IF2
RICOH FAX680MP
SERVICE MANUAL

31 March, 1997

Subject to change.

⚠CAUTION
Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with the manufacturer's instructions.

CAUTION: 1) Before attempting any of disassembly or assembly procedure, make sure of the following:

- Turn off the machine.
- Disconnect the power cord.
- Disconnect the telephone cable(s).
- Disconnect the PC interface cable(s).
- Remove the ink cartridge and place it in the cartridge holder.

NOTE: 1) Do not touch the nozzle section of the ink cartridge. This helps prevent the nozzles from clogging.

2) Do not touch the wiper blade on the maintenance unit. This also prevents the nozzles from clogging.
3) Always store an extra cartridge (if unpacked) in the cartridge holder.
4) Ensure the printer engine stops its maintenance operation before turning off the machine.
5) Ensure that the cartridge is at the head capping position (right end) before leaving the machine unplugged for long periods.

TABLE OF CONTENTS

1. OVERALL MACHINE INFORMATION

1.1 SPECIFICATIONS

Type	Desktop Transceiver
Applicable Network	PSTN, PABX (Loop Start only)
Connection	Direct Coupled
ADF Capacity	20 sheets (using 20 lb. paper)
Document	Width: Max. 220 mm
Effective Scanning Width	216 mm (8.5")
Scanning Method	Contact Image Sensor
Scan Resolution	Horizontal: 8 dots/mm Vertical: - Standard: 3.85 lines/mm - Detail: 7.7 lines/mm
Printing Method	Ink Jet
Print Resolutions	Main Scan: 300 or 150 dpi Sub Scan: 300 dpi
Effective Printing Width	203 mm (8.0")
Paper Capacity	150 sheets (using 20 lb. paper)
Printing Paper	Size: A4, 8.5 x 11", 8.5 x 14" Thickness: 0.08 - 0.12 mm
Communication Speed (ITU-T #1 Chart, MR compression, TTI off)	Transmission: 17 ± 1 s (Memory tx) Reception: 17 ± 1 s (Memory rx) 46 ± 4 s (Direct rx)
Protocol	T.30 **Important:** Non-standard signals, NSF and NSS, are not compatible with existing Ricoh fax machines.
Coding Scheme	MH, MR
Modem Speed	9600/7200/4800/2400 bps
Modulation	V.29 (QAM), V27ter (PHM), V.21 (FM)
Memory Capacity (ITU-T #1 Chart)	ECM: 128 kB SAF (standard): 384 kB (18 pages) SAF (with optional 1MB): 1.4 MB (58 pages)
Power Consumption	Standby: 17W (18W max.) Transmission: 25W (28.5W max.) Reception: 19W (21W max.) Copy: 27W (31W max.)
Operating Environment	Temperature: 17 - 28°C (63 - 82 °F) Humidity: 40 - 70 %Rh
Dimensions	Width: 363 mm Length: 285 mm Height: 173 mm (Excluding trays, supplies, and optional units)
Weight	7.1 kg (Excluding trays, supplies, and optional units)

1.2 FEATURES

Please refer to the Operator's Manual for the available user features and their details. The following table explains the chief differences from the existing ink-jet fax, model IFO.

1.2.1 FAX FEATURES

FEATURES	IF2 (THIS MODEL)	IFO (EXISTING MODEL)
Authorized reception	Not available	Standard
Batch transmission	Not available	Optional
Chain dialing	Not available	Standard
Confidential transmission/reception	Not available	Optional
Direct fax number entry	Not available	Standard
Forwarding	Not available	Standard
Number of Quick Dial keys	10	10
Number of Speed Dials	50	50
Number of dialing groups	5 groups	3 groups
Keystroke programs	Not available	Standard
Communication features using ID code (e.g., Secured polling, closed network)	Available (not compatible with existing models)	Available (not compatible with IF2)
Tonal signal transmission	Not available	Standard
Transmission deadline (TRD)	Not available	Optional
Voice Request	Standard	Not available
Page separation mark	Not available	Standard
Memory capacity display when there is no file in the SAF memory	99%	100%
Compression	MH and MR	MH, MR, MMR, EFC, and SSC
SAF memory backup	Not available	Standard (1 hour)

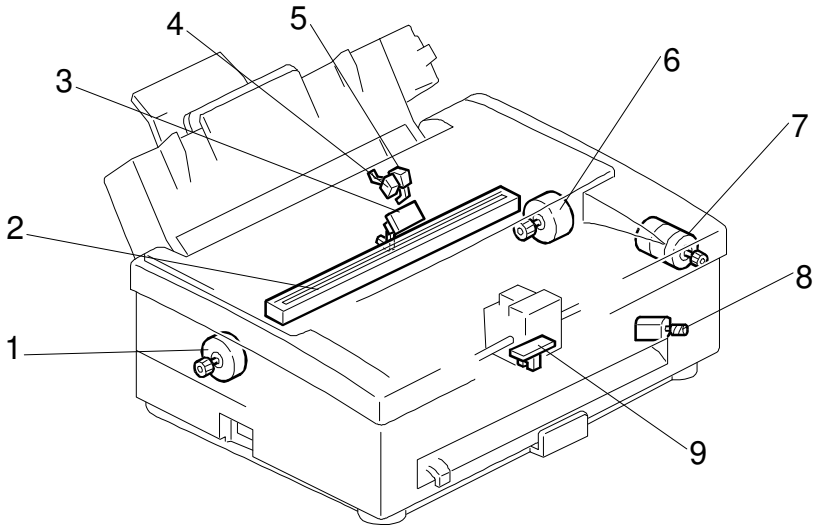
1.2.2 PC INTERFACE FEATURES

PC INTERFACE FEATURES	IF2 (THIS MODEL)	IFO (EXISTING MODEL)
Parallel interface	Bi-Centronics	Centronics
Printer Emulation	HP PCL3 and IBM PPDS	BJ and LQ
Serial interface	RS232C (9 pins)	RS232C (25 pins)
PC fax specification	Standard (EIA Class 1)	Optional (EIA Class 2)

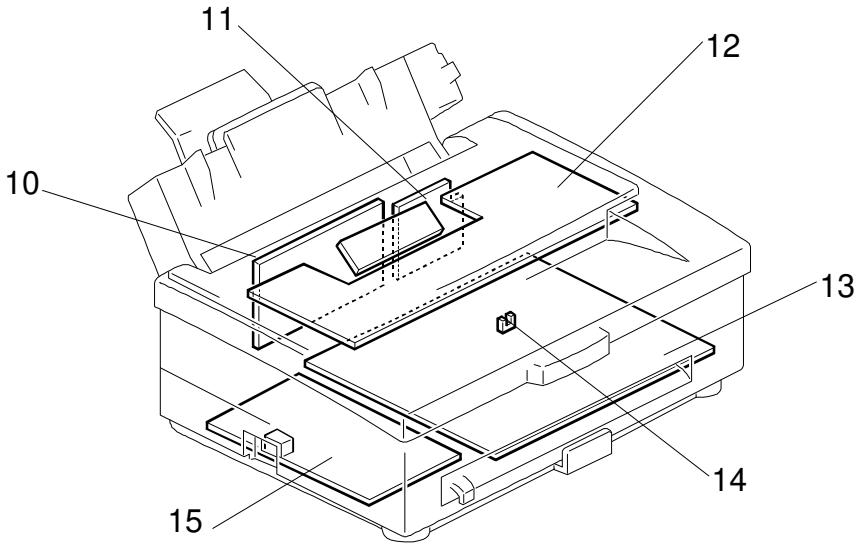
1.2.3 SERVICE MODE FEATURES

SERVICE MODE FEATURES	IF2 (THIS MODEL)	IFO (EXISTING MODEL)
Back-to-back test	Not available	Available
Bit switches	Available	Available
Buzzer test, DTMF tone test, Operation panel test, and Modem test	Not available	Available
Communication parameter display	Available	Available
Counter check	Available	Available
Country code	Available	Available
Error code display	Available	Available
File transfer	Not available	Available
Line error mark	Not available	Available
NCU parameters	Available	Available
Printer mechanism test	Not available	Available
Printer test patterns	Available	Available
Protocol dump list	Not available	Available
RAM display/rewrite	Available	Available
RAM dump	Available	Available
RAM test	Available in user mode	Available
Serial number/ Service station number programming	Not available	Available
Service monitor report	Not available	Available
Software upload/download	Not available	Available
SRAM data download	Not available	Available
System parameter list	Available	Available
Technical data on Journal	Not available	Available
User data transfer using RDS	Not available	Available
RAM read/write using RDS	Available (300 bps)	Available (9,600 bps)

1.3 COMPONENT LAYOUT



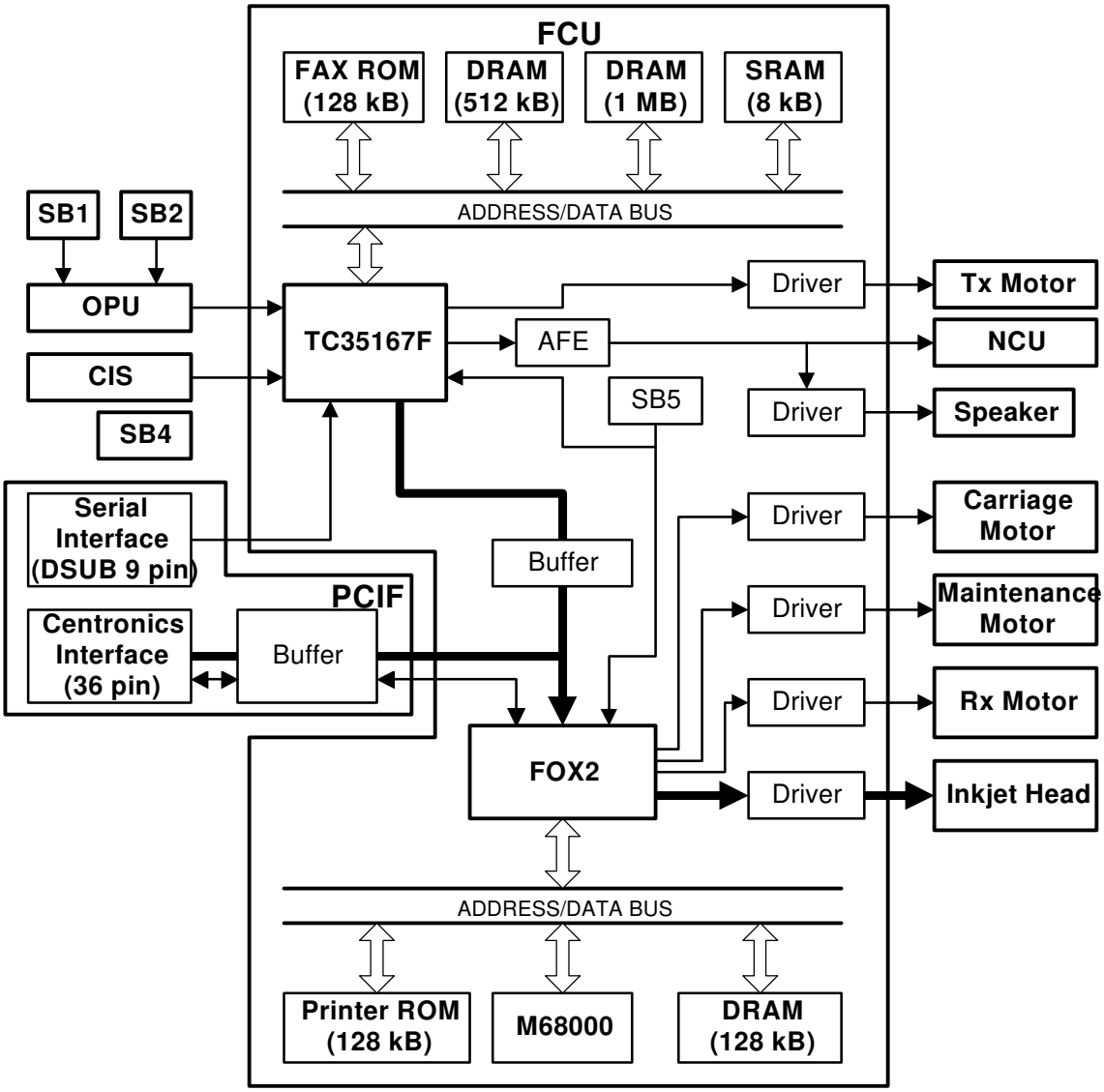
H905V001.cdr



H905V002.cdr

No.	Description	Function
1	Tx Motor	Drives the document feed mechanism.
2	CIS (Contact Image Sensor)	Scans the document.
3	Paper End Sensor (SB4)	Detects paper in the cassette.
4	Document Sensor (SB1)	Detects when a document is placed in the document feeder.
5	Scan Line Sensor (SB2)	Detects when a document arrives at the scan start position.
6	Rx Motor	Drives the paper feed mechanism.
7	Carriage Drive Motor	Drives the print carriage.
8	Maintenance Motor	Drives the print head cleaning mechanism.
9	Carriage Position Sensor	Generates a pulse signal to detect the carriage location.
10	PSU	Supplies dc voltage to the FCU.
11	PC I/F	Interfaces to a host computer through Bi-Centronics parallel and RS232C (9 pins) serial interfaces.
12	OPU	Interfaces to operators through keys and an LCD panel.
13	FCU	Controls fax and printer engines.
14	Registration Sensor (SB5)	Detects printing paper at the registration position.
15	NCU	Interfaces to an analog telephone network.

1.4 OVERALL MACHINE CONTROL

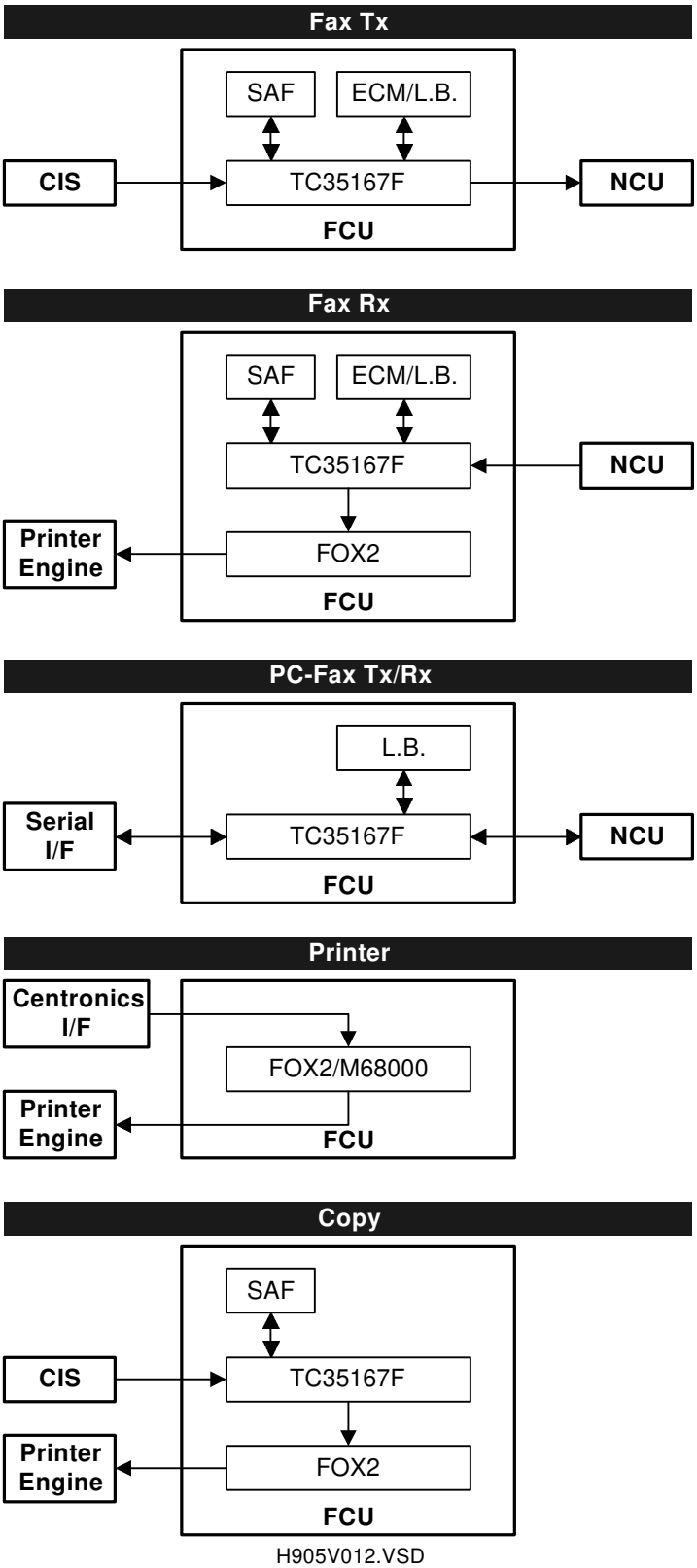


H905V010.VSD

The TC35167F fax engine controls the fax features, while the Motorola M68000 cpu controls the PC printer features. The FOX2 chip controls the printer mechanisms and the parallel port.

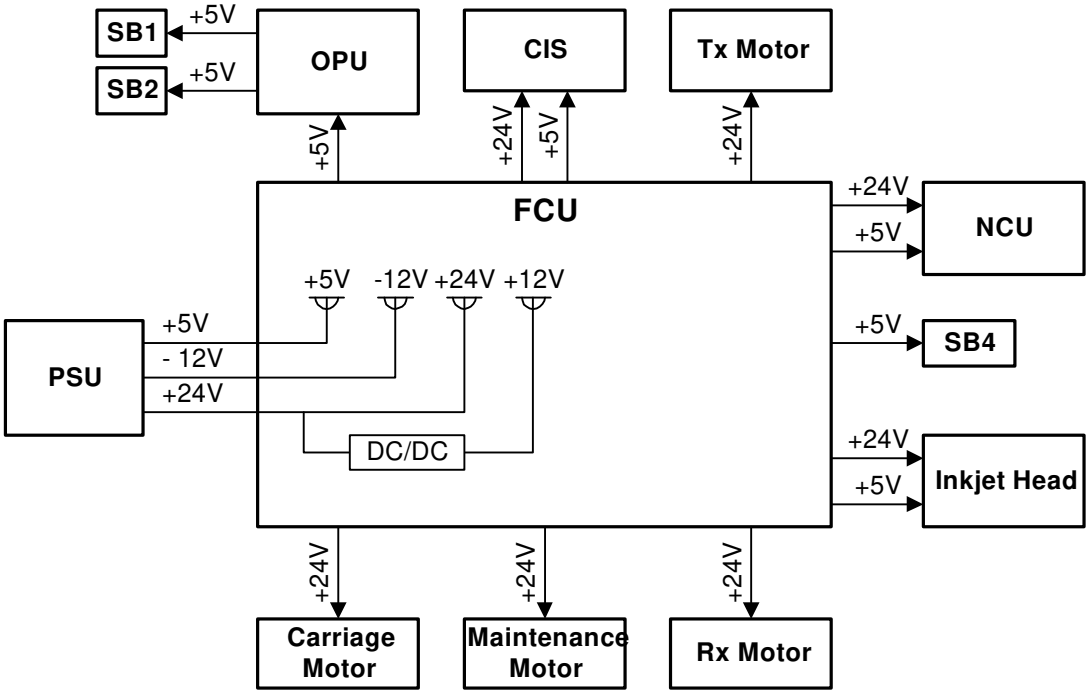
The components are described in more detail in section 2.4.

1.5 DATA PATH



H905V012.VSD

1.6 POWER DISTRIBUTION

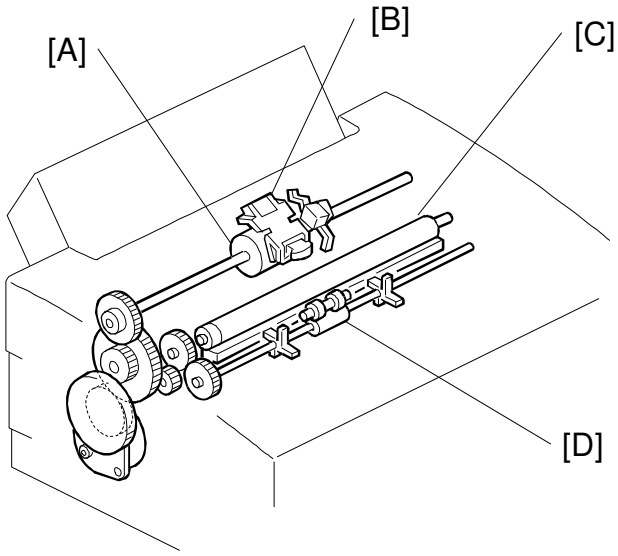


H905V011.VSD

2. DETAILED DESCRIPTIONS

2.1 SCANNER

2.1.1 DOCUMENT FEED MECHANISM



H905D001.cdr

The feed roller [A] feeds the document into scanner, and the separation pad [B] prevents more than one sheet of the document from feeding.

When the document reaches the scan line, the Tx motor stops until the machine is ready for scanning.

While scanning, the CIS roller [C] and the R2 rollers [D] feed the original.

NOTE: The pressure applied to the separation plate is adjustable. Refer to section 6.1.1.

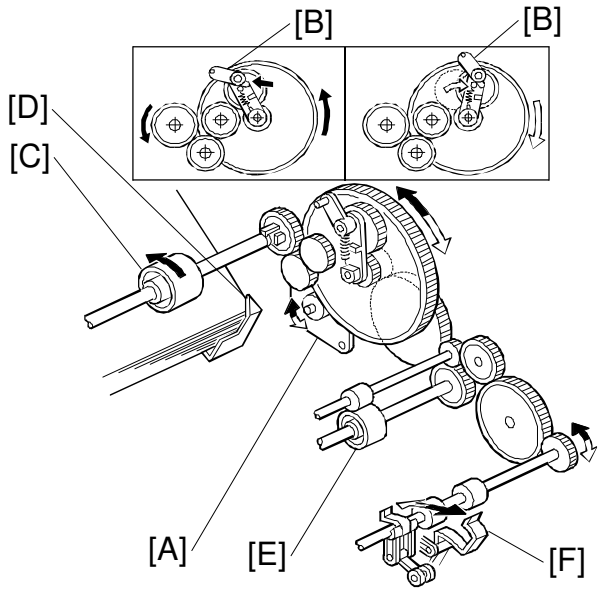
2.1.2 SCANNING

Every time the machine scans a document, the CIS (Contact Image Sensor), scans the CIS roller (a white roller located on the CIS) before scanning the first page, to get a base white waveform. This white waveform is used for the shading correction that is used while scanning all pages of the document. So, if the CIS roller becomes dirty, the scanned image becomes darker.

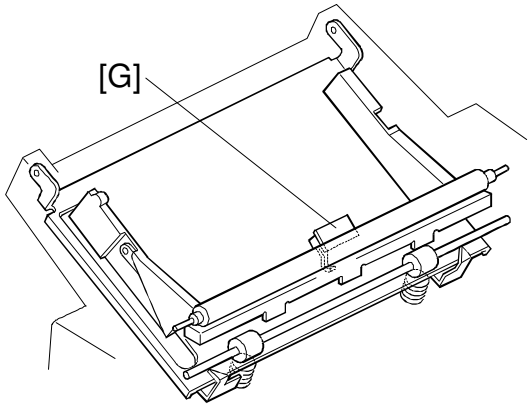
NOTE: The cleaning procedure for the CIS roller is explained in section 6.3.1, as well as in the operator's manual.

2.2 PRINTER

2.2.1 PAPER FEED MECHANISM



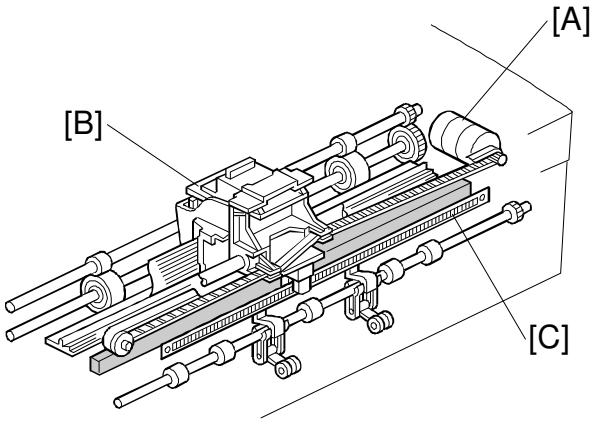
H905D003.cdr



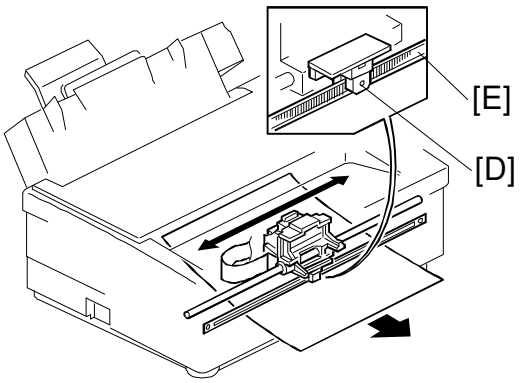
H905D002.cdr

The Rx motor [A] in the printer engine drives all the paper feed components.
At the start of printing, the Rx motor rotates clockwise to move the gear arm [B] to drive the paper feed roller [C]. The separation hooks [D] prevent more than one sheet of paper from being fed into the printer engine.
When the paper reaches the registration roller [E], the motor reverses to drive registration and feed-out rollers. After printing, the motor rotates clockwise again to eject the paper from the printer using the ejector [F], and to move the gear arm [B] to the standby position.
The paper end sensor [G] detects paper end.

2.2.2 CARRIAGE DRIVE MECHANISM



H905d004.cdr

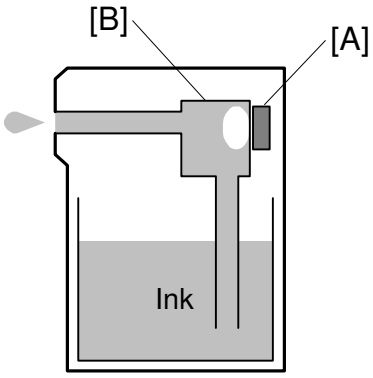


H905d005.cdr

The carriage drive motor [A] drives the print head carriage [B] through the belt [C]. The sensor [D], located under the carriage generates a pulse signal while it moves along the encoder [E] (a thin metal plate with many slits), so that the printer engine can detect the horizontal location of the carriage.

2.2.3 INKJET CARTRIDGE

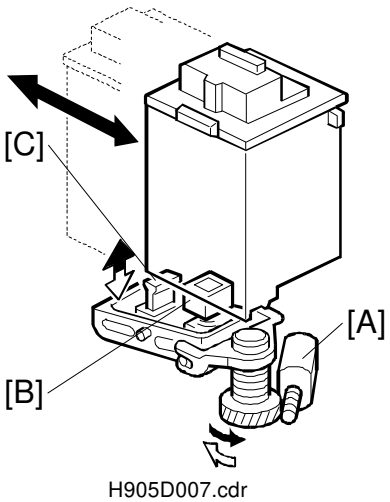
The inkjet cartridge uses a thermal ink jet mechanism. When the print head receives print signals, the heating element [A] located by ink chamber [B] generates a tiny bubble inside the chamber to eject an ink drop out of it.
The nozzles are arranged in a straight line at intervals of 300 inch. The black print head has 58 nozzles, of which 52 nozzles are for printing. The color cartridge has 48 nozzles, 16 for each color.



H905D006.vsd

2.2.4 PRINT HEAD MAINTENANCE UNIT

When the print head needs cleaning, the maintenance motor [A] moves the head cap [B] up and down towards and away from the print head. This action sucks waste ink out of the nozzles on the print head.
Then, the maintenance motor moves up the wiper blade [C], and the carriage moves right and left to wipe the waste ink off the print head.
After these maintenance actions have finished, the print head stays at the default position, and the cap [B] caps the head.



H905D007.cdr

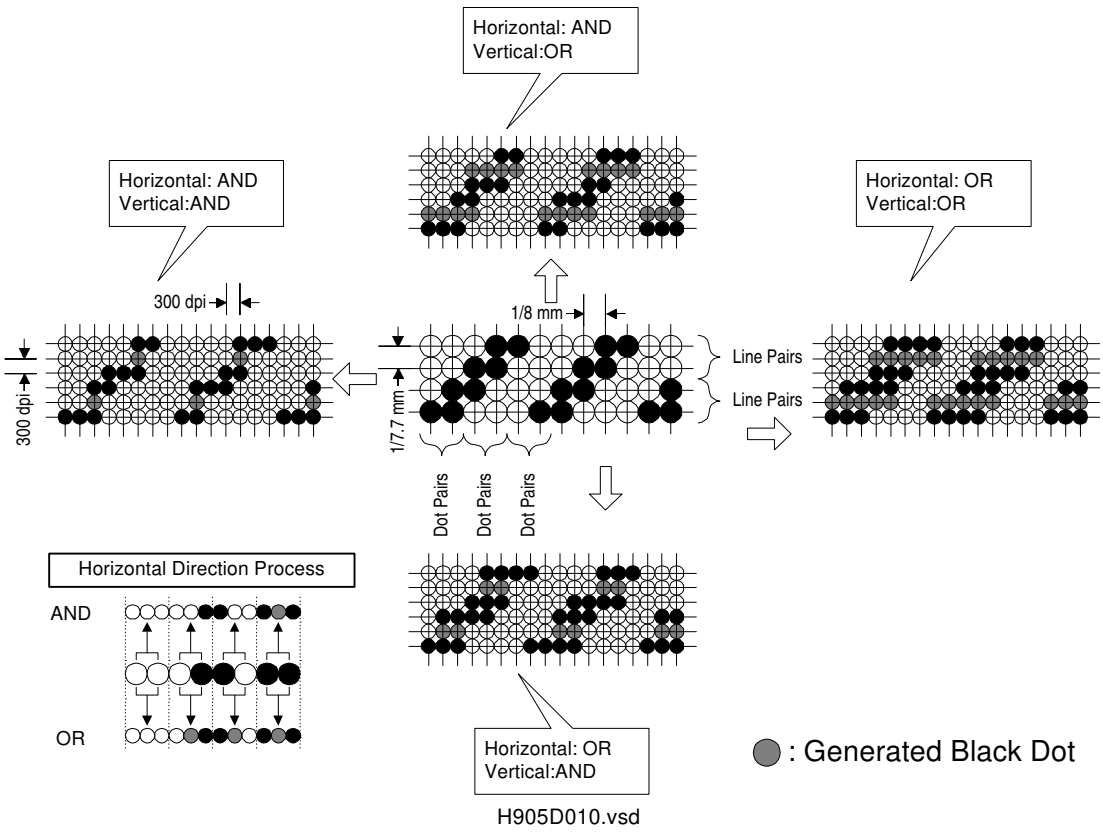
2.2.5 INK LOW CONDITION

The machine does not have an ink end detection mechanism, but it can detect an “ink low” condition.
The printer engine counts the number of ink drops to calculate the cartridge replacement timing. When the machine determines that approximately 85% of the ink has been used, the machine displays the “INK LOW” message.
When a new cartridge is installed, the machine asks the user whether the cartridge is new or used. If the user selects “Yes” to the “NEW INK Y/N?” message, the machine initializes the counter. If the user selects “No” to the message, the machine continues counting ink drops without initializing.

Therefore, the accuracy of the counter is quite important. If the user initializes the counter accidentally, ink-end may only be determined by looking at the print output. (This may easily happen when the user changes the cartridge from black to color and vise versa.)

NOTE: 1) The printer engine has separate counters for black cartridge and color cartridge. Their internal circuits are different, and the machine detects the difference to determine which counter is present.
2) The counters, CURRENT-0, 1 and 2, listed on the system parameter list are not used for detecting ink-low condition. These are just the latest three records of ink cartridge replacements.

2.2.6 PRINTING FAXES AT 300 DPI RESOLUTION



To print received fax data in 300 x 300 dpi resolution, the machine converts the resolution as shown in the diagram. After conversion, the machine gets 2592 dots (1728 x 1.5 dots). However, the number of dots required for printing is 2400 (= 8" x 300 dpi). So, the machine reduces the print data using the reduction ratio specified by Function 45. The default reduction ratio is 93% (≈ 2400/2592).

Cross Reference

Process used for converting main-scan resolution (horizontal) - Bit 5 of bit switch C

Process used for converting sub-scan resolution (vertical) - Bit 6 of bit switch C

For best results, keep both settings at "AND".

2.2.7 PROTOCOL REFERENCE

DIRECT RECEPTION IN LOW MEMORY CONDITIONS

When the machine detects an incoming fax call while in the following conditions, the machine receives the fax in direct reception mode (the data goes straight to the printer without storage in memory).

- Available SAF memory is lower than 35% (without optional memory)
- Available SAF memory is lower than 10% (with optional memory)

In these cases, if the machine is not printing, the machine answers the call using DIS/NSF signals with “I/O rate = 20 ms/line” and “modem rate = 4,800 bps” parameters. If the machine is printing, it does not answer the call.

NOTE: 1) In Germany, the machine does not answer a call in the above memory conditions.
2) If the machine’s available memory is above the threshold, the machine receives the fax message in memory reception mode.
3) Even if the amount of memory falls below the threshold while receiving a fax message, the machine continues memory reception.

2.3 PC INTERFACES

2.3.1 PC PRINTER: CENTRONICS INTERFACE

The machine can function as a PCL3 printer or an HP DeskJet500C compatible color printer, using the built-in Bi-Centronics interface. Refer to the Operator’s Manual for printer installation and set up.

PRINTER SPECIFICATIONS

Refer to the Operator’s Manual and the printer driver help file for the specifications not listed here.

Emulation Modes	PCL3 (HP DeskJet 500) PPDS (IBM Proprinter X24E) HP DeskJet 500C (Color) Hex Dump
Print Speed	2 ppm (Draft mode)
Print Margins	Top: 3+/- 1.5 mm Bottom: 4.5 +/- 1.5 mm Left: 2.5 +/- 1 mm (A4), 5.5 +/- 1 mm (LT, LG) Right: 4 +/- 1 mm (A4), 7 +/- 1 mm (LT, LG)
Interface	Bi-Centronics (IEEE 1284 compatible)
Cable	IEEE 1284 compatible, not longer than 1.8 m.
Built-in Fonts	Letter Gothic, Courier, CG Times (Scaleable), and Univers (Scaleable)

Character Sets	**PCL3 Emulation Mode** ECMA94, PC8, PC8 Danish Norwegian, PC 850, Roman 8, HP Legal, ISO2 IRV, ISO4 UK, ISO6 ASCII, ISO10 Swedish, ISO11 Swedish Names, ISO14 JIS ASCII, ISO15 Italian, ISO16 Portuguese, ISO17 Spanish, ISO21 German, ISO60 Norwegian 1, ISO61 Norwegian 2, and ISO69 French **PPDS** Code Page 437 and 850

BLACK & WHITE PRINTING

When a mono cartridge is installed, the machine prints both fax messages and print data.
If the machine receives a print request from a host computer while receiving a fax message, the computer receives a printer busy signal. In this case, the Print command on the PC must be selected again after the machine finishes printing the fax.
If the machine receives a fax message while printing a data from a host computer, the machine receives the message into SAF memory. After the machine finishes printing, the fax message prints automatically.

COLOR PRINTING

When a color cartridge is installed, the machine cannot print any fax messages or reports.
If the machine receives a fax message while a color cartridge is installed, the machine receives the message into SAF memory and displays “CHANGE INK TO MONO”. After the Mono cartridge is installed, the machine prints the message automatically.

NOTE: When “CHANGE INK TO MONO” appears, the carriage can be moved to the replacement position just by opening the top cover.

2.3.2 PC FAX MODEM: RS232C SERIAL INTERFACE

The machine can function as an EIA Class 1 fax modem, using the built-in serial interface (D-SUB 9 pins). Refer to the Operator's Manual for how to install and set up the machine as a fax modem.

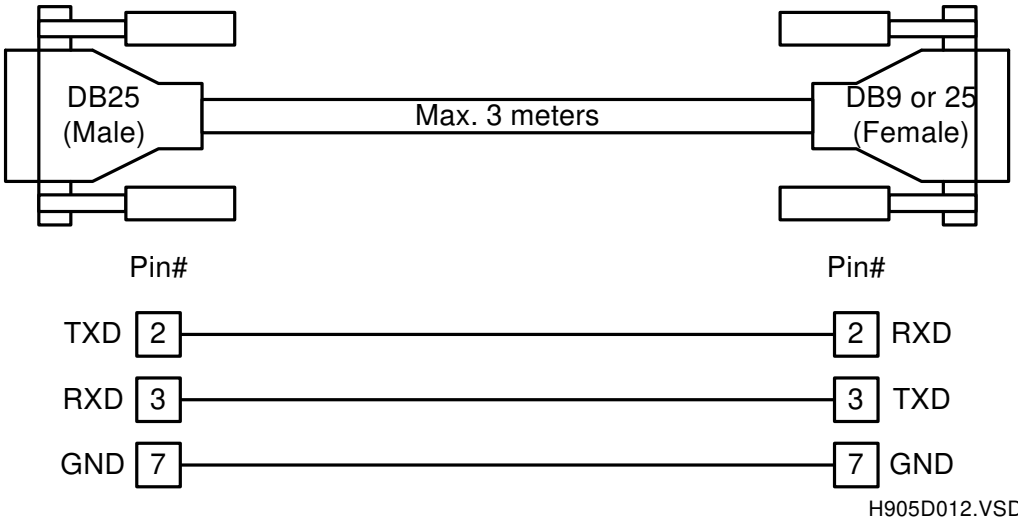
NOTE: The serial interface is not available in some countries.

SPECIFICATIONS

Standard	EIA/TIA Class 1
Fax Communication Speed	9600/7200/4800/2400 bps
Host Interface Speed	19200 bps (maximum)
Flow Control	XON/XOFF
Interface Cable	Straight-through, double-shielded serial RS232-C cable with either DB9-pin and DB25-socket connectors, or DB9-pin and DB9-socket connectors

NOTE: The machine does not come with a serial cable.

CABLE PIN ASSIGNMENT



CLASS 1 INTERFACE

The EIA/TIA Class 1 PC-Fax interface lets the fax application running on the host computer control all of the T.4, T.6 and T.30 procedures. So, the machine cannot log pc-fax communications on the TCR.

RING DETECTION

For reception, the settings of “number of rings to answer” parameters of the machine and the fax application determine which one receives a call. While the PC-FAX function is enabled (Function 47), the machine waits 3 additional rings after the number of rings programmed with NCU parameter “RID4" has passed, so that the host computer’s fax application answers the call before the fax machine.

NOTE: 1) Because of the above, the “number of rings to answer” parameter of the fax application should be between 1 and 3. As small number as possible is recommended.
2) A host computer may not be able to receive faxes with this machine using some PC fax applications. In such cases, the fax machine itself will receive and print the incoming fax message.

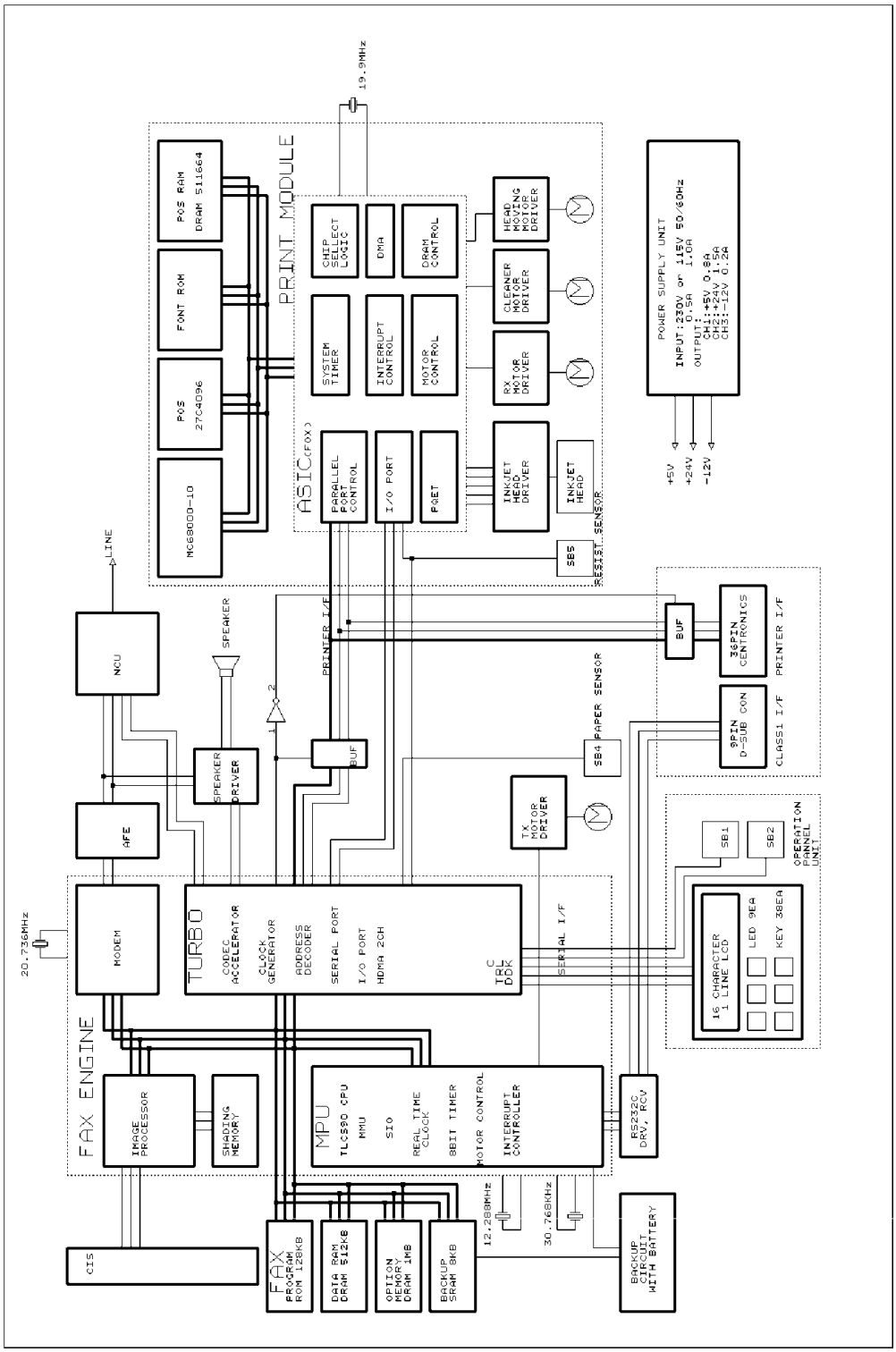
AT COMMANDS

Use these commands on the PC to display or adjust various parameters.

COMMAND	ACTION	COMMAND	ACTION
AT+FMFR?	Displays “TOSHIBA”	ATD<value>	= AT+D
ATROMVER	Displays the ROM version.	ATH	= AT+H
ATL<value>	Adjusts the speaker volume.	ATA	= AT+A
AT&P	Not used.	ATE	Result code format
AT&F	Not used.	AT+FTS	HDLC tx delay time
AT&D	Not used.	AT+FTH	HDLC frame tx
AT+X	Changes the tone detection setting	AT+FTM=?	Displays “24,48,72,96”
ATX	= AT+X	AT+FRS	HDLC rx delay time
ATZ<value>	Reset command.	AT+FRH	HDLC frame tx
ATM<value>	Speaker ON/OFF	AT+FRM=?	Displays “24,48,72,96”
ATV<value>	Result code format	ATSx=<value>	Not used.
AT+D<value>	Dial	AT+FCLASS=	0, 1
AT+H	+H0: NCU activated +H1: NCU deactivated	AT+FCLASS?	0, 1
AT+A	Answer		

2.4 PCBs

2.4.1 FCU



H905D008.BMF

TC35167F FAX ENGINE

1) 8-bit MPU
   - Memory management
   - DMA control
   - Interrupt control
   - Serial interface control
   - Tx motor control
   - Real time clock (battery backed-up)
2) Modem (V.29, V27ter, and V.21)
   - Tone/DTMF detection
   - Tone/DTMF generation
3) Image Processor
   - Shading correction
   - Automatic background control
   - 32-level halftone (dither)
4) Other
   - Compression and decompression

M68000

1) MPU for printer functions

FOX2

1) Printer motor control
2) Print head control
3) Parallel port control

MEMORY

1) ROM
   - 128 kB EPROM for fax firmware
   - 128 kB EPROM for printer firmware
2) RAM
   - 512 kB DRAM for SAF (128 kB), ECM (384 kB) memory
   - Optional 1 MB DRAM for SAF extension
   - 128 kB DRAM for printer data spooling
   - 8 kB SRAM for fax system and user parameter storage (battery backed-up)

2.4.2 NCU

JUMPER SETTINGS

- Germany - CN6 is “Shorted”.
- Switzerland - CN6 and CN24 are “Shorted”.
- Other European countries - No jumper installed.

3. INSTALLATION PROCEDURE

3.1 PRECAUTIONS

1) Never install telephone wiring during a lightening storm.
2) Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
3) Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
4) Use caution when installing or modifying telephone lines.
5) Avoid using a telephone (other than a cordless type) during an electric storm. There may be a remote risk of electric shock from lightening.
6) Do not use an telephone to report a gas leak in the vicinity of the leak.

3.2 INSTALLING THE MACHINE

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

3.3 INITIAL PROGRAMMING

3.3.1 PROGRAM AND SETUP ITEMS (SERVICE MODE)

Item	Function No.
Country code and NCU parameters	86
Protocol requirements (Germany)	81
System Parameter List	82

3.3.2 PROGRAM AND SETUP ITEMS (USER MODE)

Item	Function No.
Clock adjustment	40
Language selection	49
Dialing type selection	47
RTI, TTI and CSI programming	24, 25 and 26
Ink Nozzle Test	52
Memory test (only after an optional memory have been installed)	54

3.4 REMARKS

1. When connecting the machine to a PABX network, make sure that the PABX uses an access number (e.g., 9 or 0) to get access to the PSTN. The machine cannot be used with a PABX which uses Flash or Ground Start to get access to the PSTN.
2. TAD mode is not available with the French model.

4. SERVICE TABLES

4.1 USER MODE

FUNCTION TABLE

Function No.	Function
10	Polling Transmission & Reception
11	Send Later
20	Programming Quick Dial and Speed Dial
21	Programming Group Dial
22	Programming ID Code
23	Programming Password
24	Programming RTI
25	Programming TTI
26	Programming CSI
30	TCR Printing
31	User Parameter List Printing
32	Telephone Number List Printing
33	Polling Reservation List Printing
34	Memory File List Printing
40	Date and Time Adjustment
41	Speaker Volume Adjustment
42	Buzzer On/Off
43	Print Quality Selection
44	Printer Paper Size Selection/Change
45	Reduction Ratio Selection
46	Page Count On/Off
47	Programming User Parameters
48	Automatically Printed Reports Selection
49	Display and Report Language Selection
50	Tx and Rx Counters Display
51	TAD Mode Setup
52	Ink Head Nozzle Test
53	Replacing Ink Cartridge
54	Memory Test
60	Memory File Printing
61	Memory File Deleting
62	Deletion of Polling Reservation Files

4.2 SERVICE MODE

4.2.1 HOW TO ACCESS THE SERVICE FUNCTIONS

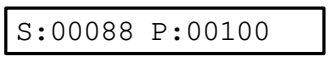
To access the service functions (functions 80 through 91), press [1], [2], [3] simultaneously.

FUNCTION TABLE

Function Number	Function
80	Feeding Count Display
81	Bit Switch
82	System Report
83	Memory Write
84	Not used
86	Nation Selection
87	Print Test
88	Print Head Alignment
89	Error Code Checking
90	RAM Check (RAM Data Dump List)
91	PCL3 Font List

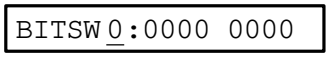
4.2.2 COUNTER DISPLAY (FUNCTION 80)

1. Press the Function key, [8], [0], then the Yes key.
   The LCD displays the total scan and print counters for 2 seconds. Then, the machine returns to standby automatically.

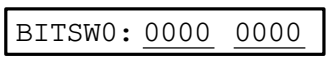


4.2.3 BIT SWITCH PROGRAMMING (FUNCTION 81)

1. Press the Function key, [8], [1], then the Yes key.
2. Select a bit switch number (0 to 9, or A to E) using the ten-key pad or Quick Dial keys A through E, then press the Yes key.



3. Adjust the bit switch.
   Example: To change the value of bit 7, press [7].



4. Press the Yes key to save any changes.
5. Press the Stop key to return to standby.

4.2.4 SYSTEM REPORT (FUNCTION 82)

1. Press the Function key, [8], [2], then the Yes key.
   The machine returns to standby after the report is printed.

```
SYSTEM PARAMETER LIST      (07 APR '97 14:25) :   <CSI>

IDENTIFICATION: RICOH FAX
  RTI:
  CSI:
  TTI:

ID NUMBERS
        ID CODE:                  0000
        PASSWORD:                 0000
        ROM VERSION:              FAX ROM Version
        ROS VERSION:              Printer ROM Version
        CCITT:                    61
        MAKER CODE:               09

COUNTERS
        TRANSMIT:                 00003
        RECEIVE:                  00004
        SCAN COUNTER:             00088
        PRINT COUNTER:            00132

SETTINGS
        PRINT DIRECTION:          SMART BIDIRECTION
        RECEIVE REDUCTION R.:     AUTO

INK CARTRIDGE CHANGE
        CURRENT-2:
        CURRENT-1:
        CURRENT-0:
NCU PARAMETER:   COUNTRY CODE = GERMANY

BIT SWITCH
```

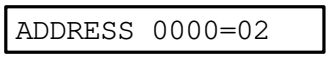
These are the print counter values when the cartridge was changed: last time (CURRENT-0), the second last (CURRENT-1), and the third last (CURRENT-2).

H905M004.vsd

Service Tables

4.2.5 RAM REWRITE (FUNCTION 83)

1. Press the Function key, [8], [3].
2. Select a RAM address using the following keys:
   [*] - Increment the value at the cursor
   [#] - Decrement the value at the cursor
   [c] - Move the cursor

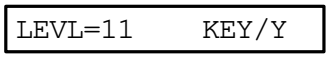
3. Press the Stop key to finish.

4.2.6 NCU PARAMETERS (FUNCTION 86)

1. Press the Function key, [8], [6].
2. Select a country using [*] or [#], then press the Yes key. The NCU parameters are reset to the selected country's default settings.

3. Adjust the NCU parameters if required (see section 4.4 for parameter details).

4. Press the Stop key to return to standby.

4.2.7 PRINT TEST (FUNCTION 87)

1. Press the Function key, [8], [7].
2. Select a test from the following:
   1) Mixed patterns chart
   2) 5% black chart
   3) Oblique lines chart
   4) ASF (Automatic Sheet Feeder) Test

   PRT TEST 1 2 3 4
3. Press the Stop key to stop the test.
4. Press the Stop key to return to standby.

4.2.8 PRINT HEAD POSITION ADJUSTMENT (FUNCTION 88)

1. Press the Function key, [8], [8], then the Yes key.
   The machine automatically adjusts the printing head carriage home position.

   HEAD ALIGN.? Y/N

   SELF TEST···
2. After automatic adjustment has been finished, fine-adjust the carriage home position using the following keys:
   [*] - Move to the left by 1/1200 inch
   [#] - Move to the right by 1/1200 inch

   LEFT-* RIGHT-#
3. Press the Stop key to finish the adjustment.

4.2.9 ERROR CODE DISPLAY (FUNCTION 89)

1. Press the Function key, [8], [9], then the Yes key.
2. Scroll through the error codes using the [*] and [#] keys.

   00:01-33 */#
3. Press the Stop key to return to standby.

4.2.10 RAM DATA DUMP LIST (FUNCTION 90)

1. Press the Function key, [9], [0], then the Yes key.
   The machine prints a RAM dump list of the addresses E000 through FDFF (H).

4.2.11 PCL3 FONT LIST (FUNCTION 91)

1. Press the Function key, [9], [1], then the Yes key.
   The machine prints the printer font list.
2. Press the Stop key to finish printing and to return to standby.

```
TEST PRINT ···
```

4.2.12 SYSTEM INITIALIZATION

INITIALIZED ITEMS

ITEM	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4/ POWER-ON
Clock	Yes	No	No	No
Scan/Print counters	Yes	Yes	No	No
Ink cartridge change record (CHFDATA0, 1 and 2)	Yes	Yes	No	No
RTI, TTI and CSI	Yes	Yes	No	No
Quick/Speed dial	Yes	Yes	Yes	No
Groups	Yes	Yes	Yes	No
Tx/Rx counters	Yes	Yes	Yes	No
Bit switches	Yes	Yes	Yes	No
NCU parameters	Yes	Yes	Yes	No
ID code	Yes	Yes	Yes	No
Password	Yes	Yes	Yes	No
Communication records for TCR/Journal	Yes	Yes	Yes	No
SAF file	Yes	Yes	Yes	Yes
Printer engine	Yes	Yes	Yes	Yes

LEVEL 1 OPERATION

1. Enter the service mode, then use function 83.
2. Change the value at RAM address E000 (H) to any value other than the default.
3. Turn off the machine, wait for several seconds, then turn it on.

LEVEL 2 (Factory Reset) OPERATION

1. Enter the service mode, then use function 81.
2. Change the following bit switches in order. When the Function key is pressed after the last switch is changed to 1, the machine automatically initializes.
   - Bit 3 of bit switch 3: 0 to 1
   - Bit 4 of bit switch 9: 0 to 1
   - Bit 4 of bit switch 1: 0 to 1

LEVEL 3 OPERATION

1. Enter the service mode, then use function 81.
2. Change the following bit switches in order. When the Function key is pressed after the last switch is changed to 1, the machine automatically initializes.
   - Bit 4 of bit switch 9: 0 to 1
   - Bit 4 of bit switch 1: 0 to 1

LEVEL 4 OPERATION

1. Enter the service mode, then use function 81.
2. Change the following bit switch. When the Function key is pressed after the switch is changed to 1, the machine automatically initializes itself.
   - Bit 4 of bit switch 9: 0 to 1

4.3 BIT SWITCHES

BIT SWITCH 0

Bit	Function	Comments
0	ADF test mode 0: Disabled 1: Enabled	Change this bit to 1 to test the ADF mechanism. Always reset this switch to 0 (zero) after the test. To start the test, place a document in the ADF and press the Start key. The machine feeds the document until the Stop key is pressed.
1	Remote Diagnostics 0: Not acceptable 1: Acceptable	0: The machine disconnects the line if a RDS accesses the machine for diagnostics. The default setting is “1”.
2	Not used	Do not change the setting.
3	Not used	Do not change the setting.
4	I/O rate (Tx) 0: 10 ms 1: 20 ms	This bit determines the I/O rate used in non-ECM transmission. This setting is available in NSS/NSF mode only.
5	Not used	Do not change the factory setting.
6	Password display 0: Disabled 1: Enabled	If the customer forgets the password for the “Limit Tx” function, change this bit to 1. The current password will be displayed when Function 23 is selected. This bit will automatically reset to 0 after using Function 23.
7	Limit tx 0: Disabled 1: Enabled	Same as the function 47 (Limit Tx) setting. 1: Transmission is not possible unless the programmed password is typed in.

BIT SWITCH 1

Bit	Function	Comments
0	Default resolution setting 0: Standard 1: Fine	Same as the Function 47 (Resolution) setting. This bit determines the default resolution setting.
1	Date format 0: Day/Month/Year 1: Month/Day/Year	Changes the date format as shown.
2 3	Default scan density setting Same as the Function 47 (Density) setting. $\binom{0}{0} = Normal, \binom{1}{0} = Dark, \binom{0}{1}\binom{1}{1} = Light$	
4	System initialization 0: Disabled 1: Enabled	Refer to section 4.2.13, SYSTEM INITIALIZATION.
5	Modem rate fall back when a negative post message is received 0: Disabled 1: Enabled	0: The machine will send the next page at the same modem rate as used in the previous error page. (In memory transmission, an error page is re-transmitted.) 1: The machine will use a lower modem rate for the next page.
6	Not used.	Do not change the factory setting.
7	Tx/Rx counter reset 0: Disabled 1: Enabled	If this bit set to 1, then transmission and reception counters are reset to 0. This bit automatically resets to 0 after counter reset.

BIT SWITCH 2

Bit	Function	Comments
0 1	Initial Tx modem rate $\binom{0}{0} = 9.6k, \binom{1}{0} = 7.2k, \binom{0}{1} = 4.8\ k, \binom{1}{1} = 2.4\ k$	
2 3	Modem speed to be notified to the transmitting terminal $\binom{0}{0} = 9.6k, \binom{1}{0} = 7.2k, \binom{0}{1} = 4.8k, \binom{1}{1} = 2.4k$	
4 5	Training error tolerance $\binom{0}{0} = 15\,bits, \binom{1}{0} = 10\,bits, \binom{0}{1} = 2\,bits, \binom{1}{1} = 25\,bits$	
6	Communication parameter display 0: Disabled 1: Enabled	1: The machine displays communication parameters during communication. Manually reset this bit to 0 after test communications.
7	Echo countermeasure 0: Disabled 1: Enabled	1: When the same code that was sent is received, it is ignored. 0: The machine will disconnect instead of ignoring echoes.

Communication Parameters

Modem Rate	Resolution	Coding	Paper Size	Mode	I/O Rate
9 (9.6 kbps) 7 (7.2 kbps) 4 (4.8 kbps) 2 (2.4 kbps)	S (3.85 l/mm) D (7.7 l/mm)	1D (MH) 1C (MH&ECM) 2D (MR) 2C (MR&ECM)	AN (A4)	DCS NSS	10 (10 ms) 20 (20 ms) 40 (40 ms)

BIT SWITCH 3

Bit	Function	Comments
0	NSF(S) transmission 0: Enabled 1: Disabled	Do not change the factory setting.
1	NSF(RTI) transmission 0: Enabled 1: Disabled	Do not change the factory setting.
2	CSI transmission 0: Enabled 1: Disabled	Do not change the factory setting.
3	System initialization level 0: LEVEL 3 or 4 1: LEVEL 2	Refer to section 4.2.13, SYSTEM INITIALIZATION.
4	NSS(S) transmission 0: Enabled 1: Disabled	Do not change the factory setting.
5	TSI transmission 0: Enabled 1: Disabled	Do not change the factory setting.
6	NSS(RTI) transmission 0: Enabled 1: Disabled	Do not change the factory setting.
7	Not used	

BIT SWITCH 4

Bit	Function	Comments
0	Not used	
1	RTI and CSI programming function 0: Enabled 1: Disabled	1: Function 24 (RTI) and 26 (CSI) are not accessible. When Czech Rep. or Hungary is selected, this bit is automatically set to “1”, so that the users cannot program the RTI and CSI by themselves (PTT requirement). To program the RTI and CSI, change this bit to “0”, program them, then change this bit back to “1”.
2	Monitor speaker during communication 0: Up to phase B 1: All the time	0: The monitor speaker is on up to the following point. TX - before DCS RX - after DIS 1: Used for testing. The monitor speaker is on all through the communication. Be sure to reset this bit after test communications.
3	Automatic new polling file list printout 0: Enabled 1: Disabled	Same as the Function 48 (New Poll Report) setting.
4	Automatic new file list printout 0: Enabled 1: Disabled	Same as the Function 48 (New File Report) setting.
5	Automatic Tx report printout 0: Enabled 1: Disabled	Same as the Function 48 (Tx Report) setting.
6	TCR data after printout 0: Keep 1: Delete	1: Communication records for TCR are deleted after the TCR is printed.
7	Automatic TCR printout 0: Automatic 1: Disabled	Same as the Function 48 (TCR Report) setting. 0: The TCR is printed automatically after every 35 communications. 1: The TCR is not printed automatically. The oldest communication record will be overwritten.

BIT SWITCH 5

Bit	Function	Comments
0	Modem types to be notified to the transmitting terminal 0: V29 & V27ter 1: V27ter	The setting is mapped to the NSF/DIS frame.
1	Paper length notified to the transmitting terminal 0: Unlimited 1: A4	The setting is mapped to the NSF/DIS frame.
2	Available compression methods 0: MR & MH 1: MH only	The setting is mapped to the NSF/DIS frame.
3	CNG transmission 0: Enabled 1: Disabled	Do not change the factory setting.
4 5	Display priority between RTI & CSI $\binom{0}{0}$ = RTI, $\binom{1}{0}$ = RTI priority, $\binom{0}{1}$ = CSI, $\binom{1}{1}$ = CSI priority	
6	Receiving mode 0: Memory reception 1: Direct reception	If the machine doesn't have enough memory to handle received data before starting a reception, — less than 35% free (no optional memory) or less than 10% free (with optional memory) — then the machine normally enters direct receiving mode. But if this bit is set to 1, the machine is always in direct receiving mode.
7	Error line counter decrement 0: Enabled 1: Disabled	0: The line error counter decrements by 1 when 10 consecutive error free lines are received. 1: The line error counter does not decrement.

BIT SWITCH 6

Bit	Function	Comments
0 to 5	Not used	Do not change the factory settings.
6	Limit Rx 0: Disabled 1: Enabled	Same as the Function 47 (Limit Rx) setting. If enabled, the machine does the following: **NSF/NSS mode:** Checks whether the ID codes at both ends are identical or not. **DIS/DCS mode:** Compares the ID code and remote fax machine's last 4 digits in the TSI frame
7	Communication time selection 0: Phase C only 1: Phase B-C-D-E	This bit determines the start point of counting the communication time.

BIT SWITCH 7

Bit	Function	Comments
0	TTI page number 0: Included 1: Not included	Same as the Function 46 setting.
1	Dialing method 0: DTMF dialing 1: Pulse dialing	Same as the Function 47 (Line Select) setting.
2	Not used	
3	Dial mode priority 0: Speed dial 1: Keypad dial	0: "QUICK: KEYPAD" is displayed for transmission. 1: "DIAL KEYPAD" is displayed for transmission.
4	Not used	Do not change the setting.
5 6	Receive mode home position (same as the function 47 setting) $\binom{0}{0} = Fax\ Mode, \binom{1}{0} = Tel\ Mode, \binom{0}{1} = Auto\ Mode, \binom{1}{1} = TAD\ Mode$	
7	Buzzer On/Off 0: On 1: Off	Turns the buzzer on and off.

BIT SWITCH 8

Bit	Function	Comments
0 1	Tx cable equalizer $\begin{pmatrix}0\\0\end{pmatrix} = Disabled, \begin{pmatrix}1\\0\end{pmatrix} = 1.8\,km, \begin{pmatrix}0\\1\end{pmatrix} = 3.6\,km, \begin{pmatrix}1\\1\end{pmatrix} = 5.6\,km$	
2	Not used.	Do not change the factory setting.
3	Automatic redial 0: Enabled 1: Disabled	0: If the destination is busy, the machine automatically redials. The number of redial attempts is programmed with function 47.
4 5 6	Speaker volume adjustment Min<----------> Max 0 1 0 1 0 1 0 1 0 0 1 1 0 0 1 1 0 0 0 0 1 1 1 1	
7	FTZ protocol selection 0: Disabled 1: Enabled	If the machine is set to Germany or Austria with Function 86, this bit is enabled.

BIT SWITCH 9

Bit	Function	Comments
0	Dial tone detection 0: Disabled 1: Enabled	This function is only available in the following countries: Austria, Belgium, Denmark, France, Ireland, Netherlands, Norway, Portugal, Spain, Sweden, and Switzerland
1	Busy tone detection 0: Disabled 1: Enabled	This function is only available in the following countries: France, Netherlands, Norway, Spain, and Switzerland
2	International dial tone detection 0: Disabled 1: Enabled	This function is only available in the following countries: Belgium, France, Spain, and Hungary
3	Country tone or IT.2 tone detection 0: Disabled 1: Enabled	This function is only available in the following countries: France, Sweden, and Hungary
4	System initialization 0: Disabled 1: Enabled	Refer to section 4.2.13, SYSTEM INITIALIZATION.
5	Scan threshold selection 0: Automatic 1: Manual (bit switch A)	Do not change the factory setting. If this bit is set to 1, the bit switch A settings determine the white and black threshold level.
6	Not used	
7	PC I/F function 0: Disabled 1: Enabled	Same as the Function 47 (PC IF Mode) setting

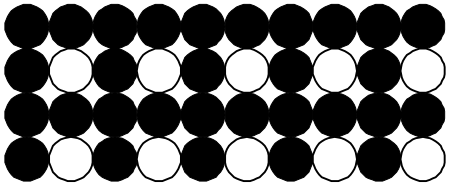
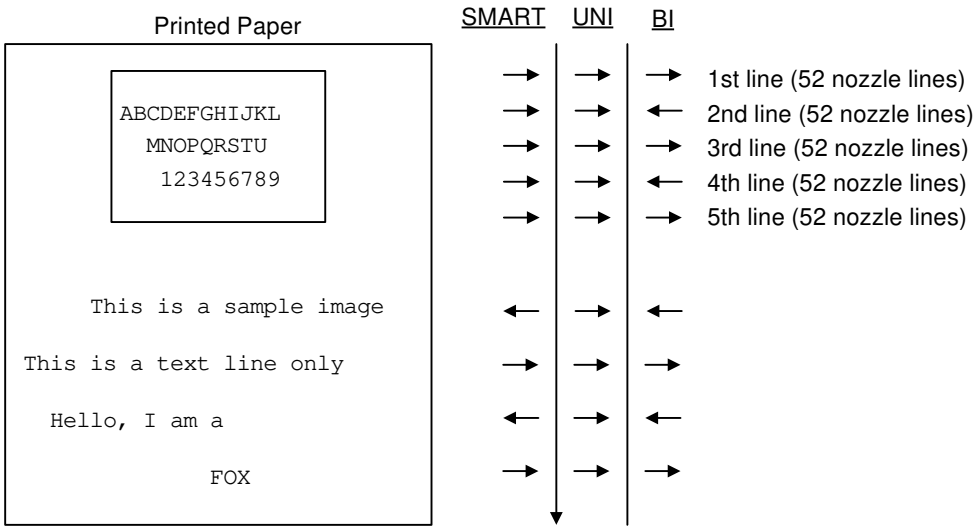
BIT SWITCH A

Bit	Function	Comments
0 to 3	White threshold level	The greater the threshold, the darker the scanned image. Adjustable range: 6 to C **Notes** 1. Do not set a value outside this range. 2. The settings of the white threshold (bits 0 to 3) and black threshold (bits 4 to 7) must be the same. B3 B2 B1 B0 Hexadecimal 0 1 1 0 6 0 1 1 1 7 1 0 0 0 8 1 0 0 1 9 1 0 1 0 A 1 0 1 1 B 1 1 0 0 C
4 to 7	Black threshold level	Same as above.

BIT SWITCH B

Bit	Function	Comments
0	Halftone contrast adjustment 0: Disabled 1: Enabled	If this bit is set to 1, halftone contrast can be adjusted manually using bits 3 to 7 below.
1	Not used	
2	Not used	
3 to 7	Halftone contrast control value	Bit switch B bit 0 should set to 1 before using these bits. Bit 7 is a sign bit If bit 7 = 0, the sign is plus (+) If bit 7 = 1, the sign is minus (-) b7 b6 b5 b4 b3 0 1 1 1 1 (+16) darken 0 1 1 1 0 (+15) | 0 0 0 0 1 (+1) 0 0 0 0 0 (0) 1 1 1 1 1(-1) 1 1 1 1 0 (-2) 1 0 0 0 1 (-15) | 1 0 0 0 0 (-16) lighten The larger the value, the darker the printed image.

BIT SWITCH C

Bit	Function	Comments
0	Ink save mode 0: 1/4 save mode 1: No save mode	0: All dots are printed. 1: Print data is filtered using the following pattern. (White dots are not printed.)  The default setting is “1”. Do not change the setting.
1	Not used	Do not change the setting.
2	Resolution available in copy mode 0: Fine 1: Fine & Standard	1: Scan resolution can be selected using the resolution key. Fine - 8 x 7.7 lines/mm Standard - 8 x 3.85 lines/mm
3	Print quality 0: Draft quality 1: Letter quality	Same as the Function 43 setting.
4	Print direction selection 0: Smart bi-direction 1: Bi-direction	[Bi-direction] is faster than [Smart Bi-direction] but the image quality is not as good. [Uni-direction] is slow, but image quality is good.
	 **SMART:** If there are vertical lines in the image, the machine prints bi-directionally, otherwise the machine prints in one-direction. (printing speed: medium, print quality: good) **UNI:** Always prints in one direction no matter what the image is. (printing speed: low, print quality: good) **BI:** Always prints in both directions regardless of the type of image. (printing speed: High, print quality: low) UNI can only be selected by a PCL command.	

Bit	Function	Comments
5	Horizontal direction 0: OR 1: AND	Refer to section 2.2.6.
6	Vertical direction 0: OR 1: AND	Refer to section 2.2.6.
7	Not used	

BIT SWITCH D

Bit	Function	Comments
0 1	PC I/F startup baud rate $\binom{0}{0} = 2.4k, \binom{1}{0} = 4.8k, \binom{0}{1} = 9.6\,k, \binom{1}{1} = 19.2\,k$ These bits determines the baud rate of the first command from the machine. The baud rate used for data communication between a host computer and this machine is automatically adjusted to the fastest speed available at each terminal. Default setting: 2.4 kbps.	
2	Not used.	Do not change the factory setting.
3	Not used.	Do not change the factory setting.
4	Not used.	Do not change the factory setting.
5	Not used.	Do not change the factory setting.
6	Not used.	Do not change the factory setting.
7	Not used.	Do not change the factory setting.

BIT SWITCH E

Bit	Function	Comments
0	ECM in transmission 0: Enabled 1: Disabled	Same as the function 47 (ECM) setting.
1	Not used.	Do not change the setting.
2	Number of RCPs 0: 6 RCPs 1: 9 RCPs	This bit determines the number of RCPs in phase C. (ECM mode only)
3	Not used.	Do not change the setting.
4	CTC transmission 0: ON 1: OFF	If this bit is set to 1, the machine does not send CTC in response to a fourth PPR. (ECM mode only)
5	Shift down selection when transmitting CTC 0: ON 1: OFF	If this bit is set to 1, the machine does not shift down when it transmits CTC.
6	T5 time 0: 1 minute 1: 4 minute	This bit determines the T5 time.

Bit	Function	Comments
7	ECM in reception 0: Enabled 1: Disabled	Same as the function 47 (ECM) setting.

4.4 NCU PARAMETERS

No.	Name	Function & Meaning	Formula	Remarks
00		After selecting a country, all the following parameters are reset to the country's defaults.		
01	LEVL	Tx signal level from the modem. Range: 0 to -15 dBm	- *N* dBm	$0 \le N \le 15$
02	RID0	Acceptable ringing signal detection frequency, range 1 lower limit	$\frac{1000}{5N}$ *Hz*	$0 \le N \le 127$
03	RID1	Acceptable ringing signal detection frequency, range 1 upper limit	$\frac{1000}{5N}$ *Hz*	$0 \le N \le 127$
04	RID2	Acceptable ringing signal detection frequency, range 2 lower limit	$\frac{1000}{5N}$ *Hz*	$0 \le N \le 127$
05	RID3	Acceptable ringing signal detection frequency, range 2 upper limit	$\frac{1000}{5N}$ *Hz*	$0 \le N \le 127$
06	RID4	Number of rings until a call is detected. While PC-FAX is enabled, "RID4 setting +3" is used.	*N* times	$0 \le N \le 127$
07	RDT0	Do not change the setting.		
08	RDT1	Non-detectable ring frequency; used for the pulse immunity test in some countries.	$\frac{1000}{5N}$ *Hz*	$0 \le N \le 127$
09	DLST	Time from OH Relay ON to dialing the first digit.	160*N* ms	$0 \le N \le 127$
10	RPST	Time from dialing end to the start of CED detection.	2.56*N* ms	$0 \le N \le 127$
11	BRKT	Break time (in pulse-dialing mode)	*N* ms	$0 \le N \le 127$
12	MAKT	Make time (in pulse-dialing mode) Calculation: 1 ms (033 = 33 ms)	*N* ms	$0 \le N \le 127$
13	MINP	Minimum pause between dialing digits (in pulse-dialing mode)	20*N* ms	$0 \le N \le 127$
14	PAUT	Pause time for a "Pause" key input Calculation: 20 ms (033 = 0.66 s)	20*N* ms	$0 \le N \le 127$
15	DTON	DTMF ON time	5*N* ms	$0 \le N \le 127$
16	DTOF	DTMF OFF time	5*N* ms	$0 \le N \le 127$
17	DTLV	DTMF tone attenuation level (high frequency)	Low freq. -*N* dBm High freq. -(*N+2*) dBm	$0 \le N \le 127$
18	REDT	Redial interval Calculation: 2.56 s (025 = 64 s).	2.56*N* s	$0 \le N \le 127$
19	REDC	Number of total redial attempts	*N* times	$0 \le N \le 127$
20	RST0	Ring reset time	160*N* ms	$0 \le N \le 127$
21	BRIT	Broadcasting interval	2.56*N* s	$0 \le N \le 127$

NCU PARAMETER SETTINGS

Country	LEVL	RID0	RID1	RID2	RID3	RID4	RDT0	RDT1	DLST	RPST	BKR
Austria	10	43	20	43	20	1	4	16	25	14	60
Belgium	8	110	40	110	40	1	30	17	25	22	67
Denmark	12	76	50	37	30	1	5	16	25	22	67
Finland	12	78	49	62	27	1	10	16	25	22	60
France	10	48	20	48	20	3	40	16	15	53	67
Germany	11	72	23	72	23	1	4	16	25	22	60
Ireland	12	103	51	103	51	1	4	15	25	22	67
Italy	8	117	27	117	27	1	17	16	25	26	60
Netherlands	13	74	51	37	25	1	10	17	25	22	60
Norway	12	76	50	37	30	1	4	16	25	22	60
Spain	12	76	51	77	38	1	4	50	25	10	67
Sweden	12	78	49	62	27	1	4	16	25	22	60
Switzerland	10	78	25	78	25	2	20	16	25	22	60
U.K.	11	128	75	86	30	1	4	16	25	22	67
Greece	11	117	27	117	27	1	17	16	25	26	62
Portugal	8	105	51	105	38	1	4	16	25	22	67
Czech Rep.	11	76	50	37	30	1	4	15	25	21	60
Hungary	10	75	45	75	45	1	4	16	20	22	67
Israel	13	78	49	62	27	1	4	16	25	22	62
Poland	10	67	30	38	25	1	4	16	25	22	67
Russia	13	76	51	77	38	1	4	16	25	22	67

Country	MAKT	MINP	PAUT	DTON	DTOF	DTLV	REDT	REDC	RSTO	BRIT
Austria	40	45	46	20	20	6	25	3	50	12
Belgium	33	37	26	20	20	6	25	3	50	12
Denmark	33	30	26	14	14	9	25	3	50	12
Finland	40	50	60	14	14	6	25	3	50	12
France	33	45	101	16	16	6	30	3	24	30
Germany	40	50	46	16	20	11	25	5	50	12
Ireland	33	45	33	14	20	9	25	3	50	12
Italy	40	45	150	20	20	6	25	3	50	12
Netherlands	40	50	33	20	20	9	25	3	50	12
Norway	40	40	33	14	14	9	25	3	50	12
Spain	33	40	100	20	20	6	25	3	50	12
Sweden	40	35	26	14	14	9	25	3	50	12
Switzerland	40	32	50	20	20	6	25	3	50	12
U.K.	33	40	33	20	20	9	25	3	50	12
Greece	38	45	150	20	20	6	25	3	50	12
Portugal	33	50	100	20	20	9	25	3	50	12
Czech Rep.	40	45	101	20	20	6	25	5	50	28
Hungary	33	45	101	20	20	6	30	5	50	30
Israel	38	50	101	18	18	9	51	5	50	12
Poland	33	45	101	20	20	6	78	3	50	12
Russia	33	45	101	20	20	6	25	3	50	12

4.5 RAM DEFINITIONS

NOTE: Do not change RAM data other than listed in this table.

Address (H)	Definitions	Note
0902 - 0905	Fax ROM version If the ROM version is 2.11: 0902 - 32 (ASCII) 0903 - 2E (ASCII) 0904 - 31 (ASCII) 0905 - 31 (ASCII)	Read only
0906 - 0909	Printer ROM version If the ROM version is 2.17: 0906 - 32 (ASCII) 0907 - 2E (ASCII) 0908 - 31 (ASCII) 0909 - 37 (ASCII)	Read only
E000 - E002	If the data at these addresses are changed from the defaults at power-on, the machine initializes itself completely, including the clock. Default settings E000 - 85 (h) E001 - 09 (h) E002 - 19 (h)	Refer to section 4.2.13.
E003 - E005	Total scan counter If the counter value is “123456”: E003 - 56 (BCD) E004 - 34 (BCD) E005 - 12 (BCD)	
E006 - E008	Total print counter (same format as the “Total scan counter)	
E00C - E014	The print counter values when the ink cartridge was changed. (same format as the “Total scan counter) E00C - E00E (h): CURRENT0 (last time) E00F - E011 (h): CURRENT1 (2nd last time) E012 - E014 (h): CURRENT2 (3rd last time)	Do not change the data.
E015 - E034	TTI E015 - 1st character (ASCII) E016 - 2nd character (ASCII) | E034 - 32nd character (ASCII)	Even if the TTI is not 32 characters long, TTI characters are stored from E015(h), and FF(h) is stored in addresses after the final character.

Address (H)	Definitions	Note
E035 - E048	RTI E035 - 1st character (ASCII) E036 - 2nd character (ASCII) | E048 - 20th character (ASCII)	Even if the RTI is not 20 characters long, RTI characters are stored from E035(h), and FF(h) is stored in addresses after the final character.
E049 - E05C	CSI E049 - 1st character (ASCII) E04A - 2nd character (ASCII) | E05C - 20th character (ASCII)	Even if the CSI is not 20 characters long, CSI characters are stored from E035(h), and FF(h) is stored in addresses after the final character.
E05D - E05E	Password for the Limit Tx function If password is “1234”: E05D - 12 (BCD) E05E - 34 (BCD)	
E05F - E06D	Bit Switches E05F (h): Bit switch 0 E060 (h): Bit switch 1 | E06D (h): Bit switch E	Refer to section 4.3.

Address (H)	Definitions	Note
E094 - E3B3	Stored dial numbers for Speed Dials 10 - 59. Each stored number consists of 16 bytes as follows: **1st byte** - Flag Bit 0: 1 = Registered in Group A Bit 1: 1 = Registered in Group B Bit 2: 1 = Registered in Group C Bit 3: 1 = Registered in Group D Bit 4: 1 = Registered in Group E Bit 5: Not used Bit 6: Not used Bit 7: 1 = A dial number is programmed **2nd byte to 15th byte** - Programmed tel. No. If the tel. no. is "0 - 123456789 ("-" is a pause)", 2nd byte = EA (h) [0 -] 3rd byte = 21 (h) [12] 4th byte = 43 (h) [34] 5th byte = 65 (h) [56] 6th byte = 87 (h) [78] 7th byte = F9 (h) [9] 8th to 15th byte = all FF(h) **16th byte** - Keep at FF(h) If a Speed Dial is not programmed, "00(h)" is stored in all the addresses for the Speed Dial.	Addresses are fixed as follows: E094 - E0A3: S.10 E0A4 - E0B3: S.11 E0B4 - E0C3: S.12 | E3A4 - E3B3: S.59 Dial number format: 0 - 0 (h) 1 - 1 (h) 2 - 2 (h) 3 - 3 (h) 4 - 4 (h) 5 - 5 (h) 6 - 6 (h) 7 - 7 (h) 8 - 8 (h) 9 - 9 (h) 0 - A (h) * - B (h) # - C (h) Pause - E (h)
E3B4 - E485	Stored dial numbers for Quick Dials A - J Each stored number consists of 21 bytes as follows: **1st byte** - Flag (refer to the 1st byte of the programmed Speed Dial format) **2nd byte to 20th byte** - Programmed tel. no. (refer to the 2nd to 15th byte of the programmed Speed Dial format) **21st byte** - Keep at FF(h) If a Quick Dial is not programmed, "00(h)" is stored in all the addresses for the Quick Dial.	Addresses are fixed as follows: E3B4 - E3C8: A E3C9 - E3DD: B | E471 - E485: J
E486 - E557	Stored dial numbers programmed from the ten-key pad for Group Dials (10 numbers max.) Each stored number consists of 21 bytes as follows: **1st byte** - Flag (refer to the 1st byte of the programmed Speed Dial format) **2nd byte to 20th byte** - Programmed tel. no. (refer to the 2nd to 15th byte of the programmed Speed Dial format) **21st byte** - Keep at FF(h)	Addresses are fixed as follows: E486 - E49A: 1st E49B - E4AF: 2nd | E543 - E557: 10th

Address (H)	Definitions	Note
E558 - E55A	Total Tx counter (same format as the “Total scan counter)	
E55B - E55D	Total Rx counter (same format as the “Total scan counter)	
E9C9 - E9CA	The latest error code detected in the last fax reception. If error code is 0-21: E9C9 - 21 (BCD) E9CA - 00 (BCD)	Do not change the data.
E9DA - E9DB	The latest error code detected in the last fax transmission. If error code is 0-08: E9DA - 08 (BCD) E9DB - 00 (BCD)	Do not change the data.
E9DC - EA1B	Latest 32 error codes (The format is the same as above) E9DC - E9DD: 1st error code E9DE - E9DF: 2nd error code | EA1A - EA1B: 32nd error code	
EA31 - EA32	Polling ID code If ID code is “1234”: EA31 - 12 (BCD) EA32 - 34 (BCD)	

Address (H)	Definitions	Note
EA33 - EA48	NCU parameters EA33: COUNTRY (See note) EA34: LEVL (Hex) EA35: RID0 (Hex) EA36: RID1 (Hex) EA37: RID2 (Hex) EA38: RID3 (Hex) EA39: RID4 (Hex) EA3A: RDT0 (Hex) EA3B: RDT1 (Hex) EA3C: DLST (Hex) EA3D: RPST (Hex) EA3E: BRKT (Hex) EA3F: MAKT (Hex) EA40: MINP (Hex) EA41: PAUT (Hex) EA42: DTON (Hex) EA43: DTOF (Hex) EA44: DTLV (Hex) EA45: REDT (Hex) EA46: REDC (Hex) EA47: RST0 (Hex) EA48: BRIT (Hex)	Refer to section 4.4 for definitions. **Country Codes** 00(h): Austria 01(h): Belgium 03(h): Denmark 04(h): Finland 05(h): France 06(h): Germany 07(h): Ireland 08(h): Italy 0A(h): Holland 0B(h): Norway 0D(h): Spain 0E(h): Sweden 0F(h): Switzerland 10(h): U.K. 12(h): Greece 13(h): Portugal 14(h): Czech Rep. 15(h): Hungary 16(h): Israel 17(h): Poland

5. PREVENTIVE MAINTENANCE

5.1 PREVENTIVE MAINTENANCE SCHEDULE

5.1.1 PM TABLE

Symbol Keys: C: Clean, R: Replace, L: Lubricate, I: Inspect

Item	EM	5K	10K	Note
Scanner/ADF				
Document Sensor			I	
Roller Bushings			I	
Separation Pad	C	C	R	Alcohol Adjust the separation pressure, if required.
Feed Roller	C		C	Alcohol
CIS Roller	C			Alcohol
CIS	C			Dry cloth or alcohol
Printer				
Roller Bushings			I	
Cartridge Shaft	C			Alcohol
Encoder	C			Alcohol
Maintenance Unit	C			Alcohol
Paper Feed Roller	C		C	Alcohol
Cassette Cork Pad	C		C	Alcohol

6. REPLACEMENT AND ADJUSTMENT

⚠CAUTION

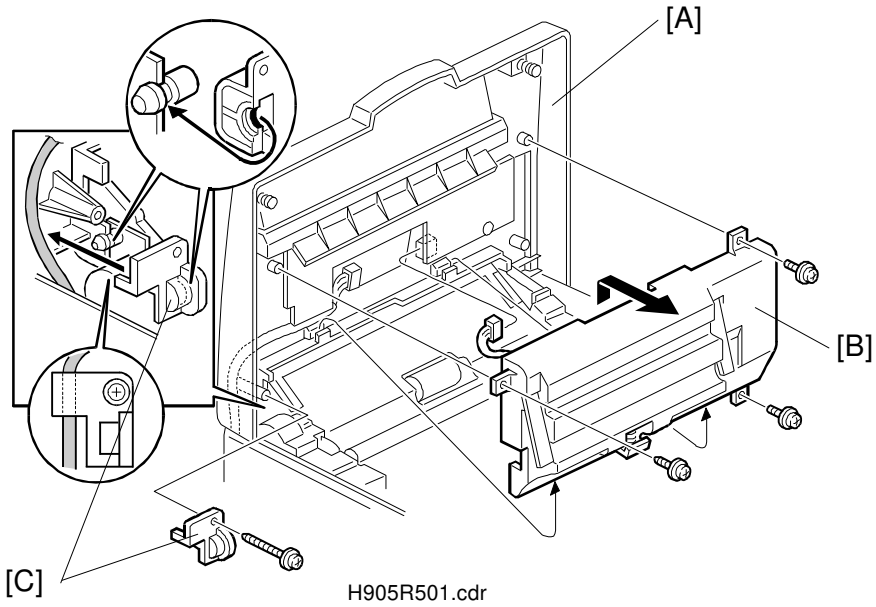
The danger of explosion exists if a battery of this type is incorrectly replaced. Replace only with the same or an equivalent type recommended by the manufacturer. Discard used batteries in accordance with the manufacturer's instructions.

CAUTION: 1) Before attempting any disassembly or assembly procedure, make sure of the following:
- Turn off the machine.
- Disconnect the power cord.
- Disconnect the telephone cable(s).
- Disconnect the PC interface cable(s).
- Remove the ink cartridge and place it into the cartridge holder.

NOTE: 1) Do not touch the nozzle section of the ink cartridge. This helps prevent the nozzles from clogging.
2) Do not touch the wiper blade on the maintenance unit. This also prevents the nozzles from clogging.
3) Always store an extra cartridge (if unpacked) in the cartridge holder.
4) Ensure that the printer engine stops its maintenance operation before turning off the machine.
5) Ensure that the cartridge is at the head capping position (right end) before leaving the machine unplugged for long periods.

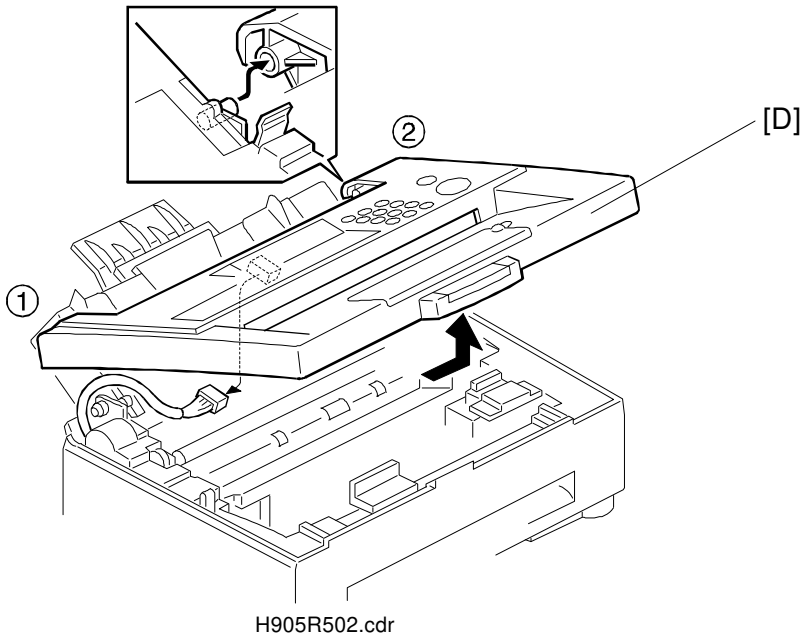
6.1 EXTERIOR

6.1.1 TOP COVER ASSEMBLY



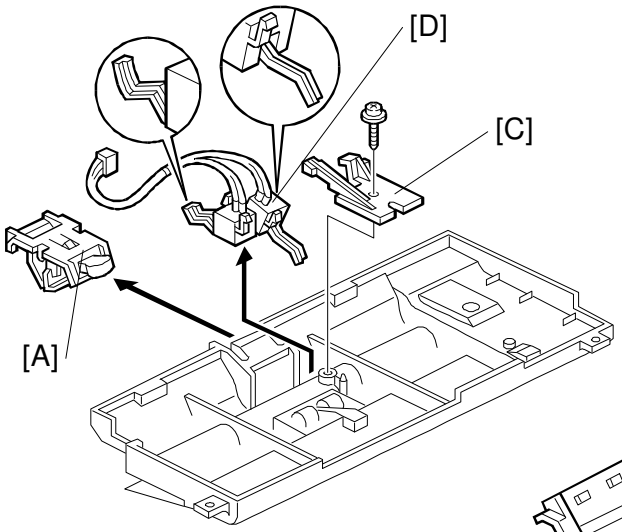
— TOP COVER AND ADF UPPER GUIDE PLATE —

1. Open the top cover [A].
2. Remove the ADF upper guide plate [B] (1 tapping screw [left] and 2 screws; 1 harness) and the part [C] (1 tapping screw).

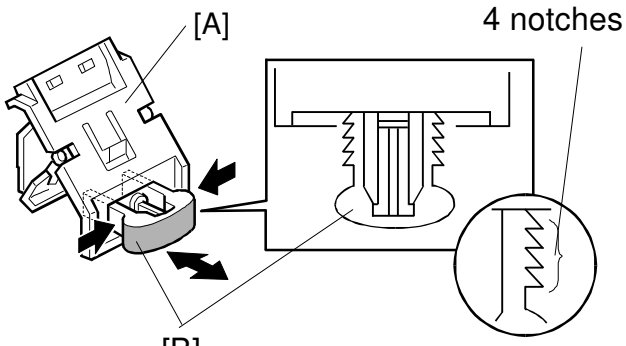


3. Remove the top cover assembly [D] (1 harness) as shown. Slightly lift up the left side ① first, then slide the cover to the right ②.

— ADF SENSOR ASSEMBLY AND SEPARATION PAD —



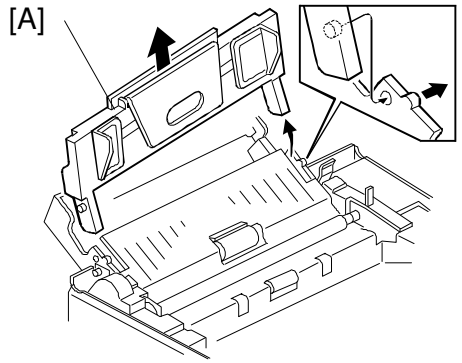
H905R503.cdr



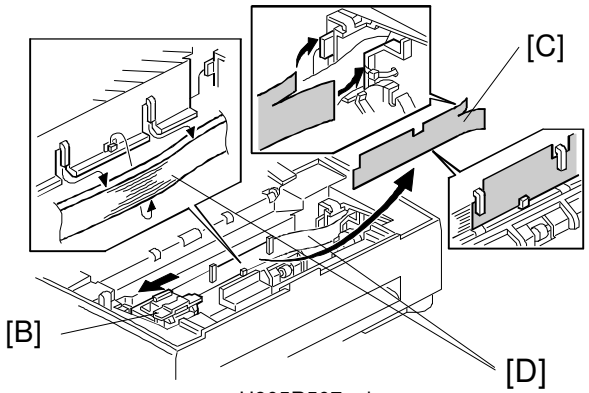
H905R505.cdr

1. Remove the ADF upper guide plate as explained in the previous section.
2. Slide out the separation pad assembly [A].
3. If required, adjust the separation pressure using the black pin [B] as shown. The illustration shows the default setting. Push it in to increase the pressure.
4. Remove the sensor holder [C] (1 tapping screw), then replace the ADF sensor assembly [D].

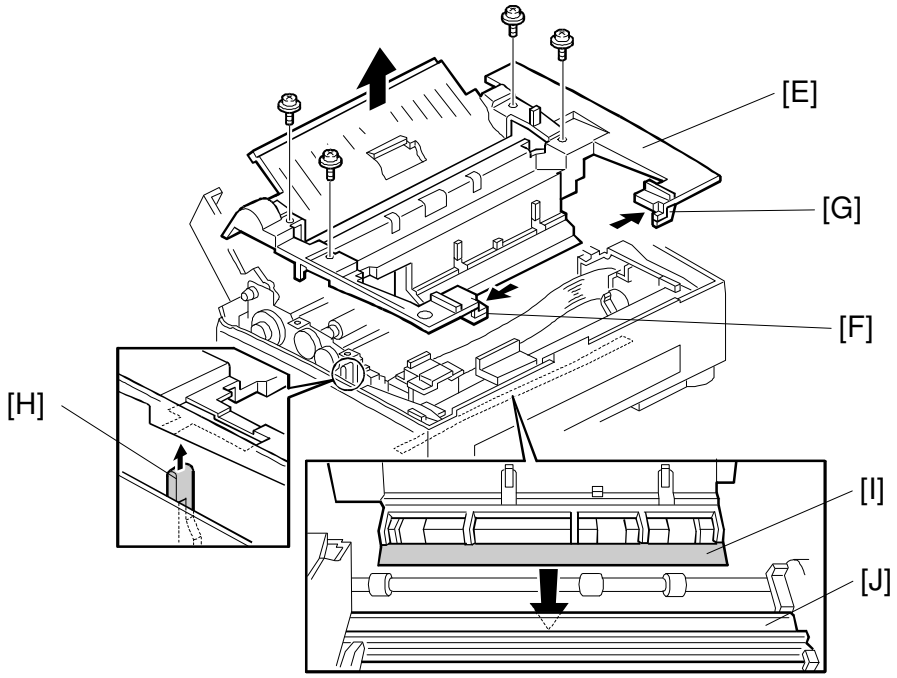
— INNER COVER —



H905R506.cdr



H905R507.cdr

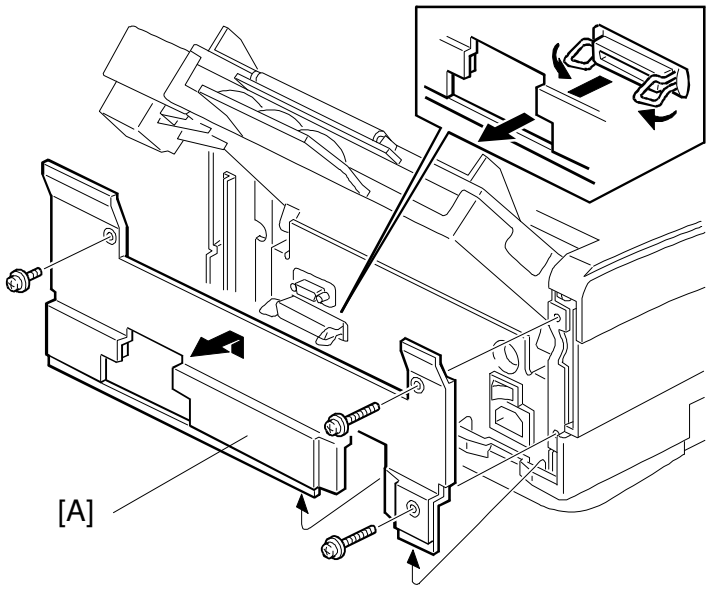


H905R508.cdr

1. Remove the document guide assembly [A] as shown.
2. Remove the top cover assembly if it has not been removed (see section 1.1.1).
3. Gently slide the print head carriage [B] to the left end, remove the cable supporter [C], and release the flat cables [D] from the hooks.
4. Remove the inner cover [E] (4 screws).

NOTE: 1) Release the hooks [F] and [G] at the front edge of the inner cover.
2) Adjust the position of blue lever [H] so it does not interfere with the inner cover.
3) At assembly, be sure that the lower edge of the inner cover [I] goes under the carriage guide rail [J], and the flat cables [D] and the cable supporter [C] are put back correctly. Also, check that the carriage moves smoothly after assembly.

6.1.2 REAR COVER

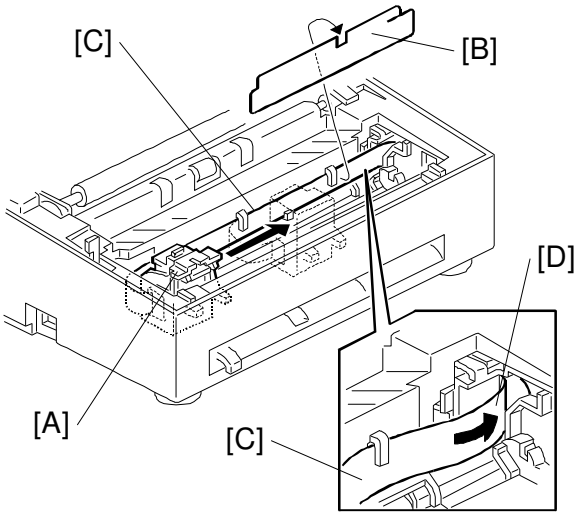


H905R509.cdr

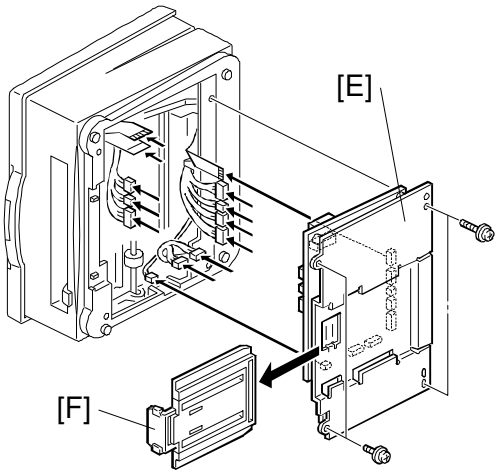
1. Remove the rear cover [A] (3 screws; the screw at the lower right corner is long. The others are short.)

6.2 PCBS

6.2.1 FCU AND NCU



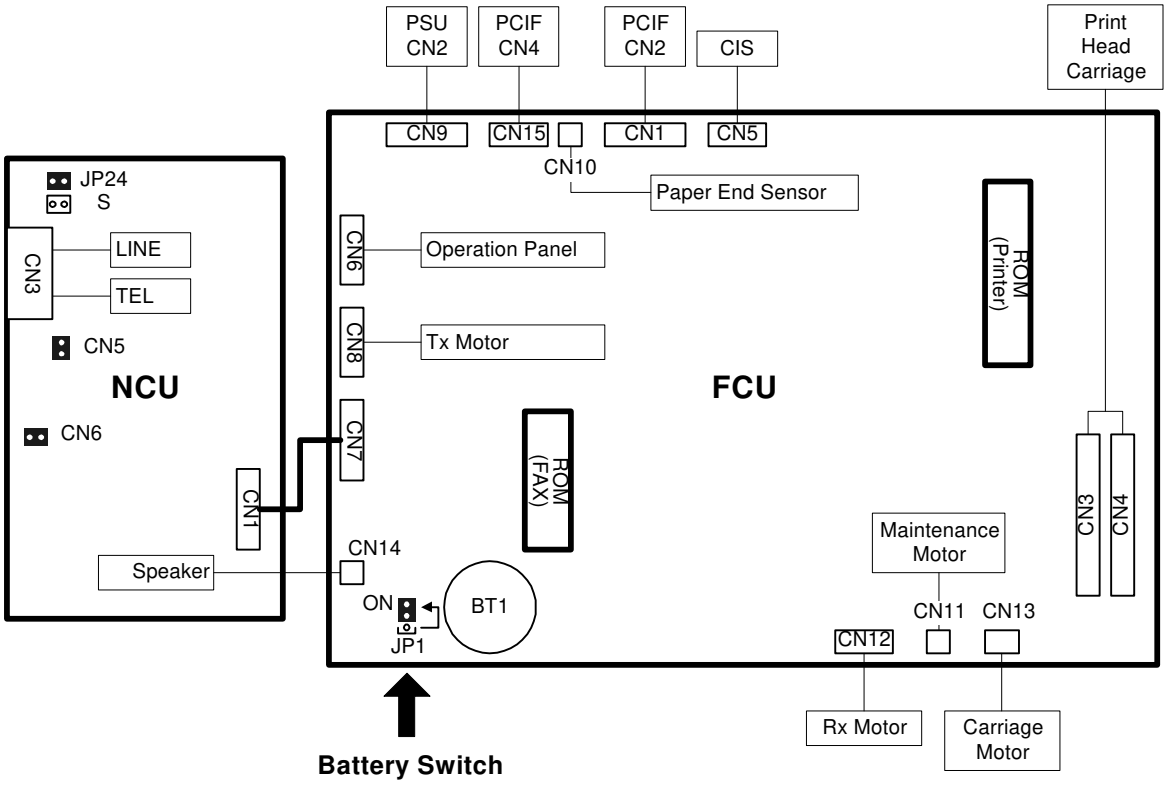
H905R510.cdr



H905R511.cdr

1. Open the top cover, gently slide the print head carriage [A] to the left end, remove the cable supporter [B], and release the flat cables [C] from the hooks (refer to section 1.2).
2. Gently slide the carriage [A] halfway across, and put the flat cables [C] inside the opening [D].
3. Place the machine as shown, and remove the bottom cover assembly [E] (13 harnesses; do not disconnect the one connecting the FCU and the NCU, 4 screws; 2 screws at the machine's front are short, the others are long) [E].
4. Remove the paper tray [F] from the bottom cover assembly.
5. Remove the FCU (4 screws, 1 harness) and the NCU (3 screws, 1 harness).
   NOTE: When replacing the FCU, make sure to turn on the battery switch (JP1) before assembly [See the next page].

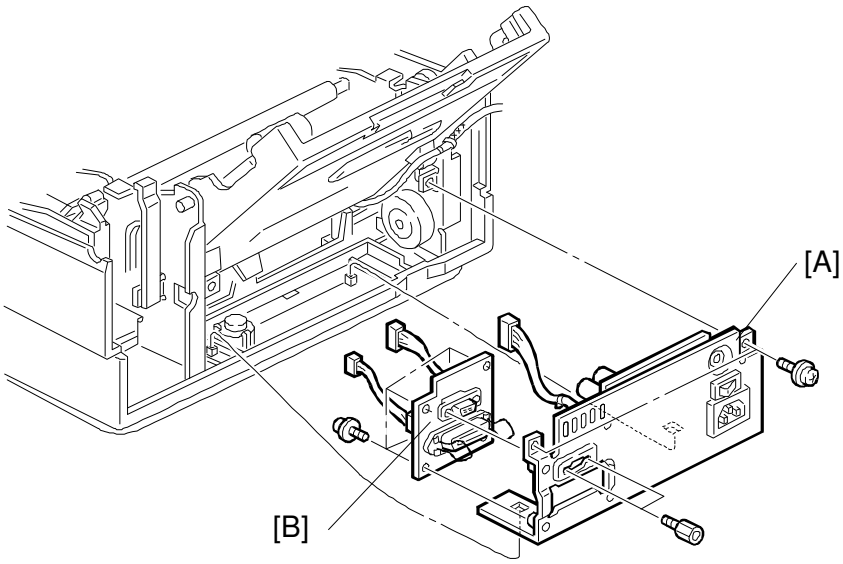
Connector Locations and Connections



H905R012.vsd

Replacement Adjustment

6.2.2 PSU AND PCIF



H905R513.cdr

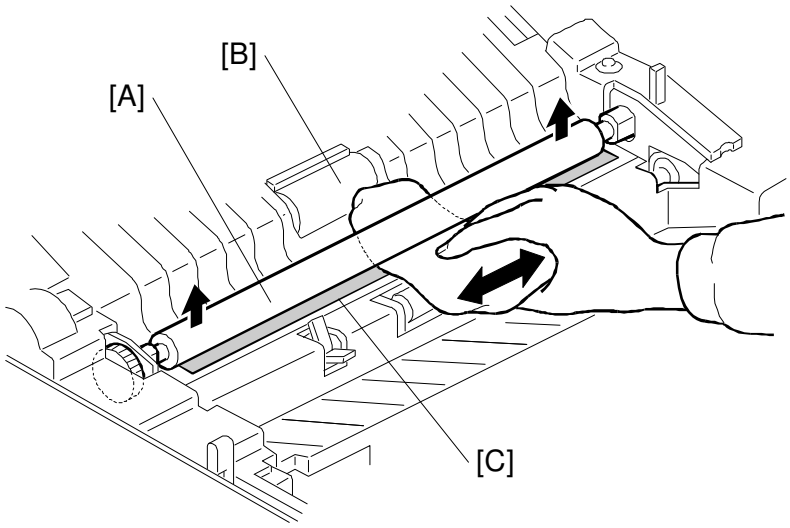
1. Remove the rear cover (see section 1.3).
2. Remove the bottom cover assembly with the FCU and the NCU (see section 2.1). If possible, instead of doing this, disconnect the harnesses from CN1, CN9, and CN15.
3. Remove the PSU/PCIF assembly [A] (2 screws).
4. Remove the PCIF [B] from the PSU assembly (4 screws and 2 hexagonal screws for the serial interface).

6.3 SCANNER AND PAPER CASSETTE

6.3.1 MAINTENANCE

— CLEANING THE SCANNER ROLLERS —

Clean the CIS roller surface using alcohol whenever possible. If the roller gets dirty, the scanned image may be partially darker.



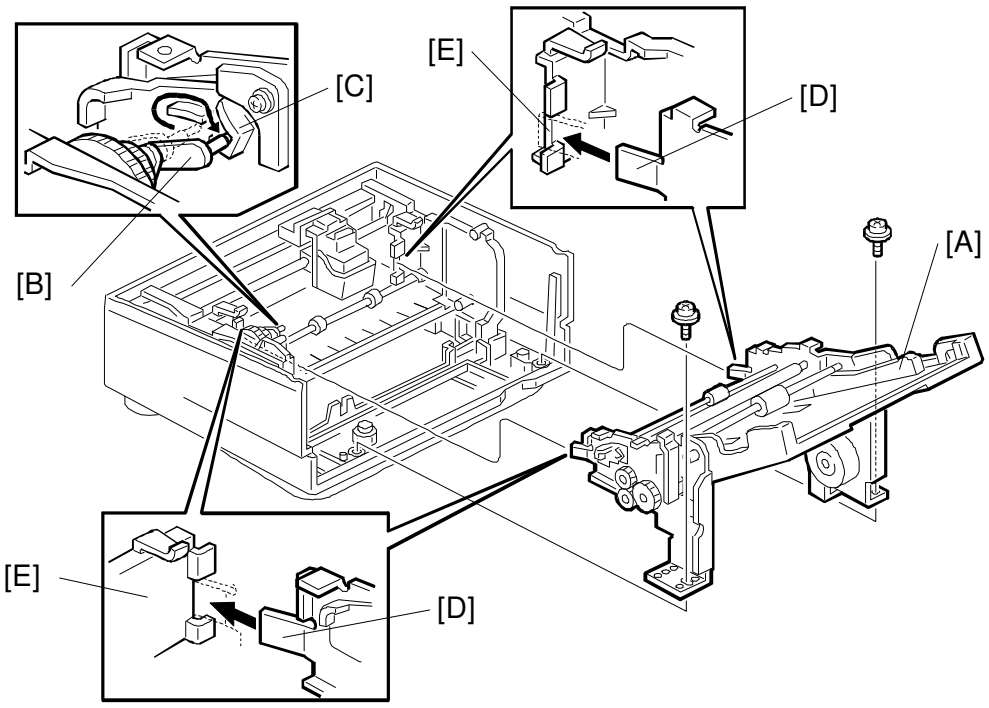
H905R515.cdr

1. Open the top cover.
2. Clean the CIS roller [A], the feed roller [B], and the CIS exposure glass [C] using a cloth moistened with alcohol.

— CLEANING THE PAPER FEED COMPONENTS —

Whenever the scanner and the paper cassette assembly has been removed, clean the paper feed rollers (2 rollers on 1 shaft) and the cork pads on the cassette bottom plate.
Refer to section 3.2 for how to remove the scanner and the paper cassette assembly.

6.3.2 SCANNER AND PAPER CASSETTE ASSEMBLY



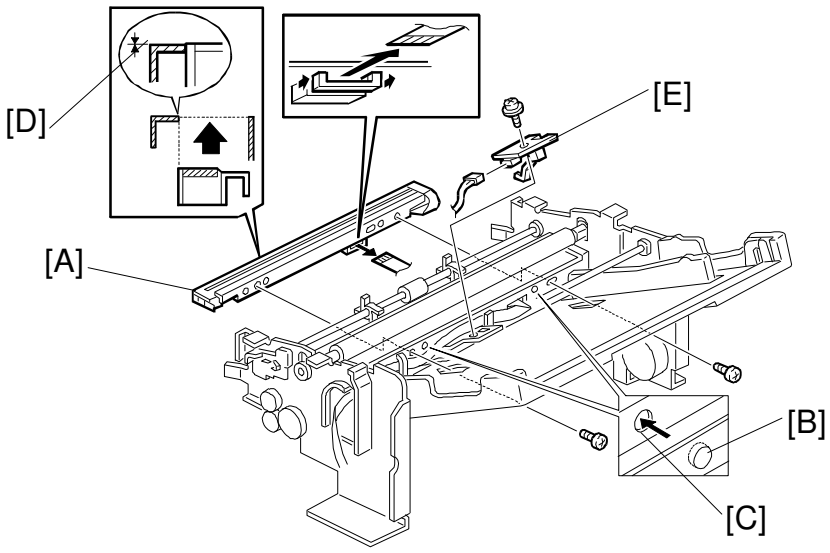
H905R516.cdr

1. Remove the top cover assembly (see section 1.1), the inner cover (see section 1.2), and the rear cover (see section 1.3).
2. Remove the bottom cover assembly with the FCU and the NCU (see section 2.1).
3. Remove the scanner and the paper cassette assembly [A] (2 screws).
   NOTE: When replacing the assembly, make sure of the following:
   - The pin [B] must go into the guide [C] correctly.
   - The positioning plates [D] must go into the guides [E].
   - The frame must sit correctly on the positioning pins.

NOTE: Clean the paper feed rollers and cork pads on the cassette bottom plate using alcohol whenever the assembly has been removed from the machine.

— CONTACT IMAGE SENSOR (CIS) AND PAPER END SENSOR —

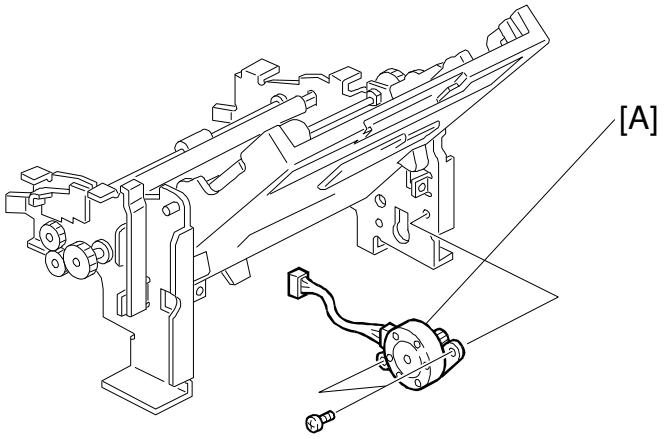
NOTE: The CIS and the paper end sensor are not available separately as spare parts. Use this procedure only when the CIS or the paper end sensor has been removed from the machine.



H905R517.cdr

1. Remove the scanner and paper cassette assembly (see section 3.1).
2. Remove the CIS [A] (2 screws, 1 harness).
   NOTE: When replacing the CIS [A], be sure that the dents [B] go into the openings [C] in the CIS.
   The upper front edge of the CIS [D] must not be lower than the CIS frame surface. Otherwise, document jams occur at this point.
3. Remove the paper end sensor [E].

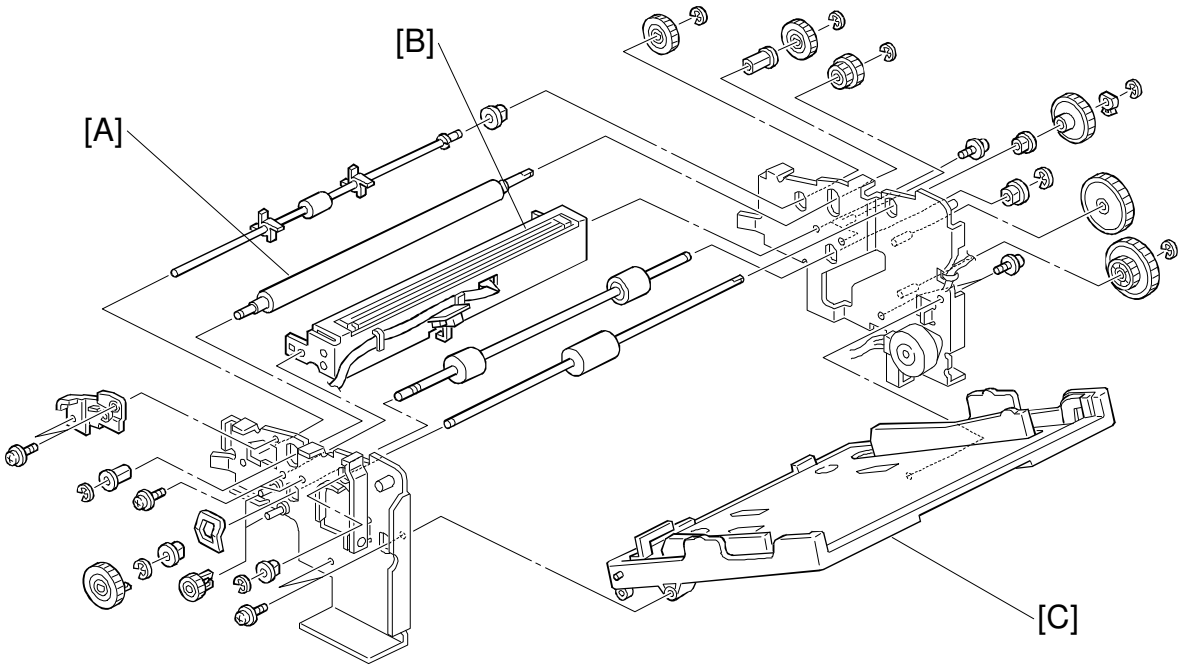
— TX MOTOR —



H905R518.cdr

1. Remove the scanner and paper cassette assembly (see section 3.1).
2. Remove the Tx motor [A] (2 screws).

— CIS ASSEMBLY, CIS ROLLER AND PAPER CASSETTE —



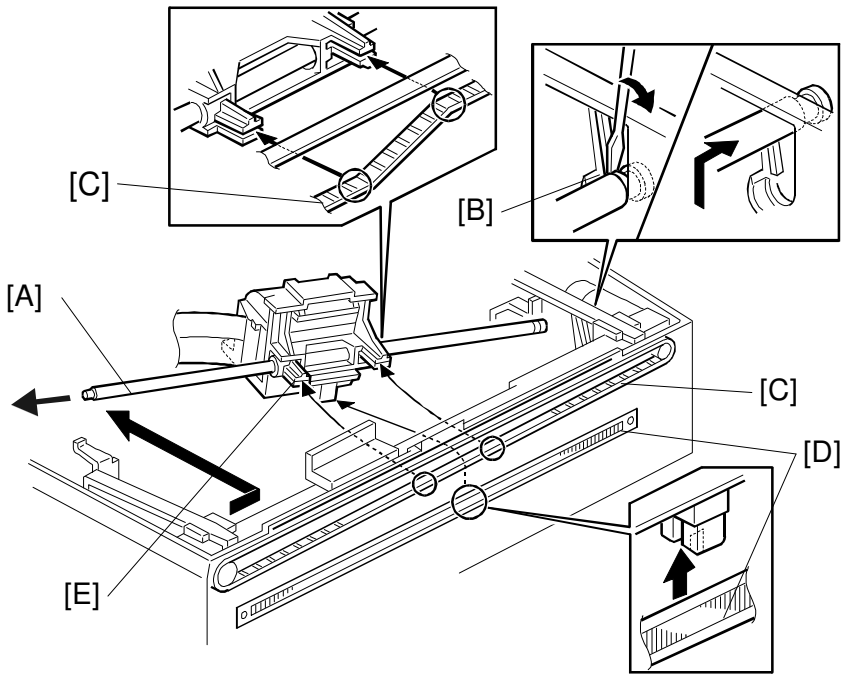
H905R519.cdr

1. Remove the scanner and paper cassette assembly (see section 3.1).
2. Remove the CIS roller [A] (2 E-rings, 1 gear, 2 bushings).
3. Remove the rollers as shown.
4. Remove the CIS assembly [B] (4 screws).
5. Remove the paper cassette [C] (2 screws).

6.4 PRINTER ENGINE

6.4.1 MAINTENANCE

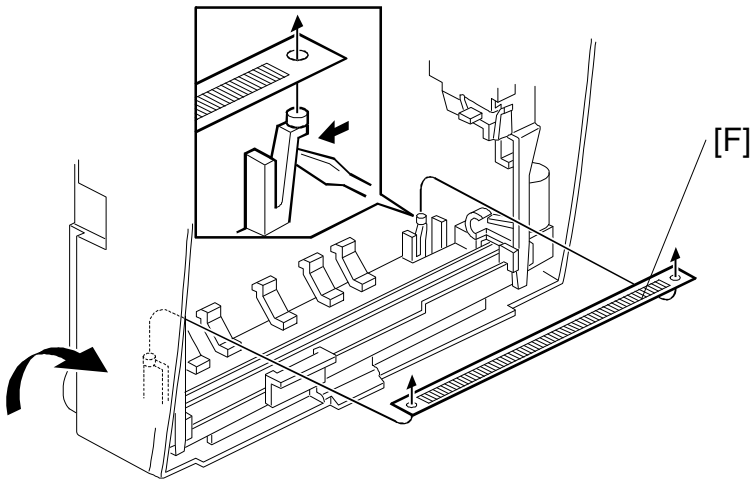
NOTE: 1) Do the following maintenance whenever possible.
2) Follow the instructions step by step. Otherwise the printer engine may malfunction.



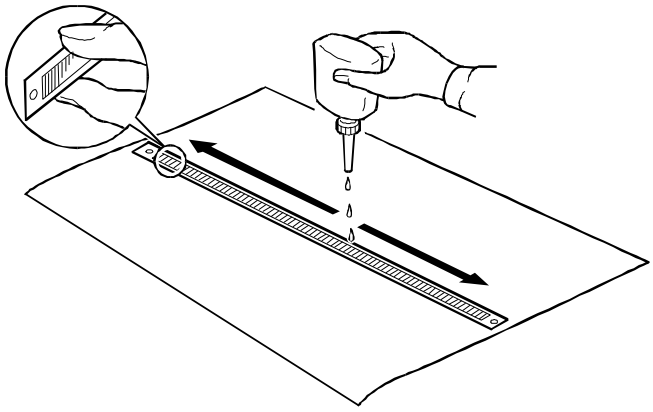
H906R520.cdr

— CARRIAGE SHAFT AND ENCODER —

1. Remove the top cover assembly (see section 1.1) and the inner cover (see section 1.2).
2. Remove the carriage shaft [A] as shown.
   NOTE: 1) Release the lock at the right end [B] of the shaft first.
   2) Remove the carriage drive belt [C] from two belt holders on the carriage.
   3) Be sure not to damage the encoder [D], a thin metal plate with lots of slits, located below the carriage shaft.
   4) Be careful not to touch the print head [E].
3. Clean the shaft [A] using a cloth moistened with alcohol.

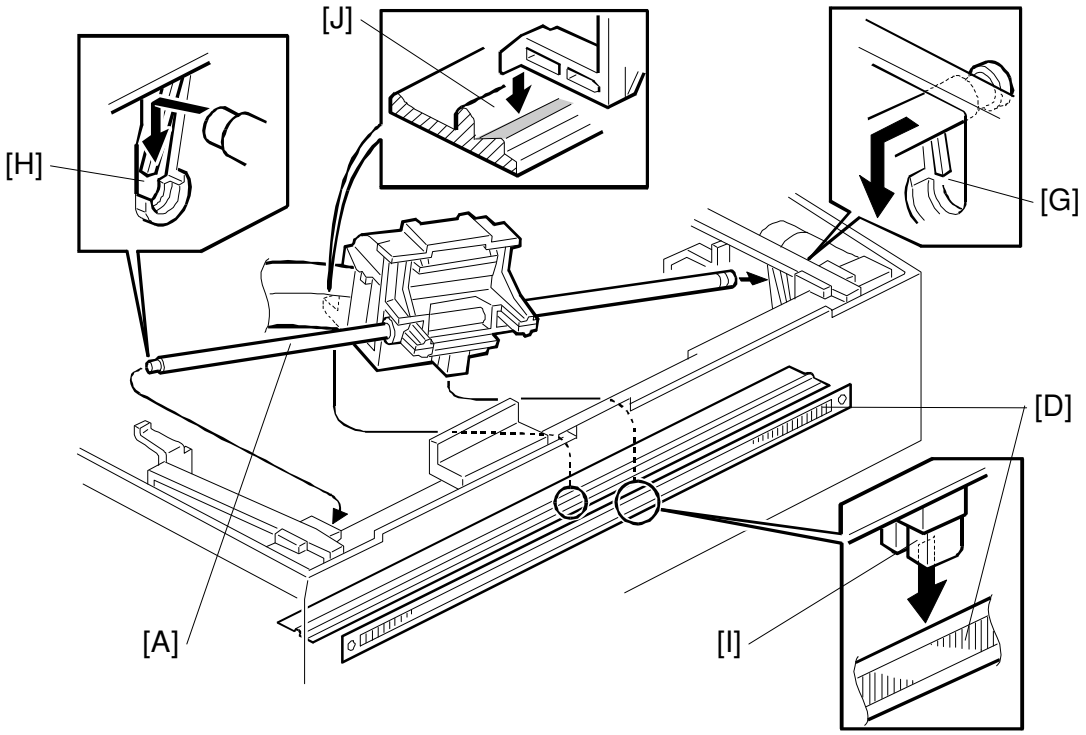


H905R523.cdr



H905R524.cdr

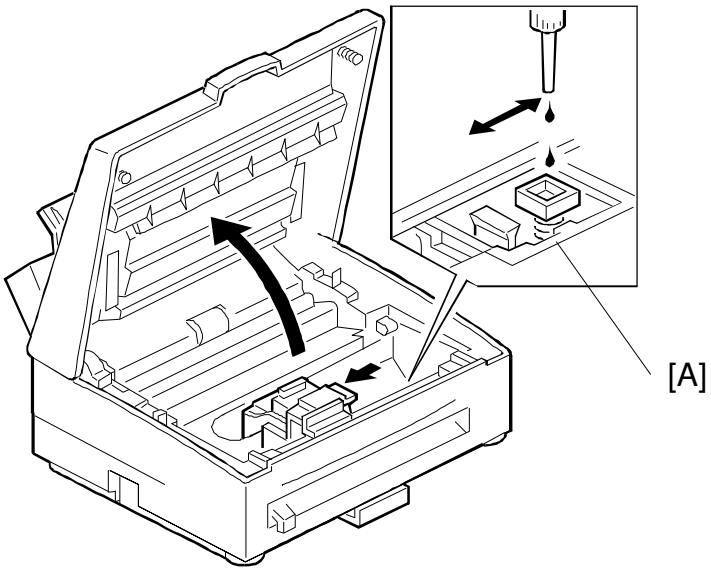
4. Remove the encoder [F].
5. Put the encoder on a sheet of paper and drop alcohol all along it.
   NOTE: 1) Do not wipe the encoder using cloth. If the slots on the encoder are clogged with dust, the carriage may not move correctly.
6. Replace the encoder [F].



H905R525.cdr

8. Insert the shaft [A] into the opening in the carriage.
9. Insert the right end of the shaft into the opening [G] in the right frame, then insert the left end into the opening [H] in the left frame. Do not lock them yet.
10. Lock the left end [H] of the shaft.
11. Be sure that the encoder [D] goes into the sensor slot [I] under the carriage and that the carriage is correctly placed on the guide rail [J], then lock the right end of the shaft.
12. Insert the carriage drive belt to the belt holders on the carriage.
13. Replace the inner cover and the top cover.
14. Turn on the machine and align the print head (function 88).
15. Make some test prints.

— MAINTENANCE UNIT —

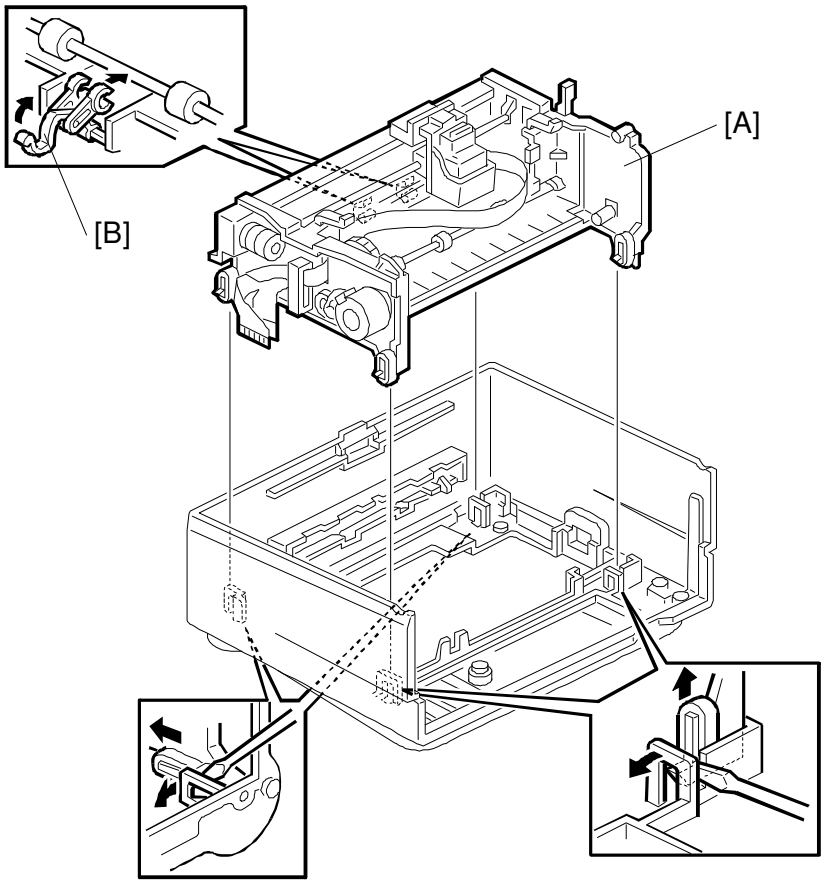


H905R527.cdr

1. Open the top cover and move the carriage to the left.
2. Clean the maintenance unit [A] with drops of alcohol.

6.4.2 REPLACEMENT

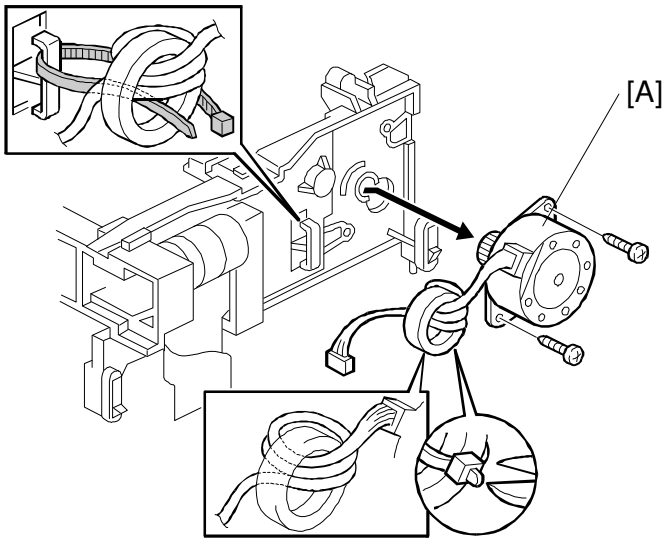
— PRINTER ENGINE ASSEMBLY —



H905R526.cdr

1. Remove the top cover assembly (see section 1.1), the inner cover (see section 1.2), and the rear cover (see section 1.3).
2. Remove the bottom cover assembly with the FCU and the NCU (see section 2.1).
3. Remove the scanner and the paper cassette assembly (see section 3.2).
4. Remove the printer engine assembly [A] (4 hooks).
   NOTE: If the ejectors [B] come off the shaft, put them back as shown.

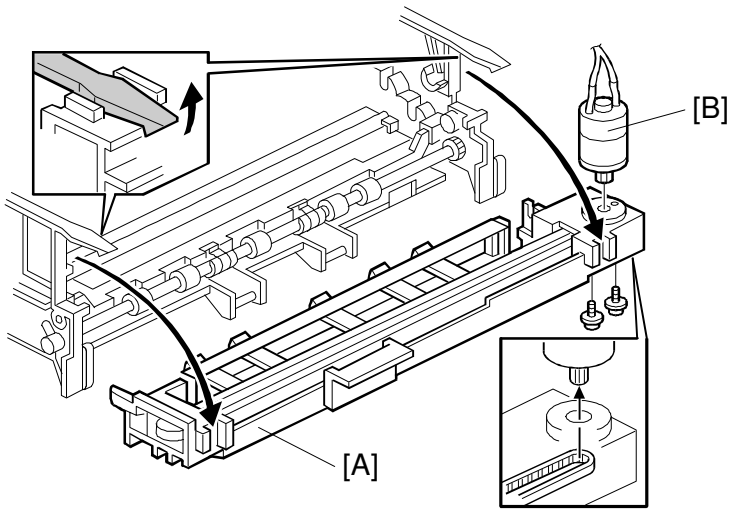
— RX MOTOR —



H905R530.cdr

1. Remove the printer engine assembly as explained in section 6.4.2.
2. Remove the Rx motor [A] (2 tapping screws; 1 harness binder).

— CARRIAGE DRIVE MOTOR —

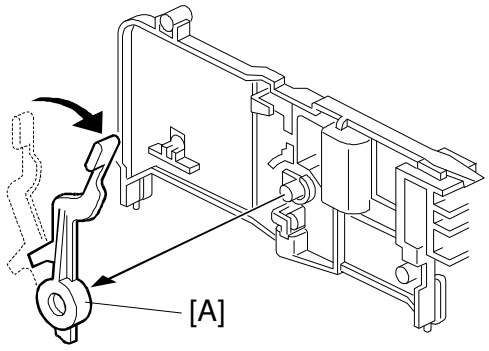


H905R531.cdr

1. Remove the printer engine assembly as explained in section 6.4.2.
2. Remove the carriage and the carriage shaft as explained in section 6.4.1.
   NOTE: Do not forget to remove the carriage before going on to the next step, otherwise the encoder plate and/or the encoder holders will be damaged.
3. Remove the front frame [A] (2 hooks).

4. Remove the carriage drive motor [B] (2 screws).

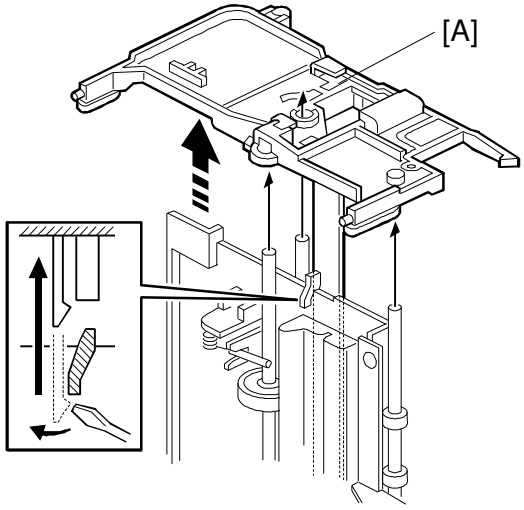
— PAPER FEED ROLLER RELEASE LEVER —



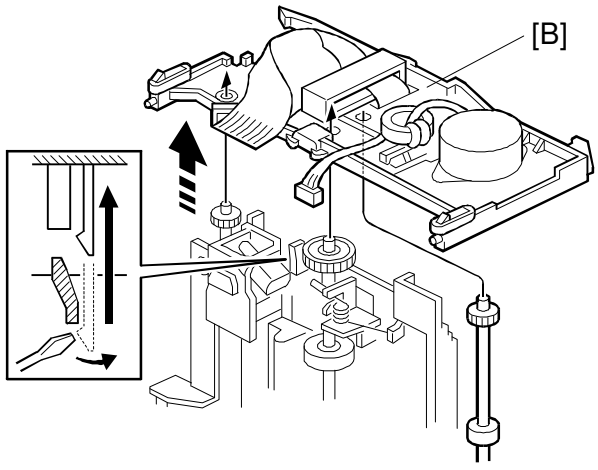
H905R532.cdr

1. Remove the printer engine assembly as explained in section 6.4.2.
2. Move the release lever [A] as shown to remove the lever (1 hook).

— MAINTENANCE UNIT —

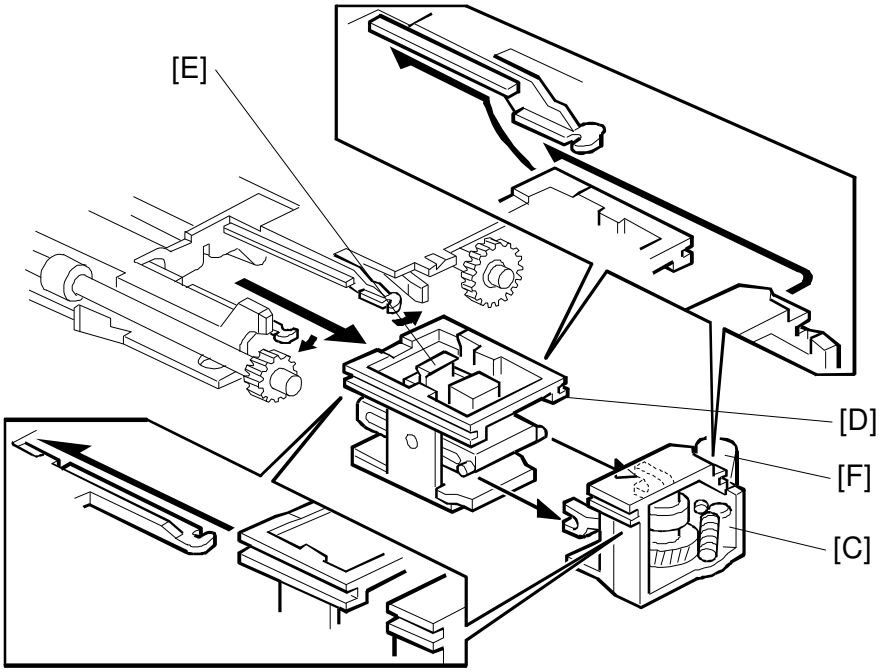


H905R533.cdr



H905R534.cdr

1. Remove the printer engine assembly and the release lever as explained above.
2. Remove the left side frame [A] (1 hook).
3. Remove the right side frame [B] (1 hook).
   NOTE: The left and right frames hold the rollers, carriage guide rail, and bottom frame. Be sure to put back the frames so that they hold these parts correctly.



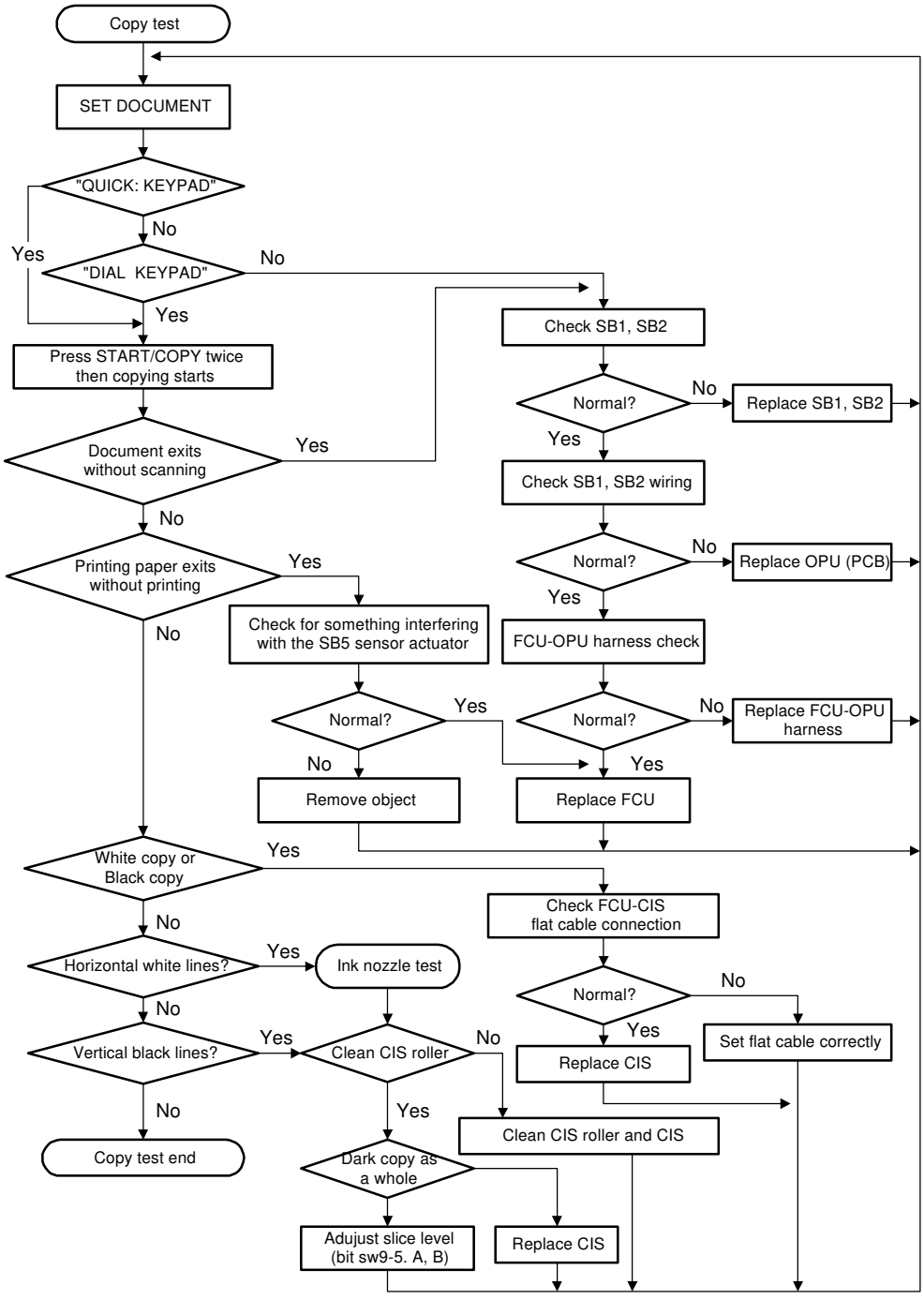
H905R535.cdr

4. Remove the maintenance motor assembly [C] and the maintenance unit [D] (both hooked on the bottom frame).
   NOTE: Do not touch the wiper blade [E] of the maintenance unit. This may damage the printer head.
5. Remove the maintenance motor [F] (2 screws).

7. TROUBLESHOOTING

7.1 TROUBLESHOOTNG PROCEDURE

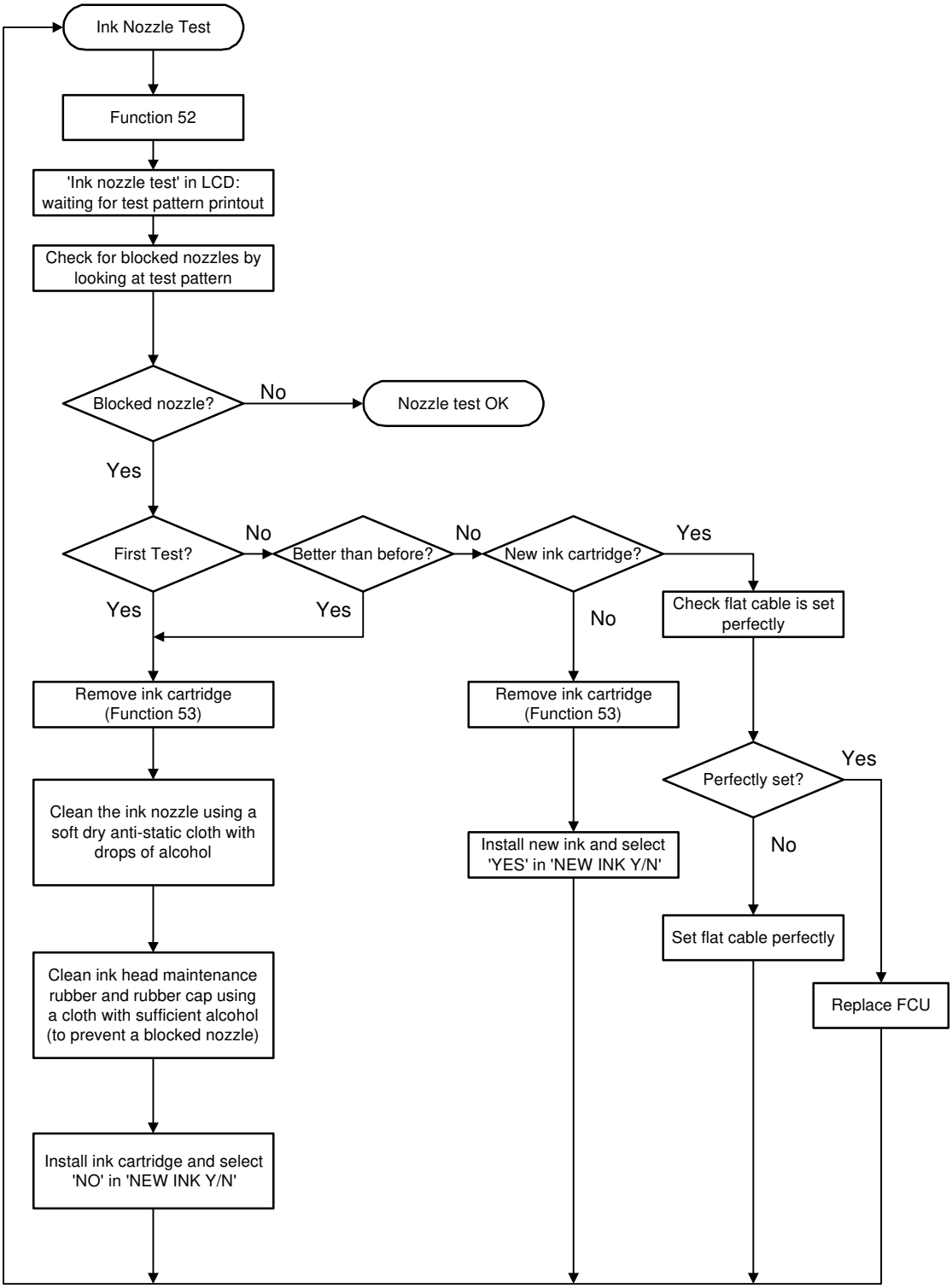
7.1.1 COPY TEST



H905T001.vsd

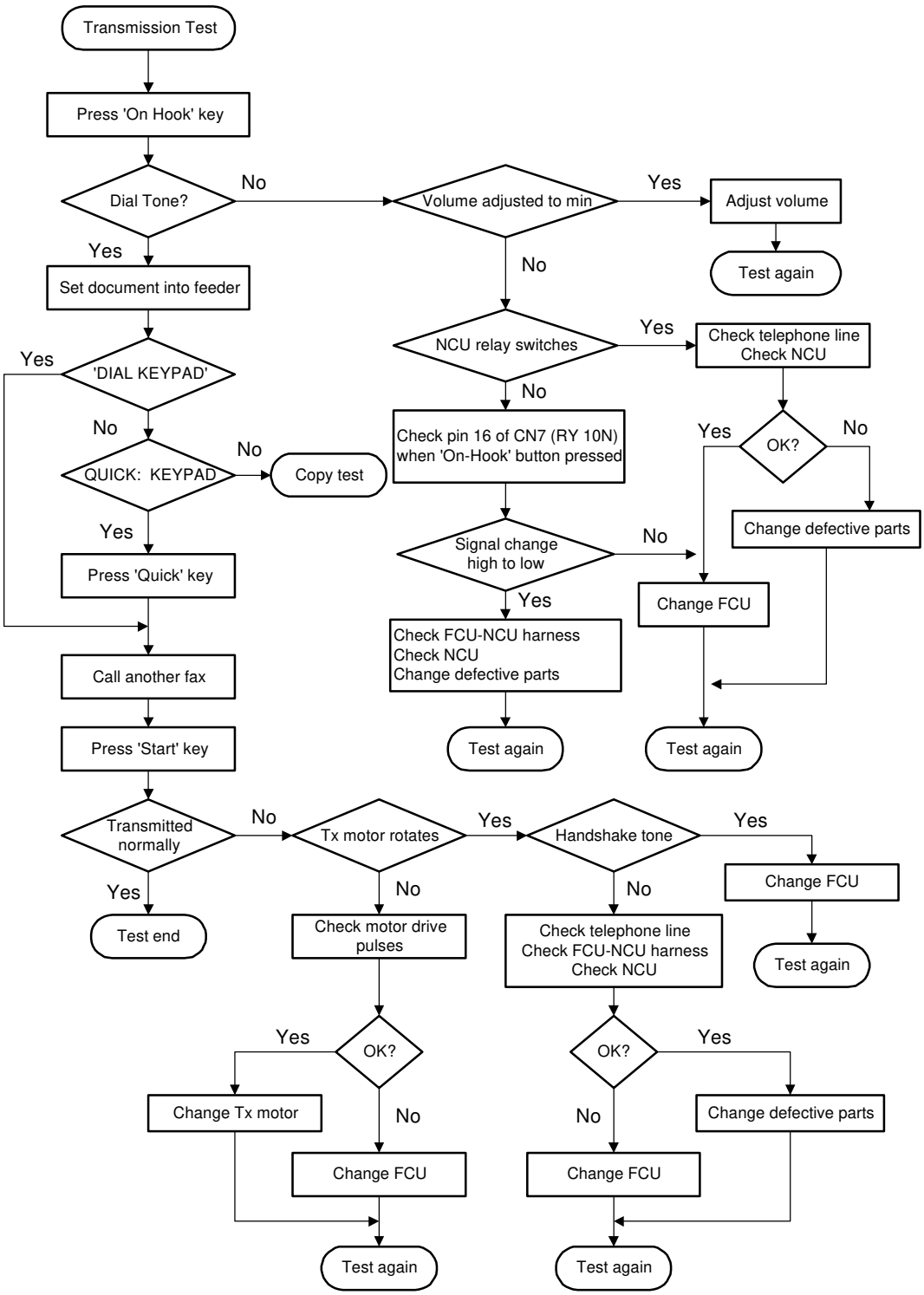
Trouble-shooting

7.2 INK NOZZLE TEST



H905T002.vsd

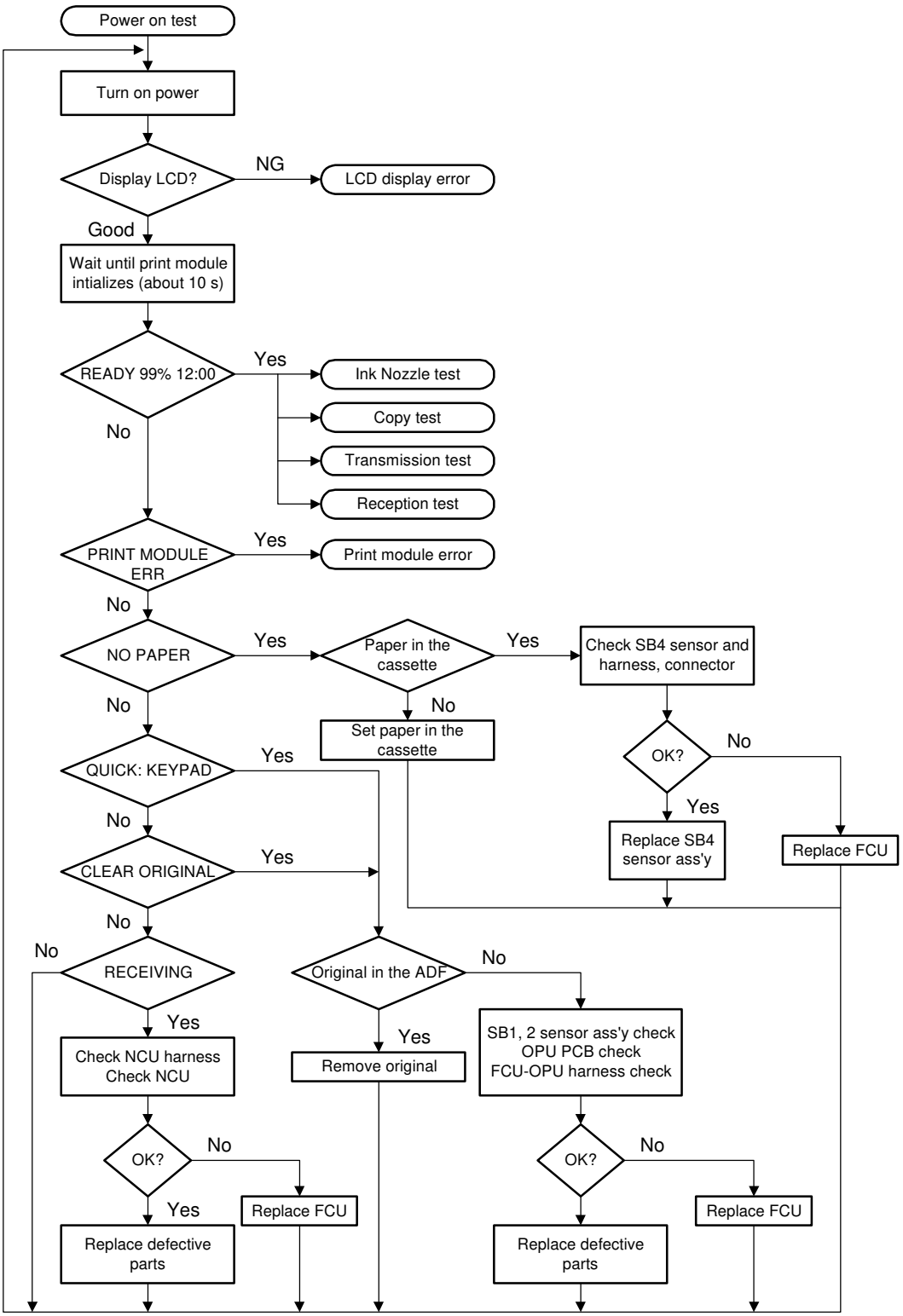
7.3 TRANSMISSION TEST



H905T003.vsd

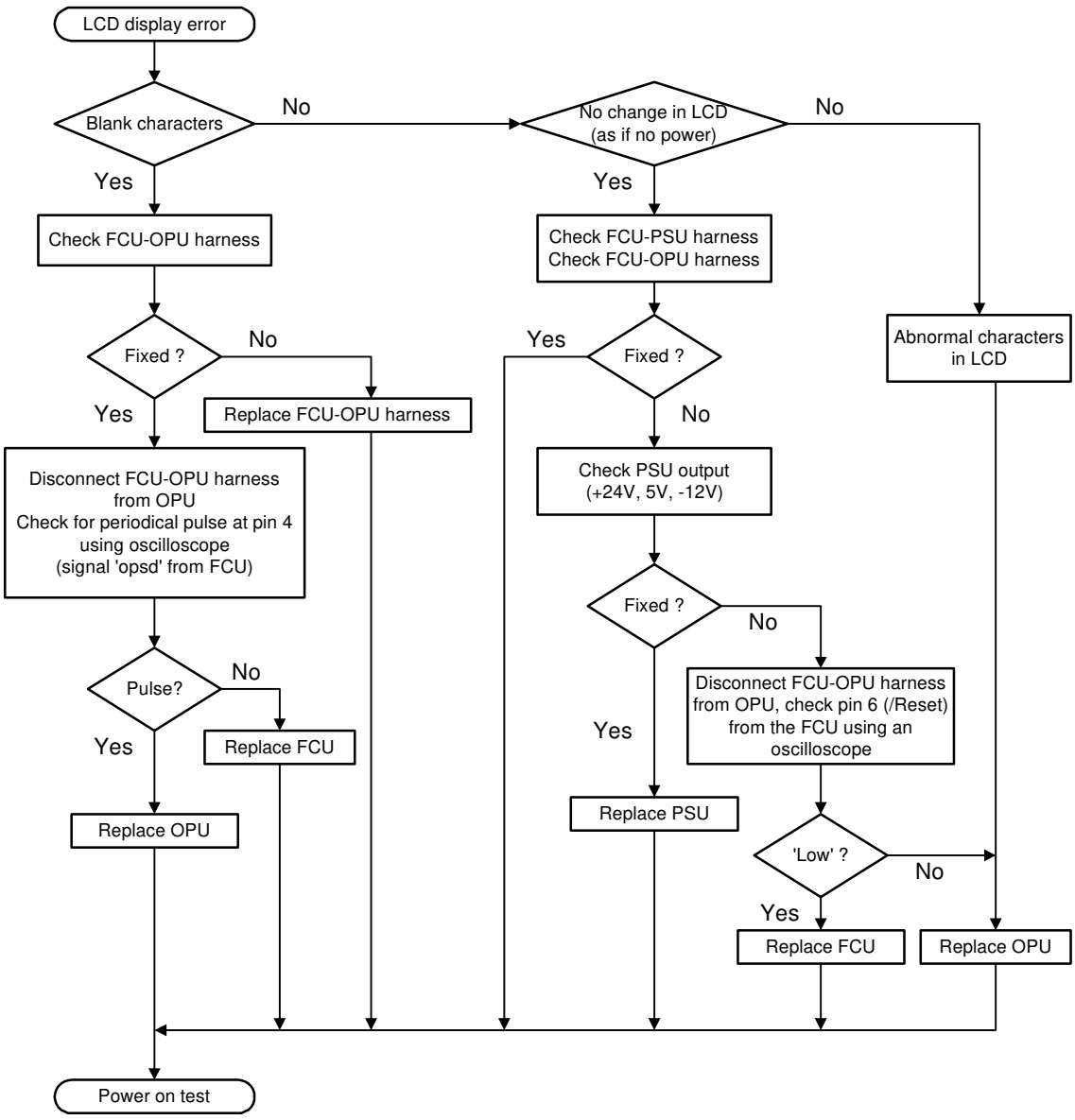
Trouble-shooting

7.4 POWER ON INITIALIZATION TEST



H905T004.vsd

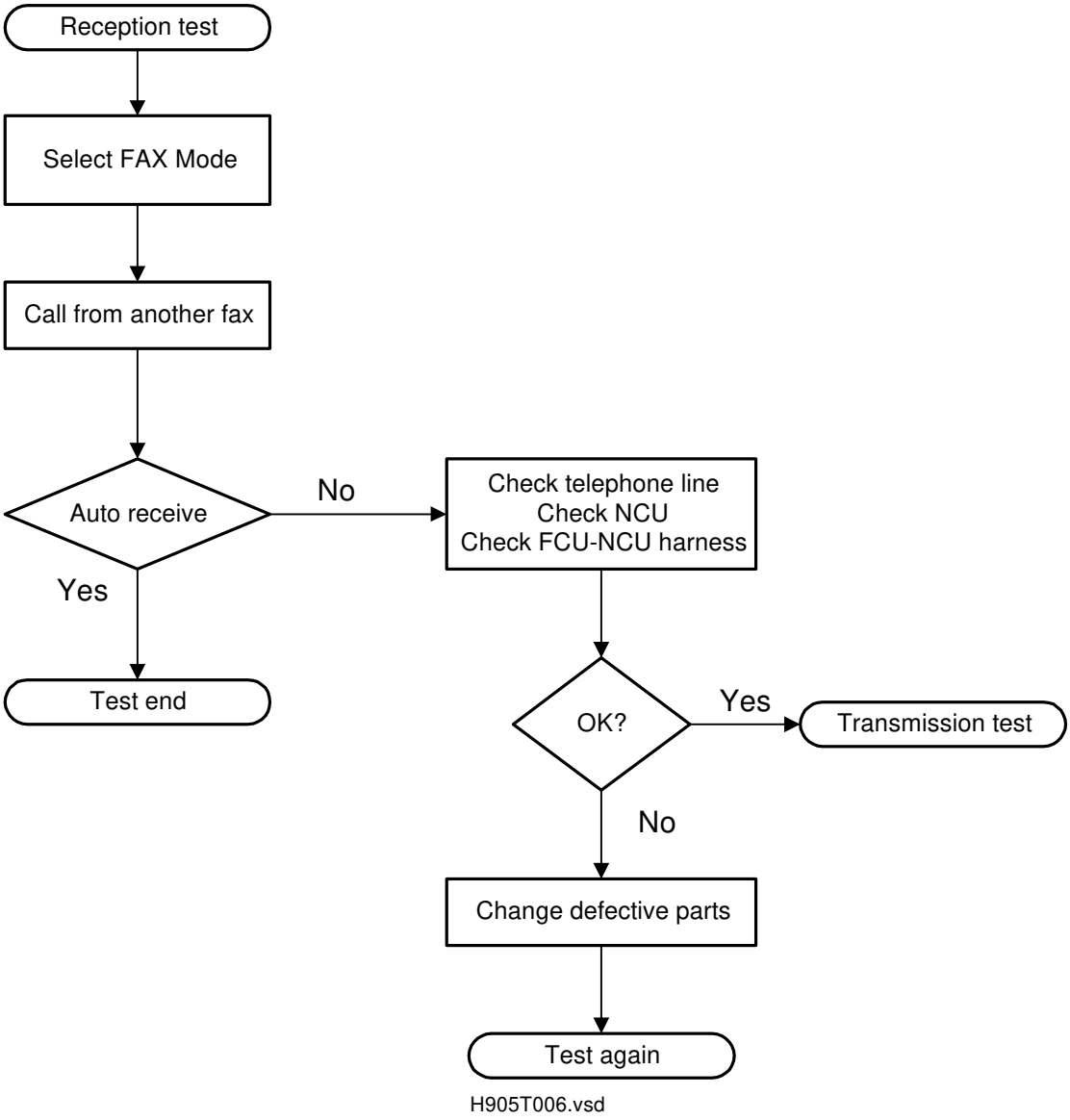
7.5 LCD DISPLAY ERROR



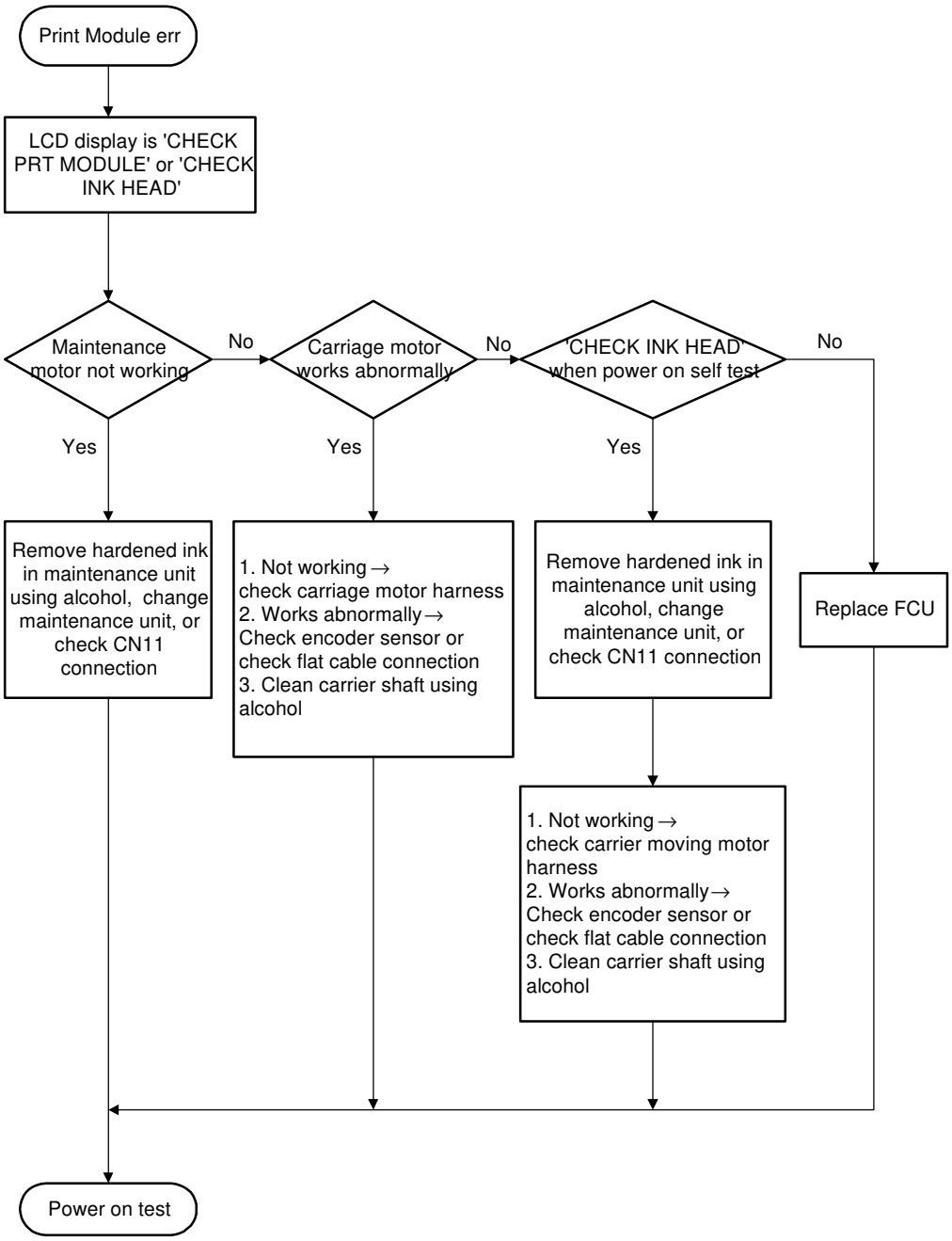
H905T005.vsd

Trouble-shooting

7.6 RECEPTION TEST



7.7 PRINT MODULE ERROR



H905T007.vsd

Trouble-shooting

7.8 **ERROR CODES**

CODE	MEANING	ACTION
0-00	DIS/NSF not received.	• Check the line connection. • Check the NCU-FCU connection. • The machine at the other end may be incompatible. • Replace the NCU or FCU.
0-01	DCN not received.	• Check the line connection. • Check the NCU-FCU connection.
0-03	The modems cannot communicate with each other.	• The other terminal has an incompatible modem.
0-04	Response to training result (CFR or FTT) is not received.	• Check the line connection. • Check the NCU-FCU connection. • Try adjusting the tx level or the cable equalizer setting. • The other terminal may be faulty. Try sending to another terminal and check the result. **Cross Reference** Tx level - NCU parameter 01 (LEVL) Tx cable equalizer - BITSW8, bits 0 and 1
0-05	Training failure after falling back to 2400 bps.	• Check the line connection. • Check the NCU-FCU connection. • Try adjusting the tx level or the cable equalizer setting. **Cross Reference** See error code 0-04.
0-06	DCS not received.	• Check the line connection. • Check the NCU-FCU connection. • The other end may be defective or incompatible.
0-07	Post-message response not received.	• Check the line connection. • Check the NCU-FCU connection. • The other end may have disconnected the line due to paper jam, paper end, or memory overflow. • Check for bad line condition.
0-08	RTN or PIN is received.	• Check the line connection. • Check the NCU-FCU connection. • The other end may have disconnected the line due to paper jam, paper end, or memory overflow. • Try adjusting the tx level or the cable equalizer setting. **Cross Reference** See error code 0-04.

CODE	MEANING	ACTION
0-20	The machine could not receive at least 1 line after starting image data reception.	• Check the line condition. • Check the NCU-FCU connection. • Check for line problems. • The other end may be incompatible.
0-21	The machine could not receive the next line within 5 seconds.	• Check the line condition. • Check the NCU-FCU connection. • Check for line problems. • The other machine may have disconnected the line.
0-22	Carrier dropped for more than 200 ms.	• Check the line condition. • Check the NCU-FCU connection. • Check for line problems.
0-23	Too many errors during reception.	• Check the line condition. • Check the NCU-FCU connection. • Check for line problems. • Try adjusting the tx level or the cable equalizer setting. **Cross Reference** See error code 0-04.
1-00	Document jam.	• Check for any obstructions in the document feed path. • If the document is not the recommended type, use a photocopy. • Clean the ADF feed roller, separation roller, CIS roller and R2 roller. • If a jam is always detected at power on, the ADF sensor(s) may be defective. • If a jam happens at the edge of the CIS, check that the CIS surface is above the CIS frame surface. **Cross Reference** Section 6.3.2 - CIS and Paper End Sensor
1-01	Document length is more than the specified length (750 mm).	• Split the document into shorter pieces, or make photocopies and use it. • Clean the ADF feed roller, separation roller, CIS roller, and R2 roller. • The ADF sensor(s) may be defective.
1-20	Paper jam during printing.	• Check for any obstructions in the paper path. • Check if the paper is not the recommended type. • Clean the paper feed rollers and registration rollers.
1-33	No paper when turning on the machine.	• Add paper in the cassette. • If the problem is present with paper in the cassette, replace the paper end sensor or FCU.

CODE	MEANING	ACTION
1-34	No paper after printing is completed.	• Add paper. • If the problem is present after adding paper, replace the paper end sensor or FCU.
1-50	Print module error during reception.	• Reset the print module using the “RESET” key. • Turn off the machine and turn it back on. • If the problem still exists, check the flat cables connections from the printer engine to the FCU. • Replace the printer engine or FCU.
1-51	Print module error during copying.	• Reset the print module using the “RESET” key. • Turn off the machine and turn it back on. • If the problem still exists, check the flat cables connections from the printer engine to the FCU. • Replace the printer engine or FCU.
1-71	Top cover was open during printing.	• Close the top cover. • If the problem still exists, replace the OPU.
2-10	The modem can not enter the receiving condition.	• Turn off the machine and turn it back on. • If the problem still exists, replace the FCU.
2-12	The clock can not be generated while data is transmitted from the modem.	• Turn off the machine and turn it back on. • If the problem still exists, replace the FCU.
2-00	FCU over-run.	• Turn off the machine and turn it back on. • If the problem still exists, replace the FCU.
2-20	Compression cannot be started.	• Turn off the machine and turn it back on. • If the problem still exists, replace the FCU.
2-21	Memory overflow during reception.	• Erase files from the memory. • If the memory overflowed due to paper end, ink end, color ink installed, or printing from a host computer, fix the problem so that the machine can start printing. • Install optional memory if it is not installed.

Point-to-Point Diagram
Model: IF2

Issued on: March 31, 1997
Revision 1.0
Subject to change

Symbol Table	
———	AC Line
———	DC Line
——→	Signal Direction
▲	Active High
▼	Active Low
[ ]	Voltage

CN1 - Centronics Interface			
1	STROBE	19	COM1
2	DATA0	20	COM1
3	DATA1	21	COM1
4	DATA2	22	COM1
5	DATA3	23	COM1
6	DATA4	24	COM1
7	DATA5	25	COM1
8	DATA6	26	COM1
9	DATA7	27	COM1
10	ACK	28	COM1
11	BUSY	29	COM1
12	PE	30	COM1
13	SLCT	31	INIT
14	AUTOFEED	32	ERROR
15	Not used	33	Not used
16	COM1	34	Not used
17	Frame Ground	35	Not used
18	+5V	36	SLCTIN

CN3 - RS232C Interface (DB9)			
1	Not used	6	Not used
2	TXD	7	CTS
3	RXD	8	RTS
4	Not used	9	Not used
5	COM2