# BJC-5500

# SERVICE MANUAL

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# SERVICE MANUAL

Canon

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# I. ABOUT THIS MANUAL

This manual is divided into five parts containing the information required for servicing the BJC-5500 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.

This manual does not contain complete information required for disassembling and assembling the BJC-5500 printer. Please also refer to the separate Parts Catalog.

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# Part 1

# SAFETY AND PRECAUTIONS


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# 1. SAFETY PRECAUTIONS

## 1.1 Moving Parts

Take care to prevent hair, clothing, personal ornaments, etc., from coming into contact with the moving parts of the printer.

Moving parts

- Carriage motor
  Carriage belt, idler rollers, and carriage
- Paper feed motor
  Paper feed rollers, paper transmission roller, eject roller, pinch roller, pin-feed tractor, pressure rollers, spurs, and paper feed motor drive gears
- Purge motor
  Purge unit and purge motor drive gears
- Auto sheet feeder (ASF) (when installed)
  ASF drive gears and ASF pickup roller
  Note that the spurs are made of metal and have sharp edge. Avoid touching the spurs with bare hands.

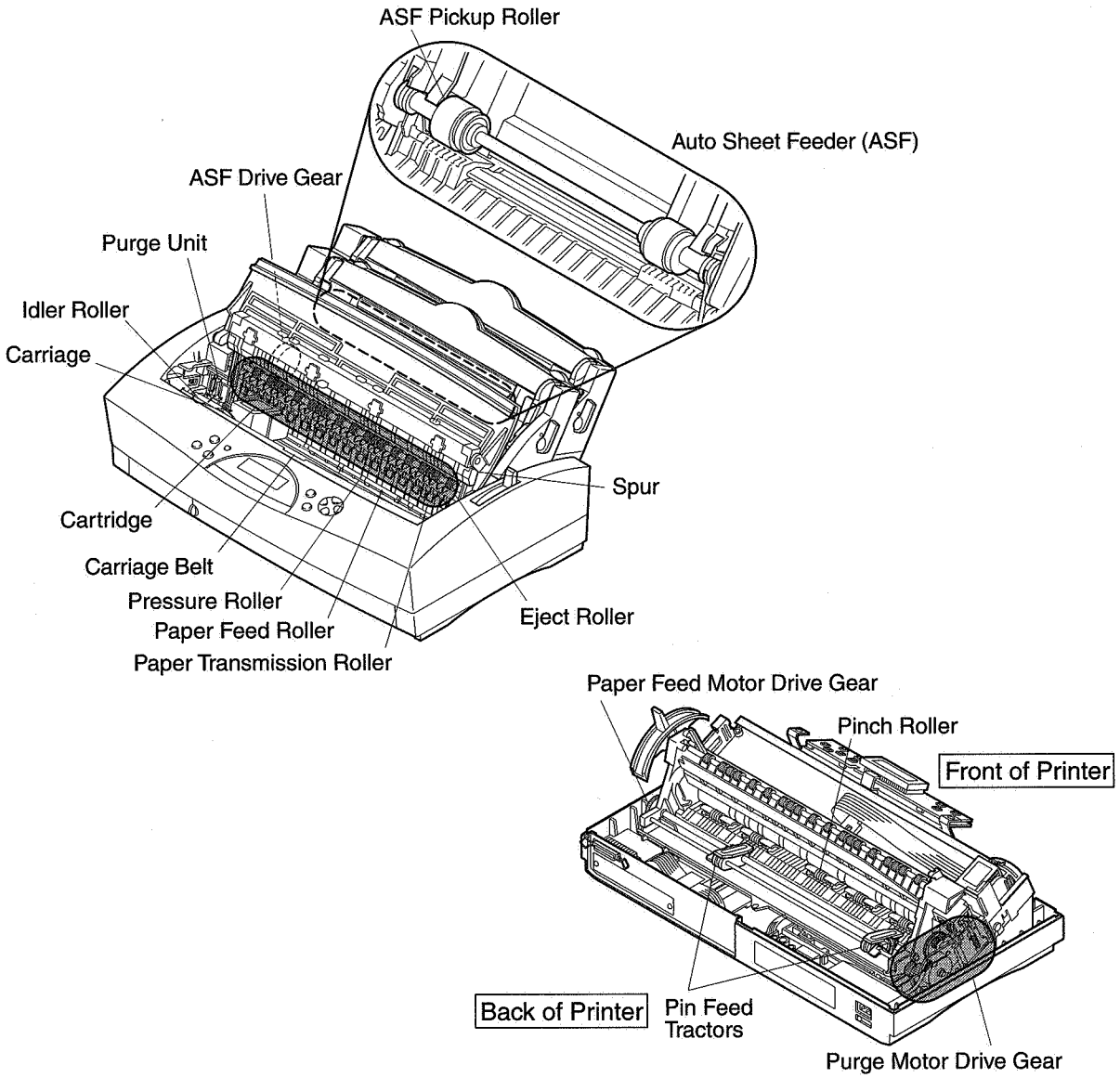


**Figure 1-1 Moving Parts of the Printer**

## 1.2 Ink Stains

### 1.2.1 Ink path

Do not touch the printer's ink path and get ink stains on printer parts, your hands, work table, clothing, etc., during servicing.
The ink path consists of the BJ cartridge nozzles, head cap, head wiper, maintenance jet receiving section, and waste ink absorber.
In the case of the color BJ cartridge, the ink cartridge's ink inlets and joint pipes are also part of the ink path.
Replace the waste ink absorbers as packs, not individually.
When the purge unit is removed, waste ink may drip from the unit's waste ink path. If you are servicing or replacing this unit, cover the waste ink path with a paper towel or similar material to prevent the waste ink from dripping out.

# CAUTION

Although the ink is non-toxic, it contains organic solvents.
Black ink: isopropyl alcohol 67-63-0, glycerin 56-81-5, and ethyleneglycol 107-21-1
Color ink: isopropyl alcohol 67-63-0 and glycerin 56-81-5
Avoid getting the ink into your mouth and eyes.
If any ink gets into your eyes, wash with plenty of water and consult a doctor. If a large amount of the ink is swallowed, consult a doctor immediately.
Give the doctor the information on the BJ cartridge package.
Since the ink contains dyes, ink stains on clothing, etc., are permanent.

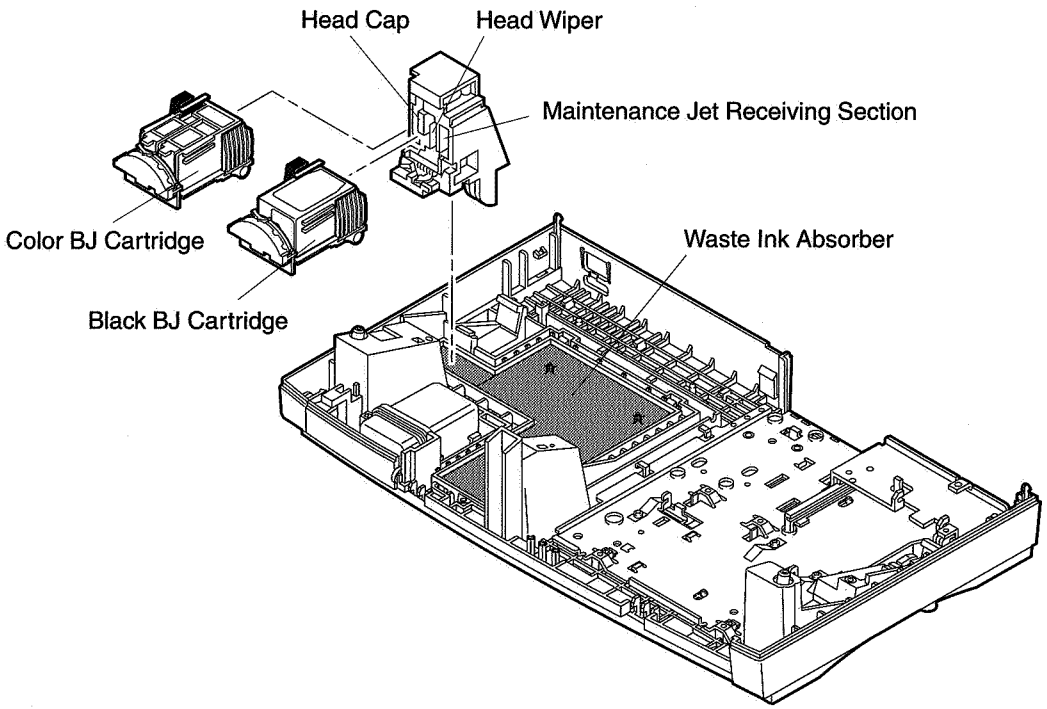


**Figure 1-2 Ink Path**

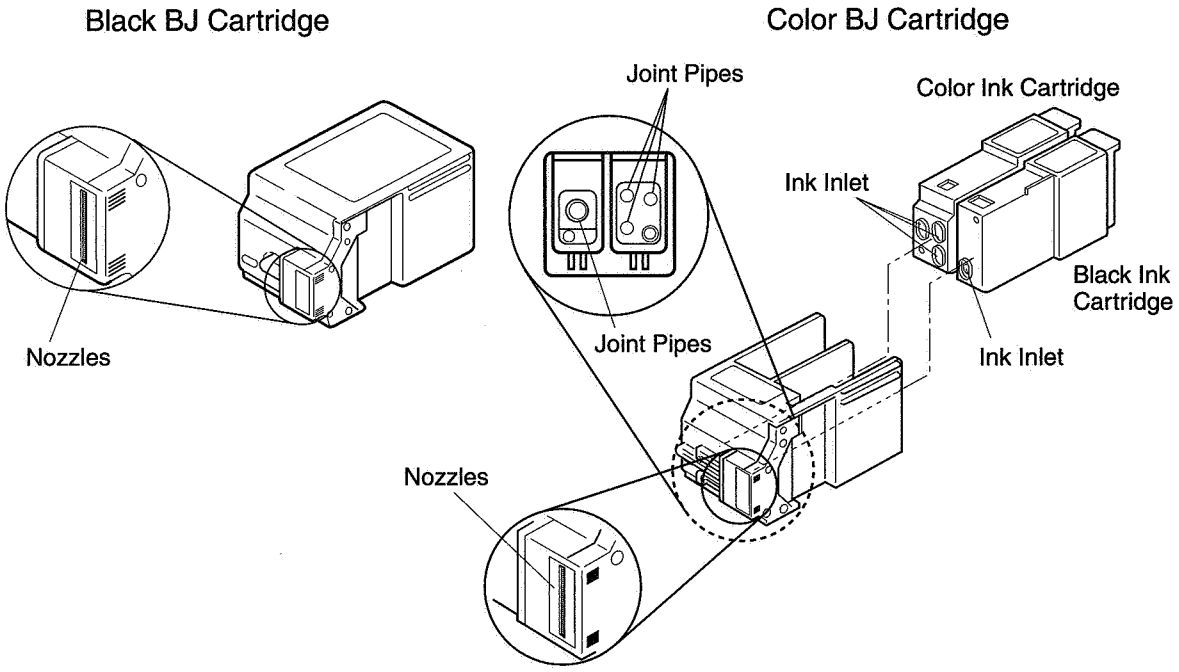


**Figure 1-3 BJ Cartridge Ink Path**

### 1.2.2 Ink mist

The BJ cartridge ejects ink onto the paper. During prolonged or heavy-duty use of the printer, the small amounts of ink mist which splatter off the paper during printing can soil the inside of the top cover and the platen.

Clean the soiled parts with a soft cloth moistened with water. This is to prevent your hands and clothing from getting dirty while servicing.

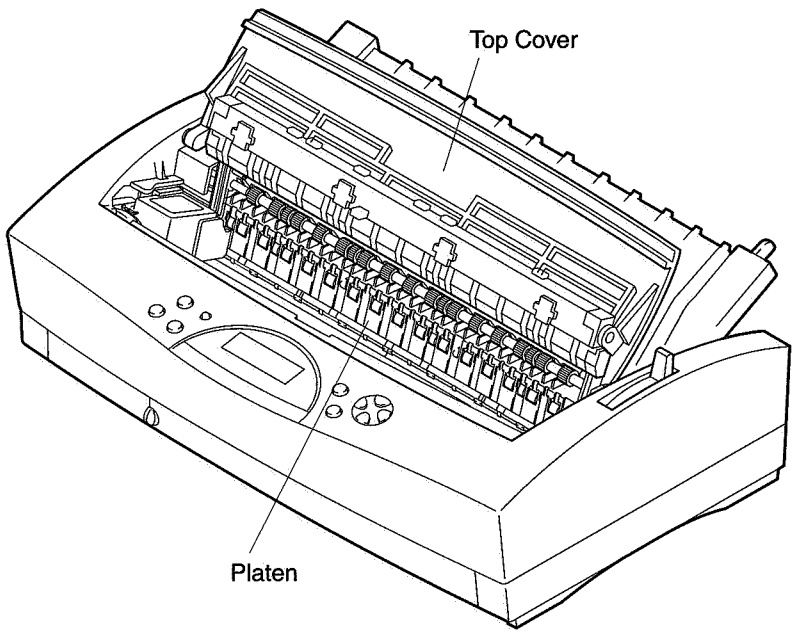


**Figure 1-4 Ink Mist**

## 1.3 Electrical Parts

When the printer's power cord is plugged into a live power outlet, the power supply unit of the printer is live irrespective of whether the *POWER* button is ON or OFF. There is a severe risk of an electric shock if you are working on the inside of a printer that is plugged in.

# CAUTION

The main AC voltage is supplied to the primary side of the power supply unit. To prevent risk of an electric shock, always disconnect the power cord before working inside the printer.

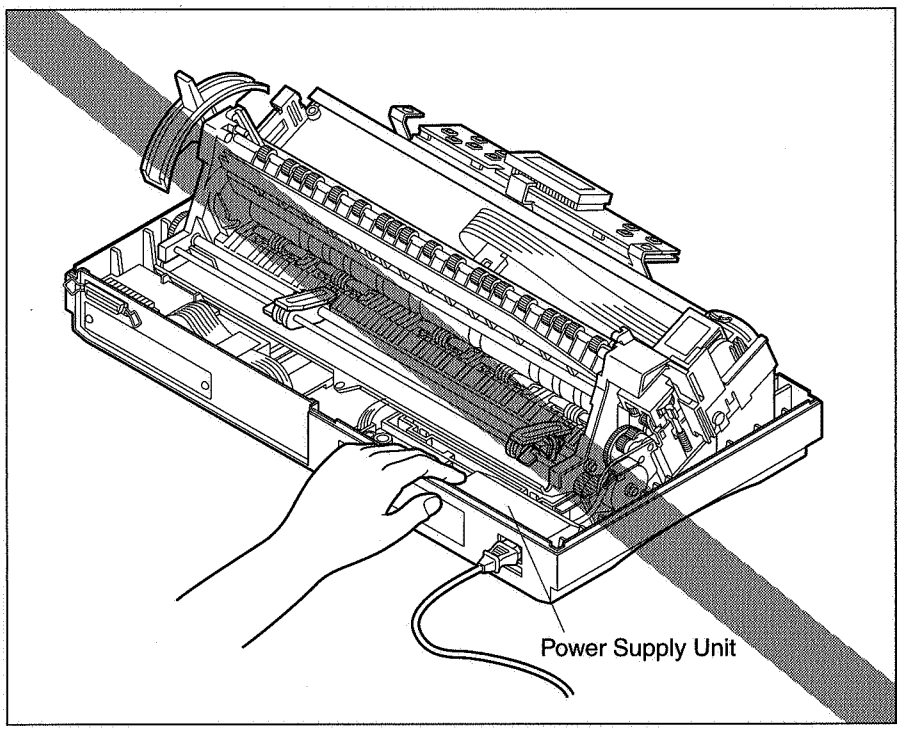


**Figure 1-5 Electrical Parts**

### 1.4 BJ Cartridge Aluminum Plate

Do not touch the BJ cartridge's aluminum plate, which becomes very hot.
The aluminum plate heats up during printing and becomes particularly hot during heavy duty printing. It also heats up if printing continues even after the cartridge has run out of ink.
If the head temperature sensor in the BJ cartridge detects overheating, the carriage returns to the home position and remains there until the head has cooled to normal operating temperature. Because of overheating, the carriage stops in the home position when you want to replace the cartridge. If this is the case, wait until the carriage moves to the replacement position.

# CAUTION

Do not touch the aluminum plate. This plate sometimes becomes hot, and can cause burns.

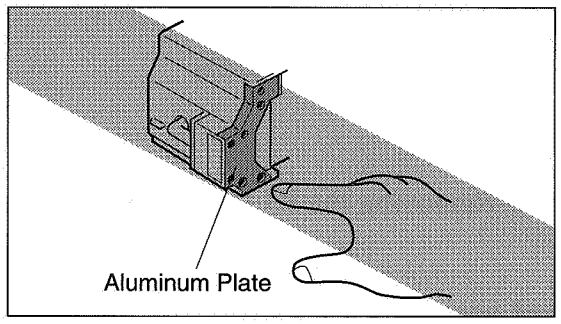


**Figure 1-6 BJ Cartridge Aluminum Plate**

The printer has the following protective mechanisms to detect overheating:

1. Overheat detection when replacing cartridge
   If overheating is detected, a buzzer sounds two times and the carriage halts to prevent the user touching the BJ cartridge's aluminum plate. Resume replacement after leaving the cartridge to cool for several minutes.

2. Overheat detection during normal printing
   To protect the printer, the carriage pauses at the end of each line, which is printed in one direction only. If, despite this, the temperature continues to rise, the buzzer sounds for 5 seconds. The font indicator then turns off and "F" and "12" blink alternately. Printing is halted due to the overheat error. The only remedy in this case is to turn the *POWER* button off then on again.

The printer will also overheat and the above protective mechanisms function if printing is continued with no ink in the cartridge.

When printing is stopped by a head temperature error or a head temperature sensor error, follow the countermeasures in *Part 5, section 6. "TROUBLESHOOTING" (pages 5-12).*

# 2. MACHINE PRECAUTIONS

## 2.1 BJ Cartridge

### 2.1.1 Handling the BJ cartridge

**1) Unpacking the BJ cartridge**

Do not unpack the BJ cartridge until you are ready to use it.
Before installing the BJ cartridge in the printer, remove the cap protecting the nozzles and gently peel off the protective tape (Figure 1-7).

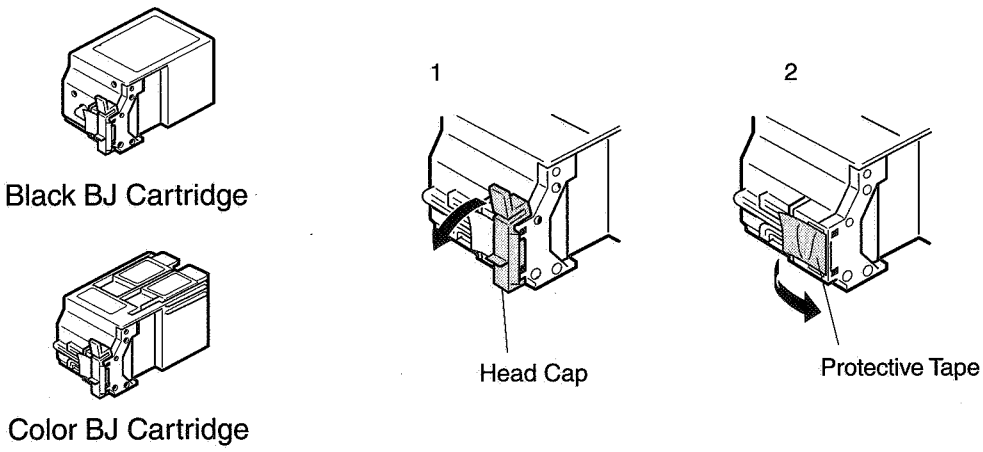


**Figure 1-7 Removing the BJ Cartridge Cap and Tape**

**2) Preventing clogged nozzles**

Never touch or wipe the nozzles with tissue paper, etc. to prevent them from clogging. For a color BJ cartridge, also never touch or wipe the joint pipes with tissue paper, etc. This is to prevent poor ink supply caused by lint, etc.
After removing the cap and peeling off the protective tape from a BJ cartridge, promptly install the cartridge in the printer and check that it is capped. If the BJ cartridge is not capped or stored in the cartridge holder, the nozzles may clog due to dried out ink or dust, etc.
BJ cartridges cannot be disassembled, reassembled, or washed.

NOTE

Clogged nozzles make white stripes across the printed characters on each line. If this problem persists even after the nozzles are cleaned, replace the BJ cartridge.

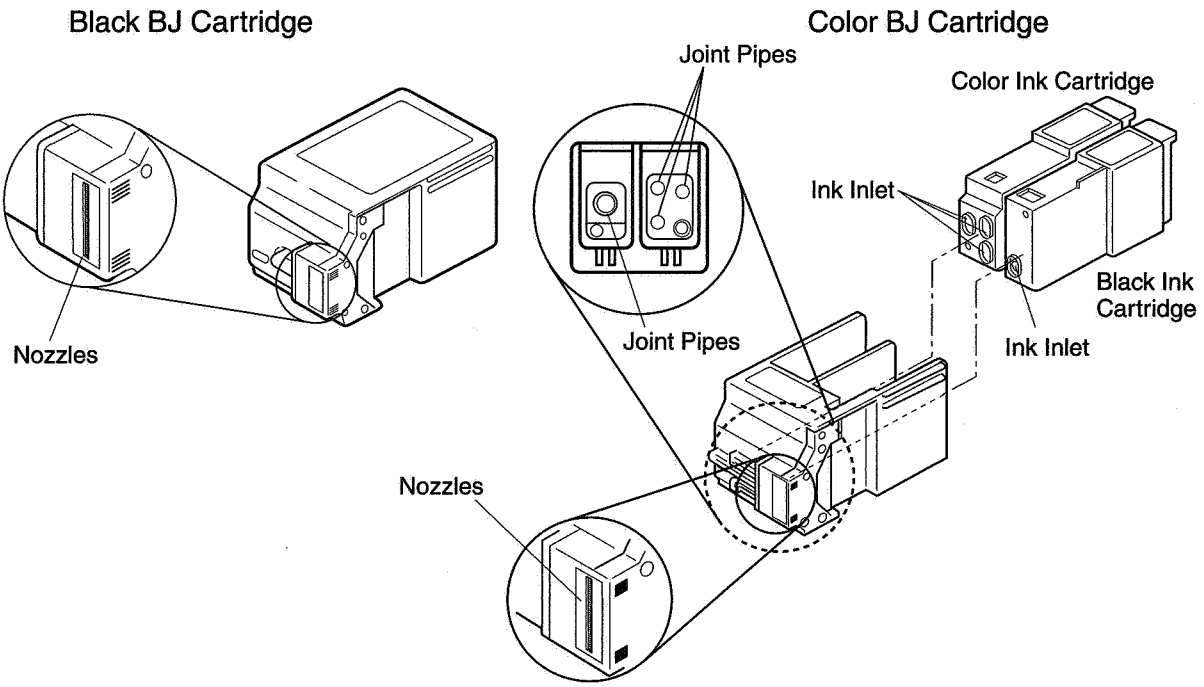


**Figure 1-8 BJ Cartridges**

If the printer is being used with both black and color BJ cartridges, store the cartridge not currently in use in the BJ cartridge container at the bottom left of the printer case.

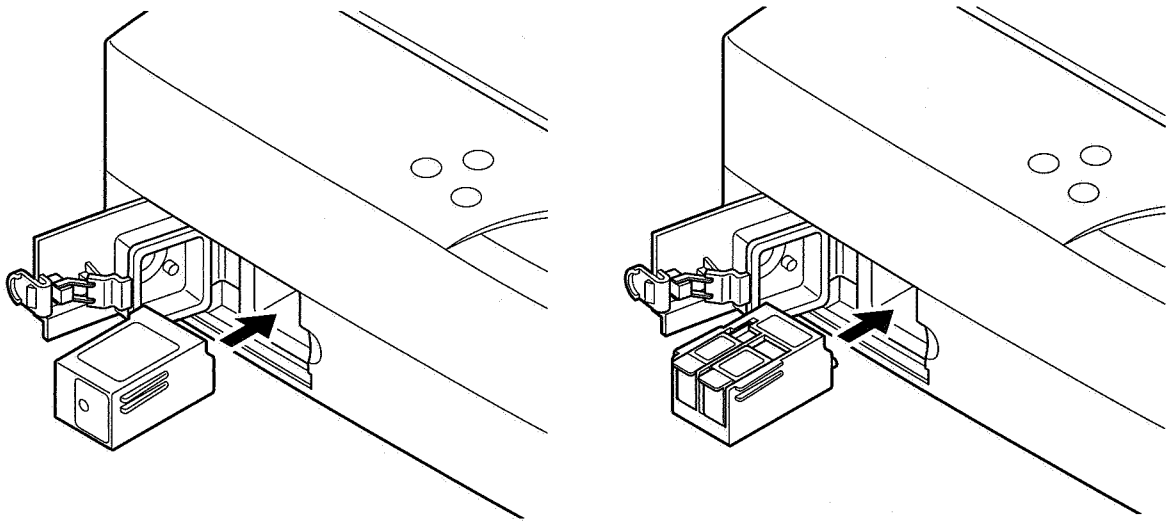

**Figure 1-9 BJ Cartridge Container**

### 2.1.2 Capping the BJ cartridge

When the printer is turned off with the *POWER* button, the printer automatically caps the BJ cartridge's nozzles for their protection and to prevent ink leakage.
If the AC power cord is disconnected before the printer is turned off with the *POWER* button, the nozzles may not be capped. In this case, reconnect the power cord, start up the printer as normal, then turn off the printer with the *POWER* button before disconnecting the AC power cord.

If the nozzles are not capped, the ink might dry out and clog the nozzles or leak from the cartridge.

### 2.1.3 When not using the printer

Keep the BJ cartridge installed in the printer even when the printer is not in use. Or store it in the BJ cartridge container. This also applies when carrying, transporting, or storing the printer.

If the BJ cartridge is taken out of the printer, dried ink or dust may clog the nozzles, resulting in inconsistent printing.
If the printer is moved or transported after removing the BJ cartridge, ink may leak from the cap mechanism.

### 2.1.4 Ink electroconductivity

The ink used in the BJ cartridge can conduct electricity. If any ink leaks into the printer's electrical components, use tissue paper, etc., and completely wipe clean. If the ink gets to the IC chips on the PCB and it is difficult to clean, replace the PCB.

Never connect the AC power cord if ink has leaked inside the printer. It may damage the circuitry.

## 2.2 Ink Cartridge (For Color BJ Cartridges)

### 2.2.1 Handling the ink cartridge

**1) Unpacking the ink cartridge**

Do not unpack the ink cartridge until you are ready to use it.
Before installing it in the color BJ cartridge, remove the packaging and the cap covering the ink outlets.

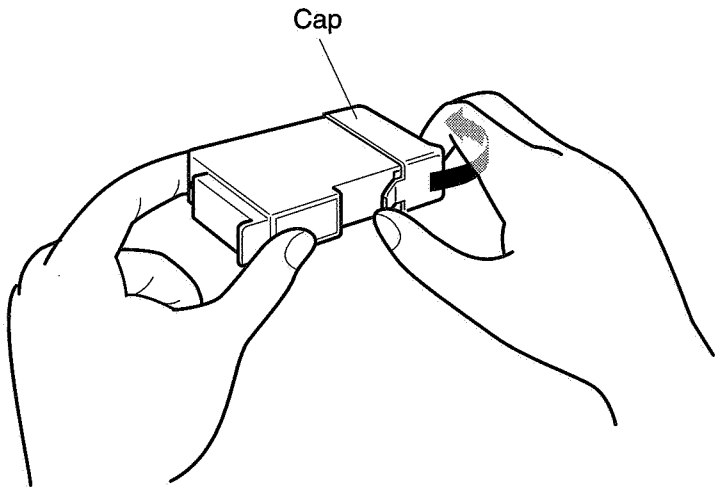


**Figure 1-10 Removing the Ink Cartridge Cap**

**2) Preventing clogging**

To prevent poor ink suction due to clogging of the joint pipes, never touch the ink cartridge's ink outlets. After removing the cap from the ink cartridge, promptly install the ink cartridge in the BJ cartridge to prevent the nozzles from clogging due to dried-out ink, dust, etc. Do not remove an ink cartridge from a BJ cartridge unless you are replacing it.

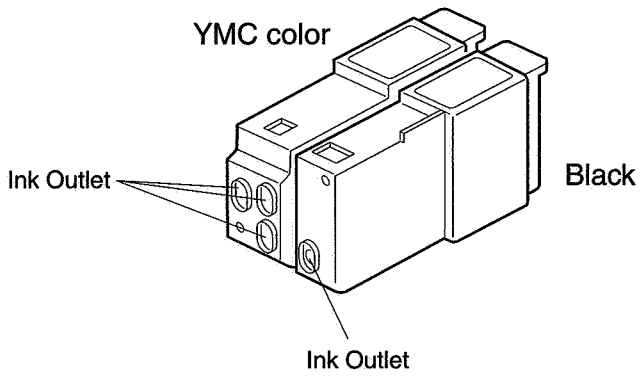


**Figure 1-11 Ink Cartridge Ink Outlets**

## 2.3 Handling of the Printer

### 2.3.1 Spurs

The spurs that transport and eject the paper after printing are very small and can be easily deformed.

The tip of the spur which comes into contact with the paper is very small and any ink adhering to the spurs is minute and wiped off by the spur cleaners. The paper is therefore unlikely to be soiled by ink on the spurs. However, if a spur is deformed, its contacting surface with the printed paper increases, causing more ink to adhere to the spur. Since the spur cleaner will be unable to wipe off all of the ink, a line of dotted ink may soil the printed paper. In such cases, a new spur unit will be required it is important to avoid touching the spurs.

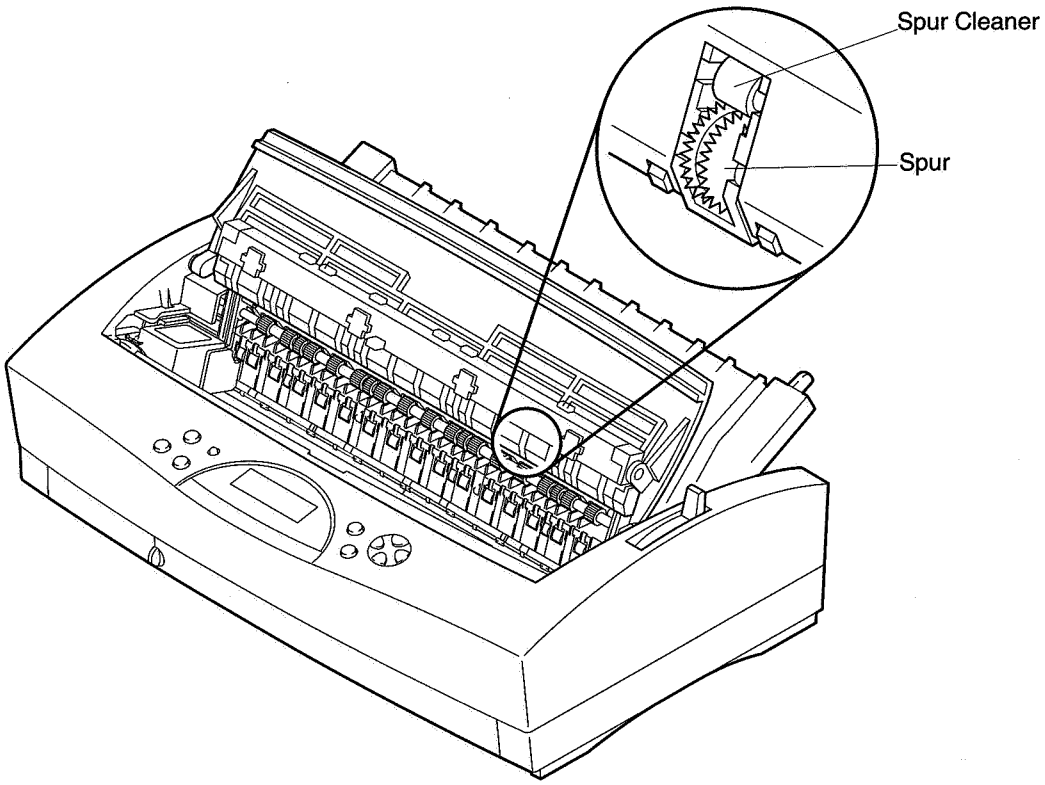


**Figure 1-12 Spur and Spur Cleaner**

### 2.3.2 Ink leaks

Do not pack, transport, or store the printer without a BJ cartridge installed. Without a BJ cartridge installed, the ink in the purge unit will flow back and leak inside the printer. When packing the printer, make sure the carriage is at the capping position (the left end of the carriage shaft) and tape it in position. (See *Part 3, section 2.2, "Transporting the Printer", (page 3-19)* for how to fix the carriage in position.)

The BJ cartridge's nozzles are capped automatically when the power is turned off with the *POWER* button. Do not disconnect the AC power cord during printing or while the carriage is moving or the nozzles may not be capped. In this case, reconnect the AC power cord, turn the power on then off again using the *POWER* button, then disconnect the AC power cord. If, due to a fault, the power will not turn on, manually move the carriage belt or the carriage itself to the capping position.

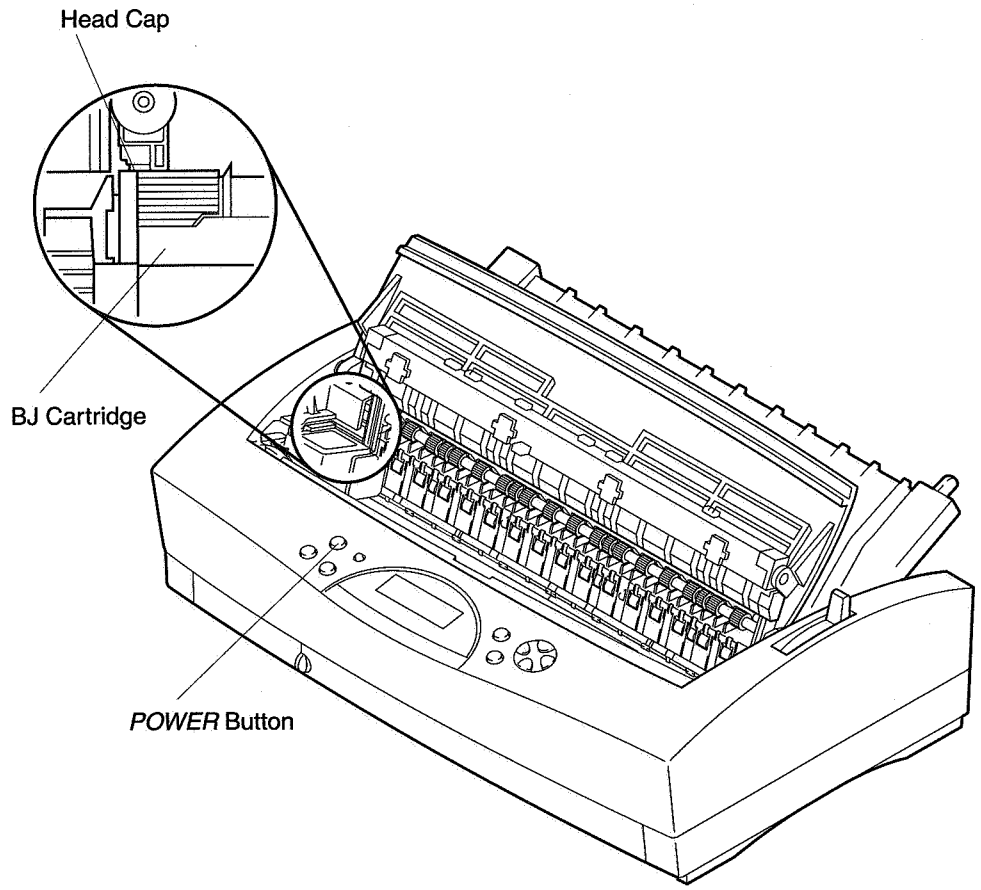


**Figure 1-13 Capping Position**

# 3. NOTES ON SERVICING

## 3.1 EEPROM Data

The printer stores the function settings and keeps track of various information including the total sheets printed with the black and color BJ cartridges, the number of dots, the number of cartridge replacements, the number of cleaning operations, and the total waste ink amount. The data is stored in the EEPROM on the logic board.
Note the following precautions during servicing:

**1) Before servicing**
The EEPROM data can be confirmed with a test print. The total number of sheets printed can provide an estimate as to how much the printer has been used.

**2) During logic board replacement**
If, due to a fault, the logic board is to be replaced, remove the EEPROM from its socket and mount it on the new socket board so that the data contained can be used. If you do not move the EEPROM to the new board, the data on printer usage will not be available and the warning functions (waste ink and low ink) will not operate correctly. There is also a risk that the function parameters will also be set incorrectly.

**3) During EEPROM replacement and when resetting the stored data**
The data in the EEPROM is lost if the EEPROM is replaced or reset. Because the data on the new EEPROM does not reflect the actual use of the printer, the waste ink and low ink warning functions will not function correctly. It is therefore essential to replace the waste ink absorber if the EEPROM is replaced. If the waste ink absorber is not replaced, the absorber may reach saturation point and leak without the appropriate error state occurring.

**4) After waste ink absorber replacement**
After replacing the waste ink absorbers, select service mode and reset the total waste ink counter to zero by clearing the EEPROM data.

After the EEPROM is reset, the data it contained cannot be printed out with a test printout. If you want to check the stored data, be sure to make a test printout before resetting the EEPROM.
When the stored data is reset, you can choose to reset all the data or only the counter for the total amount of waste ink.
After a full reset, the destination setting defaults to Europe or America.
See *Part 3, section 3.5, "Service Mode" (page 3-25)* for details of how to set the country of use.
Note that you cannot reenter the data from the control panel.

See *Part 3, section 3.5, "Service Mode" (page 3-25)* for how to make a test print of the stored data, and how to reset the EEPROM from the control panel.
See *Part 5, section 3.3, "Notes on Replacing the Logic Board and Waste Ink Absorbers" (page 5-8)* for notes on replacing the logic board and waste ink absorbers.
See *Part 5, section 6, "TROUBLESHOOTING", (page 5-12)* for how to restart the printer after operation has stopped due to a waste ink full error.

## 3.2 Static Electricity

The static charge accumulated by your body from clothing can damage electrical components and alter their electrical characteristics.

Before disassembling the printer to service it, use a wriststrap or other grounded metal object to discharge the static electricity. The following parts must not be touched before you have discharged the static from your body:

- Logic board, interface board, control panel board (ICs, LCDs, etc.)
- Power supply unit (inlet and ICs, etc.)
- Motor board and connectors
- Carriage ribbon cable (signal contact with BJ cartridge)
- Cable connectors
- BJ cartridge signal contacts

Discharge static before servicing to prevent electrostatic discharge.

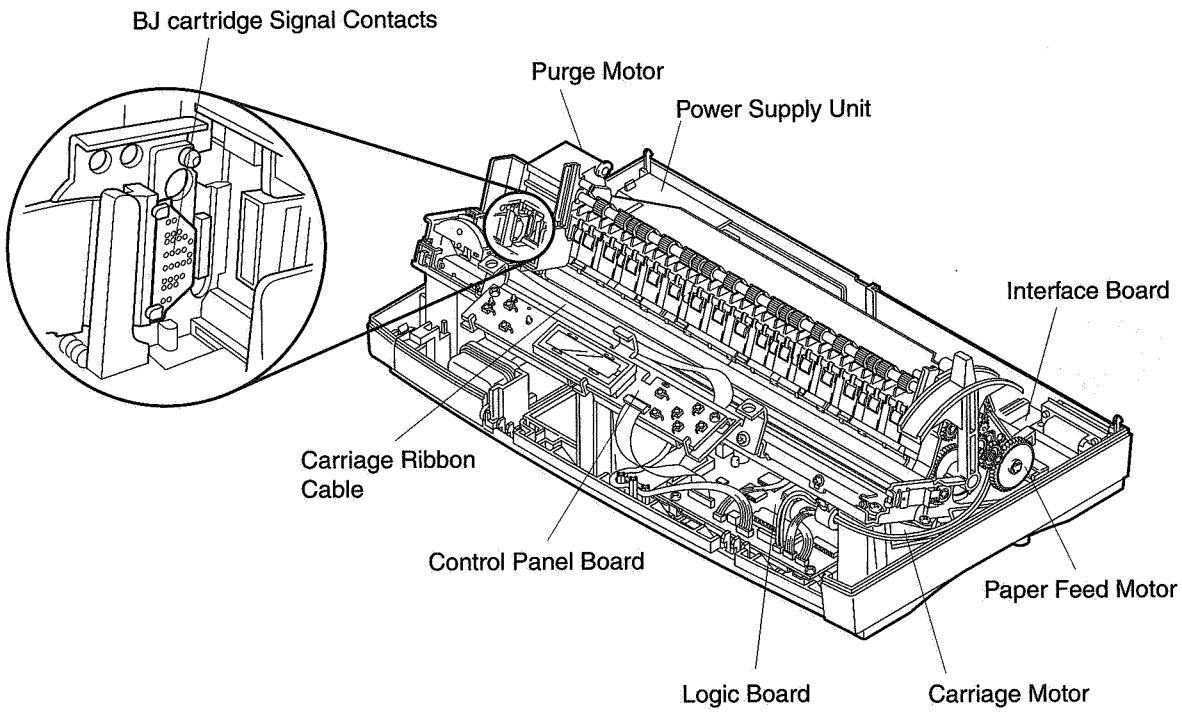


**Figure 1-14 Electrical System of Printer**

## 3.3 Disassembly and Assembly

The printer has many parts that can be damaged during disassembly and assembly. For details, see *Part 5, section 3, "DISASSEMBLY AND ASSEMBLY" (page 5-3).* Please read this section carefully before attempting to disassemble and assemble the printer. (Please also refer to the Parts Catalog.)

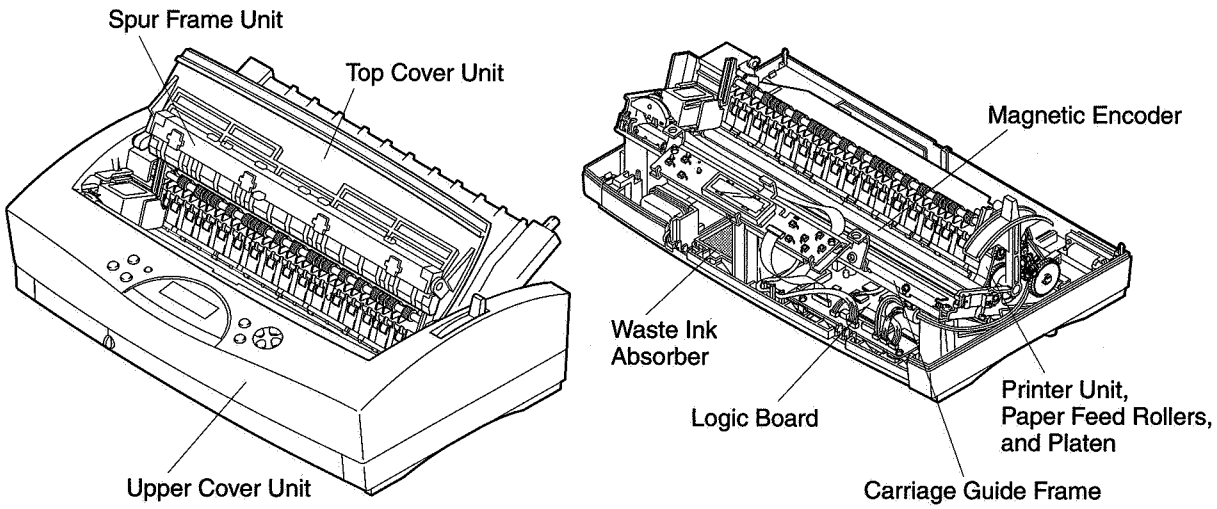


**Figure 1-15 Parts Liable to Damage During Disassembly and Assembly**

The printer also has many plastic parts. When disassembling the printer, take care not to break or bend the plastic hooks.

CAUTION

Some plastic parts contain glass fibers for extra rigidity and precision, but since their viscosity is low, the plastic hooks can break easily when excessive force is used. Do not pull the plastic hooks with excessive force while unhooking them.

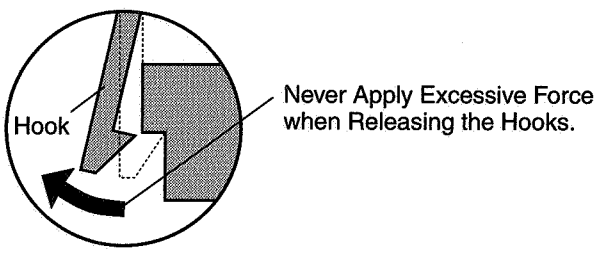


**Figure 1-16 How to Release Plastic Hooks**

## 3.4 Self-Diagnosis

The printer has a self-diagnosis feature to detect hardware defects. The results of the self-diagnosis are indicated as error codes on the LCD indicators on the control panel, and by the buzzer. For details, see *Part 3, section 3-1, "Error Indications" (page 3-20).*

# Part 2

# PRODUCT SPECIFICATIONS


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| 2 - 2 | 1.2 Features |
| 2 - 3 | 1.3 BJ Cartridge |
| 2 - 4 | 1.4 BJ Cartridge Container |
| 2 - 5 | 1.5 Options |
| 2 - 6 | 2. SPECIFICATIONS |
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| 2 -10 | 2.2 Paper Specifications |
| 2 -13 | 2.3 Interface Specifications |

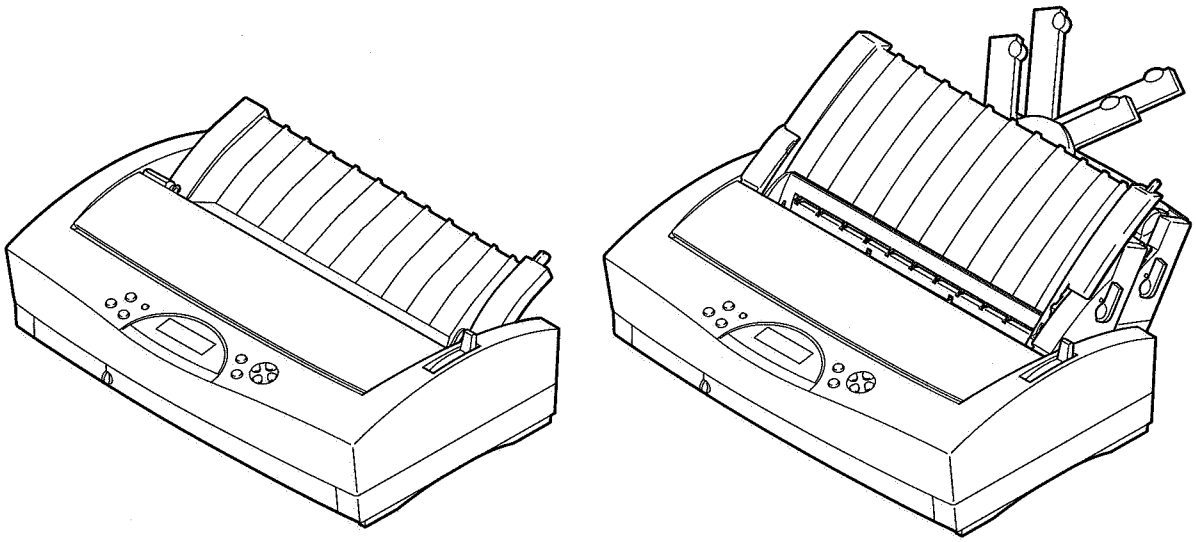
# 1. PRODUCT OUTLINE

## 1.1 Outline

The BJC-5500 is a high-speed, high print quality desktop printer with extremely flexible paper handling features for a wide range of applications.

The printer features two types of BJ cartridges: the color BJ cartridge with replaceable ink cartridges and a 136-nozzle head, and the black BJ cartridge with an integrated ink cartridge and a 128-nozzle head. Not only does the BJC-5500 print on low-cost plain paper, it also achieves the fastest print speeds of any desktop printer when using the black BJ cartridge. It also prints color with the color BJ cartridge.

The BJC-5500 is capable of printing on plain paper and special papers from A4-size to A2/C-size, and fanfold paper. The optional auto sheet feeder (ASF) also allows automatic feeding of both plain paper and special papers, and normal fanfold papers to be loaded at the same time.



BJC-5500 without ASF

BJC-5500 with ASF

**Figure 2-1 Printer Appearance**

## 1.2 Features

- Desktop serial printer
  External dimensions: 600mm (W) × 390mm (D) × 217mm (H)
  Weight: Approximately 10.2kg (including black or color BJ cartridge)
- High-speed printing (burst speed)

| | Black BJ cartridge | Color BJ cartridge |
|---|---|---|
| HQ mode | 555cps (10cpi) | 173cps (10cpi) |
| HS mode | 694cps (10cpi) | 277cps (10cpi) |

- Cut sheets to A2 portrait/C-size, or fanfold paper from 4-in to 16-in
- Automatic feeding of cut sheet paper up to A2/C-size using the optional ASF
- 360dpi high-quality printing
  When using the black BJ cartridge in HQ mode, the smoothing function increases the horizontal resolution to the equivalent of 720dpi.
- Two standard built-in print control modes
  LQ mode (LQ-2550 emulation)
  BJ mode (XL24E emulation)
  Canon extended mode (native mode)
  (Canon extended mode is supported when using the Canon printer driver.)
- Automatic print control mode switching function
  A built-in function automatically switches the print control mode according to the data received. (Automatic switching can be set on or off.)
- User-replaceable black or color BJ cartridges
  Black BJ cartridge: Unified ink cartridge with 128 nozzles (black)
  Color BJ cartridge: Separate black and tricolor ink cartridges (64 black nozzles and 24 nozzles each of yellow, magenta, and cyan. Total: 136 nozzles)
  Black ink cartridge: For color BJ cartridge (black)
  Color ink cartridge: For color BJ cartridge (YMC)
- BJ cartridge container in printer for storing a color or black BJ cartridge that is not in use
- POWER button
  This printer uses a software type rather than a hardware type of *POWER* button. Power is therefore always supplied to the printer, even when the *POWER* button is off, if the AC power cord is connected.

## 1.3 BJ Cartridge

### 1.3.1 Black BJ cartridge

This is a single-use BJ cartridge for monochrome printing. It has a unified print head with 128 nozzles and ink cartridge. Replace the BJ cartridge when the ink runs out or more than 12 months elapse after the seal is broken, or if the print quality does not improve even after cleaning the head more than five times.

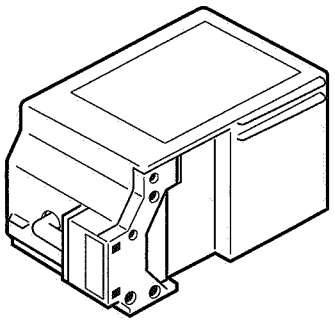


**Figure 2-2 Black BJ Cartridge**

### 1.3.2 Color BJ cartridge

The color BJ cartridge for printing in color comprises of a 136-nozzle print head and replaceable ink cartridges.

Replace the ink cartridges if the ink runs out or more than 6 months elapse after the seal is broken, or if the print quality does not improve even after cleaning the head more than five times.

Also, if the print quality does not improve even after cleaning more than 5 times after replacing the ink cartridges, replace the BJ cartridge. The color ink cartridge contains three colors (cyan, magenta, and yellow), and the entire ink cartridge must therefore be replaced even if only one of the color runs out.

The first 24 nozzles are for yellow ink, the second 24 are for magenta, the third 24 are for cyan, and the remaining 64 are for black. All 136 nozzles are in one row.

The color BJ cartridge prints at a resolution of 360dpi.

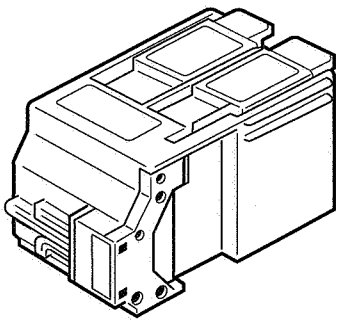


**Figure 2-3 Color BJ Cartridge**

To prevent the nozzles clogging, install the BJ cartridge in the printer immediately after unpacking it, or store it in the spare cartridge holder. Do not touch the nozzles on the print head or wipe them with tissue paper, etc.

### 1.3.3 Consumables

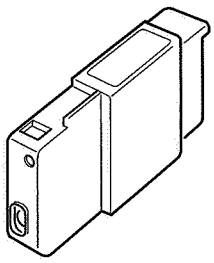
**1) Black and Color BJ Cartridges**

Although in different packages, replacement BJ cartridges are identical to the ones supplied with the printer. The color BJ cartridge includes a black ink cartridge and color ink cartridge.

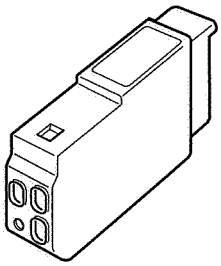
**2) Ink Cartridges**

There are two replaceable ink cartridges in the color BJ cartridge; a black and a color ink cartridge.

Both ink cartridges can only be used for 6 months after the seal is broken.



Black Ink Cartridge



Color Ink Cartridge

**Figure 2-4 Ink Cartridges**

## 1.4 BJ Cartridge Container

The cartridge container at the bottom left front of the printer is for storing the black or the color BJ cartridge—whichever is not currently being used. It is designed to prevent the nozzles from clogging due to dried ink or dust. To store the spare BJ cartridge, insert it into the holder as shown in the figure, then close the cover securely. If you are storing the color BJ cartridge, make sure that it contains both the black and color ink cartridges.

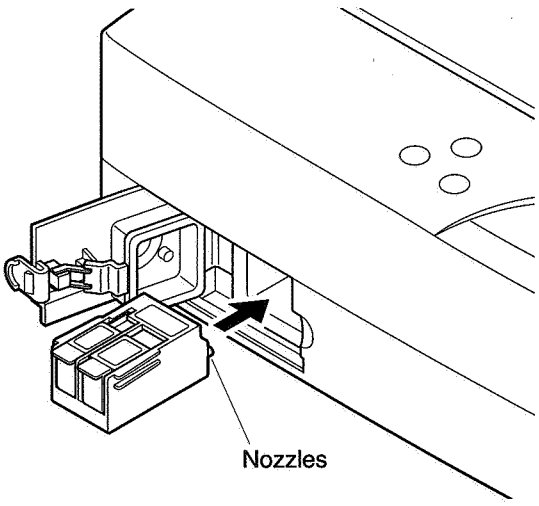



**Figure 2-5 BJ Cartridge Container**

## 1.5 Options

### 1.5.1 Auto sheet feeder (ASF)

There are two types of auto sheet feeder: ASF bin 1 and ASF bin 2. They allow automatic feeding of plain or special papers. However, note the following limitations:

- You cannot install only ASF bin 2.
- Envelopes can only be loaded into the ASF bin 1.

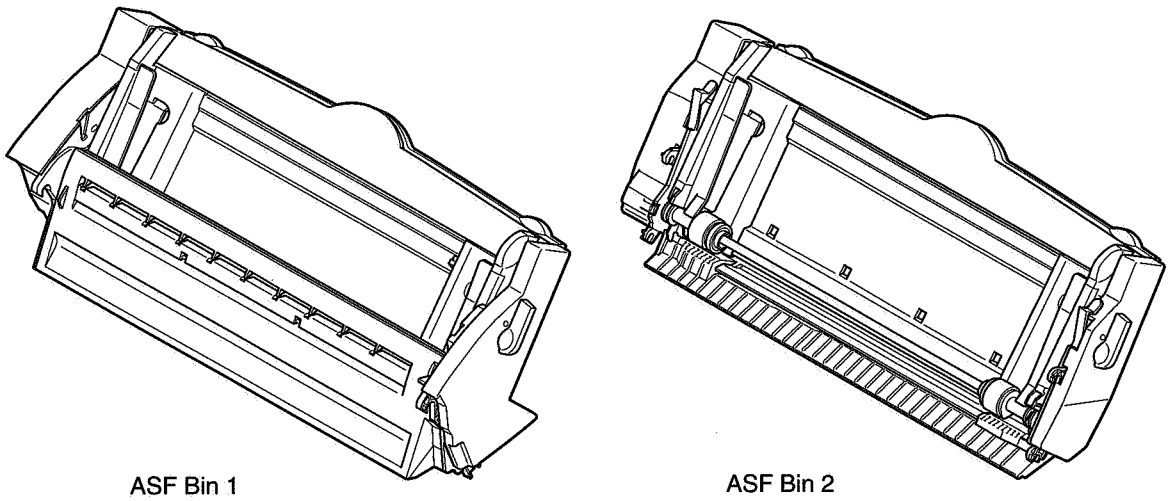



**Figure 2-6 ASF (bin 1/ bin 2)**

### 1.5.2 RS232C serial interface board

Installing the RS232C serial interface board allows the printer to be connected to a host computer with an RS232C serial port. The baud rate and parity parameters, etc., are set using the dipswitches and jumpers on the board.

Before handling the RS232C interface board, use a wriststrap or other grounded metal object to discharge the static electricity from your body.

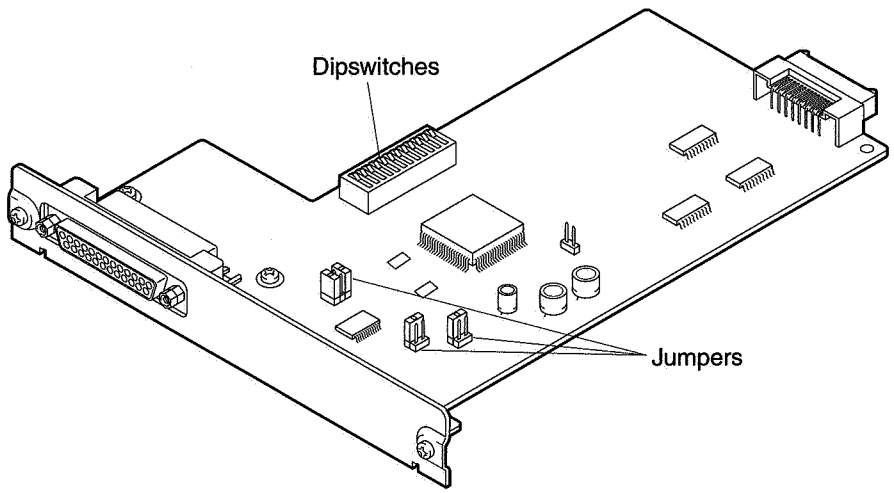



**Figure 2-7 RS232C Serial Interface Board**

# 2. SPECIFICATIONS

## 2.1 General Specifications

**1) Type**

Desktop serial printer

**2) Paper feeding method**

Printer: Pin-feed tractor (push in from back with U-turn path)
Manual feed (friction feed with U-turn path)
Optional ASF: Pick-up loading with U-turn path

**3) ASF (option) capacity**

Plain paper (A4, A3, LTR, LGL, and LDR) 10mm max. (approximately 100 sheets of 64g/m² paper)
Plain paper (A2/C): 10 sheets max.
Coated paper (LC-101): 10 mm max.
OHP film (CF-102): 50 sheets max.
Back print film (BF-102): 20 sheets max.
Color plain paper (LC-301): 10 mm max.
Envelopes (COM10, DL): 10 max.

**4) Printing speed**

Burst

| | Black BJ cartridge | Color BJ cartridge |
|---|---|---|
| HQ mode | 555cps (10cpi) | 173cps (10cpi) |
| HS mode | 694cps (10cpi) | 277cps (10cpi) |

**5) Printing direction**

Bidirectional or unidirectional (automatically switched according to print data)

**6) Printing width**

Cut sheets: 406.4mm (16 in.) max.
Fanfold paper: 368.3mm (14.5 in.) max.

**7) Line feed speed**

LF mode: 96ms/line (2/6-in line feed)
(HQ or HS mode)

**8) Built-in printing control modes**

LQ mode (Epson LQ-2550 emulation)
BJ mode (IBM Proprinter XL24E emulation)
(Canon extended mode is supported when Canon's driver is used.)

**9) Line feed pitch (n: programmable)**

LQ mode: 1/6-in, 1/8-in, n/180-in., and n/360-in
BJ mode: 1/6-in, 1/8-in, n/60-in, n/72-in, n/180-in, n/216-in, and n/360-in

**10) Printing characters**

| | | |
|---|---|---|
| Typefaces | LQ mode | Roman, Gothic, Courier, Prestige, Script, Draft |
| | BJ mode | Roman, Gothic, Courier, Prestige, Script, Draft |
| Character pitch | LQ mode | 10, 12, 15, 17, 20 cpi, PS |
| | BJ mode | 10, 12, 17 cpi, PS |
| Character matrix | HQ mode | 36 (H) × 48 (V) dots |
| | HS mode | 18 out of 36 (H) × 48 (V) dots (selective thinning) |
| | ECO mode | 9 out of 36 (H) × 48 (V) dots |

**11) Character sets**

LQ mode: Italic character set and graphic character set
(Code page 437, 850, 863, 865, 860, 857, 855, 852, 864, 869, 866, and 861)
CP861 can only be selected using function setting.
BJ mode: IBM character sets 1, 2, and All
(Code page 437, 850, 863, 865, 860, 857, 855, 852, 864, 869, 866, and 861)

**12) Number of columns printed**

| | Mode | Pitch | Characters per line | |
|---|---|---|---|---|
| | | | Cut sheet | Fanfold |
| LQ mode | 10 cpi | 10 cpi | 160 cpl | 145 cpl |
| | 10 cpi doublewide | 5 cpi | 80 cpl | 72 cpl |
| | 10 cpi condensed | 17 cpi | 272 cpl | 246 cpl |
| | 10 cpi condensed-doublewide | 8.5 cpi | 136 cpl | 123 cpl |
| | 12 cpi | 12 cpi | 136 cpl | 174 cpl |
| | 12 cpi doublewide | 6 cpi | 96 cpl | 87 cpl |
| | 12 cpi condensed | 20 cpi | 320 cpl | 290 cpl |
| | 12 cpi condensed-doublewide | 10 cpi | 160 cpl | 145 cpl |
| | 15 cpi | 15 cpi | 240 cpl | 217 cpl |
| | 15 cpi doublewide | 7.5 cpi | 120 cpl | 108 cpl |
| | Proportional spacing | PS | Varies | Variesl |
| BJ mode | 10 cpi | 10 cpi | 160 cpl | 145 cpl |
| | 10 cpi doublewide | 5 cpi | 80 cpl | 72 cpl |
| | 10 cpi condensed | 17 cpi | 272 cpl | 246 cpl |
| | 10 cpi condensed-doublewide | 8.5 cpi | 136 cpl | 123 cpl |
| | 12 cpi | 12 cpi | 192 cpl | 174 cpl |
| | 12 cpi doublewide | 6 cpi | 96 cpl | 87 cpl |
| | Proportional spacing | PS | Varies | Varies |

**13) Bit image**

Data matrix: 8, 24, or 48 dots
Resolution: 60, 120, 180, 240, 360, or 720 (with smoothing) dpi

**14) Buffer capacity**

| | Input buffer | Download buffer |
|---|---|---|
| LQ mode | 64KB | 21.2KB |
| BJ mode | 64KB | 48KB |

**15) Interface**

8-bit parallel (bidirectional Centronics)
RS232C serial (with optional interface board)

**16) BJ cartridge**

**Black BJ cartridge**

Type: Black BJ cartridge with integrated ink cartridge
Color: Black
Print head: 128 nozzles
Service life: Approximately 900 pages per cartridge (HQ mode, 1500-character standard pattern)
Weight: Approximately 86g

**Color BJ cartridge**

Type: Color BJ cartridge with replaceable ink cartridges
Colors: Yellow, magenta, cyan, and black
Print head: 24 yellow nozzles, 24 magenta nozzles, 24 cyan nozzles, and 64 black nozzles
Service life: Approximately 200 pages per black ink cartridge (HQ mode, 1500-character standard pattern)
Approximately 80 pages per color ink cartridges (HQ mode, 7.5% duty pattern)
Weight: Approximately 85g (including both ink cartridges)

**17) Sensor functions**

The printer is equipped with the following sensor functions:
Paper out
Paper width (switchable between A4 landscape (297mm) and LGL landscape (355.5mm))
Installation of BJ cartridge
BJ cartridge identification
Waste ink amount (dot counting method)
Ink out (dot counting method)
Ink out sensors are provided independently for the black BJ cartridge and the color BJ cartridge (black and color ink cartridges).
Home position
Paper selection lever position (identification of ASF and fanfold paper modes)
Self diagnosis function (ROM errors and RAM errors, etc.)

**18) Acoustic noise level**

54dB(A) max. when printing (HQ or HS mode) (Sound pressure level: according to ISO 9296)

**19) Ambient conditions**

| Status | Temperature | Humidity |
|---|---|---|
| Operating | 5°C to 35°C | 10% to 90% RH (no condensation) |
| Idle | 0°C to 35°C | 5% to 95% RH (no condensation) |

**20) Power supply**

| | Voltage/Frequency | Power consumption | Standby status |
|---|---|---|---|
| USA/Canada | AC120V/60Hz | | |
| UK/Australia | AC240V/50Hz | 58 W Max. | 16 W Max. |
| Europe | AC220V/50Hz | | |

**21) Dimensions**

Printer: 600mm (W) × 390mm (D) × 217mm (H)
With ASF bin 1: 600mm (W) × 406mm (D) × 323mm (H)
With ASF bin 2: 600mm (W) × 481mm (D) × 323mm (H)

**22) Weight**

Printer: Approximately 10.2kg (including BJ cartridge)
ASF bin 1: Approximately 1.9kg
ASF bin 2: Approximately 1.5kg

## 2.2 Paper Specifications

**1) Paper size**

Cut sheets up to A2/C-size (A3, A4, LTR (letter), and LGL (legal), LDR)
Commercial number 10 envelopes (241mm × 105mm)
European DL envelopes (220mm × 110mm)
Fanfold paper (widths from 101.6mm to 406.4mm)

**2) Paper types**

Plain paper (64g/m² to 90g/m²)
Heavy paper (91g/m² to 105g/m²)
Envelopes (COM#10 and DL)
Coated paper (LC-101)
Glossy paper (GP-101)
High-gloss film (HG-101)
Transparencies (OHP film) (CF-102)
Back-print film (BF-102)
Color plain paper (LC-301)
(Papers other than those listed above may abrade the head or damage the printer as a result of printing on the platen, etc.)

**3) Paper weight**

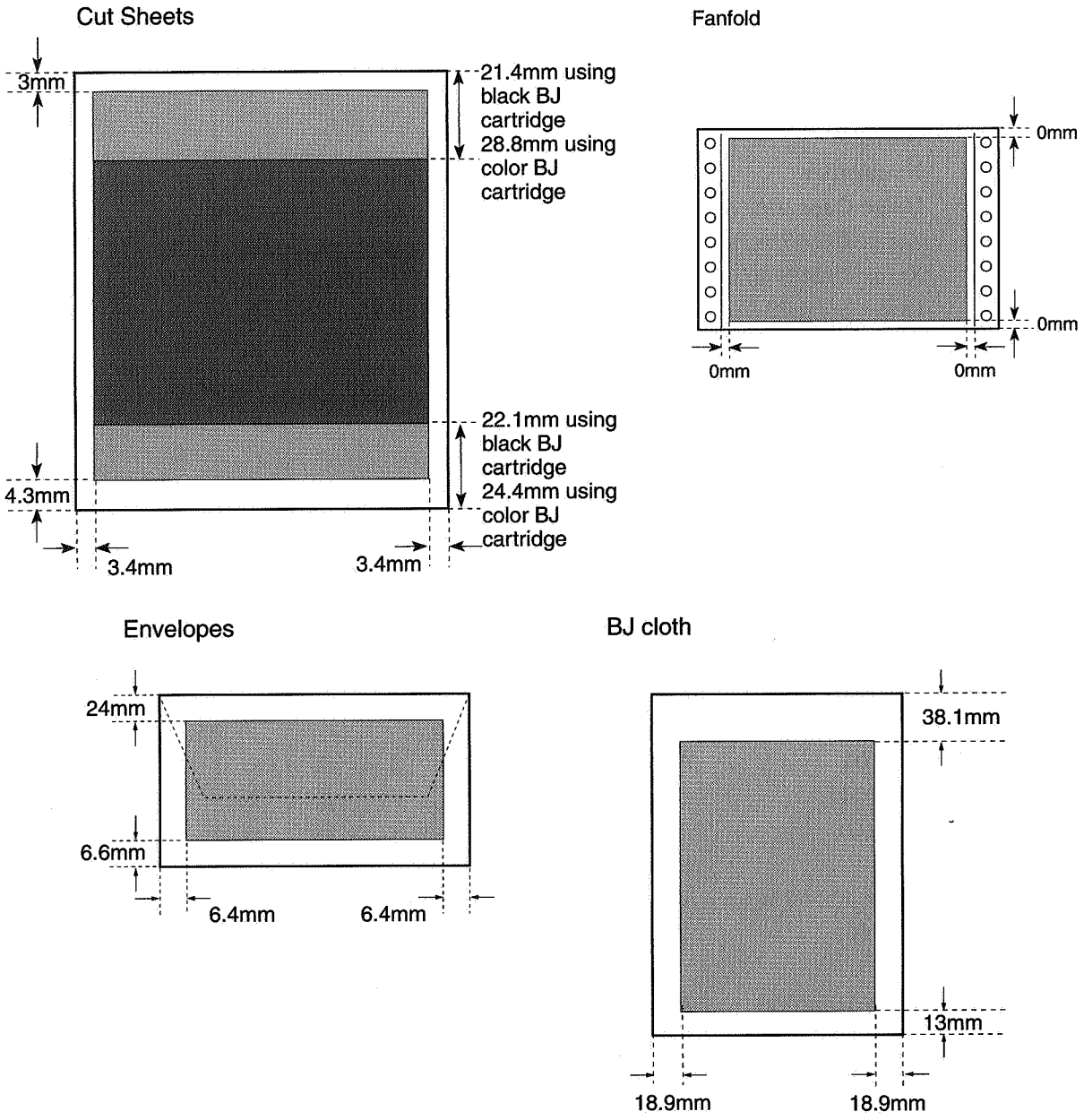
| | |
|---|---|
| Manual feed: | 64g/m² to 105g/m² |
| Auto feed: | 64g/m² to 90g/m² |
| Fanfold paper: | 52g/m² to 81g/m² |

| Type | Code | Size | Feed Method/Feed Direction | | | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | | ASF | | Manual | | PFT*1) | |
| | | | Portrait | Landscape | Portrait | Landscape | Fanfold | |
| Plain paper | PB SK | A4, A3 | ○ | ○ | ○ | ○ | – | |
| | PB DK | A4, A3 | ○ | ○ | ○ | ○ | – | |
| | Kangas | A4, A3 | ○ | ○ | ○ | ○ | – | |
| | Neusiedler | A4, A3 | ○ | ○ | ○ | ○ | – | |
| | Boise Cascade | A4, A3 | △ | △ | △ | △ | – | |
| | Xerox 4024(75g/m²) | LTR, LGL, LDR | △ | △ | △ | △ | – | |
| | Xerox 4024(90g/m²) | LTR, LGL, LDR | △ | △ | △ | △ | – | |
| | Plover Bond(75g/m²) | LTR | △ | △ | △ | △ | – | |
| Recycled paper | EW-500(SK) | A4 | △ | △ | △ | △ | – | |
| | EN-500(SK,DK) | A4 | △ | △ | △ | △ | – | |
| Fanfold | Hikari business forms (approx. 52g/m² to 81g/m²) | 4"×4" | – | – | – | – | △ | |
| | | 9.5"×11" | – | – | – | – | △ | |
| | | 16"×11" | – | – | – | – | △ | |
| Envelopes | COM #10 | 241×105(mm) | △ | × | △ | × | – | ASF bin 1 only |
| | DL | 220×110(mm) | △ | × | △ | × | – | ASF bin 1 only |
| OHP | CF-102 | A4, LTR | △ | △ | △ | △ | – | |
| BPF | BF-102 | A4, A3, A2, C, LTR, LDR | △ | △ | △ | △ | – | Vertical only on A2/C |
| Coated paper | LC-101 | A4, LTR | △ | △ | △ | △ | – | |
| Glossy paper | GP-101 | A4, LTR | × | × | △ | △ | – | |
| High-gloss film | HG-101 | A4, A3, A2, C, LTR, LDR | × | × | △ | △ | – | Vertical only on A2/C |
| C-size paper | Xerox 4024(75g/m²) | 17"×22" | △ | – | △ | – | – | |
| A2-size paper | SK,DK | 420×594(mm) | △ | – | △ | – | – | |
| Heavy paper | 91 to 105g/m² | A4, LTR | × | × | △ | △ | – | |
| Fabric | FS-101 | 241×356(mm) | – | – | △ | – | – | |
| Color plain paper | LC-301 | A4, A3, A2, C, LTR, LDR | △ | △ | △ | △ | – | Vertical only on A2/C |

○ : Yes △ : Yes (marginally lower print quality and paper transport)
× : No – : Not applicable

*1): PFT: Pin Feed Tractor

#### 4) Printing range




- The shaded portion in the diagram indicates the printable area. However, there may be a slight loss of print quality and paper feed precision. If you print close to the top or bottom margin of the printable area, there is also a risk of marks appearing in the margins.
- The printable area and the recommended printing area apply when the paper is loaded at the left side of the platen.
- In the case of fanfold paper and postcards, Canon cannot guarantee the quality of print or that the paper will feed correctly. The printable area is therefore only for reference.

**Figure 2-8 Printing Area**

## 2.3 Interface Specifications

### 2.3.1 Parallel interface

**1) Data transfer**

8-bit Centronics parallel interface

**2) Handshaking**

$\overline{\text{ACKNLG}}$/BUSY signals

**3) Signal voltage levels**

High: +2.4V to +5.0V
Low: +0.0V to +0.8V

**4) Input/output**

Each signal pulled up with +5V

**5) Interface cable**

Type: Twisted pair shielded cable
Material: AWG28 or larger
Length: Up to 2.0m (6.5 feet)

**6) Interface connectors**

On printer: Amphenol 57-40360 (or equivalent)
On cable: Amphenol 57-30360 (or equivalent)

**7) Input/output signals and pin layout**

Compatible mode

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

*1: All -RETs are connected to GND.
*2: N.C.=No Connection
*3: Vcc is connected to +5.0V through a 3.3KΩ resistor.
*4: These signals are effective only in LQ printer control mode.

Nibble mode

| No. | Signal | I/O | No. | Signal | I/O |
|---|---|---|---|---|---|
| 1 | HostClk | IN | 19 | STROBE -RET *1 | IN |
| 2 | DATA1 | IN | 20 | DATA1 -RET *1 | IN |
| 3 | DATA2 | IN | 21 | DATA2 -RET *1 | IN |
| 4 | DATA3 | IN | 22 | DATA3 -RET *1 | IN |
| 5 | DATA4 | IN | 23 | DATA4 -RET *1 | IN |
| 6 | DATA5 | IN | 24 | DATA5 -RET *1 | IN |
| 7 | DATA6 | IN | 25 | DATA6 -RET *1 | IN |
| 8 | DATA7 | IN | 26 | DATA7 -RET *1 | IN |
| 9 | DATA8 | IN | 27 | DATA8 -RET *1 | IN |
| 10 | PtrClk | OUT | 28 | ACKNLG -RET *1 | OUT |
| 11 | PtrBusy | OUT | 29 | BUSY -RET *1 | OUT |
| 12 | AckDataReq | OUT | 30 | P.E. -RET *1 | OUT |
| 13 | Xflag | OUT | 31 | INIT | IN |
| 14 | HostBusy | IN | 32 | DataAvail | OUT |
| 15 | N.C. *2 | | 33 | GND | |
| 16 | INIT -RET *1 | | 34 | N.C. *2 | |
| 17 | F.G | | 35 | Vcc *3 | |
| 18 | N.C. *2 | | 36 | 1284Active | IN |

*1: All -RETs are connected to GND. *2: N.C.=No Connection
*3: Vcc is connected to +5.0V through a 3.3KΩ resistor.

**8) Input/output signals**

**Compatible Mode**

**STROBE [Input]**

This signal is used to read DATA1 to DATA8. The signal becomes valid after the BUSY signal goes Low and the printer outputs an ACKNLG signal. This signal is normally High. After it goes Low, the printer receives data. When the signal remains Low, the printer does not operate until it goes High.

**DATA1 to 8 [Input]**

The printer receives data with the STROBE signal. The state of each bit of the signal must be maintained for at least 0.5µs from the rising edge of the STROBE signal.

**ACKNLG [Output]**

This signal is a response signal to the STROBE signal.
The host computer does not send the next STROBE signal until this signal is sent.
When the power is turned on or the BUSY signal goes Low for the input of the INIT signal, this signal is sent regardless of the STROBE signal.

**BUSY [Output]**

When this signal is High, the printer is BUSY; when Low, the printer is READY. The signal goes high when data cannot be received because of internal processing, when the printer is offline, or when an error occurs (paper-out, paper jam, etc.).

**P.E. [Output]**
This signal goes High when the printer cannot feed paper. The BUSY signal goes High and the SELECT and $\overline{\text{ERROR}}$ signals go Low.
This signal goes Low when the paper is loaded and the printer goes online. The $\overline{\text{ERROR}}$ and SELECT signals then go from Low to High.
If paper is not ejected (paper jam) after an eject operation, this signal and the BUSY signal go High, and the SELECT and $\overline{\text{ERROR}}$ signals go Low. In this case, the signals do not change even if the paper is removed manually.

**SELECT [Output]**
The printer is READY when this signal is High.
This signal goes Low when the printer is offline, when an error occurs (paper-out, paper jam, etc.)

**$\overline{\text{AUTO FEED XT}}$ [Input]**
This signal is sent as the auto line feed mode (CR=CR+LF) signal from the computer, but is ignored by the printer. The signal is valid only when auto line feed mode is selected using function setting No. 52.
See Part 3, section 3.2, "Function Settings", (page 3-21).

**$\overline{\text{INIT}}$ [Input]**
When it changes to Low, this signal sets the printer in the BUSY state, then resets the printer by changing from Low to High.
This signal must have a pulse width of 50µs or more at the printer.

**$\overline{\text{ERROR}}$ [Output]**
This signal changes to Low when the printer detects an error (paper-out, paper jam, etc.) to inform the host computer of the error state.

**$\overline{\text{SELECT IN}}$ [Input] (Valid in LQ mode only)**
When this signal is High, the DC1 and DC3 codes are valid; when Low, they are invalid. The printer judges the level of this signal when it is turned on or is initialized by the $\overline{\text{INIT}}$ signal.

**Nibble Mode**
**$\overline{\text{Host Clk}}$ [Input]**
$\overline{\text{STROBE}}$ signal to read DATA 1 to DATA 8.
Negotiation phase: Trigger signal to send the protocol confirmation to the printer.

**DATA 1 to 8 [Input]**
The printer receives data using the Host Clk signal.
The state of each bit of this signal must be maintained for at least 0.5µs from the rising edge of the Host Clk signal.

**Ptr Clk [Output]**
Reverse data transmission phase: The printer requests the host computer to read the data by making the Ptr Clk signal Low. After finishing reading, the host computer notifies the printer of completion of data receiving by making the Host Busy signal High.

**Ptr Busy [Output]**
Reverse data transmission phase: Indicates bits 3 and 7 of the transmission data.

**Ack Data Req [Output]**
Reverse data transmission phase: Indicates bits 2 and 6 of the transmission data.
Negotiation phaser: Trigger signal to inform the host computer of the printer's condition (whether it supports nibble mode or not, whether there is reverse transmission data or not, etc.).

**Xflag [Output]**
Reverse data transmission phase: Indicates bits 1 and 5 of the transmission data.

**Host Busy [Input]**
Reverse data transmission phase: Indicates that the host is ready to receive the data from the printer by making the Host Busy signal Low. After that, it goes High in sync with the Low pulse of the Ptr Clk signal to verify receiving data.
Reverse idle phase: The Host Busy signal goes High in response to the Low pulse of the Ptr Clk signal, and enters the reverse data transmission phase again.

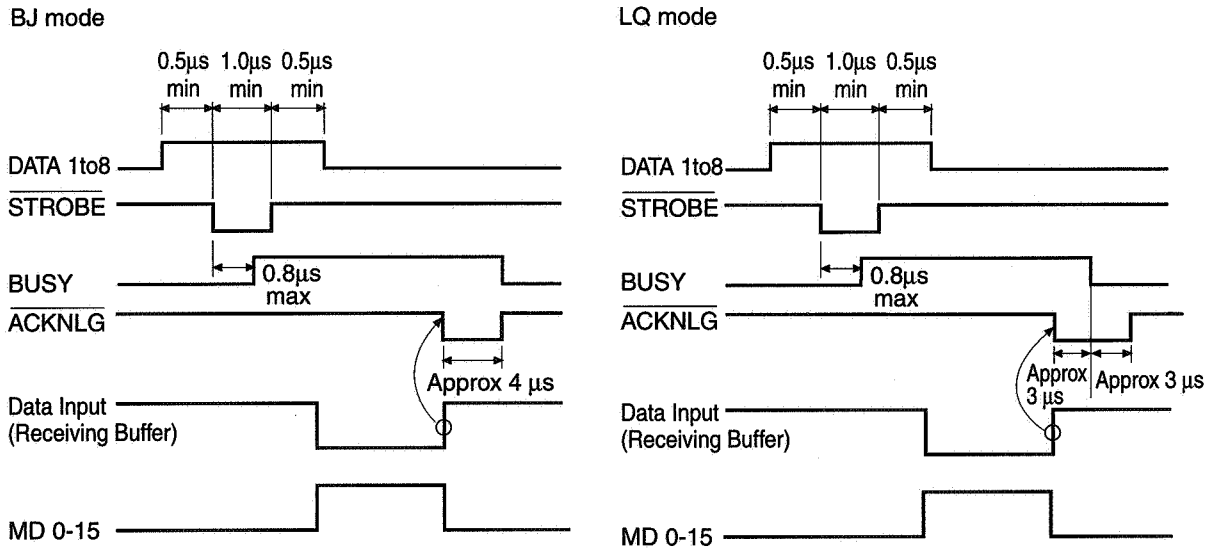
**INIT [Input]**
When this signal becomes Low, the printer changes to BUSY. The printer is reset when the signal changes from Low to High. This signal is normally High, and the pulse width must be at least 50µs at the printer side.

**DataAvail [Output]**
Reverse data transmission phase: Indicates bits 0 and 4 of the transmission data.
Negotiation phase: Informs the host computer if there is reverse transmission data or not in sync with the falling edge of the Ack Data Req signal.

**1284 Active (Input)**
This signal confirms that the printer is a 1284-compatible device when the 1284 Active signal goes High and the Host Busy signal goes Low. It changes to Low in the termination phase.

### 9) Timing Charts

#### Compatible mode




#### Nibble mode

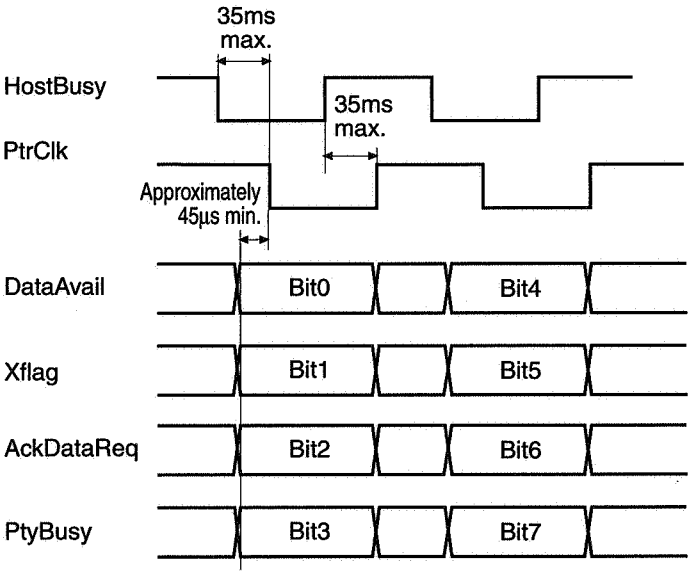



**Figure 2-9 Timing Chart**

The parallel interface sends 8-bit data from the computer to the printer. Data is sent based on handshaking using the $\overline{\text{STROBE}}$, $\overline{\text{ACKNLG}}$, and BUSY signals. When the computer is sending data, it outputs the 8-bit data to the data line, then sends the $\overline{\text{STROBE}}$ signal to the printer. The printer responds by outputting the BUSY signal. After the printer has read in the data, it informs the computer by outputting an $\overline{\text{ACKNLG}}$ signal. The BUSY signal changes to Low when the printer's data buffer is not full and more data can be received.

The above timing chart shows the handshaking.

DATA1 to 8 and the $\overline{\text{STROBE}}$ signal are output by the computer. The BUSY and $\overline{\text{ACKNLG}}$ signals are output by the printer.

### 2.3.2 RS232C serial interface

**1) Synchronization**

Async

**2) Baud rate**

300 to 38400 baud (user selectable)

**3) Data format**

Start bit: 1
Stop bit: 1 or 2 (user selectable)
Data bits: 7 or 8 (user selectable)
Parity bit: Even, odd, none, or ignored (user selectable)

**4) Signal polarity**

MARK (logical "1"): –3V to –15V
SPACE (logical "0"): +3V to +15V

**5) Protocol**

Flag control or XON/XOFF control (user selectable)
Error detection
Printer error
Transmission error (parity, framing, or overrun)

**6) Interface cable**

Shielded cable
Maximum length: 20m (66 feet)

**7) Interface connector**

On printer: RDBD-25S-LN (or equivalent)
On cable: CDB-25P (or equivalent)

**8) Input/output signals and pin configuration**

| No. | Signal | I/O | No. | Signal | I/O |
|---|---|---|---|---|---|
| 01 | FG | - | 14 | N.C. | |
| 02 | TxD | OUT | 15 | –RxD | IN |
| 03 | RxD | IN | 16 | N.C. | |
| 04 | RTS | OUT | 17 | +RxD | IN |
| 05 | CTS | IN | 18 | N.C. | |
| 06 | DSR | IN | 19 | –TxD | OUT |
| 07 | SG | | 20 | DTR | OUT |
| 08 | N.C. | | 21 | N.C. | |
| 09 | N.C. | | 22 | N.C. | |
| 10 | N.C. | | 23 | N.C. | |
| 11 | N.C. | | 24 | N.C. | |
| 12 | N.C. | | 25 | +TxD | OUT |
| 13 | N.C. | | | | |

N.C.=No Connection

**9) Input/output signals**

**TxD**

This signal transmits serial data (XON/XOFF codes) to the printer. The signal level is normally the MARK level.

**RxD**

This signal receives serial data (ASCII codes) from the computer. The signal level is normally the MARK level.

**RTS**

This signal requests the computer to send data.

**CTS**

When this signal is at the SPACE level, data (XON/XOFF codes) can be sent to the computer.

**DSR**

When this signal is at the SPACE level, the computer is ready to send data.

**DTR**

When this signal is at the SPACE level, data can be received from the computer. This signal changes according to the printer status.

**10) Timing**

DTR Packing or XON/XOFF handshaking protocols can be selected using dipswitch No.8 on the board.

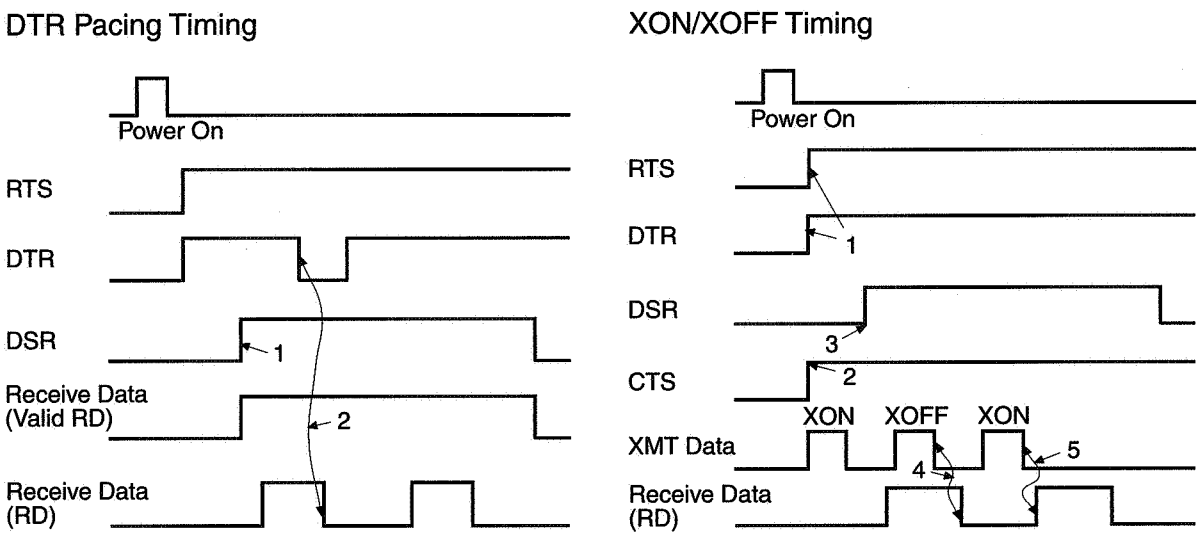



**Figure 2-10 Timing Chart**

NOTE

The printer changes to BUSY to stop the computer sending more data when less than 256 bytes are available in the data receiving buffer. Data continues to be received until 0 bytes remain in the buffer, but any further data is ignored. When 256 bytes or more are available in the buffer, the printer is READY and accepts data from the computer.

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# Part 3

# OPERATING INSTRUCTIONS


| Page | |
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| 3 - 1 | 1. PRINTER SETUP |
| 3 - 1 | 1.1 Unpacking |
| 3 - 3 | 1.2 Installation Location |
| 3 - 4 | 1.3 Installation |
| 3 -13 | 1.4 Names of Parts and Their Functions |
| 3 -17 | 1.5 Basic Operation |
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| 3 -19 | 2.1 Carrying the Printer |
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| 3 -20 | 3. PRINTER SERVICING FUNCTIONS |
| 3 -20 | 3.1 Error Indications |
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| 3 -23 | 3.4 Test Print |
| 3 -25 | 3.5 Service Mode |
| 3 -26 | 3.6 Test Print Samples |

# 1. PRINTER SETUP

## 1.1 Unpacking

### 1.1.1 Printer

After unpacking, make sure the items below have been included:

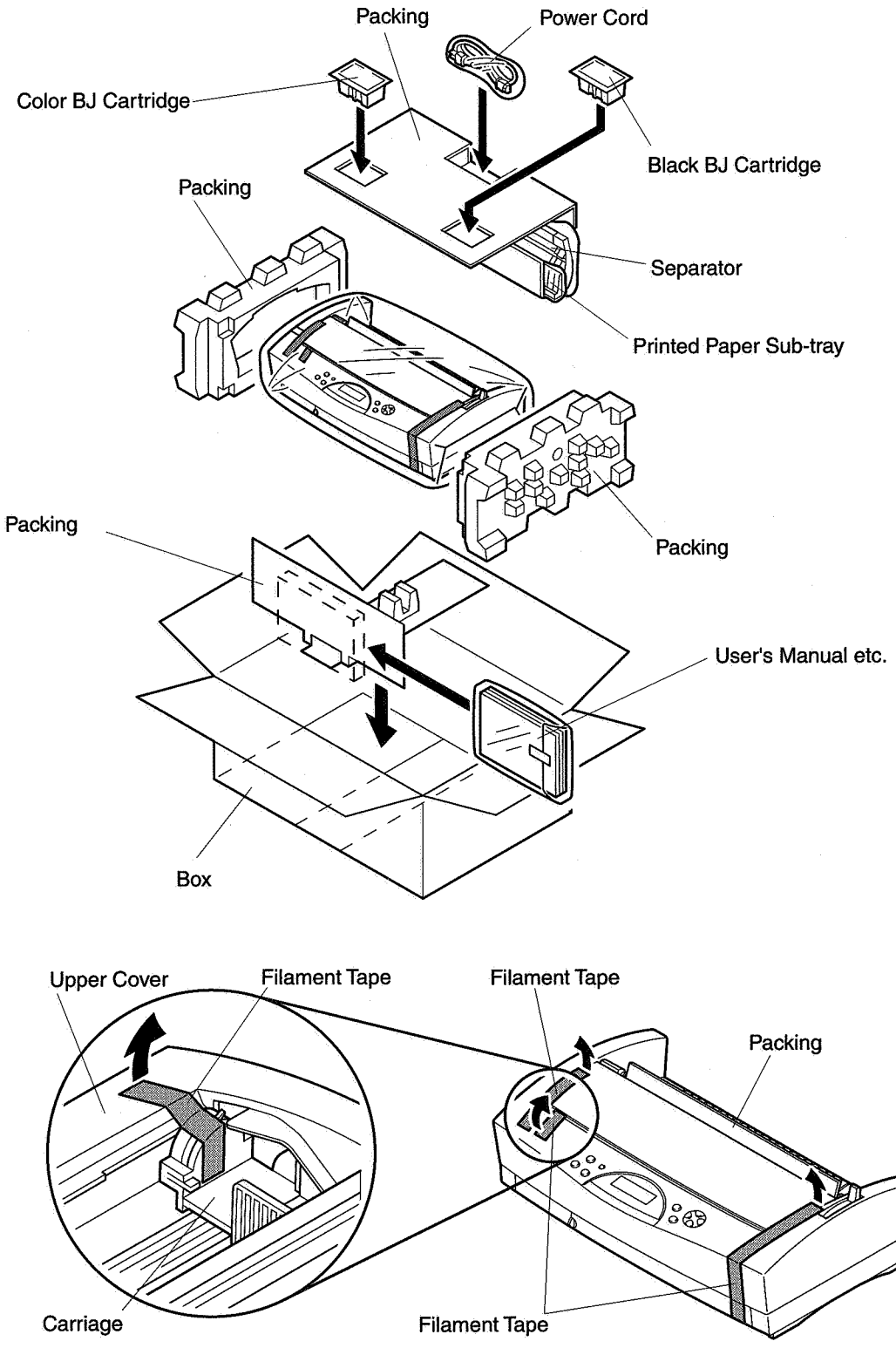



**Figure 3-1 Packaging**

### 1.1.2 Auto sheet feeder

There are two optional auto sheet feeders (ASF): ASF bin 1 and ASF bin 2. (Note that the ASF bin 2 cannot be installed without the ASF bin 1.)
The following figure illustrates the packaging of the ASF bin 1, which is the same for the ASF bin 2.

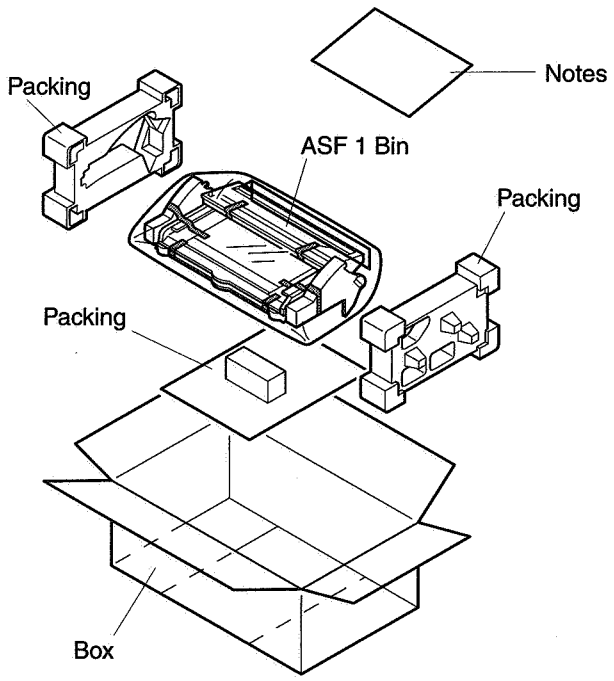



**Figure 3-2 ASF Packaging (ASF bin 1)**

### 1.1.3 Interface board

The RS232C interface can be mounted as an option.
Check that the interface kit includes the following items.

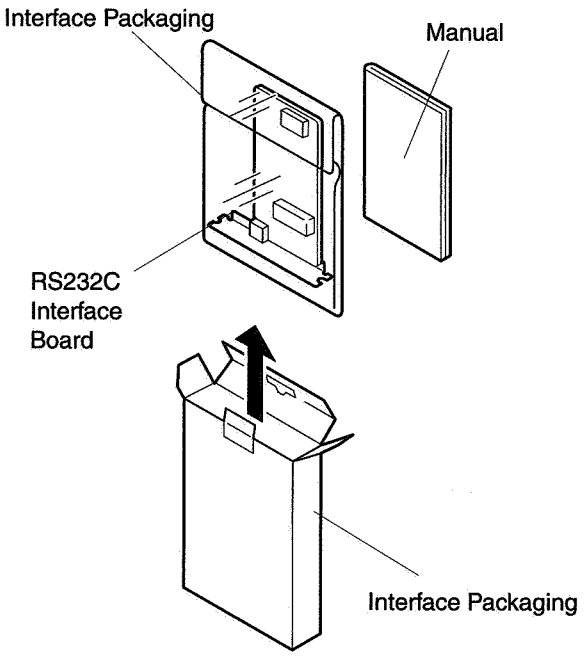



**Figure 3-3 Interface Board Packaging**

## 1.2 Installation Location

To ensure optimum performance, install the printer in adequate space. If you are using the cartridge container, you will also require adequate space to open it.
The figure illustrates the printer dimensions with and without the optional ASF bin 1 and ASF bin 2.

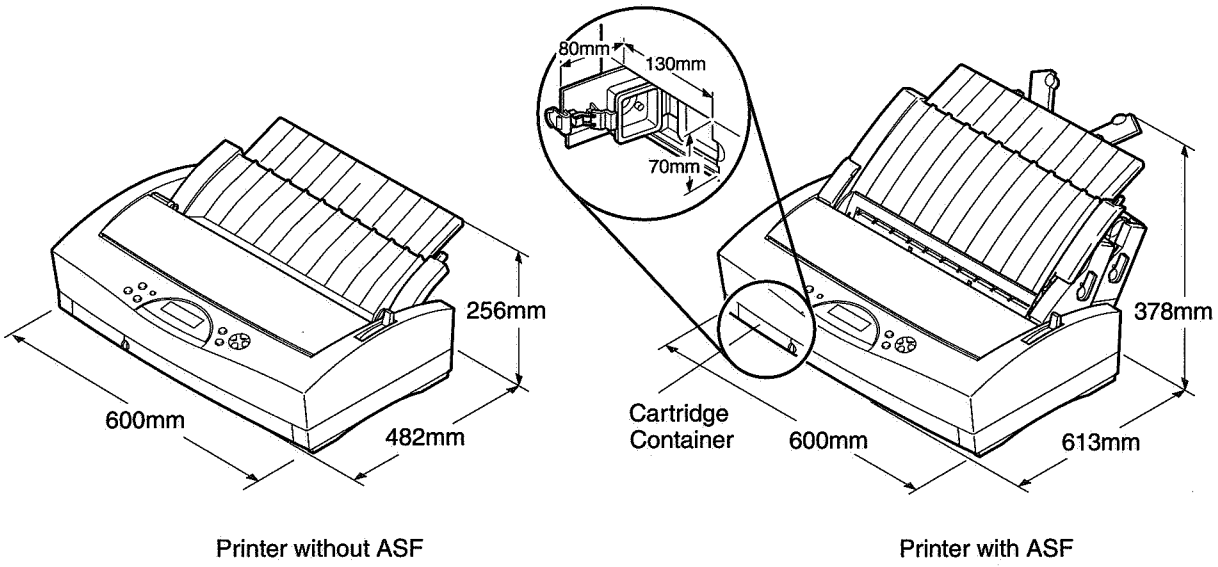



**Figure 3-4 Printer Dimensions**

NOTE

- Use the printer where the ambient temperature is between 5°C and 35°C and the ambient humidity is between 10% and 90% (no condensation).
- Install the printer on a level and stable surface. Avoid locations subject to vibration.
- Do not install the printer where it is subject to direct sunlight or where it may be subject to rapid fluctuations in temperature, such as close to airconditioners, etc. Also, do not leave the printer in motor vehicles, etc., where it may be subject to a rapid rise in temperature.
- Do not install the printer where it may be subject to excessive amounts of dust, or subject to sea breezes or other sources of salinity.
- Do not install close to TV, speakers, or other sources of magnetic fields, which may cause malfunctioning and radiointerference.

## 1.3 Installation

### 1.3.1 Printer

Set up the printer as follows.

**a) Connecting the power cord**

1) Connect the power cord to the printer.
2) Connect the power cord to a power outlet.

**b) Connecting the interface cable**

1) Check that the printer and computer are both off.
2) Connect the interface cable to the printer interface connector. Secure the cable with the connector clips.
3) Connect the other end of the interface cable to the computer and secure it.

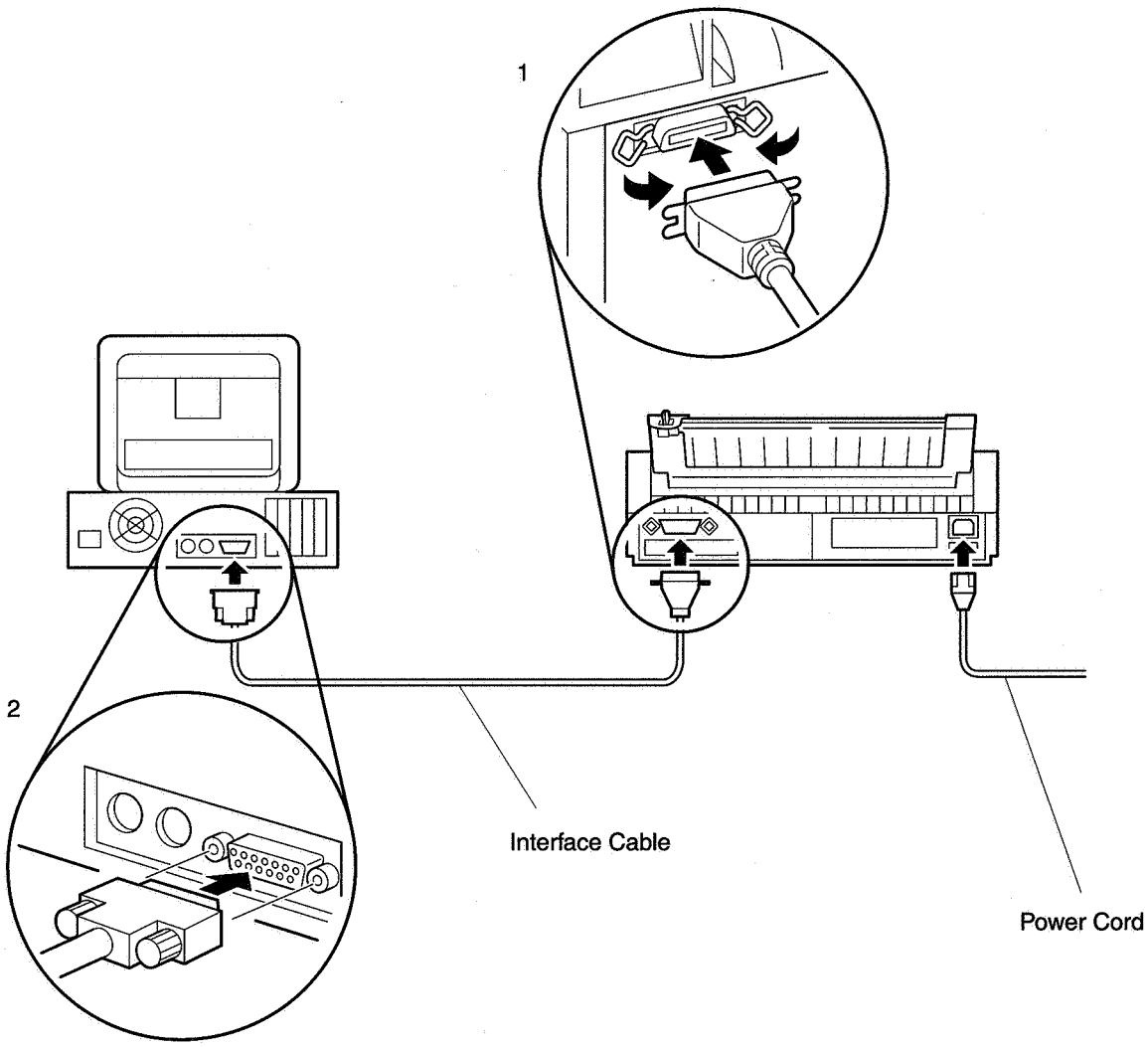



**Figure 3-5 Connecting the Interface Cable and Power Cord**

**c) Turning on the printer**

Check that the power cord is connected, then press the *POWER* button to turn on the printer. When turned on, the printer executes the initializing sequence. The buzzer sounds twice and the carriage stops in the replacement position (Figure 3-8), the *ONLINE* indicator blinks, indicating that the BJ cartridge should be installed. Before turning on the printer, first turn on the computer and then any other peripheral equipment.

**d) Installing the BJ cartridge**

Two types of cartridge can be installed in the printer: a color BJ cartridge and black BJ cartridge.

**1) Removing the BJ cartridge protectors**

Remove the BJ cartridge from the package, then remove the cap and tape on the nozzles, as shown in the figure.

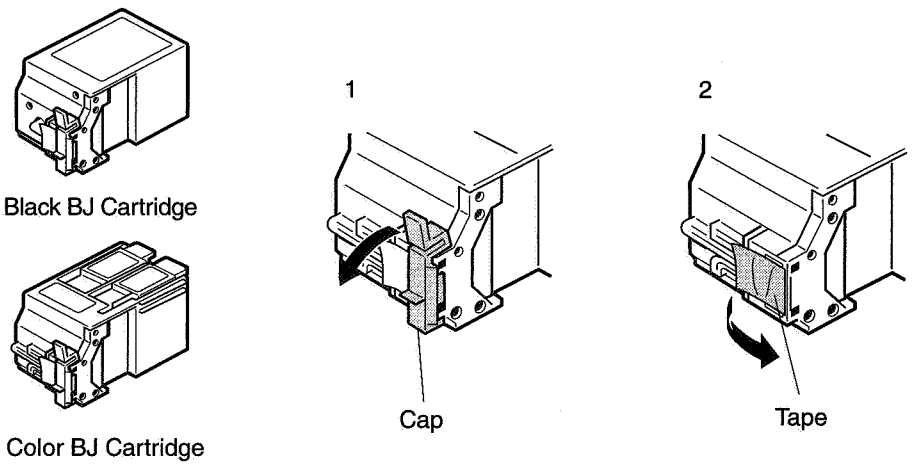



**Figure 3-6 Removing Cap and Tape from BJ Cartridge**

CAUTION

Do not reuse the cap and tape. They can cause clogging of the nozzles or mixing of the ink colors.
Do not touch the nozzles when removing the tape as doing so may result in the head becoming scratched and dirt adhering to the head, resulting in poor printing.
Do not touch the nozzles and do not shake the BJ cartridge after removing the cap and tape as doing so may result in poor printing and ink spillage.

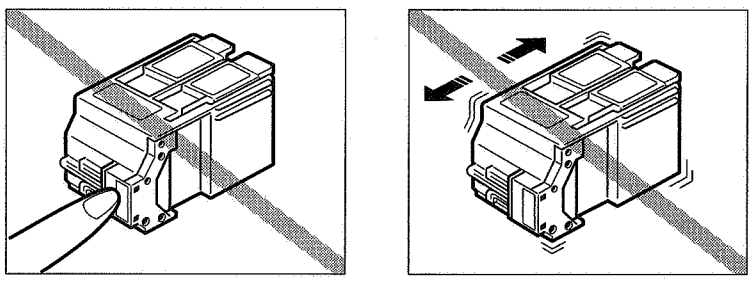


**Figure 3-7 Cartridge Handling Precautions**

**2) Installing the BJ cartridge**

Open the printer's top cover and fully push down the cartridge lock lever. Attach the BJ cartridge to the carriage and lift the lever to lock the BJ cartridge in place. Press the *CARTRIDGE* button and return the carriage to the capping position at the left end, then close the top cover.

If you do not manually return the carriage to the capping position after installing the BJ cartridge, it is returned automatically after about 10 minutes. If you leave the printer open without installing a BJ cartridge, the carriage remains in the cartridge replacement position even after 10 minutes have elapsed.

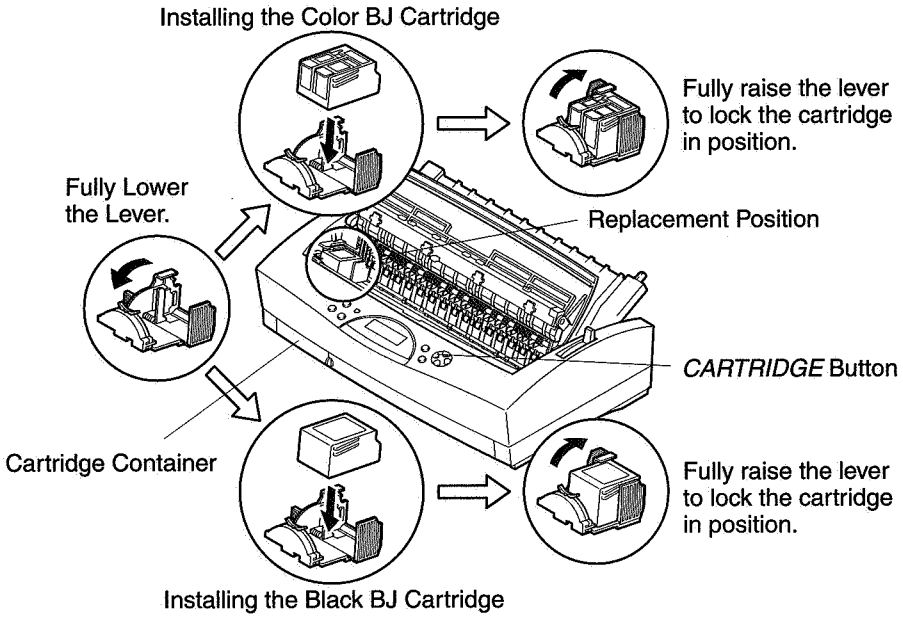



**Figure 3-8 BJ Cartridge Container**

NOTE

If you do not install the BJ cartridge correctly, the buzzer sounds once but the carriage cannot return to the capping position even if you press the *CARTRIDGE* button. Also, if the top cover is not shut securely, the paper transport may not function correctly and there may be a loss of print quality.

**3) Replacing the BJ cartridge**

To replace the BJ cartridge, open the top cover of the printer and press the *CARTRIDGE* button. The buzzer sounds once and the carriage moves to the replacement position (slightly to the right of the capping position). Remove the BJ cartridge by reversing the installation steps above, then install a new cartridge. Always store the spare BJ cartridge in the cartridge container. (The cartridge container will store one black BJ cartridge or one color BJ cartridge.)

CAUTION

If the printer has been operating for a prolonged period, the BJ cartridge's aluminum plate will be hot. If you press the *CARTRIDGE* button, the buzzer sounds four times (alarm) but the carriage may not immediately move to the cartridge replacement position. In such case, wait a few minutes before replacing the BJ cartridge and never attempt to move the carriage by hand.

**e) Replacing the ink cartridge**

When a color BJ cartridge is used, you can replace the ink cartridges as described below.

**1) When to replace the ink cartridge**

Replace the ink cartridge in any of the following cases: The ink runs out, the ink cartridge is out of its package for over six month, or the printing quality does not improve even after the cartridge is cleaned five times. The color ink cartridge contains all three colors; if one ink color runs out, the entire color ink cartridge must be replaced.

If an ink cartridge has been replaced but the printing quality does not improve even after cleaning, replace the color BJ cartridge with a new one.

**2) Removing an ink cartridge**

Move the carriage to the cartridge replacement position as described in *d)3), "Replacing the BJ Cartridge" (page 3-6)*, then take out the ink cartridge to be replaced as shown in the figure below.

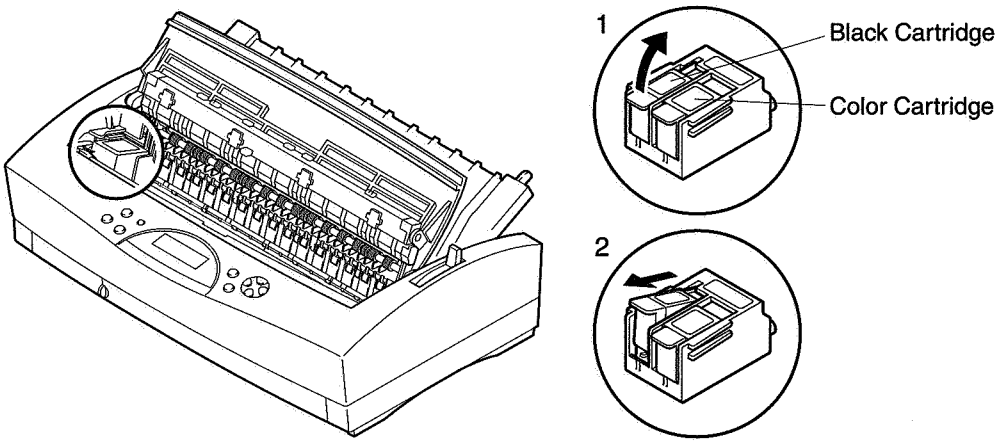



**Figure 3-9 Replacing the Ink Cartridges**

CAUTION

Ink adheres to and around the ink cartridge's ink outlet, so handle the ink cartridge with care.

**3) Installing an ink cartridge**

Take out the new ink cartridge from its package and remove the cap as shown in the figure. Install the ink cartridge by following the removal procedure in reverse.

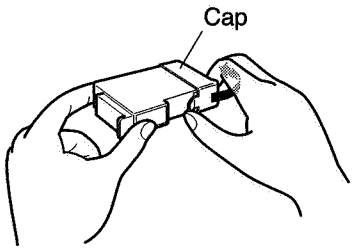



**Figure 3-10 Removing the Ink Cartridge Cap**

After installing the ink cartridge, press the *CARTRIDGE* button, as described in *d)2), "Installing the BJ Cartridge" (page 3-6)*, to return the carriage to the capping position.

**f) Storing a BJ cartridge**

A cartridge container for storing the spare BJ cartridge is provided at the bottom left front of the printer. Always store an unused BJ cartridge in the cartridge container, which will accommodate either a black or color BJ cartridge.

NOTE

If you are storing the color BJ cartridge, make sure that it contains both the black and color ink cartridges. If it does not, ink may leak or dry out.

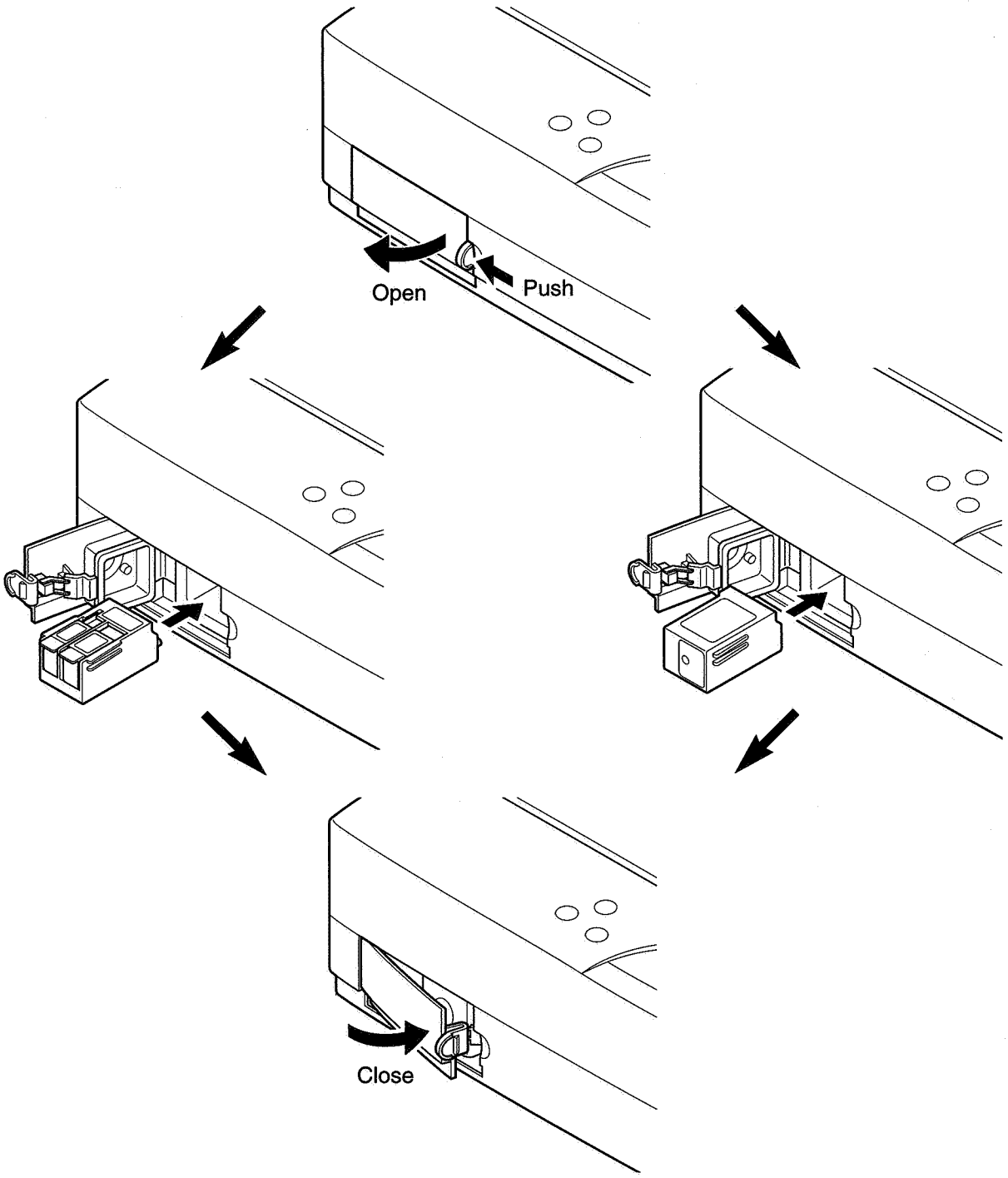



**Figure 3-11 Using the Cartridge Container**

### 1.3.2 Auto sheet feeder

There are two optional auto sheet feeders (ASF): ASF bin 1 and ASF bin 2. (Note that the ASF bin 2 cannot be installed without the ASF bin 1.)

**a) Installing the ASF on the printer**

Install the ASF on the printer as follows:

1. Remove the separator and ASF gear cover from the printer.
2. Set the paper selection lever to the cut sheet position (to the rear of the printer).
3. Install the ASF bin 1 on the printer so that it engages with the projections on the printer. If you are also installing the ASF bin 2, first install the ASF bin 2 on the ASF bin 1 (see below for mounting the ASF bin 2 on the ASF bin 1).
   To remove the ASF from the printer, lift the ASF vertically. Do not pull it forword, because the hooks of the ASF may break easily.
4. Engage the projections on either end of the separator into the grooves in the ASF bin 1.

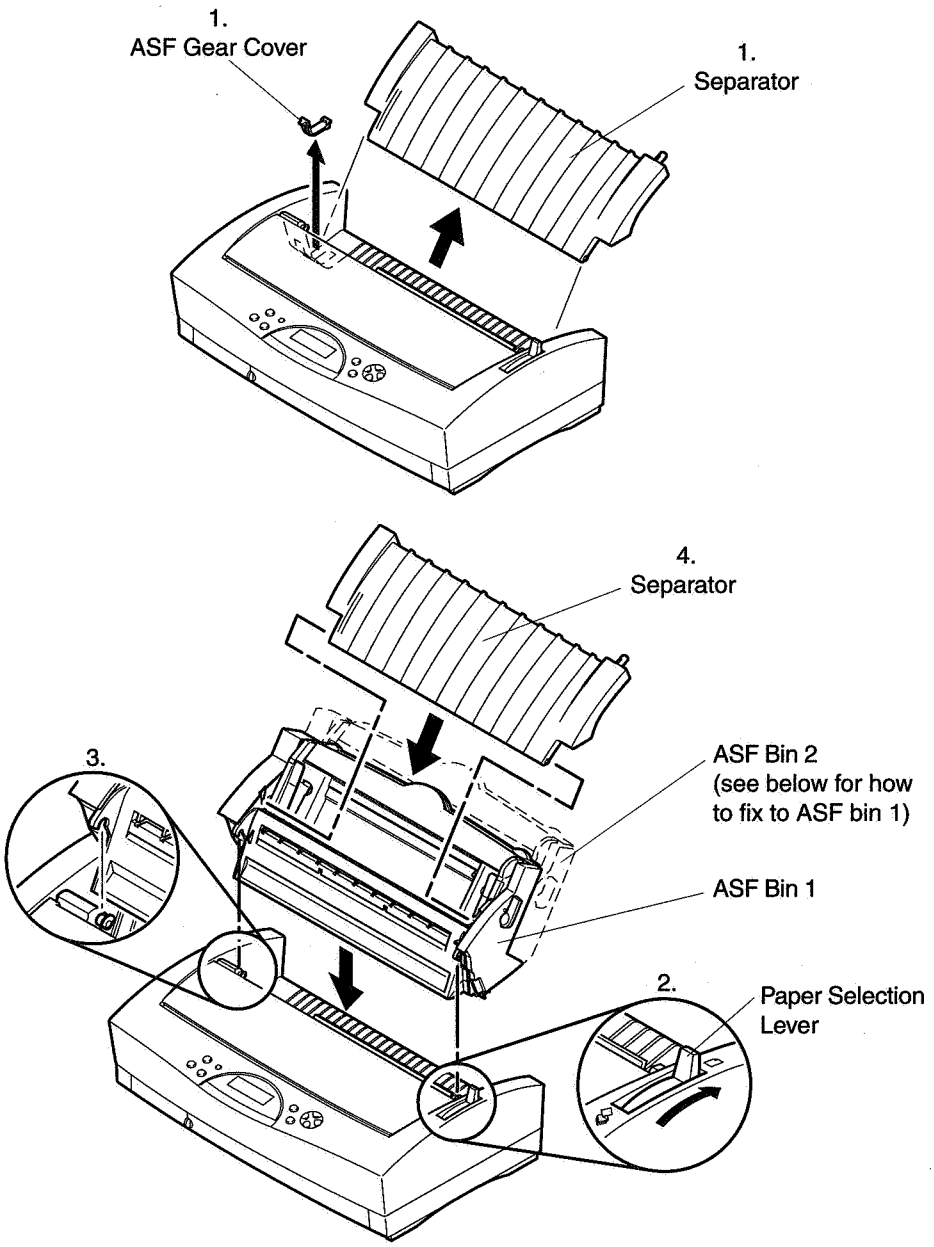



**Figure 3-12 Installing the ASF**

**b) Joining and Separating the ASF bin 1 and ASF bin 2**

The ASF bin 2 must be joined to the ASF bin 1 before it can be installed on the printer. It cannot be installed alone.

To mount the ASF bin 2 on the ASF bin 1, remove the gear cover on the back of the ASF bin 1, then slide the ASF bin 2 in the direction of the arrow so that the four lugs engage in the slots.

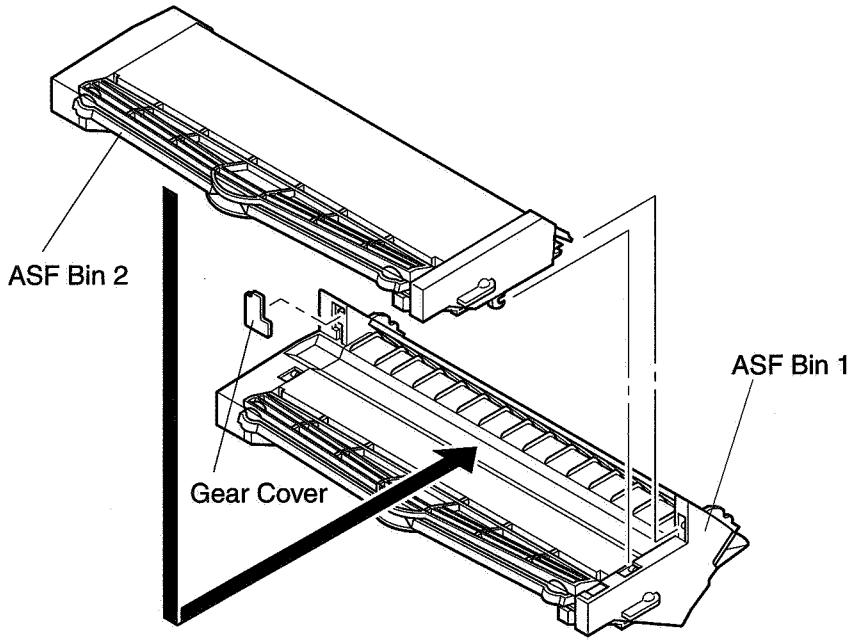



**Figure 3-13 Joining ASF Bin 1**

To separate bin 1 and bin 2, remove them from the printer, then press the tabs on either side in the direction of arrow 1 while pulling bin 2 in the direction of arrow 2.

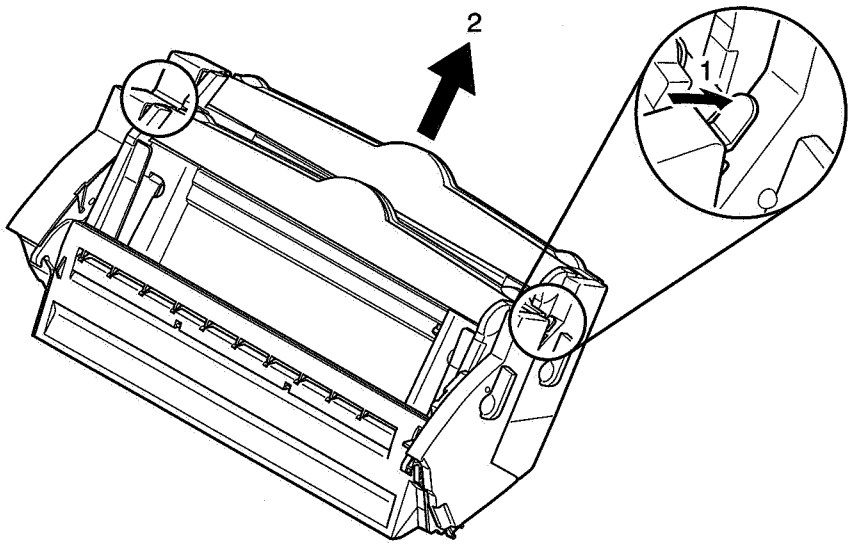


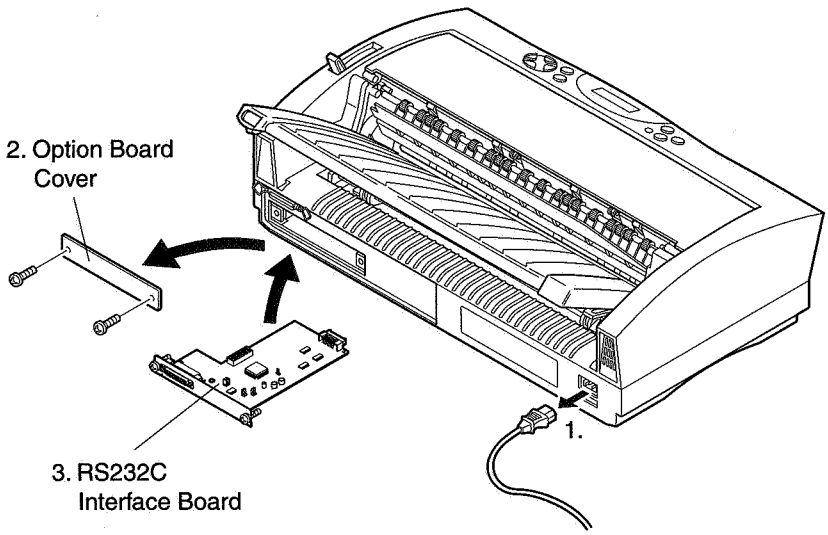

**Figure 3-14 Separating ASF Bin 1 and Bin 2**

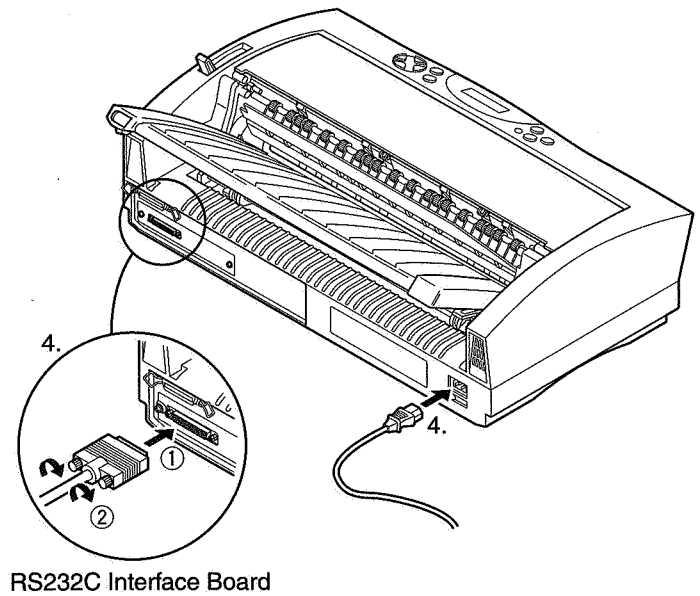
### 1.3.3 Interface board

The RS232C interface can be mounted as an option.

**a) Installing the interface board in the printer**

1. Turn off the power and disconnect the power cord.
2. Remove the option board cover.
3. Insert horizontally into the body after setting the RS232C interface board dipswitches and jumper plugs, and secure by screws.
4. Turn off the host computer and connect the interface cable and power cord.
5. Turn on the printer. The [2nd I/F] indicator in the top right of the LCD turns on to show that the optional interface board is installed.
6. Use the function settings on the indicators to switch between the standard parallel interface and the optional interface board. Set the function No. 1C to ● to use the optional interface board. (See *3.2, "Function Settings" (page 3-21)* for details.)




RS232C Interface Board

**Figure 3-15 Installing the Interface Board**

**b) Setting dipswitches and jumpers**

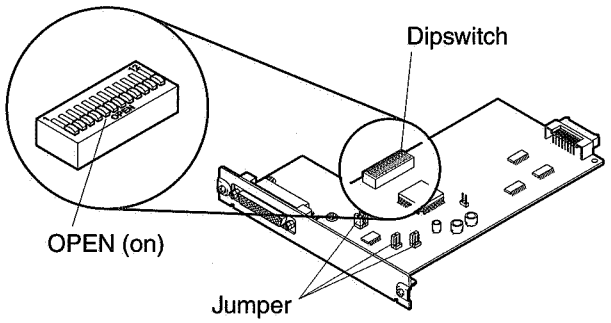



**Figure 3-16 RS232C Interface Board**

• Dipswitch settings

The dipswitches set the baud rate, parity, and data size. The switches are ON when set to the OPEN side.

**Table 3-1 Dipswitch Settings**

| Switch No. | Setting | ON | OFF | Default |
|---|---|---|---|---|
| 1 | Baud Rate | See Table 3-2 | | On |
| 2 | | | | On |
| 3 | | | | On |
| 4 | Parity Check | See Table 3-3 | | On |
| 5 | | | | On |
| 6 | Data Length | 8 Bits | 7 Bits | On |
| 7 | Stop Bit | 1 Bit | 2 Bit | On |
| 8 | Flow Control | Flag Control | XON/XOFF Control | On |
| 9 | Loop Back Self Test | Normal Mode | Test Mode | On |
| 10 | Error Detection | Indicates the Error | Ignored | On |
| 11 | Break Signal Detection | Ignored | Reset the Printer | On |
| 12 | Selects DTR or RTS | Either DTR or RTS | Both DTR and RTS | On |

**Table 3-2 Baud Rate Setting**

| Baud rate | Switch No. | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 300 | Off | Off | Off |
| 600 | On | Off | Off |
| 1200 | Off | On | Off |
| 2400 | On | Of | On |
| 4800 | Off | On | On |
| 9600 | On | On | On |
| 19200 | Off | Off | On |
| 38400 | On | On | Off |

**Table 3-3 Parity Check Setting**

| Parity check | Switch No. | |
|---|---|---|
| | 1 | 2 |
| Non | On | On |
| Odd | Off | On |
| Ignored | On | Off |
| Even | Off | Off |

• Jumper setting

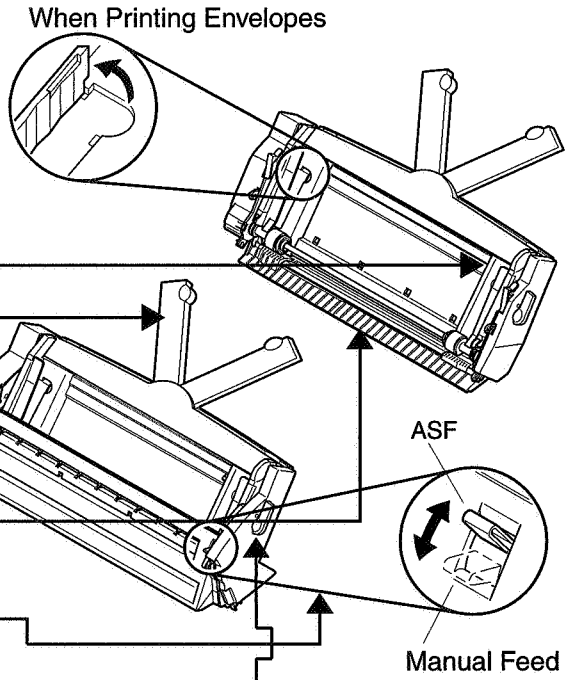
The three jumpers set DTR and RTS, etc.

**Table 3-4 Jumper Settings**

| Jumper No. | Setting | Content |
|---|---|---|
| JP1 | ACTIVE | DTR valid (Factory Setting) |
| | STUCK | DTR locked to SPACE |
| JP2 | ACTIVE | RTS valid (Factory Setting) |
| | STUCK | RTS locked to SPACE |
| JP3 | NORMAL,NORMAL | RTS and CTS valid (Factory Setting) |
| | NORMAL,LP BACK | RTS (pin 4) and CTS (pin 5) connected internally |

## 1.4 Names of Parts and Their Functions

The different parts of the printer and optional equipment and their functions are shown below.




**Guide Plate**
Lift before loading envelopes. Both ASF bin 1 and bin 2 have similar guide plates.

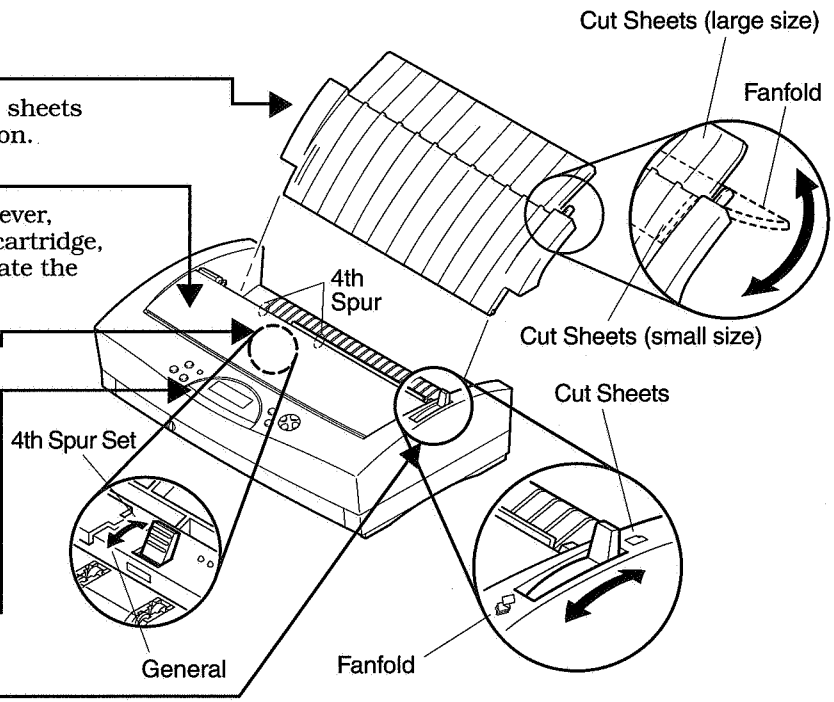
**Paper Support**
Supports the stack of paper loaded in the ASF. Extend to the appropriate height.
Both ASF bin 1 and bin 2 have similar paper supports.

**ASF Bin 1**
Optional
ASF bin 1 holds up to 10mm of A4-size cut sheet paper (approximately 100 sheets of 64g/m² paper). Each sheet is automatically fed during printing.

**ASF Bin 2**
Same as ASF bin 1
However, bin 2 cannot be installed without bin 1, and cannot be used for feeding envelopes.

**Protector Lever**
This lever prevents the paper dropping into the manual feed position when, using the ASF, the first printed sheet is once removed and then returned to the output tray.

**Loading Lever**
For loading sheets in the ASF. Both ASF bin 1 and bin 2 have similar loading levers.




**Separator**
Supports the printed sheets and sheets loaded in the manual feed position.

**Top Cover**
Open to set the paper selection lever, to replace a BJ cartridge or ink cartridge, remove jammed paper, and operate the 4th spur lever.

**4th Spur Lever**
Set the 4th spur in or out according to the weight of paper being printed. Set the 4th spur out if plotted paper curls, preventing it from being properly discharged. Open the top cover to set the lever in the desired position.

**Control Panel**
See page 3-15.

**Paper Selection Lever**
Selects fanfold or cut sheets (manual feed or ASF).

**Figure 3-17 Names of Parts and Their Functions (1)**

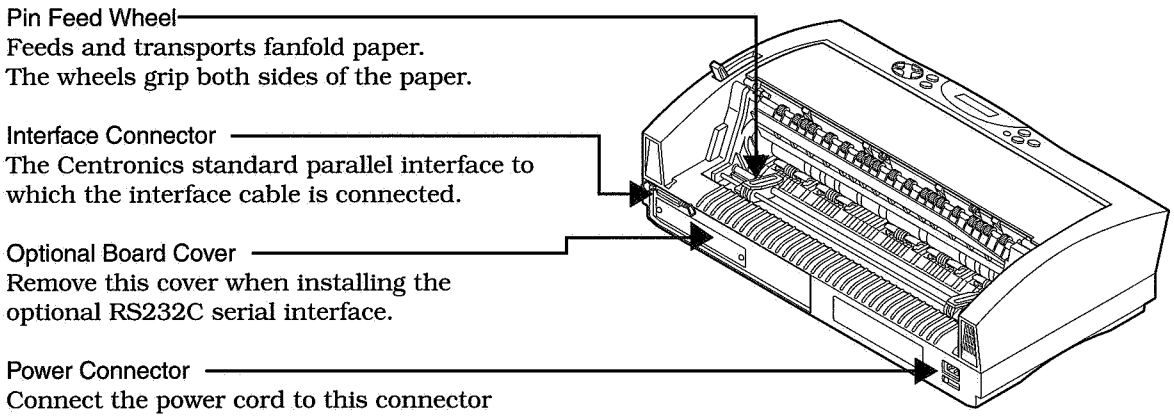



**Figure 3-18 Names of Parts and Their Functions (2)**

**Paper thickness lever**

To prevent the print head from being scratched and to improve print quality, the paper thickness lever can be set to any of three settings corresponding to the distance between the print head and the surface of the paper.
Adjust the lever as follows:
Left: Printing with the black BJ cartridge on plain paper
Center: Printing with the color BJ cartridge on plain paper.
Also when printing on coated paper, glossy papers, high-gloss film, OHP film, and back print film
Right: Printing on envelopes, heavy papers, and fanfold papers

Also set the paper thickness lever to the optimum position for papers with other qualities (soft paper, paper that easily curls, thin paper, etc.).

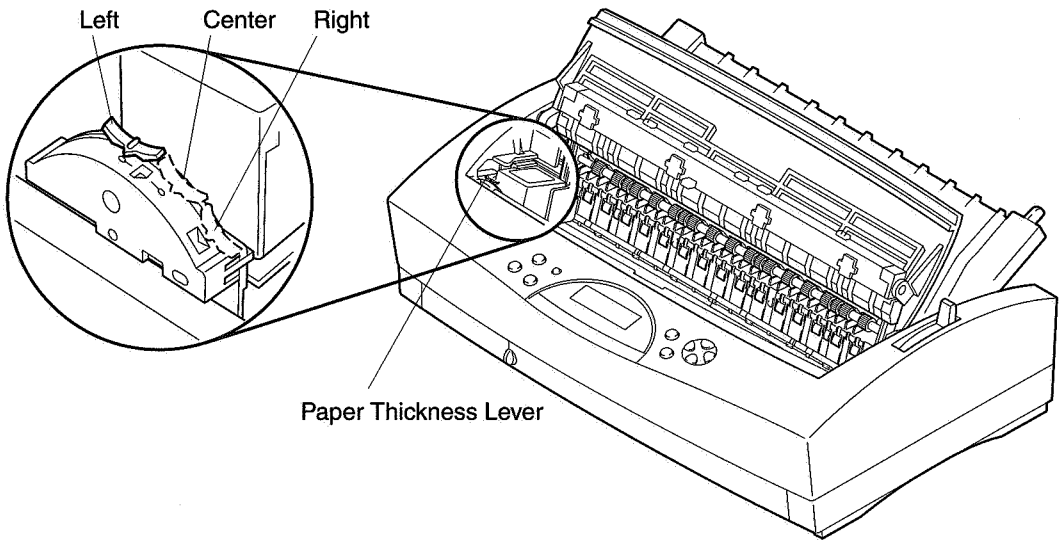
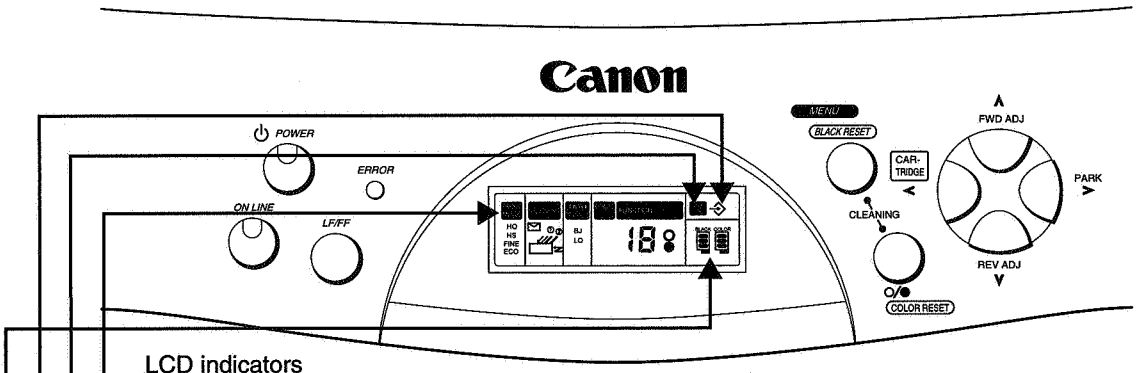



**Figure 3-19 Paper Thickness Lever**

**The control panel**




LCD indicators

Mode : Shows the mode currently selected from the menu
The black border blinks until the mode is confirmed when selecting a mode.

2nd I/F : The 2nd I/F indicator is displayed when an optional interface board is installed.

Data : The ⇨ indicator blinks when the printer is receiving data or there is unprocessed data in the buffer.

Ink : When a black or color BJ cartridge is installed, this indicator shows the amount of ink remaining in the cartridge(s).

**Figure 3-20 Names of Parts and Their Functions (3)**

**Control button functions**

**POWER button**

- Turns the printer software power control on or off.
- Prints a demonstration page (turn on while pressing and holding the *MENU* button)
  The printer enters test mode after the demonstration printout.
- Saves data to EEPROM
  Parameters reset in menu mode: control mode/font/function/amount of header when setting micro-adjustment
  Automatically updated parameters: ink eject count/page count/head replacement count/amount of waste ink

**ONLINE button**

- Alternates between online and off-line states
- Restores normal mode
  This button restores normal mode from any of the following: printing/menu mode/service mode/cartridge replacement mode/test print modes

**LF/FF button**

- Line feed/page eject (when there is paper in the printer)
- Paper feed (when there is no paper in the printer)
- Escape from eject error state (paper jam error)
- Forced purging of print buffer

**MENU button**

- Selects menu mode or service mode
- Resets the remaining ink counter for the black ink cartridge (in cartridge replacement mode)
- Selects cleaning mode (when pressed at the same time as the on/off button)
- Selects test print mode (when pressed for 1.5 sec. or more)
- Prints demonstration printout (when pressed at the same time as the *POWER* button is pressed to turn the printer on)
- Clears the EEPROM (in service mode)

**ON/OFF button (●/○ button)**
- Resets the remaining ink counter for the color ink cartridge (in cartridge replacement mode)
- Selects cleaning mode (when pressed at the same time as the *MENU* button)
- Turns the function setting on or off (●/○) (in function setting mode)

**FWDADJ button**
- Advances the paper by a fraction (offline/when paper is in the printer)
- Adjusts the paper feed position forward (online/immediately after a paper feed)
- Advances the paper (when a paper jam error occurs)
- Selects a different menu (in menu mode)

**REVADJ button**
- Reverses the paper by a fraction (offline/when paper is in the printer)
- Adjusts the paper feed position back (online/immediately after a paper feed)
- Selects a different menu (in reverse sequence, in menu mode)

**PARK button**
- Reverses fanfold paper to the feed position (when the paper selection lever is in the fanfold paper position)
- Selects a different menu (in menu mode)
- Selects service mode (when the *MENU* and *CARTRIDGE* buttons are pressed at the same time)

**CARTRIDGE button**
- Selects cartridge replacement mode
- Selects a different menu (in reverse sequence, in menu mode)
- Selects service mode (when the *MENU* and *PARK* buttons are pressed at the same time)

**Menu settings**

When the *MENU* button is pressed, the indicators change to menu setting mode, print mode is selected, and the indicators blink. Use the *CARTRIDGE* or *PARK* button to select a menu, then press the *FWDADJ* or *REVADJ* button to select a mode. Select modes from the setting menus as follows:

PRINT MODE: HQ, HS, FINE, ECO modes (ECO is not available when a color BJ cartridge is installed.)

FEEDER: manual feed, ASF bin 1, ASF bin 2, automatic switching between ASF bins 1 and 2 (When the paper selection lever is set for fanfold paper, fanfold paper is fed to the printer.)

CONTROL MODE: LQ or BJ modes

FONT: 1. Courier, 2. Prestige, 3. Gothic, 4. Script, 5. Roman, 6. Draft

## 1.5 Basic Operation

### 1.5.1 Turning the printer on

When the power cord is connected to a power source, pressing the *POWER* button turns the printer on. When turned on, the printer buzzer sounds once and the initialization process then lasts about 5 seconds. If no BJ cartridge is installed the buzzer sounds twice, the *ONLINE* indicator blinks, the *POWER* indicator turns on, and the LCD INK level indicator turns on to indicate that a BJ cartridge must be installed. If a BJ cartridge has already been installed, the *ONLINE* indicator and *POWER* indicator and LCD turn on to show that the printer is ready. When the printer is turned on after more than 72 hours have passed since the last cleaning operation (or after 24 hours the first time a color BJ cartridge or ink cartridge has been installed), the printer automatically carries out the cleaning operation after the printer is turned on. The *ONLINE* indicator blinks while the cartridge is being cleaned.

### 1.5.2 Turning the printer off

Pressing the *POWER* button when the printer is on extinguishes the display on the LCD and turns the power off. When the power is turned off, the printer executes a sequence of operations to ensure that the BJ cartridge is capped., during which the *POWER* indicator continues to blink. About 5 seconds after completion of this operation, the *POWER* indicator turns off.
Check that the *POWER* indicator is off before disconnecting the power cord.

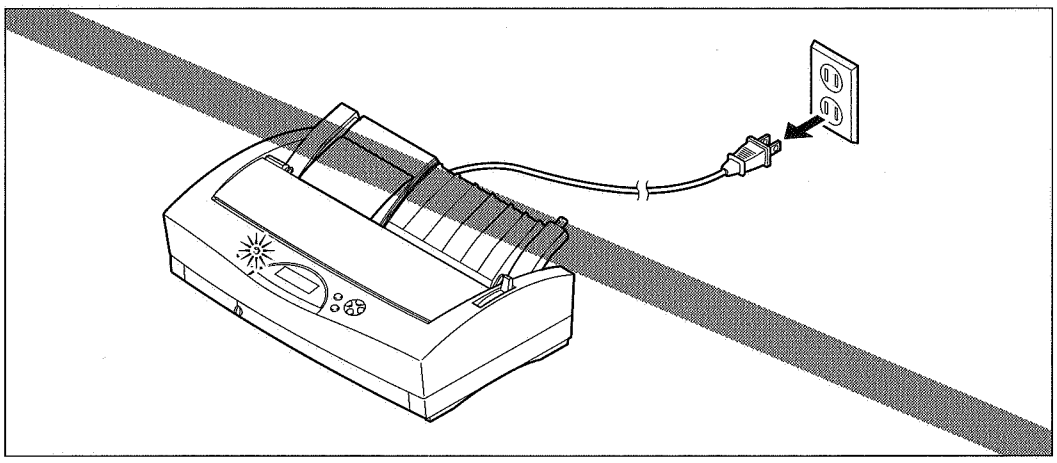


**Figure 3-21 Do not turn off the printer without pressing the POWER button first.**

NOTE

Do not turn off the printer without pressing the *POWER* button first.
If the power cord is disconnected before the printer is turned off with the *POWER* button, the BJ cartridge nozzles may not be capped, resulting in possible ink leaks and the nozzles becoming clogged. The settings displayed on the LCD will also not be saved to the EEPROM.

In the event of an error occurring, pressing the *POWER* button causes the printer to perform its powering down sequence to cap the BJ cartridge.
Any error that occurs after the powering down sequence has started is ignored. If the power is turned off while cleaning is in progress, the *POWER* indicator continues to blink until cleaning has finished. After the cleaning is completed, the BJ cartridge is capped and the printer then turns off.

### 1.5.3 Paper settings

For optimum printing, the printer has various paper settings to suit various types of paper. See *1.4, "Names of Parts and Their Functions" (page 3-13)* for details of the levers and plate positions.

**Table 3-5 Printer Paper Settings**

| | | Plain paper | Coated paper, OHP,BPF | Glossy paper, High gloss film | Heavy paper | Envelopes | Fanfold paper |
|---|---|---|---|---|---|---|---|
| Paper selection lever | Black BJ cartridge | Left | Center | | Right | | |
| | Color BJ cartridge | Center* | Center | | Right | | |
| Paper selection lever | | Back | | | | | Forward |
| Guide plate (with ASF installed) | | Down | | – | | Up | – |

* The color BJ cartridge applies a considerable amount of ink, resulting in the paper tending to lie less flat on the platen. To prevent the head being abraded, set the lever to a larger gap than when using the black BJ cartridge.
See *3.2, "Function Settings" (page 3-21)* for details of changing the settings for other papers.

# 2. TRANSPORTING THE PRINTER

When carrying or transporting the printer, keep the BJ cartridge installed in the printer or stored in the cartridge container.

## 2.1 Carrying the Printer

Before carrying the printer, follow the procedure below:

1) Press the *POWER* button to turn off the printer. The *LCD* and *POWER* indicator turn off.
2) Disconnect the interface cable.
3) Disconnect the power cord from the printer.
4) Check that the BJ cartridge is at the capping position (the left end of the printer). If the cartridge is not at the capping position, move the cartridge manually to the capping position.

CAUTION

Do not disconnect the power cord without first pressing the *POWER* button. Also do not remove the BJ cartridge before carrying or transporting the printer as doing so may result in the ink leaking or drying out in the nozzles.

## 2.2 Transporting the Printer

When transporting the printer, follow the procedure below:

1) Disconnect the interface cable and power cord as described above in 2.1, "Carrying the printer".
2) Check that the BJ cartridge is at the capping position (the left end of the printer). If the cartridge is not at the capping position, move the cartridge manually to the capping position.
3) Repack the printer in its original box and packing materials.
   (To secure the carriage, fasten it to the left end of the printer using tape.)

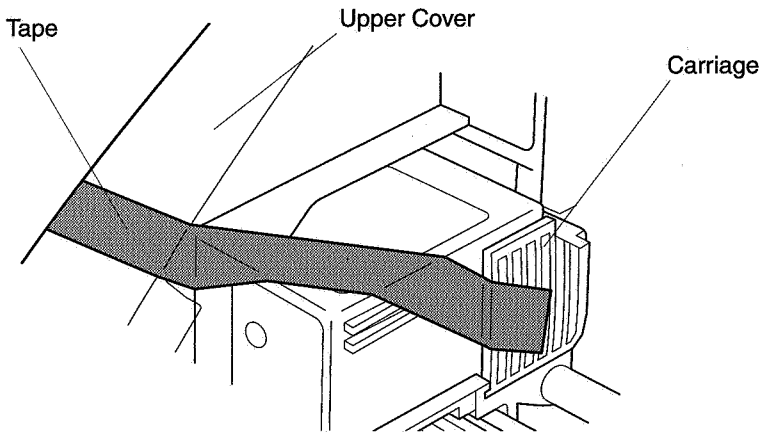



**Figure 3-22 Fastening the Carriage**

NOTE

If you do not have the original packing materials, use an ample amount of shock-absorbing materials.

# 3. PRINTER SERVICING FUNCTIONS

## 3.1 Error Indications

The indicators in combination with the buzzer indicate the nature of any error.

**1) User-correctable errors**

The buzzer sounds rapidly two times and the font display on the LCD is replaced by "E" alternating with the error number to indicate a user-correctable error.

| Display | Function | Description |
|---|---|---|
| E1 | Feed error (out of paper error | No paper is fed when the paper feed operation is executed. (Action: press the online button.) |
| E2 | Eject error (paper jam error) | The paper cannot be ejected by the eject operation. (Action: Remove the paper, then press the *ONLINE* button.) |
| E3 | Paper selector error | Cannot switch between cut sheets and fanfold paper. (Action: Return the paper selection lever then press the Line feed/page feed button or *PARK* button to eject the paper. |

**2) User-uncorrectable errors**

The buzzer sounds for 5 seconds and the font display on the LCD is replaced by "F" alternating with the error number to help quickly locate the fault. (To clear the error state, turn the power off).

However, if error F/1A. F/1b, or F/1C occurs, all printer functions stop, the buzzer does not sound, and the power cannot be turned on (while the power cord is connected, the LCD indicates that an error has occurred).

| Display | Function | Description |
|---|---|---|
| F1 | Home position error (including carriage errors) | Error in carriage motor or home position sensor |
| F3 | Encoder error | Error in encoder position reading against carriage movement pulse |
| F11 | Thermistor error | Error in thermistor for measuring temperature inside the printer |
| F12 | Overheat error (diode sensor error) | Head overheating |
| F13 | No-cartridge error | When the power is on, the cartridge is removed without using the CARTRIDGE button. |
| F14 | Waste ink error | The level of the waste ink in the absorber has exceeded the set level. |
| F15 | Cleaning error | Error in the cleaning operation at the capping position |
| F1A | ROM error | Error detected when checking the ROM on the PCB after connecting the power cord |
| F1b | RAM error | Error detected when checking the RAM on the PCB after connecting the power cord |
| F1C | EEPROM error | Error detected when checking the EEPROM on the PCB after connecting the power cord |
| F1d | Heater error | When the head subheater fuse on logic board has blown, or when electrical conductivity of the subheater is abnormal. |
| F1F | Optional interface error | The optional interface was selected, but no board was installed, or an error occurred in communication with the board. |

**3) Alarms**

The LCD changes to indicate items requiring the attention of the user. (To clear the alarm state, press the online button.)

| Display | Function | Description |
|---|---|---|
| C1 | Waste ink | The buzzer sounds twice briefly if the waste ink absorber is nearly full when checked when the printer is turned on or executes a recovery operation. |
| | Ink low | The *LCD INK* indicator blinks when the ink cartridge is nearly empty. (When using a color BJ cartridge, the indicator blinks when any one of the three ink cartridges is nearly empty.) |

## 3.2 Function Settings

You can set various functions such as horizontal printing and page length. When you press the *MENU* button, the print mode indicator blinks. Press the *CARTRIDGE* button or *PARK* button. The function indicators blink. You can now use the *FWDADJ* or *REVADJ* buttons to select the menu No., then press the *ON/OFF* button (●/○ button) to switch the function on or off.

Once the function has been set, it remains valid even when the printer power is off. Numbers 2, 3, 6, 10, 11, 12, 13, and 14 are set independently in BJ and LQ modes. Other numbers are common for both modes.

**Table 3-6 Function Settings (BJ Mode)**

| No. | Function | ● | ○ | Default | |
|---|---|---|---|---|---|
| | | | | 120V | 200V system |
| 1 | Horizonal Print | LTR | A4 | ○ | ● |
| 2 | Page Length | See Table 3-8 | | ○ | ○ |
| 3 | | | | ○ | ○ |
| 4 | Text Scale Mode | Invalid | | ○ | ○ |
| 5 | Short Tear Off | Invalid | Valid | ○ | ○ |
| 6 | Skip Perforation | Invalid | Valid | ○ | ○ |
| 7 | Envelope | Invalid | Valid | ○ | ○ |
| 8 | Smoothing | Invalid | Valid | ○ | ○ |
| 9 | Host Lock | Invalid | Valid | ○ | ○ |
| 10 | Auto Line Feed | Invalid | Valid | ○ | ○ |
| 11 | Auto CR | Invalid | Valid | ○ | ○ |
| 12 | A.G.M | Invalid | Valid | ○ | ○ |
| 14 | Character Set | Set 1 | Set 2 | ○ | ● |
| 15 | Code Page | See Table 3-9 | | ○ | ○ |
| 16 | | | | ○ | ○ |
| 17 | | | | ○ | ○ |
| 18 | | | | ○ | ○ |
| 19 | Auto Emulation | Invalid | Valid | ○ | ○ |
| 1A | Ink Level Indicator | Invalid | Valid | ● | ● |
| 1B | HQ Mode | HQ 1 | HQ 2 | ○ | ○ |
| 1C | Interface Selection | Centronics | RS232C | ○ | ○ |

## Table 3-7 Function Settings (LQ Mode)

| No. | Function | ○ | ● | Default | |
|---|---|---|---|---|---|
| | | | | 120V | 200V system |
| 1 | Horizonal Print | LTR | A4 | ○ | ● |
| 2 | Page Length | 11-in. | 12-in. | ○ | ○ |
| 4 | Text Scale Mode | Invalid | | ○ | ○ |
| 5 | Short Tear Off | Invalid | Valid | ○ | ○ |
| 6 | Skip Perforation | Invalid | Valid | ○ | ○ |
| 7 | Envelope | Invalid | Valid | ○ | ○ |
| 8 | Smoothing | Invalid | Valid | ○ | ○ |
| 9 | Host Lock | Invalid | Valid | ○ | ○ |
| 10 | Auto Line Feed | Invalid | Valid | ○ | ○ |
| 11 | Inter CG | See Table 3-10 | | ○ | ○ |
| 12 | | | | ○ | ○ |
| 13 | | | | ○ | ○ |
| 14 | Character Set | Italic | Graphics | ● | ● |
| 15 | Code Page | See Table 3-9 | | ○ | ○ |
| 16 | | | | ○ | ○ |
| 17 | | | | ○ | ○ |
| 18 | | | | ○ | ○ |
| 19 | Auto Emulation | Invalid | Valid | ○ | ○ |
| 1A | Ink Level Indicator | Invalid | Valid | ● | ● |
| 1B | HQ Mode | HQ 1 | HQ 2 | ○ | ○ |
| 1C | Interface Selection | Centronics | RS232C | ○ | ○ |

## Table 3-8 Page Length

| No.02 | No.03 | Setting | Default |
|---|---|---|---|
| ○ | ○ | 11-in. | ○ |
| ○ | ● | 12-in. | |
| ● | ○ | 17-in. | |
| ● | ● | 22-in. | |

## Table 3-9 Code Page

| No.15 | No.16 | No.17 | No.18 | Setting | Default |
|---|---|---|---|---|---|
| ○ | ○ | ○ | ○ | PC437 | ○ |
| ○ | ○ | ○ | ● | PC850 | |
| ○ | ○ | ● | ○ | PC863 | |
| ○ | ○ | ● | ● | PC865 | |
| ○ | ● | ○ | ○ | PC860 | |
| ○ | ● | ○ | ● | PC857 | |
| ○ | ● | ● | ○ | PC855 | |
| ○ | ● | ● | ● | PC852 | |
| ● | ○ | ○ | ○ | PC864 | |
| ● | ○ | ○ | ● | PC869 | |
| ● | ○ | ● | ○ | PC866 | |
| ● | ○ | ● | ● | PC861 | |

## Table 3-10 International CG

| No.11 | No.12 | No.13 | Setting | Default |
|---|---|---|---|---|
| ○ | ○ | ○ | U.S.A. | ○ |
| ○ | ○ | ● | U.K. | |
| ○ | ● | ○ | Germany | |
| ○ | ● | ● | France | |
| ● | ○ | ○ | Denmark | |
| ● | ○ | ● | Sweden | |
| ● | ● | ○ | Italy | |
| ● | ● | ● | Spain | |

## 3.3 Cleaning the BJ Cartridge

Press the *ON/OFF* button and *MENU* button at the same time. The buzzer sounds once briefly, the *ONLINE* indicator blinks, and the cleaning operation starts.
When the cleaning is completed, You can make a test print of the nozzle check pattern to check the print quality. (See *3.4, "Test Print".*)

Also, the printer cleans the BJ cartridge automatically as follows:
1) When the printer is turned on after the power cord has been connected
2) After the BJ cartridge is replaced
3) After the ink cartridge is replaced.
4) After the printer is on for 72 hours following the last cartridge cleaning with a black BJ cartridge installed. When the color BJ cartridge or its ink cartridge is installed, only the first cleaning is carried out automatically after 24 hours (after that, cleaning is carried out each 72 hours).
5) After printing a prescribed number of dots

## 3.4 Test Print

This printer has a built-in self-test function that can be executed without any connection to a computer.
To make a test print, carry out the following operations:
1) Press the *MENU* button to select menu mode, then continue to press the *MENU* button for 1 second. The buzzer sounds twice and the font display is replaced by a blinking "1".
2) Press the *FWDADJ* or *REVADJ* button to select the desired number.
3) Press the *MENU* button to start the test print for the selected number.
You can also start test print No. 6 by holding down the *MENU* button until the buzzer sounds when turning the printer on.
After selecting test print mode, the other buttons function as described below until you have selected a test number.

- *POWER* button
Turns the power off, as normal.
- *ONLINE* button
Exits test print mode and places the printer online. No test print is made.
If you press the *ONLINE* button while a test print is being made, the test ends and the page is ejected. If you are printing on fanfold paper, the paper is advanced to the end of the set page length.
All other buttons are ignored.
On completion of the test print, the printer reverts to its status before entering test print mode.

**Table 3-11 Test Print Modes**

| No. | Setting | Description |
|---|---|---|
| 1 | Printing the function status sheet | Prints the FUNCTION settings displayed on the LCD in 3 languages on 1 page |
| 2* | IBM print test (BJ mode only) | Prints the specified typeface in each print mode |
| 3* | Ripple pattern | Prints the printer version, FUNCTION settings, page count, and number of printed dots per color |
| 4** | Nozzle check pattern | Prints a test pattern for checking the state of the nozzles |
| 5 | Dump mode | Prints data received by the printer in hexadecimal format |
| 6 | Demo printout | Prints a demonstration pattern for the color head (BC-21). (When using the BC-20, the color portion is printed in black.) |

* In No. 2, "IBM print test" and No. 3, "Ripple pattern", the header contains the mode, printer version, function settings, and page count and dot count per color (in units of 10,000 dots) for both the black and color BJ cartridges in the following format.

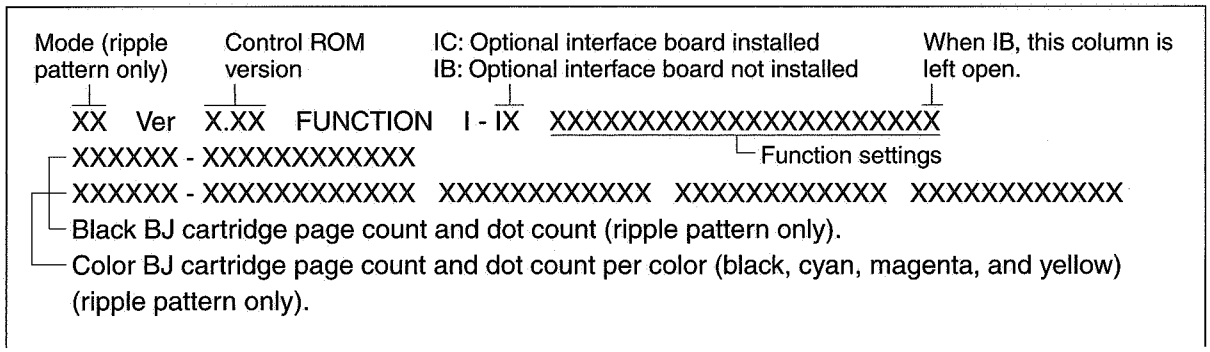



**Figure 3-23 Header**

** No. 4, "Nozzle check pattern" prints a test page for checking the condition of the BJ cartridge nozzles. If the printing is not clear, or is unstable, execute the cleaning operation again. If the print quality does not improve even after cleaning 5 times or more, replace the BJ cartridge or the ink cartridge(s).

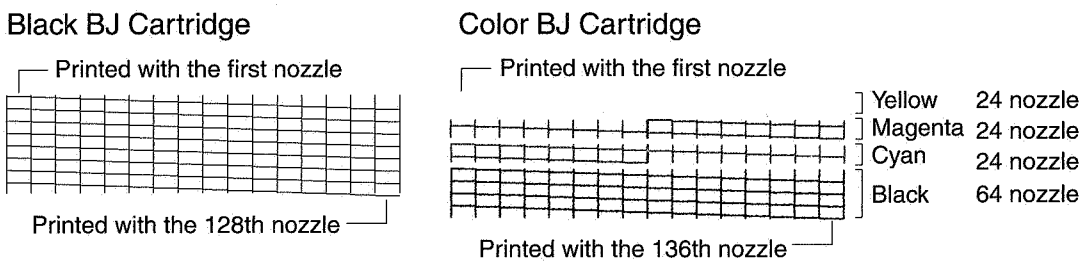



**Figure 3-24 Nozzle Check Pattern**

See *3.6, "Test Print Samples" (page 3-26)* for test print samples.

## 3.5 Service Mode

Service mode is required when replacing the waste ink absorbers, the logic board, or the EEPROM. To prevent data being deleted in error, only select service mode when absolutely necessary. When replacing the waste ink absorbers, logic board, or EEPROM, also see *Part 1, section 3.1, " EEPROM Data" (page 1-12) and Part 5, section 3.3, "Notes on Replacing the Logic Board and Waste Ink Absorbers" (page 5-8).*

Select service mode as follows:

1) Select BJ control mode.
2) Press and hold the *MENU*, *CARTRIDGE*, and *PARK* buttons together for at least 5 seconds. The buzzer sounds to indicate that service mode has been selected. When you are in service mode, the test print Nos. are followed by Nos. 7 to 12. Select a No. in the same way as when selecting a test print.

**Table 3-12 Service Mode**

| No. | Service mode |
|---|---|
| 7 | Clear waste ink counter only. |
| 8 | Clear destination country ID only (select 120V specifications) |
| 9 | Clear destination country ID only (select 230V specifications) |
| 10 | Clear EEPROM (all data) (set default to 120V specifications) |
| 11 | Clear EEPROM (all data) (set default to 230V specifications) |
| 12 | Dump count data in EEPROM to print |

See *3.3.2, "Test Print"* for Nos. 1 to 6.

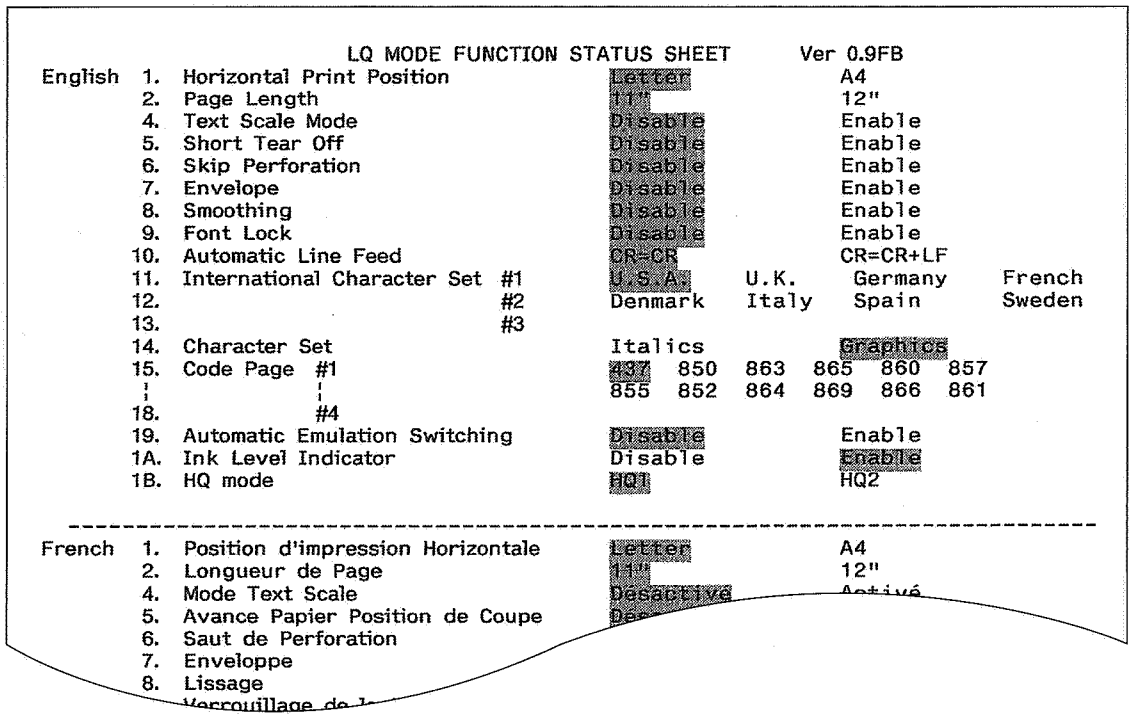
If a waste ink error occurs (F/14 blinks), select service mode by pressing the *POWER* button while pressing and holding the *FWDADJ* and *REVADJ* buttons and the *LF/FF* button (all LEDs light). Next, within 3 seconds, keep on pressing only the *ONLINE* button to start the printer with the waste ink alarm (C/1 blinks), then follow the procedure above to clear the waste ink counter. Be sure to replace the waste ink absorbers.
If you do not press the *ONLINE* button within 3 seconds of turning the power on, the printer starts with a waste ink error. In this case, repeat the procedure but press ONLINE within 3 seconds.

## 3.6 Test Print Samples

### 3.6.1 Printing the function status sheet

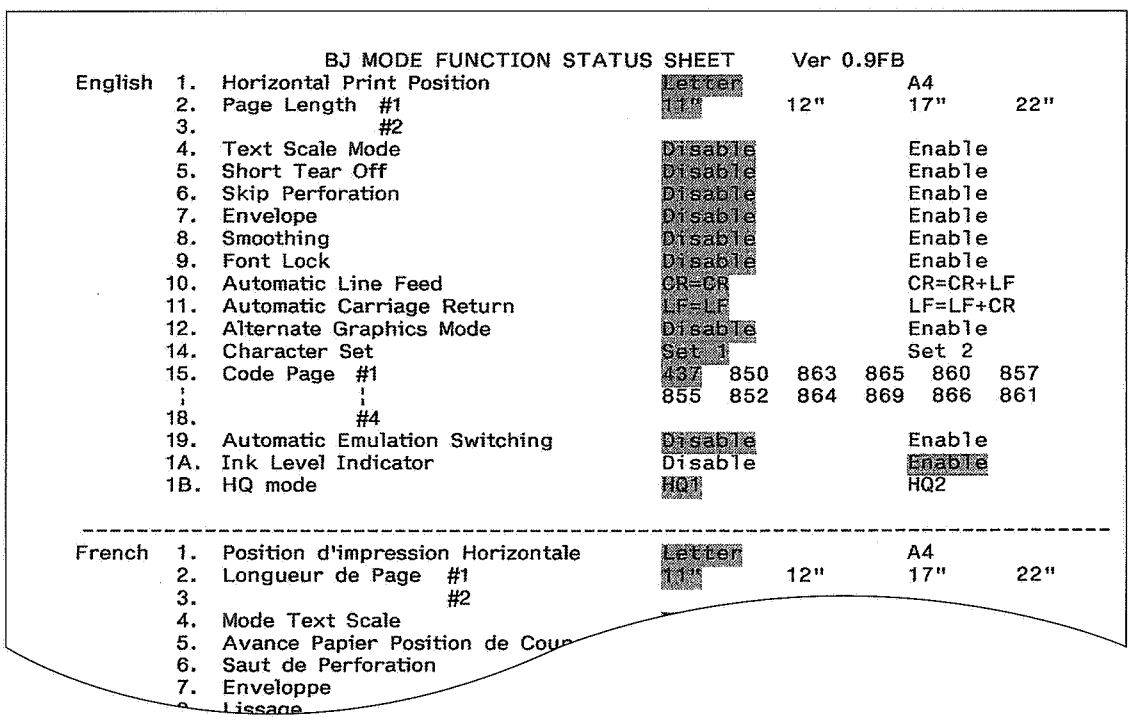
All test prints are printed in the same pattern regardless of the type of BJ cartridge installed in the printer.

LQ mode



```
                    LQ MODE FUNCTION STATUS SHEET      Ver 0.9FB
English  1.  Horizontal Print Position          Letter          A4
         2.  Page Length                        11"             12"
         4.  Text Scale Mode                    Disable         Enable
         5.  Short Tear Off                     Disable         Enable
         6.  Skip Perforation                   Disable         Enable
         7.  Envelope                           Disable         Enable
         8.  Smoothing                          Disable         Enable
         9.  Font Lock                          Disable         Enable
        10.  Automatic Line Feed                CR=CR           CR=CR+LF
        11.  International Character Set  #1    U.S.A.    U.K.    Germany    French
        12.                               #2    Denmark   Italy   Spain      Sweden
        13.                               #3
        14.  Character Set                      Italics         Graphics
        15.  Code Page  #1                      437  850  863  865  860  857
         ¦               ¦                      855  852  864  869  866  861
        18.             #4
        19.  Automatic Emulation Switching      Disable         Enable
        1A.  Ink Level Indicator                Disable         Enable
        1B.  HQ mode                            HQ1             HQ2

 ------------------------------------------------------------------------
French   1.  Position d'impression Horizontale  Letter          A4
         2.  Longueur de Page                   11"             12"
         4.  Mode Text Scale                    Desactivé       Activé
         5.  Avance Papier Position de Coupe    Des
         6.  Saut de Perforation
         7.  Enveloppe
         8.  Lissage
             Verrouillage de l
```

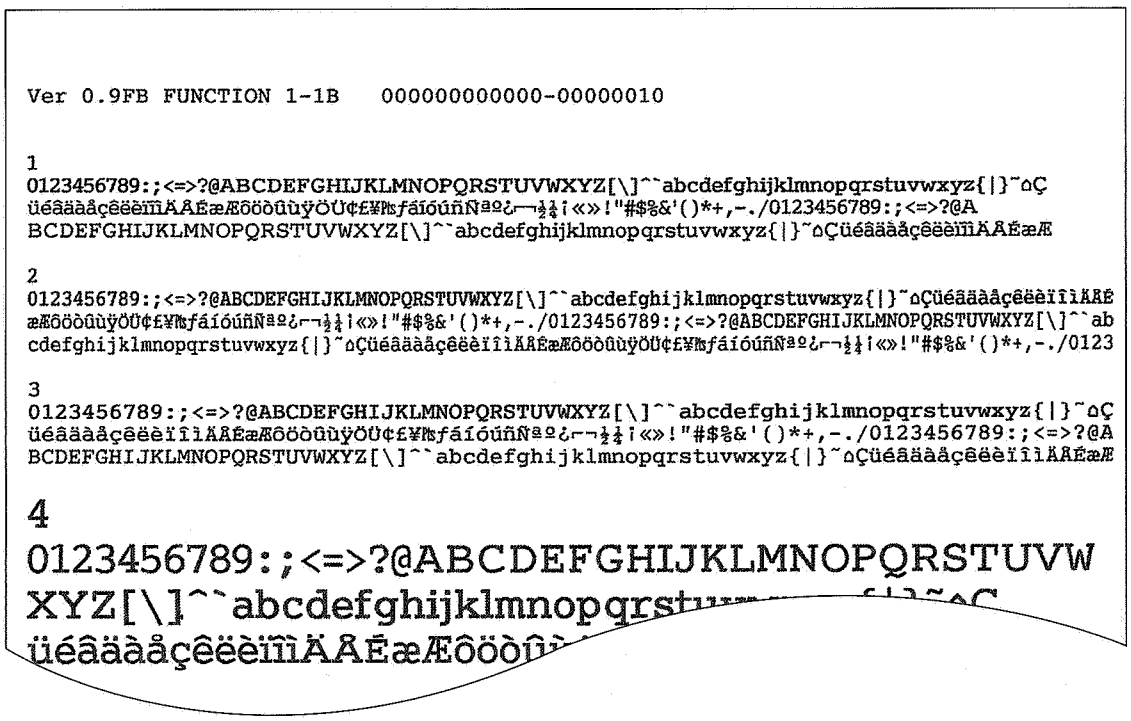
BJ mode



```
                    BJ MODE FUNCTION STATUS SHEET      Ver 0.9FB
English  1.  Horizontal Print Position          Letter          A4
         2.  Page Length  #1                    11"      12"    17"      22"
         3.               #2
         4.  Text Scale Mode                    Disable         Enable
         5.  Short Tear Off                     Disable         Enable
         6.  Skip Perforation                   Disable         Enable
         7.  Envelope                           Disable         Enable
         8.  Smoothing                          Disable         Enable
         9.  Font Lock                          Disable         Enable
        10.  Automatic Line Feed                CR=CR           CR=CR+LF
        11.  Automatic Carriage Return          LF=LF           LF=LF+CR
        12.  Alternate Graphics Mode            Disable         Enable
        14.  Character Set                      Set 1           Set 2
        15.  Code Page  #1                      437  850  863  865  860  857
         ¦               ¦                      855  852  864  869  866  861
        18.             #4
        19.  Automatic Emulation Switching      Disable         Enable
        1A.  Ink Level Indicator                Disable         Enable
        1B.  HQ mode                            HQ1             HQ2

 ------------------------------------------------------------------------
French   1.  Position d'impression Horizontale  Letter          A4
         2.  Longueur de Page  #1               11"      12"    17"      22"
         3.                    #2
         4.  Mode Text Scale
         5.  Avance Papier Position de Coup
         6.  Saut de Perforation
         7.  Enveloppe
             Lissage
```

### 3.6.2 IBM test prints

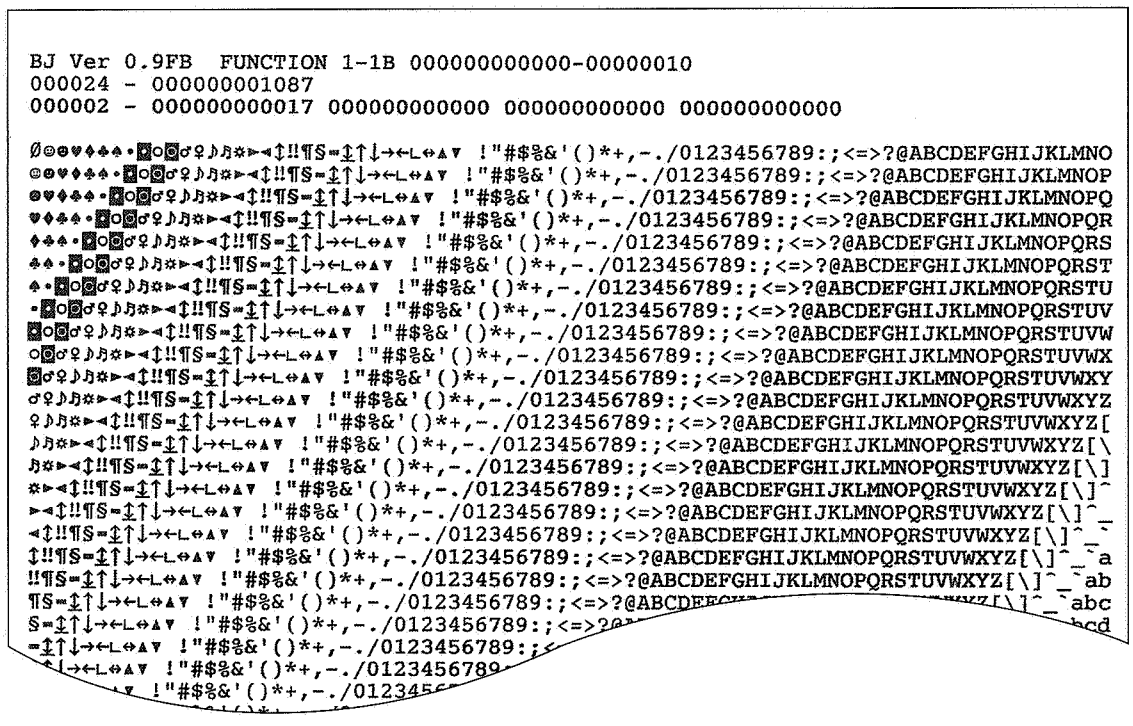
IBM test prints can be printed only in BJ mode



```
Ver 0.9FB FUNCTION 1-1B   000000000000-00000010

1
0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^`abcdefghijklmnopqrstuvwxyz{|}~⌂Ç
üéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒáíóúñÑªº¿⌐¬½¼¡«»!"#$%&'()*+,-./0123456789:;<=>?@A
BCDEFGHIJKLMNOPQRSTUVWXYZ[\]^`abcdefghijklmnopqrstuvwxyz{|}~⌂ÇüéâäàåçêëèïîìÄÅÉæÆ

2
0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^`abcdefghijklmnopqrstuvwxyz{|}~⌂ÇüéâäàåçêëèïîìÄÅÉ
æÆôöòûùÿÖÜ¢£¥₧ƒáíóúñÑªº¿⌐¬½¼¡«»!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^`ab
cdefghijklmnopqrstuvwxyz{|}~⌂ÇüéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒáíóúñÑªº¿⌐¬½¼¡«»!"#$%&'()*+,-./0123

3
0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^`abcdefghijklmnopqrstuvwxyz{|}~⌂Ç
üéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒáíóúñÑªº¿⌐¬½¼¡«»!"#$%&'()*+,-./0123456789:;<=>?@A
BCDEFGHIJKLMNOPQRSTUVWXYZ[\]^`abcdefghijklmnopqrstuvwxyz{|}~⌂ÇüéâäàåçêëèïîìÄÅÉæÆ

4
0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVW
XYZ[\]^`abcdefghijklmnopqrst
üéâäàåçêëèïîìÄÅÉæÆôöòûù
```

### 3.6.3 Ripple pattern

All test prints are printed in the same pattern regardless of the type of BJ cartridge installed in the printer. However, "LQ" or "BJ" is printed in the top left of the page to indicate the selected print control mode.

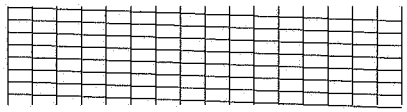


```
BJ Ver 0.9FB  FUNCTION 1-1B 000000000000-00000010
000024 - 000000001087
000002 - 000000000017 000000000000 000000000000 000000000000

Ø☺☻♥♦♣♠•◘○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
☺☻♥♦♣♠•◘○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOP
☻♥♦♣♠•◘○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQ
♥♦♣♠•◘○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQR
♦♣♠•◘○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRS
♣♠•◘○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRST
♠•◘○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTU
•◘○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUV
◘○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVW
○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWX
◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXY
♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[
♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\
♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]
☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^
►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`
↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`a
‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`ab
¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abc
§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcd
▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcde
↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdef
↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefg
↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefgh
→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghi
←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghij
∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijk
↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijkl
▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklm
▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmn
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
```

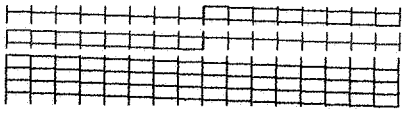
### 3.6.4 Nozzle check pattern

All test prints are printed in the same pattern regardless of printer control mode.

Black BJ Cartridge



Color BJ Cartridge



### 3.6.5 Dump mode

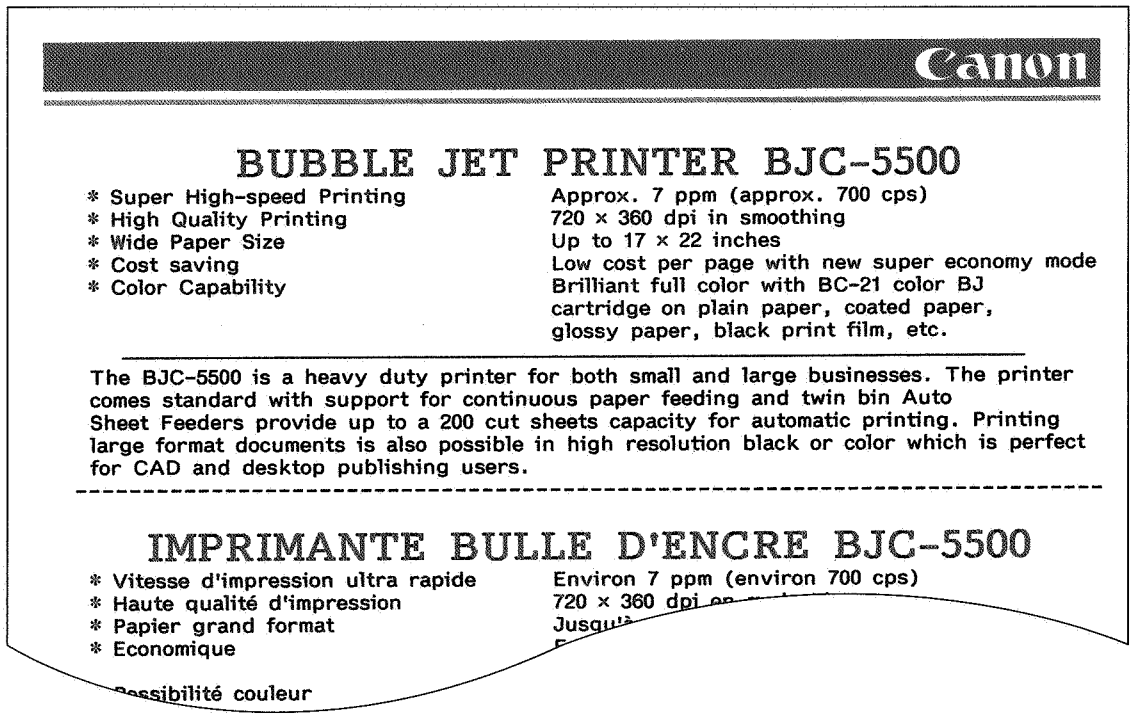
The printer prints out received data in hexadecimal regardless of the operating mode and the type of BJ cartridge installed in the printer.

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F ¦ ................
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F ¦ ................
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F ¦  !"#$%&'()*+,-./
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F ¦ 0123456789:;<=>?
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F ¦ @ABCDEFGHIJKLMNO
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F ¦ PQRSTUVWXYZ[\]^_
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F ¦ `abcdefghijklmno
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F ¦ pqrstuvwxyz{|}~.
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F ¦ ................
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F ¦ ................
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF ¦ ................
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF ¦ ................
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF ¦ ................
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF ¦ ................
E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 EA EB EC ED EE EF ¦ ................
F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FB FC FD FE FF ¦ ................
0D 0A 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D ¦ ................
0E 0F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D ¦ ................
1E 1F 20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D ¦ .. !"#$%&'()*+,-
2E 2F 30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D ¦ ./0123456789:;<=
3E 3F 40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D ¦ >?@ABCDEFGHIJKLM
4E 4F 50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D ¦ NOPQRSTUVWXYZ[\]
5E 5F 60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D ¦ ^_`abcdefghijklm
6E 6F 70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D ¦ nopqrstuvwxyz{|}
7E 7F 80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D ¦ ~
8E 8F 90 91 92 93 94 95 96 97 98 99 9A 9B 9C
9E 9F A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA
AE AF B0 B1 B2 B3 B4 B5 B6 B7 B8 B9
CF C0 C1 C2 C3 C4 C5 C6 C7
```

### 3.6.6 Demonstration printout

All test prints are printed in the same pattern regardless of the printer control mode.

Color BJ cartridge



Canon

BUBBLE JET PRINTER BJC-5500

| | |
|---|---|
| * Super High-speed Printing | Approx. 7 ppm (approx. 700 cps) |
| * High Quality Printing | 720 x 360 dpi in smoothing |
| * Wide Paper Size | Up to 17 x 22 inches |
| * Cost saving | Low cost per page with new super economy mode |
| * Color Capability | Brilliant full color with BC-21 color BJ cartridge on plain paper, coated paper, glossy paper, black print film, etc. |

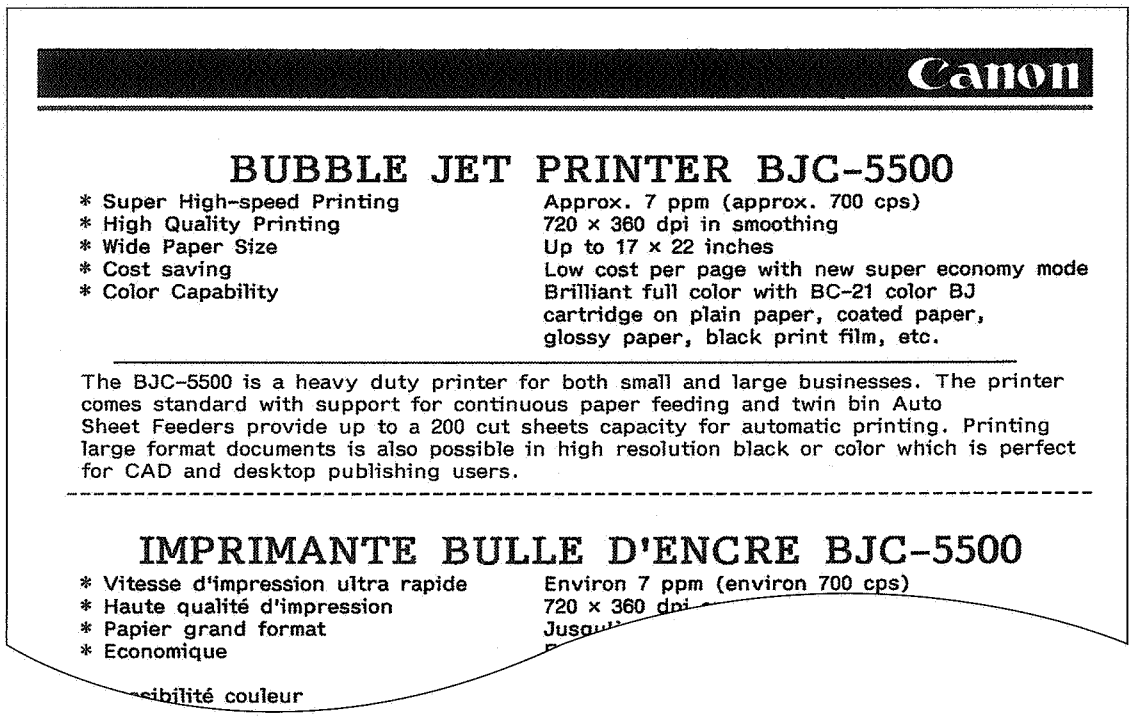
The BJC-5500 is a heavy duty printer for both small and large businesses. The printer comes standard with support for continuous paper feeding and twin bin Auto Sheet Feeders provide up to a 200 cut sheets capacity for automatic printing. Printing large format documents is also possible in high resolution black or color which is perfect for CAD and desktop publishing users.

IMPRIMANTE BULLE D'ENCRE BJC-5500

| | |
|---|---|
| * Vitesse d'impression ultra rapide | Environ 7 ppm (environ 700 cps) |
| * Haute qualité d'impression | 720 x 360 dpi en |
| * Papier grand format | Jusqu |
| * Economique | |

ssibilité couleur

Black BJ cartridge



Canon

BUBBLE JET PRINTER BJC-5500

| | |
|---|---|
| * Super High-speed Printing | Approx. 7 ppm (approx. 700 cps) |
| * High Quality Printing | 720 x 360 dpi in smoothing |
| * Wide Paper Size | Up to 17 x 22 inches |
| * Cost saving | Low cost per page with new super economy mode |
| * Color Capability | Brilliant full color with BC-21 color BJ cartridge on plain paper, coated paper, glossy paper, black print film, etc. |

The BJC-5500 is a heavy duty printer for both small and large businesses. The printer comes standard with support for continuous paper feeding and twin bin Auto Sheet Feeders provide up to a 200 cut sheets capacity for automatic printing. Printing large format documents is also possible in high resolution black or color which is perfect for CAD and desktop publishing users.

IMPRIMANTE BULLE D'ENCRE BJC-5500

| | |
|---|---|
| * Vitesse d'impression ultra rapide | Environ 7 ppm (environ 700 cps) |
| * Haute qualité d'impression | 720 x 360 dpi |
| * Papier grand format | Jusqu |
| * Economique | |

sibilité couleur

Blank page

# Part 4

# TECHNICAL REFERENCE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| 4 - 1 | 1.1 Printer Diagram |
| 4 - 2 | 1.2 Initialization Flowchart |
| 4 - 3 | 1.3 Print Signal Flow to BJ Head |
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# 1. OVERVIEW

This section describes powering up, the flow of print signals, print drive, and processes performed and controls implemented when the power is turned off.

## 1.1 Printer Diagram

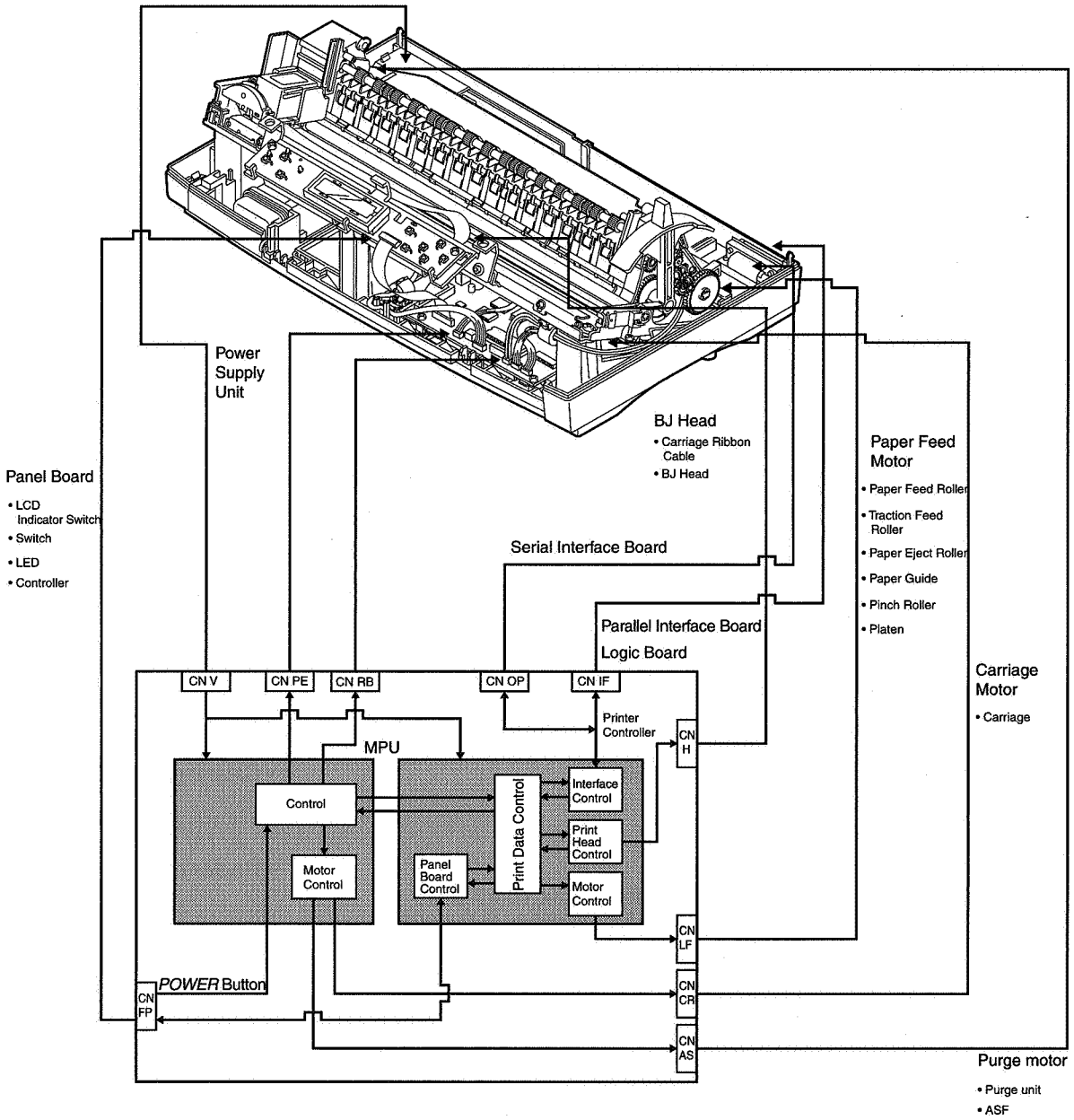
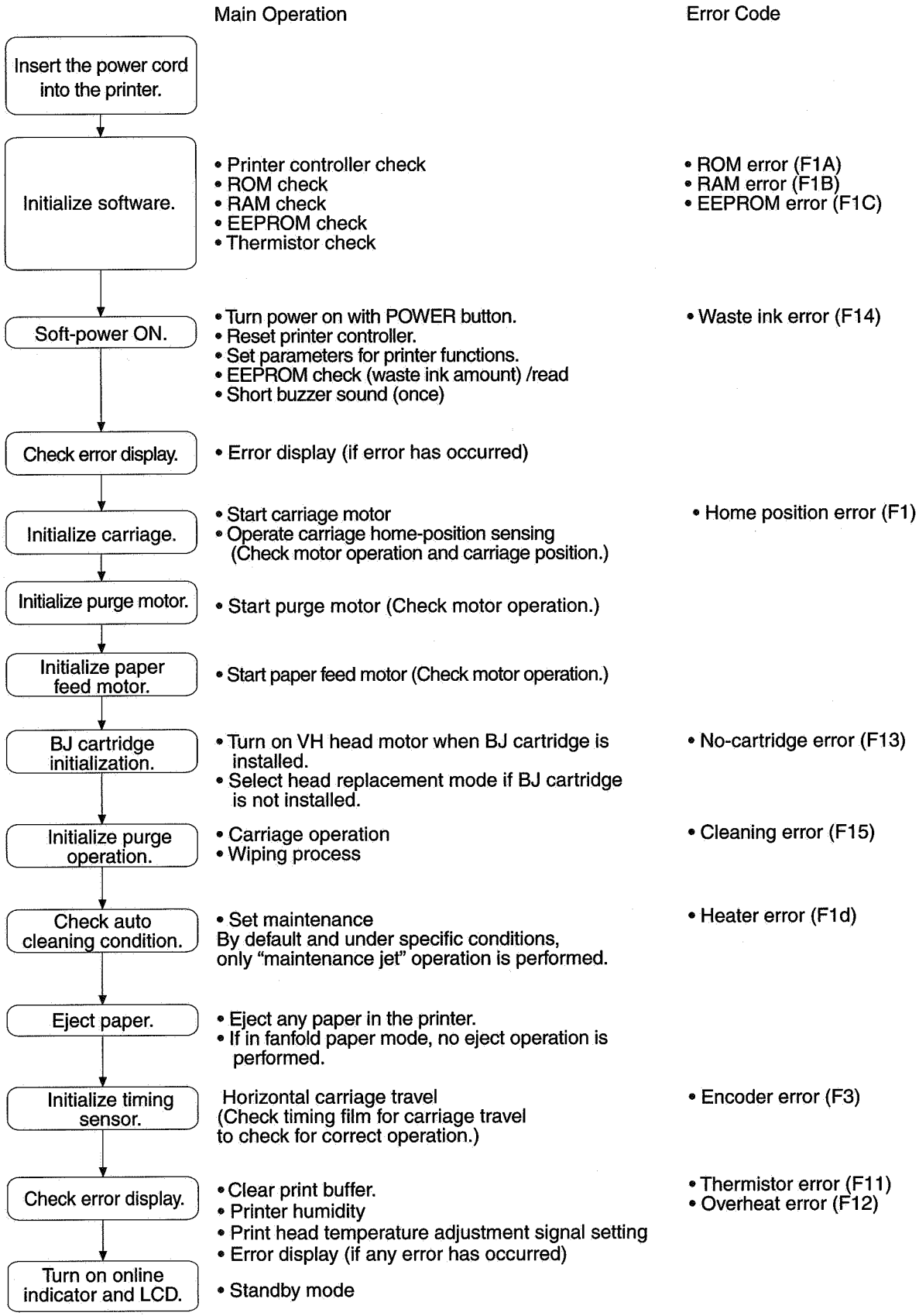



**Figure 4-1 Printer Block Diagram**

## 1.2 Initialization Flowchart



## 1.3 Print Signal Flow to BJ Head

Reference: *Section 4.2.2, "Logic section components"*

a) Print data (including the control signals) output by the host computer is received by the printer controller on the logic board through the parallel interface (or optional RS232C serial interface). The print data is then stored in the DRAM's receive buffer area.

b) The print data in the receive buffer is sent to the printer controller and separated into control commands and print data.

c) The print data is expanded in the DRAM print buffer while the control commands are processed in the printer controller.

d) Using the MPU's control timing, the printer controller reads the print data from the DRAM print buffer according to the print start request command stored in the DRAM.
At the same time, control signals are read from the control ROM into the printer controller.

e) The printer controller converts the parallel print data into serial data and outputs the serial data as print drive signals to the bubble jet head to complete the printing operation.

f) The MPU controls the driving of the entire printing operation by controlling the printer controller, control ROM, and motor drivers and detecting the status of the bubble jet head, etc.

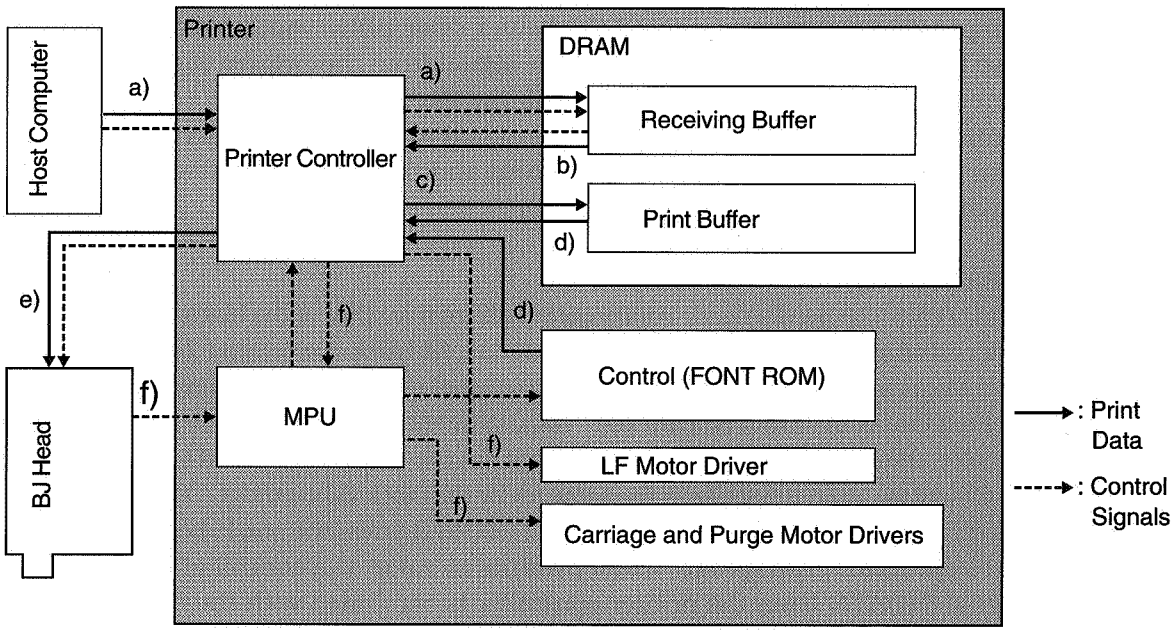



**Figure 4-2 Print Signal Data Flow**

## 1.4 Print Drive

Reference: *Section 3.2, "BJ (Ink) Cartridge"*

The print drive signals from the printer controller are sent via the carriage's connector cable to the head signal contacts. Independently, the printer controller sends the control signals for ejecting ink from the head's nozzles via the signal contacts. The control signals include drive control signals for ejecting the ink from the head's nozzles and the head temperature adjustment signals for maintaining a constant rate of ink ejection. The signal timing is adjusted to obtain optimum printing.

### 1.4.1 Print 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). Each block is further divided into odd and even blocks of nozzles (8 nozzles each). The odd and even blocks eject ink simultaneously. The control signals for the former are the BLOCK ENABLE 1, 2, and 3 signals (BENB 1, 2, and 3) and for the latter the signals are the even/odd enable signals (EVEN/ODD ENB). However, when the drive frequency is 10KHz or greater (and when smoothing mode is selected), EVEN ENB and ODD ENB are output simultaneously. To account for any deviation in the printing position as a result of the carriage drive, the order in which the signals are output is reversed each time the carriage changes its direction of travel to optimize nozzle alignment. They drive frequency differs according to the print mode and the installed cartridge. (See *Section 2.2, "Print Modes."*) Heat ENB 0 and 1 (HENB), which are the heater drive control signals for ejecting the ink, consist of a pre-pulse and main pulse. The constantly achieve optimal 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. Also, the printing drive signal from the printer controller is transferred to the shift register according to the HLATCH timing.
The printing control signal and heater drive signal are output together, and the heater for the applicable nozzles is then driven and the ink is ejected while the printing drive signal (HDATA) is latched.

**b) Color BJ cartridge drive control**

The color BJ cartridge head's nozzle configuration differs from that of the black BJ cartridge. (The color cartridge has a total of 136 nozzles including 64 black nozzles and 24 nozzles each for Yellow, Magenta, and Cyan.) Therefore, the number of nozzles in each control block is different from that of the black BJ cartridge. Also, since the heaters are driven simultaneously for each color, the heater drive control signals used are the heat enable (HENB) 0, 1, 2, and 3 signals. Otherwise, everything else is the same as for the black BJ cartridge. HENB 0, 1, and 2 signals drive the nozzle heaters for Y, M, and C. HENB 3 drives the nozzle heater for black. To ensure optimum print quality when printing in color, the control of the print drive signal (HDATA) from the printer controller is combined with the drive control.

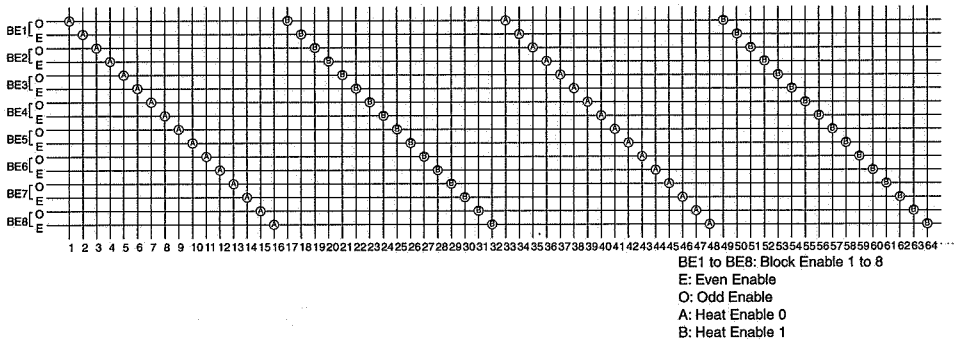
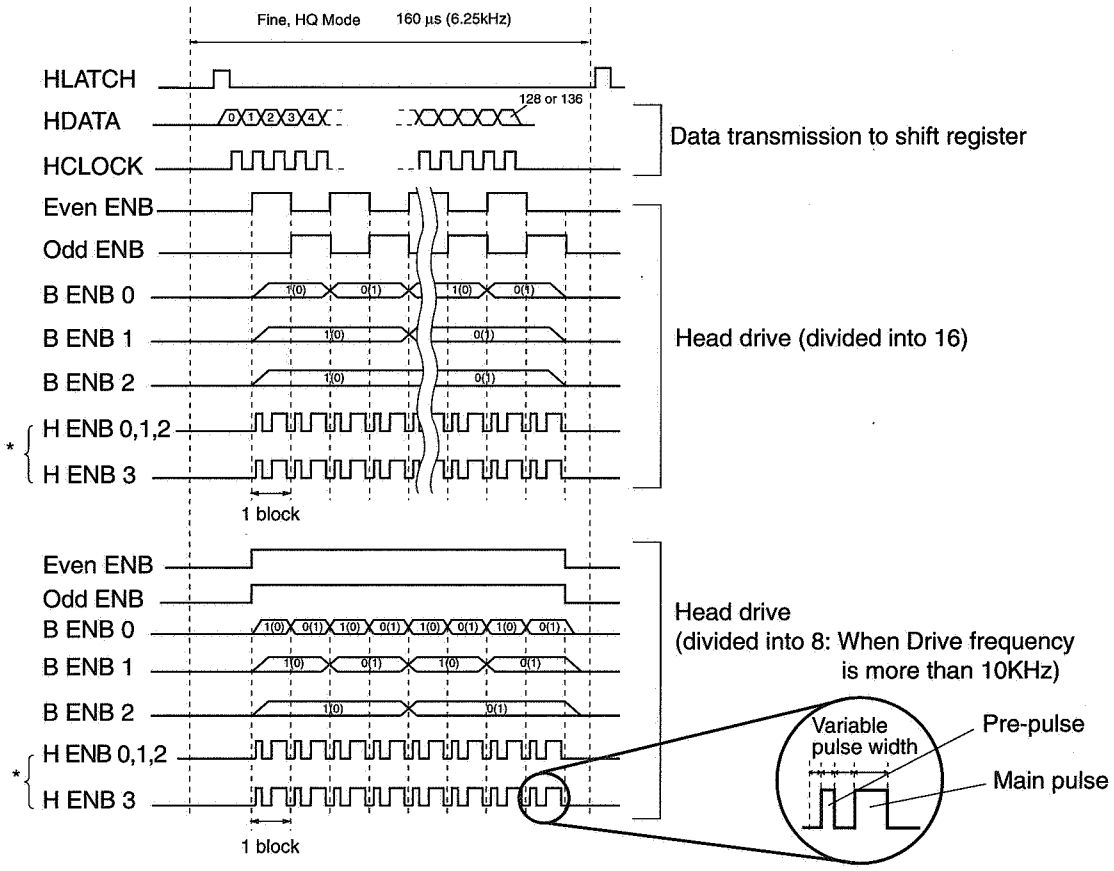


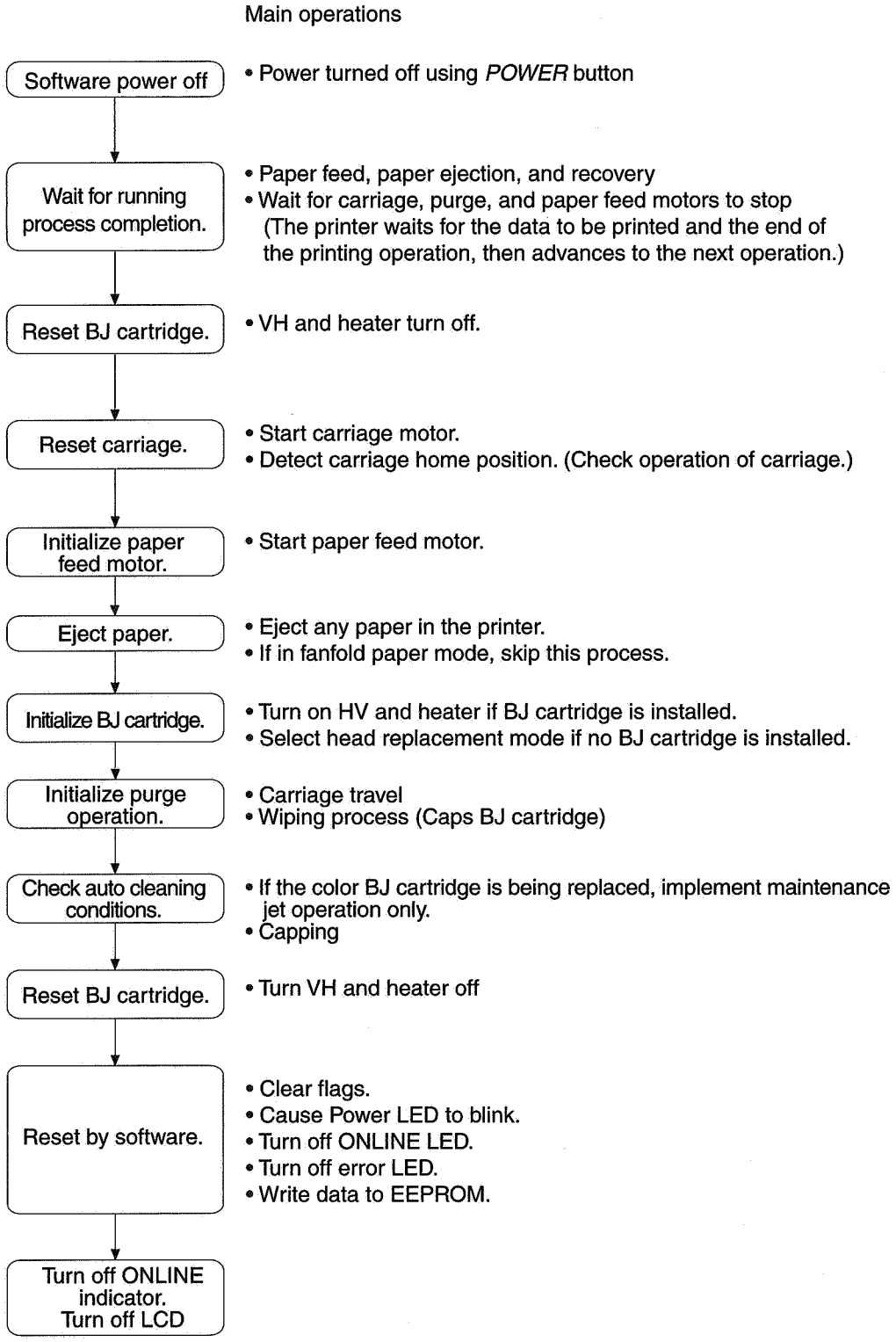

**Figure 4-3 Print Sequence (Black BJ Cartridge in HQ Mode)**




* HENB signal
  Black BJ cartridge: HENB0 and 1 only
  Color BJ cartridge: HENB0, 1, and 2 (YMC), and HENB3 (BK)
* When the carriage travels from right to left in bidirectional printing, the order of Odd ENB/Even ENB, and B ENB0, 1, and 2 is reversed (from left to right in the figure)

**Figure 4-4 Print Signals (Return travel printing with a Black BJ Cartridge)**

## 1.5 Power Off Flowchart




CAUTION

If the power cord is disconnected before the printer is turned off with the *POWER* button, the cartridge head might not be capped. In this case, reconnect the power cord, start up the printer again, then turn off the printer with the *POWER* button. The power cord may then be disconnected.

# 2. FIRMWARE

## 2.1 Interface

The printer supports the bidirectional Centronics interface standard (IEEE P1284).
The printer is standard equipped with the Centronics parallel interface board. You can also optionally install an RS232C serial interface board.
The RS232C interface boards convert the received data to standard Centronics specification (IBM-PC-compatible) parallel data. The signal lines from the connectors of the standard parallel interface board or optional interface boards are integrated in the printer's logic board. The signal lines are switched from the control panel electrically according to the selected interface board. The data is then sent to the printer's signal control block.

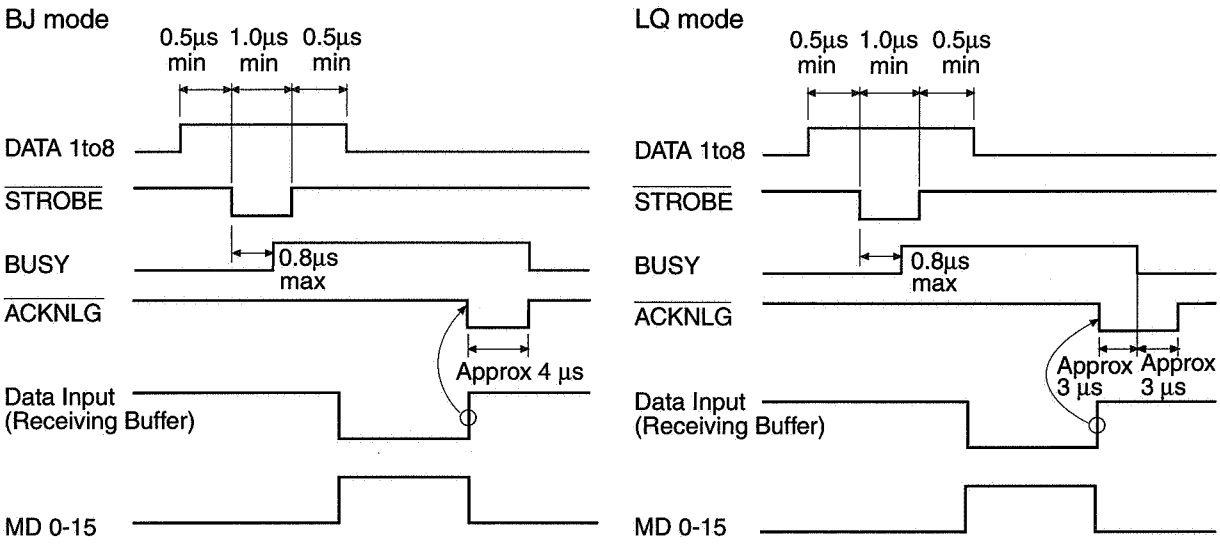
### 2.1.1 Compatibility with bidirectional Centronics interface standard

Interface signals can be exchanged only in compatible mode. Bidirectional data transfer is not supported. Nibble mode can only be used to send the device ID to the host computer, and with the standard parallel interface board. Only compatible mode can be used with the optional serial interface board(s).
In compatible mode, data is exchanged using the conventional Centronics interface protocols.
In nibble mode, data is sent from the printer to the host computer in two 4-bit units. Data is sent by handshaking using PtrClk and HostBusy signals. When sending data, the printer checks for a fall in the HostBusy signal then sets the PtrClk signal Low and outputs the lower 4 bits of data to the control signal lines. The host computer sets the HostBusy signal High when PtrClk changes to Low. Next, the printer checks for the 2nd fall in the HostBusy signal, then outputs the high 4 bits of data to the control signal lines. After HostBusy changes to High, the printer status changes to idle and waits for the next data transmission if there is no more data to send and the DataAvail signal is High.

### 2.1.2 Parallel interface signal exchange

The parallel interface transfers data in 8-bit units. Data is transferred using the $\overline{\text{STROBE}}$, BUSY, and $\overline{\text{ACKNLG}}$ signals.
When the printer receives data (Data1 to 8) from the host computer and the $\overline{\text{STROBE}}$ signal is input, the printer controller in the printer outputs a BUSY signal when the $\overline{\text{STROBE}}$ signal changes to Low and latches the data. After the BUSY signal has been output, the latched data is read into the DRAM receive buffer. The printer controller outputs an $\overline{\text{ACKNLG}}$ signal when the data has been written to the DRAM receive buffer, then sets the BUSY signal to LOW according to the timing for BJ and LQ modes, respectively, then waits for the next data to be input from the host computer.

### Compatible mode




### Nibble mode

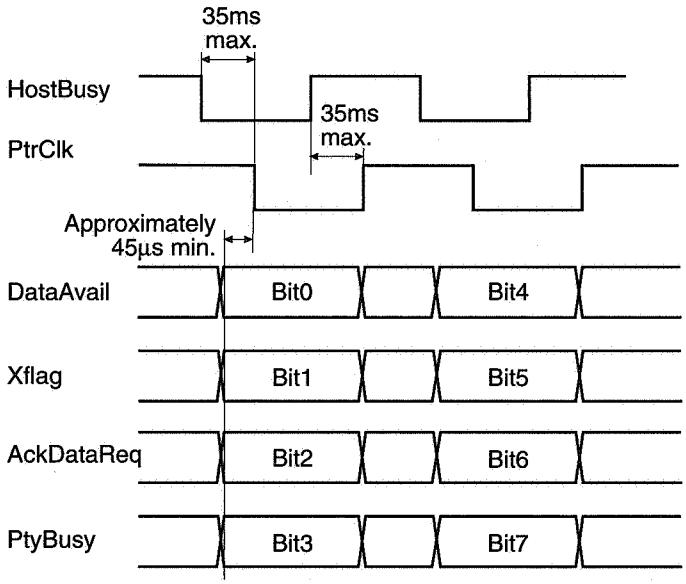



**Figure 4-5 Parallel Interface Signal Timing Chart**

### 2.1.3 Serial interface signal exchange

Both DTR pacing and XON/XOFF handshaking protocols are supported. Dipswitch No. 8 on the interface board selects the effective protocol.

NOTE

See the interface board manual and *Section 1.3.3, "Interface Boards" (page 3-11) in Part 3, "Operation"* in this manual for details of the settings and specifications of the dispatches, sliding switches, and jumpers.

**a) DTR Pacing**

Data is sent using DTR signal handshaking.

1. The printer can accept data when the DSR signal from the host computer is at the SPACE (High) level.
2. When the DTR signal level changes from MARK (Low) to SPACE (High), data transfer from the host computer is enabled and data (RD) is received.
3. When the printer status changes to BUSY (buffer full, paper out, or other error, or is offline), the DTR signal level changes from SPACE to MARK to stop data being sent from the host computer.

**b) XON/XOFF Protocol**

Data is sent using handshaking using the XON and XOFF character signals, which are output at 1-sec. intervals.

1. When you select XON/XOFF protocol, the DTR and RTS signals are fixed to the SPACE (High) level.
2. In this mode, the XON/XOFF signals are output only when the CTS signal from the host computer is at the SPACE (High) level.
3. The printer can receive data when the DSR signal from the host computer is at the SPACE (High) level.
4. The printer outputs XON (11H) when it can receive data, then receives the data (RD). If BUSY (buffer full, paper out, or other error, or the printer is offline), it outputs XOFF (13H) to stop data being sent from the host computer.

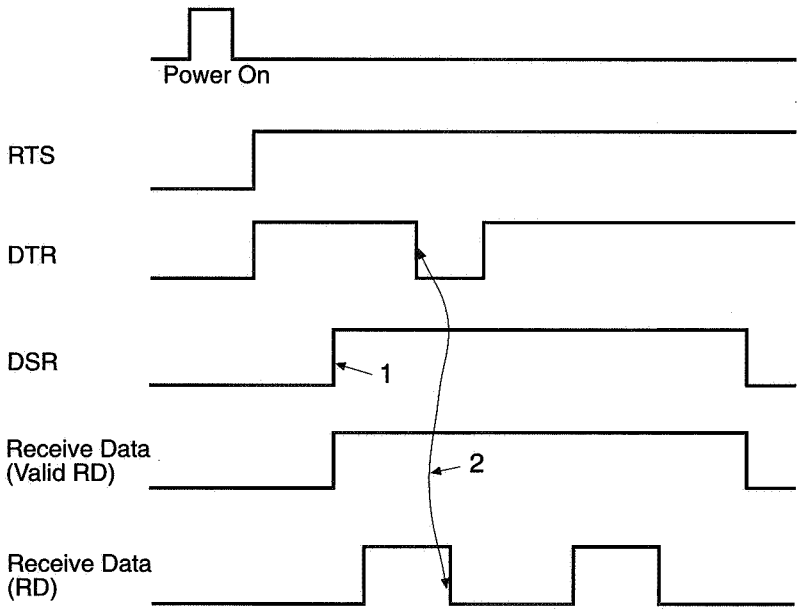
NOTE

Using either protocol, data is ignored regardless of the status of the DTR signal if the DSR signal level is MARK.

**c) Managing receiving buffer availability**

The printer status changes to BUSY to stop data being sent from the host computer when there are 256 or fewer bytes available in the receiving buffer. Data continues to be input until there is no available space in the receiving buffer after which all data is ignored. The printer status changes back to ready when there are more than 256 bytes available in the receiving buffer, enabling data to be sent from the host computer.

DTR Pacing Timing




XON/XOFF Timing

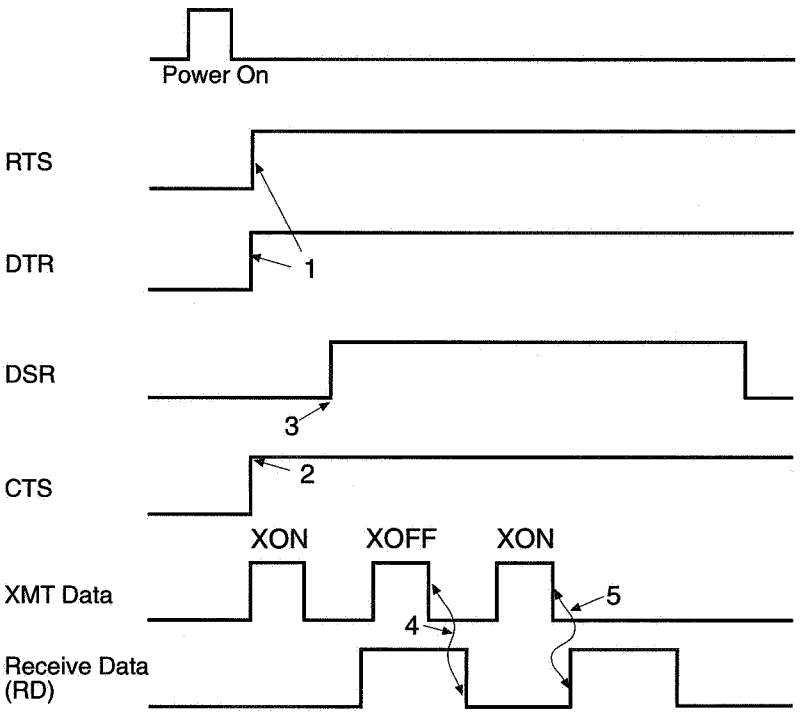



**Figure 4-6 Serial Interface Signal Timing Chart**

## 2.2 Print Modes

Depending on the cartridge installed, the selected print mode, and the printing data, etc., the printer varies the carriage movement, the carriage drive frequency, and the cartridge drive frequency, etc., to attain high-quality printing without any bleeding or shifting in the printout.
Print modes are described below.

### 2.2.1 With black BJ cartridge installed

**Table 4-1 Printing Mode and Drive**

| Printing mode | Carriage operation | Carriage drive frequency (KHz) | Data processing |
|---|---|---|---|
| ECO | 1-pass/unidirectional printing (bidirectional printing) *1 | 12.5 | Thinning using approx. 32% original mask pattern |
| HS | 1-pass/unidirectional printing (bidirectional printing) *1 | 12.5 | Approx. 50% thinning |
| HQ | 1-pass/unidirectional printing (bidirectional printing) *1 | (6.25)*2 | |
| FINE | 4-pass/unidirectional printing | 10.0 | Printing divided into four passes |
| Smoothing | 1-pass/unidirectional printing (1/720-in. pitch) | 5.0 | See *Section 2.3.1, "Smoothing."* |

*1 The printer automatically selects unidirectional or bidirectional printing according to the data it receives.
*2 In BJ and LQ modes, this frequency is selected when function 1b (HQ mode) is selected.
When using the special driver, the carriage drive frequency is automatically set to 6.25 if you select HQ print mode and a media other than plain paper.

### 2.2.2 With color BJ cartridge installed

**Table 4-2 Printing Mode and Drive**

| Printing mode | Carriage operation | Carriage drive frequency (KHz) | Data processing |
|---|---|---|---|
| HS (BK mode) | 1-pass/unidirectional printing (bidirectional printing) *1 | 10.0 | Thinning using approx. 32% original mask pattern |
| HQ (BK mode) | 1-pass/unidirectional printing (bidirectional printing) *1 | 6.25 | |
| FINE (BK mode) | 4-pass/unidirectional printing | 6.25 | Printing divided into four passes |
| HS (COLOR mode) | 1-pass/unidirectional printing | 10.0 | BK: Approx. 50%, Colors: each thinned using approx. 37.5% original mask pattern |
| COLOR NORMAL*2 | 1-pass/unidirectional printing | 6.25 | Color boundary processing *3 |
| COLOR HQ | 1-pass or 3-pass/ unidirectional printing | 6.25 | Color boundary detection processing *4 |
| FINE (COLOR mode) | 3-pass/unidirectional printing | 6.25 | Printing divided into 3 passes |

*1 The printer automatically selects unidirectional or bidirectional printing according to the data it receives.

*2 When HQ mode is selected in emulation mode, color is processed as per COLOR NORMAL.

*3 During internal processing of the print data, the printer detects the boundaries between colors and divides the print timing. If the black part is on the boundary, the printer prints black by using thinning and a mixture of cyan and black inks. By doing so, and, when superimposing inks, by printing only after the ink from the previous pass has dried, bleeding is prevented and the outline at the boundary becomes clearer.

*4 During internal processing of the print data, the printer identifies the boundaries between colors and divides the print timing and varies the number of carriage passes to 1 or 3 times. By so doing, bleeding is prevented when superimposing inks by printing only after the ink from the previous pass has dried.

## 2.3 Control Functions Affecting the Printing Process

During internal processing of the print data, the printer automatically differentiates between different types of data and performs the following processes.

### 2.3.1 Smoothing

When printing in HQ mode with a black BJ cartridge installed, the smoothing function allows high-resolution printing at 720dpi (horizontal) in which the edges of letters are smoothed. Smoothing is achieved by adding or deleting dots along the edges of the letters, or by shifting the dots horizontally by half a dot and printing them over the next dots. Smoothing stops the letters having jagged edges and achieves the equivalent of twice the horizontal resolution. Because the carriage travel slows down, printing is slower than in other modes.

Note that the smoothing function cannot be used in the following cases:

- When a color BJ cartridge is installed;
- When in ECO, HS, or FINE print mode.

Also, in the following cases, the printed characters or graphics may not appear any different with or without smoothing:

- TrueType fonts;
- Outline fonts;
- Shading;
- Graphics.

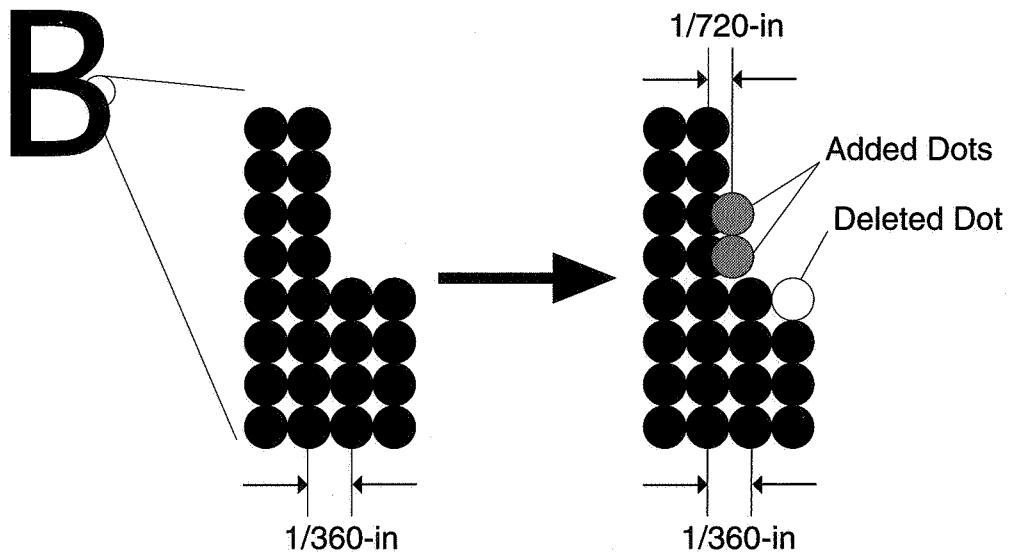



**Figure 4-7 Smoothing**

### 2.3.2 Automatic emulation switching

The printer analyzes the control commands received from the host computer and determines whether it is in BJ or LQ mode. The emulation mode is switched automatically. Automatic emulation switching is enabled by setting function setting "19" ON (●).

#### Control command recognition

By recognizing the control command received from the host computer, the printer can determine which emulation mode to select. The printer determines the emulation mode when the control command is received at any of the following times: After the power is turned on, no printing data has been received, or no printing data has been received for over 10 seconds, and when the printer has no printing data.

#### Switching the emulation mode

The emulation mode is switched automatically at any of the following times: When the printer has received more than 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 printer has been placed offline before over 512 bytes of data has been received or before over 3 seconds of data reception.

When shipped from the factory, or when the EEPROM is reset, automatic emulation switching is invalid and BJ mode is selected. After automatic emulation switching has been selected, the previous mode is valid.
When the power is turned on, the mode stored in the EEPROM is valid.
When using the special print driver, Canon extended mode is valid regardless of the above flow.

There are certain control commands which the printer cannot determine which emulation mode to select from. If the emulation mode set automatically is not the right one, turn off automatic emulation switching and select the correct emulation mode from the control panel.

### 2.3.3 Ink smear control

After the printed sheet is ejected from the printer, the ink dries naturally while on the paper output tray. If the next printed sheet is ejected before the ink has dried on the preceding sheet on the paper output tray, the ink may be smeared as the sheet slides over it. To prevent this, a wait is applied during printing so that the sheet is ejected with a delay, giving time for the ink on the preceding sheet to dry. This control is only applied when a black BJ cartridge is installed and heavy duty printing. The printer automatically detects the position of the heavy duty printing on the previously ejected sheet and applies this control.

### 2.3.4 Head overheat protection control

With continuous heavy duty printing and when printing is continued after the ink has run out, the bubble jet head may get very hot. If the print head overheats, it not only causes poor printing and operational errors but may also result in the head itself being damaged. To prevent this, the head is equipped with a temperature sensor that triggers protection control.

Protection level 1: Printing operations are as normal but, to prevent the user from touching the bubble jet head's hot aluminum plate, the carriage is stopped before the replacement position so that the BJ cartridge cannot be replaced.

Protection level 2: Printing is performed in one direction only with a 3.5-sec. delay after each line is printed, thereby suppressing any further rise in temperature. This continues for more than 20 seconds and the head temperature is again sampled. If the head has cooled, normal printing is resumed. If not, the same process is continued.

Protection level 3: If the temperature continues to rise, a head temperature error occurs and the printing operation stops.

# 3. PRINTER MECHANICAL SYSTEM

## 3.1 Overview

Structurally, the printer consists of the BJ cartridge and ink cartridge(s), the purge mechanism, the paper feed mechanism, the paper printing, transport, and ejection mechanism, and the carriage unit.

There are three motors: a paper feed motor, carriage motor, and purge motor.

- Paper feed motor: tractor feed drive, paper transport, and manual/ASF paper pick up and transport.
- Carriage motor: carriage drive, carriage operation for head maintenance.
- Purge motor: Purge operation, paper pick up when ASF is installed.

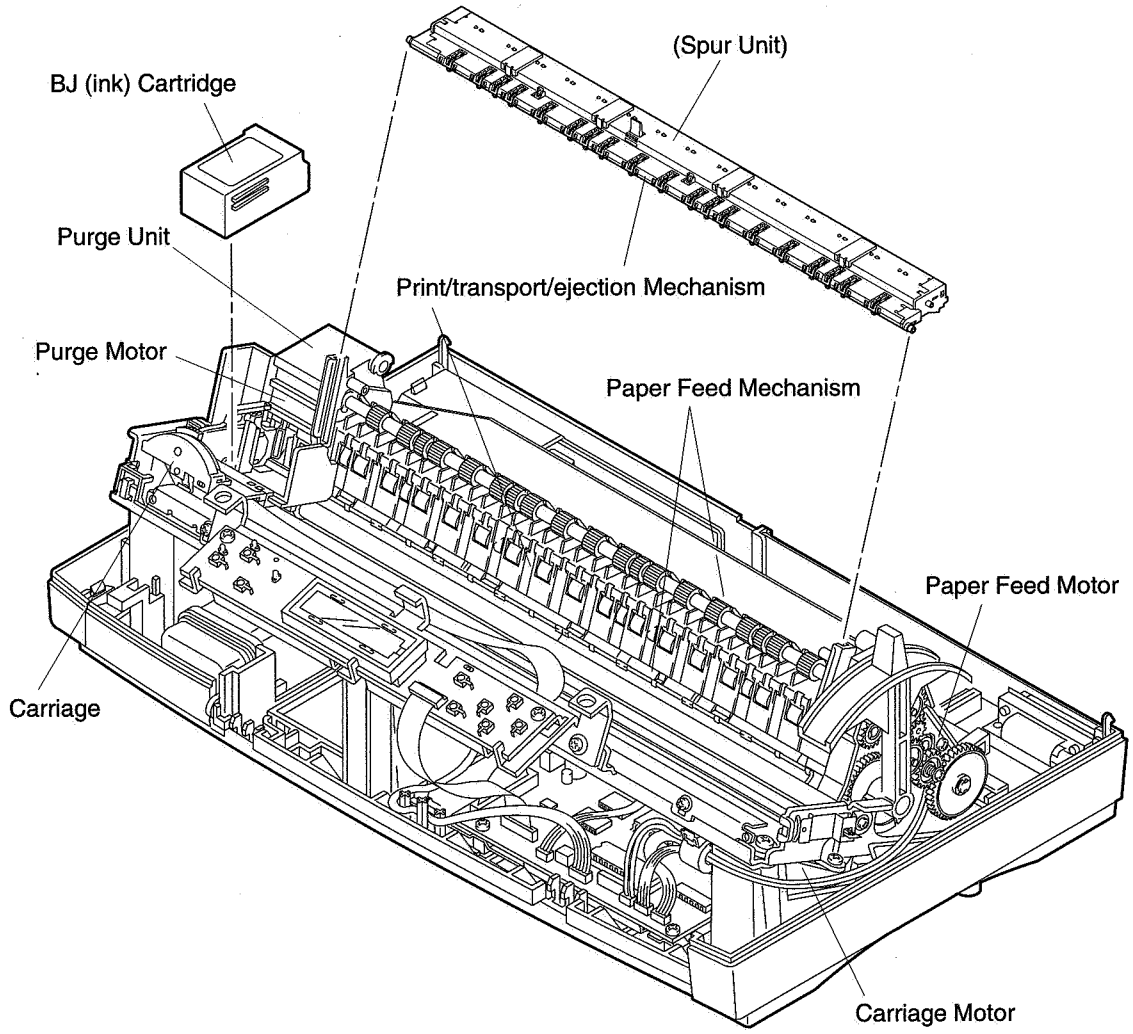



**Figure 4-8 Printer Mechanical Structure**

**a) BJ (ink) cartridge** (See *Sections 3.3.1, "Structure" and 3.3.2, "Purge unit operation", pages 4-26 to 4-28.*)

The printer comes with two types of BJ cartridge: a 360dpi black BJ cartridge with 128-nozzle head and integrated ink cartridge, and a 360dpi color BJ cartridge, with 136-nozzle head and replaceable ink cartridges.

The color BJ cartridge has replaceable ink cartridges. There is one black ink cartridge and an integrated yellow, magenta, and cyan cartridge. The black and color cartridges can be replaced independently of each other.

The black and color BJ cartridges can be swapped by the user according to the print job. The BJ cartridge not currently in use can be stored in the cartridge container at the bottom left front of the printer body.

**b) Purge unit** (See *Sections 3.3.1, "Structure", 3.3.2, "Purge unit operation", and 3.3.3, "Functions", pages 4-26 to 4-29.*)

Driven by the carriage motor, the purge unit helps maintain high-quality printing by capping and wiping the BJ cartridge's bubble jet face. It enables the ink in the nozzles to be ejected easily. The functions and mechanisms are broadly as follows:

1) Capping cylinder: capping and pumping
2) Wiper: wiping
3) Maintenance jet holders: maintenance jet operation
4) Slide lever: wiper and capping timing
5) Purge drive gear: Drive transmission and control
6) Pump lever: purge and carriage phase checking

**c) Paper feed mechanism** (See *Sections 3.4.1, "Feeder switching and detection" and 3.4.2, "Feed mechanism", pages 4-30 to 4-34.*)

This printer has two types of paper feeding mechanisms: a pin feed tractor and auto sheet feeder (ASF). It can therefore support fanfold paper, cut sheet paper, manually fed paper, and paper fed by the ASF.

The paper selection lever switches between fanfold paper and cut sheets (manual feed or ASF). There is a function to detect which feed method is selected so that only the selected feed mechanism can be set. The method of paper feed and the feed operation differs according to the selected feed mechanism and settings.

**d) Print, transport, and paper ejection mechanism** (See *Section 3.5, "Printing, Transport, and Paper Ejection Mechanism", page 4-35.*)

When paper is fed into the printer, it passes the printing mechanism, which is based on the carriage, is transported through the printer, and is ejected via the paper ejection mechanism. The transmission roller and eject roller are driven by the paper feed motor through the gears. Each roller rotates against the spurs in the top cover with the paper sandwiched between them such that it is conveyed through to the output stack. The 4th row of spurs is designed to make sure that the paper curled sheets are ejected properly. When using fanfold paper, this row of spurs can catch the perforations in the paper and the spur storage lever is therefore used to move the spurs out of the way when using this type of paper. After loading paper into the printer, only use the control buttons to advance it.

**e) Carriage unit** (See *Sections 3.6.1, "Carriage functions" and 3.6.2, "Carriage structure", pages 4-36 to 4-37.*)

The carriage travels horizontally across the printing paper driven via the carriage belts by the carriage motor.

The printing control signals from the logic board are sent to the BJ cartridge, which is mounted on the carriage, via the ribbon cable.

The carriage has two sensors: a photointerruptor type home position sensor and a magnetic timing sensor. These control the carriage position correction and, when printing in bidirectional mode, the printing position correction.

The carriage is interlocked with the operation of the purge unit and is used to obtain the timing for operating the maintenance jets and pumping. It also has the role of placing the BJ cartridge in the appropriate position.

## 3.2 BJ (Ink) Cartridge

### 3.2.1 Cartridge structure

**a) Black BJ cartridge structure**

The black BJ cartridge has a printing head equipped with 128 nozzles. The printing head and ink cartridge are integrated.

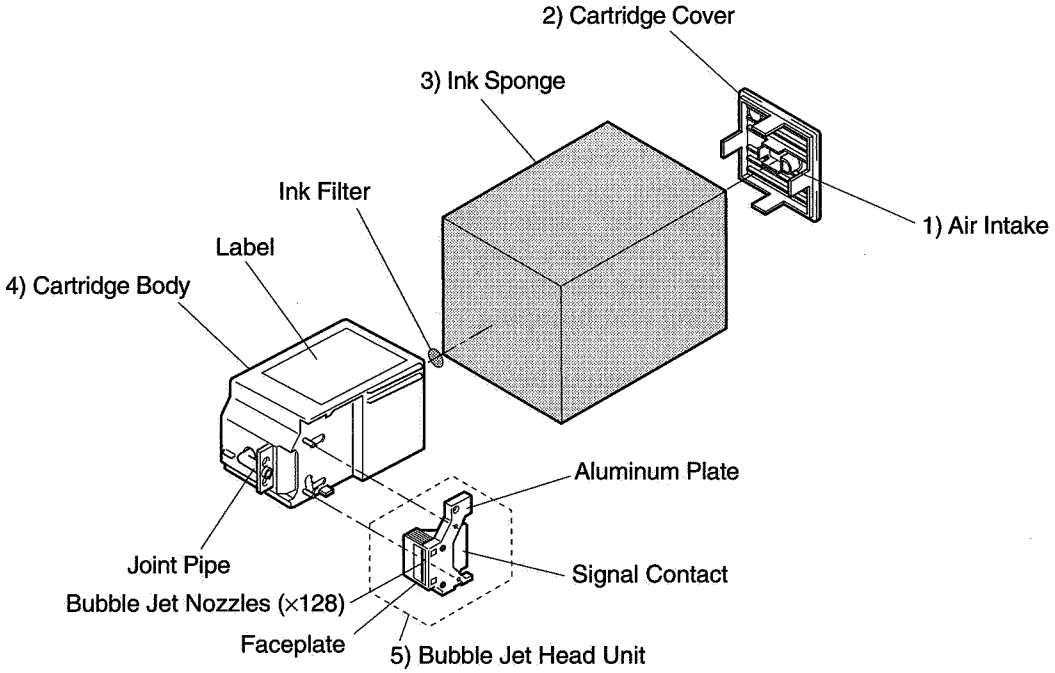



**Figure 4-9 Black BJ Cartridge Structure**

**1) Air intake**

As the ink is consumed, the pressure inside the cartridge decreases compared to the atmospheric pressure. This makes it more difficult for the ink to be supplied to the head. To counter this, the BJ cartridge has an air intake for maintaining a constant pressure inside the cartridge body without allowing the ink to leak out.

**2) Cartridge cover**

This plastic cover is attached to the cartridge body to prevent the ink leaking from the cartridge.

**3) Ink sponge**

This sponge has been developed to ensure an even distribution of ink in the ink cartridge and prevent the ink picking up atmospheric moisture. It therefore ensures a stable ink flow.

**4) Cartridge body**

This plastic case houses the ink sponge and bubble jet head unit.

**5) Bubble jet head unit**

This unit takes up the ink from the ink sponge and feeds it to the 128 nozzles in the bubble jet head. The printing signals are sent via the signal connector on the end of the carriage from the signal contact.

**b) Color BJ cartridge structure**

The color BJ cartridge has a printing head with a total of 136 nozzles for the 4 colors (24 yellow nozzles, 24 magenta nozzles, 24 cyan nozzles, and 64 black nozzles) and two replaceable ink cartridges (one black cartridge and one cartridge housing the yellow, magenta, and cyan inks).

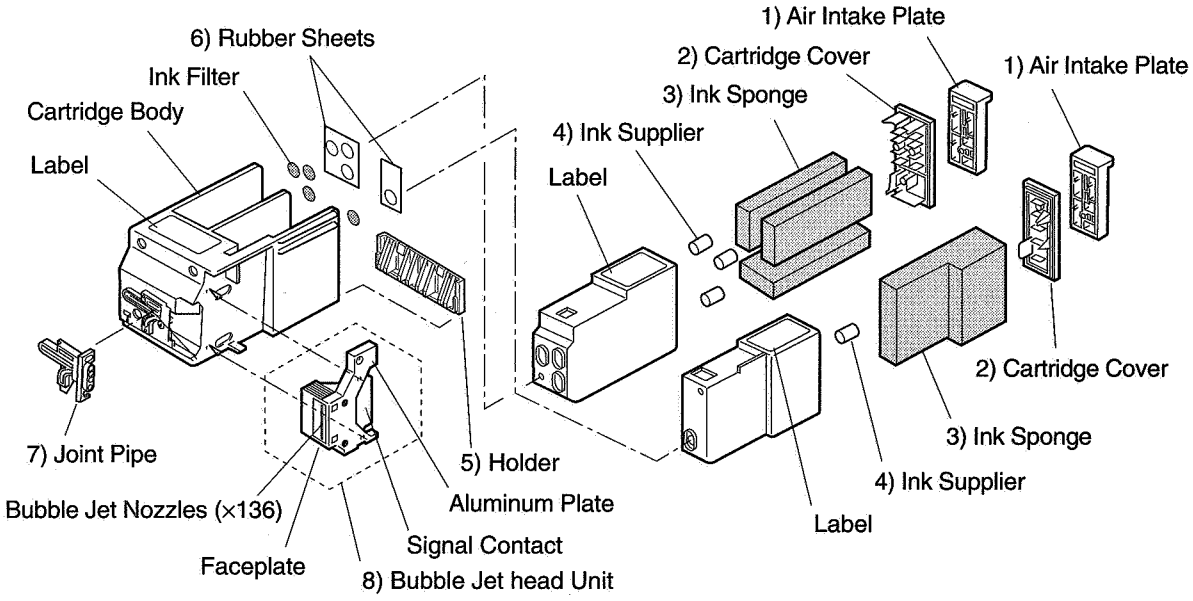



**Figure 4-10 Color BJ Cartridge Structure**

**1) Air intake plate**

As the ink is consumed, the pressure inside the cartridge decreases compared to the atmospheric pressure. This makes it more difficult for the ink to be supplied to the head. To counter this, the BJ cartridge has an air intake for maintaining a constant pressure inside the cartridge body.

**2) Cartridge cover**

This plastic cover is attached to the cartridge body to prevent ink leaking from the cartridge. It also acts as a grip when the cartridge is replaced.

**3) Ink sponges**

This sponge has been developed to ensure an even distribution of ink in the ink cartridge and prevent the ink picking up atmospheric moisture. It therefore ensures a stable ink flow.

**4) Ink suppliers**

These supply the ink from the ink sponges to the cartridge's joints at a constant pressure.

**5) Holder**

The holder holds the ink cartridges in the BJ cartridge.

**6) Rubber sheet**

The rubber sheets seal the joints between the ink cartridges and the BJ cartridge.

**7) Joint pipe**

The joint pipe forms the ink flowpath between the ink cartridge and the head unit.

**8) Bubble jet head unit**

This unit takes up the inks from the ink sponges and feeds them to the 136 nozzles in the bubble jet head. The printing signals are propagated via the signal connector on the end of the carriage from the signal contact.

### 3.2.2 Bubble head unit structure

**a) Bubble jet nozzles**

The ink held by the sponge goes through a mesh-type ink filter and flows to the bubble jet nozzles through the ink flowpath in the cartridge body.
When the head-driving current is supplied to the heater board, ink bubbles are produced. Eventually, only one bubble is formed. The head-driving current is turned off before the ink drop leaves the nozzle. However, the residual heat causes bubbling to continue and ink drops are ejected from the nozzles.
After an ink drop is ejected, the nozzle is resupplied with more ink from the ink sponge.

NOTE

The print head's heater plate uses semiconductor technology with the heater and its circuitry formed on a silicon plate.
This silicon plate, which contains various electrical circuits, is attached to an aluminum base. The plastic cover, which is shaped to form the nozzles, is also attached.

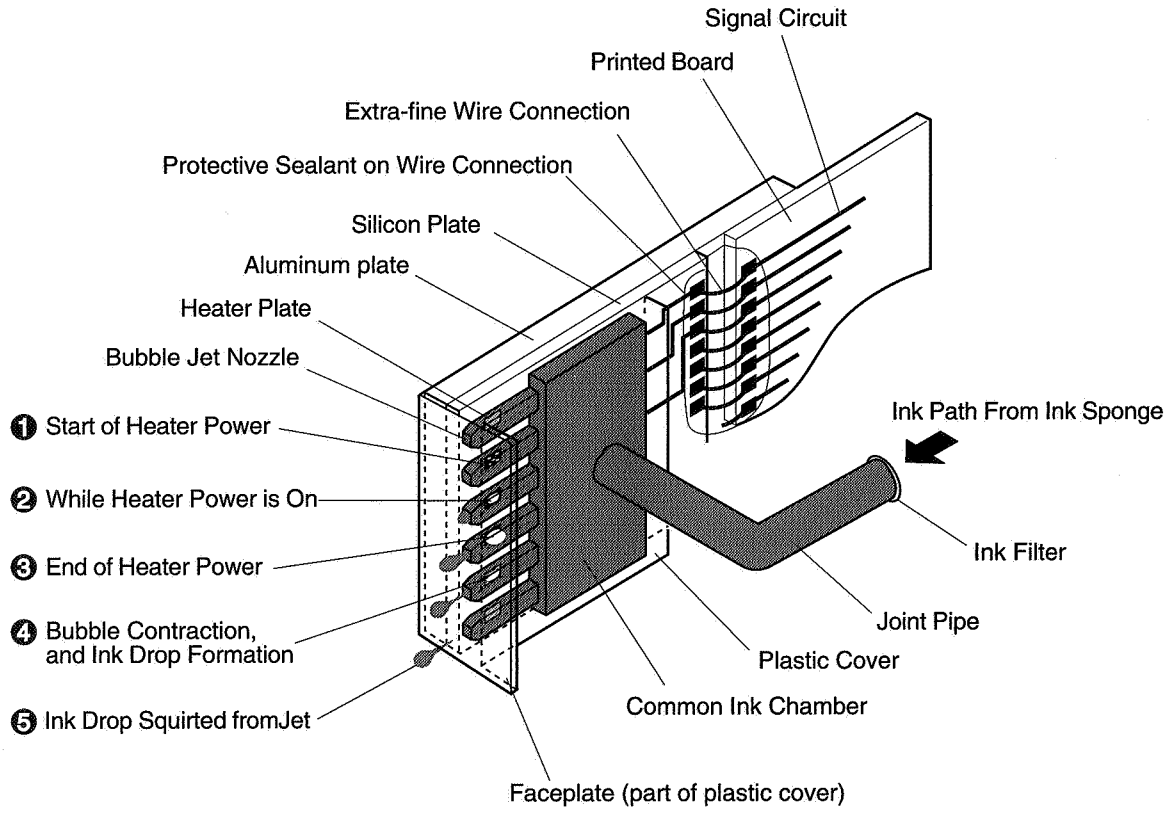



**Figure 4-11 Bubble Jet Nozzles (Partial View)**

**b) Nozzle arrangement**

The bubble jet nozzles are arranged 1/360-in apart in vertical rows.
The black BJ cartridge has 128 nozzles. On the color BJ cartridge, the first 24 nozzles are for yellow ink, the second 24 nozzles are for magenta ink, the third 24 nozzles are for cyan ink, and the remaining 64 nozzles are for black ink. The color BJ cartridge therefore has a total of 136 nozzles.

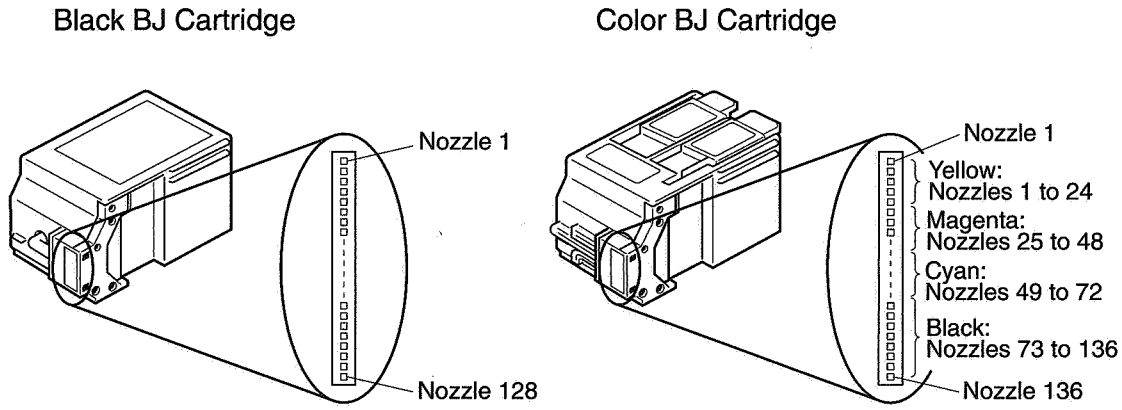



**Figure 4-12 Nozzle Arrangement**

NOTE

The actual nozzle face has several nozzles outside nozzles 1 and 128 (or nozzle 136 in the case of the color BJ cartridge) which are not used for printing. The color BJ cartridge also has 8 non-printing nozzles between each pair of colors (and 16 between the black and cyan nozzles) to prevent the colors bleeding into each other.

**c) Signal contact pad**

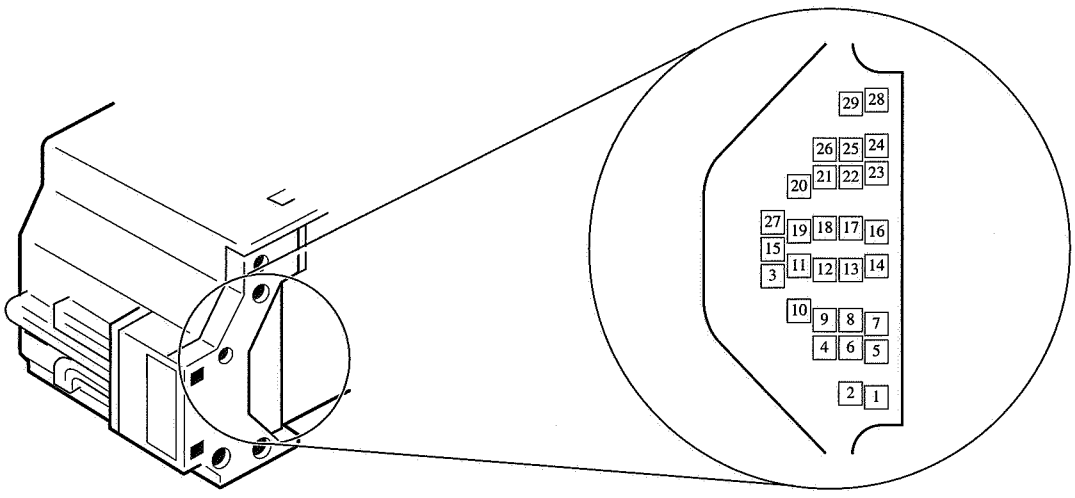



**Figure 4-13 Contact Pad Configuration**

| Pin No. | Signal | Type | Description |
|---|---|---|---|
| 1, 2 | VHG | GND | GND for head drive voltage VH |
| 3 | HT0 | IN | Drive signal for temperature control heater |
| 4 | HT1 | IN | |
| 5, 6 | VH | OUT | Head drive voltage (ink ejection heater, temperature control heater, and sub heater driver) |
| 7 | W-HT | OUT | Drive signal for sub heater |
| 9 | TOP | IN | Detection signal for rank resistance |
| 10 | DIODEA | OUT | Head temperature sensor's (diode) anode |
| 11 | ID0 | IN | BJ cartridge (black or color) detection signal |
| 12 | ID1 | IN | |
| 14 | HVss | GND | Head's logic drive voltage HVdd GND |
| 15 | HENB0(Y) | OUT | Heat enable |
| 17 | HENB1(M) | OUT | • Black BJ cartridge: ...Uses only pins 15 and 17 |
| 27 | HENB2(C) | OUT | • Color BJ cartridge: ...Uses all pins (The letter in parenthesis |
| 18 | HENB3(B) | OUT | indicates the respective color.) |
| 16 | Even ENB | OUT | Heat enable for even nozzles |
| 19 | Odd ENB | OUT | Heat enable for odd nozzles |
| 20 | BENB0 | OUT | Input signals for the 3 to 8 decoder |
| 21 | BENB1 | OUT | |
| 22 | BENB2 | OUT | |
| 23 | HVdd | OUT | IC drive voltage (+5V) |
| 24 | HCLK | OUT | Print data transfer signal |
| 25 | HLATCH | OUT | Timing signal for transferring the shift register's print data to the latch |
| 26 | HRES | OUT | Latch reset signal |
| 28 | HDATA | OUT | Print data |
| 29 | DIODEK | IN | Head temperature sensor's (diode) cathode |

- Pins 1 to 29 are connected to the BJ cartridge, and pins 30 and 31 are connected to the home position sensor.
- Pins 8 and 13 are unused.

### d) Circuit diagrams

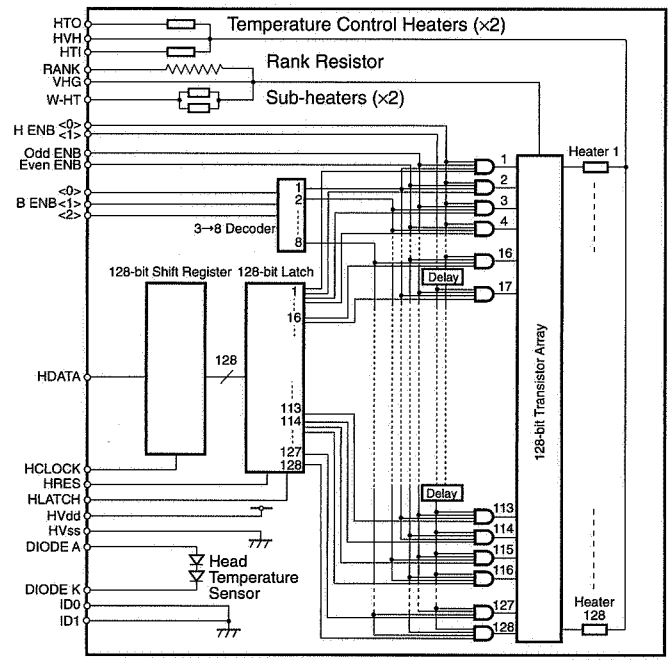



**Figure 4-14 Bubble Jet Head Driver Block Diagram (Black BJ Cartridge)**

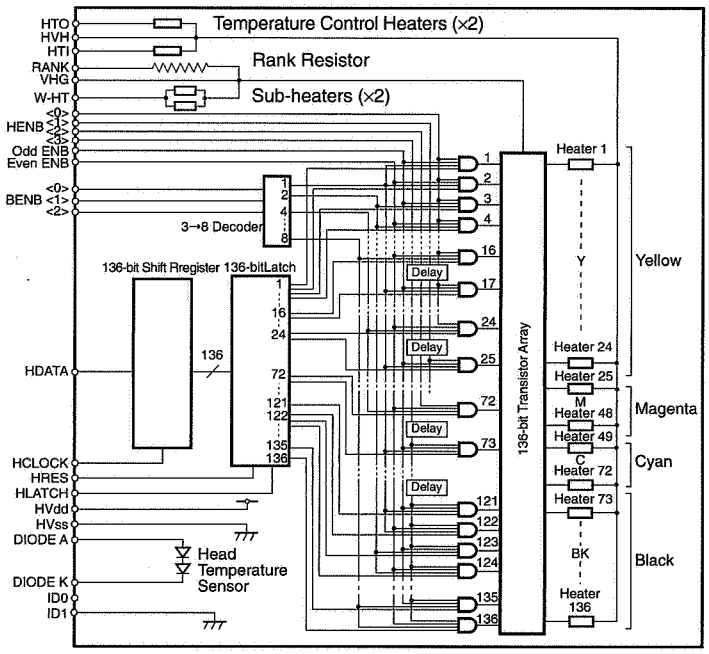



**Figure 4-15 Bubble Jet Head Driver Block Diagram (Color BJ Cartridge)**

- **128/136-bit shift register**
  This register stores the print data (HDATA) transferred from the logic board using the HCLOCK timing.
- **128/136-bit latch**
  This latches the print data (HDATA) sent from the 128/136-bit shift register using the HLATCH timing.
- **3 to 8 decoder**
  After the BENB (Block enable) 0, 1, and 2 signals have been input, the specified heat timing signal is output. The heat timing signals are output to divide the heat timing into 8.
- **Heaters (1 to 128/1 to 136)**
  The heaters heat the bubble jet nozzles. Heating is executed using the timing signal produced by the 3 to 8 decoder and the even nozzle heat enable (EvenENB), odd nozzle heat enable (OddENB), and heat enable (HENB) signals.
- **Sub heater**
  The sub heater controls the ink condition in the nozzle.
- **Temperature control heater**
  This heater controls the head temperature to stabilize the amount of ink ejected.
- **Rank resistor**
  Production-related variations in heater characteristics are classified into 13 types, which are identified by changing the rank resistance, which ensures optimum heat control of each BJ cartridge. The MPU detects the rank resistance via the analog port as a voltage and converts it from analog to digital so that the heater characteristics can be checked.
- **Head temperature sensor**
  Temperature fluctuations in the nozzle heaters are detected by the diode to prevent the bubble jet from overheating.
- **Cartridge ID**
  The type of BJ cartridge (color or black) is identified by the combination of ID0 and ID1.

**e) BJ cartridge detection function**

Connector pins 11 and 12 (ID0 and ID1) detect whether or not a BJ cartridge has been installed, and whether it is a black or color cartridge.

**Table 4-3 BJ Cartridge Installation and Signal Detection**

| | ID0 | ID1 |
|---|---|---|
| Black BJ cartridge | high | high |
| Color BJ cartridge | low | high |
| No cartridge installed | low | low |

high: Signal detected low: No signal detected (by printer)

The LCD on the control panel indicates what type of cartridge has been detected. If the printer is turned on when no cartridge has been installed (the first time the printer is turned on after unpacking, etc.), the carriage automatically moves to the cartridge replacement position regardless of its previous position.
Also, an error (F13) will occur if the printer is on and the cartridge is removed other than in the cartridge replacement mode (selected by pressing the *CARTRIDGE* button).

## 3.3 Purge Unit
### 3.3.1 Structure

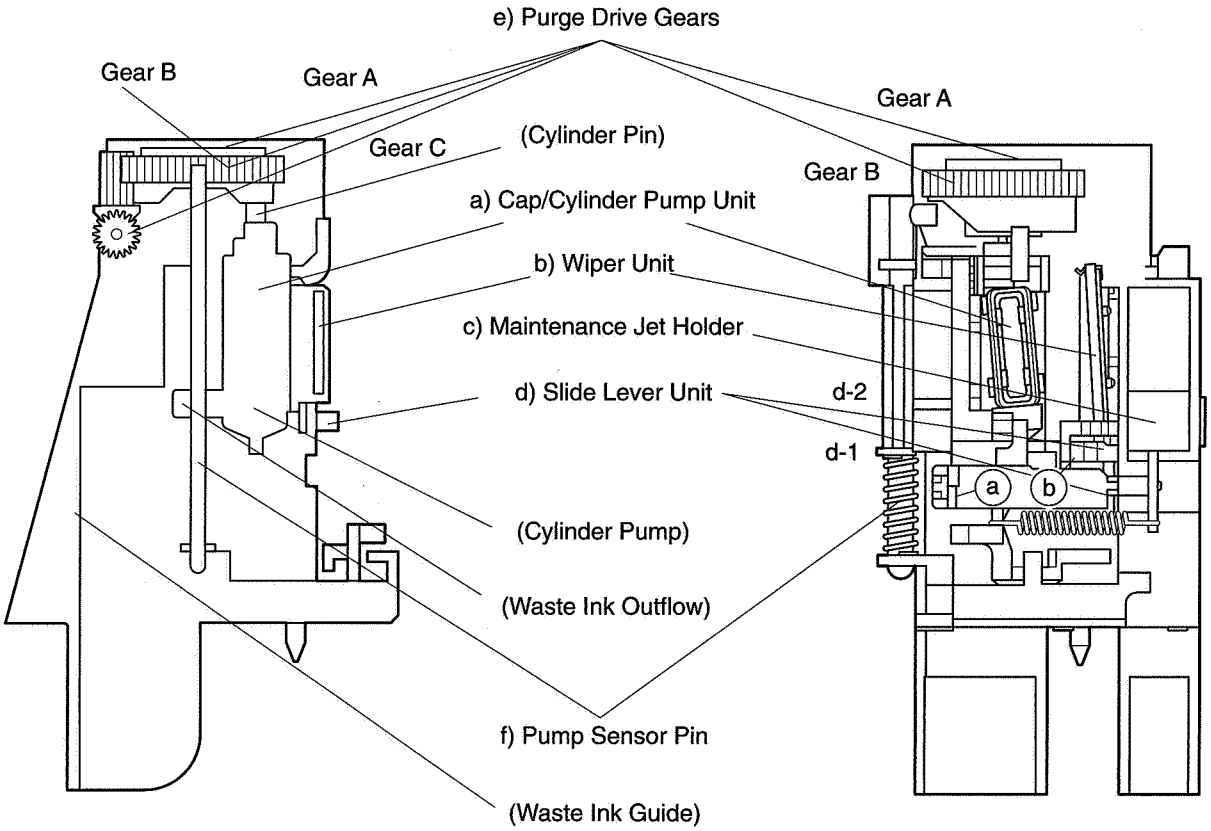



**Figure 4-16 Structure of Purge Unit**

**a) Cap/cylinder pump unit**

This unit consists of a cap, an absorber in the cap, and a cylinder pump. The cap is made of a special flexible rubber that improves the capping characteristics. The absorber in the cap is designed to quickly take up any excess ink remaining in the cap. When the carriage is in the home position, the cap caps the nozzles by being pressed against the print head faceplate. The cap is also interlocked with the cylinder pump unit such that, when the nozzles are capped, the pumping action causes the ink to be sucked in from the head nozzles. This ink is ejected via the waste ink outflow in the bottom of the cylinder pump and passes via the ink guide to the waste ink absorber in the bottom of the case.

**b) Wiper unit**

This unit consists of the wiper and its holder. The wiper is made of a highly elastic urethane rubber. The wiper is pressed against the head faceplate as the carriage moves left to right, wiping off any excess ink and foreign materials.

**c) Maintenance jet holder**

The maintenance jet holder receives the maintenance jet's ink. This ink falls along the guide to be absorbed by the waste ink absorber in the bottom of the case.

**d) Slide lever unit**

This unit consists of two levers, one that controls the cap (d1) and one that controls the wiper (d2). The cap lever is moved from right to left when the base of the carriage strikes the lever hook (a) when it returns to the home position. When the lever is actuated, the cap to which it is linked moves so that it covers the faceplate from the right side for correct capping. The wiper lever hook (b) slides around only when pressed from left to right. The wiper, which is linked to the lever hook, moves up and down. Thus, when the carriage moves from left to right, the wiper is not retracted and presses against the print head faceplate.

**e) Purge drive gear unit**

These gears transmit the force of the purge motor to the pump cylinder unit and pump lever unit. Gear A moves the pump sensor pin, which moves the pump sensor lever used when the pump sensor operates, up and down.

Gear B moves the cylinder pin up and down, which is for the pumping action of the cylinder pump.

Gear C transmits the power of the purge motor to gears A and B when purging is being performed. The slide gear on the side of the purge motor engages with gear C to transmit the power of the purge motor.

**f) Pump sensor pin unit**

The pump sensor pin presses against one of the pump sensor levers to move it up and down. The pump sensor lever functions after the carriage is detected by the home position sensor as being in the home position. When the pump sensor lever is pressed by the pump sensor pin, the tip of the lever moves to block the photointerruptor of the carriage home position sensor. This action is used to detect the position of the purge gear to obtain the timing for purging and switching for the purge operation and ASF and paper feed drive.

### 3.3.2 Operation

The purge unit acts to preserve the print head functions and ensure high-quality printing by combining the following operations:

**a) Capping**

When the carriage has moved to the home position, the cap is pressed against the print head faceplate to seal and protect it from the external environment.

The ink sucked up by the purge unit via the cap is absorbed first by the absorbers in the cap and pump, and then by the waste ink absorber.

Capping is automatically performed without a purge operation in the following cases:

1. When the power is turned off using the *POWER* button;
2. When the printer is ready but no print data is loaded into the buffer within a set time (about 60 to 120 seconds after printing). At the end of the print data, the faceplate is wiped before being capped.

**b) Wiping**

When the carriage moves to the right from the home position, the wiper touches the tank edge of the print head to dislodge any dirt, then wipes the ink from the faceplate. The wiping operation is designed to remedy and prevent problems with ink ejection caused by bits of paper and ink, etc., sticking to the head faceplate. Wiping is automatically performed without a purge operation in the following cases:

1. When the *POWER* button is turned ON or OFF;
2. Before and after capping;
3. Before starting printing each new page.

**c) Purging**

The rotation of the purge drive gear causes the pump cylinder behind the cap to be pushed down to cause a sucking action. When the head faceplate is sealed as a result of capping, the ink is sucked in from the nozzles. If the faceplate is not capped, the waste ink in the cap is sent to the waste ink absorber. The purge operation (combination with other operations and number of actions) differs according to the type of cartridge installed, the conditions under which the printer is being used, and the print data. The printer automatically detects the conditions and selects which operations are to be performed. In addition to the cleaning performed by the user as prescribed, purging is automatically performed in the following cases:

1. The first time the printer is turned ON using the *POWER* button after the power cord has been connected;
2. After the ink cartridge has been replaced (only when a color BJ cartridge is installed);
3. When the power is turned on using the *POWER* button or print data is received after more than 72 hours have elapsed from a previous purge operation;
4. When the number of printed dots exceeds a stipulated number;
5. When the BJ cartridge is replaced.

**Table 4-4 Ink Consumption when Cleaning**

| Ink consumption / Printer status | Black BJ cartridge | Color BJ cartridge | |
|---|---|---|---|
| | | BLACK | COLOR |
| First time power turned ON after power cord has been connected | 0.15g | 0.15g | 0.05g |
| When power is turned ON using *POWER* button<br>At start of printing<br>(if more than 72 hours has elapsed) | 0.15g | 0.15g | 0.05g |
| After replacing the BJ cartridge | 0.15g | 0.15g | 0.05g |
| After replacing an ink cartridge (BC-21 only) | – | 0.30g | 0.10g |
| When cleaning is performed by pressing the *CLEANING* button | 0.15g | 0.15g | 0.05g |

In the case of color BJ cartridges, the figure in the COLOR column indicates the ink consumption per color.

**d) Maintenance**

Maintenance, which is the removal of air bubbles and dirt, etc., from the nozzles, is performed by moving the carriage to the maintenance receiving position in the purge unit and ejecting ink using the same mechanism as when actually printing. Because there is a risk of ink remaining on the head faceplate after the ink has been ejected in this operation, the faceplate is wiped immediately. The timing for the maintenance jet operation differs according to the type of BJ cartridge installed, its frequency of use, and the print data, etc. The ink ejected during maintenance passes through the guides to be absorbed by the waste ink absorber.

### 3.3.3 Functions

**a) Capping functions**

- To prevent ink drying on the surfaces of the nozzles and blocking them
  Capping prevents ink sticking to the head nozzles and drying out, blocking the head and leading to poor print quality, when the printer is not in constant use.
- To prevent dirt adhering to the nozzles and the face becoming scored
  Capping prevents dirt, etc., sticking to the faceplate and abrading it.
- To prevent ink leakage
  Capping prevents ink leaking from the nozzles and getting onto other printer parts in the event that the printer is subjected to vibration or shock.
- As a means of purging the nozzles
  The ink is prevented from drying and clogging, and foreign materials from mixing with it, by purging it from the nozzles.

If the printer is disconnected from the power without first pressing the *POWER* button, the print head may not be capped and there is a risk of it being damaged. Do not disconnect the power cord without first pressing the *POWER* button.

**b) Cleaning functions**

The following actions are performed by combining the capping, wiping, purging, and maintenance operations:

- Removal of dirt
  Dirt such as paper fiber and dried ink adhering to the print head faceplate are removed by the wiper and by purging.
- Ink refreshing
  The ink is purged from the nozzles to be replaced with fresh ink, thereby preventing the nozzles from clogging by replacing drying ink.
- Removal of ink from head
  By removing ink from the print head faceplate, stable ink ejection is maintained and ink is prevented from being splattered around the printer and hardening on the faceplate, which could happen when the carriage moves.

**c) Maintenance jet functions**

- Nozzle cleaning
  By ejecting the ink from inside the nozzles, it is replaced and prevented from drying out and clogging the nozzles. This action also eliminates foreign objects.
- Stabilization of heater ejection characteristics
  Before starting printing, the heaters are turned on to idle to stabilize their performance during actual printing.

## 3.4 Paper Transport Mechanism

The paper transport mechanism is, from a functional point of view, divided into paper feed and printing, transport, and paper ejection mechanisms. This description focuses on the paper feed mechanism.

There are several methods (modes) of feeding paper into the printer: the tractor sheet feed method (fanfold paper mode), which uses the pin feed tractor, the separator feed method (manual feed mode), and the optional auto sheet feeder (ASF mode).

In the case of manual feed and the ASF, only the mechanism (separator or ASF) differs. The printing, transport, and ejection mechanisms are common to both manual feed and ASF. The mechanical parts of the printer themselves therefore only differ in the case of fanfold and cut sheet mode (manual feed and ASF) and can be switched. The panel display changes to indicate which paper feed modes can be selected according to the current position of the feeder switching and detection mechanism. There are different feed sequences according to the feed mode selected from the control panel (manual feed/ASF bin 1, ASF bin 2, ASF bins 1 and 2, or fanfold).

### 3.4.1 Feeder switching and detection

Positioning the paper selection lever toward the front of the printer selects fanfold mode. Positioning it to the rear of the printer selects cut sheet mode. The tractor feed sensor detects which position the switch is set to. When the paper selection lever is toward the front of the printer, the release cam turns the sensor on to show that fanfold mode is selected.

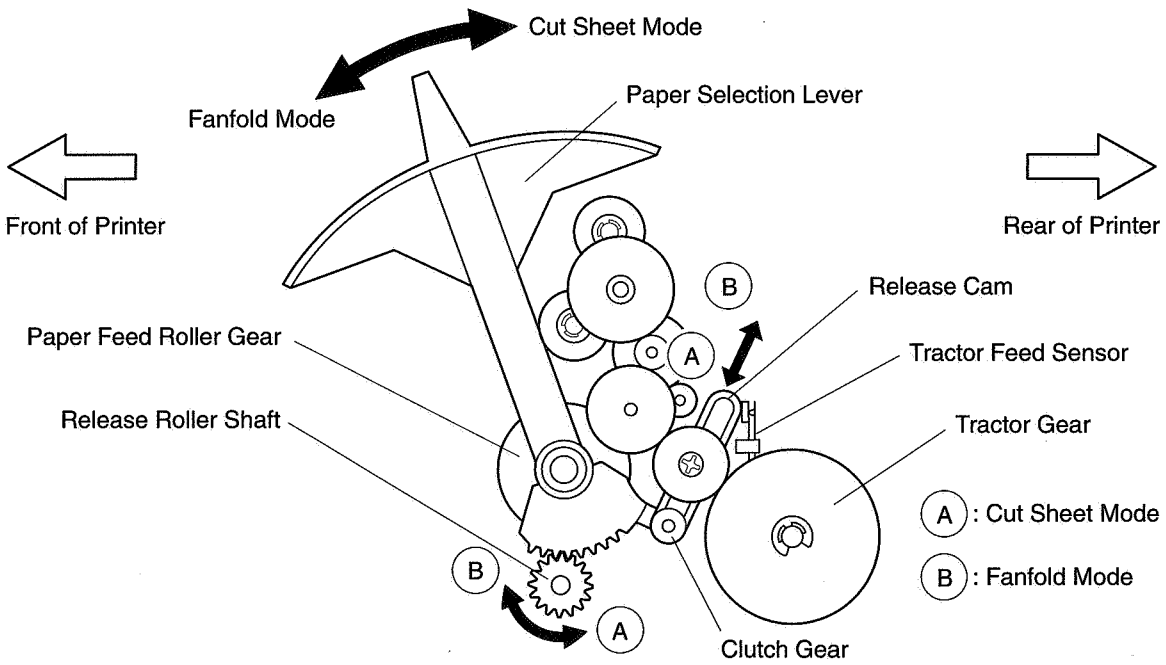



**Figure 4-17 Feeder Selection and Detection Mechanism**

CAUTION

There is no function that detects the presence of the ASF, and the ASF frame is therefore shown on the control panel and this feed mode can be selected from the control panel regardless of whether an ASF is installed. However, if no ASF is installed, a feed error (E1) occurs at the 2nd sheet if ASF is selected as the feed mode.

Table 4.5 shows how the printer handles the paper if the position of the paper selection lever is switched while using the control panel to select the feed mode, or if its position is switched after selecting the feed mode from the operation panel.

### Table 4-5 Paper Selection Lever Switching

**During Feed Mode Selection**

| Feeder selection | Available modes | Selection when switched during mode selection |
|---|---|---|
| Cut sheet mode | Manual, bin 1, bin 2, and bins 1 & 2 | • Fanfold paper only<br>(If the paper selection lever is again set to the cut sheet position, the feed mode stored in the EEPROM is valid.) |
| Fanfold mode | Fanfold paper | • Selected mode stored in EEPROM<br>(If the paper selection lever is again set to fanfold feed mode, only fanfold paper mode is valid.) |

**After Selecting Feed Mode**

| Paper selection lever | No-paper detection | Paper detected |
|---|---|---|
| Cut sheet → fanfold | Pick-up error display (E 1) | Paper selection error (E 3) |
| Fanfold → cut sheet | Change to cut sheets. | Paper selection error (E 3) |

A feed error, paper jam, or other error may occur if the position of the paper selection lever and the select feed mode do not match the installed feeder and type of paper loaded in the printer.

### 3.4.2 Feed mechanism

**a) Tractor sheet feed**

When the paper selection lever is in the forward position, the release cam moves to turn on the tractor feed sensor. The clutch gear then slides toward the center of the printer and engages with the gear so that the power from the paper feed motor is transmitted to the tractor sheet feeder. Independently, the paper selection lever causes the release roller shaft to rotate. The release roller shaft has projections in two directions. When it rotates, one of these projections presses down on the pinch roller holder while the other disengages from the leaf spring. The leaf spring pushes the pressure roller holder up to increase the pressure of the pressure roller in the direction of the paper feed roller. In this state, the pressure of the paper feed roller against the pinch roller diminishes. That is, the pressure of the pressure roller against the paper feed roller is relaxed. As a result, the force of the fanfold paper feed is directed only to the tractor sheet feeder and the fanfold paper is fed along the paper guides and separation guides to the printing position.

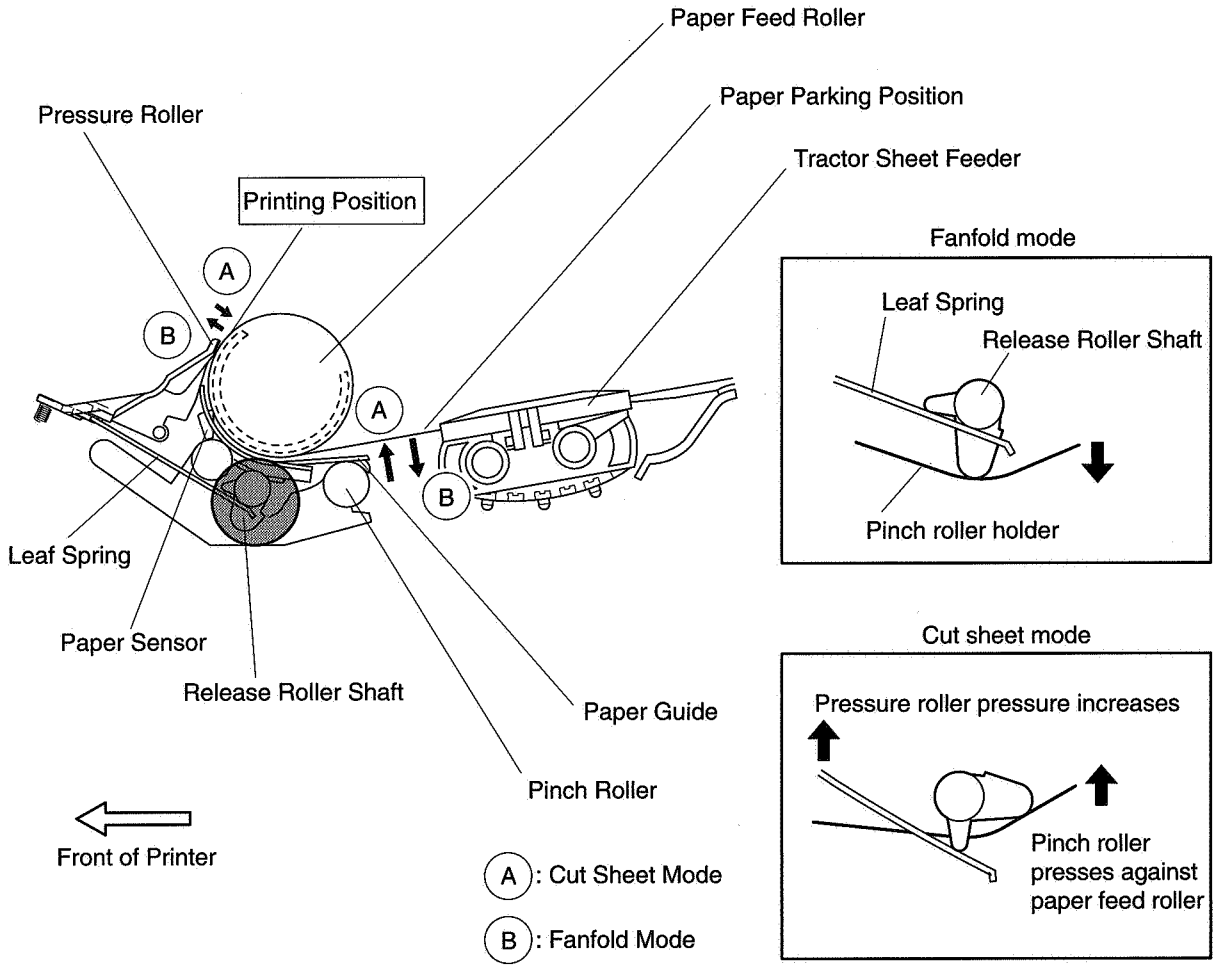



**Figure 4-18 Feeder Mechanism (Fanfold Mode)**

**b) Separator feed (including manual feed when ASF installed)**

See Figure 4.18 (page 4-32).

When the paper selection lever is positioned to the rear of the printer, the release cam moves to turn off the tractor feed sensor. The clutch gear slides toward the outside of the printer and the power of the paper feed motor is switched away from the tractor sheet feeder. Independently, the paper selection lever causes the release roller shaft to rotate and the pinch roller holder, which is pressed down by one of the projections on the shaft, is released so that the pinch roller and auxiliary pinch roller return to the position in which they are pressed against the paper feed roller. The other projection on the shaft presses down on the leaf spring to increase the pressure of the pressure roller on the paper feed roller.
Regardless of whether an ASF is installed, the separator is required for manual feed. The separator is installed on the back of the printer or, when the ASF is installed, in the specified position on bin 1. When paper is inserted into the separator, the tip of the paper is positioned where the paper feed roller contacts the pinch roller such that the paper is picked-up by the paper feed roller when it rotates. The paper follows the paper guide and separation guide and is fed to the printing position by the two pressure points where the pinch roller contacts the auxiliary pinch roller and the paper feed roller, and is forced to curve to the printing position by the pressure roller and paper feed roller.

The User Manual for how to set up the separator.

**c) ASF feed**

When ASF bin 1 is installed, gear A of the auto sheet feeder engages with gear B on the purge motor. When the purge motor rotates toward the front of the ASF, the ASF starts to operate; when it rotates toward the rear of the printer, the slide gear engages with the gear on the purge unit and a purge operation starts. Switching between ASF bins 1 and 2 is controlled by the amount of reverse drive immediately before the purge motor starts the auto sheet feeder. There is twice the amount of reverse drive with bin 2 as there is with bin 1, and the length of the clutch gear teeth of each bin is such that the clutch arm only engages with the clutch gear of the appropriate bin. When the clutch arm engages with the clutch gear, the feed drive is transferred to the pickup roller of the ASF. When the paper loading lever on the ASF is set in position, the pressure plate of the ASF presses against the pickup roller. When the pickup roller makes one rotation, the paper is fed into the printer and, as with separator feed (manual feed), the leading edge of the paper advances to the point at which the paper feed roller is in contact with the pinch roller. Thereafter, the paper is fed in the same way as in separator feed.

When envelopes and cut sheets smaller than B5 are fed from ASF bin 2, feed errors (E 1) occur because the tip of the paper does not reach the point at which the feed roller is in contact with the pinch roller. The clutch arm continues to engage with the clutch gear until a new reverse drive occurs as a result of a purge drive, pump sensing operation, or feed mode switching, etc. Therefore, if you are feeding multiple sheets using the ASF, the ASF feed drive starts from the beginning again for the 2nd and subsequent sheets.

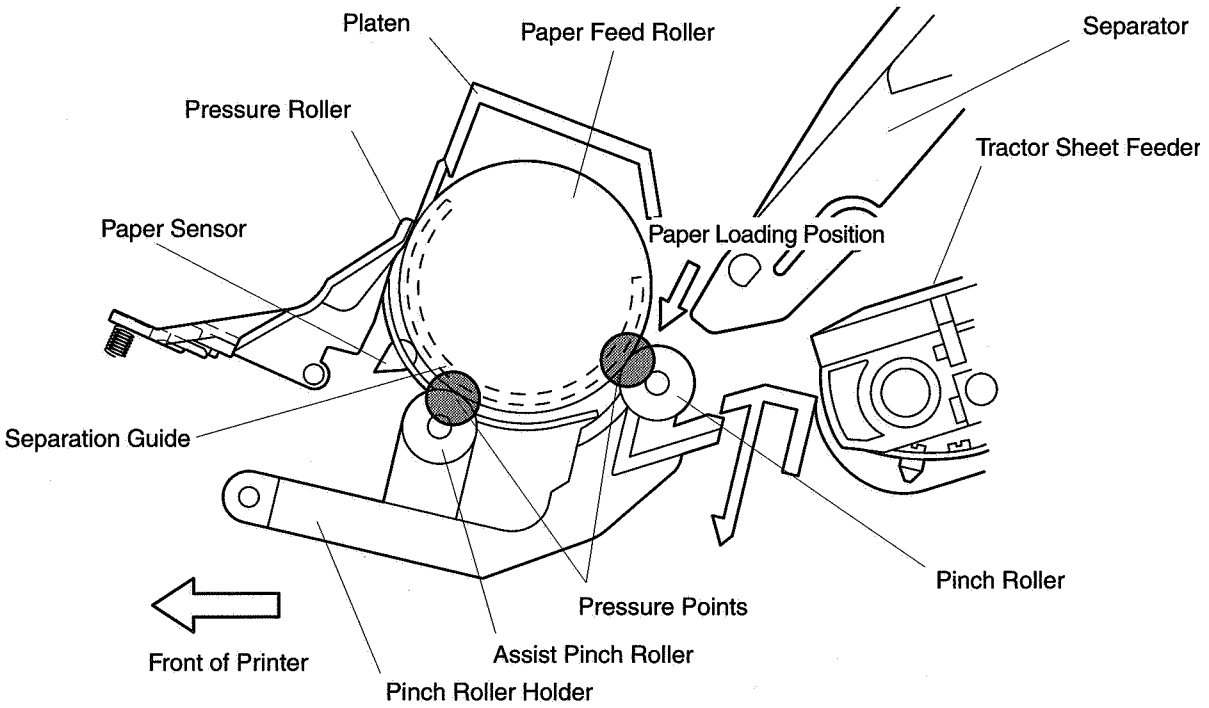



**Figure 4-19 Feeder Mechanism (Cut Sheet Mode)**

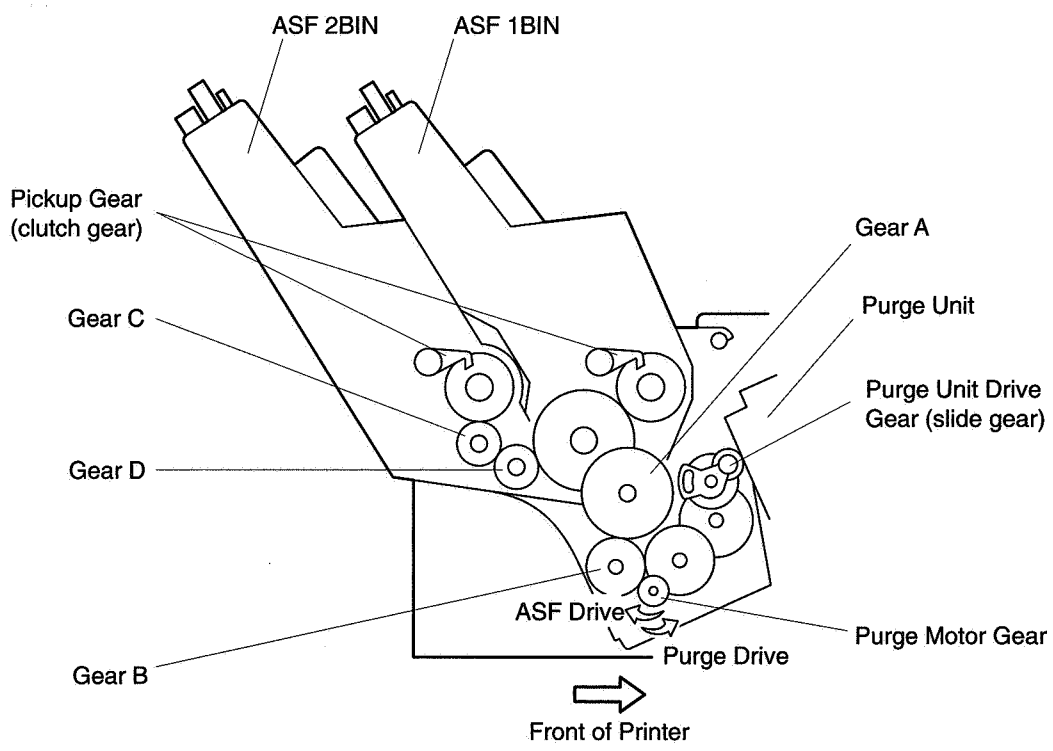



**Figure 4-20 ASF Mechanism**

## 3.5 Printing, Transport, and Paper Ejection Mechanism

The printing, transport, and paper ejection mechanism functions in the same way for all feed modes.

**a) Mechanism from feeder to print position**

After the paper is fed into the printer, it follows the paper guides and moves the paper sensor arm notifying the printer that the paper has been picked-up. It then travels between the pressure roller and paper feed roller to the platen. The separation guide prevents the paper from winding around the paper feed roller so that it is fed smoothly to the platen. Printing is performed on the platen between the pressure roller and paper transmission roller where the carriage moves horizontally. The pressure roller stops the paper from lifting away from the platen. In fanfold mode, there is less pressure on the paper feed roller, which simply acts to stop the paper lifting too much at the perforations, etc.

**b) From print position to output tray**

After it has passed the platen, the paper is fed to the pressure point between the paper transmission roller and first row of spurs. It then proceeds to the pressure points between the 2nd and 3rd rows of spurs and the paper eject roller before passing the 4th row of spurs to be ejected into the output tray. The spurs and rollers also prevent the paper from lifting and ensure that the paper is transported smoothly through the printer.

NOTE

The 4th row of spurs prevents cut sheets (particularly A3-size sheets) from bending and falling over, allowing them to be fed properly into the output tray. However, there is a risk that fanfold paper cannot be cut, or, when printing on thicker papers, that the bottom corners of the paper become creased. In such cases, use the spur storage lever to retract the 4th row of spurs.

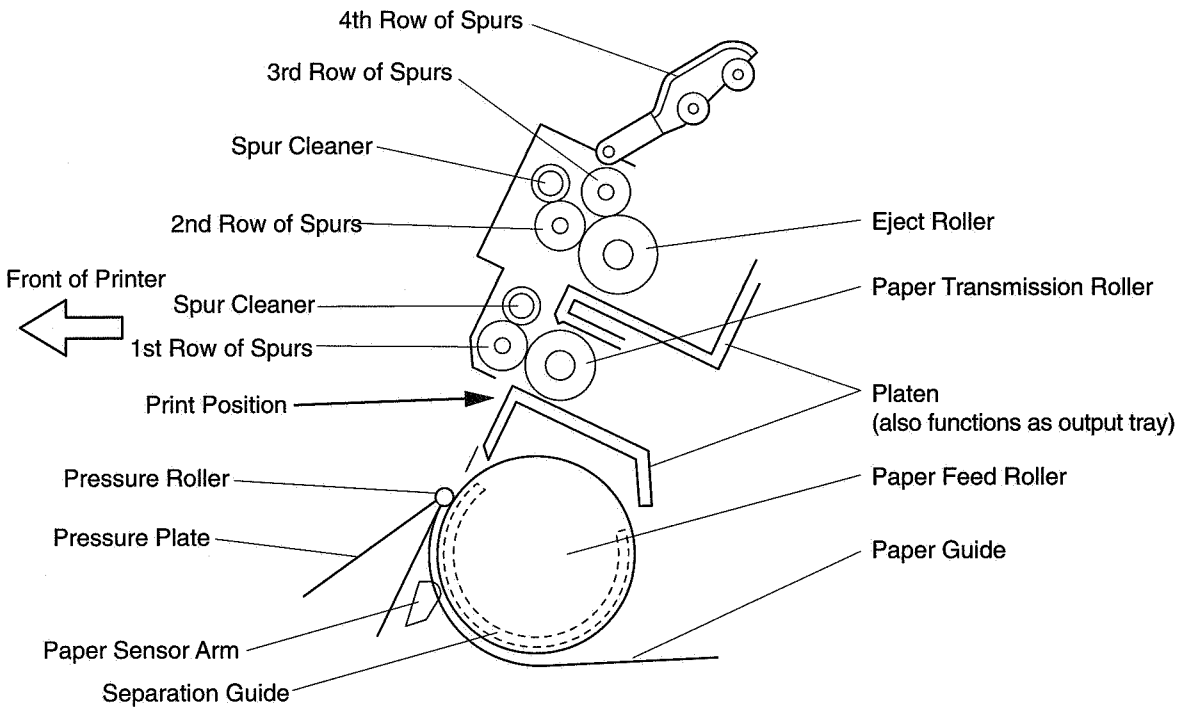



**Figure 4-21 Printing, Transport, and Ejection Mechanism**

## 3.6 Carriage

### 3.6.1 Carriage functions

**a) BJ cartridge installation**

The carriage mechanically holds the BJ cartridge. The moment a BJ cartridge is installed, it is electrically connected to the logic board via the carriage ribbon cable. When the printer is turned off, the carriage is locked in the capping position.

**b) Carriage drive**

The carriage, which is driven by the carriage motor and carriage belt, moves the BJ cartridge horizontally.

**c) BJ cartridge maintenance**

In this printer, BJ cartridge maintenance functions are performed by moving the cartridge to certain positions using carriage position control.

**d) Paper thickness adjustment**

By changing the position of the paper thickness lever on the top of the carriage, the gap between the platen and the faceplate of the print head can be adjusted according to the type and weight of paper and so prevent the head touching the paper and the printing paper being splattered with ink as a result of the paper lifting.

**e) Print position control**

To improve printing precision, the print drive start signal is based not on the carriage motor drive pulse but on the magnetic pattern of the magnetic timing film (magnetic encoder). When the carriage moves, the carriage timing sensor reads the magnetic pattern imprinted on the magnetic timing film. In bidirectional printing, the ink can be ejected onto the paper in slightly different positions as the carriage travels right and left. There may also be slight variations in the precision with which the carriage is moved, resulting in the ink being printed in slightly offset positions. To correct these slight shifts, the precision of the printing position is improved by starting the print drive using the magnetic pattern.

**f) Home position control**

In this printer, the carriage is deemed to be in the specified home position when the sensor detects it.

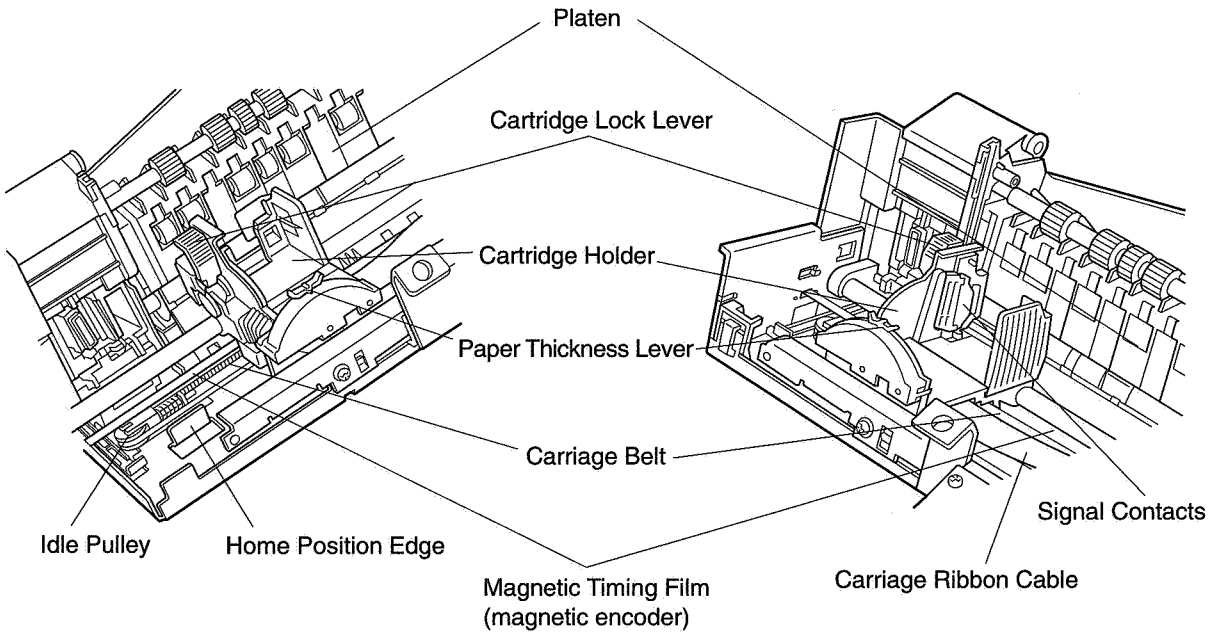



**Figure 4-22 Carriage**

### 3.6.2 Carriage structure

**a) BJ cartridge attachment**

When the cartridge lock lever is locked in position, the cartridge holder slides so that the BJ cartridge is secured on the carriage. When the BJ cartridge is secured on the carriage, the signal contacts are pressed against those of the carriage ribbon cable, allowing print signals to be sent from the logic board.

**b) Carriage drive unit**

The carriage is mounted on the carriage belt, which transmits the power from the carriage motor. The carriage belt is maintained at the correct tension with the tension pulley, ensuring that the power is transmitted accurately from the motor and that any play and noise is suppressed. The carriage motor is a pulse controlled stepping motor and minimizes drive loss and operating noise, and facilitates synchronisation with the print drive.

**c) Head-to-paper distance adjustment**

Moving the paper thickness lever changes the positions of the carriage tension cam so that the whole carriage moves slightly up or down with the paper guide rail acting as a fulcrum, changing the distance (A) between the head faceplate and the platen. The gap increases in order from the left, center (cut sheet), to right (heavy paper), allowing even heavy papers to be printed.

NOTE

The greater the gap between the head faceplate and platen, the greater the distance the drops of ink have to travel from the nozzles to the paper and the lower the printing precision and print quality. Make sure that the lever is set to match the type of paper you are using and the printing conditions.

**d) Sensors (See Sensors for details)**

There is a home position sensor and timing sensor on the bottom of the carriage. The home position sensor is a photointerruptor, the photosensor being shut off by the home position edge and pump sensor lever to achieve the desired control timing. The timing sensor is a magnetic encoder sensor. The magnetic pattern on the magnetic timing film is read as the carriage moves left and right and the signals thus generated used to accurately time the start of printing.

NOTE

See *Section 5, "Detection Functions" (page 4-48)* for details of the sensors.

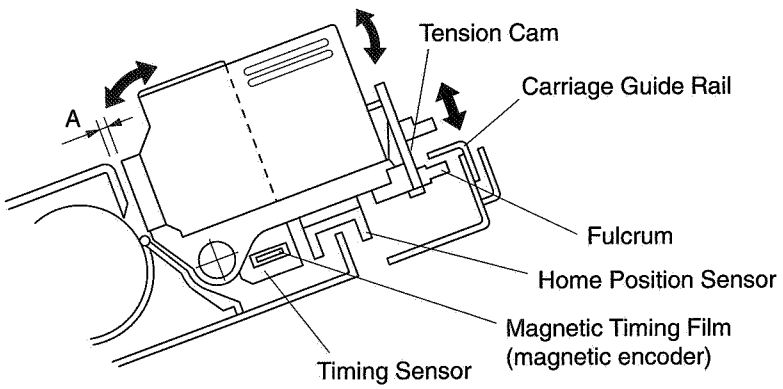



**Figure 4-23 Head-to-paper Distance Adjustment Mechanism**

# 4. THE ELECTRICAL SYSTEM

## 4.1 Overview

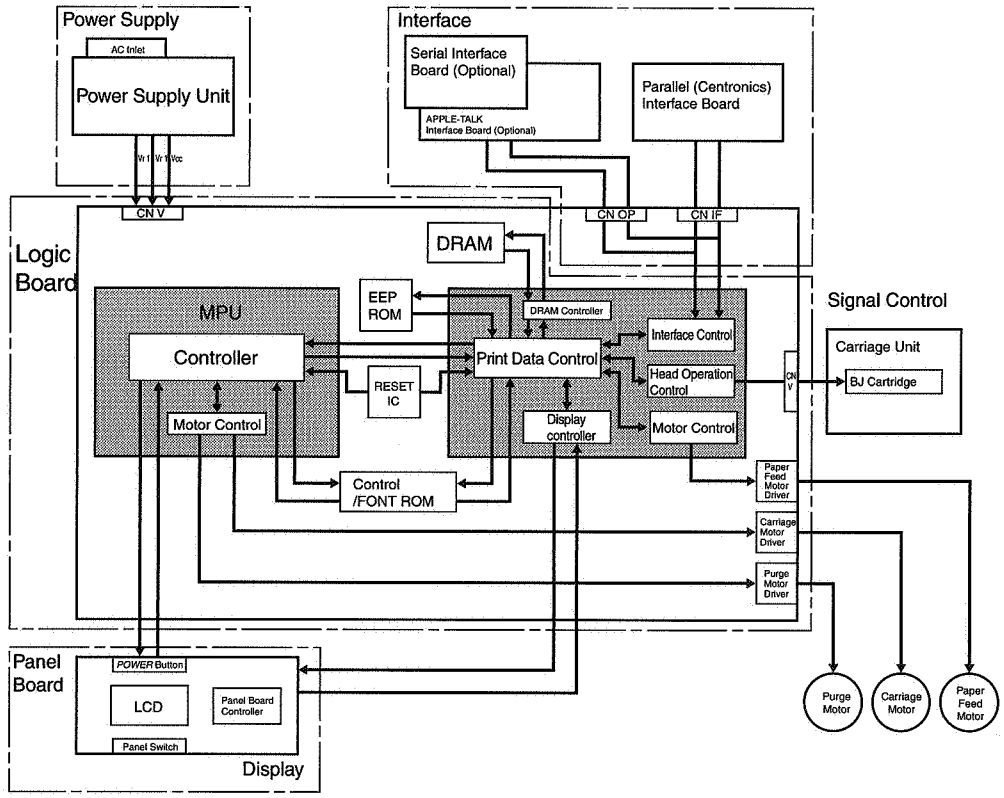



**Figure 4-24 Printer Block Diagram**

The printer's electrical system is functionally made up of the signal control block, interface block, display block, and power supply. The signal control block converts the print signals and operating signals from the interface to control the motors, cartridge, display, and sensors, etc.
The interface block is compatible with the bidirectional Centronics standard and exchanges data with the host computer. The optional serial interface board are, respectively, compatible with the RS232C protocol, and convert the data to the parallel data used in the standard Centronics protocol (IBM-PC-compatible).
The display block includes an LCD and LEDs for indicating the printer status. The control buttons turn the software power on and off, switch the printer online and offline, set the operation mode, function mode and various commands, prepare the printer for exchanging the cartridge, and perform cleaning operations. When the software power is off, the control buttons other than the *POWER* button, the LCD and LEDs, sensors, and interface are inoperative. In other respects the hardware is in the active state.
The power supply converts the AC input to a DC voltage, which drives the logic board, motors, head, and display, etc.

NOTE

Voltage is always applied to the control board providing an AC voltage is input being to the power supply.

## 4.2 The Signal Control Block
### 4.2.1 Logic section block diagram

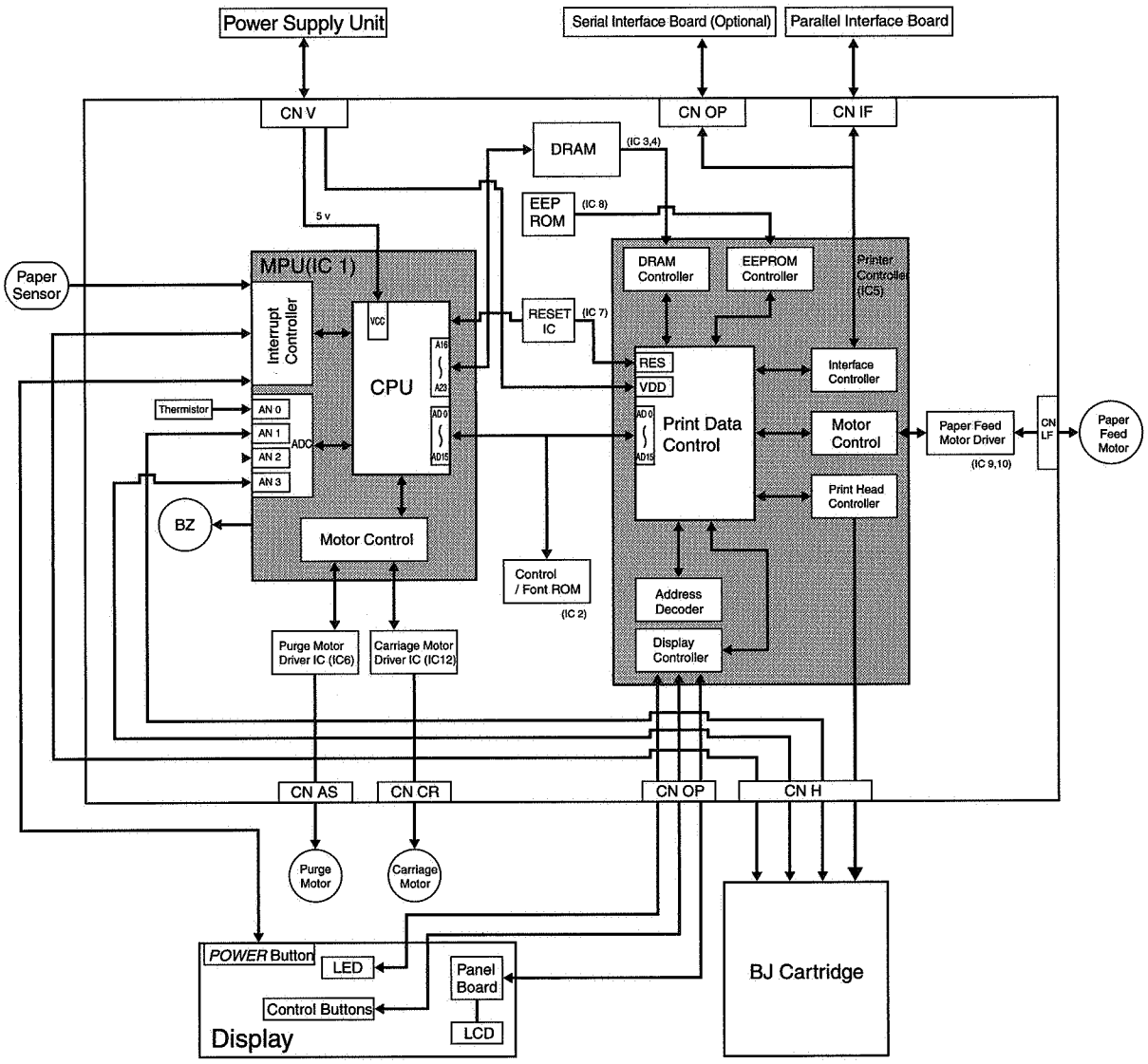



**Figure 4-25 Logic Block Diagram**

### 4.2.2 Logic section components

The printer logic section consists mainly of the following functional devices:

a) MPU (IC1)
b) Printer controller (IC5)
c) Control/Font ROM (IC2)
d) DRAM (IC3 and IC4)
e) Block enable selector (IC14)
f) Motor drivers (IC6, IC9, IC10, and IC12)
g) Reset IC (IC7)
h) EEPROM (IC8)

**a) MPU (IC1)**

Using interrupt control, the MPU controls, via the bus ports, the functional devices such as the controllers, ROM and RAM, and driver ICs. It therefore controls the printer as a whole. The MPU is a Toshiba TMP96C141AF microprocessor, which contains the following functional circuits:

1) CPU
2) Address/data bus
3) ADC
4) Carriage and purge motor controller
5) Interrupt controller
6) I/O ports

1) CPU

The 16-bit CPU operates in sync with a 16MHz external clock input. It performs a general control of all devices and overall control of the logic.

2) Address/data bus

The 16-bit address/data bus ports, 8-bit address bus ports (AD0 to AD23)
The upper 8 bits of the address bus port are linked to the printer controller and 8Mbit control/FONT ROM. Control and FONT ROM chip selection is controlled by the printer controller in sync with the read/write signals output by the CPU.
The lower 16 bits of the address/data bus port similarly perform IO with the 8Mbit control/FONT ROM.

3) ADC (AN0 to AN3)

The ADC converts the following analog signals to digital format for the CPU.
Pin 73 (AN0): Inputs the printer temperature from the thermistor on the logic board
Pin 74 (AN1): Inputs the head temperature from the diode in the BJ cartridge
Pin 75 (AN2): Inputs the voltage level from DCLEV (input voltage monitoring circuit)
Pin 76 (AN3): Inputs the head rank from the rank resistor in the BJ cartridge

4) Carriage and purge motor controller

This controller outputs a 2-phase excitation signal for driving the carriage and purge motors. It outputs a programmed pulse width modulation (PWM) signal to the carriage motor driver for optimum carriage motor control. It outputs an inverted control signal to the purge motor driver for switching between purging and ASF pickup.

5) Interrupt controller

The interrupt controller handles the external interrupts for the MPU by controlling the following signals:

- Power switching signal from the *POWER* button
- Temperature sensor, rank resistor, and ID signals, etc., from the BJ cartridge
- Signals from the respective sensors
- Initial interrupt and receive buffer full warning error signals

6) I/O ports

These ports input and output the various signals for CPU control.

- Input ports: Home position sensor, paper sensor, tractor feed sensor signals Cartridge ID, temperature sensor, and rank resistor signals from the BJ cartridge
- Output ports: BJ cartridge drive control signals, and control signals for the respective motor drivers

**b) Printer controller (IC5)**

The printer controller mainly controls print drive processes, the DRAM, and I/O data. The Toshiba TC160G70AF-1243 has a standard cell structure and operates at 22.11MHz. It has external clock input synchronization and houses the following functional circuits:

1) Interface controller
2) Display controller
3) DRAM controller
4) Address decoder
5) Buffer controller
6) Print head controller
7) Paper feed motor controller
8) EEPROM controller
9) I/O ports

1) Interface controller

This controller controls the interface signals from the parallel interface board and the optional serial interface board. The signals from the parallel interface are controlled according to the bidirectional Centronics protocol. If the optional interface board is installed, the RS232C protocol serial signals are converted on those boards to Centronics protocol parallel signals.

Thereafter, the signal data is connected to the printer controller.

2) Display controller

The display controller controls via the I/O ports the output of signals to the controllers on the panel board and the POWER, ONLINE, and ERROR LEDs, and the input of signals from the control panel switches. The timing for reading and writing to the controllers on the panel board, the output of signals for latching addresses and data, the display data, and I/O from the control buttons, is controlled to match the MPU status control.

3) DRAM controller

Independent of the MPU, the DRAM controller performs 16-bit addresss/data bus control, read/write control, RAS/CAS control, and refresh control of the 2×4M bit DRAM.

4) Address decoder

Under MPU control, the address decoder outputs via the 16-bit address/data bus, the chip selector signal for the control/FONT ROM, and the control signals, etc., from the MPU for the DRAM.

5) Buffer controller

The buffer controller controls the DRAM's receive buffer and print buffer. The receiving buffer controller automatically writes received data to the receiving buffer and controls the available space in the buffer. The print buffer controller automatically reads data from the print buffer into the MPU, then automatically clears the data from the buffer.

6) Print head controller
The print head controller converts the print data read from the DRAM print buffer from parallel to serial format, and outputs this data as the HDATA signal for driving the print head. Simultaneously, the print head controller processes the head position control signals and head temperature adjustment signals so that printing is performed optimally in relation to factors such as the head status and print data, etc.

7) Paper feed motor controller
The paper feed motor controller controls the paper feed motor driver. There are two paper feed motor drivers, each of which outputs a single-phase excitation signal, therefore producing a 2-phase drive. The paper feed motor drive is controlled by controlling the current, the controller sending 4-step current control instructions to the paper feed motor driver so that the motor speed can be controlled according to the conditions.

8) EEPROM controller
The EEPROM controller controls the writing and reading of data to and from the EEPROM via the I/O ports. The timing for reading and writing is controlled by the TCLK signal output from the MPU. Writing while the printer is on is continuously performed at a preset timing. When the power is turned on, data is read from the EEPROM; when it is turned off, data is written to the EEPROM.

9) I/O ports
These ports input and output the various signals related to the printer controller.
- Input ports: Signals from the control panel switches
  Data read from the EEPROM
- Output ports: Operating signals to the POWER, ONLINE, and ERROR LEDs
  Control signals to the paper feed motor driver
  Data written to the EEPROM
  Chip selector signal

**c) Control/FONT ROM (IC2)**

The printer control program occupies a 4Mbit area (lower) of the 8Mbit ROM. The remaining 4Mbit area (higher) and another 16Mbit area contains the bitmapped font data. The program and data is sent to the printer controller under the control of the MPU and printer controller.

**d) DRAM (IC3 and IC4)**

There are two 4Mbit DRAMs which are controlled by the printer controller. The memory area is divided up into receiving buffer, download buffer, print buffer, and working area.

**e) Block enable selector (IC14)**

The selector function allows the drive control order of the block enable signals to be switched, allowing the precision of printing control such as smoothing control to be improved.

**f) Motor drivers (IC6, IC9, IC10, and IC12)**

These driver ICs control the carriage motor, purge motor, and paper feed motor drive. The carriage motor driver IC (IC12) is a bipolar constant current driver IC. It uses the motor control signal (PWM signal) output by the MPU to control the carriage motor drive by outputting a constant current to the respective phases.
The purge motor driver IC (IC6) uses the motor control signals output by the MPU to control the purge motor drive by outputting a constant current to the respective phases. Motor operation is controlled simply by inversion, achieved by switching the order in which the current is output to the phases.
The paper feed motor driver ICs (IC9 and IC10) control the rotation by varying the current according to the 4-stage current control instructions output by the printer controller. Each driver outputs a single-phase excitation signal. Two-phase excitation is achieved by using two driver ICs.

**g) Reset IC (IC7)**

The reset IC detects the supply voltage when the power is turned on or there is a power failure, and sends reset signals to the MPU and printer controller.

**h) EEPROM (IC8)**

This 1Kbit EEPROM (Electrically Erasable and Programmable ROM), which is controlled by the printer controller, stores data, at preset timing, such as the printer utilization as well as the printer's mode and settings. The data is automatically written to the EEPROM when the power is turned on or off, when confirming changes to mode settings implemented using the control buttons, after purge operations, and when paper is ejected (only part of the data area is updated).
Resetting the printer in service mode clears the EEPROM except for the following data:

- Total page counts for black and color cartridges, number of cleaning operations, dot count (total dot count for each color), number of times BJ cartridges have installed and removed.
- Waste ink count
- Ink cartridge replacement status
- Function and mode settings
- Country ID

## 4.3 Interface Board Block

In addition to the standard parallel interface board, this printer will accept optional serial interface board in the slots in the rear of the printer. Internally, interface board converts the received serial data into standard Centronics (IBM-PC-compatible) parallel data.

### 4.3.1 Parallel interface board

**a) Block diagram**

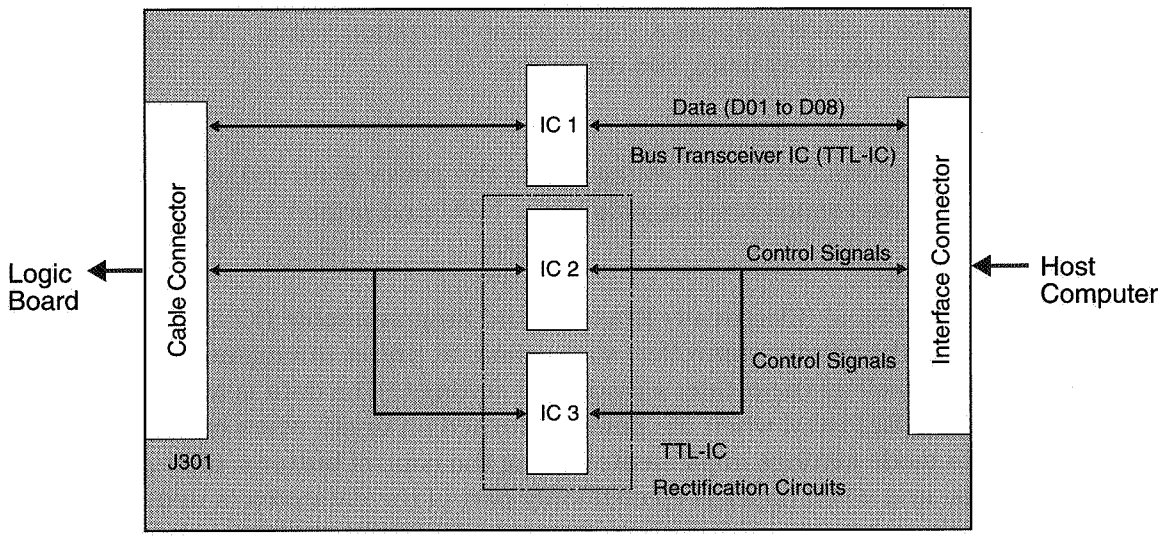



**Figure 4-26 Parallel Interface Board Block Diagram**

**b) Board structure**

The interface boards consist of a 36-pin interface connector, a bus transceiver IC (IC1) that performs waveform shaping for the data signal lines and also controls the direction of the signals according to the bidirectional Centronics specifications, TTL-ICs (IC2 and IC3) for the control signal lines, and a pin cable connector for exchanging data with the logic board. The waveforms of the data signals are shaped before being exchanged between the host computer and printer.

### 4.3.2 Serial interface board

**a) Block diagram**

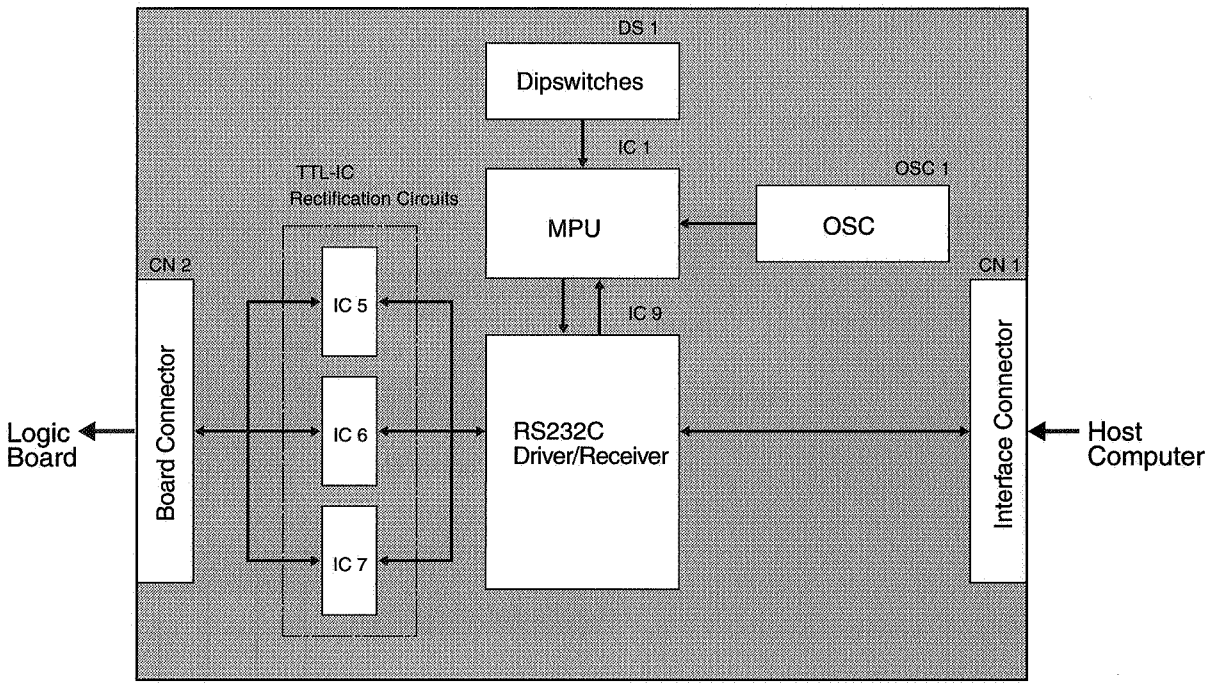



**Figure 4-27 Serial Interface Board Block Diagram**

**b) Board structure**

**1) Interface board controller (IC1)**

This is a 64-pin, 8-bit NEC µPD78238GJ controller with 1KB of RAM, 32KB ROM. It operates at 9.8MHz using an external oscillator (OSC1). The board converts the RS232C serial data from the host computer into parallel data. It also controls the RS232C transceiver IC.

**2) RS232C transceiver (IC9)**

This is an NEC µPD4723 transceiver IC. It outputs TXD, RTS, and DTR signals, and receives RXD, CTS, and DSR signals.

**3) TTL-ICs (IC5, IC6, and IC7)**

The TTL-ICs shape the data signals exchanged by the host computer and printer.

## 4.4 The Display

### 4.4.1 Panel board block diagram

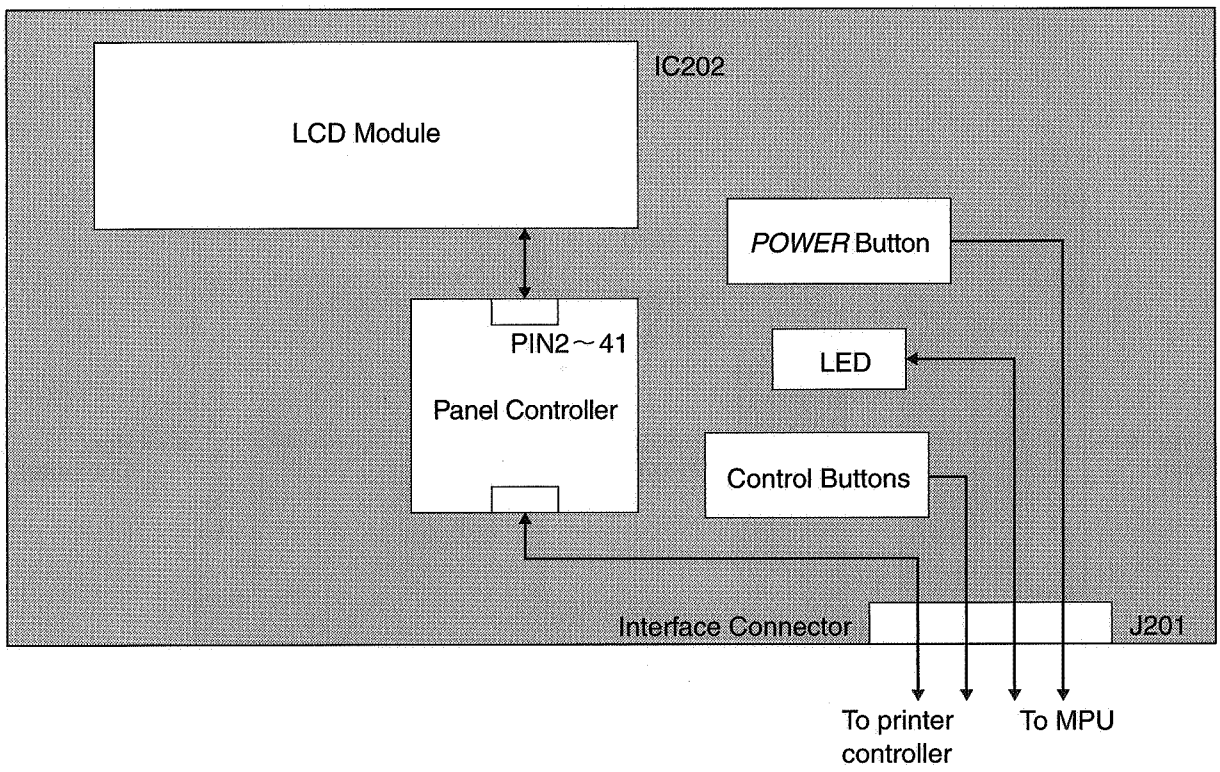



**Figure 4-28 Panel Board Block Diagram**

### 4.4.2 Panel board structure

The panel board consists of the LCD module, five control buttons, one cursor button, and three LEDs. The control panel is used for selecting the different operating modes of the printer. The LCD and LED show the various settings and printer status, as controlled by the printer controller.

**a) Panel board controller**

The panel board controller is a serial data transmission type of gate array IC. It controls the operation of the LCD module. The printer controller specifies the addresses of the panel board controller ports to control the LCD module. Control buttons other than the *POWER* button and the output of signals to the LEDs are controlled by the printer controller in the printer itself.

**b) LCD**

This TN-type LCD displays graphics and characters in positive video as controlled by the 40 SEGMENT signals and 1 COM signal.

**c) POWER button**

In contrast to the other control buttons, the *POWER* button inputs signals directly to the MPU. Pressing the *POWER* button inputs the NMI signal to the MPU.

## 4.5 Power Supply Unit

The power supply unit is a switching regulator that converts the input AC voltage into the various DC voltages supplied to the logic board.

### 4.5.1 Power supply block diagram

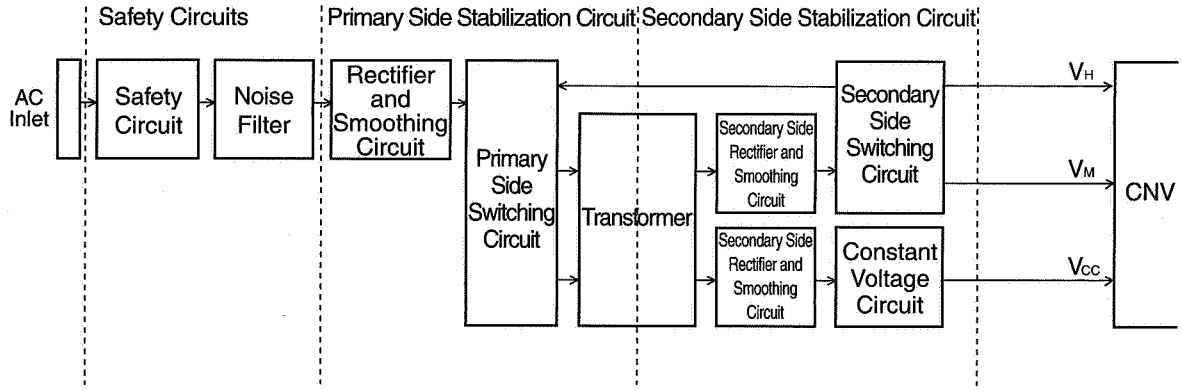



**Figure 4-29 Power Supply Unit Block Diagram**

### 4.5.2 Power supply components

**a) AC inlet**

This is a 3-terminal (including the GND terminal) AC inlet. The input voltage is as shown below.

120V model: 85V (100V-15%) to 132V (120V+10%)

220/240V model: 187 V (220V-15%) to 264V (240V+10%)

**b) Internal circuits**

Safety circuits:

The safety circuits protect the internal circuits from overcurrents and overvoltages, and eliminate noise. The safety circuits are equipped with a fuse which blows to protect the circuits in the event of an overvoltage or overcurrent. The fuse is accessed from the connector.

Primary side stabilization circuit:

This circuit performs rectification and switching on the primary side.

Secondary side stabilization circuit:

This circuit performs rectification and switching on the secondary side.

**c) Output connector**

This connector is on the secondary side of the power supply circuit. It outputs the following voltages:

VCC: Drive voltage for the ICs and LSIs. +5.0VDC±0.25VDC

VH: Head drive voltage. +24.0VDC±0.25VDC

VM: Motor drive voltage: +35.0VDC±1.8VDC

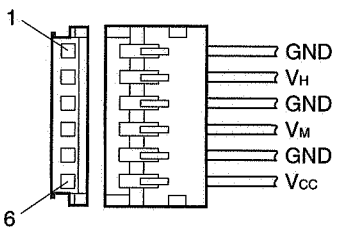



**Figure 4-30 Output Connector**

# 5. DETECTION FUNCTIONS

## 5.1 Sensors

The printer is equipped with the following sensors:

a) Tractor feed sensor
b) Paper sensor (PE sensor/page width sensor)
c) Home position sensor (purge sensor)
d) Timing sensor
e) Printer temperature sensor (TH1)
f) Head temperature sensor (diode sensor in BJ cartridge)

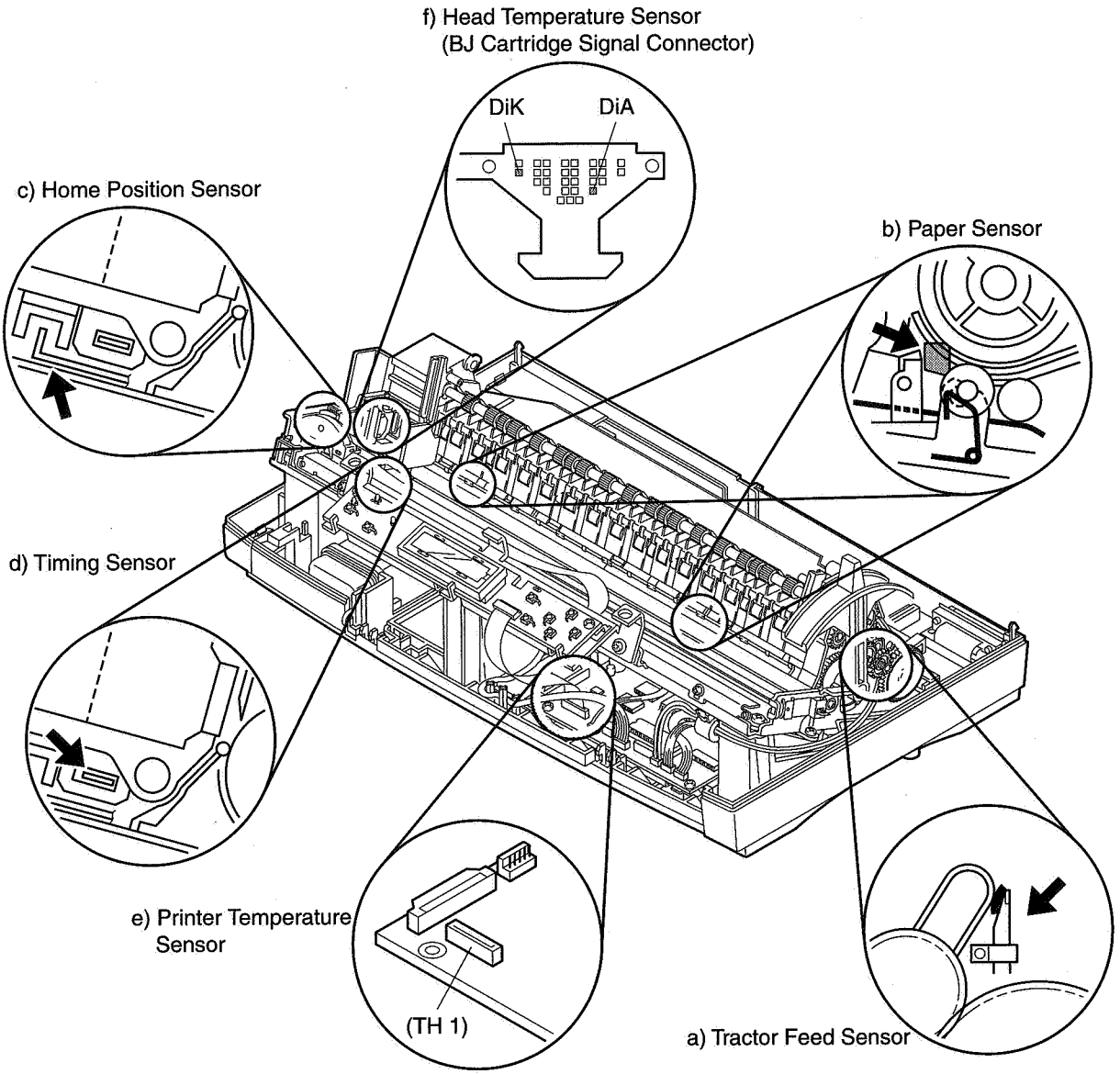



**Figure 4-31 Diagram of Sensor Positions**

**a) Tractor feed sensor**

The tractor feed sensor, which is a leaf-switch type sensor, detects whether cut sheet mode (manual or ASF feed) or fanfold mode is selected. When the paper selection lever is set in the fanfold paper position, the release cam presses the contacts against each other.

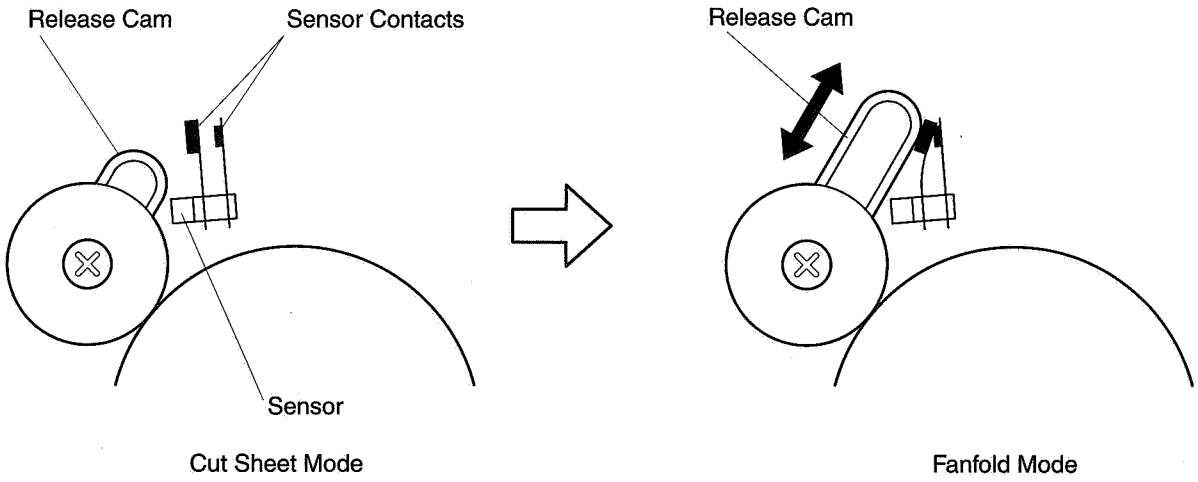



**Figure 4-32 Enlargement of Tractor Feed Sensor Contacts**

**b) Paper sensors (PE sensor/paper width sensor)**

The paper sensors are a contact type mechanical sensors. The PE sensor and the paper width sensor have the same mechanical structure. When paper is fed into the printer, the paper presses the sensor plug down, activating the sensor. The paper width sensor is positioned 114 10cpi characters from the left edge of the paper. It automatically detects if the paper is larger or smaller than A4-size in landscape mode (A3-size in portrait mode).

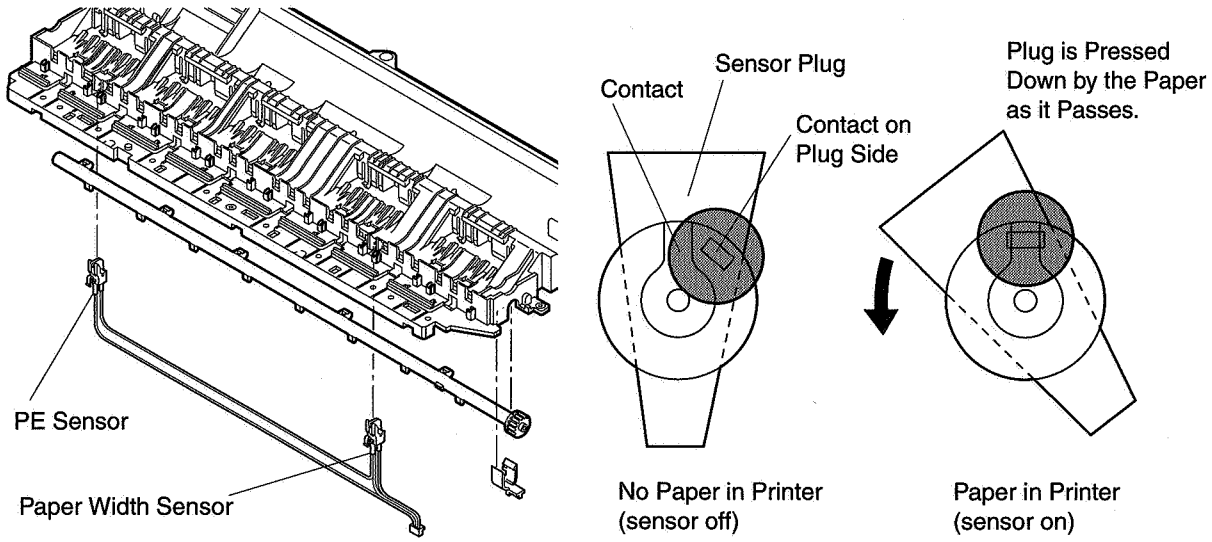



**Figure 4-33 Positions of Paper Sensors, and Enlargement of Sensor Plug**

**c) Home position sensor (purge sensor)**

The photointerruptor-type home position sensor is mounted on the carriage rail under the carriage. It detects the carriage position and the position at which the purge unit starts to function. When the carriage moves to the home position edge, the edge blocks the sensor, and the printer detects that the carriage is in the home position.

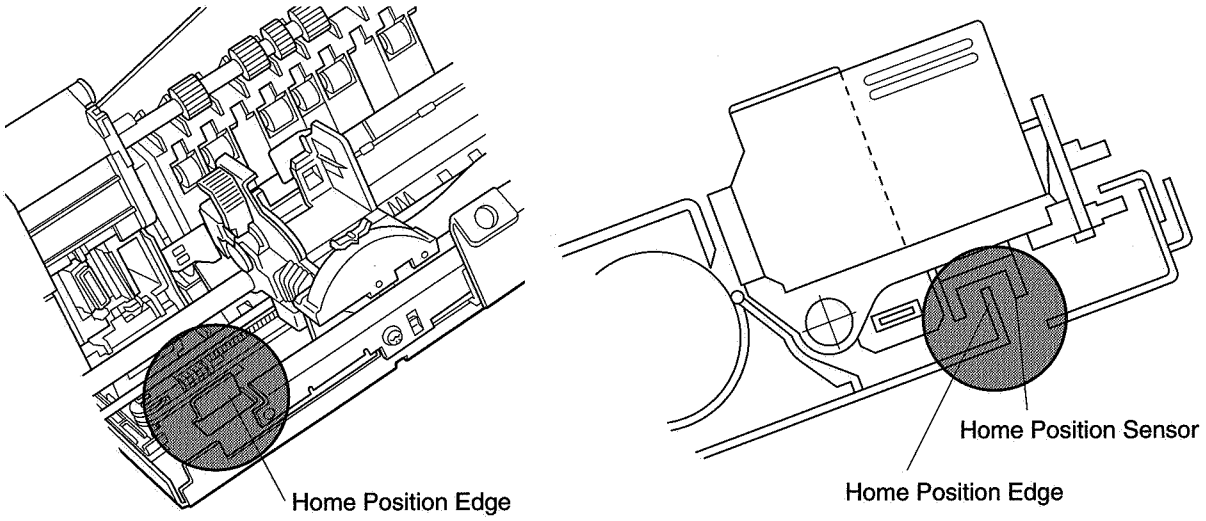



**Figure 4-34 Home Position Sensor Mechanism**

Also, if the carriage is in the capping position, the pump sensor lever shuts off the sensor when the purge unit functions. The printer therefore knows when the carriage is in the capping position and starts the purge drive operation.

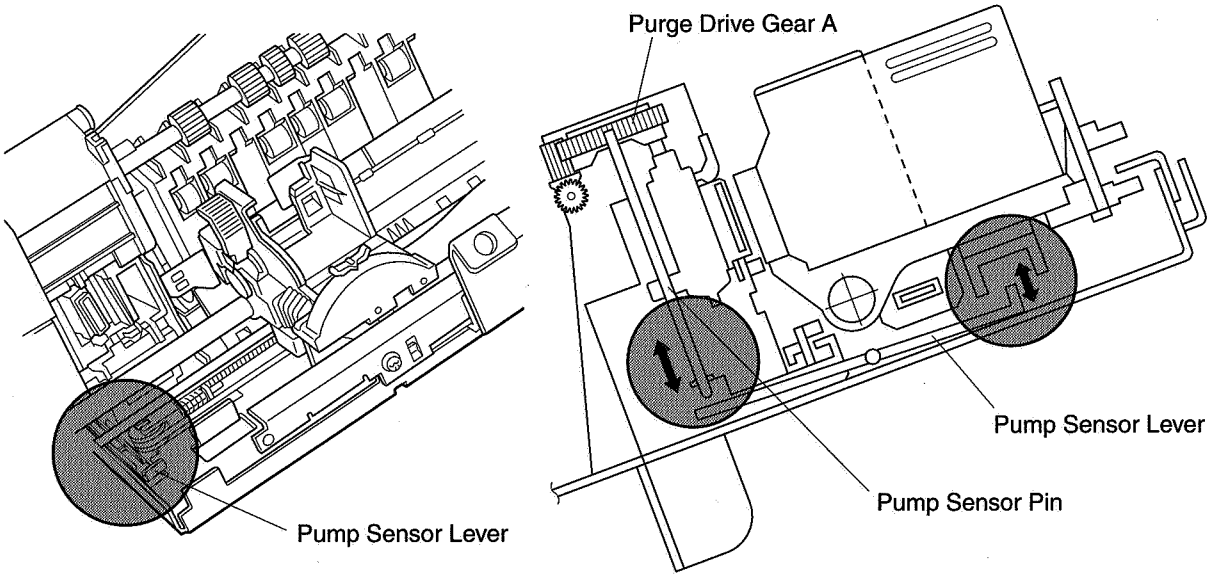



**Figure 4-35 Pump Sensor Mechanism**

**d) Timing sensor**

The timing sensor is a magnetic encoder sensor located on the bottom of the carriage. When the carriage moves, the sensor scans the equidistant pattern on the magnetic timing film to improve the accuracy of the printing position.
The timing sensor outputs to the MPU ENCOA and ENCOB, which has a 90° phase offset from ENCOA, when it scans the 120dpi-pitch magnetic pattern. The MPU divides the 120dpi output signal cycle timing into three to create 360dpi timing.
The MPU uses the 90° phase differential between ENCOA and ENCOB to determine which direction the carriage is travelling. This information is used to correct the output order and printing position in bidirectional printing.

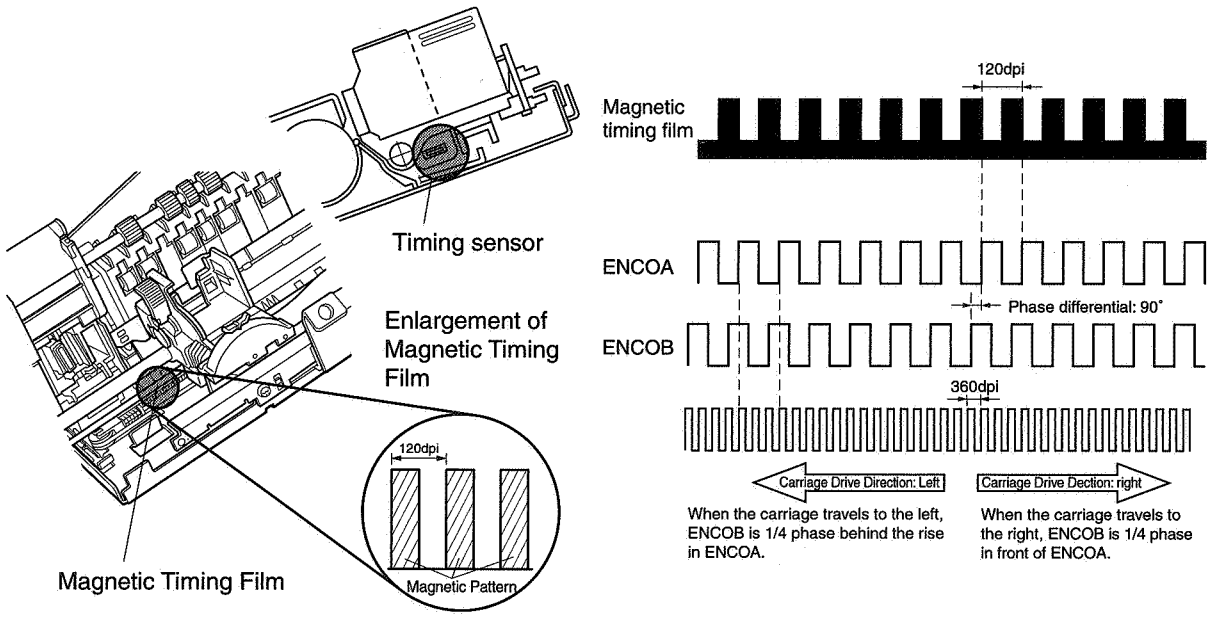



**Figure 4-36 Timing Sensor Mechanism**

**e) Printer temperature sensor (TH1)**

The printer temperature sensor is mounted on the logic board to detect the temperature inside the printer. The thermistor resistance changes as the temperature fluctuates, and the voltage change resulting from the change in the resistance is converted by ADC from analog to digital. The MPU varies the head drive pulse width, which is controlled by the printer controller, according to the changes in temperature, thereby ensuring optimum printing condition.

**f) Head temperature sensor (diode sensor in BJ cartridge)**

The head temperature sensor in the BJ cartridge is a diode sensor which detects the head's internal temperature. Temperature changes in the head are detected by the MPU as the voltage-level changes.
The MPU varies the head drive pulse and timing control according to the detected temperature to protect the head from abnormal rises in temperature.

## 5.2 Waste Ink Amount Detection

Waste ink is discharged during head maintenance and cleaning. The MPU calculates the amount of ink used and the amount of waste ink evaporation from the total dot count from maintenance and from the cleaning operations to determine the amount of waste ink. When the *POWER* button is turned off, this value is written into the EEPROM when cleaning finishes and the paper is ejected. The MPU reads the waste ink count from the EEPROM when the power is turned on. When the waste ink count is close to the upper limit of the amount of ink that the absorber can hold, it displays a waste ink warning (C 1). If the waste ink count continues to increase above the permissible level, a waste ink error (F14) is displayed and the printer stops operating.

## 5.3 Remaining Ink Warning Detection

This function warns the user to make ready a new BJ cartridge or ink cartridge when the amount of remaining ink is below a set level. This function can be set on or off using the function setting mode. The amount of ink ejected during printing and purging is calculated by the dot counter in the MPU as a dot count and the total written to the EEPROM when the power is turned off, when a page is ejected, and after cleaning. There are separate counts for the black and color BJ cartridges, and also for black and color inks in the case of the color BJ cartridge. The values in the dot counters are totalled to calculate the amount of remaining ink. The MPU reads the content of the EEPROM when the power is turned on and displays a warning to let the user know that not much ink remains when the dot count is close to the value set for the cartridge. If the printer continues to print after the warning has been displayed, the printer is switched offline at the end of the current page. Printing can, however, be resumed by switching it online again. Printing can then be continued with the warning displayed on the LCD. FULL is displayed when the cartridge is replaced and the dot count is reset.

**Table 4-6 List of Sensor Functions**

| Sensor function | Description | Status | Remarks |
|---|---|---|---|
| Paper detection | Detected by paper sensor | Provided | |
| Paper width detection | Detected by paper sensor | Provided | |
| Home position detection | Detected by home position sensor | Provided | |
| BJ cartridge detection | Identified by head's ID0 and ID1 | Provided | |
| Ink cartridge detection | | Not provided | |
| Remaining ink | Calculated from dot count and cleaning operation count (can be set on or off using function settings) | Provided | Default: ON |
| BJ cartridge ID | Identified by head's ID0 and ID1 | Provided | |
| Waste ink absorption | Calculated from dot count and cleaning operation count | Provided | |
| Paper selection lever position | Detected by tractor feed sensor | Provided | |

# Part 5

# MAINTENANCE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# 1. MAINTENANCE

## 1.1 Parts for Regular Replacement

| Level | Part |
|---|---|
| User | None |
| Service personnel | None |

## 1.2 Consumable Parts

| Level | Consumable parts | Expected lives |
|---|---|---|
| User | None | |
| Service personnel | QG5-0441-050 (SPUR FRAME UNIT) | When spur marks become distinct. |

## 1.3 Consumables

| Level | Consumable |
|---|---|
| User | Black BJ cartridge (BC-20) |
| | Color BJ cartridge (BC-21) |
| | Ink cartridge (BCI-21: black/color) |
| Service personnel | None |

## 1.4 Periodic Maintenance

| Level | Periodic maintenance |
|---|---|
| User | None |
| Service personnel | None |

# 2. SERVICING TOOLS

## 2.1 List of Tools

| Ordinary tools | Use |
|---|---|
| Phillips screwdriver | For removing and replacing screws (L=130mm or greater) |
| Blade screwdriver | For removing plastic parts (d=5.5mm, t=0.7mm or less) |
| Tweezers | For removing and installing coil springs |
| Multimeter | For troubleshooting |

| Special tools (part No.) | Use |
|---|---|
| Gap gauge 0.5mm (QY9-0001-000) | For adjusting the head gap (two gauges are required for this purpose) |
| Black BJ cartridge<br>Color BJ cartridge | Have ready as a special tool.<br>(For adjusting the head gap. Because the gap gauge will come in contact with the nozzles, do not use the user's BJ cartridge.) |
| Grease (MOLYKOTE PG641) (CK-0562-000) | For application to specified locations (see *Section 4., "Grease Application" (page 5-9.)*) |

# 3. DISASSEMBLY AND REASSEMBLY

## 3.1 Disassembly and Reassembly

When disassembling or reassembling the printer, refer to the parts catalog. The parts catalog contains enlarged diagrams where required and additional notes.

## 3.2 Notes on Disassembly and Reassembly

Note the following when disassembling or reassembling the printer.

### 3.2.1 Top cover unit

To remove the top cover, lift the hooks at an angle towards the front of the printer, then lift the cover straight up together with the spur frame unit. To replace the top cover unit, engage the left and right gear cover rails in the corners of the spur frame unit. Failure to follow this procedure may damage the cover and spur unit.

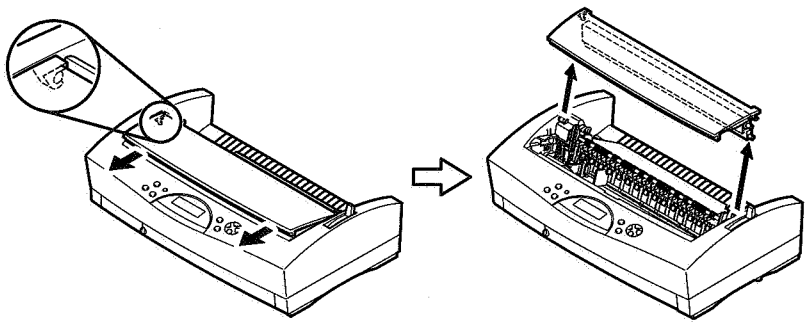


**Figure 5-1 Removing the Top Cover Unit**

### 3.2.2 Upper cover unit

The upper cover is fixed in position by two hooks at each end and three on the back. First disengage the two hooks at the front, then disengage the hooks at the back and slide the upper cover to the rear to remove it. The hooks can be disengaged by inserting a blade screwdriver through the holes in the bottom case and pushing it up.

Do not apply excessive force to the hooks as they can be damaged. When removing the upper cover, do not apply any lateral force as doing so can break the paper selection lever.
When replacing the upper cover, make sure that no wires are pinched by the hooks.

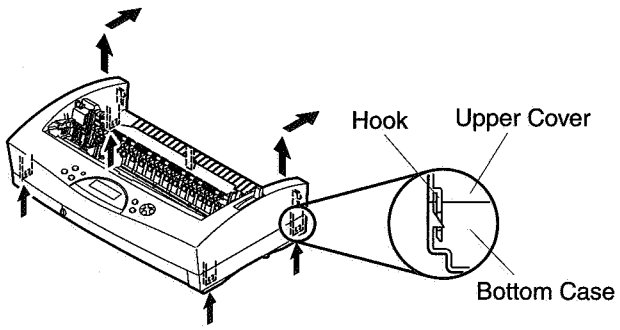



**Figure 5-2 Removing the Top Case Unit**

### 3.2.3 Spur frame unit

Make sure that when mounting the spur frame unit on the top cover that it is not installed the wrong way around. The spur frame consists of a lot of similar looking spur units.

The tips of the spurs are very small and are easily deformed. If they do become deformed, there is a risk that they way leave marks on the paper. Take care, therefore, not to touch the spurs unnecessarily or to place the spur frames face down.

CAUTION

The spurs can be damaged if you install the spur frame unit the wrong way round.

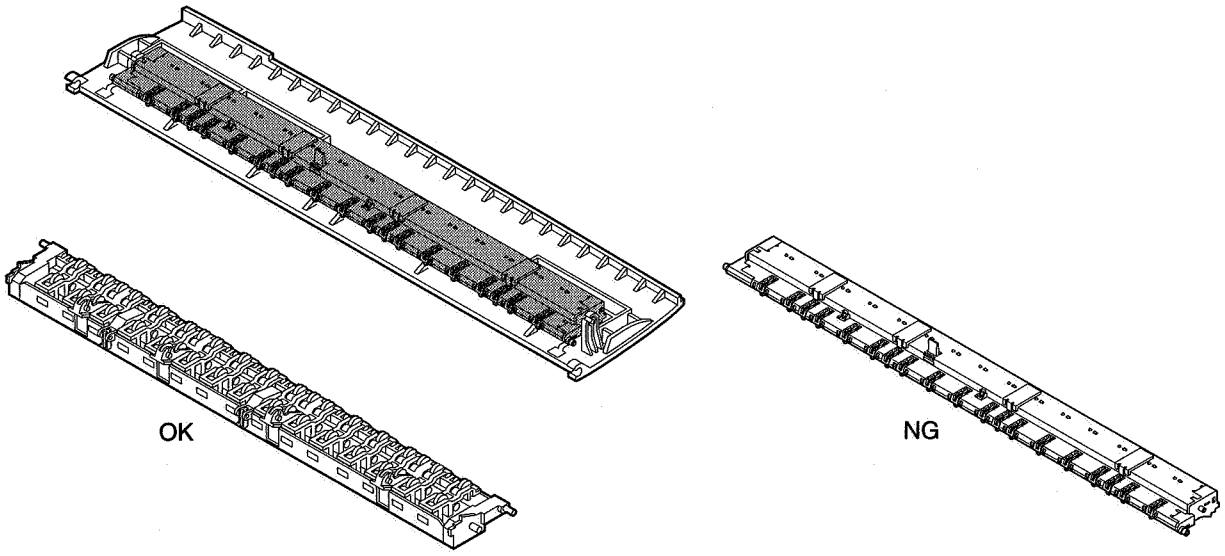



**Figure 5-3 Installation of the Spur Frame and its Position When Removed**

### 3.2.4 Logic board

Disconnect the cables from their connectors before attempting to remove the logic board. Next, remove the interface cable holder, then disconnect the interface cables by pulling the board out to the front of the printer.

CAUTION

Be sure to remove the carriage ribbon cable from the connector before removing the logic board. If you attempt to disconnect the ribbon cable after removing the logic board, the cable may break. To remove the carriage ribbon cable, lift the connector lock upward. To prevent devices on the back of the board from damaging when the board is removed, lift the front of the board slightly while removing it from the printer.

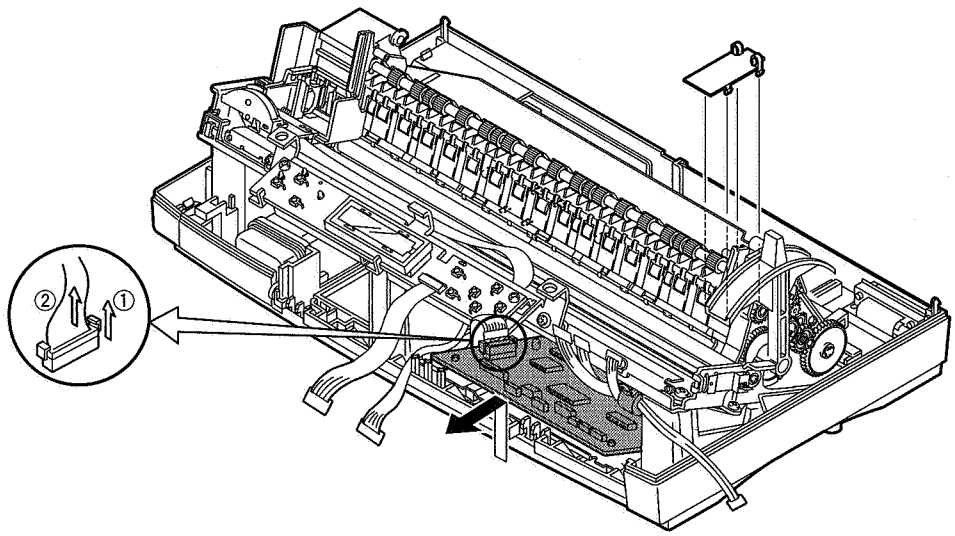



**Figure 5-4 Removing the Logic Board**

### 3.2.5 ROM replacement

Disconnect the power cord before attempting to replace the ROMs. When the power cord is connected, power is supplied to the printer. Attempting to remove the ROMs can cause the MPU on the logic board to malfunction and the fuse (for the purge motor, ICP2) to blow as the protection circuit function. This may also happen if the power is turned on with the ROM inserted incorrectly. Always disconnect the power cord before replacing the ROMs, and note carefully the orientation of the ROMs.

### 3.2.6 Printer unit

Always remove the purge unit before attempting to remove the printer unit from the bottom case. Failure to do so can result in ink leaking from the waste ink flowpath and too much weight being placed on the purge unit when the printer unit is put down, resulting in possible performance problems.
To lift the printer unit, hold the frame as shown in the figure. There are stands for the printer which allow it to be serviced on the bench.

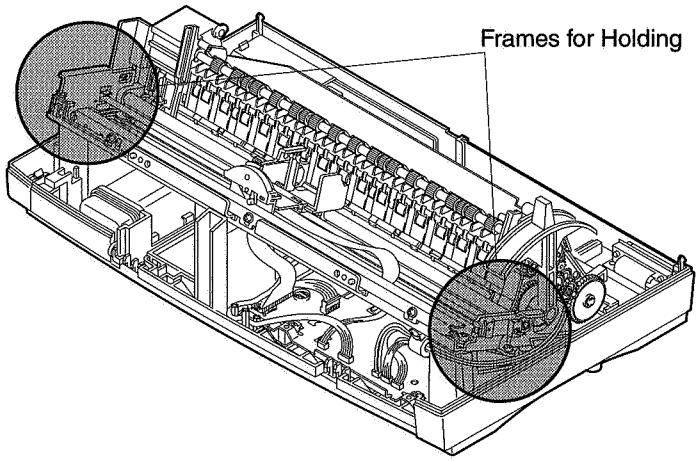



**Figure 5-5 Removing the Printer Unit**

### 3.2.7 Carriage guide frame

To ensure good print quality, the carriage guide frame fixes the gap between the faceplate of the BJ cartridge and the platen. The position of the carriage guide frame is adjusted before it leaves the factory and the screw tops are painted red to prevent the position being inadvertently changed. Provided the carriage guide frame screws are not loosed and the position changed, no adjustment is required.

If you alter the position inadvertently, readjust the head gap following the instructions in *Section 5, "ADJUSTMENTS" (page 5-10).*

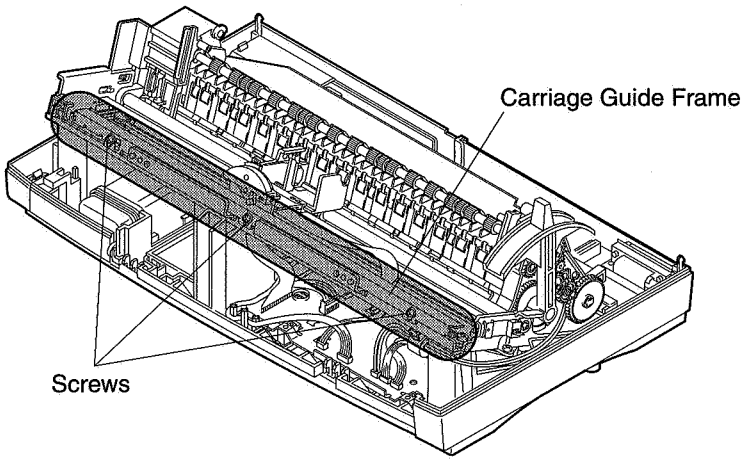



**Figure 5-6 Carriage Guide Frame**

### 3.2.8 Platen

Always remove the paper guide plate before removing the platen. Failure to do so may result in the platen coming into contact with the paper feed roller and the paper guide plate becoming bent. Insert a flat blade screwdriver into the space between the paper guide plate and the platen, and then slide it to the left to remove the paper guide plate.

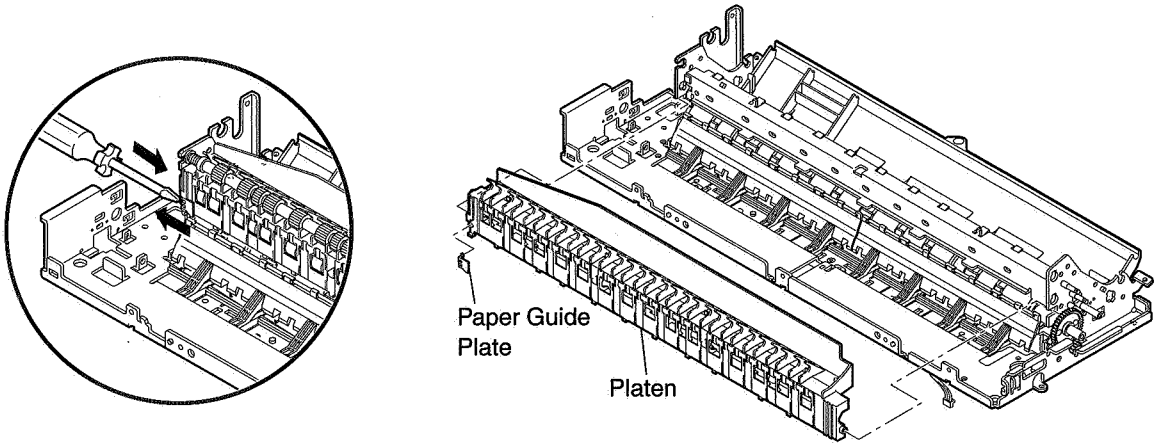



**Figure 5-7 Platen**

### 3.2.9 Handling the magnetic timing film

The magnetic timing film has magnetic stripes at equidistant intervals. As the carriage traverses this film, the magnetic encoder on the bottom of the carriage scans the pattern to improve the precision of the printing position.

To prevent damage from static when you remove the magnetic timing film, wear a wriststrap and avoid the use of magnetized screwdrivers, etc. Also take care not to fold or bend the film.

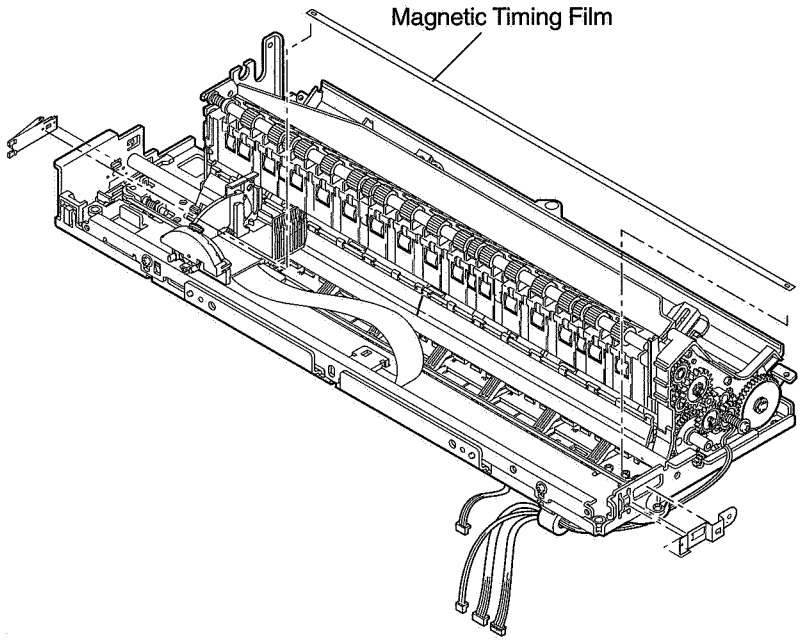



**Figure 5-8 Magnetic timing film**

## 3.3 Notes on Replacing the Logic Board and Waste Ink Absorber

When the total amount of waste ink exceeds the amount that can be absorbed, there is a risk of ink leaking from the waste ink absorber. The printer calculates the amount of waste ink generated by cleaning and maintenance operations and compares this amount with the permissible capacity of the waste ink absorber and, outputs a warning if the remaining capacity of the absorber is below a certain level.
The waste ink data is stored in the EEPROM on the logic board. Therefore, care must be exercised when replacing the EEPROM, as discussed below.

### 3.3.1 Servicing or replacing the logic board

**a) Replacing the logic board (installing old EEPROM on new board)**

When the old EEPROM is installed on the new board, the waste ink absorber(s) do not need to be replaced, as all data stored in the EEPROM, including the waste ink count, remains valid.

**b) Replacing the logic board (new EEPROM)**

If the logic board, complete with EEPROM, is replaced, all data is cleared and the printer defaults to the factory settings. The printer therefore assumes that the waste ink absorber is also new. Therefore, the waste ink absorber must be replaced, when the amount of waste ink has exceeded the specified amount. (See page 5-25 for the replacing schedule of the waste ink absorber.)

**c) Replacing the EEPROM**

As with b), above, the waste ink absorber must be replaced. Note that the data stored in the new EEPROM on the new logic board is undefined. The EEPROM must therefore be reset after it has been replaced.

No waste ink (full) error will occur even if the amount of waste ink exceeds the capacity of the absorber if you do not reset the EEPROM and replace the waste ink absorber as described in c) when the logic board and EEPROM are replaced. In this case, ink may leak out. The same problem can occur if the EEPROM is inadvertently reset.

### 3.3.2 Replacing waste ink absorber

Be sure to reset the waste ink counter in the EEPROM in service mode if the waste ink absorber has been replaced due to a waste ink absorber fault or a waste ink full error. If the waste ink counter in the EEPROM is reset, a waste ink full error, etc., may occur despite the waste ink absorber having adequate remaining capacity.

See *"Part 3, Operation, Section 3.5, Service Mode" (page 3-25)* for details of how to reset the EEPROM.
Also see *Section 6, "TROUBLESHOOTING" (page 5-12)*, if the printer stops due to a waste ink full error.

# 4. APPLYING GREASE

Apply grease at the points shown below.
Smear a thin film of the appropriate amount of grease (about the size of a small pea) smoothly over the whole area to be lubricated.

CAUTION

Never apply grease to locations other than those indicated. Also take care that grease does not get transferred onto parts neighbouring the indicated locations.

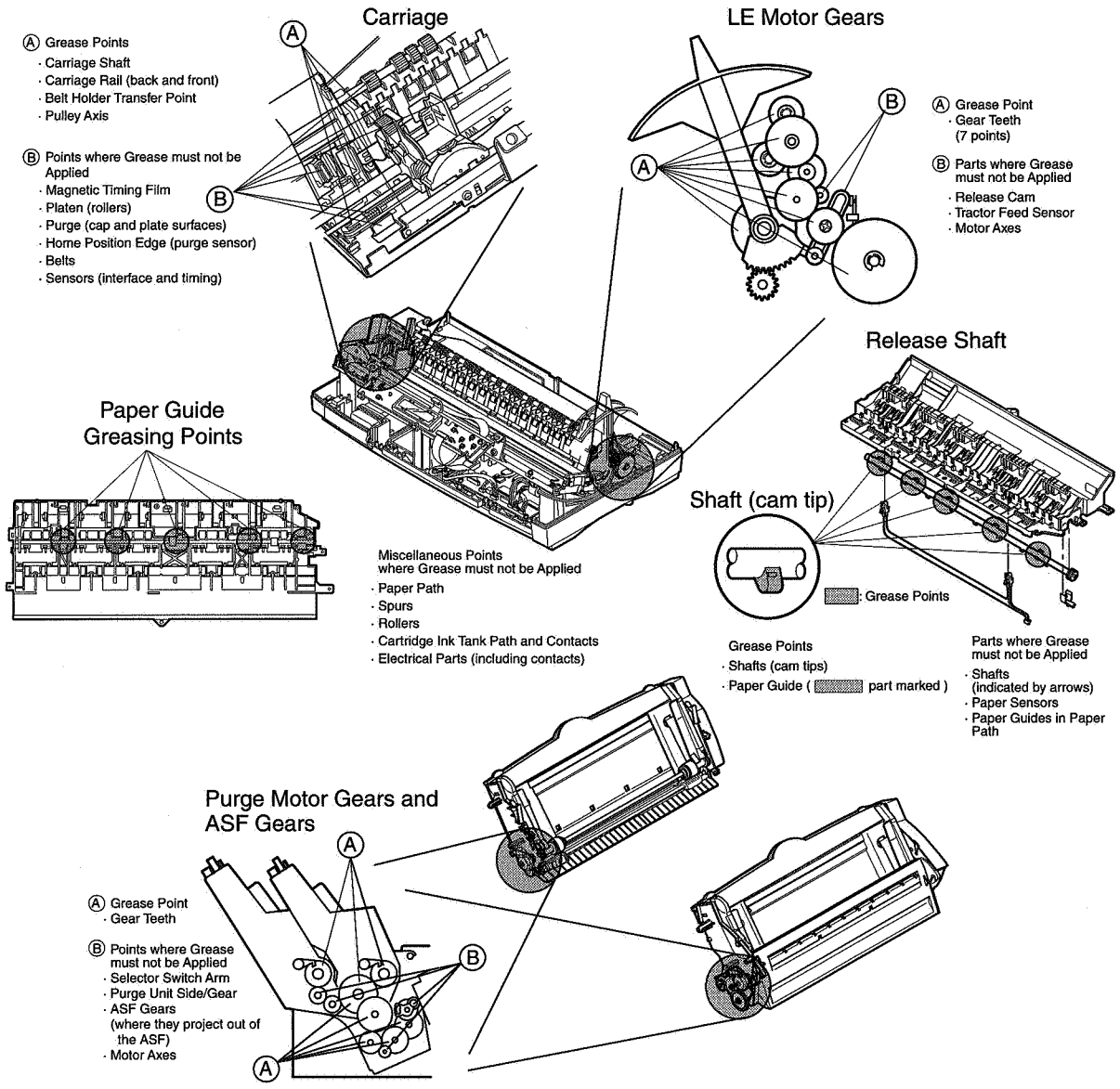



**Figure 5-9 Grease Points and Points Grease Must Not be Applied**

# 5. ADJUSTMENTS

## 5.1 Adjustment Points

Only the carriage guide frame need be adjusted.

To ensure optimum print quality, it is important that the BJ cartridge head gap (the distance between the faceplate and the platen) is correctly adjusted. The carriage guide frame is a rail that keeps the carriage in a constant position and maintains a constant head gap as the carriage moves left and right.

## 5.2 When Adjustment is Required

If the mounting position in which the carriage guide frame is changed, the gap must be adjusted. The carriage guide frame is factory adjusted before the printer is shipped and should not be repositioned unless absolutely necessary. To prevent it being inadvertently repositioned, the mounting screws are painted red.

## 5.3 Adjustment

### 5.3.1 Preparation

1) Remove the upper cover unit.
2) Remove the control panel board and panel board frame.
3) Install the black BJ cartridge for servicing in the carriage.
4) Manually move the carriage belt to move the carriage to position B (center point of platen). (Take care not to touch the magnetic timing film.)
5) Loosen screws A and C so that the carriage guide frame drops by its own weight. Then slightly tighten the screws so that there is no slack.

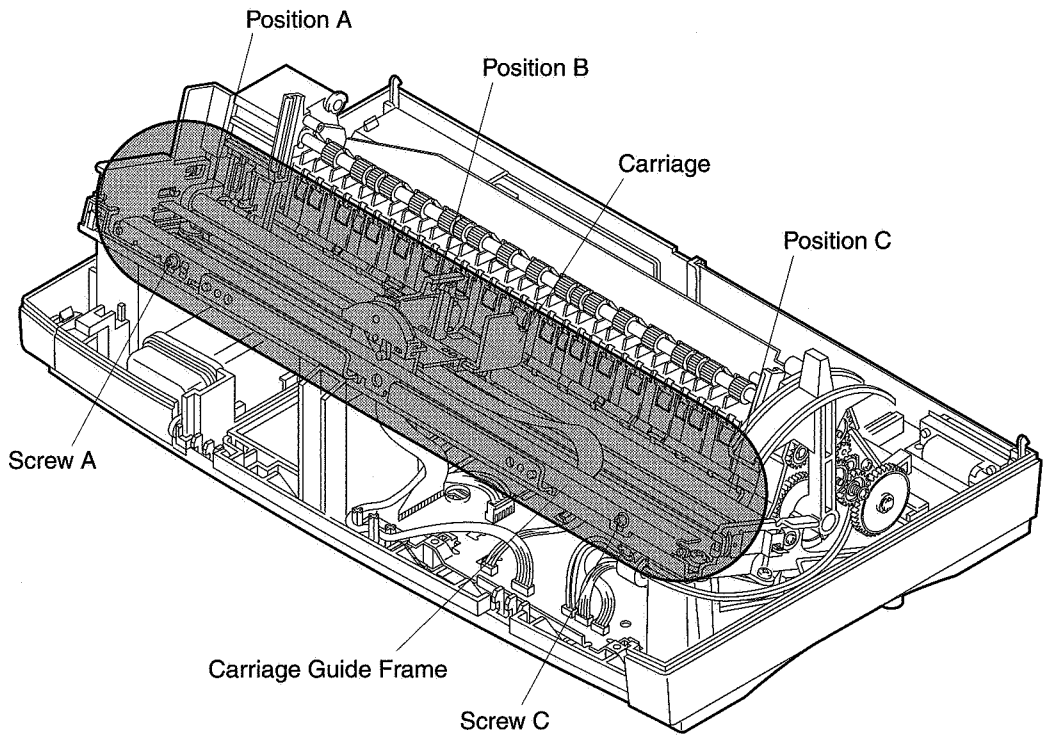



**Figure 5-10 Preparation for Adjustment**

### 5.3.2 Adjustment procedure

Please read the Cautions before starting adjustment.

1) Set the paper thickness lever to position "3", then insert two gap gauges together in position C.
2) Move the carriage to position C.
3) Set the paper thickness lever to position "1".
4) Gently lift the carriage guide frame until the head faceplate comes in contact with the gap gauges (so that the gap gauges can slide in and out without undue resistance), then semi-tighten screw C.
   Check the relationship between the head faceplate and gap gauge from each side of the carriage and from above.
5) Set the paper thickness lever to position "3", move the carriage to position B, then place one of the gap gauges on the paper guide plate at position A.
6) Move the carriage to position A.
7) Set the paper thickness lever to position "1".
8) Repeat step 4), then semi-tighten screw A.
9) Repeat steps 2) to 8) twice.
10) Alternately tighten screws A and C.

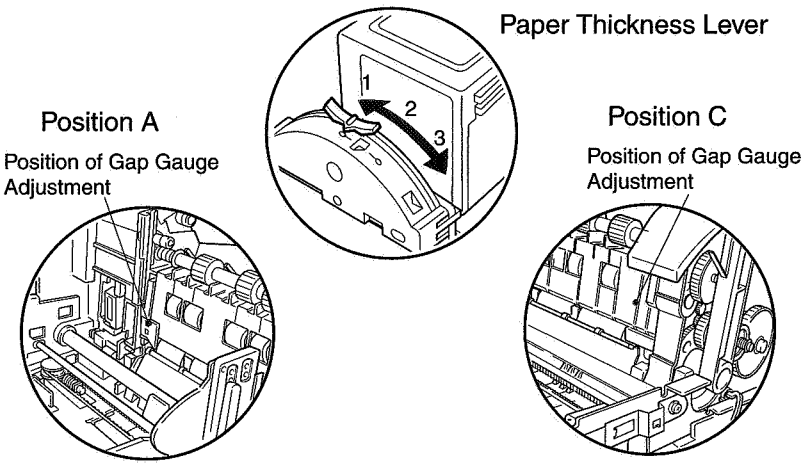



**Figure 5-11 Head Gap Adjustment**

Check before proceeding that the gap gauges are not deformed and that there is no dirt on them. Also check the platen for dirt.
Do not manually move the carriage itself as doing so may displace the carriage guide frame. To move the carriage, hold the carriage belt.
Always move the paper thickness lever to "1" before semi-tightening the screws. Do not attempt to tighten the screws when the paper thickness lever is in any other position.
There is a step in the platen and the adjustment cannot be carried out properly if the platen gauge is positioned on it. Also note that the carriage must be in the specified position at the left or right end of the platen during adjustment.
If the carriage guide frame becomes bent, not only will it not be possible to carry out proper adjustments but the head gap will not be consistent. Therefore be sure not to apply pressure to the frame while you are working.

# 6. TROUBLESHOOTING

## 6.1 Troubleshooting Overview

### 6.1.1 Overview

This chapter consists of the following two sections: "Diagnosis" and "Measure."
If you do not know the cause of a problem, consult the "Diagnosis" section. If you do know the cause, follow the instructions in the "Measure" section.

### 6.1.2 Troubleshooting cautions

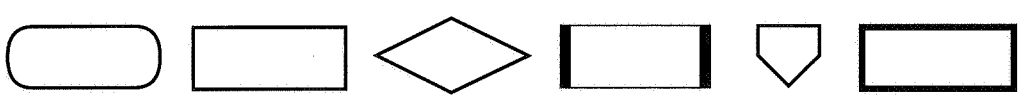
**a) Problems relating to print quality, paper feeding and ejection, and paper transport**

Problems relating to print quality, paper feeding and ejection, or paper transport can be due to incorrect usage or settings. Before attempting to diagnose the problem, check the following points:

1. Installation location and ambient environment
   Check that the printer is being used under the recommended ambient conditions. (Example: Check for excessive temperature and humidity and that the printer is installed on a level surface.)
2. Paper
   Check that you are attempting to print on the recommended type and weight of paper. (Example: Check that the paper is not excessively dusty, and is neither excessively light nor heavy.)
3. Paper thickness lever
   Check that the paper thickness lever is set to the appropriate position for the weight of paper.
4. Panel settings and device settings
   Check that the panel settings match the device settings. (For example, ASF may have been selected on the panel despite no ASF being installed.)
5. Device installation (particularly when ASF is installed)
   Check that the installation and method of use matches the type of paper being used. (Example: check if the ASF paper guide has been lowered when printing envelopes, and if the loading lever has been set in position.)
6. Fanfold paper
   Check that the fanfold paper has been loaded correctly. (Example: Check that the paper has been loaded in the correct position in the printer, and has not been tensioned excessively when mounted on the tractor.)

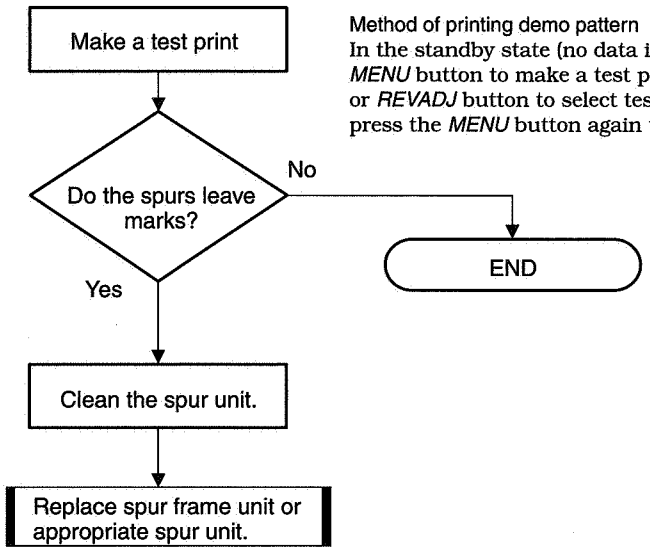
**b) Miscellaneous**

1. When replacing the logic board or waste ink absorber(s), follow the instructions in *Part 5, Section 3.3, "Notes on Replacing the Logic Board and Waste Ink Absorber" (page 5-8).*
2. Check before attempting to diagnose a problem that all connectors and ribbon cables are correctly connected.
3. Exercise extreme care to prevent an electric shock and avoid shorting the PCB if you are servicing the printer with the power cord connected and the printer case removed.
4. The troubleshooting procedures are provided as flowcharts. The flowcharts consist of the following symbols:



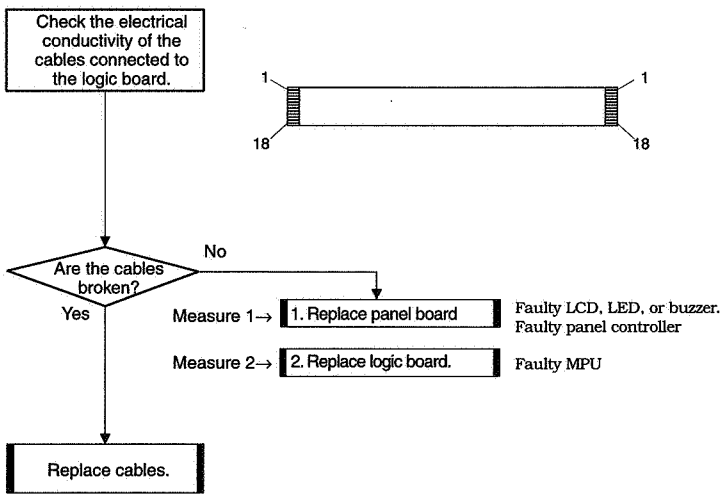
5. Always make a test print, etc., to check that the problem has been resolved after replacing parts or servicing the printer.
   If the work has not resolved the problem, Go to the next step in the flowchart.

**Example 1.**




6. In some cases, the Diagnosis and Measure sections give several procedures in succession. These procedures are given as the steps required to solve the problem. Check using a test print, etc., between each step to see if the problem has been resolved. If not, go on to the next step.
   The description printed alongside the "replace" box indicates where the problem probably lies.

**Example 2.**

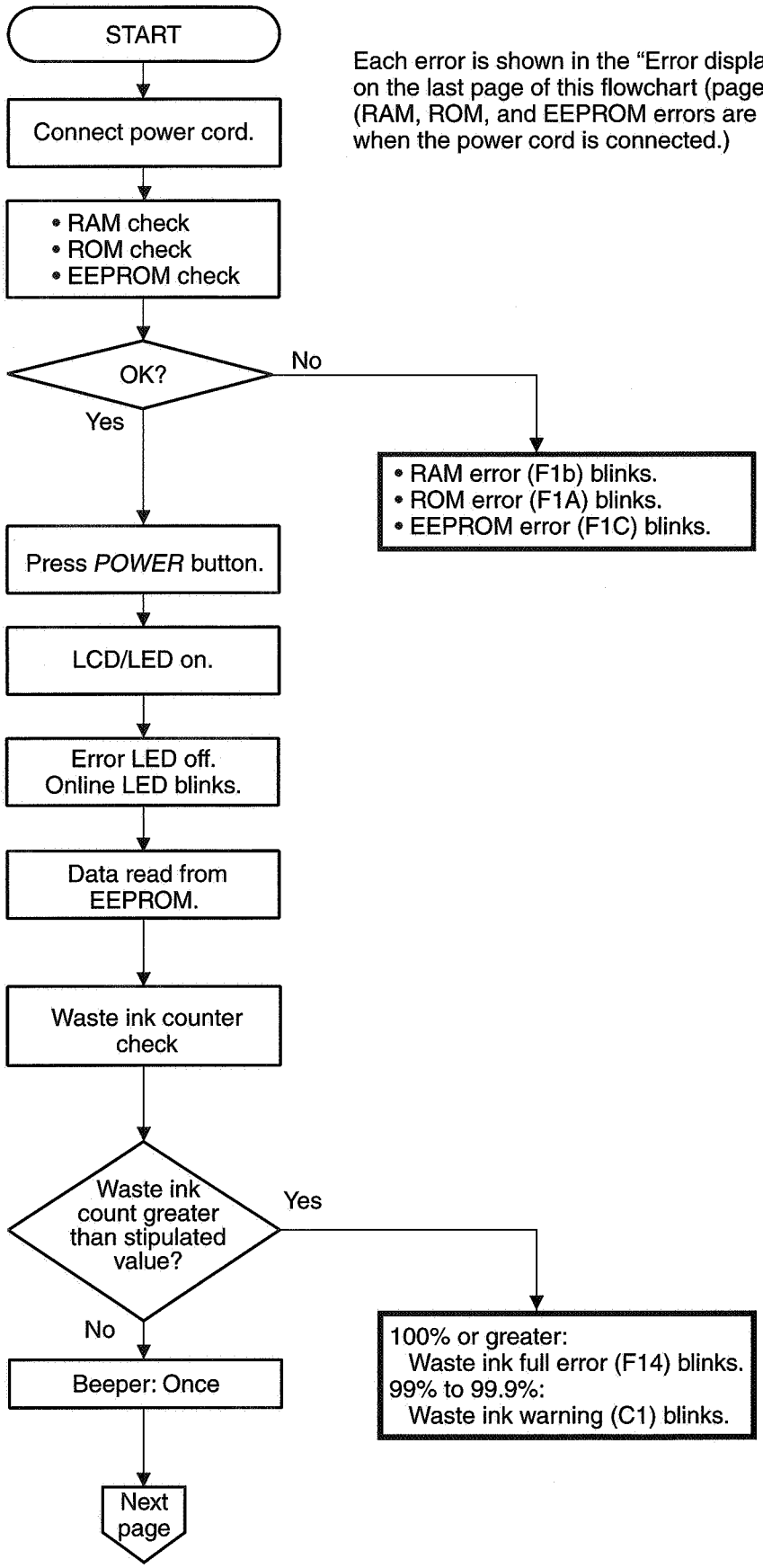



After replacing the panel board in "Measure 1", make a test print to check the printer operation and that the problem has been resolved. If not, replace the logic board as described in "Measure 2".

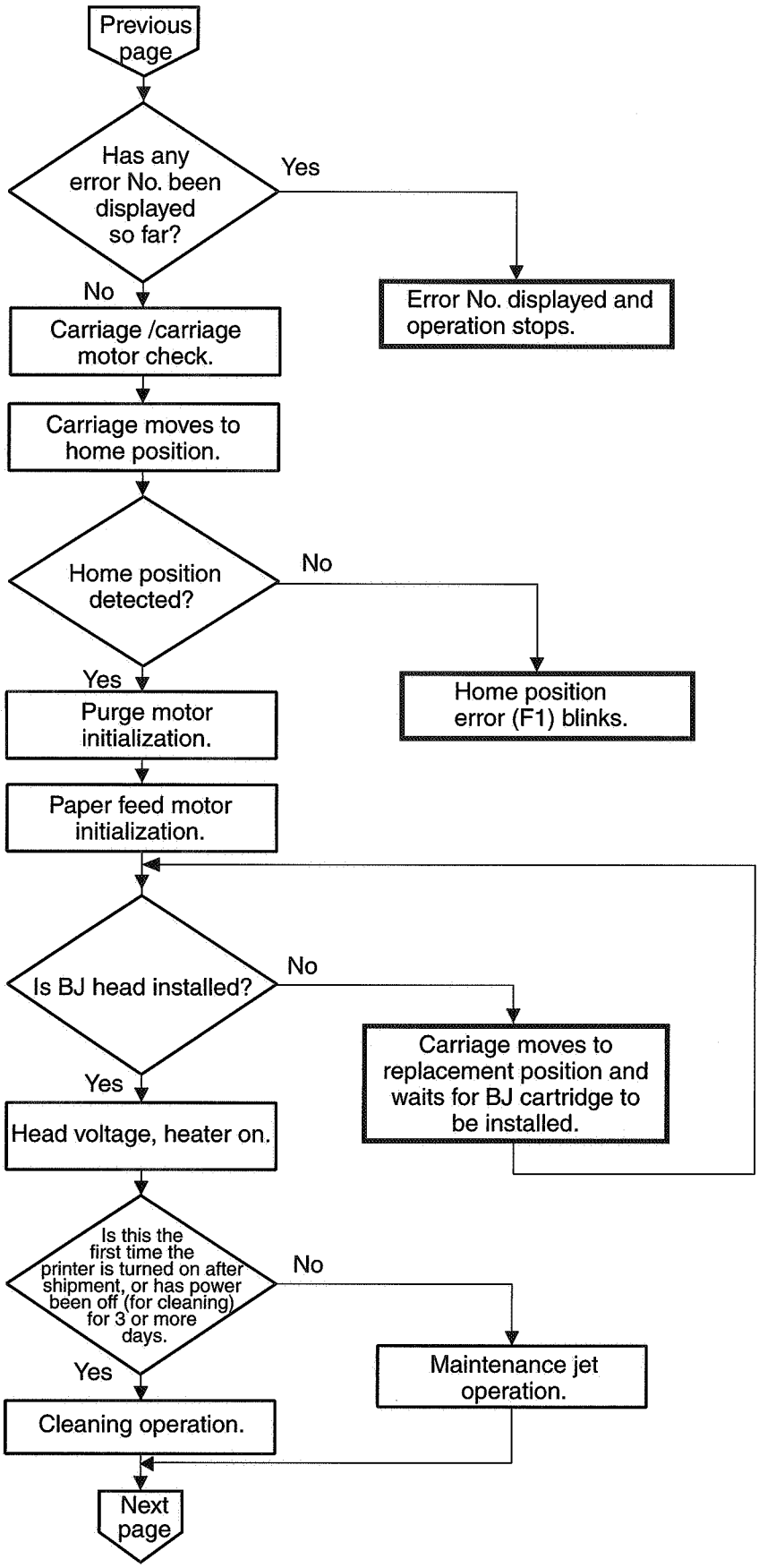
7. Make sure that you reattach all connectors and replace all screws, etc., on completion of troubleshooting.

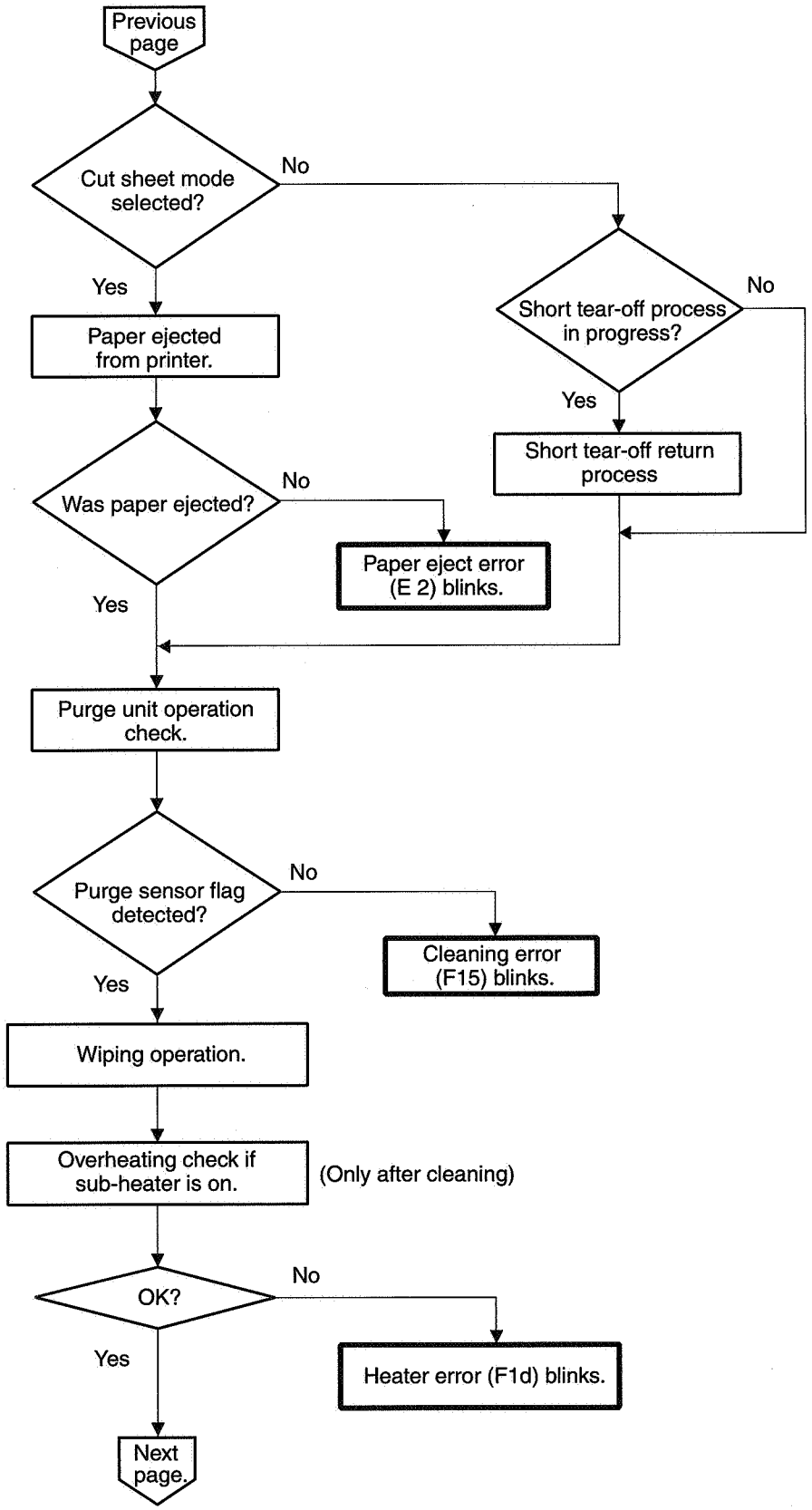
## 6.2 Diagnosis

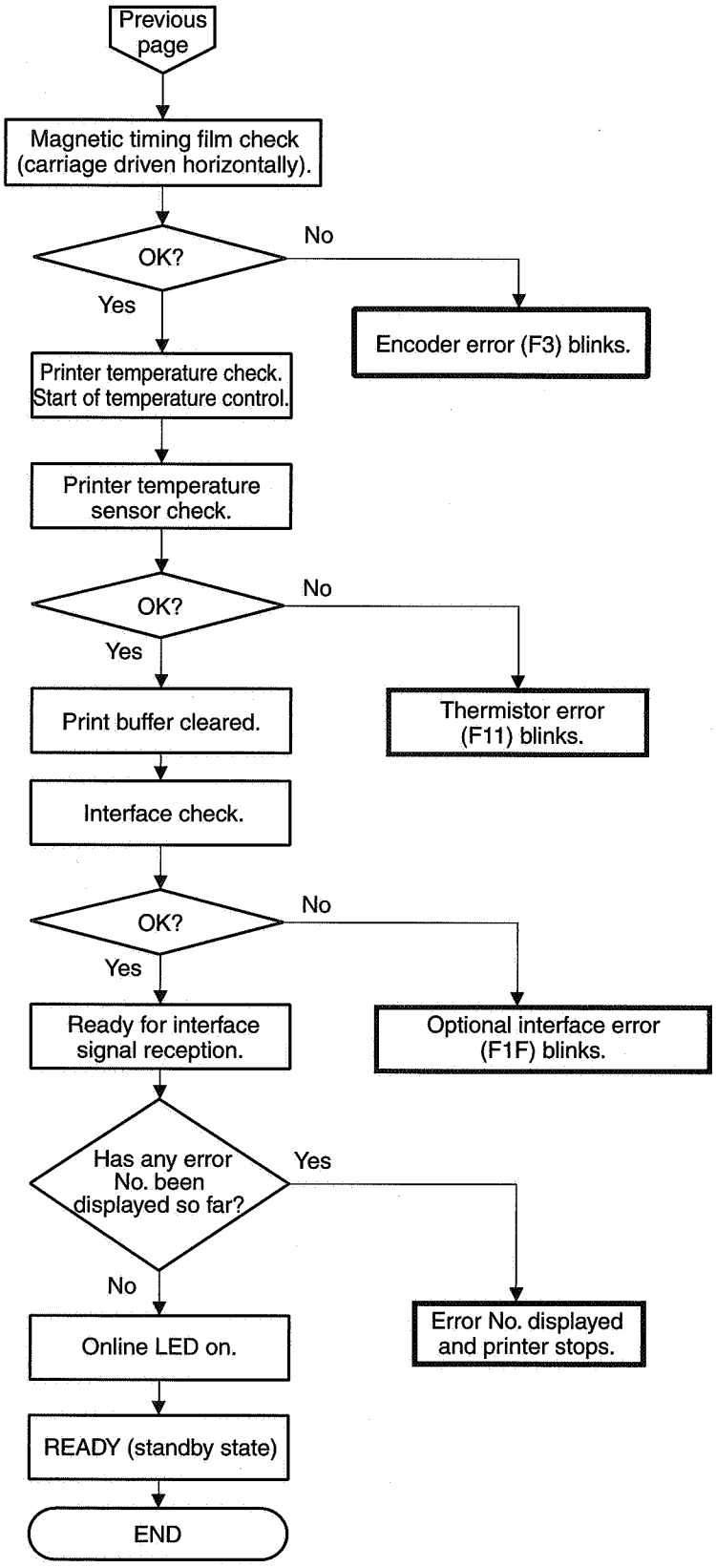
### 6.2.1 Diagnostic flowcharts




Each error is shown in the "Error display" step on the last page of this flowchart (page 5-18). (RAM, ROM, and EEPROM errors are displayed when the power cord is connected.)


Previous page
Has any error No. been displayed so far?
Yes
Error No. displayed and operation stops.
No
Carriage /carriage motor check.
Carriage moves to home position.
Home position detected?
No
Home position error (F1) blinks.
Yes
Purge motor initialization.
Paper feed motor initialization.
Is BJ head installed?
No
Carriage moves to replacement position and waits for BJ cartridge to be installed.
Yes
Head voltage, heater on.
Is this the first time the printer is turned on after shipment, or has power been off (for cleaning) for 3 or more days.
No
Maintenance jet operation.
Yes
Cleaning operation.
Next page


Previous page
Cut sheet mode selected?
No
Yes
Short tear-off process in progress?
No
Yes
Paper ejected from printer.
Short tear-off return process
Was paper ejected?
No
Paper eject error (E 2) blinks.
Yes
Purge unit operation check.
Purge sensor flag detected?
No
Cleaning error (F15) blinks.
Yes
Wiping operation.
Overheating check if sub-heater is on.
(Only after cleaning)
OK?
No
Yes
Heater error (F1d) blinks.
Next page.


Previous page
Magnetic timing film check (carriage driven horizontally).
OK?
No
Yes
Encoder error (F3) blinks.
Printer temperature check. Start of temperature control.
Printer temperature sensor check.
OK?
No
Yes
Thermistor error (F11) blinks.
Print buffer cleared.
Interface check.
OK?
No
Yes
Optional interface error (F1F) blinks.
Ready for interface signal reception.
Has any error No. been displayed so far?
Yes
No
Error No. displayed and printer stops.
Online LED on.
READY (standby state)
END

## 6.2.2 Measure

### a) Error display

This printer has three levels of error: fatal errors (F), normal errors (E), and warnings (C). Fatal errors cannot be rectified by the user whereas normal errors can. Warnings indicate states to which the user should pay close attention.

Fatal errors (F)
The beeper sounds for about 5 seconds. The font display then turns off and "F" is displayed alternately with the "fatal error No.".

Normal errors (E)
The beeper sounds briefly twice. The font display then turns off and "E" is displayed alternately with the "error No.".

Warnings (C)
As with normal errors, the beeper sounds briefly twice. The font display then turns off and "C" is displayed alternately with the "warning No.". (Excluding low-ink warning messages.)

The following pages list the errors and the respective actions to take.

| Error No. | Description | Page | Error No. | Description | Page |
|---|---|---|---|---|---|
| F 1 | Home position error | 5-19 | F1F | Optional interface error | 5-28 |
| F 3 | Encoder error | 5-21 | E 1 | Paper feed pick-up error | 5-30 |
| F11 | Thermistor error | 5-21 | E 2 | Paper ejection error | 5-30 |
| F12 | Overheat error | 5-22 | E 3 | Paper selection error | 5-31 |
| F13 | No-cartridge error | 5-24 | C 1 | Waste ink amount warning | 5-32 |
| F14 | Waste ink error | 5-25 | | Low ink warning | 5-32 |
| F15 | Cleaning error | 5-26 | | | |
| F1A | ROM error | 5-18 | | | |
| F1b | RAM error | 5-18 | | | |
| F1c | EEPROM error | 5-18 | | | |
| F1d | Heater error | 5-29 | | | |

**<ROM error>**
**<Cause>** • During initialization, data could not be read from the ROM.
**<Suspected parts>** Control/FONT ROM (IC2)
**<Measure>** Replace logic board

**<RAM error>**
**<Cause>** • Cannot read from or write to the RAM properly.
**<Suspected parts>** DRAMs (IC3 and IC4)
**<Measure>** Replace logic board

**<EEPROM error>**
**<Cause>** • Cannot write to the EEPROM properly.
**<Suspected parts>** EEPROM (IC8)
**<Measure>** Replace logic board

When the logic board is replaced, always reset the EEPROM and replace the waste ink absorber(s), as necessary. (See *Section 3.3, "Notes on Replacing the Logic Board and Waste Ink Absorber" (page 5-8).*)

**<Home position error (including cartridge error)>**

**<Cause>** • Home position sensor does not detect the carriage
• Carriage motor does not function correctly.

**<Suspected parts>** Home position sensor, timing sensor (film), carriage motor, carriage, logic board

**<Measure>**

Visually check the operation of the carriage drive.

Check that the gears are not disengaged, parts are not missing, deformed, broken, scratched, and that there is no grease on them.
Check that no paper is trapped in the printer.
Checkpoints: magnetic timing film
Timing sensor
Home position sensor
Carriage
Carriage drive path
Around the carriage (shafts, rails, belts, and idler rollers)
Carriage ribbon cable (check connectors)

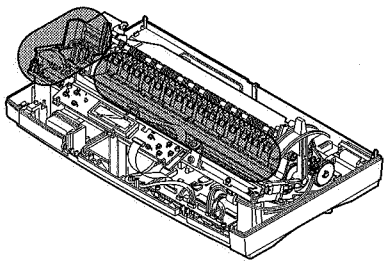


**Figure 5-12 Checkpoints**

OK?

No → Service or replace faulty parts.

Yes

Visually check operation of carriage motor.

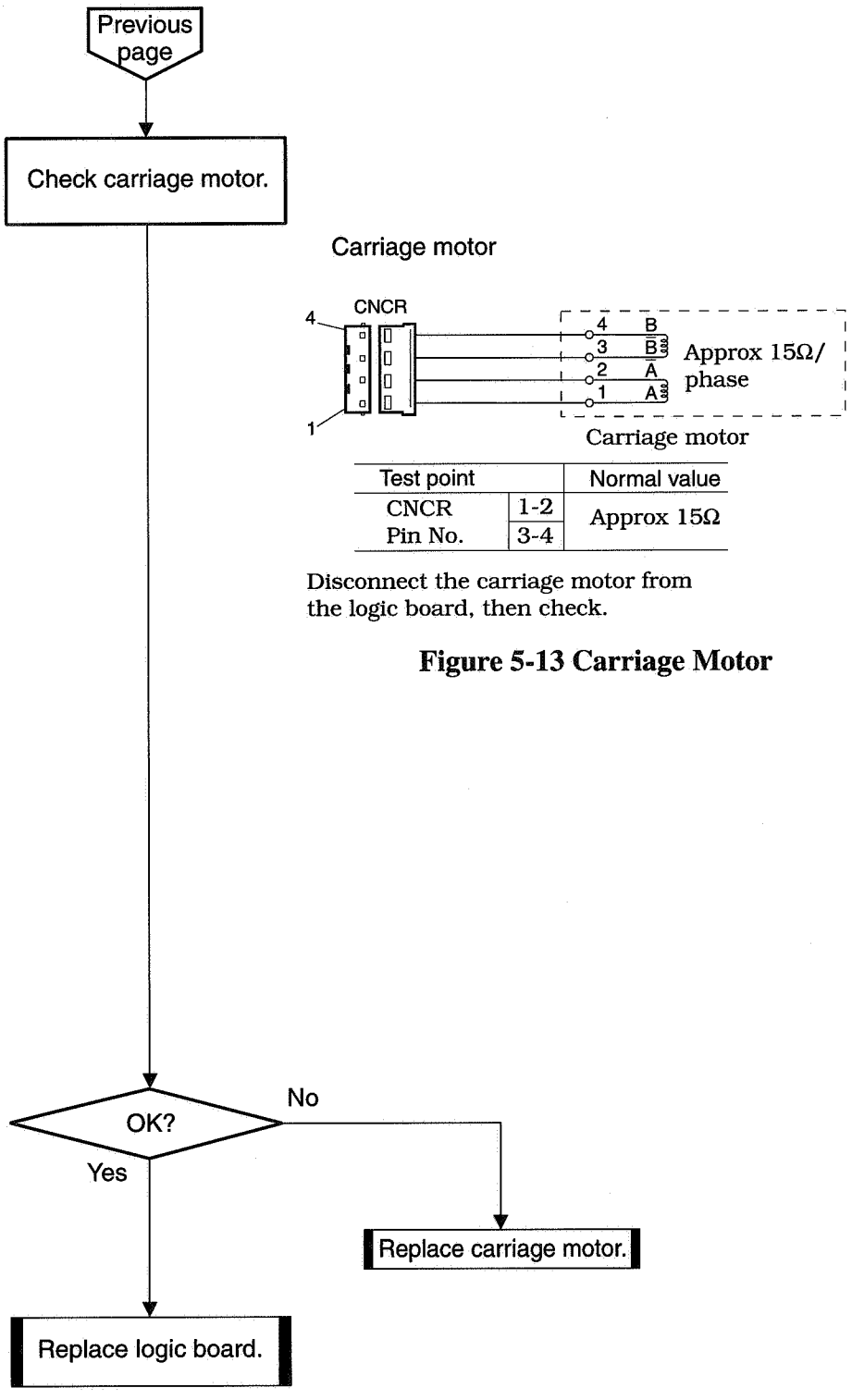
• Does the motor operate when the power is turned on?
• Is there any noise?

OK?

Yes →
1. Replace magnetic timing film.
2. Replace carriage. — Faulty carriage ribbon cable (Home position sensor or timing sensor)
3. Replace logic board. — Faulty carriage base

No → Next page

Always reset the EEPROM and replace the waste ink absorber(s) as necessary. See *Section 3.3, "Notes on Replacing the Logic Board and Waste Ink Absorber" (page 5-8).*)



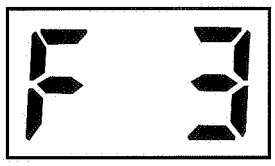

| Test point | | Normal value |
|---|---|---|
| CNCR Pin No. | 1-2 | Approx 15Ω |
| | 3-4 | |

Disconnect the carriage motor from the logic board, then check.

**Figure 5-13 Carriage Motor**

CAUTION

When the logic board is replaced, always reset the EEPROM and replace the waste ink absorber(s), as necessary. (See *Section 3.3, "Notes on Replacing the Logic Board and Waste Ink Absorber" (page 5-8).*)




**<Encoder error>**

**<Cause>** • Timing sensor does not read the magnetic timing film.
• The encoder does not show the correct position on the magnetic timing film according to the carriage pulse.

**<Suspected parts>** Magnetic timing film, timing sensor, home position sensor, carriage motor, carriage, logic board

**<Measure>** As with home position sensor error (F1).
Check, in particular, that there is no grease, dirt or scratches on the timing sensor and magnetic timing film.

**<Thermistor error (printer temperature sensor error)>**

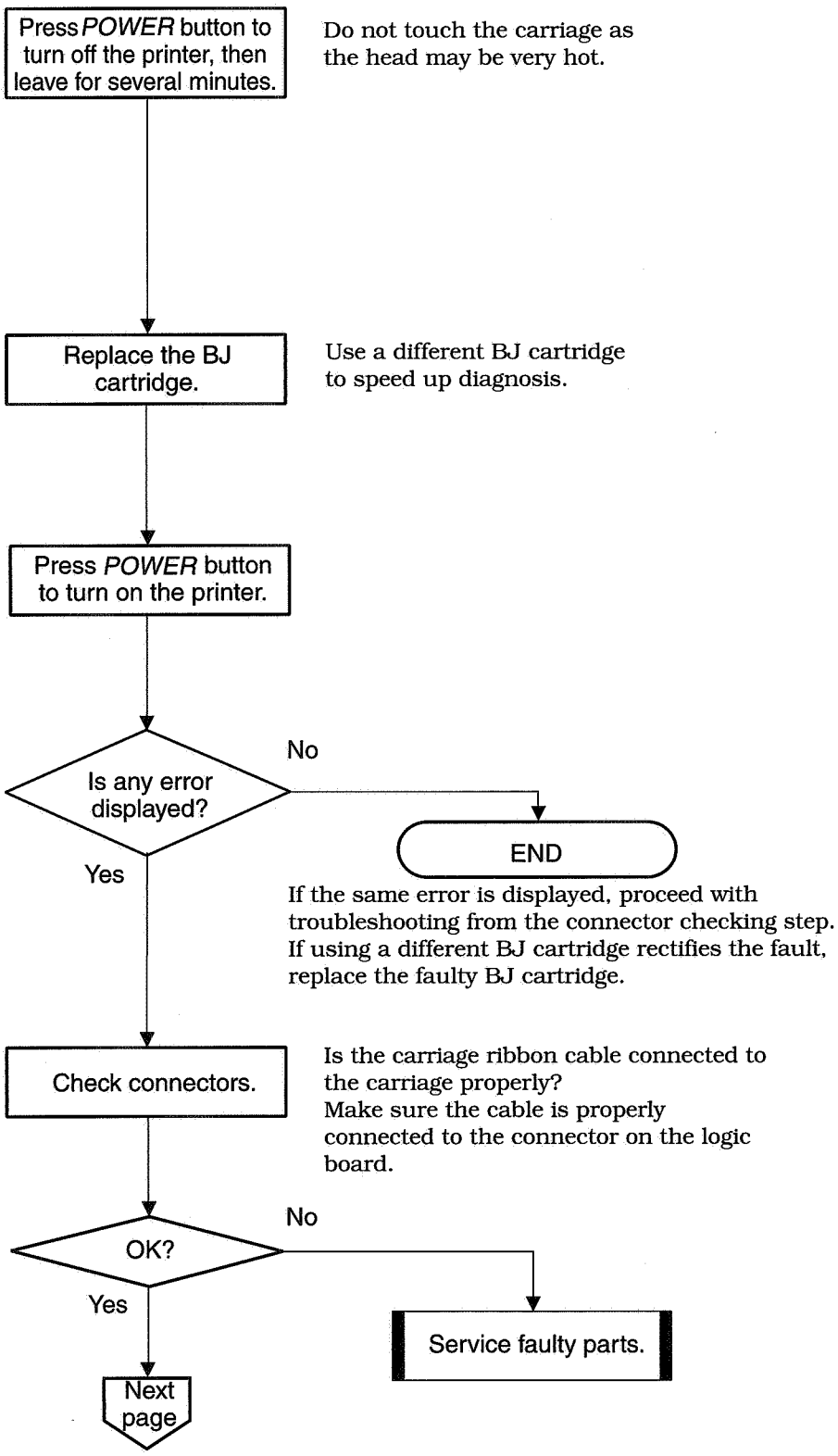
**<Cause>** Thermistor

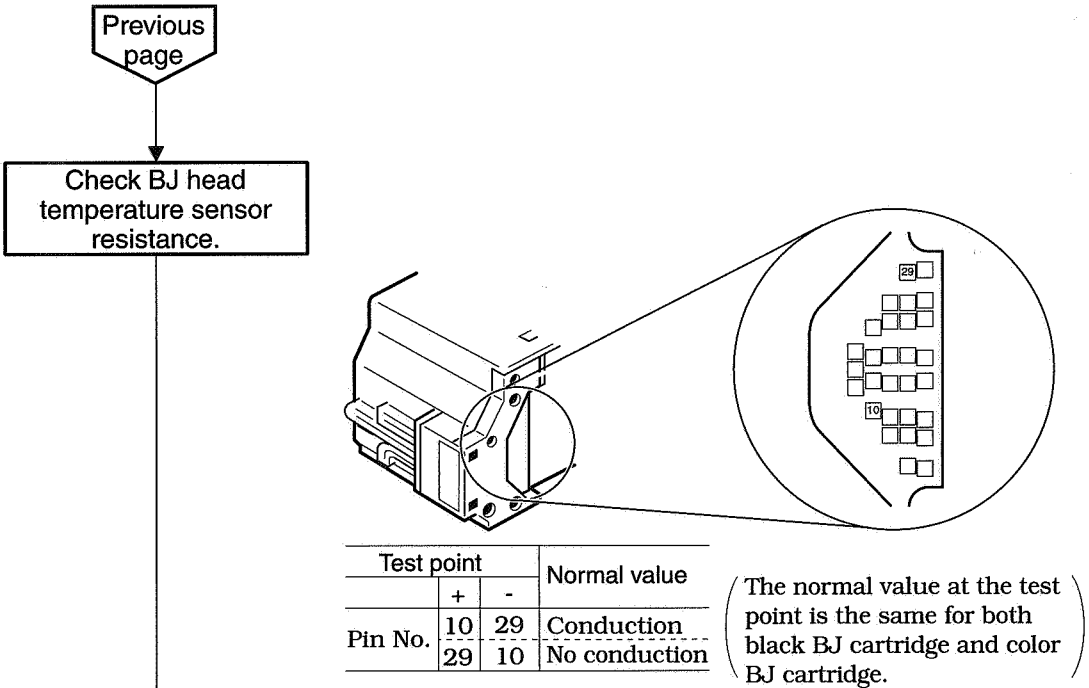
**<Suspected parts>** Thermistor (TH1)

**<Measure>** Replace logic board.

**<Overheat error (diode sensor error)>**
**<Cause>** • Overheating print head.
**<Suspected parts>** BJ cartridge, logic board, and carriage ribbon cable

**<Measure>**

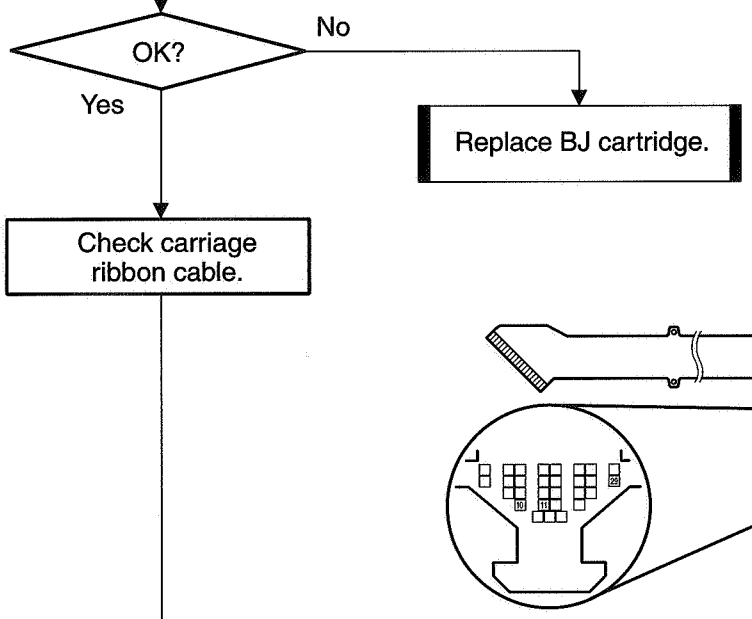


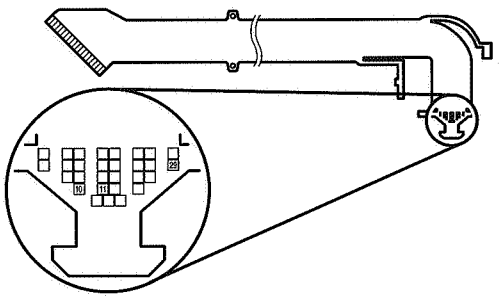



| Test point | | | Normal value |
|---|---|---|---|
| | + | - | |
| Pin No. | 10 | 29 | Conduction |
| | 29 | 10 | No conduction |

The normal value at the test point is the same for both black BJ cartridge and color BJ cartridge.

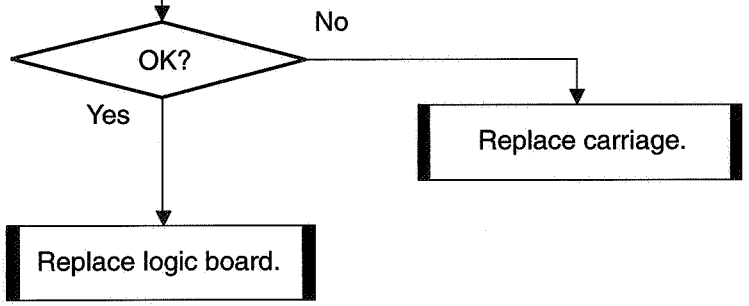
**Figure 5-14 Temperature Sensor Resistance Check**



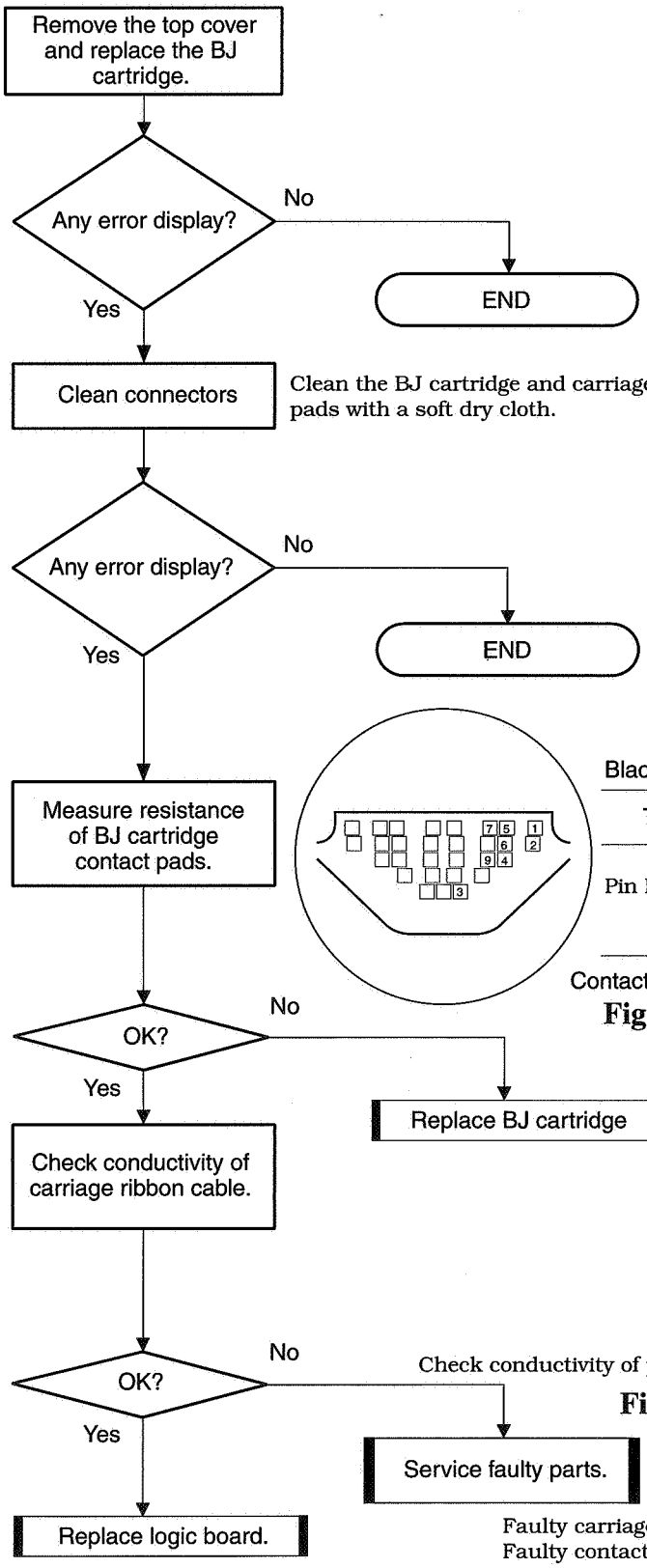
Check conductivity of pins 10, 29, and 11.

**Figure 5-15 Carriage Ribbon Cable**



**<No-cartridge error>**
**<Cause>** • BJ cartridge displaced in other than BJ cartridge replacement position.
**<Suspected parts>** BJ cartridge and logic board

**<Measure>**



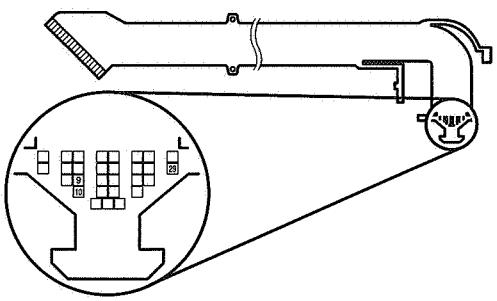



Black and color BJ cartridges

| Test point | | | Normal value |
|---|---|---|---|
| Pin No. | 1,2 | 9 | Approx. 460Ω to approx. 623Ω (rank resistance) |
| | 3 | 5,6 | Approx. 54Ω to approx. 73Ω (temperature control heater) |
| | 4 | 5,6 | |
| | 1,2 | 7 | Approx. 50Ω to approx. 68Ω (sub heater) |

Contact pads

**Figure 5-16 Contact Resistance Check**



Check conductivity of pins 9, 10, and 29.

**Figure 5-17 Carriage Ribbon Cable**

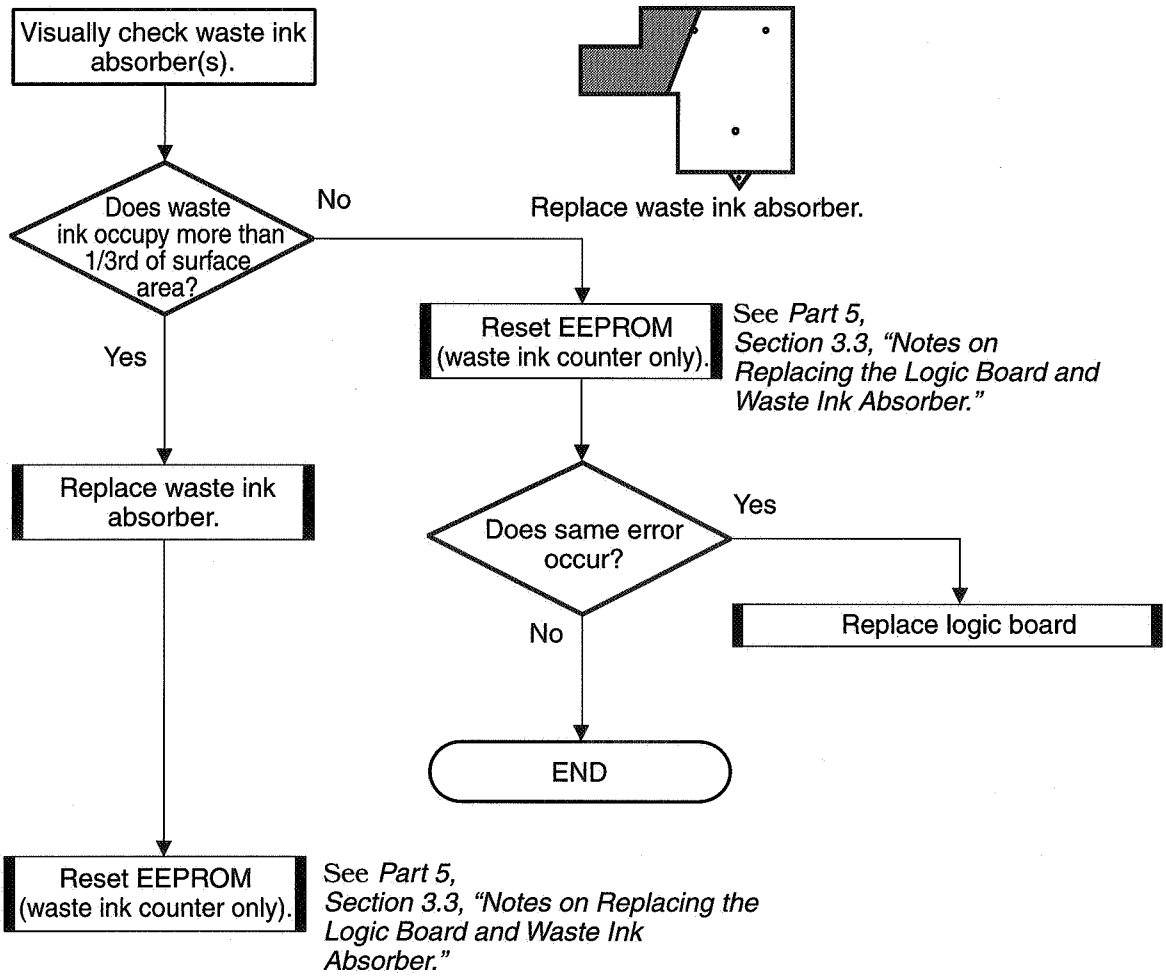
F 14

**<Waste ink error (waste ink absorber full)>**

**<Cause>** • Quantity of waste ink in waste ink absorber exceeds permissible amount.

**<Suspected parts>** Waste ink absorber, logic board, and EEPROM

**<Measure>**




CAUTION

If this error occurs, use the following steps to set the printer in service mode, then reset the waste ink counter. This error cannot be rectified unless the waste ink counter is reset in service mode.

1) Press and hold the *FWDADJ* (▲), *REVADJ* (▼), and *LF/FF* buttons, then turn on the power. All LEDs light.
2) Press and hold the *ONLINE* button within 3 seconds of turning on the power. This turns on the printer with a waste ink warning (C/1 blinks).
3) Select the BJ control mode.
4) Press and hold the *MENU* button, then simultaneously press and hold the *CARTRIDGE* and *PARK* buttons for 5 seconds. The beeper sounds to indicate that service mode has been selected.

If the *ONLINE* button is not pressed within 3 seconds of turning on the power, the printer will again start with a waste ink error. If this occurs, start again from step 1. (See *"Part 3, Section 3.5, Service Mode" (page 3-25)* and *Part 5, Section 3.3, "Notes on Replacing the Logic Board and Waste Ink Absorber" (page 5-8).*)

F 15

**<Cleaning error>**

**<Cause>** • Purge sensor does not function even when an attempt is made to start cleaning the BJ cartridge.

**<Suspected parts>** Purge motor (including gears), purge unit, carriage, carriage motor, home position sensor, purge sensor lever, and logic board

**<Measure>**

Visually check the operation of the carriage drive unit, sensors, and around the purge unit.

Check that the gears are not disengaged, parts are not missing, deformed, broken, or scratched, etc.
Check that no paper is jammed in the gears.
Checkpoints: Purge motor gears
Purge unit
Home position sensor/page sensor lever
Carriage
Around the carriage (shafts, rails, belts, and idler rollers)

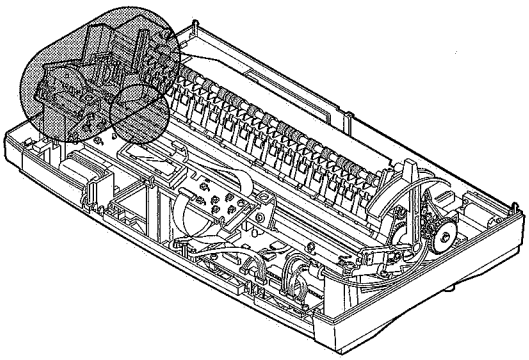


**Figure 5-18 Checkpoints**

OK?

No → Service or replace faulty parts.

Yes

Visually check the operation of the carriage motor and purge motor.

- Check for any unusual noises.
- Check for correct initialization when the power is turned on.

OK?

Yes → 1. Replace home position sensor.

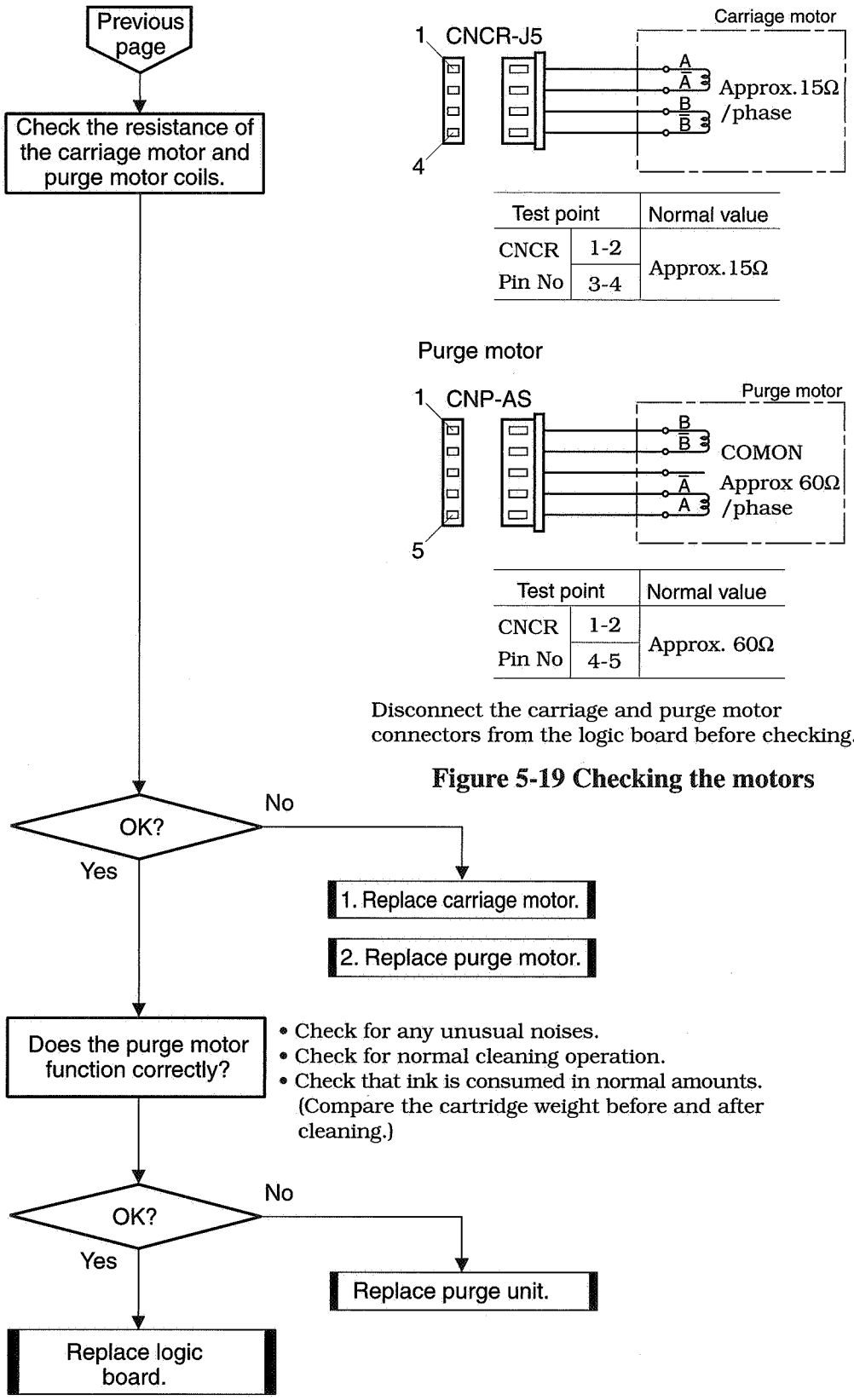
No

2. Replace carriage.

3. Replace logic board. Faulty fuse (ICP2)

Next page

- When replacing the ROMs, the fuse might blow if the power cord is connected or if the ROMs are inserted incorrectly.




Carriage motor




| Test point | | Normal value |
|---|---|---|
| CNCR Pin No | 1-2 | Approx.15Ω |
| | 3-4 | |

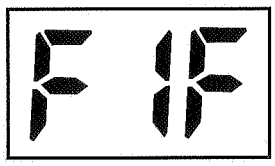
Purge motor




| Test point | | Normal value |
|---|---|---|
| CNCR Pin No | 1-2 | Approx. 60Ω |
| | 4-5 | |

Disconnect the carriage and purge motor connectors from the logic board before checking.

**Figure 5-19 Checking the motors**

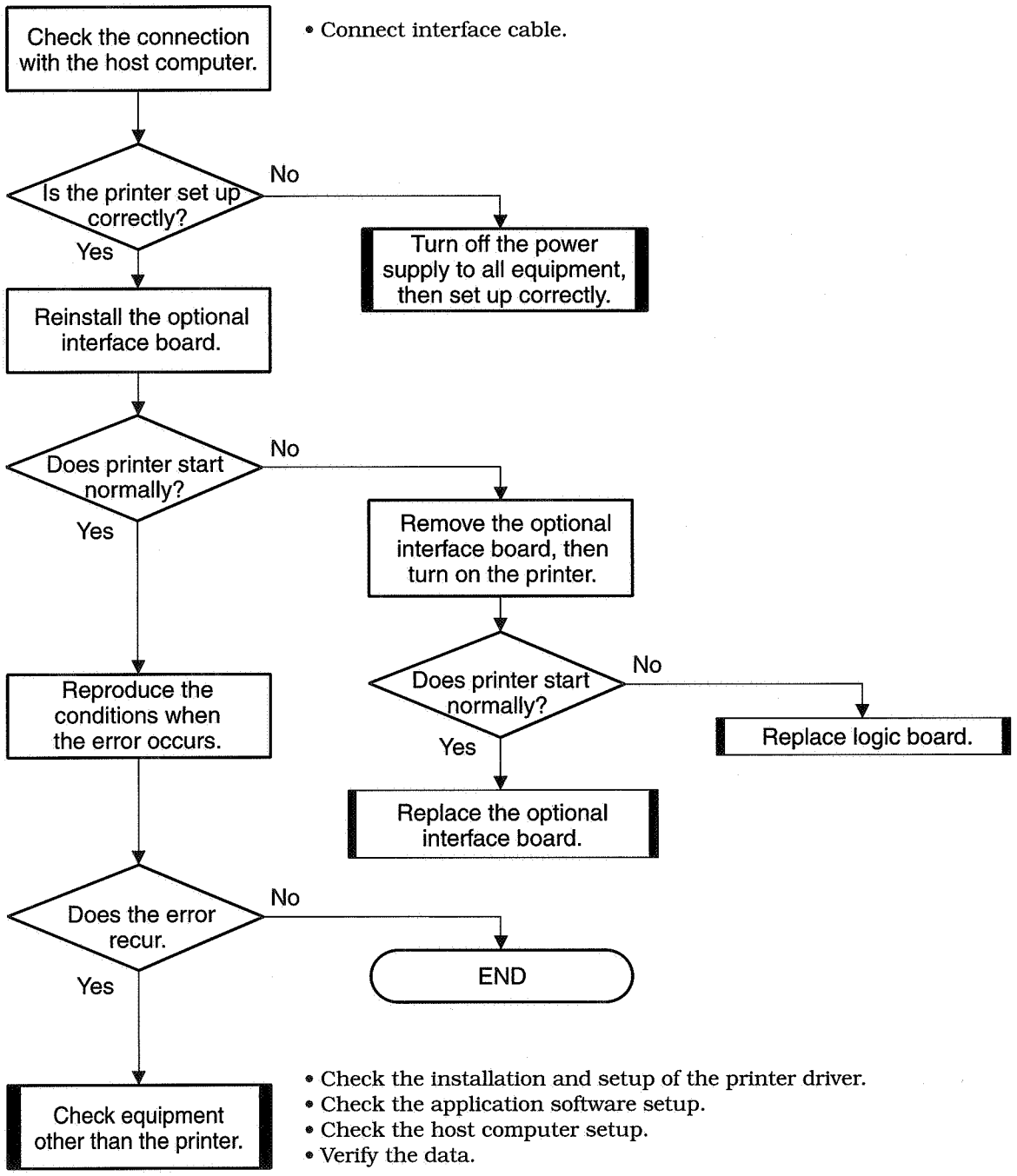



**<Optional interface error>**

**<Cause>**
- Optional interface board installed incorrectly
- Abnormal data or control signals output by the optional interface board

**<Suspected parts>** Optional interface board and logic board

**<Measure>**

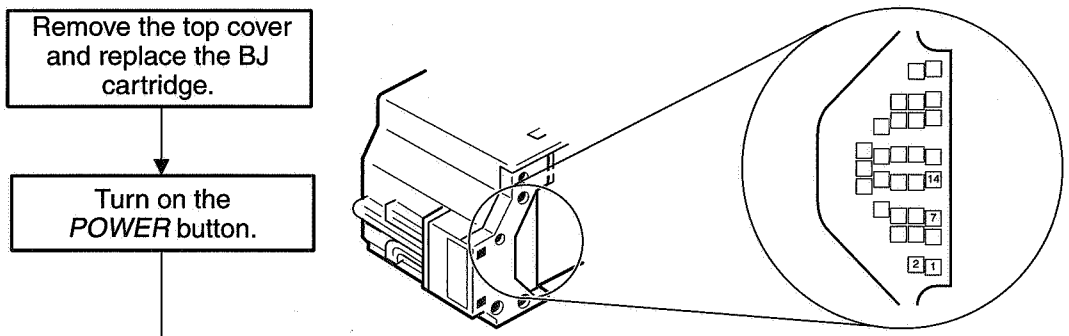


**<Heater error>**

**<Cause>** • The sub heater is not working, either because the fuse (ICP4) that protects the subheater drive circuit on the logic board has blown, or due to poor conductivity.
Reasons for fuse blowing:
Faulty BJ cartridge or cartridge contacts, or the surface of the contacts has been soiled by ink mist so that the sub heater drive signal terminal (Pin 7) is shorting on the GND terminals (Pins 1, 2, and 14).

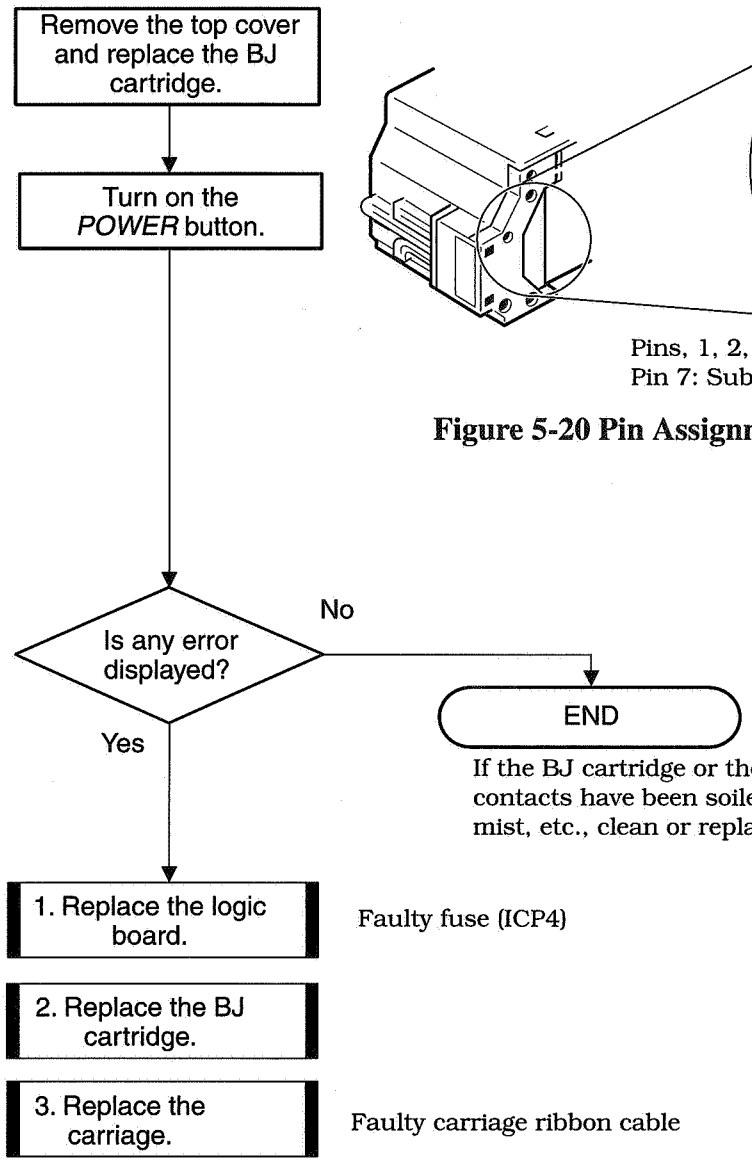
**<Suspected parts>** Logic board (fuse (ICP4)), BJ cartridge, carriage, and carriage ribbon cable.

**<Measure>**




Pins, 1, 2, and 14: GND terminals
Pin 7: Sub heater drive signal terminal

**Figure 5-20 Pin Assignment on Contact Pad**

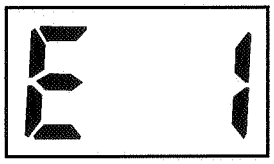



If the BJ cartridge or the cartridge contacts have been soiled by the ink mist, etc., clean or replace them.

Faulty fuse (ICP4)

Faulty carriage ribbon cable

If, using the above procedure, you only replace the logic board, the logic board may again be damaged and the error recur because of faulty contacts, etc. Always replace all three components (logic board, BJ cartridge, and carriage) at the same time.



**<Paper feed error>**

**<Cause>** • No paper is detected even after a paper feed operation.

**<Suspected parts>** Paper sensor, paper feed motor, paper feed roller, pinch roller, paper guides, logic board, or ASF

**<Measure>**

Check that the type of paper used and the ambient conditions satisfy the printer's specifications. Also check that the feeder setup matches the setting on the control panel.

Check that the ASF and separator are set up correctly for the paper you are using.

OK?

No

Yes

Use the printer with paper and under ambient conditions that satisfy the specifications.

Visually check the paper transport system.

Check that parts are not missing or deformed, and that no paper is jammed in the printer.
Check for foreign objects.
Visually check the operation of the paper sensor.
If the ASF is installed, visually check the ability of the ASF to feed and transport paper (check gears, pick up rollers, pressure plate, and separator guide).

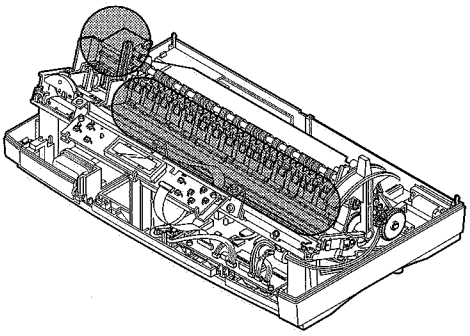


**Figure 5-21 Checkpoints**

OK?

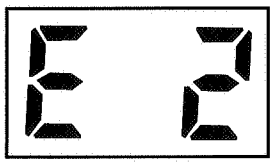
No

Yes

Remove foreign objects.
Service or replace faulty parts.

1. Replace paper feed motor.
2. Replace logic board.

Faulty paper sensor.
Faulty paper feed roller.
Faulty transport system (pinch rollers, paper guides, transmission rollers, paper eject rollers, spur unit).
Faulty ASF transport system.

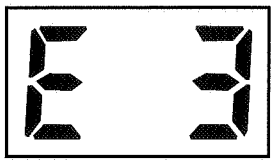


**<Paper ejection error>**

**<Cause>** • After the paper ejection instruction, the paper sensor detected a page length greater than 24.7 in. (695.9mm). (However, in fanfold paper mode, paper was detected even after reversing the paper after a parking operation by 16.2 in (411.4mm).

**<Suspected parts>** Paper sensor, paper feed motor, paper feed rollers, spur unit paper eject rollers, transmission rollers, logic board, and ASF.

**<Measure>** Same as for paper feed error (E1).

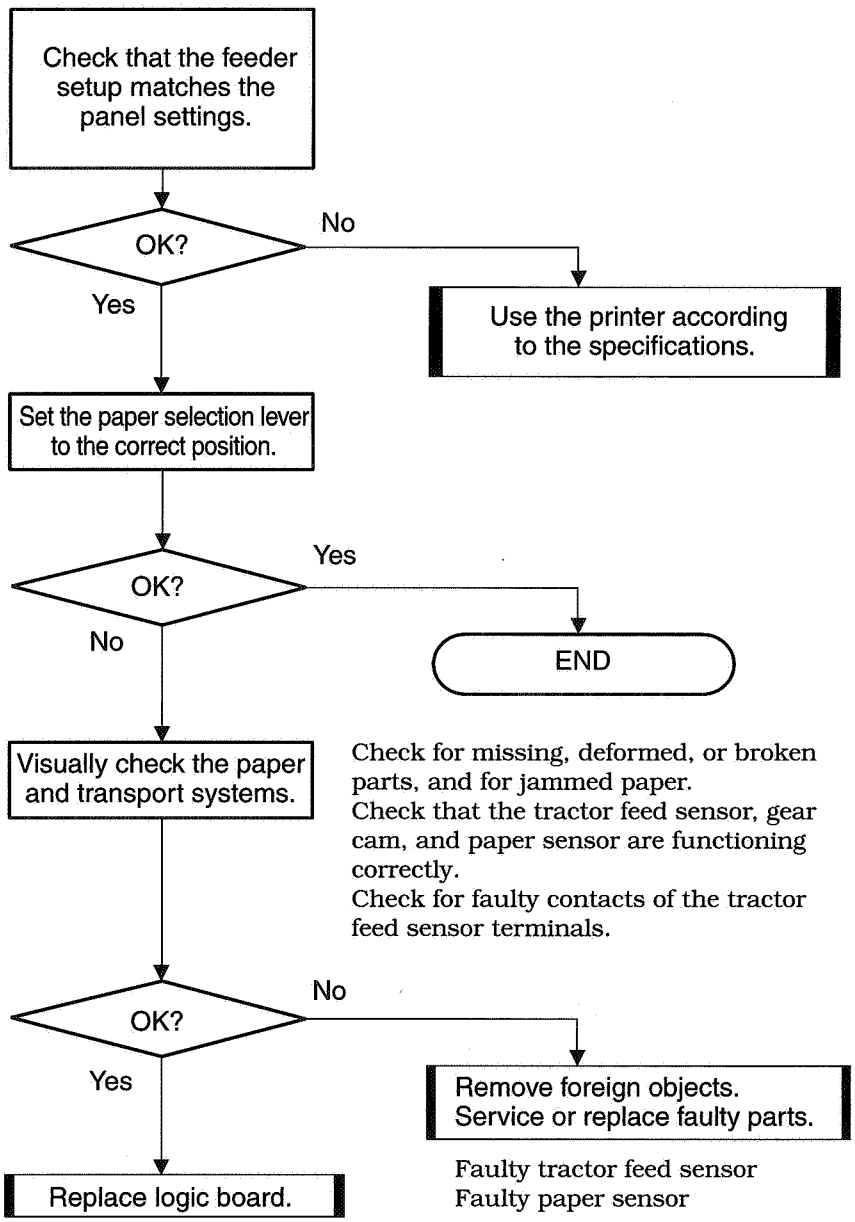


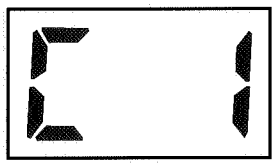

**<Paper selection error>**

**<Cause>** • The paper selection lever position was changed after paper had been fed into the printer (paper sensor had detected presence of paper).

**<Suspected parts>** Paper selection lever, tractor feed sensor, paper sensor, logic board, or paper feed rollers.

**<Measure>**






**<Waste ink warning>**

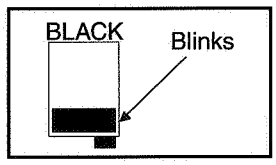
**<Cause>** • When the power is turned on, the waste ink count is compared at the end of the recovery operation with the capacity of the ink absorber. This warning is displayed if the estimated remaining capacity is 1% or less.

**<Warning location> Waste ink absorber**

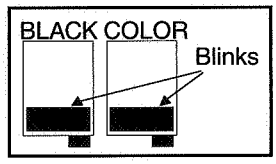
**<Measure>** 1) Press the *ONLINE* button for a recovery operation. The alarm status is cancelled by pressing the *ONLINE* button. A waste ink error (F14) occurs when the estimated content of the waste ink absorber is 100%.

2) Replace waste ink absorber.
If you replace the waste ink absorber when the warning is displayed, select service mode and reset the waste ink counter in the EEPROM. (See *Part 5, Section 3.3, "Notes on Replacing the Logic Board and Waste Ink Absorber" (page 5-8).*)

**Black BJ cartridge installed**




**Color BJ cartridge installed**




**<Low-ink warning>**

This warning can be set on or off using the function settings.

**<Conditions under which this warning are displayed>**

When, due to the number of printed dots, the number of maintenance jet operations, and the number of cleaning operations, the estimated ink usage exceeds the possible amount per ink cartridge, the printer stops and the indicator displays the amount of ink remaining in the respective ink cartridge.

**<Warning location>**

Remaining ink level indicator
Black BJ cartridge: Only the BLACK ink level is displayed.
Color BJ cartridge: The BLACK and COLOR ink levels are displayed. (Only the indicator for the lowest of the 3 ink levels blinks.)
(In the case of a color cartridge, the low-ink warning is displayed as soon as one of the three color ink cartridges reaches the low-ink level.)

**<Measure>** 1) Press the *ONLINE* button to cancel the warning.

2) Replace the ink cartridge, then reset the warning status.

- Cancelling the warning
  If you press the *ONLINE* button to cancel the warning status, no warning is displayed and the printer does not stop operating even if a low-ink status is again detected.
- Resetting the low-ink warning
  Press the *CARTRIDGE* button. The beeper sounds and the carriage travels to the cartridge replacement position. The printer is now in replacement mode. In this mode, the ONLINE LED blinks until the cartridge has been replaced and automatically resets (about 10 minutes).

<Resetting black ink counter>
Press the *CLEANING* button to reset the count. Press the *MENU* button again to restore the status prior to the reset.

<Resetting the color ink counter>
Press the *MENU* button to reset the count. Press the *CLEANING* button again to restore the status prior to the reset.

<End of cartridge replacement>
Press the *CARTRIDGE* and *ONLINE* buttons to end cartridge replacement. Pressing the CARTRIDGE restores the status prior to entering replacement mode. Pressing the *ONLINE* button restores the online status.

Note that the BJ cartridge must be replaced to reset a low-ink warning and cancel the resetting.

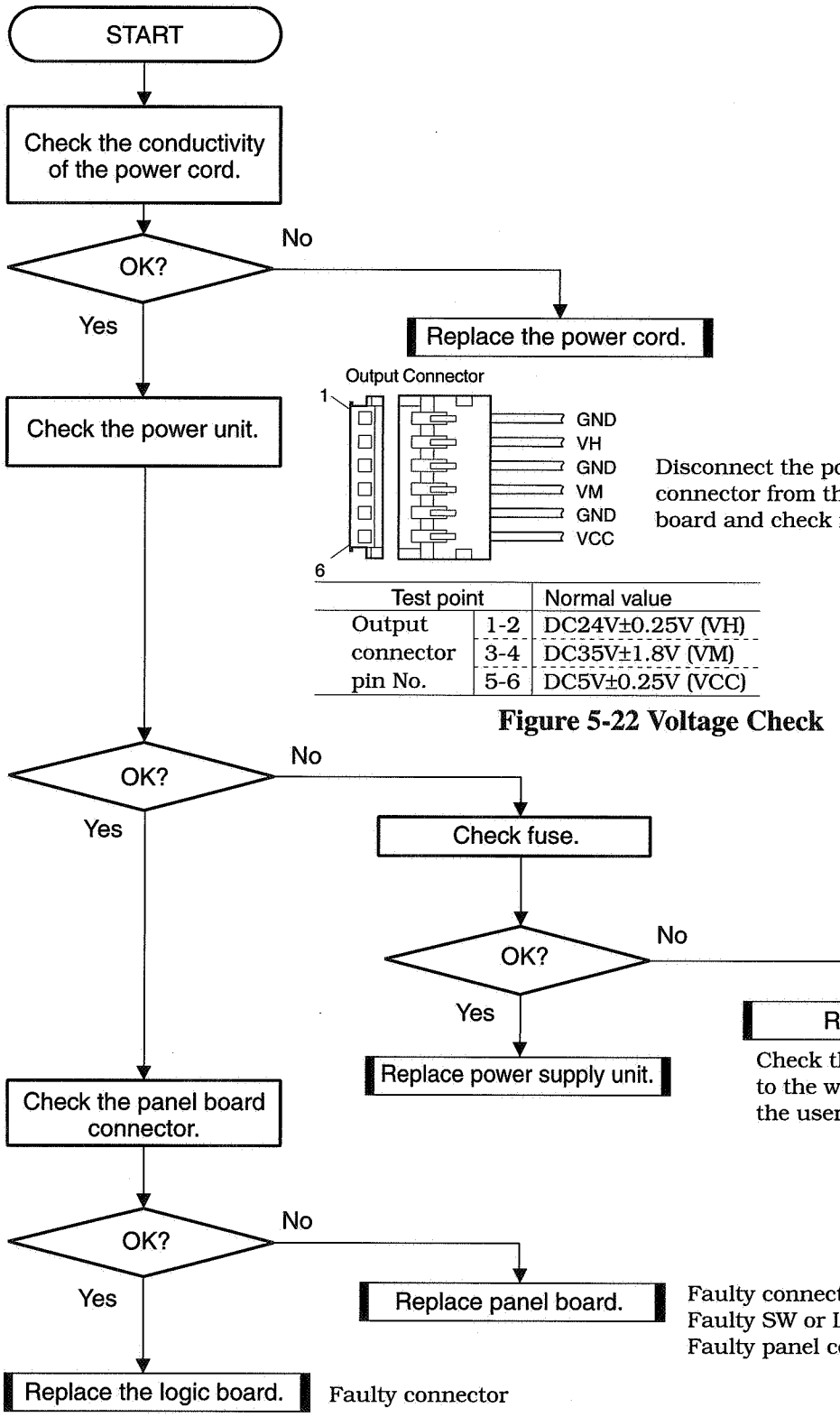
**b) Symptoms**

**1. The power does not turn on.**

**<Symptoms>** • The power does not turn on even when the *POWER* button is pressed.

**<Cause>** Faulty power cord, faulty power unit, faulty logic board, or faulty panel board

**<Measure>**




| Test point | | Normal value |
|---|---|---|
| Output connector pin No. | 1-2 | DC24V±0.25V (VH) |
| | 3-4 | DC35V±1.8V (VM) |
| | 5-6 | DC5V±0.25V (VCC) |

**Figure 5-22 Voltage Check**

## 2. Faulty control panel

**<Symptoms>** • Corrupted LCD display, or LCD does not turn on. LED does not turn on.
• Control buttons are inoperative.

**<Cause>** Faulty LCD, LED or buttons
Faulty panel board (faulty panel controller)
Faulty logic board

**<Measure>**

Check the conductivity of the cable linking the control panel and logic board.

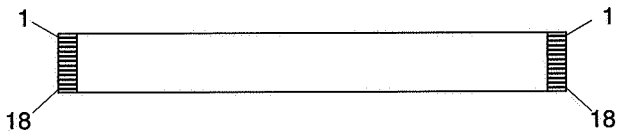



**Figure 5-23 Control Panel Cable**

Is the cable broken?

No

1. Replace panel board. — Faulty LCD, LED, or beeper / Faulty panel controller

2. Replace logic board. — Faulty MPU

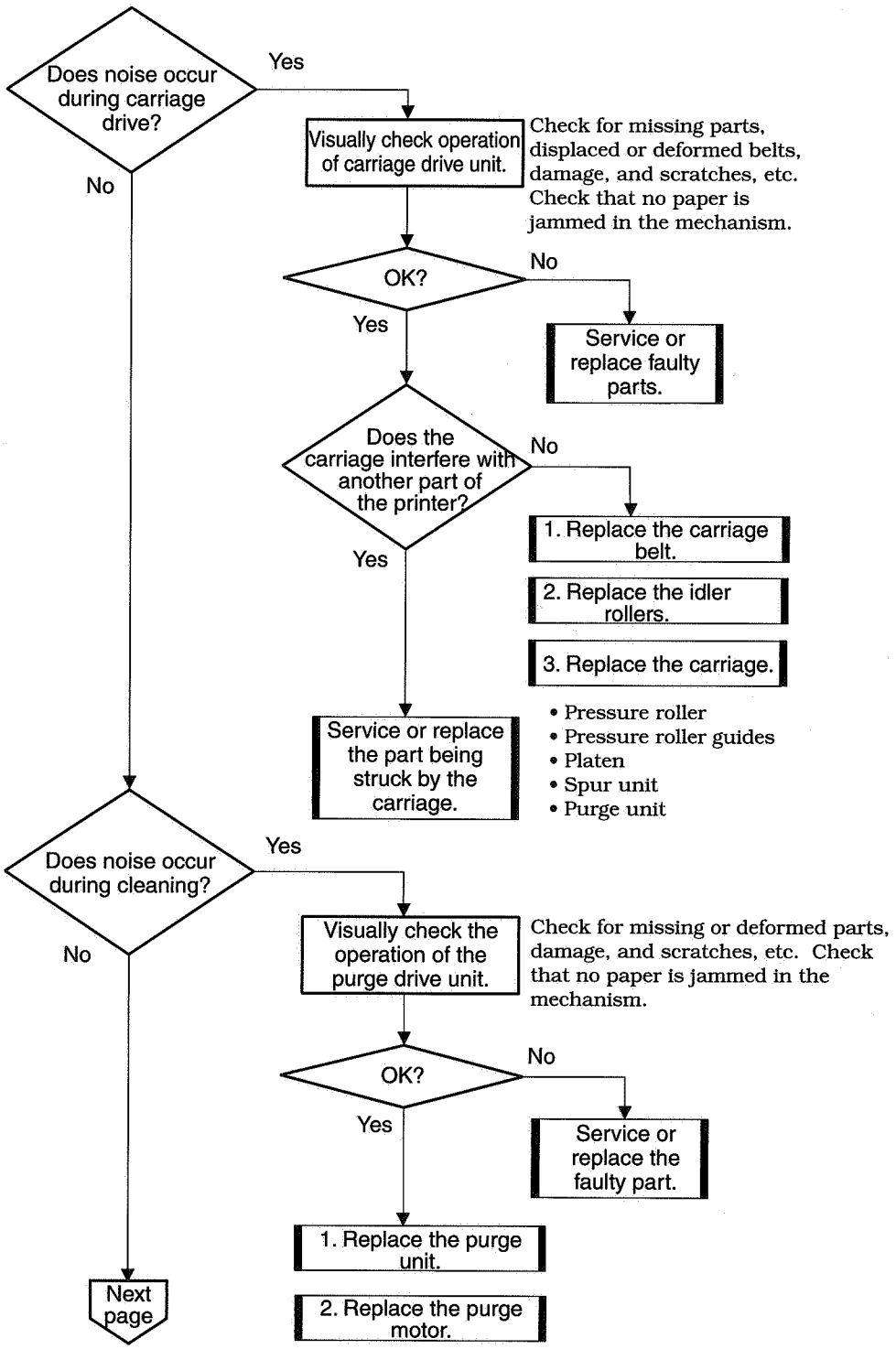
Yes

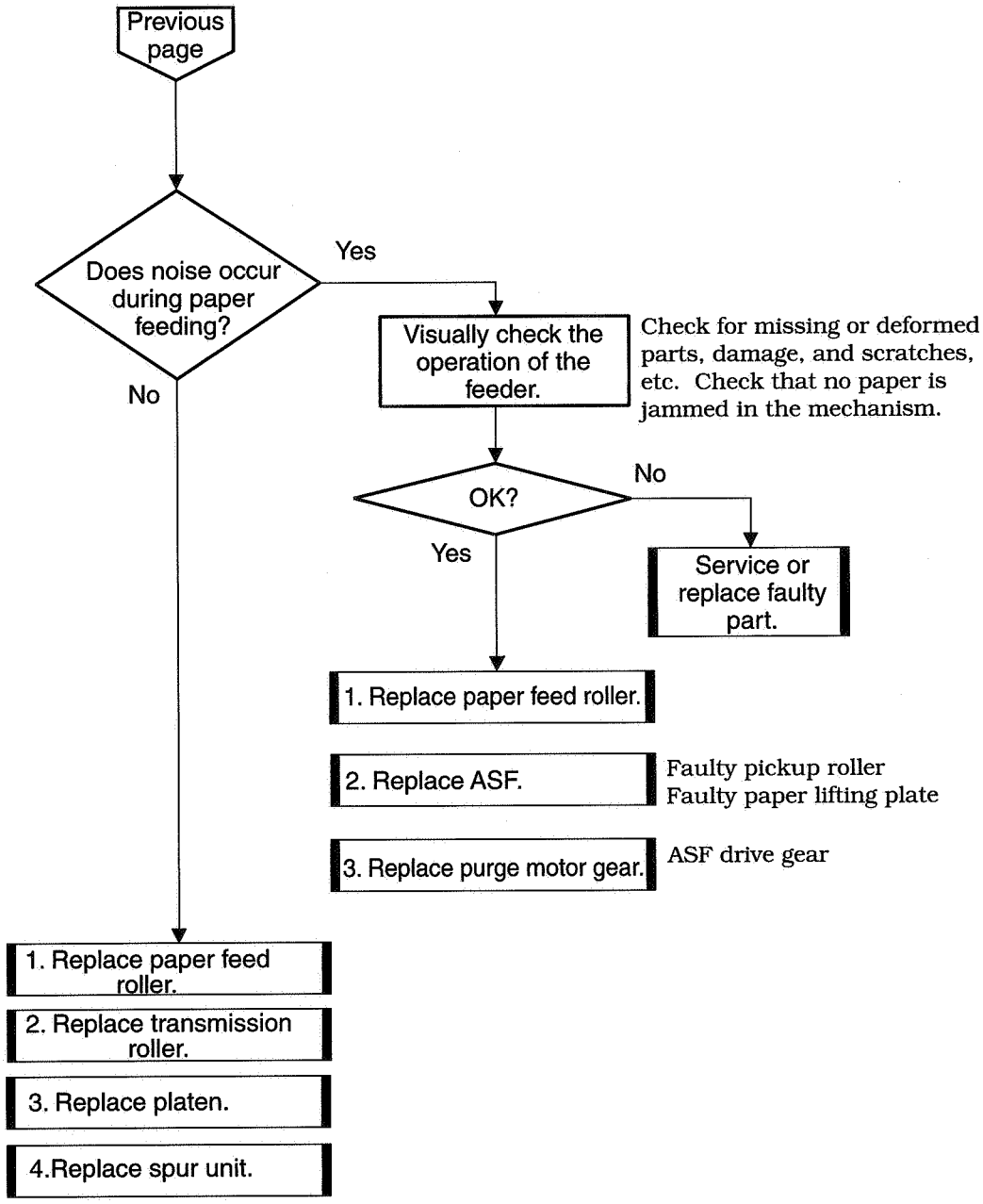
Replace cable.

# 3. Abnormal noise

**<Symptoms>**
- When the carriage moves
- During purge operations
- During paper feeding, ejection, or transport

**<Cause>**
- Foreign material in carriage drive unit
- Interference between carriage and other parts
- Faulty purge unit or faulty purge motor and/or gears
- Faulty paper feed, eject, and transmission rollers, gears (including ASF gears) or spur unit



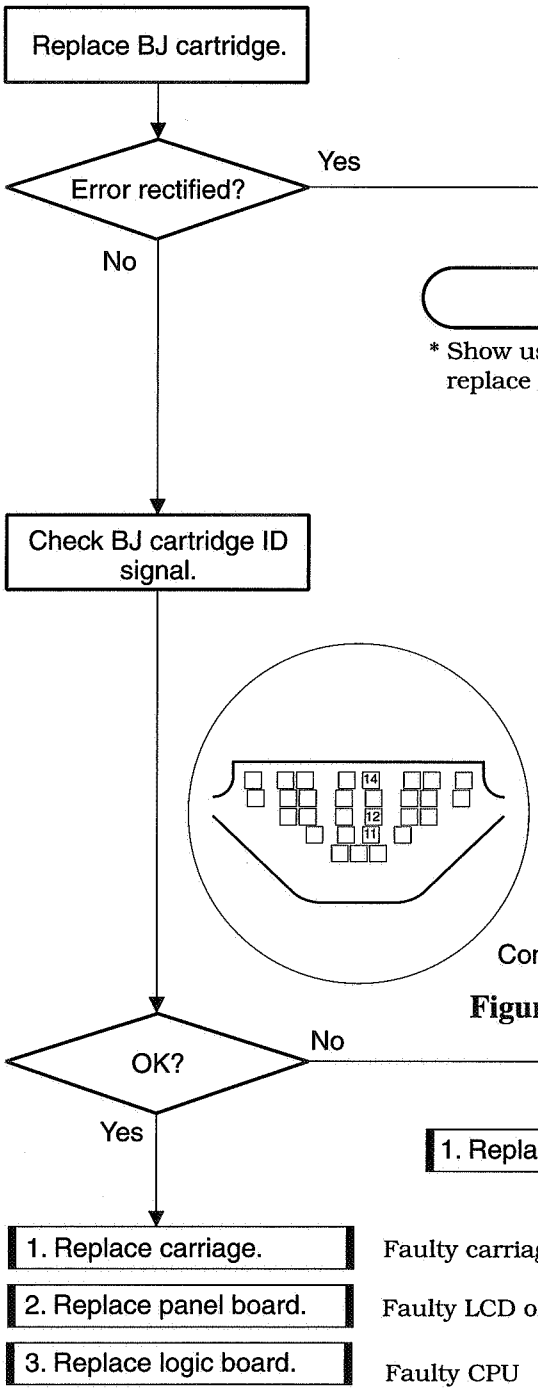

Previous page
Does noise occur during paper feeding?
Yes
No
Visually check the operation of the feeder.
Check for missing or deformed parts, damage, and scratches, etc. Check that no paper is jammed in the mechanism.
OK?
No
Yes
Service or replace faulty part.
1. Replace paper feed roller.
2. Replace ASF.
Faulty pickup roller
Faulty paper lifting plate
3. Replace purge motor gear.
ASF drive gear
1. Replace paper feed roller.
2. Replace transmission roller.
3. Replace platen.
4.Replace spur unit.

## 4. Printer does not recognize BJ cartridge

**<Symptoms>**
- Corrupted LCD display
- Installed BJ cartridge not recognized
- Even when BJ cartridge is installed, the carriage returns to the replacement position.
- The installed cartridge is recognized as the wrong type.

**<Cause>** Faulty contacts between BJ cartridge and carriage
Faulty BJ cartridge
Faulty carriage
Faulty logic board

**<Measure>**




Black BJ cartridge

| Test point | | | Normal value |
|---|---|---|---|
| Pin No. | 11 | 12 | Approx. 0Ω |
| | 11 | 14 | |
| | 12 | 14 | |

Color BJ cartridge

| Test point | | | Normal value |
|---|---|---|---|
| Pin No. | 11 | 12 | ∞ |
| | 11 | 14 | |
| | 12 | 14 | Approx. 0Ω |




Contact pad

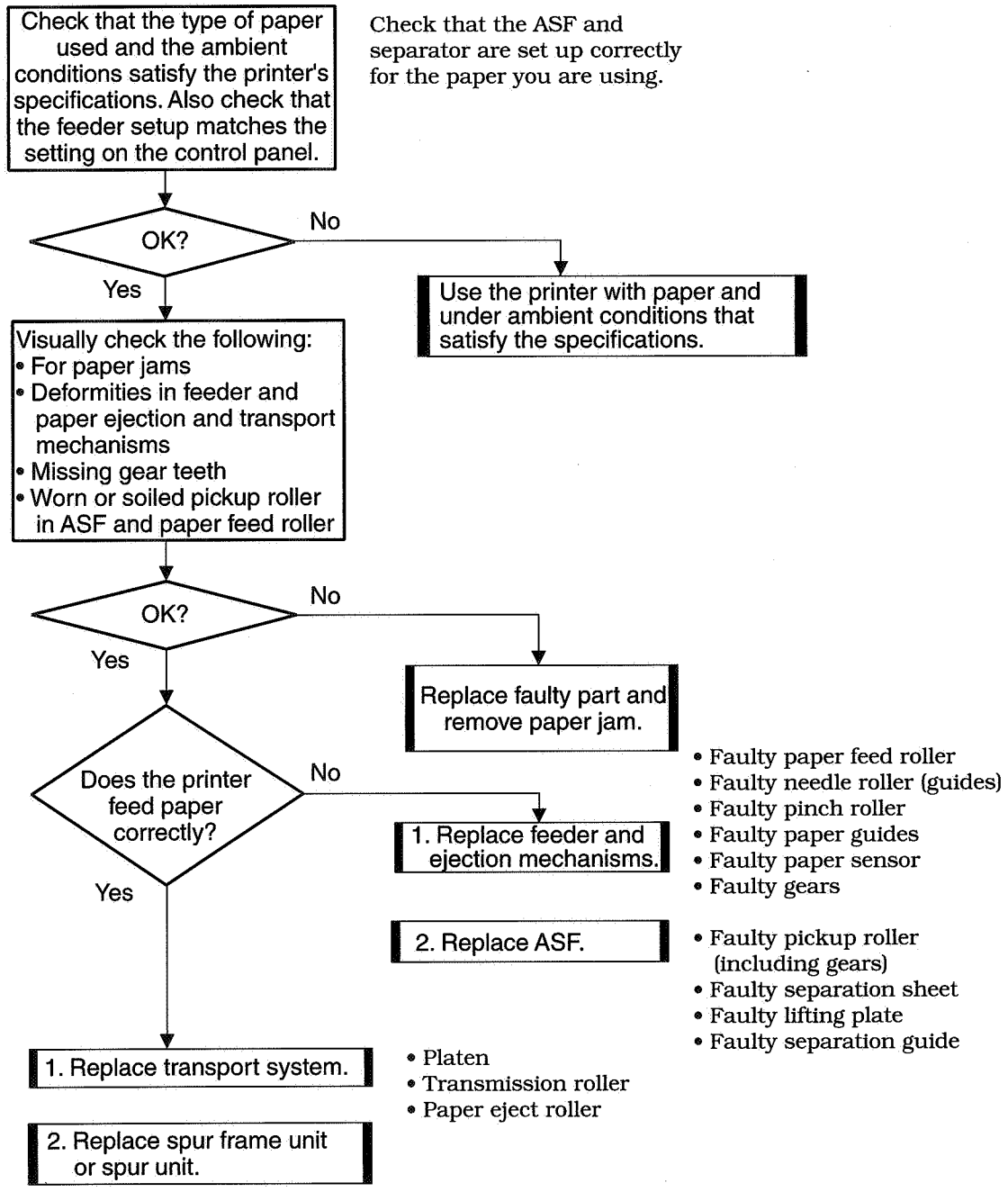
**Figure 5-24 Checking Resistance of Contacts**

# 5. Faulty paper feed

**<Symptoms>**
- No paper feed, or two or more sheets fed together
- Skewing and no paper ejection
- Frequent paper jams

**<Cause>** Faulty paper feed roller operation
Faulty paper eject roller, transmission roller, or spur unit operation, and paper jams
Faulty needle roller, faulty pinch roller, faulty paper guide
When ASF installed:
Worn or deformed pickup roller
Worn or deformed separation sheet
Deformed lifting plate, incorrect setup of separation guides

**<Measure>**

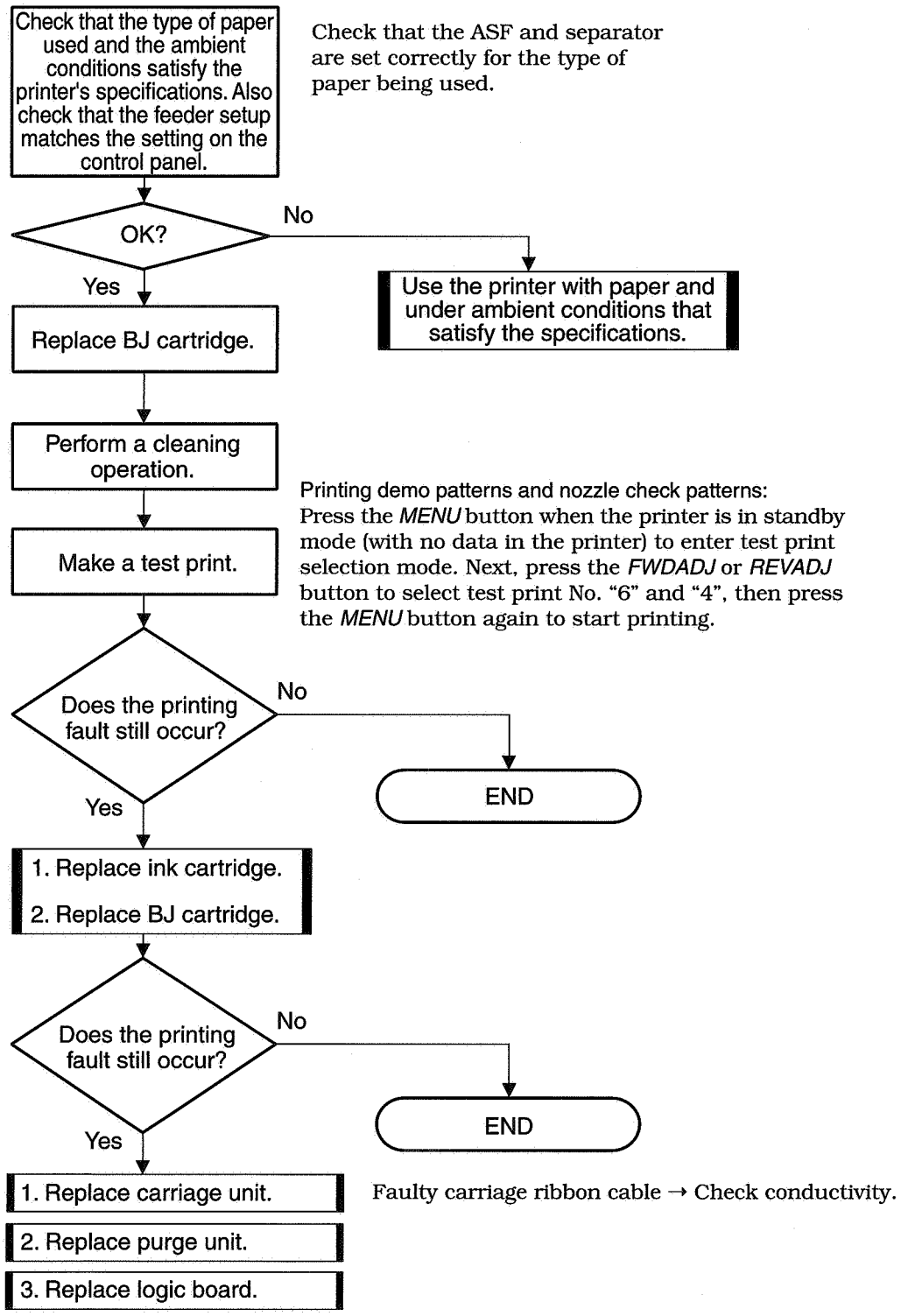


# 6. Faulty printing (1): No printing

**<Symptoms>** • The printer does not print at all.
• Printing stops mid-way.
• Only a certain color is printed.

**<Cause>** The ink has run out or the BJ cartridge is faulty. The logic board is faulty, the carriage ribbon cable is faulty, or the purge unit is faulty.

**<Measure>**

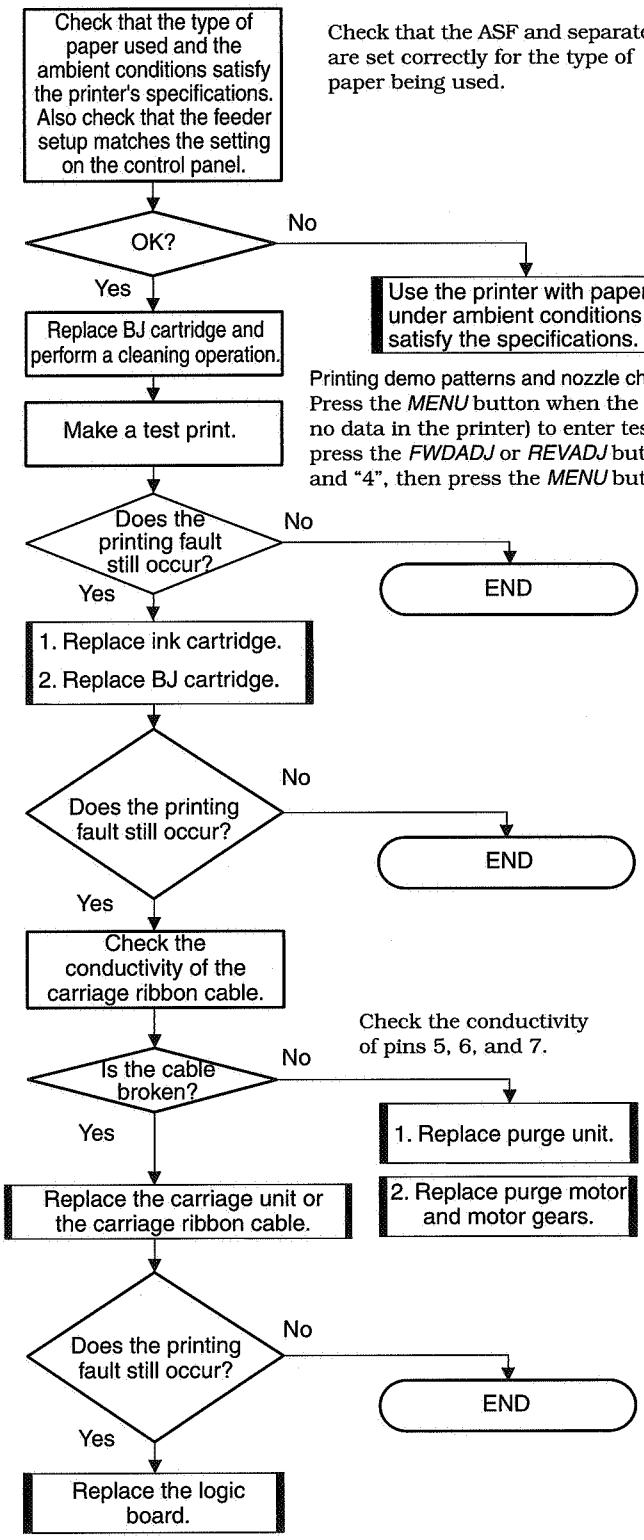


# 7. Faulty printing (2): White stripes

**<Symptoms>** • Blotching
• White stripes

**<Cause>** The BJ cartridge or carriage ribbon cable is faulty. The purge unit or the paper feeder is faulty (missing gear teeth).

**<Measure>**




Check that the ASF and separator are set correctly for the type of paper being used.

Printing demo patterns and nozzle check patterns:
Press the *MENU* button when the printer is in standby mode (with no data in the printer) to enter test print selection mode. Next, press the *FWDADJ* or *REVADJ* button to select test print No. "6" and "4", then press the *MENU* button again to start printing.

Check the conductivity of pins 5, 6, and 7.

Sample of white stripes

Troubleshooting consists of err
diagnosis, which is required if t
error is unknown, and error rec
performed if the cause of an er
cause of an error is unknown,
condition diagnosis, and if it is
error recovery.

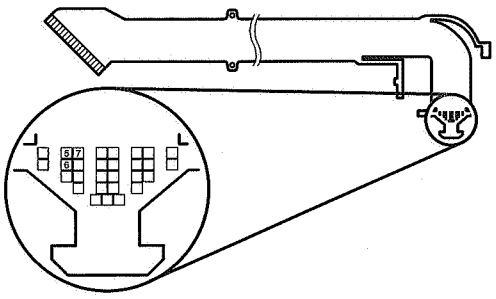


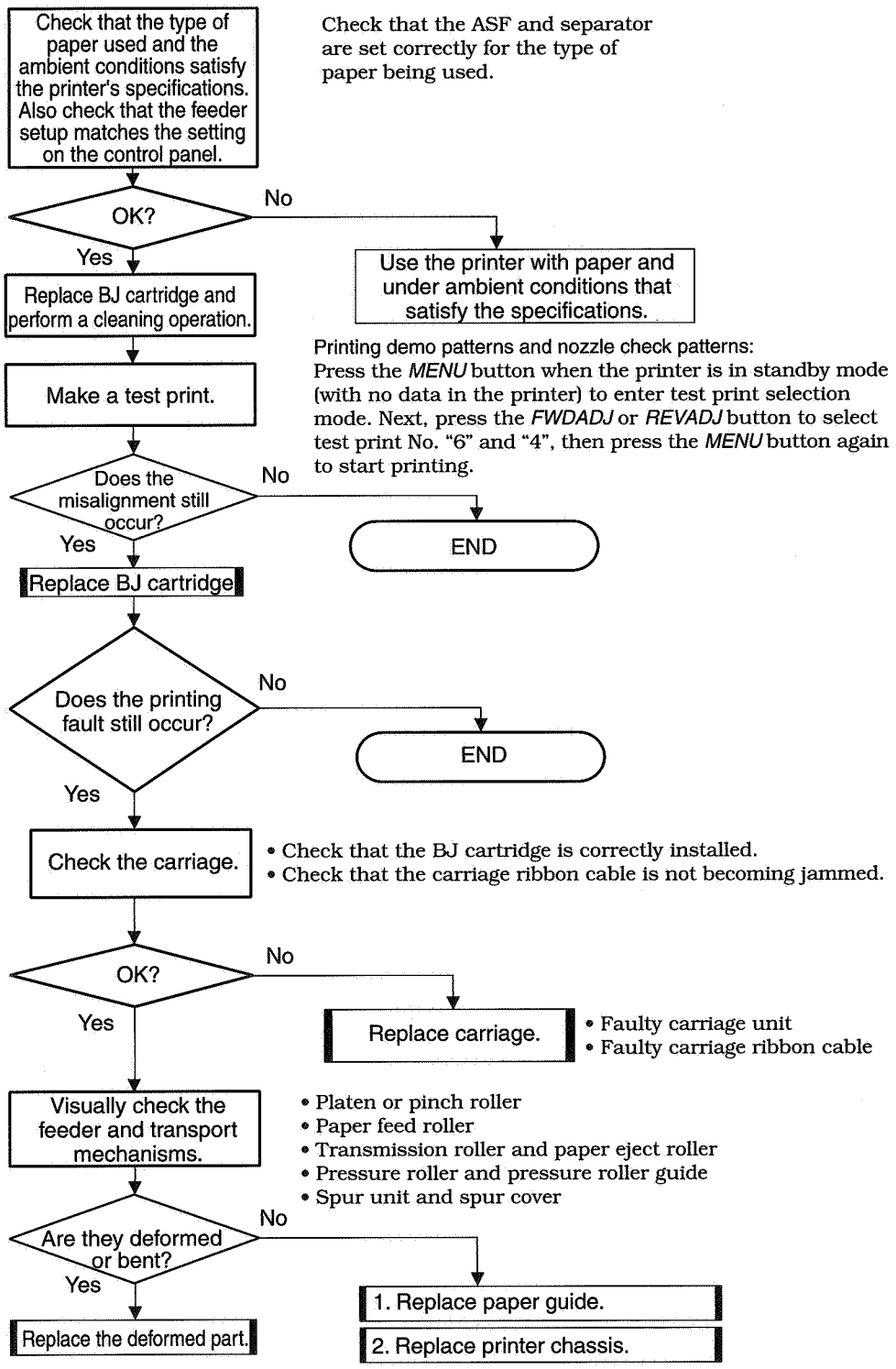
**Figure 5-25 Carriage Ribbon Cable**

# 8. Faulty printing (3): Misalignment of vertical and horizontal ruled lines, and black lines on printout

**<Symptoms>** • Misalignment of vertical and horizontal ruled lines
• Black lines on printout

**<Cause>** BJ cartridge, faulty carriage drive unit, bent or deformed guide rail or carriage shaft

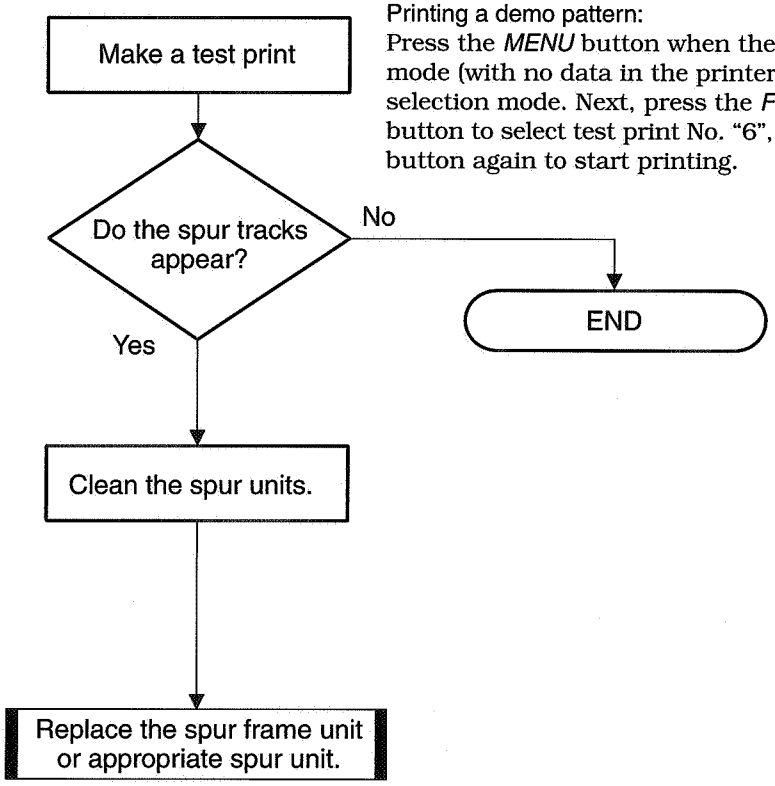
**<Measure>**



# 9. Faulty printing (4): Spur tracks

**<Symptoms>** Spur tracks appear on printed pages.
**<Cause>** • Dirty spurs
• Deteriorated and bent spurs

**<Measure>**




Printing a demo pattern:
Press the *MENU* button when the printer is in standby mode (with no data in the printer) to enter test print selection mode. Next, press the *FWDADJ* or *REVADJ* button to select test print No. "6", then press the *MENU* button again to start printing.

## 10. Faulty printing (5): Soiled printing paper

**<Symptoms>**
- Dirt on back of printing paper
- Dirt on printed side of printing paper

**<Cause>**
- Dirty feeder mechanism (pickup roller, lifting plate, or separator)
- Dirty transport or paper eject mechanism
- Dirty purge unit

**<Measure>**

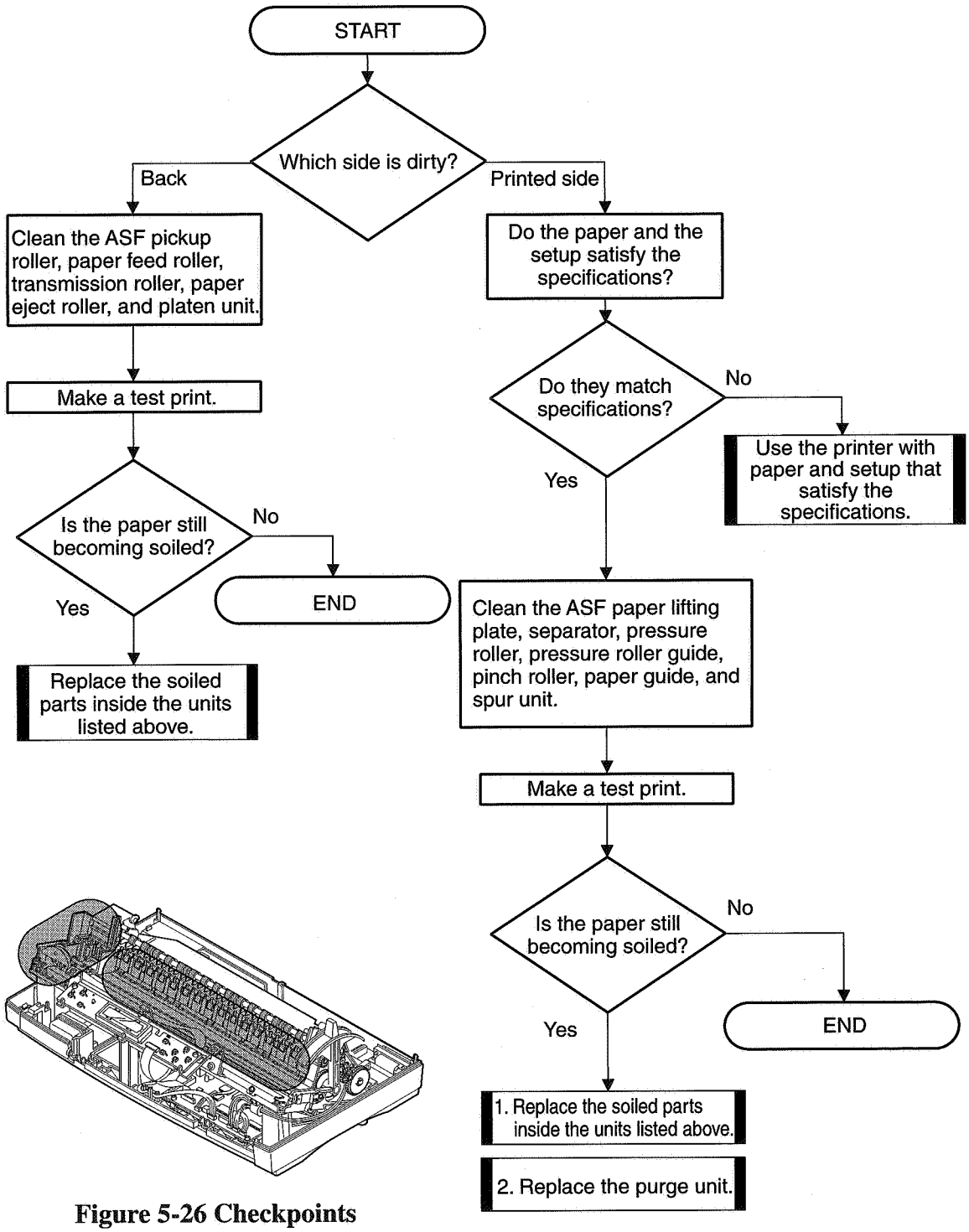


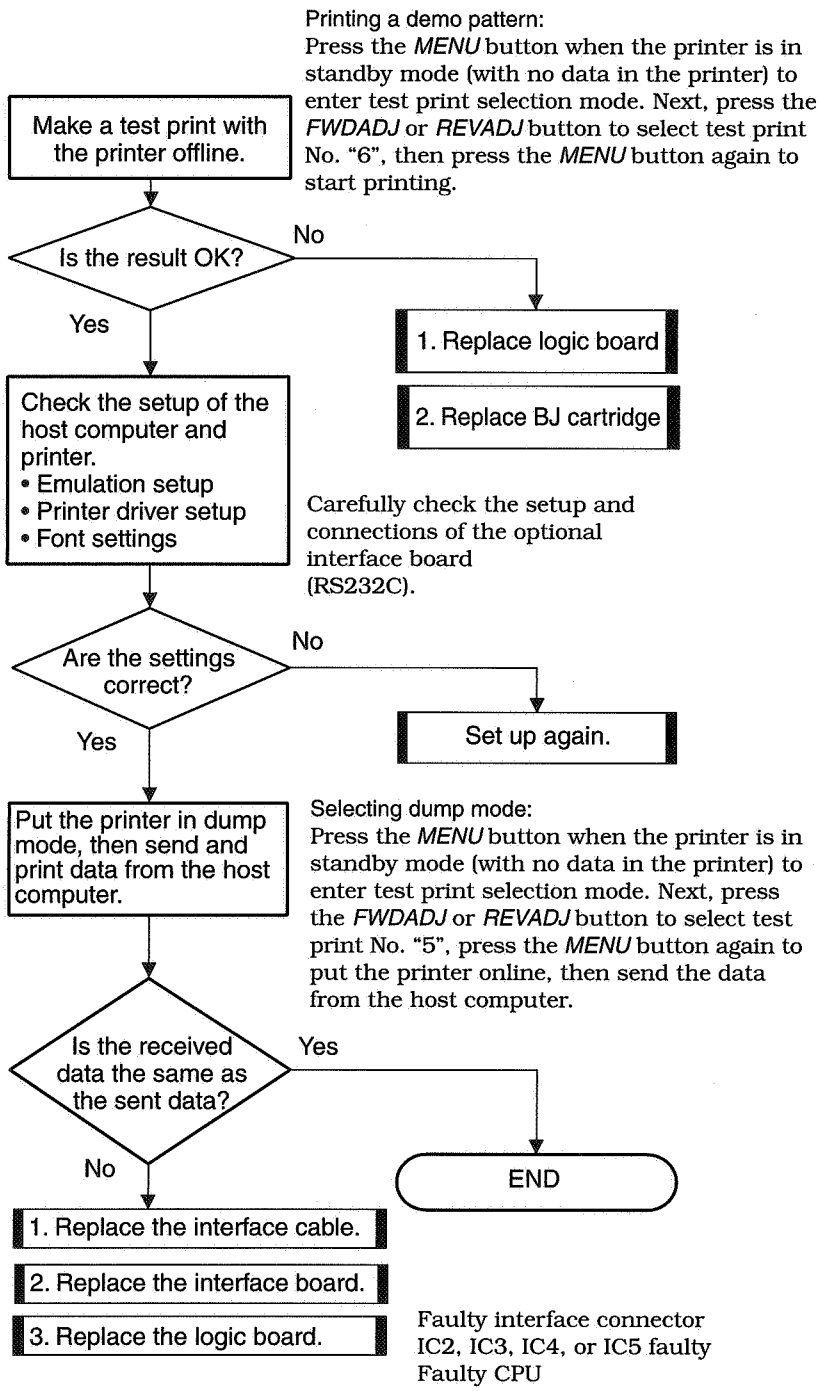

**Figure 5-26 Checkpoints**

# 11. Faulty printing (6): Wrong characters

**<Symptoms>**
- Incorrect host computer or printer settings
- Characters printed in a different font from that specified
- Page printed in color(s) different from those specified
- Characters deformed during data transmission

**<Cause>**
- Host computer or printer incorrectly set up
- Incorrect printer driver setup
- Faulty interface board
- Faulty interface cable
- Faulty logic board (printer)
- Faulty BJ cartridge

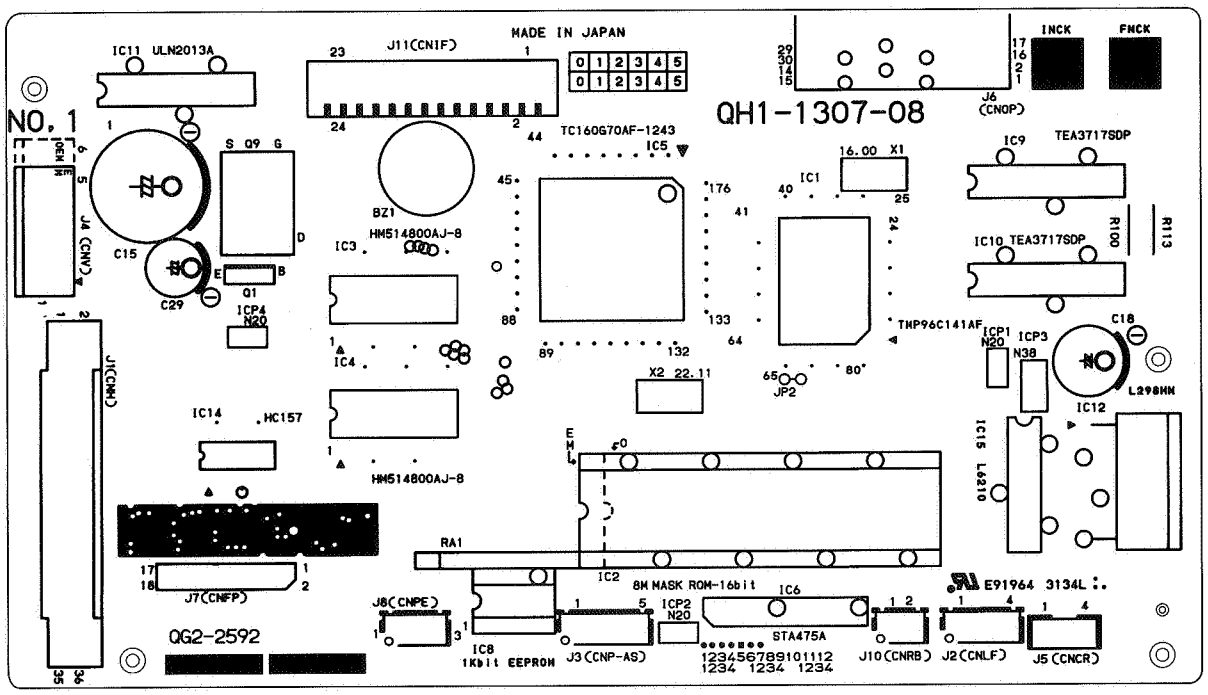
**<Measure>**



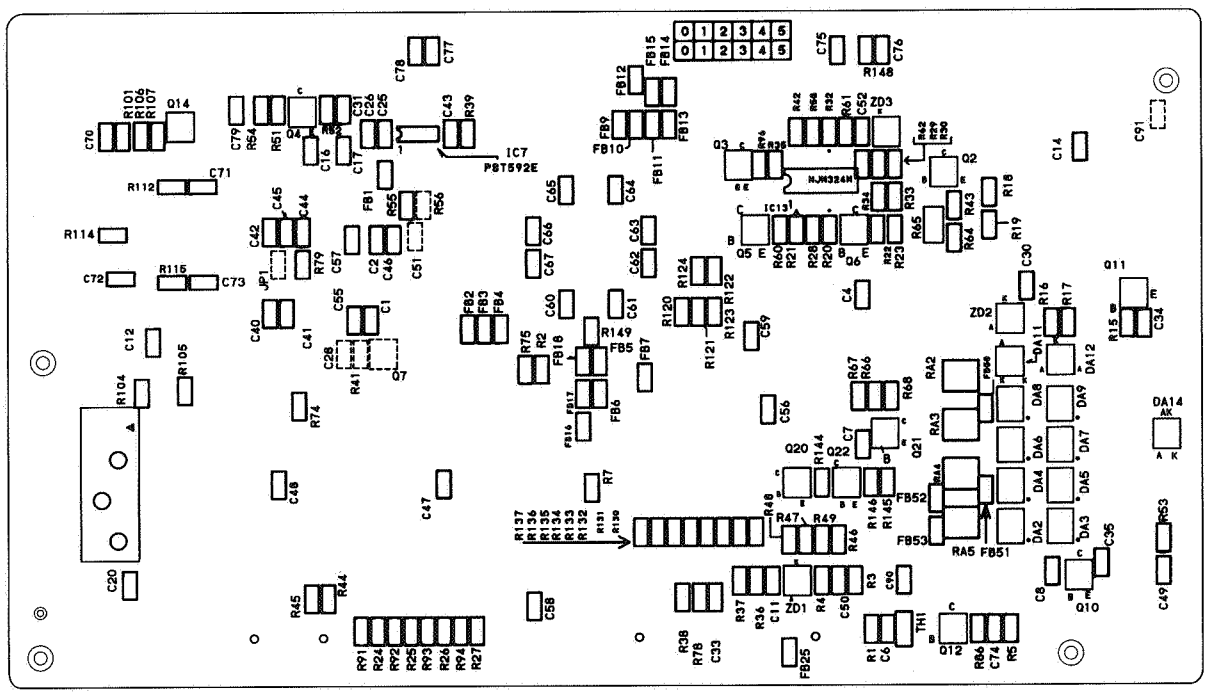
# 7. CIRCUIT DIAGRAMS

## 7.1 Parts Layout

### 7.1.1 Logic board

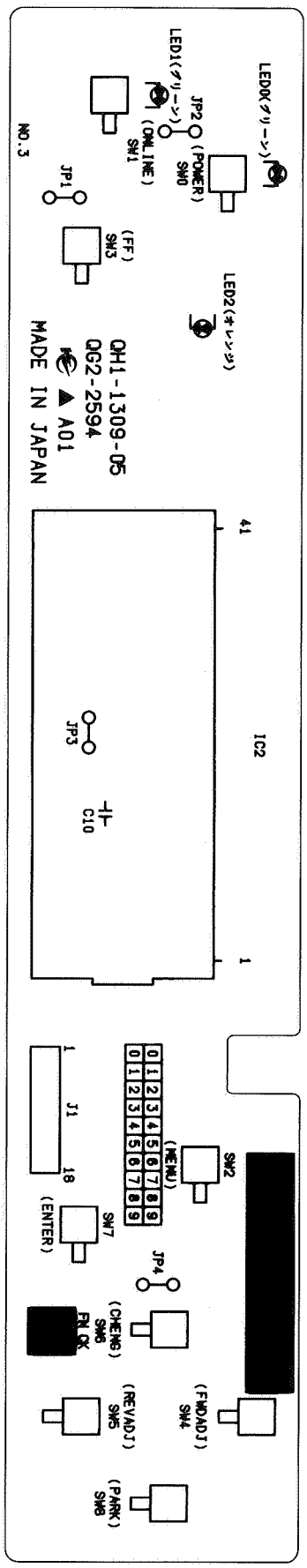



Top View

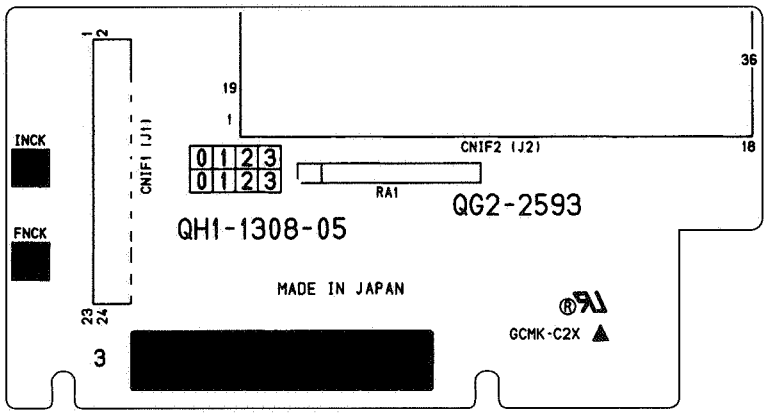


Bottom View

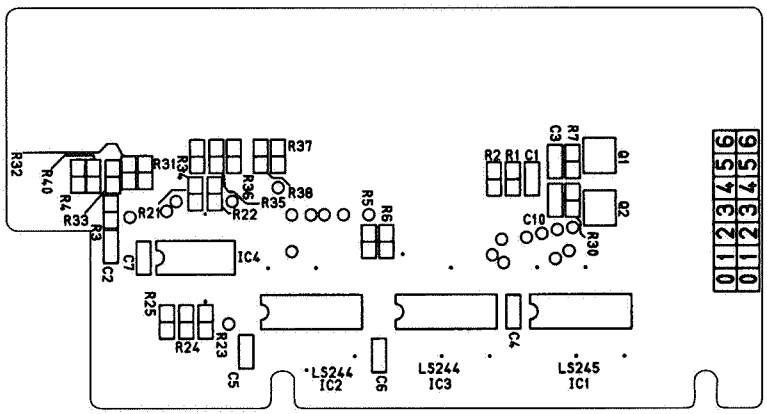
### 7.1.2 Panel board



### 7.1.3 Interface board



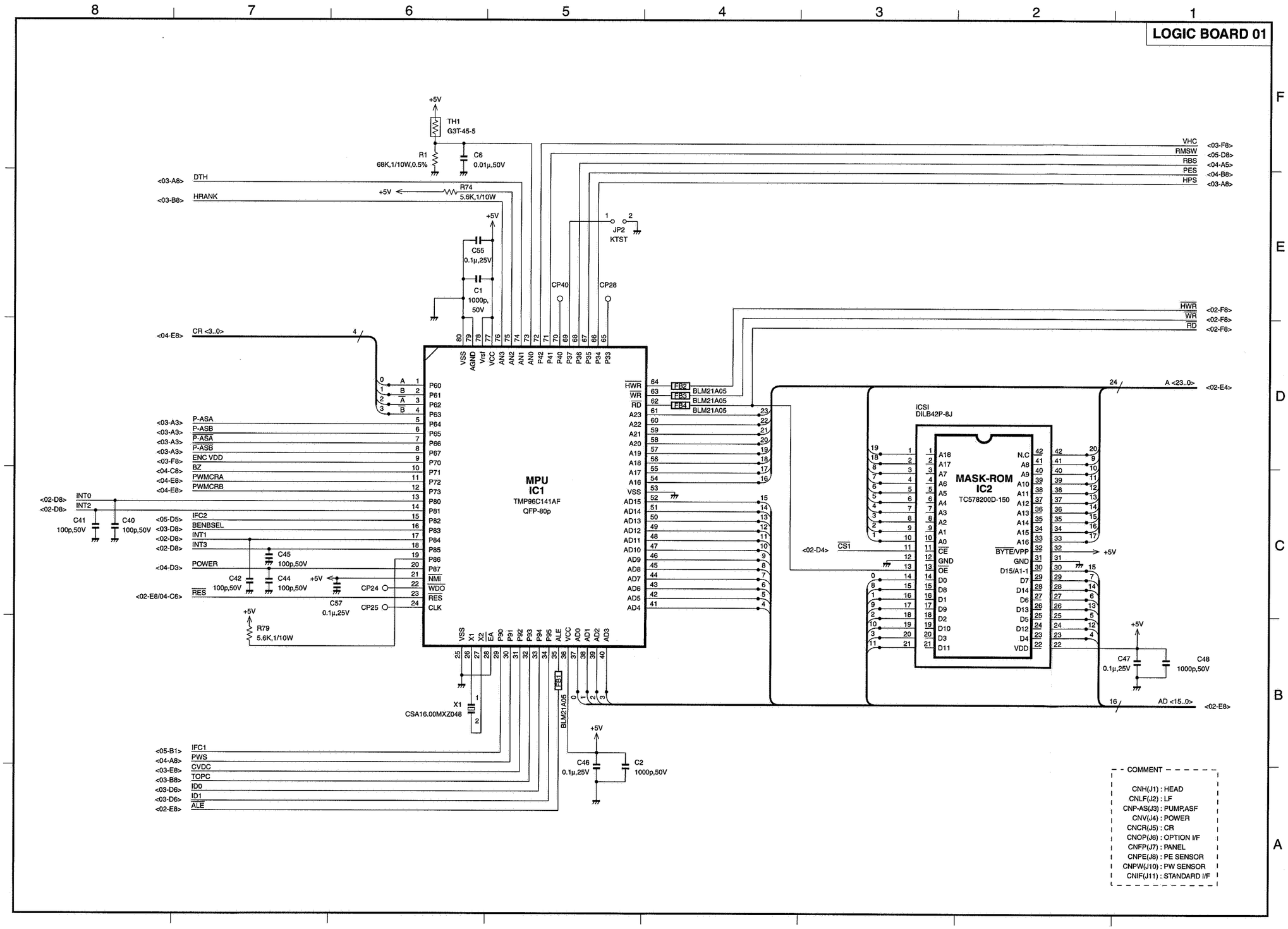

**Top View**




**Bottom View**

Blank page

## 7.2 Circuit Diagrams
### 7.2.1 Logic board



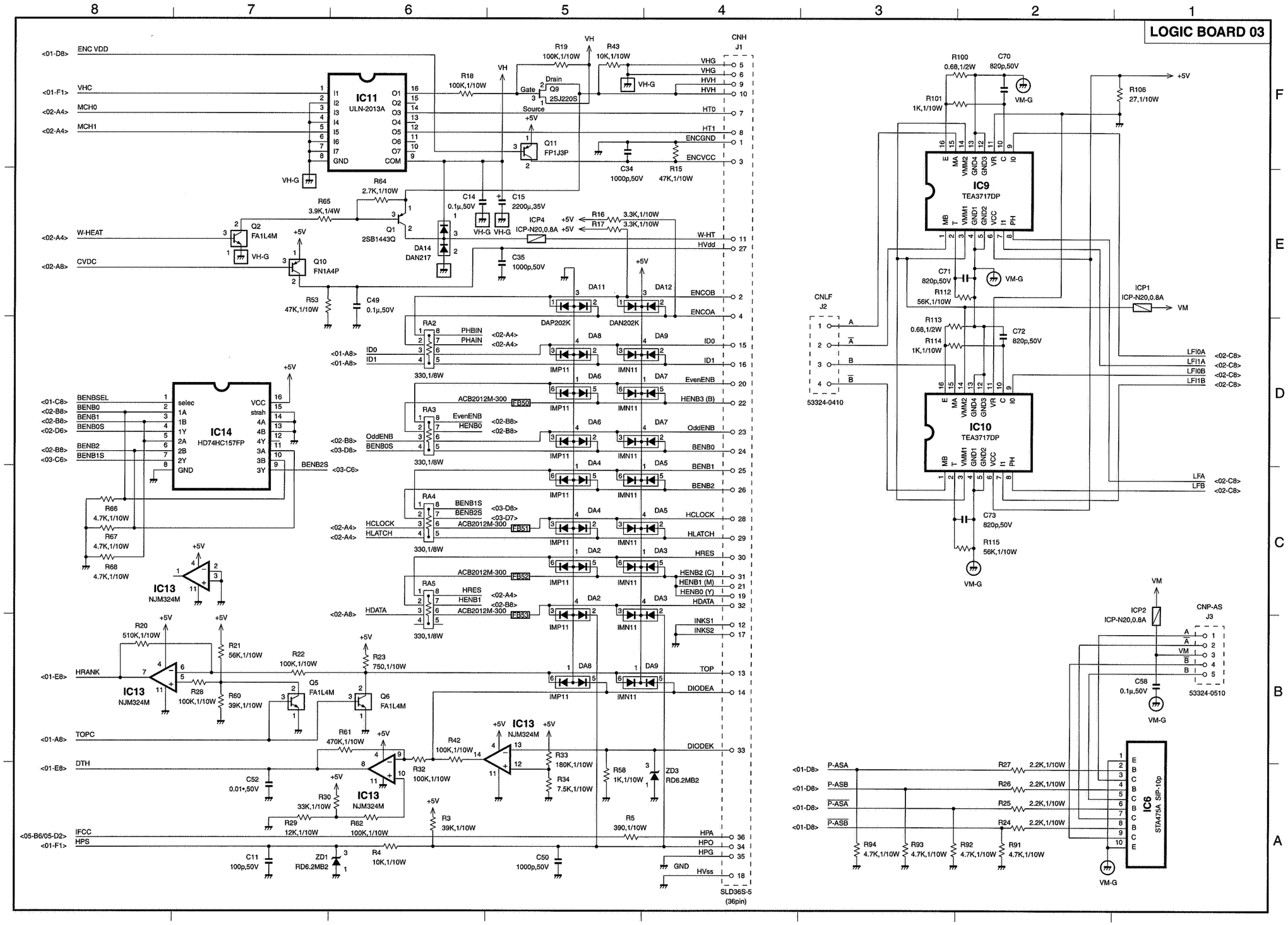
LOGIC BOARD 02

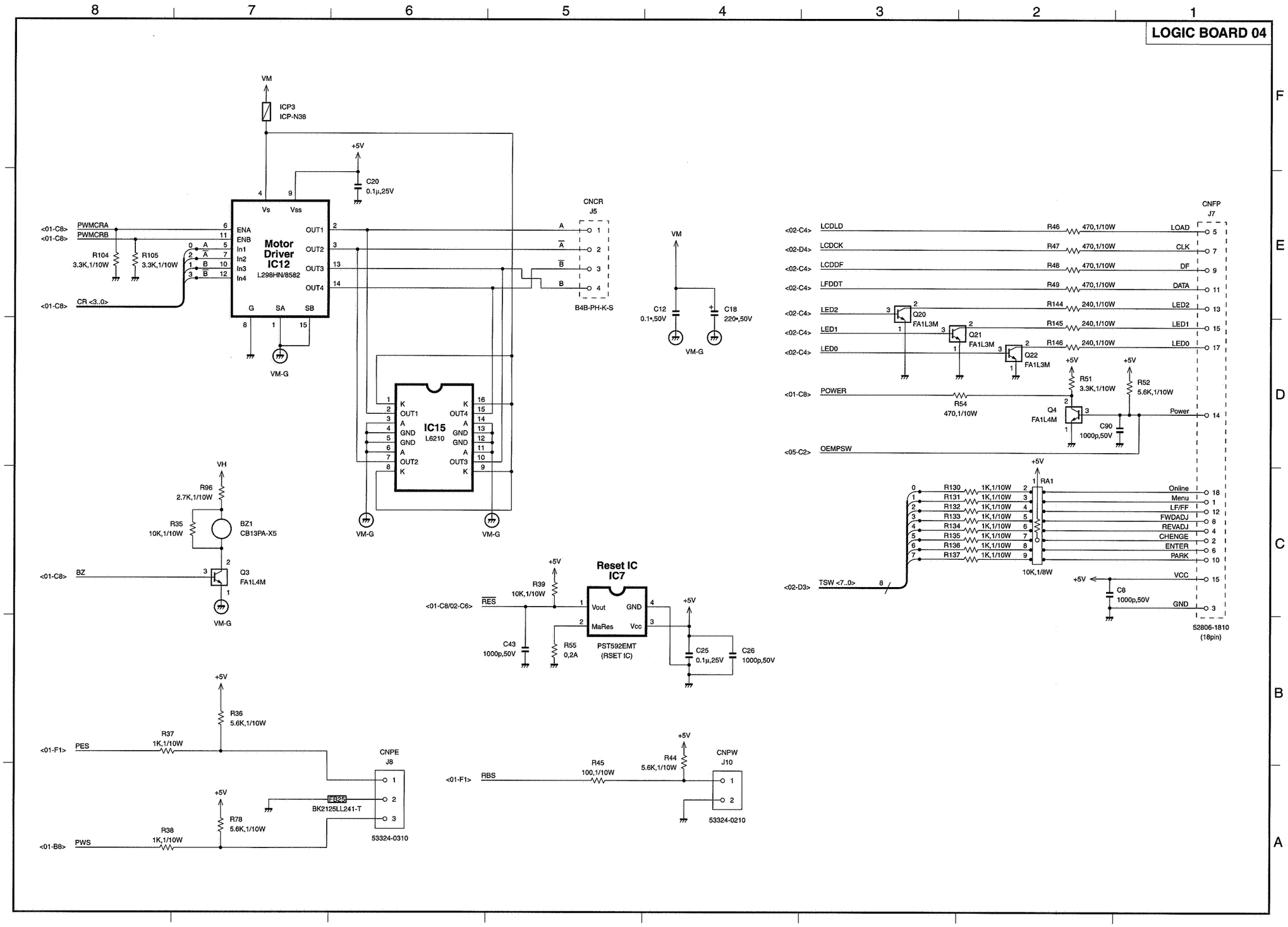
Printer Controller
IC5
TC160G70AF-1243

D-RAM (4M)
IC3
MSM44800AJ-8

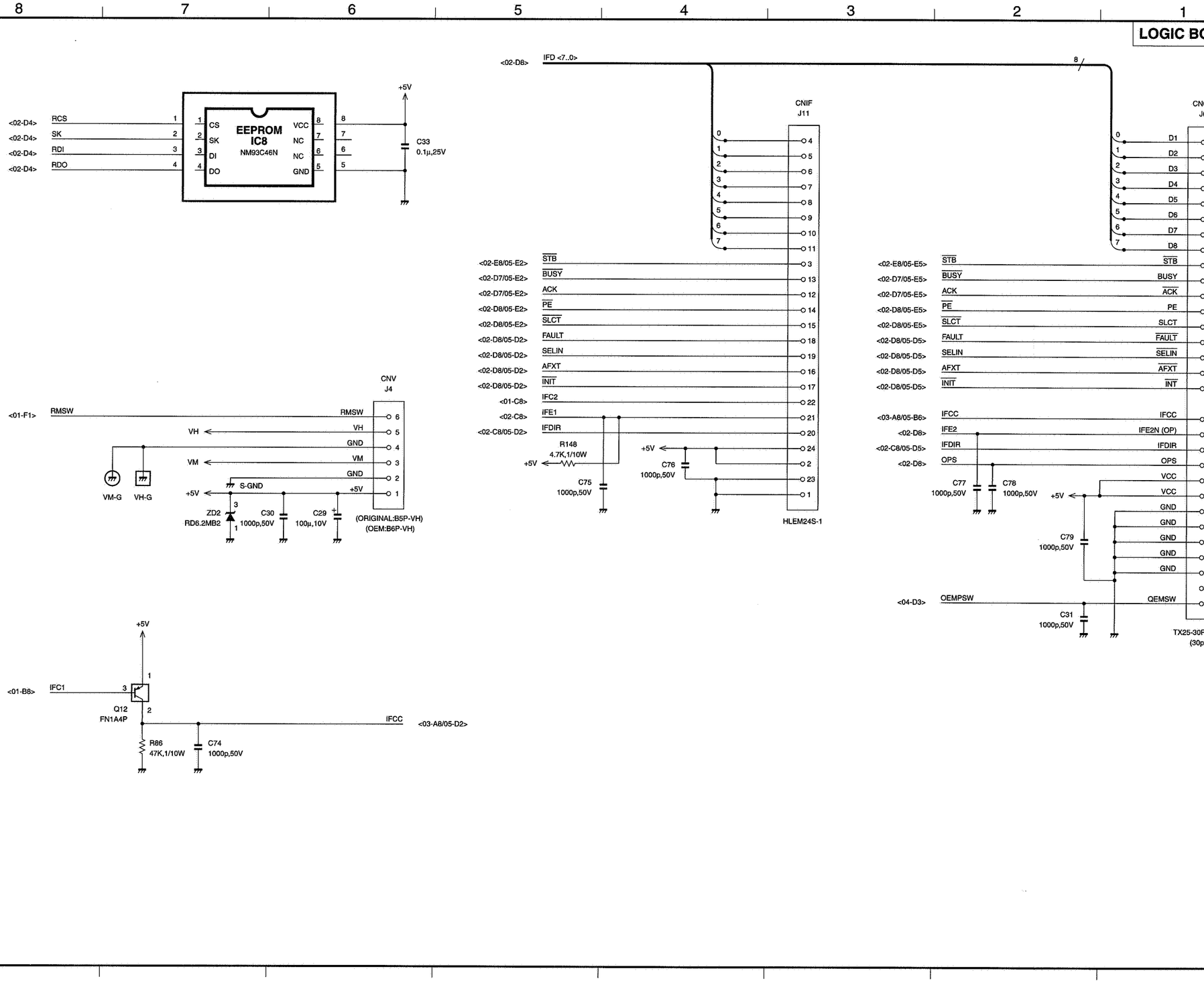
D-RAM (4M)
IC4
MSM44800AJ-8

## LOGIC BOARD 03

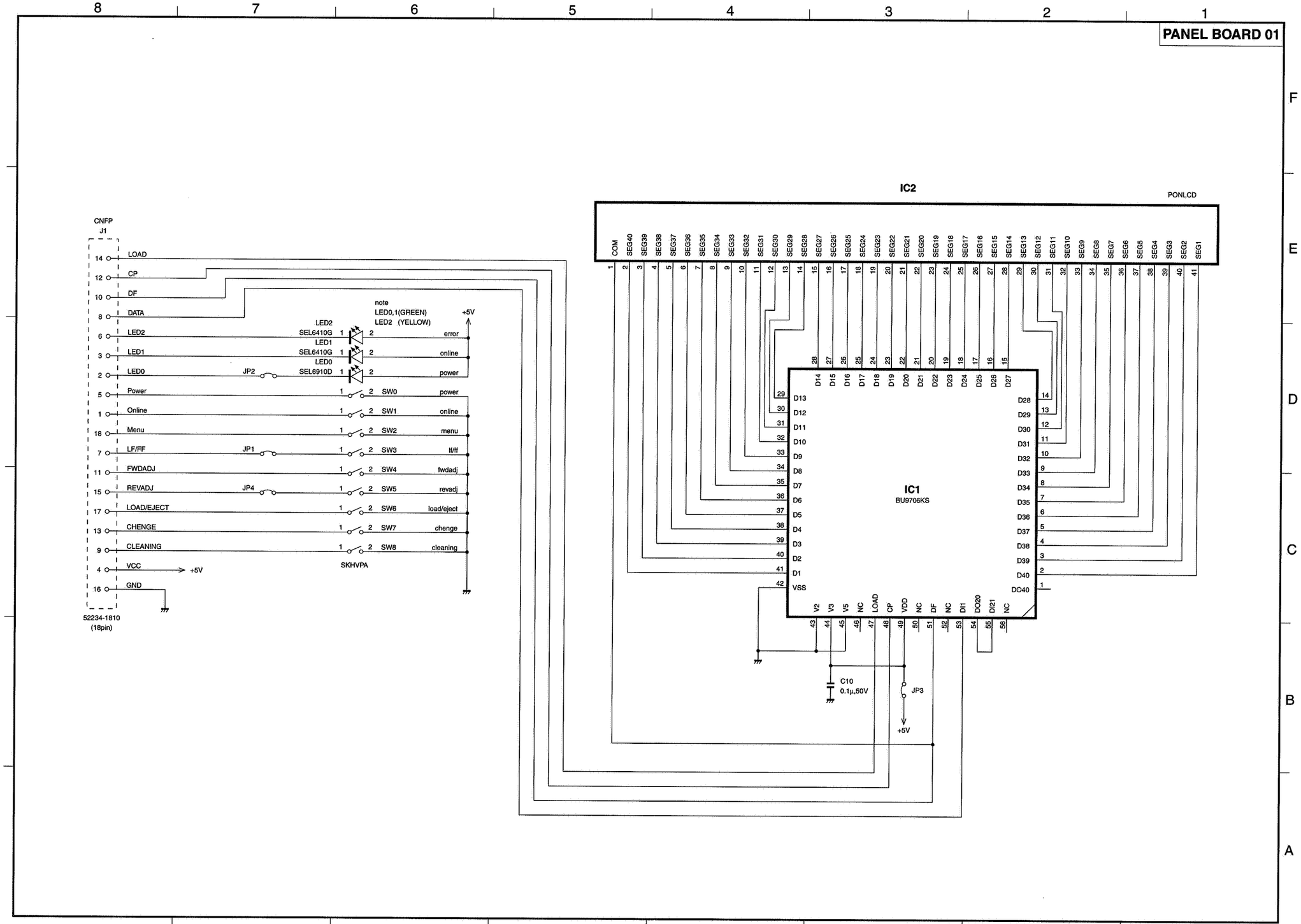



LOGIC BOARD 04
8
7
6
5
4
3
2
1
F
E
D
C
B
A
VM
ICP3
ICP-N38
+5V
C20
0.1µ,25V
Motor Driver IC12
L298HN/8582
Vs
Vss
ENA
ENB
In1
In2
In3
In4
OUT1
OUT2
OUT3
OUT4
G
SA
SB
<01-C8> PWMCRA
<01-C8> PWMCRB
<01-C8> CR <3..0>
R104 3.3K,1/10W
R105 3.3K,1/10W
CNCR J5
B4B-PH-K-S
VM-G
C12 0.1•,50V
C18 220•,50V
IC15 L6210
K
OUT1
A
GND
OUT2
OUT3
OUT4
VH
R96 2.7K,1/10W
R35 10K,1/10W
BZ1 CB13PA-X5
<01-C8> BZ
Q3 FA1L4M
R39 10K,1/10W
<01-C8/02-C6> RES
Reset IC IC7
Vout
MaRes
GND
Vcc
PST592EMT (RSET IC)
C43 1000p,50V
R55 0,2A
C25 0.1µ,25V
C26 1000p,50V
R36 5.6K,1/10W
R37 1K,1/10W
<01-F1> PES
R78 5.6K,1/10W
R38 1K,1/10W
<01-B8> PWS
CB25
BK2125LL241-T
CNPE J8
53324-0310
R45 100,1/10W
R44 5.6K,1/10W
<01-F1> RBS
CNPW J10
53324-0210
CNFP J7
<02-C4> LCDLD
<02-D4> LCDCK
<02-C4> LCDDF
<02-C4> LFDDT
<02-C4> LED2
<02-C4> LED1
<02-C4> LED0
R46 470,1/10W
R47 470,1/10W
R48 470,1/10W
R49 470,1/10W
R144 240,1/10W
R145 240,1/10W
R146 240,1/10W
LOAD
CLK
DF
DATA
LED2
LED1
LED0
Q20 FA1L3M
Q21 FA1L3M
Q22 FA1L3M
<01-C8> POWER
R54 470,1/10W
R51 3.3K,1/10W
R52 5.6K,1/10W
Q4 FA1L4M
C90 1000p,50V
Power
<05-C2> OEMPSW
RA1
R130 1K,1/10W
R131 1K,1/10W
R132 1K,1/10W
R133 1K,1/10W
R134 1K,1/10W
R135 1K,1/10W
R136 1K,1/10W
R137 1K,1/10W
10K,1/8W
Online
Menu
LF/FF
FWDADJ
REVADJ
CHENGE
ENTER
PARK
<02-D3> TSW <7..0>
VCC
GND
C8 1000p,50V
52806-1810 (18pin)

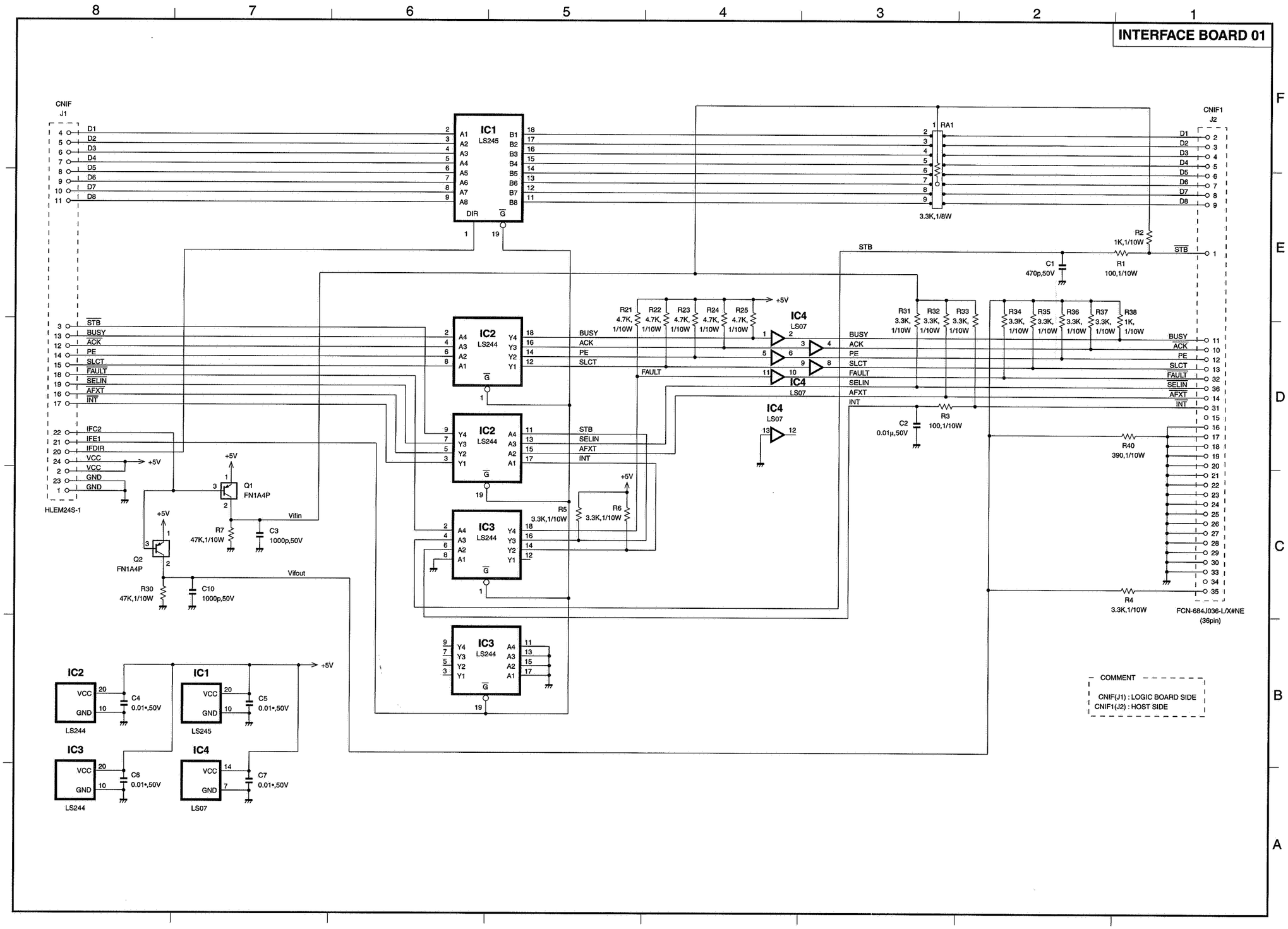
## LOGIC BOARD 05



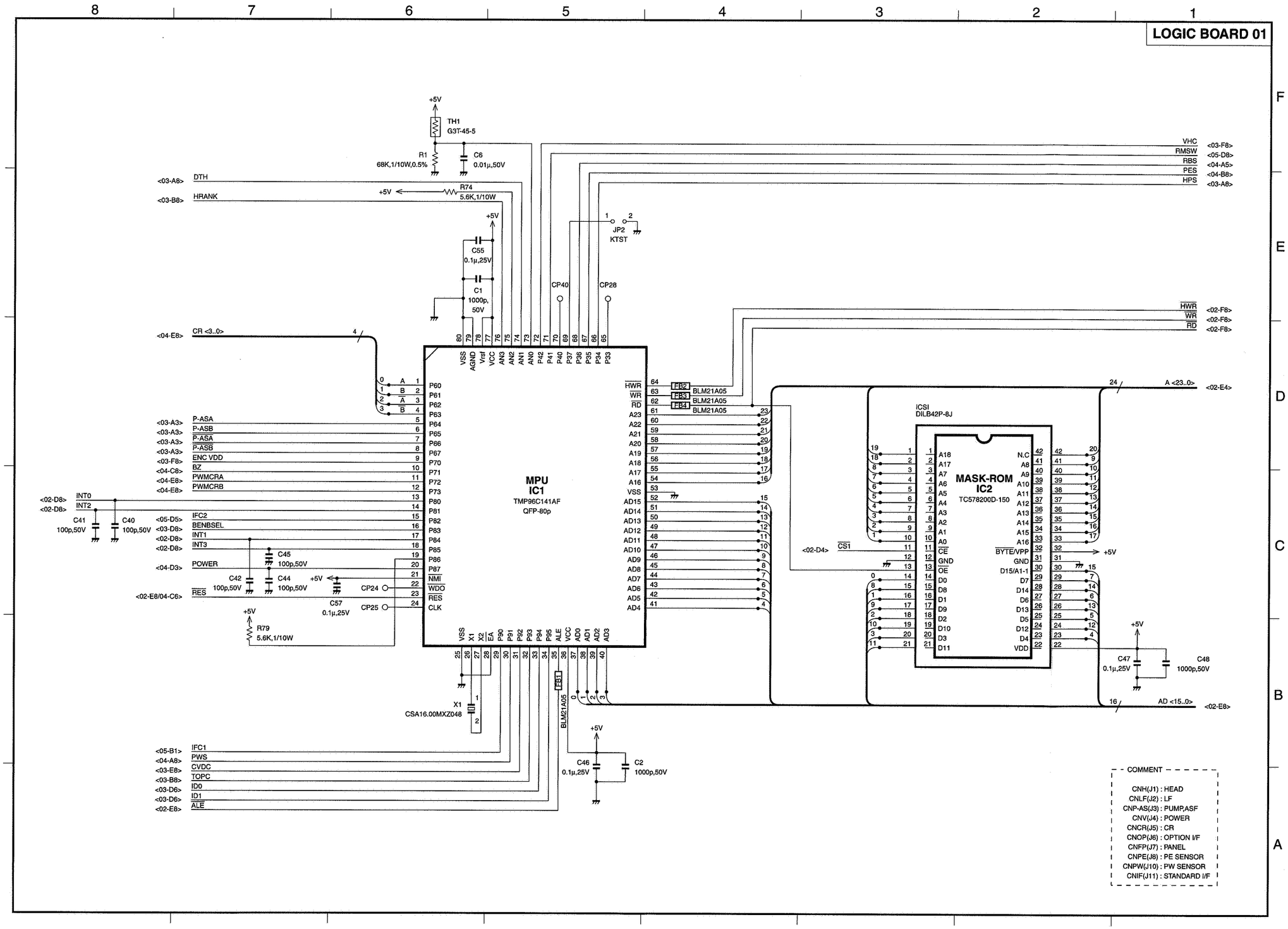
### 7.2.2 Panel board



### 7.2.3 Interface board



## 7.2 Circuit Diagrams
### 7.2.1 Logic board



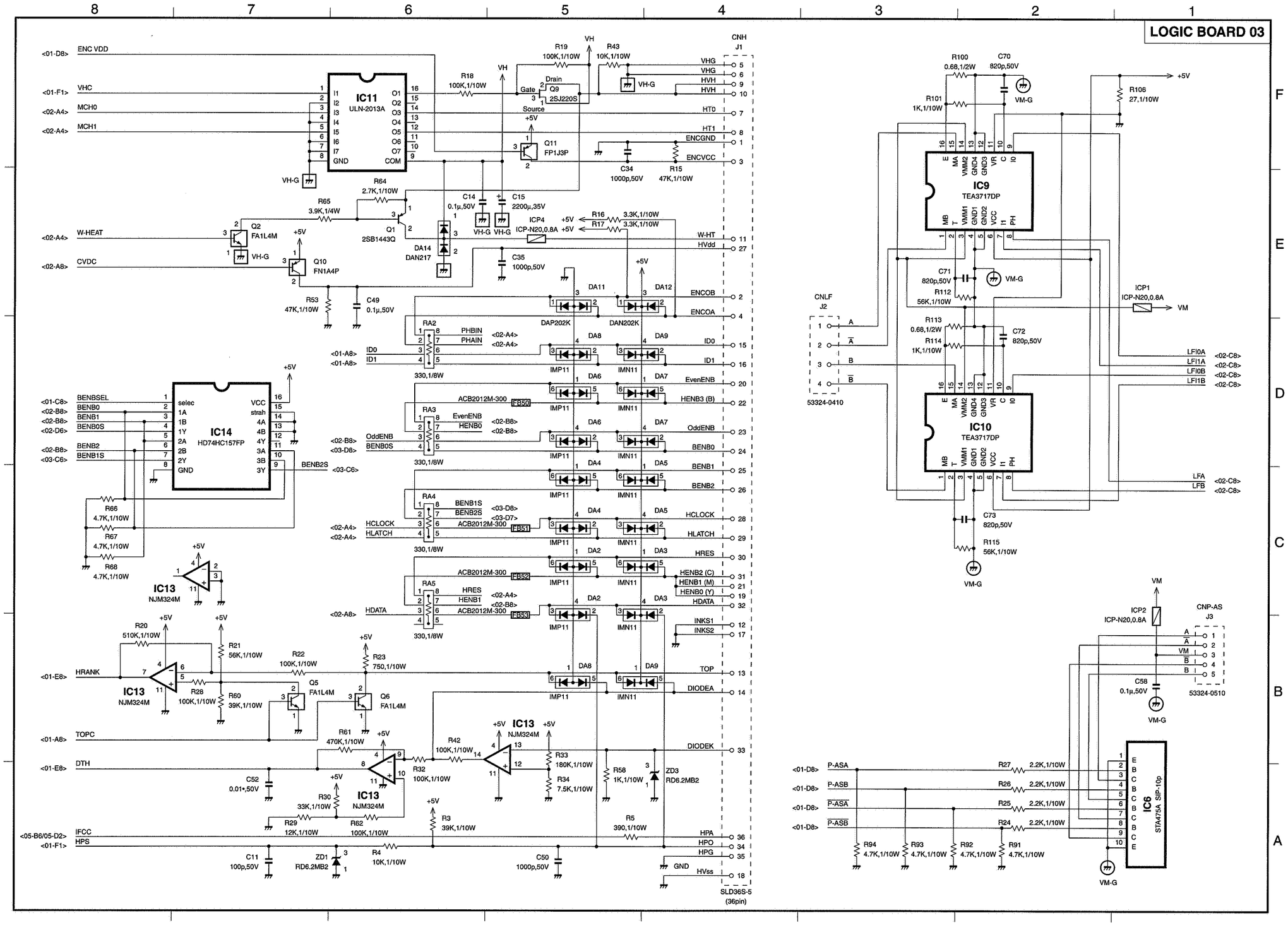
LOGIC BOARD 02

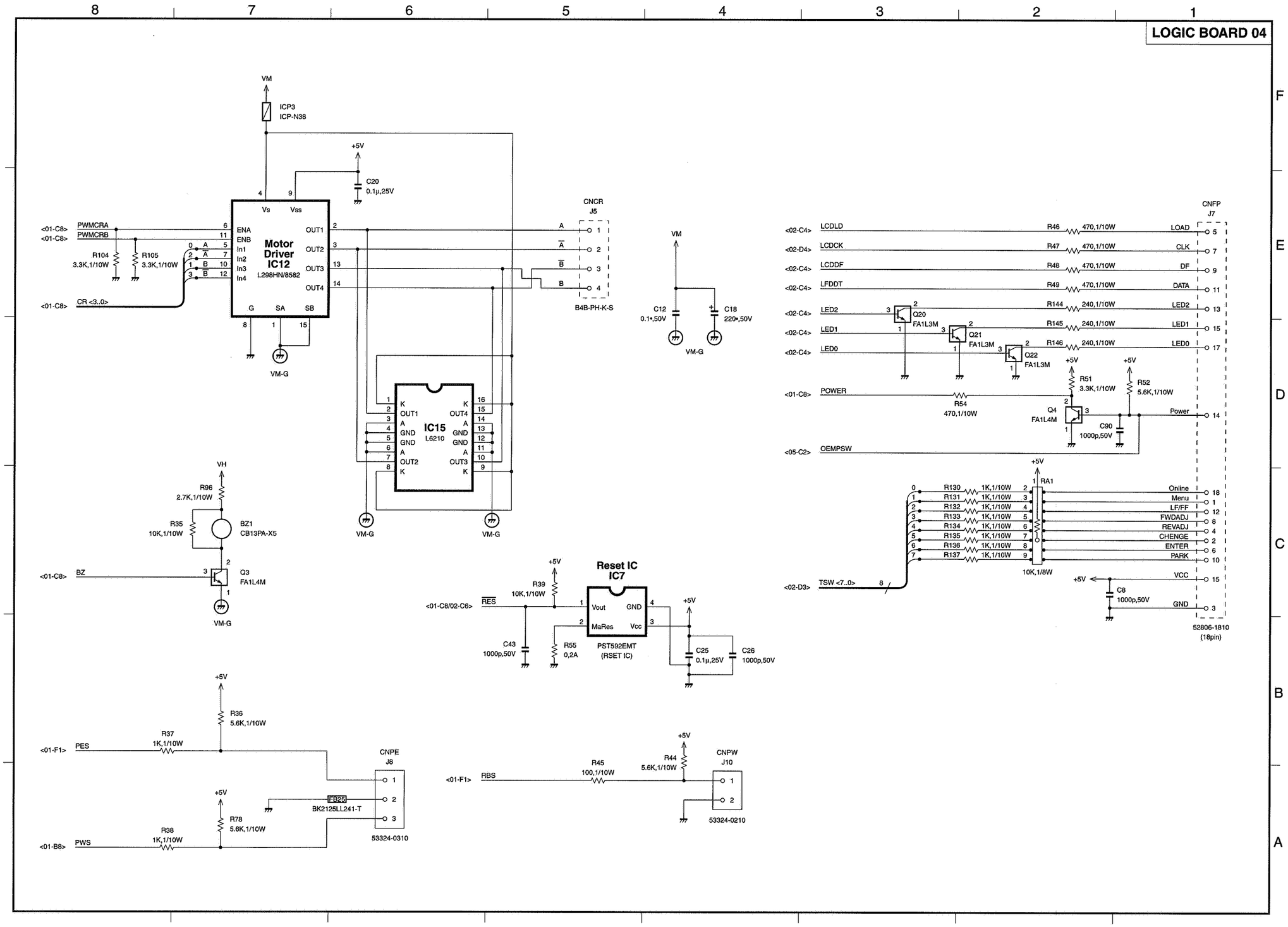
Printer Controller
IC5
TC160G70AF-1243

D-RAM (4M)
IC3
MSM44800AJ-8

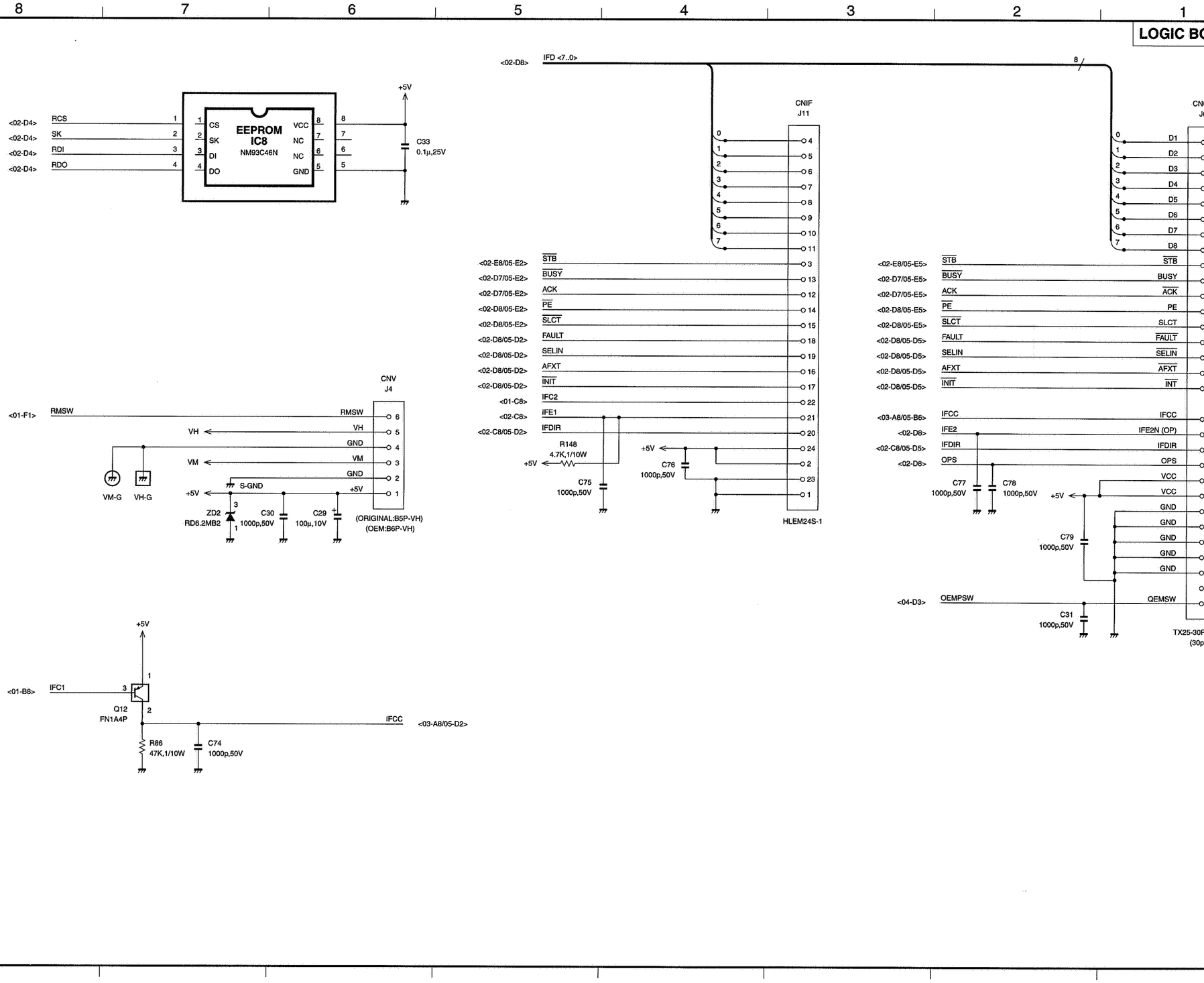
D-RAM (4M)
IC4
MSM44800AJ-8

## LOGIC BOARD 03

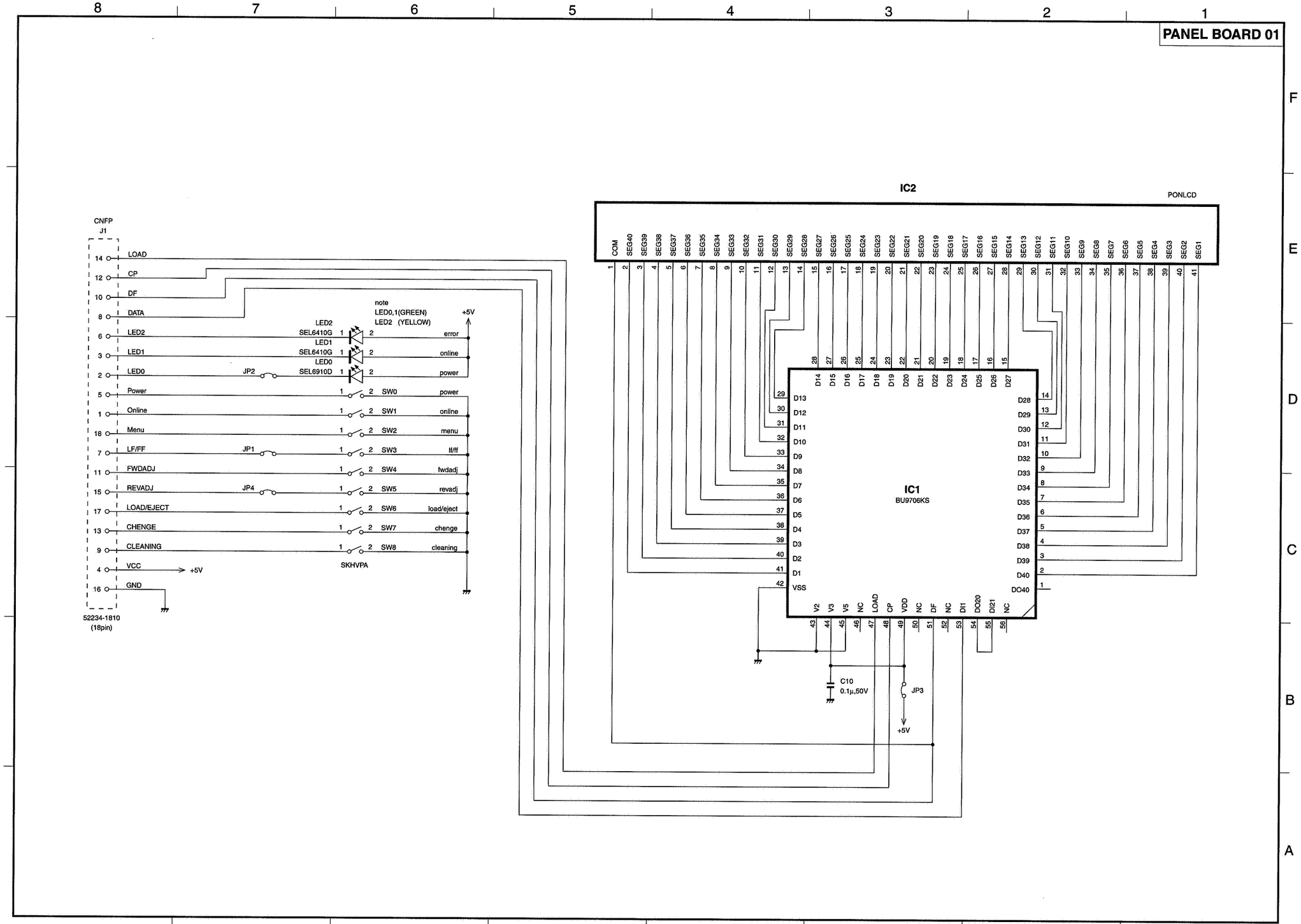



LOGIC BOARD 04
8
7
6
5
4
3
2
1
F
E
D
C
B
A
VM
ICP3
ICP-N38
+5V
C20
0.1µ,25V
Motor Driver IC12
L298HN/8582
Vs
Vss
ENA
ENB
In1
In2
In3
In4
OUT1
OUT2
OUT3
OUT4
G
SA
SB
<01-C8> PWMCRA
<01-C8> PWMCRB
<01-C8> CR <3..0>
R104 3.3K,1/10W
R105 3.3K,1/10W
CNCR J5
B4B-PH-K-S
VM-G
C12 0.1•,50V
C18 220•,50V
IC15 L6210
K
OUT1
A
GND
OUT2
OUT3
OUT4
VH
R96 2.7K,1/10W
R35 10K,1/10W
BZ1 CB13PA-X5
<01-C8> BZ
Q3 FA1L4M
R39 10K,1/10W
<01-C8/02-C6> RES
Reset IC IC7
Vout
MaRes
GND
Vcc
PST592EMT (RSET IC)
C43 1000p,50V
R55 0,2A
C25 0.1µ,25V
C26 1000p,50V
R36 5.6K,1/10W
R37 1K,1/10W
<01-F1> PES
R78 5.6K,1/10W
R38 1K,1/10W
<01-B8> PWS
CB25
BK2125LL241-T
CNPE J8
53324-0310
R45 100,1/10W
R44 5.6K,1/10W
<01-F1> RBS
CNPW J10
53324-0210
CNFP J7
<02-C4> LCDLD
<02-D4> LCDCK
<02-C4> LCDDF
<02-C4> LFDDT
<02-C4> LED2
<02-C4> LED1
<02-C4> LED0
R46 470,1/10W
R47 470,1/10W
R48 470,1/10W
R49 470,1/10W
R144 240,1/10W
R145 240,1/10W
R146 240,1/10W
LOAD
CLK
DF
DATA
LED2
LED1
LED0
Q20 FA1L3M
Q21 FA1L3M
Q22 FA1L3M
<01-C8> POWER
R54 470,1/10W
R51 3.3K,1/10W
R52 5.6K,1/10W
Q4 FA1L4M
C90 1000p,50V
Power
<05-C2> OEMPSW
RA1
R130 1K,1/10W
R131 1K,1/10W
R132 1K,1/10W
R133 1K,1/10W
R134 1K,1/10W
R135 1K,1/10W
R136 1K,1/10W
R137 1K,1/10W
10K,1/8W
Online
Menu
LF/FF
FWDADJ
REVADJ
CHENGE
ENTER
PARK
<02-D3> TSW <7..0>
VCC
GND
C8 1000p,50V
52806-1810 (18pin)

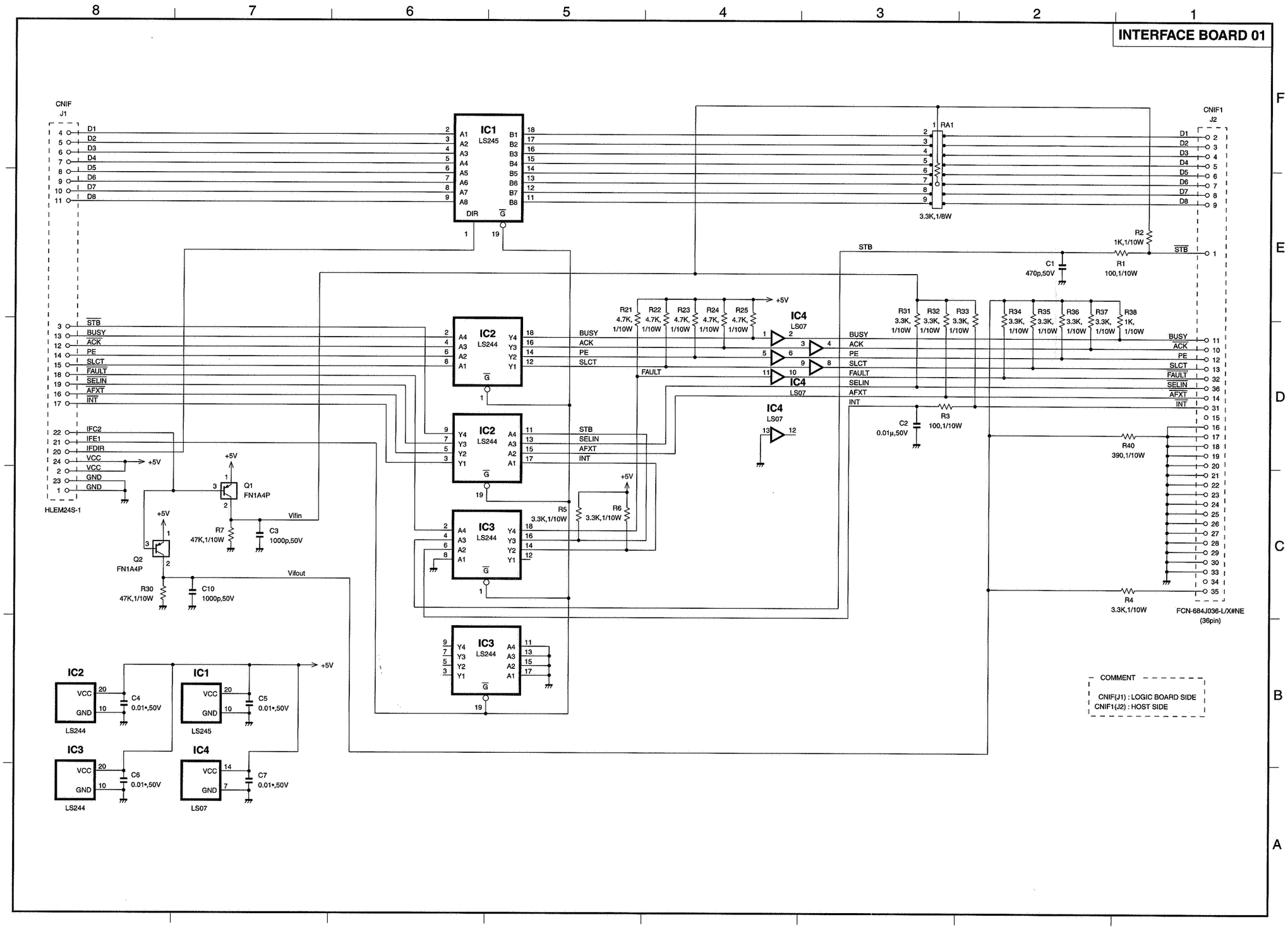
## LOGIC BOARD 05

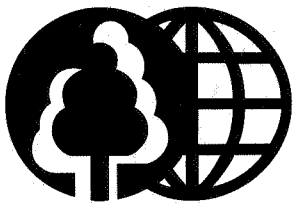


### 7.2.2 Panel board



### 7.2.3 Interface board





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