TEC

TEC Thermal Printer

B-570 SERIES

Service Manual

Document No. **EM0-33013A**

Original **Nov., 1993**
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TOKYO ELECTRIC CO., LTD.

PRINTED IN JAPAN

Precaution

This service manual, intended for field engineers and technicians, is designed as a guide for maintenance, service and repair of TEC Thermal Printers on the market.

The following related manuals contain additional information on using the B-570 Series.

Please refer to the detail information for specific purposes. (For instance, please read carefully the supply manual when media or ribbon is needed.)
They are available from TEC sales headquarters.

- Interface/Communication Manual
- Supply Manual
- Specifications

Safety Summary

Personal safety in handling or maintaining the equipment is extremely important. Warnings and Cautions necessary for safe handling are included in this manual. All warnings and cautions contained in this manual should be read and understood before handling or maintaining the equipment.

Safety Precaution

Energized electrical equipment is dangerous. Electrical shock from energized equipment can cause death. Never work on energized equipment unless authorized to do so by a responsible authority.
If emergency work on energized equipment is authorized, be sure that it is accomplished in strict compliance with approved safety regulations.

The following safety precautions will help to ensure proper use of the printer:

- Turn off the printer before opening the top for any reason.
- Unplug the printer whenever you are working inside the printer.
- Keep your work environment static free.

TEC

TEC Thermal Printer

B-570 SERIES

Owner's Manual

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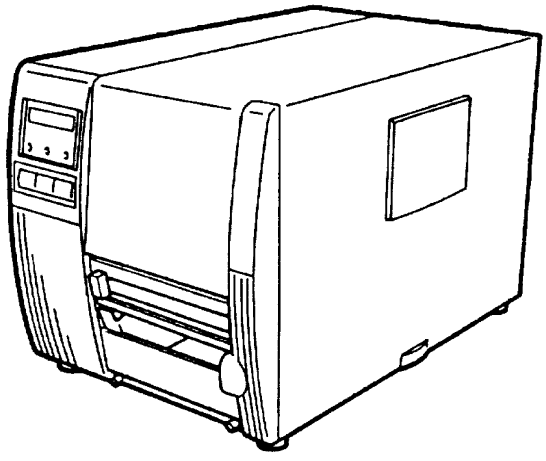

TEC CORPORATION

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CAUTION:

1. *This manual may not be copied in whole or in part without prior written permission of TEC.*
2. *The contents of this manual may be changed without notification.*
3. *Please refer to your local Authorized Service representative with regard to any queries you may have in this manual.*

1. INTRODUCTION

Thank you for choosing the TEC B-570 Series thermal/transfer printer. This new generation high performance/quality printer is equipped with the latest hardware including the newly developed high density (12 dot/mm, 306 dot/inch) near edge print head. This will allow very clear print at a maximum speed of 203.2 mm/sec. (8 inch/sec.). Other standard features include an automatic ribbon saver, a built-in rewinder/strip mechanism and an internal media supply spool. Combine this with an optional high speed P.C. interface board which allows vastly reduced graphic data transfer times and you have a printer to suit a variety of applications and environments.

This manual contains general set-up and maintenance information and should be read carefully to help gain maximum performance and life from your printer. For most queries please refer to this manual and keep it safe for future reference.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operations of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. (for USA only)

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

"This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations."

"Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada."

(for CANADA only)

CAUTION

To avoid injury, be careful not to catch or jam your fingers while opening or closing the cover.

CAUTION

Do not touch moving parts. To reduce the risk that fingers, jewelry, clothing, etc., be drawn into the moving parts, push the switch in the "OFF" position to stop movement.

Safety Summary

Personal safety in handling or maintaining the equipment is extremely important. Warnings and Cautions necessary for safe handling are included in this manual. All warnings and cautions contained in this manual and written inside or outside of the printer should be read and understood before handling or maintaining the equipment.

Do not attempt to effect repairs to this equipment. If a fault occurs that cannot be rectified using the procedures described in this manual, turn off the power, unplug the machine, then contact your authorised TEC representative for assistance.

Safety Precautions

This Owner's Manual and the products (machines) which you have purchased contain indications which should be observed in order to use the machines safely and prevent harm to yourself and others and damage to property. The meanings of these indications and symbols are given below.
Read these indications and become familiar with their contents before reading this Owner's Manual.

The following safety precaution will help to ensure proper use of the printer.

- Unplug the printer whenever you are working inside the printer.
- Keep your work environment static free.

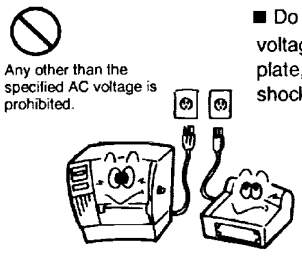
Meanings of Each Symbol

This symbol indicates warning items (including cautions).
Specific warning contents are drawn inside the △symbol.
(The symbol on the left indicates a general caution.)

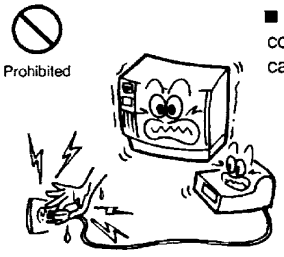
This symbol indicates prohibited actions (prohibited items).
Specific prohibited contents are drawn inside or near the ⃠ symbol.
(The symbol on the left indicates "no disassembling".)

This symbol indicates actions which must be performed.
Specific instructions are drawn inside or near the ● symbol.
(The symbol on the left indicates "disconnect the power cord plug from the outlet".)

WARNING This indicates that there is the risk of **death** or **serious injury** if the machines are improperly handled contrary to this indication.



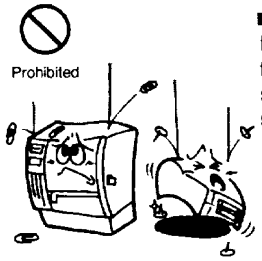
■ Do not use voltages other than the voltage (AC) specified on the rating plate, as this may cause fire or electric shock.



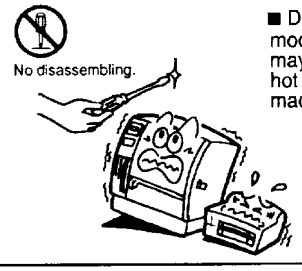
■ Do not plug in or unplug the power cord plug with wet hands as this may cause **electric shock**.

■ If the machines share the same outlet with any other electrical appliances which consume large amounts of power, the voltage will fluctuate widely each time these appliances operate. Be sure to provide an exclusive outlet for the machine as this may cause the machines to **malfunction**.

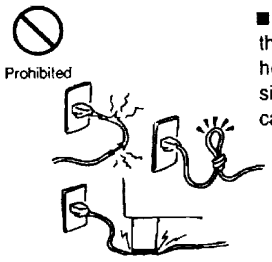
■ Do not place metal objects or water-filled containers such as flower vases, flower pots or mugs, etc. on top of the machines. If metal objects or spilled liquid enter the machines, this may cause **fire** or **electric shock**.



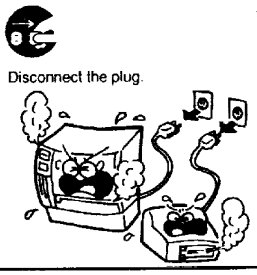
■ Do not insert or drop metal, flammable or other foreign objects into the machines through the ventilation slits, as this may cause **fire** or **electric shock**.



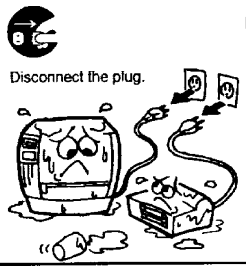
■ Do not remove covers, repair or modify the machine by yourself. You may be **injured** by high voltage, very hot parts or sharp edges inside the machine.



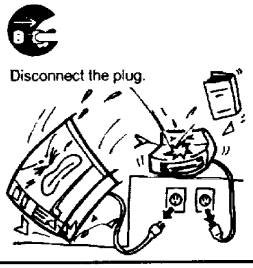
■ Do not scratch, damage or modify the power cords. Also, do not place heavy objects on, pull on, or excessively bend the cords, as this may cause **fire** or **electrical shock**.



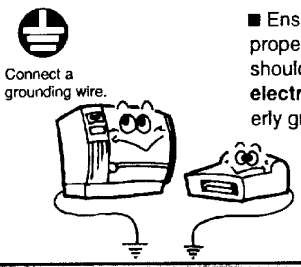
■ Continued use of the machines in an abnormal condition such as when the machines are producing smoke or strange smells may cause **fire** or **electric shock**. In these cases, immediately turn off the power switches and disconnect the power cord plugs from the outlet. Then, contact your sales agent (or maintenance and service agent).



■ If foreign objects (metal fragments, water, liquids) enter the machines, first turn off the power switches and disconnect the power cord plugs from the outlet, and the contact your sales agent (or maintenance and service agent). Continued use of the machine in that condition may cause **fire** or **electric shock.**

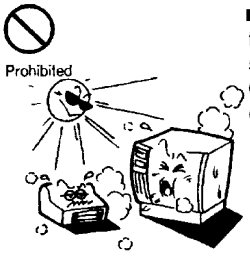


■ If the machines are dropped or their cabinets damaged, first turn off the power switches and disconnect the power cord plugs from the outlet, and the contact your sales agent (or maintenance and service agent). Continued use of the machine in that condition may cause **fire** or **electric shock**.

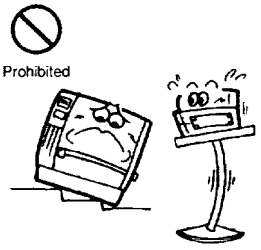


■ Ensure that the equipment is properly grounded. Extension cables should also be grounded. **Fire** or **electric shock** can occur on improperly grounded equipment.

CAUTION This indicates that there is the risk of personal **injury** or **damage** to objects if the machines are improperly handled contrary to this indication.

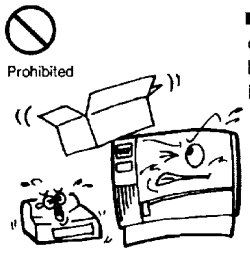


■ Do not install the machines where they might be exposed to direct sunlight, high humidity, or dust. Otherwise **fire** or **electric shock** could occur.

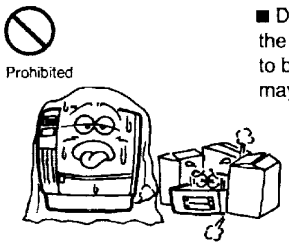


[Precautions During Installation]

■ Do not place the machines on unstable or slanted surfaces, as they may drop or fall and cause **injury**.

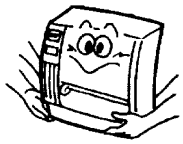


■ Do not place heavy objects on top of the machines, as these items may become unbalanced and fall causing **injury**.



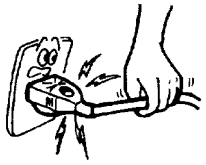
■ Do not block the ventilation slits of the machines, as this will cause heat to build up inside the machines and may cause **fire**.

Caution



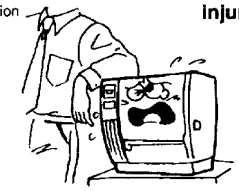
■ Be sure to move large scale machines with two or more people. In addition, machines should be mobed after first confirming that connecting wires between machines and externally connected wires, etc. have been removed. Failure to observe these precautions may result in **injury**.

Disconnect the plug.



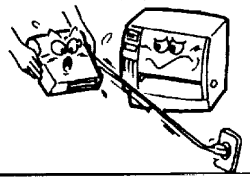
■ When unplugging the power cords, be sure to hold and pull on the plug portion. Pulling on the cord portion may cut or expose the internal wires and cause **fire** or **electric shock**.

Caution



■ Do not lean against the machine. It may fall on you and could cause **injury**.

Disconnect the plug.



[Precautions When Moving the Machines]

■ When moving the machines, be sure to first unplug the power cords. Moving the machines with the power cords plugged in may damage the cords and cause **fire** or **electric shock**.

Precaution

The following precautions will help to ensure that this machine will continue to function correctly.

① Try to avoid locations that have the following adverse conditions:
- * Temperatures below 5°C and above 40°C
- * Direct sunlight
- * Shared power socket
- * Excessive vibration

② The cover should be cleaned by wiping with a dry cloth or a cloth slightly dampened with a mild detergent solution. NEVER USE THINNER OR ANY OTHER VOLATILE SOLVENT on the plastic covers.

③ USE ONLY TEC SPECIFIED labels, tags and ribbons.

④ DO NOT STORE the labels, tags or ribbons where they might be exposed to direct sunlight, high temperatures, high humidity, dust, or gas.

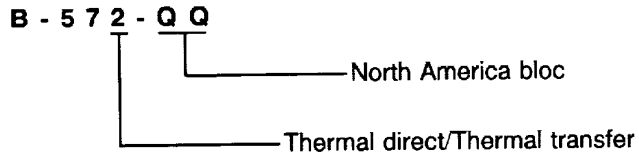
⑤ Ensure the printer is operated on a level surface.

⑥ Any data stored in the memory of the printer could be lost during a printer fault.

1.1 Applicable Model

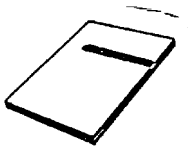
- B-572-QQ

Model name description

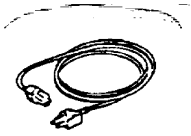


1.2 Accessories

Owner's manual (EM1-33035)

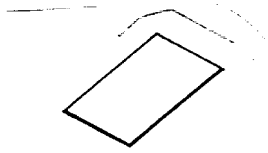


Power cord

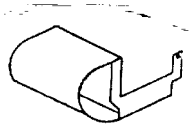


Print head cleaner (24089500013)

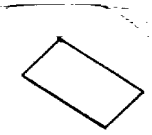
Unpacking procedure



Rewinder guide plate (FMBD0034501)



Quality control report



Screw (SM-4×6B)

2. SPECIFICATIONS

2.1 Printer

Item \ Model	B-570-QQ
Supply voltage	AC 100V ~ 120V +10%, –15%, 50/60Hz + 2Hz, –2Hz
Power consumption	2A, 198W maximum (standby: 500mA, 51W maximum)
Operating temperature range	5°C ~ 40°C
Relative humidity	25% ~ 85%RH (no condensation)
Print head	Thermal print head 12 dots per mm (306 dots per inch)
Printing methods	Thermal direct or Thermal transfer
Print speeds	76.2 mm/sec. (3 inch/sec.), 127 mm/sec. (5 inch/sec.), 203.2 mm/sec. (8 inch/sec.)
Maximum print width	127.5 mm (5.02 inches)
Dispensing modes	Batch (Continuous), Strip (On-demand) and Cut modes (Cut mode is only available when optional cutter is fitted.)
Message display	20 characters × 1 line
Dimensions	291 mm (width) × 460 mm (depth) × 308 mm (height)
Weight	19 kg (without media and ribbon)
Available bar-code types	JAN8, JAN13, EAN8, EAN8 + 2digits, EAN8 + 5digits EAN13, EAN13 + 2digits, EAN13 + 5digits UPC-E, UPC-E + 2digits, UPC-E + 5digits UPC-A, UPC-A + 2digits, UPC-A + 5digits MSI, ITF, NW-7, CODE39, CODE93, CODE128, EAN128 PDF417, DATA MATRIX, Industrial 2 to 5
Fonts	Times Roman (6 sizes), Helvetica (6 sizes), Presentation (1 size), Letter Gothic (1 size), Prestige Elite (2 sizes), Courier (2 sizes), OCR (2 types), Writable characters (40types), Outline font (1 type)
Rotations	0°, 90°, 180°, 270°
Standard interfaces	Serial interface (RS-232C) Parallel interface (Centronics) Expansion I/O interface Flash memory card interface
Optional interface	High speed PC interface

2.2 Option

Option Name	Type	Usage
Cutter module	B-4205-QM	A stop and cut swing cutter
High speed PC interface kit	B-4800-PC-QM	This interface kit allows extremely high speed information transfer between the printer and PC.
Fanfold paper guide module	B-4905-FF-QM	This is a paper guide exclusively used for fanfold paper. Attaching it in place of the standard paper guide allows the printer to print on fanfold paper.
Memory module	————	A 512 KB RAM chip which enhances the image handling capability of the printer.
Flash memory card	————	A flash ROM card (1MB) for storing logos, writable characters and printer formats.

2.3 Media

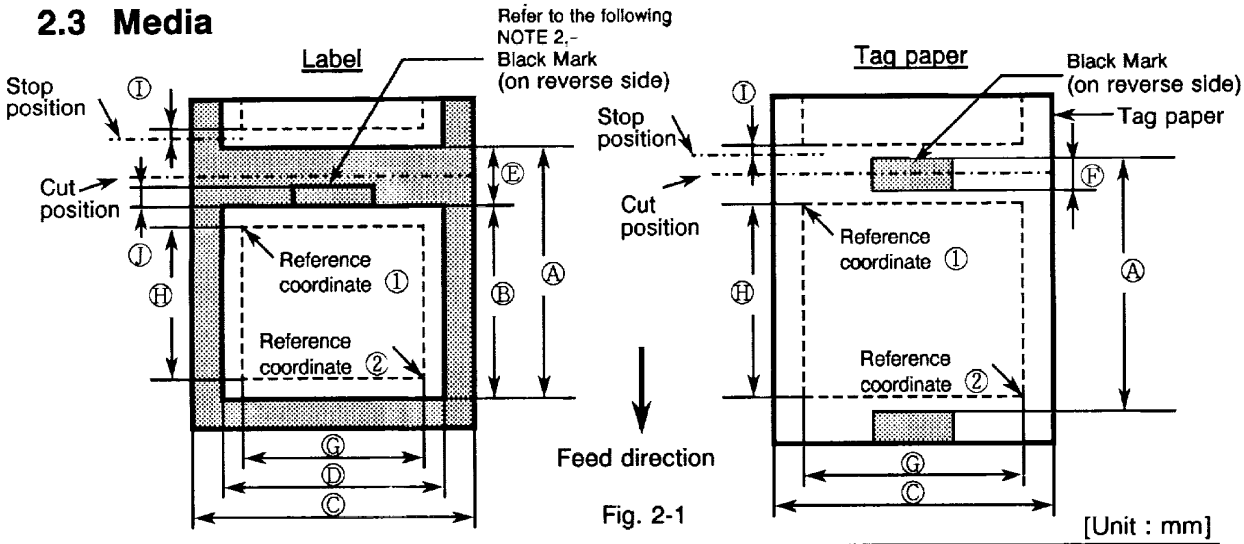


Fig. 2-1

[Unit : mm]

Item \ Label dispensing mode			Batch mode	Strip mode	Cut mode
Ⓐ: Span of one label/tag			10.0 ~ 999.0	25.4 ~ 999.0	Label: 38 ~ 999.0 Tag: 25.4 ~ 999.0
Ⓑ: Label/tag length			8.0 ~ 997.0	23.4 ~ 997.0	25.0 ~ 993.0
Ⓒ: Width including backing paper			50.8 ~ 140.0		
Ⓓ: Label width			47.8 ~ 137.0		
Ⓔ: Gap length			2.0 ~ 20.0	2.0 ~ 20.0	6.0 ~ 20.0
Ⓕ: Black mark length (Tag paper)			2.0 ~ 10.0		
Ⓖ: Effective print width			10.0 ~ 128.0		
Ⓗ: Effective print length	Label	Standard	6.0 ~ 298.6	21.4 ~ 298.6	23.0 ~ 298.6
		Max. memory	6.0 ~ 995.0	21.4 ~ 995.0	23.0 ~ 991.0
	Tag	Standard	8.0 ~ 298.6	23.4 ~ 298.6	23.4 ~ 298.6
		Max. memory	8.0 ~ 997.0	23.4 ~ 997.0	23.4 ~ 997.0
Ⓘ: Print speed up/slow down area			1.0		
Ⓙ: Black mark length (Label)			Refer to the following NOTE 2.		
Maximum effective length for on the fly issue		Standard	149.3		
		Max. memory	661.3		
Outer roll diameter			Ø200 Max.		
Thickness	Label		0.13 ~ 0.17		
	Tag		0.15 ~ 0.29		

NOTES: *1. The media specification other than above are unchanged.*
2. When marking black marks on label rolls, the following requirements must be satisfied.
When the gap length is less than 4 mm:
The black mark length should be longer than the gap length.
When the gap length is 4 mm or more:
The black mark should not overlap the gap for more than 4 mm and the following label.

2.4 Ribbon

Type	Spool type
Width	68 mm~134 mm
Length	600 m
Outer diameter	Ø90 mm (max.)

NOTES: *1. "On the fly issue" means that the printer can draw and print without stopping between labels.*
2. To ensure print quality and print head life use only TEC specified media and ribbons.
3. When using the cutter ensure that label length Ⓑ plus inter label gap length Ⓔ exceeds 35 mm. (i.e. label pitch should be greater than 35 mm.)
4. When rewinding the media onto the take-up spool in batch mode, the max. outer roll diameter should be 180 mm.
5. Use of rough media for the ribbon saving issue may cause ribbon smudges.

3. OVERVIEW

3.1 Front/Rear View

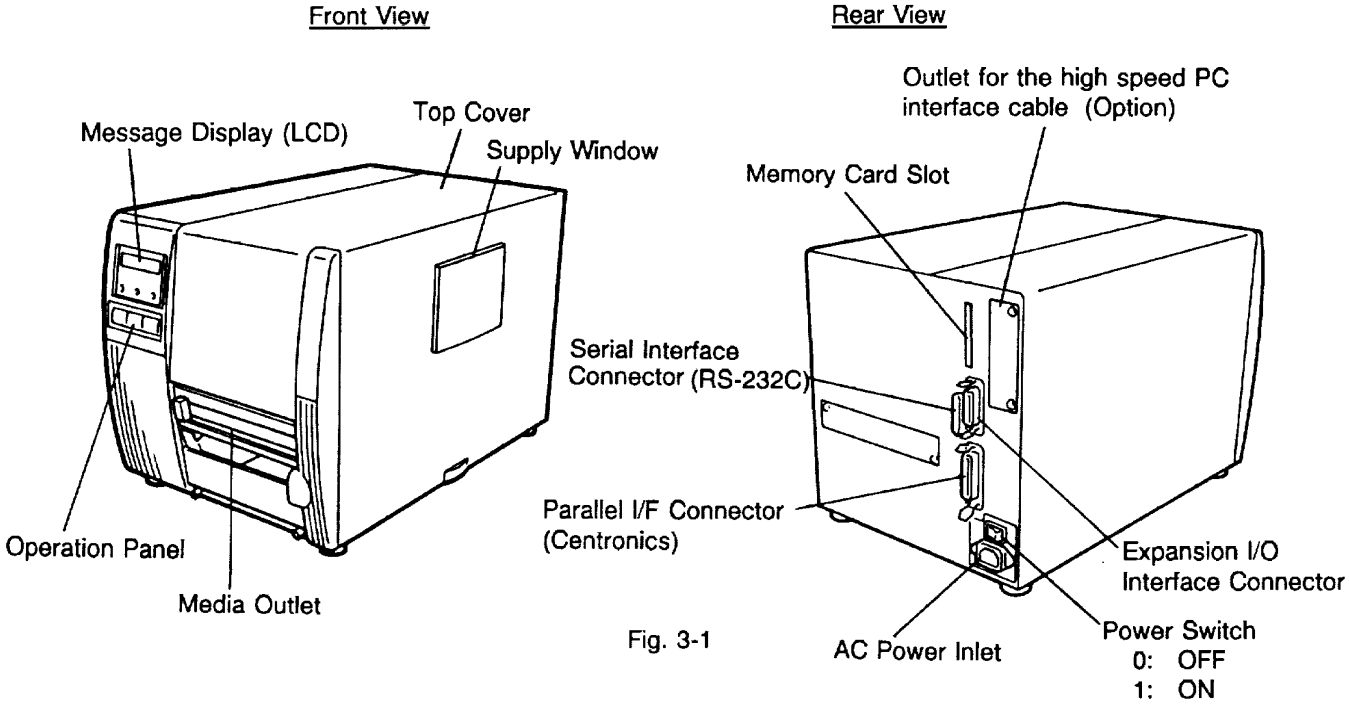


Fig. 3-1

3.2 Operation Panel

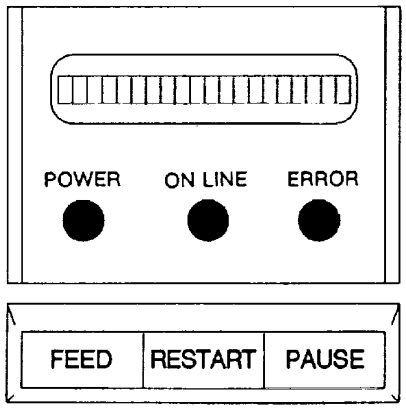


Fig. 3-2

MESSAGE DISPLAY (LCD)
Displays messages in the language selected by DIP switch. When power is turned on and it is ready to print, "ON LINE" is displayed.

POWER LED (Green)
Lights when the power is turned on.

ON-LINE LED (Green)
1) Flashes when communicating with a host computer.
2) On while printing.

ERROR LED (Red)
Lights when a communication error occurs, when the media/ ribbon ends or the printer does not operate correctly.

FEED Key
Feeds paper.

RESTART Key
Resets the printer when paused or when an error occurs. Used to set the threshold. (Refer to page 10-4)

PAUSE Key
Pauses printing.
Message display shows "PAUSE"and an unprinted count.
Used to set the threshold. (Refer to page 10-4)

4. DIP SWITCH FUNCTIONS

The DIP switches are located to the right of the supply shaft.

WARNING:
*Turn the **POWER OFF** before switching the functions.*

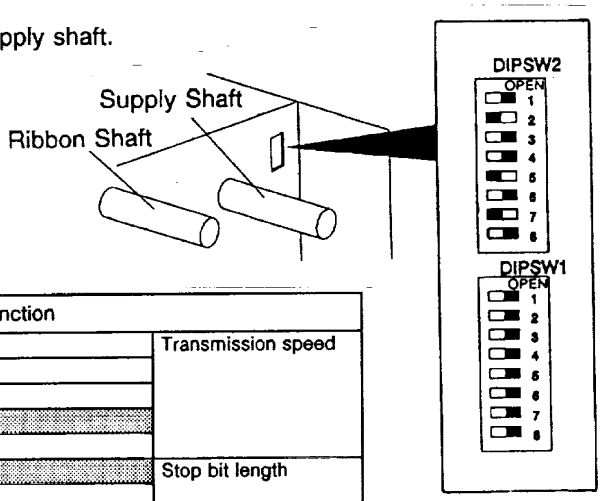


Fig. 4-1

(1) DIP SW 2

No.	ON/OFF		Function	
1	1	2		Transmission speed
	OFF	OFF	2400BPS	
	ON	OFF	4800BPS	
2	**OFF**	**ON**	**9600BPS**	
	ON	ON	19200BPS	
3	**OFF**		**1 bit**	Stop bit length
	ON		2 bits	
4	OFF		7 bits	Data length
	ON		**8 bits**	
5	**OFF**		**Without**	Parity check
	ON		With	
6	**OFF**		**EVEN**	Parity check (effective when DIP SW #5 is set to ON.)
	ON		ODD	
7	7	8		Data protocol
	OFF	OFF	XON/XOFF (No XON is output at the power on time.) (No XOFF is output at the power off time.)	
	ON	OFF	READY/BUSY (DTR) (No XON is output at the power on time.) (No XOFF is output at the power off time.)	
8	**OFF**	**ON**	**XON/XOFF + READY/BUSY (XON is output at the power on time.) (XOFF is output at the power off time.)**	
	ON	ON	XON/XOFF (XON is output at the power on time.) (XOFF is output at the power off time.)	

(2) DIP SW 1

No.	ON/OFF			Function	
1	**OFF**			**Without**	Auto ribbon save function
	ON			With	
	2	3	4		Language to display LCD error message
2	**OFF**	**OFF**	**OFF**	**English**	
	ON	OFF	OFF	German	
	OFF	ON	OFF	French	
3	ON	ON	OFF	Dutch	
	OFF	OFF	ON	Spanish	
	ON	OFF	ON	Japanese	
4	OFF	ON	ON	Not used	
	ON	ON	ON	Not used	
5	**OFF**			**Without**	Auto media feed after a cut issue (See page 6-4)
	ON			With	
6	**OFF**			**Without**	Use of the built-in rewinder/Head up function in cut mode Refer to Note 2.
	ON			With	
7	**OFF**			**Must be set to OFF.**	
	ON				
8	**OFF**			**Must be set to OFF.**	
	ON				

NOTES: *1. The shaded settings are the factory default settings. "OFF" means "OPEN".*
2. The Dip switch #1-6 functions in accordance with equipment to be used.

5. INSTALLING THE PRINTER

Connecting the Power Cord and Cables

WARNING:
*Turn the **POWER SWITCH to OFF** before connecting the power cord or cables.*

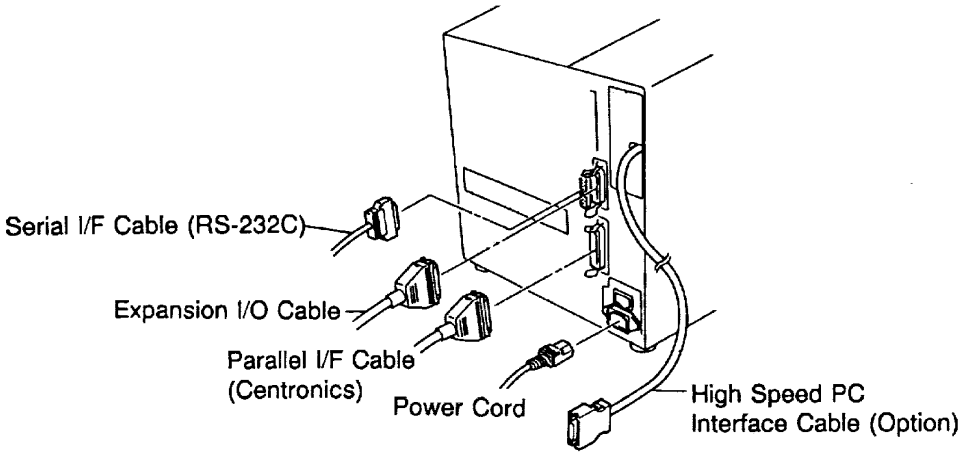


Fig. 5-1

6. LOADING THE MEDIA

The printer prints both labels and tags.

1. Turn off the power and open the top cover.
2. Turn the head lever to position ③, then release the ribbon shaft holder plate.

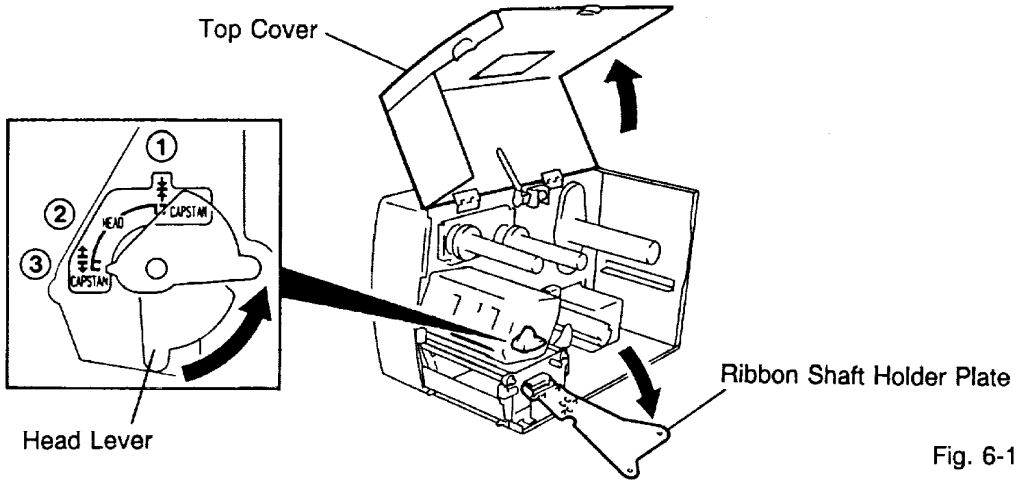


Fig. 6-1

NOTES: *1. When the head lever is turned to position ②, the print head is raised.*
2. When the head lever is turned to position ③ ⇞, the print head and the pinch roller are raised.
3. To allow printing the head lever must be set to position ① ⇞. (This ensures that the print head and the pinch roller are closed.)

3. Untape the supply holder.
4. Turn the outside supply holder 30 degrees and remove from the supply shaft.

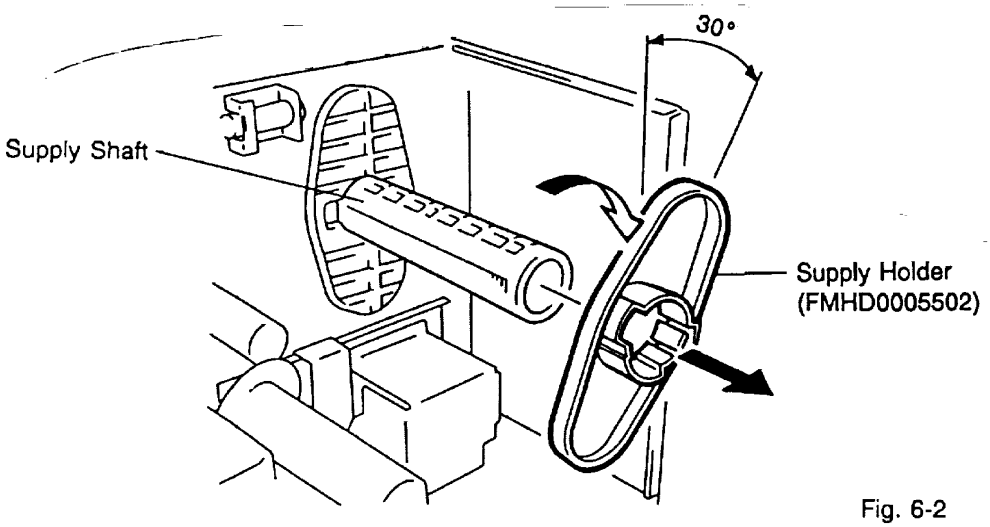


Fig. 6-2

NOTE: *Set the inside supply holder to the scale on the shaft according to media to be used.*

5. Put the media on the supply shaft.
6. Pass the media around the damper, then pull the media towards the front of the printer. Fix the remaining supply holder to the supply shaft with the pinchers facing away from the printer.

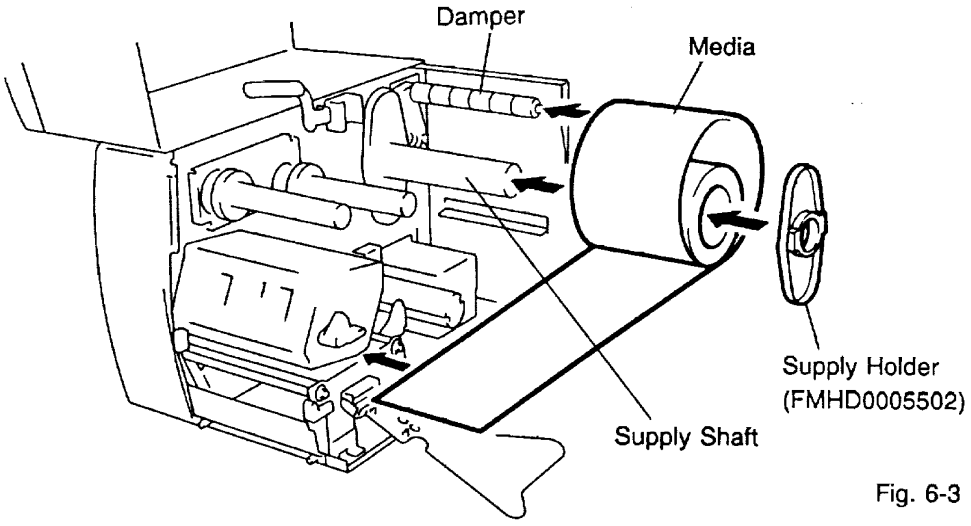


Fig. 6-3

7. Insert the media into the paper holders of the media guide, adjust the media guides to the media width, and tighten the locking screw.
8. Check that the media path through the printer is straight. The media should be centered under the print head.

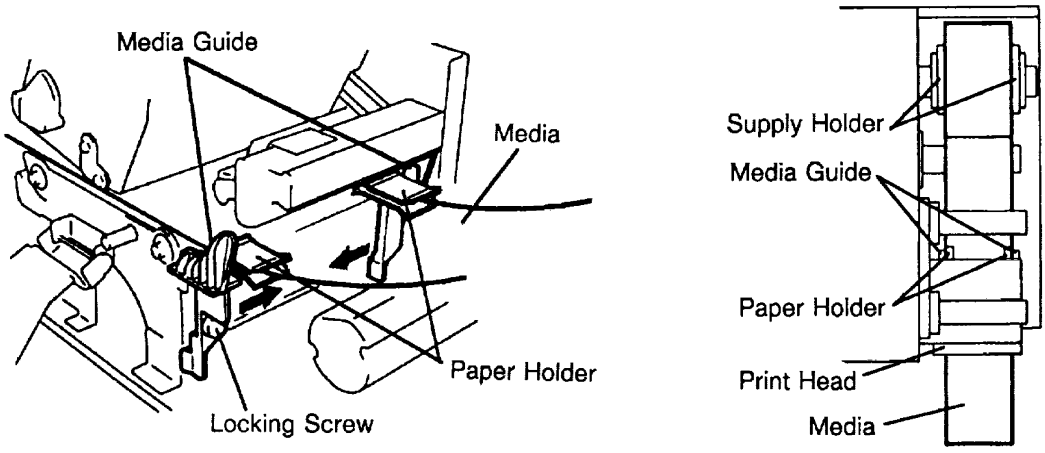


Fig. 6-4

NOTE: *When using the label rolled with labels facing outside, please remove the upper plates of both paper holders using the following procedure. Failure to do this may cause a paper jam error.*
If you have any questions, please contact your nearest TEC service representative.

■ Removing the paper holders' upper plates from the media guide

① Remove the two T-4×8 screws to detach the media guide from the printer.

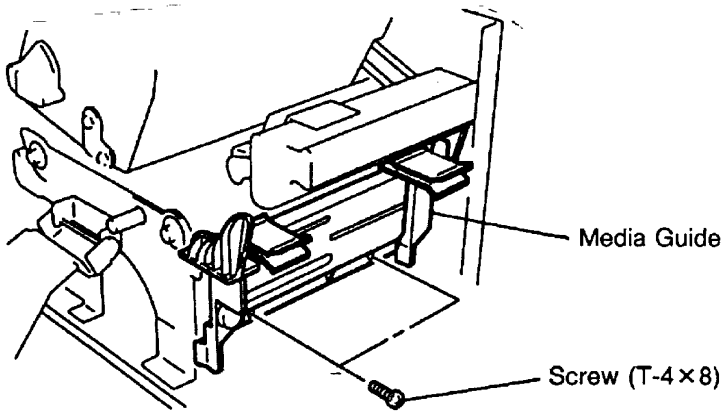


Fig. 6-5

② Remove the SM-3×6 screw or the SM-3×8 screw to detach the paper holders' upper plates from the media guide.

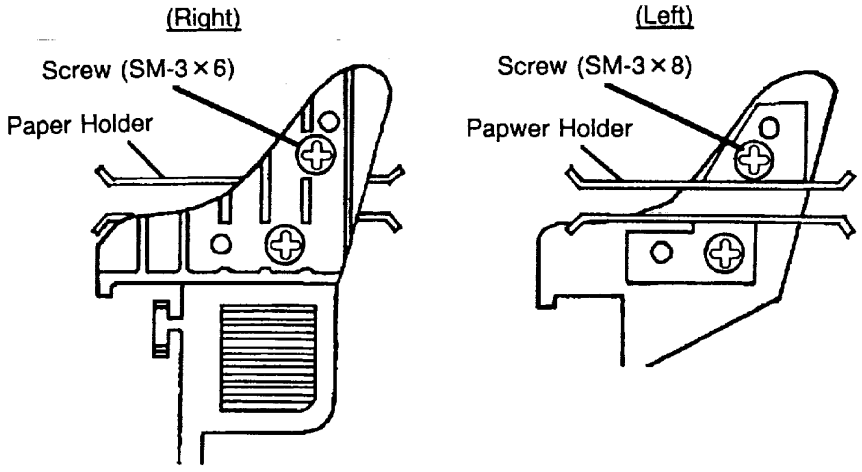


Fig. 6-6

③ Attach the media guide back in position.

NOTE: *Do not lose the removed upper plates because they are required when using the label rolled with labels facing inside.*

9. Set the black mark/feed gap sensor to the correct position by turning the adjusting knob. Turning the knob right will move the sensor towards the center of the media while turning left will move it away from the center of the media.

■ An easy way to set the black mark sensor position

① Pull the media about 500 mm out of the front of the printer, turn the media back on it's self and feed it under the print head past the sensor so that the black mark can be seen from above.

② Adjust the sensor position to that of the black mark (the upper hole indicates the position of the black mark sensor).

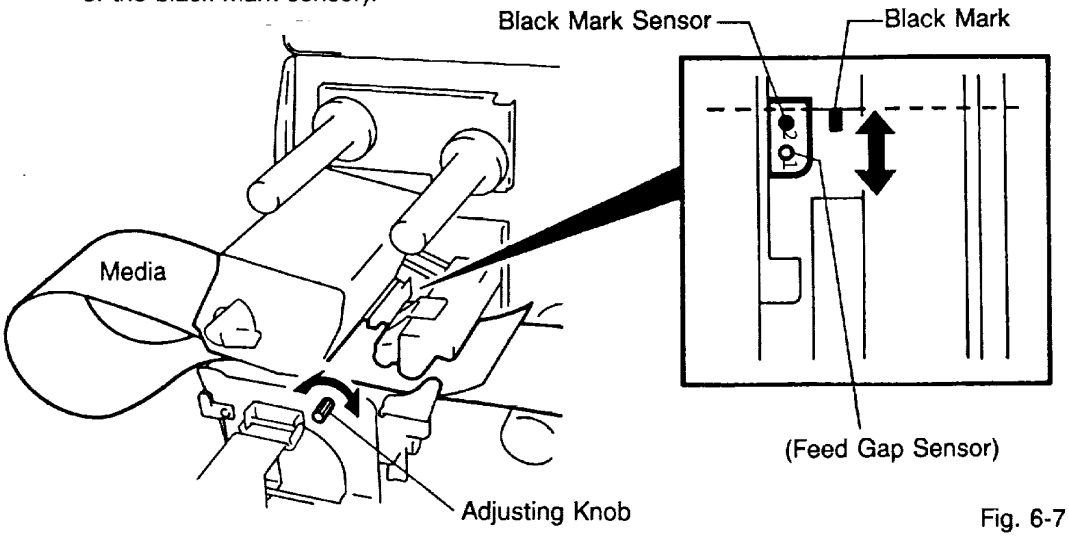


Fig. 6-7

NOTE: *Make sure to set the sensor to detect the center of the black mark, otherwise a paper jam error could occur.*

■ Setting the feed gap sensor position

① Adjust the sensor to detect on the gap (the lower hole indicates the position of the feed gap sensor.)

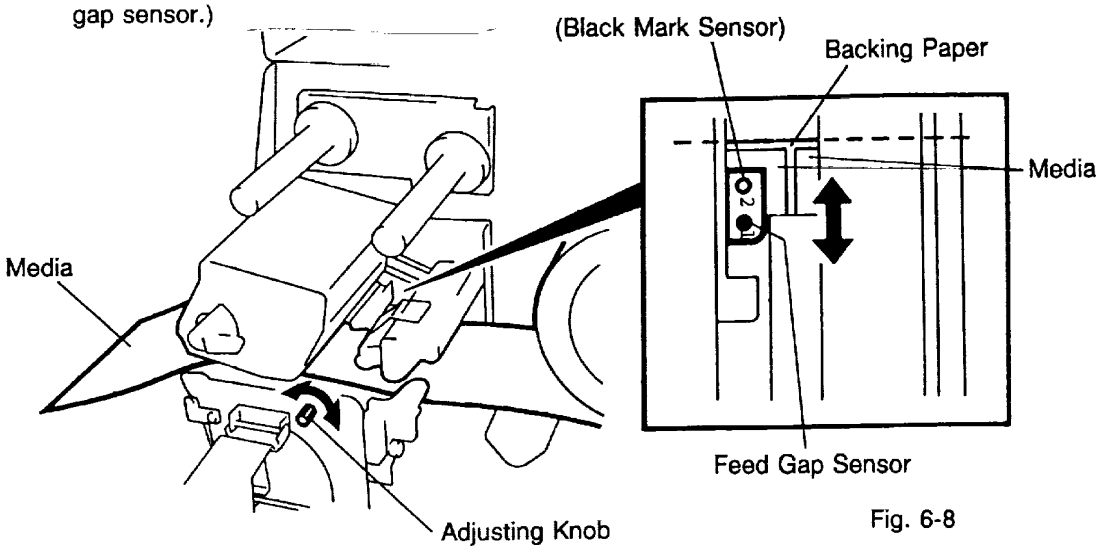


Fig. 6-8

10. The media is now loaded and the sensor position is set.

Batch type:

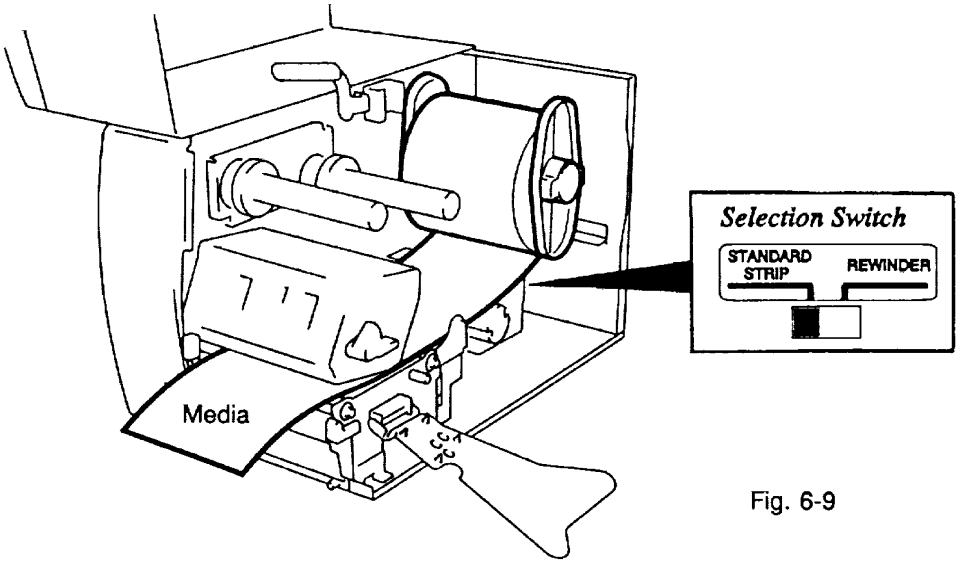


Fig. 6-9

NOTE: *Set the selection switch to the STANDARD/STRIP position. Improper setting can affect the print quality.*

Strip type:

① Remove enough labels from the leading edge media to leave 500 mm of backing paper exposed.

② Wind the backing paper onto the take-up spool and fix in position with the take-up clip. (Wind the paper counter clockwise around the spool as this is the direction it rotates.)

③ Rotate the take-up spool anti-clockwise a few times to take up any slack in the backing paper.

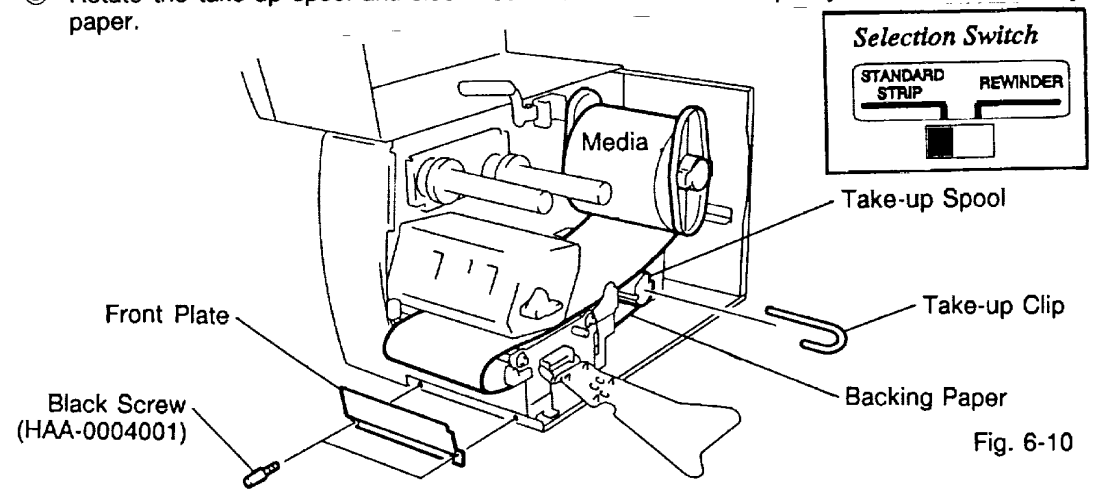


Fig. 6-10

NOTES: *1. The backing paper is easier to feed back to the take-up spool if the front plate is removed.*

2. When fitting the take-up clip the longer side of the clip should be fitted into the shallow groove on the take-up spool.

3. Set the selection switch to the STANDARD/STRIP position.

Cutter type: Where a cutter is fitted load the media as standard and feed it through the cutter module.

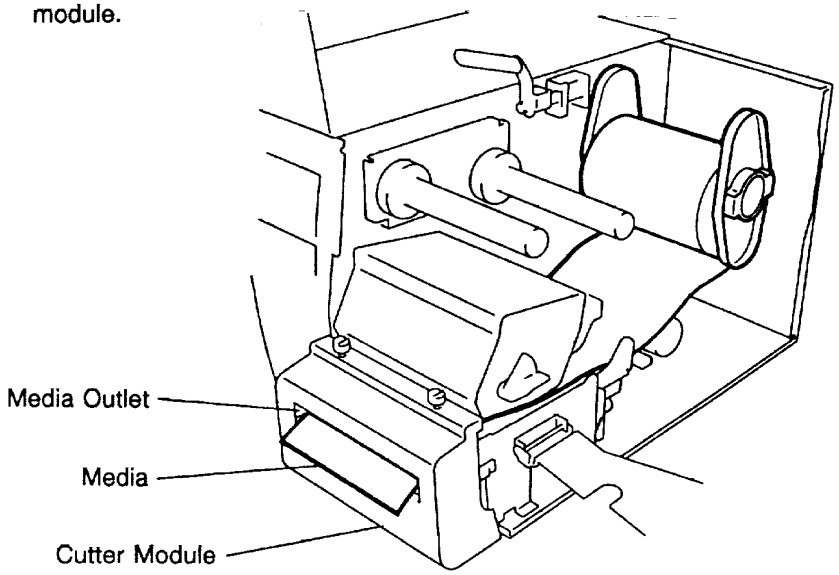


Fig. 6-11

NOTES: *1. Be sure to cut the backing paper of label. Cutting label will cause the glue to stick to the cutter, which may affect the cutter quality and shorten the cutter life.*

2. If the top edge of label winds onto the platen in cut issue, set the DIP SW 1-5 to ON.

3. For the cutter type, the selection switch can be set to either position.

Built-in rewinder type:

① Remove two black screws and front cover.

② Fit the rewinder guide plate to the strip shaft, then attach it with the sems screws.

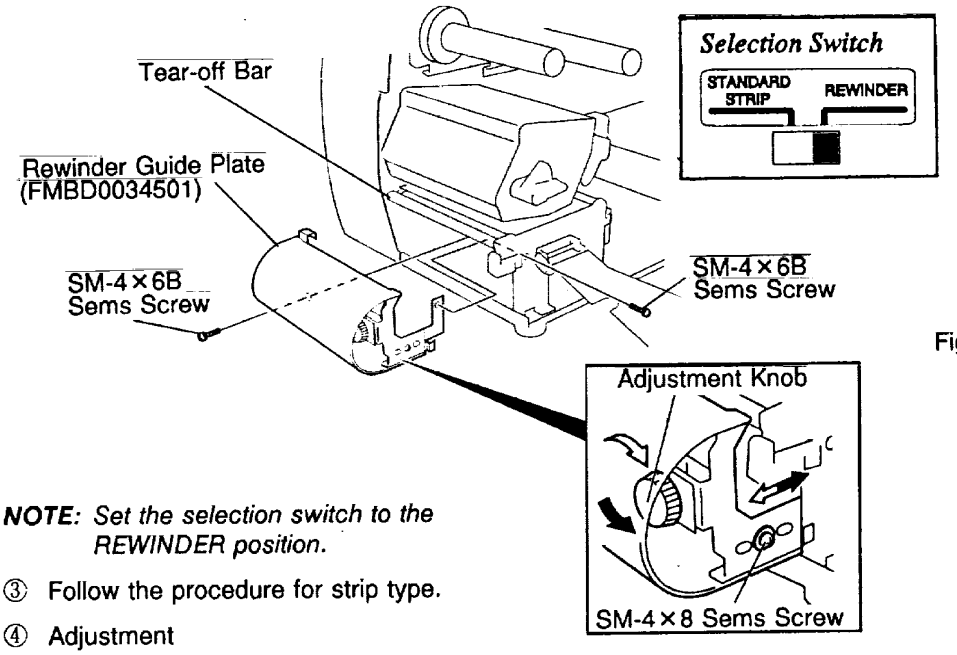


Fig. 6-12

NOTE: *Set the selection switch to the REWINDER position.*

③ Follow the procedure for strip type.

④ Adjustment

If the label skews when using built-in rewinder unit, turn the adjustment knob of the rewinder guide plate to correct the label feed. Clockwise turn moves the rewinder guide plate forward and counterclockwise moves it backward.

* When labels skew to the right:

  Loosen the SM-4×8 sems screw with a phillips-head screw driver. Turn the adjustment knob clockwise, and tighten the SM-4×8 screw when the rewinder guide plate is positioned correctly.

* When labels skew to the left:

  Loosen the SM-4×8 screw with a phillips-head screw driver. Turn the adjustment knob counterclockwise, and tighten the SM-4×8 screw when the rewinder guide plate is positioned correctly.

7. LOADING THE RIBBON

There are two types of media available for printing on, these are standard media and direct thermal media (a chemically treated surface). **DO NOT LOAD** a ribbon when using a direct thermal media.

1. When using a narrow width ribbon, slide the ribbon stoppers along the shafts to a position where the ribbon will be centered when it is fitted. When changing from a narrow width to a wider one rotate the ribbon stoppers by 90°, push them back to the correct position and then rotate back to lock.

NOTE: *When attaching the ribbon stoppers, fit them to the shafts with the pinchers facing into the printer.*

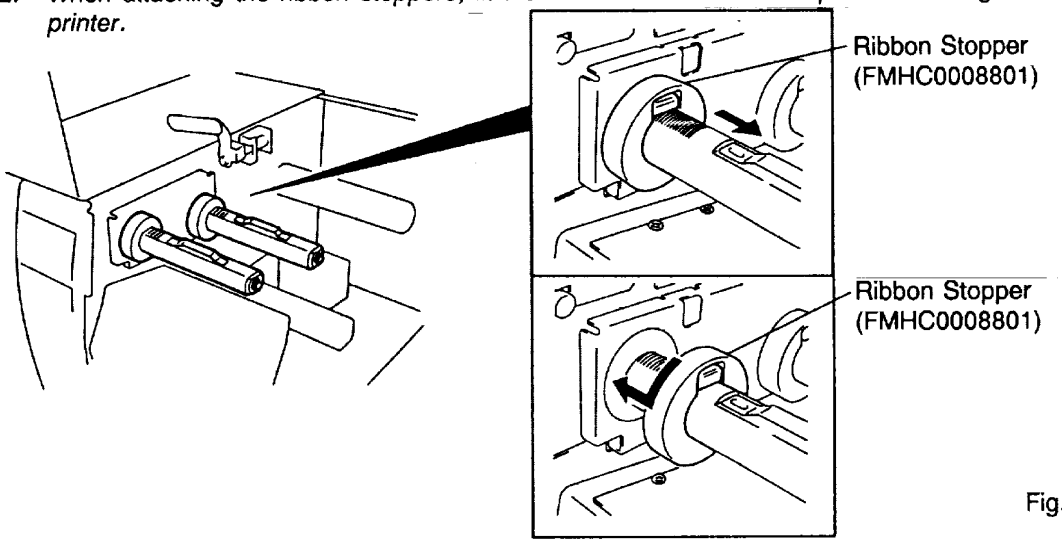


Fig. 7-1

2. Leaving plenty of slack between the spools, fit the ribbon as shown below. When the ribbon is fitted it must be positioned over the ribbon sensor.
3. Wind both shafts towards each other to tighten the ribbon.

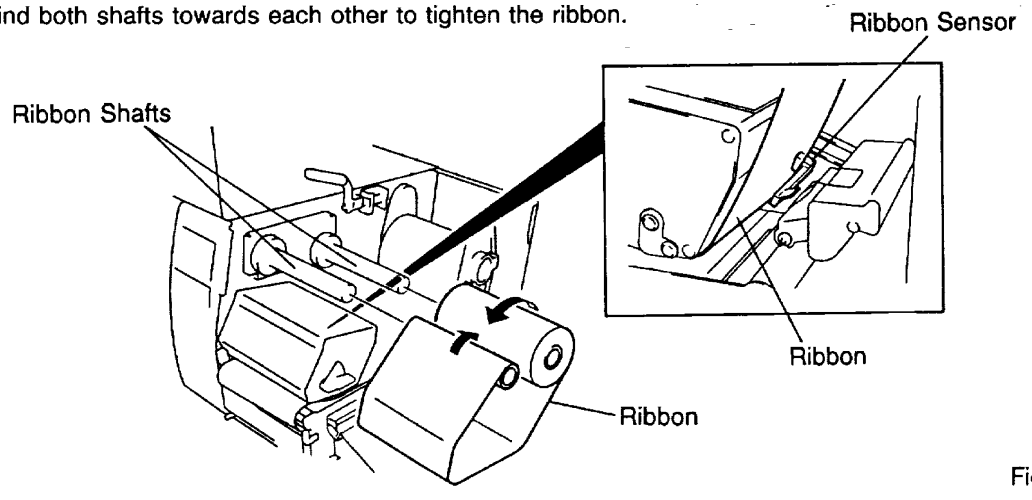


Fig. 7-2

4. Reset the ribbon shaft holder plate by aligning it with the ribbon shaft.
5. Turn the head lever clockwise to lower the print head.
6. Close the top cover.

8. INSERTING THE OPTIONAL FLASH MEMORY CARD

8. INSERTING THE OPTIONAL FLASH MEMORY CARD

WARNING:
*Turn the power **OFF** when inserting or removing the flash memory card.*

CAUTION:
To protect memory cards, discharge static electricity from your body by touching the printer rear cover prior to touching the memory cards.

1. Turn the power off.
2. Insert the flash memory card into the memory card slot on the rear of the printer.
3. Turn the power on.

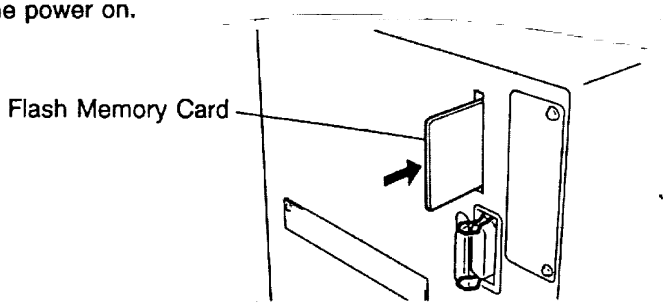


Fig. 8-1

NOTES:
1. *Be sure to protect a flash memory card when not in use in the printer by putting it in it's protective cover.*
2. *Do not subject the card to any shocks or excessive forces.*
3. *Do not expose the card to extremes of heat by either storing in direct sunlight or close to a heater.*
4. *Do not expose the card to excessive humidity by wiping it with a wet cloth or storing it in a damp place.*
5. *Before inserting or removing the card, make sure that the power switch is turned off.*

9. CARE/HANDLING OF THE MEDIA AND RIBBON

9. CARE/HANDLING OF THE MEDIA AND RIBBON

> ***CAUTION :***
> *Be sure to read carefully and understand the Supply Manual. Use only media and ribbon which meet specified requirements. Use of non-specified media and ribbon may shorten the head life and result in problems with bar code readability or print quality. All media and ribbon should be handled with care to avoid any damage to the media, ribbon or printer. Read the following guideline carefully.*

- Do not store the media and ribbon for longer than the manufactures recommended shelf life.
- Store media rolls on the flat end, do not store them on the curved sides as this might flatten that side causing erratic media advance and poor print quality.
- Store the media in plastic bags and always reseal after opening. Unprotected media can get dirty and the extra abrasion from the dust and dirt particles will shorten the print head life.
- Store the media and ribbon in a cool, dry place. Avoid areas where they would be exposed to direct sunlight, high temperature, high humidity, dust or gas.
- The thermal paper used for direct thermal printing must not have the specifications which exceed Na^+ 800 ppm, K^+ 250 ppm and CL^- 500 ppm.
- Some ink used on pre-printed labels may contain ingredients which shorten the print head's product life. Do not use labels pre-printed with ink which contain hard substances such as carbonic calcium ($CaCO_3$) and kaolin (Al_2O_3, $2SiO_2$, $2H_2O$).

For further information please contact your local distributor or your media and ribbon manufacturer.

10. GENERAL MAINTENANCE

10.1 Cleaning

To help retain the high quality and performance of your printer it should be regularly cleaned. The greater the usage of the printer, the more frequent the cleaning. (i.e. low usage = weekly : high usage = daily).

1. Turn the power off.
2. Open the top cover.
3. Turn the head lever to raise the print head.
4. Remove the ribbon and media.
5. Clean the element of print head with print head cleaner.
6. Wipe the platen, feed roller and pinch roller with a cleaner moistened with alcohol. Remove dust or foreign substances from the internal part of the printer, if any.

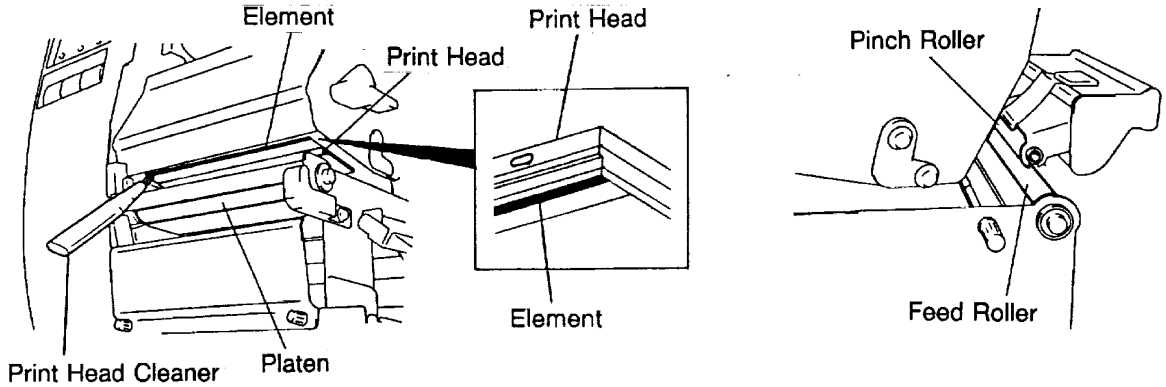


Fig. 10-1

WARNING: *1) Be sure to disconnect the power cord prior to performing any maintenance.*
2) Do not use any tool that may damage the print head.
3) DO NOT POUR WATER directly onto the printer.

10.2 Covers and Panels

The covers should be cleaned by wiping with a dry cloth or a cloth slightly dampened with a mild detergent solution.

NOTE: *Clean printer cover with an electrostatic free cleaner for automated office equipment.*

WARNING: *1) DO NOT POUR WATER directly onto the printer.*
2) DO NOT APPLY cleaner or detergent directly onto any cover or panel.
3) NEVER USE THINNER OR OTHER VOLATILE SOLVENT on the plastic covers.
4) DO NOT clean the panel covers or the supply window with alcohol as it may cause them to discolor, loose their shape or develop structural weakness.

10.3 Removing Jammed Paper

1. Turn the power off.
2. Open the top cover.
3. Turn the head lever to position ③, then release the ribbon shaft holder plate.
4. Remove the black screw to detach the media guide plate. (See Fig. 10-2.)
5. Remove the ribbon and media.
6. Remove the jammed paper. DO NOT USE any sharp implement or tool as these could damage the printer.
7. Clean the print head and platen, then remove any further dust or foreign substances.
8. Place the portion Ⓑ of the media guide plate on the media sensor. Secure the media guide plate with the black screw.

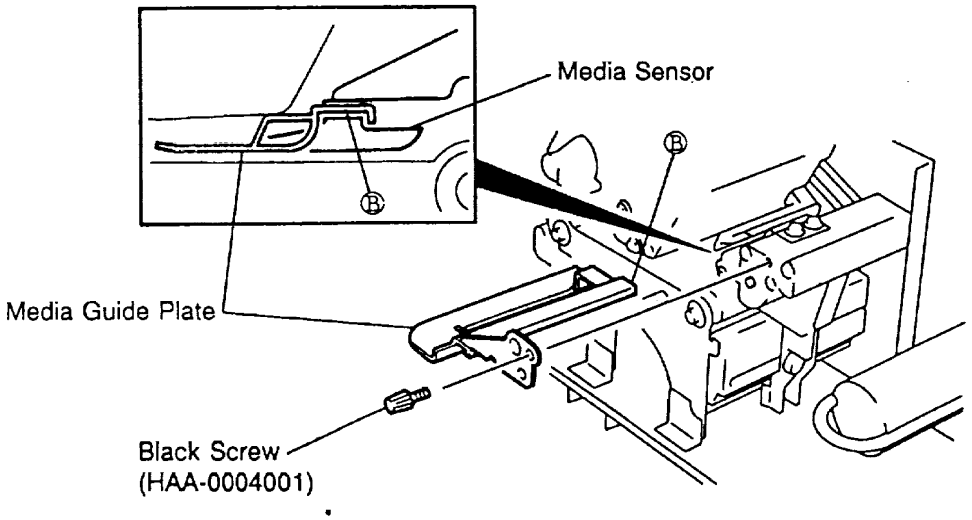


Fig. 10-2

9. Paper jams in the cutter unit can be caused by wear or residual glue from label stock on the cutter. Do not use none specified media in the cutter. If you get frequent jams in the cutter contact your Authorized Service representative.

■ Cleaning the Cutter Unit

> ***WARNING:*** *1) Be sure to turn the power off before cleaning the cutter unit.*
> *2) The cutters are sharp and care should be taken not to injure yourself when cleaning.*

1. Loosen two screws and remove the cutter cover.
2. Remove the white screw and media guide.
3. Remove the jammed paper and trash.
4. Clean the cutter with dry cloth.

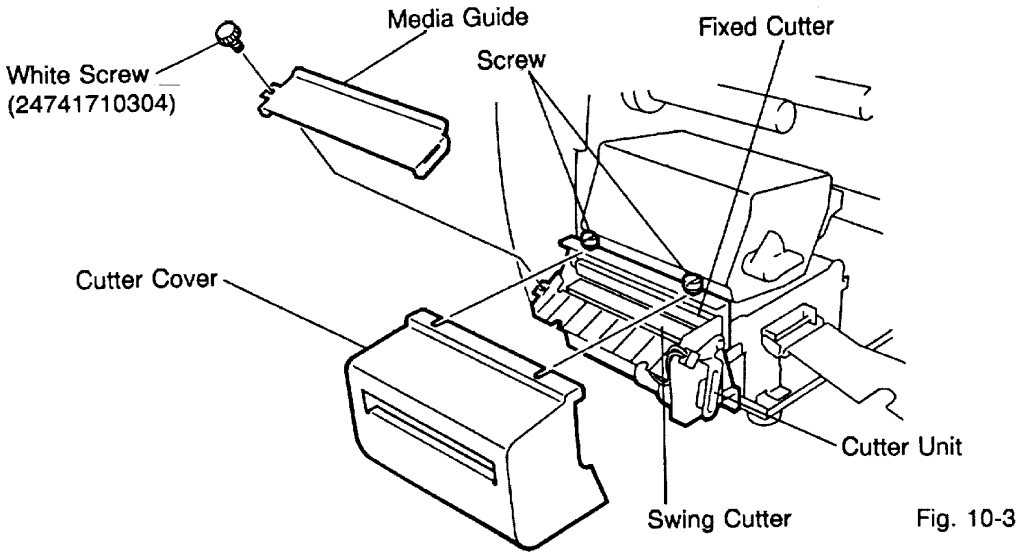


Fig. 10-3

5. Assembling is reverse order of removal.

10.4 Threshold Setting

For the printer to maintain a constant print position it uses the transmissive sensor to detect the gap between labels by measuring the amount of light passing through the media. When the media is pre-printed, the darker (or more dense) inks can interfere with this process causing paper jammed errors. To get around this problem a minimum threshold can be set for the sensor in the following way.

■ Threshold setting procedure

① Turn the power on.

② Load the pre-printed label. (Any position)

③ Press the [PAUSE] key once.

④ Hold down the [PAUSE] key for more than 3 second and when two labels have been issued. When both conditions have been met, release the [PAUSE] key.

⑤ Press the [RESTART] key for ON LINE mode.

⑥ Threshold setting is now completed.

NOTES: *1. If the [PAUSE] key is not held down for more than 3 seconds in PAUSE mode the threshold will not be set.*

2. If the [PAUSE] key is released before 2 labels have been issued the setting may not be correct and will have to be re-set.

■ Auto Ribbon Saving Mode

Auto ribbon saving function is activated when it is selected by DIP switch (Refer to page 4-1) and no print area extends more than 20 mm.

NOTE: *According to the relation between the outer diameter of rewound ribbon and print speed, ribbon loss per saving vary as follows:*

Print speed	Ribbon loss
3"/sec.	Approx. 5 mm
5"/sec.	Approx. 8 mm
8"/sec.	Approx. 17 mm

11. TROUBLESHOOTING

WARNING:
If you cannot solve a problem with the following solutions, do not attempt to repair it yourself. Turn the power off, unplug the printer, then contact your Authorized Service representative for assistance.

Error Message	Problem	Solution
PAPER JAM ****	1. The media is not fitted correctly.	1. Re-fit the media correctly. → Press the [RESTART] key.
	2. The media path is jammed and does not feed smoothly.	2. Remove the cause of the jam and replace the media correctly. → Press the [RESTART] key.
	3. The installed media type does not match the selected sensor.	3. Turn the power off then on again. Select the correct sensor. → Feed the media.
	4. The black mark position on the media does not match the sensor position.	4. Adjust the sensor position. → Press the [RESTART] key.
	5. The installed media size is different from the programmed size.	5. Turn the power off then on again. Set the correct media size. → Feed the media.
	6. The feed gap sensor cannot see the difference between the print area and the gap.	6. Set the threshold (see page 10-4). Else Turn the power off and call your Authorized Service representative.
HEAD OPEN ****	Feed or printing has been attempted while the print head is raised.	Lower the print head. → Press the [RESTART] key.
NO PAPER ****	The media has run out.	Load new media. → Press the [RESTART] key.
NO RIBBON ****	The ribbon has run out.	Load a new ribbon. → Press the [RESTART] key.
REWIND FULL ****	Too much backing paper or media is wound on the internal take-up spool.	Remove the backing paper or media from the internal take-up spool. Then press the [RESTART] key.

Error Message	Problem	Solution
EXCESS HEAD TEMP.	The print head is too hot.	Turn the power off and decrease the print head temperature.
HEAD ERROR	This message is displayed when sending the head broken check command ([ESC] HD001 [LF] [NUL]) and the print head has a broken element.	1. Restart the printing by pressing the [RESTART] key. 2. Replace the print head.
RIBBON ERROR ****	There is a fault with the ribbon sensor.	Turn the power off. Contact your Authorized Service representative.
CUTTER ERROR ****	Media is jammed in the cutter.	Remove the jammed media and feed the undamaged media through the cutter. → Press the [RESTART] key. Else Turn the power off and contact your Authorized Service representative.
FLASH WRITE ERROR	An error has occurred when loading data onto a flash memory card.	1. Turn the power off, re-seat the flash memory card and try again. 2. Replace the flash memory card and retry. 3. Turn the power off and contact your Authorized Service representative.
FORMAT ERROR	An error has occurred while formatting a flash memory card.	1. Turn the power off, re-seat the flash memory card and try again. 2. Replace the flash memory card and retry. 3. Turn the power off and contact your Authorized Service representative.
FLASH MEMORY FULL	No more data can be saved in the flash memory card.	Replace the card with a new one. Re-send from the beginning of the unfinished data. (Max. capacity of the card is 1MB)
COMMUNICATION ERROR	A communication error has occurred with the host.	Turn the power off then on again or press the [RESTART] key. Check the program data. → Call your Authorized Service representative if necessary.

Error Message	Problem	Solution
example) PC001 ; 0A00, Command error 0300, 2, 2	When an error is detected in a command 20 bytes of the command are displayed. (ESC, LF, NUL are not displayed.)	Correct the command and re-send it again.
Other Error Message	Hardware or software trouble.	Turn the power off then on again. If the problem still exists turn the power off and contact your Authorized Service representative.
NOTE: *If an error is not cleared by pressing the* [RESTART] *key, the power must be switched off then on again.* *After the power has been switched off and on, all print data in the printer is cleared.* ***** denotes a remaining count of unprinted labels.*		

Problem	Solution
No print.	1. Check that the media and the ribbon is loaded correctly. 2. Check whether the print head is set correctly or not. 3. Check the cabling between the printer and the host.
Dots missing in the print.	Dirty print head. → Clean the print head. Call your Authorized Service representative if necessary.
Unclear (or blurred) printing.	1. Dirty print head. → Clean the print head. 2. Bad or faulty ribbon. → Replace ribbon. 3. Poor media quality. → Change media type.
Power does not come on.	1. Plug power cord into an AC socket. 2. Check the circuit breakers or fuses. 3. Plug another appliance into the AC socket to check if there is power supplied. Call your Authorized Service representative if necessary.
Printer does not cut.	Check for a paper jam in the cutter. Call your Authorized Service representative if necessary.
You see a raised nap where the media has been cut.	1. Clean the cutter blades. 2. The blades are worn. → Call your Authorized Service representative.

TEC
TEC CORPORATION

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E PRINTED IN JAPAN
EM1-33035G

TEC

TEC Thermal Printer

B-570 SERIES

Product Description

Document No. **EM10-33006A**

Original **Nov., 1993**

(Revised **Apr., 1994**)

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TEC CORPORATION

PRINTED IN JAPAN

EM10-33006A
(Rivision Date Apr. 28, '95)

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CAUTION:

1. *This manual may not be copied in whole or in part without prior written permission of TEC.*
2. *The contents of this manual may be changed without notification.*
3. *Please refer to your local Authorized Service representative with regard to any queries you may have in this manual.*

1. OUTLINE OF THE SYSTEM

1.1 FEATURES OF THE B-570 SERIES

1) Various bar codes, characters and graphic data can be printed using both thermal transfer and thermal direct methods.
   This printer can also print writable characters and logos at designated coordinates by using a graphic command.
2) The RS-232C and Centronics are available as standard interfaces between the printer and a PC. In addition, a flash memory card interface for data storage and an expansion interface for connecting external devices except PCs are provided.
3) A 16-bit CPU and a Gate Array equipped with several peripheral LSIs realizes high system performance.
4) With the element positioned at the edge of the print head, print quality is improved because the media passes straight through. No adjustment of media thickness or printing pressure is necessary.

   A high dot density of 12 dots/mm produces a clear print and the heat history control system optimizes applied pulse signal to the head.
5) This printer accommodates a max. format size of 138 mm wide, by 997 mm long and a max. print speed of 203.2 mm/sec.
6) High throughput can be obtained with "on-the-fly" formatting.
7) Installation space is minimized because the media is loaded internally.
8) The metal cover and damper provide a heavy-duty enclosure.
9) A strip unit and rewinder are provided as standard equipment on this printer. And a high-speed ribbon saving function which economizes ribbon usage is available.
10) Optional devices such as a cutter module, high speed interface board, flash memory card (1MB) and a memory module (max. 3MB) are available.

NOTE: *Every size is written in millimeter (mm) in this manual. To obtain the size in inch, divide by 25.4.*

1.2 DESCRIPTION OF MODEL NUMBER

B - 572 - QP

- QP → Destination Code:
  - QQ : North America Bloc
  - QP : Europe Bloc
- 572 → Printing Method: Thermal direct or Thermal transfer

1.3 OVERVIEW AND DIMENSIONS (APPROXIMATE)

1.3.1 Front View/Rear View

Front View

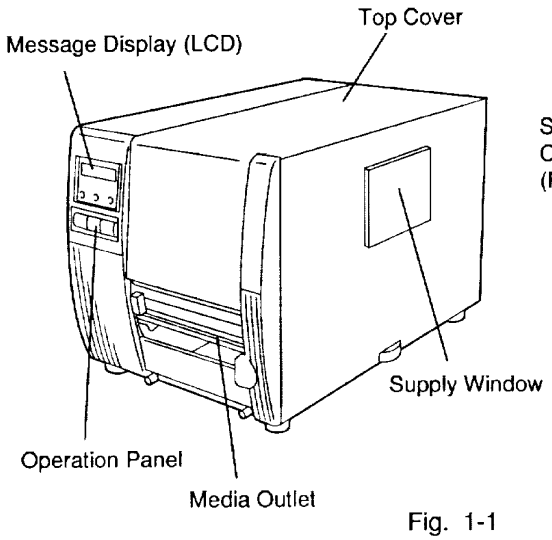


Fig. 1-1

Rear View

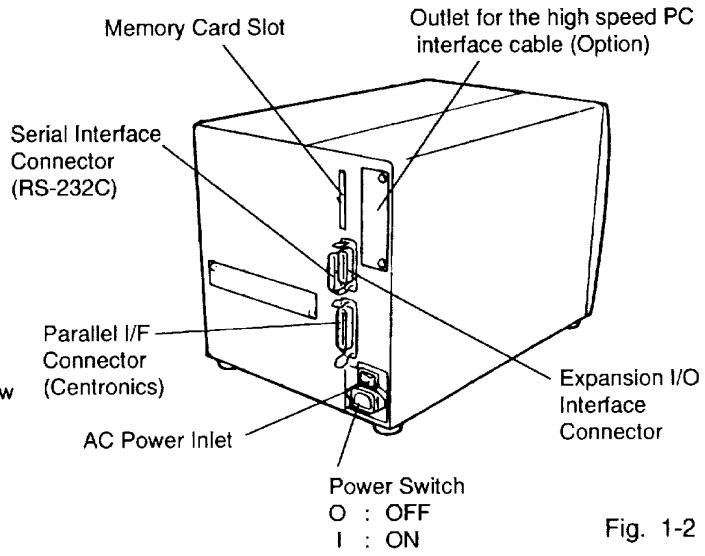


Fig. 1-2

1.3.2 Operation Panel

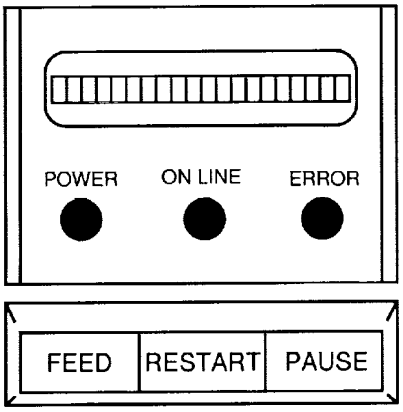


Fig. 1-3

MESSAGE DISPLAY (LCD)
Displays messages in the language selected DIP switch.
When power is turned on and it is ready to print, "ON LINE" is displayed.

POWER LED (Green)
Lights when the power is turned on.

ON-LINE LED (Green)
1) Flashes when communicating with a host computer.
2) On while printing.

ERROR LED (Red)
Lights when the printer does not operate correctly.

FEED Button
Feeds paper.

RESTART Button
Resets the printer when paused or when an error occurs.
Used to set the threshold. (Refer to Owner's Manual)

PAUSE Button
Pauses printing.
Message display shows "PAUSE" and an unprinted count.
Used to set the threshold. (Refer to Owner's Manual)

1.3.3 Dimensions (Approximate)

Standard : 291 mm (W) x 460 mm (D) x 308 mm (H)
With cutter module : 291 mm (W) x 521 mm (D) x 308 mm (H)

1.4 BASIC SPECIFICATIONS

1) Printing method ..... Thermal direct printing or thermal transfer printing
For the thermal transfer printing it may occur that horizontal lines printed within 20 mm from the print start position of the first label become lighter than other. Please adjust the print tone according to what you print.

2) Print head (5 inches)
① Total number of dots .... 1536 dots
② Dot density ..... 12 dots/mm
③ Effective print width .... 127.5 mm
④ Thermal pitch ..... 0.083 mm

3) Print speed ..... 76.2 mm/sec., 127 mm/sec., 203.2 mm/sec. (selectable)
NOTE: *These print speeds are available when printing ratio is less than 15% of the entire label or tag paper.*

4) Format size (W) x (L) ..... Label: 137.0 x 995.0 max.
Tag Paper: 137.0 x 997.0 max.

5) Issuing mode ..... Batch or Strip printing (standard)
Auto cut (Auto cut mode is only available when an optional cutter is attached.)

6) Type of bar code
① UPC-A, UPC-A+2digits, UPC-A+5digits
② UPC-E, UPC-E+2digits, UPC-E+5digits
③ EAN8, EAN8+2digits, EAN8+5digits, EAN13, EAN13+2digits, EAN13+5digits, EAN128
④ JAN8, JAN13
⑤ NW-7
⑥ CODE39 (standard/full ASCII)
⑦ CODE93, CODE128 (auto code switch with/without)
⑧ ITF
⑨ MSI
⑩ Data Matrix
⑪ PDF417
⑫ Industrial 2 or 5

7) Bar code rotation ..... 0°, 90°, 180°, 270°

8) Magnification of bar code
■ UPC/EAN/JAN/CODE93/128/PDF417 ..... Up to 6 modules can be automatically calculated using 1-module width disignation (1 to 15 dots).

Bar code \ Dots/Module		2	3	4	5	6	7	8
UPC-A/E EAN8/13 JAN8/13	Min. Module Width (mm)	-	0.25	0.33	0.42	0.50	0.58	0.66
	Magnification (times)	-	0.76	1	1.27	1.52	1.76	2
CODE93 EAN128 CODE128 PDF417	Min.Module Width (mm)	0.166	0.25	0.33	0.42	0.50	0.58	0.66

Bar code \ Dots/Module		9	10	11	12	13	14	15
UPC-A/E EAN8/13 JAN8/13	Min. Module Width (mm)	-	-	-	-	-	-	-
	Magnification (times)	-	-	-	-	-	-	-
CODE93 EAN128 CODE128 PDF417	Min.Module Width (mm)	0.747	0.83	0.91	1.00	1.08	1.16	1.25

- NW-7/CODE39/ITF/MSI/ Industrial 2 of 5 ..... The width of narrow bars, wide bars and spaces can be optionally changed in a range of 1 to 99 dots.
- Data Matrix ..... The width of one cell can be changed in a range of 1 to 99 dots.

9) Type of characters

① Times Roman medium (8, 10 point)
② Times Roman bold (10, 12, 14 point)
③ Times Roman Italic (12 point)
④ Helvetica medium (6, 10, 12 point)
⑤ Helvetica bold (12, 14 point)
⑥ Helvetica Italic (12 point)
⑦ Presentation bold (18 point)
⑧ Letter Gothic medium (9.5 point)
⑨ Prestige Elite medium (7 point)
⑩ Prestige Elite bold (10 point)
⑪ Courier medium (10 point)
⑫ Courier bold (12 point)
⑬ OCR-A, B (12 point)
⑭ Outline font (Helvetica bold)
⑮ Writable characters (40 types) (224 char./types)

10) Character code

① PC-850 ② PC-8

11) Character magnification

① Regular font: 0.5 ~ 9.5 times (magnified by 0.5 times in each direction)
② Outline font : 2.0 ~ 85.0 mm (magnified by 0.1 mm in each direction)

NOTE: *When the outline font size is large, the ribbon may winkle according to the quality of the ribbon or print tone.*

12) White or black background All types of characters are available

13) Character rotation ..... 0°, 90°, 180°, 270°

14) Character strings rotation ..... 0°, 90°, 180°, 270°

15) Type of line

①Horizontal line ②Vertical line ③Slant line ④Square ⑤Rounded Rectangle ⑥Circle

16) Line width ..... 1 dot to 12 dots can be specified (in units of 0.1 mm)
Guaranteed only when a line has more than 3 dots.

17) Mechanism

① Batch mechanism
This is the standard mechanism which let the printer print continuously without winding the label and tag paper. By attaching the rewinder guide printed media can be wound onto the take-up spool. The auto-cut function is available when the optional cutter module is installed.

② Strip mechanism
A printed label is separated from its backing paper by the stripf shaft. The next label will not be printed until the preceding label is taken away. The backing paper is wound onto the take-up spool.

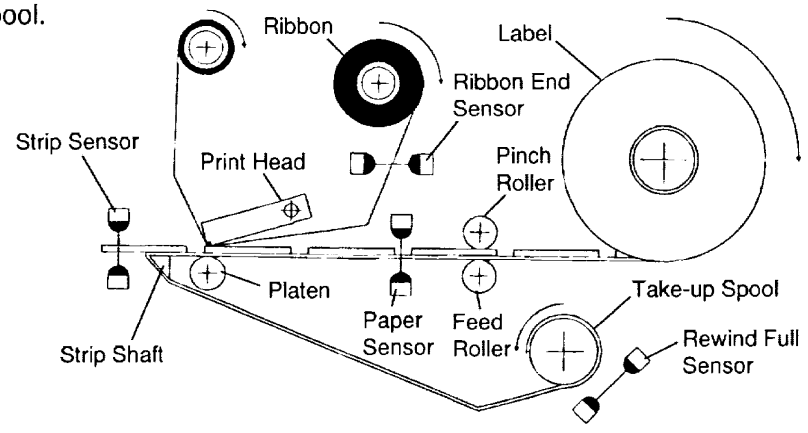


Fig. 1-4

③ Auto cut mechanism
When the cutter module is installed, the backing paper and tag paper are cut individually (stop and cut). Minimum cut length is 25.4 mm (tag paper) or 38 mm (label).

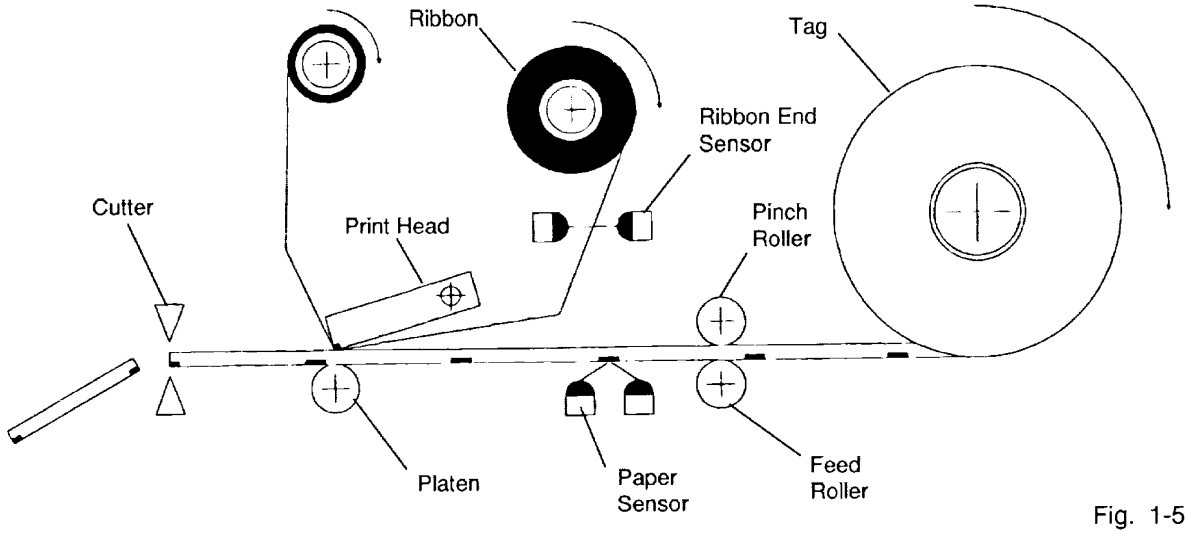


Fig. 1-5

18) Power supply
QQ model: AC 100 ~ 120 V + 10%, -15%, 50/60Hz ± 2Hz
QP model: AC 220 ~ 240 V + 10%, -15%, 50Hz ± 2Hz
19) Current consumption
Printing: 198 W max., QQ model: 2 A max., QP model: 1 A max.
(Stand by: 51 W, QQ model: 500 mA, QP model: 250 mA)
20) Rush current ..... 30A or less

1.5 ELECTRONICS SPECIFICATIONS

1) CPU µPD70236AGD-16-588
2) Memory
① Program: Flash ROM 128KB (max. 256KB: option)
② Character generator: Mask ROM 512KB
③ Backup: EE-PROM 128 Bytes
④ Image buffer + Work: D-RAM 1MB (max. 4MB: option)
3) Interface
① RS-232C interface
(1) Communication mode: Full-duplex
(2) Transmisson speed: 2400,4800,9600,19200 BPS (selectable)
(3) Synchronization: start-stop synchronization
(4) Transmission parameter
- Parity: None, EVEN, ODD
- Start bit: 1-bit
- Stop bit: 1-bit or 2-bit
- Word length: 7-bit or 8-bit

(5) Error detection
- Parity check: VRC (Vertical parity check)
- Framing error: This error occurs when no stop bit is found in the frame specified starting with the start bit.
- Overrun error: This error occurs when subsequent data is input before the data input to the UART from the host is read by the printer.

(6) Data entry code: ASCII, 8-bit code for European characters, 8-bit code for graphic

(7) Receiving buffer: 5KB

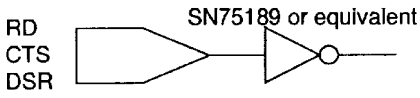
(8) Protocol
- XON/XOFF (DC1/DC3) protocol
  - When initialized after power on, this printer becomes ready to receive data and sends an XON code (11H). (Trasmission or non-transmission of XON code is selectable by means of the DIP switch.)
  - The printer sends an XOFF code (13H) when the blank positions in the receive buffer becomes 800 Bytes or less.
  - The printer sends an XON code (11H) when the blank positions in the receive buffer are 2KB or more.
  - When there are no blank positions in the receive buffer, the printer discards data received which exceeds the receive buffer capacity, without storing it in the buffer. (After detecting the XOFF code, the host computer must stop transmission before the printer receive buffer becomes full.)
  - The printer sends an XOFF code (13H) at power off time. (XOFF code send is selectable with Dip switch.)
- READY/BUSY (DTR) protocol
  - When initialized after power on, this printer becomes ready to receive data and converts the DTR signal to "High" level (READY).
  - The printer converts the DTR signal to "Low" level (BUSY) when the blank positions in the receive buffer amount to 800 Bytes or less.
  - The printer converts the DTR signal to "High" level (READY) when the blank positions in the receive buffer amount to 2KB or more.
  - When there are no blank position in the receive buffer, the printer discards data received which exceed the receive buffer capacity, without storing it in the buffer. (After detecting a BUSY signal, the host computer must stop transmission before the printer receive buffer becomes full.)
- XON/XOFF (DC1/DC3) protocol + READY/BUSY (DTR) protocol
  - When initialized after power on, this printer becomes ready to receive data and converts the DTR signal to "High" level (READY). The printer sends an XON code (11H).
  - When the blank positions in the receive buffer are 800 Bytes or less, the printer converts the DTR signal to "LOW" level (BUSY) and sends an XOFF code (13H).
  - When the blank positions in the receive buffer are 2KB or more, the printer converts the DTR signal to "High" level (READY) and sends an XON code (11H).
  - When there are no blank positions in the receive buffer, the printer discards data received which exceeds the receive buffer capacity, without storing it in the buffer. (After detecting the XOFF code or BUSY signal, the host computer must stop transmission before the printer receive buffer becomes full.)
  - The printer sends an XOFF code (13H) at power off time.

(9) Pin description

Pin No.	Signal	I/O	Description
1	FG (Framed Ground)	-	Ground line for circuit protection.
2	RD (Received Data)	I	Data line from which the priter receives data from the host (receive data line). Logic "1" is "Low", and "0" "High". It is LOW (MARK) while no data is being sent.
3	TD (Transmit Data)	O	Data line from which the printer sends data to the host (send data line). Logic "1" is "Low", and "0" "High". It is LOW (MARK) while no data is being sent.
4	CTS (Clear to Send)	I	Input signal from the host. It must be "High" for the printer to send data.
5	RTS (Request to Send)	O	Output signal to the host. It indicates there is data to send to the host. After Power is ON, it is always "High".
6	DTR (Data Terminal Ready)	O	Output signal from the printer. (Indicates whether the printer is ready to receive data.) The signal is at the Low level when the data amount in the data buffer is near full, and at the High level when near empty.)
7	SG (Signal Ground)	-	Ground line for all data and control signals.
20	DSR (Data Set Ready)	I	Input signal from the host. It must be "High" for the printer to receive data.

(10) Interface circuit

■ Input circuit



■ Output circuit

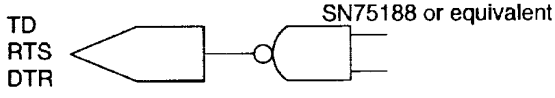


Fig. 1-6

■ Signal level

Input voltage	"H"	+ 3V ~ + 15V
	"L"	- 3V ~ -15V
Output voltage	"H"	+ 6V ~ + 13V
	"L"	- 6V ~ -13V

② Centronics interface
(1) Data input method: 8-bit parallel (DATA 1 ~ 8)
(2) Control signals: $\overline{ACK}$, BUSY, $\overline{PAUSE}$, $\overline{DATA;STB}$, $\overline{INPUT;}$ $\overline{PRIME}$, $\overline{FAULT}$, PE
(3) Data input code: ASCII, JIS 8-bit code for European characters, 8-bit code for graphic
(4) Receiving buffer: 5KB
(5) Input/Output crcuit configuration and Input/Output conditions

Type	Signal Name	Configuration
Input	DATA 1 ~ 8	+5V, 1K, SN74LS14 or equivalent
	$\overline{INPUT}$•$\overline{PRIME}$ $\overline{DATA}$•$\overline{STB}$	+5V, 1K, 100P, SN74LS14 or equivalent
Output	BUSY $\overline{FAULT}$ $\overline{PAUSE}$ $\overline{ACK}$ PE	SN7406 or equivalent, +5V, 1K, 100P

Logical level (input)
"1" = 2~5 V
"0" = 0~0.4 V

Logical level (input)
"1" = 2.4~5 V
"0" = 0~0.4 V

Fig. 1-7

③ External I/O interface
(1) Interface circuit
■ Input circuit

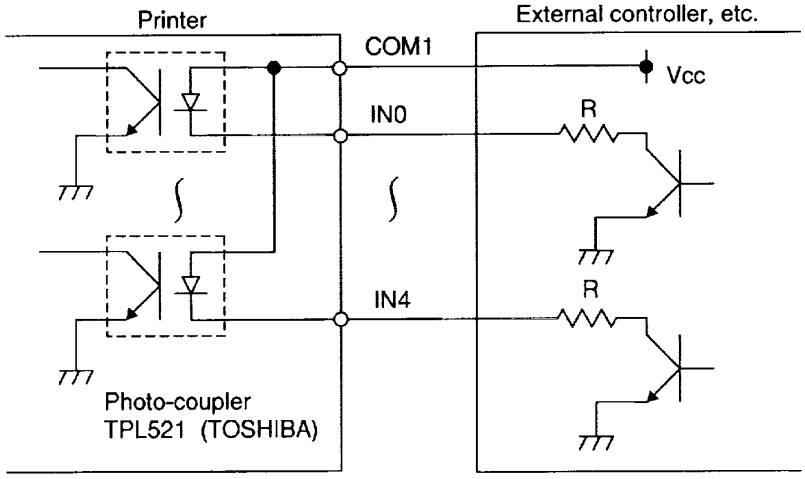


Fig. 1-8

There are five input circuits, and each input is a current loop using a photo-coupler. The anode of the photo-coupler is connected to common pin COM1 in each of the five circuits. Each cathode is independent. The voltage of Vcc is 24 V (max.) while the diode operating current is 16 mA.

■ Output circuit

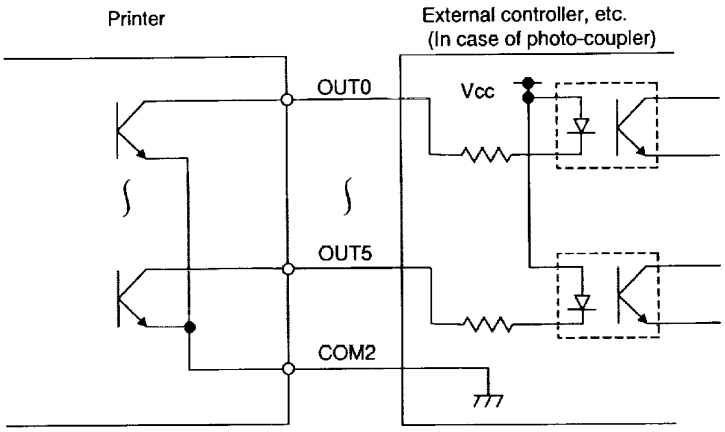


Fig. 1-9

There are six output circuits, and each output is an open collector. The voltage of Vcc is 24 V (max.) while the operating current is 150 mA.
For other details, please refer to the Expansion I/O specification.

4) Sensor/switch

① Head up switch (micro switch)
This switch, attached at the lower left of the print head as viewed from the media outlet, detects that the print head is ready to print (head is down). When the head lever is lowered, the head down cam pushes up the print head, the micro switch is turned on and the print head prepares to print.

② Paper sensor
This sensor is comprised of the black mark sensor and feed gap sensor. It is positioned 92.1 mm from the platen.
The sensor position is adjustable according to the media width. It moves toward the main frame a max. of 70 mm by turning the knob counterclockwise.

■ Black mark sensor (Reflective sensor)
This sensor detects the difference of potential between the black mark and tag paper to find the print position of the tag paper.
It is located at the home position with the tag paper or print head before shipment.

Side detection (max.)

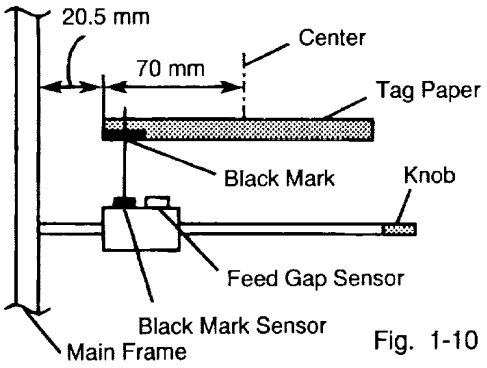


Fig. 1-10

Center detection

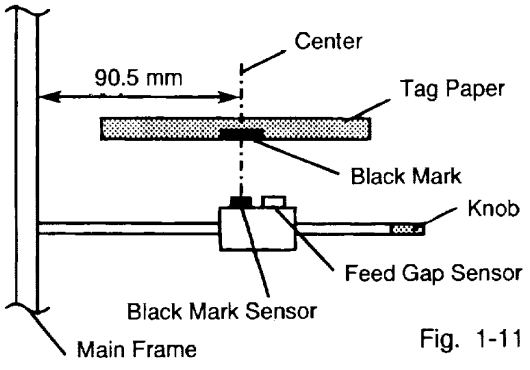


Fig. 1-11

■ Feed gap sensor (Transmissive sensor)
This sensor detects the difference in potential between the backing paper and the label to find the print position of the label. The feed gap sensor is located 8 mm to the right of the black mark sensor.

Side detection limit position

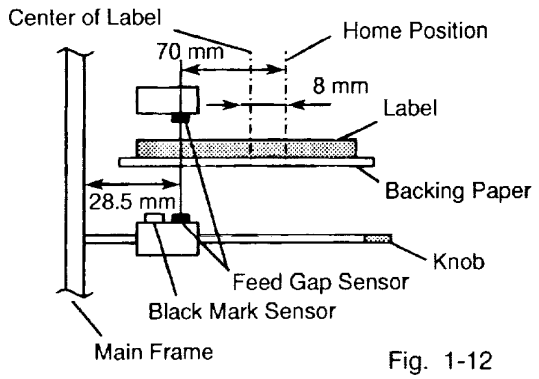


Fig. 1-12

Home position

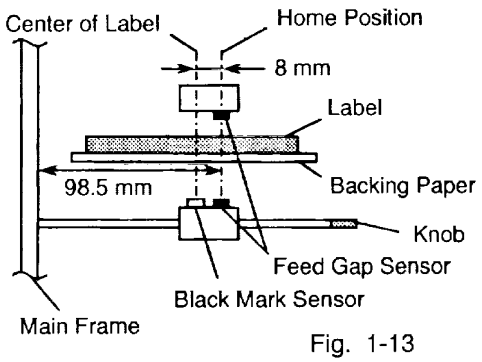


Fig. 1-13

③ Strip sensor (Transmissive sensor)
This sensor detects whether or not the label has been removed and controls the label feed. It is positioned 13.7 mm from the platen.

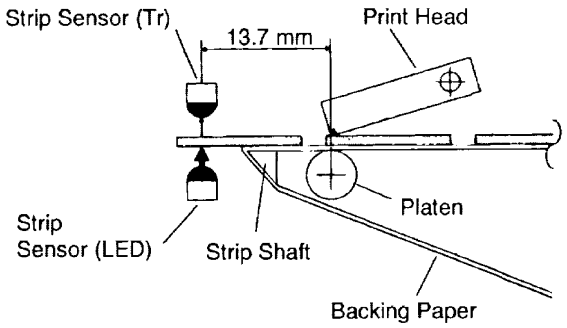


Fig. 1-14

④ Ribbon end sensor (Transmissive sensor)
When printing in thermal transfer mode, this sensor detects the difference in potential between the ribbon and the ribbon end to indicate the ribbon end. It is positioned 94.8 mm from the platen and the detection point is 76.5 mm from the main frame.

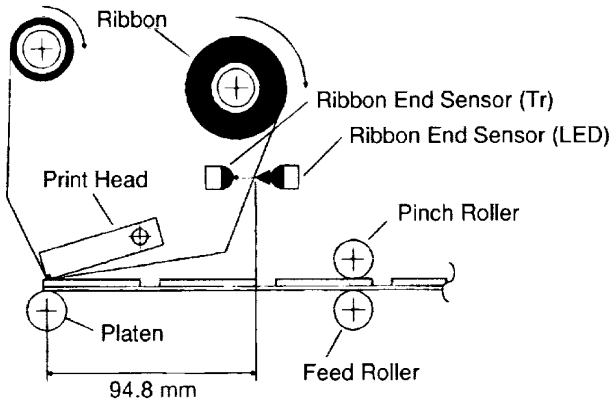


Fig. 1-15

⑤ Rewind full sensor (Transmissive sensor)

This sensor detects excessive winding when winding backing paper or label onto the take-up spool. It is positioned 195.3 mm (Tr side) and 150.9 mm (LED side) from the platen, and the detection point is 92.5 mm from the main frame. Excessive winding is detected when backing paper blocks the light from the LED.

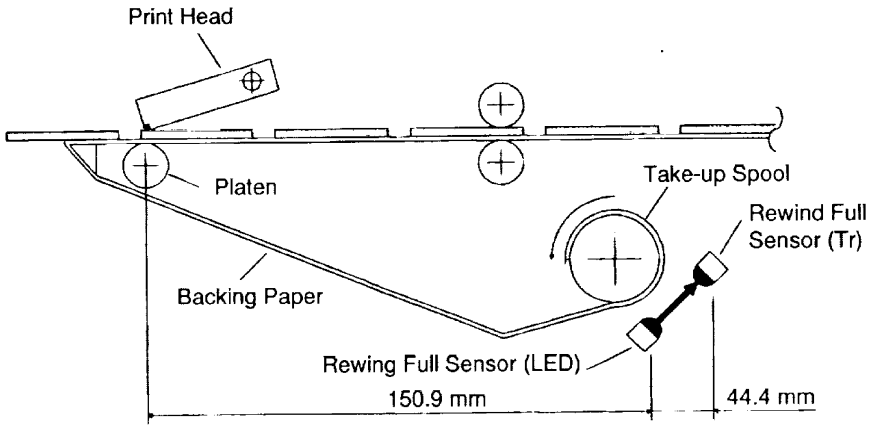


Fig. 1-16

⑥ Slit sensor (Transmissive sensor)

This sensor detects the rotation count of the ribbon shaft and the ribbon motors. The ribbon motors toque works to take up slack in the ribbon and is dependent on the detected count. The slit sensor is a photo coupler combining an LED and a transistor.

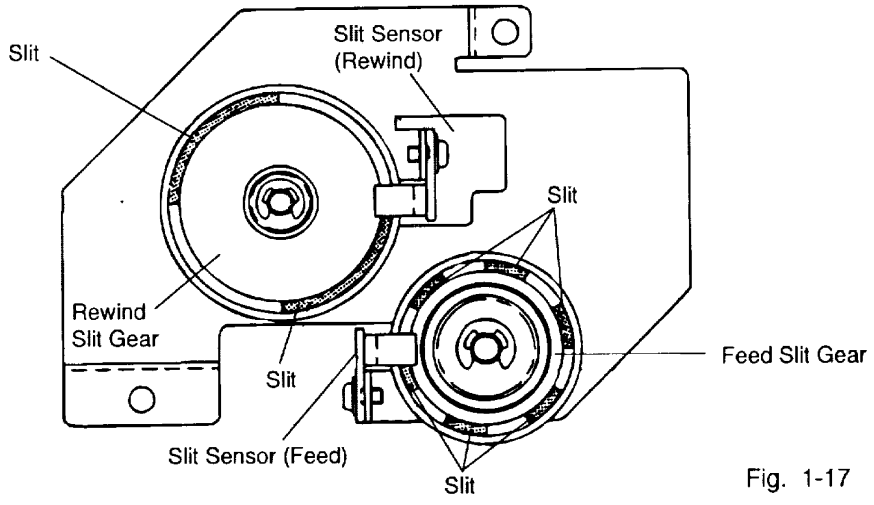


Fig. 1-17

⑦ Cutter home position switch (micro switch)

A cam positioned at the end of the cutter motor arm turns the micro switch on/off in accordance with the cycle of the cutter motion (one rotation). The micro switch status indicates if the cutter is in the home position.
For details, please refer to the Maintenance Manual section 4.1 Cutter Drive.

2. SUPPLY SPECIFICATIONS

Information regarding the supply specifications contained in Product Description is essential to service engineers. Detail specifications and other information on the media and ribbon are described in Supply Manual by model. It is issued by and sent from TEC H.Q. (Sales Division) upon release of new model or manual's revision. When purchasing the supplies locally, be sure to refer to the Supply Manual for details, or trouble may occur. Be sure to read carefully and understand the Supply Manual since it also includes the details about notes, precision of the print start position, limitations on printing, etc.

2.1 MEDIA

Type / Item	Thermal Label			Tag Paper	
	Batch	On-demand	Auto-cut	On-demand	Auto-cut
Width (mm)	50.8 ~ 140.0			50.8 ~ 140.0	
Length (mm)	10.0 ~ 999.0	25.4 ~ 999.0	38.0 ~ 999.0	10.0 ~ 999.0	25.4 ~ 999.0
Thickness (mm)	0.13 ~ 0.17			0.15 ~ 0.29	
Outer roll diameter (mm)	200.0 max.			200.0 max.	
Recommended paper	RICOH: 140LA / OSAKA SEALING: C6TB			I-BEST S / I-BEST W	

NOTES:

1. *When rewinding the media onto the take-up spool in batch mode, the max. outer roll diameter should be 180 mm.*
2. *When cutting the thermal label, secure a gap of 6 mm or more and cut in the middle of the gap.*
3. *The thermal paper used for direct thermal printing must not have the specifications which exceed Na^+ 800 ppm, K^+ 250 ppm and Cl^- 500 ppm.*
4. *Some ink used on pre-printed labels may contain ingredients which shorten the print head's product life. Do not use labels pre-printed with ink which contain hard substances such as carbonic calcium ($CaCO_3$) and kaolin (Al_2O_3, $2SiO_2$, $2H_2O$).*
5. *The label should be at least three times as long as the detection gap.*
6. *Relations between media roll length and core diameter.*

$$L = \frac{(D^2 - d^2) \times \pi}{4t}$$

L: Media length *d: Media core outside diameter*
D: Max. roll diameter *t: Media thickness*

7. *Use of media with a width less than the minimum media width may shorten the print head life.*

1) Thermal Label

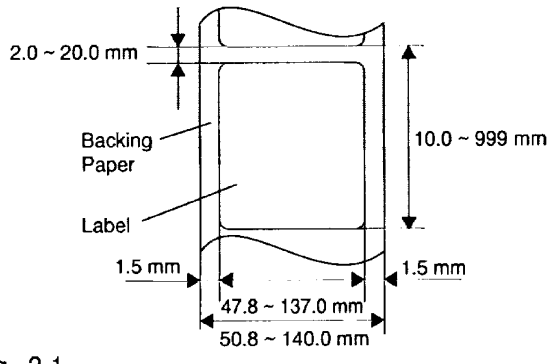


Fig. 2-1

<Design>

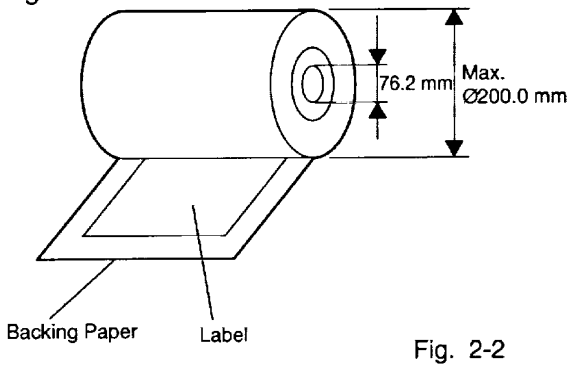


Fig. 2-2

2) Tag Paper

<Design>

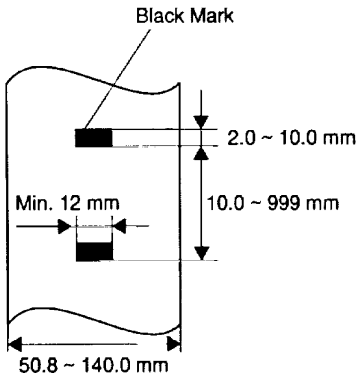


Fig. 2-3

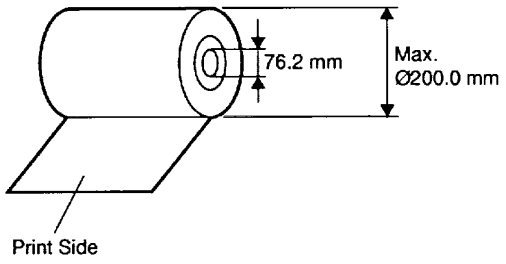


Fig. 2-4

NOTE: *The reflection rate of the black mark is 10% or less at wavelength of 950 nm. A square hole can substitute for the black mark. When the square hole is used, no printing is allowed on the back side.*

<Non Print Area>

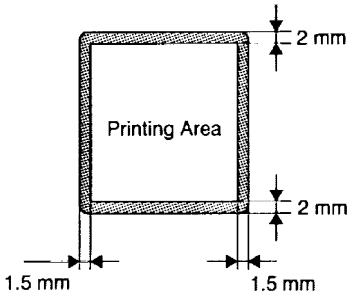


Fig. 2-5

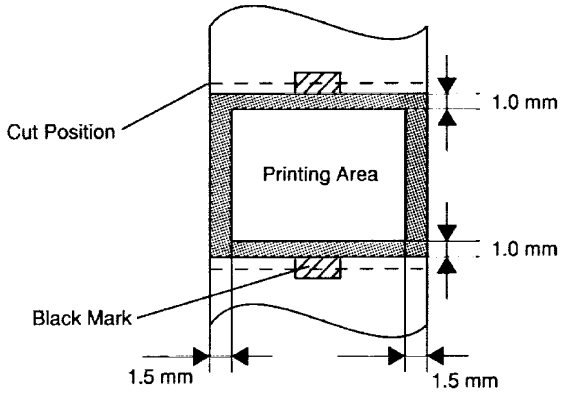
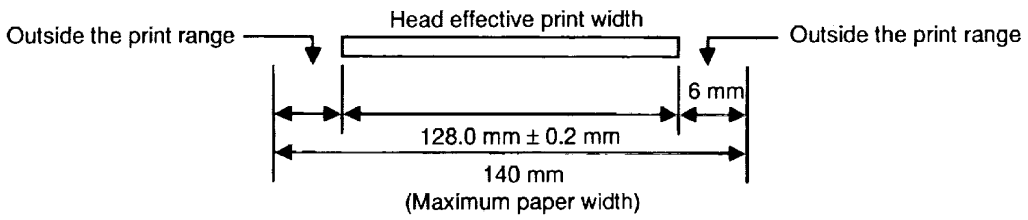


Fig. 2-6

NOTE: *Max. effective print area is 128.0 mm (W) x 995 mm (L) for label, 128.0 mm (W) x 997 mm (L) for tag paper.*

3) Relationship between the head effective print width and paper



2.2 RIBBON

No.	Item		Specification
1	Shape		Spool type
2	Width		68 ~ 134 mm
3	Max. length		600 m
4	Max. OD		ø 90 mm
5	Back treatment		Coated
6	Core	Material	Cardboard
		Shape	See Fig. 2-7.
7	Leader tape		Polyester film (Opaque), 300 ± 5 mm long
8	End tape		Polyester film (Opaque), 250 ± 5 mm long
9	Winding method		The ink side is outside of ribbon winding.

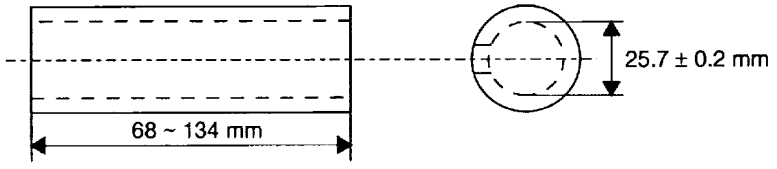
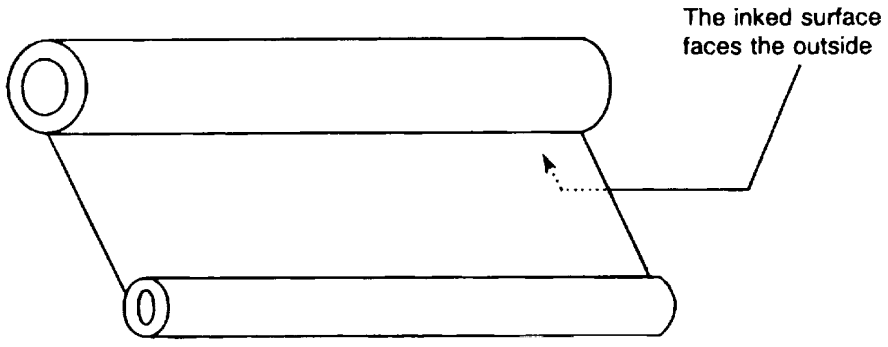


Fig. 2-7

NOTE: *When purchasing ribbons locally, they must meet the above size. There may be TEC-approved ribbons which do not fall within the above size, however, they have to functional problem.*



The ribbon should be would at center of the core.

Fig. 2-8 Positional relationship between core and ribbon

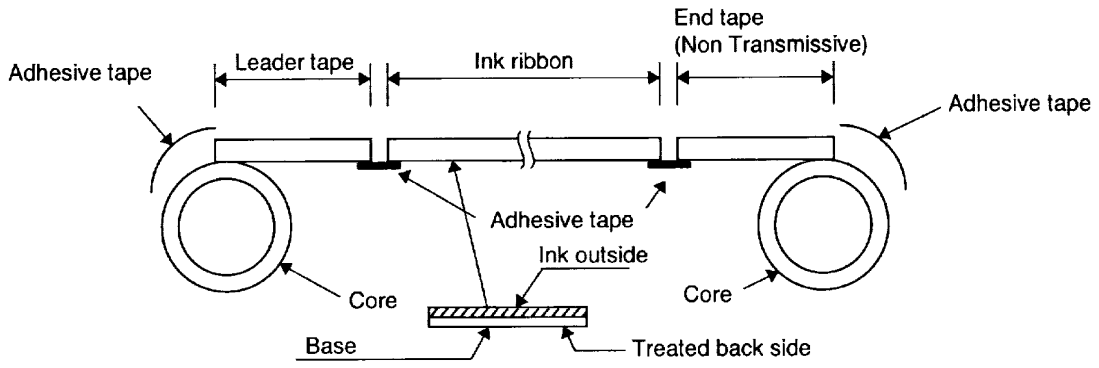


Fig. 2-9 Connection between leader tape and ribbon

2.3 CARE AND HANDLING OF THE MEDIA AND RIBBON

CAUTION:
Be sure to read carefully and understand the Supply Manual. Use only media and ribbon which meet specified requirements. Use of non-specified media and ribbon may shorten the head life and result in problems with bar code readability or print quality. All media and ribbon should be handled with care to avoid any damage to the media, ribbon or printer. Read the following guideline carefully.

- Do not store the media and ribbon for longer than the manufactures recommended shelf life.
- Store media rolls on the flat end, do not store them on the curved sides as this might flatten that side causing erratic media advance and poor print quality.
- Store the media in plastic bags and always reseal after opening. Unprotected media can get dirty and the extra abrasion from the dust and dirt particles will shorten the print head life.
- Store the media and ribbon in a cool, dry place. Avoid areas where they would be exposed to direct sunlight, high temperature, high humidity, dust or gas.
- The thermal paper used for direct thermal printing must not have the specifications which exceed Na^+ 800 ppm, K^+ 250 ppm and CL^- 500 ppm.
- Some ink used on pre-printed labels may contain ingredients which shorten the print head's product life. Do not use labels pre-printed with ink which contain hard substances such as carbonic calcium ($CaCO_3$) and kaolin (Al_2O_3, $2SiO_2$, $2H_2O$).
- Avoid using media containing SiO_2 or talc which wears the print head protection layer.

For further information please contact your local distributor or your media and ribbon manufacturer.

3. OPTIONAL KIT

Option Name	Type	Use
Cutter module	B-4205-QM	This cutter module uses a swing cutter. It cuts backing paper of labels and tag paper automatically in "stop and cut" mode. To purchase the cutter module, please contact your distributor or TEC H.Q. can assist in finding one for you.
High speed PC interface board	B-4800-PC-QM	This interface board quickly controls command transfer and printing. To purchase the high speed PC interface board, please contact your distributor or TEC H.Q. can assist in finding one for you.
Memory module	Part No. CAC-0293001	The image buffer can be extended up to 3 MB by using 512 KB of D-RAM. Necessary parts are available from the Parts Center or retail outlets.
Flash memory card	———	This flash memory card of 1 MB is used to save logos, writable characters and print format. It is available at retail outlets.

3.1 CUTTER MODULE: B-4205-QM

This compact cutter module uses a built-in swing cutter. The specification is provided below:

① Cutting method ..... Swing cut
② Cut mode ..... Stop cut
③ Minimum cut length ..... Tag paper: 25.4 mm, Label: 38 mm
④ Home position switch ..... Micro switch

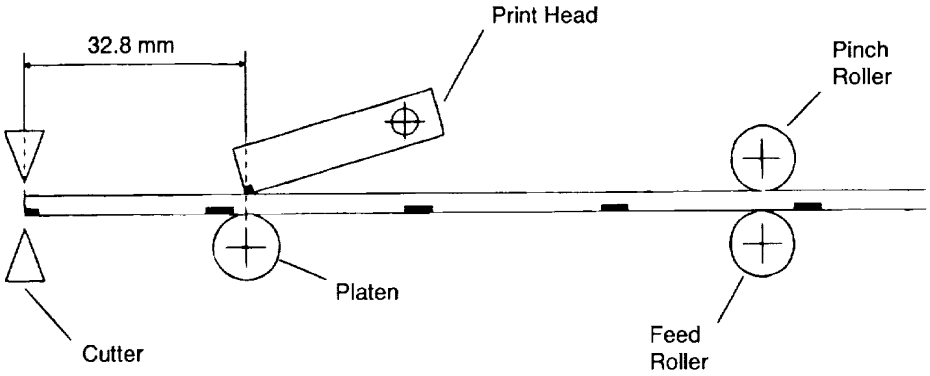


Fig. 3-1

3.2 HIGH SPEED PC INTERFACE BOARD: B-4800-PC-QM

Command transfer and printing can be processed quickly by connecting a PC and the printer via a FIFO (first-in first-out) IC on the high speed PC interface board. For details, refer to the specification for high speed PC interface.

① Configuration of interface

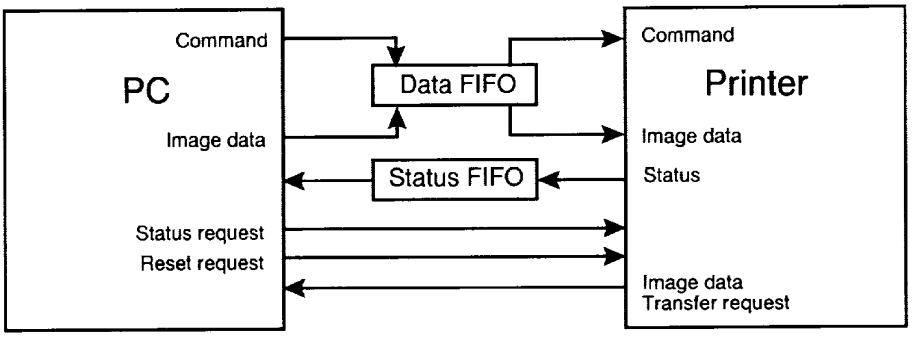


Fig. 3-2

② Signal description

Signal	Direction	Description
Data FIFO	PC → Printer	FIFO to transfer commands and image data. In case of a command, FIFO data reading is performed by the CPU. In case of image data, reading is performed by DMA transfer.
Status FIFO	PC ← Printer	FIFO to transfer status. The status for a status autosending or for status request is written by the BPE.
Status request signal	PC → Printer	The PC turns this signal high-level to request for a status. It is cleared when reading is performed.
Reset request signal	PC → Printer	The PC turns this signal high-level to request for reset. It is cleared when reading is performed.
Image data transfer request signal	PC ← Printer	The printer turns this signal high-level when ready for an image data transfer. When transfer is completed, it is turned low-level. The PC must not write the image data to the FIFO until this signal turns high level. Also, the PC must confirm that this signal is low-level for sending a command.

③ Transmission control

- When a command is sent from the PC to the printer:
  Confirms that the image data transfer request bit has not been ON and the FIFO is vacant, then writes a command to the FIFO.
- When image data is sent from the PC to the printer:
  Confirms that the image data transfer request bit has been ON, then writes the image data to the FIFO.
- When the printer transfers image data from the PC using DMA:
  Turns the image data transfer request bit high-level to start DMA. When DMA transfer of all the image data is completed, turns the image transfer request bit low-level.
- When a status is sent from the printer to the PC: Writes a status to the FIFO.

3.3 MEMORY MODULE

This memory module is a D-RAM chip used to extend the image buffer. Addition of one D-RAM expands about 170.7 mm for normal drawing, and 85.3 mm for on-the-fly drawing. An image buffer, equipped with 1MB (512KB x 2) as standard, can be expanded up to 4MB by installing D-RAMs on IC19, 20, 21, 22, 23 and 24 on the CPU PC board.

RAM Capacity	IC No.	Part No.	Max. drawing size (normal) (W) x (H) (mm)			Max. drawing size (on-the-fly) (W) x (H) (mm)			Remarks
			Batch	Strip	Auto-cut	Batch	Strip	Auto-cut	
1MB	IC17,18	CAC-0293001	138.0 x 298.6			138.0 x 149.3			Standard
1.5MB	IC17~19	CAC-0293001	138.0 x 469.3			138.0 x 234.6			Option
2MB	IC17~20	CAC-0293001	138.0 x 640.0			138.0 x 320.0			Option
2.5MB	IC17~21	CAC-0293001	138.0 x 810.7			138.0 x 405.3			Option
3MB	IC17~22	CAC-0293001	138.0 x 981.4			138.0 x 490.7			Option
3.5MB	IC17~23	CAC-0293001	*138.0 x 995.0		*138.0 x 991.0	138.0 x 576.0			Option
4MB	IC17~24	CAC-0293001	*138.0 x 995.0		*138.0 x 991.0	138.0 x 661.3			Option

*: The size for the tag paper is 138.0 x 997.0.

D-RAM is available from the Parts Center or retail outlets.
When purchasing please refer to the following.

- Maker: HITACHI
- Type: HM514260AZ-7 475 mil 40 pin plastic zip

3.4 FLASH MEMORY CARD

This flash memory card of 1MB is used to save logos, writable characters and print format data. This flash memory card is directly connected to CN1 on the I/F PC board, and stored data can be overwritten by down-line-loading from the PC. When purchasing flash memory card, refer to the following.

- Maker/type: HITACHI MAXELL / EF-1M-TB (AA), MITSUBISHI / MF81M1-GBDATXX, SUMITOMO/SMC-01MFJ-M
- Specification: JEIDA version 4.1 / PCMCIA 2.0 or equivalent flash memory card of 1MB
  - ① 128KB data can be erased at one time.
  - ② Attribute memory is not used.

3.5 FANFOLD PAPER GUIDE MODULE: B-4905-FF-QM

This is paper guide exclusively used for fanfold paper. Attaching it in place of the standard paper guide allows the printer to print on fanfold paper.
For the installation procedure, refer to the Maintenance Manual.

TEC

TEC Thermal Printer

B-570 SERIES

Maintenance Manual

Document No. **EM18-33010A**

Original **Nov., 1993**

(Revised **Apr., 1994**)

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TEC CORPORATION

PRINTED IN JAPAN

EM18-33010A
(Revised Date Feb. 01 '96)

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CAUTION:

1. *This manual may not be copied in whole or in part without prior written permission of TEC.*
2. *The contents of this manual may be changed without notification.*
3. *Please refer to your local Authorized Service representative with regard to any queries you may have in this manual.*

1. UNPACKING

1.1 Procedure

1) Open the carton.
2) Unpack the accessories from the carton.
3) Unpack the side pad (L)/(R) and the printer from the carton.
4) Place the printer on the level surface.

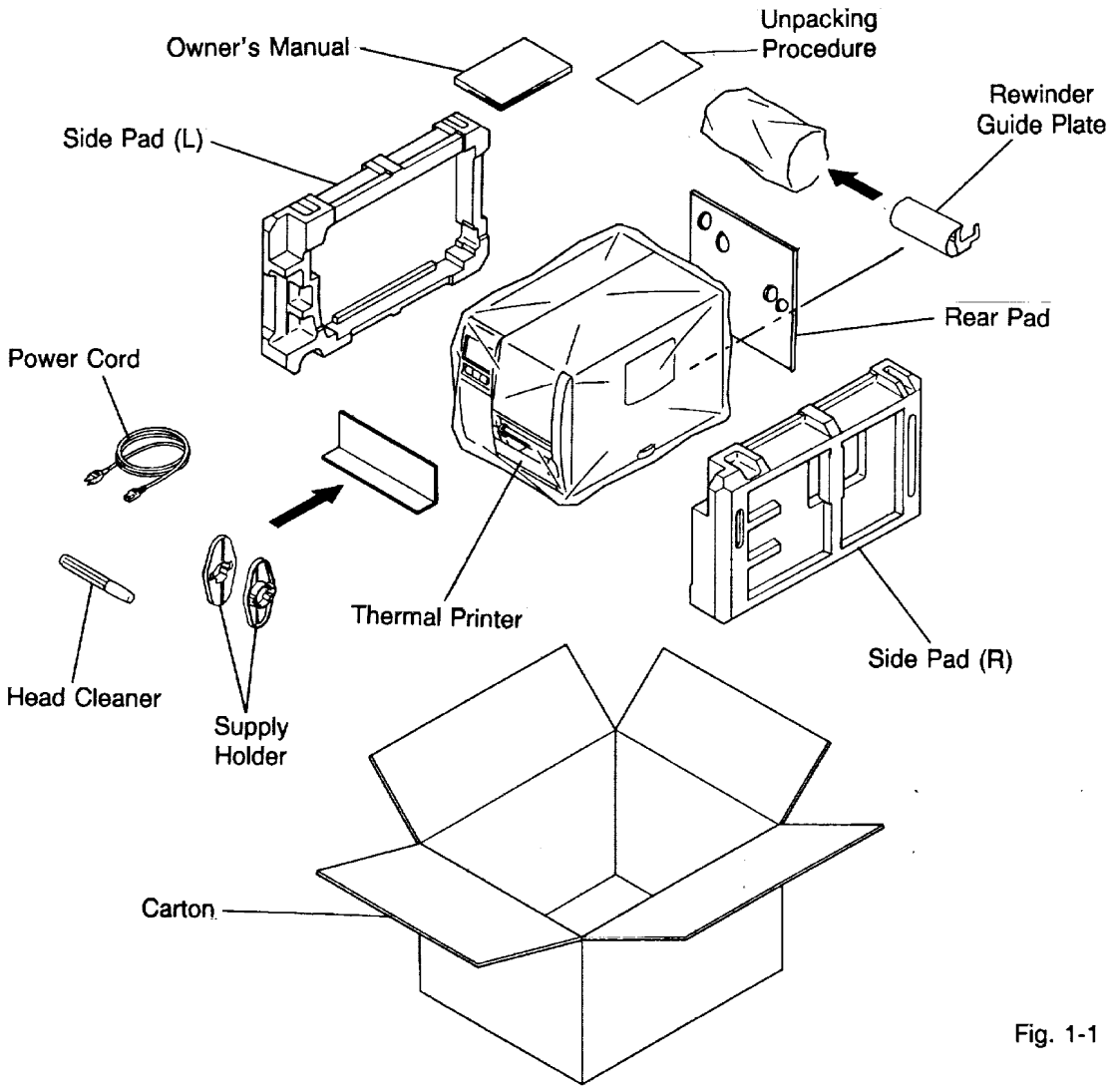


Fig. 1-1

1.2 Checks

1) Check for damages or scratches on the machine.
2) Confirm that none of the accessories are missing.

NOTE: *Keep the carton and side pads for later transport.*

2. MAJOR UNIT REPLACEMENT

WARNING!

Disconnect power cord before replacing important parts.

CAUTION:

1. *NEVER separate the ribbon motors from the attaching plate (bracket), because doing so will change their adjustment. (See Fig. 2-8)*
2. *NEVER remove the two screws painted red on the side of the print block. (See Fig. 2-13)*
3. *NEVER remove the four screws on the side of the print block. (See Fig. 2-13)*
4. *NEVER remove the four screws painted red fixing the right plate and reinforcing plate. (See Fig. 2-16) However, the machine with a serial number of 4T×××××× or later is not equipped with the red screws because of the change in the right plate shape.*
5. *NEVER remove unmentioned screws because doing so will change their adjustment.*

1) Turn the power off.
2) Open the top cover to remove the four FL-3×5 screws. Slide the top cover to the left to release the damper and remove the top cover.
3) Remove the seven screws (FL-4×5 and B-4×5) to remove the left side cover.
4) Disconnect the FAN motor connector from the PS unit.

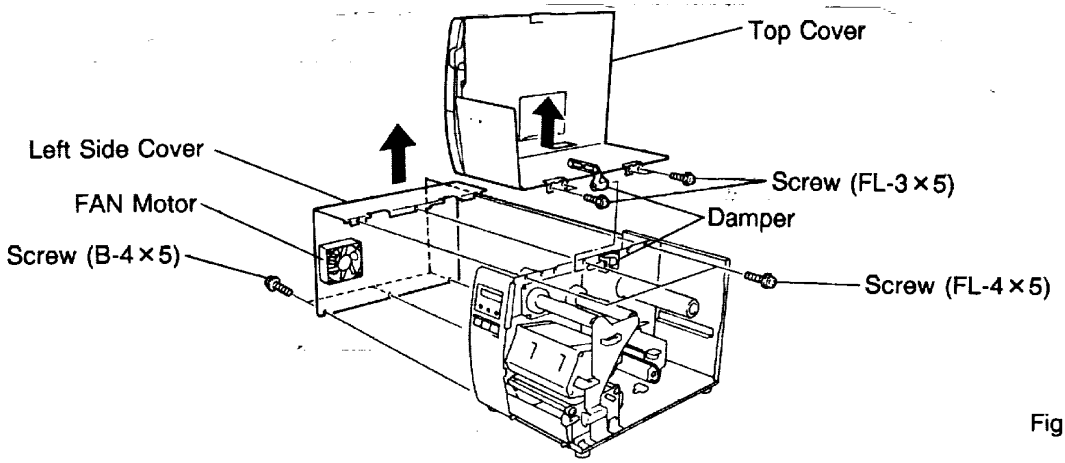


Fig. 2-1

NOTE: *Instructions to remove the top cover and left side cover are omitted from each removal/installation procedure provided below.*

■ Lubrication

CAUTION: *1) Lubrication: During parts replacement*
2) Kinds of oil: FLOIL G-488: 1 Kg kan. (Part No. 19454906001)

Any machine is generally in its best condition when delivered; therefore, it is necessary to try to keep this condition. Unexpected failure occurs due to lack of oil, debris or dust. To keep its best condition, periodically clean the machine and apply proper kinds of oil to each part in which lubrication is needed.
Although the frequency of lubrication varies according to how much the machine is used, at least it is necessary to lubricate before the machine becomes dry. It is also necessary to wipe off excessive oil as it collects dirt.

CAUTION: *Do not spray the inside of the printer with lubricants unsuitable oil can damage the mechanism.*

2.1 Replacing the PS Unit, I/F PC Board and CPU PC Board

CAUTION: *Replace only with same type and ratings of fuse for continued protection against risk of fire.*

1) Remove the three FL-4×6 screws and disconnect the two connectors to detach the PS unit.
2) Remove the FL-3×5 screw and the four locking supports to remove the I/F PC board.

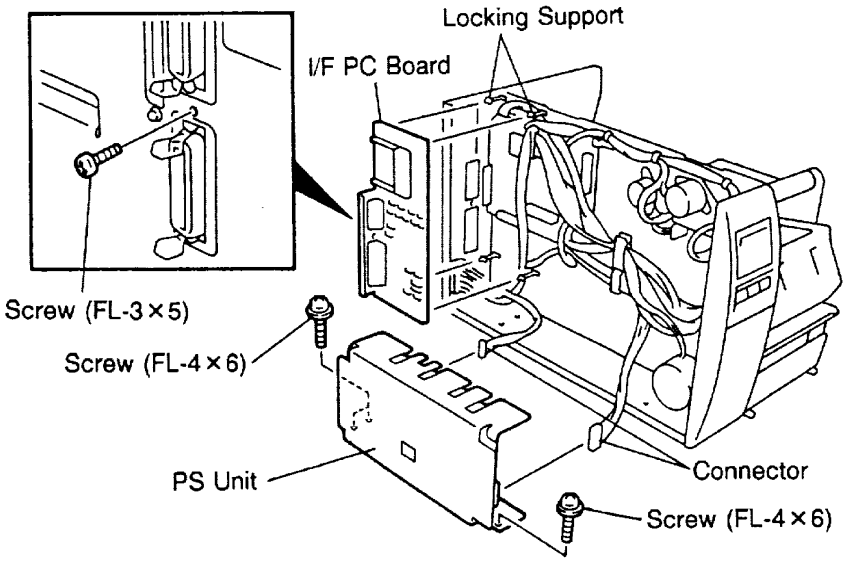


Fig. 2-2

3) Disconnect the 13 connectors from the CPU PC board.
4) Remove the six screws (SM-3×6B, SM-3×6C) to detach the CPU PC board from the printer.

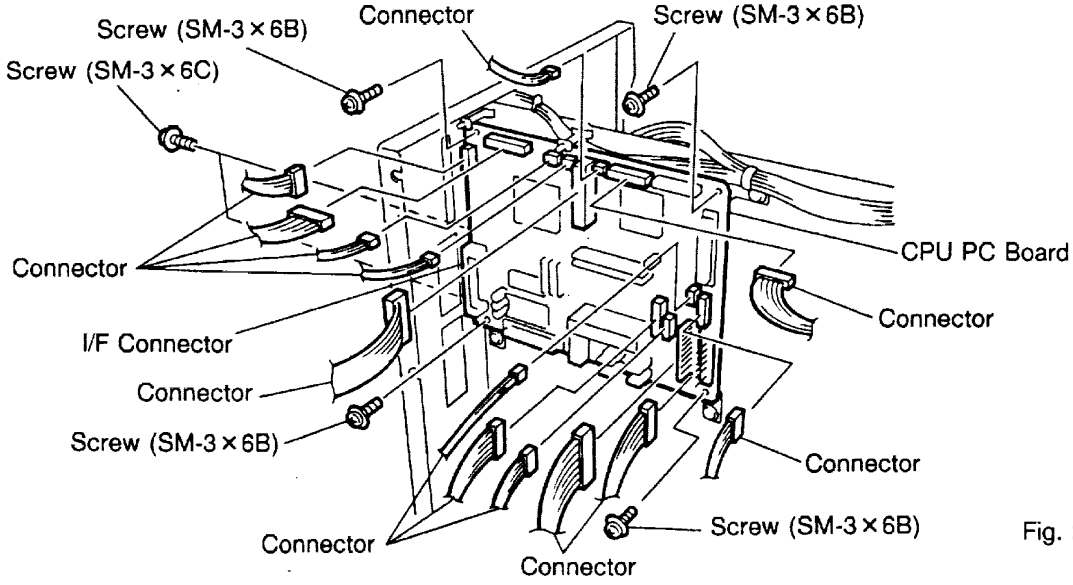


Fig. 2-3

5) Replace the PS unit, I/F PC board and CPU PC board. Insert the connectors correctly and install in the reverse order of removal above. Do not mount the left side cover and top cover.

7) Adjust the ribbon end sensor.
Use the following Ribbons; TTM-78 (Maker: Fujicopian)

① Set the ribbon so that the ribbon end sensor can detect the ribbon. Turn the power on.

② Turn the VR2 so that the voltage between Pin 1 (GND) and Pin 7 of CN10 is 3.0 ± 0.2 V with an oscilloscope.

③ Turn the power off and mount the left side cover and top cover.

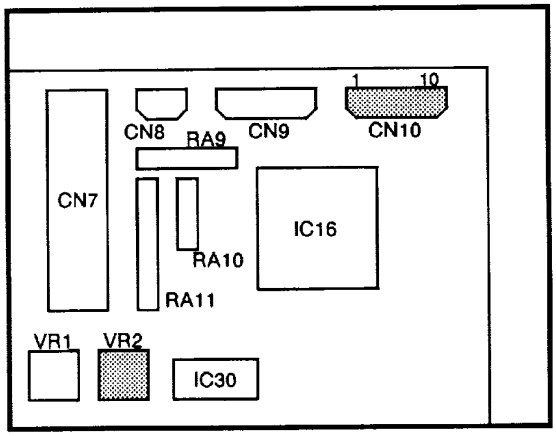


Fig. 2-4

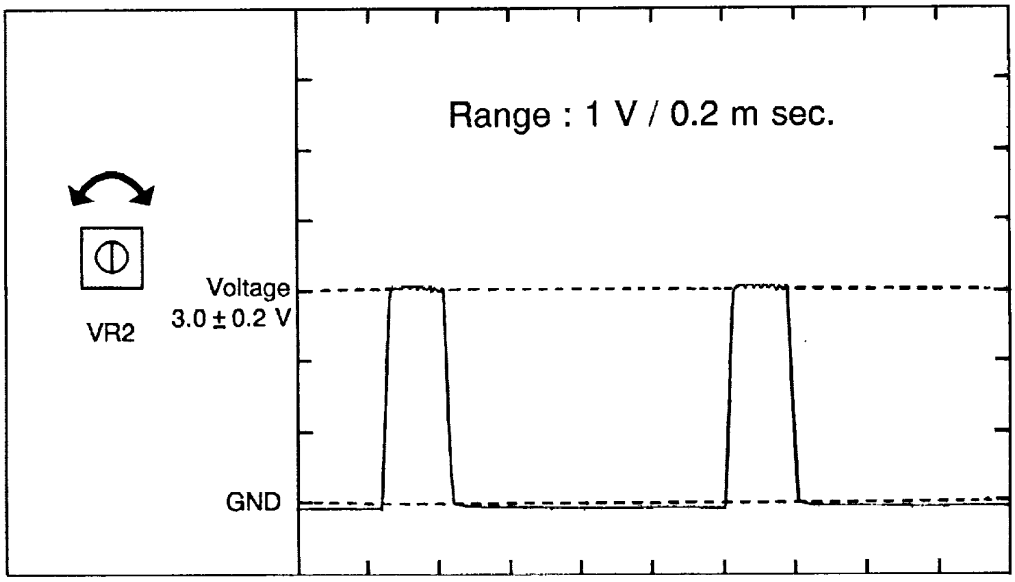


Fig. 2-5

8) Adjust the black mark sensor.
As the black mark sensor is adjusted by key entries in system mode, refer to page 6-39 for the adjustment procedure.

9) Adjust the feed gap sensor.
As the feed gap sensor is adjusted by key entries in system mode, refer to page 6-40 for the adjustment procedure.

CAUTION:
Be careful when replacing the CPU PC board, since a non-resettable counter (IC12) is installed on this board. (Refer to Section 6.2.1 Maintenance Counter Printing.)
If this counter should be reset, replace IC12.

2.2 Replacing the Stepping Motor

1) Remove the two black screws to detach the front plate, remove the two FL-4×6 screws to detach the belt cover.

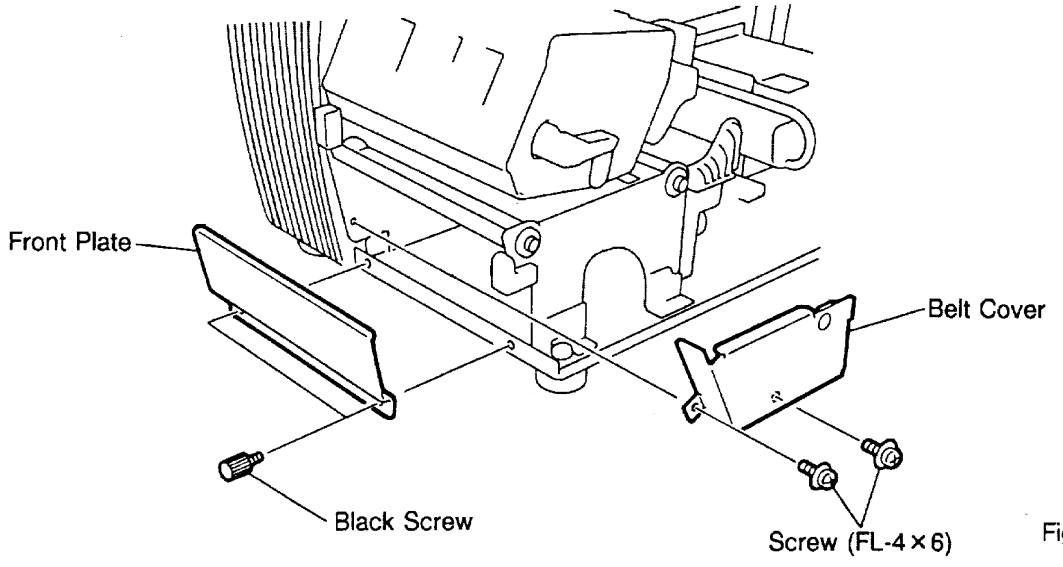


Fig. 2-6

2) Unclamp and disconnect the connector from CN14 on the CPU PC board.
3) Remove the two SM-4×8B screws, loosen the two belts from the pinion gear, and remove the stepping motor.

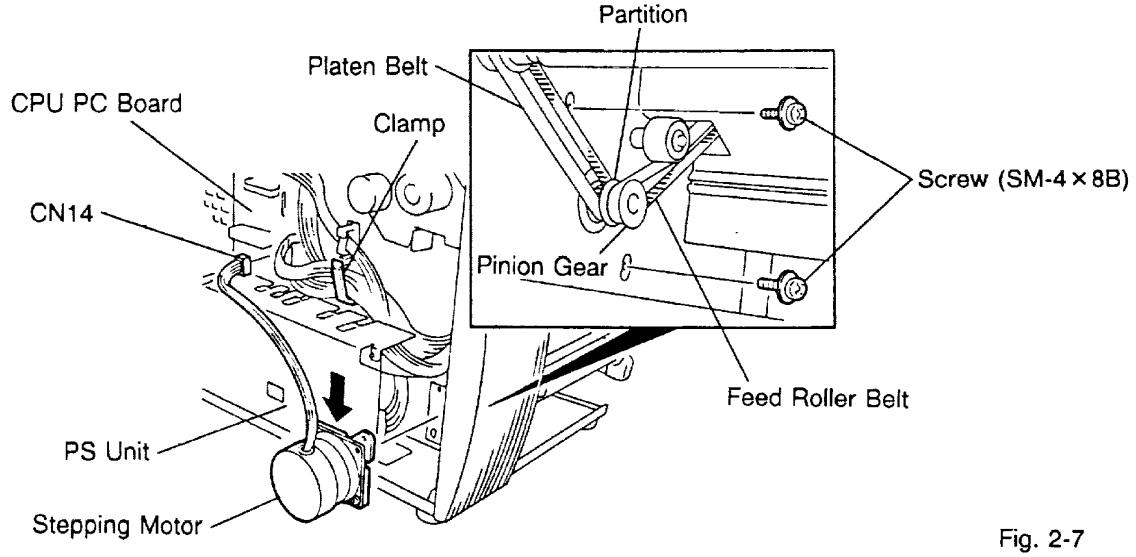


Fig. 2-7

4) When replacing the stepping motor, place the platen belt first then the feed roller belt around the pinion gear so that the partition is positioned between two belts. Hold down the stepping motor at 3.5 kg ± 300 g force and secure it so that the belts have no slack or disengagement.
5) Reassemble in the reverse order of removal.

2.3 Replacing the Ribbon Motors

> ***CAUTION:***
> *NEVER separate the ribbon motors from the attaching plate because doing so will change their adjustment.*

1) Disconnect the connector and remove the two SM-3×5B screws to detach the ribbon motors.

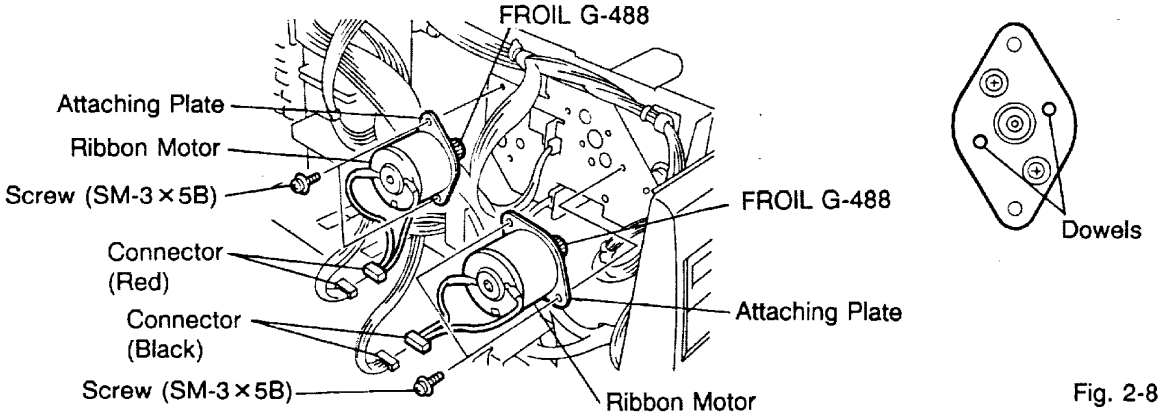


Fig. 2-8

2) Replace the ribbon motors, then align the dowels to attach the ribbon motors. Reassemble in the reverse order of removal.

2.4 Replacing the Take-up Motor

> ***CAUTION:***
> *NEVER separate the take-up motor from the bracket because doing so will change the adjustment.*

NOTE: *The following procedure can be employed without removing the top cover and left side cover.*

1) Remove the four FL-3×5 screws to detach the motor cover.
2) Remove the connector for the rewind full sensor (LED).
3) Disconnect the connector from the CN1 on the PWM PC board and remove the two FL-3×5 screws to detach the take-up motor.

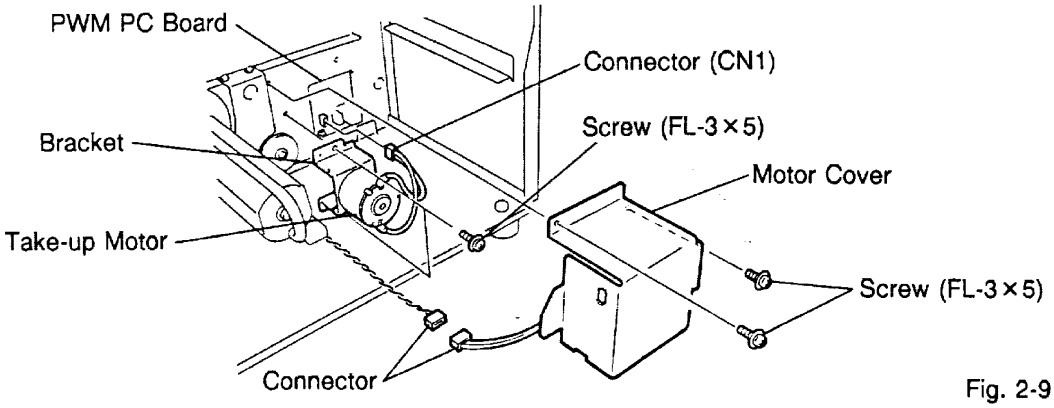


Fig. 2-9

4) Replace the take-up motor, then align the dowels to attach the motor cover and rewind full sensor (Tr).

2.5 Replacing the Solenoid

NOTE: *The following procedure can be employed without removing the top cover and left side cover.*

1) Before removing the ribbon stopper, check its attaching direction for later installation. Remove the ribbon stopper from the ribbon shaft on which the ribbon is wound.
2) Remove the two SM-4×8B screws, disconnect the connector CN1 on the RSV PC board to detach the solenoid unit.

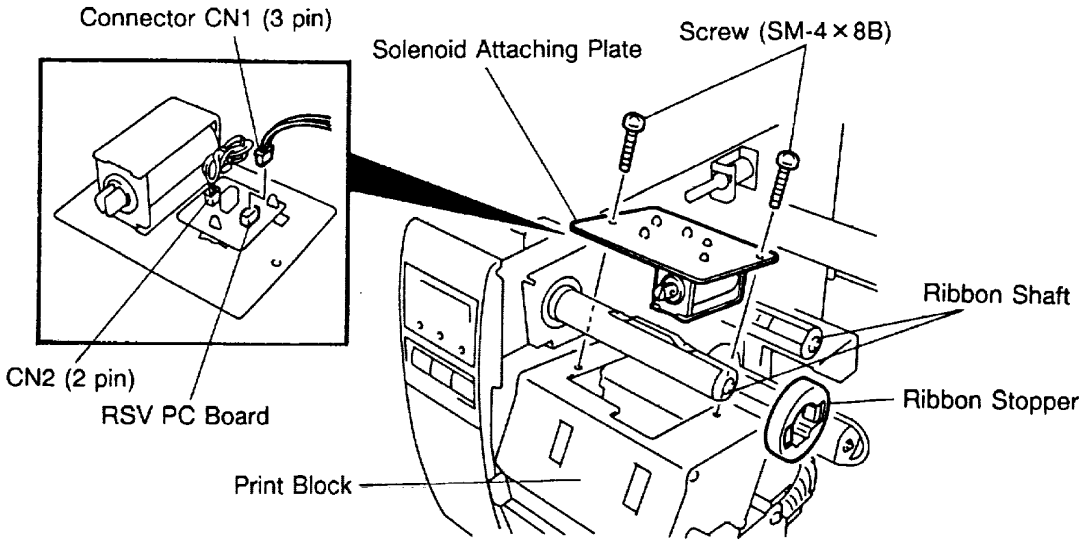


Fig. 2-10

3) Remove the two SM-3×5B screws and disconnect the connector CN2 on the RSV PC board to detach the solenoid.

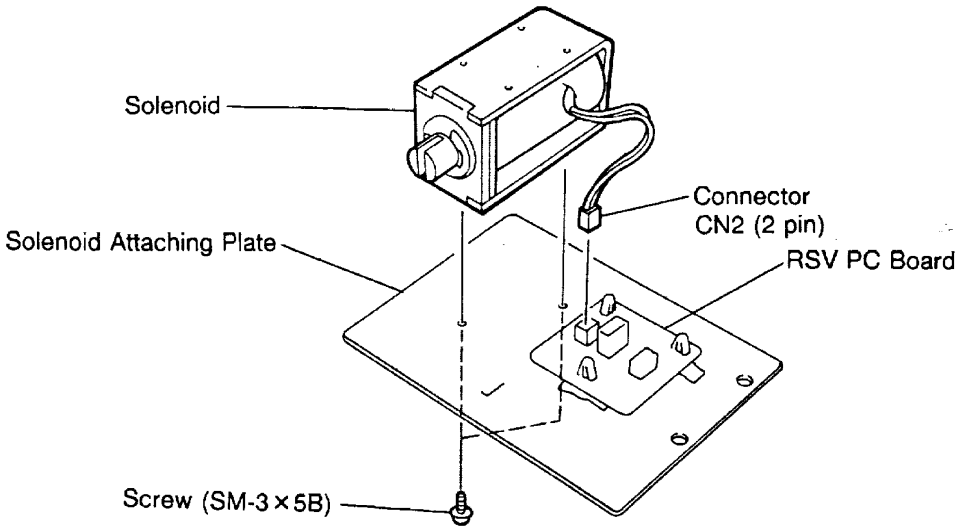


Fig. 2-11

NOTE: Make sure to remove any dust that appears during removal or installation because it may affect the print quality.

4) Replace the solenoid and attach it to the solenoid attaching plate.
5) Assemble the solenoid unit so that the head up link engages the spring pin.

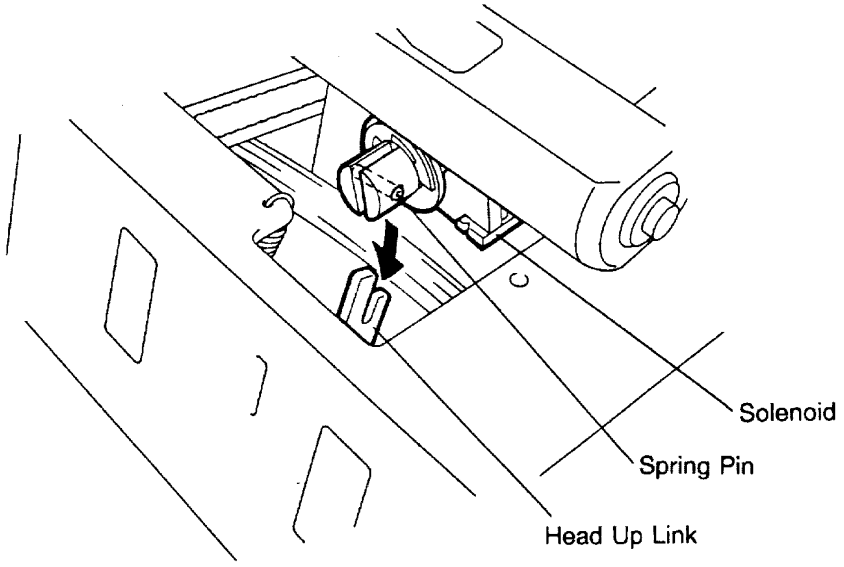


Fig. 2-12

CAUTION:
Take care to orient the screws so that they are vertically aligned with the solenoid attaching plate.

6) Reassemble in the reverse order of removal.

2.6 Replacing the Print Head

CAUTION:

1. *NEVER touch the element when handling the print head.*
2. *NEVER touch the connector pins to avoid a breakdown of the print head by static electricity.*
3. *NEVER remove the two screws painted red on the side of the print block.*
4. *NEVER remove the four screws on the side of the print block.*
5. *NEVER remove the print block, otherwise it requires the adjustment of the position when reassembling.*

NOTE: *The following procedure can be employed without removing the top cover and the left side cover.*

2.6.1 Old type print head

1) Turn the head lever clockwise to lower the print head. Remove the two SM-4×8B screws.
2) Turn the head lever counter clockwise and disconnect the two connectors to detach the print head from the print block.

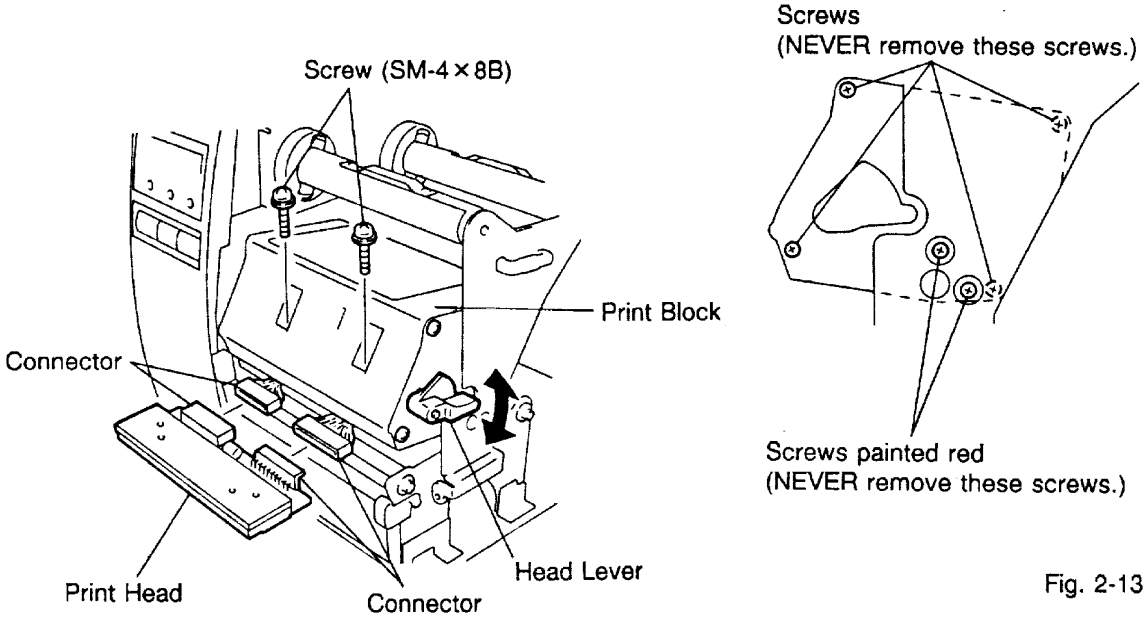


Fig. 2-13

3) Replace the print head, connect the connectors and install it in the print block.
4) Turn the head lever clockwise. Push the print head and secure it temporarily. Follow the procedure on the next page.

■ Adjusting the print head position

① Fit the jig in the platen and strip shaft.

② Press the jig at an angle of 45° until it is sung against the print head. Then secure the print head.

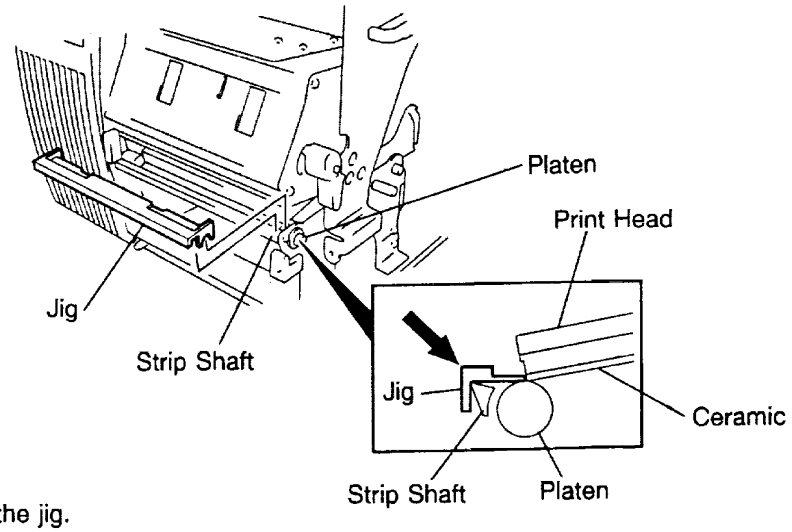


Fig. 2-14

③ Remove the jig.

④ Refer to page 6-43 and clear the maintenance counter.

⑤ Refer to page 6-31 and perform test print.

NOTE: *Use caution to prevent damage to the element during adjustment of the print head.*

2.6.2 New type print head

NOTE: *Never loosen screws other than two SM-4×8B.*

1) Turn the head lever clockwise to lower the print head. Remove the two SM-4×8B screws.
2) Turn the head lever counterclockwise and disconnect the two connectors to detach the print head from the print block.

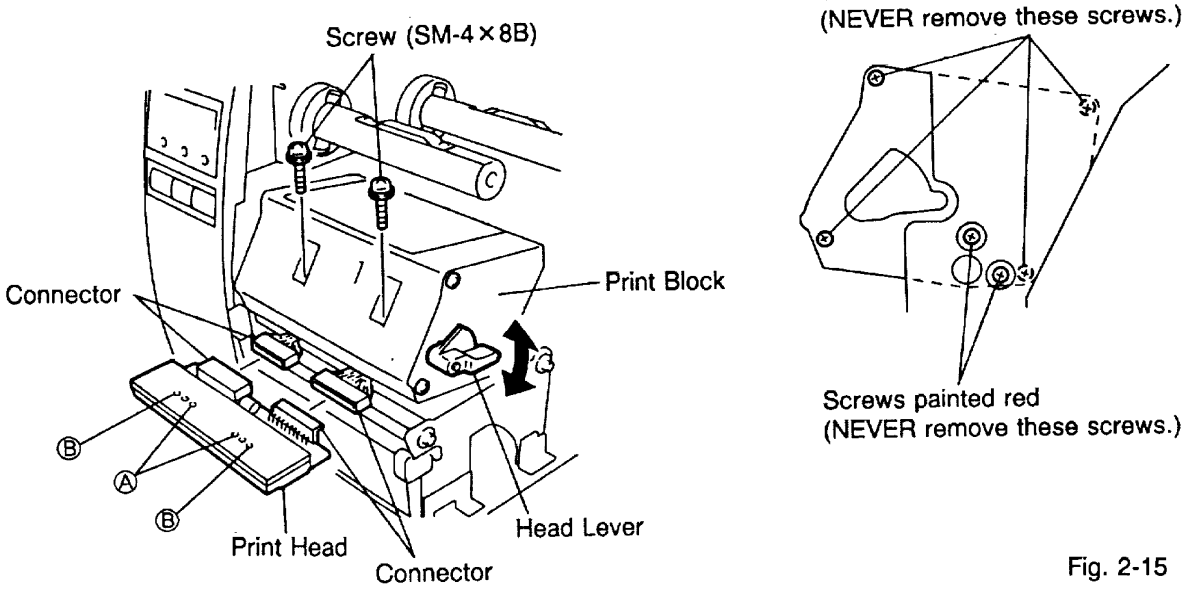


Fig. 2-15

3) Replace the print head and connect the connectors.
4) Align the two holes Ⓐ in the middle of the print head with the print head position adjusting pins provided in the print block and fit the print head into the print block.
5) Turn the head lever clockwise and secure the print head with screws in the holes Ⓑ.

NOTE: *Use caution to prevent damage to the element during print head adjustment.*

■ Adjusting the print head position

When print tone becomes light from using special paper with improper print head position, please follow the procedure below and adjust the print head position.

NOTE: *Never loosen screws ⓒ unless print position fine adjustment is required because they have been adjusted properly. Doing so will change the adjustment.*

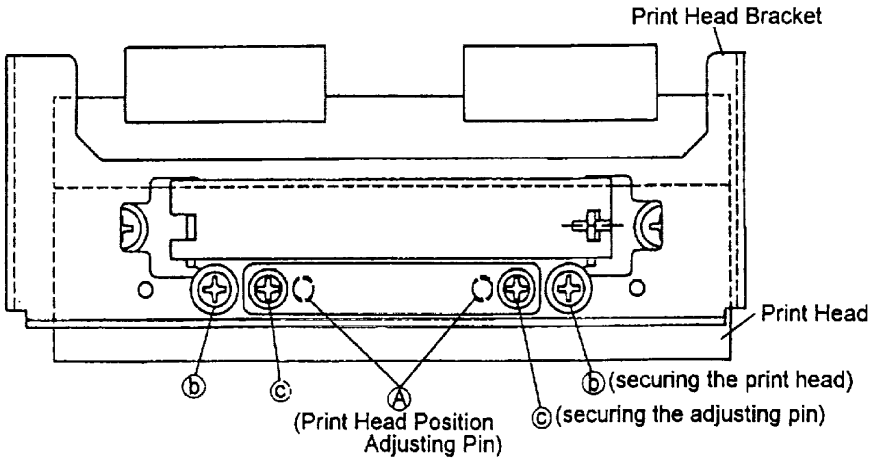


Fig. 2-16

(1) Loosen the screws ⓒ securing the print head position adjusting pin.

(2) Loosen the screws ⓑ one by one, slightly move the print head backward or forward, and then tighten the screws ⓑ and ⓒ. Ensure that the print head is parallel to the platen. If not, print tone will be uneven.

(3) Make a test print and if necessary, repeat Step 2) until the printer prints properly.

2.7 Replacing the Platen and Feed Roller

CAUTION:

1. *NEVER remove the four screws painted red fixing the right plate and reinforcing plate. (See Fig. 2-16)*
2. *The pinch roller belt assembled inside the printer does not need to be replaced because it receives less load.*

1) Remove the front plate and belt cover. (See Fig. 2-6.)

2) Turn the head lever counterclockwise, then release the ribbon shaft holder plate.

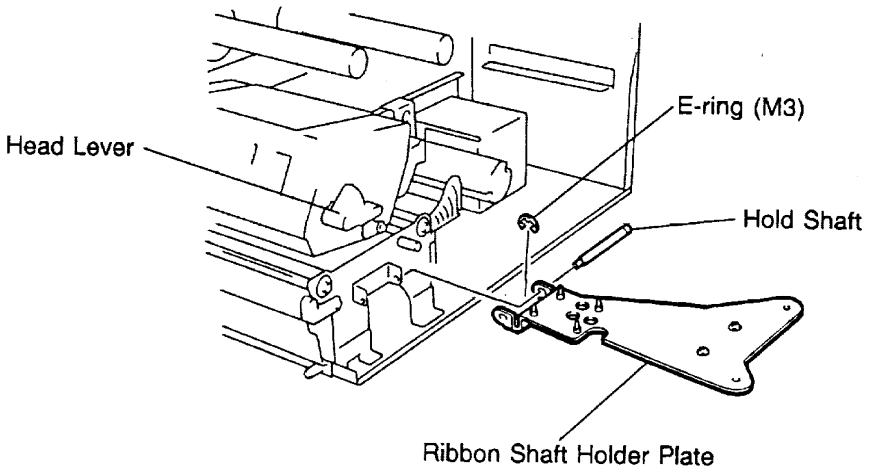


Fig. 2-17

3) Disconnect the connector for the strip sensor (LED).
4) Remove the six screws (FL-4×6, B-4×12 and P-3×12) to detach the right plate Ass'y.

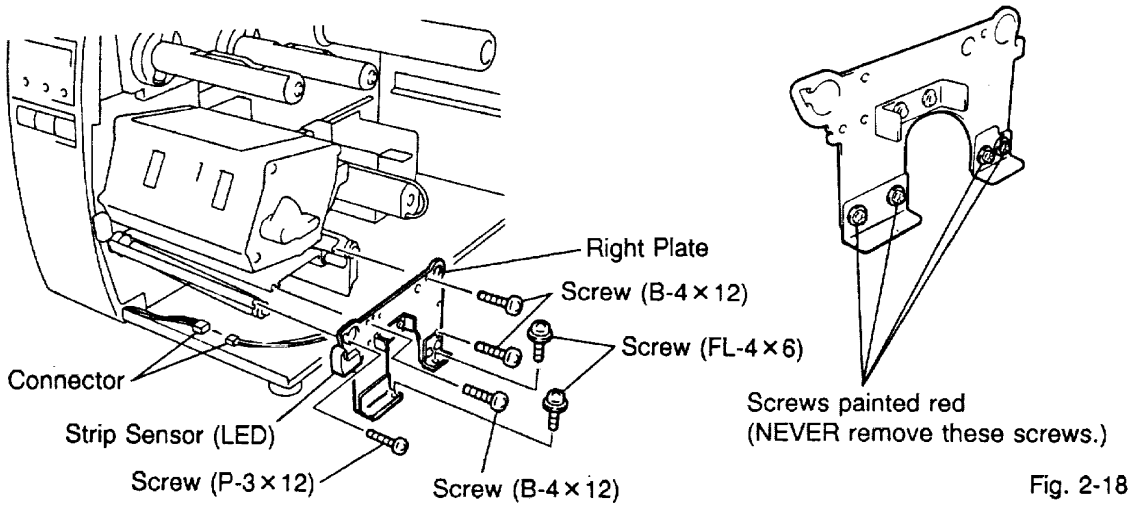


Fig. 2-18

NOTE: The machine with a serial number of 4T×××××× or later is not equipped with the red screws because of the change in the right plate shape.

5) Loosen the two screws (SM-4×8B) fixing the stepping motor to loosen the platen belt and feed roller belt.
6) Remove the platen belt to detach the platen. Remove the feed roller belt to detach the feed roller.
7) Remove both bearings from the platen or feed roller.

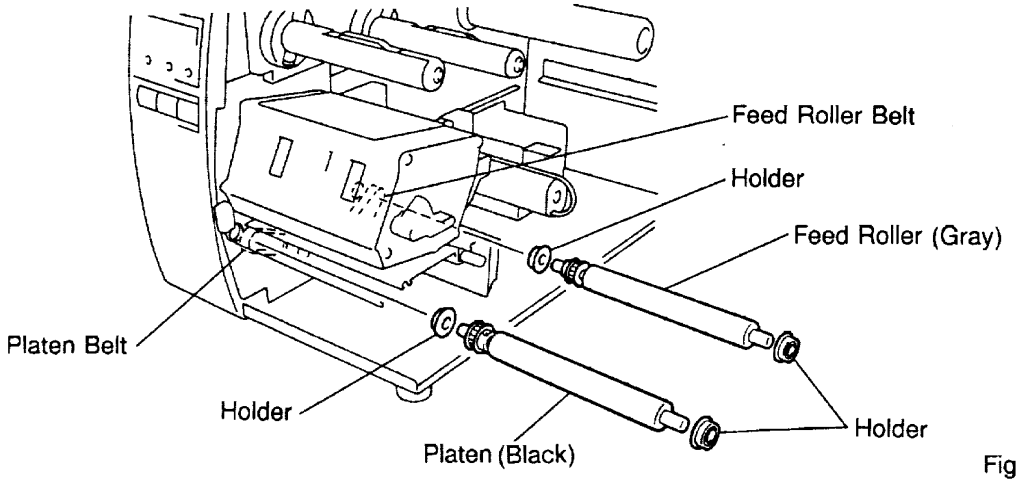


Fig. 2-19

8) Replace the platen and feed roller, put on the belt and assemble it with the printer. The longer belt is the platen belt.
9) Attach the right plate.
10) Hold down the stepping motor and secure it so that the belts have no slack or disengagement.
11) Reassemble in the reverse order of removal.

2.8 Replacing the Paper Sensor

NOTE: Turn the knob until the paper sensor reaches full forward.

1) Disconnect the connector for the strip sensor (LED) to remove right plate Ass'y. (See Figs. 2-17 and 2-18.)
2) Disconnect the connectors for the paper sensor.
3) Remove M1.5 E-ring, M3 washer and paper sensor unit.
4) Remove M1.5 E-ring, turn the knob counter clockwise, then remove the paper sensor.

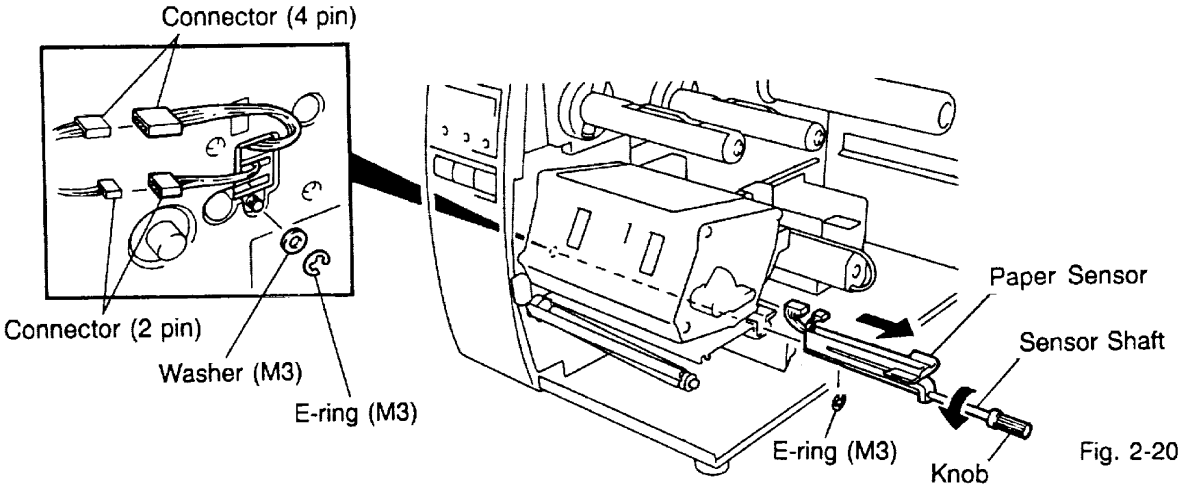


Fig. 2-20

5) Replace the paper sensor and reassemble in the reverse order of removal.
6) After replacing the paper sensor, refer to page 6-32/6-33 and adjust the voltage.

2.9 Replacing the Ribbon Back Tension Block

1) Turn the head lever counterclockwise, then release the ribbon shaft holder plate.
2) Remove the M3 E-ring and the two M3 washers to remove the ribbon back tension block. At this time, remove the back tension stopper and ribbon back tension washer from the ribbon back tension block.

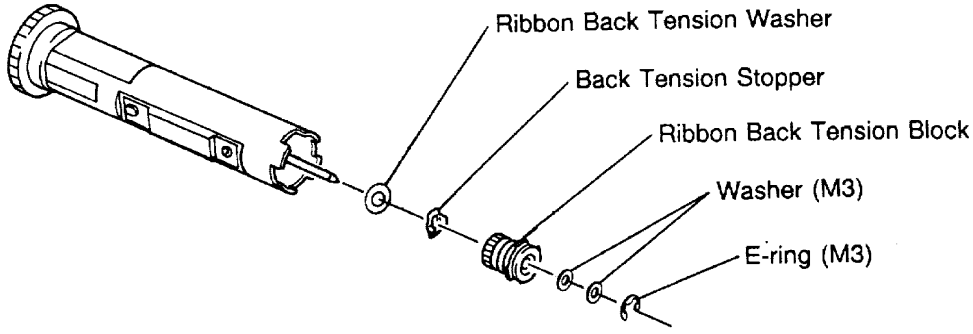


Fig. 2-21

3) Replace the back tension block and reassemble in the reverse order of removal.

2.10 Replacing the Pinch Roller Shaft Ass'y

1) Turn the head lever to position ③, and release the ribbon shaft holder plate.
2) Remove the black screw to detach the media guide plate.

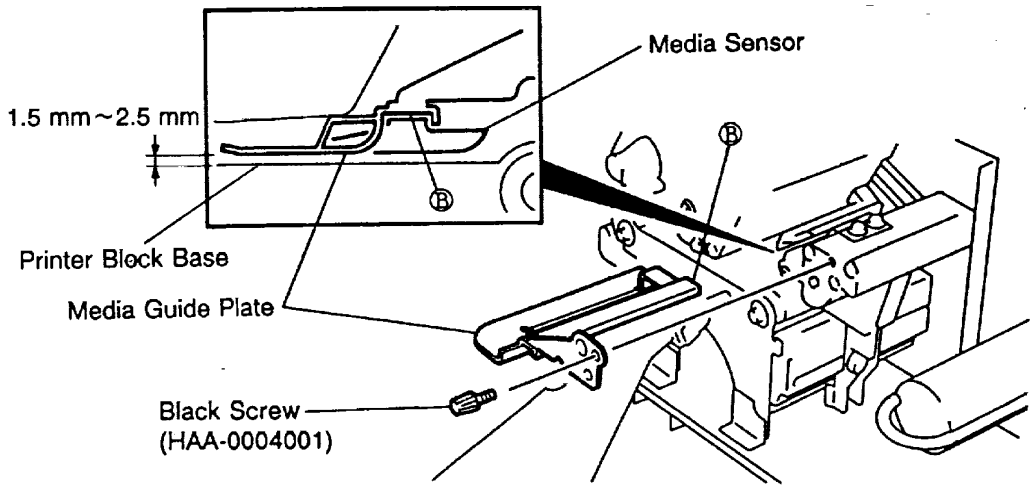


Fig. 2-22

3) Remove the SM-4×8B screw to detach the spring plate.
4) Remove the six B-4×12 screws to detach the pinch roller cover.
5) Remove the E-5 E-ring to loosen the pinch roller belt, and remove the pinch roller shaft ass'y.

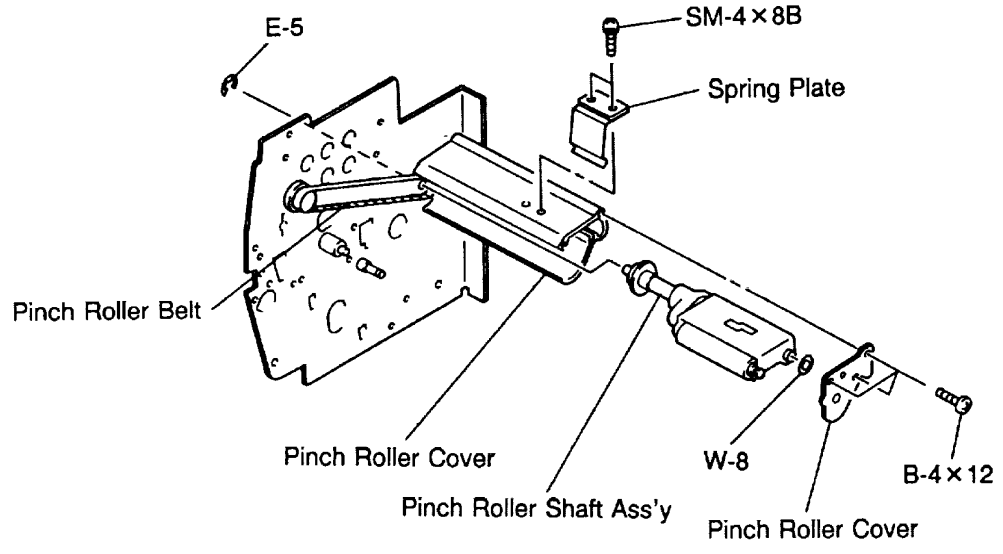


Fig. 2-23

6) After replacing the pinch roller shaft ass'y, make the following adjustment while you reassemble the pinch roller shaft ass'y in the reverse order of removal.

■ Adjustment

1. Install the pinch roller unit so it parallels the base. If it does not, change the engaging position of the pinch roller belt and the pulley.

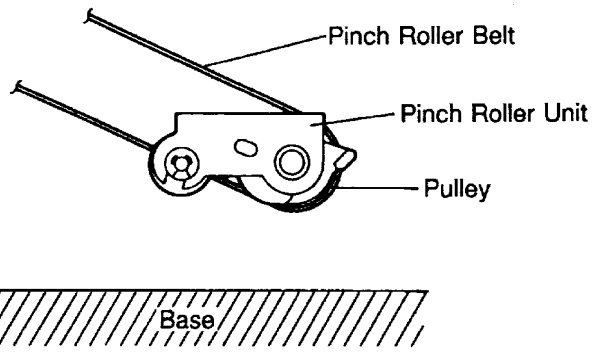


Fig. 2-24

2. Attach the jig to the platen, feed roller and pinch roller shaft as shown in the figure below. Then attach the pinch roller cover to the pinch roller frame with the three B-4×12 screws. Then secure the pinch roller frame with the three B-4×12 screws.

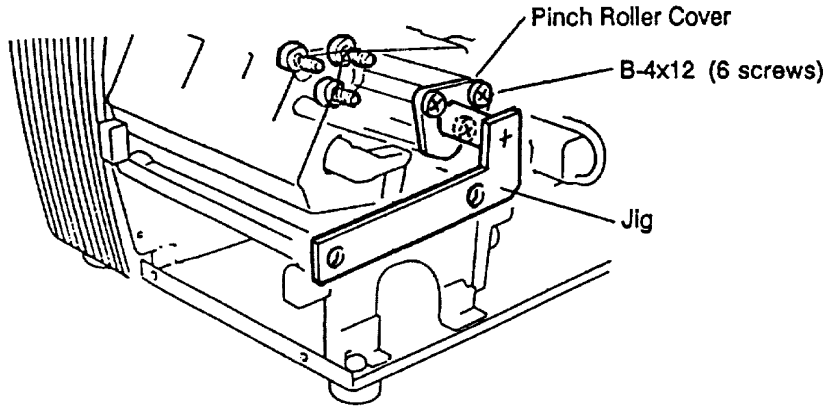


Fig. 2-25

NOTES: *1. Replace the platen and the feed roller prior to attaching the jig.*

2. Attach the fig while the pinch roller frame is tentatively attached to the main frame with the B-4×12 screws. Secure the pinch roller cover to the pinch roller frame with the three B-4×12 screws, then tighten the other side of the screws.

3. The flat top of the pinch roller frame must be installed in parallel to bosses on the printer frame.

Check

① Check if excessive load is applied to the jig after the above NOTE 2. (For example, check if the pinch roller frame moves when the jig is removed.)

② Check that there is no gap caused by a slant shaft between the pinch roller and the feed roller when the pinch roller is lowered.

3. Turn the head lever clockwise to lock the pinch roller shaft ass'y. Attach the spring plate to the pinch roller frame with the two SM-4×8B screws, pushing the spring plate toward the rear of the printer.

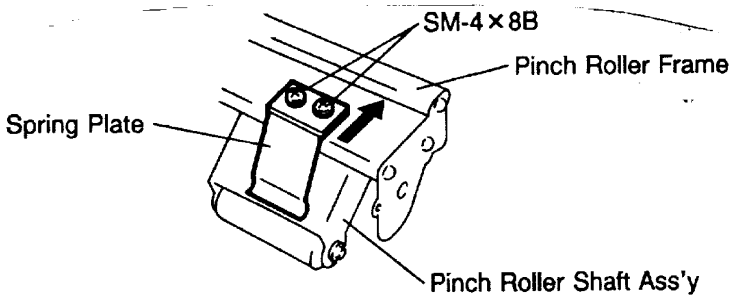


Fig. 2-26

NOTE: Check that the pinch roller shaft ass'y moves up and down smoothly when turning the head lover clockwise/counterclockwise.

4. Install the media guide plate to the printer so there is a 1.5 to 2.5 mm gap between the media guide plate and the printer block base.

2.11 Correcting Skew Printing

- If media still skews after adjusting the pinch roller shaft Ass'y with the jig, follow the procedure below to correct the skew problem.

1. Check if the media skews right or left.
2. Loosen the B-4×12 screw to move the pinch roller cover to the front or rear of the printer depending on the skew direction.

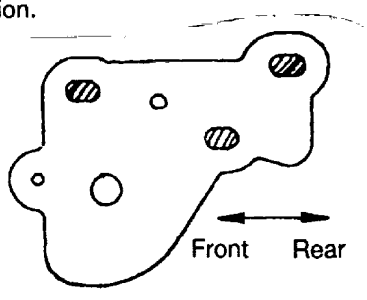


Fig. 2-27

When the media skews right, move the pinch roller cover to the front.
When the media skews left, move the pinch roller cover to the rear.

- If a paper skew problem should occur when using rolls wound with labels facing outside after completing the modification, adjust the paper guide as follows.
  * In case the label skews to the right side of the print head, move the guide downward.
  * In case the label skews to the left side of the print head, move the guide upward.

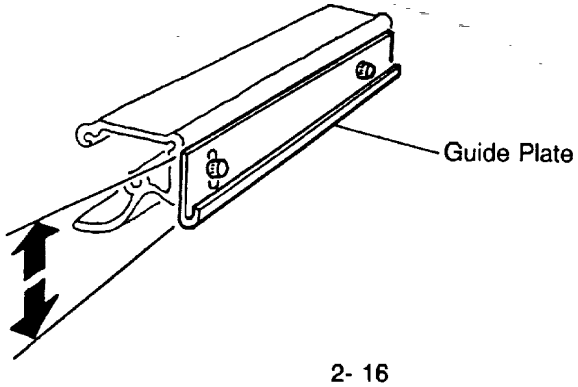


Fig. 2-28

3. INSTALLATION PROCEDURE FOR THE OPTIONAL EQUIPMENT

WARNING!

Make sure to unplug the power cord before installing the optional equipment.

3.1 High Speed PC Interface Board (B-4800-PC-QM)

The high speed PC interface board can be used together with the IBM PC-AT or its compatible machine only.

Description	Q'ty/Unit	Description	Q'ty/Unit
BPE PC board	1	Locking support	2
BPC PC board	1	Program diskette	1
Printer cable	1	Owner's Manual	1
Cable support	1		

1. Remove the top cover and left side cover. (See Fig. 2-1.)
2. Remove the two FL-3×5 screws to detach the blind plate.
3. Pass the printer cable through the opening.
4. Fasten the ground wire of the printer cable to the CPU PC board at the upper right with the SM-3×6B screw securing the CPU PC board.
5. Attach the two locking supports to the main frame plate. Install the BPE PC board aligning with the connector (CN15) and locking supports.

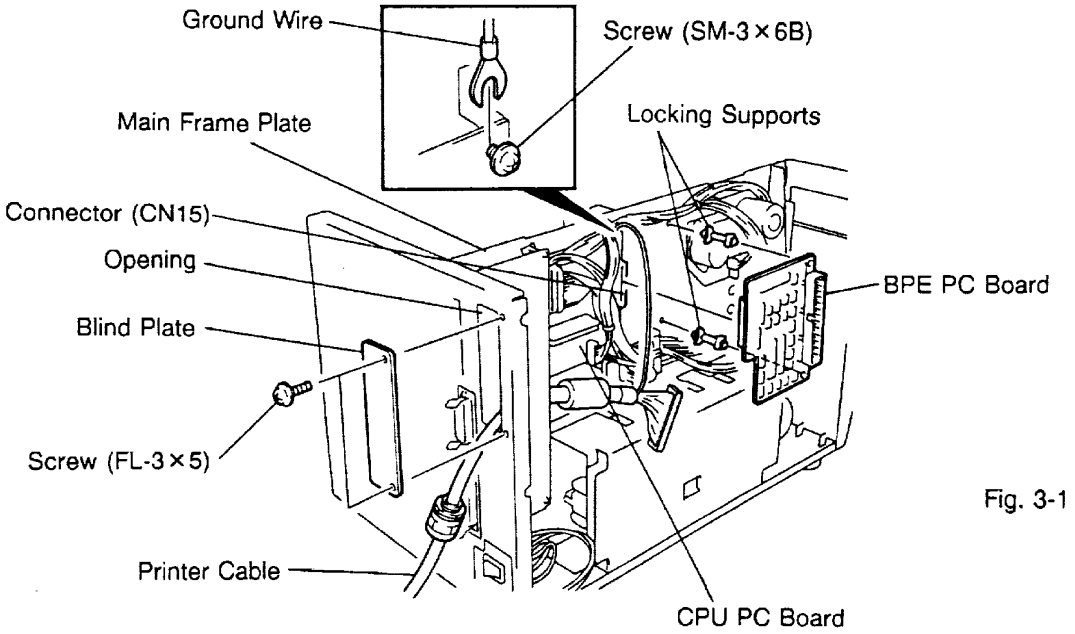


Fig. 3-1

6. Connect the printer cable to the connector (CN1) on the BPE PC board.
7. Put the cable strain relief of the printer cable in the notch of the cable support plate. Secure the cable strain relief to the cable support plate by turning the nut.
8. Attach the cable support plate to the printer with the FL-3×5 screws removed in step 2.

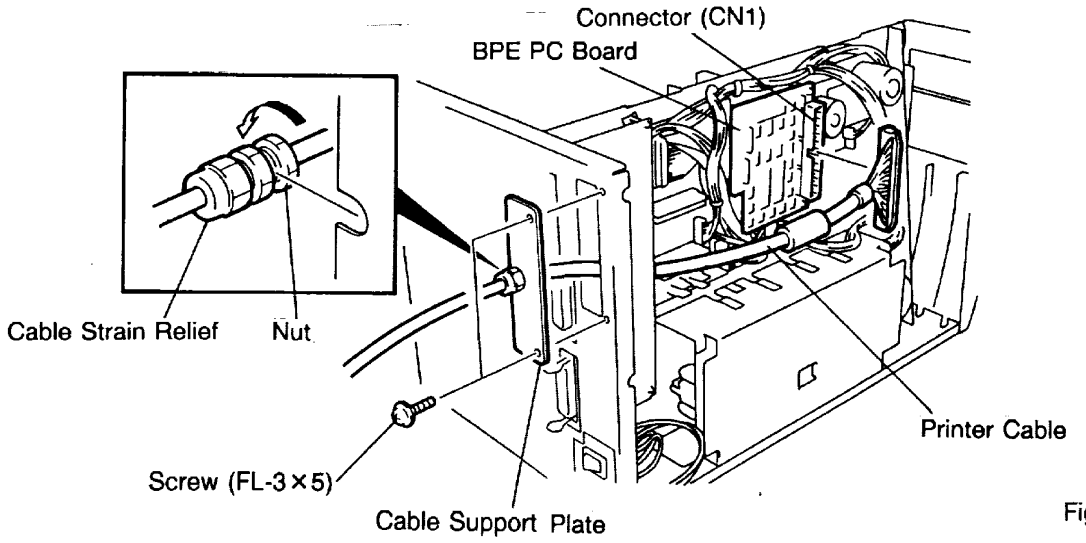


Fig. 3-2

9. Reassemble in the reverse order of removal.
10. Following procedure should be employed with your PC after this.
11. Set the DIP SW. on the BPC PC board for the I/O address according to your PC.
12. Install the BPC PC board on the expansion port bus line of your PC.
13. Connect the printer cable mentioned in step 5 to the BPC PC board.
14. Insert the attached FDK into the FDD and install the data in the hard disk. Since the installation procedure is different between MS-DOS and Windows, refer to each owner's manual.
15. Perform a motion check.

3.2 Cutter Module (B-4205-QM)

Description	Q'ty/Unit	Description	Q'ty/Unit
Cutter Unit	1	Cutter Attaching Screw	2
Cutter Cover	1	Screw (FL-4×6)	1
Take-up/Cutter Harness	1	Cleaner	1

NOTE: *For the B-570 series, the take-up/cutter harness enclosed with the B-4205-QM is not used but the take-up harness connected to CN2 on the PWM PC board.*

1. Remove the top cover and left side cover. (See Fig. 2-1.)
2. Remove the I/F PC board. (See Fig. 2-2.)
3. Remove the front plate. (See Fig. 2-6.)
4. Remove the screw (SM-4×8B) and two connectors to detach the operation panel.

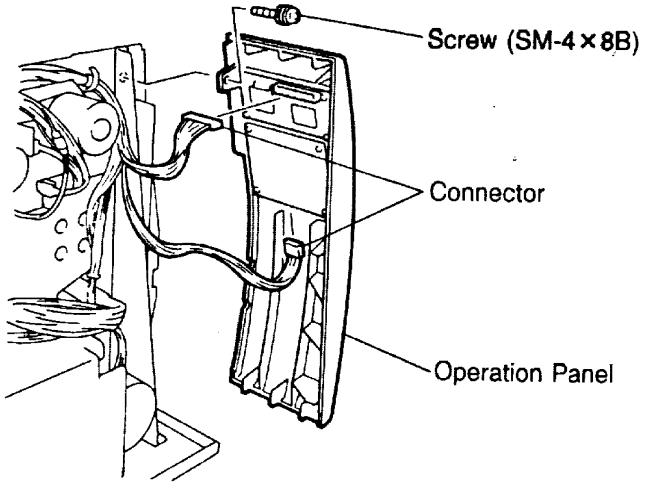


Fig. 3-3

5. Unclamp and disconnect the connector for the strip sensor from CN5 on the CPU PC board.
6. Remove the SM-4×6B screw to detach the strip sensor (LED)/(Tr).

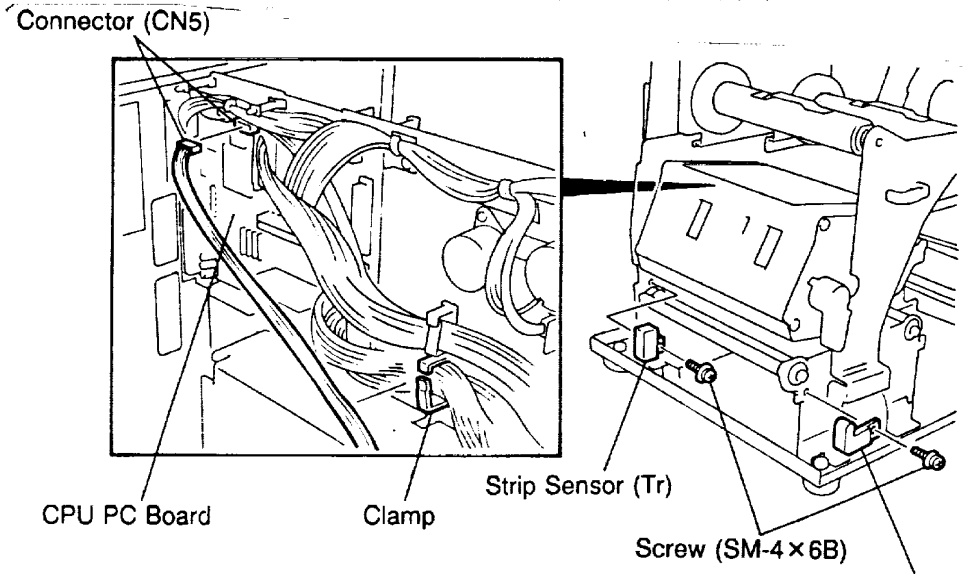


Fig. 3-4

7. Install the cutter unit with the attached screws (cutter attaching screw, FL-4×6).

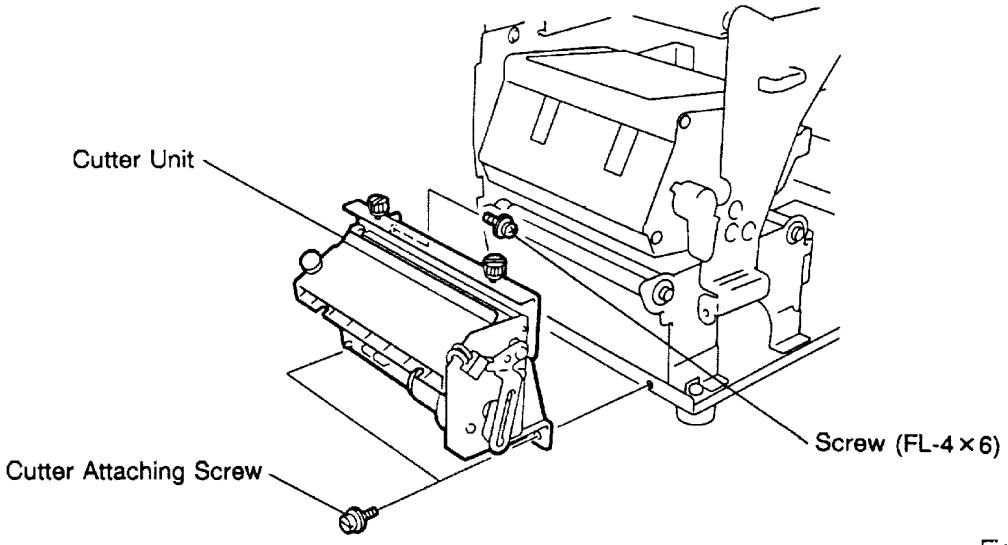


Fig. 3-5

8. Remove the motor cover. (See Fig. 2-9.)
9. Disconnect the connector from CN2 on the PWM PC board.
   Clamp and pass the cable through the opening and connect it to the CN1 on the Cutter I/F PC board.

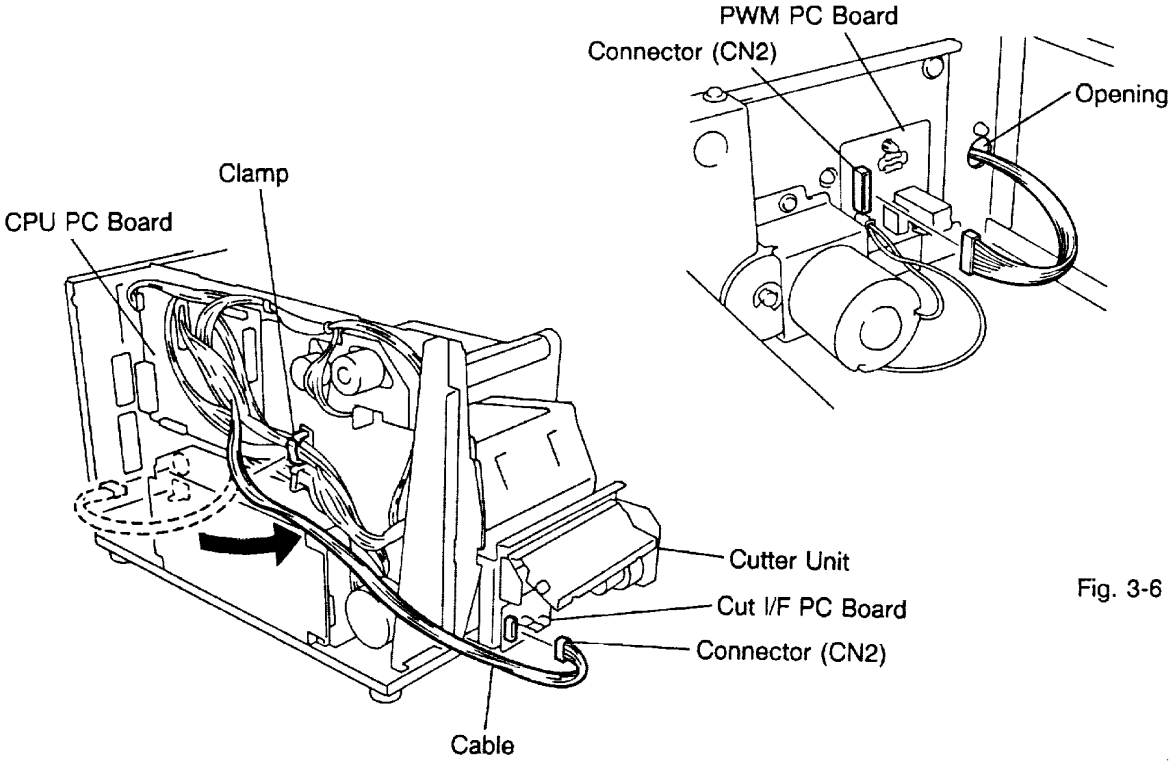


Fig. 3-6

10. Mount the cutter cover with the two screws.

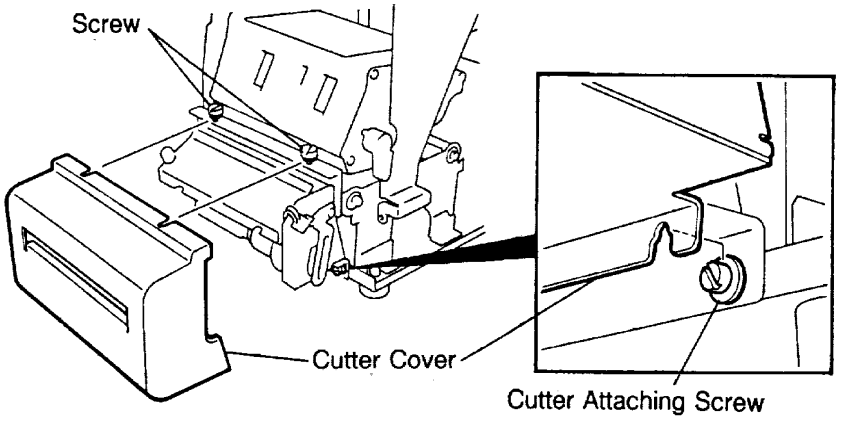


Fig. 3-7

11. Reassemble the motor cover, rewind full sensor (Tr), I/F PC board, left side cover and top cover in order.
12. After reassembly is complete, perform a test print to confirm that the cutter works properly. After printing a print sample at a speed of 8"/sec., feed the media about 33 mm and check that the swing cutter works without error. After cutting the media, feed the media about 33 mm in the reverse direction and check that it correctly stops at the print start position.

NOTES: 1. If the top edge of label winds onto the platen in cut issue, set DIP SW. 1-5 to ON. (Refer to the Owner's Manual.)
2. Retain the parts that are removed during installation of the cutter unit. They will be required when the printer is modified to a standard type.

Removed Parts	Q'ty/Unit	Removed Parts	Q'ty/Unit
Front plate	1	Strip sensor (LED)/(Tr)	1
Black screws	2	Screw (P-4×6)	2

■ Adjusting the Cutter Guide Plates

After replacing the cutter unit the following adjusting procedure should be employed to prevent paper jams.

1. Attach the cutter guide plate A with two SM-4×6C screws so that the fixed cutter is positioned 0.1 mm to 0.4 mm above the bottom of the cutter guide plate A.
2. Attach the cutter guide plate B with two FL-4×8 screws so that there is a clearance of 0.5 mm between the cutter guide plate A and cutter guide plate B using a clearance gauge.

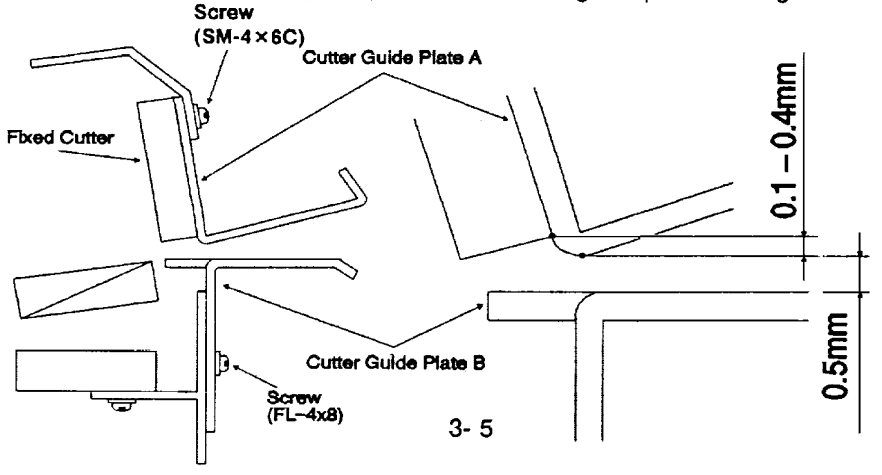


Fig. 3-8

3.3 Memory Module

1. Remove the top cover and left side cover. (See Fig. 2-1.)
2. Hold the memory module so that the Pin 1 is on the upper right, then attach the memory module to the IC socket. Expanding the memory must be performed in sequence, IC19, IC20, IC21, IC22, IC23 and IC24.

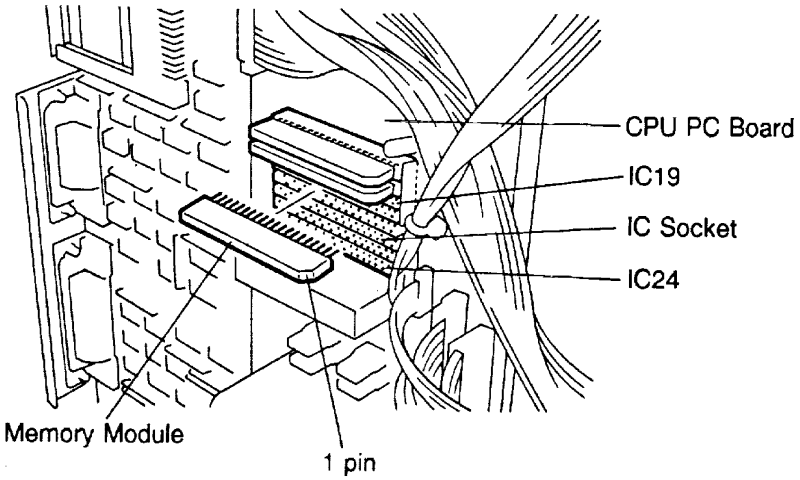


Fig. 3-9

3. Reassemble the left side cover in the reverse order of removal.

■ Expansion memory and drawing size

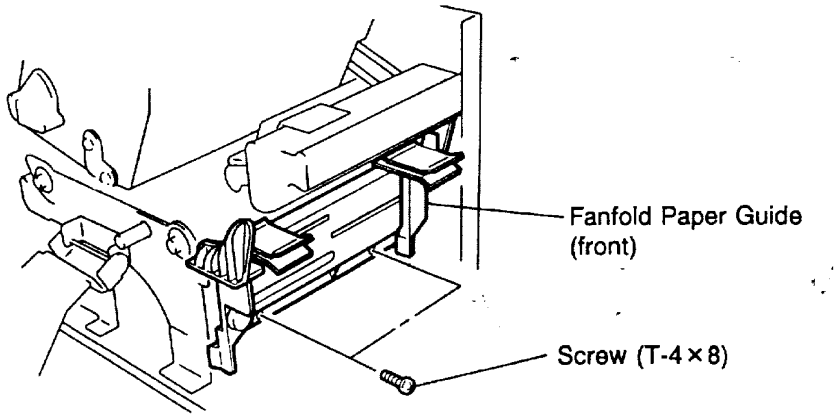
RAM Capacity	IC No.	Max. drawing size (normal) (W) × (H) (mm)			Max. drawing size (on-the-fly) (W) × (H) (mm)			Remarks
		Batch	Strip	Auto-cut	Batch	Strip	Auto-cut	
1MB	IC17, 18	138.0×298.6			138.0×149.3			Standard
1.5MB	IC17~19	138.0×469.3			138.0×234.6			Option
2MB	IC17~20	138.0×640.0			138.0×320.0			Option
2.5MB	IC17~21	138.0×810.7			138.0×405.3			Option
3MB	IC17~22	138.0×981.4			138.0×490.7			Option
3.5MB	IC17~23	* 138.0×995.0		* 138.0× 991.0	138.0×576.0			Option
4MB	IC17~24	* 138.0×995.0		* 138.0× 991.0	138.0×661.3			Option

*: The size for the tag paper is 138.0 × 997.0.

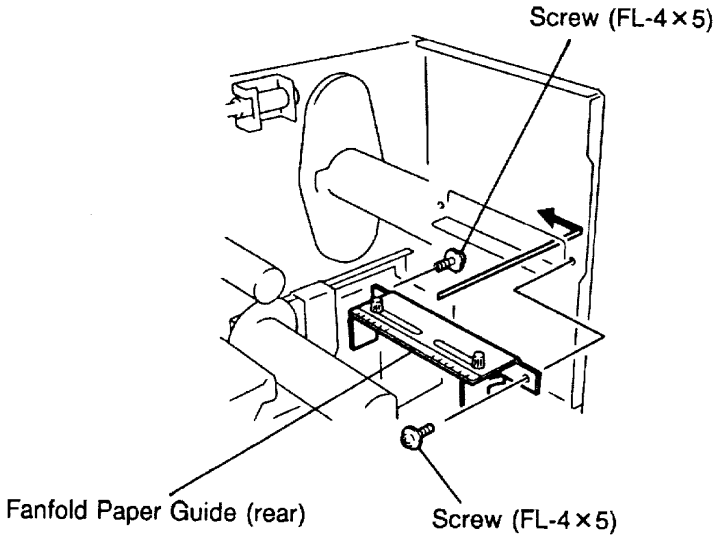
3.4 Fanfold Paper Guide Module (B-4905-FF-QM)

Description	Q'ty/unit
Fanfold Paper Guide (rear)	1
Fanfold Paper Guide (front)	1

1. Open the top cover.
2. Remove the T-4×8 screws to detach the paper guide ass'y at the center of the printer and attach the fanfold paper guide (front) with these same screws.



3. Remove the FL-4×5 screw to detach the blind plate on the back of the printer and attach the fanfold paper guide (rear) with the same screw.



4. MECHANISM DESCRIPTION

4.1 Cutter Drive (Cutter mode)

The printer supplies DC +27 V to the cutter motor to rotate the cutter motor and clutch counter clockwise. The arm swings like a pendulum and moves the fixed slide cutter up and down to make a cut.

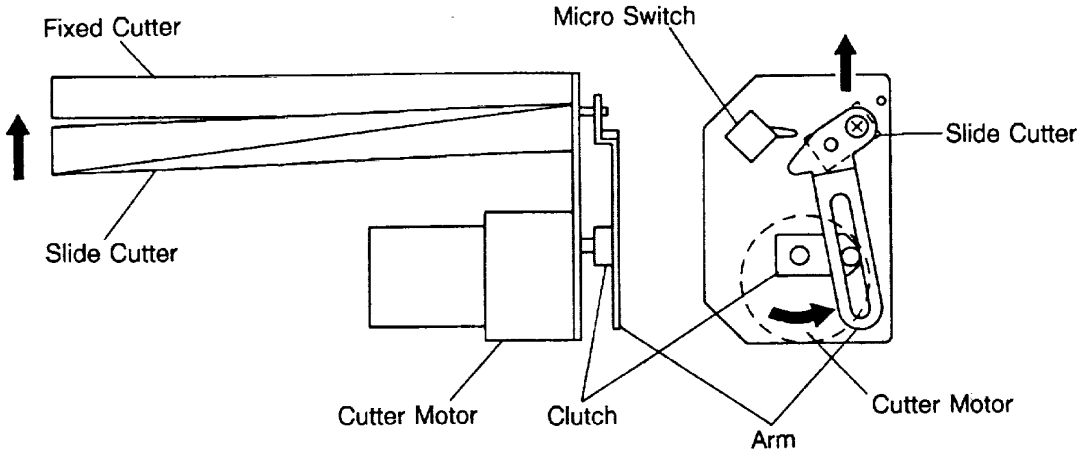


Fig. 4-1

After making a cut the arm turns the micro switch off and the cutter home position is detected. When the cutter does not return to the home position because of a paper jam, an error occurs and the next piece of paper will not be cut.

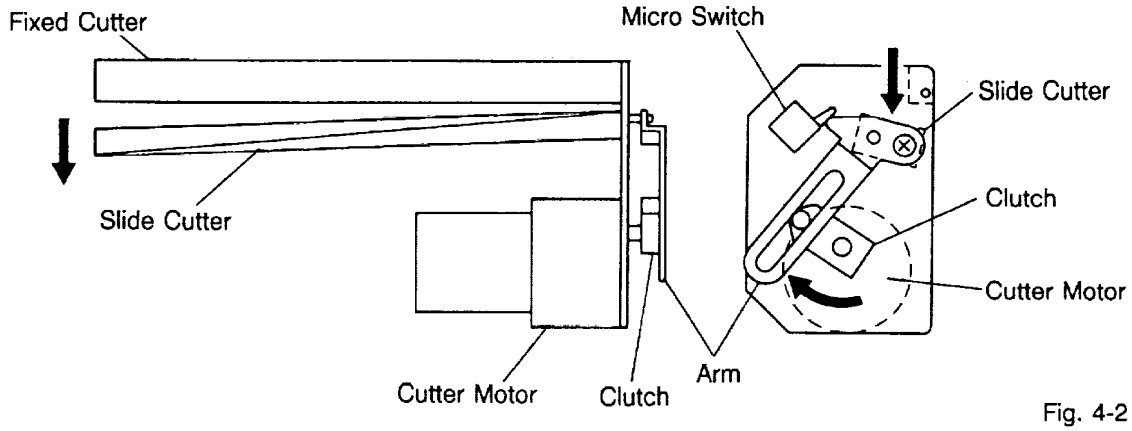
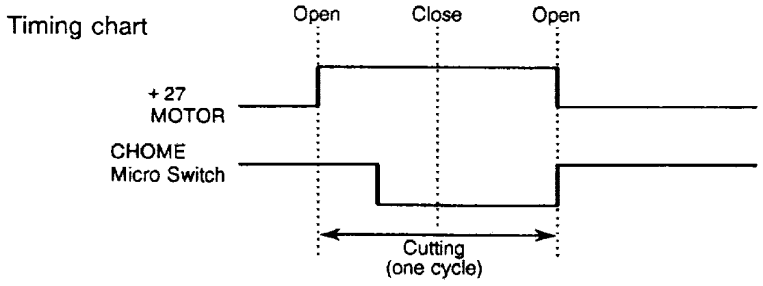


Fig. 4-2



4.2 Harness Wiring

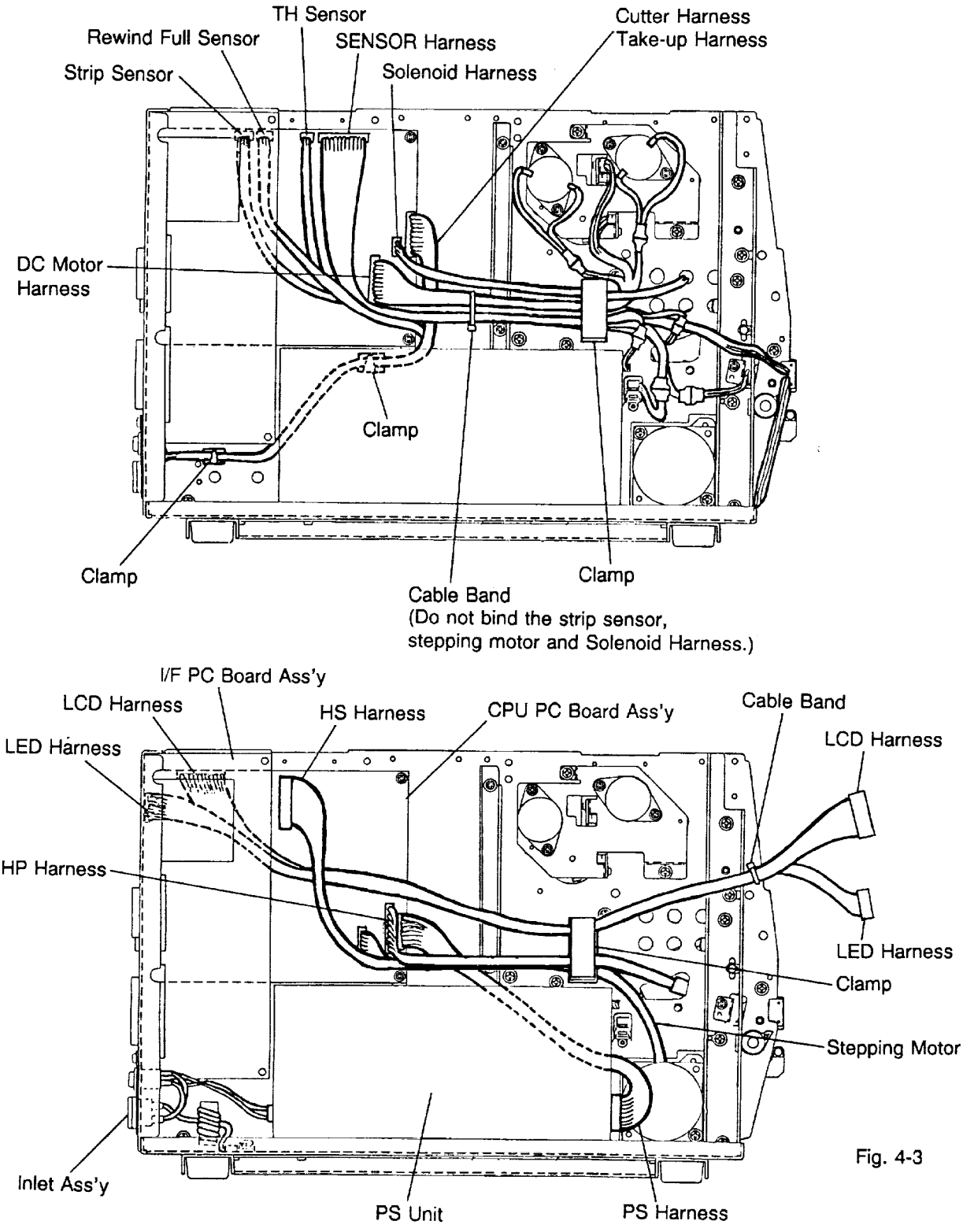


Fig. 4-3

5. TROUBLESHOOTING

Problems	Cause	Solution
Power is not turned ON.	1. Input voltage to the printer is not within the rated voltage. (Check by CN1 on the PS unit.)	• Replace the power cable or power inlet.
	2. Output voltage from the printer is not within the rated voltage. (Check that the voltage between Pin 4 and Pin 6 (GND) of CN2 on the PS unit is 27 V. And check the voltage between Pin 1 and Pin 3 (GND) is 5 V.)	• Replace the PS unit.
	3. CPU PC board is not applied with voltage. (Check the voltage between Pin 1 and Pin 3 (GND) of the CN17 on the CPU PC board is 27 V.)	• Replace the power harness.
	4. Failure of CPU PC board.	• Replace the CPU PC board.
LED or LCD does not light.	1. Failure of the LED board/LCD	• Replace the LED board/LCD.
	2. Failure of the LCD/LED harness	• Replace the LCD/LED harness.
	3. Failure of the CPU PC board	• Replace the CPU PC board.
Poor printing	1. The print paper is of poor quality.	• Use the media approved by TEC.
	2. Dirty print head	• Clean the print head.
	3. The head lever fastens the print head incompletely.	• Fasten the head lever completely.
	4. Alignment adjustment of the print head is improper.	• Re-adjustment the head.
Printer does not print.	1. Print head failure	• Replace the print head.
	2. Connection of the print head connector is incomplete, a bad contact, or broken wires.	• Connect the harness completely, or replace the harness.
	3. Failure in the rewinding/feeding of the ribbon.	• Replace the ribbon rewind motor, ribbon feed motor or CPU PC board.
	4. Failure of the CPU PC board	• Replace the CPU PC board.
	5. Failure of the software	• Check the program.
	6. Failure of the printer cable	• Replace the printer cable.

Problems	Cause	Solution
Dot missing	1. Broken element of print head	• Replace the print head.
	2. Broken wires of print head cable	• Replace the print head harness.
	3. Failure of the CPU PC board	• Replace the CPU PC board.
Blurred print	1. Poor quality of media.	• Use only TEC specified media.
	2. Dust is attached to the media.	• Clean the print head and remove the dust from the media.
Ribbon wrinkle	1. Poor quality of the ribbon	• Use only TEC specified ribbon.
	2. Ribbon is not rewound or fed smoothly.	• Replace the ribbon rewind motor or ribbon feed motor.
Ribbon end error	1. Poor quality of the ribbon	• Use only TEC specified ribbon.
	2. Improper voltage applied to the ribbon end sensor	• Refer to page 2-3 to adjust the ribbon end sensor.
	3. Failure of the ribbon end sensor	• Replace the ribbon end sensor.
	4. Failure of the circuit which controls the ribbon end sensor.	• Replace the CPU PC board.
Label feed failure	1. Paper is not set properly.	• Set the paper properly.
	2. Paper of poor quality	• Use the paper approved by TEC.
	3. Improper adjustment of the feed gap sensor or black mark sensor.	• Re-adjustment the sensor.
	4. Failure of the feed gap sensor or black mark sensor	• Replace the feed gap sensor or black mark sensor.
	5. Labels cannot be stripped off the backing paper or the backing paper with labels cannot be wound properly.	• Replace the take-up motor or CPU PC board.
	6. The cutter mechanism is not installed properly.	• Install the cutter mechanism properly.
	7. Failure of the stepping motor	• Replace the stepping motor or CPU PC board.
Communication error	1. Failure of the communication cable	• Replace the cable.
	2. Failure of the RS-232C connector	• Replace the connector.
	3. Failure of the communication connector	• Replace the connector.
	4. Failure of the PC or application software	• Modify the program.
	5. Failure of the CPU PC board	• Replace IC5 (MC145407). If the trouble is not solved, replace the CPU PC board.

TABLE OF CONTENTS

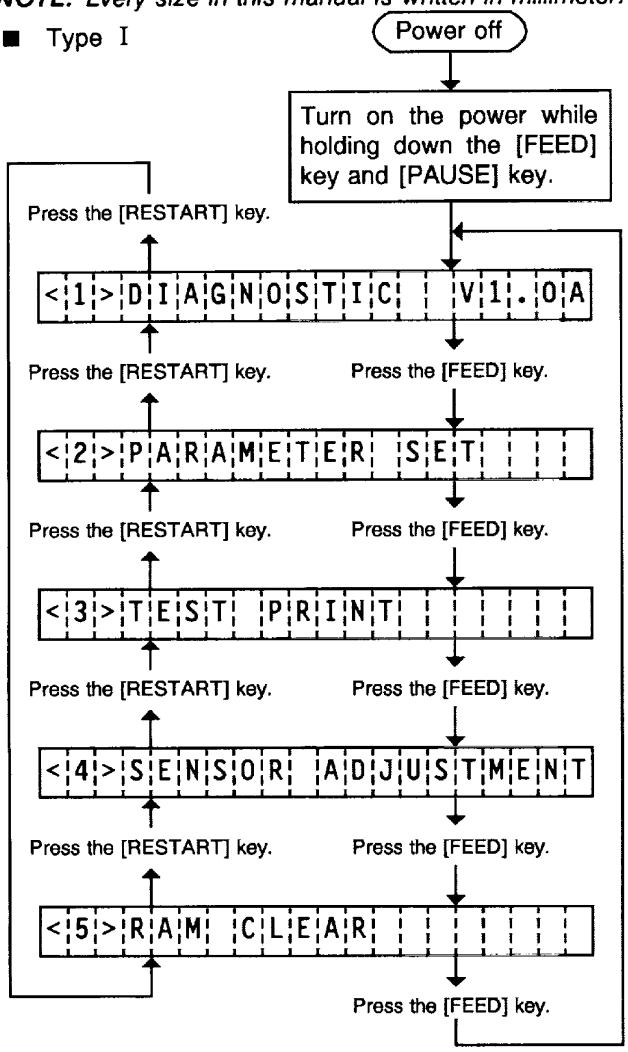
6. DIAG. TEST OPERATION

6.1 OUTLINE OF THE DIAG. TEST OPERATION

In system mode the diag. test operation is used to diagnose the printer and to set the parameters by using the [FEED], [RESTART] and [PAUSE] keys on the operation panel. Diag. test operation (Type I) is started from the power off state and the parameter setting (Type II) is started while the printer is on-line or printing. For further details, please refer to the corresponding pages.

***NOTE:** Every size in this manual is written in millimeter. To obtain the size in inch, divide by 25.4.*

■ Type I



■ Self Test Mode (See page 6-3)
Data from the maintenance counter and automatic diagnosis are printed on the media. The result of the head broken element check is indicated in the display.

■ Parameter Setting Mode (See page 6-13)
Fine adjustment of the feed length, cut/strip position, back feed, X axis and print tone, and selection of character font, font zero, control code, ribbon type, ribbon motor torque and strip wait status are available in this mode.

■ Test Print Mode (See page 6-31)
Print condition and test print type (slant line, characters and bar code) are selectable.

■ Sensor Setting Mode (See page 6-38)
A thermistor check and the setting of the black mark and feed gap sensors are available in this mode.
A transmission check is made to both a print head thermistor and an environmental temperature thermistor.

■ RAM Clear Mode (See page 6-41)
Data from the maintenance counter is cleared and parameter setting is initialized in the RAM clear mode.

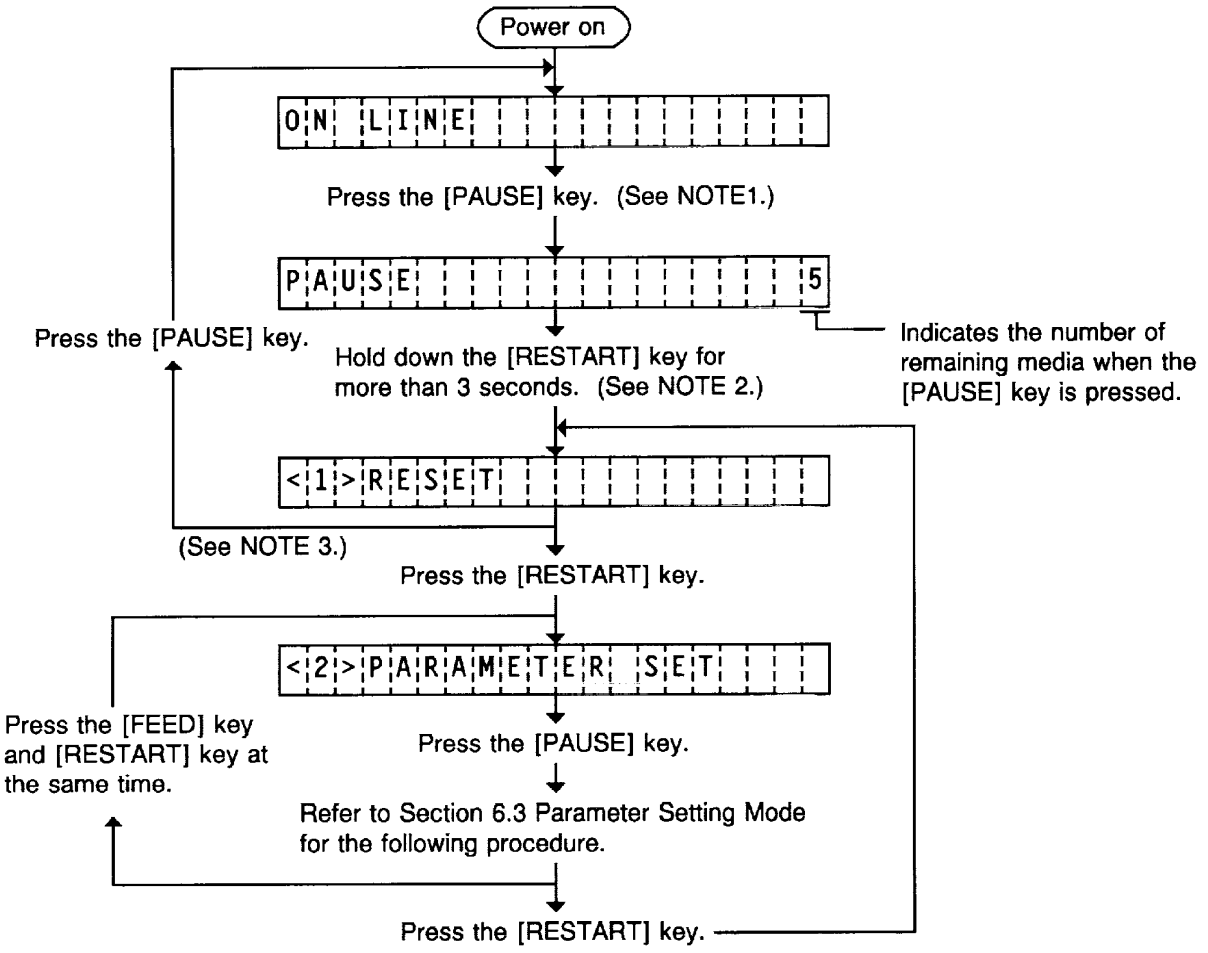
In system mode the [FEED], [RESTART] and [PAUSE] keys function as described below.

■ Key Function Table

Key Name	Function
[FEED] key	Used to start the system mode as a [PAUSE] key does. Used to select the parameter mode or to fine adjust the parameters in the negative direction (−).
[RESTART] key	Used to select the parameter mode or to fine adjust the parameters in the positive direction (+)
[PAUSE] key	Used to start the system mode as a [FEED] key does and to select the parameter mode. Used as an enter key.

■ Type II

The parameter setting such as feed length fine adjustment or cut/strip position fine adjustment can be changed while the printer is on-line or printing. Pressing the [PAUSE] key causes the printer to enter parameter setting mode. Reset mode is provided for this procedure to cancel the steps which follow the [PAUSE] key without turning the power off.



NOTES:

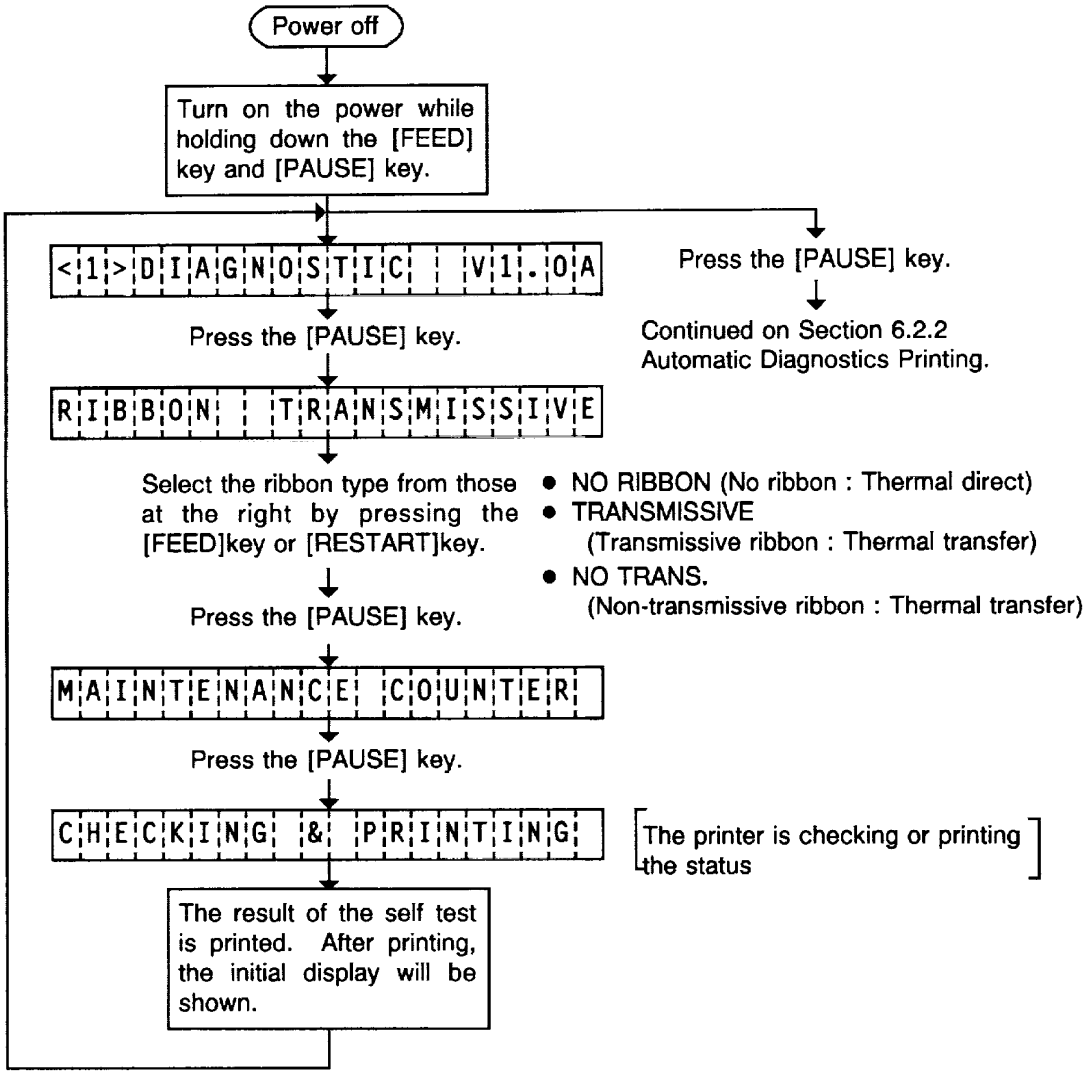
1. *Pressing the [PAUSE] key during printing causes the printer to pause printing and show the number of remaining media.*
2. *If the [RESTART] key is released within 3 seconds, the printer will resume printing because the [RESTART] key is activated.*
3. *Since the reset is performed when terminating this mode, the printer cancels the remaining media and returns to on-line mode. This reset will not clear the changed parameter settings.*

6.2 SELF TEST MODE

In self test mode the printer status is printed in two types of sample print. The result of the head broken element check is indicated in the display.

6.2.1 Maintenance Counter Printing

The data from ① to ㉔ on a sample print is printed. This data is the printer status and the value set in the parameter setting mode.



NOTES: *1. If the maintenance counter printing results in an error, the printer will display the error message and stop printing. The error status can be cleared by the [PAUSE] key, however, the display will return to the initial display "<1> DIAGNOSTIC V1.0A". Printing is not automatically resumed after the error is cleared.*

2. Both label and tag paper can be used for printing.

■ Sample Print

[Print Condition]

- Preset count : 1
- Print speed : 127 mm/sec.
- Sensor : No sensor
- Printing method: Thermal transfer
- Supply length : 50 mm
- Issuing mode : Batch printing (without rewinder)

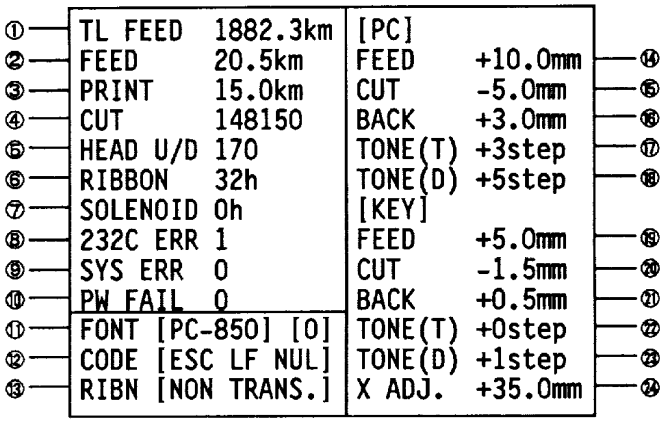


Fig. 6-1

1) Maintenance Counter

#	Item	Count Condition	Range
①	Total media distance covered	Counted when the feed motor drives to feed, print and issue the media. (Counted also during ribbon save operation and back feed.) [See NOTE 2.]	0.0~3200.0 km
②	Media distance covered		0.0~200.0 km
③	Print distance	Counted while printing. (Feeding and issuing media, and ribbon saving operation are not counted.) [See NOTE 2.]	0.0~200.0 km
④	Cut count	Counts every cut. [See NOTE 3.]	0~1000000 times
⑤	Head up and down count	Counts every up and down of the print head using the solenoid for ribbon save operation. (Up + Down = 1 count) [See NOTE 3.]	0~2000000 times
⑥	Ribbon motor driving time	Counts when the ribbon motor drives to feed, print and issue the media. (The driving time is not counted during ribbon saving operation, but is during back feed.) [See NOTE 4.]	0~2000 hours
⑦	Solenoid driving time	Counted during ribbon saving operation. [See NOTE 4.]	0~1000 hours
⑧	RS-232C hardware error count	Counted when a parity, overrun or framing error occurs. [See NOTE 5.]	0~255 times
⑨	System error count	Counted when a zero-dividing error occurs or undefined command is retrieved.	0~15 times
⑩	Momentary power failure count	Counted when a momentary power failure occurs.	0~15 times

NOTES:

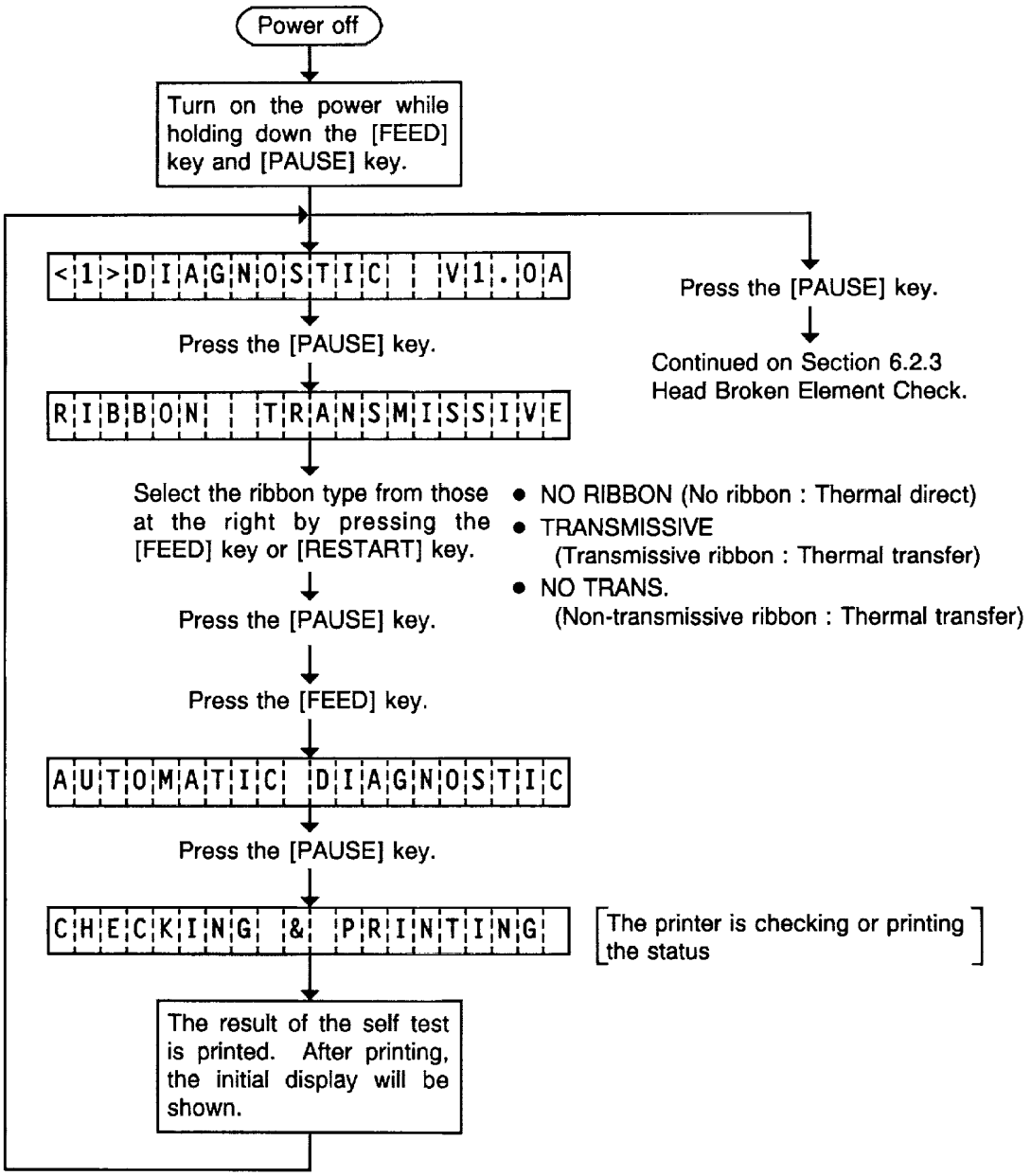
1. *Item from ② through ⑩ are initialized to "0" after RAM clear.*
2. *If the distance is 5.5 m or less, it is rounded down and no data is added to the memory at power off.*
3. *If the count is 31 counts or less, it is rounded down and no data is added to the memory at power off.*
4. *If the driving time is 27 sec. or less, it is rounded down and no data is added to the memory at power off.*
5. *When a sent command results in an error, the same number as the data capacity of the command is counted by byte.*

2) Parameters

#	Item	Contents
⑪	Character code selection	PC-850 : PC-850 PC-8 : PC-8
	Font zero selection	0 : No slash used. ø : Slash used.
⑫	Control code selection	AUTO : Automatic selection ESC LF NUL : ESC LF NUL mode { ¦ } : Mainframe mode
⑬	Ribbon type selection	TRANS. : Transmissive ribbon NON TRANS. : Non-transmissive ribbon
⑭ ⑲	Feed length fine adjustment (PC), (KEY)	-50.0mm ~ +50.0 mm
⑮ ⑳	Cut/strip position fine adjustment (PC), (KEY)	-50.0mm ~ +50.0 mm
⑯ ㉑	Back feed length fine adjustment (PC), (KEY)	-9.9 mm ~ +9.9 mm
⑰ ㉒	Print tone fine adjustment (Thermal transfer) (PC), (KEY)	-10 step ~ +10 step
⑱ ㉓	Print tone fine adjustment (Thermal direct) (PC), (KEY)	-10 step ~ +10 step
㉔	X axis fine adjustment	-99.5 mm ~ +99.5 mm

6.2.2 Automatic Diagnostic Printing

The data from ① to ⑨ on a sample print is printed.



NOTES: *1. If the automatic diagnosis printing results in an error, the printer will display the error message and stop printing. The error status can be cleared by the [PAUSE] key, however, the display will return to the initial display "<1> DIAGNOSTIC V1.0A". Printing is not automatically resumed.*

2. Both label and tag paper can be used for printing.

■ Sample Print

[Print Condition]

- Preset count : 1
- Print speed : 127 mm/sec.
- Sensor : No sensor
- Printing method: Thermal transfer
- Supply length : 50 mm
- Issuing mode : Batch printing (without rewinder)

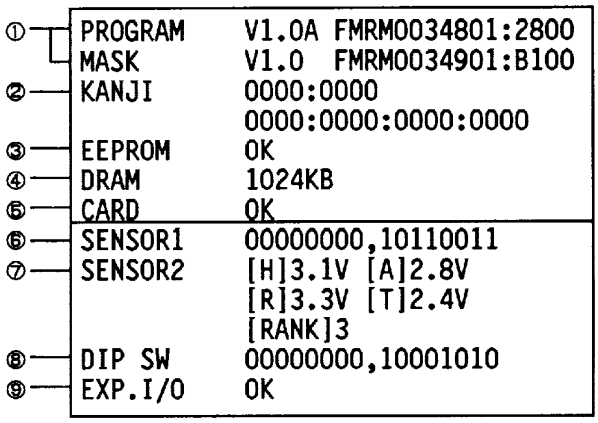
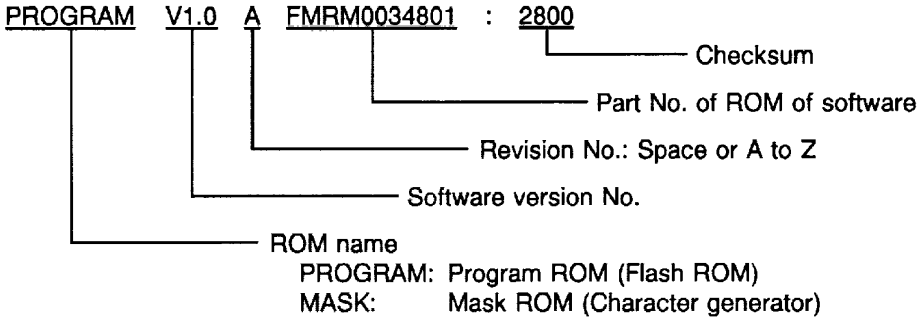


Fig. 6-2

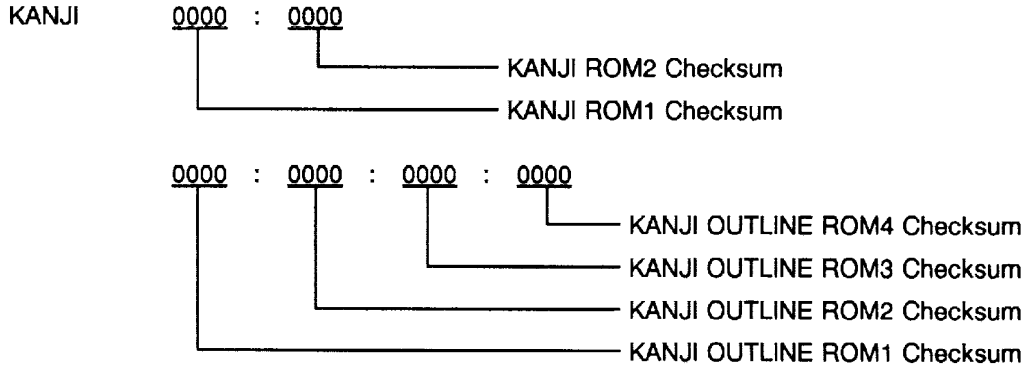
① PROGRAM/MASK ROM Check



NOTE: *1. Software version No., part No. of ROM and checksum vary according to the software version of PROGRAM/MASK ROM.*

2. The last two digits of the checksum are usually 0.

② KANJI ROM Check

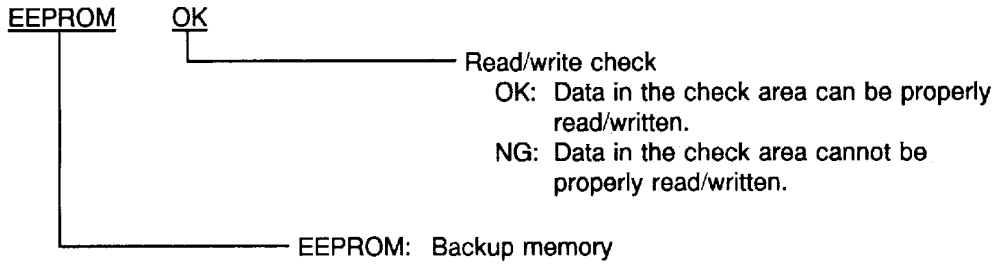


NOTES: *1. Checksum varies according to the software version.*

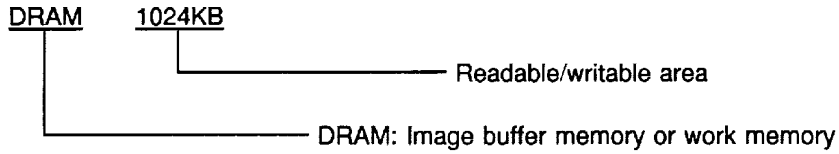
2. When the KANJI ROM or KANJI OUTLINE ROM is not installed, the checksum becomes "0000".

3. The last two digits of the checksum are not 0.

③ EEPROM Check

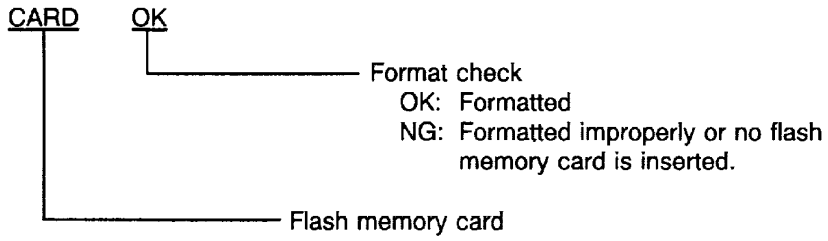


④ DRAM Check

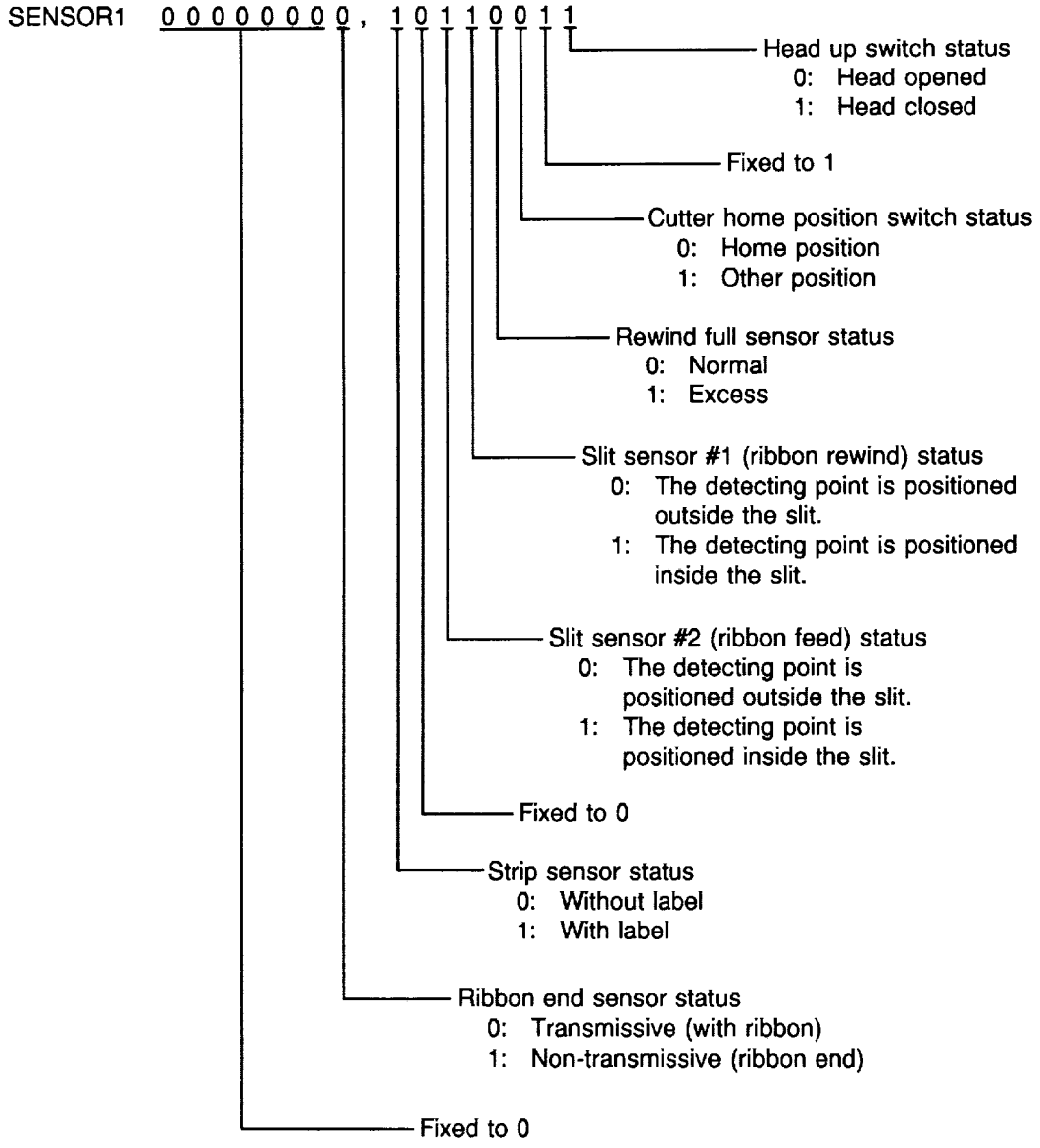


NOTE: *1. If an error is detected during DRAM check, the display of readable/writable area will stop when the error occurs.*

⑤ Flash Memory Card Check



⑥ Sensor 1 Check



■ Print status content description of each sensor/switch

Sensor/Switch	Print status content description
Head up switch	Indicates whether the print head is opened or closed.
Cutter home position switch	Indicates whether the cutter is at the home position or not.
Rewind full sensor	Indicates whether the media is wound to peak capacity on the built-in take-up spool or not.
Slit sensor #1 (ribbon rewind) Slit sensor #2 (ribbon feed)	Controls ribbon motor rotation by detecting the slit on the ribbon rewind motor and the ribbon feed motor. Indicates the position of the slit sensor.
Strip sensor	Indicates the existence of label in strip mode. When no label is detected (0), the subsequent label is issued, when a label is detected (1), the subsequent label will not be issued until the current label is removed.
Ribbon end sensor	The display of the ribbon end sensor only shows whether the ribbon is transmissive or non-transmissive. The status of the ribbon end detection differs according to the parameter setting. The following table shows the parameter settings in the parameter setting mode.

Type of ribbon / Ribbon end sensor	Transmissive	Non-transmissive
Transmissive	With ribbon	Ribbon end
Non-transmissive	Ribbon end	With ribbon

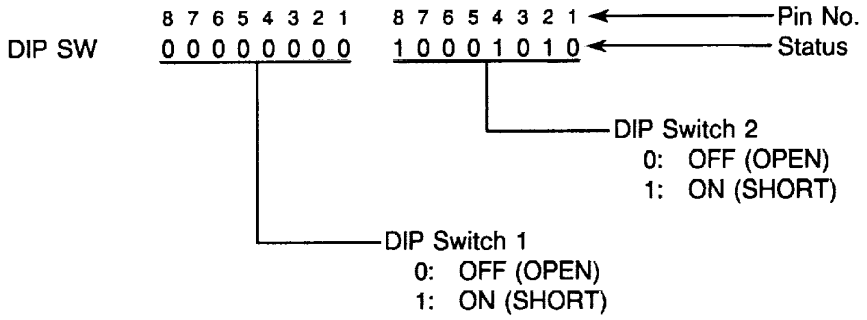
⑦ SENSOR2 Check

SENSOR2 [H] 3.1V [A] 2.8V
- Environmental temperature thermistor status: 0.0~5.0 V
- Print head thermistor status: 0.0~5.0 V

[R] 3.3V [T] 2.4V
- Feed gap sensor status: 0.0~5.0 V
- Black mark sensor status: 0.0~5.0 V

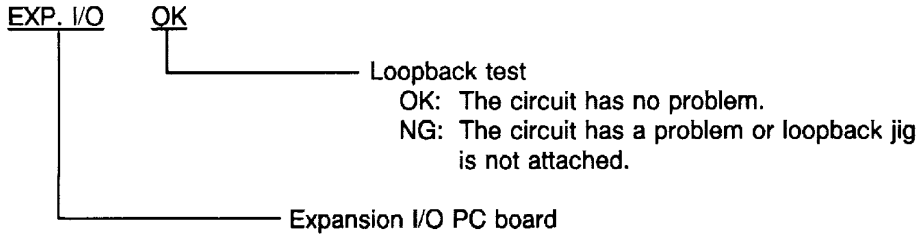
[RANK 3]
- Print head resistance rank: 0~15

⑧ DIP SW Check

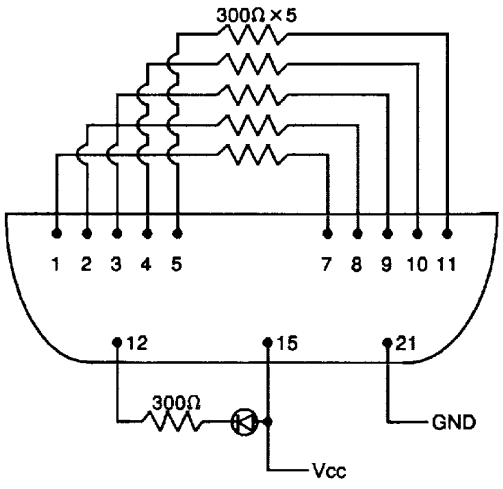


NOTE: *The DIP switch 1-7 is to be set to 0 (OFF : OPEN) regardless of setting item.*

⑨ EXP. I/O Check



For the loopback test, connect jig as shown below and check HIGH output / HIGH input and LOW output / LOW input.

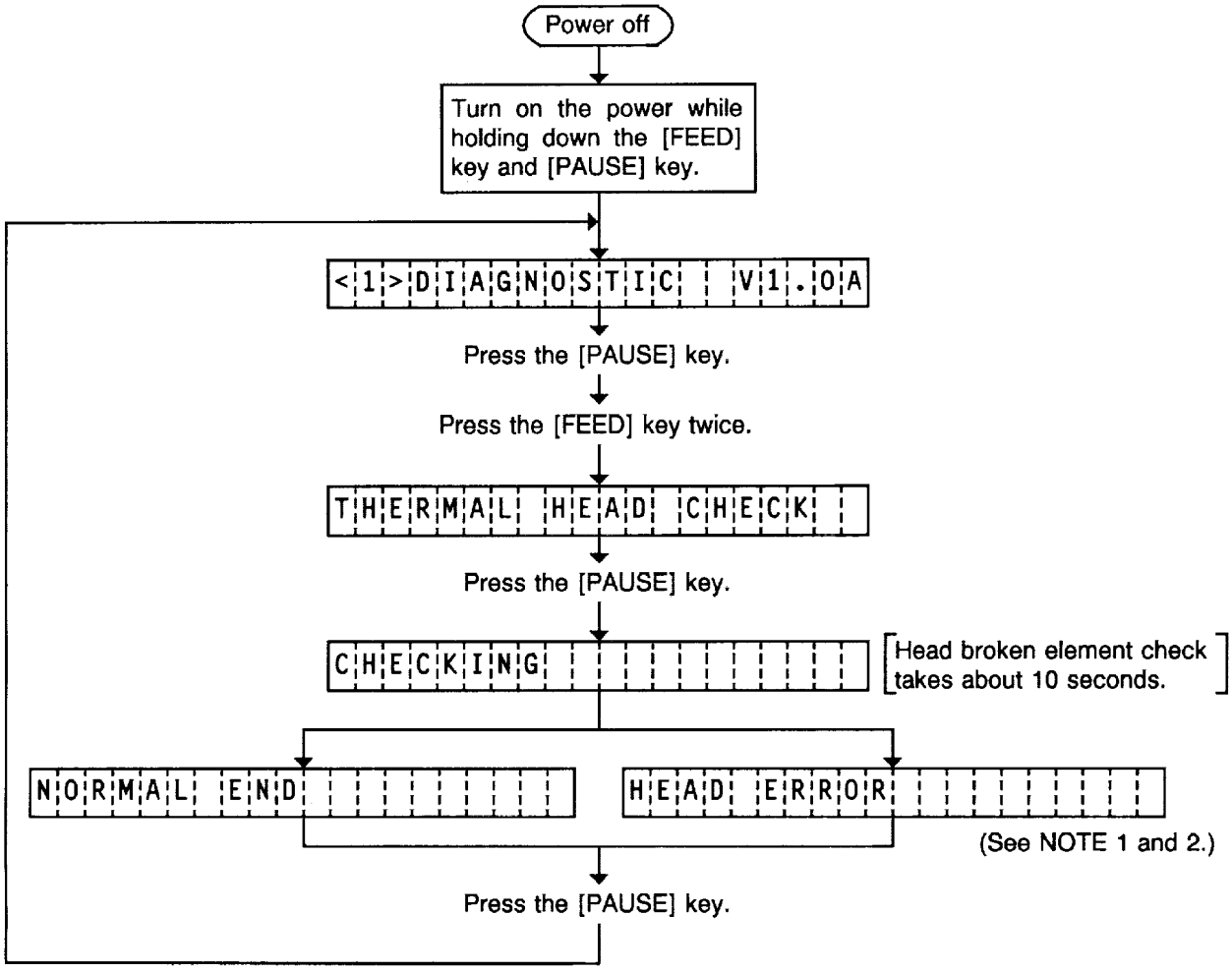


Connector: FCN-781P024-G/P

Fig. 6-3

6.2.3 Head Broken Element Check

The printer automatically performs the head broken element check. The result of the head broken element check is indicated in the display.

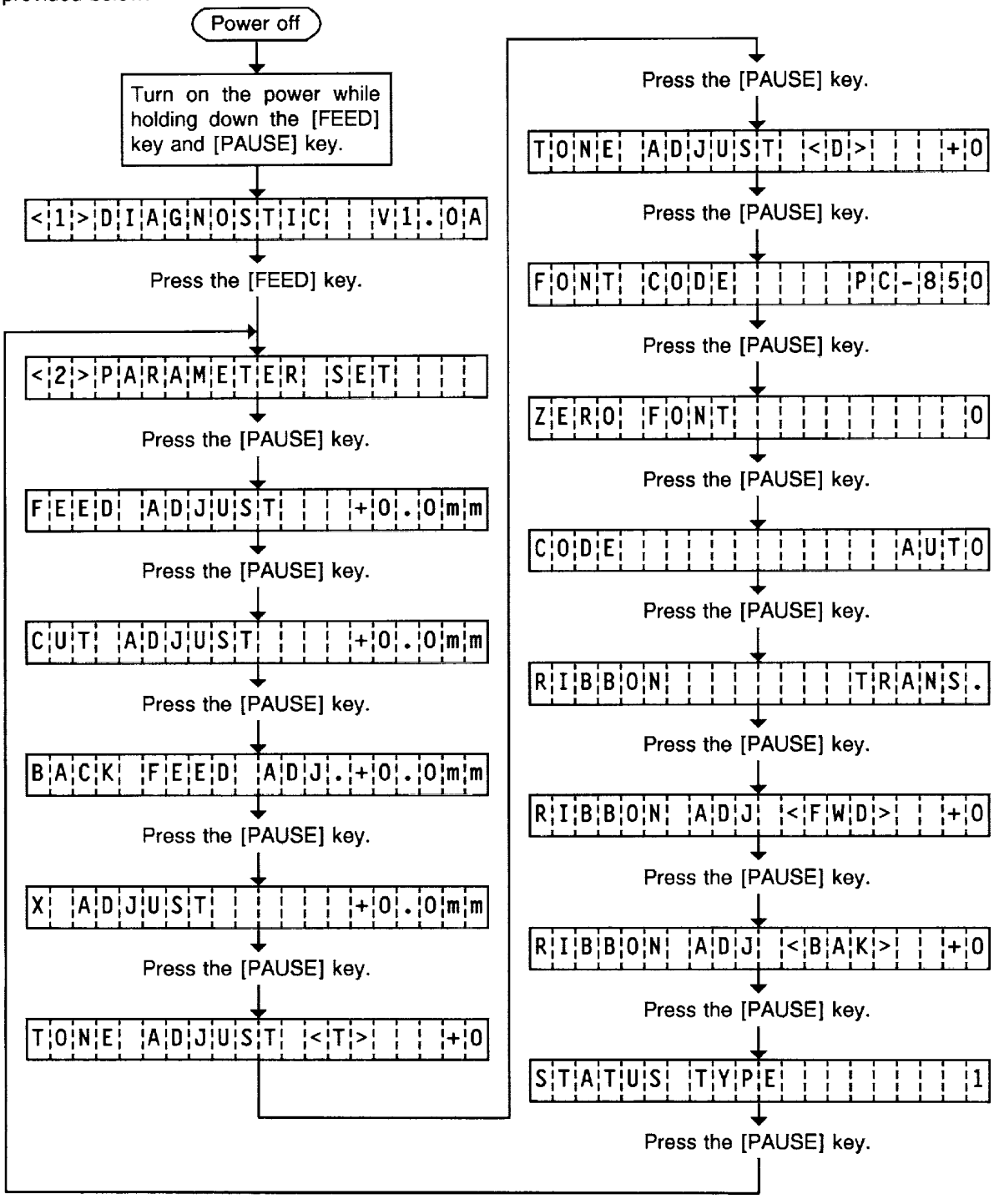


NOTES: *1. If the head broken element check results in 'HEAD ERROR', the print head must be replaced after referring to Section 2.6 Replacing the Print Head.*

2. After replacing the print head, clear the maintenance counter as described in Section 6.6.1 and perform a test print in Section 6.4 TEST PRINT MODE.

6.3 PARAMETER SETTING MODE

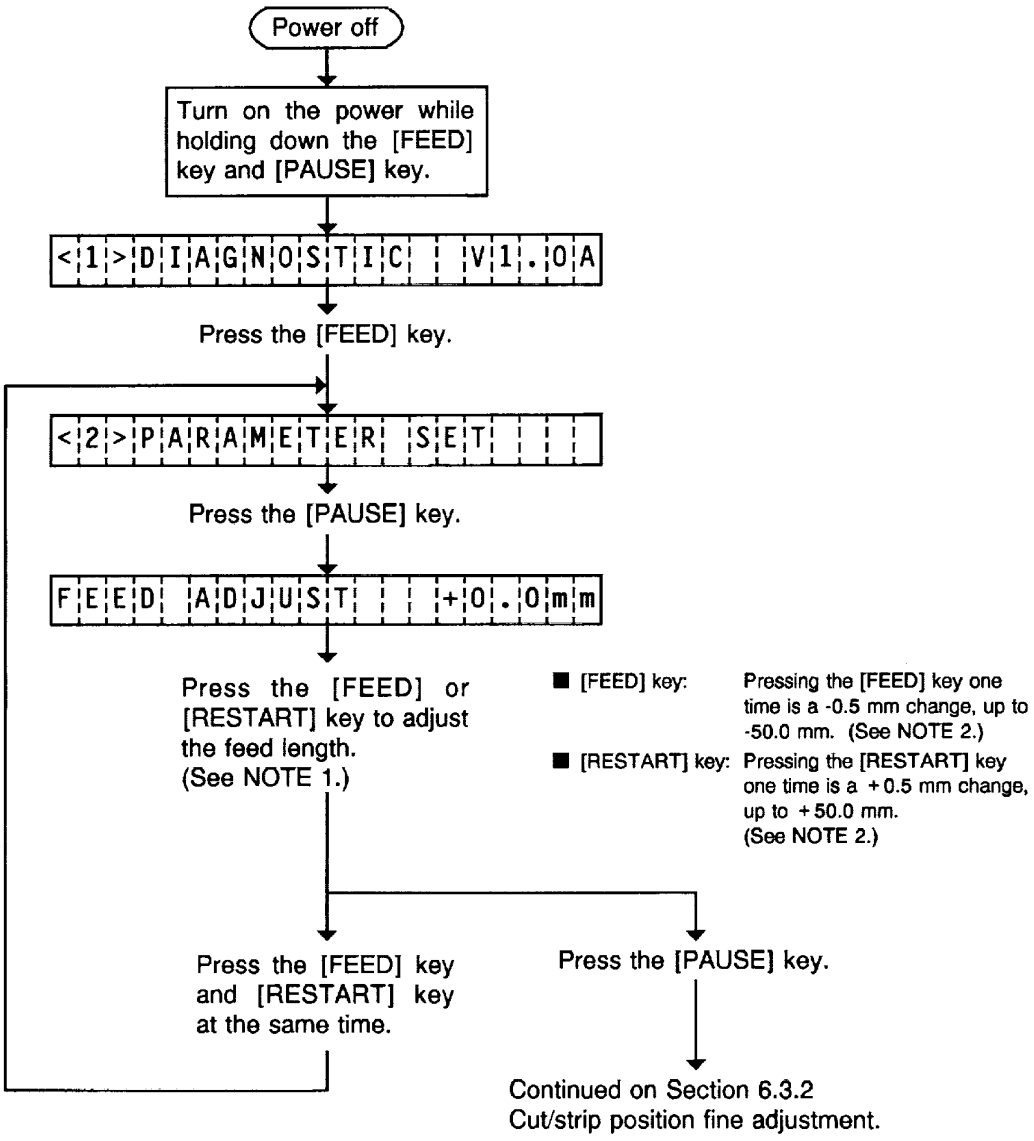
The following 10 items are set in the parameter setting mode. The values set in this mode are printed on the sample print of the maintenance counter. Setting procedure and functions are provided below.



■ Parameter Setting Mode Table

Mode Name	Function
FEED ADJUST	Using this parameter the feed length is fine adjusted.
CUT ADJUST	Using this parameter the cut position or strip position is fine adjusted.
BACK FEED ADJ.	Using this parameter the back feed length from the cut/strip position to the home position is fine adjusted.
X ADJUST	This setting is used to finely adjust print position in the X axis.
TONE ADJUST <T> (Thermal transfer printing) TONE ADJUST<D> (Thermal direct printing)	Using this parameter the print tone is fine adjusted. The longer the print pulse width, the darker the print tone becomes. The shorter, the lighter the print tone becomes.
FONT CODE	The character code either PC-850 or PC-8 is selected.
ZERO FONT	The font zero either 0 or Ø is selected.
CODE	The command code out of AUTO, ESC/LF/NUL, or { ¦ } is selected.
RIBBON	Ribbon type either transmissive or non-transmissive is selected.
RIBBON ADJ <FWD> (Ribbon feed motor) RIBBON ADJ <BAK> (Ribbon feed motor)	Using this parameter the torque of the ribbon motors is fine adjusted.
STATUS TYPE	Whether or not the strip wait status (05H) is sent in response to the status request command from the PC is selectable.

6.3.1 Feed Length Fine Adjustment

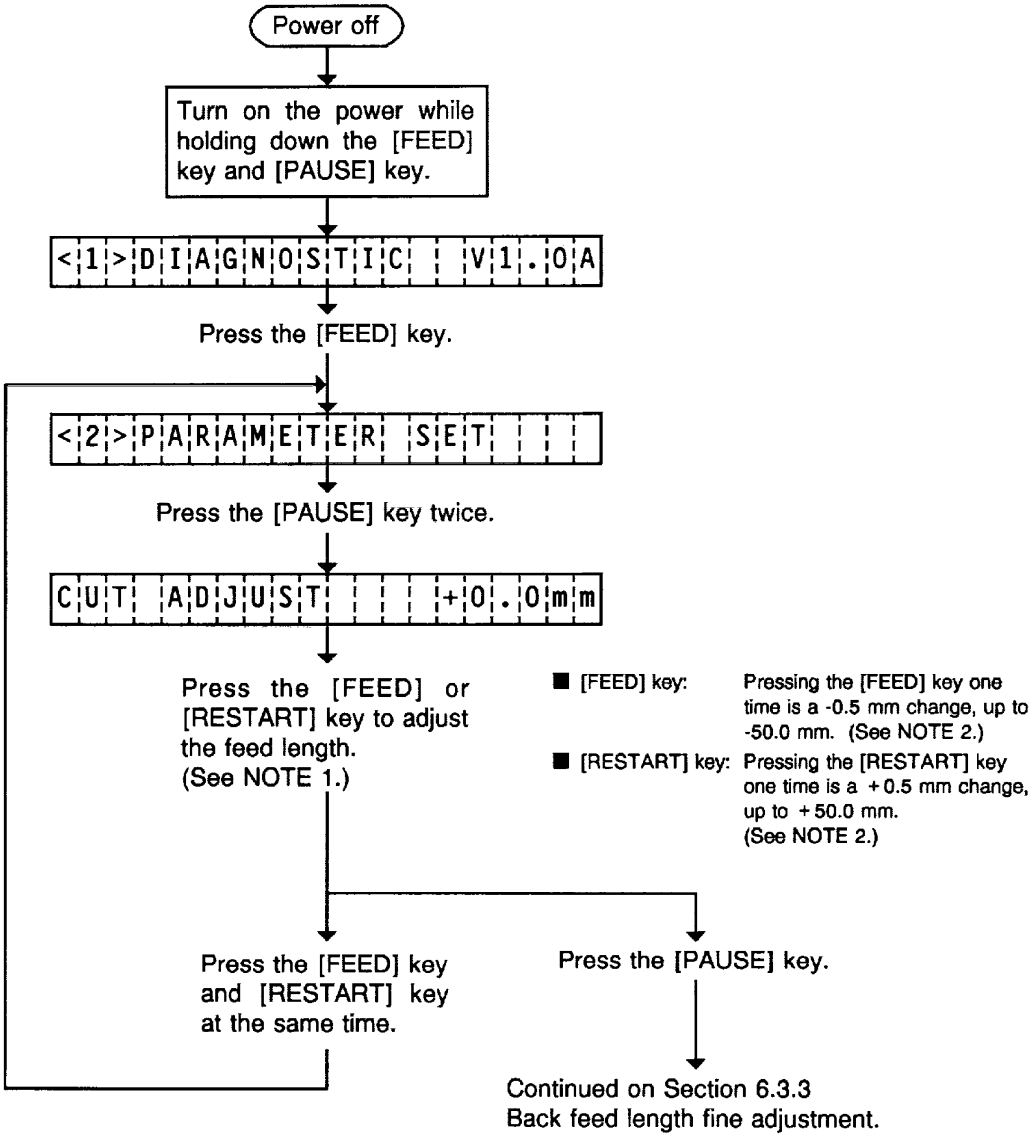


NOTES: 1. *Holding the [FEED] key or [RESTART] key down for more than 0.5 seconds enables a fast forward.*

2. *Max. fine adjustment ±50.0 mm = Key fine adjustment value (±50.0 mm) + PC fine adjustment value (±50.0 mm)*
   When the value reaches the maximum, the value remains unchanged even if the subsequent fine adjustment is performed.

3. *A changed feed value is stored in memory by pressing the [PAUSE] key.*

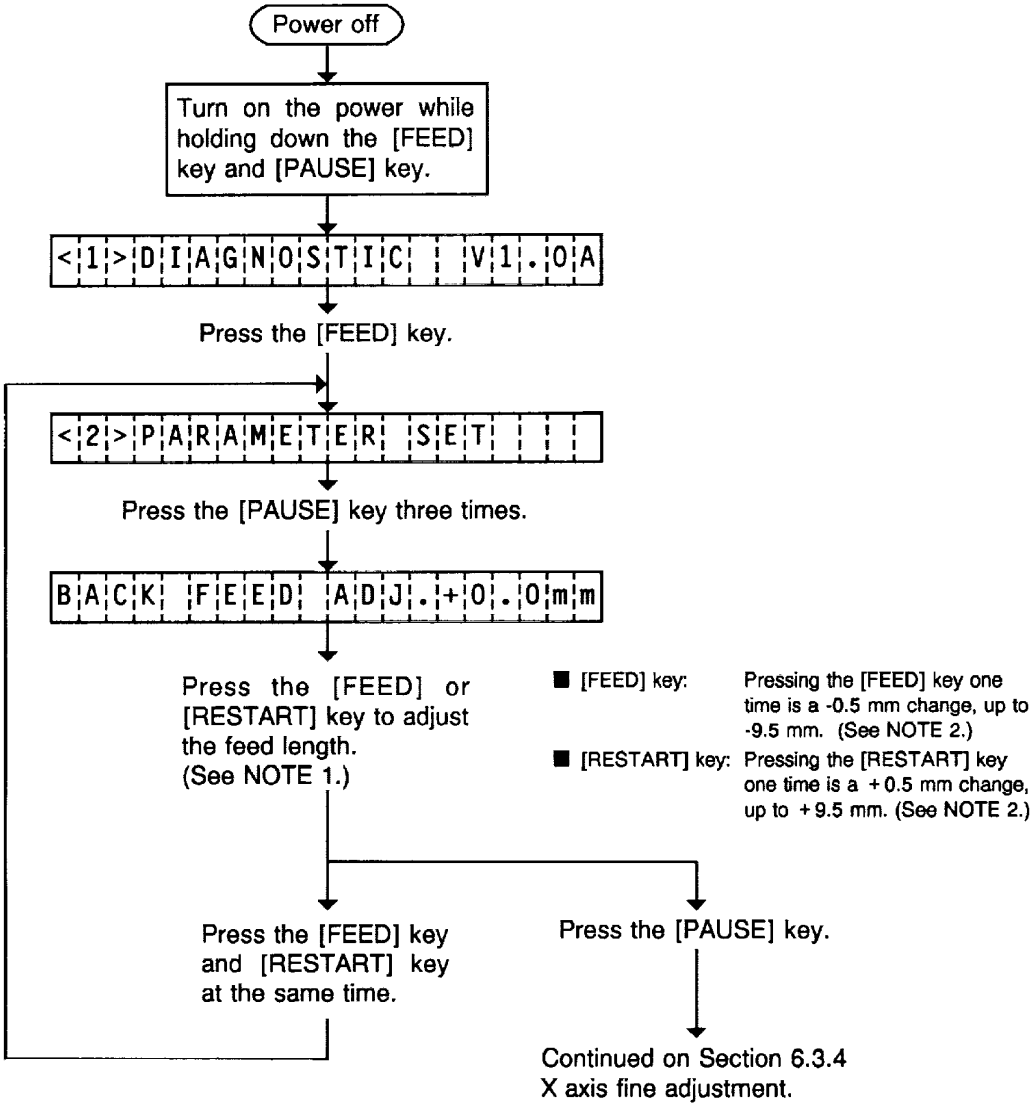
6.3.2 Cut/Strip Position Fine Adjustment



NOTES:

1. *Holding the [FEED] key or [RESTART] key down for more than 0.5 seconds enables a fast forward.*
2. *Max. fine adjustment ±50.0 mm = Key fine adjustment value (±50.0 mm) + PC fine adjustment value (±50.0 mm)*
   When the value reaches the maximum, the value remains unchanged even if a subsequent fine adjustment is performed.
3. *A changed cut/strip position value is stored in memory by pressing the [PAUSE] key.*
4. *When using label with length of less than 38 mm, calculate the cut position fine adjustment value using the expression provided on page 6-19.*

6.3.3 Back Feed Length Fine Adjustment



NOTES: 1. *Holding the [FEED] key or [RESTART] key down for more than 0.5 seconds enables a fast forward.*

2. *Max. fine adjustment ±9.9 mm = Key fine adjustment value (±9.5 mm) + PC fine adjustment value (±9.9 mm)*
   When the value reaches the maximum, the value remains unchanged even if the subsequent fine adjustment is performed.

3. *A changed back feed value is stored in memory by pressing the [PAUSE] key.*

■ **Feed Length Fine Adjustment Example**

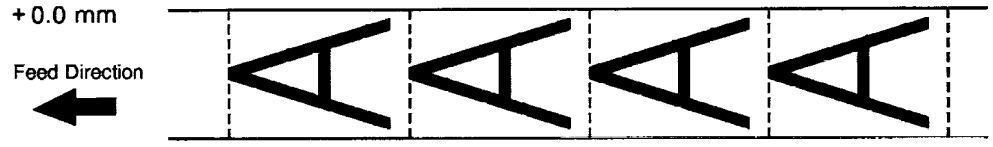


Fig. 6-4

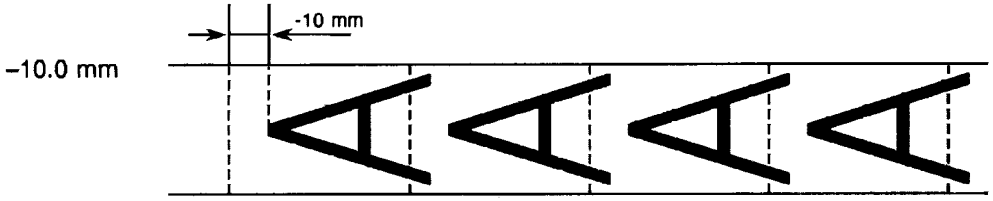


Fig. 6-5

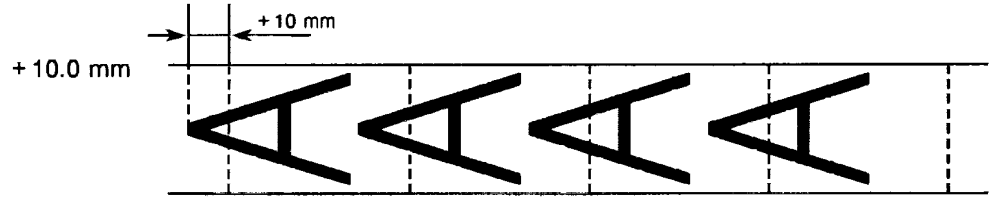


Fig. 6-6

■ **Cut Position Fine Adjustment Example**

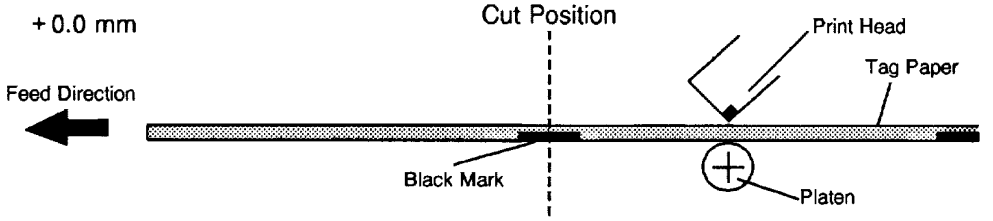


Fig. 6-7

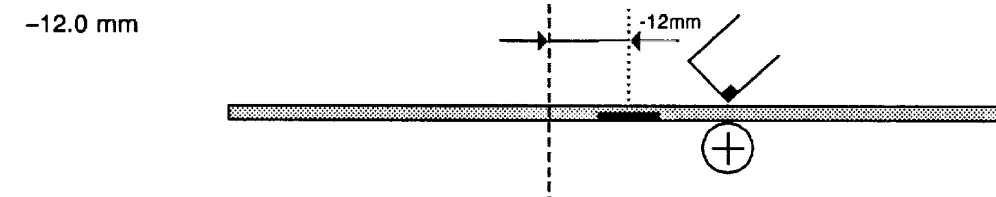


Fig. 6-8

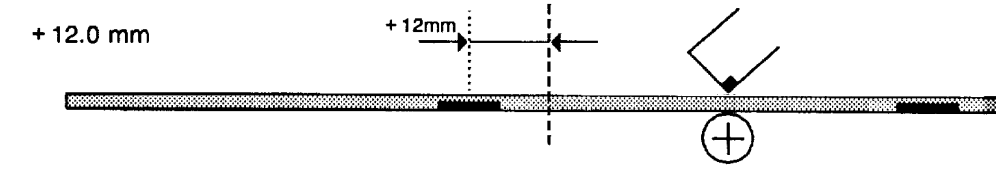


Fig. 6-9

■ **When using a label with a length of less than 38 mm :**

Case 1

Conditions: Issue command [ESC]XS, feed command [ESC]T and eject command [ESC]IB are received. Label pitch: 38.0 mm or less, with cut, feed gap sensor, cut position fine adjustment value ±10 mm or less, and issue mode set to C (cut). When the above conditions are all met, the issue operation in cut issue mode is as follows:

① Head lifted →② Forward feed to the cut position →③ Head lowered →④ Cut →
⑤ Head lifted →⑥ Backfeed to the home position →⑦ Head lowered.

Case 2

Generally the minimum label length which is available in cut mode is 38.0 mm. When using a label with a length of less than 38 mm, the edge of the label may be caught on the print head during back feed to the print start position after cutting the label gap, causing a improper print start position.
In this case set the cut position fine adjustment value after calculating the value using the following formula so that the unprinted label returns to the correct print start position.
However, use of this method will leave one or two printed label(s) between the print head and the cutter. Feed or print the label(s) to remove them.

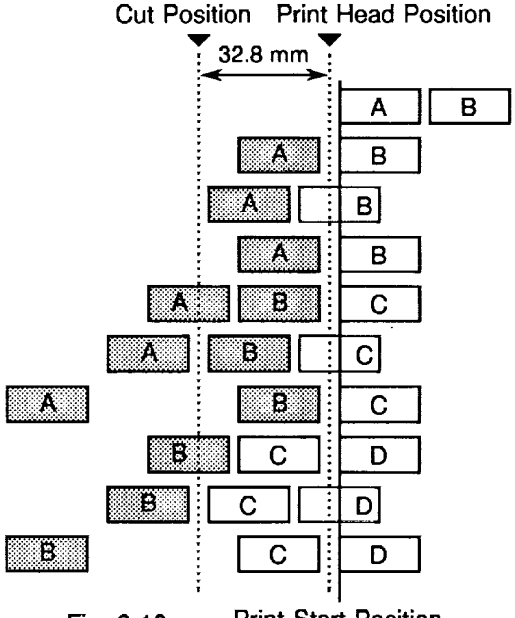
(a) Formula for cut position fine adjustment value

Cut position fine adjustment value
= (the number of labels left between the print head and the cutter) × (span of label)
= (32.8 mm/span of label) × (span of label)

※ Omit the decimals of the value obtained by dividing 32.8 mm by the label length for one unit.

(example) Span of label : 30.0 mm
(32.8 mm/30.0 mm) × 30.0 mm = 1 × 30.0 mm = +30.0 mm

(b) Example



① Idling
② Printing the first label (A) is completed.
③ Label A is fed to the cut position and the front gap is cut.
④ Label B is fed in the reverse direction to the print start position.
⑤ Printing the second label (B) is completed.
⑥ Label B is fed to the cut position and the front gap is cut.
⑦ Label C is fed in the reverse direction to the print start position.
⑧ To take away label B, label (C) is fed.
⑨ Label B is fed to the cut position and the front gap is cut.
⑩ Label D is fed in the reverse direction to the print start position.

Fig. 6-10

■ **Strip Position Fine Adjustment Example**

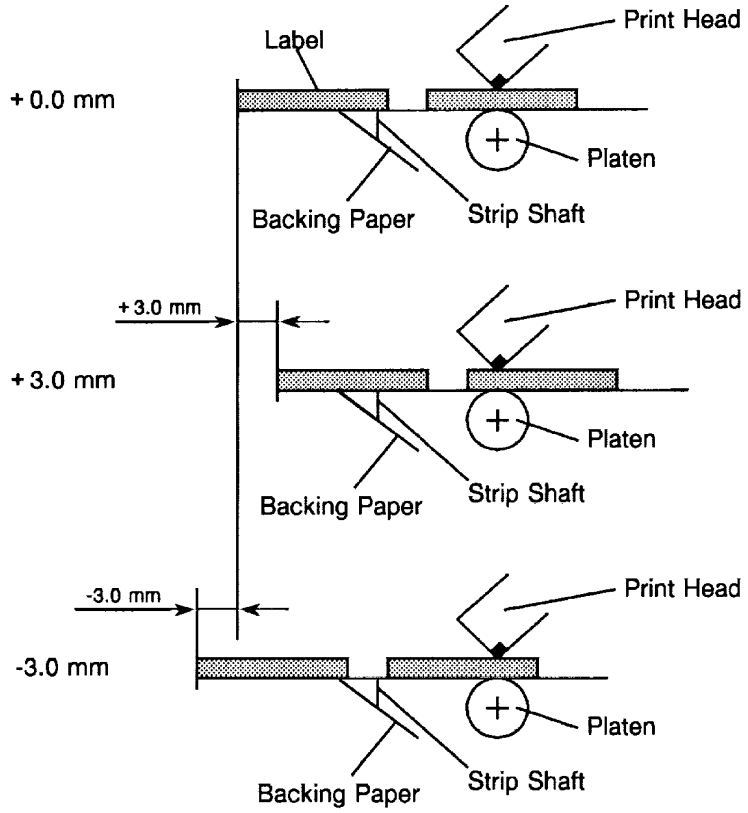


Fig. 6-11

Fig. 6-12

Fig. 6-13

NOTE: *The print stop position when printing the label in strip mode varies according to label length for the strip mode printing stops so that the edge of the strip shaft is 4 mm from the middle of the gap. This is because the gap length is programmed as 2 mm. When the gap length is 5 mm or more, the effective print length should be set to the value obtained by subtracting 2 mm from the label pitch, that is, set the gap length to 2 mm. If the print format hangs over the gap as a result, correct the print start position. If the print stop position is improper, refer to Section 6.3.2 and make a fine adjustment.*

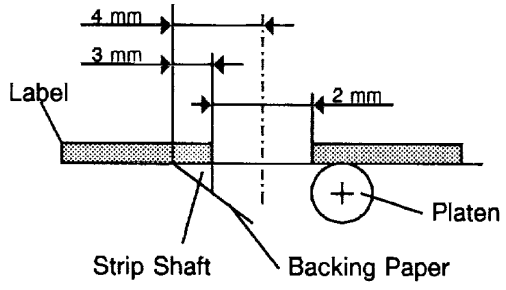


Fig. 6-14

■ **Back Feed Length Fine Adjustment Example**

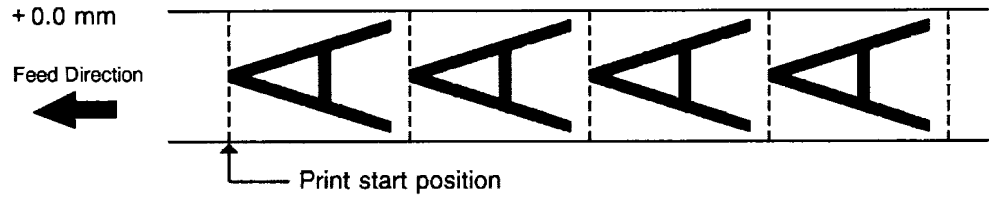


Fig. 6-15

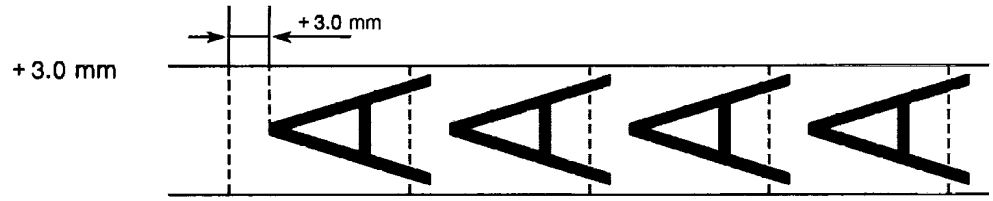


Fig. 6-16

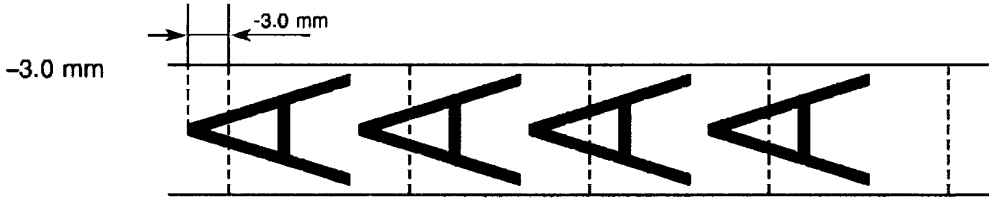
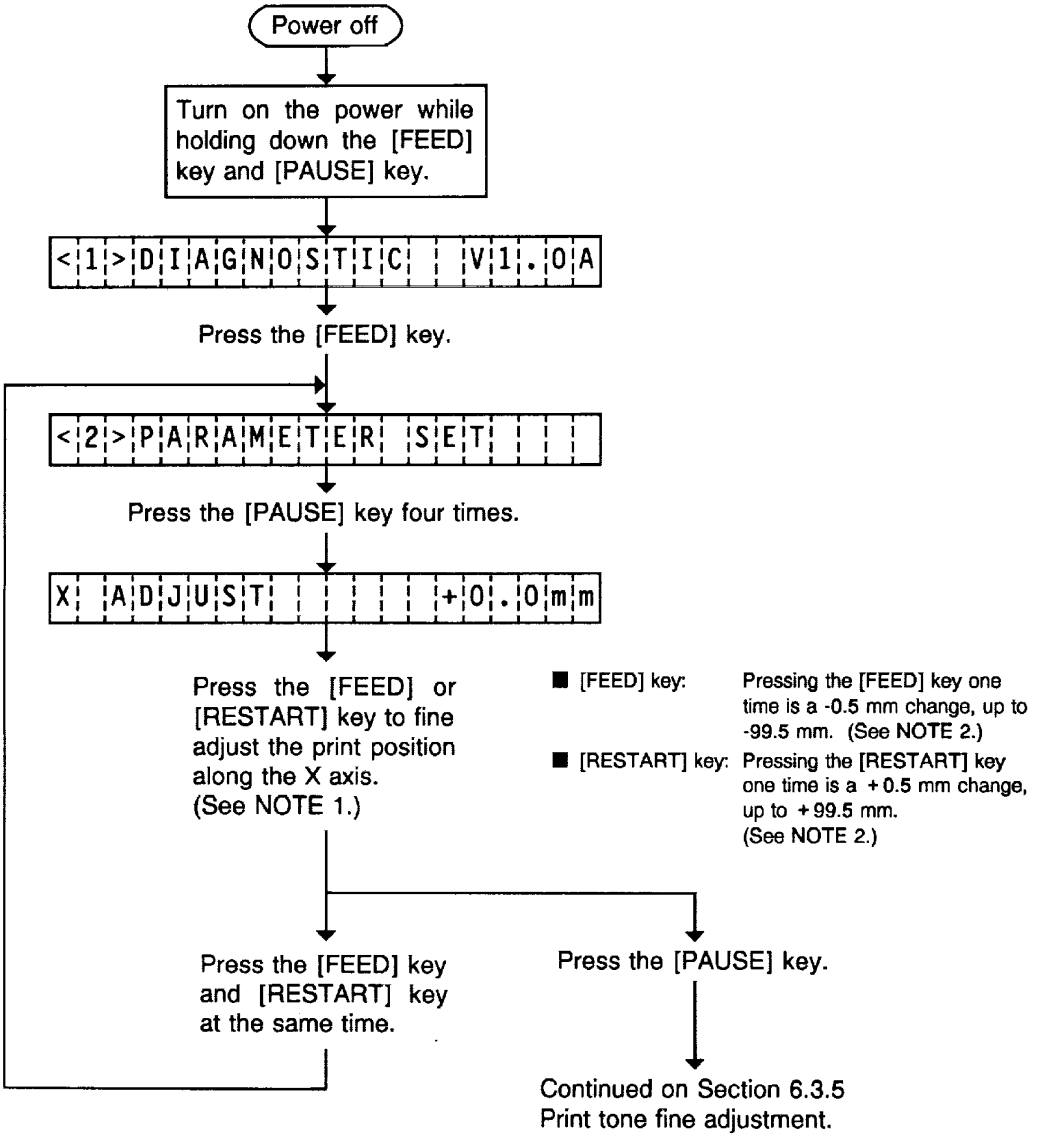


Fig. 6-17

6.3.4 X Axis Fine Adjustment



NOTES: *1. Holding the [FEED] key or [RESTART] key down for more than 0.5 seconds enables a fast forward.*

2. Max. fine adjustment ±99.5 mm = X axis value
When the value reaches the maximum, the value remains unchanged even if the subsequent fine adjustment is performed.

3. A changed X axis is stored in memory by pressing the [PAUSE] key.

■ **X Axis Fine Adjustment Example**

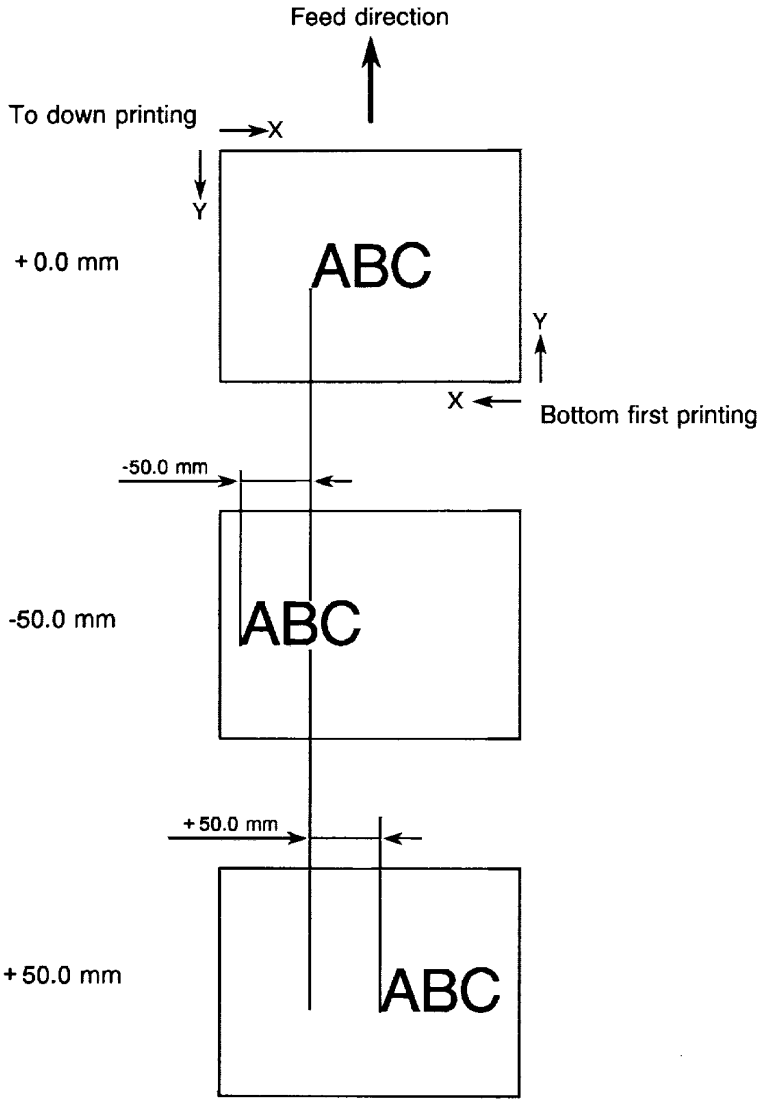


Fig. 6-18

Fig. 6-19

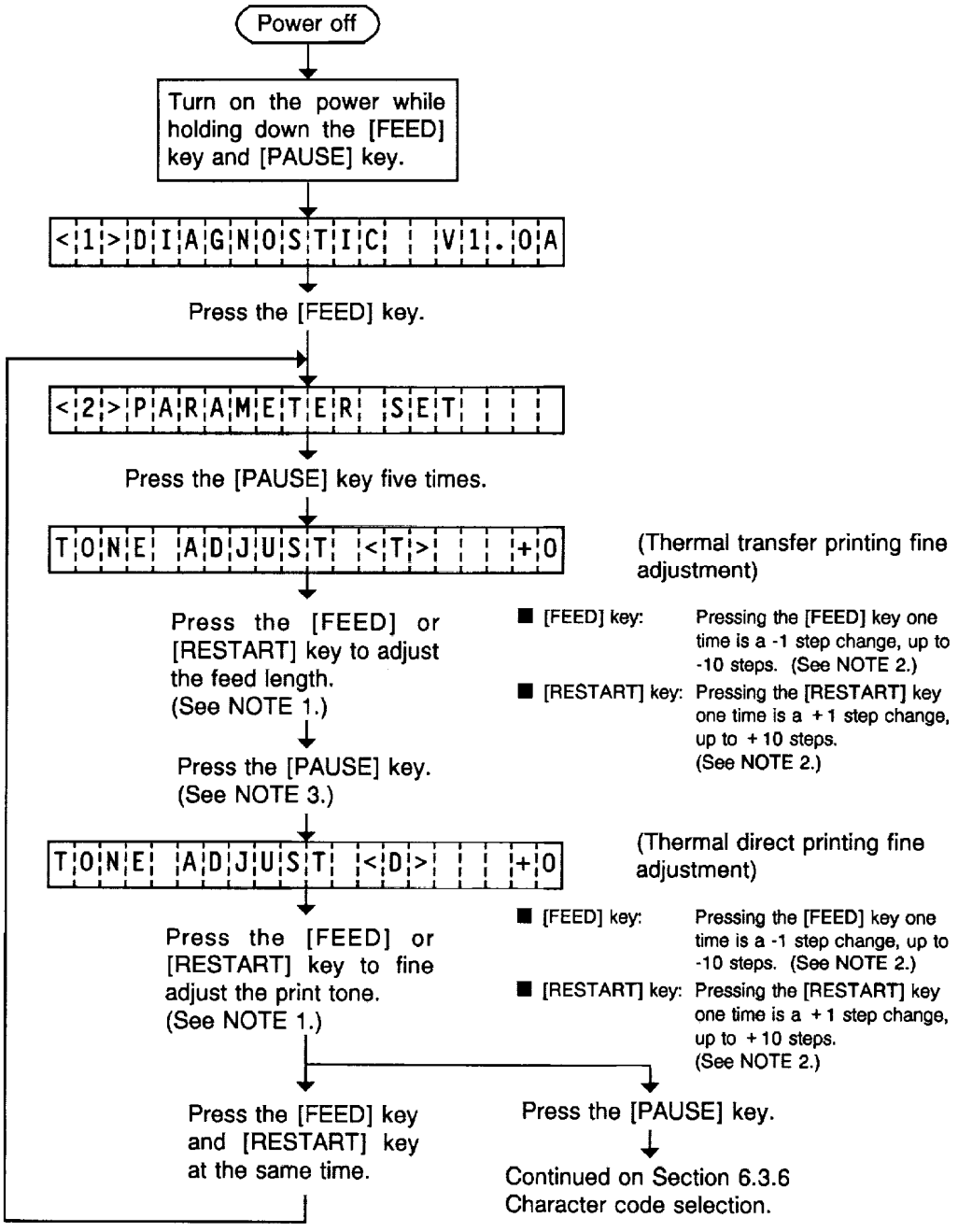
Fig. 6-20

NOTES: *4. The X axis fine adjustment is performed to fine adjust the X axis of the drawing in the left or right direction.*

5. Adjust the X axis in the effective print range. (After the value reaches the coordinate "0", the value remains unchanged even if the subsequent fine adjustment is performed in the negative direction.)

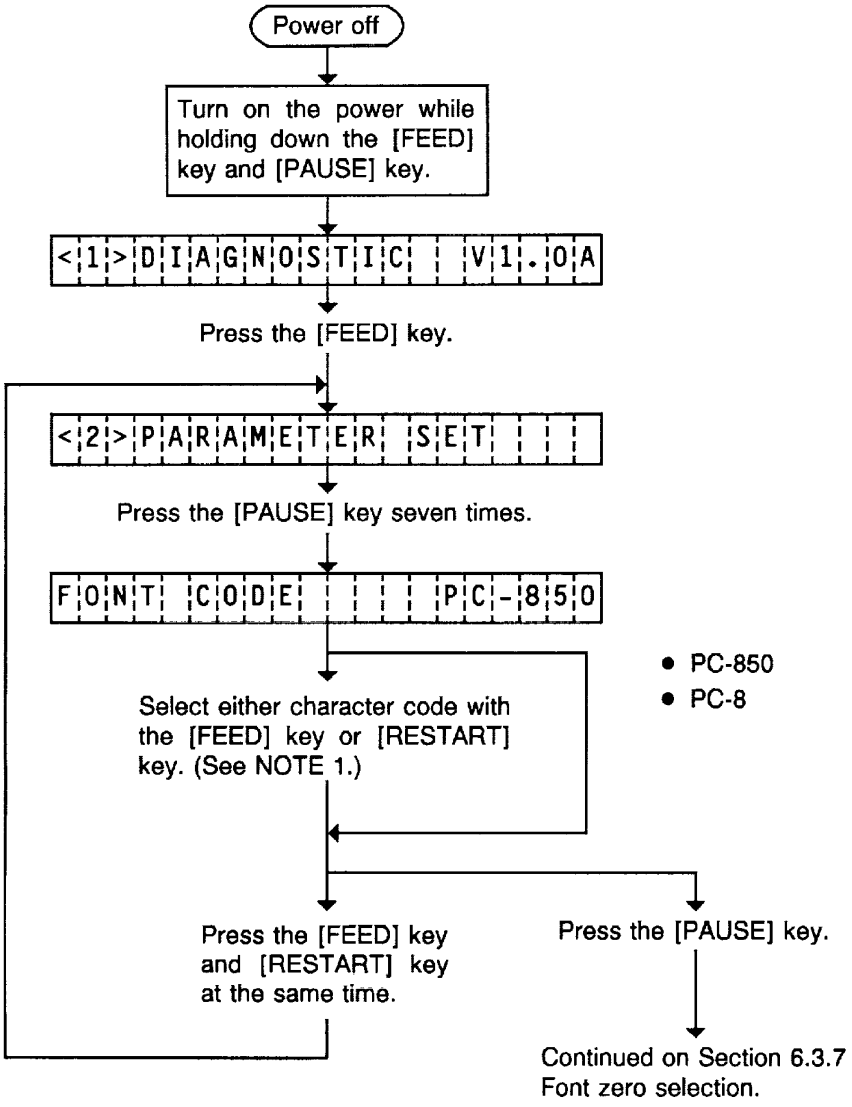
6. X axis fine adjustment cannot be used in self test mode or test printing.

6.3.5 Print Tone Fine Adjustment



NOTES:
1. *Holding the [FEED] key or [RESTART] key down for more than 0.5 seconds enables a fast forward.*
2. *Max. fine adjustment ±10 steps = Key fine adjustment value (±10 steps) + PC fine adjustment value (±10 steps)*
   When the value reaches the maximum, the value remains unchanged even if the subsequent fine adjustment is performed.
3. *A changed print tone value is stored in memory by pressing the [PAUSE] key.*

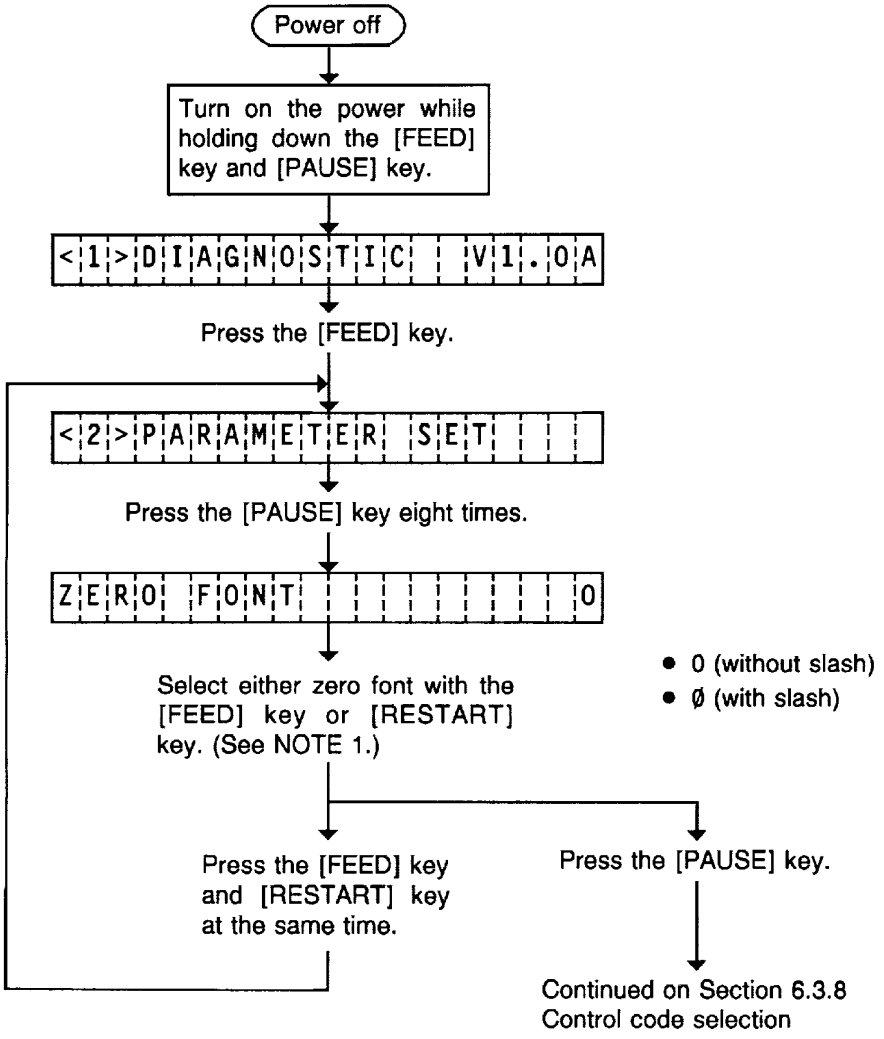
6.3.6 Character Code Selection



NOTES: *1. Holding the [FEED] key or [RESTART] key down for more than 0.5 seconds enables a fast forward.*

2. A changed font code is stored in memory by pressing the [PAUSE] key.

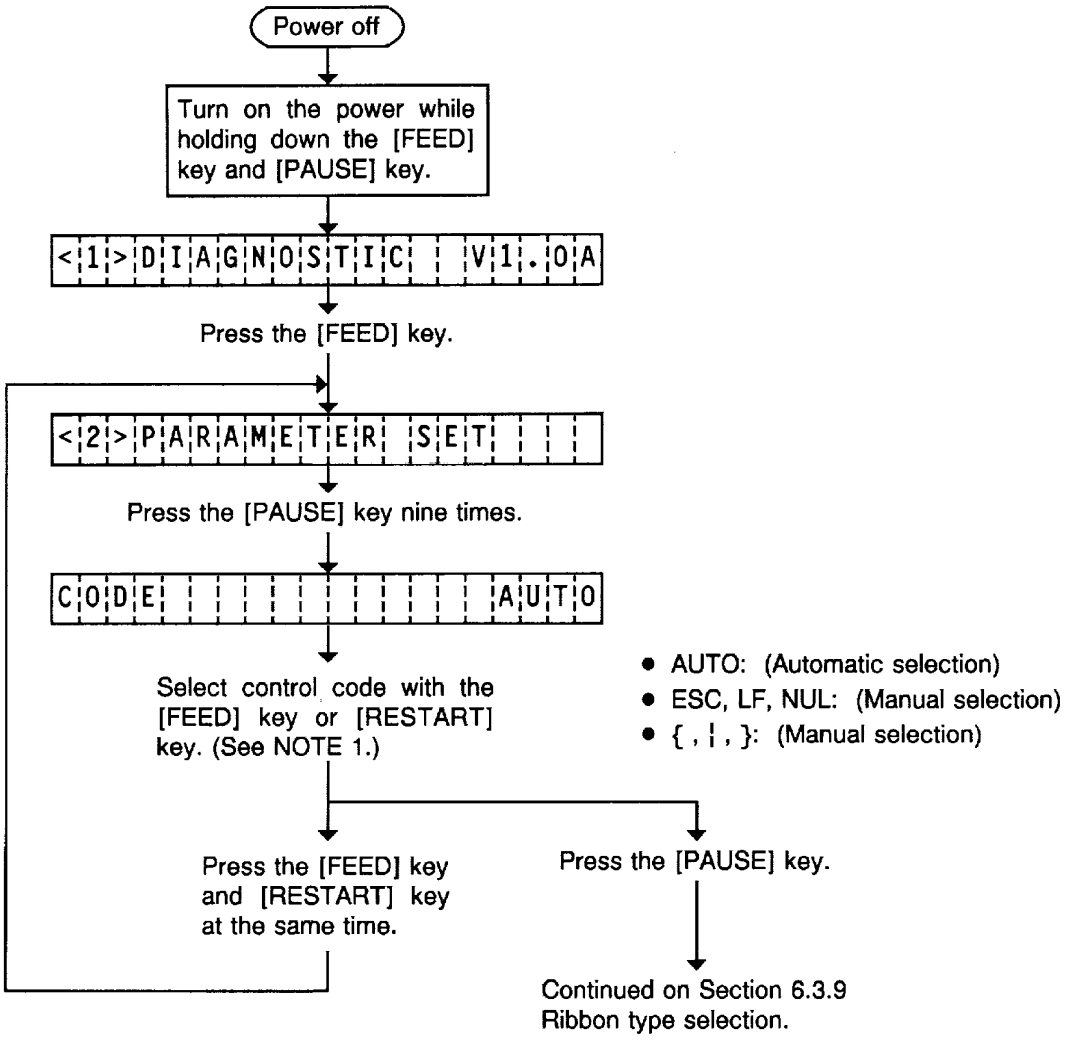
6.3.7 Font Zero Selection



NOTES: *1. Holding the [FEED] key or [RESTART] key down for more than 0.5 seconds enables a fast forward.*

2. A changed zero font is stored in memory by pressing the [PAUSE] key.

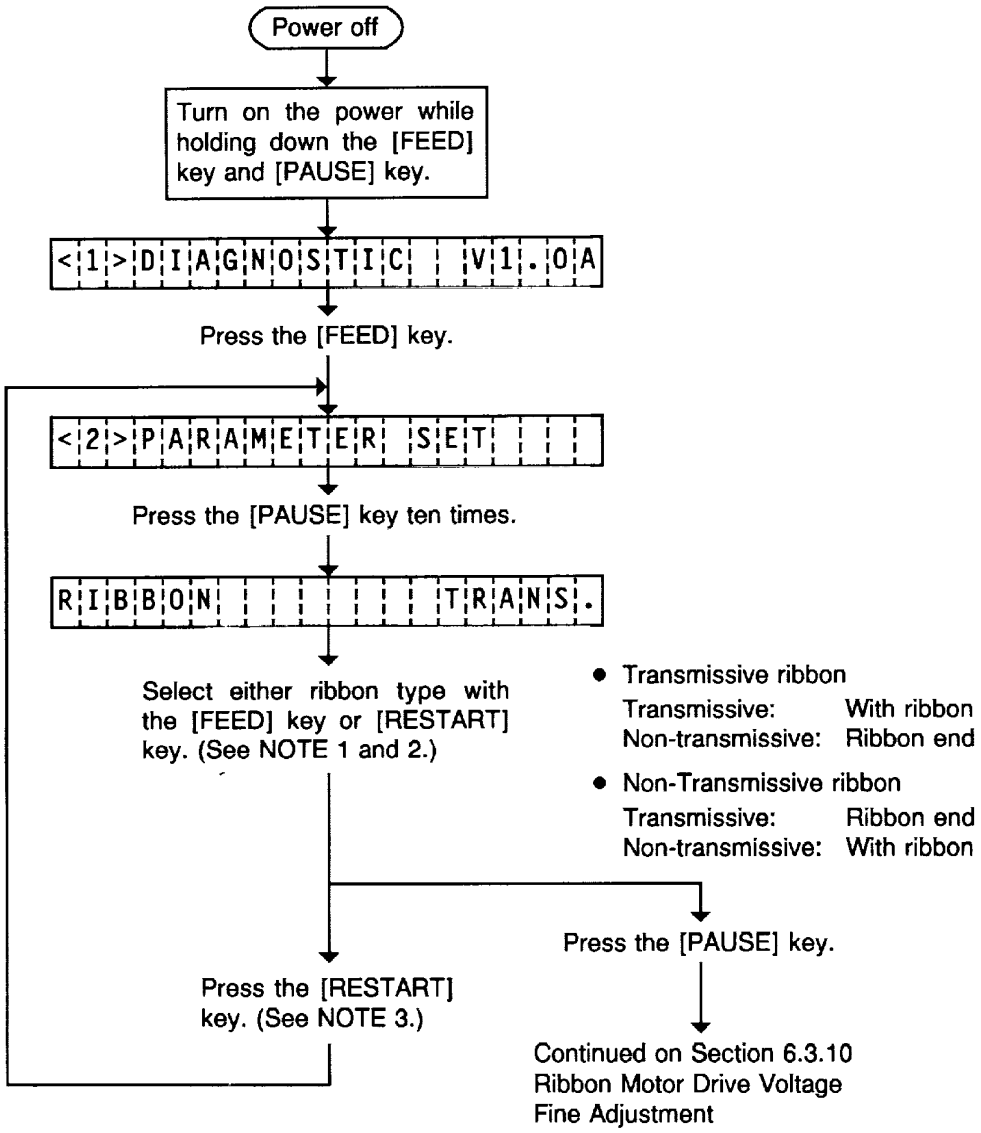
6.3.8 Control Code Selection



NOTES: *1. Holding the [FEED] key or [RESTART] key down for more than 0.5 seconds enables a fast forward.*

2. A changed control code is stored in memory by pressing the [PAUSE] key.

6.3.9 Ribbon Type Selection

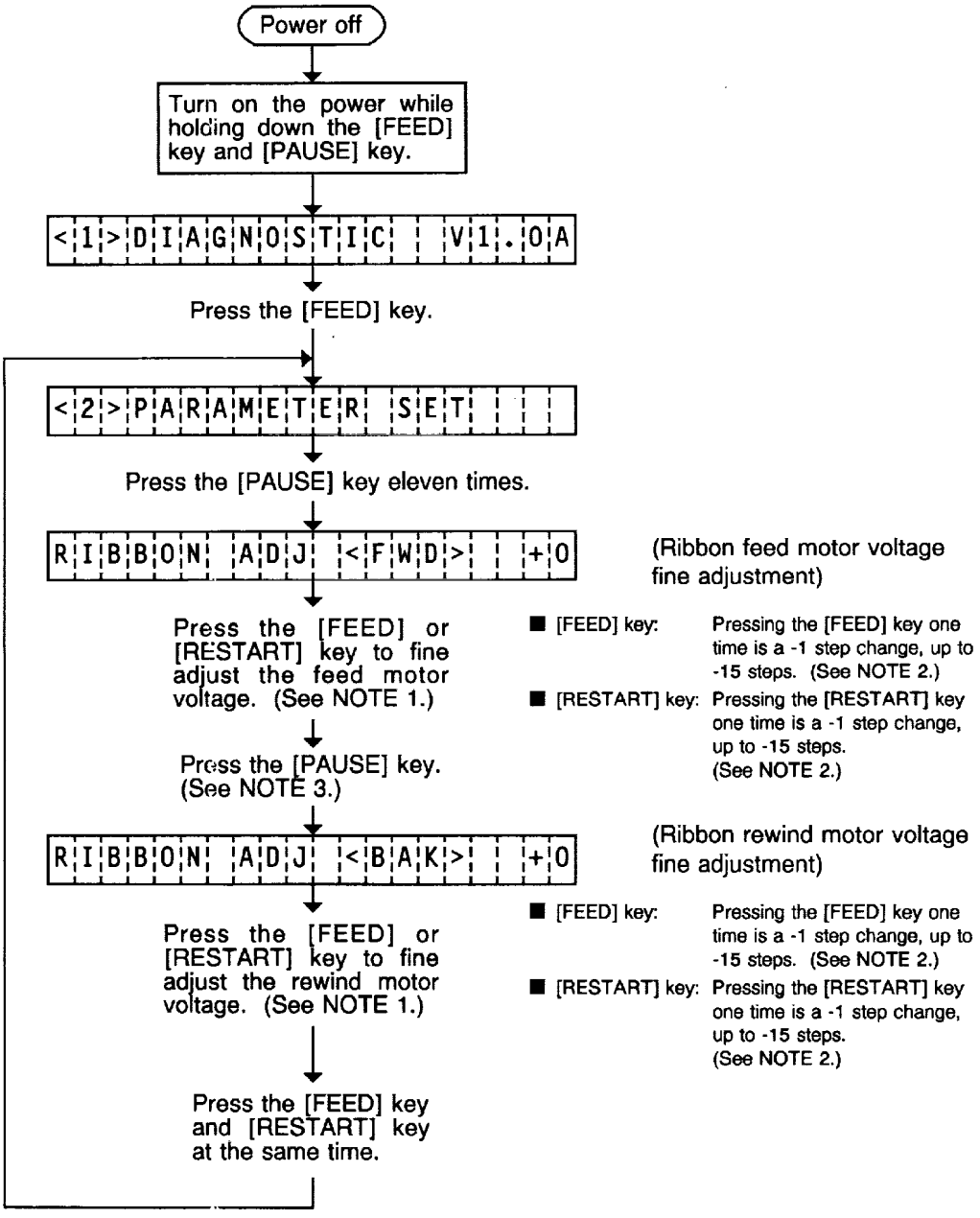


NOTES: *1. Holding the [FEED] key or [RESTART] key down for more than 0.5 seconds enables a fast forward.*

2. Non-transmissive (NON TRANS.) ribbon cannot be used so the ribbon type must be set to transmissive (TRANS.) ribbon.

3. A changed ribbon type is stored in memory by pressing the [PAUSE] key.

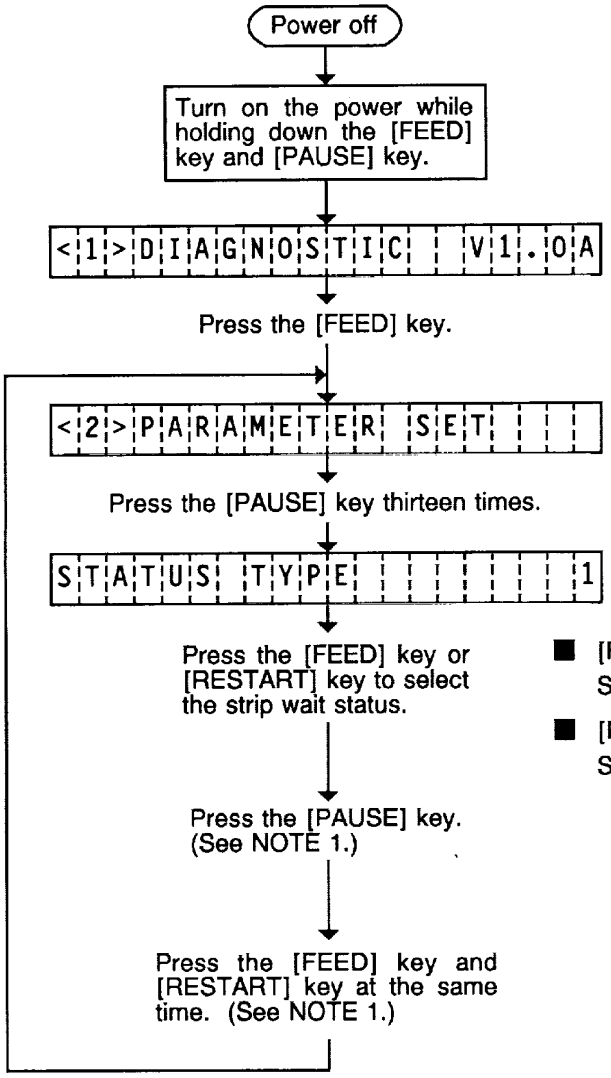
6.3.10 Ribbon Motor Drive Voltage Fine Adjustment



NOTES:

1. *Holding the [FEED] key or [RESTART] key down for more than 0.5 seconds enables a fast forward.*
2. *Max. fine adjustment -15 steps = Key fine adjustment value (-15 steps) + PC fine adjustment value (-15 steps)*
   When the value reaches the maximum, the value remains unchanged even if the subsequent fine adjustment is performed.
3. *A changed motor voltage value is stored in memory by pressing the [PAUSE] key.*
4. *One step corresponds to 5% of the standard voltage and up to 75% of the voltage can be decreased.*

6.3.11 Strip Wait Status Setting



- [FEED] key:
  Status type 2: A strip wait status is sent.
- [RESTART] key:
  Status type 1: A strip wait status is not sent.

NOTE: *When the status type 1 is selected, the printer will send (00H) in response to the status request command sent from the PC while a label stays at the strip sensor (when idling, after feeding, or all printing finished).*
When the status type 2 is selected, the printer will send (05H) in response to the status request command sent from the PC while a label stays at the strip sensor (when idling, after feeding, or all printing finished.)
If the status request command is sent during printing, the printer will always send (05H) regardless of the setting.

6.4 TEST PRINT MODE

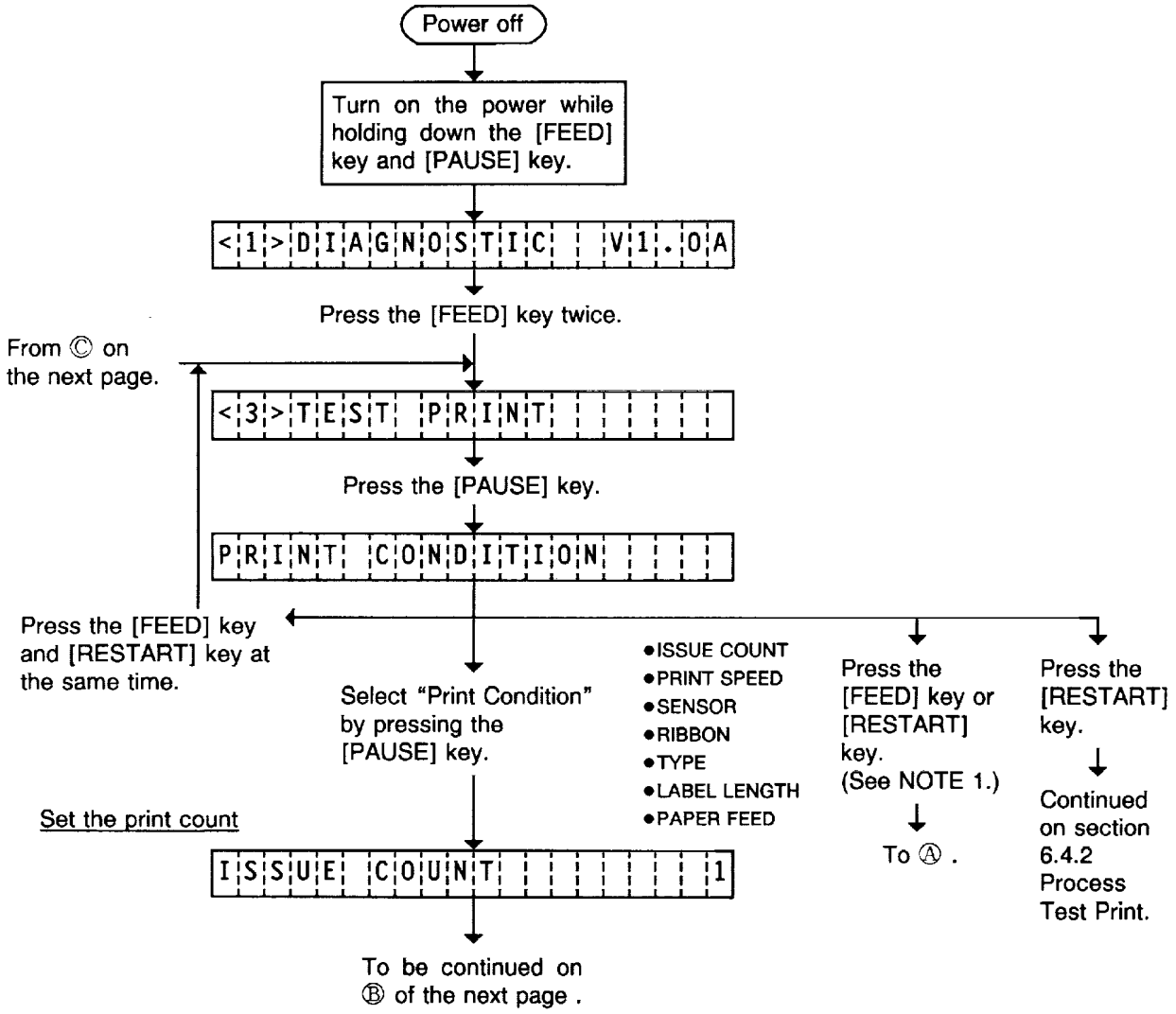
Test print mode contains normal test print and process test print.

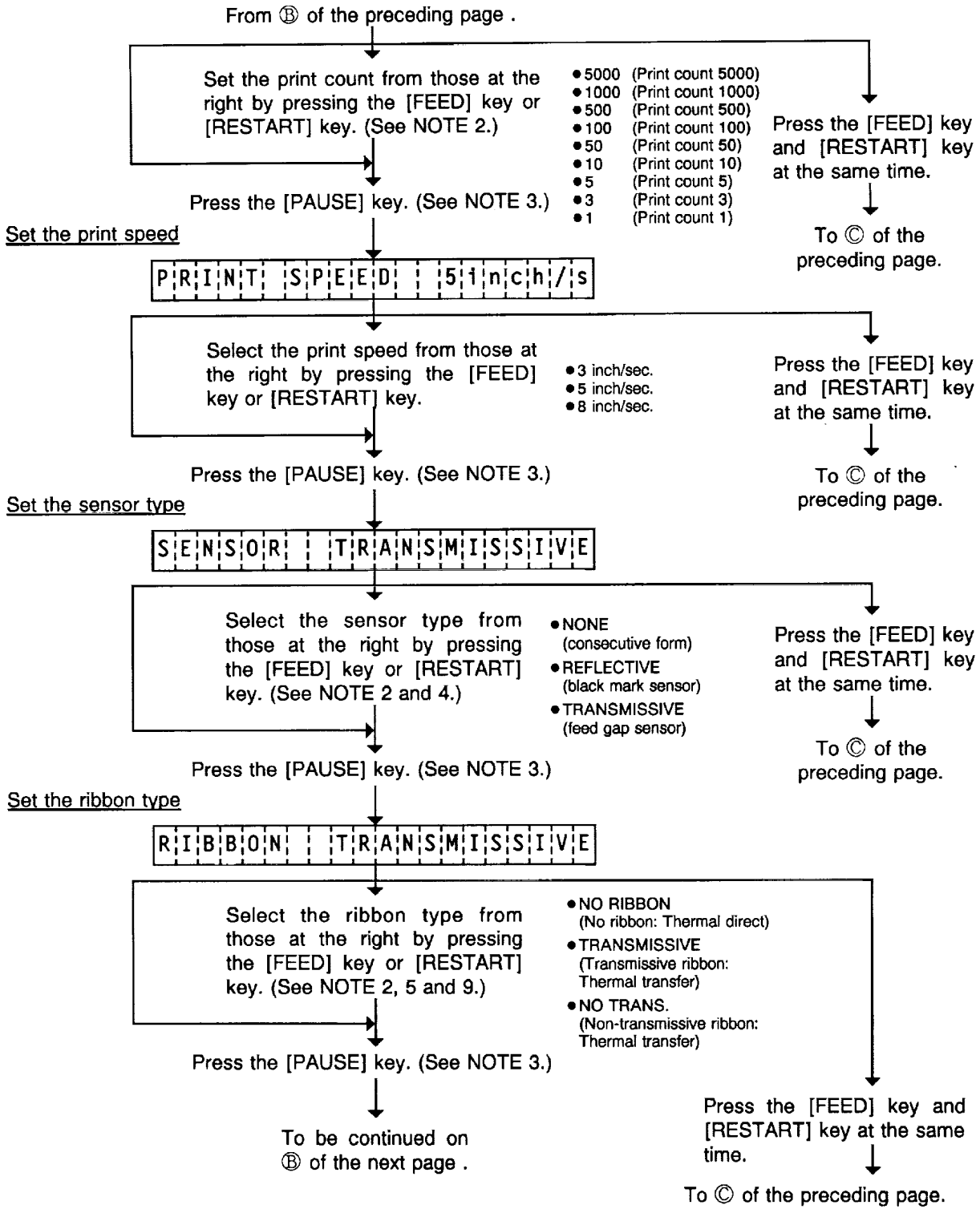
6.4.1 Normal Test Print

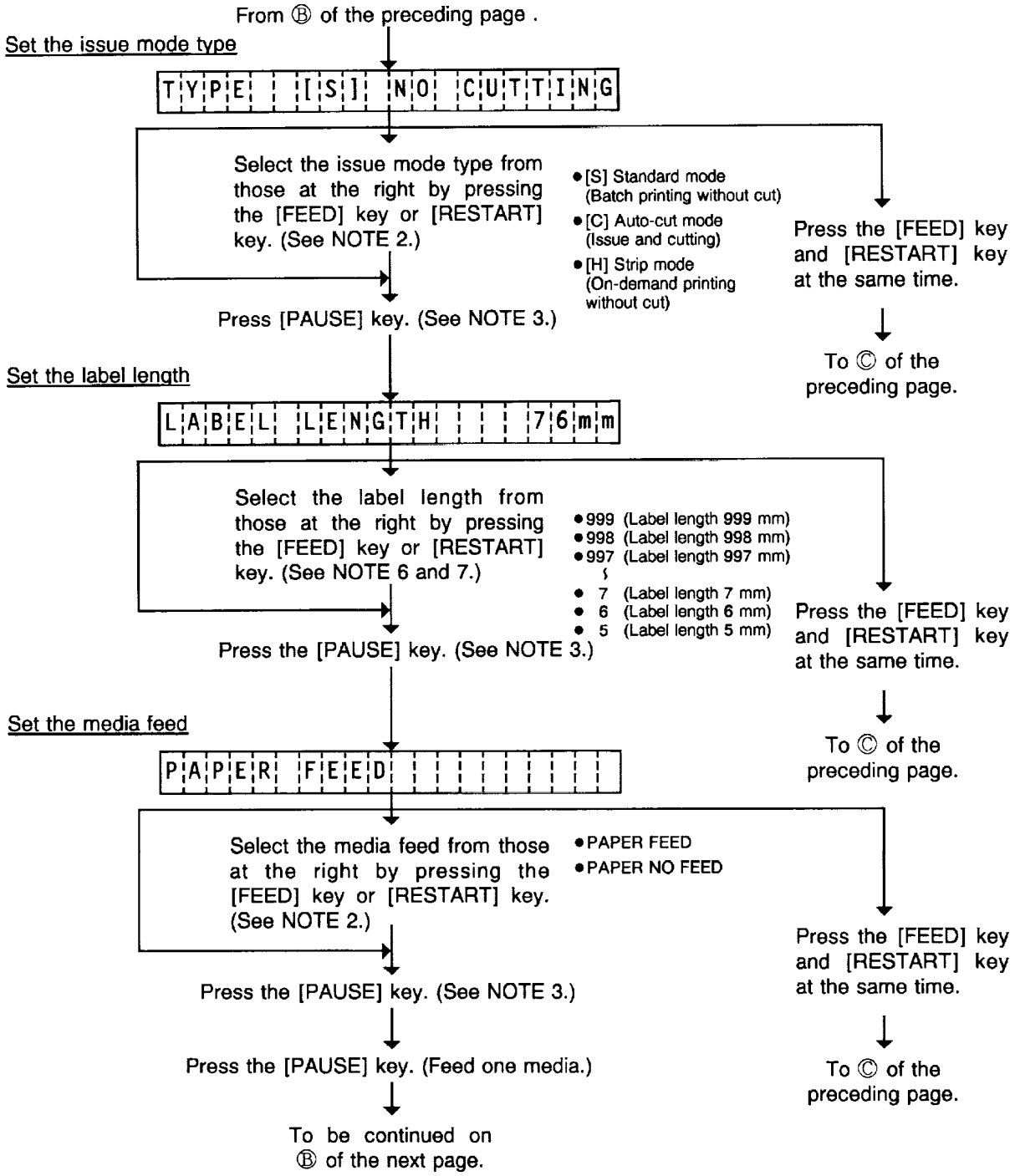
Eight kinds of test prints are provided in the test print mode. When performing the test print, 7 parameters should be set. The default parameter at power on is as below:

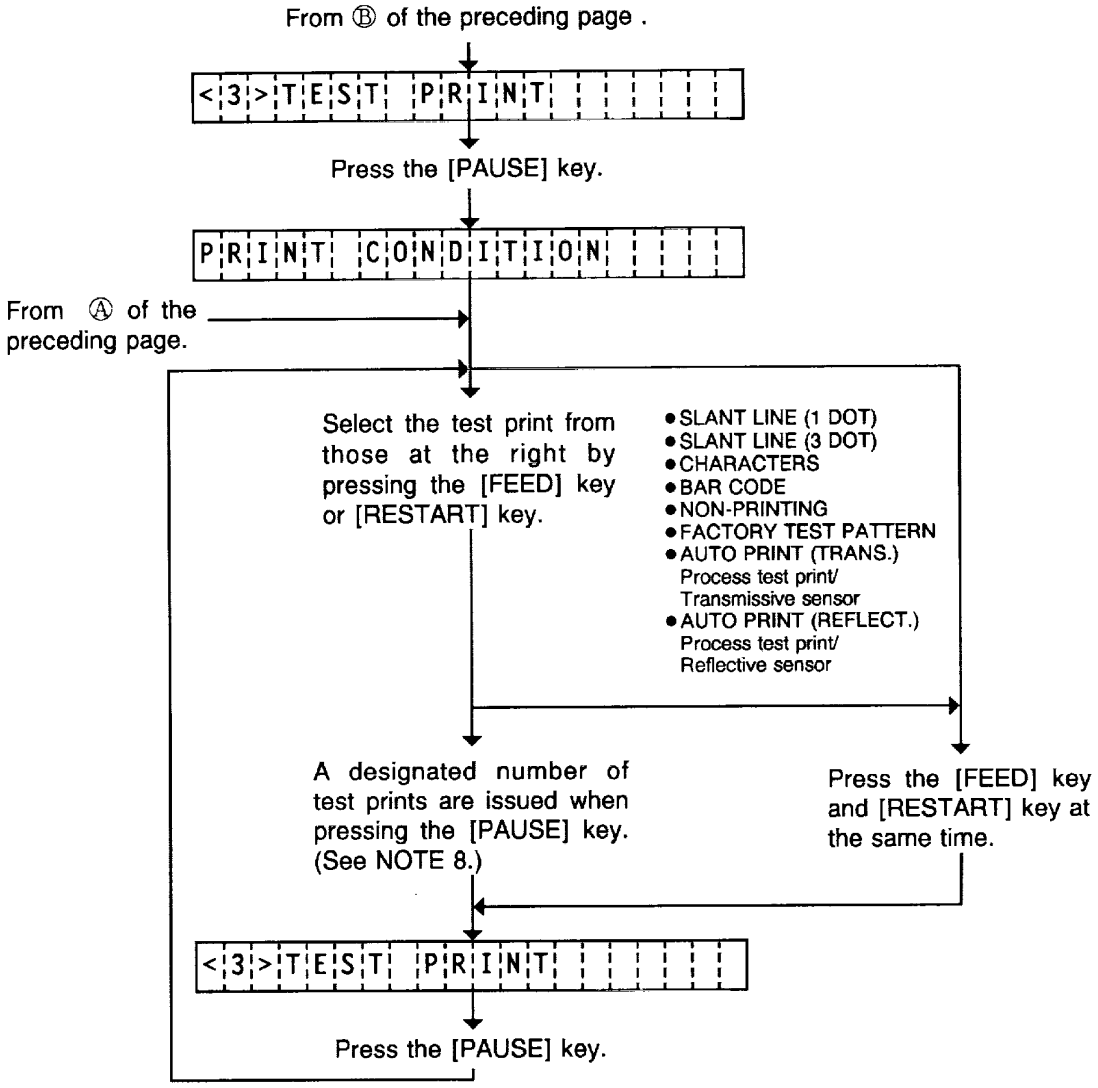
- ISSUE COUNT : 1
- PRINT SPEED : 5 inch/sec.
- SENSOR : Transmissive sensor
- RIBBON : Transmissive ribbon
- TYPE : Batch (without cut)
- LABEL LENGTH : 76 mm
- PAPER FEED : Feed

Operating procedure for the test mode is provided below.




From Ⓑ of the preceding page .
Set the print count from those at the right by pressing the [FEED] key or [RESTART] key. (See NOTE 2.)
• 5000 (Print count 5000)
• 1000 (Print count 1000)
• 500 (Print count 500)
• 100 (Print count 100)
• 50 (Print count 50)
• 10 (Print count 10)
• 5 (Print count 5)
• 3 (Print count 3)
• 1 (Print count 1)
Press the [FEED] key and [RESTART] key at the same time.
To © of the preceding page.
Press the [PAUSE] key. (See NOTE 3.)
Set the print speed
PRINT SPEED 5inch/s
Select the print speed from those at the right by pressing the [FEED] key or [RESTART] key.
• 3 inch/sec.
• 5 inch/sec.
• 8 inch/sec.
Press the [FEED] key and [RESTART] key at the same time.
To © of the preceding page.
Press the [PAUSE] key. (See NOTE 3.)
Set the sensor type
SENSOR TRANSMISSIVE
Select the sensor type from those at the right by pressing the [FEED] key or [RESTART] key. (See NOTE 2 and 4.)
• NONE (consecutive form)
• REFLECTIVE (black mark sensor)
• TRANSMISSIVE (feed gap sensor)
Press the [FEED] key and [RESTART] key at the same time.
To © of the preceding page.
Press the [PAUSE] key. (See NOTE 3.)
Set the ribbon type
RIBBON TRANSMISSIVE
Select the ribbon type from those at the right by pressing the [FEED] key or [RESTART] key. (See NOTE 2, 5 and 9.)
• NO RIBBON (No ribbon: Thermal direct)
• TRANSMISSIVE (Transmissive ribbon: Thermal transfer)
• NO TRANS. (Non-transmissive ribbon: Thermal transfer)
Press the [PAUSE] key. (See NOTE 3.)
To be continued on Ⓑ of the next page .
Press the [FEED] key and [RESTART] key at the same time.
To © of the preceding page.


From Ⓑ of the preceding page .
Set the issue mode type
TYPE [S] NO CUTTING
Select the issue mode type from those at the right by pressing the [FEED] key or [RESTART] key. (See NOTE 2.)
• [S] Standard mode (Batch printing without cut)
• [C] Auto-cut mode (Issue and cutting)
• [H] Strip mode (On-demand printing without cut)
Press the [FEED] key and [RESTART] key at the same time.
To © of the preceding page.
Press [PAUSE] key. (See NOTE 3.)
Set the label length
LABEL LENGTH 76mm
Select the label length from those at the right by pressing the [FEED] key or [RESTART] key. (See NOTE 6 and 7.)
• 999 (Label length 999 mm)
• 998 (Label length 998 mm)
• 997 (Label length 997 mm)
ξ
• 7 (Label length 7 mm)
• 6 (Label length 6 mm)
• 5 (Label length 5 mm)
Press the [FEED] key and [RESTART] key at the same time.
To © of the preceding page.
Press the [PAUSE] key. (See NOTE 3.)
Set the media feed
PAPER FEED
Select the media feed from those at the right by pressing the [FEED] key or [RESTART] key. (See NOTE 2.)
• PAPER FEED
• PAPER NO FEED
Press the [FEED] key and [RESTART] key at the same time.
To © of the preceding page.
Press the [PAUSE] key. (See NOTE 3.)
Press the [PAUSE] key. (Feed one media.)
To be continued on Ⓑ of the next page.



NOTES:

1. *When there is no change to the print condition, select one of the test print options to issue the test print.*
2. *Holding the [FEED] key or [RESTART] key down for more than 0.5 seconds enables a fast forward.*
3. *A selected print condition is activated when the [PAUSE] key is pressed.*
4. *When the feed gap sensor is selected, the gap between labels becomes 3mm long.*
5. *Non-transmissive (NON TRANS.) ribbon cannot be used so the ribbon type must be set to transmissive (TRANS.) ribbon or no ribbon.*
6. *A label size greater than the image buffer length cannot be designated. The image buffer length differs according to memory size. If designated, the printer prints in the image buffer, or the printer stops because of an error.*
7. *Pressing the [FEED] key changes the label length -1 mm, pressing the [RESTART] key changes +1 mm.*
8. *When an error occurs during a test print, the error message is displayed and printing is stopped. The error is cleared by pressing the [PAUSE] key and the display shows "<3> TEST PRINT". Printing is not automatically resumed after the error is cleared.*

9. *When the transmissive ribbon is selected and DIP SW. 1-1 is set to ON, and the space area is also 20 mm or more, the printer automatically enters ribbon saving print mode.*
10. *When "AUTO PRINT" is selected, 5 pcs. of the 3-dot slant line labels, bar code labels and character labels are printed respectively after one label is fed.*

■ Test Print Sample

- Slant line (1 dot)

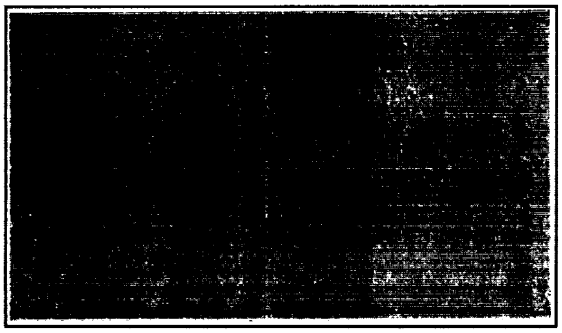


Fig. 6-21

- Slant line (3 dot)

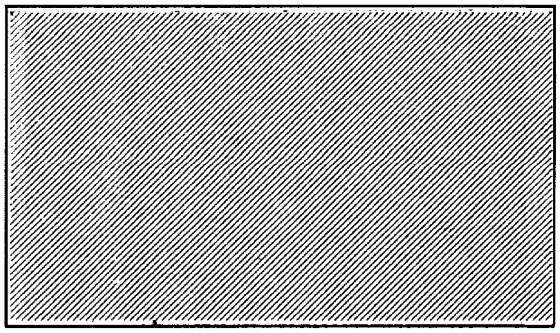


Fig. 6-22

- Characters

Fig. 6-23

- Bar code

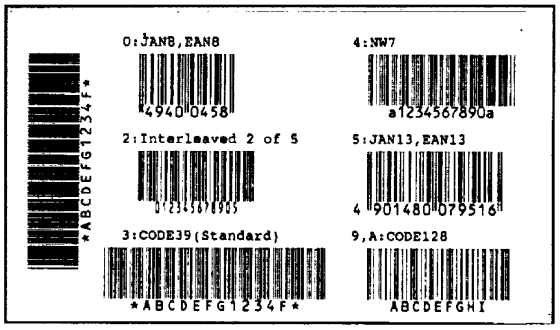


Fig. 6-24

- FACTORY TEST PATTERN

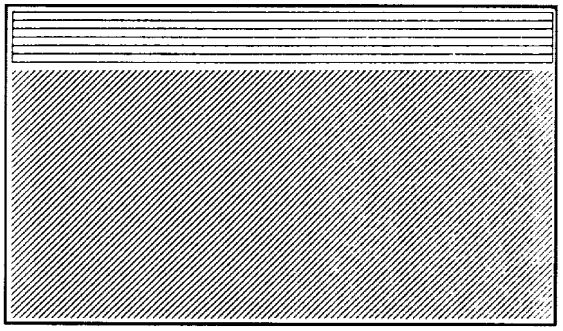


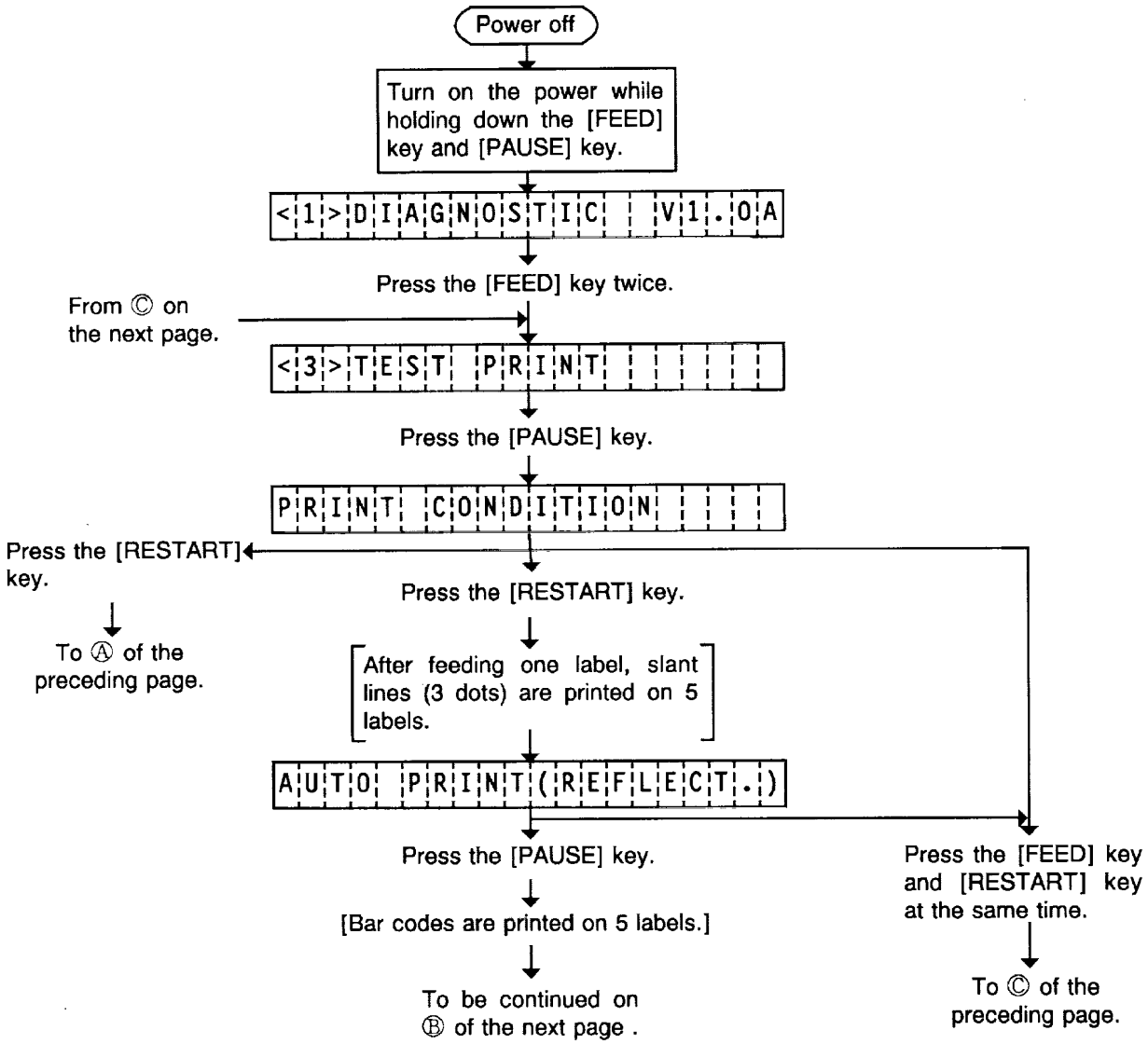
Fig. 6-25

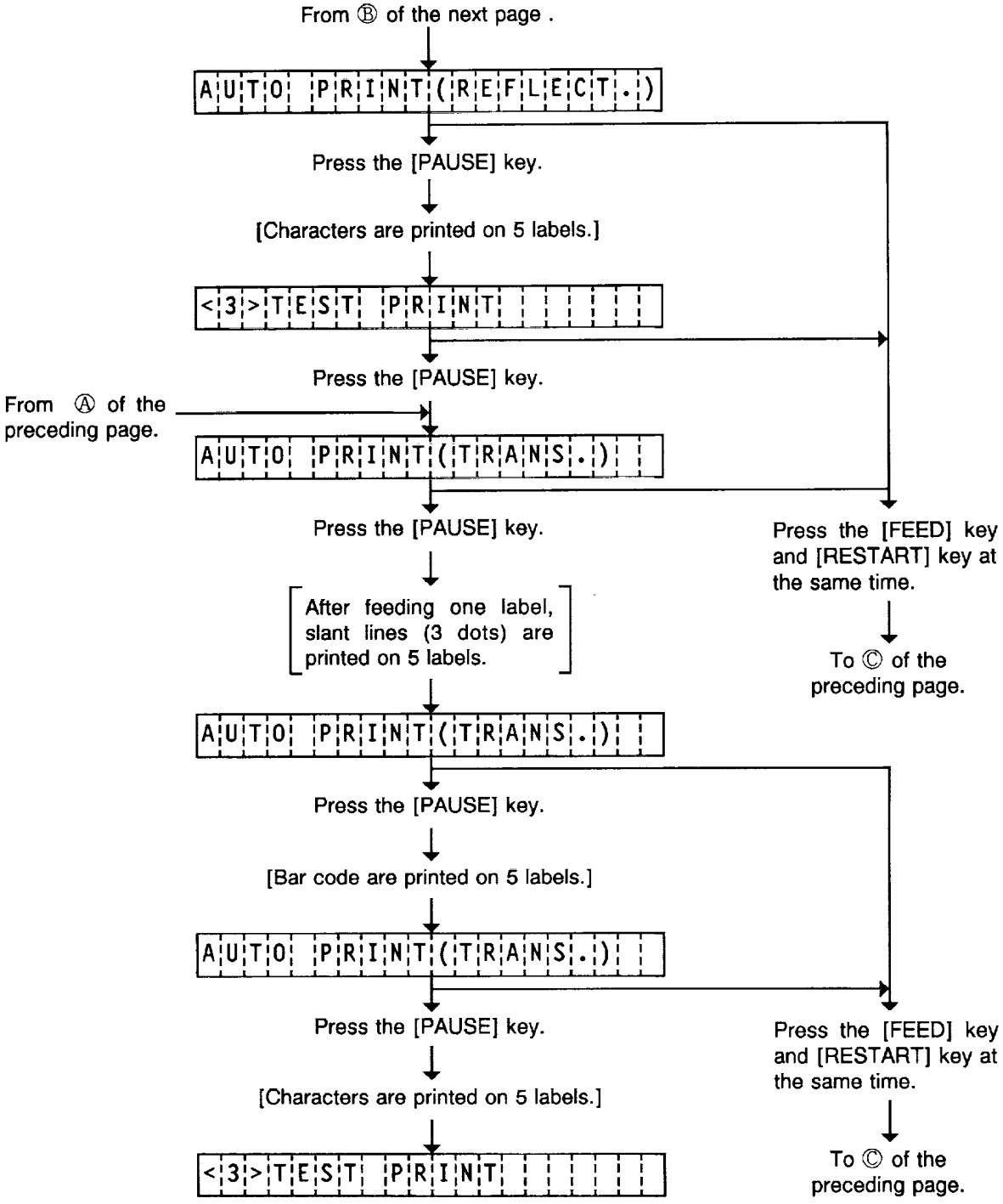
6.4.2 Process Test Print

In the process test print, the test print is automatically performed under the following conditions. Parameter setting and print tone fine adjustment value is ignored.

- OPERATION : One label feed, 3-dot slant line print, bar code print, character print
- ISSUE COUNT : 5 labels each
- PRINT SPEED : 8 inches/sec.
- SENSOR : Transmissive sensor (feed gap sensor) or reflective sensor (black mark sensor)
- RIBBON : Transmissive ribbon
- TYPE : Batch (without cut)
- LABEL LENGTH : 76 mm
- PRINT TONE FINE ADJUSTMENT VALUE : +0

Operating procedure for the test mode is provided below.



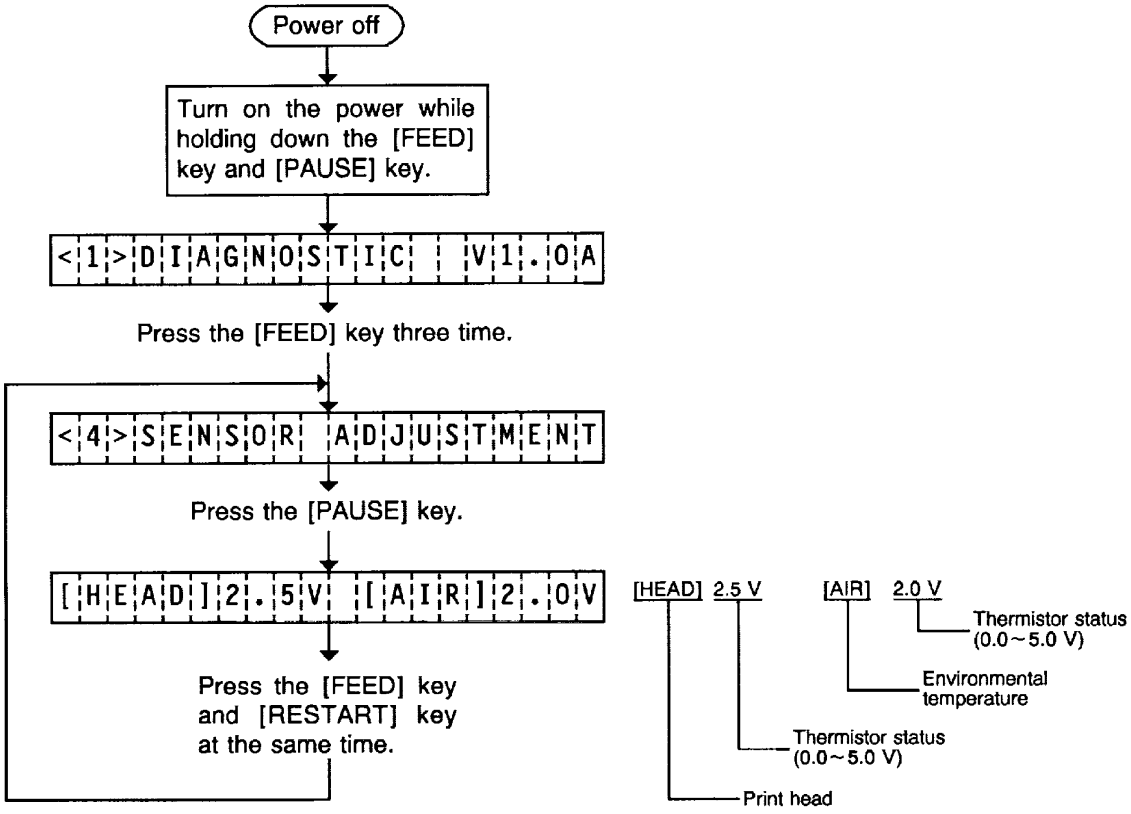

From Ⓑ of the next page .
AUTO PRINT(REFLECT.)
Press the [PAUSE] key.
[Characters are printed on 5 labels.]
<3>TEST PRINT
Press the [PAUSE] key.
From Ⓐ of the preceding page.
AUTO PRINT(TRANS.)
Press the [PAUSE] key.
Press the [FEED] key and [RESTART] key at the same time.
To Ⓒ of the preceding page.
After feeding one label, slant lines (3 dots) are printed on 5 labels.
AUTO PRINT(TRANS.)
Press the [PAUSE] key.
[Bar code are printed on 5 labels.]
AUTO PRINT(TRANS.)
Press the [PAUSE] key.
Press the [FEED] key and [RESTART] key at the same time.
[Characters are printed on 5 labels.]
To Ⓒ of the preceding page.
<3>TEST PRINT

6.5 SENSOR SETTING MODE

Thermistor check and black mark/feed gap sensor settings are provided in the sensor setting mode. The value set in this mode is printed as data of sensor 2 in Automatic diagnosis printing in self test mode.

6.5.1 Thermistor Check

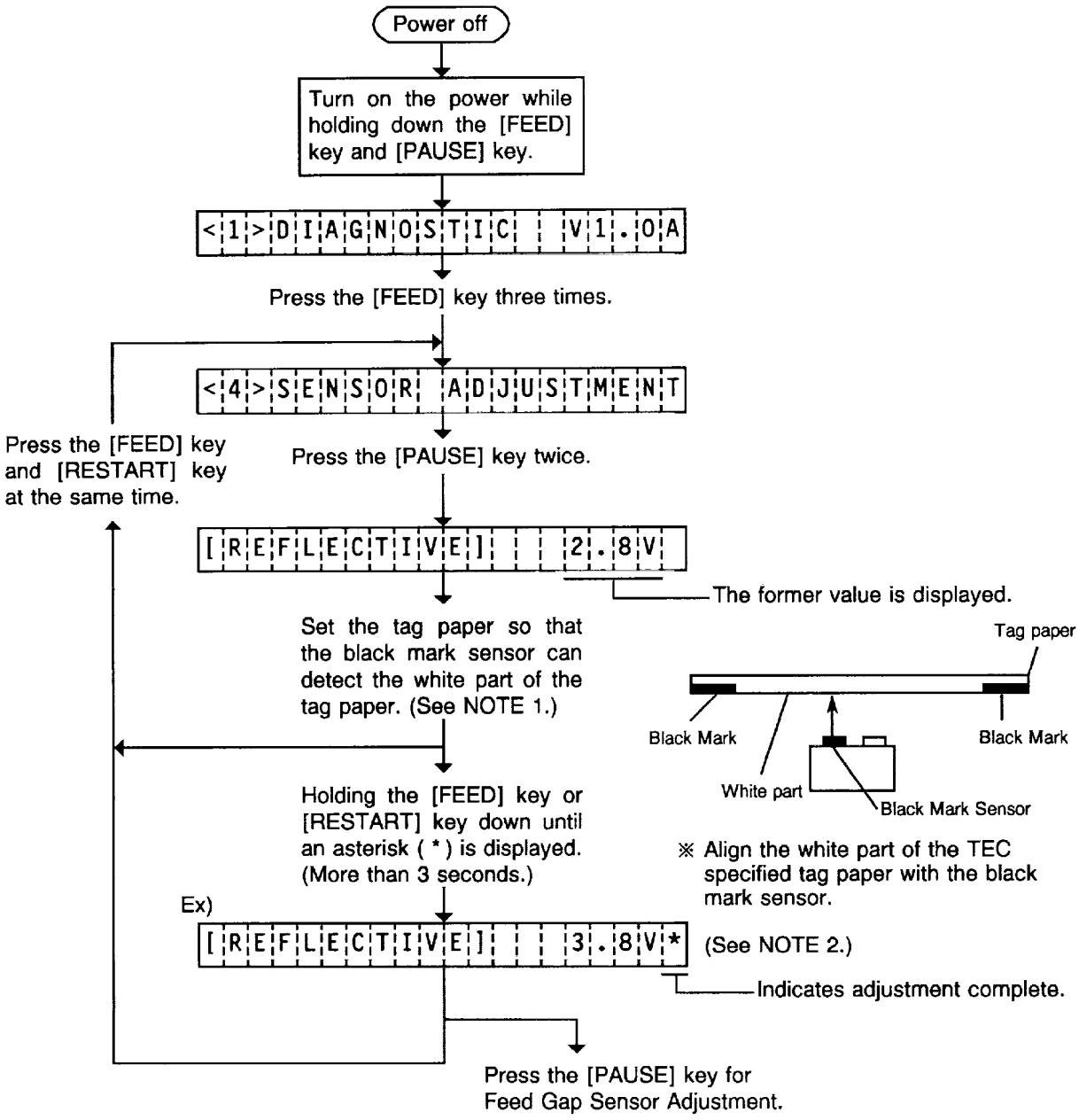
Thermistor check should be performed to check the environmental temperature and print head temperature after the excess head temp. error occurs or batch printing is performed for a long time.



NOTE: *1. Since the thermistor is supervised every 200 ms while displaying the status, the display could vary.*

6.5.2 Black Mark Sensor Adjustment

Black mark sensor setting should be performed after replacing the CPU PC board or changing the tag paper to other maker's one, or when a paper feed error occurs.

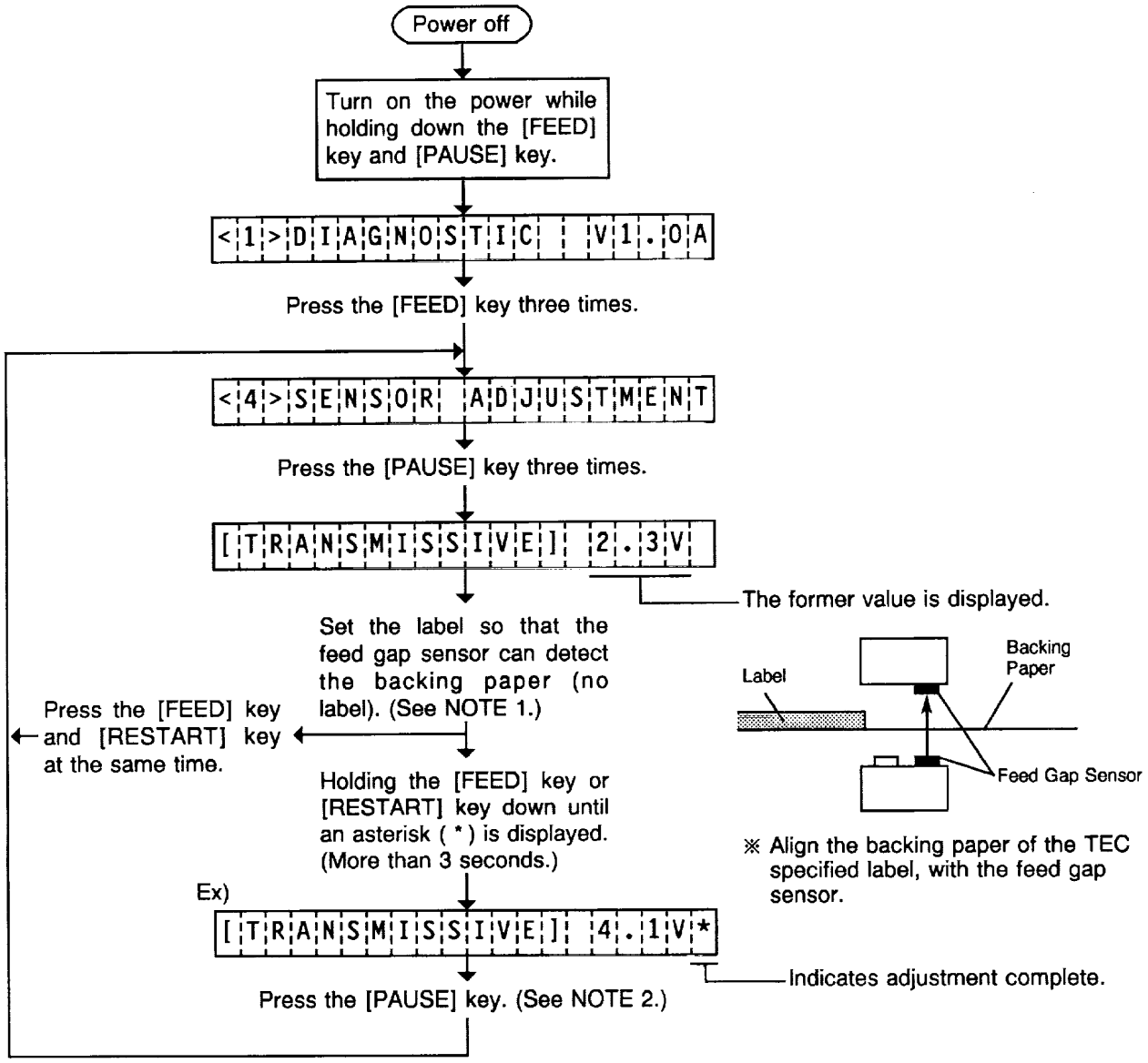


NOTES: *1. Make sure to adjust the black mark sensor using the white part of the tag paper as a criterion. Though an adjustment can be performed with the black mark, it may cause a paper jam error.*

2. Pressing the [PAUSE] key validates the sensor adjustment. The value of the sensor is displayed up to 5.0 V.

6.5.3 Feed Gap Sensor Adjustment

Feed gap sensor setting should be performed after replacing the CPU PC board or changing the label to other maker's one, or when a paper feed error occurs



NOTES: *1. Make sure to adjust the feed gap sensor using the backing paper with no label as a criterion. Though an adjustment can be performed with the label, it could cause a paper jam error.*

2. Pressing the [PAUSE] key validates the sensor adjustment. The value of the sensor is displayed up to 5.0 V.

6.6 RAM CLEAR MODE

In RAM clear mode, various data written on the EEP-ROM can be initialized. There are two clear functions; Maintenance counter clear and parameter clear in the parameter setting mode. After referring to the following table specify and clear or initialize the data.

■ RAM Clear Mode Table

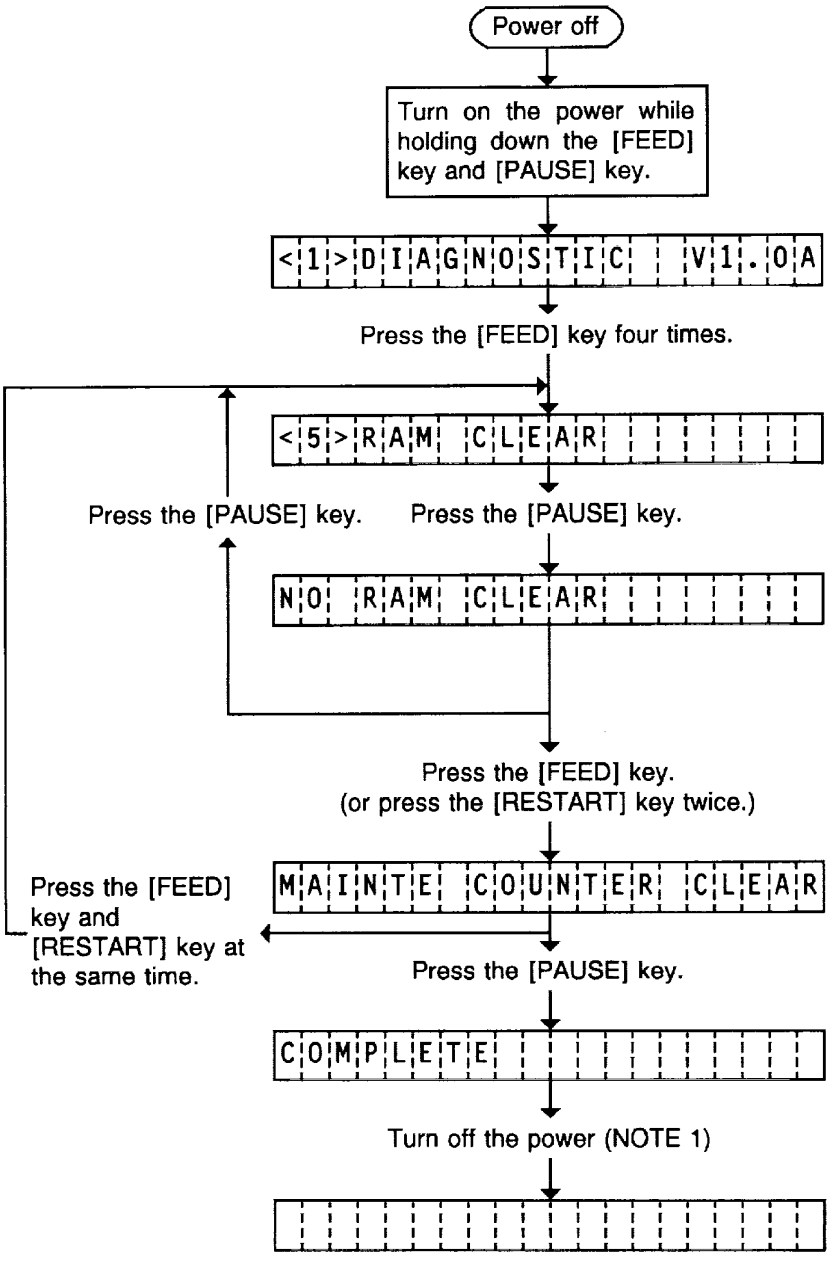
<table>
<tr><th>Mode Name</th><th>Function</th></tr>
<tr><td>NO RAM CLEAR</td><td>If you enter the RAM clear mode by mistake, specify this mode to escape from the RAM clear mode without executing RAM clear.</td></tr>
<tr><td>MAINTE. COUNTER CLEAR</td><td>After replacing the print head, cutter module, ribbon feed/rewind motor, solenoid and CPU PC Board, clear the maintenance counter. The following data will be cleared to zero. Confirmation can be made through the maintenance counter procedure in self test mode. (See NOTE 1 and 2.)
<table>
<tr><th>Item</th><th>Initial Value</th></tr>
<tr><td>Media distance covered</td><td>0.0 km</td></tr>
<tr><td>Print distance</td><td>0.0 km</td></tr>
<tr><td>Cut count</td><td>0 times</td></tr>
<tr><td>Head up and down count</td><td>0 times</td></tr>
<tr><td>Ribbon motor driving time</td><td>0 hours</td></tr>
<tr><td>Solenoid driving time</td><td>0 hours</td></tr>
<tr><td>RS-232C hardware error count</td><td>0 times</td></tr>
<tr><td>System error count</td><td>0 times</td></tr>
<tr><td>Momentary power failure count</td><td>0 times</td></tr>
</table></td></tr>
<tr><td>PARAMETER CLEAR</td><td>This clear should be employed when initializing the following parameters to the settings before shipment. Confirmation can be made through the automatic diagnostic procedure in self test mode. (See NOTE 1 and 2.)
<table>
<tr><th>Item</th><th>Initial Value</th></tr>
<tr><td>Feed length fine adjustment (PC)</td><td>0.0 mm</td></tr>
<tr><td>Cut/strip position fine adjustment (PC)</td><td>0.0 mm</td></tr>
<tr><td>Back feed length fine adjustment (PC)</td><td>0.0 mm</td></tr>
<tr><td>Print tone fine adjustment (Thermal transfer) (PC)</td><td>0 step</td></tr>
<tr><td>Print tone fine adjustment (Thermal direct) (PC)</td><td>0 step</td></tr>
<tr><td>Feed length fine adjustment (KEY)</td><td>0.0 mm</td></tr>
<tr><td>Cut/strip position fine adjustment (KEY)</td><td>0.0 mm</td></tr>
<tr><td>Back feed length fine adjustment (KEY)</td><td>0.0 mm</td></tr>
<tr><td>Print tone fine adjustment (Thermal transfer) (KEY)</td><td>0 step</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Mode Name</th><th>Function</th></tr>
<tr><td>PARAMETER CLEAR</td><td>
<table>
<tr><th>Item</th><th>Initial Value</th></tr>
<tr><td>Print tone fine adjustment (Thermal direct) (KEY)</td><td>0 step</td></tr>
<tr><td>X axis fine adjustment</td><td>0.0 mm</td></tr>
<tr><td>Character code selection</td><td>PC-850</td></tr>
<tr><td>Font zero selection</td><td>"0" (without slash)</td></tr>
<tr><td>Control code selection</td><td>Auto.</td></tr>
<tr><td>Ribbon type selection</td><td>Trans.</td></tr>
<tr><td>Ribbon motor drive voltage fine adjustment (PC)</td><td>0</td></tr>
<tr><td>Ribbon motor drive voltage fine adjustment (KEY)</td><td>0</td></tr>
<tr><td>Strip wait status setting</td><td>1</td></tr>
<tr><td>Status response</td><td>ON</td></tr>
<tr><td>Label pitch</td><td>76.2 mm</td></tr>
<tr><td>Effective printing length</td><td>74.2 mm</td></tr>
<tr><td>Effective printing width</td><td>128 mm</td></tr>
<tr><td>With/without ribbon</td><td>With</td></tr>
<tr><td>Sensor type</td><td>Transmissive sensor (Feed gap sensor)</td></tr>
<tr><td>Feed Speed</td><td>5 inch/sec.</td></tr>
<tr><td>Issue mode</td><td>Standard (Batch printing)</td></tr>
<tr><td>PC save automatic calling</td><td>ON</td></tr>
</table>
</td></tr>
</table>

NOTES:

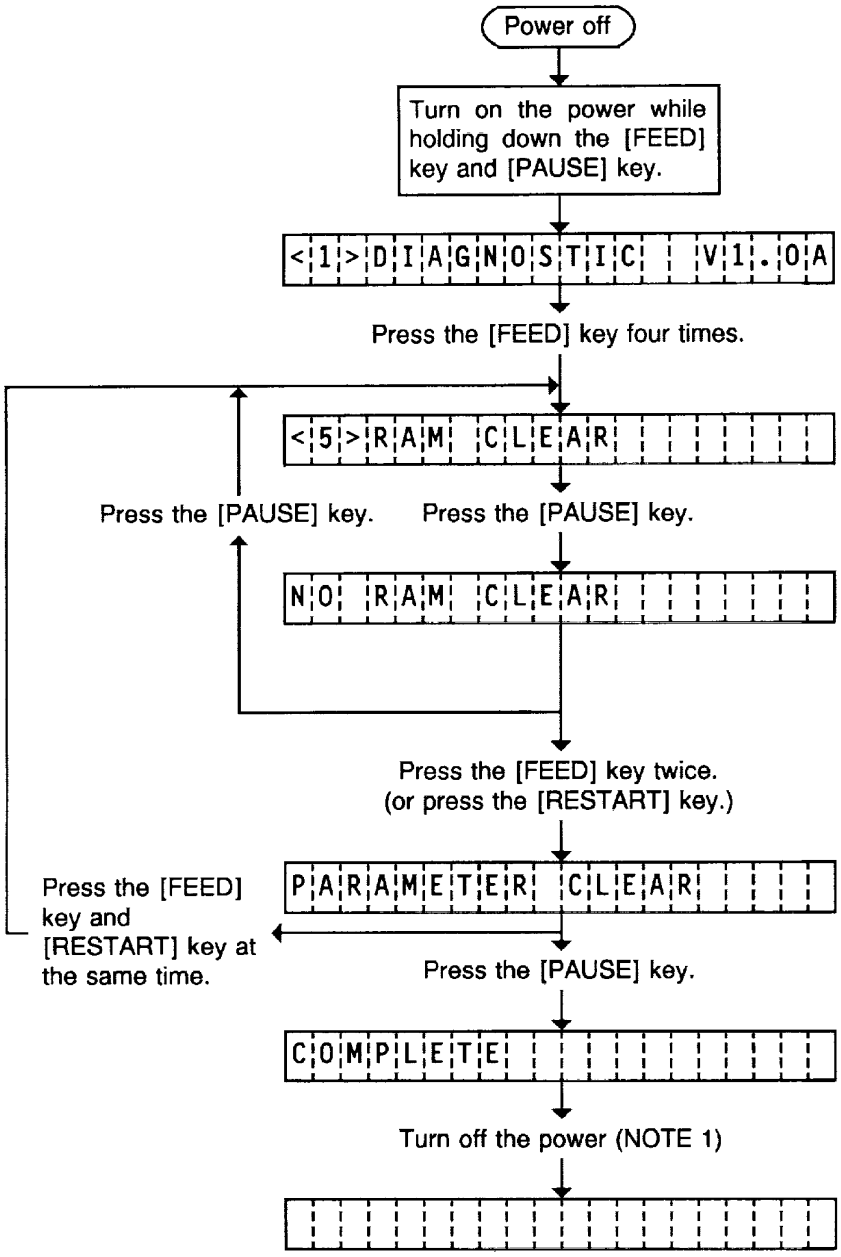
1. *Total media distance covered (TL FEED) and the adjustment value for the sensors cannot be cleared.*
2. *Data stored on the flash memory card cannot be cleared with this procedure. To clear data on the flash memory card, send the format command to initialize the card. For details, refer to the External Equipment Interface Specification.*
3. *For data to be cleared in the RAM clear mode, refer to the RAM clear mode table.*
4. *After RAM clear is performed, the threshold setting value will turn to the default (0). When using pre-printed labels, be sure to set the threshold after referring to the Owner's Manual.*

6.6.1 Maintenance Counter Clear



NOTE: *1. Confirm that "COMPLETE" is displayed, then turn the power off.*

6.6.2 Parameter Clear



NOTE: *1. Confirm that "COMPLETE" is displayed, then turn the power off.*

7. PROGRAM DOWN LOAD

The main program for the printer has been written onto the flash ROM. If the main program is upgraded, due to the addition/change of the specification, down load the main program from the PC to the printer with the down-load floppy disk and RS-232C interface or high speed PC interface.

7.1 Floppy Disk

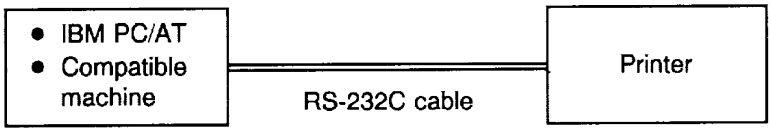
(1) Media . . . . . 3.5 inches (2DD)

(2) System disk . . . . 1 disk (This floppy disk contains the main program written onto the printer and the tool program for down load.)

7.2 Setup

The transmission control code for the printer must be set to either the automatic selection or manual selection (ESC, NUL, LF). For details, refer to Section 6.3.8 Control Code Selection.

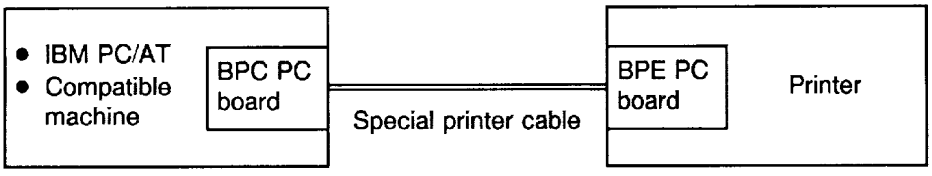
(1) Program down load with RS-232C interface



Connect the PC to the printer with an RS-232C cable. Set the DIP SW2 on the CPU PC board of the printer as follows:

SW#	Status	Function	Description
1	OFF	9600 BPS	Transmission Speed
2	ON		
3	OFF	1 bit	Stop bit length
4	ON	8 bits	Data length
5	OFF	No	Presence/absence of parity

(2) Program down load with high speed PC interface



Install the BPC and BPE PC boards in the PC and printers, respectively, and connect both boards to each other with the special printer cable after referring to the Maintenance Manual Section 3.1. Refer to the Owner's Manual enclosed with the high speed PC interface board kit to set the DIP SW on the BPC PC board and to install the BPC driver in the PC (hard disk drive).

7.3 Down Load Procedure

(1) Turn the PC power on.

(2) Turn the printer power on.

(3) Insert the program down load floppy disk into the PC.

(4) Change the drive to A. Type [A] [:] [↵]

(5) Start the batch file "PDL". Type [P] [D] [L] [↵]
Or copy the contents of the floppy disk in to the hard disk and start the program in the hard disk.

(6) After starting the batch file "PDL", the following menu is displayed. Ⓐ indicates the main program version.

```
This is the down load program for B-X          DD-MM-YYYY

This program down line loads
     the program file (Version V1.0A) to the B-X
                                    Ⓐ
       Select the communication device.  [ ]
      ( 1=RS-232C , 2=High Speed PC interface )

                Are you sure ? (Y/N)  [ ]
 (Pressing the <Y key> will transmit the program file.)   ←Ⓑ

        To end the program press the <F1 key>
```

(7) Select the interface.
- RS-232C interface [1] [↵]
- High speed PC interface [2] [↵]

(8) Start the main program transmission. [Y] [↵]
When changing the interface, press [N] [↵] and go back to step (7).

(9) While the main program is being transmitted, the following message is displayed in line Ⓑ. "###" in the message, a running count, from 0 through 128 is shown indicating the number of KB transferred.

```
** Now transmitting (###/128KB) **
```

(10) When the transmission is successfully completed, the following message is displayed in line Ⓑ.

```
End of Transmission.  Continue(Y/N) ? [ ]
```

- To continue
  ① Turn the printer power off and exchange the printer with another one.
  ② Turn the printer power on.
  ③ Start the main program transmission. [Y] [↵]
- To terminate [N] [↵]

(11) When an error occurs, the following message is displayed together with the error code in line Ⓑ.

```
The following error occurred during transmission. (ERROR=##)
      Press any key to retry.                          └── Error code
```

Doing so will revert to the display described in step (6). Refer to the error code to find the cause of the error, then retry the down load.

(12) After terminating the down load, refer to the Maintenance Manual Section 6.2 SELF TEST MODE and perform diagnostic printing. Check that the printer operates properly and the main program version and checksum is printed on the label.

7.4 Error Code

Error Code (#)	Error	Remarks
06	Communication error (Error is detected during command analysis.)	Status from the printer
07	Communication error (Parity error, overrun error or framing error occurred during communication with RS-232C.)	
50	Write error occurred while data was being written onto the flash ROM.	
51	Delete error occurred during formatting of the flash ROM.	
57	Checksum error occurred in the transmission program data.	
81	Image data transmission request signal is not converted to "L".	Error detected in PC
82	Data FIFO of the high speed PC interface is not empty.	
88	Undefined status is received when awaiting data in RS-232C.	
89	An IOCTL carry is detected in the high speed PC interface.	
90	A parameter error occurred.	
92	An overrun error occurred in RS-232C.	
93	A parity error occurred in RS-232C.	
94	A framing error occurred in RS-232C.	
95	A break is detected in RS-232C.	
97	COM1 open error occurred in RS-232C.	
98	Undefined status is received against the loading setup command.	
99	Undefined status is received when the loading operation is terminated.	

Check the following when an error occurs:

- The printer power is turned on.
- The RS-232C cable or high speed PC interface cable is connected properly.
- The DIP SW on the CPU PC board or BPC PC board is set correctly.
- With the high speed PC interface, that the BPC/BPE PC boards are installed in the PC/printer properly. That the BPC driver is installed in the PC (hard disk drive) properly.

TEC

TEC Thermal Printer

B-570 SERIES

Circuit Description

Document No. **EM6-33009A**

Original **Nov., 1993**

(Revised **Apr., 1994**)

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TEC CORPORATION

PRINTED IN JAPAN

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CAUTION:

1. *This manual may not be copied in whole or in part without prior written permission of TEC.*
2. *The contents of this manual may be changed without notification.*
3. *Please refer to your local Authorized Service representative with regard to any queries you may have in this manual.*

1. OUTLINE OF THE PC BOARD

This printer is comprised of the following electronic components, a CPU PC Board, a flash memory card, an I/F PC Board which allows Centronics interface and expansion I/O interface and a PWM2 PC Board which drives the take-up motor.

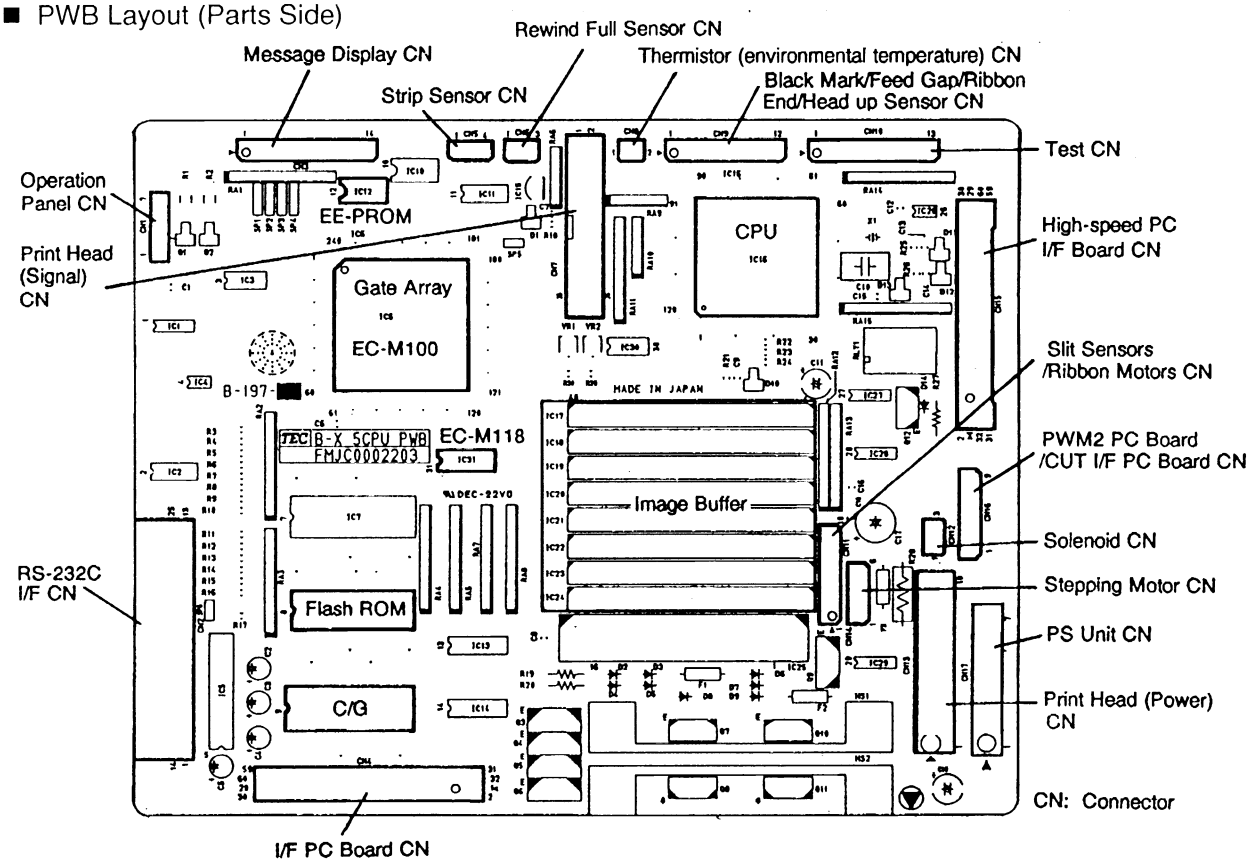
The cutter module is an optional part. The cutter module contains the CUT I/F PC Board which drives the cutter motor. The optional High-speed PC Interface Board consists of the PC Boards (BPE and BPC PC Boards).

The outline of each PC Board is described below.

1.1 CPU PC BOARD

The CPU PC Board contains the 16 bit CPU (μPD70236) for the system clock (16 MHz) and gate array (EC-M100). This board functions as the heart of this printer, and performs sensor detection, controls the motors and print head, and provides a serial interface.
For the features and functions of the CPU and the EC-M100, refer to Section 5 of this manual.
The CPU PC Board also contains the 128 KB flash ROM where the main program is stored, a 1024 KB D-RAM used as a drawing image buffer, an EE-PROM where the total media distance covered is written, and a mask ROM for the character generator. The D-RAM can be expanded up to 4096 KB in units of 512 KB.

■ PWB Layout (Parts Side)



1.2 I/F PC BOARD

This PC Board contains the flash memory card interface circuit for registering logos, writable characters and PC commands, a Centronics interface circuit for printing controlled by the PC and an expansion I/O interface circuit for printing controlled by external equipment which may include a labeler.

1.3 PWM2 PC BOARD

This PC Board is connected between the CPU PC Board and the take-up motor. According to the signal output from the CPU PC Board, this PC Board turns the transistor on this PC Board on and off and drives the take-up motor.

1.4 CUT I/F PC BOARD

This PC Board contains the optional cutter module. According to the signal output from the CPU PC Board, this PC Board turns on and off the transistor on this PC Board and drives the cutter motor.

The signal from the Cutter home position switch is transmitted to the CPU PC Board via this PC Board.

When the cutter module is used, remove the cable connecting CN16 on the CPU PC Board to the PWM2 PC Board. Then connect the CUT I/F PC Board to CN16 on the PCU PC Board.

1.5 HIGH-SPEED PC I/F BOARD

This board is used to connect the printer to an IBM PC-AT or compatible PC and to process commands from the PC at high speed. Data is transferred in parallel mode.

This board is comprised of the BPE PC Board and the BPC PC Board. The BPE PC Board is installed in the printer and the BPC PC Board is in the PC. By connecting these PC Board using the cable, data transfer can be done.

This BPE PC Board contains the buffer, decoder and FIFO (Fist-in, First-out) memory with a capacity of 576 bytes. Data transfer is performed asynchronously.

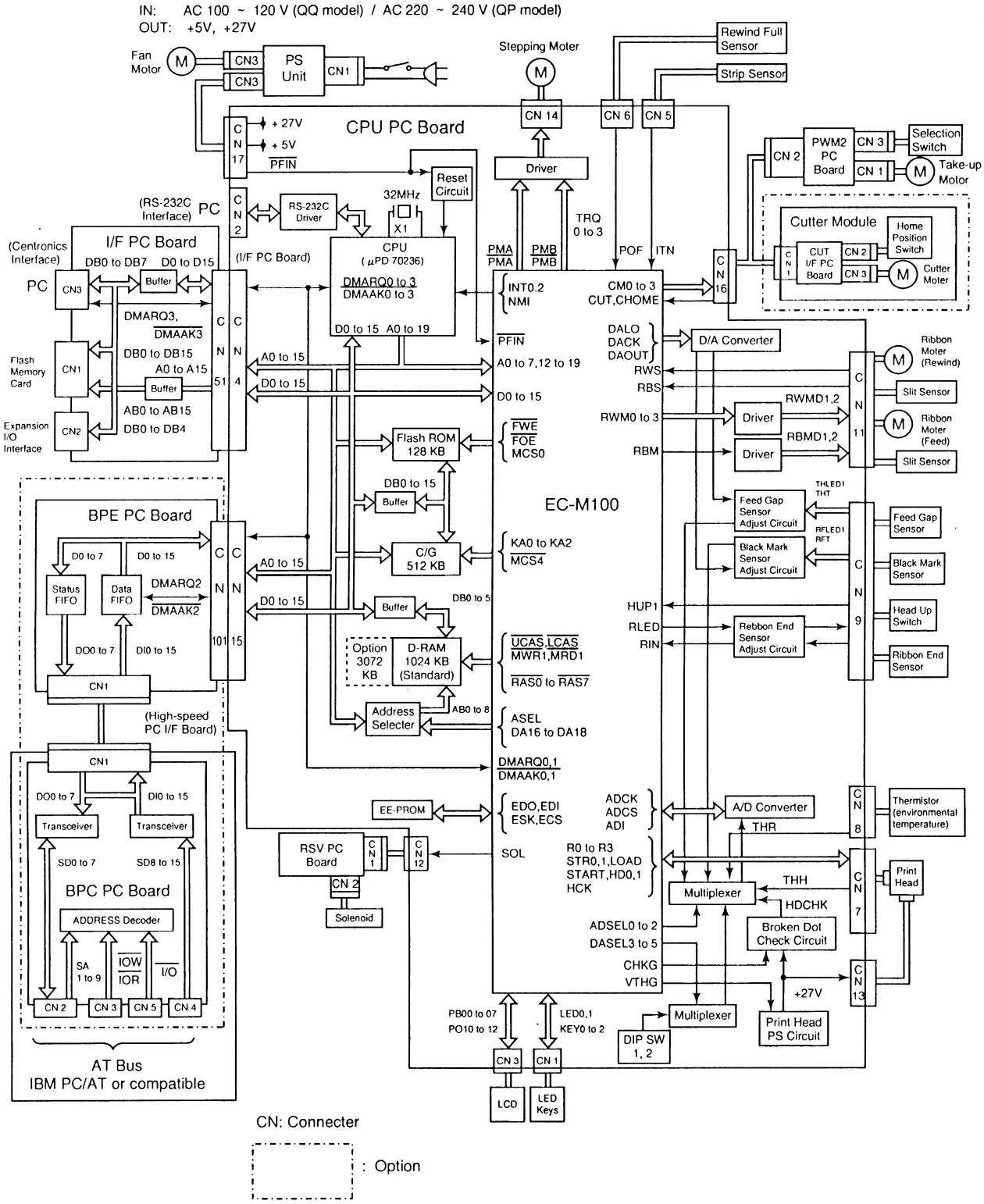
The print data or command data output from the PC to the printer is written into the FIFO memory on the BPE PC Board. According to the DMA request signal output from the FIFO memory, the data is processed in DMA mode, allowing high-speed printing.

The status data is output from the printer to the PC. The BPC PC Board is connected to the AT bus of the PC. This board contains the transceiver, buffer and address decoder. Using the I/O address programmed with the DIP switch on this PC Board, print data, command data and status data are transferred between the printer and the PC.

1.6 PS UNIT

This PC Board not only generates the rated voltages for various logic circuits, the print head, various motors, etc. but also works to reset the main elements when a voltage-down occurs due to a power failure, etc. It is also provided with a protection function to protect the circuit from an excessive voltage or short-circuiting and with a Variable Resistor for voltage adjustment.

2. BLOCK DIAGRAM



■ PRINTER OPERATIONS

By transferring commands and print data from the PC using serial interface (RS-232C), parallel interface (Centronics), or high-speed PC interface, the printer issues a label. Data transfer in the high-speed PC interface and Centronics interface is performed in DMA mode.

(1) When the power is turned on, the program in the mask ROM is activated, various devices including the D-RAM are initialized. When initialization is complete, the CPU starts operating according to the main program in the flash ROM.

(2) The print data transferred from the PC is written in an area in the receive buffer, converted to drawing image data according to the commands from the PC, then written in an area in the image buffer of the D-RAM.

(3) When printing, the EC-M100 requests interruption and stops the CPU processing. Then the EC-M100 directly reads one line print data from the image buffer in DMA mode and commands the print head to perform one-line printing.

Synchronized with this operation, the EC-M100 drives the stepping motor and detects feed length to feed paper in one line length.

The following operations are also performed by the EC-M100, synchronized with the printing.

- Drives the take-up motor in strip dispensing mode.
- Drives the cutter motor in cut dispensing mode.
- Drives the ribbon motors in thermal transfer method.
- Excites the solenoid and controls the print head up/down to perform functions such as ribbon saving.

(4) After one-line printing is performed, the CPU resumes processing which is aborted and operates according to the commands from the PC or the main program.

(5) To the EC-M100, the statuses of the slit sensor, cutter home position switch, rewind full sensor, strip sensor and head-up switch are input directly. The statuses of the slit sensor, feed gap sensor, black mark sensor and thermistor are also input.

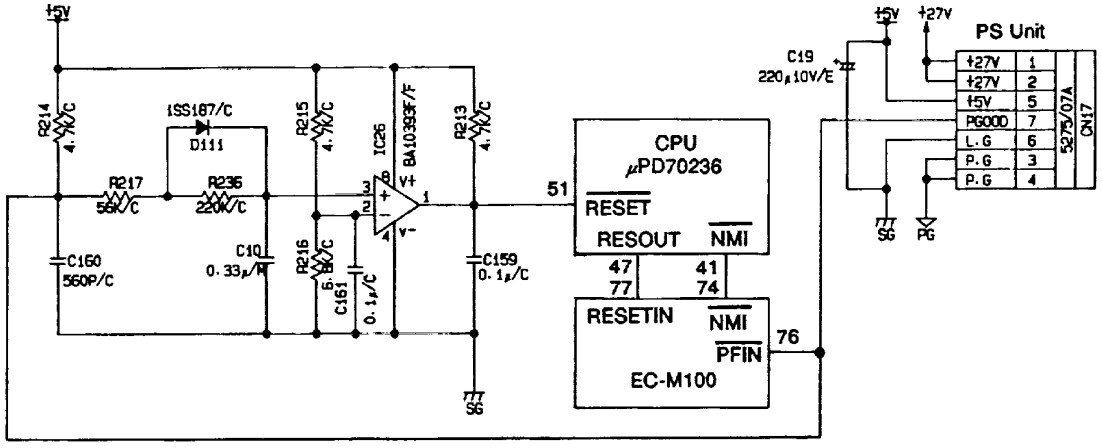
The CPU reads these statuses in units of 5 ms and controls each device including the motors and sensors according to the statuses.

(6) By performing steps (3) to (5) above, a bar code, character, graphic and ruled line are printed then a label is issued.

3. CIRCUIT DESCRIPTION

3.1 CPU PC BOARD

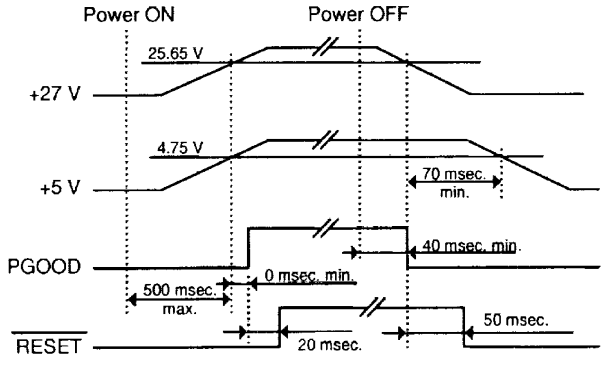
3.1.1 Reset Circuit



This circuit clears a reset state and resets the CPU and EC-M100 when a power failure is detected by using the PGOOD signal output from the PS unit connected to CN17.

The PGOOD signal output from the PS unit is input to IC26. IC26 outputs the reset signal to pin 51 of the CPU. The PGOOD signal goes from low to high about 500 ms after the power is turned on. About 20 ms later, the reset signal input to pin 51 of the CPU goes from low to high, causing the reset status to be cleared. In addition, the RESOUT signal output from the CPU to the EC-M100 goes from low to high, causing the reset status of the EC-M100 to be cleared.

The PGOOD signal goes from high to low about 40 ms after the power is turned off. At this time, a power failure state is detected by pin 76 of the EC-M100. Accordingly, the $\overline{\text{NMI}}$ signal goes low to transmit a power failure interruption to the CPU.

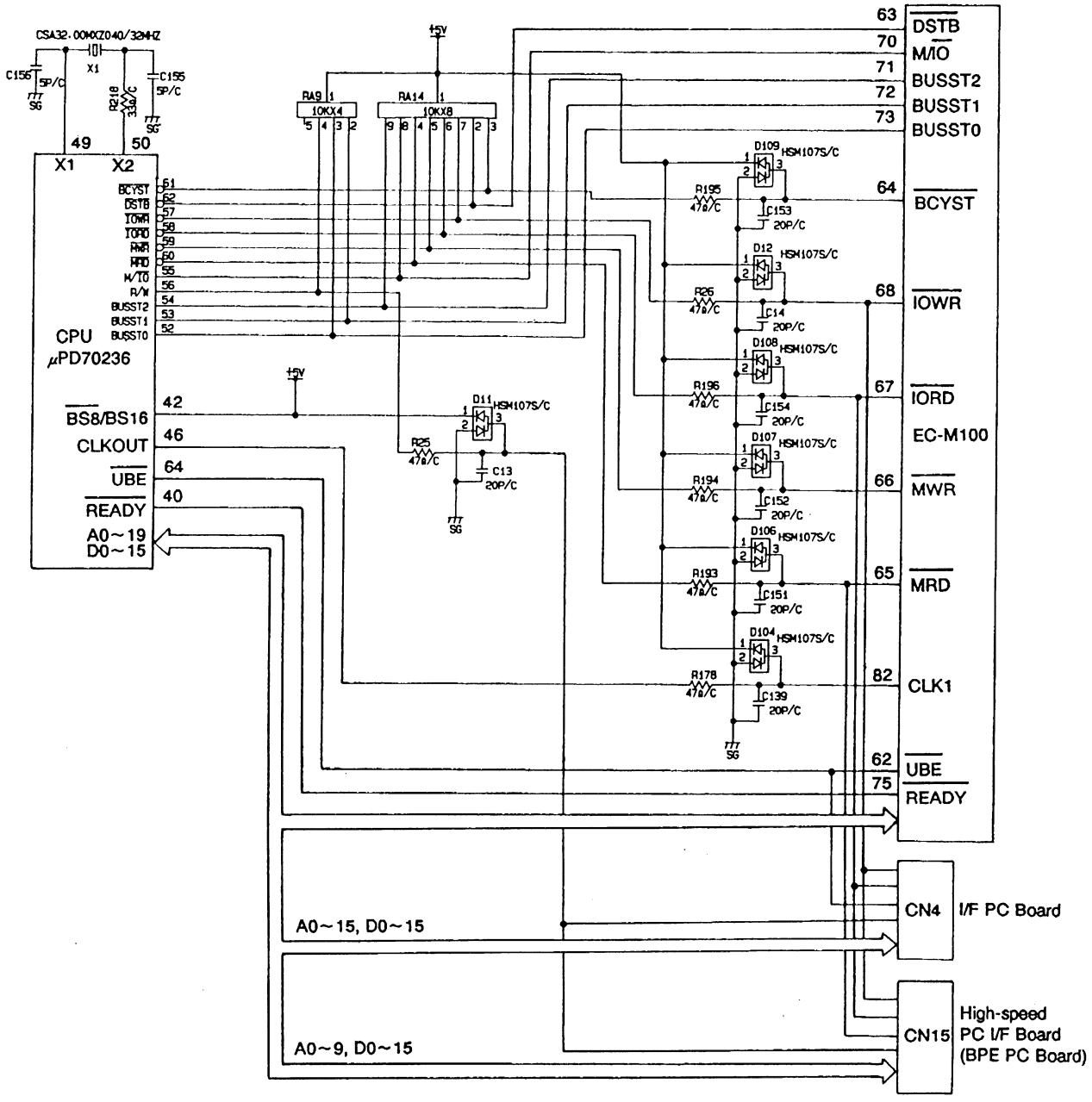


When the CPU receives the power failure interruption, it stops all operations in process and enters a reset state.

+ 5V falls in 70 ms after the PGOOD signal goes from high to low, then the power supply to all circuits stops.

When the EC-M100 is reset before + 5V falls, the circuit is protected from the voltage drop.

3.1.2 Clock Circuit and Bus Control Circuit



These circuits control the bus for the EC-M100, I/F PC board and high-speed PC I/F board via the CPU. The crystal X1 of this circuit which is connected to the CPU generates the system clock.

Pins 49 and 50 of the CPU are connected to X1 generating a 32 MHz clock. This clock is divided by two in the CPU and is used as a 16 MHz system clock. The 16 MHz clock is output from pin 46 and is used as the system clock for the EC-M100 and is used to generated a clock (4 MHz) for the print head.

The $\overline{\text{BCYST}}$ signal input to pin 64 of the EC-M100 indicates the start of the bus cycle when the CPU transfers data to the EC-M100.

The $\overline{\text{IOWR}}$ and $\overline{\text{IORD}}$ signals are output to the EC-M100 when the CPU writes or reads data to/from the I/O devices including the sensors, motors, print head and LCD via the EC-M100.

The $\overline{\text{MWR}}$ and $\overline{\text{MRD}}$ signals are used to generate a signal which controls D-RAM read/write access functions.

The M/$\overline{\text{IO}}$ signal input to the EC-M100 indicates that the CPU is going to access memory or an I/O device. When this signal is high, the CPU accesses the memory. When low, the CPU accesses the I/O device. According to the combination of this signal and the BUSST0 to BUSST2 signals input to pins 71 to 73, the accessing method is selected. This signal is also used to decode the chip select signal output from the EC-M100.

The $\overline{\text{UBE}}$ signal input to the EC-M100 indicates how many bits are accessed when accessing the memory or I/O device by being combined to the address A0. In the CPU, this signal is also used to decode the memory chip select signal and to generate the D-RAM control signal.

The $\overline{\text{DSTB}}$ signal input to the EC-M100 is a strobe signal which goes low when the read/write function is used. This signal is also used to generate the bus enable signal.

The $\overline{\text{READY}}$ signal controls delay of the bus cycle so that the bus cycle is adjusted to the access time of the memory or I/O device which has different transfer conditions.

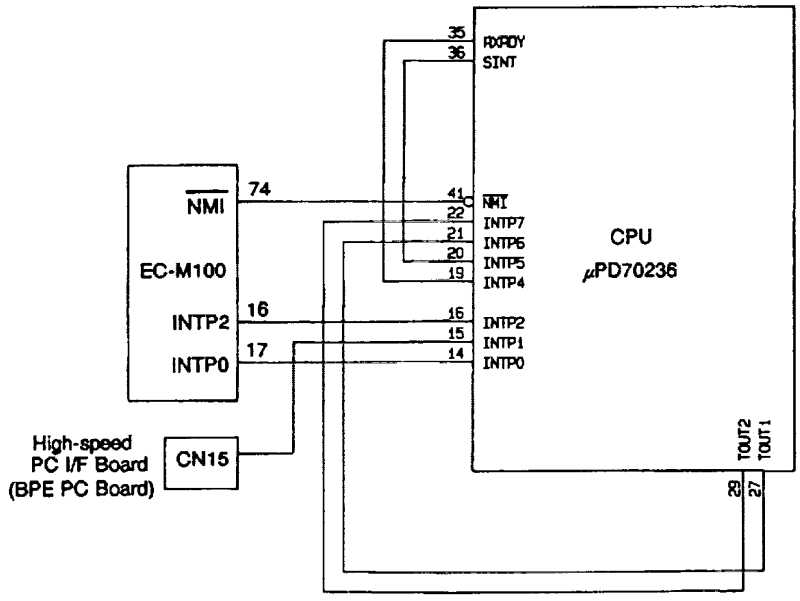
The $\overline{\text{BS8}}$/BS16 signal input to pin 42 of the CPU selects 8-bit or 16-bit for data bus which is output to the I/F PC board and high-speed PC I/F board. In this machine, 16-bit access is adopted.

The R/$\overline{\text{W}}$ signal output to pin 56 of the CPU indicates that the bus cycle in process is for reading or writing. This signal is input to the I/F PC board and high-speed PC I/F board. When this signal is high, the read cycle is indicated, and when low, the write cycle is indicated.

The diodes D11, D12, D104 and D106 to D109 remove noises from the R/$\overline{\text{W}}$, $\overline{\text{IOWR}}$, $\overline{\text{IORD}}$, $\overline{\text{MWR}}$ and $\overline{\text{MRD}}$ signals. ,

The I/F PC board and the high-speed PC I/F board are connected directly to CN4 and CN5, respectively. For details, refer to Section 3.2 I/F PC BOARD and Section 3.5 BPE PC BOARD (HIGH-SPEED PC I/F BOARD) of this manual.

3.1.3 Interrupt Request Circuit



This circuit processes various Interrupt Request signals via the CPU.

The CPU controls interruption. When the Interrupt Request (INTP0 to INTP7, $\overline{\text{NMI}}$) signal is input, the CPU stops the operation to process the signal according to the following order of priority preprogrammed in the software.

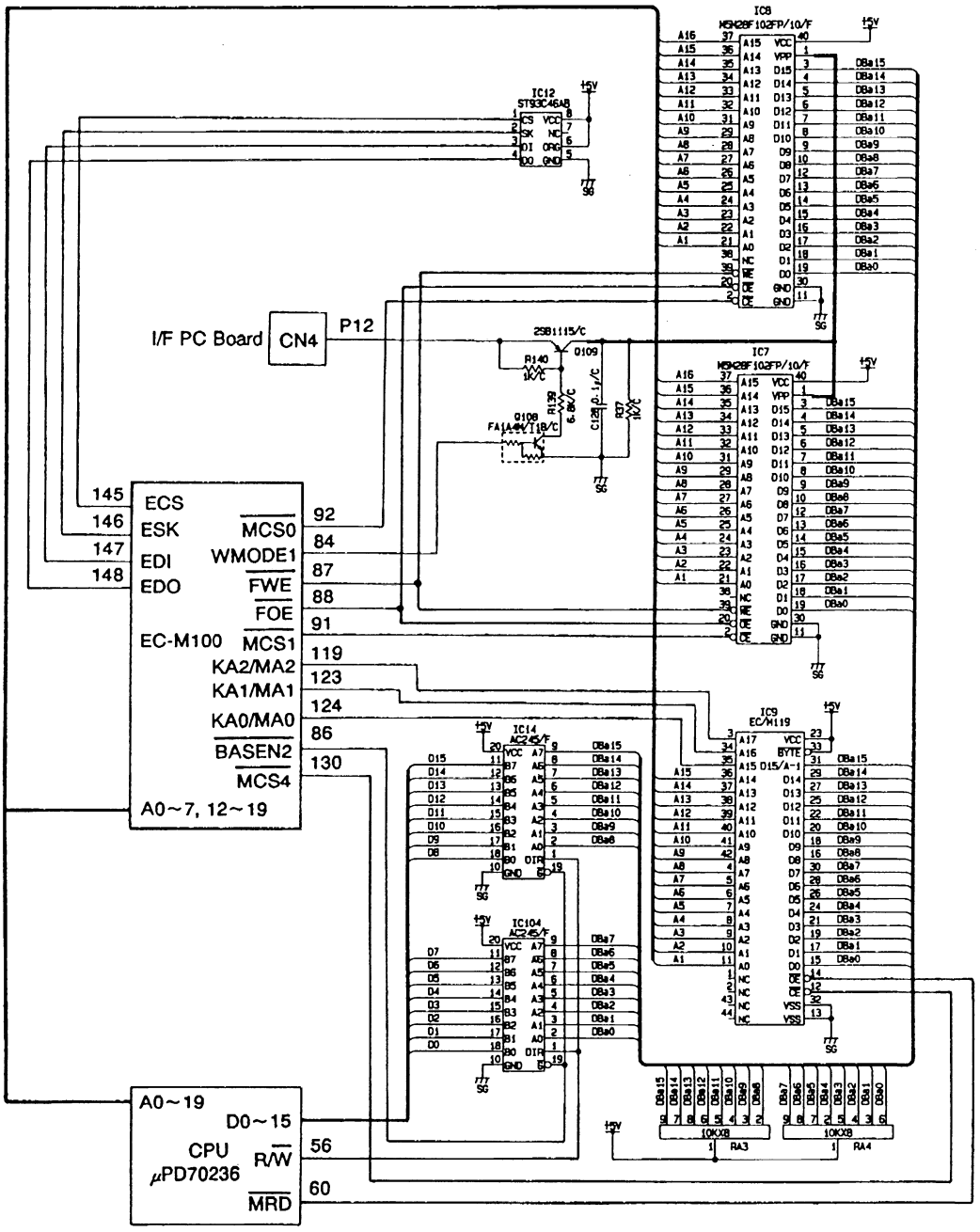
Order of Priority	Hight ←						→ Low
Siganl Name	$\overline{\text{NMI}}$	INTP0	INTP4	INTP2,5	INTP6	INTP7	INTP1

The following processes can be performed using the $\overline{\text{NMI}}$, and INTP0 to INTP7 signals.

Signal Name	Pin No.	Description
$\overline{\text{NMI}}$	41	This signal is an active-low non maskable interrupt signal output from the EC-M100. When the EC-M100 detects a power failure, this asynchronous interrupt signal is output to the CPU. When the signal level becomes low, the CPU stops processing.
INTP0	14	This signal is output from the EC-M100 when printing or feeding. For details about this signal, refer to INTP6.
INTP4	19	The signal output from pin 35 of the CPU is the input for pin 19. This signal level becomes high when the CPU receives data via the serial interface. The received data can then be read and the signal level becomes high. Then, the CPU stops the operations in process and starts serial data transfer.

Signal Name	Pin No.	Description
INTP2	16	This signal is output from the EC-M100. When the EC-M100 is going to transfer data to the CPU, this signal level becomes high, causing an interrupt request to be sent to the CPU.
INTP5	20	The signal output from pin 36 of the CPU is the input for pin 20. This signal level becomes high when the CPU transmits data via the serial interface. When this signal level becomes high, the CPU stops all operations in process and starts serial interface.
INTP6	21	The signal output from pin 27 of the CPU is the input for pin 21. To this pin, the interrupt signal is output from pin 27 every 5 ms. The following functions are performed during the interruption: 1. Detects the ribbon end, ribbon error (ribbon break, etc.), cutter abnormal (paper jam at the cutter, etc.), print head abnormal (overheating) and take-up motor rewind full status. 2. Controls the print pulse width of the print head (Processed concurrently with detection of a print head abnormal status.) 3. Controls drive of the cutter motor. (Processed concurrently with detection of a cutter abnormal status.) 4. Detects the status of the head-up switch and the strip sensor. Functions 1 to 3 above are performed when the INTP0 signal is output from the EC-M100.
INTP7	22	The signal output from pin 29 of CPU is the input for pin 22. To this pin, the interrupt signal is output from pin 29 every 20 ms. The following functions are performed during the interruption: 1. The Online LED lights, goes out and blinks (when a serial or Centronics interface is used). The error LED also lights, goes out and blinks. 2. Monitors the reset request in Centronics interface and activates the DMA dependent on the memory capacity in the receive buffer. 3. Detects a reset request and status requests from the high-speed PC I/F board (BPE PC board) and stores data into the receive buffer in the FIFO memory.
INTP1	15	This signal is not used.

3.1.4 Memory Circuit



This circuit controls the read/write functions of the flash ROM (IC7, 8), mask ROM (IC9) and EE-PROM (IC12).

- **Flash ROM**

  IC8 is a flash ROM with a capacity of 128 KB. IC7 is a flash ROM used for main program expansion, but is not installed since it is not presently used.

  The flash ROM is electrically programmable and erasable.

  When the main program is upgraded, it should be downloaded into the flash ROM using an RS-232C interface or high-speed PC interface.

  When the program is written into IC8 by downloading the program, the WMODE1 signal level becomes high and transistor Q109 is activated. Then P12 is supplied to IC8, enabling the write operation.

  IC8 is selected by the $\overline{\text{MCS0}}$ signal output from the EC-M100. The read/write functions of IC8 are controlled by the $\overline{\text{FOE}}$ and $\overline{\text{FWE}}$ signals. This IC is addressed with 16-bit addressed A1 to 16 and data transfer occurs in units of 16 bits.

- **Mask ROM**

  IC9 (EC-M119) has a capacity of 512 KB and contains a character generator and two programs: one initializes the I/O devices and memories when the power is turned on, and the other writes data downloaded from the PC into the flash ROM.

  IC9 is selected by the $\overline{\text{MCS4}}$ signal output from the EC-M100. The read function is controlled by the $\overline{\text{MRD}}$ signal.

  The mask ROM is equipped with 18-bit address terminals. The upper three bits are addressed by the KA0 to KA2 signals output from the EC-M100 and the other 15 bits are addressed by A1 to A15 output from the CPU. Data is, therefore, transferred in units of 16 bits. Also the mask ROM is bank selectable in units of 64 KB by KA0 to KA2 signals.

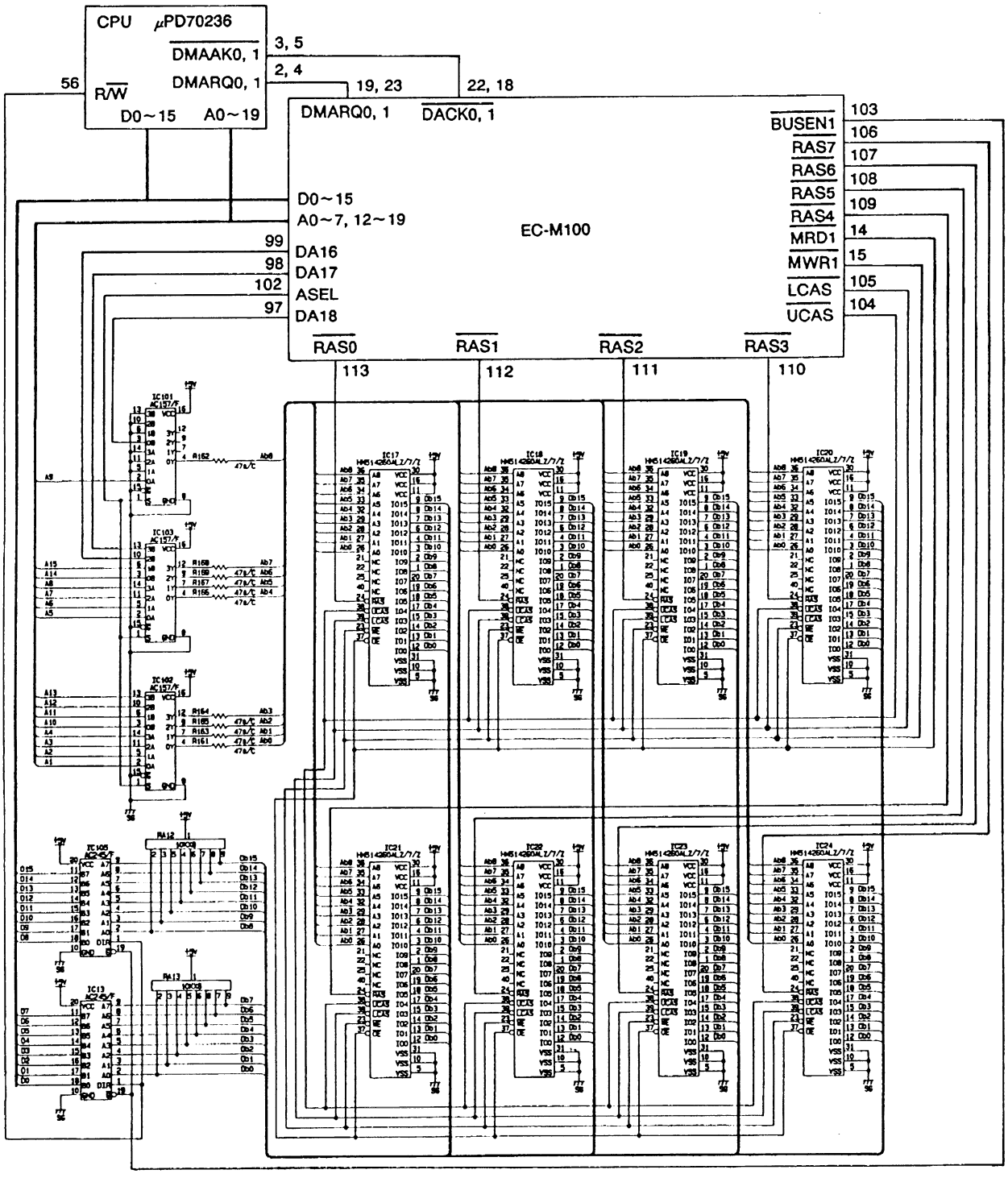
- **EE-PROM**

  IC12 is an EE-PROM which has a capacity of 128 bytes. Into this IC, the total media distance covered, feed gap sensor/black mark sensor adjust values and feed gap sensor threshold value are written.

  When the ECS signal output from the EC-M100 is high, IC12 can operate.

  Synchronizing with the rise of the ESK signal, the command output from the EC-M100 is input to pin 3 of IC12. IC12 synchronizes with the rise of the ESK signal and input data to pin 3 or outputs data from pin 4.

3.1.5 D-RAM (Image Buffer) Circuit



This circuit processes drawing data to be printed by the print head, using an image buffer with a capacity of up to 4096 KB according to time division. The EC-M100 controls D-RAM access and the CPU controls data transfer between the EC-M100 and the D-RAM.

IC17 to IC24 are D-RAM as image buffers for the print head which each have a capacity of 512 KB. The 128 KB area of IC17 is used as program work RAM (including the receive buffer) and the other area of IC17 and IC18 to IC24 (896 KB to 3968 KB) are used as the image buffer for drawing. The $\overline{\text{MRD1}}$ and $\overline{\text{MWR1}}$ signals output from the EC-M100 control the read/write functions and the row address strobe signals $\overline{\text{RAS0}}$ to $\overline{\text{RAS7}}$. The column address strobe signals $\overline{\text{UCAS}}$ and $\overline{\text{LCAS}}$ control the addresses.

IC101 to IC103 selects the addresses A1 to A15 output from the CPU and the DA16 to DA18 signals output from the EC-M100, according to the ASEL signal input to pin 1, to generate the address to access the D-RAM. When ASEL is low, A1 to A9 input to port A are output to port Y and converted to Ab0 to Ab8. At this time, D-RAM is accessed with the fall of the $\overline{\text{LCAS}}$ signal. When ASEL is high, A10 to A15 and DA16 to DA18 input to port B are input from port Y, converted to Ab0 to Ab8. At this time, D-RAM is accessed with the fall of the $\overline{\text{UCAS}}$ signal.

When the level of the $\overline{\text{RAS0}}$ to $\overline{\text{RAS7}}$ signals is low, IC17 to IC24 are bank selectable respectively. D-RAM is bank selectable into 8 banks by 64 KB according to the upper 3 bits of DA16 to DA18 signals.

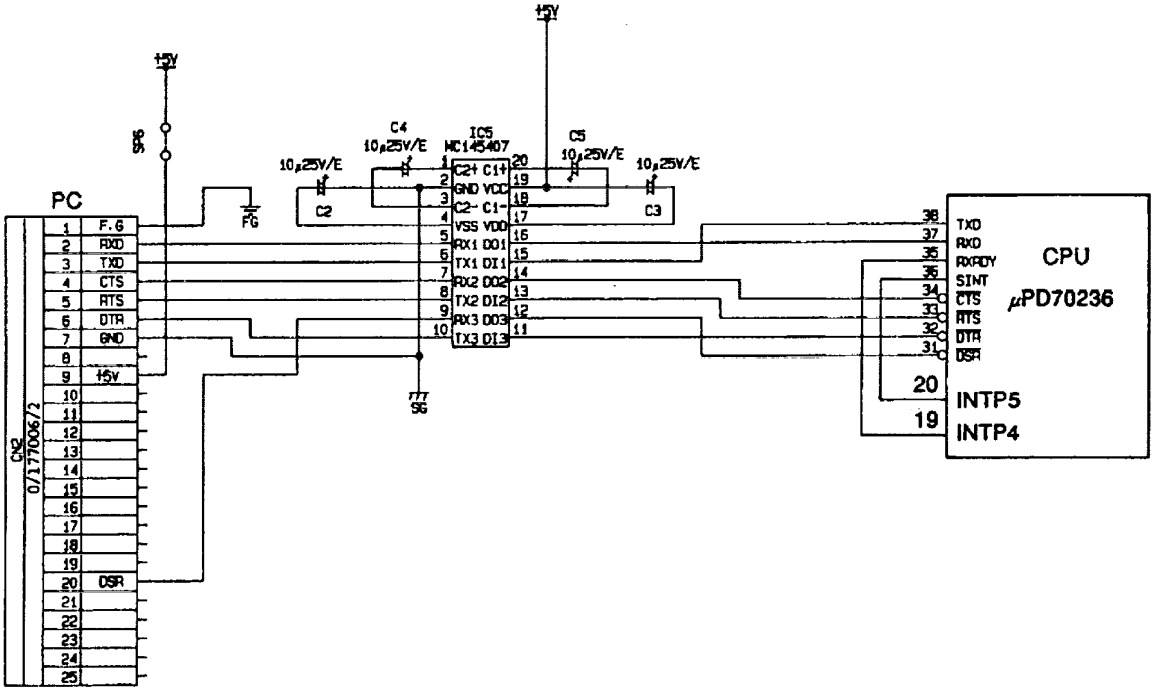
DMARQ0 and DMARQ1 are direct memory access (DMA) request signals output from the EC-M100. When printing is performed, these signals are output. After they are received, the CPU outputs the $\overline{\text{DMAAK0}}$, $\overline{\text{DMAAK1}}$ signals to start DMA. Then, the EC-M100 receives the print data directly from the D-RAM (image buffer) and the data is output to the print head, and printing begins.

IC17 and IC18 are part of the standard installation. IC19 to IC24 can be expanded. By adding D-RAMs, the drawing size can be enlarged. For the relation between D-RAM capacity and drawing size, refer to Section 3.3 MEMORY MODULE of the Product Description.

IC13 and IC105 are transceivers to control data transfer between the D-RAM and the CPU and between the D-RAM and the EC-M100. In these ICs, the $\overline{\text{BUSEN1}}$ signal output from the EC-M100 is input. When this signal level becomes is low, data transfer starts.

The direction of data transfer is controlled by the R/$\overline{\text{W}}$ signal output from the CPU. When this signal level is high, data is read from the D-RAM. When this signal level is low, data is written into the D-RAM.

3.1.6 Serial Interface Circuit

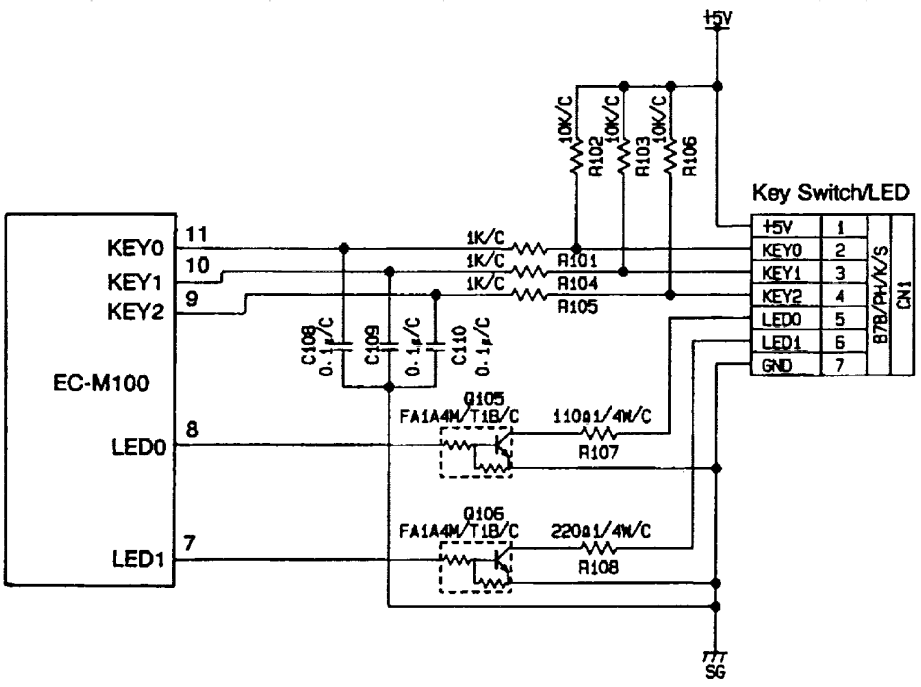


This circuit is used to download data to the flash ROM as well as to transfer serial data to/from the PC. The CPU contains the built-in serial interface controller for the RS-232C serial interface. The transmission speed, stop bit length, data length, parity and data protocol of this interface can be selected using DIP SW2 on the CPU PC board.

Pin No.	Signal	I/O	Pin Function
1	FG (Framed Ground)	–	Ground line for circuit protection.
2	RXD (Received Data)	I	Data line with which the printer receives data from the host (receive data line). Logic "1" is "Low," and "0" is "High." It is LOW (MARK) when no data is being sent.
3	TXD (Transmit Data)	O	Data line with which the printer sends data to the host (send data line). Logic "1" is "Low," and "0" is "High." It is LOW (MARK) when no data is being sent.
4	CTS (Clear to Send)	I	Input signal from the host. it must be "High" for the printer to send data.
5	RTS (Request to Send)	O	Output signal to the host. It indicates that data exists which is to be output to the host. After the power is turned on, it always remains "High."

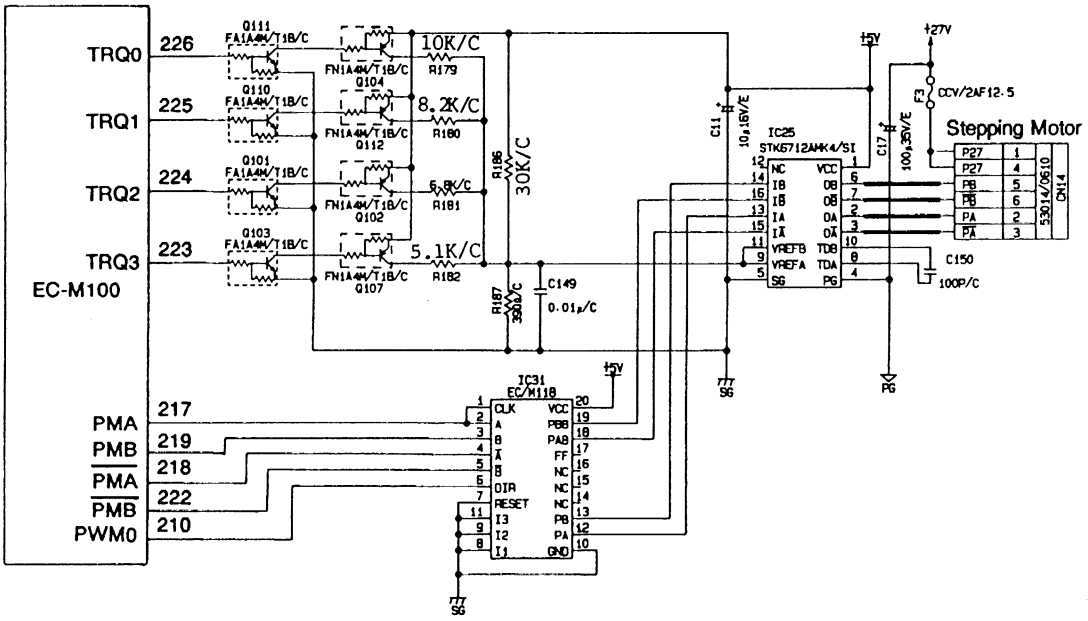
Pin No.	Signal	I/O	Pin Function
6	DTR (Data Terminal Ready)	O	Output signal from the printer. (Indicates whether the printer is ready to receive data.) The signal level is low when the data buffer is almost full. The signal level is high when the buffer is close to empty.
7	SG (Signal Ground)	–	Ground line for all data and control signals.
20	DSR (Data Set Ready)	I	Input signal from the host. It must be "High" for the printer to receive data.

3.1.7 Key Switch and LED Circuit



In this circuit, the EC-M100 detects the status of each key switch and turns each LED on and off. When the PAUSE, RESTART, and FEED keys are ON, the signal input from KEY0 to KEY2 to the EC-M100 are pulled low. When these keys are OFF, the signal lines are pulled high. The EC-M100 detects the ON or OFF status of each key switch using the KEY0 to KEY2 signals.

3.1.8 Stepping Motor Circuit



The EC-M100 controls the stepping motor which is connected to CN14 in this circuit.

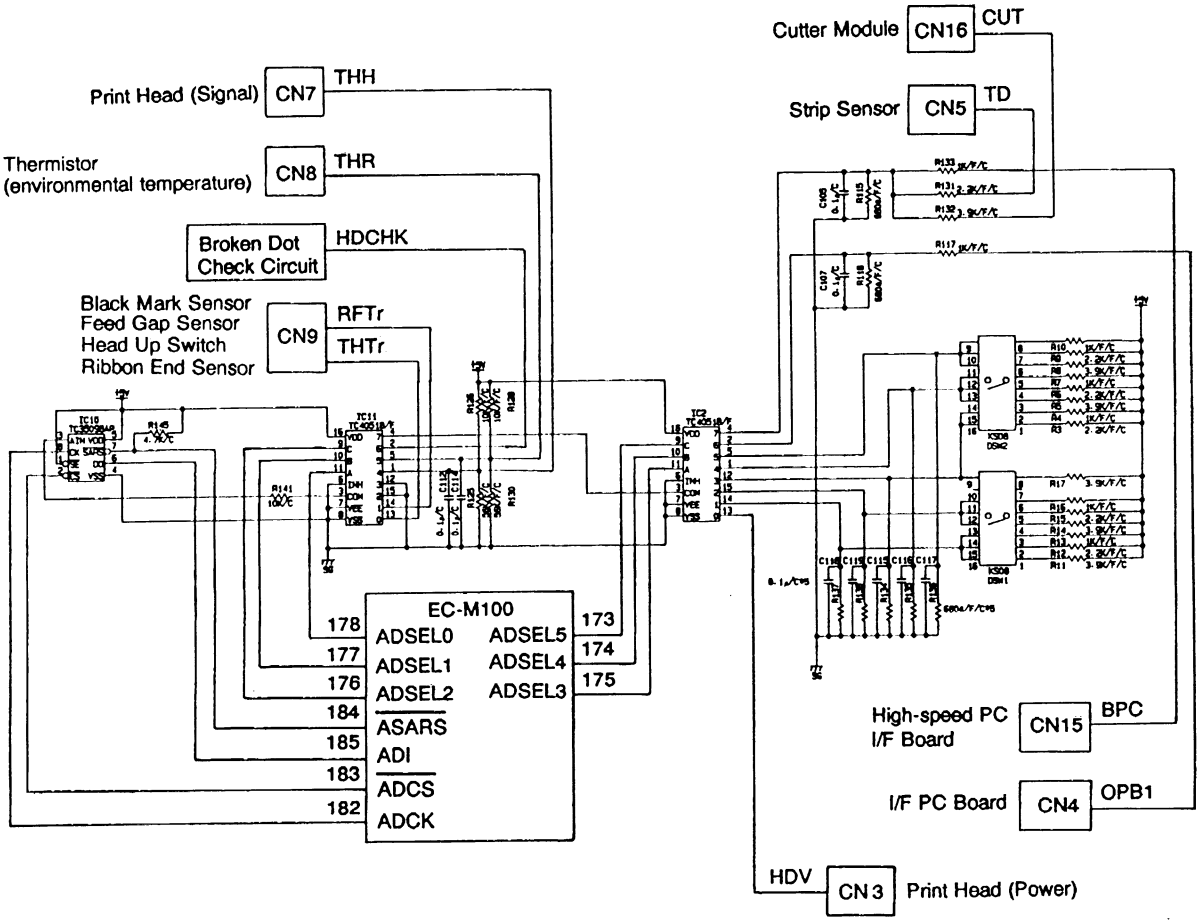
The PMA, PMB, $\overline{\text{PMA}}$ and $\overline{\text{PMB}}$ signals output from the EC-M100 are pulse signals which drive the 2-phase excitation motor. These signals are converted to a pulse signal to drive the 1-2-phase excitation motor by the EC-M118.

The PWM0 signal input to pin 6 of the EC-M118 indicates forward or reverse rotation of the motor. When the motor rotates forward, the signal level is low. When the motor rotates in reverse, the signal level is high.

IC25 is a motor driver to drive the stepping motor which is connected to CN14. IC25 inputs the signals converted by the EC-M118 to pins 13 through 16. Then, IC25 converts the PA, PB, $\overline{\text{PA}}$ and $\overline{\text{PB}}$ signals output from pins 2, 3, 6 and 7 to a voltage using the voltage input to pins 9 and 11. The stepping motor is supplied with this voltage and the stepping motor is driven to be synchronized with the print speed.

The voltage input to pins 9 and 11 of IC25 is controlled by the TRQ0 to TRQ3 signals.

3.1.9 Sensor Detect Circuit



This circuit inputs the signal from each sensor and DIP switch to the EC-M100 via the A/D converter. The EC-M100 detects the sensor status and controls the issuance and transfer of data.

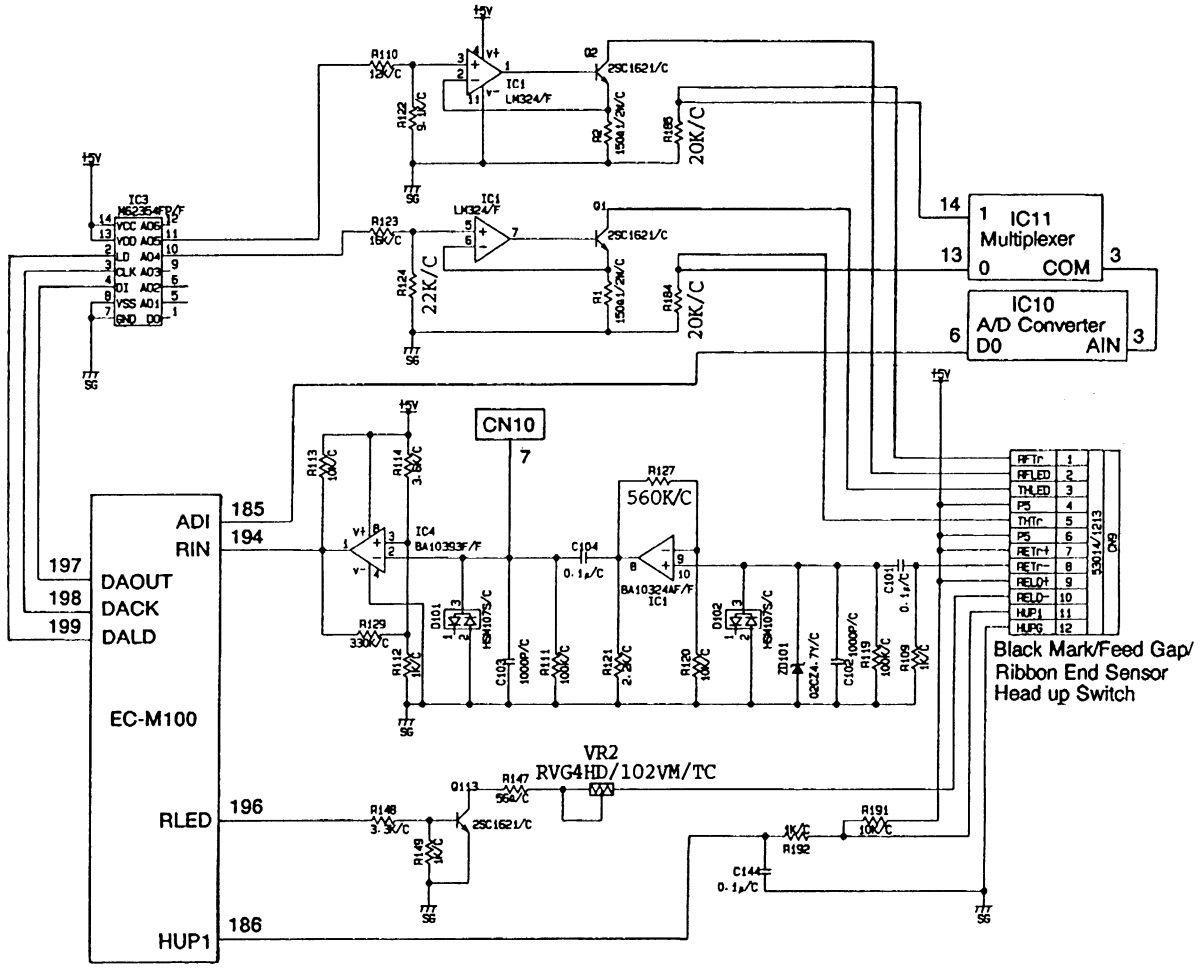
IC2 and 11 are multiplexers which contain an 8-channel input port. The signals output from each sensor and DIP switch are input to IC2 and 11. The input signal of each channel is described in the following table. Pin 3 of IC2 and pin 4 of IC11 are cascaded.

Input Channel		Description	Signal Name
IC11	Channel 0	Feed gap sensor status	THTr
	Channel 1	Black mark sensor status	RFTr
	Channle 4	Print head thermistor	THH
	Channel 5	Thermistor(environmental temperature)	THR
	Channel 6	Broken dots check	HDCHK
IC2	Channel 0	Print head voltage value	HDV
	Channel 1	Pins 1 to 3 of DIP switch 1	–
	Channel 2	Pins 4 to 6 of DIP switch 1	–
	Channel 3	Pin 8 of DIP switch 1, and pins 1 and 2 ofDIP switch 2	–
	Channel 4	Pins 3 to 5 of DIP switch 2	–
	Channel 5	Pins 6 to 8 of DIP switch 2	–
	Channel 6	I/F PC board identification	OPB1
	Channel 7	Identification of high-speed PC I/F board,strip sensor, cutter modul	BPC, TD, CUT

These signals input to the above channels are selected by the ADSEL0 to ADSEL5 signals output from the EC-M100, then output from pin 3 of IC11 to IC10 (A/D converter) and converted from analog to digital.

When the $\overline{\text{ADCS}}$ signal output from the EC-M100 is low, IC10 synchronizes with the ADCK signal to conbert the ADI signal from analog to digital. The converted ADI signal is output to the EC-M100 and used for DIP switch and sensor detection.

3.1.10 Sensor Adjust Circuit



The EC-M100 detects each sensor and switch status and adjusts the light emitting volume of the LED of each respective sensor in this circuit. To CN9, the black mark sensor, feed gap sensor, ribbon end sensor, and head-up switch are connected.

The RFTr signal output from the black mark sensor and the THTr signal output from the feed gap sensor are A/D-converted by IC10 (A/D converter) via IC11 (multiplexer) then input to the EC-M100. Dependent on the signals, the EC-M100 outputs the DAOUT signal to IC3 (D/A converter).

Synchronized with the rise of the DACK signal output from the EC-M100, IC3 obtains the DAOUT signal. This IC synchronizes the D/A conversion with the rise of the DALD signal. The D/A-converted signal is amplified by IC1 (Op. Amp.) and adjusted dependent on the type of paper to control the light emitted from the feed gap sensor and the black mark sensor.

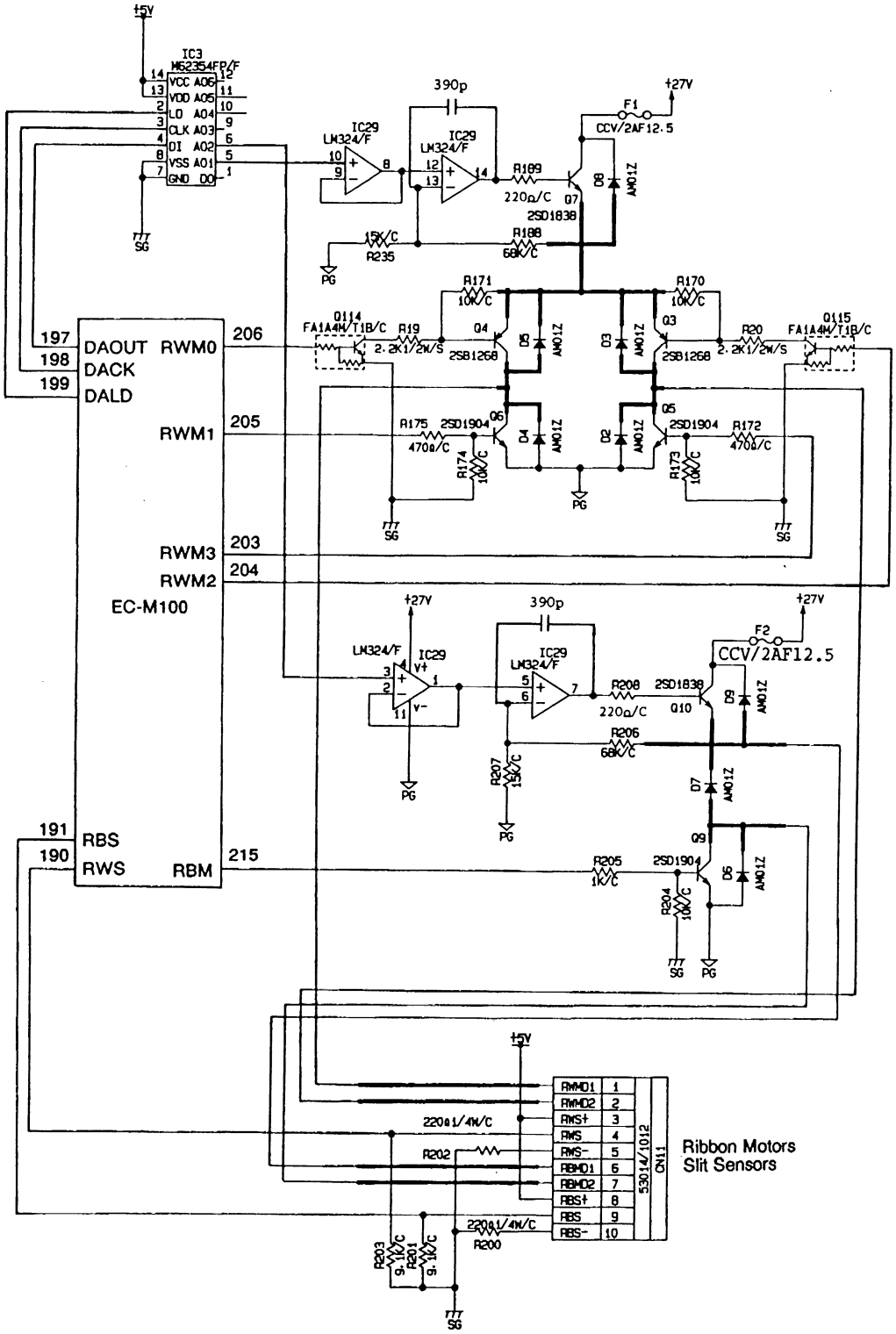
The RLED signal output from the EC-M100 controls the ribbon end sensor LED to turn it on and off. When this signal level is high, the LED is turned on, and when it is low, the LED is turned off.

The RETr signal output from the ribbon end sensor is compared by the comparator of IC1 and IC4 (Op. Amp.), converted to the RIN signal, then input to the EC-M100. The RIN signal detects the ribbon end. There are two ways to detect the ribbon end status according to the ribbon type. However, the non-transmissive type ribbon is not normally used.

When the ribbon is transmissive:	When the signal level is low, the ribbon end status is detected.
When the ribbon is not transmissive:	When the signal level is high, the ribbon end status is detected.

CN10 is used to adjust the ribbon end sensor. For details, refer to Section 2.1 of the Maintenance Manual.

3.1.11 Ribbon Motor Drive Circuit



This circuit adjusts the torque of the ribbon motors according to the print speed and optimizes the rotation of the motor.

CN11 is connected to the ribbon motors and slit sensors. The RWS and RBS signals output from the slit sensors are square-wave pulses. The EC-M100 measures the period of time per pulse of these signals to detect rotation of the motors and adjusts the torque in the motors according to that rotation.

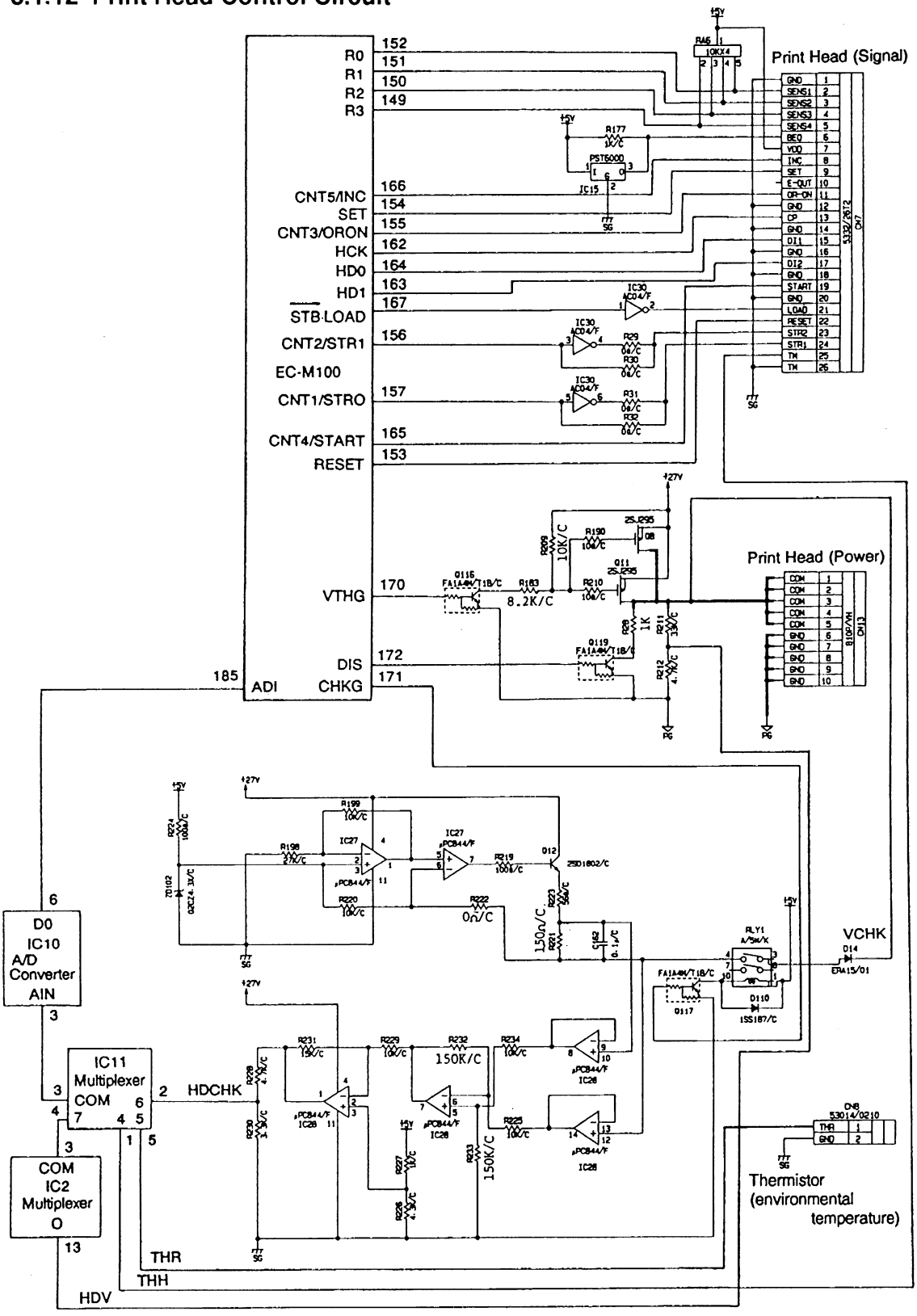
The DAOUT signal output from the EC-M100 according to the RWS and RBS signals is synchronized with the rise of the DACK signal and input to IC3 (D/A converter).
Synchronized with the rise of the DALD signal, this signal is D/A-converted and an analog signal is output from pins 5 and 6 of IC3. This analog signal is amplified by IC29 (Op. Amp.). The torque of each motor is controlled in 4 steps by varying the + 27V line voltage to be supplied to the ribbon motors.

The operations including ribbon motor (rewind) rotation is controlled by the RWM0~RWM3 signals output from the EC-M100 as follows:

Ribbon motor (rewind) operation	RWM0	RWM1	RWM2	RWM3
Stop	L	L	L	L
Drive	H	L	L	H
Brake	L	H	L	H

The forward rotation and stop of the ribbon motor (feed) is controlled by the RBM signal output from the EC-M100. When the signal level is high, the motor rotates forward. When the signal level is low, the motor stops.

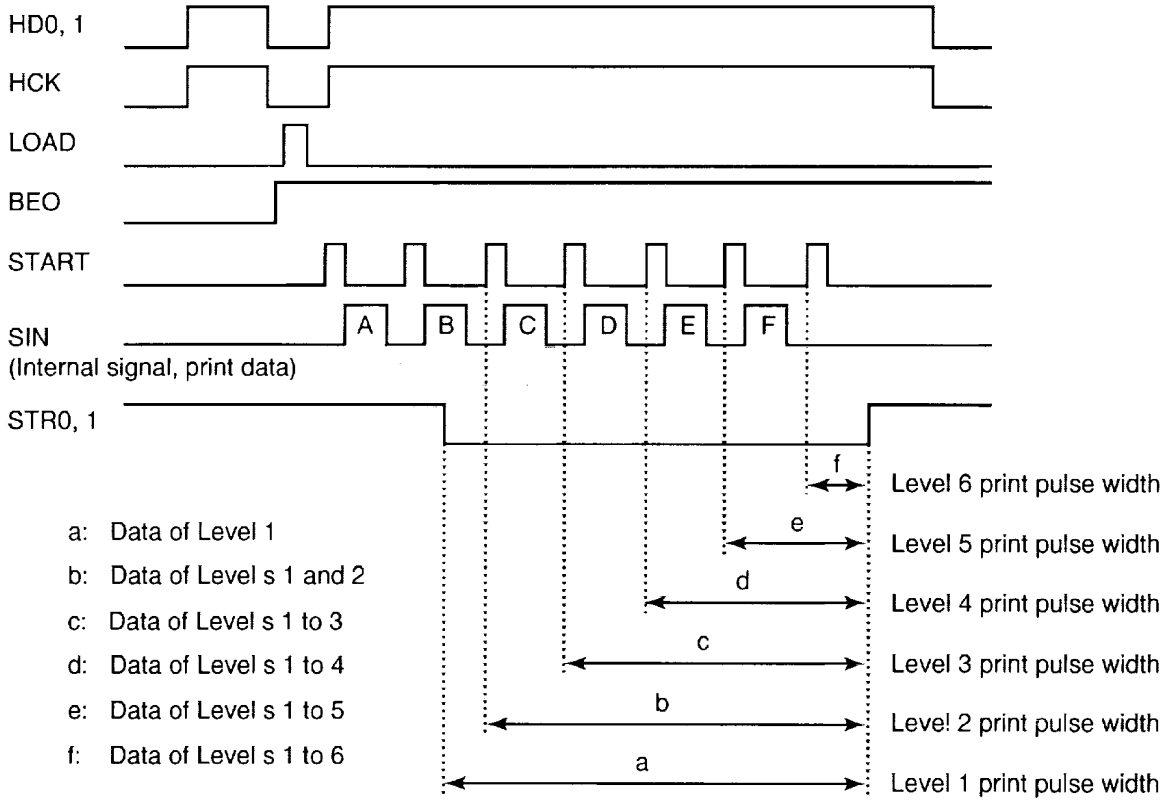
3.1.12 Print Head Control Circuit



This circuit controls the print head connected to CN7 and CN13.

The print head of this printer monitors the status of all dots (1536 dots) of the print head on the present and past bases by recording the heat history, and judging the accumulated heat status. With this known status, the circuit adjusts the width of the print pulse applied to the print head in 6 levels. The more heat accumulates, the shorter the print pulse width becomes, and vice versa. This adjusts the print pulse width to optimize print density. The heat history is controlled to each dot (1536 dots in total) of the print head.

The following timing chart describes the print pulse width and the signals output from the EC-M100 to the print head.



The HCK signal is a 4-MHz clock signal. Synchronized with this clock, the print data HD0 and HD1 signals are input. The HD0, HD1 signals contain 768 bits each since the data of one line of the print head (1536 dots) is divided by two.

The LOAD signal output from the EC-M100 is a strobe signal which captures the print data and heat history data to be input to the print head.

The BEO signal output from IC15 is an active low reset signal. When this signal level is low, the print head is inactive.

The SIN signal is a print data signal generated in the print head for each dot (1536 dots), synchronized with the rise of the START signal output from the EC-M100.

The STR0, STR1 signals output from the EC-M100 are enable signals. When these signal levels are low, the period in which the SIN signal is output is converted to a print pulse signal. Pulses a to f in the above figure are output for the dot which has the smallest accumulated heat, causing the print pulses of level 1 to be applied. For the dot which has the largest accumulated heat, only pulse f is output, activating the print pulse level 6. Also, this print pulse increases one level on each one pulse of the INC signal.

The following signals are also used besides the above.

This print head uses 6 levels of print pulse. When there is little difference between two levels in print density, level of the print pulse can be decreased by inputting the INC signal of active high to the print head and skipping the SIN signal. The print pulse decreases by one level per INC signal.

R0 to R3 output from the print head are status signals indicating the head rank of the print head. There are 16 levels (levels 0 to 15) in the head rank.

The resistance value of the print head is read according to the head rank. The print pulse width and print quality are controlled by lengthening or shortening the cycles of the STR0, STR1 signals and the START signals output from the EC-M100.

When the SET signal output from the EC-M100 is high, the print data in the print head, including the heat history data becomes 1. When the RESET signal is high, the data in the print head becomes 0.

IC15, a reset IC, resets the print head to avoid a malfunction when a voltage drop is detected.

In this circuit, a broken dots check is performed according to the following procedure in addition to the print control by the EC-M100.

(1) The VTHG signal level from the EC-M100 becomes low and the transistors Q116, Q8 turn off, causing voltage (+ 27V) to the print head to be cut-off.

(2) The DIS signal level from the EC-M100 becomes high, Q119 turns on and the voltage accumulated in the print head drops to GND. At this time, the voltage of the print head (HDV) is A/D-converted by IC10 and detected by the EC-M100.

(3) When the HDV drops to about 10 V, the DIS signal level becomes low, and the transistor Q119 turns off, causing the print head voltage drop to be cut-off.

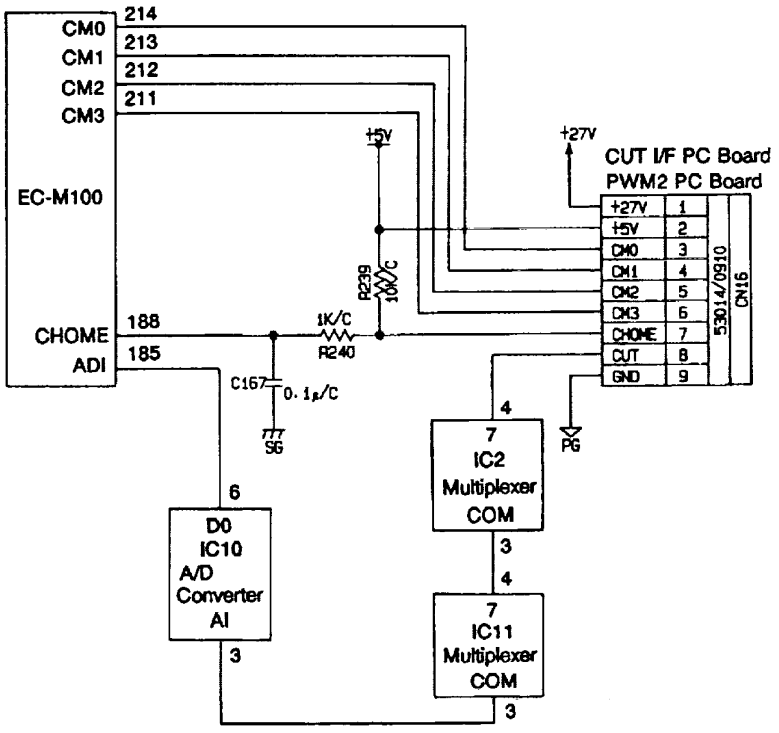
(4) The CHKG signal level from the EC-M100 becomes high and the relay RLY1 turns on. When the voltage input to pins 5 and 6 of the Op. Amp. (IC27) becomes 5.9 V, the VCHK signal output from the transistor Q12 stabilizes to about 10 V and is supplied to the print head.

(5) The data in which all dots are 0 is output to the print head. At this time, the voltage value VCHK signal is input to IC28 (Op. Amp) and converted to the HDCHK signal with about 4V. The HDCHK signal is A/D-converted and detected by the EC-M100.

(6) The data in which all dots are 1 is output to the print head dot by dot. At the same time, the voltage value of the HDCHK signal is detected as in step (5). When a dot is normal, the voltage value is lower than 4V. If the dot is broken, the voltage is about 4V and the printer judges that the dot is broken.

CN8 is a connector that the thermistor which detects the environmental temperature is connected to. Depending on the environmental temperature the print pulses input to the print head are controlled to optimize the print density.

3.1.13 Take-up Motor/Cutter Moter Circuit



In this circuit, the take-up motor or the cutter motor are driven by turning on and off the transistors on the PWM2 PC board or on the CUT I/F PC board according to the CM0~CM3 signals output from the EC-M100.

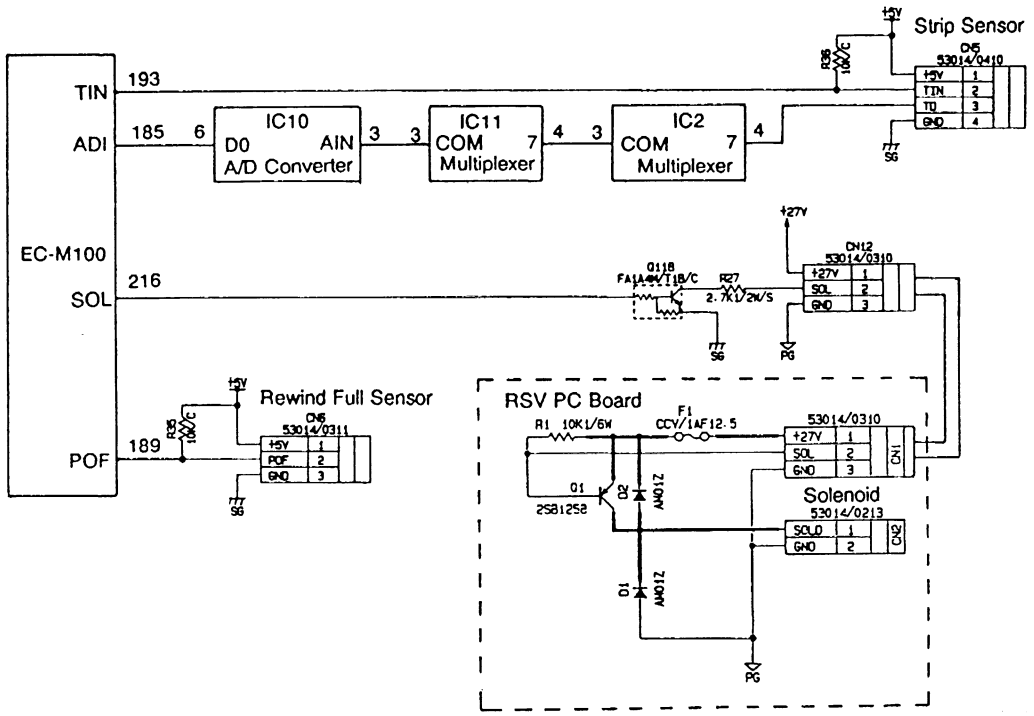
For details about the CM0 to CM3 signals, refer to Section 3.3 or 3.4.

The CHOME signal is a cutter home position signal which indicates the home position when the signal level is high.

The CUT signal is a cutter module identification signal which indicates that the cutter module is connected when the signal level is high. This signal is A/D-converted by IC10 (A/D converter) via IC2, IC11 (Multiplexers) and detected by the EC-M100.

CN16 is usually connected to the PWM2 PC board. When the optional cutter module is used, CN16 switches to the cutter module.

3.1.14 Rewind Full Sensor/Strip Sensor/Solenoid Circuit



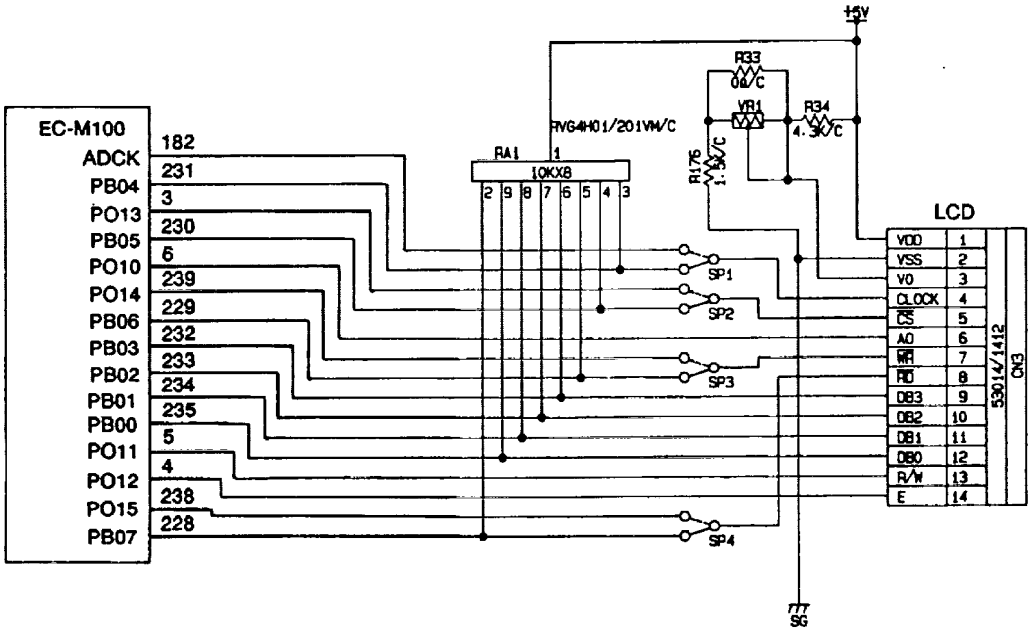
CN6 connects to the rewind full sensor which detects that media taken up by the take-up motor exceeds the prescribed limit. When the POF signal is high, it detects that the limit is exceeded and that the take-up motor has stopped.

CN5 connects the strip sensor which detects the presence or absence of the label to control a label feed in strip dispensing mode. When the TIN signal level is high, no label is detected. When this signal level is low, a label is detected.

The TD signal indicates that the strip sensor is connected to CN5. + 5V output from CN5 loops back and turns to the TD signal. Therefore, when the strip sensor is connected to CN5, the TD signal level is high. This signal is A/D-converted by IC10 (A/D converter) via IC2, IC11 (Multiplexers) and detected by the EC-M100.

CN12 connects to the solenoid which performs the ribbon saving function by raising/lowering the print head. The drive voltage is +27V. When the SOL signal output from the EC-M100 is high, the solenoid is excited, and the print head is raised to perform the ribbon saving function. When the SOL signal level is low, the print head is lowered to start printing.

3.1.15 LCD Circuit



This circuit outputs a control signal for the LCD which is connected to CN3 and displays the messages.

The LCD is comprised of a 5 x 7 dots, 20-digit matrix LCD and a control IC which contains a character generator ROM storing 96 alphanumeric characters and a character generator RAM indicating the desired characters.

The VO signal is used as a power supply for driving the LCD and is supplied with +5V.

The PO10 signal output from the EC-M100 is an internal register select signal of the control IC.

The PB00 to PB07 signals that output from the EC-M100 are 8-bit data buses. Using these data buses, commands, an address signal accessing the character generator ROM and data written into character generator RAM are transmitted to the control IC.

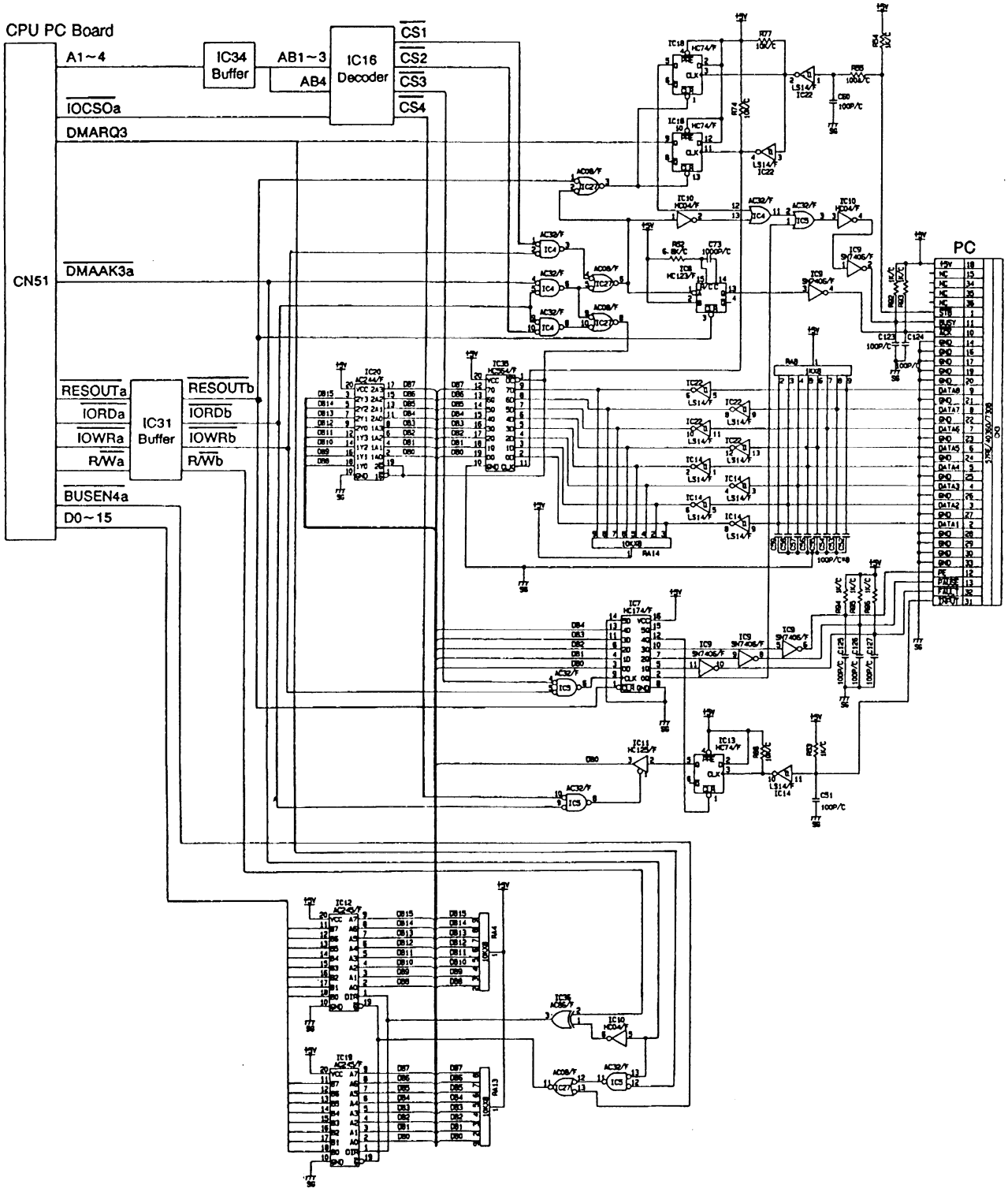
The R/W signal is used to control data read/write from/to the control IC. When this signal level is high, data is read. When this signal level is low, data is written.

When the E signal level is high, data read/write from/to the control IC is performed. The control IC displays characters stored in the character generator ROM or the character generator RAM according to the commands output from the EC-M100.

VR1 is a variable resistor for adjusting the brightness of the LCD, but it is not installed.

3.2 I/F PC BOARD

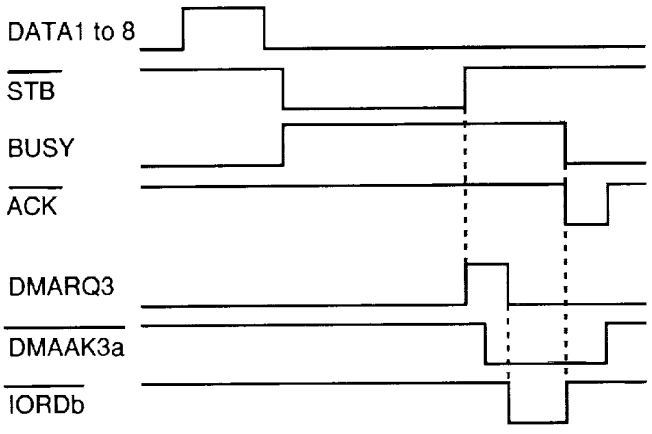
3.2.1 Centronics I/F Circuit



This circuit controls data transfer between the CPU PC board and the PC connected to CN3 in the Centronics interface.

When the AB4 and the $\overline{\text{IOCS0a}}$ output signals from the CPU PC board are low, IC16 (decoder IC) decodes AB1 to AB3 and generates the chip select signals $\overline{\text{CS1}}$ to $\overline{\text{CS4}}$. This IC is used to generate the DMARQ3, BUSY, and $\overline{\text{ACK}}$ signals and to determine data transfer timing, using the $\overline{\text{RESOUT}}$,$\overline{\text{IORDb}}$, $\overline{\text{IOWRb}}$, R/$\overline{\text{W}}$b and $\overline{\text{CS1}}$ to $\overline{\text{CS4}}$ signals, and $\overline{\text{STB}}$ signal output from the PC.

The Centronics interface transfers data according to the following timing.



The DATA1 to DATA8 signals are parallel 8-bit data which are output from the PC. Using these data lines, the PC transmits the commands and prints the data.

The $\overline{\text{STB}}$ signal output from the PC is a synchronizing signal for reading DATA1 to DATA8. When data is input, the $\overline{\text{STB}}$ signal moves from a high to low level. Synchronized with this fall, the BUSY signal becomes high to indicate to the PC that the printer cannot receive data.

Synchronized with the rise of the $\overline{\text{STB}}$ signal, which moves from a low to high level, the DMARQ3 signal output from IC13 (D Flip-Flop) to the CPU which requests DMA, becomes high. When DMA is accepted, the $\overline{\text{DMAAK3a}}$ and $\overline{\text{IORDb}}$ signals output from the CPU PC board become low. Synchronized with the fall of the $\overline{\text{IORDb}}$ signal, the DMARQ3 signal becomes low.

At this time, IC35 (D Flip-Flop) and IC20 (buffer) are enabled. Then DATA1 to DATA8 are input to IC35, converted into DB0 to DB7 and output to IC19 (transceiver). DB0 to DB7 are converted to the upper 8-bit data DB8 to DB15 by IC20 and output to IC12 (transceiver).

The level of the $\overline{\text{BUSEN4a}}$ and R/$\overline{\text{W}}$b signals output from the CPU becomes low, and IC12,IC19 are enabled. Then, DB0 to DB15 are output to the CPU PC board, allowing data transfer.

When the printer receives data, it issues a label according to the command data and print data.

When data transfer is complete, the level of the $\overline{\text{IORDb}}$ signal output from the CPU PC board becomes high. Synchronized with the rise of this signal, the printer reads the data transferred from the PC, the level of the BUSY and $\overline{\text{ACK}}$ signals become low and indicate to the PC that next data can be received.

The $\overline{\text{PAUSE}}$ signal is an output signal which indicates whether the printer is in a PAUSE state or placed on-line. The printer can receive data while placed on-line.

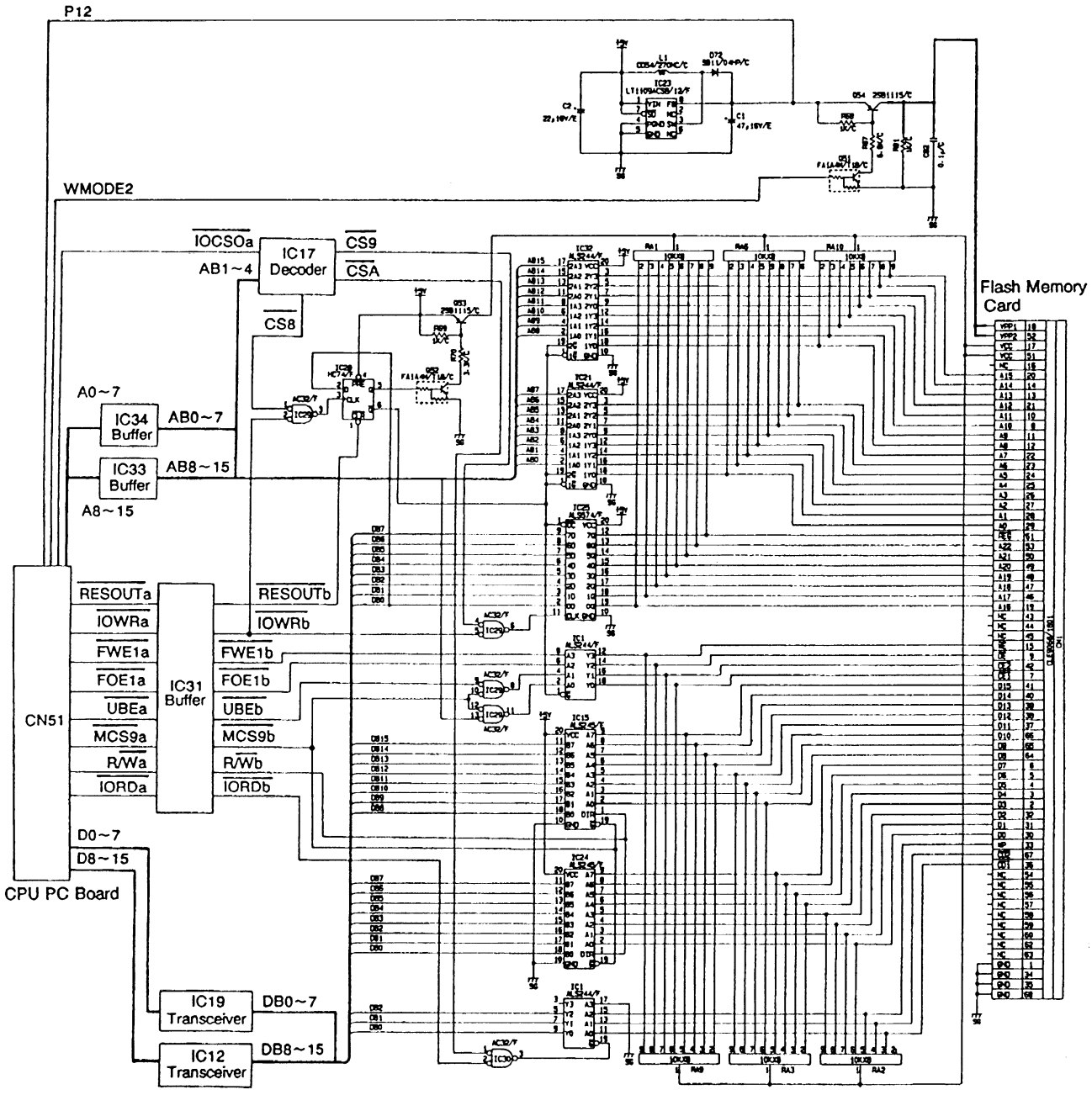
The $\overline{\text{FAULT}}$ signal indicates that the printer is in a FAULT state. The signal level is low while the printer is in a FAULT state.

The PE signal indicates a label end or ribbon end state. The signal level is low when a label end or ribbon end state is detected.

When the signal input to pin 9 of IC7 (D Flip-Flop) moves from a low to high level, the $\overline{\text{PAUSE}}$, $\overline{\text{FAULT}}$ and PE signals are output to the PC.

The $\overline{\text{INPUT}}$ signal output from the PC is a reset signal for the printer. The level of this signal is changed at IC14 and converted to the clock signal for IC13. Synchronized with the fall of the signal which moves from a high to low level, the high-level reset request signal is output from pin 5 of IC13. When the level of the $\overline{\text{CS4}}$ and $\overline{\text{IORDb}}$ signals is low, this signal is converted to DB0 and read by the CPU PC board.

3.2.2 Flash Memory Card I/F Circuit



This interface circuit controls the 1024 KB flash memory card which is connected to CN1.

The flash memory card is used to store logos, writable characters and PC commands.

To CN1, 23-bit address buses A0 to A22, 16-bit data buses D0 to D15, the write enable signal ($\overline{WE}$), and the output enable signal ($\overline{OE}$) are input/output to write/read data into/from the flash memory card.

Various signals for data transfer to the flash memory card are input from the CPU PC board via CN51.

Addresses A0 to A15 output from the CPU are buffered in IC33, IC34, IC21 and IC32 and converted to 16-bit addresses A0 to A15 for the flash memory card.

AB1 to AB4 output from IC34 are decoded in IC17 and used as the chip select signals $\overline{CS8}$, and $\overline{CS9}$, $\overline{CSA}$.

IC12, IC19, IC15 and IC24 are transceiver ICs used for 16-bit data transfer between the CPU PC board and the flash memory card. Data transfer direction is selected by the R/$\overline{W}$b signal (DIR) input to these ICs. When the signal level is high, data is read. When the signal level is low, data is written

.

IC1 buffers various signals output from the CPU PC board . The $\overline{WE}$ signal output from IC1 is a write enable signal which becomes low when data is written into the flash memory card. The $\overline{OE}$ signal is an output enable signal which becomes low when data is read from the flash memory card.

The $\overline{CE1}$ and $\overline{CE2}$ signals are chip enable signals which become low when a read/write access is performed to the flash memory card. According to the combination of these signals, the number of access bits is selected.

$\overline{CE1}$	$\overline{CE2}$	Access
L	H	Lower 8 bits
H	L	Upper 8 bits
L	L	16 bits

The $\overline{CD1}$ and $\overline{CD2}$ signal output from the flash memory card are card detect signals which becomes low when the card is inserted.

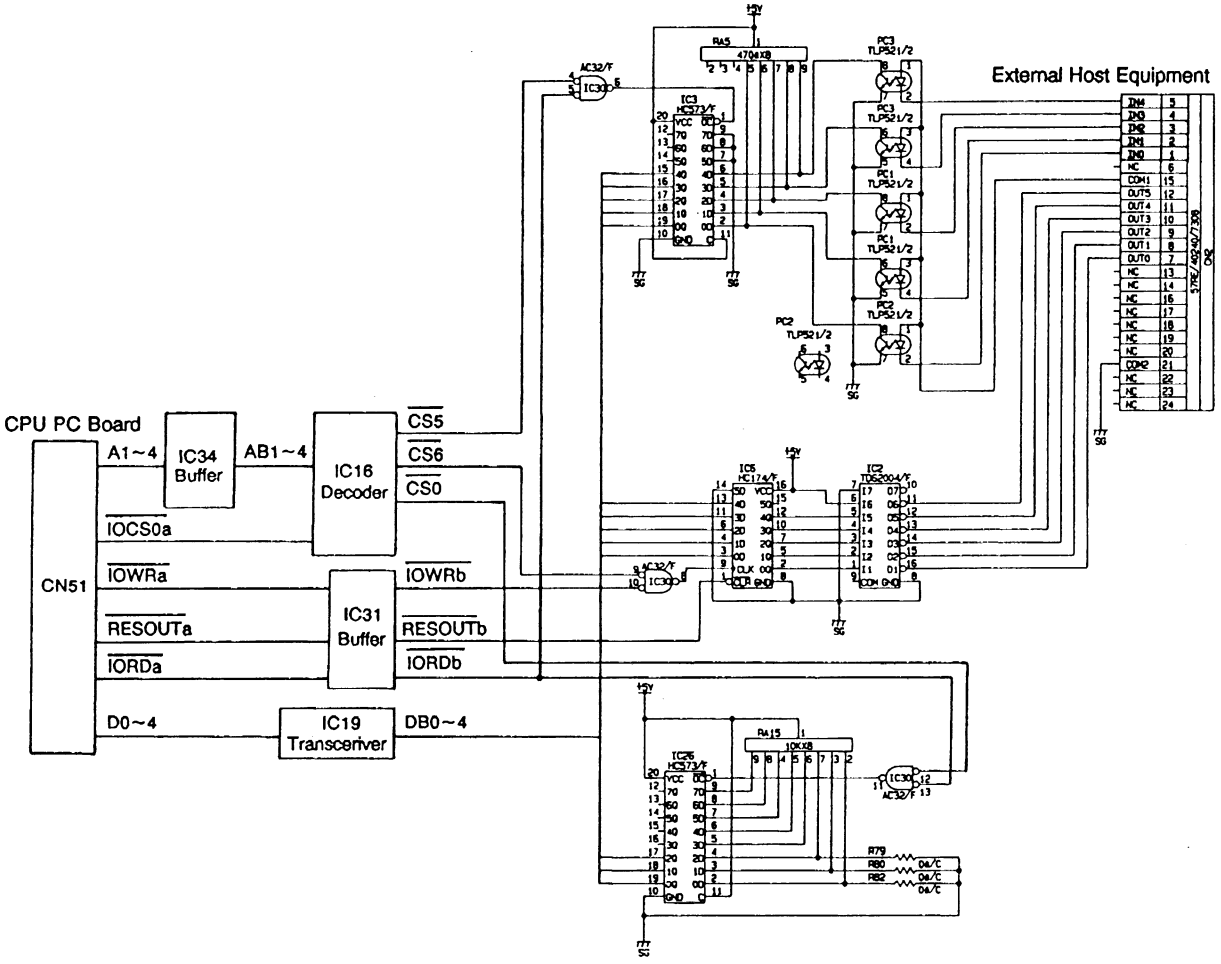
The level of the WP signal output from the flash memory card becomes high to prevent data writing when the card is in a write protect state.

The $\overline{CD1}$, $\overline{CD2}$ and WP signals transmits data to the CPU PC board via IC1, IC19 when the level of the $\overline{CSA}$, $\overline{IORDb}$ signals is low and the R/$\overline{W}$ signal level is high.

IC23 is a DC-DC converter which generates + 12V (P12) required to write/erase data into/in the flash ROM or the flash memory card, using +5V. When data is written or erased in the flash memory card, the level of the WMODE2 signal output from the CPU PC board becomes high, the transistors Q51, Q54 are turned on, causing P12 to be supplied to the flash memory card. P12 is also provided to the flash ROM on the CPU PC board.

+5V is provided to the flash memory card when reading data. This operation is controlled by. IC28 (D Flip-Flop). Synchronized with the rise of the signal input to pin 3 of IC28, a high signal is output from pin 5 and the transistors Q52, Q53 are turned on. Then +5V is provided to the flash memory card to read data.

3.2.3 Expansion I/O I/F Circuit



In addition to control by the PC commands, the expansion I/O interface circuit performs a feed and issue according to the input/output signal from external host equipment by interfacing with the equipment (including a labeler) connected to CN2.

IC31, IC34 buffer various signals from the CPU PC board.

IC16 decodes AB1 to AB4 and outputs the $\overline{CS0}$, $\overline{CS5}$ and $\overline{CS6}$ signals which select a circuit.

IC19 is a transceiver which controls input/output of data buses used for data transfer between the CPU PC board and the external host equipment.

IN0 to IN4 are input signals from the external host equipment. However, IN3, IN4 are not presently used. The COM1 signal is +24V input to the anode side of the LED in PC1 to PC3 (photo-couplers).

When IN0~IN4 are low, COM1 input to the photocouplers is pulled by the cathode side, and the LEDs are turned on, causing the phototransistors to be turned on. At that time, low-level signals are input to pins 2 to 6 of IC3 (D Flip-Flop).

When IN0 to IN4 are high, the LEDs in the photocouplers are not turned on and the phototransistors are turned off. At that time, high-level signals are input to IC3.

When the level of the $\overline{CS5}$ and $\overline{IORDb}$ signals is low, data input to IC3 is output from the data buses DB0 to DB4, converted into D0 to D4 via IC19 (transceiver) and input to the CPU PC board.

The data buses DB0 to DB4 output from the CPU PC board are input to IC6. Synchronized with the rise of the signal input to pin 9 of IC6. the DB0 to DB4 signals are output to IC2. The level of the DB0 to DB4 signals are changed at IC2. These signal are converted to the OUT0 to OUT5 signals and output to the external host equipment. OUT4 is not presently used.

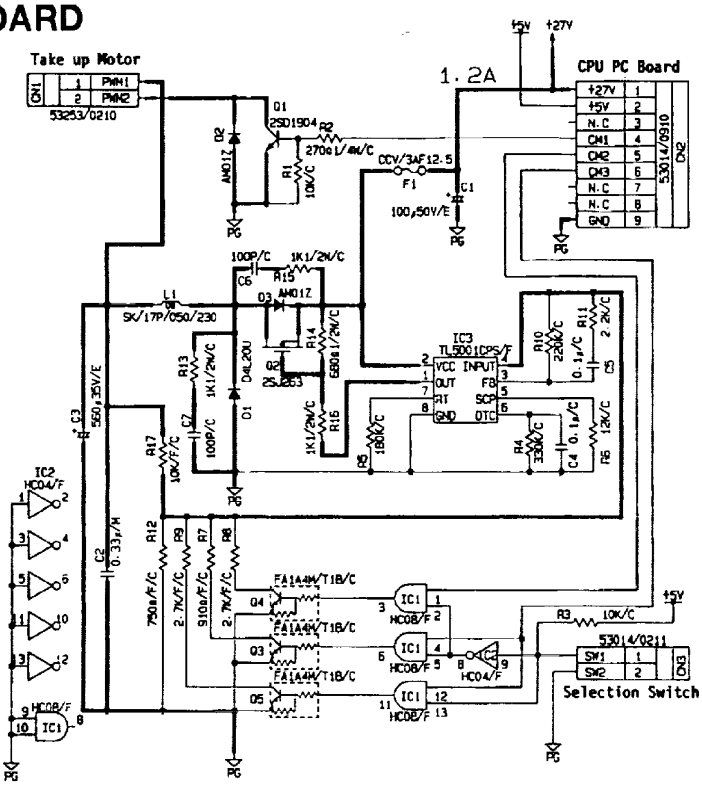
The IN0 to IN2 and OUT0 to OUT3,OUT5 signals have the following functions.

Signal Name	Function
IN0	Feeds one label.
IN1	Prints one label.
IN2	Temporarily stops label print.
OUT0	Indicates the printer is feeding a label.
OUT1	Indicates the printer is printing a label.
OUT2	Indicates the printer is pausing.
OUT3	Indicates the printer is in an erroneous state.
OUT5	Indicates the printer power is on.

IC26 outputs the interface identification signals DB0 to DB2 dependent on the input of the low-level $\overline{CS0}$ and $\overline{IORDb}$ signals. The DB0 to DB2 signals output vary according to the interfaces installed as follows:

Installed Interface Circuit	Signal Output
Expansion I/O interface	DB2: Low level
Flash memory card interface	DB1: Low level
Centronics interface	DB0: Low level

3.3 PWM2 PC BOARD



The PWM2 PC board drives the take-up motor which is connected to CN1. This board is controlled by the CPU PC board which is connected to CN2.

+27V is a drive voltage which is supplied to the take-up motor.

The CM1 signal turns Q1 on and off to drive the take-up motor.

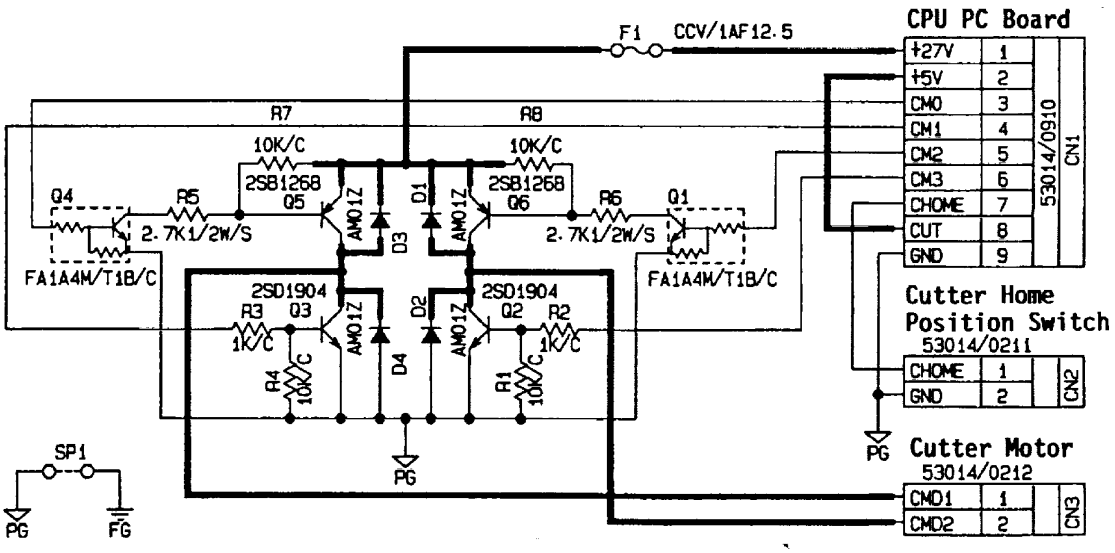
The CN3 connector is connected to the selection switch that selects rewinder or strip (peel-off) operation. The SW1 signal output from this switch is combined with the CM2 and CM3 signals output from the CPU PC board, causing the Q3 to Q5 transistors to be turned on or off. As a result, the composite resistance of R7 to R9 and R12 varies, causing the electrical potential of pin 4 of IC3 to be changed.

IC3 (switching regulator) detects the electrical potential of pin 4 and turns the Q2 transistor on or off according to the OUT signal output from pin 1, to keep the voltage (PWM1) supplied to the take-up motor constant.

The voltage (PWM1) supplied to the take-up motor varies according to the CM1 to CM3 signals, selection switch and print speed, ad follows:

Take-up Motor Operation (Label issue speed)	CM1	CM2	CM3	Selection Switch	PWM1
Stop	L	H	H	Rewinder	0 V
				Strip (Peel-off)	
8"/sec.	H	H	L	Rewinder	18 V
				Strip (Peel-off)	25 V
3'/sec., 5'/sec.	H	L	H	Rewinder	14 V
				Strip (Peel-off)	18 V

3.4 CUT I/F PC BOARD



The CUT I/F PC board is located in the cutter module which is connected optionally. This board is used to drive the cutter motor which is connected to CN3. CN1 is connected to the CPU PC board.

+27 V input from the CPU PC board to the CUT I/F PC board is a cutter motor driving voltage. +5V loops to the CPU PC board and converts into the CUT signal for identifying the cutter module.

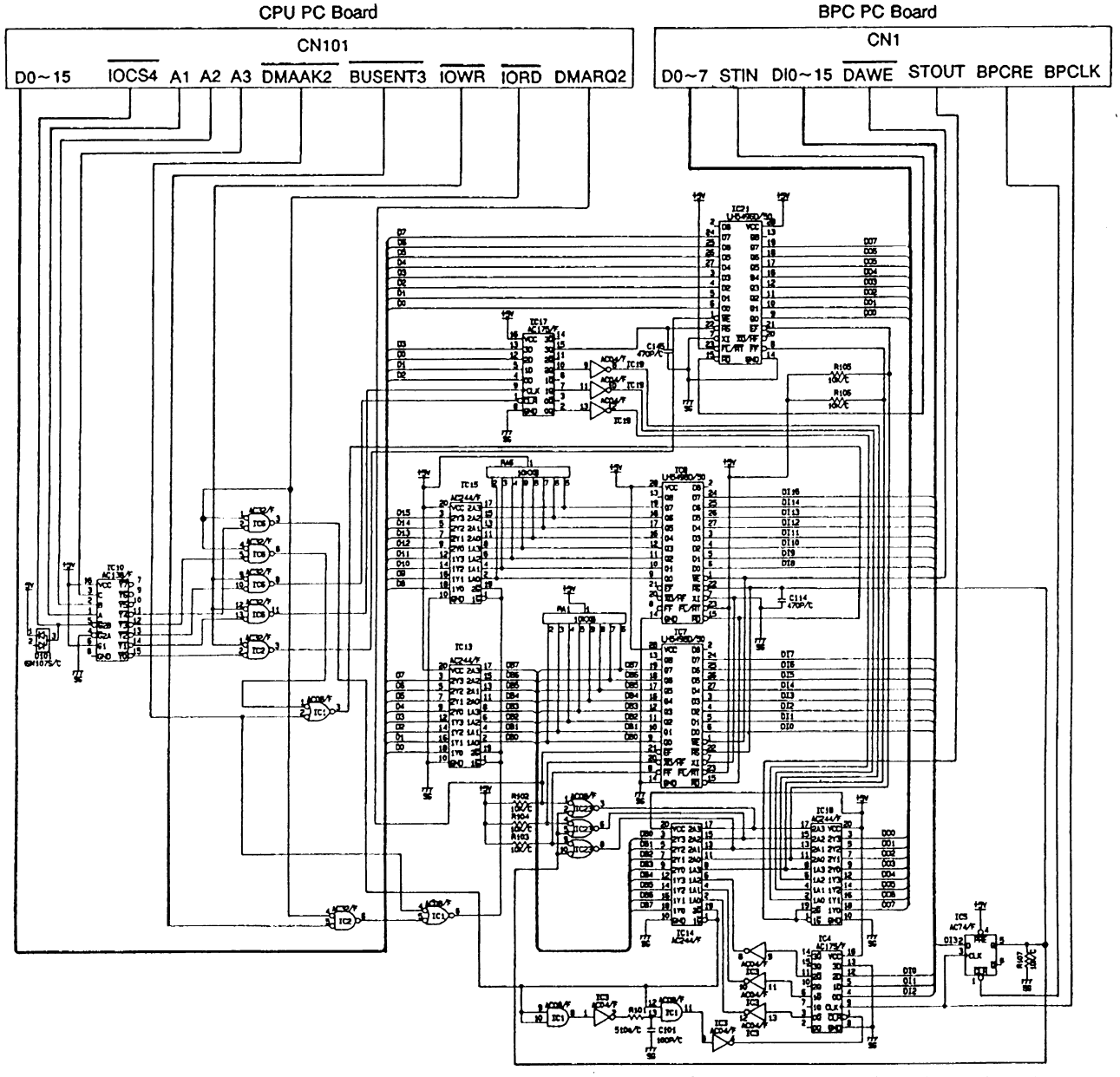
The CM0 to CM3 signals turn the Q1 to Q6 transistors on and off to drive the cutter motor.

The cutter motor operates as follows according to thje CM0 to CM3 signals.

Cutter Motor Operation	CM0	CM1	CM2	CM3
Stop	L	L	L	L
Cut	H	L	L	H
Brake	L	H	L	H

To CN2, the cutter home position switch is connected.

3.5 BPE PC BOARD (HIGH-SPEED PC I/F BOARD)



The BPE PC board is installed in the printer. This board transfers data received from the PC to the CPU PC board using the DMA, and transmits status data output from the CPU PC board to the PC (BPC PC board).

CN101 is connected to the CPU PC board directly. Via this connector, the signal controlling the interface with the PC is input/output.

The A1 to A3 address signals are decoded by IC10 (decoder) and logically combined with the $\overline{IORD}$ and $\overline{IOWR}$ signals. These signals are used as follows:

- Clear signal and clock signal for IC17 (D Flip-Flop)
- Write enable signal for IC21 (FIFO)
- Logically combined with the $\overline{DMAAK2}$ signal to the Read signal for IC7, IC8 (FIFO)
- Enable signal for IC14 (buffer), clear signal for IC4 (buffer)

IC7, IC8 and IC21 are First-in, First-out (FIFO) memories which contain the address generation circuit and the 576 byte memory. These ICs perform read/write operations on an asynchronous basis to allow high-speed processing.
The $\overline{EF}$, $\overline{HF}$, and $\overline{FF}$ signal output from IC7, IC21 indicate the amount of data written into these ICs.

Signal	Description
$\overline{EF}$ (Empty)	The FIFO memory is empty.
$\overline{HF}$ (Half-full)	The FIFO memory is half full with data.
$\overline{FF}$ (Full)	The FIFO memory is full with data.

When the level of the STOUT signal input to IC18 is low, the above signals are converted into 8-bit data (D0 to D7) and information about remaining spaces in memory is output to the PC.

Similarly, when the level of the $\overline{IORD}$, A1, A2 signals input from the CPU PC board is low, and the level of the A3 signal input from the CPU PC board is high, the level of the CS4 signal input to IC14 becomes low and the $\overline{EF}$, $\overline{HF}$ and $\overline{FF}$ signal output from IC7, IC21 are converted into 8-bit data (DB0 to DB7). Then the information about remaining spaces in memory is output to the PC.

This operation prevents a malfunction that the PC or the CPU writes data into the FIFO memory when it is full, or that the PC or the CPU reads data in the FIFO memory when it is empty.

IC7, IC8 receive the 16-bit command and image data to be printed and transfers them to the printer.

When the level of the D13 and BPCRE signal input to IC5 is high, the level of the BPCLK signal output from the PC (BPC PC board) moves a low to high level and the DARES signal level becomes high. Then the reset of IC7, IC8 is reset to allow data transfer.

When the level of the DARES signal output from IC5 is low, IC7, IC8 are reset and data transfer is not performed.

The $\overline{DAWE}$ signal is a data write enable signal which becomes low when data output from the PC (BPC PC board) is written into IC7, IC8.

The $\overline{EF}$ signal output from IC7 is used as a DMARQ2 signal. The signal level becomes high to request DMA from the CPU when data is written in IC7.

When DMA is accepted, the level of the $\overline{DMAAK2}$ and $\overline{IORD}$ signals becomes low and the level of the A3 address signal output from the CPU PC board becomes low, the level of the address signals A1, A2 becomes high, and the level of the CS3 signal output from pin 3 of IC1 becomes low.

The CS3 signal converts into a read signal for IC7, IC8 and is output to the CPU PC board via IC13, IC15 (buffer).

DI0 input from PC to IC4 is also used as a status request signal and DI1 is used as a reset request signal.

IC21 is used to transmit 8-bit status data output from the printer to the PC (BPC PC board). Using this data bus, the status data is input from the printer. When the level of the signal output from pin 15 of IC17 is low, IC21 is reset and data transfer is not performed.

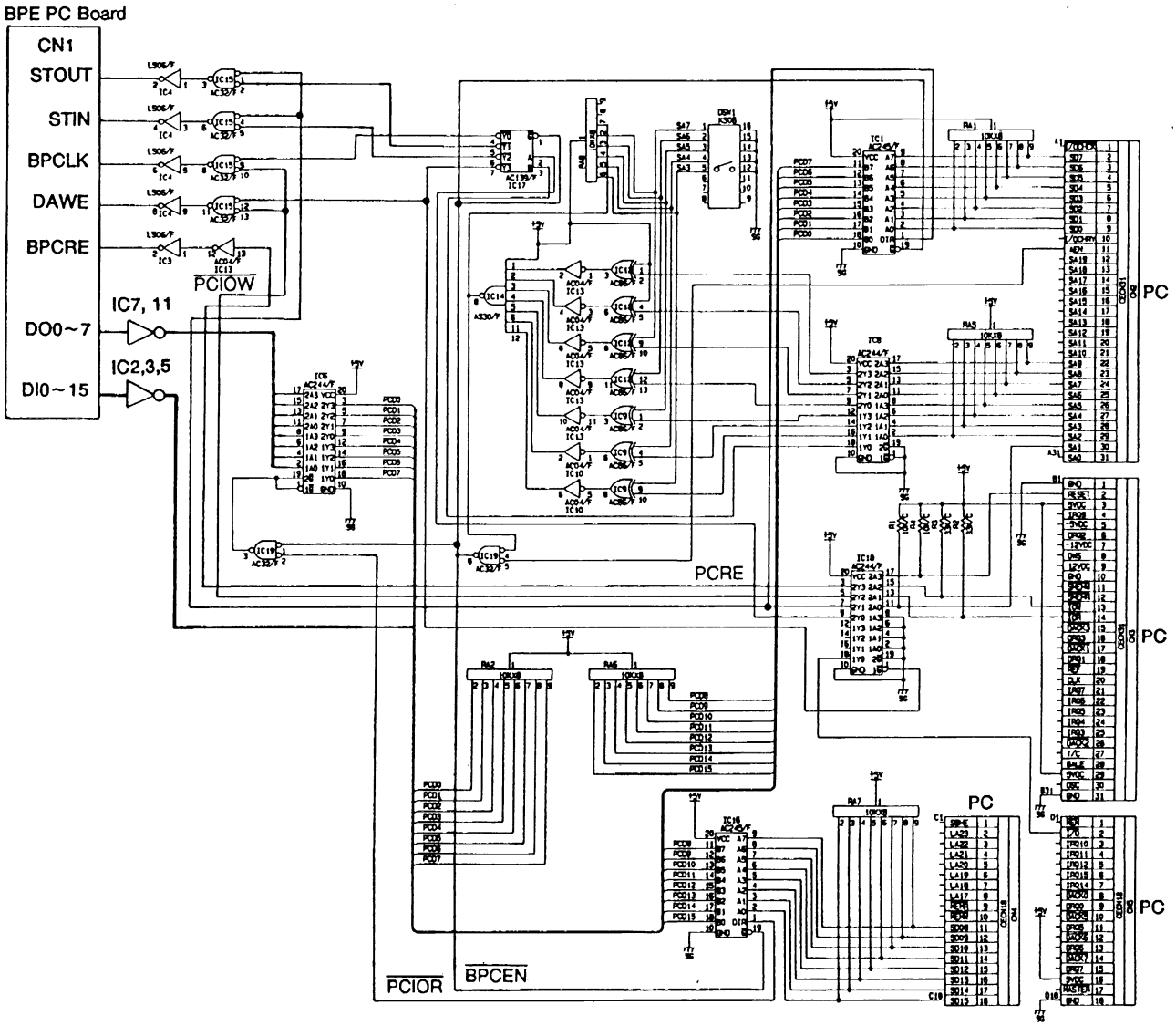
When the level of the D3 input to IC17 is high, and the level of the signal input to pin 1 is high, the level of the signal from pin 15 becomes high, synchronized with the rise of the signal input to pin 9. Accordingly, the reset of IC21 is cleared and data transfer is possible.

The level of the $\overline{\text{IOWR}}$ signal output from the CPU PC board is low and the level of the A1 to A3 address signals output from the CPU PC board is low, the level of the signal input to pin 1 of IC21 becomes low, causing the status data output from the CPU PC board is written into IC21.

The status data is output from IC21 and input to the PC using the DO0 to DO7 data buses when the level of the STIN signal output from the PC is low.

The D0 signal output from the printer is used as a image data request signal. This signal is output to IC18, synchronized with the rise of the signal input to pin 9 of IC17. When the level of the STOUT signal output from the PC (BPC PC board) is low, this signal is converted into the DO5 signal and input to the PC.

3.6 BPC PC BOARD (HIGH-SPEED PC I/F BOARD)



The BPC PC board is installed to the AT bus inside the PC. When the I/O address programmed using the DIP switch on this board is accessed from the PC, the commands, print data and status data are transferred between the PC and the printer (BPE PC board) using this I/O address.

CN1 connects the BPE PC board in the printer via the cable.

CN2 to CN5 are connected to the AT bus inside the PC and various signals are input/output.

The addresses SA2 to SA9 output from the PC are logically combined with the status signals of the DIP switch (DSW1) at IC9, IC10, IC12 to IC14. When the I/O addresses programmed using DSW1 are the same with the addresses SA2 to SA9, the printer is accessed by the PC, causing the level of the signal output from pin 8 of IC14 to become low. Using this signal, the logic buffer and transceivers are operable.

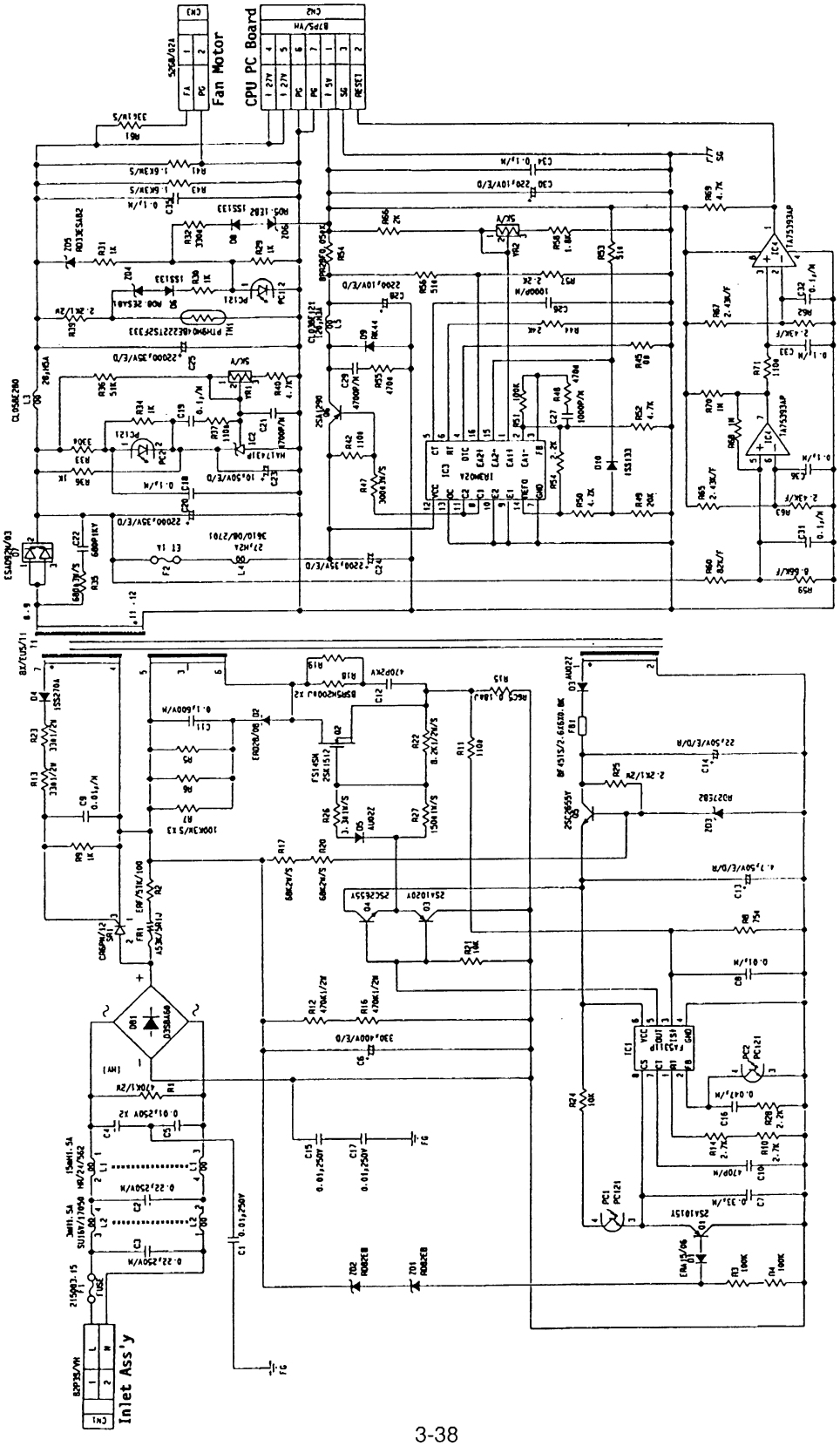
The signal output from pin 8 of IC14 is logically combined with the AEN signal output from the PC at IC19, converted into the $\overline{\text{BPCEN}}$ signal to be used as an enable signal for IC1, IC16 (transceiver) and IC6, IC18 (buffer). IC18 is a bufter which outputs the PCRE, $\overline{\text{PCIOW}}$ and $\overline{\text{PCIOR}}$ signals.

The 16-bit data SD0 to SD15 output from the PC are input to IC1, IC16 (transceiver). When the $\overline{\text{BPCEN}}$ signal level is low and the $\overline{\text{PCIOR}}$ signal level is high, these data are converted into PCD0 to PCD15. The level of these signal are changed in IC2, IC3, IC5. Then the signals are converted into DI0 to DI15 and output to the printer (BPE PC board).

When the level of the $\overline{\text{BPCEN}}$ signal and the $\overline{\text{PCIOR}}$ signal is low, DO0 to DO7 output from the printer (BPE PC board) are converted into SD0 to SD7 via IC6 (buffer) and IC1 (transceiver) and transmitted to the PC. Using the 8-bit data, the status data is output to the PC.

When the $\overline{\text{BPCEN}}$ signal level is low, IC17 decodes the SA1, SA2 signals and output to IC15. The decoded signals are logically combined with the $\overline{\text{PCIOR}}$ and the $\overline{\text{PCIOW}}$ signals at IC15. Then the level of these signals is changed in IC4. After that, these signals are converted into the STOUT, STIN, BPCLK and DAWE signals and output to the printer (BPE PC board). For details about the STOUT, STIN, BPCLK and DAWE signals, refer to Section 3.5.

3.7 PS UNIT



This PC board generates a DC voltage from an AC voltage (QQ model: AC 100 to 240 V ± 15 %, QP model: AC 220 to 240 V ± 15 %, 50/60 Hz + 6 Hz, -3 Hz) input from the CN1 of the primary side circuit, through the capacitor, the inductance, resistor and the rectifier. This board also drops the voltage and removes noise using the transformer and the capacitor. + 27V (rating: 27 V ± 1.35 V) and + 5V (rating: 5 V ± 0.25 V) are generated in the secondary side circuit and output from CN2, and CN3 to the CPU PC board and the fan motor. + 27V and + 5V can be adjusted by VR1 and VR2, respecitively.

The fan motor is connected to CN3, and 27 V is output as the motor drive voltage. The CPU PC board is connected to CN2, and 27 V for the print head, the solenoid and the motors and 5 V for each logic circuit are output.

•+ 27V Generation Circuit

At power on time AC voltage input from CN1 is converted to DC voltage by the DB1 rectifier and output to the T1 transformer through FR1 and R2. When the DC voltage inputs to the T1 transformer, the electromotive force is generated between pin 4 and pin 7 of T1, which turns the thyristor SR1 on. After the power is supplied, the DC voltage output from DB1 is output to T1 through this thyristor. T1 drops this DC voltage to 27 V and output from pins 8, 9, 11 and 12. 27 V is output from CN3 to the fan motor, and from CN2 to the CPU PC board. This voltage is also input to the PC2 photocoupler.

The output from PC2 is detected by pin 2 of IC1 (pulse width modulation). When +27V is lower than the rating, the level of the output from pin 5 of IC1 becomes high. By turning the transistor Q2 on through the amplifying transistor Q4, the DC voltage is input to the T1 transformer, causing the output voltage of the primary side to be raised. When +27V is higher than the rating, the level of the output from pin 5 of IC1 becomes low. The Q2 transistor is turned off through the amplifying transistor Q3, and the DC voltage input to the T1 transformer is cut-off, causing the voltage drop.

Thus, IC1 detects and controls the ON/OFF time of the Q2 transistor to maintain a constant +27V voltage.

• + 5 V Generation Circuit

IC3 is a DC-DC converter to drop the voltage from 27V to 5V. The voltages at both ends of R54 are input to pins 1 and 16. IC3 detects the voltage. When +5V is lower than the rating, the level of the outputs from pins 8 and 11 of IC3 becomes low and the Q6 transistor is turned on. Since 27V is input to the +5V voltage line, the +5V voltage is raised. When +5V is higher than the rating, the level of the outputs from pins 8 and 11 of IC3 becomes high and Q6 is turned off.

Accordingly, 27V is not input to the +5V voltage line, causing the +5V voltage to be dropped.

Thus, IC3 detects the voltage and turns on and off the Q6 transistor to generate 5V from 27V and to maintain a constant +5V voltage.

• Overvoltage/Overcurrent Detection

The overvoltage of +27V (approx. 32V) and the overvoltage of +5V (approx. 6.5V) are detected by IC1. 27V, the primary side output voltage is input to the PC1 photocoupler. The output from the photocoupler is input to pin 8 of IC1. When the overvoltage is detected using this voltage, a low-level signal is output from pin 5 of IC1 and the DC voltage supplied to the T1 transformer is cut-off, causing the output from the secondary side to be stopped.

To pin 3, IC1 inputs the voltage to be applied to R15, to detect the overcurrent of +27V (approx. 8.5A). When an overcurrent is detected, a low-level signal is output from pin 5 of IC1 and the DC voltage supply to T1 is cut-off, causing the output from the secondary side to be stopped.

Also IC1 prevents an error operation caused by the voltage drop. If the DC voltage rectified by DB1 falls to 78V or less for QQ or 164V or less for QP, the current is not applied to ZD1 and ZD2 zener diodes, Q1 transistor is turned on and pin 8 of IC1 becomes low. When detecting the low-level signal, IC stops outputting the pulse and inputting the voltage to the transistor.

The overcurrent of +5V (approx. 2.0A) is detected by the voltage input to pins 1 and 16 of IC3. When an overcurrent is detected, a high-level signal is output from pins 8 and 11 of IC3 and Q6 is turned off, causing 5V to be dropped.

In the primary side circuit, the fuse is blown due to an overcurrent of the input (QQ model: 6.3A/125V, QP model: 3.15A/250V), and the input voltage is cut off to protect the circuit.

The PS unit is also protected from the input overvoltage. The DC voltage rectified by DB1 is increased by R17 and 20, and input to the base of Q5 transistor. When the voltage exceeds 27V, the zener diode applies the electric current, the base of the Q5 becomes low-level and Q5 is turned off. When Q5 is OFF, operating voltage is not supplied to IC1 which outputs the pulse, so the PS unit is not activate.

- **Thermal Protection Circuit**

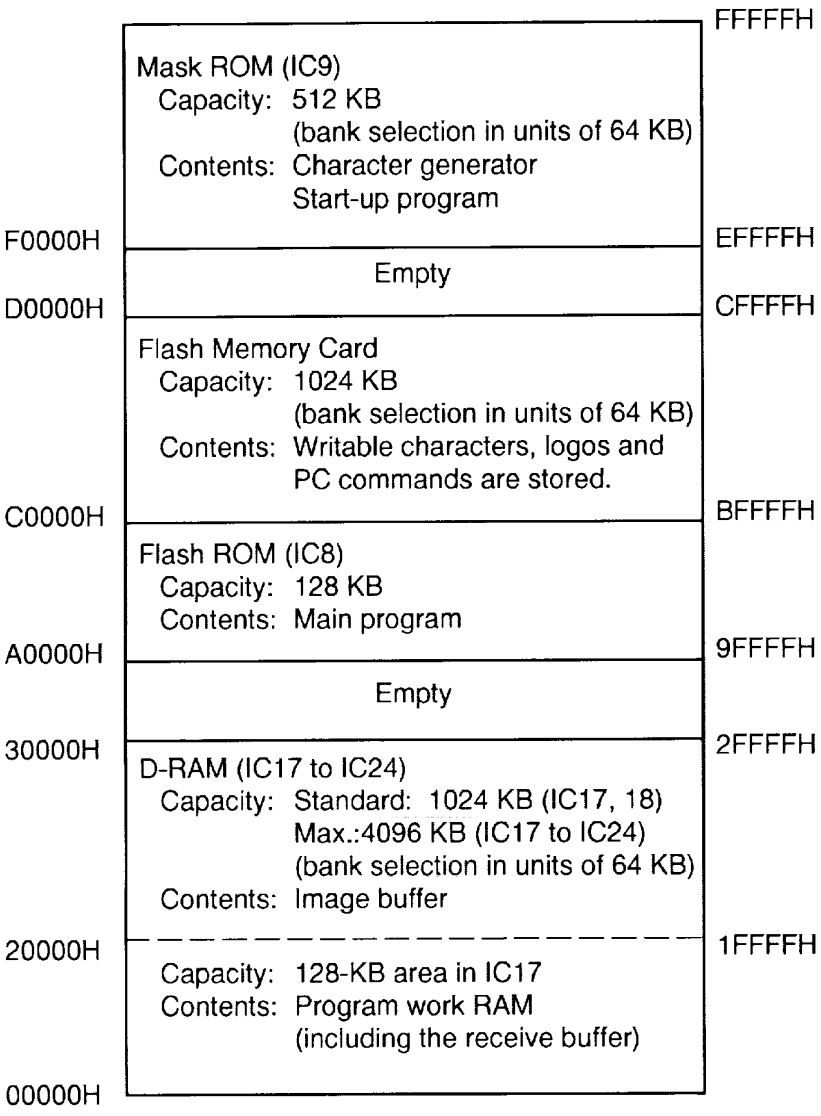
TH1 is a posistor whose resistor rises according to the rise of the temperature. When the temperature of the heat sink exceeds 75°C, the current is applied to ZD4 zener diode, PC1 photocoupler is tuned on, which is detected by IC1. If IC1 detects the overheat, it stops pin 5 from outputting the pulse, causing the PS unit to be inactive.

- **Reset Circuit**

IC4 is the OP. Amp. which detects voltage drop due to power interruption, by comparing the primary side output voltage of the transformer.

When a voltage drop is detected, the level of the RESET signal which is output from pin 1 of IC4 and is input to the CPU PC board becomes low and protect the main elements including the CPU and gate array against voltage drop. For reset operations, refer to Section 3.1.1.

4. MEMORY MAP


FFFFFH
Mask ROM (IC9)
Capacity: 512 KB
(bank selection in units of 64 KB)
Contents: Character generator
Start-up program
F0000H
EFFFFH
Empty
D0000H
CFFFFH
Flash Memory Card
Capacity: 1024 KB
(bank selection in units of 64 KB)
Contents: Writable characters, logos and
PC commands are stored.
C0000H
BFFFFH
Flash ROM (IC8)
Capacity: 128 KB
Contents: Main program
A0000H
9FFFFH
Empty
30000H
2FFFFH
D-RAM (IC17 to IC24)
Capacity: Standard: 1024 KB (IC17, 18)
Max.:4096 KB (IC17 to IC24)
(bank selection in units of 64 KB)
Contents: Image buffer
20000H
1FFFFH
Capacity: 128-KB area in IC17
Contents: Program work RAM
(including the receive buffer)
00000H

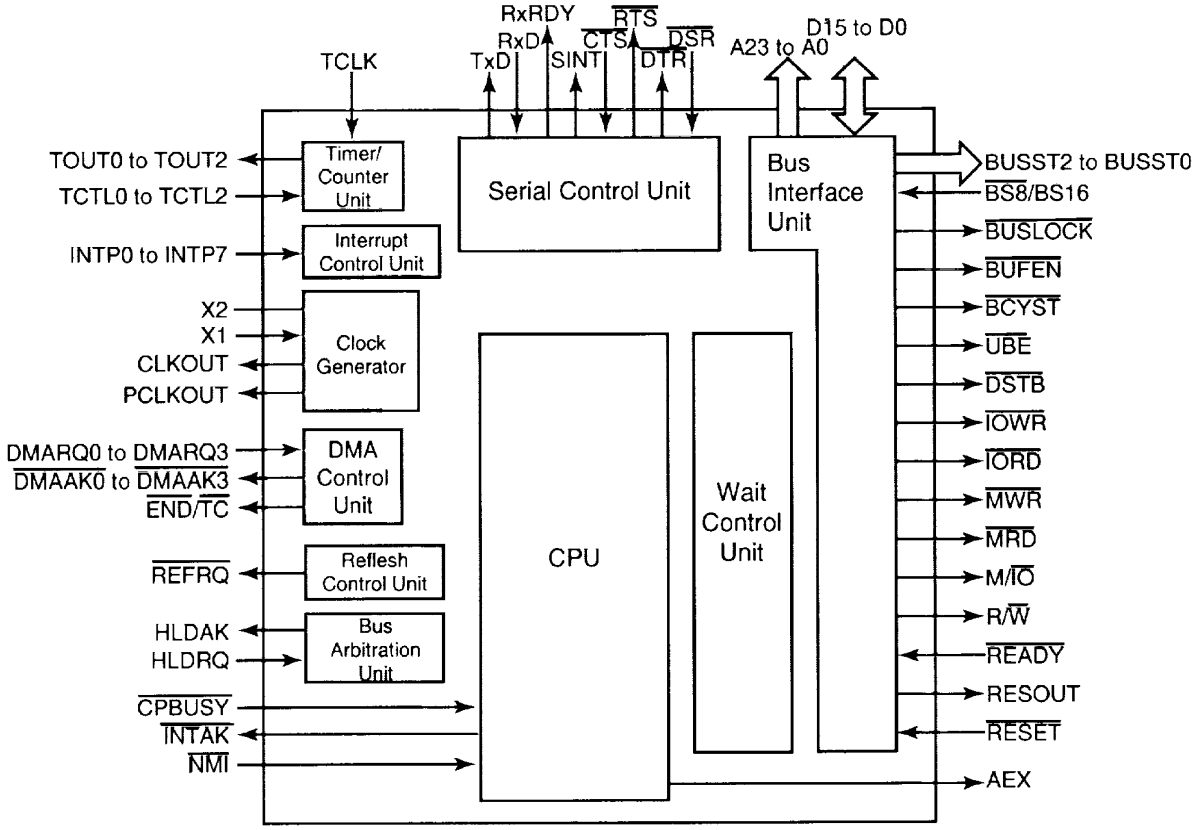
5. APPENDIX

5.1 CPU (μPD70236)

The μPD70236 is a 16-bit CPU which contains a 16 MB memory area and a 64 KB I/O area. This CPU functions as a center of this printer and has the following functions.

- Standard peripheral LSI functions
  - Clock Generator
  - Programmable wait control unit
  - D-RAM refresh function
  - Timer/counter unit
  - Serial control unit
  - Interruption control unit
  - DMA control unit
- Standby functions
  - HALT mode (Only the CPU clock stops.)
  - STOP mode (All clocks stop.)
  - Instruction cycle time varying function
- Operation frequency: 10, 12.5, 16 MHz (when 20, 25, 32 MHz supplied from outside)

The internal block of the μPD70236 is as follows:



Symbol	Pin No.	Type	Name and Function
BUSST0 to BUSST2	52 to 54	O	**Bus Status** These signals encode and output the data which represents the type of the bus cycle currently executed. At bus hold, the impedance of this pin becomes high. The operations shown below are indicated by combining these signals with the M/$\overline{IO}$ and R/$\overline{W}$ signals. **Table 5-2 V53 Bus Cycle Table** M/$\overline{IO}$ | R/$\overline{W}$ | BUSST2 | BUSST1 | BUSST0 | Bus Cycle 0 | 1 | 0 | 0 | 0 | Interrupt acknowledge cycle (from SLAVE) 0 | 1 | 1 | 0 | 0 | Interrupt acknowledge cycle (From ICU) 0 | 1 | 0 | 0 | 1 | External I/O read cycle 0 | 1 | 1 | 0 | 1 | Internal I/O read cycle 0 | 0 | 0 | 0 | 1 | External I/O write cycle 0 | 0 | 1 | 0 | 1 | Internal I/O write cycle 0 | 1 | 0 | 1 | 0 | Coprocessor read cycle 0 | 0 | 0 | 1 | 0 | Coprocessor write cycle 0 | 0 | 0 | 1 | 1 | Halt acknowledge cycle 1 | 1 | 0 | 0 | 0 | Instruction fetch cycle 1 | 1 | 1 | 0 | 0 | Refresh cycle 1 | 1 | 0 | 0 | 1 | CPU memory read cycle 1 | 1 | 1 | 0 | 1 | DMA read transfer cycle 1 | 0 | 0 | 0 | 1 | CPU memory write cycle 1 | 0 | 1 | 0 | 1 | DMA write transfer cycle 1 | 1 | 0 | 1 | 0 | Coprocessor memory read cycle 1 | 0 | 0 | 1 | 0 | Coprocessor memory write cycle 1 | 1 | 1 | 1 | 1 | DMA cascade
$\overline{BCYST}$	61	O	**Bus Cycle Start Strobe** This signal indicates the start of the bus cycle. A low-level signal is output for one clock immediately after the bus cycle starts. At bus hold, the impedance of this pin becomes high.
$\overline{DSTB}$	62	O	**Data Strobe** This is the read and write operation strobe signal. It does not become active at the halt acknowledge cycle, which shows that a HALT instruction was executed. At bus hold, the impedance of this pin becomes high. The output timing is different in read and write operations. At internal I/O read/write cycle, DMA cycle and refresh cycle, the signal level becomes high.
$\overline{BUSLOCK}$	44	O	**Bus Lock** This signal shows that use of the bus by bus users other than the CPU itself (for example, DMA controller or other processor) is prohibited. It Is active from the start of the first interrupt acknowledge cycle to the start of the second interrupt acknowledge cycle and while an instruction with BUSLOCK prefix is executed. During the bus lock period, this signal is active, bus requests from other than the CPU are not accepted.

Symbol	Pin No.	Type	Name and Function
A0 to A23	91 to 94, 97 to 102, 104 to 107, 109 to 114, 117 to 120	O	**Address Bus** These pins output the real addresses when accessing an external memory unit and an I/O device. The 16 MB of memory space and the 64 KB (including reserved area) of I/O space can be accessed. • At reset, hold, and DMA cascade connection, the impedance of these pins becomes high. • At this interrupt acknowledge cycle, these pins are undefined. At cascade connection, the cascade address is output at A0 to A2. • When not in address extension mode, A20 to A23 output low level • At I/O access, A16 to A23 output low level. • The address extension function is also effective at interrupt vector table access.
D0 to D15	71,72, 74 to 77, 79 to 84, 87 to 90	I/O	**Data Bus** These pins input and output the write data and read data when an external memory unit and I/O device is accessed. They take the input state at other than the write bus cycle. At the write bus cycle, these pins take the output state from the rising edge of the T1 clock to the rising edge of the first clock after the end of the write bus cycle.
$\overline{UBE}$	64	O	**Upper Byte Enable** When access to an external memory unit and I/O device includes access to the high-order 8 bits (D15 to D8) of the data bus, the rising edge of the T1 clock changes the state of this pin. A0 controls the low-order 8 bits (D0 to 07) of the data bus. The relation between UBE, A0 and bus access operation is shown in Table 5-1. **Table 5-1 $\overline{UBE}$, A0 and Bus Access Operation** $\overline{UBE}$ | A0 | Operation 0 | 0 | 16-bit access 0 | 1 | High-order 8 bits access 1 | 0 | Low-order 8 bits access 1 | 1 | No. 2 cycle at bus sizing
R/$\overline{W}$	56	O	**Read/Write** This signal shows if the access cycle being executed is the read cycle or write cycle. This is effective when the bus cycle starts. This pin, when high, indicates the read cycle. When low, it indicates the write cycle. At the interrupt acknowledge cycle, this pin outputs a high level signal. At bus hold, the impedance of this pin becomes high. The falling edge of the T1 clock changes the state of the signal.
M/$\overline{IO}$	55	O	**Memory /IO** This signal shows if the access currently executing is for memory or for another device (I/O device, coprocessor, etc.). The type of access is specified by combining this signal with the BUSST0 to BUSST2 and R/W signals (see Table 5-2). At bus hold, the impedance of this pin becomes high. The falling edge of the T1 clock changes the state of the signal.

Symbol	Pin No.	Type	Name and Function
HLDRQ	11	I	**Hold Request** This signal requests that an external device releases the address bus, data bus, and control bus for V53. When the signal level is high while the bus cycle is executed, the CPU releases the bus at the end of the cycle. If a bus cycle is not executed, the CPU immediately sets the address bus, data bus and control bus to the high impedance state and makes the HLDAK signal active, and releases the bus. However, when the BUSLOCK signal level is low, an input is not accepted.
HLDAK	12	O	**Hold Acknowledge** This is the acknowledge signal which indicates that V53 has received the HLDRQ signal and has opened the buses at the external device by making the address/data bus and control bus to have high impedance. The proper HLDRQ bus priority is as follows: REFU (highest priority) > DMAU > HLDRQ > CPU > REFU (lowest priority) When the bus is idle (T1) and when a hold requests (HLDRQ) was generated from the external device in the CPU bus cycle and lowest priority refresh cycle, the HLDRQ signal is received and the bus is released immediately after the end of the bus cycle. However, when a DMA requests or lowest priority refresh request was generated during bus hold, V53 makes HLDAK inactive and requests return of the right to use the bus. In this case, the external device must make HLDRQ inactive and return the right to use the bus. However, another bus master cannot use the bus until HLDRQ becomes inactive. When the HLDAK signal is made inactive forcefully because of a bus return requests, the high level width or the HLDAK signal becomes at least one clock.
RESET	51	I	**Reset** This signal initializes the processor. When it returns to the high level after being held at low level for six or more clocks, the processor is reset. However, when the HALT or STOP mode is released, the RESET input should be activated during the oscillation stabilization time.
RESOUT	47	O	**Reset Output** This pin outputs the asynchronous RESET input signal as an active-high signal which is synchronized with the internal clock. This signal can be used as the system reset signal.
REFRQ	10	O	**Refresh Request** This signal becomes active in the refresh cycle T2, TW and T3 states, and informs the outside that the system is in the refresh cycle.
MRD	60	O	**Memory Read** This pin outputs the read signal which becomes active in the memory read cycle. This signal is output at the DMA read transfer, as well as the CPU memory read cycle. In the refresh cycle, the signal output fs high.

Symbol	Pin No.	Type	Name and Function
READY	40	I	**Ready** This signal controls whether or not the bus cycle is extended to adjust to the access time of a low speed memory or I/O control device. The input level is ignored at the halt acknowledge cycle, which shows that a HALT instruction was executed, and the internal I/O area access cycle. Note that the READY input setup/hold time must be observed, otherwise the operation cannot be secured.
BS8/BS16	42	I	**Bus Size 8 Bits / 16 Bits** This signal controls whether the external data bus is made 8 bits or 16 bits. It is sampled by the rising edge of the T2 or last TW clock of the bus cycle. When the signal level is high, the 16 bits of the external data bus operate as valid data. When it is low, the low-order 8 bits of the external data bus operate as valid data. An exception is that as the halt acknowledge cycle, interrupt acknowledge cycle, coprocessor data access cycle, DMA cycle and refresh cycle, 8 bits are ignored, even if these bits are set and the external data bus operates as a 16-bit data bus. When 8-bit width was specified in the coprocessor data access cycle, operation is undefined.
AEX	39	O	**Address Extension** This signal indicates whether read address generation is performed in standard or extended mode. This pin outputs the contents of the XA flag. When the signal level is high, 24-bit real addresses are generated. When it is low, 20-bit real addresses are generated. This signal becomes active from the BRKXA instruction initial fetch cycle and becomes inactive from the RETXA instruction initial fetch cycle.
NMI	41	I	**Non-maskable Interrupt Request** This is a non-maskable interrupt request signal. This signal is always accepted regardless of the state of the interrupt enable flag in the PSW. This signal is detected by the falling edge of the clock signal. Interrupt processing begins immediately after the end of the current instruction. However, when this interrupt processing starts, interruption is not given until the end of processing by RETI instruction. However, the standby state during NMI servicing can be released by NMI input. In this case, an NMI interrupt signal is generated, and the process enters the NMI servicing routine. This signal can be also used to clear HALT and STOP modes.
CPBUSY	69	I	**Co-processor Busy** This pin inputs the signal which indicates the status of the coprocessor. When the signal level is low, the coprocessor is in a BUSY state. When the coprocessor is not connected, this pin should be connected to GND.

Symbol	Pin No.	Type	Name and Function
INTP0 to INTP7	14 to 17, 19 to 22	I	**Interrupt from Peripherals** These pins are on-chip interrupt control unit (ICU) asynchronous interrupt requests inputs. Edge trigger (rising edge) or level trigger (high level) can be selected as the input signal. Fixed or rotating can be selected as the acceptance priority. These interrupt requests inputs can be also used to clear the HALT and STOP modes.
$\overline{\text{INTAK}}$	23	O	**Interrupt Acknowledge** This pins outputs the active-low acknowledge signal for maskable interrupts.
TXD	38	O	**Transmit Data** This pin outputs serial data. The signal level becomes high (marking) when there is no data to transmit. When transmit data is set, the start bit is output automatically, then the set data is output serially. A parity bit and stop bit are added to the end of each data.
RXD	37	I	**Receive Data** This pin inputs serial data. When there is no data to receive, the signal level becomes high (marking). When the start bit is selected, serial data reception starts.
RXRDY	35	O	**Receive Ready** When the SCU has received one character of data and the data has been transferred to the receive data buffer, i.e., when receive data can be read, a high-level signal is output from this pin.
$\overline{\text{RTS}}$	33	O	**Requests to Send** This is a general-purpose output pin. The state of this pin can be set using bit 5 of the serial command register (SCM). This pin can be also used as a data transfer request to the outside.
$\overline{\text{CTS}}$	34	I	**Clear to Send** This pin controls the serial transmission input. When bit 0 (TE) of the serial command register (SCM) becomes "1" and the signal input to this pin is low, the SCU can transmit. When the signal is high while the SCU is transmitting, the transmit operation stops and the signal output from the TXD pin goes high after all data written at that time has been sent.
$\overline{\text{DSR}}$	31	I	**Data Set Ready** This is a general-purpose output pin. The state of this pin can be set using bit 7 of the serial status register (SST). The signal can also inform the SCU that data is ready.
SINT	36	O	**Serial Interrupt** The level of the signal output from this pin becomes active as an interrupt requests signal from the SCU, when the transmit buffer is empty and transmit interrupts are not masked, or when data to be read exists in the receive buffer and receive interrupts are not masked. This signal can be also used as the ready-to-transmit signal (TXRDY) by masking at the receive interrupt mask register.

Symbol	Pin No.	Type	Name and Function
$\overline{\text{MWR}}$	μ59	O	**Memory Write** This pin outputs the write signal which becomes active in the memory write cycle. This signal is output at the DMA write transfer, as well as in the CPU memory write cycle. The DMA cycle has two $\overline{\text{MWR}}$ output timings: extended write and normal write.
$\overline{\text{IORD}}$	58	O	**I/O Read** This pin outputs the read signal which becomes active in the I/O read cycle. This signal is output at the DMA write transfer as welt as in the CPU I/O read cycle. However, it is not output in the CPU internal I/O read cycle.
$\overline{\text{IOWR}}$	57	O	**I/O Write** This pin outputs the write signal which becomes active in the I/O write cycle. This signal is output at the DMA read transfer as well as in the CPU I/O write cycle. The DMA cycle has two IOWR output timings: extended write and normal write. However, it is not output in the CPU internal I/O write cycle.
$\overline{\text{BUFEN}}$	63	O	**Buffer Enable** This signal is used as an external buffer output enable signal. It becomes active in the read cycle, interrupt acknowledge cycle, write cycle and coprocessor cycle. However, it does not become active during the DMA cycle and at the internal I/O access.
X1, X2	49, 50	I	**Crystal** When the internal clock generator is used, a crystal having a double operating frequency is connected to pins X1 and X2. When the external clock generator is used, a square wave having a double operating frequency is input to the X1 pin and the opposite phase (inverter output) of X1 is input to the X2 pin.
CLKOUT	46	O	**Clock Output** This pin outputs a square wave obtained by dividing the clock frequency applied to X1 and X2. The duty of this clock is approx 50%. The output frequency is the same as the CPU internal operating frequency (1/2, 1/4, 1/8 and 1/16 of the oscillator frequency).
PCLKOUT	45	O	**Peripheral Clock Output** This pin outputs a square wave clock obtained by dividing the clock frequency applied to X1 and X2 by four. The duty of this clock is approx. 50%.
TCLK	30	I	**Timer Clock** This is the TCU external clock input signal. Whether the external clock from this pin or the clock obtained by dividing the internal clock is used as the TCU input clock is selected at initialization.

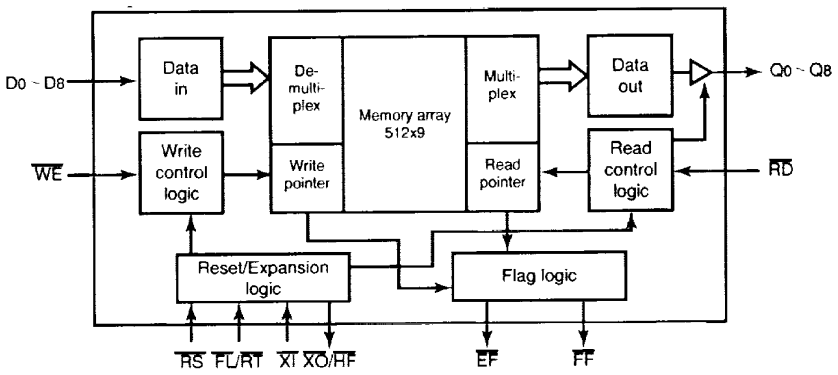
Symbol	Pin No.	Type	Name and Function
TOUT0 to TOUT2	25, 27,29	O	**Timer Output** This pin outputs the three counters of the TCU. The output states differ with the six modes set by the TCU.
TCTL0 to TCTL2	24,26,28	I	**Timer Control** These pins input the three counters of the TCU. The control function differs from the six modes set at the TCU.
$\overline{DTR}$	32	O	**Data Terminal Ready** This is a general-purpose output pin. The state of this pin can be set using bit 1 of the serial command register (SCM). The signal can also inform the outside that the SCU is in a ready state.
DMARQ0 to DMARQ3	2, 4, 6, 8	I	**DMA Request** These pins inputs on-chip DMAU channels 0 to 3 active-high DMA requests signals. DMARQ should be kept high until the corresponding $\overline{DMAAK}$ becomes active. Also, DMARQ should be released while the corresponding $\overline{DMAAK}$ is active.
$\overline{DMAAK0}$ to $\overline{DMAAK3}$	3, 5, 7, 9	O	**DMA Acknowledge** These pins outputs on-chip DMAU channels 0 to 3 active-low DMA requests signals.
$\overline{END}/\overline{TC}$	1	I/O	**End/Terminal Count** This pin inputs/outputs on-chip DMAU DMA transfer end active-low signal. • $\overline{END}$ input: When a low pulse is input during DMA transfer, the service completes after the end of the bus cycle being transferred, even during DMA service. • $\overline{TC}$ output: When the count register of the channel being transferred becomes "0" and the specified transfer count completes, a low level pulse is output. Since this pin is open drain output, connect a pull-up resistor externally.
V_{DD}	18,48,66, 78,86,96 108,116	–	**Power** This is 5V±10% positive power supply pin. An V_{DD} Pins should be connected to the same power supply.
GND	13,43,65, 67,68,73, 85,95, 103,115	–	**Ground** These are the ground potential pins (0 V). An GND pins should be connected to the same ground. ***NOTE:*** *This product is manufactured using the CMOS process. Thus input pins should be set to high or low to prevent the input from becoming an intermediate electric potential (directly after reset, etc.).*

5.2 FIFO (LH5496)

The LH5496 is an FIFO memory which contains an address generation circuit and allow read/write operations in asynchronous mode. The empty, half-full and full flags prevent data overflow or underflow. This IC has the following functions.

- Bit configuration: 512 words x 9 bits
- Maximum access time: 50 ns
- Maximum power consumption: 550 mW (f=33MHz)
- Expandable word length and memory capacity
- Status flag: Empty, half-full, and full
- Read/write operation in complete asyrchrcnous mode
- Read pointer reset function
- Input/output TTL compatible

The block diagram for this IC is as follows:



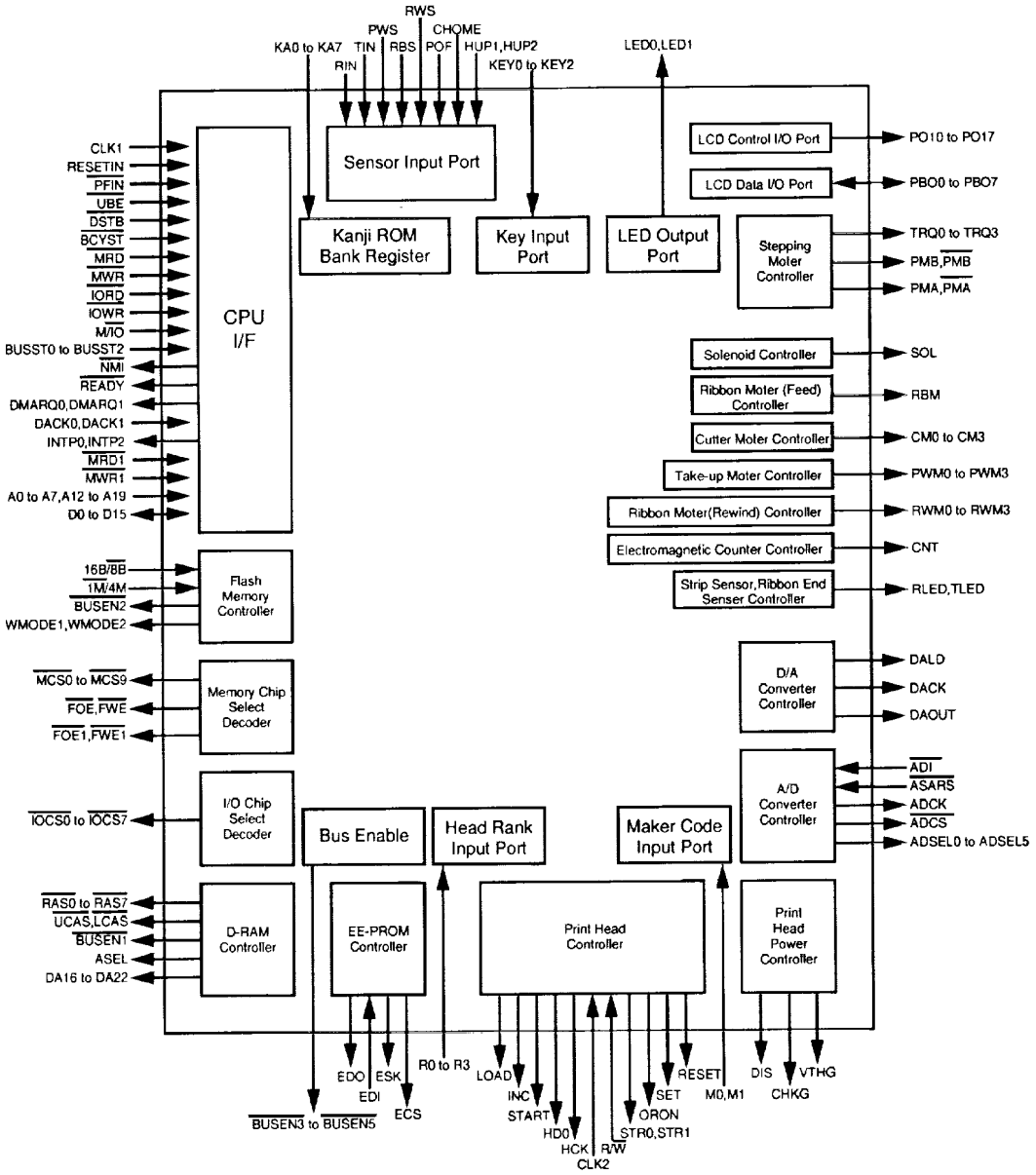
Symbol	Pin No.	Type	Name and Function
D0 to D8	2 to 6, 24 to 27	I	**Data Bus** These are 9-bit data bus input pins. 8-bit data is input to these pins. D8 is not presently used.
Q0 to Q8	9 to 13, 16 to 19	O	**Data Bus** These are 9-bit data bus output pins. 8-bit data is output from these pins. Q8 is not presently used.
$\overline{WE}$	1	I	**Write Enable** When the signal level is low, data on D0 to D8 is written.
$\overline{RD}$	15	I	**Read Enable** When the signal level is low, 8-bit data is read from Q0 to Q8.
$\overline{EF}$	21	O	**Empty Flag** This signal is an active-low signal which indicates that no data is written in the FIFO memory. When the signal level is low, the level of the HF and FF signals becomes high.
$\overline{FF}$	8	O	**Full Flag** This signal is an active-low signal which indicates that the FIFO memory is full. When the signal level is low, the level of the $\overline{EF}$ and $\overline{HF}$ signals becomes high.
$\overline{XO}/\overline{HF}$	20	O	**Expansion Output/Half-full Flag** This signal is an active-low signal which indicates that half of the FIFO memory is full. When the signal level is low, the level, of the $\overline{EF}$ and $\overline{FF}$ signals becomes high. The expansion output function is not presently used.
$\overline{XI}$	7	I	**Expansion Input** This pin is not presently used and fixed to GND.
$\overline{FL}/\overline{RT}$	23	I	**First Load / Retransfer** This pin is not presently used and fixed to +5V.
$\overline{RS}$	22	I	**Reset** When the signal level is low, the FIFO memory is in a reset state.
Vcc	28	-	**Power** This pin is a +5V input pin.
GND	14	-	**Ground** This pin is a ground potential (0V) pin.

5.3 EC-M100

This gate array functions as a center of this printer together with the CPU. It controls the motors and the print head and detects the statuses of the sensors. It contains the following functions.

- Bus control
- Print head control
- Chip selection generation
- D-RAM control
- Control over the A/D converter and D/A converter
- Motor drive
- Sensor detection

The block diagram for this gate array is as follows:



Symbol	Pin No.	Type	Name and Function
INTP0, INTP2	17, 16	O	**Interrupt Request** The active-high interrupt request signals are output to the CPU.
$\overline{\text{MRD1}}$, $\overline{\text{MWR1}}$	14, 15	O	**Memory Read, Memory Write** The active-low signals indicating a read/write access to the D-RAM are output.
A0 to A7, A12 to A19	24 to 39	I	**Address Bus** These pins are used to input the A0 to A7 and A12 to A19 16-bit addresses.
D0 to D15	43 to 58	I/O	**Data Bus** These pins are used to input/output the D0 to D15 16-bit data.
16B/$\overline{\text{8B}}$	77	I	**16-bit Bus/8-bit Bus** The signal is input which indicates whether the access to the flash memory card is performed in 16-bit mode or 8-bit mode. Since +5V is input to this pin on this printer, the 16-bit access is performed.
$\overline{\text{1M}}$/4M	79	I	**1024 KB / 4098 KB** The signal input indicates whether the capacity of the flash memory card is 1024 KB or 4096 KB. Since the 1024 KB flash memory is used on this machine, this pin is fixed to GND.
$\overline{\text{BUSEN1}}$, $\overline{\text{BUSEN2}}$	86, 103	O	**Bus Enable** The $\overline{\text{BUSEN1}}$ signal is an active-low signal which enables the data bus among the D-RAM, CPU and EC-M100. The $\overline{\text{BUSEN2}}$ signal is an active-low signal which enables the data bus among the flash ROM, mask ROM and CPU.
WMODE1, WMODE2	84, 85	O	**WMODE** The WMODE1 and WMODE2 signals are active-high signals which control P12 (+12V) supply to the flash ROM and the flash memory card.
$\overline{\text{MCS0}}$ to $\overline{\text{MCS9}}$	89 to 92, 125 to 130	O	**Memory Chip Select** The active-low chip select signals are output to the memory, etc.
$\overline{\text{FOE}}$,$\overline{\text{FWE}}$	87, 88	O	**Flash Output Enable, Flash Write Enable** The $\overline{\text{FOE}}$ signal is an output enable signal output to the flash ROM. When the signal level is low, data is read from the flash ROM. The $\overline{\text{FWE}}$ signal is a write enable signal output to the flash ROM. When the signal level is low, data is written into the flash ROM.
$\overline{\text{FOE1}}$, $\overline{\text{FWE1}}$	12, 13	O	**Flash Output Enable, Flash Write Enable** The $\overline{\text{FOE1}}$ signal is an output enable signal which is output to the flash memory card. When the signal level is low, data is read from the flash memory card. The $\overline{\text{FWE1}}$ signal is a write enable signal which is output to the flash memory card. When the signal level is low, data is written into the flash memory card.
$\overline{\text{IOCS0}}$ to $\overline{\text{IOCS7}}$	131 to 138	O	**I/O Chip Select** The active-low chip select signals are output to the I/O devices.
$\overline{\text{RAS0}}$ to $\overline{\text{RAS7}}$	106 to 113	O	**Row Address Strobe** The active-low row address strobe signals are output to the D-RAM.

Symbol	Pin No.	Type	Name and Function
CLK1	82	I	**Clock** The 16-MHz clock output from the CPU is the input for pin 82. The EC-M100 uses this signal as the system clock.
RESETIN	78	I	**Reset** The reset signal output from the CPU is the input for pin 78. When the signal level is high, the EC-M100 is in a reset state.
$\overline{\text{PFIN}}$	76	I	**Power Failure** The power failure detection signal output from the PS unit is the input for pin 76. When the signal level is low, a power failure is detected and $\overline{\text{NMI}}$ signal is output to the CPU.
$\overline{\text{NMI}}$	74	O	**Non-maskable interrupt** When the EC-M100 detects a voltage drop, an active-low signal is output from this pin to transmit the power failure interruption to the CPU.
$\overline{\text{UBE}}$	62	I	**Upper Bus Enable** The active-low signal which indicates that 16-bit access is performed is input.
$\overline{\text{DSTB}}$	63	I	**Data Strobe** The strobe signal is input which becomes low when a read/write access is performed.
$\overline{\text{BCYST}}$	64	I	**Bus Cycle Start Strobe** The active-low signal which indicates the start of the bus cycle is input.
$\overline{\text{MRD}}$, $\overline{\text{MWR}}$	65, 66	I	**Memory Read, Memory Write** The signals which indicate memory read/write access are input. When the level of these signal is low, the memory read/write operation is performed.
$\overline{\text{IORD}}$, $\overline{\text{IOWR}}$	67, 68	I	**I/O Read, I/O Write** The signals which indicate an I/O read/write access are input. When the level of these signal is low, the I/O read/write operation is performed.
M/$\overline{\text{IO}}$	70	I	**Memory / IO** The signal is input which indicates whether the access in process is performed to the memory or to the I/O device. When the signal level is high, a memory access is performed. When it is low, the I/O device is accessed.
BUSST0 to BUSST2	71 to 73	I	**Bus Status** The signals which indicate the type of bus cycle in process are input.
$\overline{\text{READY}}$	75	O	**Ready** The signal is output which adjust the bus cycle to the access time of the memory or I/O device which have different transfer speeds.
DMARQ0, DMARQ1	23, 19	O	**DMA Request** The active-low signal which requests a DMA is output to the CPU.
$\overline{\text{DACK0}}$, $\overline{\text{DACK1}}$	22, 18	I	**DMA Acknowledge** The signals which permit the DMA request are input. When the level of these signals is low, the DMA is performed.

Symbol	Pin No.	Type	Name and Function
STR0, STR1	156,157	O	**Strobe** The signals output from this pin are used as a print head enable signal. When the level of this signal is low, printing is performed.
ORON	155	O	**ORON** The signal output from this pin is used to select print pattern of the thermal transfer control.
SET	154	O	**Set** The signal level is high, all dots of print data are set to 1.
RESET	153	O	**Reset** The signal level is high, all dots of print data are set to 0.
M0,M1	168,169	I	**Maker Code** These pins are to input the print head manufacturer mode but not presently used.
DIS	172	O	**DIS** This signal removes excessive load from the print head when checking the print head for broken dots.
CHKG	171	O	**Check** This is an active-high signal to supply approx. 10 V to the print head when checking the print head for broken dots.
VTHG	170	O	**Print Head Voltage** This signal controls +27V supply as a power voltage applied to the print head. When the signal level is high, +27V is supplied to the print head. +27V is supplied during printing.
ADSEL0 to ADSEL5	173 to 178	O	**A/D Select** These signal select the signal input from the sensors to the EC-M100 via the A/D converter.
$\overline{\text{ADCS}}$	183	O	**A/D Chip Select** This active-low chip select signal selects the A/D converter.
ADCK	182	O	**A/D Clock** Data is converted from analog to digital in the A/D converter, synchronized with this signal.
$\overline{\text{ASARS}}$	184	I	**ASAR Status** The active-low signal which indicates that the A/D conversion starts is input.
$\overline{\text{ADI}}$	185	I	**A/D Input** Data converted from analog to digital is input.
DAOUT	197	O	**D/A Output** This signal is a data signal which is output to the D/A converter.
DACK	198	O	**D/A Clock** The DAOUT signal is input to the D/A converter, synchronized with the clock output from this pin.

Symbol	Pin No.	Type	Name and Function
$\overline{\text{UCAS}}$, $\overline{\text{LCAS}}$	104,105	O	**Upper Column Address strobe, Lower Column Address Strobe** The active - low column address strobe signals are output to the D-RAM.
ASEL	102	O	**Address Select** The address select signal is output to the D-RAM.
DA16 to DA22	93 to 99	O	**D-RAM Address** The D-RAM address signals are output. DA19 to DA22 are not presently used. DA16 to DA18 are used to select D-RAM banks.
$\overline{\text{BUSEN3}}$ to $\overline{\text{BUSEN5}}$	142 to 144	O	**Bus Enable** The active-low bus enable signals are output. When the $\overline{\text{BUSEN3}}$ signal level is low, data transfer is performed using the high-speed PC interface. When the $\overline{\text{BUSEN4}}$ signal level is low, the Centronics interface is performed. The $\overline{\text{BUSEN5}}$ signal is not presently used.
EDO	148	O	**EE-PROM Output Data** Serial data to be written into the EE-PROM is output.
EDI	147	I	**EE-PROM Input Data** Serial data read from the EE-PROM is input.
ESK	146	O	**EE-PROM Clock** Data is input/Output to/from the EE-PROM, synchronized with the clock signal output from this pin.
ECS	145	O	**EE-PROM Chip Select** The signal output from this pin is used as the EE-PROM chip select signal.
R0 to R3	149 to 152	I	**Rank** These signals are rank signals which indicate the average resistance value of the print head. According to these signals, the print pulse width of the print head is adjusted.
LOAD	167	O	**Load** The print data in the print head is captured according to the pulse signal output from this pin.
START	165	O	**Start** The signal output from this pin is used as a fiming signal within the print head. The print pulse is applied to the print head, synchronized with this signal.
HD0,HD1	163,164	O	**Head Data** The print data is output from these pins.
HCK	162	O	**Head Clock** The HD0 and HD1 signals are input to the print head, synchronized with the 4-MHz clock signal output from this pin.
CLK2	159	I	**Clock** The 16-MHz clock output from the CPU is input. The frequency of this clock is divided by four to generate the HCK signal.

Symbol	Pin No.	Type	Name and Function
KEY0 to KEY2	10 to 12	I	**Key 0 to Key 2** The signals which indicate the status of the PAUSE, RESTART and FEED keys. When the signal, level is high, the ON status is indicated. When it is low, the OFF status is indicated.
HUP1, HUP2	186,187	I	**Head Up** The HUP1 signal indicates the status of the head-up switch. When the signal level is high, the print head is raised. When it is low, the print head is lowered. The HUP2 signal is not presently used.
CHOME	188	I	**Cutter Home Position** The signal indicates the status of the cutter home position switch. When the signal level is high. the cutter is located at its home position.
POF	189	I	**Paper Overflow** This signal indicates the status of the rewind full sensor. When the signal level is high, overflow is indicated.
RWS	190	I	**Ribbon Motor (Rewind) Sensor** The signal for the slit sensor for detecting the rotation speed of the ribbon motor (rewind) is input.
RBS	191	I	**Ribbon Motor (Feed) Sensor** The signal for the slit sensor for detecting the rotation speed of the ribbon motor (feed) is input.
PWS	192	I	**Paper Wind Motor Sensor** This pin is not presently used.
TIN	193	I	**Strip Sensor** The signal indicating the status of the strip sensor is input. When the signal level is high, a label exists. When low, no label exists.
RIN	194	I	**Ribbon End Sensor** This signal indicates the status of the ribbon end sensor. With the transmissive ribbon used, the ribbon has run out when the signal level is low. With the non-transmissive ribbon used, the ribbon has run out when the signal level is high.
KA0 to KA7	114 to 119, 123,124	O	**Kanji Address** These pins are not presently used.

Symbol	Pin No.	Type	Name and Function
DALD	199	O	**D/A Load** When thle signal level is high, data is converted from digital to analog in the D/A converter.
RLED, TLED	196,197	O	**Ribbon End Sensor LED, Strip Sensor LED** The RLED signal is an active-high signal which controls on and off of the ribbon end sensor LED. The TLED signal is not presently used.
CNT	202	O	**Counter** This signal controls the electromagnetic counter. This signal is not presently used.
RWM0 to RWM3	203 to 206	O	**Ribbon Motor (Rewind)** This signal controls the ribbon motor (rewind) operations including stop and forward rotation.
PWM0 to PWM3	207 to 210	O	**Paper Wind Motor** The PWM0 signal indicates the stepping motor rotation direction. When the signal level is low, the motor rotates forward. When it is high, the motor rotates in reverse. The PWM1 to PWM3 signals are not presently used.
CM0 to CM3	211 to 214	O	**Cutter Motor** These signals control the operation of the cutter moter and the take-up motor.
RBM	215	O	**Ribbon Motor (Feed)** This signal controls the operation of the ribbon motor (feed). When the signal level is high, the motor rotates forward. When it is low, the motor rotates the reverse.
SOL	216	O	**Solenoid** This signal controls the solenoid which is used in ribbon saving operation. When the signal level is high, the solenoid is excited and the head is raised, allowing a ribbon saving operation.
PMA,$\overline{\text{PMA}}$, PMB,$\overline{\text{PMB}}$	217,218, 219,222	O	**Stepping Motor** The signals which control the operation of the stepping motor are output.
TRQ0 to TRQ3	223 to 226	O	**Torque** These signals control the torque or the stepping motor.
PB0 to PB7	228 to 235	I/O	**PB0 to PB7** 8-bit data is output to the LCD. The LCD displays according to the data.
PO10 to PO17	3 to 6, 239,240	O	**PO10 to PO17** The PO10 to PO12 signals control the LCD. The PO13 to PO17 signals are not presently used.
LED0, LED1	7, 8	O	**LED0, LED1** The LED0 signal turns on the Online LED. When the signal level is high, the Online LED is on. The LED1 signal blinks the Error LED. When the signal level is high, the Error LED is on.

TEC

TEC Thermal Printer

B-570 SERIES

Schematic Diagram

Document No. **EM7-33009A**

Original **Nov., 1993**

(Revision **Apr., 1994**)

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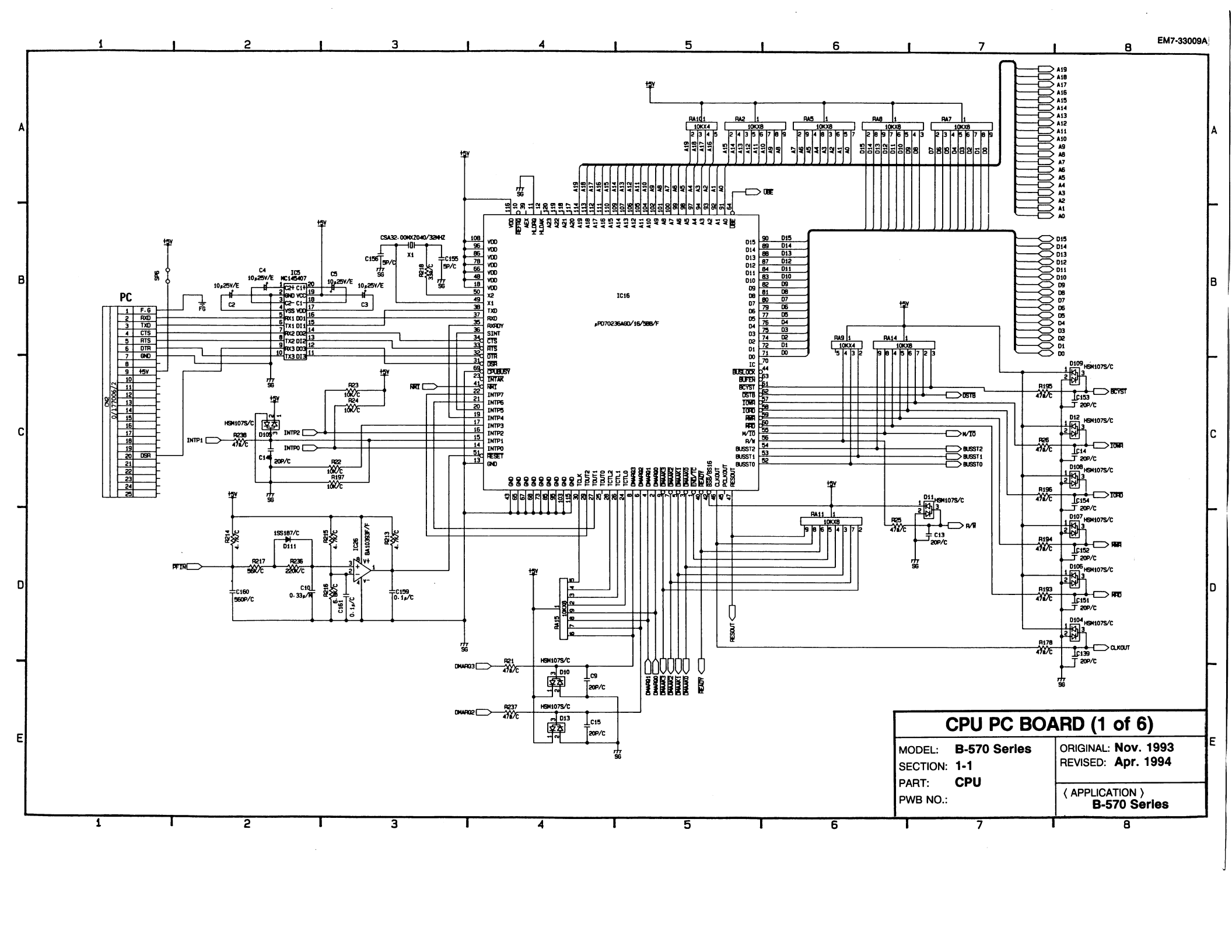
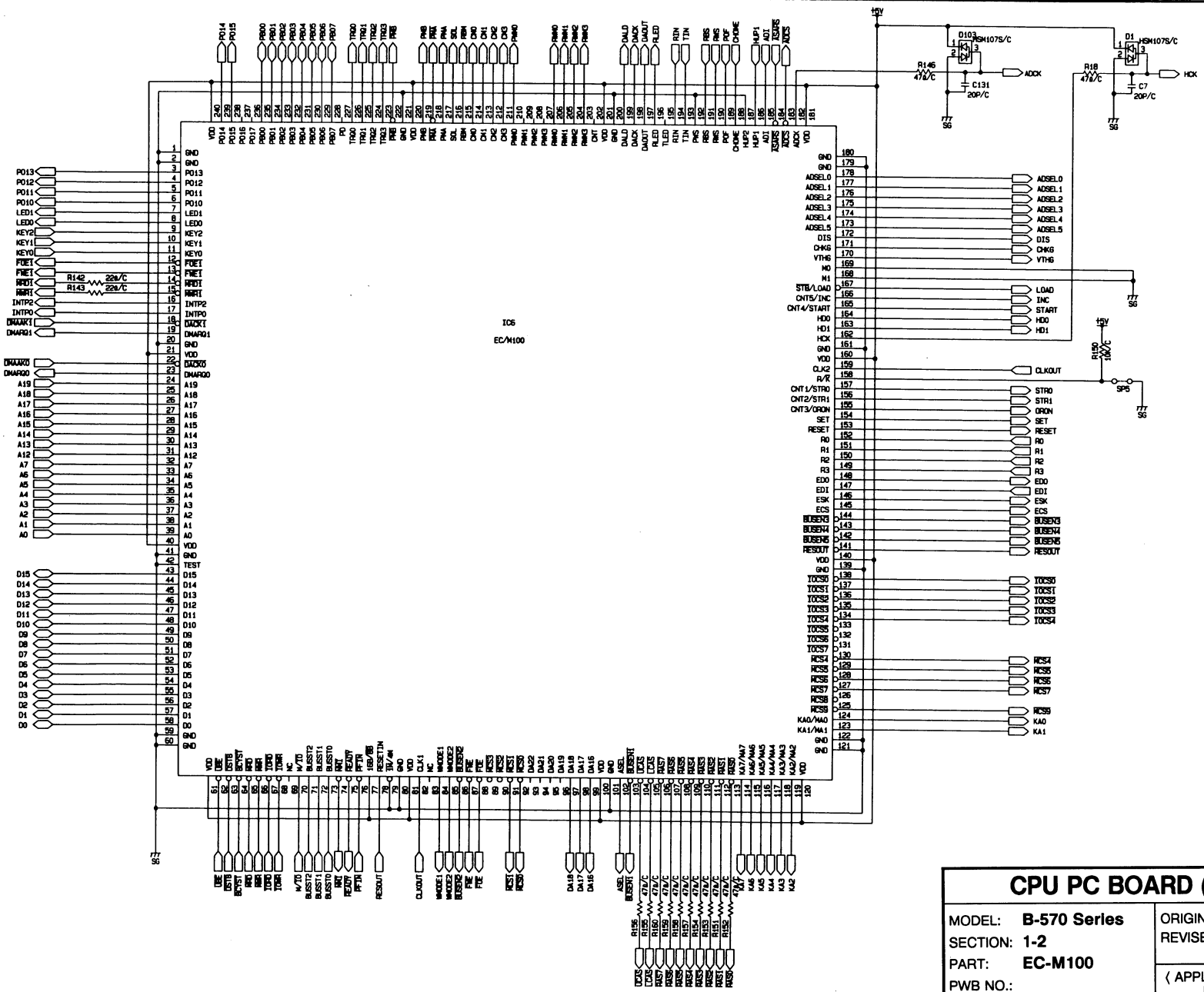


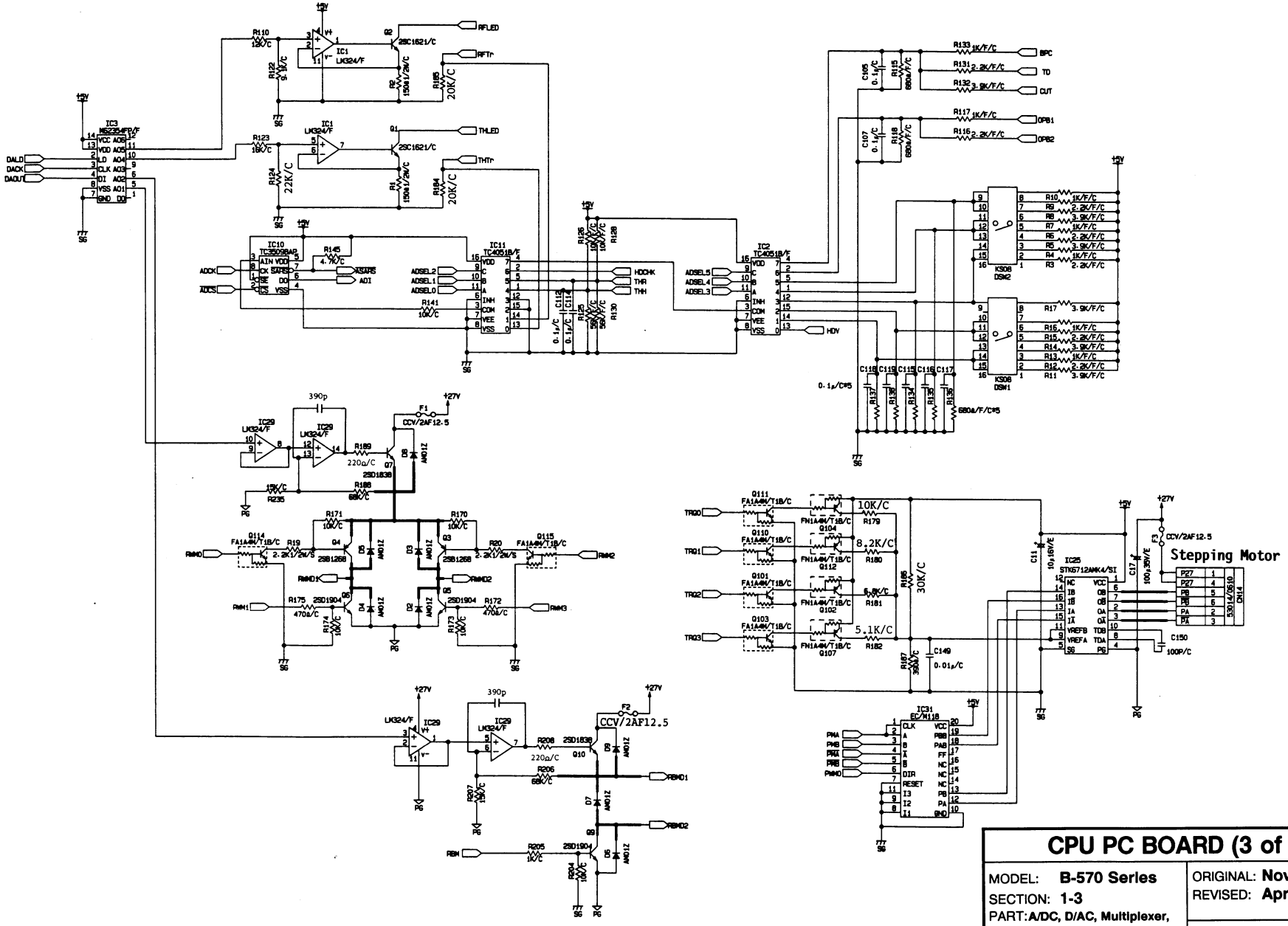
CPU PC BOARD (1 of 6)

MODEL: **B-570 Series**	ORIGINAL: **Nov. 1993**
SECTION: **1-1**	REVISED: **Apr. 1994**
PART: **CPU**	⟨ APPLICATION ⟩ **B-570 Series**
PWB NO.:	



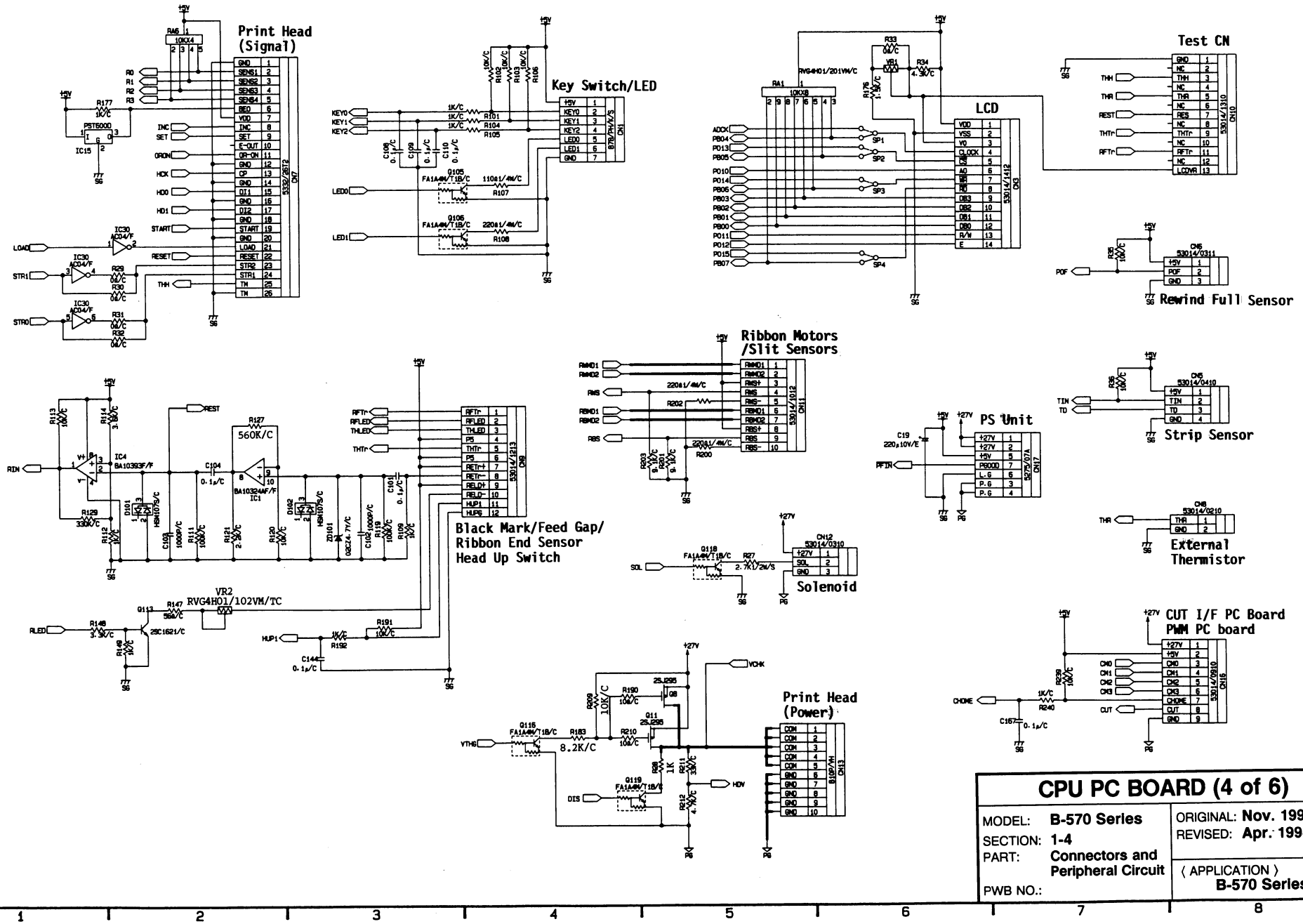
CPU PC BOARD (2 of 6)

MODEL: **B-570 Series**	ORIGINAL: **Nov. 1993**
SECTION: **1-2**	REVISED: **Apr. 1994**
PART: **EC-M100**	⟨ APPLICATION ⟩ **B-570 Series**
PWB NO.:	



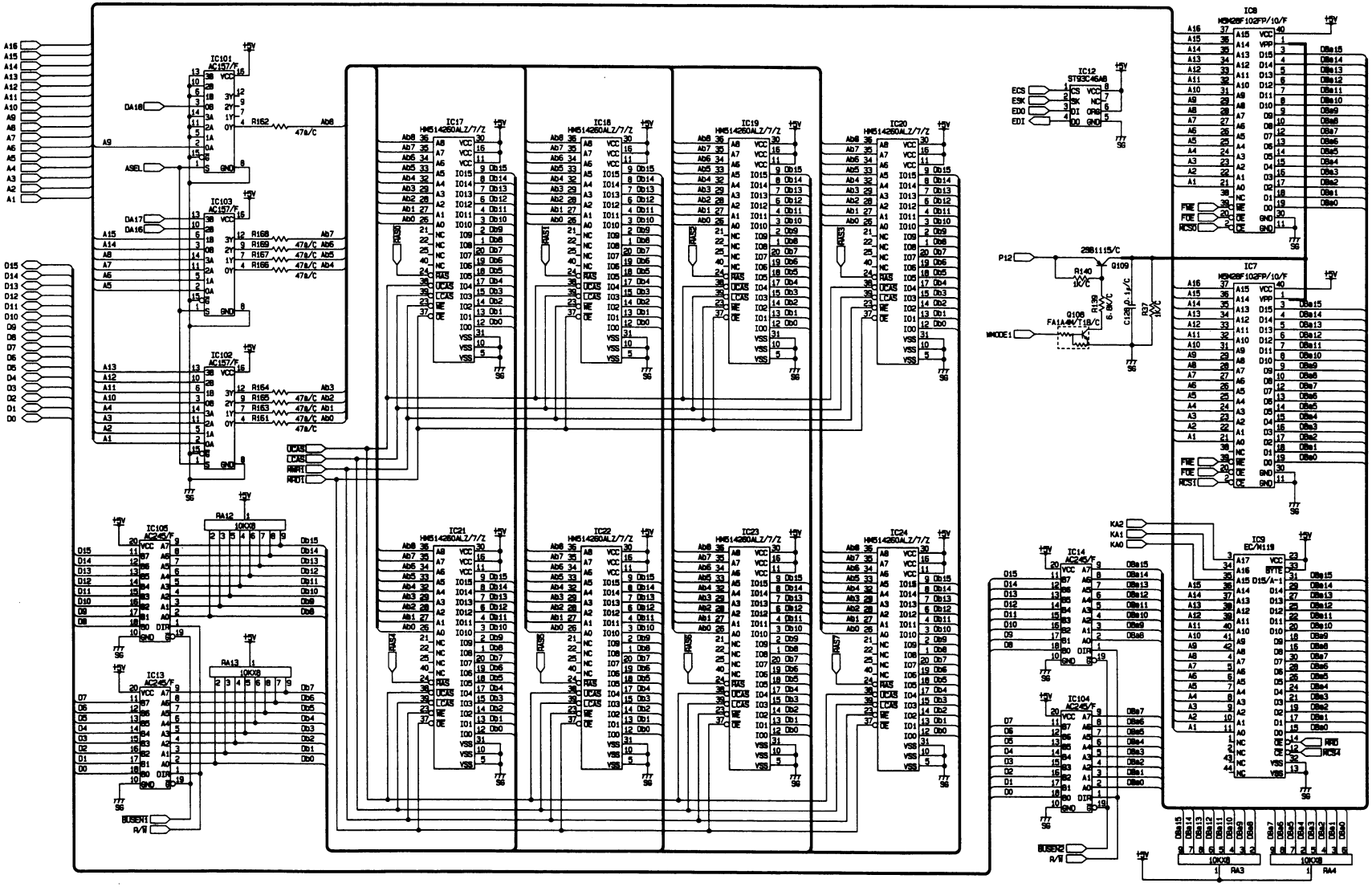
CPU PC BOARD (3 of 6)

MODEL: **B-570 Series**	ORIGINAL: **Nov. 1993**
SECTION: **1-3**	REVISED: **Apr. 1994**
PART: **A/DC, D/AC, Multiplexer, and Peripheral Circuit**	⟨ APPLICATION ⟩ **B-570 Series**
PWB NO.:	



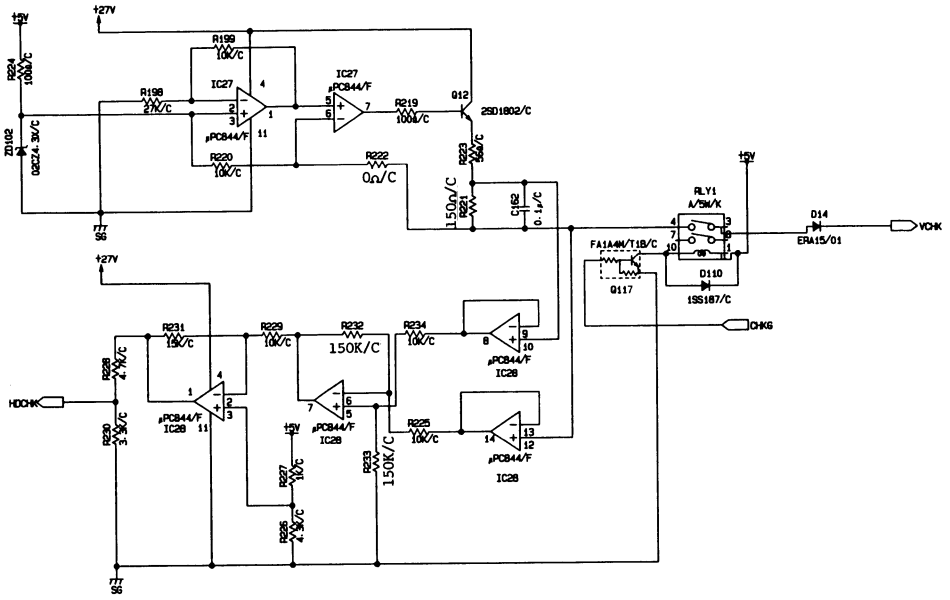
CPU PC BOARD (4 of 6)

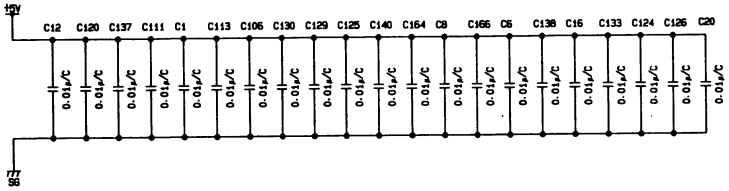
MODEL: **B-570 Series**	ORIGINAL: **Nov. 1993**
SECTION: **1-4**	REVISED: **Apr. 1994**
PART: **Connectors and Peripheral Circuit**	⟨ APPLICATION ⟩ **B-570 Series**
PWB NO.:	

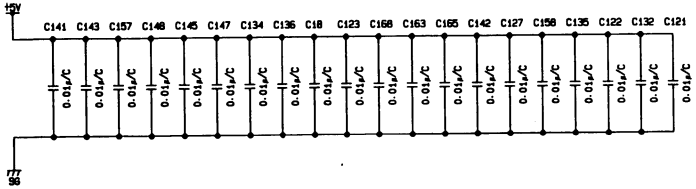


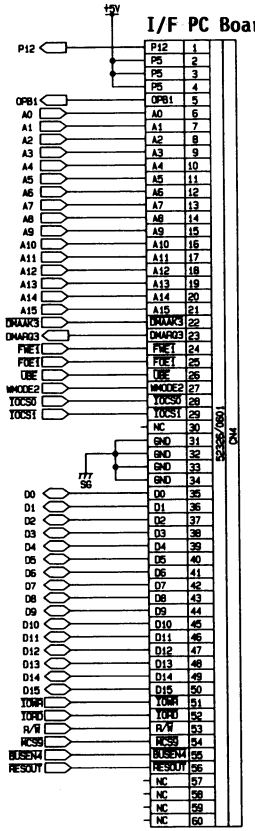
CPU PC BOARD (5 of 6)

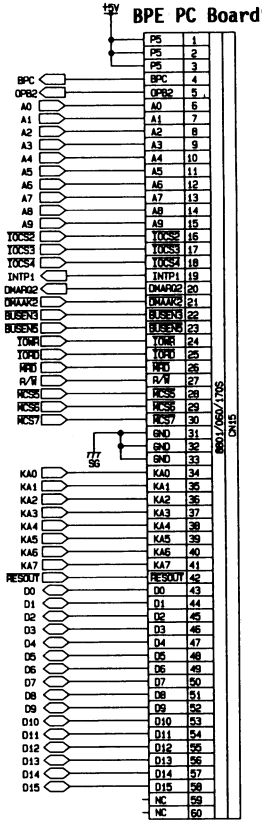
MODEL:	**B-570 Series**	ORIGINAL:	**Nov. 1993**
SECTION:	**1-5**	REVISED:	**Apr. 1994**
PART:	**Memories**	⟨ APPLICATION ⟩	**B-570 Series**
PWB NO.:			





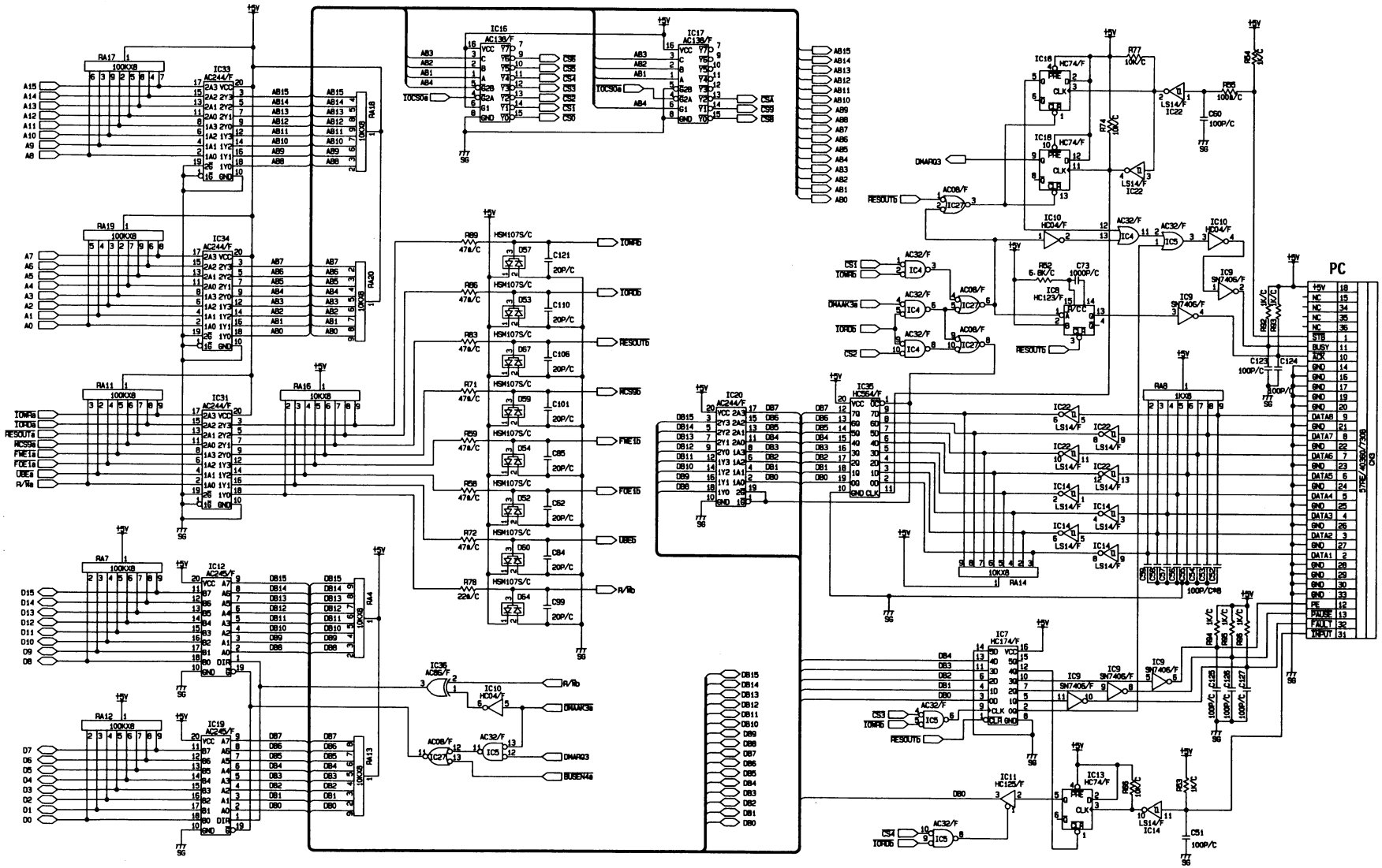






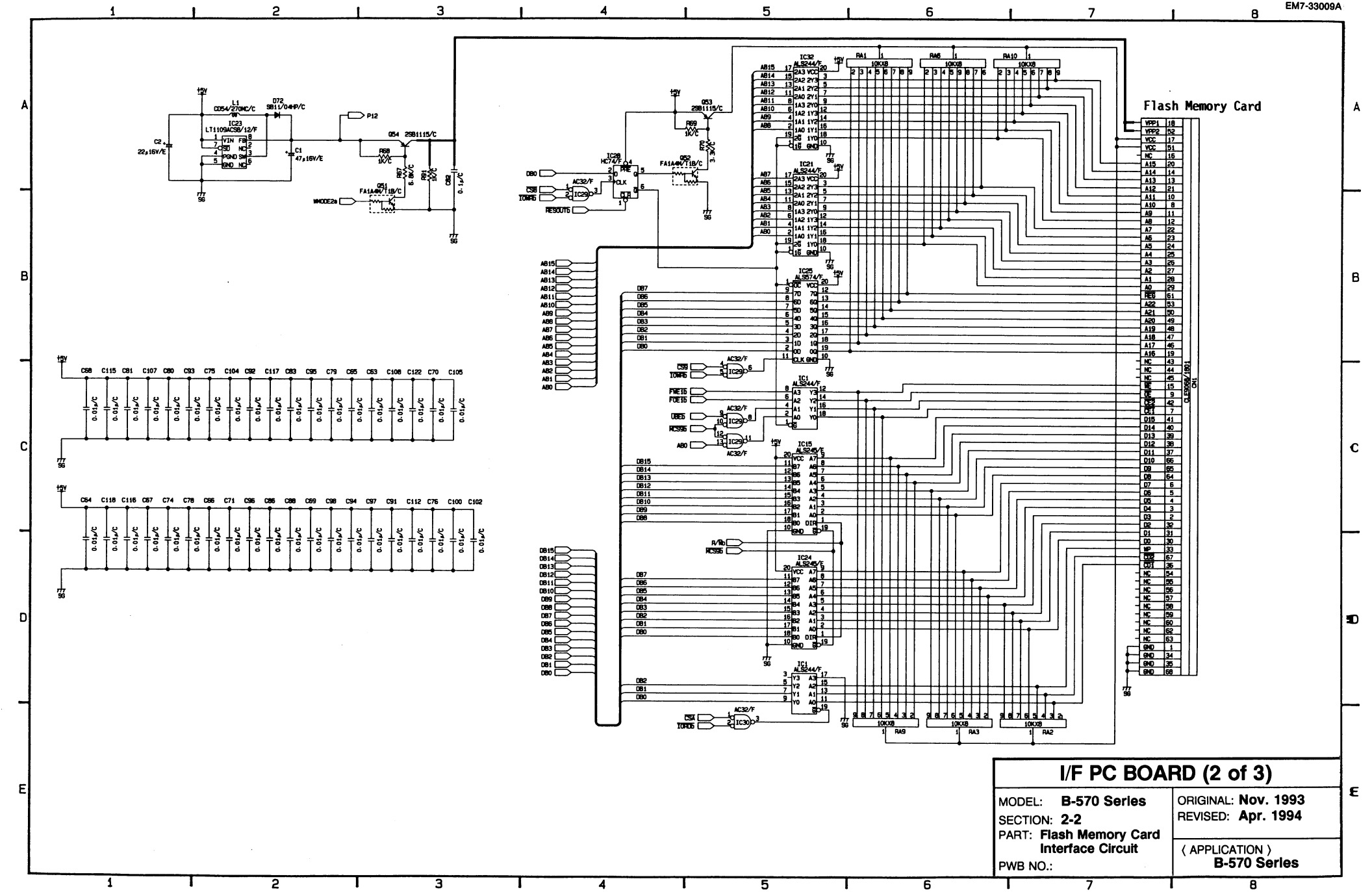
CPU PC BOARD (6 of 6)

MODEL: **B-570 Series**	ORIGINAL: **Nov. 1993**
SECTION: **1-6**	REVISED: **Apr. 1994**
PART: **Connectors and Head Error Check Circuit**	⟨ APPLICATION ⟩ **B-570 Series**
PWB NO.:	



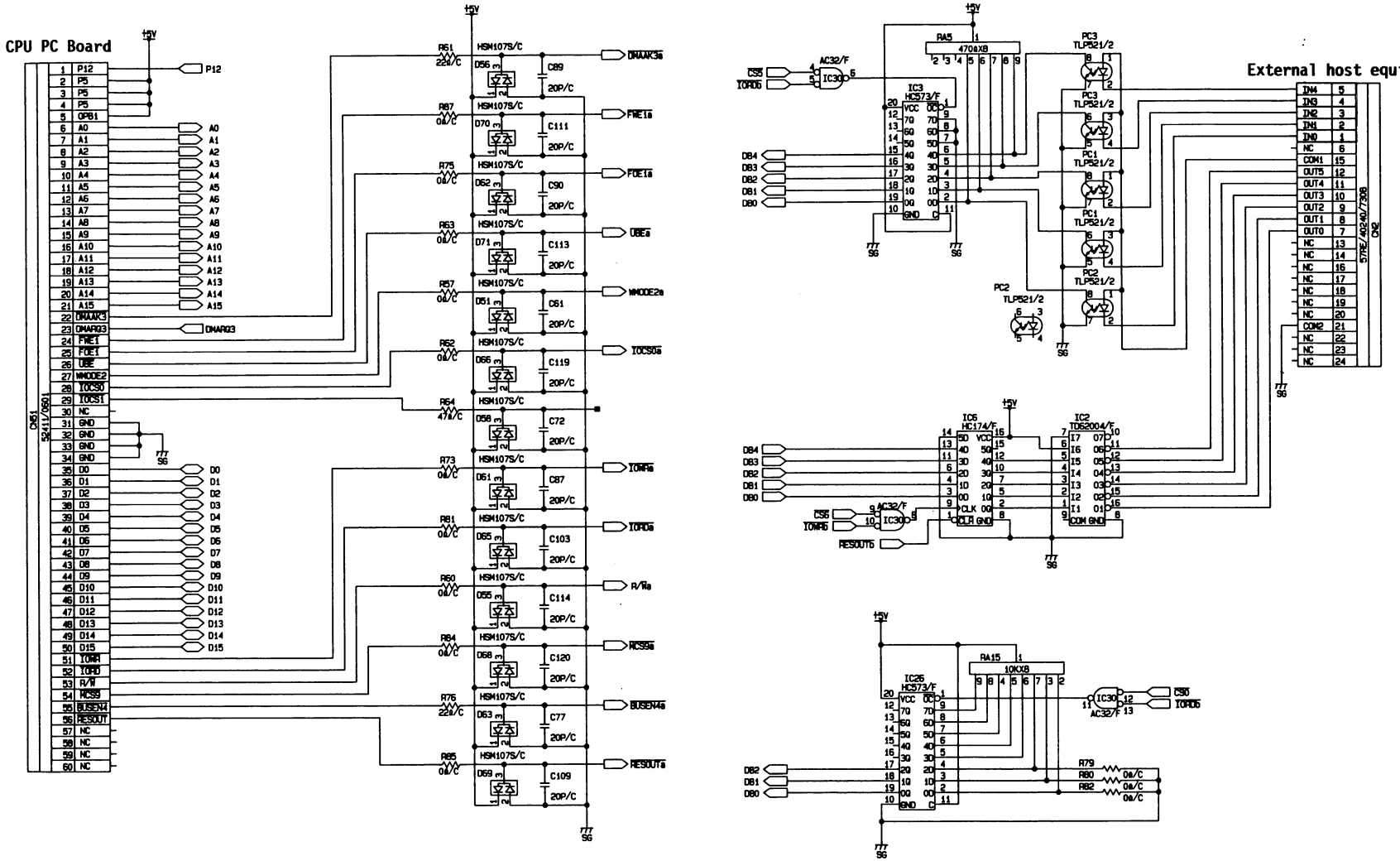
I/F PC BOARD (1 of 3)

MODEL: **B-570 Series**	ORIGINAL: **Nov. 1993**
SECTION: **2-1**	REVISED: **Apr. 1994**
PART: **Centronics Interface Circuit**	〈 APPLICATION 〉 **B-570 Series**
PWB NO.:	



I/F PC BOARD (2 of 3)

MODEL: **B-570 Series**	ORIGINAL: **Nov. 1993**
SECTION: **2-2**	REVISED: **Apr. 1994**
PART: **Flash Memory Card Interface Circuit**	
PWB NO.:	⟨ APPLICATION ⟩ **B-570 Series**

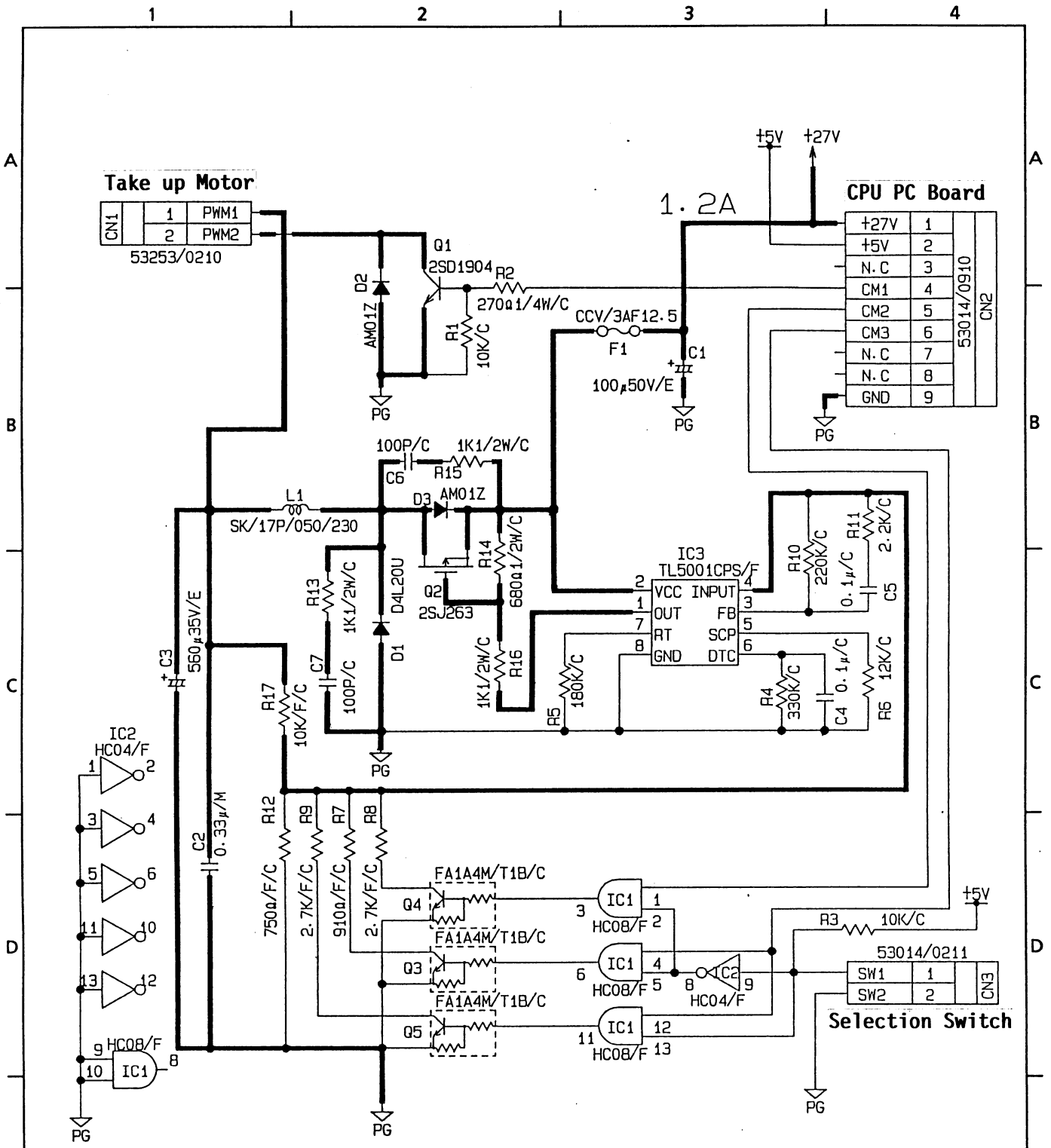


I/F PC BOARD (3 of 3)

MODEL: **B-570 Series**	ORIGINAL: **Nov. 1993**
SECTION: **2-3**	REVISED: **Jun. 1995**
PART: **Expansion I/O Interface Circuit**	⟨ APPLICATION ⟩ **B-570 Series**
PWB NO.:	

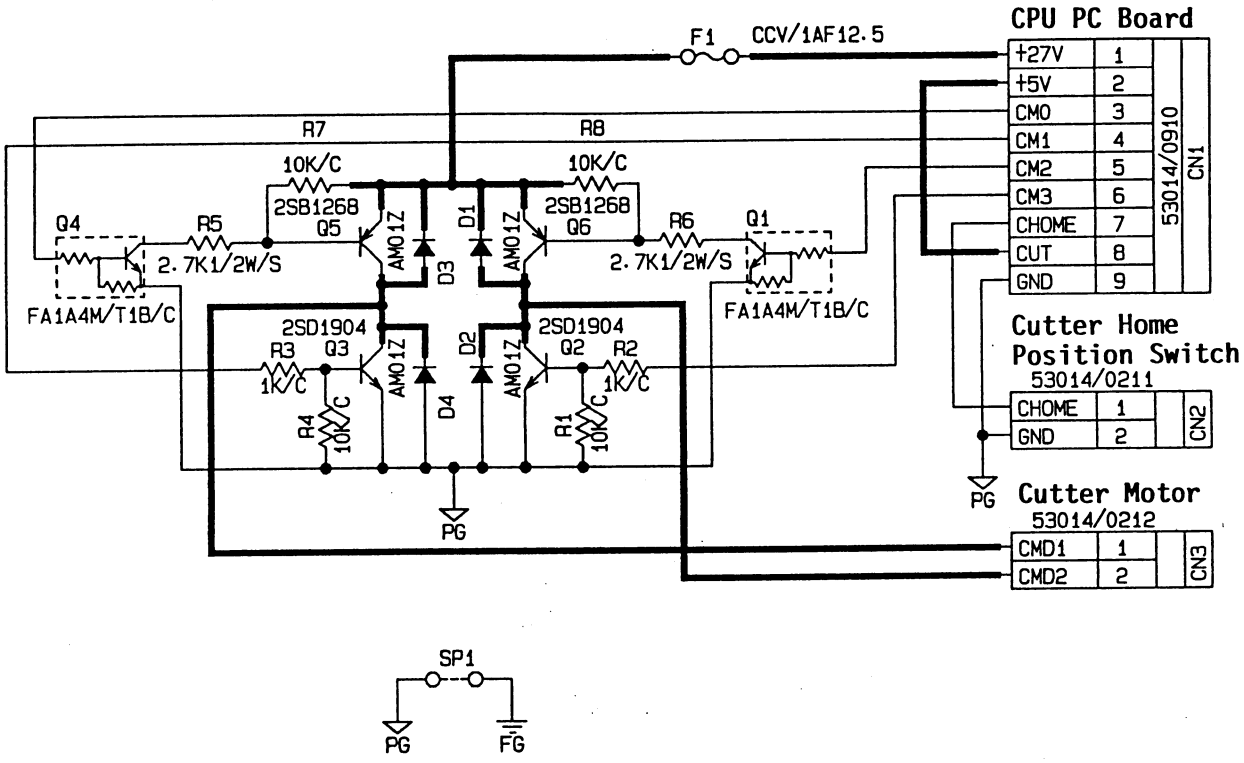
(Revised Date Oct. 13 '95)

EM7-33009A



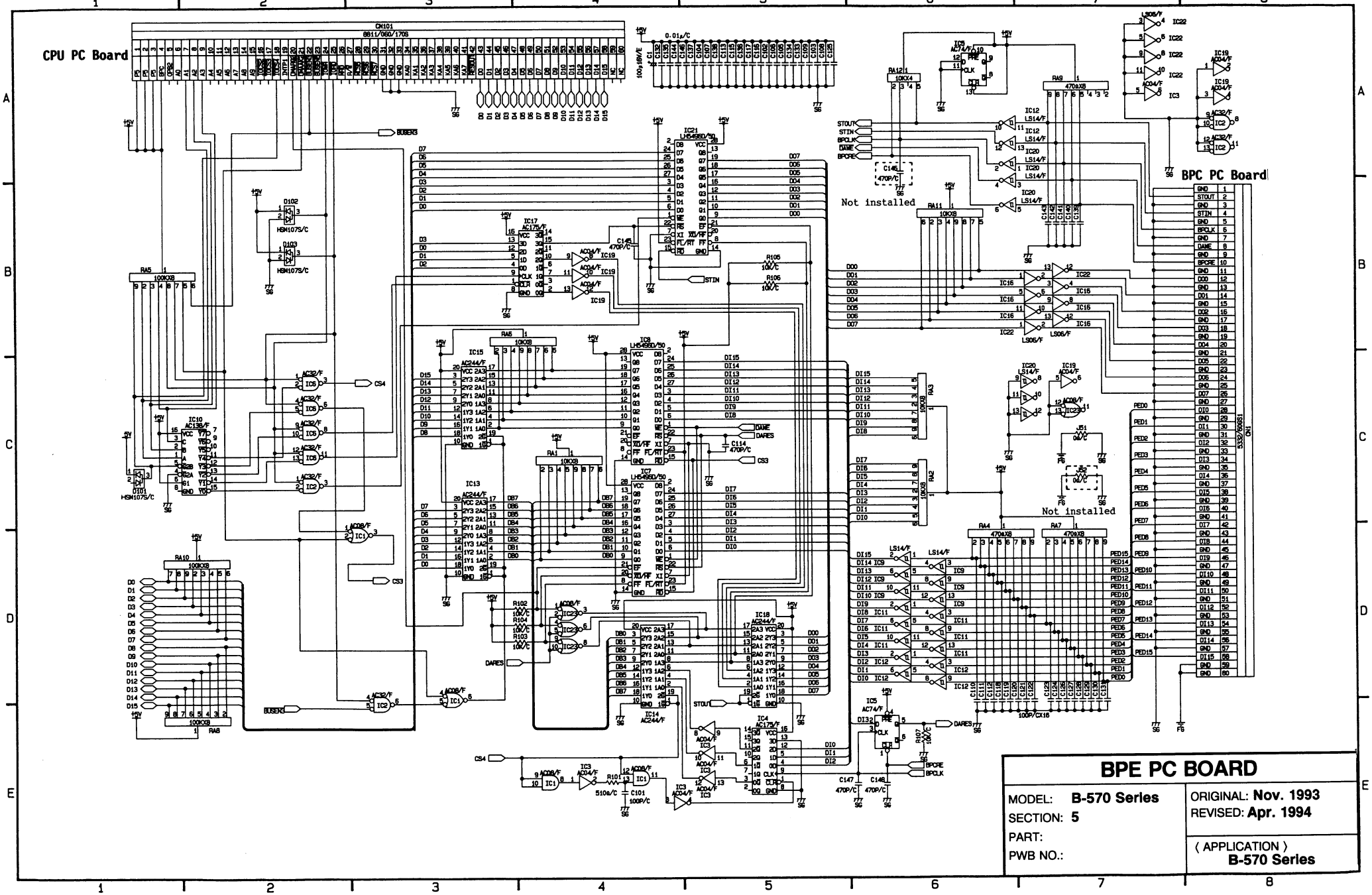
PWM2 PC BOARD

MODEL: **B-570 Series**	ORIGINAL: **Nov. 1993**
SECTION: **3**	REVISED: **Oct. 1995**
PART:	
PWB NO.:	〈 APPLICATION 〉 **B-570 Series**



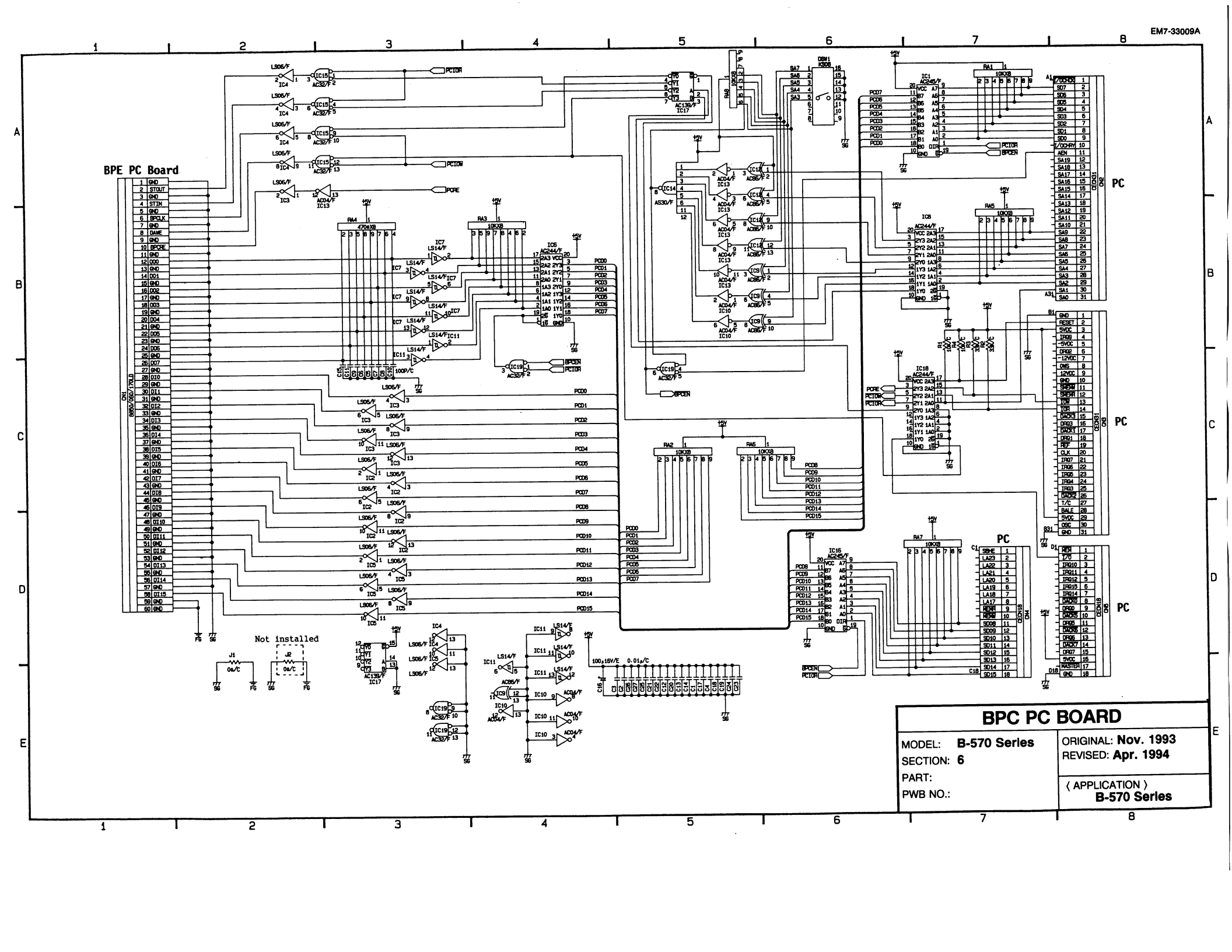
CUT I/F PC BOARD

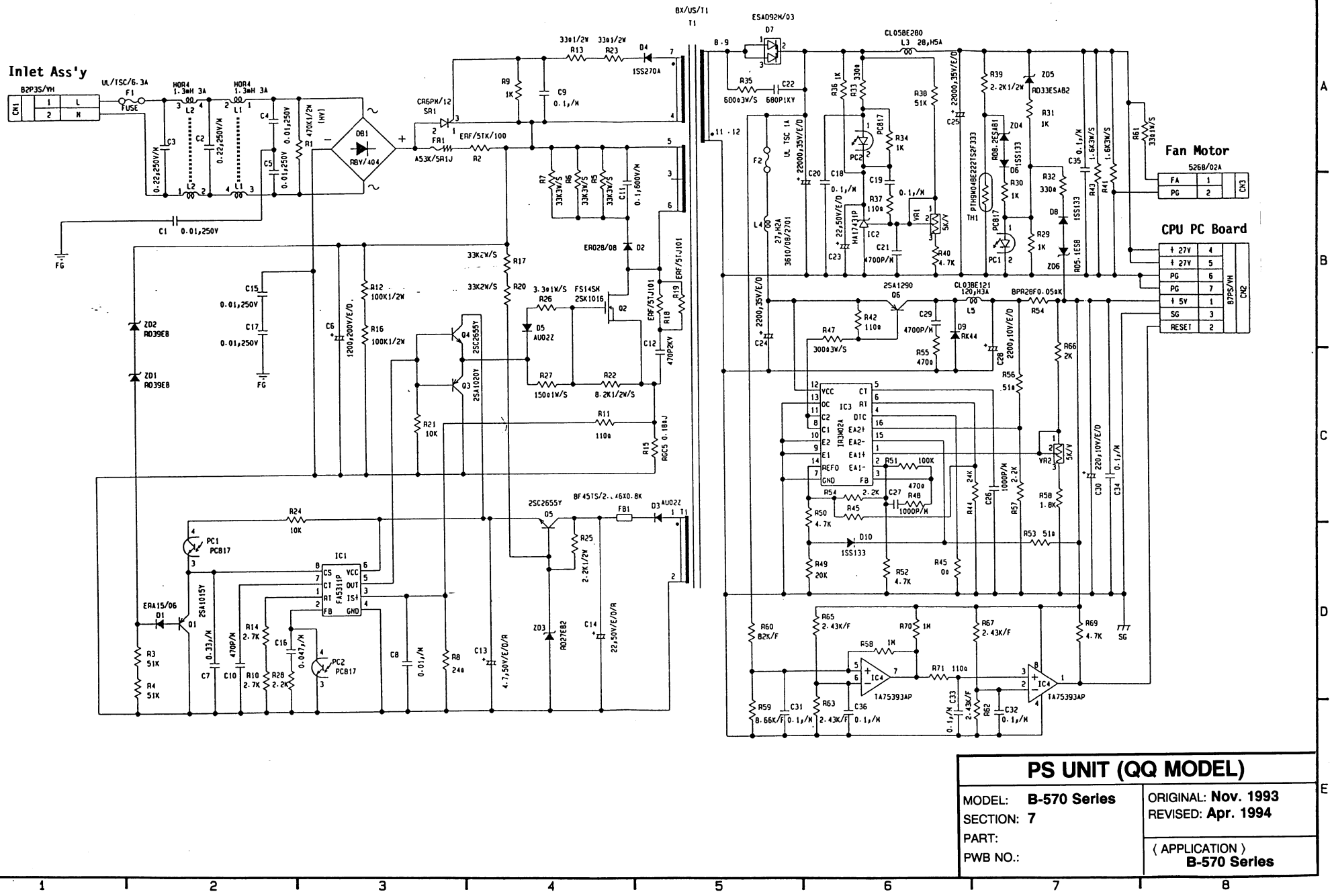
MODEL: **B-570 Series**	ORIGINAL: **Nov. 1993**
SECTION: **4**	REVISED: **Apr. 1994**
PART:	
PWB NO.:	⟨ APPLICATION ⟩ **B-570 Series**



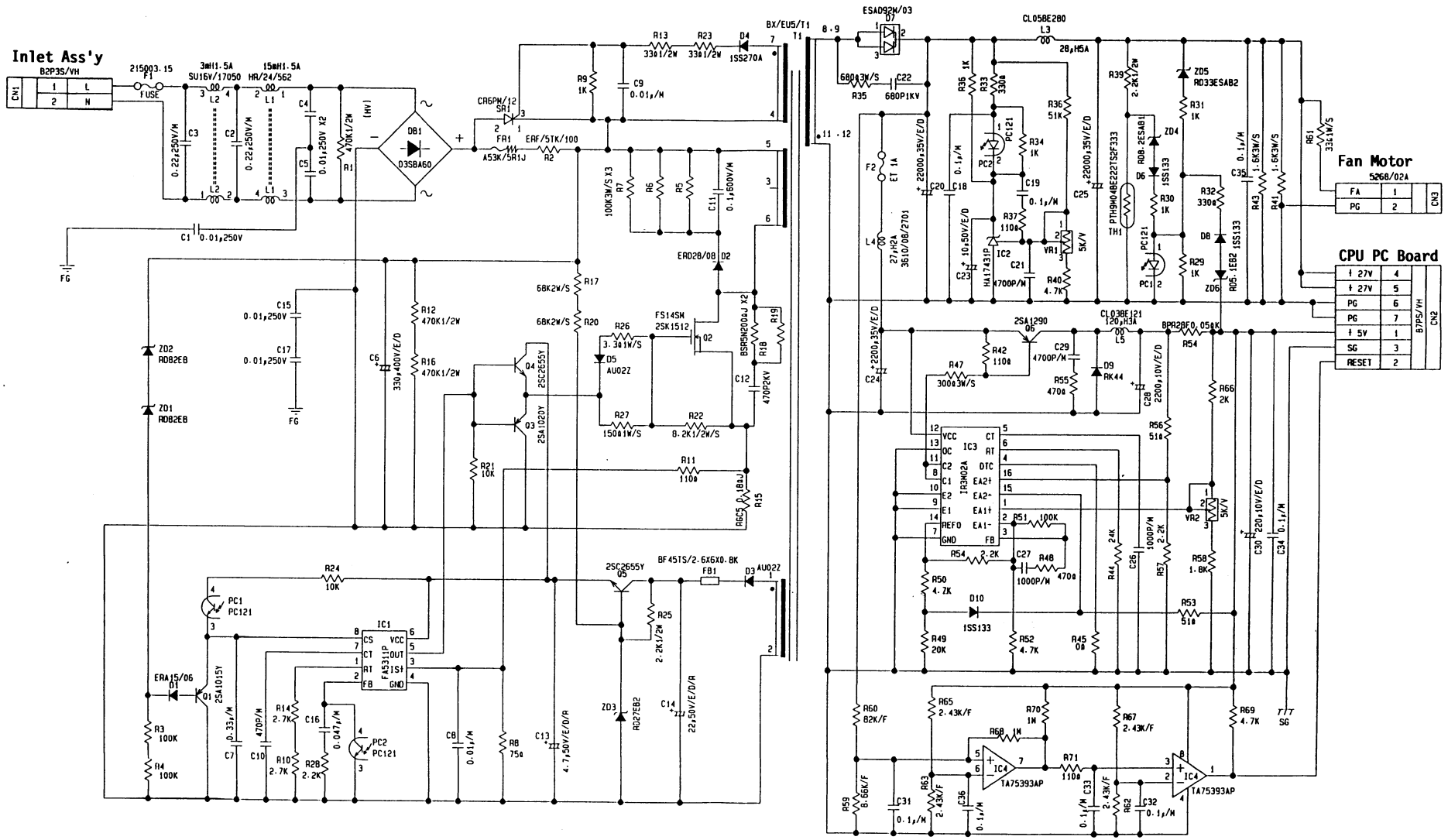
BPE PC BOARD

MODEL: **B-570 Series**	ORIGINAL: **Nov. 1993**
SECTION: **5**	REVISED: **Apr. 1994**
PART:	
PWB NO.:	⟨ APPLICATION ⟩ **B-570 Series**


BPE PC Board
Not installed
PC
PC
PC
PC
BPC PC BOARD
MODEL: B-570 Series
SECTION: 6
PART:
PWB NO.:
ORIGINAL: Nov. 1993
REVISED: Apr. 1994
〈 APPLICATION 〉
B-570 Series


Inlet Ass'y
Fan Motor
CPU PC Board
PS UNIT (QQ MODEL)
MODEL: B-570 Series
SECTION: 7
PART:
PWB NO.:
ORIGINAL: Nov. 1993
REVISED: Apr. 1994
⟨ APPLICATION ⟩
B-570 Series

EM7-330O9A


Inlet Ass'y
Fan Motor
CPU PC Board
FG
IC1
IC2
IC3
IC4
TA75393AP
FA5311P
IR3H02A
HA17431P
PS UNIT (QP MODEL)
MODEL: B-570 Series
SECTION: 8
PART:
PWB NO.:
ORIGINAL: Nov. 1993
REVISED: Apr. 1994
〈 APPLICATION 〉
B-570 Series

TEC

TEC Thermal Printer

B-570 SERIES

Parts List

Document No. **EM8-33013A**

Original **Nov., 1993**

(Revision **Apr., 1994**)

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TEC CORPORATION

PRINTED IN JAPAN

EM8-33013A
B-570 SERIES APR. '94
(Revision Date Apr. 18 '95)

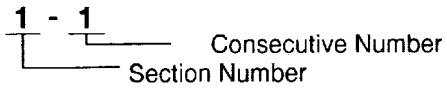
TABLE OF CONTENTS

CAUTION:

1. *This manual may not be copied in whole or in part without prior written permission of TEC.*
2. *The contents of this manual may be changed without notification.*
3. *Please refer to your local Authorized Service representative with regard to any queries you may have in this manual.*

HOW TO USE THIS PARTS LIST

1) Indication of Ref. No.



2) The initials found in the Remarks column refer to the names of countries. Please find the corresponding countries below. If there is no symbol, it is a standard part.

QP..... for Europe bloc.
QQ ..... for North America bloc

3) Miscellaneous parts (screws, washers, etc.) shall be ordered in minimum lots of 100.

4) As a rule, orders will not be accepted and the company will not be responsible for problems concerning parts not listed in this parts list.

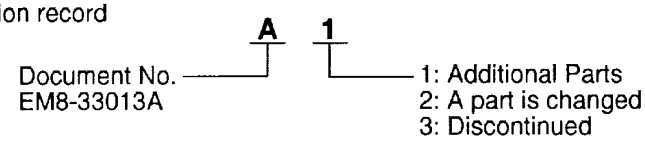
5) The columns from *1 through *4 indicate as follows:

*1 : Quantity/Unit

*2 : Recommendation of parts stock

	Q'ty/100 Units
Class A	10
Class B	7
Class C	5
Class D	3
Class E	1

*3 : Revision record



*4 : New part (indicated with " O ")

6) Any item with the # mark at the top in the description means one of the SPC (Strategic Products Control) parts.

7) The name of the electronic parts are abbreviated as below:

Ref. No.	Real Name	Abbreviation	Ref. No.	Real Name	Abbreviation
C	Capacitor	CAP.	Q	Transistor	XISTOR.
R	Resistor	RSTR.	CN	Connector	CONN.
RA	Resistor Array	RSTR. Array	ZD	Zener Diode	Z. Diode
VR (RV)	Variable Resistor	V. RSTR			

NOTES: *1. The parts shown in this list may be modified by TEC together with issuing the parts information, if necessary.*

2. The figures in this parts list are provided for reference and may be different form the actual parts in shape.

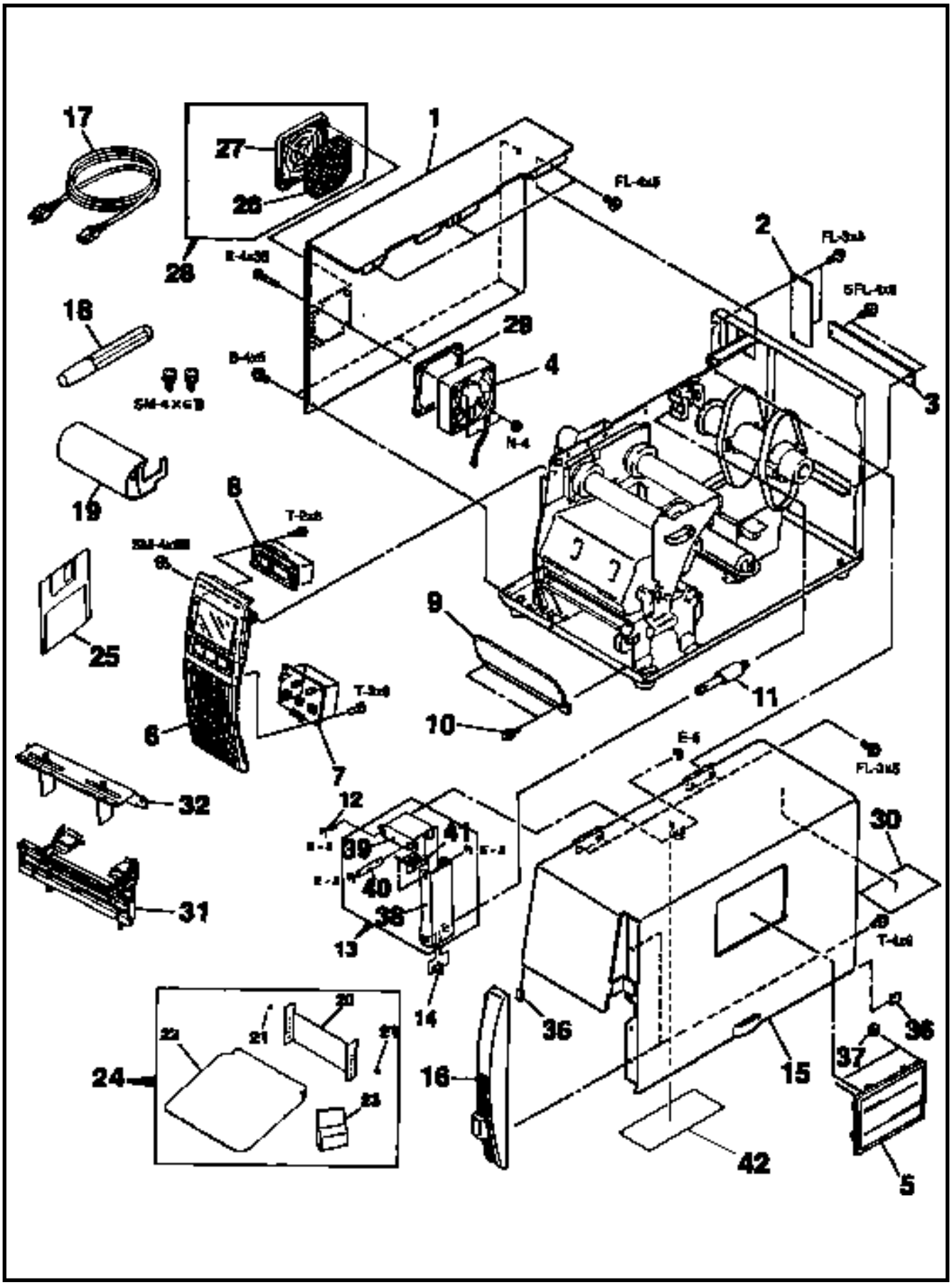
3. Electronic parts with the same Ref. No. are interchangeable with each other unless their quantities are listed.

4. For the underlined assembly parts, the components are available separately.

8) Parts with no reference numbers are irreplaceable and unauthorized as service parts.

BODY PARTS

1 COVERS



1 COVERS 1/2

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
1- 1	FMEE0009501	Side Panel (L)		1			
1- 2	FMEB0084901	Blind Plate		1			
1- 3	FMEB0084601	Rear Cover C		1			
1- 4	FHQB0004801	FAN Motor		1	D		
1- 5	FMHD0008901	Supply Window		1			
1- 6	FMCC0024402	Front Panel		1	A2		
1- 7	FMBB0032501	LED PC Board Ass'y		1	E		
LD1,2	CBH-0162001	LED SLP-236B-81 (Green)		2			
LD3	CBH-0161001	LED SLP-136B-81 (Red)		1			
R1	DBA-121JA2F	Carbon RSTR. RD1/4SST26 120Ω		1			
	DBA-121JA2S	Carbon RSTR. SRD1/41200HMJ 120Ω				A1	
SW1~3	EBA-0040001	Key Switch SKHCAB		3			
CN1	EAA-2375001	CONN. S7B-PH-K-S		1			
1- 8	FMBB0029401	LCD		1	D	○	
1- 9	FMEC0035701	Front Plate		1			
1-10	HAA-0004001	Black Screw M-4x6		2	A		
1-11	HZC-0024001	Damper TD16A1-25K-01		1	C	○	
1-12	FMDB0069001	Damper Shaft S		1			
1-13	FMBB0050001	Damper Link Ass'y		1			
1-14	FMEB0111601	Damper Sapport		1			
1-15	FMCD0013101	Top Cover		1			
1-16	FMHE0002902	Front Cover		1		A2	
1-17	FBCB0030203	Power Cord	QQ	1	D	A1	
	FBCB0030202	Power Cord	QQ Added:10/'98				
	EKA-0030001	Power Cord	QP	1	D		
1-18	24089500013	Print Head Cleaner		1	A		
1-19	FMBD0034501	Rewinder Guide Plate		1		A2	
1-20	FMEC0038801	Stacker Holder	Service option	1		A1	
1-21	24741710304	White Screw M-3x4	Service option	2	A	A1	
1-22	FMEC0038701	Stacker	Service option	1		A1	
1-23	HP82B219520	Partition	Service option	3		A1	
1-24	FMBC0037401	Stacker Module	Service option	1		A1	
1-25	FMBC0036001	Program Down Load FDK	Service part	1			
1-26	FMQB0039501	Filter Pad	QP	1		A1	
1-27	FMHB0020801	Filter Retainer	QP	1		A1	

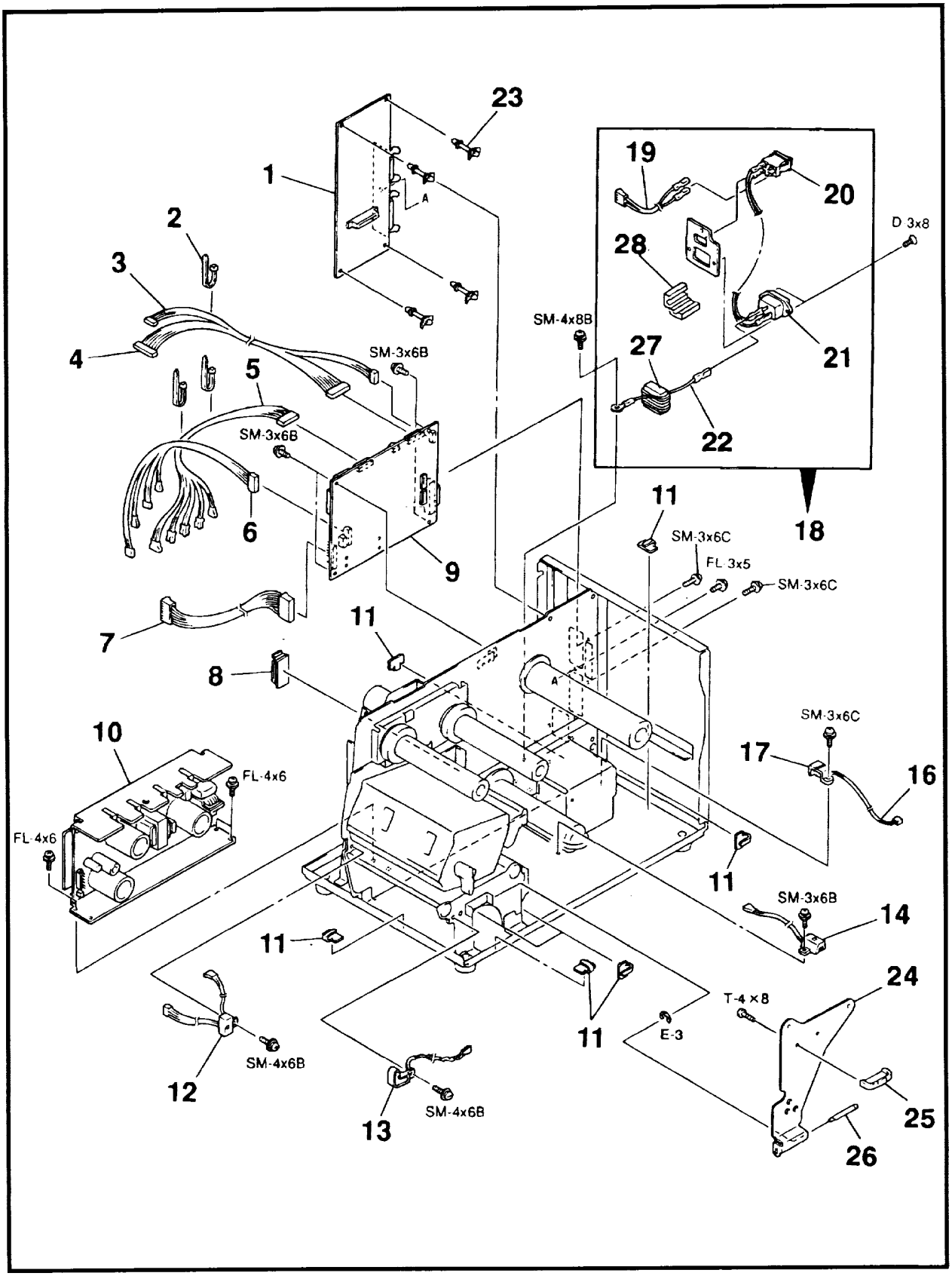
*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

1 COVERS 2/2

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
1-28	FMBB0036801	FAN Filter	QP	1		A1	
1-29	FMQB0039901	FAN Spacer		1		A1	
1-30	FMMC0014502	Roll Loading Instructions Label		1		A1	
1-31	FMBD0025103	Fanfold Paper Guide (Front)	B-4905-FF-QM	1		A1	
1-32	----------	Fanfold Paper Guide (Rear)	B-4905-FF-QM	1		A1	
~~1-33~~	~~FMMB0050601~~	~~Caution Label A~~	Deleted:4/'98	~~1~~		~~A1~~	
~~1-34~~	~~FMMB0050701~~	~~Caution Label B~~	Deleted:4/'98	~~1~~		~~A1~~	
~~1-35~~	~~FMMB0050801~~	~~Caution Label C~~	Deleted:4/'98	~~1~~		~~A1~~	
1-36	~~FMQB0045101~~ FMHB0031901	Top Cover Edge Guard	Changed:7/'98	2		A1	
1-37	JFQB0015001	Flat Push Nut		2			
1-38	FMEB0111401	Damper Link L		1			
1-39	FMEB0111501	Damper Link S		1			
1-40	FMDB0068901	Damper Shaft L		1			
1-41	FMQB0058201	Damper Spring		1			
1-42	FMMC0020201	Caution Label ABC	Added:4/'98	1			0

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

2 PC BOARD BLOCK

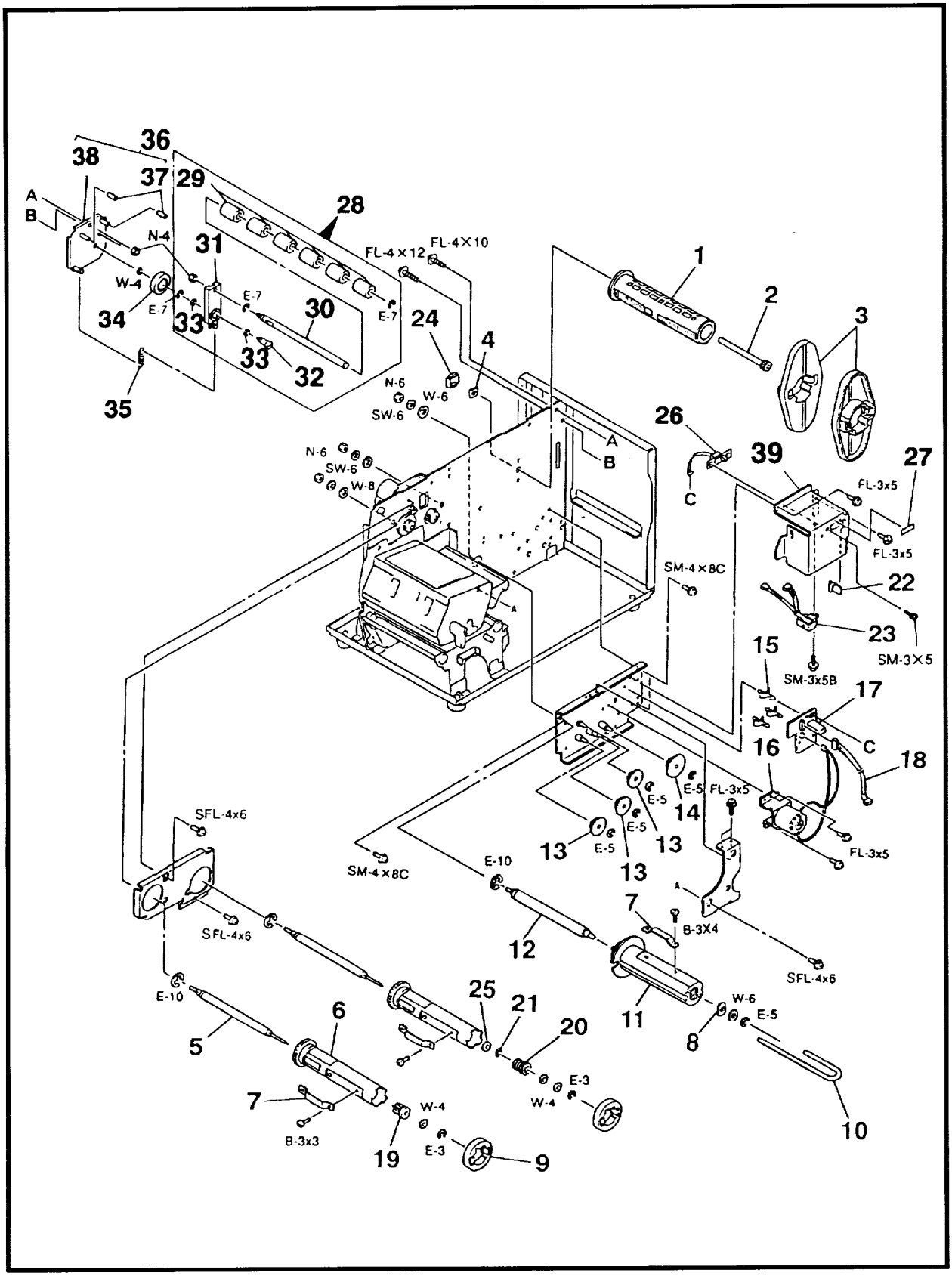


2 PC BOARD BLOCK

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
2- 1	----------	I/F PC Board Ass'y (Service No. B-198-02)		1	E		
2- 2	24081600000	Cable Band ALT096S TC-100		3			
2- 3	FMCB0056102	LED Harness		1	E	A2	
2- 4	FMCB0056202	LCD Harness		1	E	A2	
2- 5	FMCC0023202	Sensor Harness		1	E	A2	
2- 6	~~FMCC0023303~~ FMCC0023304	DC Motor Harness	Changed:9/'98	1	E	A2	
2- 7	FMCB0056502	PS Harness		1	E	A2	
2- 8	24060200098	Clamp FCN-3010		1			
2- 9	FMBC0036301	CPU PC Board Ass'y ~~(Service No. B-197-21)~~ (Serivee No. B-197-31)	QP Changed: 10/'97	1	E		
	FMBC0036304	CPU PC Board Ass'y ~~(Service No. B-197-24)~~ (Service No. B-197-34)	QQ Changed: 10/'97	1	E	A1	
2-10	GDB-0087001	PS Unit	QQ	1	E	A1	
	GDB-0085001	PS Unit	QP	1	E		
2-11	24088100910	Clamp K-103G		7			
2-12	FMBB0031301	Strip Sensor (TR)		1	B		
2-13	FMBB0029101	Strip Sensor (LED)		1	B		
2-14	FMBB0031501	Rewind Full Sensor (LED)		1	B		
2-15	FDB-0103001	Locking Support EMS-14S		1		A2	
2-16	FMBB0029301	TH Sensor		1	B		
2-17	EAHB0000201	Sensor Holder		1			
2-18	FMBB0027901	Inlet Ass'y	QP	1			
	FMBB0027902	Inlet Ass'y	QQ	1		A2	
2-19	FMCB0058702	Power Switch Harness	QP	1	E	A2	
	FMCB0058703	Power Switch Harness	QQ	1	E		
2-20	EBE-0054001	Power Switch JWZ2120-1603		1			
2-21	EAG-0012001	Inlet AP-300-3B2 (V)		1	D		
2-22	FMCB0058502	Earth Harness		1	E	A2	
2-23	FDB-0107001	Locking Support LCBT-14S		4		A1	
	FDB-0056004	Locking Support KGLS-14S					
2-24	FMCB0062402	Ribbon Shaft Holder Plate		1		A1	
2-25	FMHC0009501	Ribbon Holder Knob		1		A1	
2-26	FMDB0056501	Holder Plate Shaft		1		A1	
2-27	24320600070	Ferrite Core ESD-R-25B		1		A1	
2-28	DDA-0123001	Ferrite Coer SFC-5	QQ	1		A1	

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

3 TAKE-UP BLOCK



3 TAKE-UP BLOCK

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
3- 1	~~FMHD0005601~~	Supply Shaft		1			
	FMBC0080501		Changed:6/'99				
3- 2	24A300108A0	Hex. Bolt H-8x100		1			
3- 3	~~FMHD0005503~~	Supply Holder		2	C		
	FMHD0005504		Changed:6/'99				
3- 4	24A45310080	Plate Nut		1			
3- 5	FMDC0005701	Ribbon Shaft		2			
3- 6	FMCB0060501	Ribbon Holder		2			
3- 7	FMQB0036201	Holder Stopper		3		A2	
3- 8	FMEB0084501	Ribbon Shaft Stopper		1			
3- 9	FMHC0008801	Ribbon Stopper		2			
3-10	FMDC0005901	Take-up Clip		1			
3-11	FMCB0060601	Take-up Holder		1			
3-12	FMDC0005601	Take-up Shaft		1			
3-13	FMHB0019701	Take-up Gear		3	D		
3-14	FMHB0018201	Idle Gear		1	D		
3-15	FDB-0044001	Locking Support LCBT-3S		3			
	FDB-0027001	Locking Support KGLS-3S					
3-16	FMBB0030601	Take-up Motor		1	E		
3-17	FMBC0047101	PWM2 PC Board Ass'y		1	E	A2	
		(Service No. B-236-01)					
3-18	FMCB0056602	Take-up/Cutter Harness		1	E	A2	
3-19	FMHB0020401	Dummy Spacer		1			
3-20	FMBC0035901	Ribbon Back Tension Block		1	A		
3-21	FMEB0090701	Back Tension Stopper		1			
3-22	24088100910	Clamp K-103G		1			
3-23	FMBB0031401	Rewind Full Sensor (TR)		1	B		
3-24	FMHB0020501	Nut Cap		1			
3-25	FMQB0037201	Ribbon Back Tension Washer		1			
3-26	FMBB0041101	Selection Switch Ass'y		1		A1	
3-27	FMMB0044201	Selection Switch Label		1		A1	
3-28	FMBC0048801	Damper Arm Ass'y		1		A1	
3-29	FMHB0021701	Damper Roller		6		A1	
3-30	FMDB0062201	Damper Shaft		1		A1	
3-31	FMCB0075101	Damper Arm Sub Ass'y		1		A1	
3-32	FMDB0062301	Arm Shaft		1		A1	

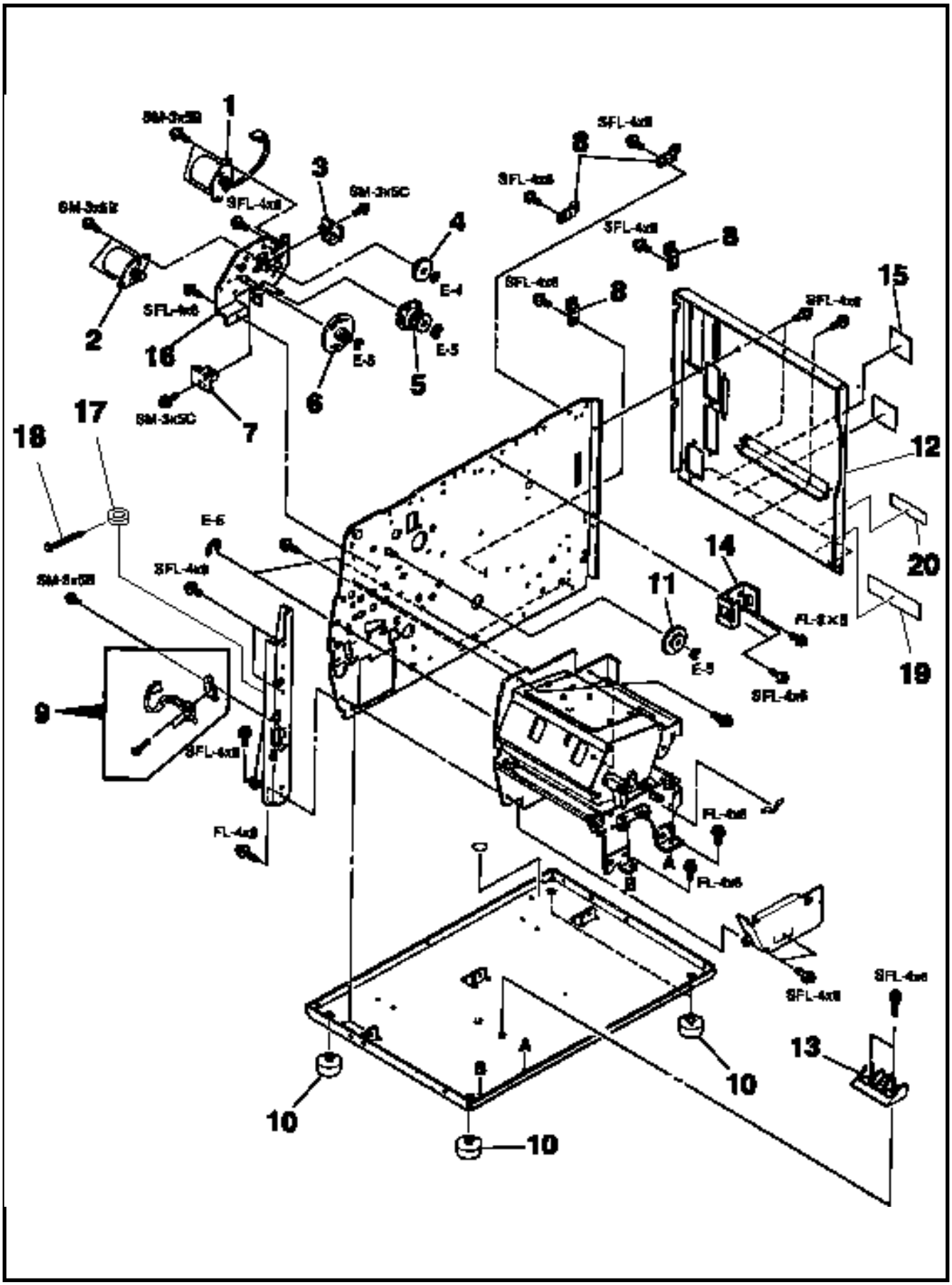
*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

3 TAKE-UP BLOCK

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
3-33	FMEB0092601	Damper Washer		2		A1	
3-34	FMHB0021601	Damper Spacer		1		A1	
3-35	FMQB0045501	Damper Spring		1		A1	
3-36	FMBC0048701	Damper Arm Stopper Plate Ass'y		1		A1	
3-37	FMQB0045601	Damper Stopper Rubber		2		A1	
3-38	FMCC0030401	Damper Arm Stopper		1		A1	

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

4 RIBBON DRIVE BLOCK

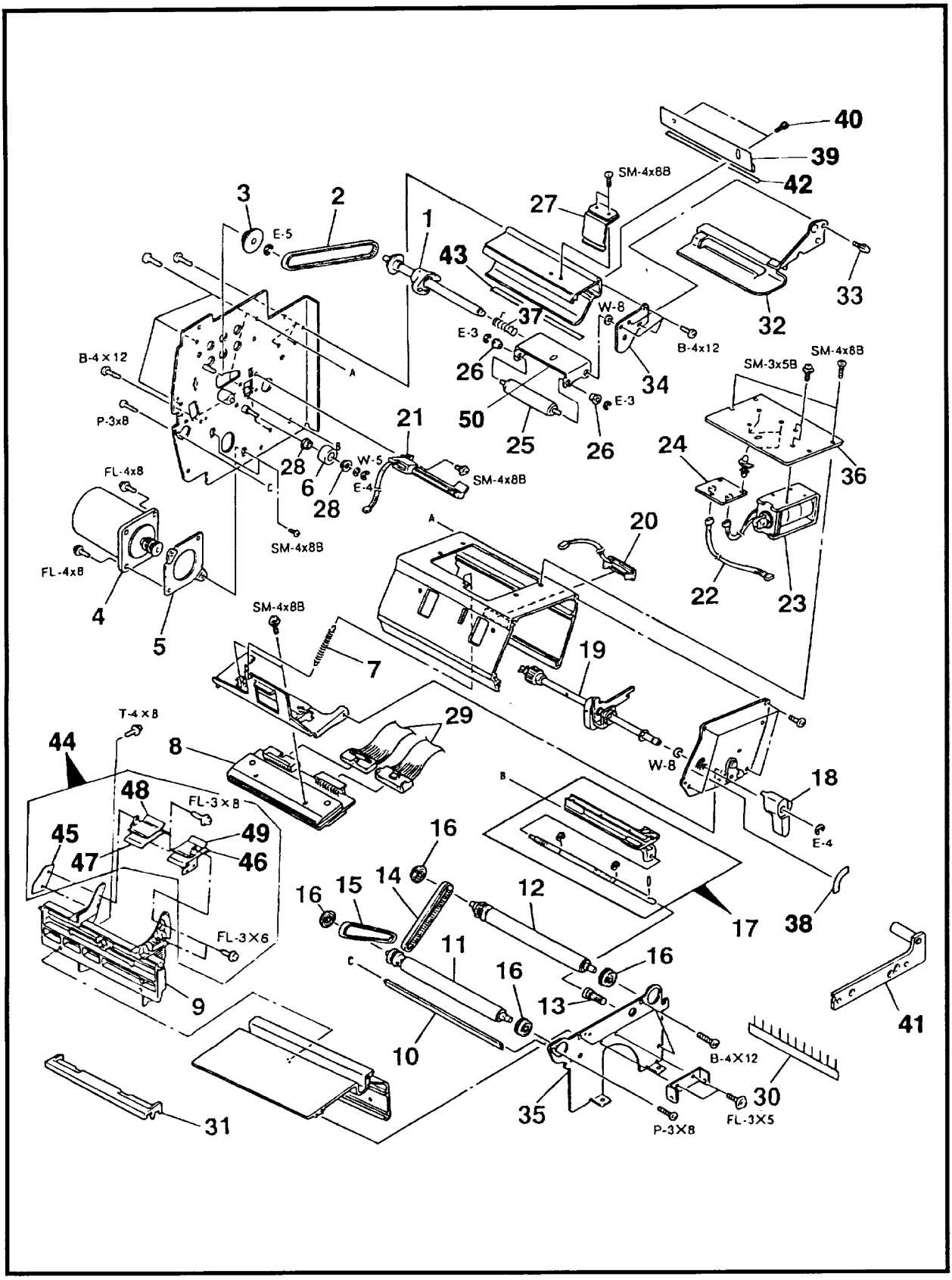


4 RIBBON DRIVE BLOCK

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
4- 1	FMBB0030502	Ribbon Motor (Feed) [CONN. color: Red]		1	E		
4- 2	FMBB0030501	Ribbon Motor (Rewind) [CONN. color: Black]		1	E		
4- 3	FMBB0028402	Slit Sensor (Rewind)		1	B		
PC1	DED-0049001	Photo Coupler TLP826		1			
CN1	EAA-0585001	CONN. 53015-0311 Black		1			
4- 4	FMHB0018301	Idle Gear		1	D		
4- 5	FMHC0008501	Feed Slit Gear		1	D		
4- 6	FMHC0008201	Rewind Slit Gear		1	D		
4- 7	FMBB0028401	Slit Sensor (Feed)		1	B		
PC1	DED-0049001	Photo Coupler TLP826		1			
CN1	24420201450	CONN. 53015-0310		1			
4- 8	FMEB0085101	PCB Attached Plate		4			
4- 9	FMBB0030901	Head Up Switch		1	E		
4-10	24089157031	Plastic Foot 1325		4			
4-11	FMHB0018201	Idle Gear		1	D		
4-12	FMEE0009401	Rear Cover		1			
4-13	FMHB0021801	Rewinder Paper Guide		1			
4-14	FMEB0087801	Damper Bracket		1		A1	
4-15	FMMB0045801	DOC Label		1		A1	
4-16	FMCC0024001	Ribbon Motor Attach Plate		1		A1	
4-17	DDA-0122001	Ferrite Core TFC-23-11-14		1			
4-18	24081600000	Cable Band ALT096S TC-100		1			
4-19	FMMB0062701	Caution Label D	QQ Added:4/'98	1			O
4-20	FMMB0062801	Number Label	QQ Added:4/'98	1			O

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

5 PRINTER BLOCK



5 PRINTER BLOCK 1/2

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
5- 1	FMBB0031101	Pinch Roller Shaft		1			
5- 2	FCA-0072001	Timing Belt 40S3M300		1	B		
5- 3	FMHB0017801	Pinch Roller Gear B		1			
5- 4	~~FMBB0035201~~	~~Stepping Motor (SPH-54AB135)~~		1	E	A2	
	FMBB0035202	Stepping Motor (STH-55D332-01)	Changed:7/'99				
5- 5	FMEB0086902	Motor Bracket		1			
5- 6	FMDB0054902	Idle Roller	See NOTE 1	1		A2	
5- 7	FMQB0034501	Head Up Spring		1			
5- 8	~~FMBB0050101~~	Print Head		1	A		○
	FMBB0050103		Changed:6/'99				
5- 9	FMBD0025103	Paper Guide Ass'y		1			
5-10	FMGB0000401	Strip Shaft		1			
5-11	FMBB0030701	Platen		1	B		
5-12	FMBB0030702	Feed Roller		1	B		
5-13	FMHB0018101	Knob		1			
5-14	FCA-0076001	Timing Belt 60S2M190		1	B		
5-15	FCA-0075001	Timing Belt 60S2M200		1	B		
5-16	FAA-0056001	Holder LNR-1680HHR		4	B		
5-17	FMBC0034302	Paper Sensor Ass'y		1	B		
5-18	FMHB0020601	Head Lever		1			
5-19	FMBC0034401	Head Cam Shaft Ass'y		1			
5-20	FMBB0032401	Ribbon End Sensor (TR)		1	B		
5-21	FMBB0032301	Ribbon End Sensor (LED)		1	B		
5-22	FMCB0056702	Solenoid Harness		1	E	A2	
5-23	FMBB0032101	Solenoid		1	D		
5-24	FMBB0029601	RSV PC Board Ass'y (Service No. B-200-01)		1	E		
Q1	CBA-0327001	PNP XISTOR. 2SB1268		1			
R1	DBA-103JA2F	Carbon RSTR. RD1/4SSTJ 10KΩ		1			
	DBA-103JA2S	Carbon RSTR. SRD1/4S10K0HMJ				A1	
F1	EHA-0076007	Fuse CCV-1AF12.5 1A		1	D		
D1,2	2421BAM01Z0	Diode AM01Z		2			
CN1	EAA-1178001	CONN. 53014-0310		1			
CN2	EAA-0589001	CONN. 53014-0213		1			
5-25	FMQB0034301	Pinch Roller		1	B		
5-26	HDA-0033001	Shaft Holder B-F4-73		2	B		
5-27	FMCB0065301	Spring Plate		1		A2	

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

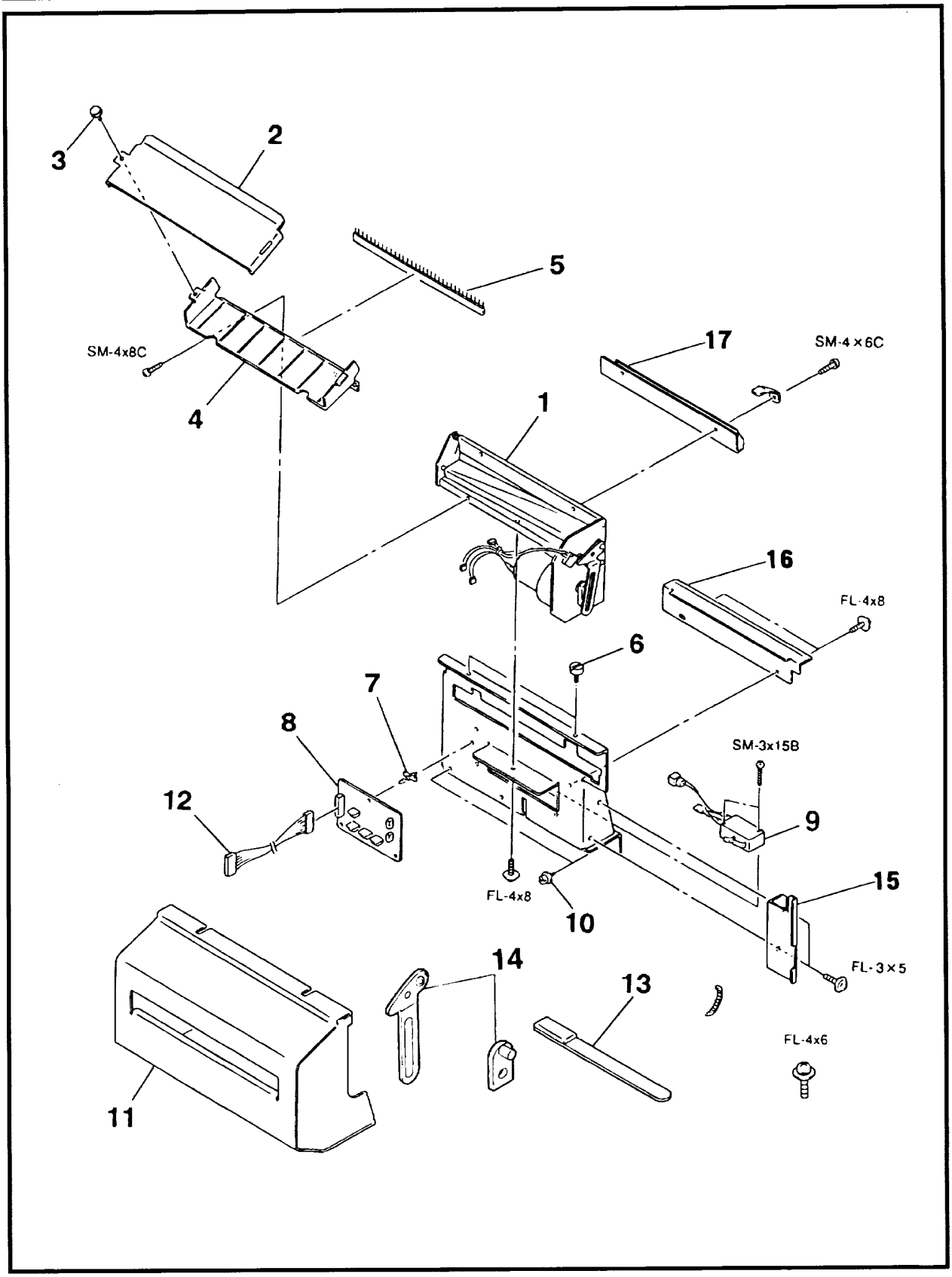
5 PRINTER BLOCK 2/2

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
5-28	FAF-0022001	Shaft Holder B-F5-53		2	B	A2	
5-29	FMCC0025302	Head Harness		1	E	A2	
5-30	FMQB0037901	Brush 30mm		1			
	FMQB0037801	Brush 70mm		1			
	FMQB0037701	Brush 135mm		1			
	FMQB0037601	Brush 163mm		1			
5-31	FMYC0000401	Print Head Jig	Service Part				
5-32	FMCC0028601	Media Guide Plate		1		A1	
5-33	HAA-0004001	Black Screw M-4x6		1	A	A1	
5-34	FMEB0084302	Pinch Roller Cover		1		A1	
5-35	FMEC0035411	Right Plate		1			
5-36	FMEC0035101	Solenoid Attaching Plate		1			
5-37	FMQB0042701	Pinch Roller Spring		1		A1	
5-38	FMMB0037803	Head Open Label		1		A1	
5-39	FMEC0044601	Guide Plate		1		A1	
5-40	24A31040406	Hex. Bolt Screw M-4x6		2		A1	
5-41	FMYC0001001	Pinch Roller Jig	Service part				
5-42	FMQB0053701	Teflon Sheet A		1			
5-43	FMQB0053801	Teflon Sheet B		1			
5-44	FMBB0046701	Paper Holder Ass'y		1		A1	
5-45	FMEB0098001	Paper Holder Support		1		A1	
5-46	FMEB0108201	Paper Holder R(Lower)		1		A1	
5-47	FMEB0108001	Paper Holder L(Lower)		1		A1	
5-48	FMEB0108101	Paper Holder L(Upper)		1		A1	
5-49	FMEB0108301	Paper Holder R(Upper)		1		A1	
5-50	FMEB0084201	Pinch Roller Holder		1			

NOTE 1: Attach the idle roller so that the side grooved deeper faces the E-4 E-ring.

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

6 CUTTER MODULE (B-4205-QM)

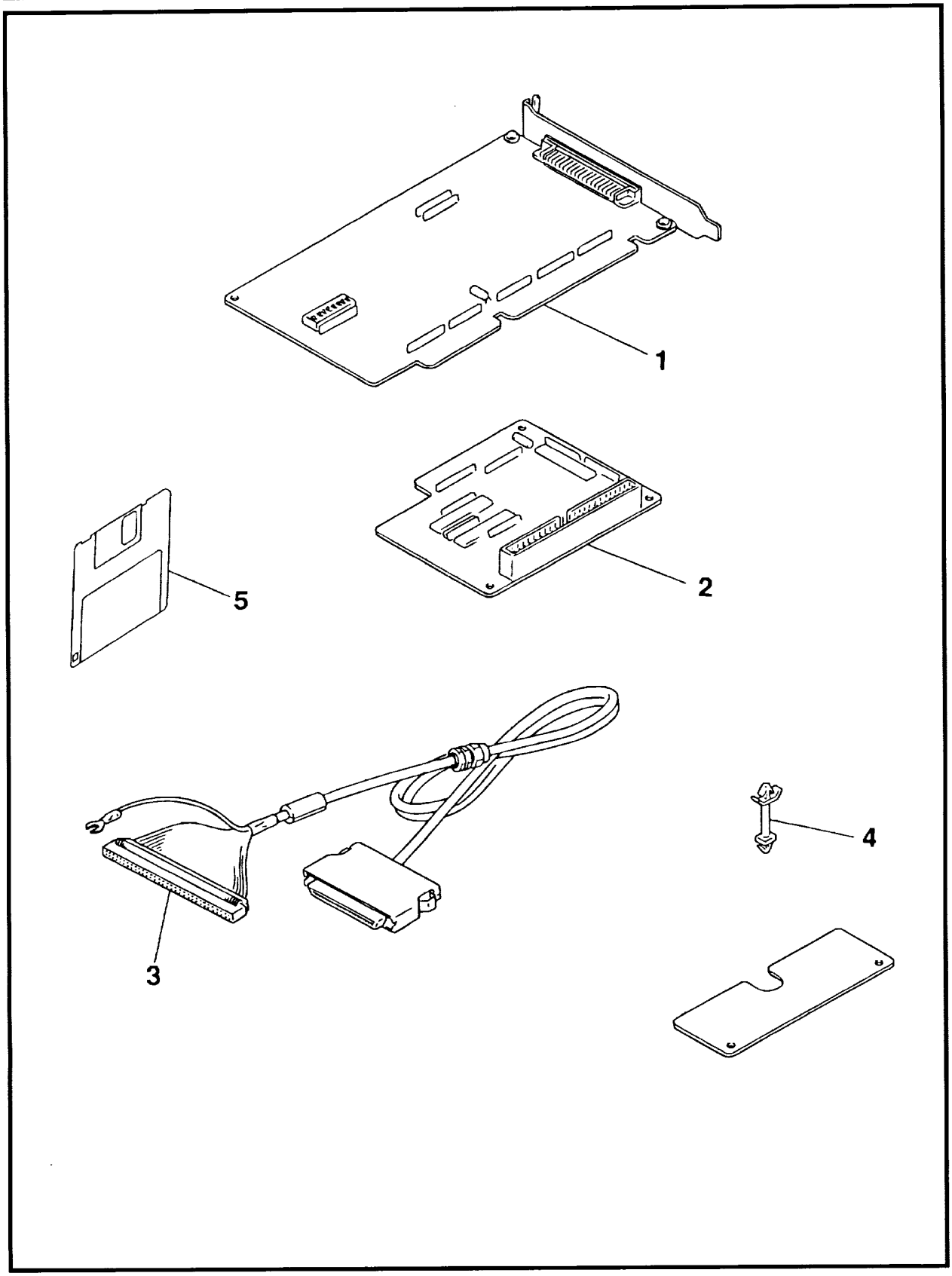


6 CUTTER MODULE (B-4205-QM)

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
6- 1	GFM-0060001	Cutter Unit		1	E		
6- 2	FMBC0037301	Media Guide B		1			
6- 3	24741710304	White Screw M-3x4		1	A		
6- 4	FMCC0025401	Media Guide A		1			
6- 5	FMQB0038201	Brush 128mm		1			
6- 6	HDA-0038001	Cover Holding Screw		2	A		
6- 7	FDB-0044001	Locking Support LCBT-3S		3			
6- 8	FMBB0034301	CUT I/F PC Board Ass'y (Service No. B-199-01)		1	E		
6- 9	FMBB0034401	Cover Open Switch		1	E		
6-10	FMDB0056601	Cutter Attaching Screw		2	A		
6-11	FMBC0037001	Cutter Cover		1			
6-12	FMCB0056602	Take-up/Cutter Harness		1	E	A2	
6-13	FMQB0051601	Cleaner		1	A		
6-14	ZBA-1464001	Arm and clutch Kit	Service Part				
6-15	FMEB0091701	Cutter Link Cover		1			
6-16	FMEC0038301	Cutter Guide Plate B		1			
6-17	FMEC0038201	Cutter Guide Plate A		1			

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

7 HIGH SPEED PC INTERFACE BOARD (B-4800-PC-QM)



7 HIGH SPEED PC INTERFACE BOARD (B-4800-PC-QM)

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
7- 1	----------	BPC PC Board Ass'y (Service No. B-203-01)		1	E		
7- 2	----------	BPE PC Board Ass'y (Service No. B-202-01)		1	E		
7- 3	FMCB0064001	Printer Cable		1	E		
7- 4	FDB-0103001	Locking Support EMS-14S		2			
7- 5	FMBC0037503	Printer Driver FDK		1			

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

8 MISCELLANEOUS PARTS 1/2

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
SM-3x5B	24BB0010305	Sems Screw SM-3x5B					
SM-3x5C	24BP0010305	Sems Screw SM-3x5C					
SM-3x6B	24BB0010306	Sems Screw SM-3x6B					
SM-3x6C	24BP0010306	Sems Screw SM-3x6C					
SM-3x15B	24BB0010315	Sems Screw SM-3x15B				A1	
SM-4x6B	24BB0010406	Sems Screw SM-4x6B					
SM-4x6C	24BP0010406	Sems Screw SM-4x6C				A1	
SM-4x8B	24BB0010408	Sems Screw SM-4x8B					
SM-4x8C	24BP0010408	Sems Screw SM-4x8C				A1	
FL-3x5	24B50010305	Flanged Screw FL-3x5					
FL-4x5	24B50010405	Flanged Screw FL-4x5					
FL-4x6	24B50010406	Flanged Screw FL-4x6					
FL-4x8	24B50010408	Flanged Screw FL-4x8					
SFL-4x6	24A16710406	S Tite Flanged Screw SFL-4x6				A1	
SFL-4x8	24A16710408	S Tite Flanged Screw SFL-4x8				A1	
B-3x3	24B05010303	Bind Screw B-3x3					
B-3x4	24B05040304	Bind Screw B-3x4				A1	
B-4x5	24B05040405	Bind Screw B-4x5					
B-4x12	24A10510412	Bind Screw B-4x12	with Tapping			A2	
B-4x35	24B05040435	Bind Screw B-4x35					
T-2x6	24A17010206	Tap Tight Screw T-2x6					
T-3x8	24A17010308	Tap Tight Screw T-3x8					
T-4x6	24A17010406	Tap Tight Screw T-4x6					
T-4x8	24A17040408	Tap Tight Screw T-4x8					
P-3x8	24A10040308	Pan Head Screw P-3x8				A2	
P-4x8	24A10040408	Pan Head Screw P-4x8					
D-3x8	24B01010308	Dish Head Screw D-3x8					
E-3	24A64050030	E-Ring E-3					
E-4	24A64050040	E-Ring E-4					
E-5	24A64050050	E-Ring E-5					
E-10	24A64050100	E-Ring E-10					

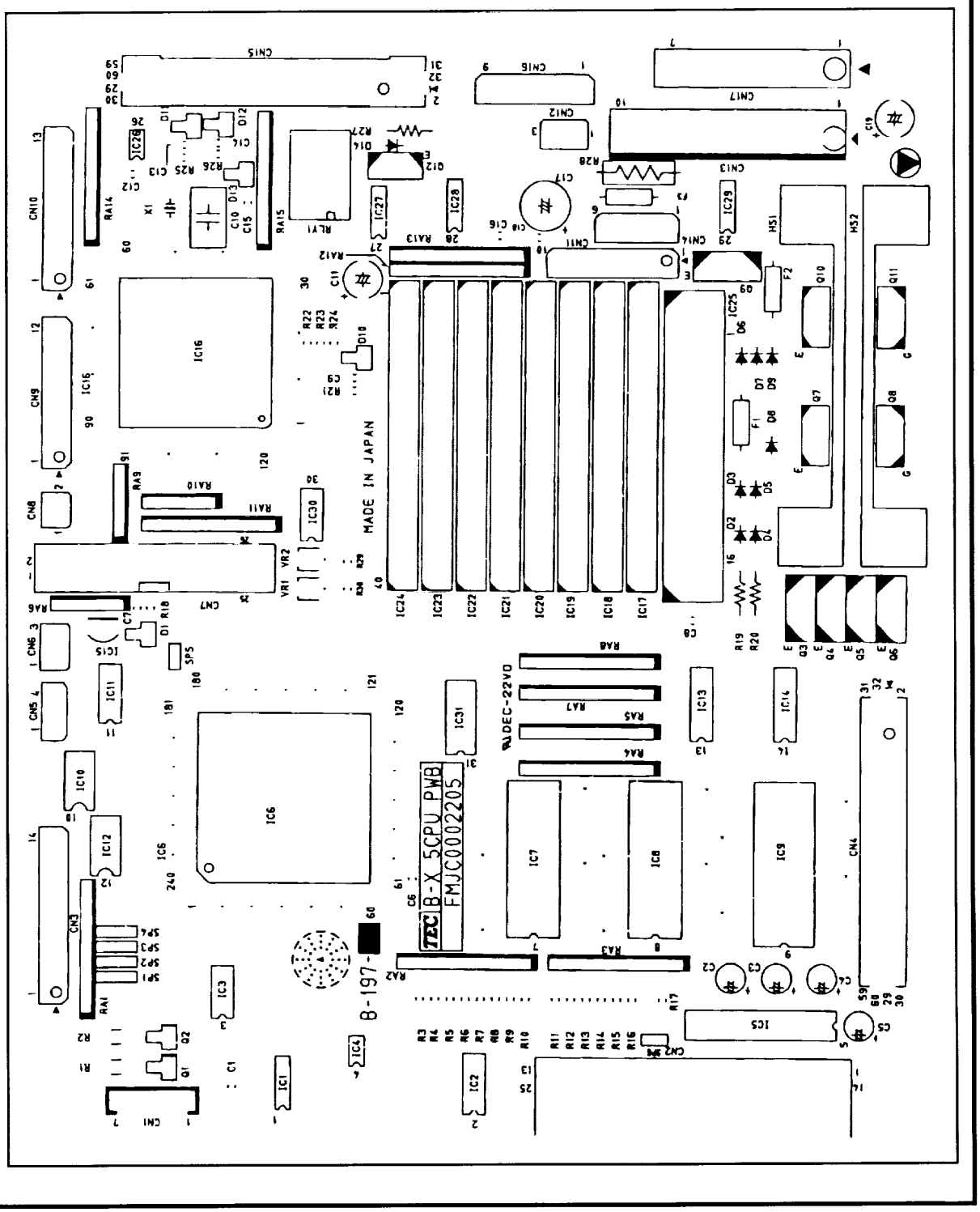
*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

8 MISCELLANEOUS PARTS 2/2

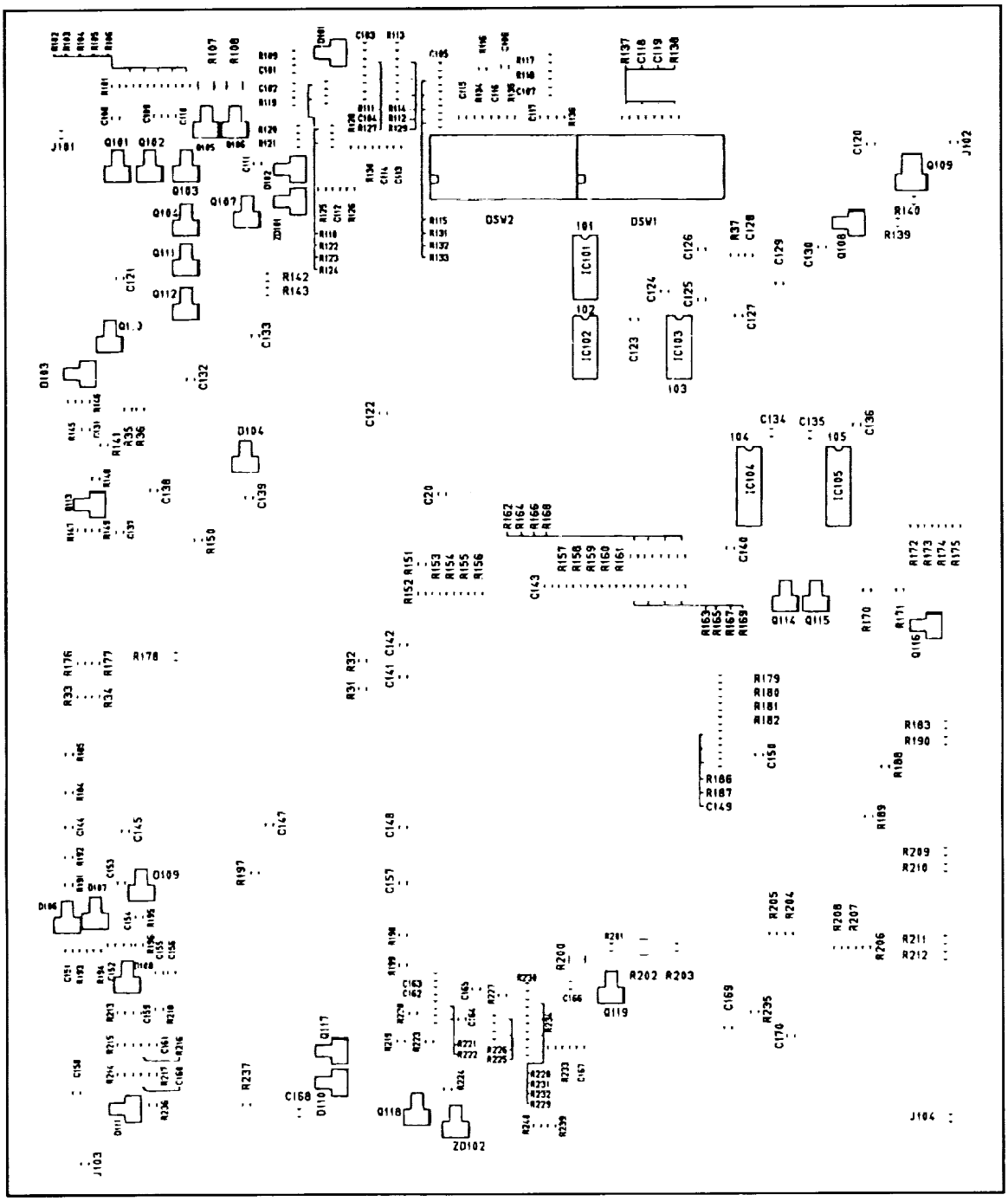
Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
W-4	24A62101040	Washer W-4					
W-5	24A62101050	Washer W-5					
W-6	24A62101060	Washer W-6	t=0.8				
	24A62001060	Washer W-6	t=1.0				
W-8	24A62101080	Washer W-8	t=0.8				
	24A62001080	Washer W-8	t=1.6				
SW-6	24A60001060	Spring Washer SW-6					
N-4	24A40010400	Nut N-4					
N-6	24A40010600	Nut N-6					

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

1 CPU PC BOARD ASS'Y 1/2



1 CPU PC BOARD ASS'Y 2/2



1 CPU PC BOARD ASS'Y 1/6

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
	FMBC0036301	CPU PC Board Ass'y (Service No. B-197-21)	QP	1	E		
	FMBC0036304	CPU PC Board Ass'y (Service No. B-197-24)	QQ	1	E	A1	
IC1,29	CAG-0578001	Op Amp LM324NS		2	E	A2	
	CAG-0339001	Op Amp LM324ANS					
IC2,11	CAN-005102E	CMOS IC BU4051BF		2	E		
IC3	CAG-0439001	Linear IC M62354FP		1	E		
IC4,26	CAG-0185001	Comparetor IC BA10393F-T1		2	E		
IC5	CAH-0055001	CMOS IC MC145407P		1	E		
	EAB-0076001	IC Socket 2-641264-3		1			
IC6	CAJ-0294001	Gate Array EC-M100		1	E	○	
IC8	CAD-0286001	Flash ROM M5M28F102FP-10		1	E		
IC9	CAE-0097001	Mask ROM EC-M119		1	E	○	
IC10	CAG-0147001	Linear IC TC35098P		1	E		
IC12	CAD-0149002	EEP-ROM ST93C46AB1		1	E		
	CAD-0149003	EEP-ROM ST93C46CB 1/6					
	CAD-0288001	EEP-ROM M93C46-BN6					
	EAA-2390001	IC Socket 2-641260-3		1			
IC13,14,104 105	CAM-024508A	CMOS IC TC74AC245F TP2		4	E		
IC15	CAG-0524001	Reset IC PST600D		1	E		
IC16	CAA-0249001	CPU UPD70236AGD-16-5BB		1	E	○	
IC17,18	CAC-0293001	D-RAM HM514260AZ-7		2	E		
	CAC-0368003	D-RAM HM514260CZ-7		1			
IC19~24	EAA-2389001	IC Socket 90510-0140		6			
IC25	CAK-0056001	HIC STK6712AMK4		1	E		
IC27,28	CAG-0438001	Linear IC UPC844G2		2	E		
IC30	CAM-000408A	Linear IC TC74AC04F TP1		1	E		
IC31	CAJ-0343001	Gate Array EC-M118A		1	E	○	
IC101~103	CAM-015708A	CMOS IC TC74AC157F		3	E		
Q1,2,113	24220200320	Tip XISTOR. 2SC1621-T1B		3			
Q3,4	CBA-0327001	PNP XISTOR. 2SB1268		2			
Q7,10	CBA-0326001	NPN XISTOR. 2SD1838		2			
	FMEB0087201	Heat Sink A		2			
	FMEB0087301	Heat Sink B		1			
	FMEB0087401	Heat Sink C		1			
	24BP0010306	Sems Screw SM-3x6C		4		A2	

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

1 CPU PC BOARD ASS'Y 2/6

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
Q7,10	24BB0010325	Sems Screw SM-3x25		2			
Q5,6,9	CBA-0186001	NPN XISTOR. 2SD1904RS		3			
Q8,11	CBA-0332001	FET XISTOR. 2SJ295		2			
	CBQ-0126001	FEX XISTOR. 2SJ376					
Q12	2422SD01802	Tip XISTOR. 2SD1802		1			
Q101,103 105,106,108, 110,111, 114~119	24220200310	Tip XISTOR. FA1A4M-T1B		13			
Q102,104, 107,112	24220100050	Tip XISTOR. FN1A4M-T1B		4			
Q109	24220100060	PNP XISTOR. 2SB1115-T1		1			
		<Tip RSTR.>					
R1,2	DBK-151JA1A	MCR50JZHJ151 150Ω		2			
R3,6,9,12, 15,116,131	DBK-222FA4A	MCR10EZHF2201 2.2KΩ		7			
R4,7,10,13, 16,117,133	DBK-102FA4J	CRG10GF102T 1KΩ		7			
R5,8,11,14, 17,132	DBK-392FA4J	CRG10GF392T 3.9KΩ		6			
R18,21,25, 26,146,151~ 169,178,193~ 196,237	DBK-470JA4J	CRG10GJ470T 47Ω		30			
R22~24,35, 36,102,103, 106,113,120, 141,150,170, 171,173,174, 191,197,199, 204,209,220, 225,229,234, 239	DBK-103JA4J	CRG10GJ103T 10KΩ		26			
R30,32,33, 222,J104	DBK-000JA4A	MCR10EZHJ000 0Ω		5			
R34,226	DBK-432JA4J	CRG10GJ432T 4.3KΩ		2			

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

1 CPU PC BOARD ASS'Y 3/6

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
		<Chip RSTR.>					
R37,101,104, 105,109,112, 140,149,177, 192,227,240	DBK-102JA4J	CRG10GJ102T 1KΩ		12			
R107	DBK-111JA2J	CRG4GJ111T 110Ω		1			
R108,200,202	DBK-221JA2J	CRG4GJ221T 220Ω		3			
R110	DBK-113FA4A	MCR10EZHUF1102 11KΩ		1			
R111,119	DBK-104JA4J	CRG10GJ104T 100KΩ		2			
R114	DBK-362JA4J	CRG10GJ362T 3.6KΩ		1			
R115,118, 134~138	DBK-681FA4J	CRG10GF681T 680Ω		7			
R121	DBK-222JA4J	CRG10GJ222T 2.2KΩ		1			
R122	DBK-153FA4A	MCR10EZHF1502 15KΩ		1			
R123	DBK-163JA4J	CRG10GJ163T 16KΩ		1			
R124	DBK-223JA4J	CRG10GJ223T 22KΩ		1			
R125,130	DBK-563FA4J	CRG10GF563T 56KΩ		2			
R126,128	DBK-103FA4J	CRG10GF103T 10KΩ		2			
R127	DBK-564JA4J	CRG10GJ564T 560KΩ		1			
R129	DBK-334JA4J	CRG10GJ334T 330KΩ		1			
R139,179, 181,216	DBK-682JA4J	CRG10GJ682T 6.8KΩ		4			
R142,143	DBK-200JA4J	CRG10GJ200T 20Ω		2			
R145, 212~215,228	DBK-472JA4J	CRG10GJ472T 4.7KΩ		6			
R147,223	DBK-560JA4J	CRG10GJ560T 56Ω		2			
R148,230	DBK-332JA4J	CRG10GJ332T 3.3KΩ		2			
R172,175	DBK-471JA4J	CRG10GJ471T 470Ω		2			
R176	DBK-152JA4J	CRG10GJ152T 1.5KΩ		1			
R180,183	DBK-822JA4J	CRG10GJ822T 8.2KΩ		2			
R182	DBK-512JA4J	CRG10GJ512T 5.1KΩ		1			
R184	DBK-203JA4A	MCR10EZHUJ203 20KΩ		1			
R186	DBK-303JA4J	CRG10GJ303T 30KΩ		1			
R187	DBK-391JA4J	CRG10GJ391T 390Ω		1			
R188,206	DBK-683JA4J	CRG10GJ683 68KΩ		2			

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

1 CPU PC BOARD ASS'Y 4/6

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
		<Chip RSTR.>					
R189,208	DBK-221JA4J	CRG10GJ221T 220Ω		2			
R219,224	DBK-101JA4J	CRG10GJ101T 100Ω		2			
R190,210	DBK-100JA4J	GRG10GJ100T 10Ω		2			
R185,198	DBK-273JA4A	MCR10EZHUJ273 27KΩ		2			
R207,231,235	DBK-153JA4J	CRG10G153T 15KΩ		3			
R201,203	DBK-912JA4A	MCR10EZHUJ912 9.1KΩ		2			
R211	DBK-333JA4J	CRG10GJ333T 33KΩ		1			
R217	DBK-563JA4J	CRG10GJ563T 56KΩ		1			
R218	DBK-330JA4J	CRG10GJ330T 33Ω		1			
R221	DBK-151JA4J	CRG10GJ151T 150Ω		1			
R232,233	DBK-154JA4J	CRG10GJ154T 150KΩ		2			
R236	DBK-224JA4J	CRG10GJ224T 220KΩ		1			
R19,20	DBC-222JA5F	MOF RSTR. RSS1/2PJ 2.2KΩ		2			
R27	DBC-272JA5F	MOF RSTR. RSS1/2T52J 2.7KΩ		1			
R28	DBC-102JA3G	MOF RSTR. RSM2FB 1KΩJ		1			
RA1~5,7,8 11~15	DBP-0047005	RSTR. Array EXB-F9E103J 10KΩ		12			
RA6,9,10	DBP-0047004	RSTR. Array EXBF5E103J 10KΩ		3			
VR2	DBG-0196001	Tip V.RSTR. RVG4H01-102VM-TC 1KΩ		1	E		
ZD101	CBG-0222001	Z.Diode 02CZ4.7Y		1			
ZD102	DBG-0361001	Z.Diode 02CZ4.3X		1			
D2~9	2421BAM01Z0	Diode AM01Z		8			
D14	24210000060	Diode ERA1501		1			
D101,102	CBN-0022001	Tip Diode HSM107STL		2			
D110,112	CBE-0100001	Tip Diode 1SS187 TE85L		2			

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

1 CPU PC BOARD ASS'Y 5/6

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
		<Ceramic CAP.>					
C1,6,8,12 16,18,20, 106,111,113, 120~127,129, 130,132~138, 140~143,145, 147~149,157, 158,163~166, 168	DAB-103MK10	GRM40B103K50PT 0.01µF		42			
C101,104, 105,107~110, 112,114~119, 128,144,159, 161,162,167	DAB-104MZ11	GRM40F104Z50PT 0.1µF		20			
C102,103	DAB-102MK05	GRM40B102K50PT 1000pF		2			
C150	DAB-101MJ17	GRM40CH101J50PT 100pF		1			
C155	DAB-050MK02	GRM40CH050D50PT 5pF		1			
C169,170	DAB-391MJ12	Ceramic CAP. GRM40CH391J50PT 390pF		2			
		<Electrolytic CAP.>					
C2~5	DAA-100HM16	CESEM1E100 10µF		4			
C11	~~DAA-100FM18~~	~~CESEM1C100 10µF~~		1			
	DAA-100FM67	SME16VB10M 10µF	Changed:4/'99				
C17	~~DAA-101MM08~~	~~CESEM1H101A 100µF~~		1			
	DAA-101MM40	SME50VB100M 100µF	Changed:4/'99				
C19	DAA-221CM17	CESEM1A221 220µF		1			
C10	DAC-334MK02	Film CAP. DTDB1H334K 0.33µF		1			
C160	DAB-561MK06	Tip CAP. GRM40CH561K50PT 560pF		1			
CN1	EAA-2187001	CONN. B7B-PH-K-S		1			
CN2	EAA-0361018	CONN. 17LE-13250-27 (D4AK) millimeter screw type	QP	1			
	EAA-0361019	CONN. 17LE-13250-27 (D4CK) inch screw type	QQ	1			
	FMEB0085201	Sealed Plate RS-232C		1			
CN3	EAA-2387001	CONN. 53014-1412		1			
CN4	EAA-2306001	CONN. 52326-0601		1			

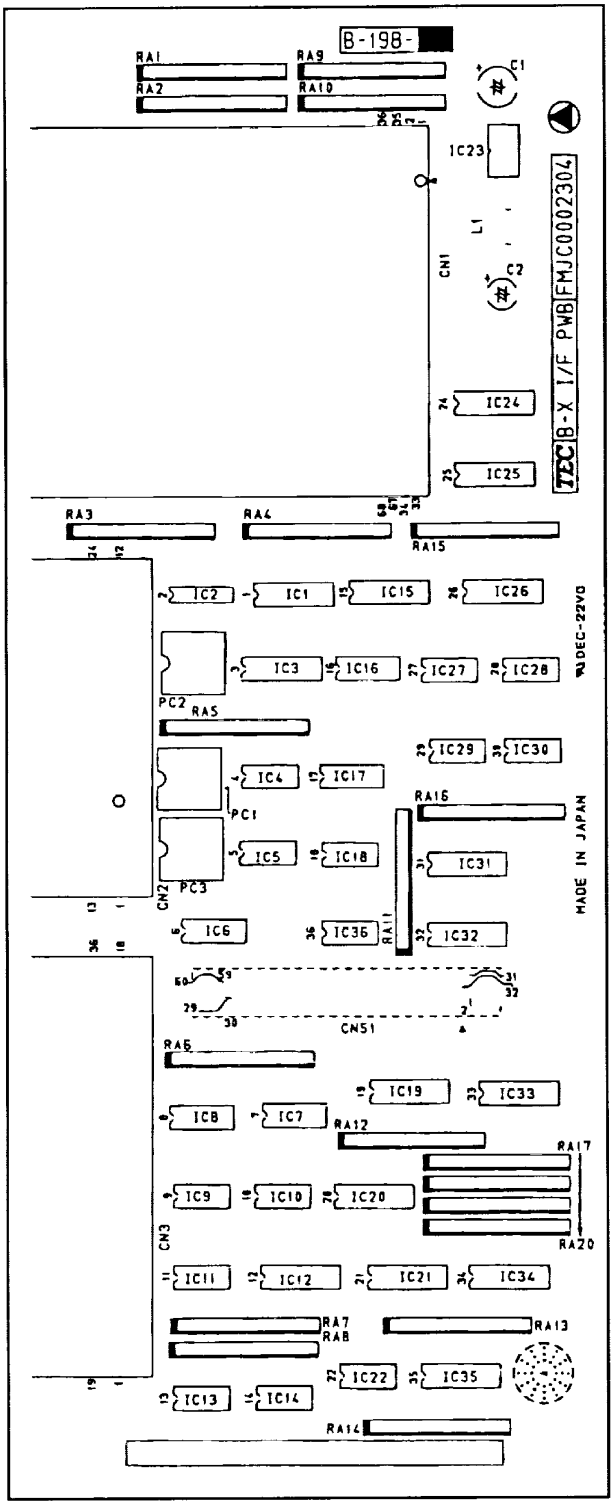
*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

1 CPU PC BOARD ASS'Y 6/6

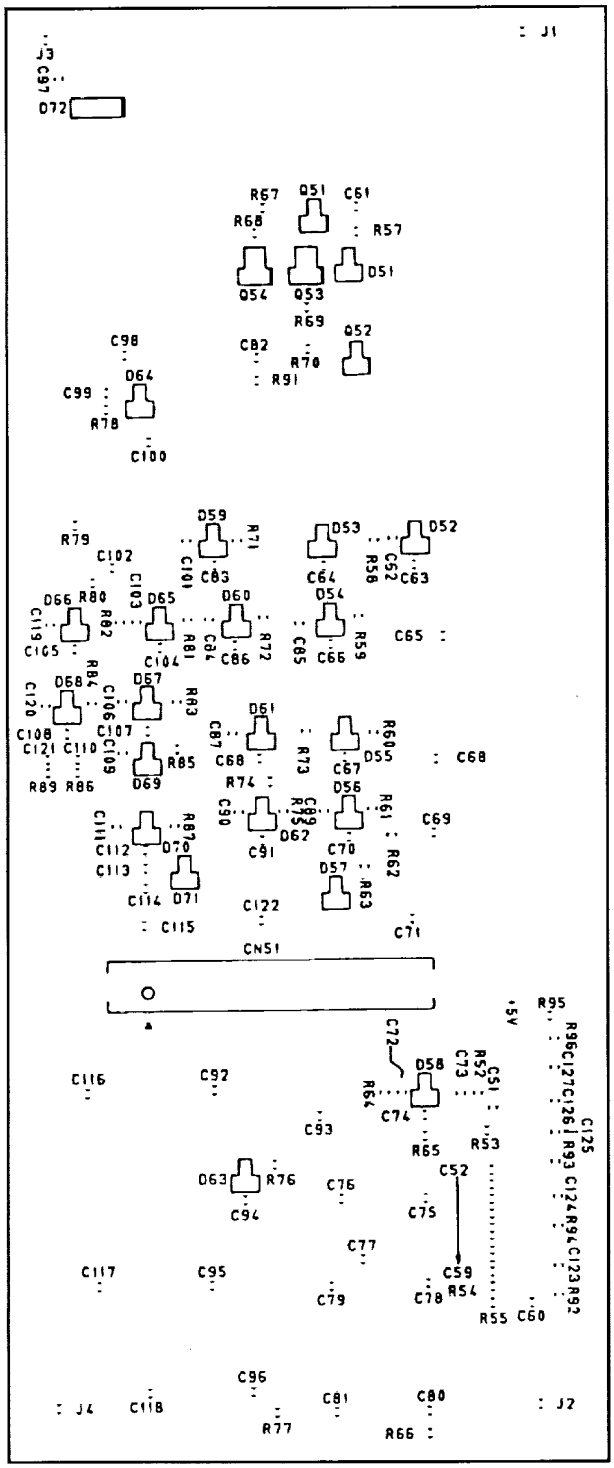
Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
CN5	24420201530	CONN. 53014-0410		1			
CN6	EAA-2303001	CONN. 53014-0311		1			
CN7	EAA-0011001	CONN. 5332-26T2		1			
CN8	24420201430	CONN. 53014-0210		1			
CN9	EAA-2388001	CONN. 53014-1213		1			
CN10	EAA-2302001	CONN. 53014-1310		1			
CN11	EAA-2386001	CONN. 53014-1012		1			
CN14	24420201540	CONN. 53014-0610		1			
CN15	EAA-2394001	CONN. 8801-060-170S		1			
CN16	EAA-0520001	CONN. 53014-0910		1			
CN17	24421080295	CONN. 5275-07A		1			
DSW1,2	EBC-0065001	DIP Switch KS08		2			
F1~3	EHA-0201001	Fuse CCV-2AF12.5 2A		3	D		
RLY1	ELA-0026001	Relay A-5W-K		1			
X1	DCD-0267001	Crystal CSA32.00MXZ040 32MHz		1	E		
SP6	24420130479	Jumper CONN. PS-40PF-D4T1-FKL1		1		A1	
	HBMB0012901	PCB No. Label	Attached to Heat Sink A				

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

2 I/F PC BOARD ASS'Y 1/2



2 I/F PC BOARD ASS'Y 2/2



2 I/F PC BOARD ASS'Y 1/3

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
	----------	I/F PC Board Ass'y (Service No. B-198-02)		1	E		
IC1,21,32	2420SAL244S	TTL IC SN74ALS244NS		3	E		
IC2	CBB-0022001	XISTOR. Array TD62004F		1	E		
IC3,26	CAM-057302A	CMOS IC TC74HC573AF		2	E		
IC4,5,29,30	CAM-003208A	CMOS IC TC74AC32F TP1		4	E		
IC6,7	CAM-017402A	CMOS IC TC74HC174AF TP1		2	E		
IC8	CAM-012302A	CMOS IC TC74HC123AF TP1		1	E		
IC9	CAF-000606F	TTL IC SN7406NS-SR05		1	E		
IC10	CAM-000402A	CMOS IC TC74HC04AF TP1		1	E		
IC11	CAM-012502G	CMOS IC MC74HC125F		1	E		
IC12,19	CAM-024508A	CMOS IC TC74AC245F TP2		2	E		
IC13,18,28	CAB-0029001	CMOS IC TC74HC74AF TP1		3	E		
IC14,22	CAF-001407F	TTL IC SN74LS14NS-SR05		2	E		
IC15,24	CAF-024508F	TTL IC SN74ALS245ANS		2	E		
IC16,17	CAM-013808A	CMOS IC TC74AC138F TP1		2	E		
IC20,31,33, 24	CAM-024408A	CMOS IC TC74AC244F		4	E		
IC23	CAG-0541001	DC-DC Converter LT1109ACS8-12		1	E		
IC25	CAF-057408F	TTL IC SN74ALS574BNS		1	E		
IC27	CAM-000808A	CMOS IC TC74AC08F TP1		1	E		
IC35	CAM-056402G	CMOS IC MC74HC564F		1	E		
IC36	CAM-008608A	CMOS IC TC74AC86F		1	E		
PC1~3	24440400200	Photo Coupler TLP521-2		3			
Q51,52	24220200310	Tip XISTOR. FA1A4M-T1B		2			
	CBC-0040002	Tip XISTOR. KRC102S-RTK				A1	
Q53,54	24220100060	PNP XISTOR. 2SB1115-T1		2			
		<Tip RSTR.>					
R52,67	DBK-682JA4J	CRG10GJ682T 6.8KΩ		2			
	DBK-682JA4S	RGC210J682				A1	
R53,54,68, 69,91~96	DBK-102JA4J	CRG10GJ102T 1KΩ		10			
	DBK-102JA4S	RGC210J102				A1	

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

3 PWM2 PC BOARD ASS'Y 1/2

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
	FMBC0047101	PWM2 PC Board Ass'y (Service No. B-236-01)		1	E	A2	
IC1	CAM-000802A	CMOS IC TC74HC08AF		1	E		
IC2	CAM-000402A	CMOS IC TC74HC04AF		1	E		
IC3	CAG-0618002	Linear IC TC74HC04AF		1	E		
Q1	CBA-0186001	NPN XISTOR. 2SD1904RS		1			
Q2	CBQ-0105001	FET XISTOR. 2SJ263		1			
Q3~5	24220200310	Tip XISTOR. FA1A4M-T1B		3			
	CBC-0040002	Tip XISTOR. KRC102S-RTK				A1	
		<Tip RSTR.>					
R1,3	DBK-103JA4J	CRG10GJ103T 10KΩ		2			
	DBK-103JA4S	RGC210J103				A1	
R2	DBK-271JA2J	CRG4GJ271T 270Ω		1			
	DBK-271JA2S	MCR25JZHU271				A1	
R4	DBK-334JA4J	CRG10GJ334T 330KΩ		1			
	DBK-334JA4S	RGC210J334				A1	
R5	DBK-184JA4J	CRG10GJ184T 180Ω		1			
	DBK-184JA4S	RGC210J184				A1	
R6	DBK-123JA4J	CRG10GJ123T 12KΩ		1			
	DBK-123JA4S	RGC210J123				A1	
R7	DBK-911FA4A	MCR10EZHUF9100 910Ω		1			
	DBK-911FA4S	RGC210F911				A1	
R8	DBK-272FA4J	CRG10GF272 2.7KΩ		1			
	DBK-272FA4S	RGC210F272				A1	
R9	DBK-272FA4A	MCR10PZHF2701 2.7KΩ		1			
	DBK-272FA4S	RGC210F272				A1	
R10	DBK-224JA4J	CRG10GJ224T 220KΩ		1			
	DBK-224JA4S	RGC210J224				A1	
R11	DBK-222JA4J	CRG10GJ222T 2.2KΩ		1			
	DBK-222JA4S	RGC210J222				A1	
R12	DBK-751FA4A	MCR10PZHF7500 750Ω		1			
	DBK-751FA4S	RGC210F751				A1	
R14	DBK-681JA1A	MCR50PZHJ681 680Ω		1			
R16	DBK-102JA1J	CRG2GJ102T 1KΩ		1			
	DBZ-0035001	MCR50JZHJ102				A1	

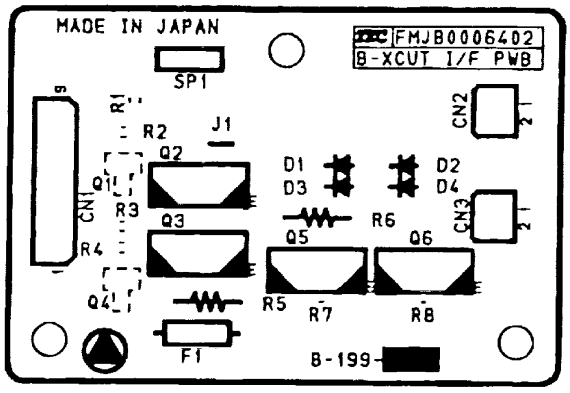
*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

3 PWM2 PC BOARD ASS'Y 2/2

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
R17	DBK-103FA4J	CRG10GF103T 10KΩ		1			
	DBK-103FA4S	RGC210F103				A1	
C1	~~DAA-101MM08~~	Electrolytic CAP.		1			
		~~CESEM1H101A 100μF~~					
	DAA-101MM40	SME50VB100M 100μF	Changed:4/'99				
C2	DAC-334MK02	Film CAP. DTDB1H 0.33μF		1			
	DAC-334MJ06	Film CAP. ECQ-V1H334JZ				A1	
C3	~~DAA-561KM02~~	Electrolytic CAP.		1			
		~~CEEFM1V561M6 560μF~~					
	DAA-561KM05	LXY35VB560MJ30 560μF	Changed:4/'99				
C4,5	DAB-104MZ11	Ceramic CAP.		2			
		GRM40F104Z50PT 0.1μF					
	DAB-104MZ33	Ceramic CAP. C2012JF1H104Z				A1	
D1	CBE-0317001	Diode D4220U		1			
D2,3	2421BAM01Z0	Diode AM01Z		2			
CN1	EAA-1738001	CONN. 53253-0210		1			
CN2	EAA-0520001	CONN. 53014-0910		1			
CN3	EAA-0590001	CONN. 53014-0211		1			
F1	EHA-0076006	Fuse CCV-3AF12.5 3A		1	D		
L1	DDD-0145002	Coil SK-17P-050-230		1			
HS1	24084074039	Heat Sink		1			
	24BP0010306	Sems Screw SM-3x6		3			

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

4 CUT I/F PC BOARD ASS'Y

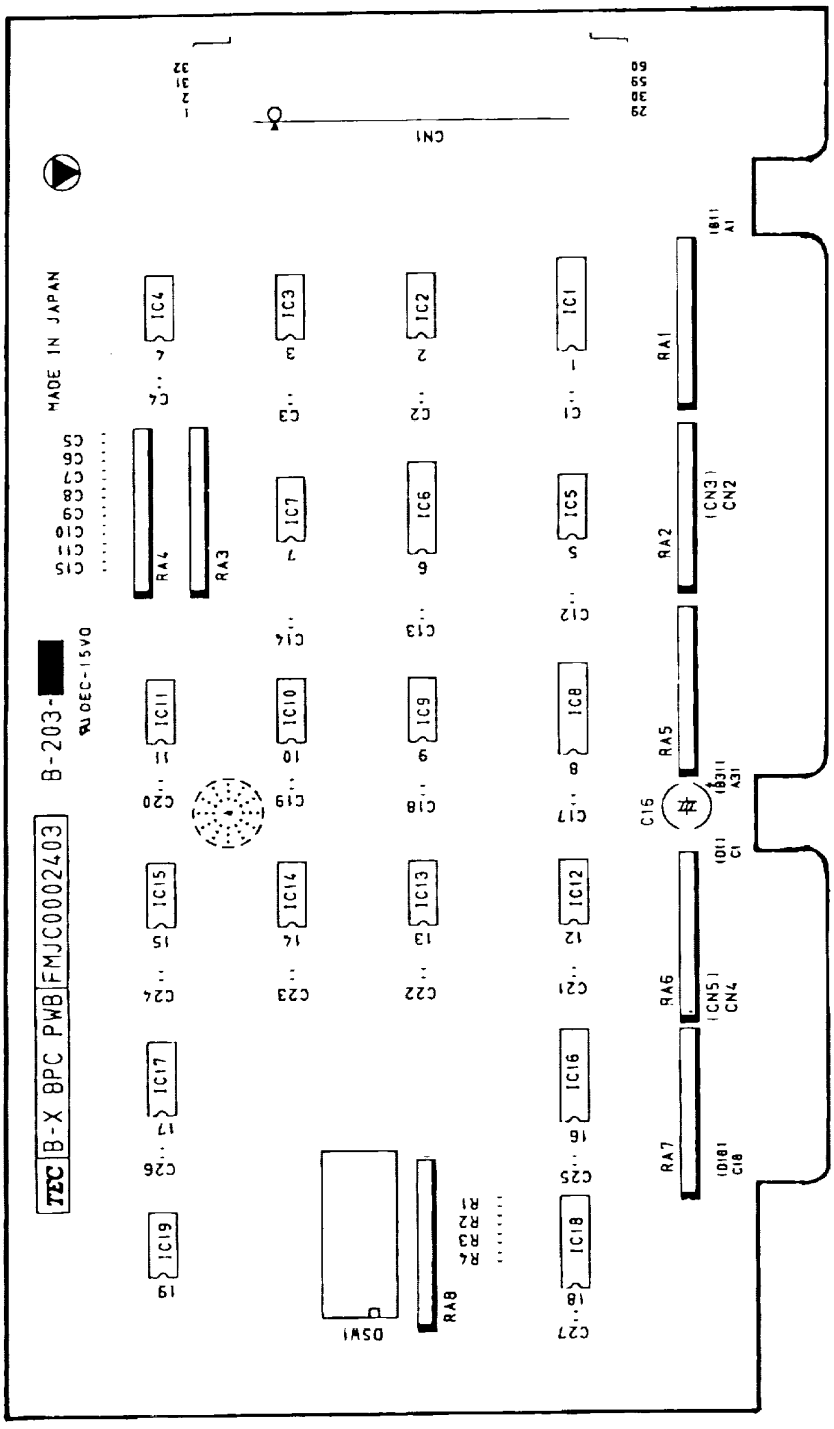


4 CUT I/F PC BOARD ASS'Y

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
	FMBB0034301	CUT I/F PC Board Ass'y (Service No. B-199-01)		1	E		
Q1,4	24220200310	Tip XISTOR. FA1A4M-T1B		2			
Q2,3	CBA-0186001	NPN XISTOR. 2SD1904RS		2			
Q5,6	CBA-0327001	PNP XISTOR. 2SB1268		2			
R1,4,7,8	DBK-103JA4J	Tip RSTR. CRG10GJ103T 10KΩ		4			
R2,3	DBK-102JA4J	Tip RSTR. CRG10GJ102T 1KΩ		2			
R5,6	DBC-272JA5F	MOF RSTR. RSS1/2T52J 27KΩ		2			
D1~4	2421BAM01Z0	Diode AM01Z		4			
F1	EHA-0076007	Fuse CCV-1AF12.5 2A		1	D		
CN1	EAA-0520001	CONN. 53014-0910		1			
CN2	EAA-0590001	CONN. 53014-0211		1			
CN3	24420202270	CONN. 53014-0212		1			
J1	DBA-0R0JA2F	Carbon RSTR. RD1/4SST236J 0Ω		1			

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

5 BPC PC BOARD ASS'Y

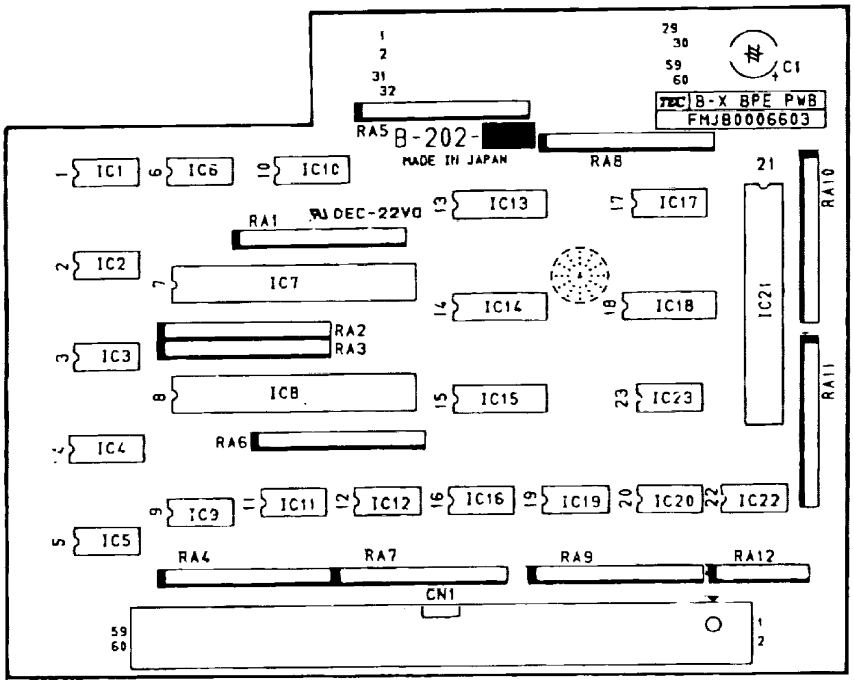


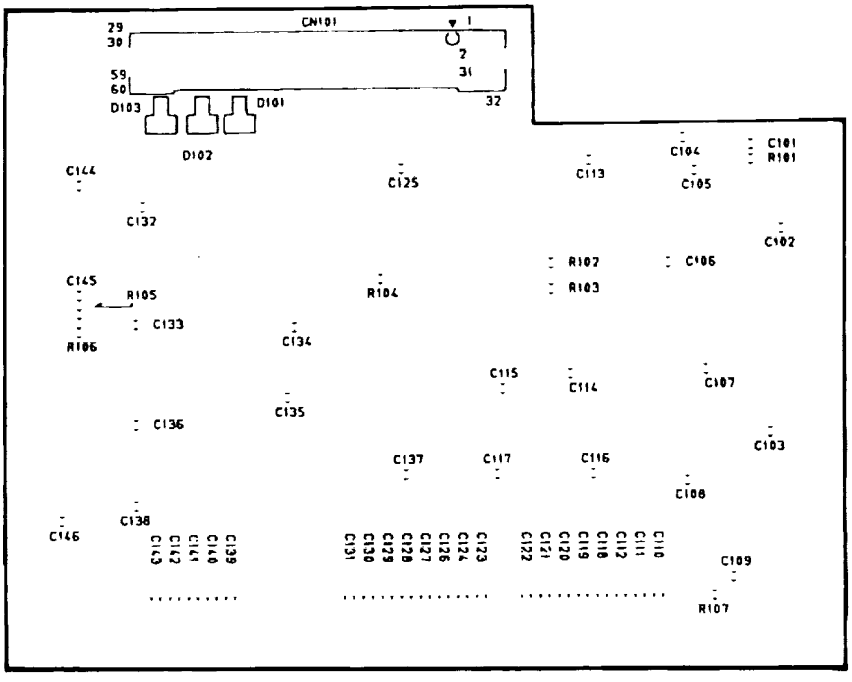
5 BPC PC BOARD ASS'Y

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
	----------	BPC PC Board Ass'y (Service No. B-203-01)		1	E		
IC1,6	CAM-024508A	CMOS IC TC74AC245F TP2		2	E		
IC2~5	2420SNLS06S	TTL IC SN74LS06NS		4	E		
IC6,8,18	CAM-024408A	CMOS IC TC74AC244F		3	E		
IC7,11	CAF-001407F	TTL IC SN74LS14NS-SR05		2	E		
IC9,12	CAM-008608A	CMOS IC TC74AC86F		2	E		
IC10,13	CAM-000408A	CMOS IC TC74AC04F TP1		2	E		
IC14	CAF-003010F	TTL IC SN74AS30NS-SR05		1	E		
IC15,19	CAM-003208A	CMOS IC TC74AC32F TP1		2	E		
IC17	CAM-013908A	CMOS IC TC74AC139F TP2		1	E		
R1,4	DBK-103JA4J	Tip RSTR. CRG10GJ103T 10KΩ		2			
R2,3	DBK-333JA4J	Tip RSTR. CRG10GJ333T 33KΩ		2			
RA1~3,5~8	2425240008J	RSTR. Array EXB-F9E103J 10KΩ		7			
RA4	DBP-0013001	RSTR. Array EXB-F9E471J 470Ω		1			
C1~4,12~14, 17~27	DAB-103MK10	Ceramic CAP. GRM40B103K 50PT 0.01μF		18			
C5~11,15	DAB-101MJ17	Ceramic CAP. GRM40CH101J 50PT 100pF		8			
C16	DAA-101CM21	Electrolytic CESEM1A101 100μF		1			
CN1	EAA-2423001	CONN. 8850-060-170LD		1			
	FMEB0091401	PC Shield Plate		1			
	24B50010305	Flanged Screw FL-3x5		2			
	24BB001G606	Sems Screw SM-2.6x6		2			
DSW1	EBC-0065001	Dip Switch KS08		1			
J1	DBK-000JA4A	Tip RSTR. MCR10EZHJ000 0Ω		1			

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

6 BPC PC BOARD ASS'Y



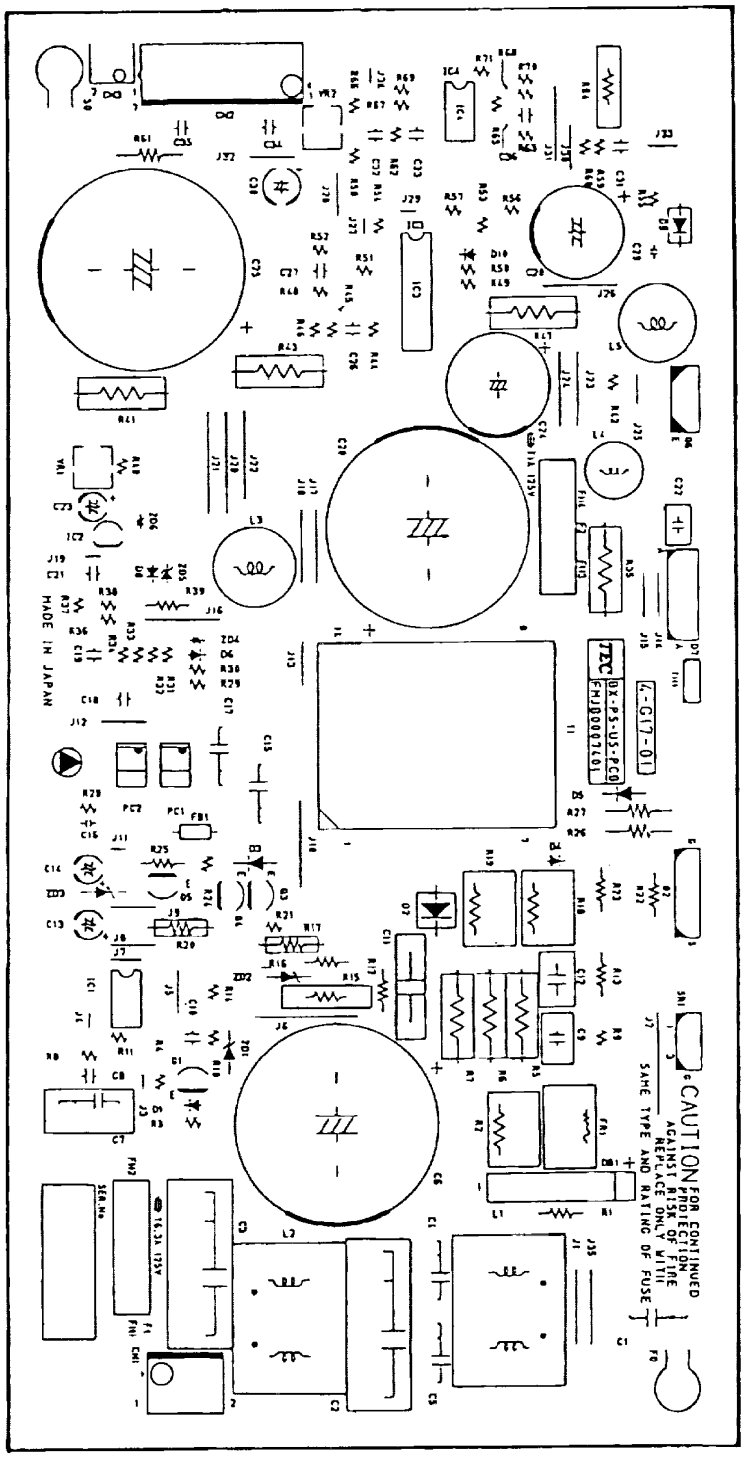


6 BPC PC BOARD ASS'Y

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
	----------	BPE PC Board Ass'y (Service No. B-202-01)		1	E		
IC1,23	CAM-000808A	CMOS IC TC74AC08F TP1		2	E		
IC2,6	CAM-003208A	CMOS IC TC74AC32F TP1		2	E		
IC3,19	CAM-000408A	CMOS IC TC74AC04F TP1		2	E		
IC4,17	CAM-017508A	CMOS IC TC74AC175F		2	E		
IC5	CAM-007408A	CMOS IC TC74AC74F TP1		1	E		
IC7,8,21	CAC-0274001	FIFO IC LH5496D-50		3	E		
IC9,11,12,20	CAF-001407F	TTL IC SN74LS14NS-SR05		4	E		
IC10	CAM-013808A	CMOS IC TC74AC138F TP1		1	E		
IC13~15,18	CAM-024408A	CMOS IC TC74AC244F		4	E		
IC16,22	2420SNLS06S	TTL IC SN74LS06NS		2	E		
R101	DBK-511JA4J	Tip RSTR. CRG10GJ511T 510Ω		1			
R102~107	DBK-103JA4J	Tip RSTR. CRG10GJ103T 10KΩ		6			
RA1~3,6,11	2425240008J	RSTR. Array EXB-F9E103J 10KΩ		5			
RA4,7,9	DBP-0013001	RSTR. Array EXB-F9E471J 470Ω		3			
RA5,8,10	2425240030J	RSTR. Array EXB-F9E104J 100KΩ		3			
RA12	2425240007J	RSTR. Array EXB-F5E103J 10KΩ		1			
D101~103	CBN-0022001	Tip Diode HSM107STL		3			
C1	DAA-101CM21	Electrolytic CAP. CESEM1A101 100μF		1			
C101,110~112, 118~124,126~ 131,139~143	DAB-101MJ17	Ceramic CAP. GRM40CH101J 50PT 100pF		22			
C102~109,113, 115~117,125, 132~138,144, 146	DAB-103MK10	Ceramic CAP. GRM40B103K 50PT 0.01μF		22			
C114,145, 147,148	DAB-471MJ07	Ceramic CAP. GRM40CH471J 50PT 470pF		4			
CN1	EAA-0299020	CONN. 5332-60GS1		1			
CN101	EAA-2395001	CONN. 8811-060-170S		1			
J51	DBK-000JA4A	Tip RSTR. MCR10EZHJ000 0Ω		1			

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

7 PS UNIT (QQ MODEL)



7 PS UNIT (QQ MODEL) 1/4

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
	GDB-0087001	PS Unit	QQ	1	E	A1	
IC1	CAG-0412001	Reset IC FA5311P		1	E		
IC2	CAG-0239001	Regulator IC HA17431P-TZ		1	E		
IC3	CAG-0260001	Regulator IC IR3M02A		1	E		
IC4	CAG-0144011	Comparetor IC TA75393P		1	E		
PC1,2	DEC-0001005	Photo Coupler PC817		2			
T1	FMQC0020901	Transformer BX-US-T1		1			
Q1	CBA-0007030	PNP XISTOR. 2SA1015-Y		1			
Q2	CBQ-0040002	FET XISTOR. 2SK1016		1			
	HHC-0023001	Silicone Cap TC-45A (CP-TO-3P)		1			
Q3	CBA-0007038	PNP XISTOR. 2SA1020-Y		1			
Q4,5	CBA-0082016	NPN XISTOR. 2SC2655		2			
Q6	CBA-0160001	PNP XISTOR. 2SA1290		1			
	HHC-0023002	Silicone Cap TC-45A (CP-TO-220)					
VR1,2	DBJ-0004001	V. RSTR. KVSF367T 5KΩ		2	E		
		<Carbon RSTR.>					
R1	DBA-474JA1E	RDM12TS471J 470KΩJ		1			
R3,4,51	DBA-104JA2E	RDM14TS104J 100KΩ		3			
R8	DBA-240JA2E	RDM14TS240J 24ΩJ		1			
R9	DBA-102JA2E	RDM14TS102J 1KΩ		1			
R10,14	DBZ-0122001	RDMF14TS272J 2.7KΩJ		2			
R11,37,42,71	DBA-111JA2E	RDM14TS111J 110Ω		4			
R12,16	DBA-104JA1E	RDM12TS104J 100KΩ		2			
R13,23	DBZ-0145001	RDMF12S330J 33ΩJ		2			
R21,24	DBA-103JA2E	RDM14TS103J 10KΩ		2			
R25,39	DBA-222JA1E	ERG12ANJ222 2.2KΩ		2			
R28,54,57	DBA-222JA2E	RDM14TS222J 2.2KΩ		3			
R29~31,34,36	DBA-102JA2E	RDM14TS102J 1KΩ		5			
R32	DBA-331JA2E	RDM14TS331J 330Ω		1			
R33	DBA-681JA2E	RDM14TS681J 680Ω		1			
R38	DBA-513JA2E	RDM14TS513J 51KΩ		1			

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

7 PS UNIT (QQ MODEL) 2/4

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
		<Carbon RSTR.>					
R40,50,52,69	DBA-472JA2E	RDM14TS472J 4.7KΩ		4			
R44	DBA-243JA2E	RDM14TS243J 24KΩ		1			
R48,55	DBA-471JA2E	RDM14TS471J 470Ω		2			
R49	DBA-203JA2E	RDM14TS203J 20KΩ		1			
R53,56	DBA-510JA2E	RDM14TS510J 51Ω		2			
R58	DBA-182JA2E	RDM14TS182J 1.8KΩ		1			
R66	DBA-202JA2E	RDM14TS202J 2KΩ		1			
R68,70	DBA-105JA2E	RDM14TS105J 1MΩ		2			
		<MOF RSTR.>					
R5~7	DBC-333JB2E	RSMF3BL 33KΩ		3			
R17,20	DBC-333JB3E	RSMF2BL 33KΩJ		2			
R22	DBC-822JA5E	RSMF1/2B 8.2KΩJ		1			
R26	DBC-3R3JA4E	RSMF1B3R3 3.3Ω		1			
R27	DBC-151JA4E	RSMF1B151J 150Ω		1			
R35	DBC-681JB2E	RSMF3BL681J 680Ω		1			
R41,43	DBC-162JA2E	RSMF3BL 1.6KΩJ		2			
R47	DBC-301JA2E	RSMF3BL 300ΩJ		1			
R61	DBC-330JA4E	RSMF1B330J 33Ω		1			
R2	DBD-0145001	Cement RSTR. ERF-5TK-100 10Ω		1			
R15	DBD-0051001	Cement RSTR. RGC5 0.18ΩJ		1			
R18,19	DBD-0055004	Cement RSTR. ERF-5TJ101 100Ω		2			
R64	DBD-0046002	Cement RSTR. BPR28F 0.05Ω		1			
R59	DBB-866101E	Metal Film RSTR. RNM14TS8661F 8.66KΩ		1			
R60	DBB-820202E	Metal Film RSTR. RNM14TS8202F 82KΩ		1			
R62,63,65,67	DBB-243101E	Metal Film RSTR. RNM14TS2431F 2.43KΩ		4			
ZD1,2	CBG-0199001	Z.Diode RD39ES-T1 (AB)		2			
ZD3	CBG-0070031	Z.Diode RD27EB2		1			
ZD4	CBG-0314001	Z.Diode RD8.2ESAB1-T1		1			
ZD5	CBG-0147001	Z.Diode RD33ESAB2-T1		1			
ZD6	CBG-0230001	Z.Diode RD5.1ESB-T1		1			

*1: Q'ty/Unit *2: Recommended Parts *3: Revised Record *4: New Parts

7 PS UNIT (QQ MODEL) 3/4

Ref.No.	Part No.	Description	Remarks	*1	*2	*3	*4
D1	CBE-0069004	Diode ERA15-06V3		1			
D2	DBF-0040003	Diode ERD28-08		1			
D3,5	CBE-0180001	Diode AU02Z		2			
	CBE-0137001	Diode 1SA124-200A					
D4	CBE-0016008	Diode 1SS270A		1			
	CBE-0139001	Diode 1N4531					
D6,8,10	CBE-0093002	Diode 1SS133T-77		3			
D7	CBE-0124001	Diode ESAD92M-03		1			
	HHC-0023001	Silicone Cap TC-45A (CP-TO-3P)		1			
D9	CBE-0140001	Diode RK44		1			
DB1	CBM-0013004	Diode Bridge RBV-404		1			
SCR1	CBK-0022003	Thyristor CR6PM-12-A8		1			
	HHC-0023002	Silicone Cap TC-45A (CP-TO-220)		1			
		<Film CAP.>					
C2,3	DAC-224VM05	CF-KH22E224M 0.22μF		2			
C7	DAC-334MK08	ECQ-B1H334KF 0.33μF		1			
C8	DAC-103MK08	ECQ-B1H103KF 0.01μF		1			
C9	DAC-104MK09	ECQ-B1H104KF 0.1μF		1			
C10	DAC-471MK02	ECQ-B1H471KF 470pF		1			
C11	DAC-104WK08	ECQ-E6104KF 0.1μF		1			
C16	DAC-473MK06	ECQ-B1H473KF 0.047μ		1			
C18,19,31~36	DAC-104MK09	ECQ-B1H104KF 0.1μF		8			
C21,29	DAC-472MK02	ECQ-B1H472KF 4700pF		2			
C26,27	DAC-102MK06	ECQ-B1H102KF 1000pF		2			
		<AL CAP.>					
C6	DAA-122VM02	CEDUF2E122M41 1200μF		1			
C13	DAA-4R7MM15	CEEFM1H4R7M3 4.7μF		1			
C14,23	DAA-220MM20	CEDFM1H220M3 22μF		2			
C20,25	DAA-223KM04	CEAUF1V223M4 22000μF		2			
C24	DAA-222KM01	CEBSM1V222M 2200μF		1			
C28	DAA-222CM04	CEDFM1A222M7 2200μF		1			
C30	DAA-221CM15	CEBSM1A221M 220μF		1			

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