SP5/SP5L PRINTER CONTROLLER
(Machine Code: A852)

1.   OVERALL MACHINE INFORMATION

1.1   INTRODUCTION

The SP5 base engine contains an interface for the SP5 multi-function controller. The SP5 multi-function controller adds printer function. Printer function can operate independently and simultaneously with other functions in the background, and their output will be interleaved with the copy mode output.

The printer supports the PCL6, and PostScript level 3. PostScript language support is an optional function.

Host printer data can be received via the standard parallel port or the optional Network Interface Board (NIB). The parallel port supports bi-directional Command and Status feed back communication with the host machines.

An optional IDE hard disk drive provides font download, macro download, and other functions.

Additional DRAM SIMMs can be installed to boost the printer performance.

Images can be rasterized at 300, 400, or 600 dpi in the controller but printed at 400 or 600 dpi. For 300 dpi printing, the 300 dpi data from the controller is simulated in the base engine by printing the same pixel twice and the same line twice at 600 dpi.

The SP5 engine can print 65 pages per minute at both 400 and 600 dpi. On the other hand, the SP5L engine can print 55 pages per minute at both 400 and 600 dpi.

1.2 SPECIFICATIONS

Resolution:	600 x 600 dpi
	400 x 400 dpi (available when the PostScript option is installed)
	300 x 300 dpi (simulated by doubling pixel width and height at 600 dpi resolution)
Gray Scale:	256 levels
Printing Speed:	65 ppm (SP5)
	55 ppm (SP5L)
Printing Emulation:	Main Controller Board: PCL5e and PCL6 Optional PS Board: PostScript Level 3
Printer Font:	45 scaleable typefaces in 14 typeface families (35 Intellifont and 10 TrueType format fonts)
	6 bitmapped typefaces in the Line Printer typeface family
Printer Interface:	Bi-directional Parallel x 1 (Standard)
	Network Interface x 1 (Option)
	Ethernet (100 base-TX/10 base-T for TCP/IP, IPX/SPX, EtherTalk)
DRAM Capacity:	8 MB (Standard)
	2 DRAM SIMM slots (up to 64 MB)
	Maximum Total: Up to 72 MB

1.3 SOFTWARE

1.3.1 PRINTER DRIVERS

The following printer drivers are enclosed in the printer manual/driver kit
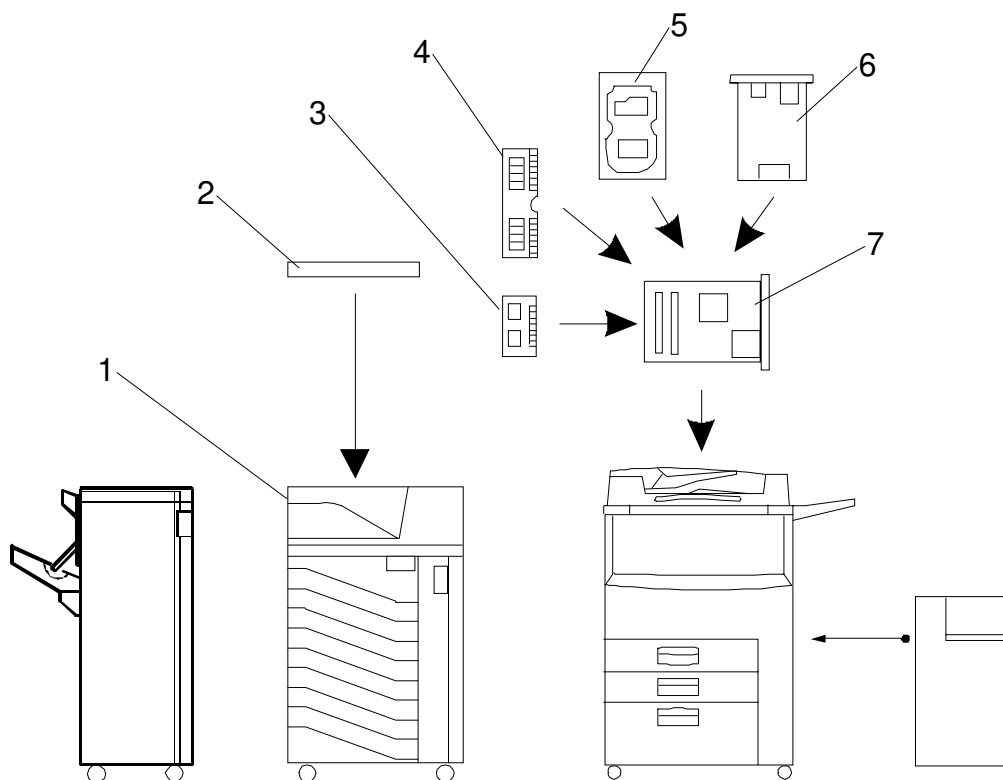- PCL5e Printer Driver for Windows 3.1/95/98/NT
- PCL6 Printer Driver for Windows 3.1/95/98/NT
- PS3 Printer Driver for Windows 3.1/95/98/NT and Macintosh

1.3.2 NETWORK UTILITIES

The network utilities are enclosed in the Network Interface Board option. Refer to the NIB manual for details.
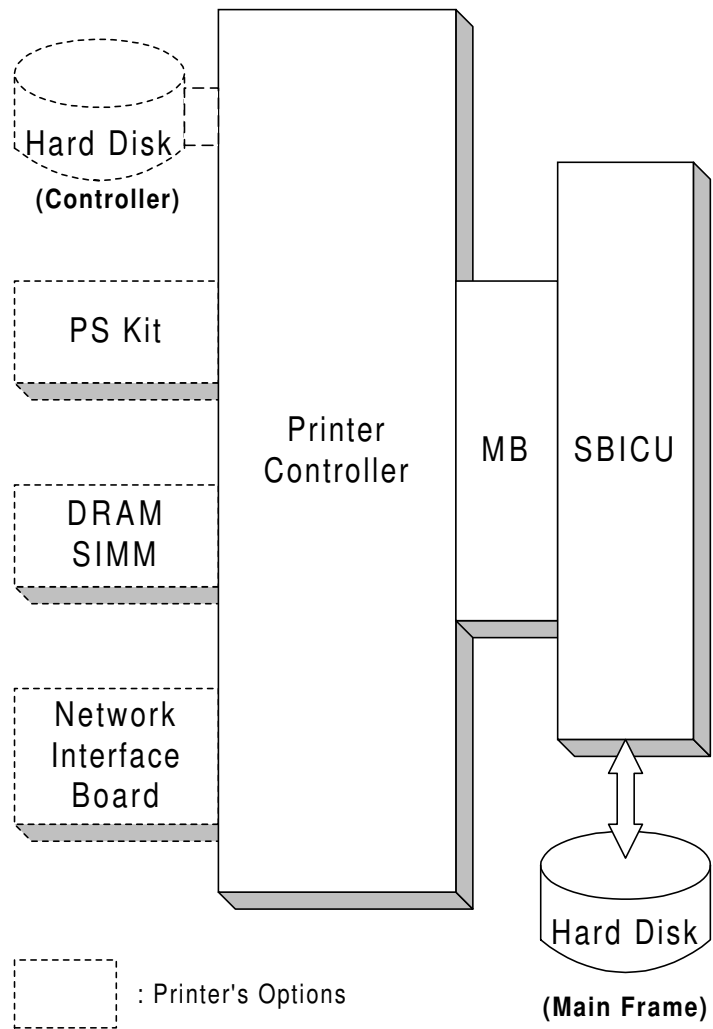
1.4 MACHINE CONFIGURATION

A852V500.WMF

Item	Machine Code	No.
Printer Controller	A852	7
PostScript Kit	A866	3
Hard Disk	A853	5
Network Interface Board	A855	6
Mailbox	G909	1
Mailbox Bridge Unit	G912	2
RAM SIMM	---	4
Printer Manual/Driver Kit	A868	---

1.5 STRUCTURE

1.5.1 BLOCK DIAGRAM

A852V501.WMF

1.5.2 DESCRIPTIONS

1. Printer Controller

The printer controller handles the following functions:

- Printer host interface
- Printing functions
- Interface and control of additional controller options (HDD, PS kit, DRAM SIMM, and network interface board)

2. Hard Disk (option)

This HDD stores the additional soft fonts and macros (both PCL and PS fonts).

3. PS Kit (option)

This is to add the PostScript level 3 feature.

4. Network Interface Board (option)

The network interface board is an additional printer interface to allow the printer to be used on a network.

5. DRAM SIMM (option)

There are two DRAM SIMM slots. This is used for an additional printer processing memory area. 8, 16, or 32 Mbyte standard SIMM modules can be installed. As a result, up to 72 Mbytes of RAM are installable (8 Mbytes on board plus 64 Mbytes of optional SIMM).

6. MB (Mother Board)

This connects the controller to the SBICU board in the printer controller box.

2.   DETAILED SECTION DESCRIPTIONS

2.1 HARDWARE OVERVIEW
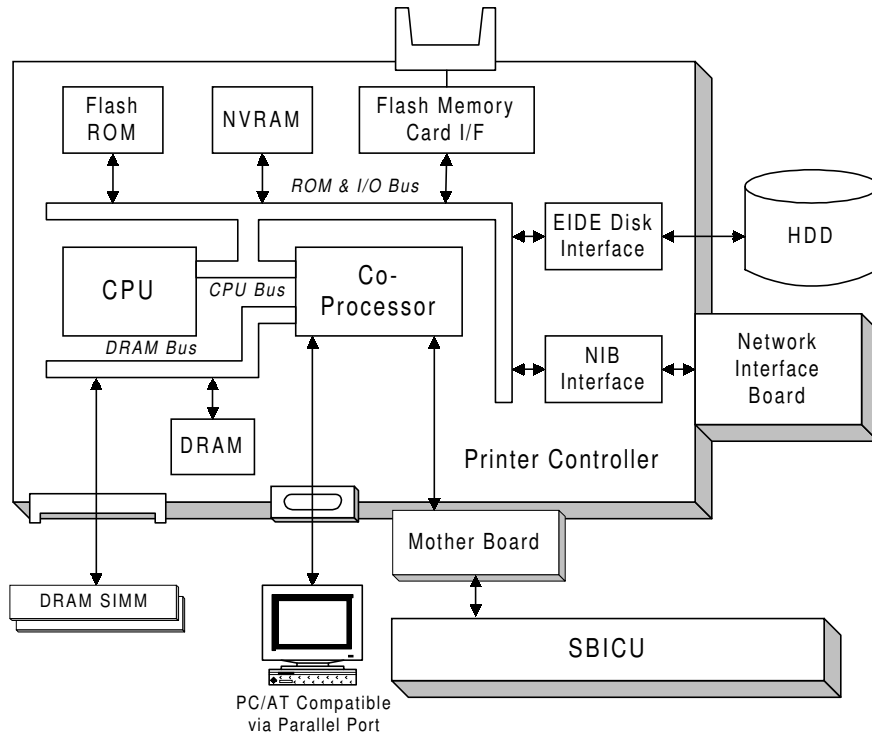
A852D500.WMF

The above block diagram shows the major components of the printer controller.
The main features of the controller are as follows.

1.   CPU

An IBM PPC603 processor is used. A 33 MHz oscillator is used as the clock
source for both this CPU and the coprocessor.
The processor with a bus clock of 33 MHz, and internal clock of 133 MHz.

2.   Co-processor

This performs the following functions.

- ROM control
- I/O control
- DRAM control
- Printer video interface
- Printer communication interface
- IEEE 1284 compliant bi-directional parallel port interface
- Interrupt control

2-1

3. ROM memory

1) Flash ROM (4 Mbytes)

This flash ROM includes boot code, operation system code, PCL5e codes, PCL6 code, and font data for both PCL languages (resident fonts).

2) ROM SIMM (4 Mbytes for the PostScript option)

This ROM SIMM includes the PostScript code and PostScript font data.

4. NVRAM (8 Kbytes)

This NVRAM contains the printer settings, job record data, and error record data.

5. Network Interface Board Interface

This controls the optional network interface board, and printer MIB is provided to support the network operations.

6. Hard Disk Drive Interface (Enhanced IDE)

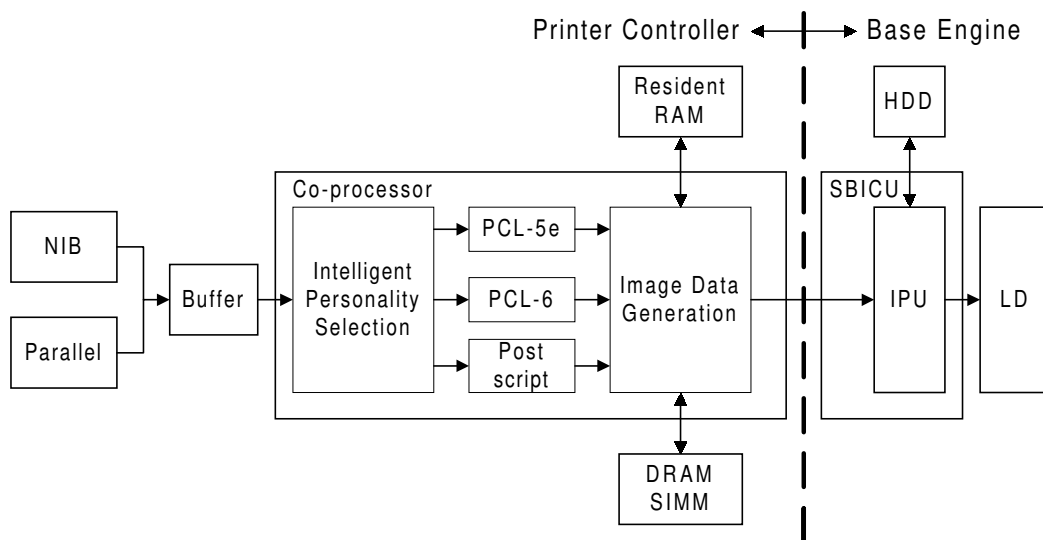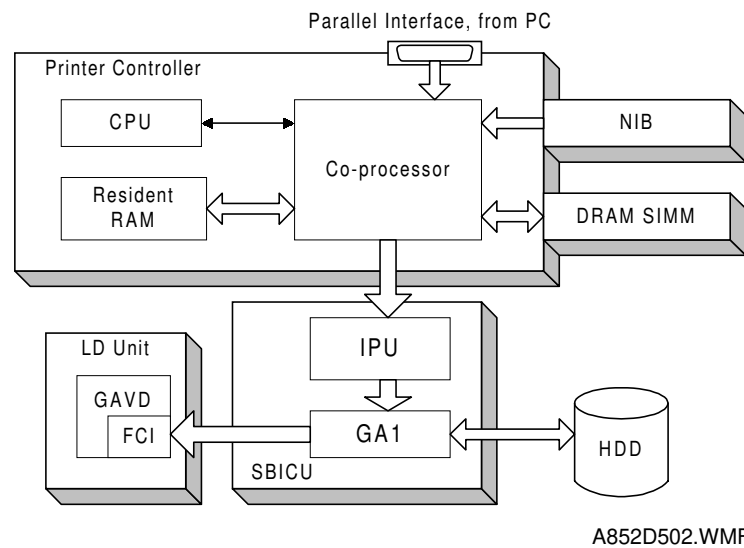This HDD interface is provided to support storage of fonts and macros downloaded from a PC.

7. Flash Memory Card Interface

The flash memory card for updating the controller and PostScript firmware is connected to this flash memory card slot.

8. Power-on Self Diagnostic

When the controller is turned on, the controller performs a self diagnostic test.

2.2 IMAGE PRINTING

Parallel Interface, from PC

Printer Controller

CPU

Co-processor

NIB

Resident
RAM

DRAM SIMM

LD Unit

IPU

GAVD

FCI

GA1

HDD

SBICU

A852D502.WMF

Printer Controller ←→ Base Engine

Resident
RAM

HDD

NIB

Buffer

Co-processor

Intelligent
Personality
Selection

PCL-5e

PCL-6

Post
script

Image Data
Generation

SBICU

IPU

LD

Parallel

DRAM
SIMM

A852D503.WMF

The printer controller receives the print data from the computer through the parallel or network interface port. The co-processor handles the image data but it only makes a raster image. All image processing, such as edge smoothing and toner saving, are done in the base engine.
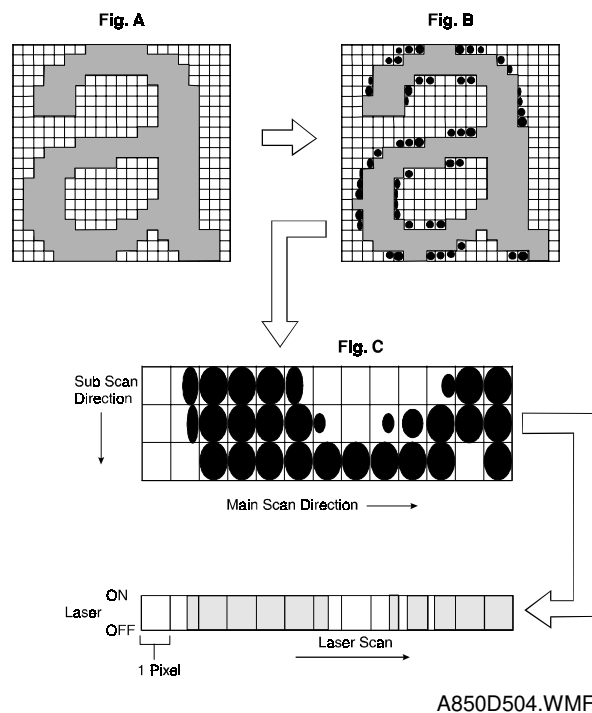
The image data from a PC goes to the buffer in the resident RAM. Then, it goes to the co-processor. The co-processor selects the printer language automatically, then the co-processor generates the print data to match the selected printer language. After generating the print data, the co-processor sends it to the LD unit through the IPU on the SBICU board. At that time, the data is also sent to the hard disk for multiple printing and sorting, as well as backup in case of paper jams.

2.3 IMAGE DATA PROCESSING

The FCI in the LD unit is responsible for edge smoothing and toner saving functions.

The edge smoothing and toner saving modes can be switched on or off using the printer user tool or the printer driver.

2.3.1 EDGE SMOOTHING

Fig. A   Fig. B

Fig. C

Sub Scan
Direction

Main Scan Direction ⟶

ON
Laser
OFF

Laser Scan

1 Pixel

A850D504.WMF

Usually, binary picture processing generates jagged edge on characters as shown in the above left illustration. The FCI reduces the edges of characters using edge smoothing.

Whether or not the object pixel undergoes smoothing depends on the surrounding image data. Smoothing for the object pixel is done by changing the laser pulse position.

2.3.2 TONER SAVING MODE

Toner saving is done by reducing the number of black dots printed, not by varying the development bias. In toner saving mode, the image data is filtered through a matrix.

As a result of passing through the filter, less toner is used to create the latent image on the drum, and black areas print as gray.

2.4 FEATURES

2.4.1 SORTING

If "Collate" is turned on and a multicopy job is printed, the first copy of the job will be printed directly. At the same time, the image data for the copy job is stored in the hard disk of the main machine. When the main machine prints the next copy, the next copy will be printed from the hard disk.

If the finisher is not installed, the rotate sort feature can be used. The image is rotated by the SBICU, in the same way as image rotation for the copier.

Detailed Descriptions

2.4.2 DUPLEX PRINTING

Duplex printing is available with all output bin options but not all paper sizes (refer to the specifications section of the copier manual). If a job specifies duplex but the paper size to be used is not usable in the duplex unit, the job will be printed simplex.

Duplex printing is available in two binding methods: Short-edge binding and Long-edge binding.

In short-edge binding, when printing the second side of a page, the image may require rotation. The image is rotated by the co-processor in the printer controller.

The co-processor corrects the image printing order for duplexing as follows.

• Larger than A4 lengthwise/LT lengthwise (example 8 pages)
  1st page – 3rd page – 2nd page – 5th page – 4th page – 7th page – 6th page – 8th page

• Up to A4 lengthwise/LT lengthwise (example 14 pages)
  1st page – 3rd page – 5th page – 2nd page – 7th page – 4th page – 9th page – 6th page – 11th page – 8th page – 13th page – 10th page – 12th page – 14th page

2.4.3 STAPLING

Stapling is only available when the finisher is installed.

The finishers have the following stapling positions.

  1) Upper left, diagonal
  2) Upper right, diagonal
  3) Left, two staples
  4) Top, two staples
  5) Right, two staples
  6) Upper left, horizontal
  7) Upper right, horizontal
  8) Upper left, vertical
  9) Upper right, vertical

Depending on the paper orientation, the image may have to be rotated. This image rotation is done by the co-processor in the printer controller.

There is a limit for the number of sheets which can be stapled by finisher. If a job that specifies stapling has more than this number of sheets, it will not be stapled.

2.4.4 PUNCHING

Punching is only available when the punch unit is installed with the finisher. The number of holes depends on the type of punching unit. The punching unit has only one available position, so the relationship between the punching position and the printed image depends on the paper feeding orientation and imaging. The punching positions are defined as follows.

  1) Left
  2) Top
  3) Right

2.4.5 JAM RECOVERY

If the jam recovery feature is on and a paper jam occurs, the controller will reprint all pages for which a feed-out indication has not been received from the main machine. In usual cases, all image data from the controller will be sent to the hard disk on the main machine, When a jam occurs, the recovery data will be sent from the hard disk on the main machine.

Detailed Descriptions

2.4.6 AUTO TRAY SELECT

When "Auto Select" is selected with the printer driver, the printer searches for a tray that contains the specified size of normal plain paper. The search starts from the LCT, and when a tray that contains the specified size of paper is found, the printer starts printing and feeds paper from that tray. The search sequence is as follows.

LCT – 1st tray – 2nd tray – 3rd tray – LCT

The default setting for the current tray is LCT. If the LCT is not installed, the default is the 1st tray.

2.4.7 POWER ON SELF DIAGNOSTICS

When the controller is turned on, it performs a self diagnostic sequence of tests automatically. If any errors were detected, an error message will be displayed on the operation panel.

Test Items

Devices always tested

- Co-processor
- Flash ROM
- Resident RAM
- NVRAM
- Engine I/F

Devices tested when they are installed

- DRAM SIMM
- PS DIMM I/F
- HDD I/F
- Network interface board I/F

2.4.8 DOCUMENT SERVER

The Document Server enables to save documents in the mainframe memory (HDD), then can be edited and printed as operator want.

There are two ways to save documents.

- Sending data from the computer
- Scanning originals from the document feeder (ADF), or the exposure glass of the machine

There are three featurs.

- **Prepare the documents operator want to save.**

- **Save the documents.**
  The documents are saved in the mainframe memory.

- **Print the documents.**
  Operator can print any of the saved documents with any desired settings at any time.

2.5 HARD DISK

Two hard disks are used for the printer functions. One is connected to the printer controller (Printer HDD). The other is in the main machine (Engine HDD).

2.5.1 PRINTER HDD

When the main power switch is turned on after the printer HDD is installed, the machine asks you to format the hard disk in the printer mode.

If you press the "Continue" button, the machine formats the hard disk. At this time, two partitions will be made on the hard disk. One is for PCL and the other is for PostScript (fonts and macros only).

If you press the "Cancel" button, the machine determines that there is no optional printer hard disk.

2.5.2 ENGINE HDD

The hard disk in the main machine is used for copy, printer and document server functions. Therefore, the hard disk has three partitions: for copier, printer, and document server (one of the copier features). The sizes of the partitions depends on the setting of "System Settings – Count Manager – Memory Allocation", as shown below.

|	Copy Priority (Default)	Document Server Priority	Printer Priority	Min. Memory for Copier	Max. Memory for Copier	Max. Mem. for Doc. Server
OMB						
	Copier 1050 MB	Copier 650 MB	Copier 650 MB	Copier 450 MB	Copier 1450 MB	Copier 450 MB
		Printer 200 MB	Printer 600 MB	Printer 400 MB		Printer 200 MB
	Printer 200 MB	Document Server 800 MB	Document Server 400 MB	Document Server 800 MB	Document Server 100 MB	Document Server 1000 MB
1650 MB	Document Server 400 MB				Document Server 100 MB	

A850D505.WMF

3. INSTALLATION PROCEDURE

3.1 PRINTER CONTROLLER
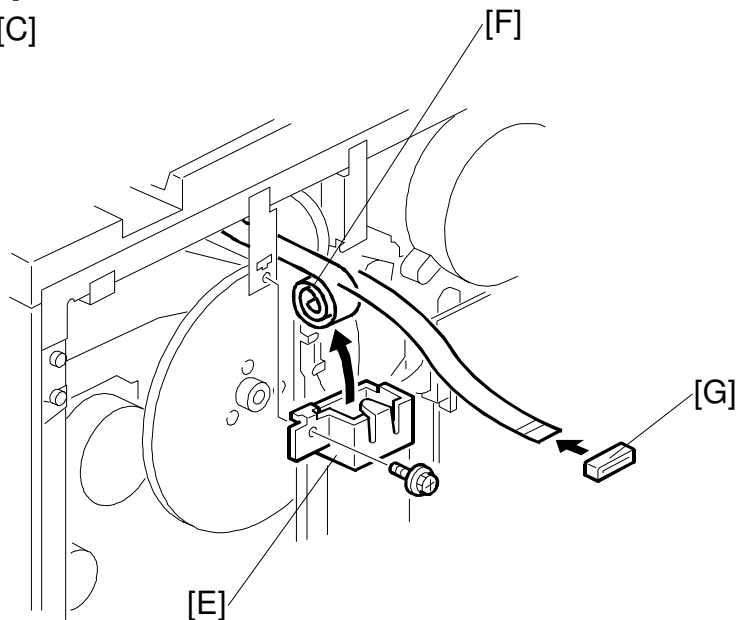
3.1.1 ACCESSORY CHECK

Check the accessories in the box against the following list.

No.	Description	Q'ty
1.	Controller Box Cover	1
2	Cable Clamp	1
3	Key Top - Copy/Printer/Document Server	1
4	Tapping Screw – M4 x 8	3
5	Tapping Screw – M3 x 6	6
6	Ferrite Core	1
7	Installation Procedure	1

Installation

3.1.2 INSTALLATION PROCEDURE

[A]

[B]

[D]

[C]

A852I501.WMF

[F]

[G]

[E]
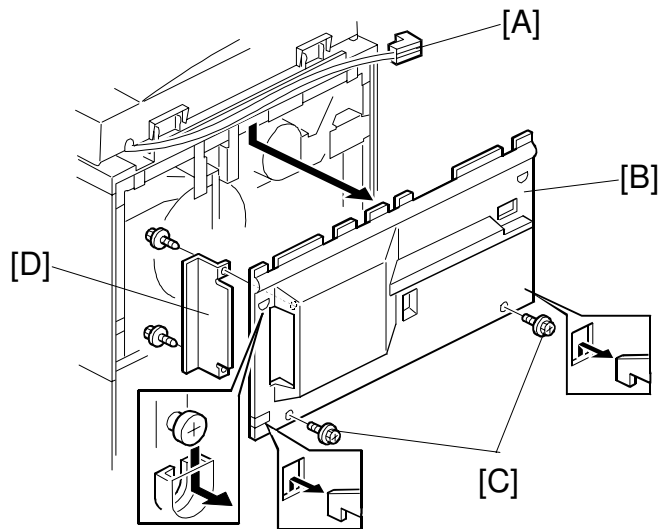
A852I502.WMF

⚠**CAUTION**

Unplug the copier power cord before starting the following procedure.

1. Disconnect the ADF connector [A].

2. Remove the upper rear cover [B] (2 screws [C]).

3. Remove the bracket [D] (2 screws).

4. Remove the cable folder [E] (1 screw).

5. Stretch the flat cable [F].

6. Thread the flat cable through the ferrite core [G].
   NOTE: The ferrite core drops easily, so bend the end of cable as shown in the
   diagram on the next page.

A852I504.WMF

A852I500.WMF

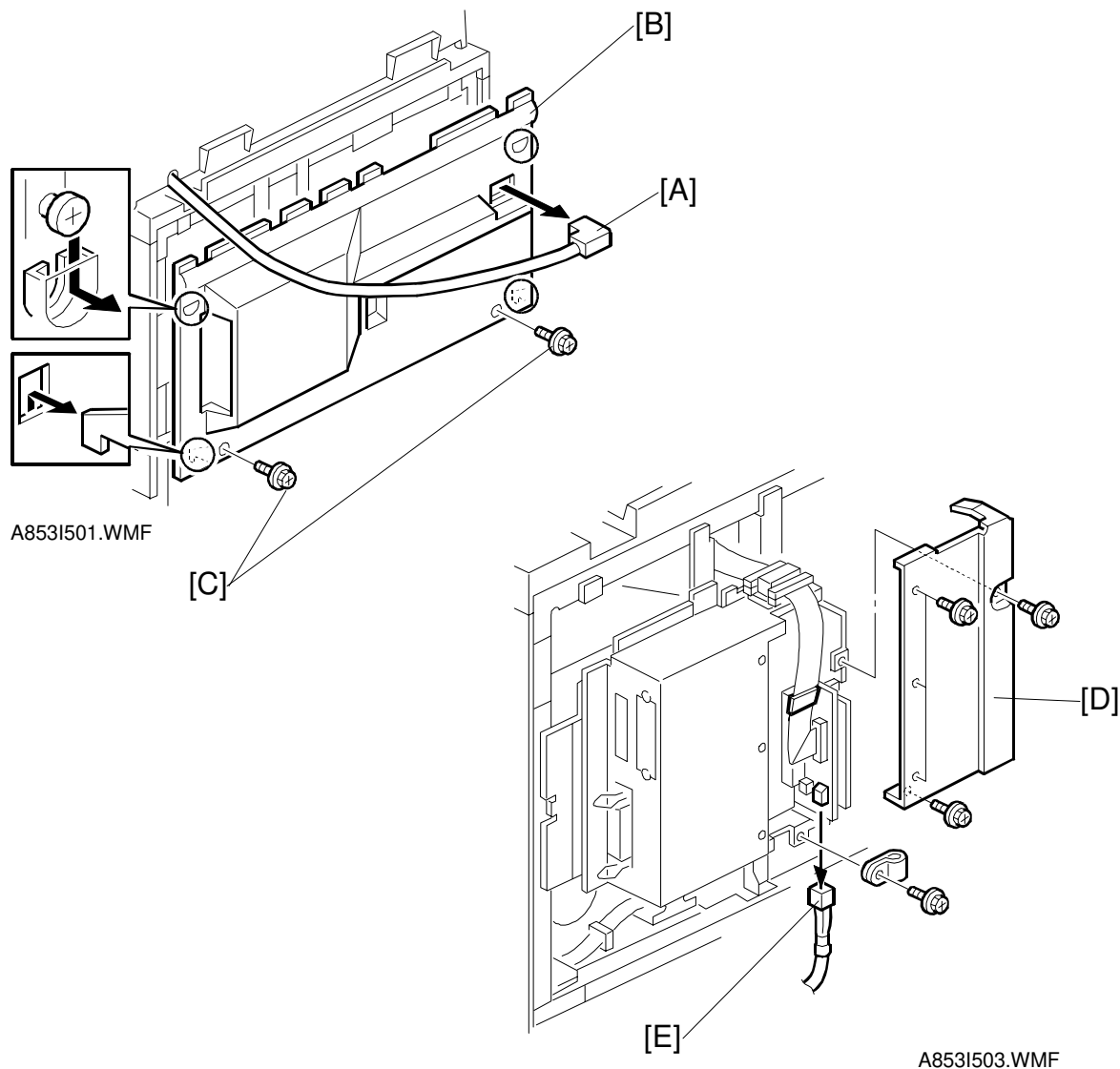|	120V	220 - 240V
Copy		▯
Document Server		▱
Printer		▱

A852I505.WMF
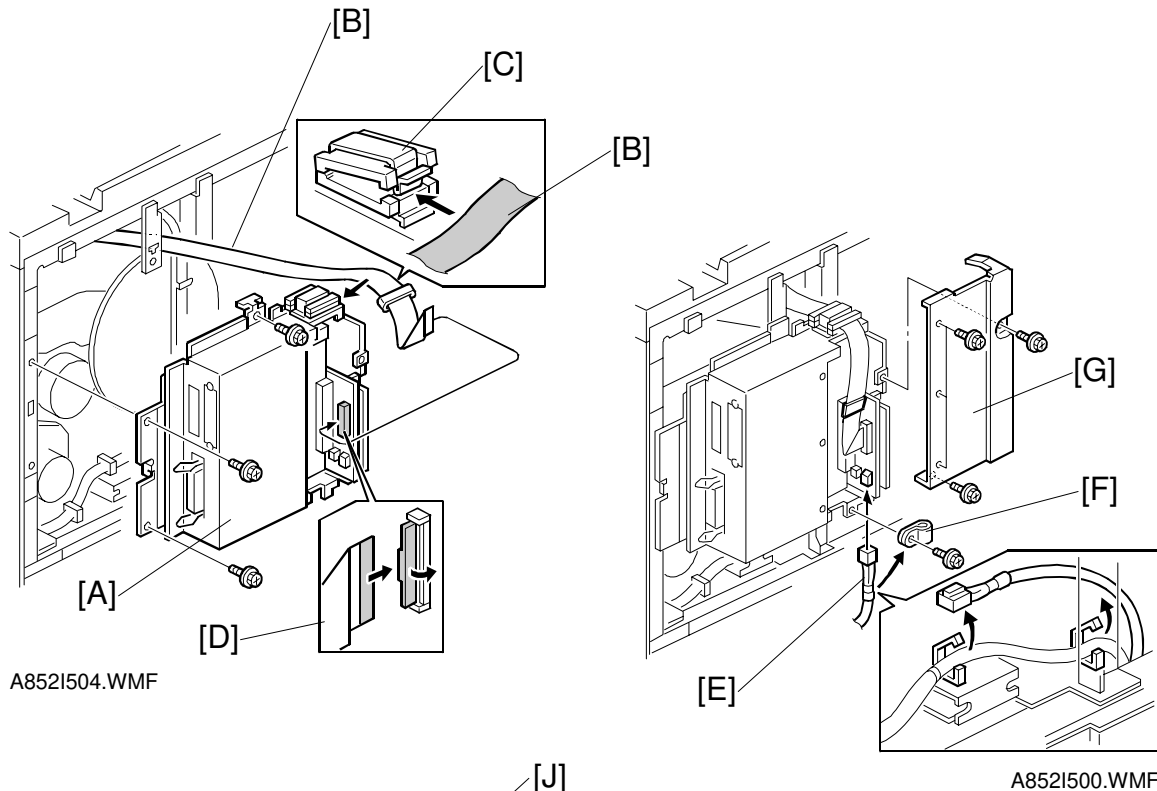
7. Install the controller box [A] (3 screws).

8. Attach the flat cable [B] to the ferrite core [C].

9. Connect the flat cable [D] as shown (1 connector).

10. Connect the cable [E] and attach the clamp [F] (1 connector and 1 screw)

11. Install the cover [G] (5 screws).

12. Remove the key top cover [H] of the operation panel.

13. Install the key top [I] and the key top cover [J] on the operation panel as shown.

14. Make sure that the parallel cable is not connected to the controller and turn the machine on, then check the setting of the following copier SP mode.
   • SP5-907: Plug & Play Brand Name and Production Name Setting – select the correct one.
   • Sp5-811: Machine Serial Number-make sure that this is stored.

15. If the customer wishes to expand the hard disk space in the main machine for use by the printer, change the setting of "Memory Allocation" (User Tools – System Settings – Count. Manager – Memory Allocation) to "Printer Priority".

16. Print the Printer Configuration Page (User Tools – Printer Features – Test – Print Configuration page) to check the printer controller connection.

17. If the parallel cable is going to be connected, turn off the machine first and connect the parallel cable, then turn the machine back on again.

NOTE: If the Plug & Play Brand Name setting is changed, perform the power on cycle twice to create a valid new Brand Name, prior to connecting the printer cable to the PC.

3.2 HARD DISK DRIVE
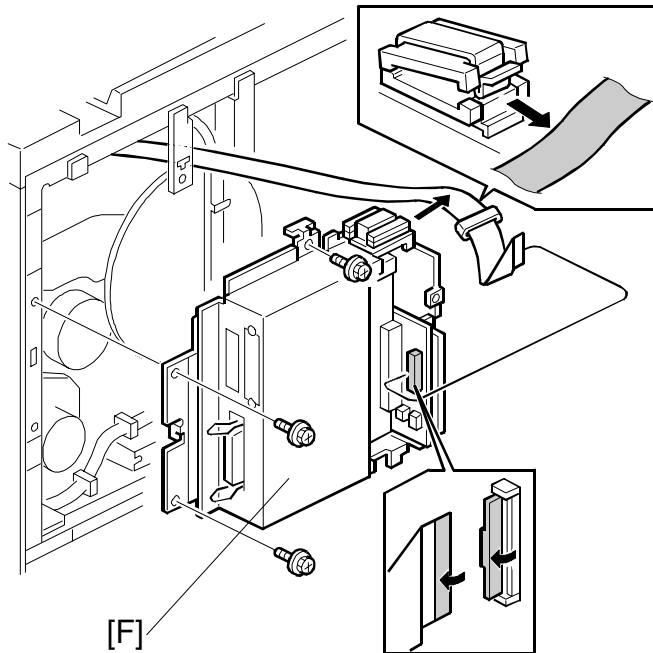
3.2.1 INSTALLATION PROCEDURE

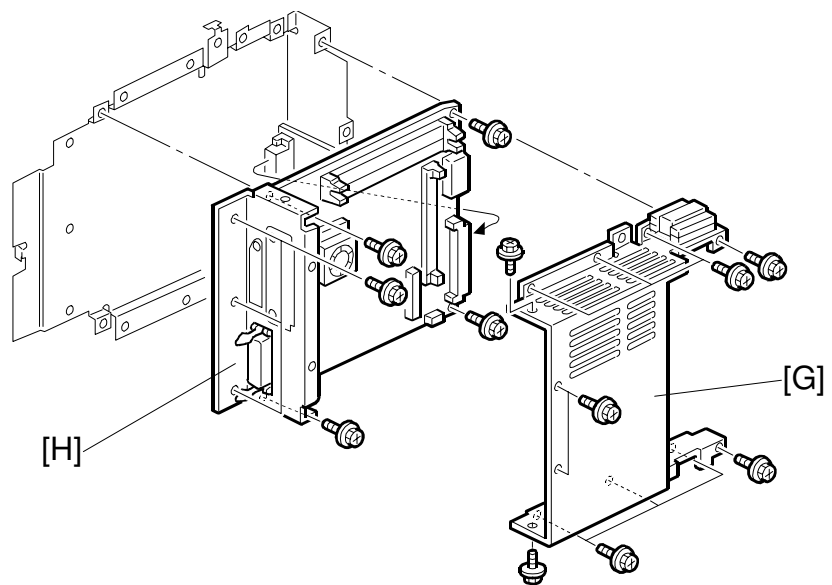A853I501.WMF

A853I503.WMF

⚠CAUTION
Unplug the copier power cord before starting the following procedure.

NOTE: When this hard disk drive and the printer controller (A852) are installed at the same time, skip step 1 to 6.

1. Disconnect the ADF connector [A].

2. Remove the upper rear cover [B] (2 screws [C]).

3. Remove the cover [D] (5 screws).

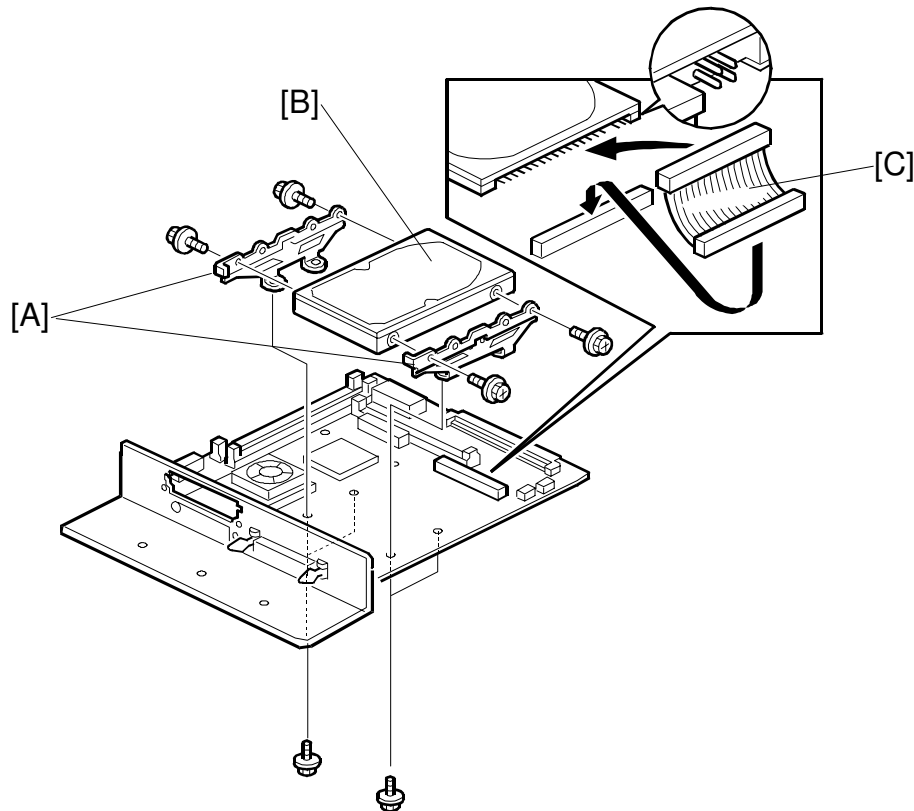4. Disconnect the cable [E] (1 connector, 1 clamp).

A853I504.WMF

A853I505.WMF

5. Remove the controller box [F] (3 screws, 1 connector, 1 ferrite core).
    NOTE: The ferrite core drops off easily.

6. Remove the controller cover [G] (12 screws).

7. Remove the controller board [H] (7 screws).

[B]

[A]

[C]

Installation

A853I502.WMF

8. Attach the HDD brackets [A] to the hard disk drive [B] as shown (2 screws each).

9. Connect the cable [C] to the hard disk drive.

10. Attach the hard disk drive to the printer controller (4 screws, 1 connector).

11. Install the printer controller board in the controller box.

12. Install the controller box in the main machine (refer to the Printer Controller Installation Procedure).

13. After turning on the main switch and pressing the printer key, the machine asks you to format the hard disk drive.
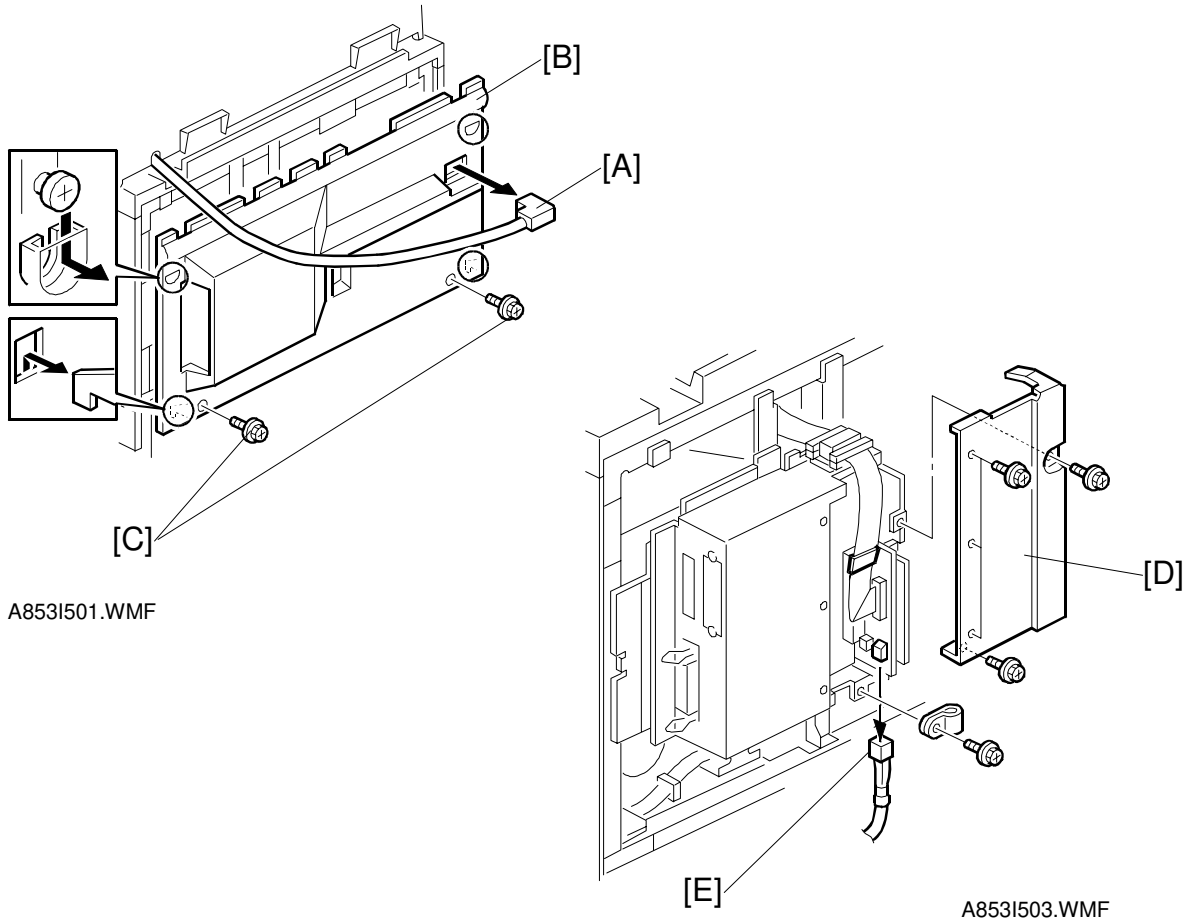
3.3 POSTSCRIPT KIT

3.3.1 INSTALLATION PROCEDURE
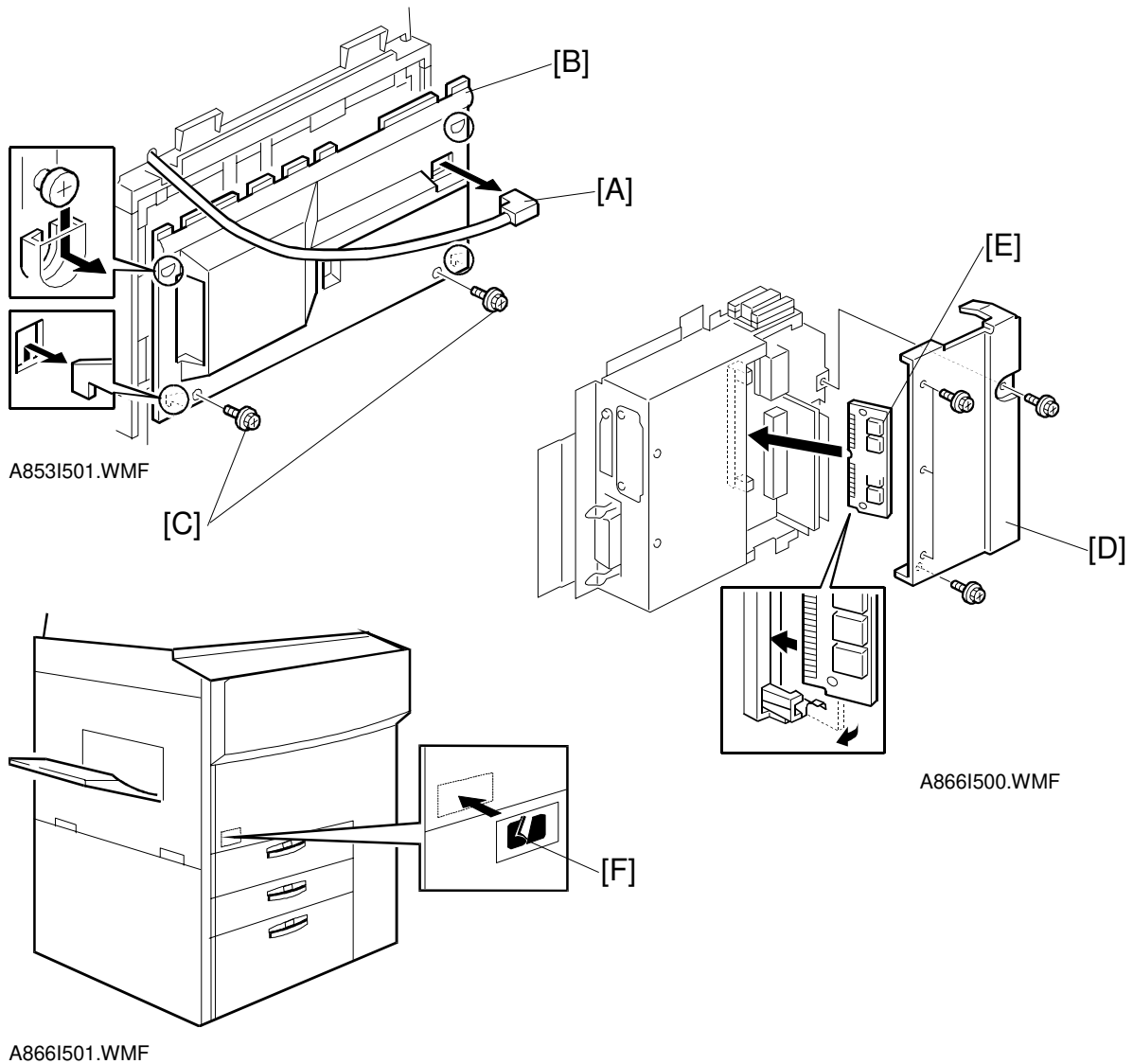
A853I501.WMF

A866I500.WMF

A866I501.WMF

⚠️**CAUTION**

Unplug the copier power cord before starting the following procedure.

NOTE: When this hard disk and the printer controller (A852) are installed at the same time, skip steps 1 to 3.

14. Disconnect the ADF connector [A].

15. Remove the upper rear cover [B] (2 screws [C]).

16. Remove the cover [D] (5 screws).

17. Install the PostScript board [E] as shown.

18. Attach the PostScript decal [F] to the front cover as shown.

# 3.4 NETWORK INTERFACE BOARD

3.4.1 INSTALLATION PROCEDURE

A853I501.WMF


A853I503.WMF

Installation

⚠**CAUTION**
Unplug the copier power cord before starting the following procedure.

NOTE: When this network interface board and the printer controller (A852) are
installed at the same time, skip step 1 to 6.

1. Disconnect the ADF connector [A].

2. Remove the upper rear cover [B] (2 screws [C]).

3. Remove the cover [D] (5 screws).

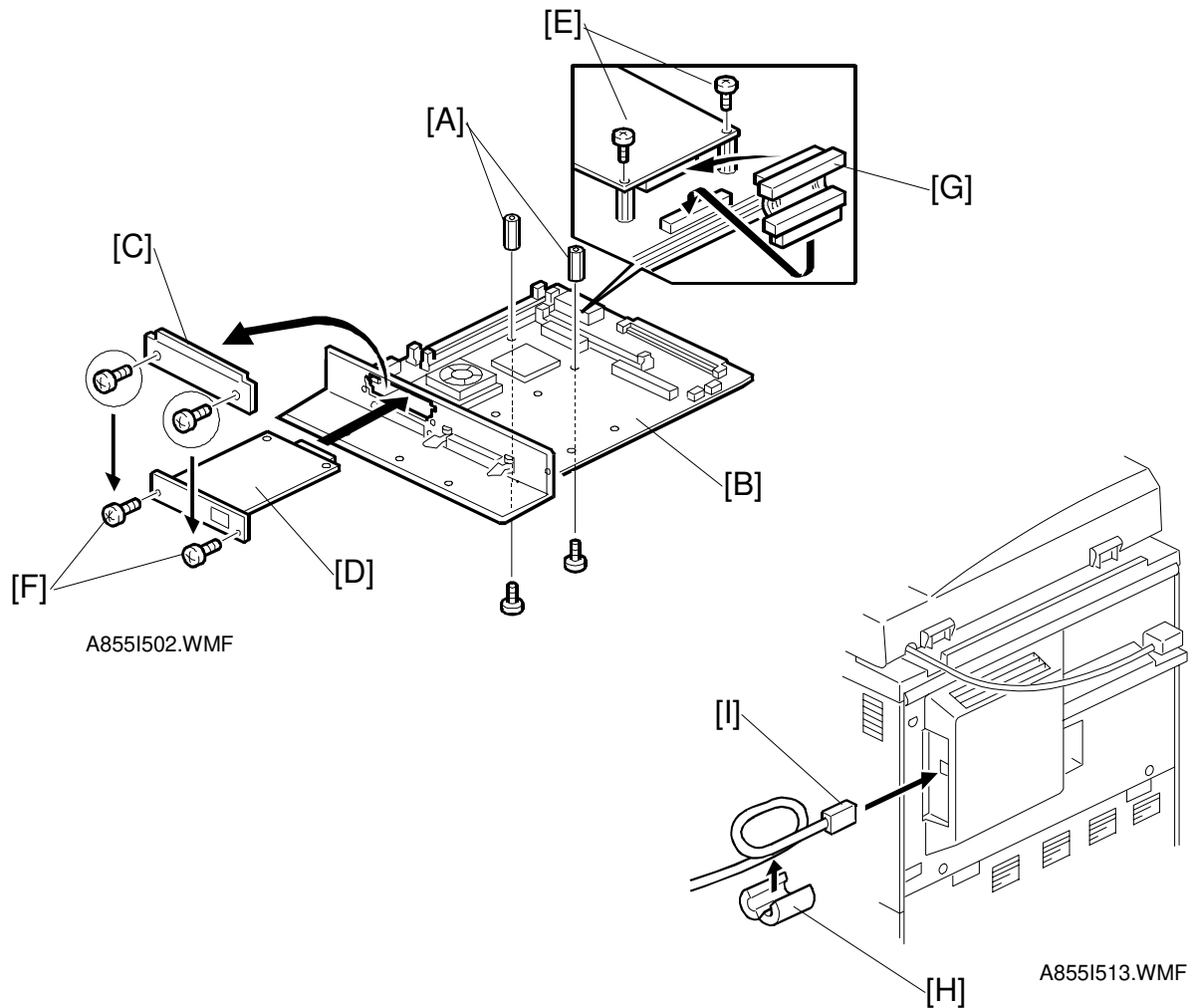4. Disconnect the cable [E] (1 connector, 1 clamp).

A853I504.WMF

[G]

[H]
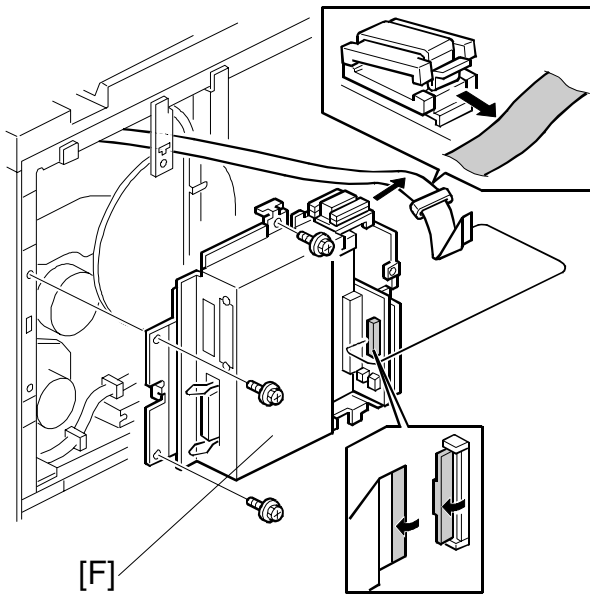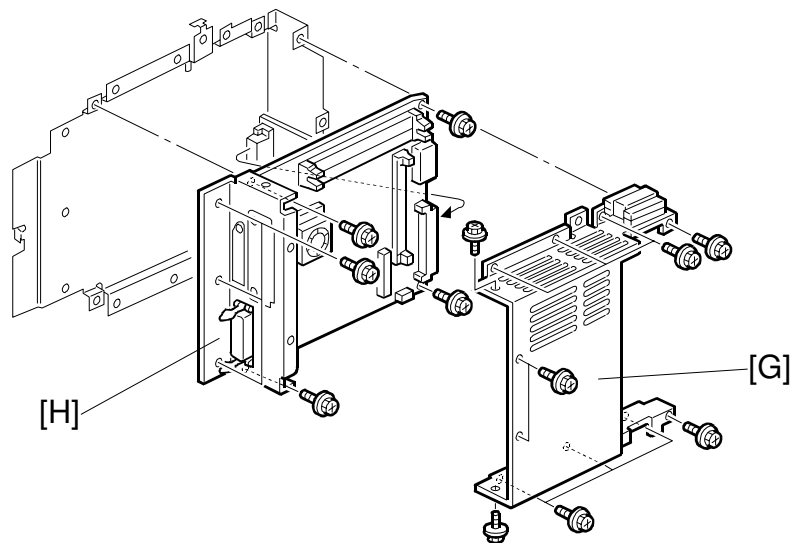
A249I553.WMF

5. Remove the controller box [F] (3 screws, 1 connector, 1 ferrite core).
    NOTE: The ferrite core drops off easily.

6. Remove the controller cover [G] (12 screws).

7. Remove the controller board [H] (7 screws).

A855I502.WMF

A855I513.WMF

8. Attach two spacers [A] to the printer controller board [B] (1 screw each).

9. Remove the cover bracket [C] (2 screws).

10. Install the network interface board [D] as shown (2 screws [E] in the accessory box, 2 screws [F] were used for the cover bracket [C]).

11. Connect the cable [G] to both the network interface board and printer controller as shown.

12. Install the printer controller board in the controller box.

13. Install the controller box in the main machine (refer to the Printer Controller Installation Procedure).

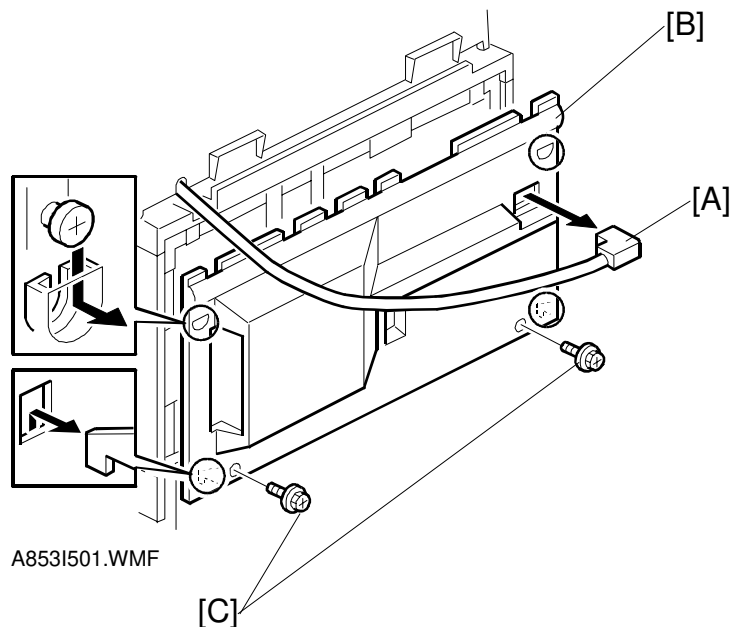14. Attached the ferrite core [H] to the STP cable [I] as shown.

3.5 DRAM SIMM

3.5.1 REQUIRED SPECIFICATION CHECK

Before installing the DRAM SIMM, check that it satisfies the requirements below.

Type	PC Compatible
Number of bins	72 pins
Access speed	70 ns or faster
Capacity	8, 16, or 32 MB
Parity	Any OK

3.5.2 INSTALLATION PROCEDURE

– For A229 copier –

A853I501.WMF
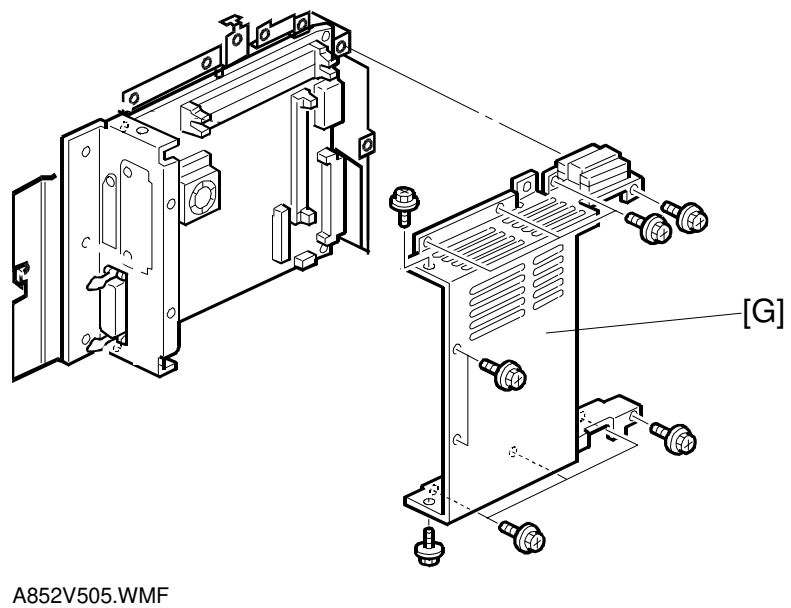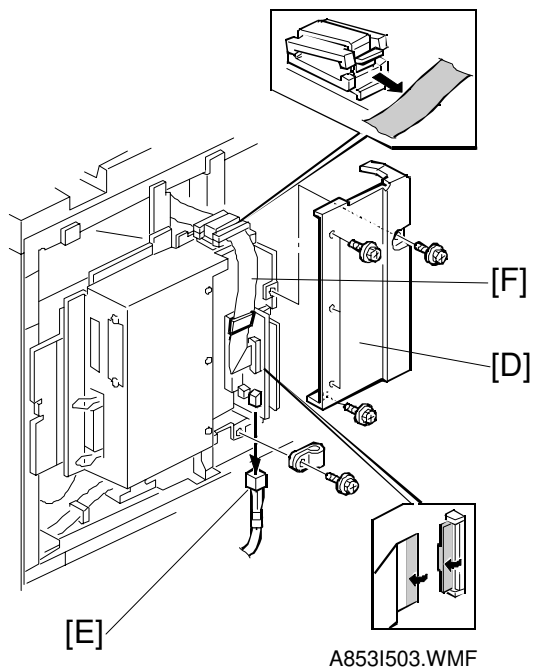
⚠**CAUTION**
Unplug the copier power cord before starting the following procedure.

1. Disconnect the ADF connector [A].
2. Remove the upper rear cover [B] (2 screws [C]).

A853I503.WMF

A852V505.WMF

3. Remove the cover [D] (5 screws).

4. Disconnect the cable [E] (1 connector, 1 clamp).

5. Disconnect the flat cable [F] (1 connector, 1 ferrite core).
NOTE: The ferrite core drops off easily.

6. Remove the controller cover [G] (12 screws).
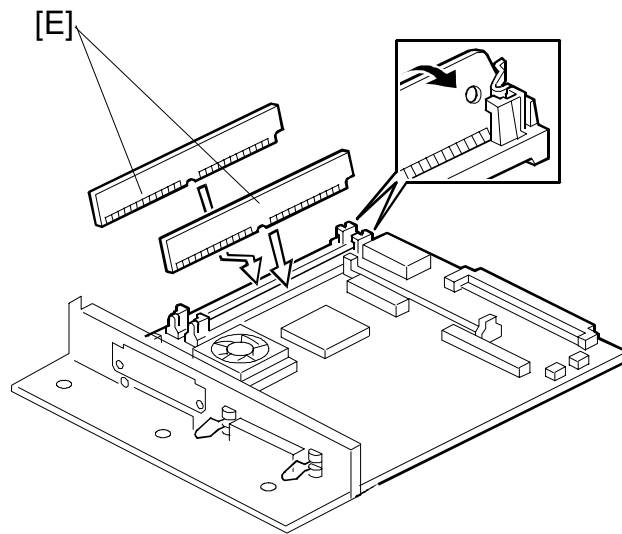
A850I503.WMF

7. Install the DRAM [H], as shown.
NOTE: Make sure that DRAM SIMM is installed properly.

3.6 CONNECTING THE INTERFACE CABLES

3.6.1 PARALLEL INTERFACE

An IEEE1284 compatible printer cable is required to connect the printer controller to a host PC parallel port.

3.6.2 NETWORK INTERFACE

A STP (Shielded Twisted Pair) cable with RJ45 connectors is required to connect the Network Interface Board to the computer network. (The cable should be Category/Type 5 or better.) After hardware setup, the network setup should be done by the user. The setup procedure is described in the NIB manual.

Installation

3.7 CHECKING THE CONNECTION

3.7.1 CONNECTION BETWEEN PRINTER CONTROLLER (and related options; PostScript ROM, DRAM SIMM, Hard Disk Drive, NIB) AND ENGINE.

1. Plug in the power cord and turn on the main and operation switches.

2. Enter the printer user mode.
   1) Press the User Tool key.
   2) Press the Printer Features button.

3. Print out the printer configuration page.
   1) Select the List Print tab.
   2) Press the Configuration Page button to print the configuration page. The machine prints the printer configuration page automatically.
NOTE: For more detailed information about the operation panel settings, refer to the operation manual.

The printer configuration page is similar to that shown on the next page.

Printer Configuration Page

PCL MENU
ORIENTATION = PORTRAIT
FORM LENGTH = 60 LINES
FONT SOURCE = INTERNAL
FONT NUMBER = 0
POINT SIZE = 12.00
PITCH = 10.00
SYMBOL SET = ROMAN-8

POSTSCRIPT MENU
PRINT ERRORS = OFF

FEEDER MENU
PAGE SIZE = LETTER
PAPER TRAY = AUTO
AUTO TRAY CHANGE = ON
BYPASS PAPER TYPE =
DUPLEX = OFF
BINDING = LONG
SEPARATION = OFF
STAPLE = OFF
PUNCH = OFF

PARALLEL MENU
EMULATION = AUTO
BIDIRECTION = ON
I/O TIMOUT = 30

CONFIGURATION MENU
RESOLUTION = 600
AUTO CONTINUE = ON
SMOOTHING = ON
AUTOCONT TIMEOUT = 30

NETWORK MENU
I/O TIMEOUT = 30
TCP/IP SETTING
IP ADDRESS = 131.100.100.111
SUBNET MASK = 255.255.255.0
GATEWAY ADDRESS = 131.100.100.1

PRINTER DETAILS
MODEL:
MANUFACTURER:
MACHINE S/N: 00000010200
SERVICE PHONE: 00-0000-0000
FIRMWARE LEVELS:
  Controller 1.15
  PeerlessPrint5-E V 1.4.10 98/05/06
  PeerlessPrintXL V 1.1.10 98/05/06
  PS 1.05
PRINTER OPTIONS
  Printer Hard Disk Drive
  Adobe Postscript
  Network Interface Board
PAPER HANDLING OPTIONS
  MSU Installed
  Tandem Tray 1
  Standard Tray 2
  Internal LCT Tray 3
  Manual Paper Tray
  Large Capacity Tray
  Duplex Unit
  9 Bin Mailbox Unit
  Finisher 3000
  Punch Unit, 2 Hole

TOTAL MEMORY = 72 MB

Peerless Print is a trademark of Peerless System Corporation.
Adobe, PostScript, the Adobe logo and the Postscript logo are the trademarks
of Adobe System Incorporated.

A852I504.WMF

CONFIGURATION MENU
RESOLUTION = 600
AUTO CONTINUE = ON
SMOOTHING = ON
AUTOCONT TIMEOUT = 30

NETWORK MENU   [C]
I/O TIMEOUT = 30
TCP/IP SETTING:
  IP ADDRESS = 131.100.100.111
  SUBNETMASK = 255.255.255.0
  GATEWAY ADDRESS = 131.100.100.1

PRINTER DETAILS
MODEL:
MANUFACTURER:
MACHINE S/N: 00000010200
SERVICE PHONE: 00-0000-0000   [D]
FIRMWARE LEVELS:
  Controller 1.15
  PeerlessPrint5-E V 1.4.10 98/05/06
  PeerlessPrintXL V 1.1.10 98/05/06
  PS 1.05
PRINTER OPTIONS: [A]
  Printer Hard Disk Drive
  Adobe Postscript
  Network Interface Board
PAPER HANDLING OPTIONS:
  MSU Installed
  Tandem Tray 1
  Standard Tray 2
  Internal LCT Tray 3
  Manual Paper Tray
  Large Capacity Tray
  Duplex Unit
  9 Bin Mailbox Unit
  Finisher 3000
  Punch Unit, 2 Hole   [B]

TOTAL MEMORY = 72 MB

A852I505.WMF

Check the following:

- For the printer controller board, confirm that the machine prints the printer configuration page.
- For the hard disk drive and PS kit, confirm that the configuration page includes them in the "Printer Options" section [A].
- For DRAM SIMM, confirm that "Total Memory" [B] printed on the configuration page shows the correct amount of memory in the machine (including the 8 MB on board and the SIMM).
- For the NIB, confirm that the configuration page includes the "Network Menu" section [C] and includes the network interface board in the "Printer Options" section [A].
- For the firmware version, check "Firmware Levels" [D].

If any problem occurs with the above checks, reinstall the printer controller and other options. Then set up the machine again and redo the test.

3.7.2 CONNECTION BETWEEN MAIN CONTROLLER BOARD AND THE NETWORK INTERFACE BOARD

There are two ways to check the connection between the main controller board and the network interface board.

1. To check "Network Menu" on the configuration page.

2. To check the Network Interface Board Status Sheet with the network information that is printed automatically after power on.

Print the Network Interface Board Status Sheet

Whenever the main switch is turned on, the machine prints the network interface board status sheet automatically.

NOTE: If the machine does not print the status sheet, check the Network menu in the printer user tools.

If any problem occurs with the above check, reinstall the printer controller and other options. Then set up the machine again and redo the test.

Installation

4.   SERVICE TABLE

4.1   GENERAL CAUTION

Do not turn off the machine or switch the controller off-line when the data LED is blinking or is lit, or the data which has been sent to the controller will be lost. If you need to do this, ask the customer for consent.

4.2   SERVICE PROGRAM MODE

4.2.1   SERVICE PROGRAM ACCESS PROCEDURE

The service program access procedure, such as "Entering Service Program (SP) Mode" and "Exiting SP Mode" is the same procedure as for copier, as follows.

Entering SP mode

⊛/⊚ → 1 → 0 → 7 → C/⊚ (hold it for more than 3 seconds.)

Exiting SP mode

Press the "Back" and "Exit" keys until the standby mode display appears.

Service
Tables

4.2.2   SERVICE PROGRAM MODE TABLES

| No.	Description	Function
01	Flash System From Parallel	Downloads the printer controller firmware from a PC through the parallel port.
02	Flash System From PCMCIA	Downloads the printer controller firmware using an IC card through the PCMCIA port.
03	Flash Postscript From Parallel	Downloads the PostScript firmware from a PC through the parallel port.
04	Flash Postscript From PCMCIA	Downloads the PostScript firmware using an IC card through the PCMCIA port.
05	Copy Flash ROM	Copies the printer controller firmware between ROM DIMM and printer controller
06	Format Disk	Formats the hard disk drive
07	Print Job Log Data	Prints the print/job count log page
08	Print Error Log Data	Prints the printer error log page
09	Clear Job Log Counter	Clears the print/job counter
10	Clear Error Log Data	Clears the error log counter
11	Parallel Loop Back Test	Performs the parallel loop back test

4.3 DOWNLOADING NEW FIRMWARE

New firmware for the printer controller and PostScript can be downloaded from a PC through the parallel cable and from a flash memory card through the PCMCIA port.

4.3.1 FIRMWARE UPDATE USING A FLASH MEMORY CARD (SP02 AND 04)

1. Prepare a flash memory card that has been programmed with the latest firmware.
   NOTE: When you program a flash memory card with a firmware file, use the following parameter settings.
   • Start Address – 000000h
   • Length – 3FFFFFh

2. Turn off the machine, remove the cover [A], and insert the flash memory card [B] into the slot so that the "A" side of the card faces the front of the machine.
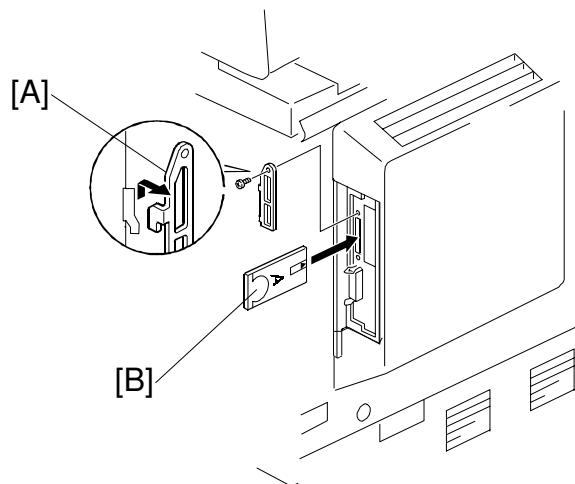
A852M501.WMF

3. Turn on the machine and enter the printer SP mode.

4. Select the Flash tab.

5. Press "Flash System From PCMCIA" button or "Flash PostScript From PCMCIA" button depending on the firmware type.

6. Press "Yes" in reply to the confirmation message. Firmware download will take several minutes.

7. After new firmware has been downloaded successfully, turn off the machine, remove the card from the slot, and turn the machine back on.

8. Print the "Printer Configuration Page" to check the new firmware version ([User Tools] – [Printer Features] – [List Print tab] – [Configuration Page]).
   The firmware version number is printed in the "Printer Details" section of the configuration page.

4.3.2 FIRMWARE UPDATE FROM PARALLEL PORT

1. Prepare the latest firmware file and Fcopy.exe on a host computer.

2. Turn off the machine, connect the host computer using a parallel cable, and turn the machine back on.

3. Enter the printer SP mode.

4. Select the Flash tab.

5. Press "Flash System from Parallel" button or "Flash Postscript From Parallel" button depending on the firmware type.

6. Press "Yes" in reply to the confirmation message.

7. On the host computer, start MS-DOS Prompt and type the following command.

   Either
   > *C:\\> FCOPY path\\filename*

   or
   > *C:\\> COPY /b path\\filename port*

CAUTION: Do not turn off the machine while "Downloading New System Software" is displayed on the LCD, even if FCOPY has finished in the MS-DOS Prompt.

8. After new firmware has been downloaded successfully, turn off the machine, disconnect the printer cable if necessary, and turn the machine back on.

9. Print the "Printer Configuration Page" to check the new firmware version ([User Tools] – [Printer] – [List Print] – [Configuration Page]).
   The firmware version number is printed in the "Printer Details" section of the configuration page.

4.3.3 FORMATING THE HARD DISK

This function is used to format the printer hard disk. If the hard disk is formatted, the stored data (downloaded fonts and macros) will be erased. So, when performing this function, ask the customer for consent. After this operation, advise the customer to restore their data, if necessary.

1. Enter the printer SP mode.

2. Select the Flash tab.

3. Press "Format Disk" button.

4. Press "Yes" in reply to the confirmation message. Hard disk formatting will take several minutes.

5. After confirming that formatting was successful, turn the machine off and back on again.

Service Tables

4.3.4 COPY FLASH ROM

There are two functions; one is to copy the printer controller firmware from the ROM DIMM to the printer controller, the other is the opposite way.

Download from ROM DIMM to printer controller

When downloading the printer controller firmware from either the flash memory card or a PC was not successful and the printer controller does not start up, the controller firmware cannot be downloaded from the flash memory card or a PC to recover the machine. However, the firmware can be downloaded from ROM DIMM using this function, using the following procedure.

A850M500.WMF
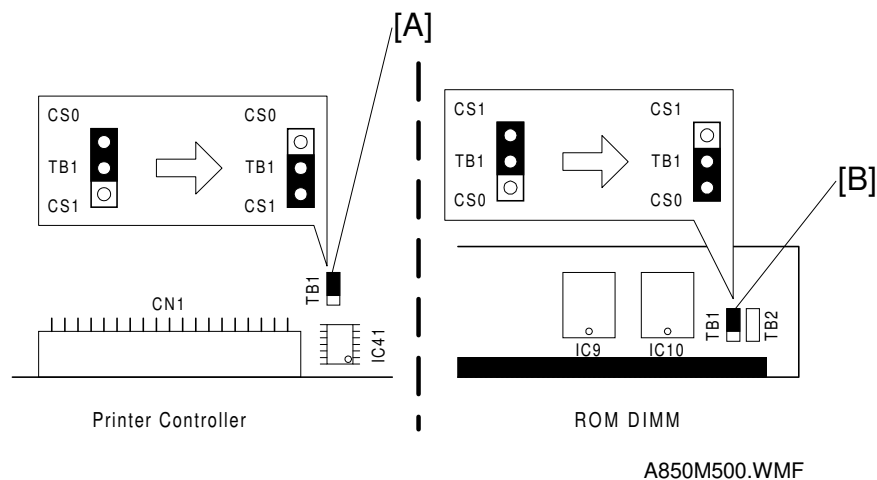
1. Remove the printer controller.

2. Change the position of the TB1 jumper [A] on the controller from CS0 to CS1.

3. Change the position of the TB1 jumper [B] on the ROM DIMM that contains the controller firmware from CS1 to CS0.

4. Install the ROM DIMM on the controller.
   CAUTION: Make sure to install the correct ROM DIMM in the PostScript SIMM.

5. Install the printer controller and turn on the machine.

6. Enter the printer SP mode and press "Copy Flash ROM" button.

7. Press "Yes" in reply to the confirmation message.

8. After downloading is successful, turn off the machine and remove the printer controller then remove the ROM DIMM as well.

9. Reposition the jumpers on the printer controller and ROM DIMM.

10. Reinstall the printer controller then turn on the machine.

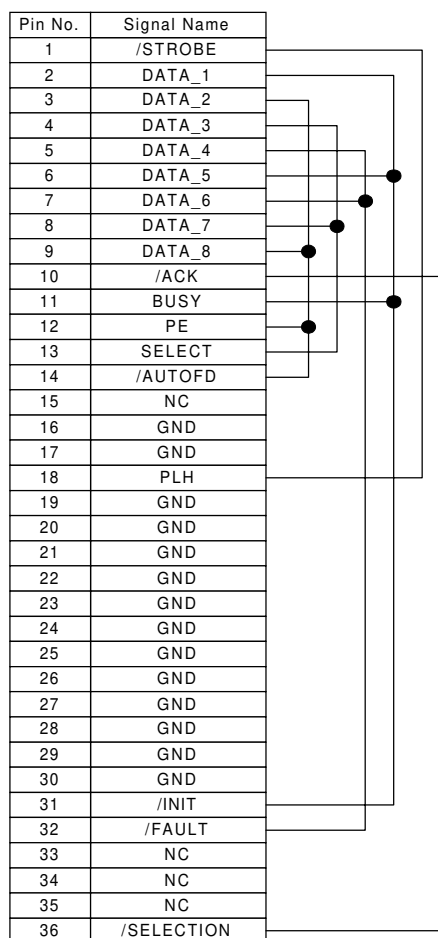11. Check that the printer controller starts up.

Download from the controller to ROM DIMM

CAUTION: Never perform this function if the PostScript ROM SIMM is installed on the controller. Otherwise, the controller firmware will be copied to the PostScript kit. Take out the PostScript ROM SIMM and install a blank one.

1. Remove the printer controller.

2. Install the ROM DIMM on the controller.

3. Install the printer controller and turn on the machine.

4. Enter the printer SP mode and press "Copy Flash ROM" button.

5. Press "Yes" in reply to the confirmation message.

6. After downloading is successful, turn off the machine and remove the printer controller then remove the ROM DIMM as well.

7. Reinstall the printer controller then turn on the machine.

4.3.5 PARALLEL LOOP BACK TEST (SP11)

1. Plug the loop back connector into the parallel port of the printer.

2. Enter the printer SP mode then press "Parallel Loop Back Test" button.

3. Press "Yes" in reply to the confirmation message. The result of the test will be displayed on the operation panel.

Pin No.	Signal Name
1	/STROBE
2	DATA_1
3	DATA_2
4	DATA_3
5	DATA_4
6	DATA_5
7	DATA_6
8	DATA_7
9	DATA_8
10	/ACK
11	BUSY
12	PE
13	SELECT
14	/AUTOFD
15	NC
16	GND
17	GND
18	PLH
19	GND
20	GND
21	GND
22	GND
23	GND
24	GND
25	GND
26	GND
27	GND
28	GND
29	GND
30	GND
31	/INIT
32	/FAULT
33	NC
34	NC
35	NC
36	/SELECTION

A850D501.WMF

Service
Tables

4.4 USER PROGRAM MODE

A user program (UP) mode is available for printer features as well as for copy and fax. Press the User Tool button to access it.

4.4.1 UP MODE TABLE (PRINTER FEATURES)

NOTE: The function of each UP mode is explained in the Printer Reference section of the operating instructions.

1. PCL	1. Orientation
	2. Form Length
	3. Font Source
	4. Font Number
	5. Font Size
	6. Font Pitch
	7. Symbol Set
2. Postscript	1. Print Errors
3. Paper Feed	1. Paper Size
	2. Tray Priority
	3. Auto Tray Switching
	4. Bypass Paper Type
	1. Duplex
	2. Sort
	3. Staple
	4. Punch
4. Parallel	1. Printer Language
	2. Bi-direction
	3. I/O Timeout
5. Network	1. I/O Timeout
	2. IP Address
	3. Subnet Mask
	4. Gateway Address
6. Configuration	1. Resolution
	2. Auto Continue
	3. Edge Smoothing
	4. Continue Timeout
7. List Print	1. PS Font List
	2. PCL Font List
	3. PS Demo Page
	4. PCL Demo Page
	5. Configuration Page
8. Reset Select	1. Job Reset
	2. Menu Reset
	3. System Reset

4.5 DIP SWITCHES/JUMPER PINS/LEDS

4.5.1 DIP SWITCHES

SW2:

No.	Function	On	OFF
1	Destination for firmware downloading	**To flash ROM**	To ROM SIMM
2	Source for firmware downloading	(No.2, 3)	
3		**On, On: From Host PC** On, Off: From flash memory card Off, On: From ROM SIMM Off, Off: From flash ROM	
4	Operation mode	**Normal operation**	Programming firmware

NOTE: The functions of DIP switches no.1, 2, and 3 are enabled when changing the setting of no.4 to the off position. However, **do not change the default settings** (keep them all on). Always do the firmware downloading using SP mode.

4.5.2 JUMPER PINS

TB1:

Function	CS0	CS1
Bank setting for resident flash ROM	**Bank setting for flash ROM is "0".**	Bank setting for flash ROM is "1".

TB2

| Function	UN-PROT	PROT
Not used	Do not change this setting. Keep at "UN-PROT".	

4.5.3 LEDS

Symbol	Function
PWR	This LED turns on when +5 V is supplied to the printer controller.
LED2	Refer to section 6.2 (LEDs) for more detail.
LED3	
LED4	
LED5	

5. REPLACEMENT AND ADJUSTMENT

> ⚠ **CAUTION**
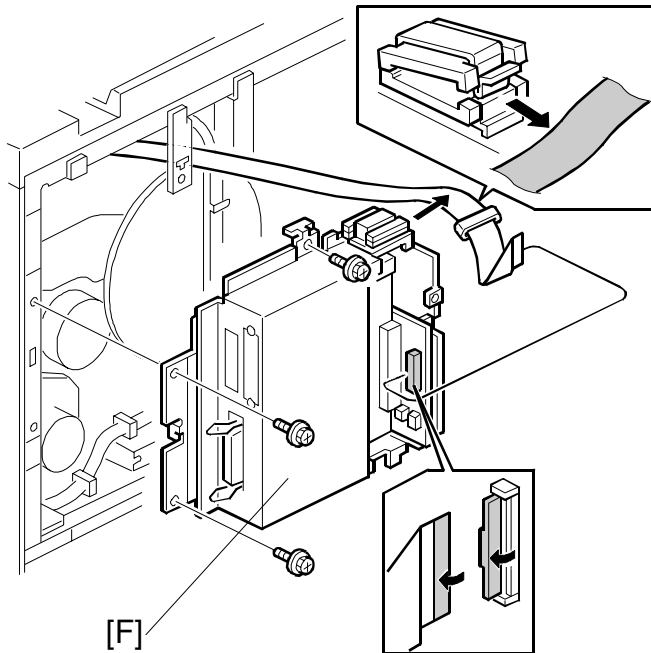> **Turn off the main power switch and unplug the machine before attempting any of the procedures in this section.**
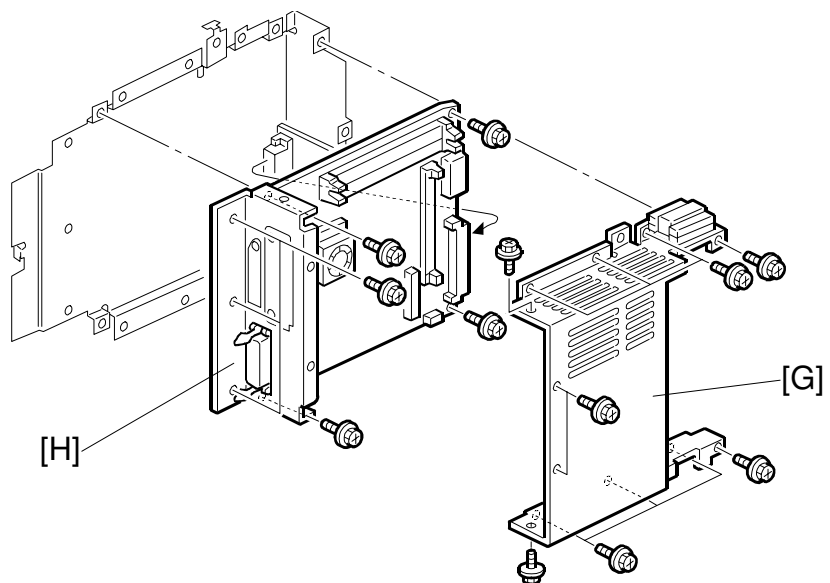
5.1 PRINTER CONTROLLER BOARD
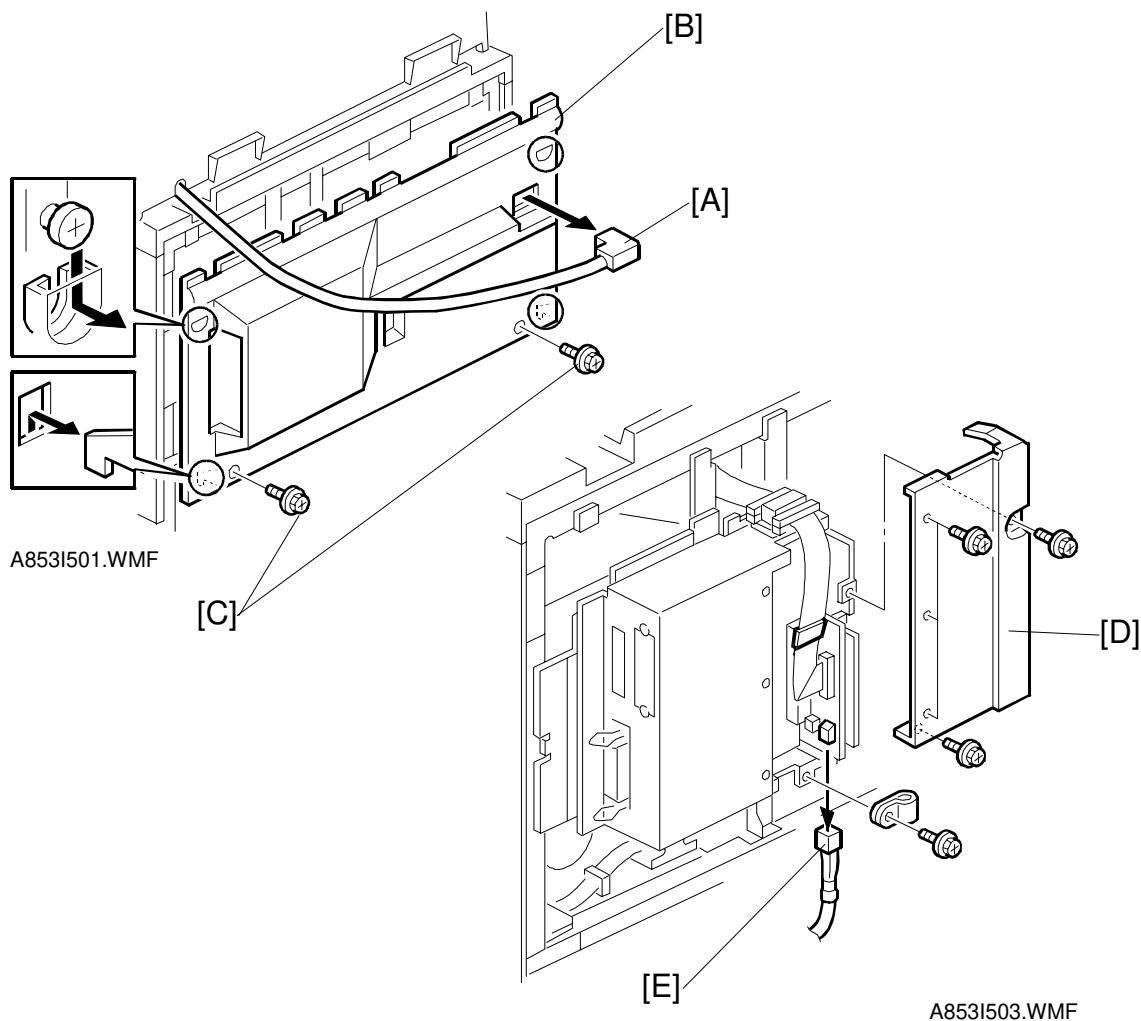
A853I501.WMF

A853I503.WMF

1. Disconnect the ADF connector [A].

2. Remove the upper rear cover [B] (2 screws [C]).

3. Remove the cover [D] (5 screws).

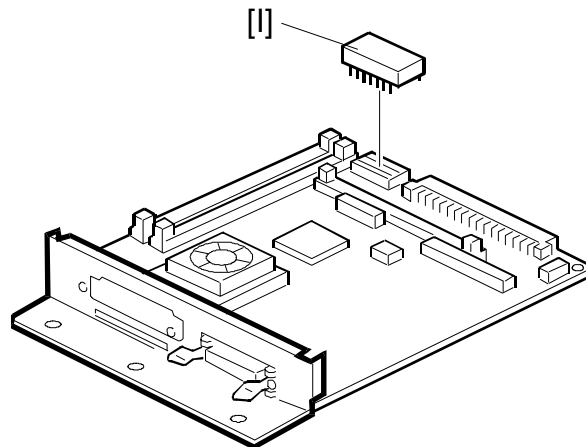4. Disconnect the cable [E] (1 connector, 1 clamp).

A853I504.WMF

A853I505.WMF

5. Remove the controller box [F] (3 screws, 1 connector, 1 ferrite core).
    NOTE: The ferrite core drops off easily.

6. Remove the controller cover [G] (12 screws).

7. Remove the controller board [H] (7 screws).

[I]

A850R506.WMF

8. Remove the optional hard disk, network interface board, PS kit, and DRAM SIMMs if they are installed (see their replacement procedures).

9. Remove the NVRAM [I] from the old printer controller and install it on the new printer controller.

10. Install the options on the new printer controller.

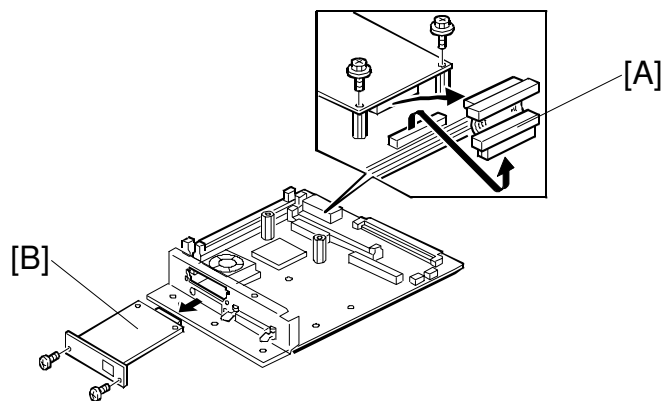**Replacement**
Adjustment
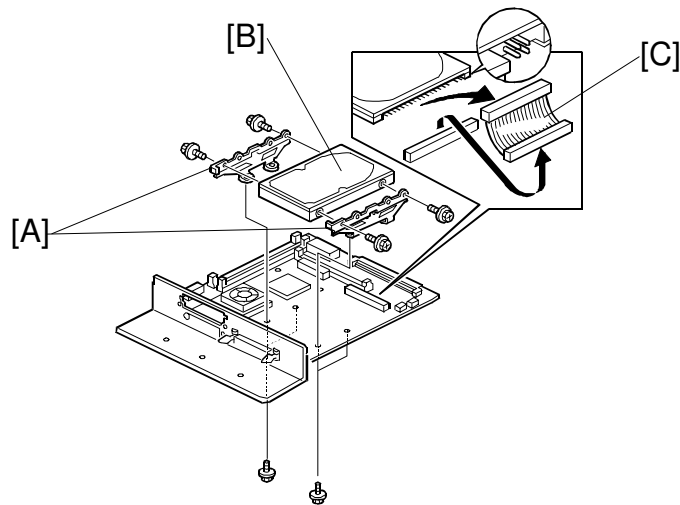
5.2 HARD DISK

A850R504.WMF

1. Remove the printer controller (see Printer Controller).

2. Dismount the hard disk [A] with bracket and IDE cable from the printer controller (4 screws).

3. Remove the brackets [B] (2 screws each).
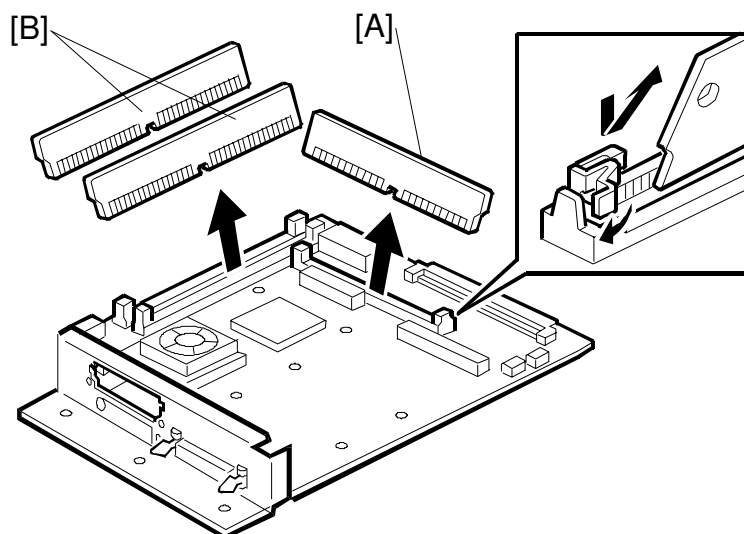
4. Disconnect the IDE cable [C].

5.3 NETWORK INTERFACE BOARD

A850R503.WMF

1. Remove the printer controller (see Printer Controller).

2. Disconnect the cable [A] from the printer controller and network interface board.

3. Remove the network interface board [B] (4 screws).

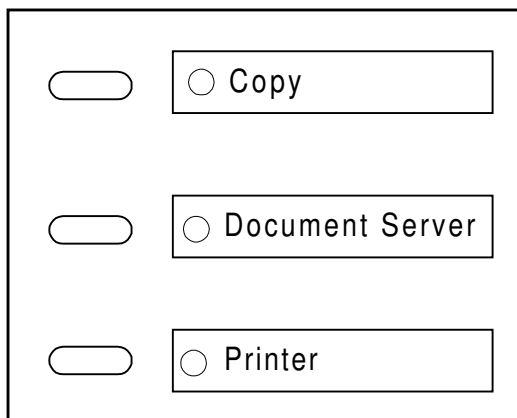## 5.3.1 POSTSCRIPT ROM BOARD AND DRAM SIMM

A850R505.WMF

1. Remove the printer controller (see Printer Controller).

2. Remove the PS ROM board [A].

3. Remove the DRAM SIMMs [B].

Replacement Adjustment

6.　TROUBLESHOOTING

6.1　ERROR MESSAGES

If an error occurred, the error LED lights (red light with the printer key) and an error message is displayed on the LCD.

A852T501.WMF

Service call (SC) codes

| SC No.	Description / Definition	Possible Cause
SC2000	Functional problems (Self diagnostic error)	Printer controller board defective.
	A diagnostic error occurred at power on. The controller has a hardware problem.	
SC2001	Functional problems (Debug trap error)	The controller software has a problem.
	An error has occurred in the controller. The controller has a software problem.	
SC2002	Functional problems (Exception error)	Printer controller board defective.
	An error has occurred in the controller. The controller has a software or hardware problem.	

Trouble-shooting

Other messages

The following errors might need assistance from service.

Error Message	Condition	Possible Cause
Printer HDD Error. Press Reset to cancel current job.	A hard disk error was detected during downloading the macro or fonts.	• Printer HDD defective • Printer controller defective
Parallel Communication Error. Please set up communication parameters in parallel menu. Press Reset to cancel current job.	Parallel communication error occurred during a print job via the parallel port.	• An item in the parallel menu was set incorrectly • Parallel cable defective • Printer controller defective
Print overrun. Press Reset to cancel current job, or press Continue to print.	This error occurred when a file was being printed in banding mode. A complex page may not have enough time to image a band while the engine is printing the previous page.	• Insufficient memory • A complex page is printed • The DRAM SIMM board is defective • The controller is defective
Memory overflow. Press Reset to cancel current job.	This error occurred during printing. The language has sent a file that is too complex to interpret in the available memory.	• Insufficient memory • A complex page is printed • The DRAM SIMM is board defective • The controller is defective

6.2 LEDS

6.2.1 LOCATION

Four LEDs (LED2 to LED5) are located near SW2 on the printer controller. They indicate display the progress of the self test, and errors and status conditions.

A850T500.WMF
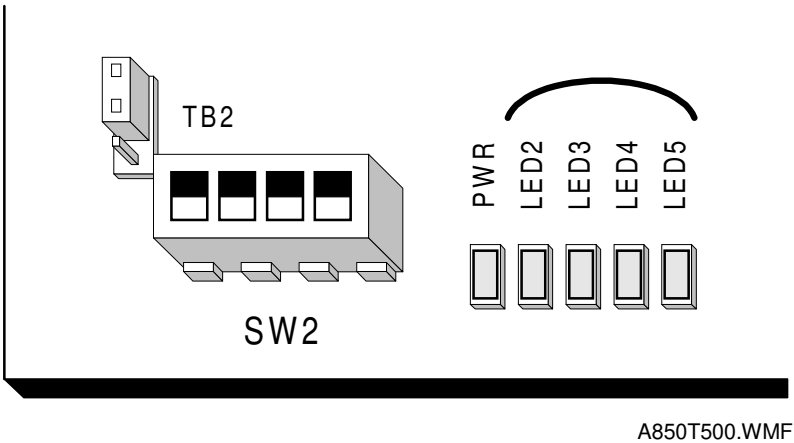
6.2.2 LED CODE TABLE

Self diagnostic

The following LED table is for the self diagnostic function. When an error occurs during the self diagnostic test, all four LEDs blink then indicate the error as shown in the following table.

e.g.) RAM error:

All LEDs on (1 s) → off (1 s) → on (1 s) → off (1 s) → LED4 on (5 s) → from the beginning.

1 = LED is lit,   0 = LED is off

LEDs				Description
LED2	LED3	LED4	LED5	
0	0	0	1	ROM error
0	0	1	0	RAM (resident, SIMM) error: note 1)
0	0	1	1	NVRAM error: note 1)
0	1	0	1	Fatal error
0	1	1	0	Debug trap error: note 2)

NOTE: 1) SC2000 is also displayed.
          2) SC2002 is also displayed.

Trouble-shooting

Controller Firmware Copy/Download

During controller firmware copying and downloading, the following LED status will be indicated.

1 = LED is lit,   0 = LED is off,   1/0 = LED is blinking

LEDs				Description
LED2	LED3	LED4	LED5	
1	0	0	0	Data downloading
0	1/0	0	0	Erasing
1/0	1/0	1	0	Programming
0	0	0	1	Verifying
1	0	0	1	Insufficient RAM error
1	0	1	0	Verify failure
1	0	1	1	Download failure (check sum error)
1	1	0	0	Erase failure
1	1	0	1	Download failure (other error)
1	1	1	1	Copy/download success