KAISER1 PRINTER CONTROLLER
(Machine Code: H144-54, 55)
PRINTER INTERFACE TYPE 500

November 29, 1999
Subject to change

TABLE OF CONTENTS

1. OVERALL MACHINE INFORMATION

1.1 SPECIFICATIONS

1.1.1 GENERAL SPECIFICATIONS

Print Speed (Max.):	15 ppm (600 dpi, A4 sideways)
Printer Languages:	PCL 6 and PCL 5e
Print Resolution:	PCL 6 – 600 dpi
	PCL 5e – 300/600 dpi
Memory (SIMM):	8 MB (standard)
	40 MB (maximum)
	NOTE: There is 1 slot for a 16 or 32 MB SIMM.
Resident Fonts:	PCL: 45 outline fonts and 1 bitmap font
Host Interfaces:	IEEE1284/ECP parallel interface x 1 (standard)
	Ethernet 10BaseT/100BaseTX network interface x 1 (optional) **NOTE:** Refer to the NIB service manual for details.
Other Interfaces:	SIMM interface x 1 (for optional memory)

1.1.2 SUPPORTED PAPER SIZES

Paper	Size (W x L)	Tray 1			Tray 2/3			By-pass
		NA	EU	Asia	NA	EU	Asia	
Ledger	11 x 17"	Y	N	N	Y	N	N	Y#
Legal	8.5 x 14"	Y	N	N	Y	N	N	Y#
Letter SEF	8.5 x 11"	Y	N	N	Y	N	N	Y#
Letter LEF	11 x 8.5"	Y	Y	Y	Y	Y	Y	Y#
Half Letter SEF	5.5 x 8.5"	N	N	N	N	N	N	Y#
Half Letter LEF	8.5 x 5.5"	N	N	N	N	N	N	N
Executive SEF	7.25 x 10.5"	N	N	N	N	N	N	Y#
Executive LEF	10.5 x 7.25"	N	N	N	N	N	N	Y#
A3	297 x 420 mm	N	Y	Y	Y	Y	Y	Y#
B4	257 x 364 mm	N	Y	Y	N	Y	Y	Y#
A4 SEF	210 x 297 mm	Y	Y	Y	Y	Y	Y	Y#
A4 LEF	297 x 210 mm	N	Y	Y	N	Y	Y	Y#
B5 SEF	182 x 257 mm	N	N	N	N	N	N	Y#
B5 LEF	257 x 182 mm	N	N	N	N	N	N	Y#
A5 SEF	148 x 210 mm	N	N	N	N	N	N	Y#
A5 LEF	210 x 148 mm	N	Y	Y	N	Y	Y	Y#
A6 SEF	105 x 148 mm	N	N	N	N	N	N	N
A6 LEF	148 x 105 mm	N	N	N	N	N	N	N
B6	128 x 182 mm	N	N	N	N	N	N	Y#
Folio	8.25 x 13"	Y#	Y#	Y#	N	N	N	Y#
Foolscap	8.5 x 13"	N	N	N	N	N	N	Y#
F	8 x 13"	Y#	Y#	Y#	N	N	N	Y#
Com10 Env	4.125 x 9.5"	N	N	N	N	N	N	Y#
Monarch Env	3.875 x 7.5"	N	N	N	N	N	N	Y#
C6 Env	114 x 162 mm	N	N	N	N	N	N	Y#
C5 Env	162 x 229 mm	N	N	N	N	N	N	N
DL Env	110 x 220 mm	N	N	N	N	N	N	Y#
8K	267 x 390 mm	N	N	N	N	N	N	Y#
16K SEF	195 x 267 mm	N	N	N	N	N	N	Y#
16K LEF	267 x 195 mm	N	N	N	N	N	N	Y#
Custom	[Minimum] 90 x 148 mm [Maximum] 297 x 432 mm	N	N	N	N	N	N	YC

Keys:

Y	Supported. The paper size sensor detects this paper size.
Y#	Supported. The user has to select the correct paper size for the tray.
YC	Supported. The user has to enter the width and length of the paper.
N	Not supported.

NA: North America version, EU: Europe version

1.2 SOFTWARE ACCESSORIES

The printer drivers and utility software are provided on one CD-ROM.

1.2.1 PRINTER DRIVERS

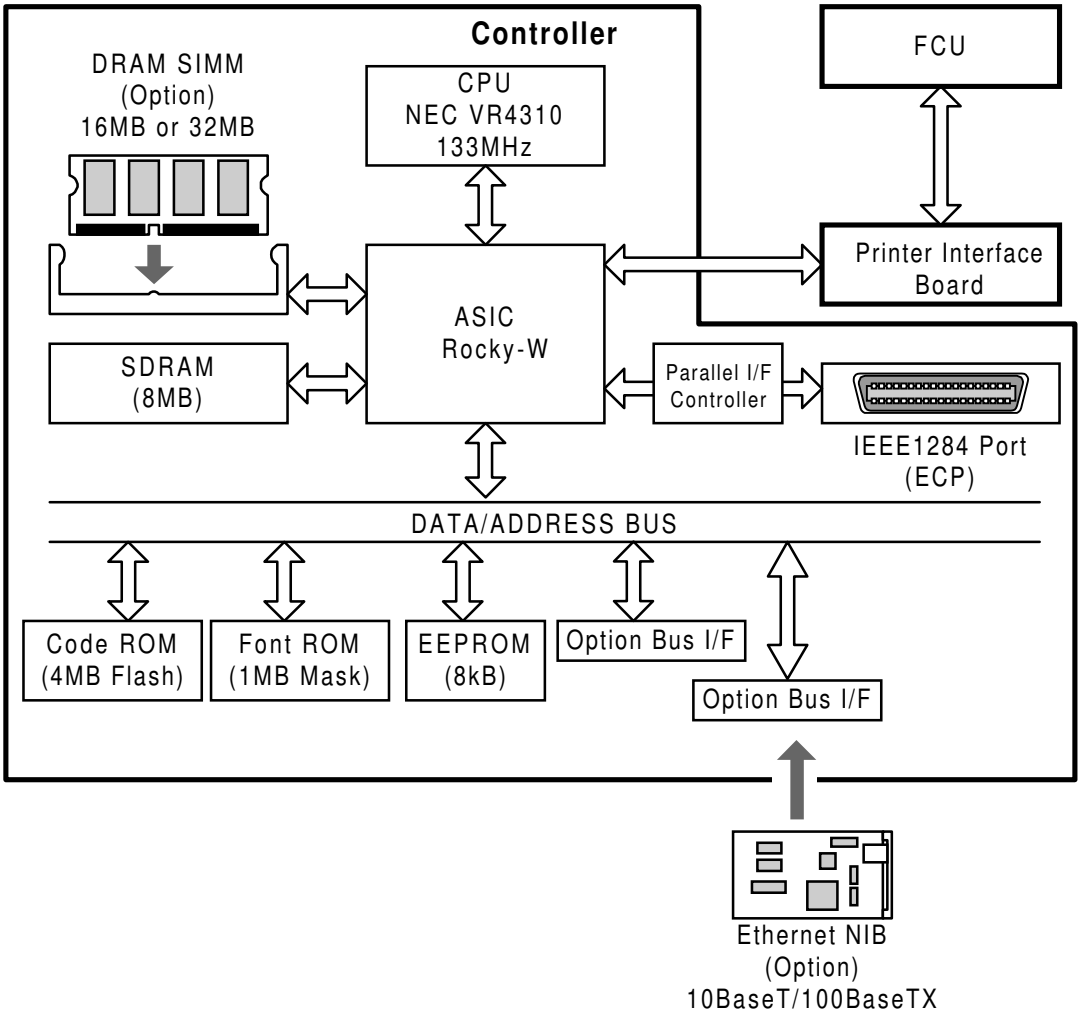
Printer Language	Windows 3.1x	Windows 95/98	Windows NT4.0	Macintosh
PCL 6	No	Yes	Yes	No
PCL 5e	No	Yes	Yes	No

NOTE: The printer drivers for Windows NT 4.0 are only for the Intel x86 platform. There is no Windows NT 4.0 printer driver for the PowerPC, Alpha, or MIPS platforms.

1.2.2 UTILITY SOFTWARE

Software	Description
Afga Font Manager (Win 95/98, NT4)	A font management utility with screen fonts for the printer.
Aficio Manager for Admin (Win 95/98, NT4)	A printer management utility for network administrators. NIB setup utilities are also available.
Aficio Manager for Client (Win95/98, NT4)	A printer management utility for client users.
Port Navi (Win95/98, NT4) Available from April '00	A peer-to-peer print utility over a TCP/IP network. This provides parallel printing and recovery printing functions. Parallel printing: Divides a print job over more than one printer Recovery printing: Allows another printer to print the job when the selected printer is not available

1.3 BLOCK DIAGRAM



H144V502.WMF

The controller board contains a CPU (NEC VR4310) and an ASIC (Rocky-W). The ASIC controls the main memory (SDRAM), engine interface, ROM interface, IEEE1284 parallel interface, and an option bus interface for the NIB. The other option bus interface can be used for upgrading firmware (using an IC card with an IC card adapter).

There is one optional memory socket that can have either a 16MB or a 32MB SIMM module to increase RAM capacity. With the 32MB SIMM module, the RAM capacity is increased to 40MB.

The flash memory card interface allows the firmware for the controller and NIB to be updated.

The Printer Interface Board (PIF) exchanges video data and operation panel data (LCD, LED, and key data) between the FCU board and the controller board.

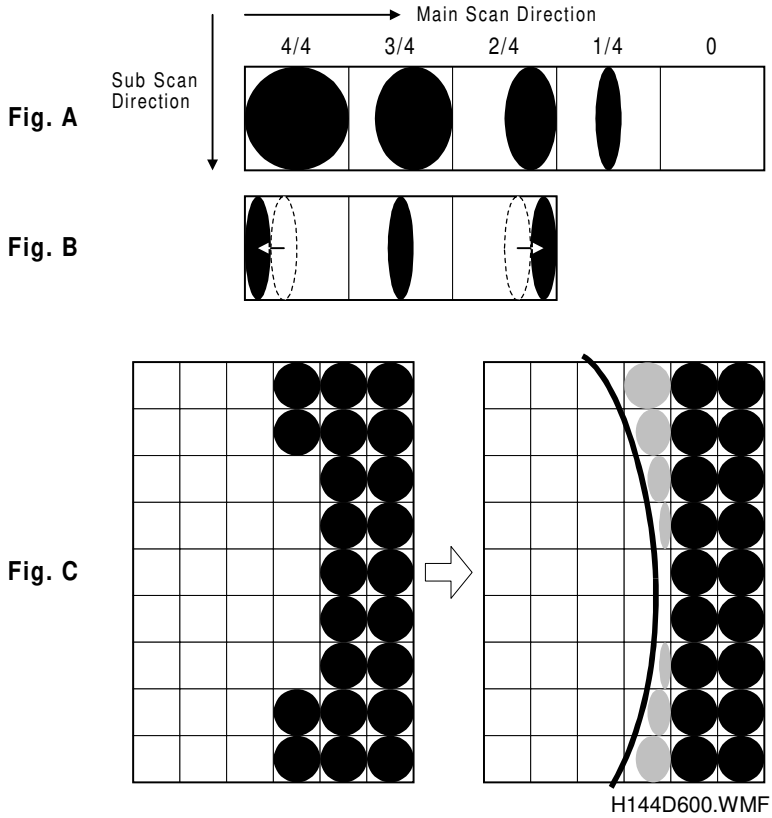
2. DETAILED SECTION DESCRIPTIONS

2.1 CONTROLLER FUNCTIONS

2.1.1 IMAGE DATA PROCESSIING

Edge smoothing and toner saving are performed by an ASIC (ROCKY W). The edge smoothing and toner saving modes can be switched on/off with the machine's control panel or the printer driver.

Edge Smoothing



Jagged edges on characters as shown in the above illustration are reduced using edge smoothing. Edge smoothing changes the laser pulse duration and position for certain pixels.

Fig. A shows the four possible pulse durations, and Fig. B shows how the laser pulse can be in one of three positions within the pixel. Fig. C shows an example of how edge smoothing is used.

Toner Saving Mode

Toner saving is done by reducing the number of black dots in the printed image. An 8 x 8 matrix filter is used.

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

The printer driver prevents edge smoothing and toner saving mode from being used at the same time.

2.1.2 PAPER SIZE/TYPE DETECTION AND SELECTION

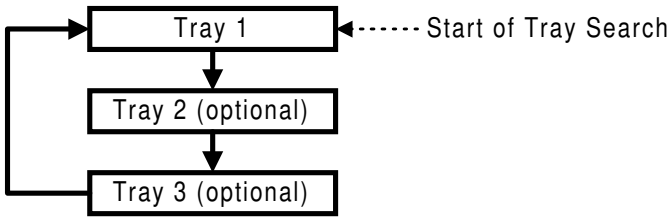
The controller uses the paper sizes detected by the print engine for trays 1, 2, and 3. For the by-pass tray, the user has to specify a paper size using the Job Control menu in the Printer User Tools. Refer to section 1.1.2 for details on supported paper sizes.

Thick paper can be selected using User Tools (User Tools – Printer – Job Control Menu).

When the printer controller receives a print job, the controller prints using the paper size specified in the PJL or PCL commands and the paper type specified in the PCL commands.

2.1.3 PAPER SOURCE SELECTION

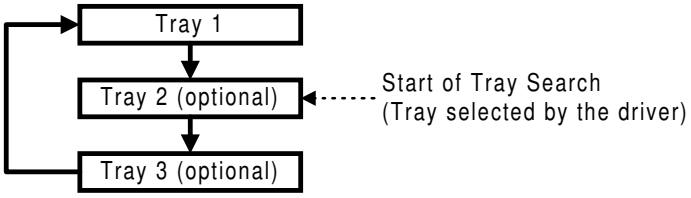
Auto Tray Select



H144D601.WMF

The controller searches for the specified paper size and paper type, starting from Tray 1, and uses the first tray that has the specified paper size and paper type. If the selected tray is pulled out or paper runs out during printing, the controller searches for another tray with the specific paper size and paper type then if found, automatically switches to it. If the controller cannot find another paper tray with the specified paper size and paper type, printing stops and the LCD displays the message “Load Tray xx [paper size]”.

Manual Tray Select



H144D602.WMF

When the printer driver specifies a tray, the selected tray becomes the first tray checked at the start of the tray search. If the selected tray does not have the size and type of paper specified by the driver, the controller searches the other trays for the same paper size and paper type.

NOTE: Tray Priority in the Job Control menu does not specify the start of the tray search, but specifies the paper size in the selected tray as the default paper size.

Tray Lock

If Tray Lock is enabled for a tray, the controller does not use the “locked” tray in the tray search process. If a tray has, for example, coloured A4 size paper for fax prints, enable tray lock for that tray so that the controller does not select the tray for printing.

If the printer driver selects a “locked” tray, the controller uses the tray for printing only when the specified paper size matches the actual paper size in the tray.

By-pass Tray

The by-pass tray is not part of the automatic tray search. To print from the by-pass tray, the user has to select the by-pass tray (using either the driver or operation panel). Even if the by-pass tray is empty, the controller will not switch to another tray; the message on the LCD asks the user to add paper to the by-pass tray.

Paper Size Mismatch

When the controller could not find the specified paper size and paper type in any of the trays, the machine displays an error message.

Then the user can either load the requested paper size and paper type in a tray or select another tray, e.g., a tray that contains A4 size paper, by pressing the “Form Feed” key.

The controller will print the job if the specified paper size and paper type are detected in a tray, or if the user presses the Enter key after selecting a tray.

2.1.4 RESET OPERATIONS

Job Reset

This resets the job being processed and ignores all incoming data until a data end is received.

System Reset

This initializes the fonts and macros downloaded to the RAM. The menu settings, NIB settings, system log data, and error codes remain unchanged.

NOTE: Do not use this when the controller is receiving a print job.

Menu Reset

This resets all the menu settings to their default values, including the NIB settings.

2.1.5 ENERGY SAVER MODE

Energy Saver appears in the printer user tool menu, but the setting has no effect. To select an Energy Saver mode, use the fax user tools.

If the paper size and the dial setting is changed when the machine is in energy saver mode, the fax machine will not inform this change to the printer controller. Then a printing error may occur. This error will then wake up the fax machine, and

the new paper settings will be informed to the controller immediately, and the user can try again.

When the machine is in (or recovering from) energy saver mode, the machine always prints a white page if you print out a service report (such as the print log sheet). At the second time, the machine prints a normal page. This is because the fusing unit has not warmed up enough for printing, but the printer controller cannot wait for printing while in service mode.

When the machine is in Night Timer mode, the machine cannot print any data.

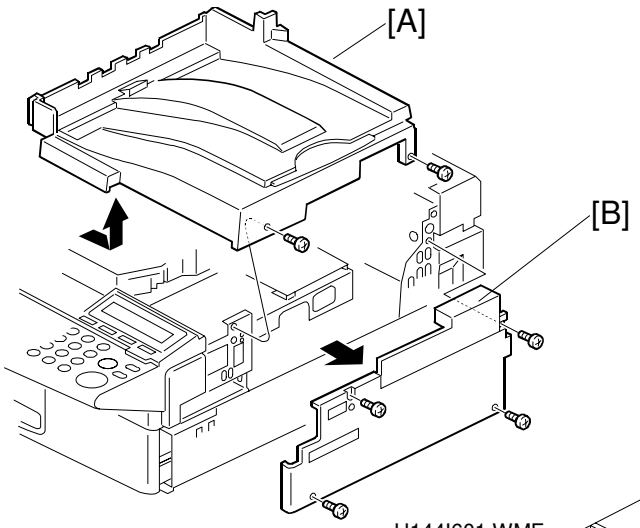
3. INSTALLATION PROCEDURES

3.1 PRINTER CONTROLLER

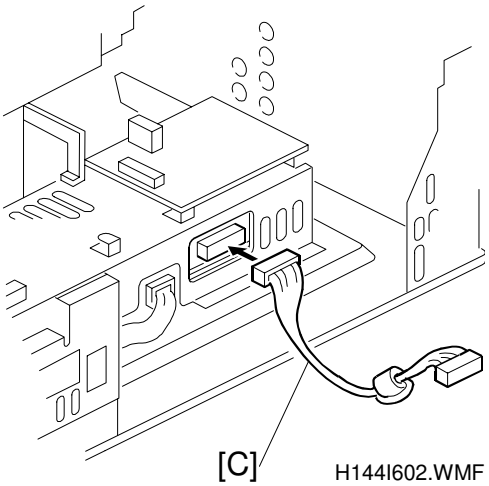
⚠CAUTION

Before installing this option, do the following:

1. **Print out all messages stored in the memory.**
2. **Print out the list of user-programmed items and the system parameter list**
3. **Turn off the main switch and disconnect the power cord, the telephone line, and the network cable.**

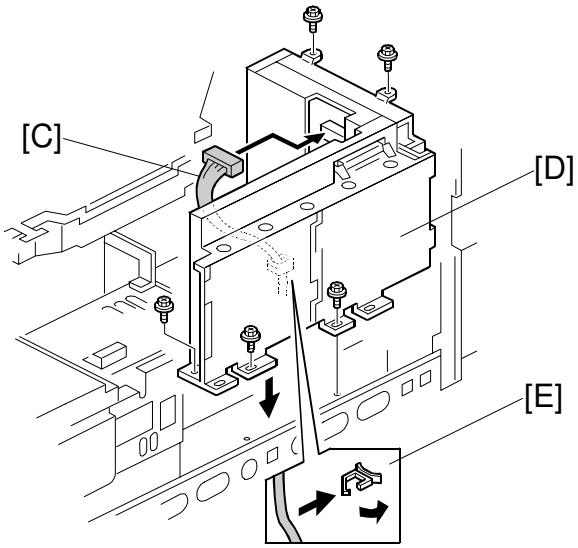


H144I601.WMF

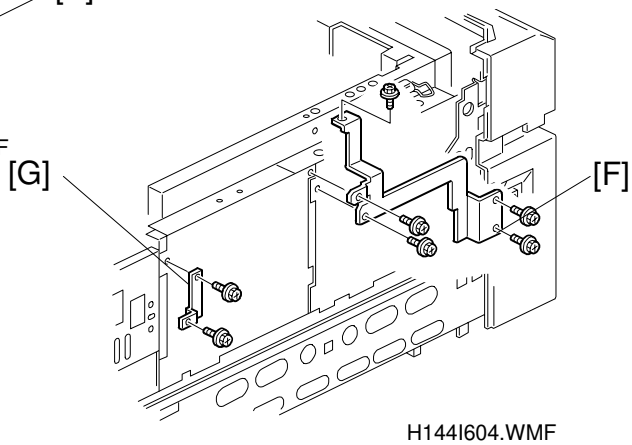


H144I602.WMF

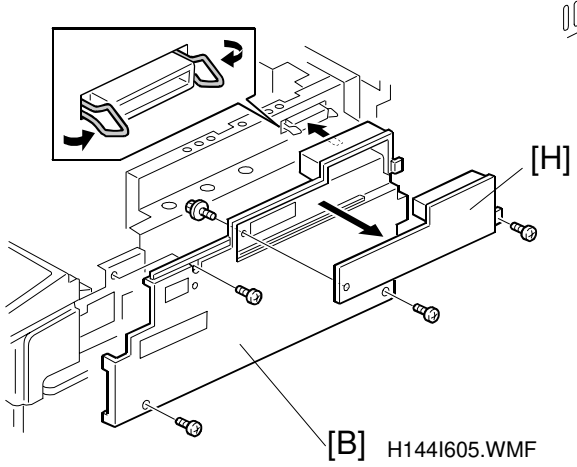
1. Remove the top cover [A] (2 screws) and right cover [B] (4 screws).
2. Connect cable [C] to the FCU board as shown.



H144I603.WMF

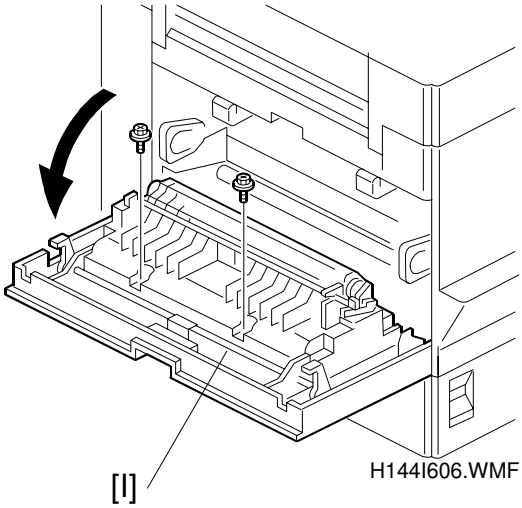


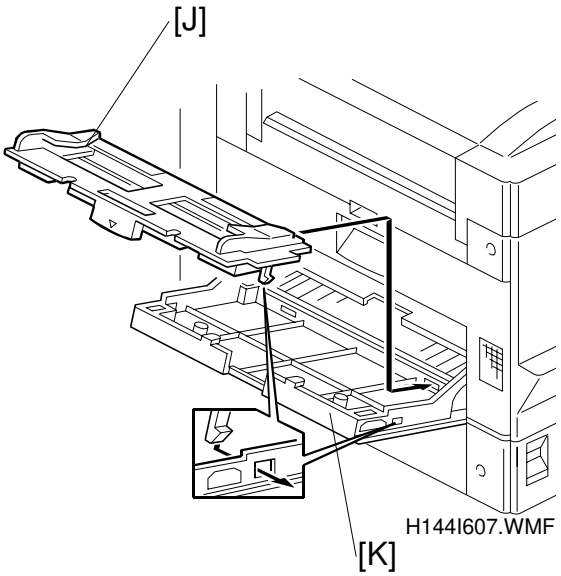
H144I604.WMF

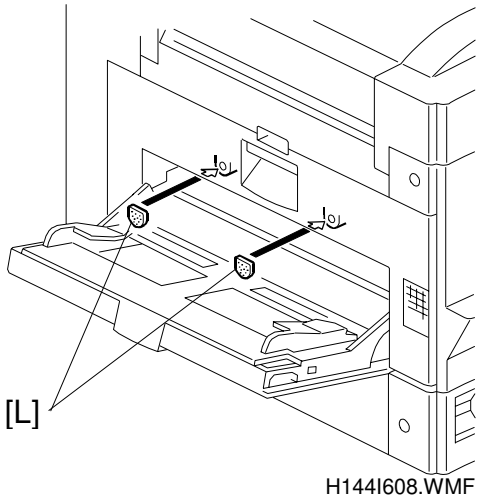


H144I605.WMF

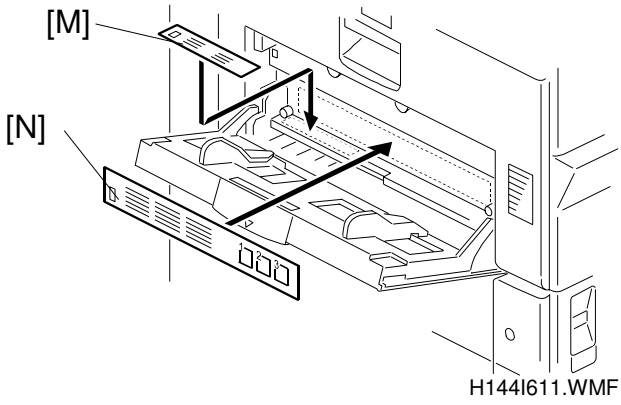
3. Attach the printer interface [D] to the machine (5 screws) and connect cable [C] to the printer interface. Then run the cable [C] through the clamp [E] as shown.
   NOTE: Make sure that the cable is not pinched between the printer interface [D] and the machine.
4. Attach the grounding plates [F] (5 screws) and [G] (2 screws) to the printer interface unit as shown.
5. Remove the small cover [H] (1 screw) then replace the right cover [B] as shown.



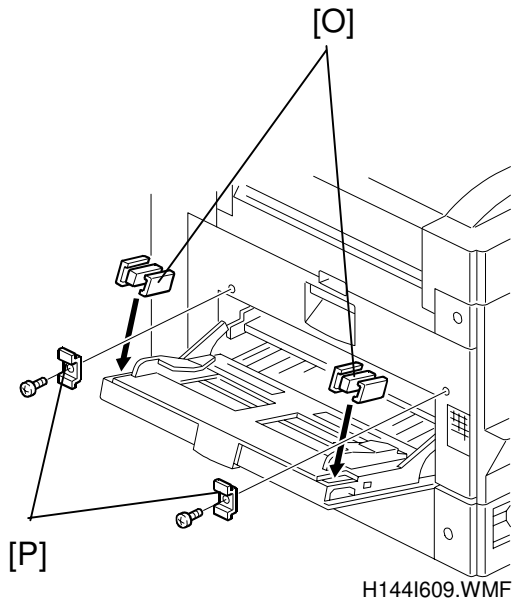




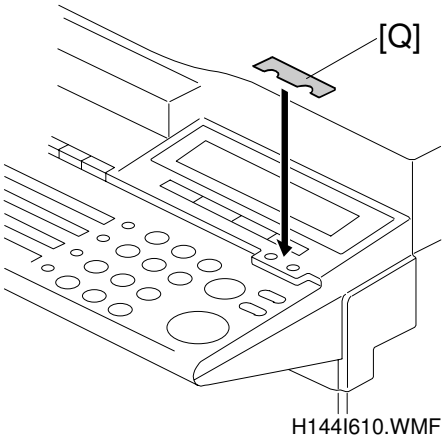
6. Open the left cover [I]. Remove the 2 screws to separate the small cover from the left cover.
7. Attach the guide plate [J] to the left small cover [K] separated in step 6, as shown.
8. Attach cushions [L] to the left side of the machine.



H144I611.WMF



H144I609.WMF



H144I610.WMF

9. Attach the decals [M] and [N] to the left side of the machine.
10. Attach magnet catches [O] to the left cover and small brackets [P] (1 screw each) to the left side of the machine as shown.
11. Replace the top cover.
12. Attach the decal [Q] to the operation panel as shown.
13. Plug in the machine and make sure that the parallel cable is not connected to the controller, then turn the machine on.
14. Enter the printer service mode (User Tools – [Printer] – # + 2) and change the Product Name to " "(blank). Then press the Esc key.
15. Print the Print Log page to check that the printer controller is connected correctly. Then exit service mode (# + *).
16. Enter the service mode and print the system parameter list, then make sure that "PRINTER INTERFACE" is listed as an option. Then exit the service mode.
17. If the parallel cable is going to be connected, turn off the machine first, connect the parallel cable, and then turn the machine back on again.

3.2 NETWORK INTERFACE BOARD (NIB)

⚠CAUTION

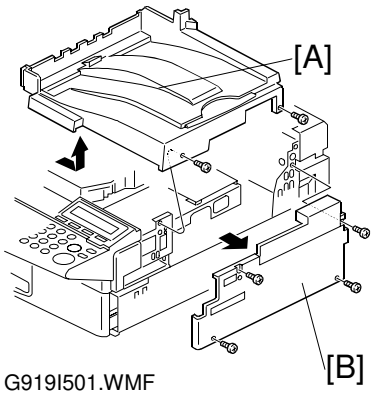
Before installing this option, do the following:

1. Print out all messages stored in the memory.

2. Print out the list of user-programmed items and the system parameter list

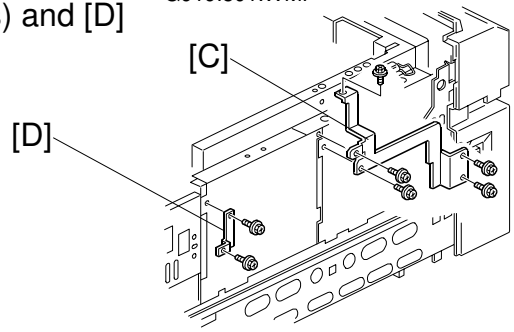
3. Turn off the main switch and disconnect the power cord, the telephone line, and the network cable.

1. Remove the top cover [A] (2 screws) and right cover [B] (4 screws).



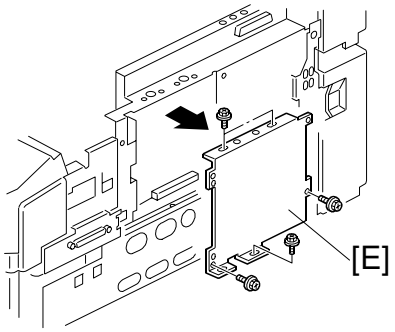
G919I501.WMF

2. Remove the grounding plates [C] (5 screws) and [D] (2 screws).



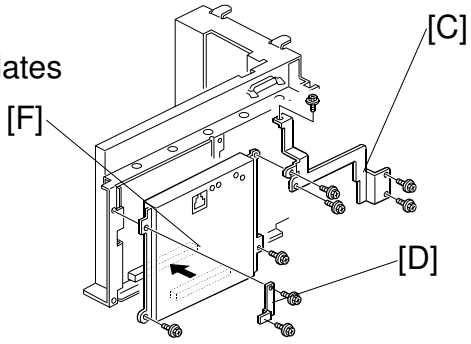
G919I502.WMF

3. Remove the printer interface left plate [E] (5 screws).



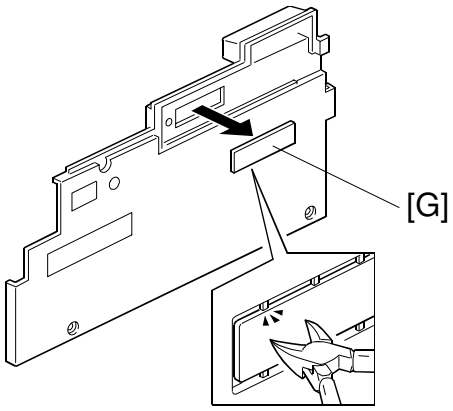
G919I503.WMF

4. Attach the network interface board [F] to the printer interface (2 screws). Then replace the grounding plates [C] and [D] as shown.



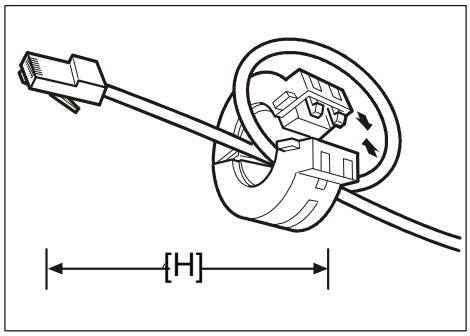
G919I504.WMF

5. Remove the cutout [G] from the right cover. Then replace the top cover and right cover.



G919I505.WMF

6. Loop the network interface cable and attach the ferrite core as shown in the illustration.
   NOTE: The network interface cable loop should be about 15 cm (6”) [H] from the end of the cable (on the end closest to the printer).



G919I506.WMF

7. Attach the network interface cable to the jack on the board. Then connect the other end of the network interface cable to the network expansion device.

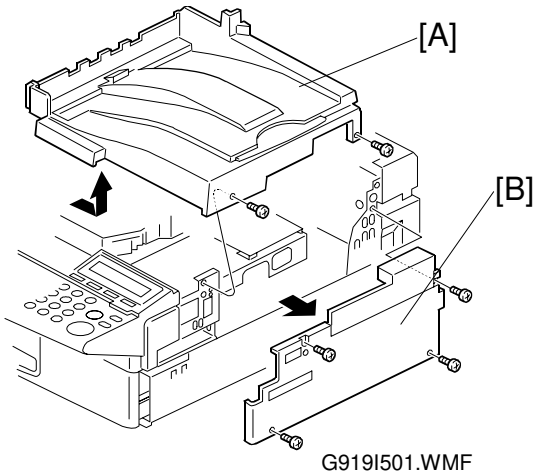
8. Plug in the machine and turn on the main power switch.

3.3 MEMORY (DRAM SIMM)

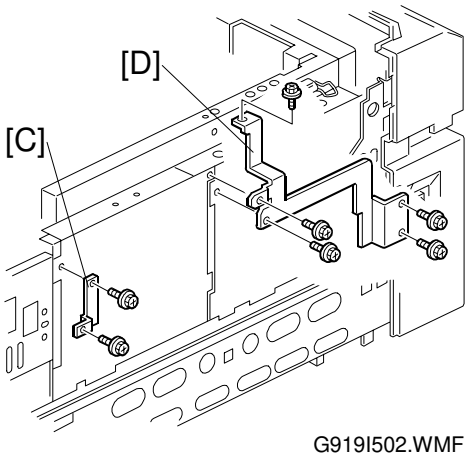
⚠CAUTION

Before installing this option, do the following:

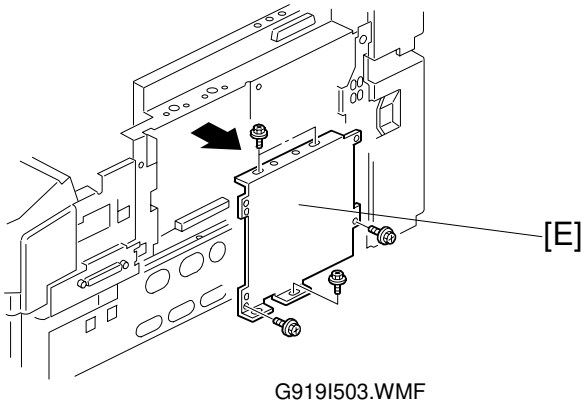
1. **Print out all messages stored in the memory**
2. **Print out the list of user-programmed items and the system parameter list**
3. **Turn off the main switch and disconnect the power cord, the telephone line, and the network cable.**



G919I501.WMF

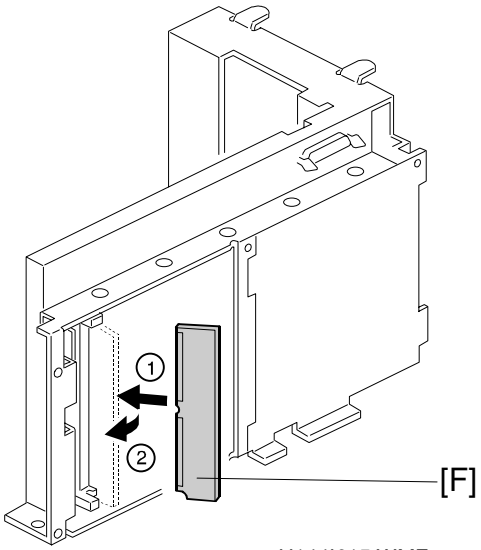


G919I502.WMF



G919I503.WMF

1. Remove the top cover [A] (2 screws) and the right cover [B] (4 screws).
2. Remove the grounding plates [C] (5 screws) and [D] (2 screws).
3. Remove the printer interface left plate [E] (5 screws).



H144I615.WMF

4. Install the SIMM memory [F].
5. Replace the printer interface left cover, the grounding plates, the right cover, and the top cover.
6. Plug in the machine and turn on the main power switch.
7. Check that the total installed RAM value on the configuration sheet is correct.

4. SERVICE TABLES

4.1 PRECAUTION

Do not turn off the machine, or switch the controller off-line, while the data-in LED is blinking or lit. Otherwise, some data that the controller has received for raster image processing may be lost.

Check with the customer before maintenance to avoid such data loss.

4.2 SERVICE MODES

4.2.1 HOW TO ENTER THE SERVICE MODES

NOTE: Before using any of the service modes, disconnect the parallel and Ethernet cables.

Entering Printer Service Mode

1. Press the [User Tools] key then press the [Printer] key to enter the "Printer" mode.
2. Press the [#] key and [2] key together until the service mode menu appears on the display.
3. Use the [◀] [▶] keys to scroll through the menu listing. To select an item, press the [Enter] key. Then the sub-menu will appear.
4. To return to the 1st level menu, press the [Esc] key several times.

[User Tools] → [Printer] → [#] + [2] (Hold for more than 3 seconds.)

Exiting Service mode

There are two ways to exit the service mode.

1. [#] key and [*] key
   1) Press the [#] key and [*] key together.
   2) Wait for a few seconds. The machine exits service mode automatically.

   [#] + [*] (Hold for more than 3 seconds.)

2. Turning off and on
   1) Turn off the machine.
   2) Wait for a few seconds and then turn it on again.

4.2.2 SERVICE MODE TABLE

SERVICE MENU

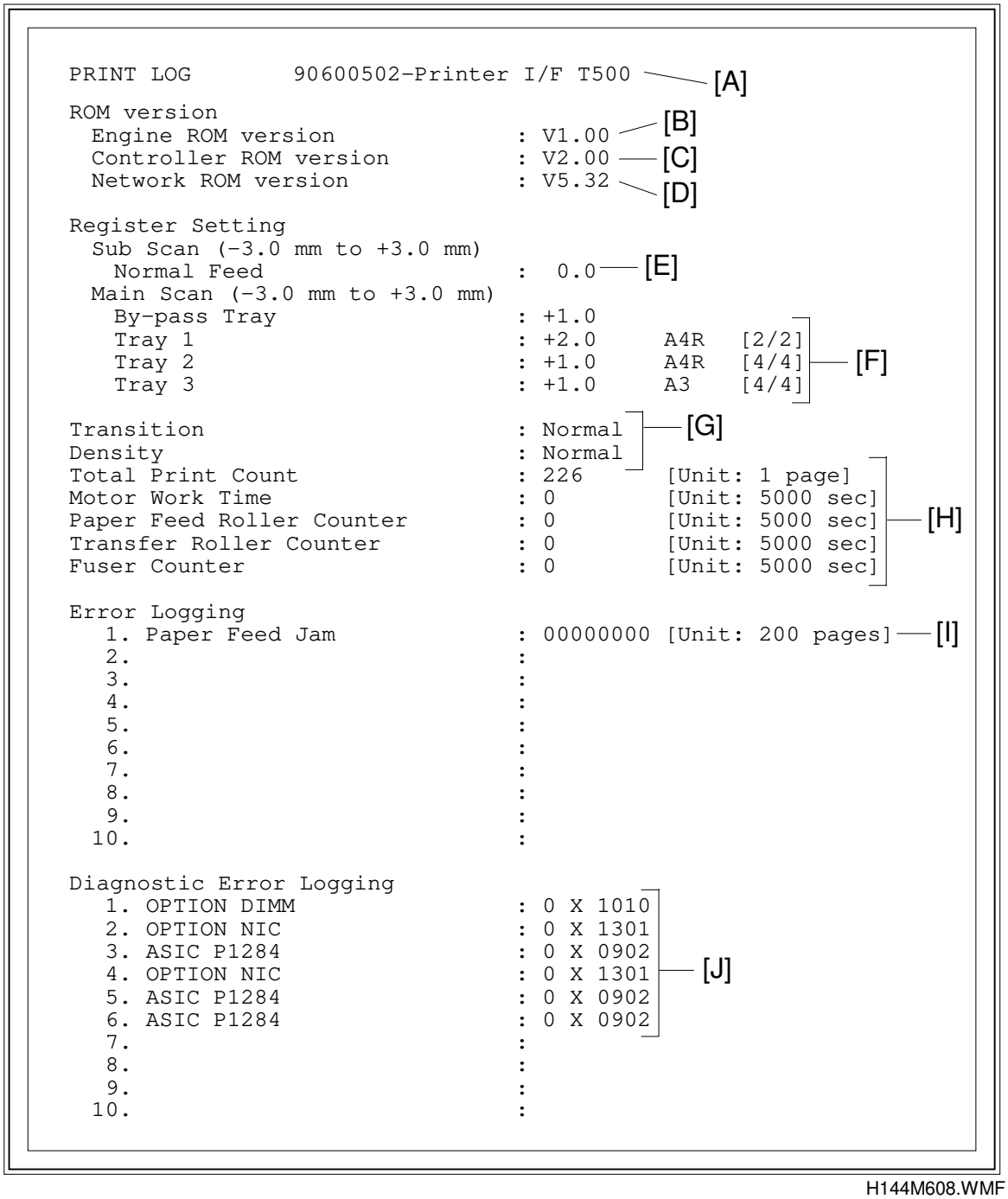
Menu Level			Function
Level 1	**Level 2**		
Main Scan	Tray 1	Not used	Do not change the settings. The registration values are stored in the printer option when the machine is turned on. Refer to the fax service manual for how to adjust.
	Tray 2		
	Tray 3		
	By-pass Tray		
Sub Scan	Normal Feed	Not used	Do not change the settings. The registration values are stored in the printer option when the machine is turned on. Refer to the fax service manual for how to adjust.
Counter Clear	Total Print	Not used	Do not change the settings.
	Paper Feed		
	Transfer Roller		
	Fusing		
	Error Log & Counter		
EEPROM Clear		Not used	Do not change the settings.
Fusing Error Clear		Not used	Do not change the settings.
Print Log			Prints the print log
			To print the log sheet, select the tray using the "▲/▼" keys then press the [Enter] key. *See the "Print Log" section for details.*
ROM Version	Engine	Not used.	V1.00 is always displayed. If you want to see the PIF board ROM version, print out the System Parameter List for the fax machine.
	Controller	F/W Version Display (Main Control Board)	Displays the main printer control board firmware version.
	Network ROM	NIB Firmware version Display	Displays the NIB firmware version.
Output Check	Main Motor	Not used	Do not change the settings.
	1,200 dpi Motor		
	Polygon Motor		
	Laser Enable		
	Charger ON		
	1,200 dpi Charger ON		
	Development Bias ON		

Menu Level			Function
Level 1	**Level 2**		
Output Check	1,200 dpi Development Bias ON	Not used	Do not change the settings.
	Registration Clutch ON (Stinger - P3)		
	By-pass Solenoid ON		
	Feed Clutch ON (Stinger - P3)		
	Feed Solenoid ON (Stinger - P4)		
	2nd Feed Clutch ON		
	2nd Feed Motor ON		
	3rd Feed Clutch ON (Stinger - P3)		
	3rd Feed Motor ON (Stinger - P3)		
	Fan Motor		
Product Name		Plug and Play Model Name	Select the blank (" ") from the product name list.
			Use the "◀/▶" keys to select the name. This name is used for the plug and play name and is indicated on the top of configuration page and print log.
	Note: 1. The product name is stored in the NVRAM on the controller board. 2. When the IC Card boot menu NVRAM clear is done, change the product name to " " (blank) again. 3. User settings stored in the NVRAM are reset when the product name is changed.		
Serial Number		Printer ID Setting	Views and stores the printer ID
			To view the printer ID, press the [Enter] key.
			Normally, the printer ID should not be changed.
	Note: 1. The serial number is stored in the NVRAM on the controller board. 2. The printer ID is checked during font downloading. 3. Store the same number when the NVRAM is cleared with the IC card boot menu. 4. The product number of the controller board is used as the printer ID and stored in the factory. See the "Printer ID" section for how to store the serial number.		
Diag. Clear		Diagnostic Error Log Clear	Clear the diagnostic error log.
			To clear the log, press the [Enter] key.

4.2.3 PRINT LOG

Sample

An example of the print log follows.



H144M608.WMF

Printing the Log Sheet

To print the log sheet, do the following.

1. Press the User Tools key, then press the [Printer] key to enter the "Printer" mode.
2. Press the # key and 2 key together until the service mode menu appears on the display.
3. Use the ◀ ▶ keys until "PRINT LOG" appears. Then press the [Enter] key.
4. Use the ◀ ▶ keys to select the appropriate tray, then press the [Enter] key.

NOTE: If the fusing unit temperature is too low, when the machine still recovering from energy saver mode, the machine prints out no data on the paper. Please print out the log sheet again. The second time, the log sheet is printed out normally if the temperature has recovered.

Items on the Log Sheet

[A]: Serial Number and Model Name (Printer ID)
The serial number and model name are stored in the NVRAM on the printer control board. The Printer ID consists of the serial number and the model name together. However, the 'Printer ID' service mode is only used to input the serial number part. The model name is input with the 'Product Name' service mode.

- Serial Number -

The 8-digit serial number is stored in the factory. Each printer control board has a serial number and it is printed on the PCB.

The Printer ID was introduced for previous models that contained a hard disk for fonts, to prevent copyright violations when downloading fonts. Normally, when the printer control board is changed, the NVRAM on the board is removed and then installed on the new board. For those previous models with hard disks, the serial number stored in the memory had to stay the same, even though a printer control board with a new serial number had been installed.

However, this model does not have a hard disk so the copyright violation problem does not occur. So, if you change the controller board, you can change the serial number setting if you wish.

After clearing the NVRAM or replacing the NVRAM, the original number is deleted. To store it again, use 'Serial Number' in service program mode. (See the "Printer ID" section).

- Model Name -

The model name is fixed in the controller software at “Printer I/F T500”. The model name is used for the “plug and play” name. The product name should be changed to blank when the printer option unit is installed. Refer to the Installation Procedure in this manual. After clearing the NVRAM or replacing the NVRAM, restore the model name using ‘Product Name’ in service program mode (make sure that the ‘blank’ setting is selected).

NOTE: When the model name is restored by service program mode in the field, the NVRAM will be partially cleared (user settings such as print quality settings and system settings on the configuration sheet are reset).

If the NVRAM was cleared and the product name was lost, when the log sheet is printed, “?????” is marked on the log print.

Refer to the “IC Card Boot Service Menu” section for how to reset the NVRAM.

[B]: Engine ROM version

On this report, the version number is fixed at V1.00. If you want see the PIF board and/or engine firmware version, see the fax system parameter list.

[C]: Controller ROM version

This is the printer control board firmware version. The controller firmware consists of PCL firmware and diagnostic firmware. The controller ROM version changes when one or more of these is updated.

The controller firmware version is stored in the NVRAM on the printer control board. The controller firmware can be installed from an IC card. The engine firmware and NIB firmware cannot be installed using this method.

[D]: Network ROM version

This is the NIB firmware version. The firmware can be updated with utility software on a PC connected to the NIB through the network.

[E]: Sub Scan/Main Scan

Not used. Do not change the settings using the printer service mode.

The registration values are stored in the printer option when the machine is turned on.

[F]: Tray paper status

This shows the paper size and amount of paper remaining. The remaining paper is showed in 3 steps for the 1st tray. “0/2” means no paper and “2/2” means the tray is full.

NOTE: For the 2nd and 3rd trays (optional feed units), the remaining paper seems to be shown in 4 steps. But, the option paper feed unit cannot detect how much paper is remaining. So, the value is always “0/4” or “4/4”.

[G]: Transition/Density
This shows the transfer current and image density settings in the engine board. These are user settings, and they go to 'normal' when the EEPROM is cleared.

[H]: Counters
These counters are always "0" except for the total print counter. The total print counter value is copied from the engine unit. The total counter cannot be reset by using counter clear in the service mode menu.

If you want see all the counters, please use the fax service mode.

[I]: Error Logging
Not used.

The errors are logged in the RAM in the base machine.

Refer to the fax main service manual.

[J]: Diagnostic Error Logging
The ten latest errors are logged. The log is stored in the NVRAM and can be cleared by 'Diag clear' in the service program mode menu. When the printer control board is replaced and the old NVRAM is installed on the new board, the diagnostic errors should be cleared because these errors occurred with the old printer control board.

e.g. 0 x 1010

- 1010 — Error code (see section 7 for details of the codes).
- 0 x — Means that the following is a hex number.

4.2.4 PRINTER ID

Overview

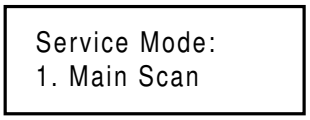
The original printer ID is stored in the NVRAM on the printer control board in the factory. The serial number of the printer control board is used as part of the ID. When the printer control board is replaced in the field, the old NVRAM is installed on the new board. In this case, the printer ID is not deleted.

When the NVRAM is cleared or changed because of a hardware problem, the printer ID is deleted. You can restore it with this service program.

Restoring the Printer ID

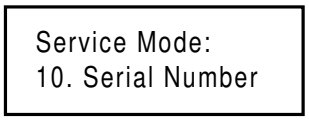
The printer ID can be stored using the service program mode as follows.

1. Press the User Tools key, then press the [Printer] key to enter the "Printer" mode. Press # and 2 together until the service mode menu appears on the display.



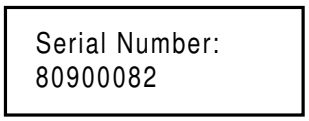
H144M628.WMF

Use the ◀ ▶ keys.



H144M610.WMF

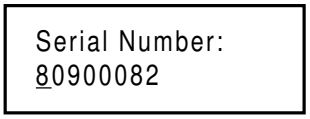
Press the [Enter] key.



H144M611.WMF

An 8-digit number appears.

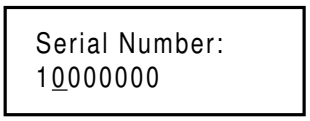
2. Press # and 3 at the same time
   A cursor will appear under the 1st digit.



H144M612.WMF

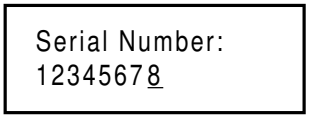
Service Tables

3. Use the ◀ ▶ keys to change the number, and press the [Enter] key to store the displayed number.
   NOTE: Store the same number which had been stored previously (see the top of the Print Log sheet).
   The printer control board has a serial number printed on the board, but if the old board had been replaced earlier, the serial number on the new board must not be used for the Printer ID.



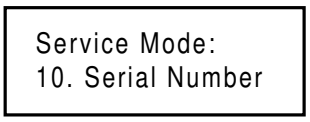
H144M613.WMF

4. Then the cursor shifts to the right.



H144M614.WMF

5. To store the number in the display, press the [Enter] key.



H144M610.WMF

6. The display goes back to the previous menu.
7. Use the ◀ ▶ keys to select “PRINT LOG”.

H144M615.WMF

8. Print the log sheet and check that the printer ID at the top of the page (serial number and model name) is correct.

4.2.5 SERVICE TOOL MENUS

There are two service menus that include tools for downloading firmware. These are the 'service tool menu' and the 'IC card boot service menu'.

Service Tool Menu

Entering This Menu

1. Press the User Tools key, then press the [Printer] key to enter the "Printer" mode.
2. Press the # key and 4 key together until the service tool menu appears on the display.

Exiting this mode

There are two ways to exit the service mode.

1. # key and * key
   1) Press the # key and * key together.
   2) Wait for a few seconds. The machine exits service mode automatically.

   # + * (Hold for more than 3 seconds.)
2. Turning off and on
   1) Turn off the machine.
   2) Wait for a few seconds and then turn it on again.

Menu Contents

Menu Item	Contents
Test Print	Print a controller-generated test pattern (Listed below – for factory use only)
Download	Not used.
Clear NVRAM	Clear the NVRAM
	To clear the NVRAM, press the [Enter] key twice. Normally, NVRAM clear should not be used. **Note:** This resets all the settings stored in the NVRAM to their default settings. This procedure is required only after replacing the NVRAM chip.
Copy to CARD	Not used.
DIMM to Memory	Not used.

TEST Print menu

Sub menu	Function
4 x 4	Print 4 x 4 dots pattern for uniformity
Brown Fox	Print “Brown Fox” words
Black Square	Print checker pattern and black square
All Blank	Print all blank data
Regist Adjustment	Print this then adjust main/sub registration with the fax service mode
Free Size	Print 2 x 2 pattern on free size paper
Header Attach	Print with header dpi : 600 dpi Paper : Thick/Normal Tray : CS-S standard cassette : CS-1 second tray : CS-2 third tray : CS-M bypass tray Page : number of prints
EEPROM Clear	Not used.
Clear Counter	Not used.
Version Info	View the software version of the pattern generator.

IC Card Boot Service Menu

Entering This Menu

1. Turn the machine off.
2. Turn on DIP SW 1 on the printer control board.
3. Plug the IC card into the IC card adapter, then connect it to the option bus connector on the printer control board.
   NOTE: The connector on the right can only be used for this function. Do not use a blank IC card.
4. Turn the machine on. The IC card boot service menu will be displayed.

Menu Contents

The IC card boot service menu contains the following features.

Menu	Function
Update Firmware	Update controller firmware using an IC card.
	For details, see “Downloading New Controller Software” in section 4 of the service manual.
Download	Not used.
Copy to DIMM	Not used.
Copy to CARD	Not used.
Clear NVRAM	This is the same as in the service tool menu.

Exiting This Menu

1. Turn the machine off.
2. Remove the IC card and IC card adapter.
3. Turn DIP SW 1 off.
4. Turn on the machine again.
5. The user menu will appear.

NOTE: Don’t forget to return DIP SW1 to the off position. Otherwise the printer will not boot.

4.3 NVRAM RESET PROCEDURES

The following list shows what data is stored in the NVRAM.

- User settings for the controller
- Product name (plug and play)
- Controller serial number
- Diagnostic error logging
- Controller firmware version

NOTE: When the NVRAM is cleared, all the data shown above is cleared from the memory.

Memory clear procedure

- Printer Service Tool Menu – Clear NVRAM

4.4 DOWNLOADING NEW CONTROLLER SOFTWARE

4.4.1 OVERVIEW

This section explains how to upgrade the controller firmware using an IC card, also known as a flash card.

To connect the IC card to the printer, an IC card adapter is required. This adapter plugs into one of the option bus connectors on the printer control board. The IC card adapter is provided as a service tool.

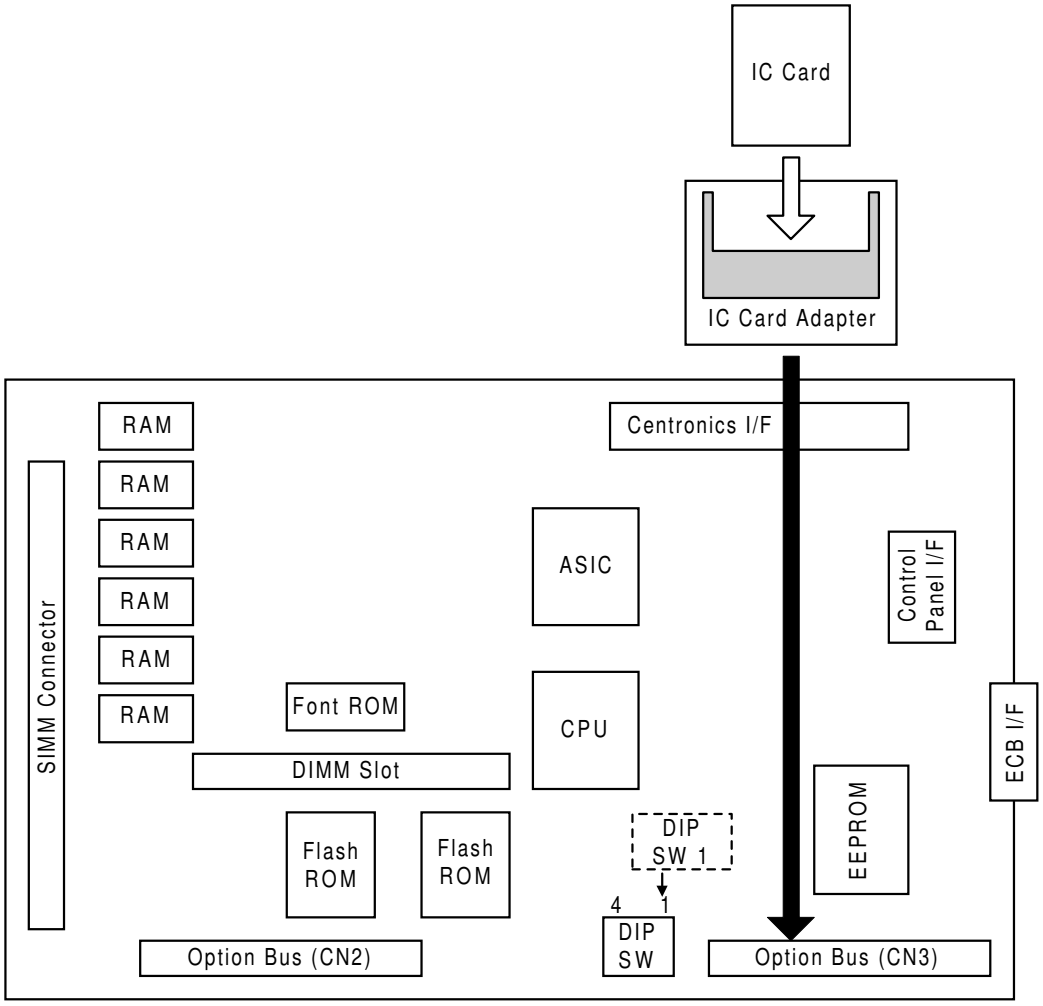
If power is interrupted during downloading, the printer can boot again with the previous firmware except if it happens while downloading the boot area. In this case, the printer must be booted with an IC card.

4.4.2 DOWNLOADING NEW FIRMWARE FROM AN IC CARD

Preparation

- IC card containing new firmware
- IC card adapter (P/#: G0319350)

Connecting the IC Card



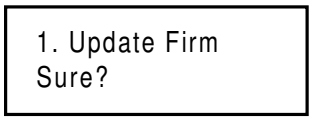
H144M602.WMF

Downloading Procedure

1. Turn off the printer.
2. Change DIP SW1 to ON on the printer control board.
3. Attach the IC card to the IC card adapter, and then plug the adapter into the option bus connector.
   NOTE: The printer controller has two option bus connectors. Only the connector on the right side can be used for downloading.
4. Turn on the printer. The printer will boot from the firmware in the IC card.
   NOTE: Don't use a blank IC card. Otherwise the printer will not boot up.
5. The service menu will appear as follows. Do the following step by step.

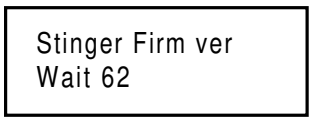
H144M609.WMF

Press the [Enter] key.



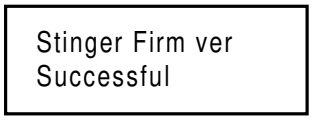
H144M629.WMF

Press the [Form Feed] key.



H144M630.WMF

The counter on the display counts down to zero.

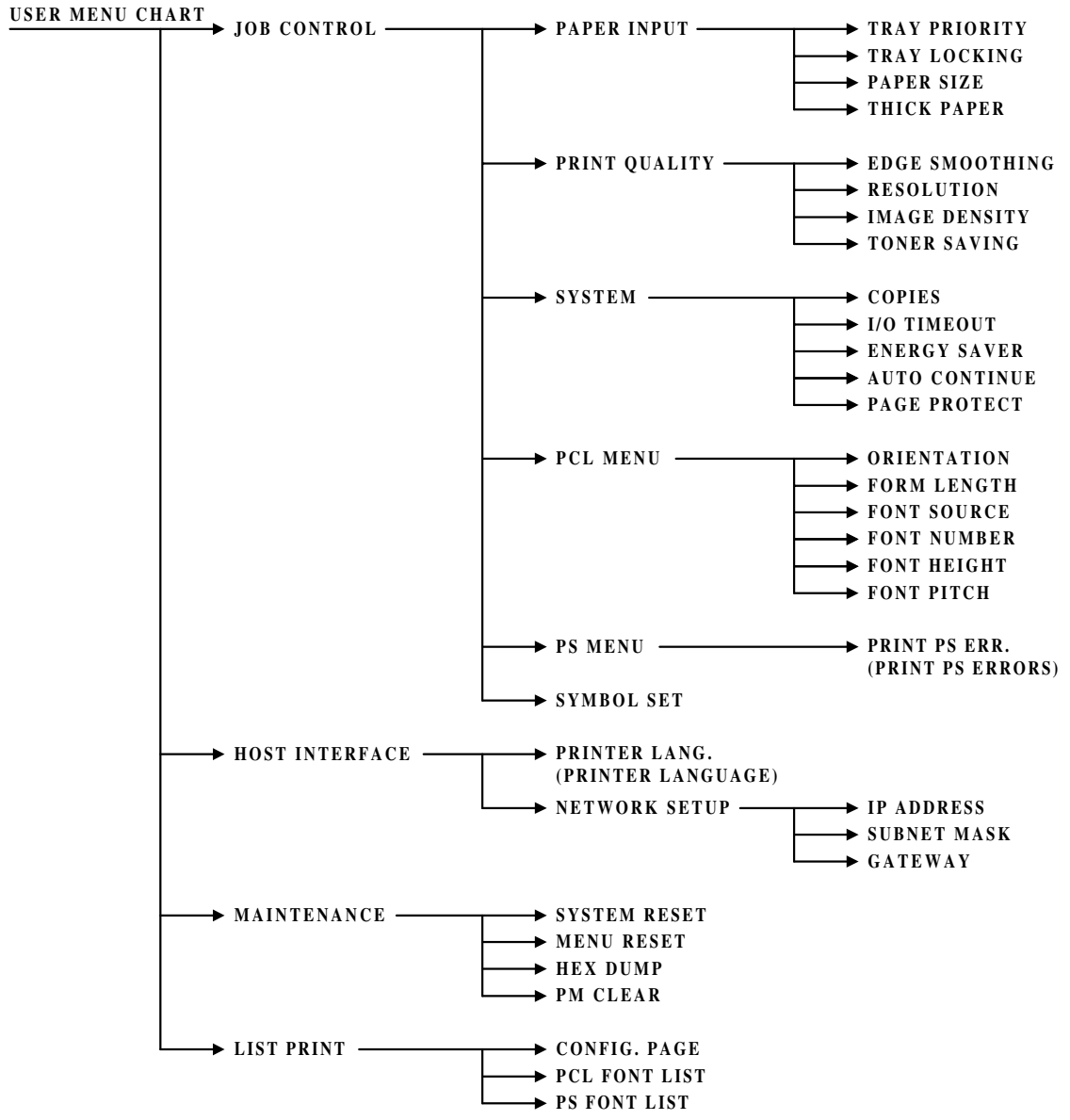


H144M631.WMF

6. The above display shows that updating has finished.
7. Turn off the printer.
8. Detach the IC card and the IC card adapter.
9. Change DIP SW1 to off.
10. Turn the printer on and enter the service program mode.
11. Print the log print and check the controller firmware version.
12. Return to the user mode.

NOTE: There are two ways to go back to the user mode from the service mode.
1) Press # and * together. Then initialization will start.
2) Turn the printer off and on.

4.5 USER MENU



H144M607.WMF

Service Tables

4.6 DIAGNOSTIC TEST MODES

4.6.1 OVERVIEW

This machine has two types of diagnostic test mode.

- Power-up diagnostics: Done every time the machine is switched on
- Detailed diagnostics: Done after entering the detailed diagnostic mode

4.6.2 POWER-UP DIAGNOSTIC MODE

This is automatically done to check system integrity whenever the machine is powered up.

If the machine detects an error, the machine displays an SC code (e.g. SC 2100) on the operation panel, blinks the Error LED (the left one of the two status indicators on the front of the operation panel), and stops system booting.

If the error is for an optional device (if one of the following SCs is displayed), switch off the power, disconnect the defective optional device, then turn the power back on. The machine will restart.

SC Code	Optional Device
SC2700	NIB
SC3100	SIMM
SC3200	Unknown Option
SC3201	Unknown Option

4.6.3 DETAILED DIAGNOSTIC MODE

Entering Detailed Diagnostic Mode

To enter this mode, press the User Tools key, then press the [Printer] key to enter the "Printer" mode. Press # and 1 together.

During the Test

While testing, the machine displays the component being tested.

If the machine has detected an error, the machine displays the error code (e.g. 0101) on the operation panel, blinks the Error LED, and stops the test.

If an error occurs during the test, press # and 5 together to continue the test. However, if the error is one of those in the 'Power-up and Detailed Diagnostics Modes – Program Execution Errors" table (see section 5, 'Troubleshooting'), the test cannot continue.

If the Centronics loopback connector (P/#: G0219350) is not plugged in, an error will occur for the device with the missing connector

Print Log Output

The print log is printed automatically after the detailed diagnostic test has finished.

NOTE: When the machine is recovering from energy saver mode, a blank sheet of paper will be printed out and an error message will be displayed on the operation panel. This is because the fusing unit is not hot enough for printing, but the printer controller wants to print a PRINT LOG immediately. Please do the diagnostic test again when the machine is printing normally.

4.6.4 DIAGNOSTIC TEST DETAILS

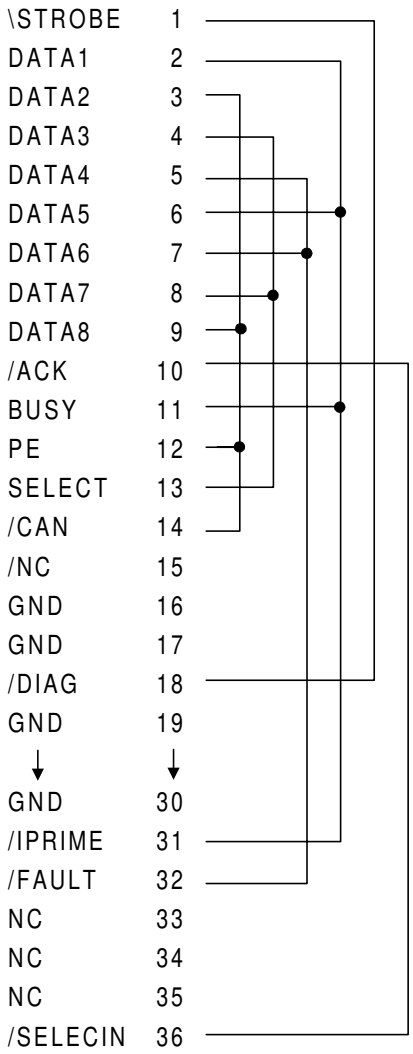
Item	Mode		Function
	Normal	Detail	
Always executed			
VR4300 (CPU) Timer	✓	✓	Tests the timer of the CPU
Code ROM	✓	✓	Tests the code ROM
Resident DRAM	✓	✓	Tests the resident DRAM
VR4300 Exception	✓	✓	Tests the exception interrupt function of the CPU
VR4300 Cache	✓	✓	Tests the cache memory of the CPU
VR4300 FPU	✓	✓	Teats the FPU of the CPU
ASIC Timer	✓	✓	Tests the timer of the ASIC
NVRAM	✓	✓	Tests the NVRAM
ASIC P1284	✘	✓	Tests the parallel interface (IEEE1284)
ASIC Engine I/F	✓	✓	Tests the engine control board I/F of the ASIC
Font ROM	✓	✓	Tests the font ROM
ASIC PVDMA	✓	✓	Tests the PVDMA of the ASIC
Executed if they are installed			
Optional SIMM	✓	✓	Tests the SIMM
NIB	✓	✓	Tests the NIB

The option tests are executed only if these devices are detected.

The parallel loopback test requires the loopback connector to be connected. If this connector is not attached, the test for this component will result in an error.

Loopback Connector for the Centronics Interface

(P/#: G0219350)



H144M604.WMF

5. TROUBLESHOOTING

5.1 OPERATOR ERRORS

Error Message	Function
Close Side Cover	Side Cover Open
Check Paper Size Tray XX	Paper Size Error
Remove Misfeed Front Cover & Tray Remove Misfeed Open Front Cover	Paper Misfeed
Replace Toner Cartridge	AIO Cartridge Installation Error
Replacing Fusing Unit	Fusing Unit Installation Error
Install Tray XX	Tray Installation Error
Tray XX: Add paper	Paper End
Load Tray XX: {paper size} Load By-pass Tray XX: {paper size}	Paper Tray Error
Memory Overflow	Memory Overflow
Print Overrun	Print Overrun
Error SC 2700	Network Interface Board Error
Error SC 3100	Memory Unit (SIMM) Error
Error SC 3200	Left Optional Board Error
Error SC 3201	Right Optional Board Error

Side Cover Open

Message:
- Close Side Cover

Definition:
- The side cover is open.

Reset Method:
- Close the side cover.

Paper Size Error

Message:
- Check Paper Size Tray XX

Definition:
- The paper size setting of the tray differs from the actual paper size in the tray.

Reset Method:
- Pull out the paper tray and check the paper size setting then put the tray back.
- Press the [Enter] key and load the correct size of paper into the tray.

Paper Misfeed

Message:

- Remove Misfeed Side Cover & Tray
- Remove Misfeed Open Side Cover

Definition:

- There is a misfeed in the printer.

Reset Method:

- Remove the misfed paper.

AIO Cartridge Installation Error

Message:

- Replace Toner Cartridge

Definition:

- The AIO cartridge is not installed correctly or toner has almost run out.

Reset Method:

- Set the AIO cartridge correctly.
- If the image density gets too light, replace the AIO cartridge.

NOTE: This machine only has a toner near-end sensor. There is no toner end sensor.

Fusing Unit Installation Error

Message:

- Replacing Fusing Unit

Definition:

- The fusing unit is not installed correctly.

Reset Method:

- Set the fusing unit correctly.

Tray Installation Error

Message:

- Install Tray XX

Definition:

- Tray XX is not installed correctly.

Reset Method:

- Set the tray correctly.

Paper End

Message:
- Tray XX: Add Paper

Definition:
- Paper has run out in tray XX.

Reset Method:
- Load paper.

Paper Tray Error

Message:
- Load Tray XX: {paper size}
- Load Bypass Tray: {paper size}

Definition:
- Tray XX (or the by-pass tray) is empty.
- The actual size of paper loaded in tray XX (or the by-pass tray) does not match the size for which the page was created.

Reset Method:
- Load paper of the correct size in the specified feed direction into tray XX (or the by-pass tray), and print automatically. If not, check that the paper size setting in the tray is correct.

NOTE: 1) When “Auto Select” is specified for the paper source using the printer driver, this message might appear when there is paper of the correct size but in the different feed direction in any of the trays.

2) The page is printed on the incorrect paper size in tray XX (or the by-pass tray) in the following cases.

a) If you press [Enter] without loading the correct paper.

b) If a specified period of time has passed with the Auto Continue feature on. (Auto Continue does not work if this error exists.) If that happens, you cannot continue printing if there is a paper size error. You should take one of the following actions to clear this error.

- Press [Enter].
- Open and close any of the trays.

Memory Overflow

Message:

- Memory Overflow

Definition:

- There is not enough memory to print the data.

Reset Method:

- If the “Auto Continue” feature is on or when the [Enter] key is pressed, the data in the memory is printed out. To clear this message, change the print resolution from 600 dpi to 300 dpi, and try printing again. If the job cannot be printed completely, you should increase the memory capacity.

Print Overrun

Message:

- Print Overrun

Definition:

- The data sent to the printer was too complex.

Reset Method:

- Press [Enter] to print out the data sent to the printer. If you do not want to lose any of the transferred data, set the “Page Protect” feature to “On” before printing the job. If you cannot clear this message, simplify the print job.

NOTE: Make sure to return the “Page Protect” feature to “Off” after the print job. With the “Page Protect” feature “On”, printer performance might be reduced.

Network Interface Board Error

Message:

- Error SC_2700

Definition:

- Error in the optional network interface board.

Reset Method:

- Remove the network interface board from the printer and turn the printer’s main switch off and on. Then try to do the print job again.

Memory Unit (SIMM) Error

Message:

- Error SC_3100

Definition:

- Error in the optional memory unit (SIMM).

Reset Method:

- Remove the memory unit from the printer and turn the printer's main switch off and on. Then try to do the print job again.

NOTE: If you remove the memory unit, you might not be able to print a job that contains large or complex data.

Left Optional Board Error

Message:

- Error SC_3200

Definition:

- Error in the left optional board.

Reset Method:

- Remove the left optional board from the printer and turn the printer's main switch off and on. Then try to do the print job again.

Right Optional Board Error

Message:

- Error SC_3201

Definition:

- Error in the right optional board.

Reset Method:

- Remove the right optional board from the printer and turn the printer's main switch off and on. Then try to do the print job again.

5.2 PRINTER ENGINE SC CODES

SC No.	Function
302	High Voltage Power Supply Error
320	Polygon Mirror Motor Error
322	Laser Synchronization Error
500	Main Motor Error
542	Fusing Error
998	Fusing Unit Mismatch
999	Communication Error

NOTE: To clear SC codes from SC542, check and replace the fusing unit first. Then set printer switch 01 bit 0 to 1 (fax service mode bit switch), and turn the power off and on.

SC302: High Voltage Power Supply Error

Definition:

- A charge roller current leak signal is detected.
- A transfer roller current leak signal is detected.
- A development bias leak signal is detected.

Possible Causes:

- Charge roller damaged.
- Transfer roller damaged.
- Discharge brush grounding problem
- High voltage supply board defective
- Poor PSU connection

SC320: Polygon Mirror Motor Error

Definition:

- The polygon mirror motor does not reach its operating speed within 10 seconds after the polygon mirror motor on signal, or the lock signal is not detected for more than 10 seconds continuously during operation.

Possible Causes:

- Polygon mirror motor defective
- Poor connection between the polygon mirror motor driver and the engine control board
- FCU board defective

SC322: Laser Synchronization Error

Definition:

- The laser synchronization signal cannot be detected by the main scan synchronization detector board for more than 4 consecutive 100 ms intervals.

Possible Causes:

- Laser synchronization detector out of position
- Laser synchronization detector defective
- FCU board defective

SC500: Main Motor Error

Definition:

- A main motor lock signal is detected for more than 1 second or the lock signal is not detected for more than 500 ms during rotation.

Possible Causes:

- Too much load on the drive mechanism
- Main motor defective

SC542: Fusing Error

Definition:

- An abnormal fusing temperature is detected. Refer to the fax service manual for more details.

Possible Causes:

- Fusing thermistor defective or out of position
- Fusing lamp open
- Fusing thermofuse open
- Poor fusing unit connection
- FCU board defective
- Power supply unit defective

5.3 DIAGNOSTIC ERROR CODES

5.3.1 DIAGNOSTIC ERROR CODE TABLE

The diagnostic error codes are shown in the following table.

Power-up Diagnostic Mode

Device Name	Device Code	Error Code	Description	Possible Cause
VR4300 (CPU) Timer	01	SC2102	CPU (VR4300) timer error	• Printer Control Board defective
Code ROM	02	SC2100	Flash ROM check sum error	• Printer Control Board defective
Resident DRAM	03	SC2101	Resident DRAM check error	• Printer Control Board defective
VR4300 Exception	04	SC2102	Exception interrupt check error	• Printer Control Board defective
VR4300 Cache	05	SC2102	Data cache or instruction cache check error	• Printer Control Board defective
VR4300 FPU	06	SC2102	Floating point operation error	• Printer Control Board defective
ASIC Timer	07	SC2104	ASIC timer error	• Printer Control Board defective
NVRAM	08	SC2105	NVRAM check error	• Printer Control Board defective
ASIC P1284 (parallel port)	09	--	Not tested during power-up diagnostics	
ASIC Engine I/F	0A	SC2500	Engine interface check error	• Printer Control Board defective
Font ROM	0B	SC2103	Font ROM CRC check error	• Printer Control Board defective
ASIC PVDMA	0D	SC2104	PVDMA operation error in the ASIC	• Printer Control Board defective
Optional SIMM	11	SC3100	SIMM check error	• Optional SIMM defective
NIB	13	SC2700	NIB check error	• Optional NIB defective
Option0	15	SC3200	Unidentified or unsupported device in the left option slot	• Optional device in the left option slot defective
Option1	15	SC3201	Unidentified or unsupported device in the right option slot	• Optional device in the right option slot defective

Power-up and Detailed Diagnostic Modes – Program Execution Errors

Error Code	Description	Possible Cause
**A1	Accessing error for prohibited address	Printer Control Board defective
**A2	Unmatched load or fetch address for TLB	
**A3	Unmatched store address for TLB	
**A4	Load or fetch address error	
**A5	Store address error	
**A6	Bus error for fetch	
**A7	Bus error for load or store	
**A8	System call exception	
**A9	Break point exception	
**AA	Fetch unsupported command	
**AB	Co-processor exception	
**AC	Overflow exception	
**AD	Trap command exception	
**AF	Floating point operation exception	
**B7	Watch exception	
**B8	Data access or fetch with vertical address	
**E0	Interrupt 0 exception	
**E1	Interrupt 1 exception	
**E2	Interrupt 2 exception	
**E3	Interrupt 3 exception	
**E4	Interrupt 4 exception	
**E5	Interrupt 5 exception	

The above "**" means the device code for which the diagnostic program error occurred during its device test. For details of the device codes, refer to the 'Device Code" column of the "Power-up Diagnostic Mode" table.

Detailed Diagnostic Mode – Other Errors

Device.	Code	Description	Possible Cause
VR4300 Timer	0101	Clock frequency error	Printer Control Board defective
	0102	Interrupt error	
	0103	Exception interrupt error	
	0104	Interrupt masking error	

Device.	Code	Description	Possible Cause
Code ROM	0201	Sum check error	Printer Control Board defective

Device.	Code	Description	Possible Cause
Resident DRAM	0301	Write and read check error	Printer Control Board defective

Device.	Code	Description	Possible Cause
VR4300 Exception	0401	Error during the address error check with load or fetch instructions	Printer Control Board defective
	0402	Error during the address error check with storing instructions	
	0403	Error during the bus error check with jump instructions	
	0404	Error during the bus error check with load or storing instructions	
	0405	Error during the system call check with SYSCALL instructions	
	0406	Error during the break point check with BREAK instructions	
	0407	Error during the unsupported instructions check of the VR4300	
	0408	Coprocessor check error	
	0409	Overflow check error	
	040A	Error during the trap check with the TRAP instructions	
	040B	Floating point calculation check error	
	040C	Error during the watch-LO register check	
	040D	VR4300 TLB register check error	

Device.	Code	Description	Possible Cause
VR4300 Cache	0501	Instruction cache size error	Printer Control Board defective
	0502	Instruction cache hit error	
	0503	Instruction cache write back error	
	0504	Instruction cache clear error	
	0511	Data cache size error	
	0512	Data cache hit error	
	0513	Data cache write back error	
	0514	Data cache write back clear error	
	0515	Data cache clear error	

Device.	Code	Description	Possible Cause
VR4300 FPU	0601	Addition error during floating point operations with low accuracy mode	Printer Control Board defective
	0602	Subtraction error during floating point operations with low accuracy mode	
	0603	Division error during floating point operations with low accuracy mode	
	0604	Multiplication error during floating point operations with low accuracy mode	
	0605	Addition error during floating point operations with high accuracy mode	
	0606	Subtraction error during floating point operations with high accuracy mode	
	0607	Division error during floating point operations with high accuracy mode	
	0608	Multiplication error during floating point operations with high accuracy mode	

Device.	Code	Description	Possible Cause
ASIC Timer	0701	ASIC interrupt request error	Printer Control Board defective
	0702	VR4300 interrupt request error	
	0703	Interrupt check error	
	0704	Interrupt mask error	
	0705	Timer frequency error	

Device.	Code	Description	Possible Cause
NVRAM	0802	NVRAM verification check error	Printer Control Board defective
	0804	Write error	

Device.	Code	Description	Possible Cause
ASIC P1284	0901	Timeout error	Printer Control Board defective
	0902	Interrupt request error of the ASIC when the STROBE signal goes low	
	0903	Interrupt request error of the VR4300 when the STROBE signal goes low	
	0904	Interrupt start error of the VR4300 when the STROBE signal goes low	
	0905	Interrupt masking error when the STROBE signal goes low	
	0906	Interrupt request error of the ASIC when the STROBE signal goes high	
	0907	Interrupt request error of the VR4300 when the STROBE signal goes high	
	0908	Interrupt start error of the VR4300 when the STROBE signal goes high	
	0909	Interrupt masking error when the STROBE signal goes high	
	090A	Interrupt request error of the ASIC when the INIT signal goes low	

Device.	Code	Description	Possible Cause
ASIC P1284	090B	Interrupt request error of the VR4300 when the INIT signal goes low	Printer Control Board defective
	090C	Interrupt start error of the VR4300 when the INIT signal goes low	
	090D	Interrupt masking error when the INIT signal goes low	
	090E	Interrupt request error of the ASIC when the INIT signal goes high	
	090F	Interrupt request error of the VR4300 when the INIT signal goes high	
	0910	Interrupt start error of the VR4300 when the INIT signal goes high	
	0911	Interrupt masking error when the INIT signal goes high	
	0912	Interrupt request error of the ASIC when the SELECT signal goes low	
	0913	Interrupt request error of the VR4300 when the SELECT signal goes low	
	0914	Interrupt start error of the VR4300 when the SELECT signal goes low	
	0915	Interrupt masking error when the SELECT signal goes low	
	0916	Interrupt request error of the ASIC when the SELECT signal goes high	
	0917	Interrupt request error of the VR4300 when the SELECT signal goes high	
	0918	Interrupt start error of the VR4300 when the SELECT signal goes high	
	0919	Interrupt masking error when the SELECT signal goes high	
	091A	Interrupt request error of the ASIC when the FEED signal goes low	
	091B	Interrupt request error of the VR4300 when the FEED signal goes low	
	091C	Interrupt start error of the VR4300 when the FEED signal goes low	
	091D	Interrupt masking error when the FEED signal goes low	
	091E	Interrupt request error of the ASIC when the FEED signal goes high	
	091F	Interrupt request error of the VR4300 when the FEED signal goes high	
	0920	Interrupt start error of the VR4300 when the FEED signal goes high	
	0921	Interrupt masking error when the FEED signal goes high	
	0922	Loopback data error	
	0923	Interrupt request error of the ASIC in DMA mode	
	0924	Interrupt request error of the VR4300 in DMA mode	
	0925	Interrupt start error of the VR4300 in DMA mode	

Device.	Code	Description	Possible Cause
ASIC P1284	0926	Interrupt masking error in DMA mode	Printer Control Board defective
	0927	Loopback data error in DMA mode	
	0928	Interrupt request error of the ASIC in ECP DMA mode	
	0929	Interrupt request error of the VR4300 in ECP DMA mode	
	092A	Interrupt start error of the VR4300 in ECP DMA mode	
	092B	Interrupt masking error in ECP DMA mode	
	092C	Loopback data error in ECP DMA mode	

Device.	Code	Description	Possible Cause
Engine I/F	0A01	Transmission timeout	Printer Control Board defective
	0A02	Reception timeout	
	0A03	Reception parity error	
	0A04	Data error	
	0A05	Interrupt request error of the ASIC during command reception	
	0A06	Interrupt request error of the VR4300 during command reception	
	0A07	Interrupt start error of the VR4300 during command reception	
	0A08	Interrupt masking error during command reception	

Device.	Code	Description	Possible Cause
Font ROM	0B01	Font ROM CRC check error	Printer Control Board defective

Device.	Code	Description	Possible Cause
ASIC PVDMA	0D01	Interrupt request error of the ASIC in PVDMA mode	Printer Control Board defective
	0D02	Interrupt request error of the VR4300 in PVDMA mode	
	0D03	Interrupt start error of the VR4300 in PVDMA mode	
	0D04	Interrupt masking error in PVDMA mode	
	0D05	PVDMA mode timeout	
	0D06	PVDMA read bus error	
	0D07	PVDMA write bus error	
	0D08	FILL operation error	
	0D09	MOVE operation error	
	0D0A	HALF operation error	
	0D0B	QUART operation error	
	0D0C	K3 operation error	
	0D0D	K3 double operation error	

Device.	Code	Description	Possible Cause
Optional SIMM	1102	SIMM size error: Unsupported SIMM size	Optional SIMM defective Printer Control Board defective
	1103	8MB SIMM check error	
	1104	16MB SIMM check error	
	1105	32MB SIMM check error	

Device.	Code	Description	Possible Cause
NIB	1301	Initialization error	• Optional NIB defective • Printer Control Board defective
	1302	Command timeout error	
	1303	Command reception interrupt request error of the ASIC in NIB mode	
	1304	Command reception interrupt request error of the VR4300 in NIB mode	
	1305	Command reception interrupt start error in NIB mode	
	1306	Command reception interrupt masking error in NIB mode	
	1307	NIB command error	
	1308	NIB buffer full error	

Device.	Code	Description	Possible Cause
Option Error	1501	Unidentified or unsupported device in the left option slot	Optional device in the left option slot defective
	1502	Unidentified or unsupported device in the right option slot	Optional device in the right option slot defective