LX7

RICOH FAX1750MP
MV106

SERVICE MANUAL

October 30th, 1996
Subject to change

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1. OVERALL MACHINE INFORMATION

1.1. SPECIFICATIONS

1. PC Print

General Specifications:

Host Interface
IEEE 1284 Bi-directional Parallel
RS422 Serial (optional: only available in North America)

Emulation
Windows GDI
PCL 4.5 (Software emulation)
Macintosh QuickDraw

1st Print Time
Max. 22s printing A4/LT paper, feeding from the standard tray

Print Speed
Max. 6 ppm using A4/LT paper, feeding from the standard tray

Print Resolution
300 dpi (Pseudo 600 dpi with smoothing)

Toner Saving Mode
Off, Light, Medium, Dark
(Available in the status display.)

Smoothing
Off, Level 1, Level 2, Level 3
(Available in the status display.)

Density Control
Lighten, Normal, Darken

Specifications: GDI Mode

Paper Size
Standard Tray
A4, LT, EXE, A5, F4,
US No.10 Envelope*, European DL Enve lope*
* Note: These paper sizes can only be printed one at a time by manual feeding. (Print quality is not guaranteed.)

Paper Feed Unit (Optional)
A4, LT, LG

Paper Type
Copier paper, Transparency
(Only A4 or LT size transparancy can be printed one at a time by manual feeding.)

Specifications: PCL Mode

Paper Size
Standard Tray
A4, LT, EXE, A5
US No.10 Envelope*, European DL Enve lope*
* Note: These paper sizes can only be printed one at a time by manual feeding. (Print quality is not guaranteed.)

Paper Feed Unit (Optional)
A4, LT, LG

2. PC Scan

Host Interface
IEEE 1284 Bi-directional Parallel
RS422 Serial (optional: only available in North America)

Standards Applied
Twain

Scanning Time
Minimum 11 s, scanning A4 size document, ITU-T#1 test document with MMR compres sion

Scanning Resolution
Main Scan: 8 dots/mm
Sub Scan: 7.7 lines/mm

3. PC Fax

Application Programming Interface
TR29, EIA578: Class-1, EIA592: Class-2

Transmission Speed
14,400/12,000/9,600/7,200/4,800/2,400 bps

1.2. FEATURES

1. PC Print

General Settings Available:

- Toner Saving Mode: Off, Light, Medium, Dark
- Smoothing: Off, Level 1, Level 2, Level 3
- Density Control: Lighten, Normal, Darken

Features available in the GDI / PCL Mode

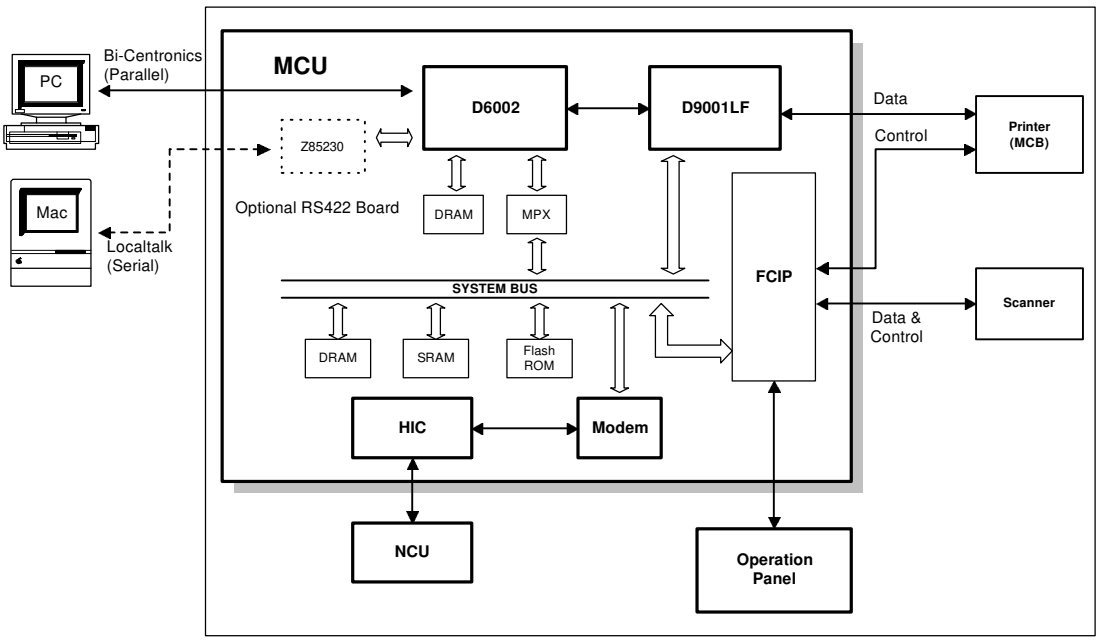
	GDI Mode	PCL Mode
Print Orientation	Portrait, Landscape	
Print Order	Forward, Reverse	——
Manual Duplexing	Off, Book, Report	——
Overlay	Available	——
Scale Print	10 to 500% (in 1% step)	——
2 Up / 4 Up Printing	Available	——
Image Adjustment	Brightness, Contrast	——
Default Font Setting	——	Courier, Line Printer
Margin Setting	——	Top, Bottom, Left, Right

2. PC Scan

Features Available:

- Scanning Mode: Line Art, Dither, Error Diffusion
- Density: Auto, Lightest, Lighter, Normal, Darker, Darkest
- Brightness: Auto, Super Darken, Darken, Normal, Lighten, Super Lighten

1.3. OVERALL MACHINE CONTROL



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In addition to the functions of the FCU of the base facsimile machine (FX7), the MCU (Multiple Control Unit) has some ICs, a bi-directional parallel interface, and an optional serial interface board. Using these interfaces, the machine can communicate with a PC or Macintosh and work as a multi-function machine as a PC printer, PC scanner, and PC fax.

There are two major additional ICs (D6002 and D9001LF) on the MCU. In every case of printing, scanning, or faxing from Windows running on a PC, the control commands sent from the PC are received by the D6002, and forwarded to the FCIP. In accordance with the firmware, the FCIP processes the commands and controls the proper components related to the job. It controls the MCB, D6002, and D9001LF when printing, the scanner components when scanning, and the modem when faxing.

For jobs from a Macintosh, the commands are received by the Z85230 IC on the optional interface board and forwarded to the D6002. After that, the control procedure is the same as for jobs from a PC.

1. PC Printer

For printing from Windows, the application software calls the printer driver which is installed on the PC and forwards the data. The driver sends the data using the Windows GDI and sends it to the machine via the parallel interface. The data consists of compressed print data and control commands, such as input tray selection, smoothing, and toner saving. The commands are received by the D6002 IC on the MCU and are sent to the FCIP. The FCIP processes them and sends them to the MCB which controls the printer components. The FCIP and the MCB communicate with each other so that the FCIP detects the printer status. When a PC sends a command to check the machine status (input using the Status Display window), the MCU responds with the printer status.

For printing from a Macintosh, the driver produces the data using QuickDraw and sends it to the machine via the serial RS422 interface. Other control procedures are the same as for printing from a PC.

2. PC Scanner

For scanning, the TWAIN driver sends commands to the machine. The commands are received by the D6002 IC and sent to the FCIP. Then the FCIP starts scanning by controlling the scanner components, such as the Tx motor driver.

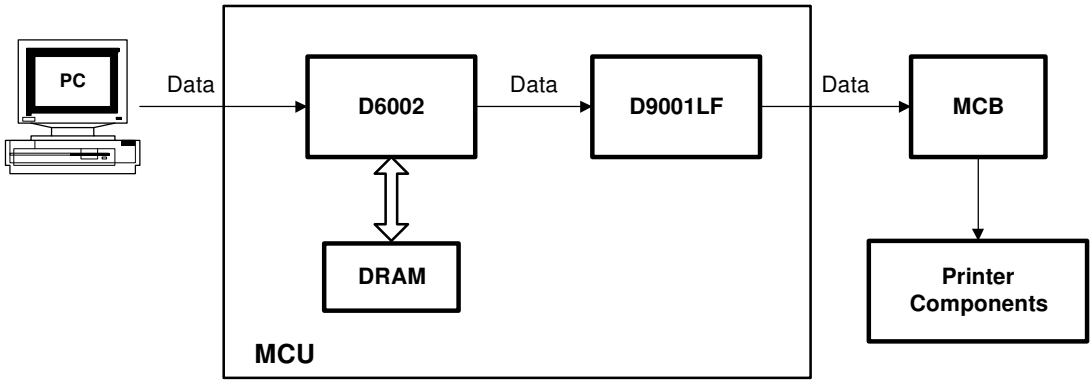
3. PC Fax

When transmitting data from a PC, the PC fax software produces the AT commands and sends them to the specified COM port of the PC. The software redirects them to the specified parallel port. Then the commands and data are sent from the parallel port to the machine. The D6002 receives them, and the commands are sent to the FCIP. The FCIP controls the modem in accordance with the AT command sent from the PC, and the data is sent through the modem and the NCU.

When receiving data, the data is stored in the ECM buffer in the same way as for the FX7's memory reception mode. The data is then sent to the PC via the D6002.

1.4. VIDEO DATA PATH

1. PC Printing



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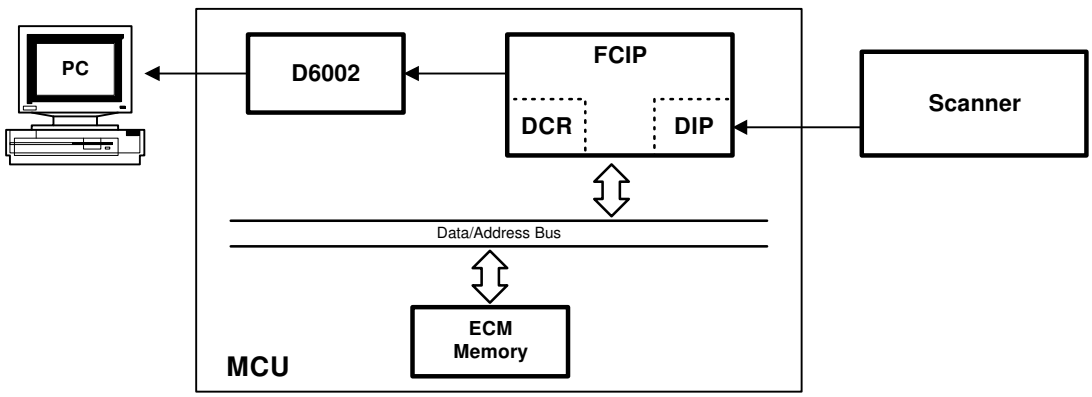
The video data is compressed by the printer driver and then sent to the D6002 through the parallel interface. The DRAM works as an input / output buffer and sends reconstructed data to the D9001LF where smoothing and toner saving are done. The data is then sent to the MCB for printing.
The page memory is not used for PC printing.

2. PC Scanning



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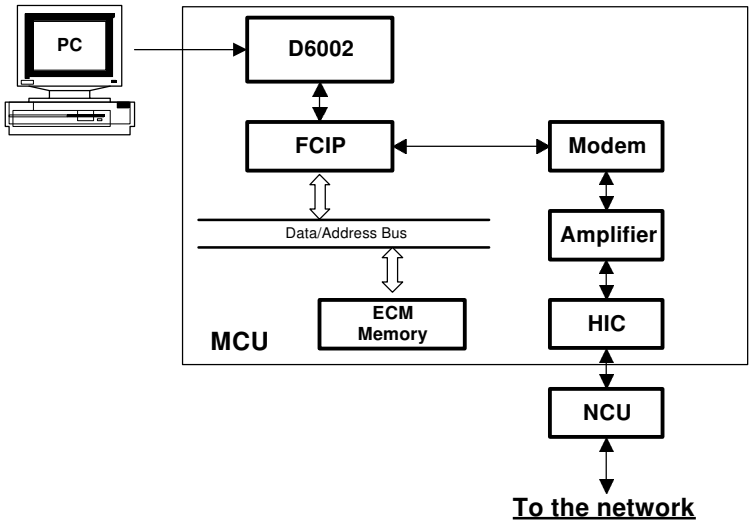
The scanned data passes through the DIP block in the FCIP for analog/digital processing. The data is compressed in the DCR block in the FCIP and passes through the ECM memory. Then it is sent to the PC through the D6002 without any processing. The data is reconstructed in the driver in the PC (the image processing is done in the same way as for fax scanning).

3. PC Fax



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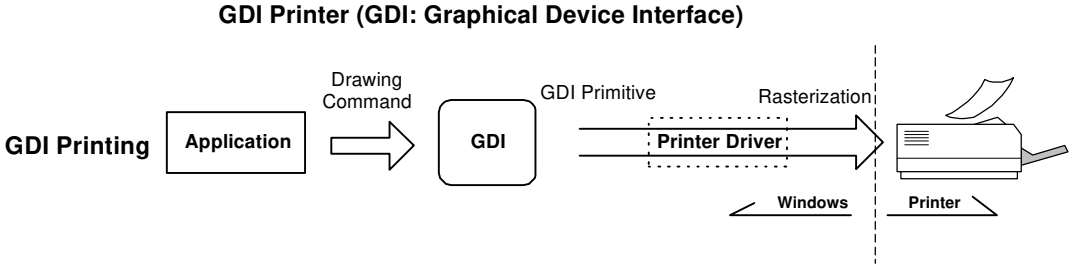
PC Fax Transmission
The PC data is compressed by the application software being used. The data passes to the ECM memory through the D6002 without any processing. Then it is sent to the telephone line through the modem and the NCU.

PC Fax Reception
The data from the line passes to the modem through the NCU. The data demodulated in the modem passes to the D6002 through the ECM memory. The data is reconstructed by the application software being used.

2. DETAILED SECTION DESCRIPTIONS

2.1. GDI Printer



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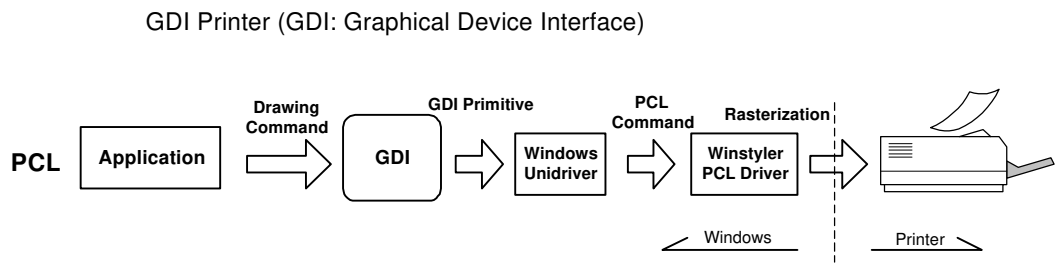
A GDI printer receives data from the GDI (Graphical Device Interface) inside Windows.

GDI is a device driver in Windows which interfaces application software with drivers for graphics devices. The application makes the data for image printing and sends it to GDI, and then GDI sends the data to the printer driver.

GDI printers do not require interpreter software (such as font data) or a high-speed CPU, because the print data is rasterized in the Windows by the drivers. However, printing time can be reduced if a high-speed PC is used.

GDI printers cannot be used without Windows 95 or Windows 3.1.

2.2. PCL Printer



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The PCL driver of this model receives data from the Windows Unidriver as PCL commands and rasterizes the data, and then sends it to the printer. Only the bundled PCL driver can be used for this model.

2.3. TWAIN

TWAIN is a standard interface between applications and scanners. Applications developed under the TWAIN standard can be used with this model's scanner.

Scanner vendors develop driver software under the TWAIN standard and bundle it with the scanner. Under the TWAIN standard, each application has the same user interface for scanning.

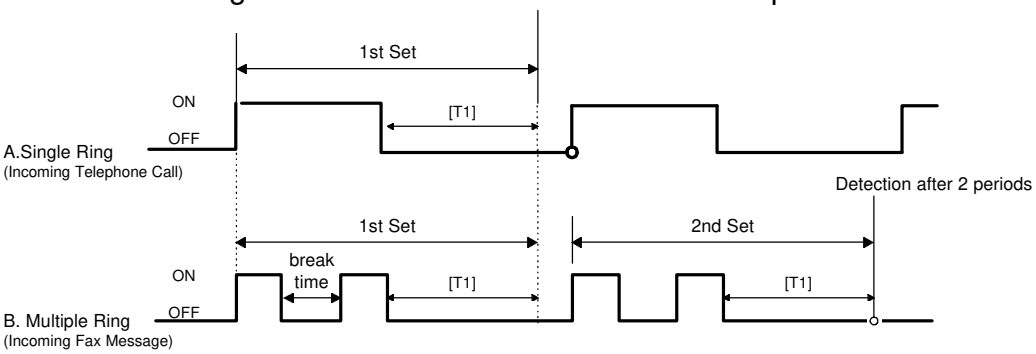
2.4. Distinctive Ring

Note: This feature is available only in the USA (aslo available in the FX7).

Distinctive Ring is a service provided by some telephone companies in the USA. Multiple telephone numbers are provided for one line and different ringing cadence are applied to specify each number.

This machine can recognize two different ringing signal cadences; one is for an incoming telephone call, and one is for an incoming fax message. When this function is turned on with User Parameter 12, the machine will change the reception mode to Fax mode or Tel mode depending on the detected ringing cadence.

- Single Ringing -
When the machine detects “single ringing” (please refer to the diagram below), the machine determines the call to be a telephone call and rings the external telephone.
- Multiple Ringing
When the machine detects “multiple ringing”, the machine determines the call to be a fax message and starts to send CED for fax reception.



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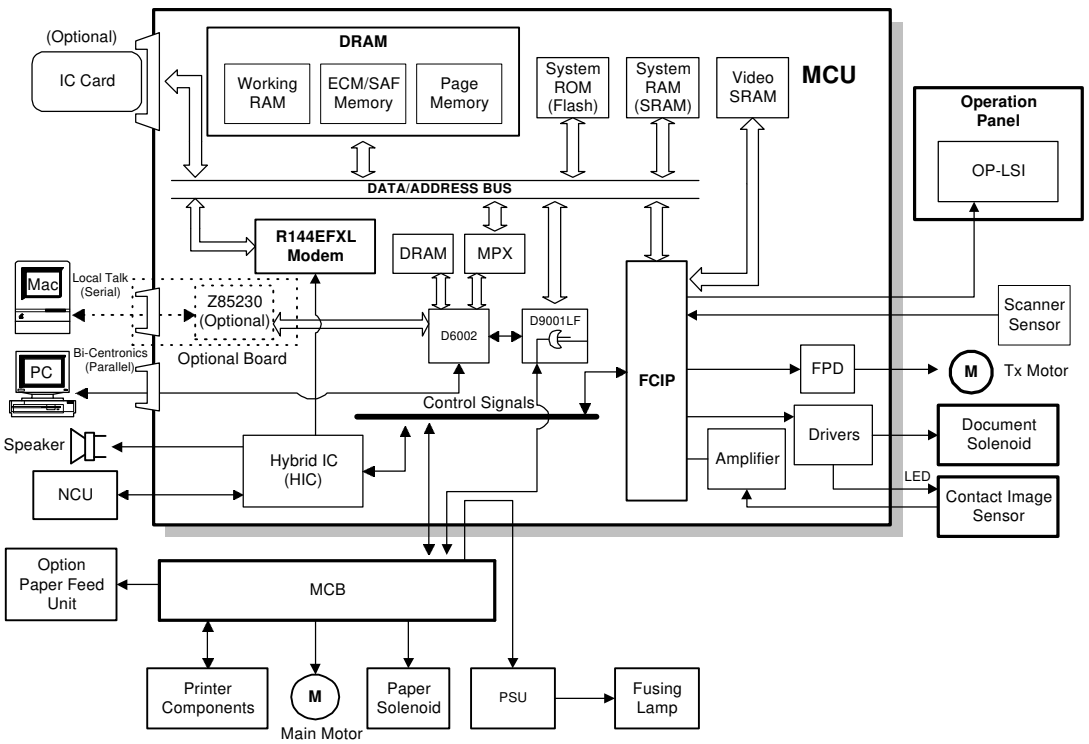
Ringing Signal Detection

The machine determines whether the ringing is single or multiple by the break time between rings (maximum and minimum break time can be changed by a RAM adjustment).

- The machine determines the end of a ring-set when the break time exceeds T1 (stored in RAM address 807F6B).
- The machine detects single ringing when no break is detected within a ring-set.
- The machine detects multiple ringing when a break is detected within a ring-set (minimum break time is stored in RAM address 807F6A, to prevent temporary dropouts in the ringing signal from being detected as breaks).

Cross reference:
NCU Parameter Settings: section 4-1 of this manual

2.5. MCU



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The MCU has following parts on board in addition to the FCU.

1. Oscillators

- 22.0 MHz oscillator for the D6002
- 25.183 MHz oscillator for the D9001LF

2. D6002

- Reconstruction (used for PC printing.)
- Parallel interface
- Serial interface (interface for Z85230)
- I/O controller
- DRAM controller

3. DRAM (used for D6002)

- 0.5 MB DRAM for the command buffer, output buffer and input buffer of the D6002. (It is used for reconstruction of the data during PC printing.)

4. D9001LF

- EET (Smoothing) for PC printing
- Toner saving during PC printing

5. MPX

- Connects the D6002 to the FCIP data bus through the multiplexed bus

2.6. RS422 Interface (Optional)

- Local talk connects to a Macintosh

1. Oscillators

- 3.6864 MHz oscillator for Z85230

2. Z85230

- Serial communication controller (SCC)

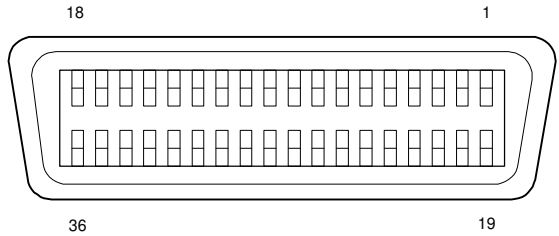
3. Serial I/F Driver

- RS422 driver
- +-5V supplied from the MCU

2.7. Interface

2.7.1. Host Interface

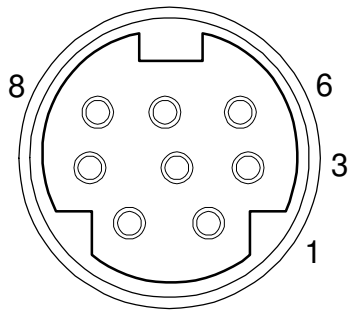
1. Parallel Interface



A 36 pin D-SUB Centronics connector (female).

SIGNAL PIN	SIGNAL NAME
1	/STROBE (I)
2-9	DATA1-8 (I)
10	/ACK (O)
11	BUSY (O)
12	PE (O)
13	SELECT (0)
14	/AUTOFEED (I)
15	NC
16	GND
17	CHASSIS GND
18	NC
19-30	GND
31	/INIT (I)
32	/ERROR (O)
33	GND
34	NC
35	+5V
36	/SELECTION (I)

2.7.2. RS422



An 8 pin female connector (DIN-8).

PIN NO.	SIGNAL NAME	DESCRIPTION
1	HSK (0)	Handshake
2	HSK (0)	Handshake
3	TXD- (O)	Transmit data —
4	GND	Signal ground
5	RXD- (I)	Receive data —
6	TXD+ (O)	Transmit data
7	N.C.	No connection
8	RXD+ (I)	Receive data +

3. INSTALLATION

3.1. INSTALLING THE MACHINE

Refer to the Operator's Manual for the installation environment and how to install and set up the machine.

Refer to section 2.4.4. of the FX7 manual for how to set up the NCU hardware in each country.

3.2. INITIAL PROGRAMMING

Refer to section 3 of the FX7 manual for initial programming of the machine.

3.3. INSTALLING OPTIONAL UNITS

Optional Paper Feed Unit

An optional paper feed unit is available for this machine. Refer to the Operator's Manual for how to install and set up the paper feed unit.

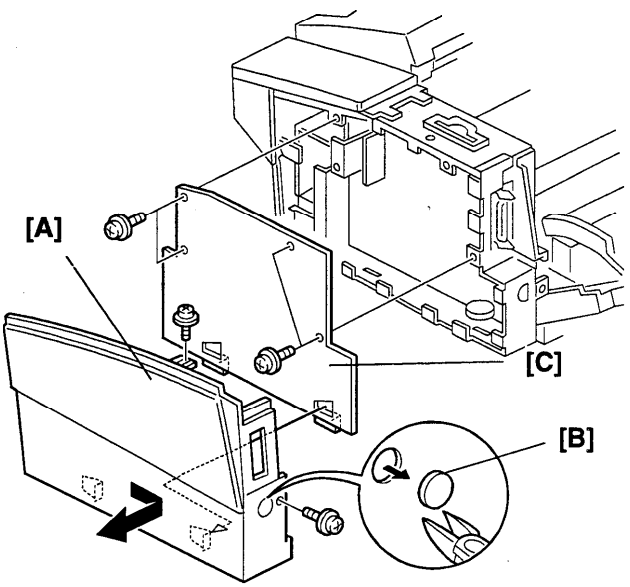
RS422 Kit

⚠CAUTION

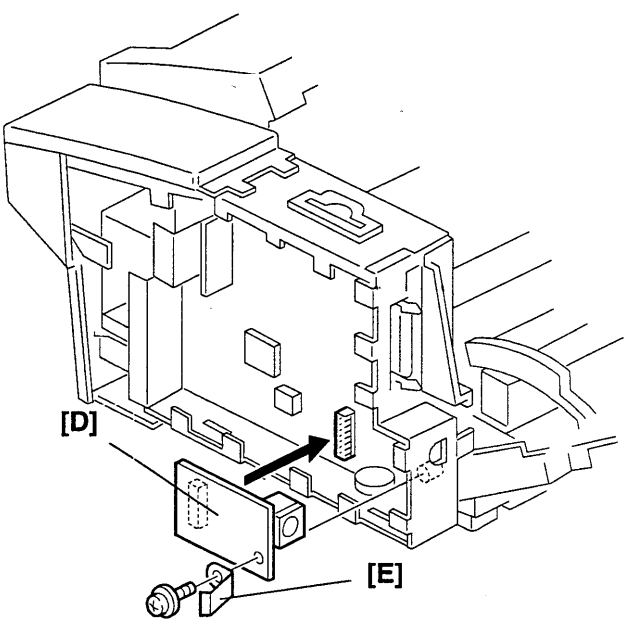
Do the following before installing an optional unit:

1. **Print out all messages stored in the memory.**
2. **Print out the lists of user-programmed items and the system parameter list.**
3. Turn off the main power.

1. **Remove the right cover [A] (2 screws) and cut off the RS422 option cover [B] as shown.**
2. **Remove the metal bracket [C] (4 screws).**



3. **Install the RS422 board [D] as shown. Secure the board with the ground plate [E] (1 screw).**
4. **Put back the metal bracket [C], then put back the right cover [A].**
5. **Plug in the machine and turn on the main switch.**
6. **Print the system parameter list and make sure that "RS422" is listed as an option on the list.**



4. SERVICE TABLES AND PROCEDURES

4.1. NCU PARAMETERS

The following NCU Parameters have been assigned for the settings of the Distinctive Ring feature. Refer to section 2.4. of this manual for a description of this feature.

Address	Function	Unit	Remarks
807F69	Distinctive Ring detection	Bit 0: 0: Disabled 1: Enabled	
807F6A	Distinctive Ring: Minimum detection time for break time	20 ms	Refer to section 2.4. of this manual for details.
807F6B	Distinctive Ring: Maximum detection time for break time	20 ms	

5. ERROR CONDITIONS

If there is a problem when the machine is used with a PC, first distinguish whether the problem is caused by the machine or somewhere in the PC connection. Take a copy when the machine is being used as a stand-alone fax machine, and follow the steps described in section 6.1 of the FX7 manual to determine the cause. If the problem is caused by the machine, follow the steps described in section 6 of the FX7 manual.

If the problem is not caused by the machine, check the connection between the PC and the machine. If the problem still remains, check the following.

Note: WS = WinStyler T175 (the driver used by this machine)

Cover Open

Condition	Display	Action to Recover	Action of the Machine after Recovery
Before PC printing	LCD: “CLOSE COVER” WS: “Cover Open”	Close the cover.	Print from the 1st page.
After the 1st page is fed	LCD: “CLOSE COVER” WS: “Cover Open”	Remove the jammed paper and close the cover.	Print from the 1st page.
Between pages: Before the 2nd page is fed	LCD: “CLOSE COVER” WS: “Cover Open	Remove the jammed paper and close the cover.	Print from the 1st page.
Between pages: After the 2nd page is fed	LCD: “CLOSE COVER” WS: “Cover Open”	Remove the jammed paper and close the cover.	Print from the 1st page.
Between pages: After printing of the 1st page is complete	LCD: “CLOSE COVER” WS: “Cover Open”	Remove the jammed paper and close the cover.	Print from the 2nd page.
Between pages: Before the 3rd page is fed	LCD: “CLOSE COVER” WS: “Cover Open”	Remove the jammed paper and close the cover.	Print from the 2nd page.
Between pages: After the 3rd page is fed	LCD: “CLOSE COVER” WS: “Cover Open”	Remove the jammed paper and close the cover.	Print from the 1st page.
Between pages: After printing of the 2nd page is complete.	LCD: “CLOSE COVER” WS: “Cover Open”	Remove the jammed paper and close the cover.	Print from the 3rd page.

Paper Non Feed

Condition	Display	Action to Recover	Action of the Machine after Recovery
Before PC printing	LCD: "CLEAR COPY" WS: "Feed Error"	Pull out the paper and reset it.	Print from the 1st page.
		Open and then close the cover.	Print from the 1st page.
When the 1st page is being fed	LCD: "CLEAR COPY" WS: "Feed Error"	Pull out the paper and reset it.	Print from the 1st page.
		Open the cover and close.	Print from the 1st page.
When the 2nd page is being fed	LCD: "CLEAR COPY" WS: "Feed Error"	Pull out the paper and reset it.	Print from the 2nd page.
		Open and then close the cover.	Print from the 2nd page.
When the 3rd page is being fed	LCD: "CLEAR COPY" WS: "Feed Error"	Pull out the paper and reset it.	Print from the 3rd page.
		Open and then close the cover.	Print from the 3rd page.

Paper Jam

Condition	Display	Action to Recover	Action of the Machine after Recovery
Before PC printing 	LCD: "CLEAR COPY" WS: "Paper Jam"	Open the cover, remove the jammed paper, close the cover, then click "Resume." **Note:** The cover must be opened and then closed.	Print from the 1st page.
When the 1st page is being fed	LCD: "CLEAR COPY" WS: "Paper Jam"	Open the cover, remove the jammed paper, close the cover, then click "Resume." **Note:** The cover must be opened and then closed.	Print from the 1st page.
When the 1st and 2nd pages are being fed	LCD: "CLEAR COPY" WS: "Paper Jam"	Open the cover, remove the jammed paper, close the cover, then click "Resume." **Note:** The cover must be opened and then closed.	Print from the 1st page.

When the 2nd page is being fed	LCD: “CLEAR COPY” WS: “Paper Jam”	Open the cover, remove the jammed paper, close the cover, then click “Resume.” **Note:** The cover must be opened and then closed.	Print from the 2nd page.
When the 2nd and 3rd pages are being fed	LCD: “CLEAR COPY” WS: “Paper Jam”	Open the cover, remove the jammed paper, close the cover, then click “Resume.” **Note:** The cover must be opened and then closed.	Print from the 2nd page.
When the 3rd page is being fed	LCD: “CLEAR COPY” WS: “Paper Jam”	Open the cover, remove the jammed paper, close the cover, then click “Resume.” **Note:** The cover must be opened and then closed.	Print from the 3rd page.

Paper Size Error

When the paper size setting in the printer driver is different from the setting of the machine.

Condition	Display	Action to Recover	Action of the Machine after Recovery
When the Print command is selected from the printer driver	LCD: “CHECK PAPER SIZE” WS: “Paper Size Error”	Reset the paper size setting and click “Resume.”	Print from the 1st page.
		Click “Resume.”	Print from the 1st page.
Before the 2nd page is fed	LCD: “CHECK PAPER SIZE” WS: “Paper Size Error”	Reset the paper size setting and click “Resume.”	Print from the 2nd page.
		Click “Resume.”	Print from the 2nd page.
Before the 3rd page is fed	LCD: “CHECK PAPER SIZE” WS: “Paper Size Error”	Reset the paper size setting and click “Resume.”	Print from the 3rd page.
		Click “Resume.”	Print from the 3rd page.

To avoid offset printing, the machine stops printing when the paper size setting of the printer driver is different from the machine.

When the actual paper size is different from the paper size setting of the machine (and also from the printer driver setting), the machine detects a paper size error after paper has been fed out.

Note:
The paper size cannot be changed between pages from the printer driver. However, there are software applications in which you can change the paper tray setting between pages. The above table (“Before the 2nd/3rd page is fed”) describes what happens when this occurs.

Paper Size Error (After the paper has been fed out)

Condition	Display	Action to Recover	Action of the Machine after Recovery
When printing of the 1st page is complete	LCD: "CHECK PAPER SIZE" WS: "Paper Size Error"	Reset the paper and click "Resume."	Print from the 2nd page.
		Reset the paper size setting and click "Resume."	Print from the 2nd page.
When printing of the 2nd page is complete	LCD: "CHECK PAPER SIZE" WS: "Paper Size Error"	Reset the paper and click "Resume."	Print from the 3rd page.
		Reset the paper size setting and click "Resume."	Print from the 3rd page.
When printing of the final page is complete	LCD: "CHECK PAPER SIZE" WS: "Paper Size Error"	Reset the paper and click "Resume."	Print job is complete.
		Reset the paper size setting and click "Resume."	Print job is complete.

To avoid offset printing, the machine stops printing when the actual paper size is different from the paper size setting of the machine (and also from the printer driver setting).

Paper End

Condition	Display	Action to Recover	Action of the Machine after Recovery
Before PC printing	LCD: "ADD PAPER" WS: "Main Paper Empty"	Reset the correct size paper and click "Resume."	Print from the 1st page.
When the 1st page is being fed	LCD: "ADD PAPER" WS: "Main Paper Empty"	Reset the correct size paper and click "Resume."	Print from the 2nd page.
When the 2nd page is being fed	LCD: "ADD PAPER" WS: "Main Paper Empty"	Reset the correct size paper and click "Resume."	Print from the 3rd page.
When the final printing page is being fed	LCD: "ADD PAPER" WS: "Ready"	No action required.	Print job is complete.

Note:
Make sure to set the correct size of paper in the paper tray specified by the printer driver (when an optional paper feed unit is installed).

Toner End

Condition	Display	Action to Recover	Action of the Machine after Recovery
Before PC printing	LCD: “ADD TONER” WS: “Toner Empty”	Open and close the cover.	Print from the 1st page.
When printing of the 1st page is complete	LCD: “ADD TONER” WS: “Toner Empty”	Open and close the cover.	Print from the 2nd page.
When printing of the 2nd page is complete	LCD: “ADD TONER” WS: “Toner Empty”	Open and close the cover.	Print from the 3rd page.
When printing of the final page is complete	LCD: “READY” WS: “Ready”	No action required.	Print job is complete.

Note:
When toner end is detected, the machine stops printing after the page being printed is fed out. You can print the next page just by opening and closing the cover without replacing the DTM.

Point-to-Point Diagram
Model:LX7

Issued on: October 30th, 1996
Version 1.0
Subject to change

Symbol Table

━━━	AC Line
───	DC Line
──►	Signal Direction
▲	Active High
▼	Active Low
[ ]	Voltage