# LSO

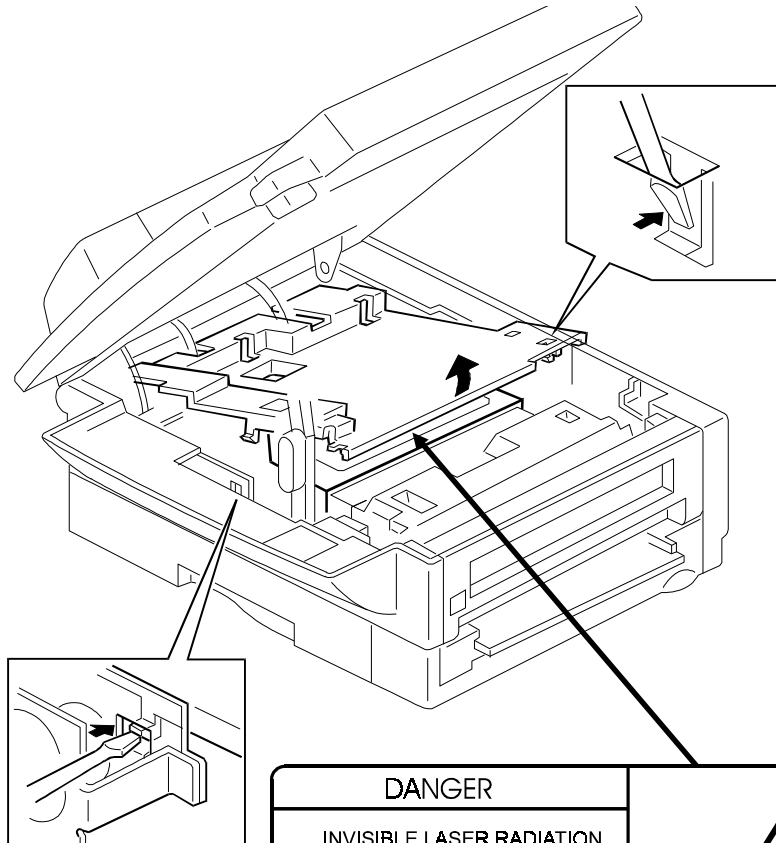# RICOH MV310

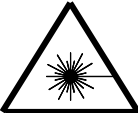# SERVICE MANUAL

## ⚠ WARNING

**THIS MACHINE CONTAINS A LASER BEAM GENERATOR. LASER BEAMS CAN CAUSE PERMANENT EYE DAMAGE. DO NOT OPEN THE LASER UNIT OR LOOK ALONG THE LASER BEAM PATH WHILE THE MAIN POWER IS ON.**



**DANGER**

INVISIBLE LASER RADIATION WHEN OPEN AVOID DIRECT EXPOSURE TO BEAM

**CAUTION**

INVISIBLE LASER RADIATION WHEN OPEN AVOID EXPOSURE TO BEAM

**VORSICHT**

UNSICHTBARE LASERSTRAHLUNG, WENN ABDECKUNG GEÖFFNET NICHT DEM STRAHL AUSSETZEN

## Lithium Batteries (Memory Back-up)

## ⚠ 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.**

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# 6. TROUBLESHOOTING

# 1. OVERALL MACHINE INFORMATION

## 1.1. SPECIFICATIONS

**Type**
Desktop transceiver

**Circuit**
PSTN, PABX

**Connection**
Direct couple

**Book Scanner**
  **Document Size:**
        Smaller than 257 x 364 mm
               [10.1 x 14.3 ins]
  **Thickness:**    Less than 30 mm
  **Weight:**      Less than 5 kg

**ADF**
  **Document Size**
  **Length:**      105 - 364 mm
               [4.1 - 16.5 ins]
               Up to 1200 mm [47.2 ins],
               manually assisted
  **Width:**       148 - 257 mm
               [5.8 - 10.1 ins]
  **Thickness:**    0.05 to 0.2 mm  [2 to 8 mils]
               (equivalent to 50 - 90 g/m$^2$)
               0.04 to 0.4 mm [1.6 to 16 mils],
               manually assisted
               (equivalent to 40 - 120 g/m$^2$)

  **Document Feed**
          Automatic feed, face up

  **ADF Capacity**
          30 sheets (using 20 lb paper)

**Scanning Method**
Contact image sensor, with xenon lamp

**Maximum Scan Width**
256 mm [10.1 ins] ± 0.25%

**Scan Resolution**
 **Fax mode**
  Standard: 8 x 3.85 lines/mm [203 x 98 dpi]
  Detail: 8 x 7.7 lines/mm [203 x 196 dpi]
  Fine: 8 x 15.4 lines/mm [203 x 392 dpi]
 **Copy mode:**
  16 x 15.4 lines/mm [406 x 392 dpi]

**Memory Capacity**
**ECM:** 64 or 128 kB; single or double buffer
**SAF:** 576 kB (45 pages/A4)

**Protocol**
Group 3 with ECM

**Compression**
MH, MR, EFC, MMR, SSC (MMR only with ECM)
Storage to SAF memory for tx: MMR and/or raw data

**Modulation**
V.29 (QAM), V.27ter (PHM), V.21 (FM)

**Data Rate (bps)**
9600/7200/4800/2400, Automatic fallback

**I/O Rate**
With ECM: 0 ms/line
Without ECM: 2.5, 5, 10, 20, or 40 ms/line

**Transmission Time**
9 s at 9600 bps; Measured with G3 ECM using memory for a CCITT #1 test document (Slerexe letter) using standard resolution

**Printing System**
Laser printing, plain paper, dry toner

**Printing Time**
10 ppm for A4 size paper

**Paper Size**
 **Standard Cassette:**
  USA: Half-Letter, Letter, Legal
  Europe/Asia: A4, A5, B5, F, F4
 **Optional 100 Sheet Cassette:**
  USA: Half-letter, Letter, Legal
  Europe/Asia: A4, A5, B5 lengthwise, F/F4

**Paper Capacity**
 **Standard Cassette:** - 250 sheets
 **Optional 100 Sheet Cassette:**
               - 100 sheets
 **Bypass Feeder:** - 1 page

**Maximum Printing Width**
248 mm [9.8 ins]

**Printer Resolution**
 **Fax/Copy Mode:** 16 x 15.4 lines/mm
              [406 x 392 dpi]
 **Printer Mode:** 300 x 300 dpi

**Power Supply**
**USA:**        115 ± 20 Vac, 60 ± 1 Hz
**Europe/Asia:** 220 Vac +20/-10%, 50 ± 1 Hz

**Power Consumption**
**Standby:** Minimum 2 W, Normal 70 W
**Transmitting:** 35 W
**Receiving:** 200 W
**Copying:** Normal 300 W, Maximum 800 W

**Operating Environment**
**Temperature:** 17 - 28 °C [63 - 82 °F]
**Humidity:** 40 - 70 %Rh

**Dimensions (W x D x H)**
555 x 555 x 342 mm [21.9 x 21.9 x 13.5 ins]
Excluding handset, trays, and optional units

**Weight**
30 kg [66 lbs]
Excluding handset, trays, and optional units

## 1.2. FEATURES

**KEY:** O = Used, X = Not Used
A = With optional 100 sheet cassette only
B = With optional counter only
C = With optional handset only
D = With printer interface only

| Equipment | |
|---|---|
| ADF | O |
| Book scanner | O |
| Built-in handset | X |
| Bypass feed: 1 sheet | O |
| Optional cassette: 100 sheets | A |
| Cabinet | X |
| Counter | B |
| Cutter | X |
| Handset | C |
| Hard disk | X |
| Manual feed mechanism | X |
| Marker (Stamp) | O |
| Monitor speaker | O |
| Printer interface option | D |

| Video Processing Features | |
|---|---|
| Contrast | O |
| Auto image density control | O |
| Halftone (Basic & Error Diffusion) | O |
| MTF | O |
| Reduction (Fax) | O |
| Resolution | O |
| Smoothing to 16 x 15.4 l/mm (Fax) | O |

| Communication Features - Auto | |
|---|---|
| Automatic fallback | O |
| Automatic redialing | O |
| Confidential reception | X |
| Dual Access | O |
| Substitute reception | O |

| Communication Features - User Selectable | |
|---|---|
| Action as a transfer broadcaster | X |
| AI Redial (last ten numbers) | X |
| Answering machine interface | X |
| Authorized Reception | O |
| Auto-answer delay time | X |

| Communication Features - User Selectable | |
|---|---|
| Auto dialing (pulse or DTMF) | O |
| Auto Document | X |
| Auto image density selection | O |
| Automatic Voice Message | X |
| Batch Transmission | X |
| Broadcasting | O |
| Chain Dialing | X |
| Communication Result Display | X |
| Confidential ID Override | X |
| Confidential Transmission | X |
| Direct Fax Number Entry | O |
| Economy Transmission | X |
| Fax on demand | X |
| Forwarding | X |
| Free Polling | X |
| Groups (3 groups) | O |
| Group Transfer Station | X |
| Hold | X |
| ID Transmission Option | X |
| Immediate Redialing | O |
| Immediate transmission | O |
| Keystroke Programs | X |
| Memory transmission | O |
| Multi-step Transfer | X |
| Next Transfer Station | X |
| OMR | X |
| On Hook Dial | O |
| Ordering Toner | X |
| Page Count | O |
| Personal Codes | X |
| Personal Codes with Conf. ID | X |
| Polling Reception | O |
| Polling Transmission | X |
| Polling tx file lifetime in the SAF | X |
| Quick Dial (20 stations) | O |
| Reception modes (Fax, Tel, ~~Auto~~) | O |
| Reduction | O |
| Remote control features | X |
| Remote Transfer | X |
| Restricted Access | X |
| Secured Polling | X |
| Secured Polling with Stored ID Override | X |
| Secure Transmission | X |
| Send Later | O |

| Communication Features - User Selectable | |
|---|---|
| Silent ringing detection | X |
| Specified Image Area | X |
| Speed Dial (50 stations) | O |
| Super Fine Resolution (16 x15.4 l/mm : 400 x 400 dpi) | X |
| Telephone Directory | X |
| Tonal Signal Transmission | O |
| Transfer Request | X |
| Transmission Deadline (TRD) | X |
| Turnaround Polling | X |
| Two-step Transfer | X |
| Two in one | X |
| Voice Request (immed. tx only) | X |

| Communication Features - Service Selectable | |
|---|---|
| AI Short Protocol | O |
| Auto-reduction override option | O |
| Busy tone detection | O |
| Closed Network (tx and rx) | X |
| Continuous Polling Reception | X |
| Dedicated tx parameters | O |
| ECM | O |
| EFC | O |
| Inch-mm conversion | X |
| Page retransmission | O |
| Page separation mark | O |
| Protection against wrong conn. | O |
| Resol'n stepdown override option | X |
| Short Preamble | X |
| Well log | O |

| Copier Features | |
|---|---|
| Auto Image Density | O |
| Auto Paper Select (Book mode) | O |
| Reduction/Enlargement | O |
| Erase center/border | O |
| Distribution number printing | O |
| Center marks | O |

| Other User Features | |
|---|---|
| Area Code Prefix | X |
| Auto Service Call | O |
| Center mark | O |
| Checkered mark | X |

| Other User Features | |
|---|---|
| Clearing a memory file | O |
| Clearing a polling file | O |
| Clock | O |
| Confidential ID | X |
| Copy mode | O |
| Copy Mode Restriction | X |
| Counters | O |
| Daylight Saving Time **(USA only)** | O |
| Destination Check | X |
| Direct entry of names | O |
| File Retention Time | X |
| File Retransmission | O |
| Function Programs | X |
| ID Code | X |
| Label Insertion ("From xxx") | X |
| Language Selection | O |
| LCD contrast control | Service |
| Memory Lock | X |
| Memory Lock ID | X |
| Modifying a memory file | X |
| Multi Sort Document Reception | X |
| Multicopy mode (up to 99) | O |
| Own telephone number | X |
| Power Saver (Night Timer and standby mode) | O |
| Print density control | O |
| Printing a memory file | O |
| RDS on/off | O |
| Reception Mode Switching Timer | X |
| Reception time printing | X |
| Remaining memory indicator | O |
| Remote ID | X |
| Reverse Order Printing | X |
| RTI, TTI, CSI | O |
| Secure ID | X |
| Service Report Transmission | O |
| Speaker volume control | O |
| Specified Cassette Selection | X |
| Substitute reception on/off | O |
| Telephone line type | O |
| Toner saving mode | O |
| TTI on/off | O |
| User Function Keys | X |
| User Parameters | O |
| Wild Cards | O |

| Reports - Automatic | |
|---|---|
| Charge Control Report | X |
| Communication Failure Report | O |
| Confidential File Report | X |
| Error Report | O |
| Memory Storage Report | O |
| Mode Change Report | X |
| Polling Clear Report | X |
| Polling Reserve Report | O |
| Polling Result Report | O |
| Power Failure Report | O |
| TCR | O |
| Toner Cassette Order Form | X |
| Transfer Result Report | X |
| Transmission Result Report | O |

| Reports - User-initiated | |
|---|---|
| Authorized Reception List | O |
| Charge Control Report | X |
| File List | O |
| Forwarding List | X |
| Group List | O |
| Personal Code List | X |
| Program List | X |
| Quick Dial List | O |
| Specified Cassette Selection List | X |
| Speed Dial List | O |
| TCR | O |
| Transmission Status Report | X |
| User Function List | X |
| User Parameter List | O |

| Service Mode Features | |
|---|---|
| Auto Paper Select Test | O |
| Back-to-back test | O |
| Bit switch programming | O |
| Book Test | O |
| Buzzer test | O |
| Cable equalizer | O |
| Comm. parameter display | O |
| Counter check | O |
| Country code | O |
| DTMF tone test | O |
| Echo countermeasure | O |
| Effective term of service calls | O |
| Error code display | O |
| Excessive jam alarm | O |

| Service Mode Features | |
|---|---|
| File Transfer | O |
| Hex Dump List | E |
| LCD contrast adjustment | O |
| Line error mark | O |
| Memory file printout (all files) | O |
| Modem test | O |
| NCU parameters | O |
| Operation panel test | O |
| Periodic service call | O |
| PM Call | O |
| Printer mechanism test | X |
| Printer test patterns | O |
| Programmable attenuation | X |
| Protocol dump list | O |
| RAM display/rewrite | O |
| RAM dump | O |
| RAM test | O |
| Ringer test | X |
| Scanner lamp test | O |
| Scanner mechanism test | O |
| Sensor initialization | X |
| Serial number | O |
| Service monitor report | O |
| Service station number | O |
| Software upload/download | O |
| SRAM data download | O |
| Status Sheet | D |
| System parameter list | O |
| Technical data on the TCR | O |
| Thermal head parameters | X |
| Transmission Status Report | X |
| User data transfer | O |

## Memory Files

Max. number of files: 100
Max. number of stations/file: 100
Max. number of stations overall: 200
Max. number of pages overall: 150

## 1.3. COMPONENT LAYOUT

### 1.3.1. Mechanical Components
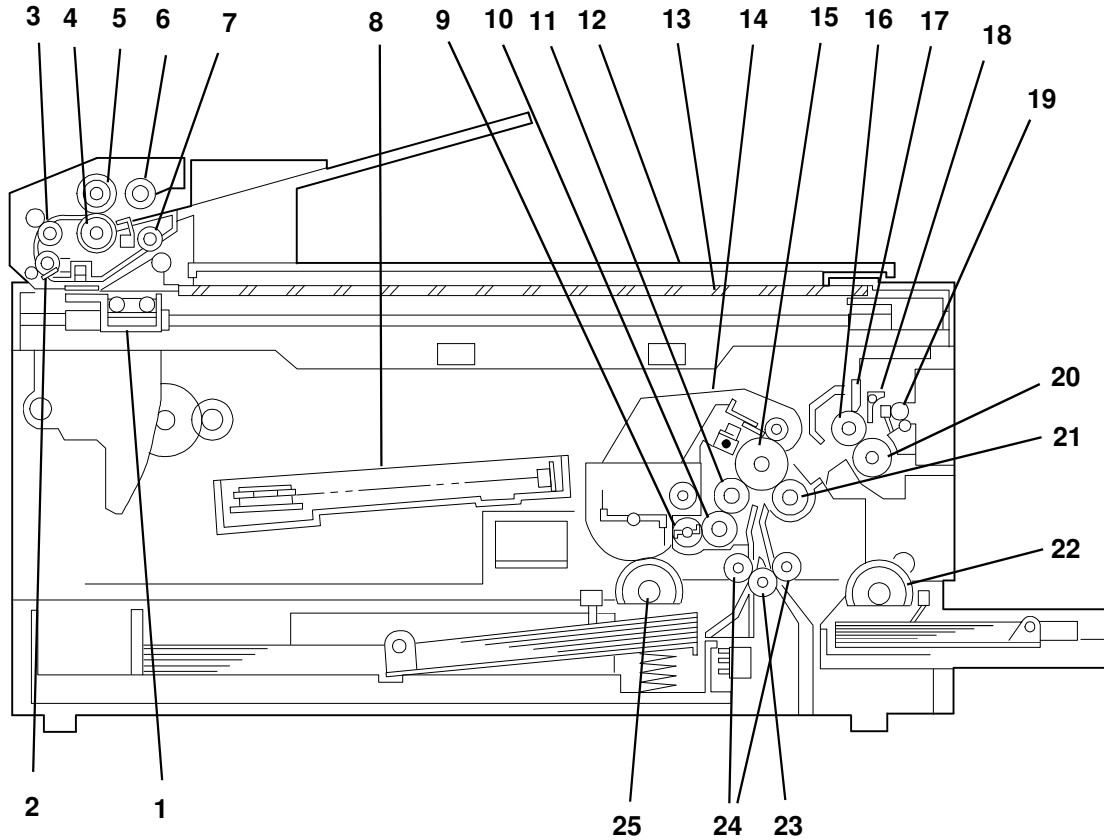


H521V501.wmf

| No. | Name | Description |
|-----|------|-------------|
| 1 | Scanner | Contains a contact image sensor and a xenon lamp driver. |
| 2 | R1 Roller | Feeds the document through the scanner. |
| 3 | R0 Roller | Feeds the document into the scanner. |
| 4 | Separation roller | Prevents more than one sheet from feeding into the scanner. |
| 5 | Document Feed Roller | Feeds the document into the scanner. |
| 6 | Pick-up Roller | Picks up pages of the document from the document table one at a time. |
| 7 | R2 Roller | Feeds the document through the scanner. |
| 8 | Laser Unit | This consists of the LDDR (Laser Diode Driver), Focusing lens, Fθ Lenses, Hexagonal mirror motor, and other laser optic components. |

| No. | Name | Description |
|---|---|---|
| 9 | Toner Supply Bar | This stirs up and transfers toner to the toner application roller. |
| 10 | Toner Application Roller | This roller transfers toner to the development roller. |
| 11 | Development Roller | This roller applies toner to the latent image on the drum. |
| 12 | Platen Cover | This covers the original which was placed on the exposure glass. |
| 13 | Exposure Glass | Book scanner reads the original on it. |
| 14 | CTM (Cleaning Toner Magazine) | This consists of the toner cartridge, cleaning unit, used toner tank, charge corona unit, and quenching lamp. |
| 15 | OPC Drum | The latent image is written to this Organic Photoconductor Drum. |
| 16 | Hot Roller | Heat from this roller fuses the toner to the copy paper. |
| 17 | Cleaning Pad | This cleans up and spreads silicone oil on the surface of the hot roller. |
| 18 | Hot Roller Strippers | These take the paper off the hot roller after fusing. |
| 19 | Paper Feed-out Rollers | These feed the paper out of the printer. |
| 20 | Fusing Pressure Roller | This applies pressure to the paper during fusing. |
| 21 | Transfer Roller | This applies a charge to the paper to pull the toner off the drum and onto the copy paper. |
| 22 | Paper Feed Rollers (100 Sheet Cassette) | These pick up the top sheet of paper from the stack in the optional 100 sheet cassette and feed it into the printer. |
| 23 | Registration Roller | This carries out the registration process. |
| 24 | Paper Feed Pressure Rollers | These feed paper from the cassette or bypass feed slot into the printer. |
| 25 | Paper Feed Rollers | These pick up the top sheet of paper from the stack in the cassette and feed it into the printer. |

## 1.3.2. Electrical Components
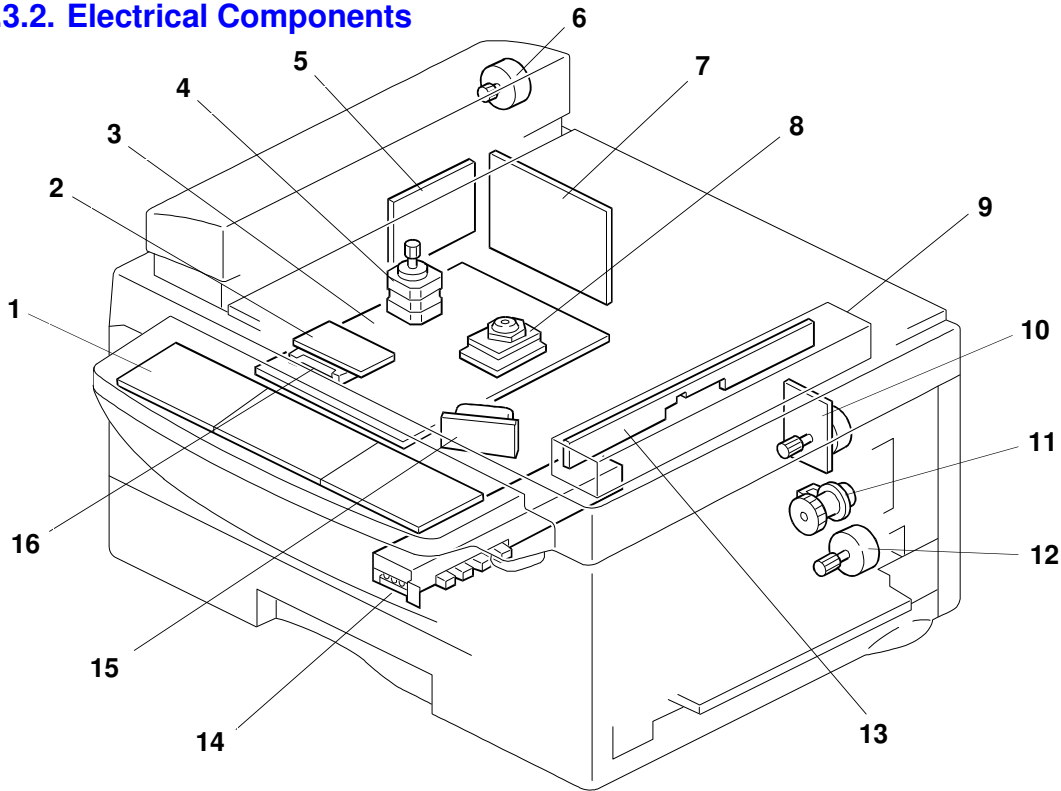


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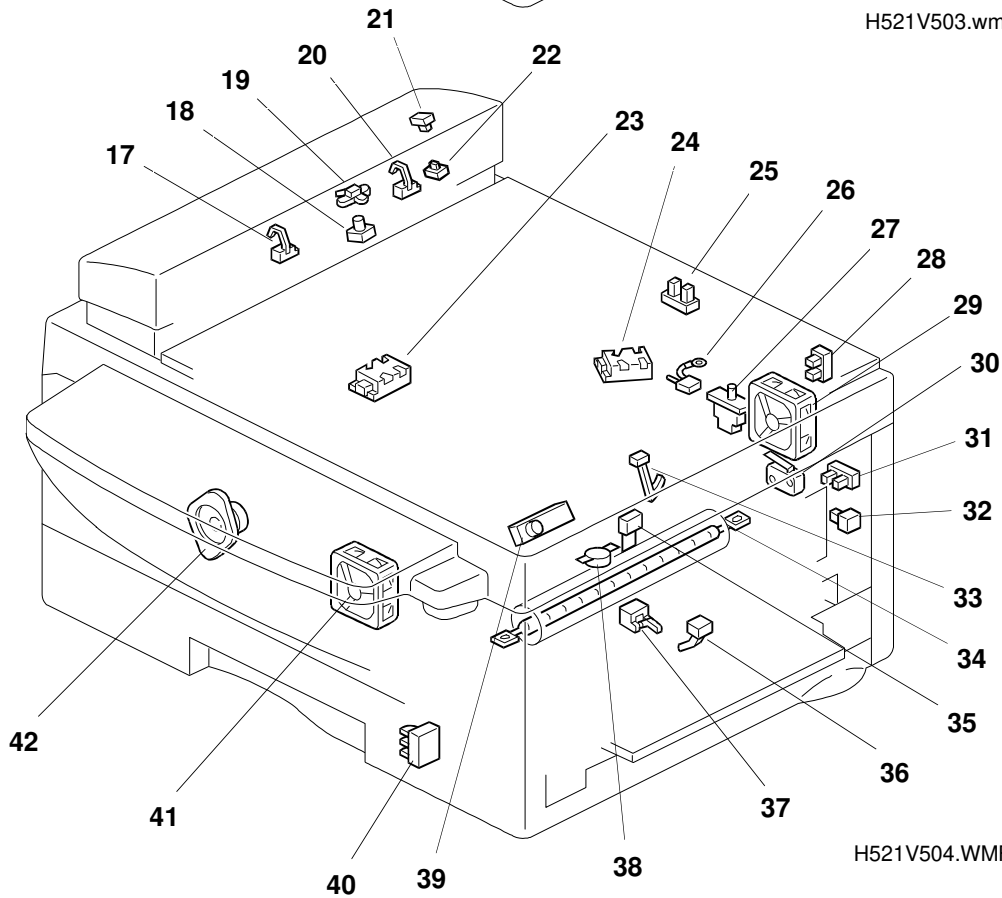


H521V504.WMF

## 1. PCBs

| No. | Name | Description |
|---|---|---|
| 3 | FDU (Facsimile Driver Unit) | This board contains drivers for the motors, a dc-dc converter, the energy saving mode cpu, and other drive electronics. |
| 2 | FCE (Facsimile Control Engine) | This board controls the machine. It contains the main cpu, flash ROM, system RAM, and so on. |
| 5 | NCU (Network Control Unit) | This board contains a relay and switches for interfacing the machine to the network and the handset. |
| 1 | OPU (Operation Panel Unit) | This board controls the operation panel. |
| 7 | PSU (Power Supply Unit) | This board supplies power to the machine, and switches the fusing lamp on/off. |
| 15 | LDDR (Laser Diode Driver) | This board drives the laser diode. |
| 14 | Power Pack | This supplies high voltages to the corona wire, transfer roller, and development bias terminal. |
| 9 | Contact Image Sensor and Xenon Lamp | This sensor reads and converts the light reflected from the document into an analog video signal. It uses an RMLA (Roof Mirror Lens Array) sensor unit.<br>The xenon lamp which illuminates the document is contained in this unit. |
| 16 | IC Card | This contains a DRAM which is used as page memory for 400 x 400 dpi printing of incoming B4 faxes. |

## 2. Motors and Clutches

| No. | Name | Description |
|---|---|---|
| 6 | ADF Motor | This stepper motor drives the scanner. |
| 10 | Main Motor | This brushless dc motor drives the drum, fusing unit, development unit, and CTM. |
| 12 | Paper Feed Motor | This stepper motor drives the registration roller and the paper feed mechanisms in the cassettes. |
| 8 | Hexagonal Mirror Motor | This high-speed dc motor drives the hexagonal mirror in the laser printer optics. |
| 41 | Ozone Fan Motor | This removes ozone-laden air from the vicinity of the drum, and filters out the ozone. |
| 29 | Cooling Fan Motor | This cools the interior of the machine. |
| 4 | Scanner Motor | This stepper motor drives the book scanner. |
| 11 | Paper Feed Clutch | This transfers main motor drive to the cassette and bypass tray paper feed mechanisms. |

## 3. Sensors

| No. | Name | Description |
| --- | --- | --- |
| 17 | Document Sensor | This detects the presence of a document in the feeder. |
| 19 | Scan Line Sensor | This detects when a page is approaching the auto shading position. |
| 20 | Document Width Sensor | This detects when a B4 width [10.1"] document has been placed in the feeder. |
| 39 | Toner End Sensor | This detects when the toner has run out. |
| 40 | Paper Size Detector | This detects the paper size installed in the cassette. The user must install the correct actuator. |
| 33 | Paper End Sensor | This detects when the paper in the cassette has run out. |
| 37 | Registration Sensor | This detects when paper has reached the registration roller. |
| 31 | Paper Feed-out Sensor | This detects when the paper has been fed out of the printer. |
| 32 | Paper Exit Cover Switch | This detects whether the paper feed-out cover is open or closed. |
| 36 | Bypass Feed Sensor | This detects when a sheet of paper has been inserted into the bypass feed slot. Then the registration roller feeds the paper a short distance into the machine to prepare for printing, and stops. |
| 21 | ADF Cover Switch | This detects whether the ADF cover is open or closed. |
| 28 | Scanner Home Position Sensor | This detects when the image sensor is at home position. |
| 23 24 | Paper Size Sensors | These detect the size of the paper which was placed on the exposure glass. |
| 25 | Platen Cover Sensor | This detects whether the platen cover is open or closed. |
| 22 | ADF Switch | This detects whether the ADF unit is open or closed. |

## 4. Interlock Switches

| No. | Name | Description |
| --- | --- | --- |
| 27 30 | Fusing Unit Cover Interlock Switches | If the fusing unit cover and/or top cover are open, these interlock switches interrupt the +5VLD power supply for the laser diode and the +24VD power supply for the power pack, motors, and other components. |

## 5. Others

| No. | Name | Description |
|---|---|---|
| 18 | Stamper Ass'y | This stamps a red circle on each page that is successfully fed through the scanner. |
| 38 | Thermostat | This interrupts the ac power supply to the fusing lamp if the temperature of the thermostat surface exceeds 400°C. |
| 35 | Thermistor | This monitors the temperature inside the fusing unit. |
| 34 | Fusing Lamp | This fuses the toner to the paper. |
| 42 | Monitor Speaker | This allows the user to listen to the condition of the telephone line. |
| 26 | Zener Diode | This ensures that the charge given to the drum by the charge corona wire does not exceed -750 volts. |
| 13 | Lamp Stabilizer | This supplies power to the xenon lamp. |

## 6. Options



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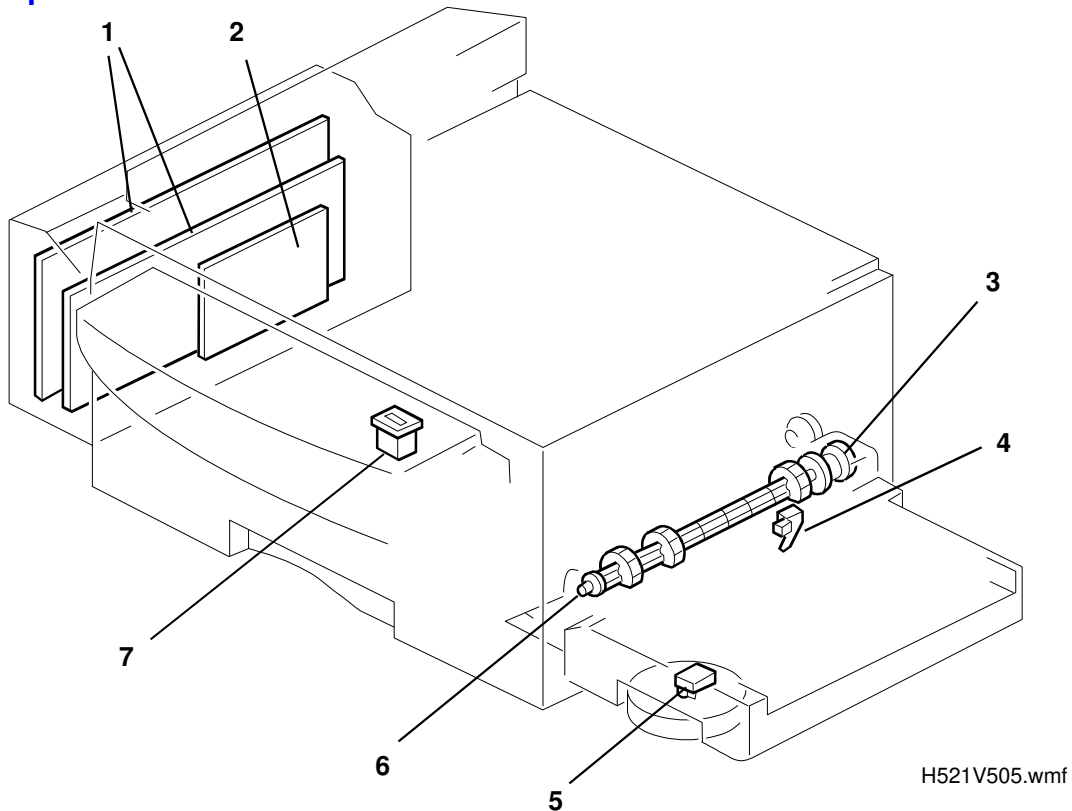
| No. | Name | Description |
|---|---|---|
| 1 | Printer Interface | This allows the machine to be connected to a computer as a laser printer. |
| 2 | RS232C Interface Board* | This allows the machine to be connected to a computer as an external fax device for example. |
| 3 | Paper Feed Clutch (100 Sheet Cassette) | This transfers motor drive to the mechanisms in the 100 sheet cassette. |
| 4 | Paper End Sensor (100 Sheet Cassette) | This detects when the paper in the optional 100 sheet cassette has run out. |
| 5 | Paper Size Detector (100 Sheet Cassette) | This detects the paper size installed in the optional 100 sheet cassette. |
| 6 | Paper Feed Roller (100 Sheet Cassette) | This feeds paper from the 100 sheet cassette into the machine. |
| 7 | Counter | This counts the number of prints. |
| 8 | 100 Sheet Cassette | This increases the paper capacity of the machine, and allows the machine to have more than one paper size available at the same time. |

* This option may not be available in some countries.

# 1.4. OVERALL MACHINE CONTROL



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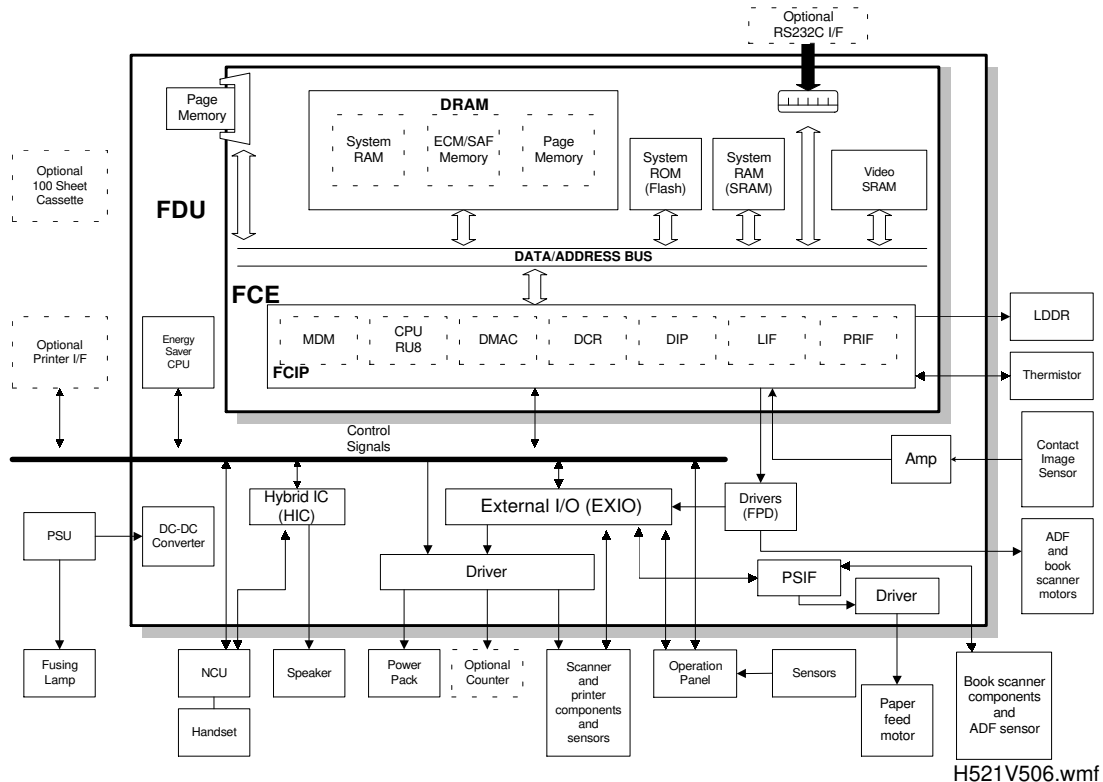
The FCE (Facsimile Control Engine) board contains the FCIP (Facsimile Control and Image Processor), DRAM, SRAM, System ROM, and video processing memory, and it controls the entire system through the FDU (Facsimile Driver Unit) board.

There are two cpus in the machine: the main cpu (FCIP) on the FCE board and the energy saver cpu on the FDU board. In energy saver mode, the main CPU switches off and the energy saver CPU takes over.

The FCIP consists of the following component blocks:
- RU8 CPU - Main CPU
- LIF- Laser Interface
- PRIF - Printer Interface
- DCR - Data Compression and Reconstruction
- MDM - Modem
- DMAC - DMA Controller
- DIP - Digital Image Processor

The 4 MB DRAM contains the SAF memory, ECM buffer memory, work area, and page memory. For B4 size copies at 16 x 15.4 dot/mm resolution, a page memory IC card is installed. A rechargeable battery backs up the DRAM for one hour.

The system ROM uses a 512 KB (4 Mbits) flash ROM. Software in this ROM can be rewritten from the IC card slot or by RDS.

## 1.5. VIDEO DATA PATH

### 1.5.1. Transmission



DIP: Digital Image Processor
DCR: Data Compression and Reduction
MDM: Modem

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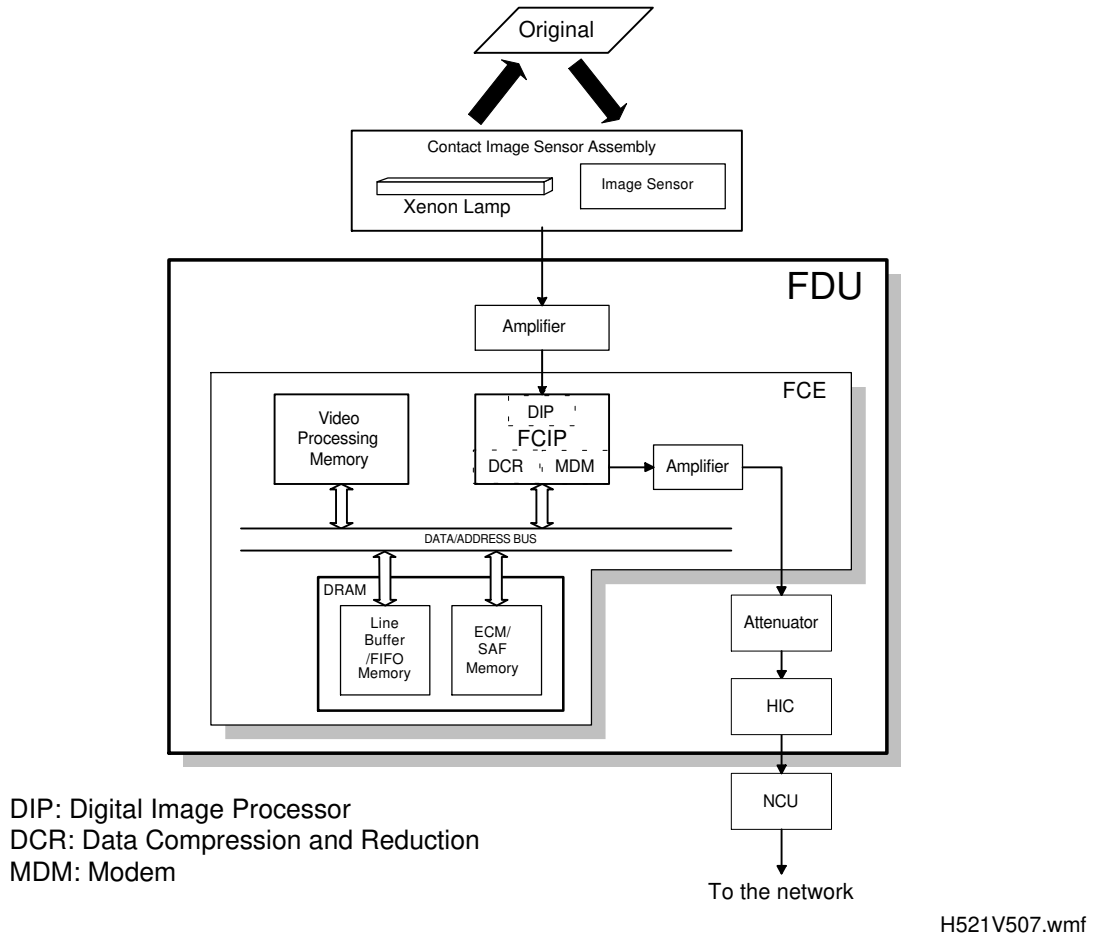
**Immediate Transmission:**
Scanned data form the contact image sensor passes to the DIP block in the
FCIP. After analog/digital video processing, the DCR block compresses the
data for transmission. The compressed data then passes either to the FIFO
memory or to the ECM memory, before it is sent to the telephone line through
the modem.

**Memory Transmission:**
First, the scanned data is stored in the SAF memory after compression in the
DCR block.
At the time for transmission, the DCR block decompresses the data from the
SAF memory, then compresses it again after handshaking with the other ter-
minal is done. The compressed data then passes either to the FIFO memory
or to the ECM memory, before it is sent to the telephone line through the mo-
dem.

## 1.5.2. Reception



MDM: Modem
DCR: Data Compression and Reduction
LIF: Laser Interface
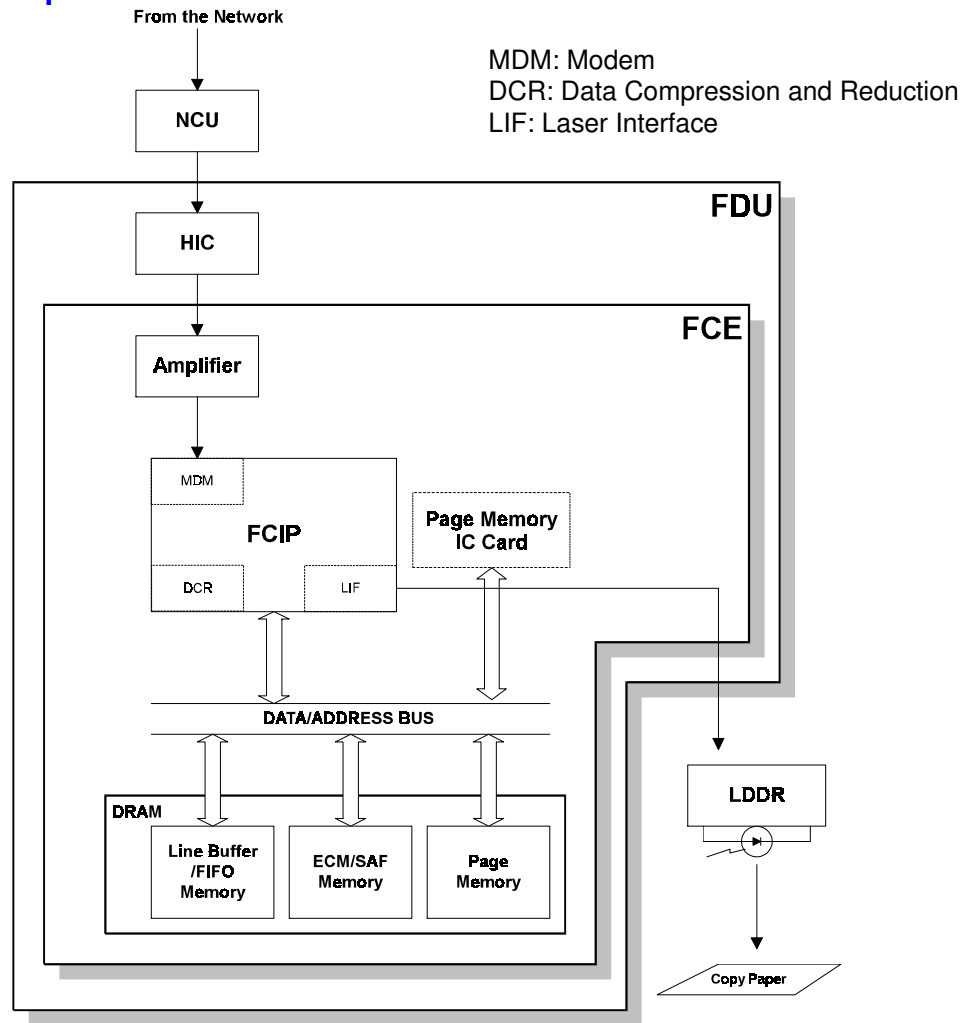
H521V508.wmf

Data from the line passes to the modem through the NCU and hybrid IC. After the modem demodulates the data, the data passes to the DCR block, through either the FIFO or the ECM memory, where the data is decompressed to raster image data. At the same time, the compressed data passes to the SAF memory as a backup in case of mechanical problems during printing (substitute reception).

The raster image data is then passed to the page memory for printing. After a page of data has been stored in the page memory, the data is sent to the LDDR through the LIF block.

### 1.5.3. Copying



DIP: Digital Image Processor
DCR: Data Compression and Reduction
LIF: Laser Interface

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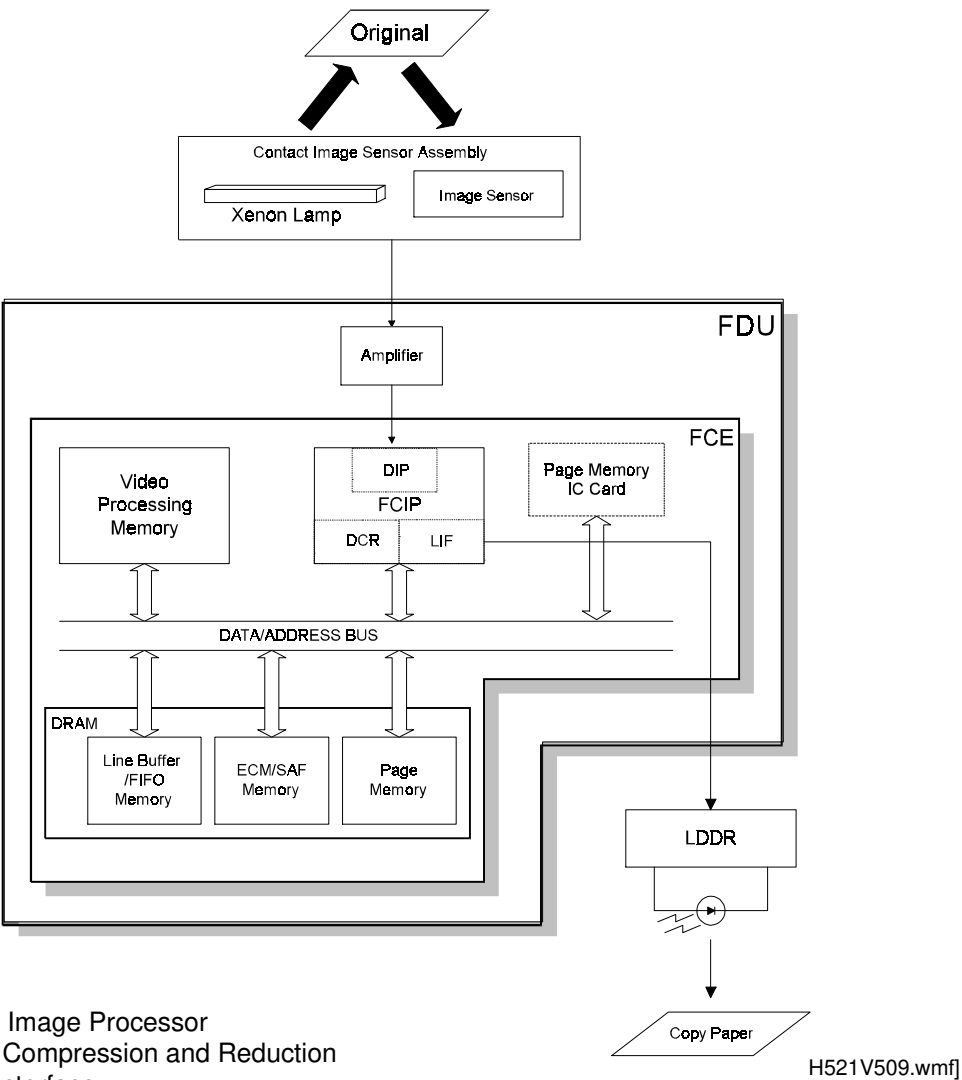
The scanned data passes to the page memory after video processing in the DIP block. After a page of data has been stored in the page memory, the data is sent to the LDDR through the LIF block.

**Reproduction/Enlargement Ratios**

The following reproduction ratios are available:

| Reduction | 50% | 65% | 71% | 74% | 77% | 82% | 87% | 93% |
|---|---|---|---|---|---|---|---|---|
| US | Yes | Yes | No | Yes | Yes | No | No | Yes |
| Europe/Asia | Yes | No | Yes | No | No | Yes | Yes | Yes |
| Enlargement | 115% | 121% | 122% | 129% | 141% | 155% | 200% | |
| US | No | Yes | No | Yes | No | Yes | Yes | |
| Europe/Asia | Yes | No | Yes | No | Yes | No | Yes | |

## Reduction and Enlargement

The reduction/enlargement process is done in two steps, one at the scanner, and the other at the printer.

At the scanner, the machine changes the motor speed to get a reduced/enlarged image in the sub-scan direction. For example, the machine doubles the motor speed to get 50% reduction (halving the number of scan lines), and slows the motor speed down by half to get 200% enlargement (doubling the number of scan lines). The scanner always scans the full B4 (216 mm) width in the main scan direction. The scanned data is then stored in the page memory for printing.

At the printer, the machine deletes certain specified bits from each line to reduce the printing image in the main-scan direction. For example, every other bit is deleted to get a 50% reduced image.
Also, the machine changes the laser pulse width for each pixel to enlarge the printing image in the main-scan direction. For example, the machine doubles the pulse width to get a 200% enlarged image.

H521V513.wmf

**Full Size**

H521V514.wmf

**50% Reduction**

H521V515.wmf

**200% Enlargement**
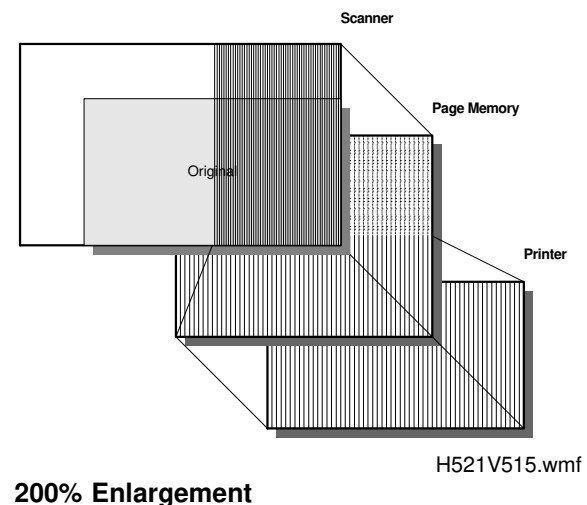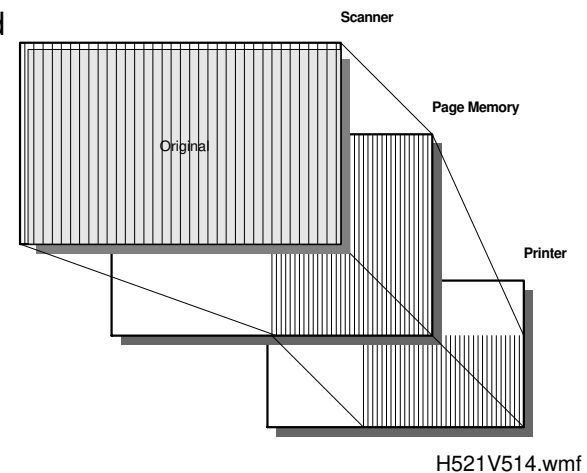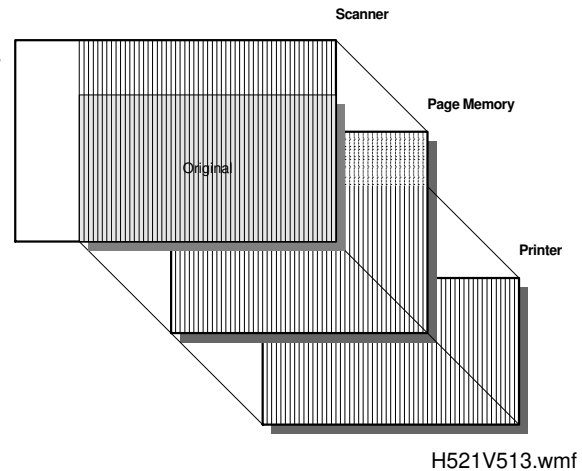
## 1.5.4. Printing using the Optional Printer Interface

PRIF: Printer Interface
LIF: Laser Interface



H521v512.wmf
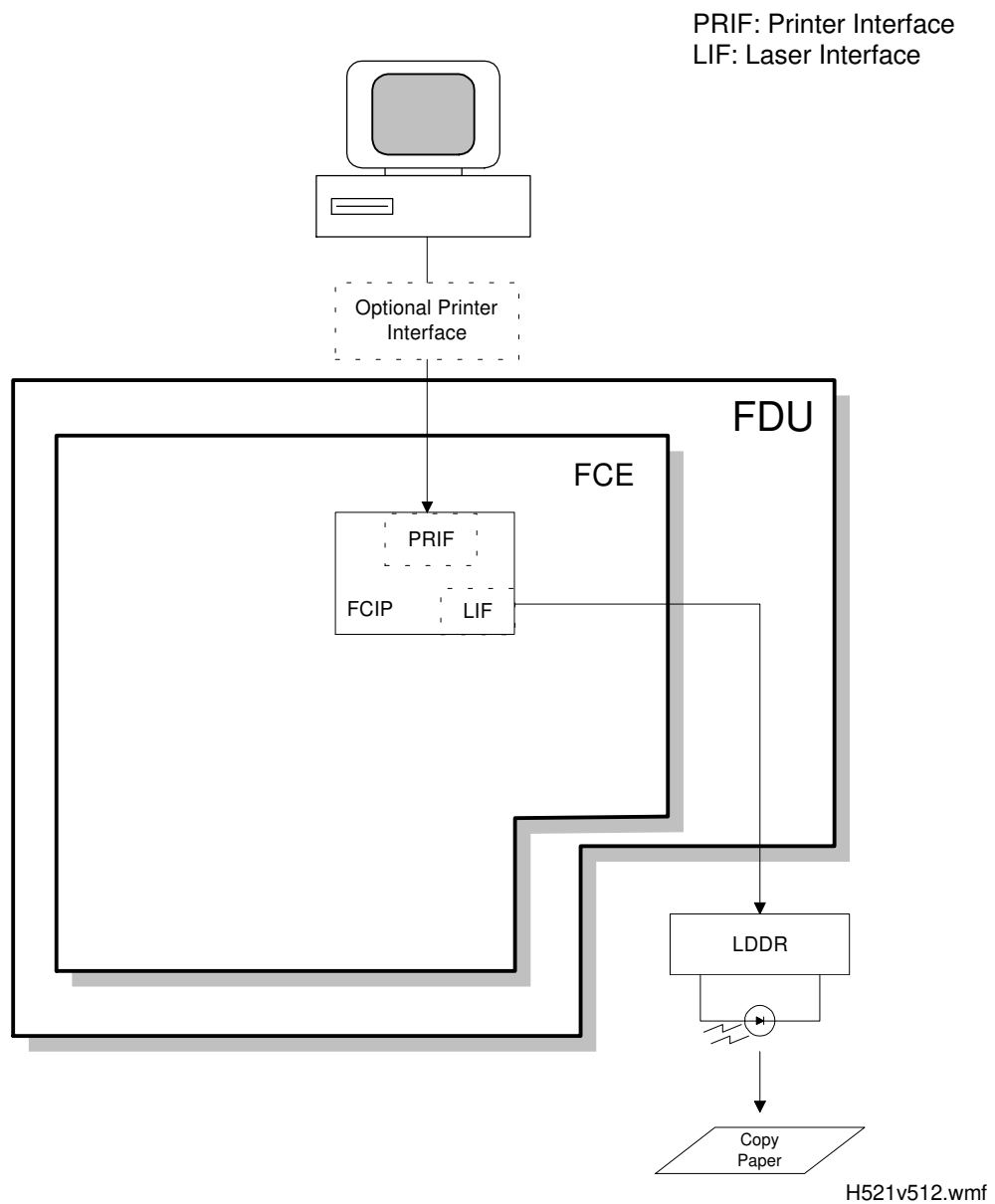
After a page of data has been stored in the printer interface's page memory, the data is sent directly to the LIF through the PRIF (Printer Interface) block.

# 1.6. POWER DISTRIBUTION

## 1.6.1. Distribution Diagram
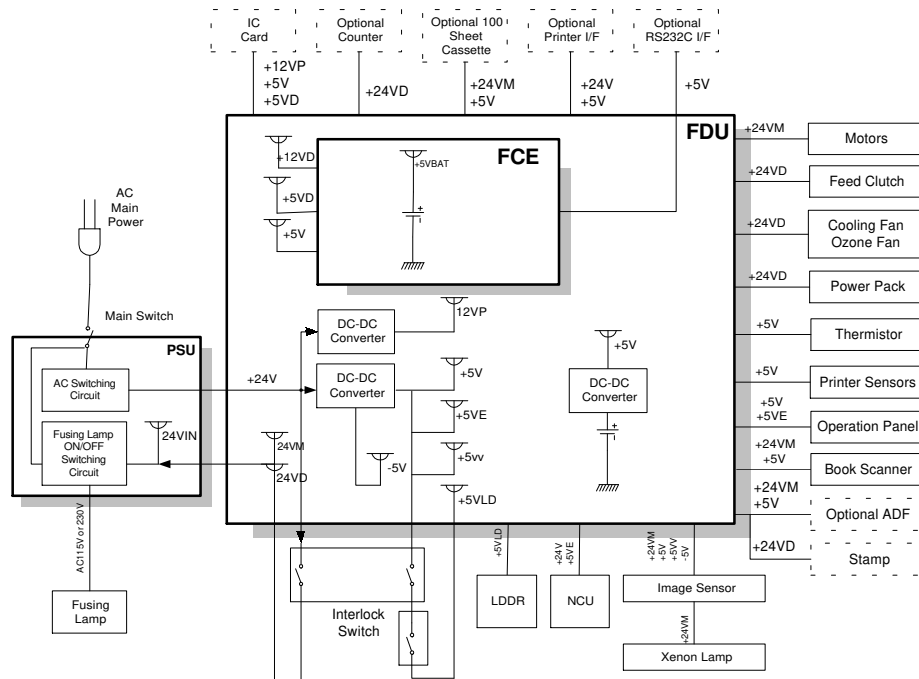


H521V510.wmf

The PSU supplies +24V dc power to the FDU. The FDU converts the +24V dc power supply to the following supplies.

| +5V | This is normally on when the main switch is on. |
|---|---|
| +5VE | This is used for watching the activation signal when the machine is in energy saving mode. |
| +5VLD | This supplies the laser diode. It is interrupted if the fusing unit cover interlock switch opens. |
| +5VV | This is a more stable power supply than +5V. It is used for the image sensor. |
| +5VD | This supplies the DRAM and the page memory card on the FCE to back up the stored data for one hour, if the power is switched off and some data is stored in them. A rechargeable lithium battery is used to generate +5VD. |
| +5VBAT | This supplies the system RAM on the FCE to back up the programmed data, if the power is switched off. A lithium battery is used to generate +5VBAT. |
| +24V | This is normally on when the main switch is on. |
| +24VD | This is interrupted if the fusing unit cover interlock switch opens. |
| +24VIN | This supplies +24V to the fusing unit on/off switching circuit. It is interrupted if the fusing unit cover interlock switch opens. |
| +24VM | This is interrupted if the machine enters energy saving mode. |
| -5V | This is used for the image sensor. |
| +12VP | This is used for the page memory card. |

## 1.6.2. Memory Back-up Circuit
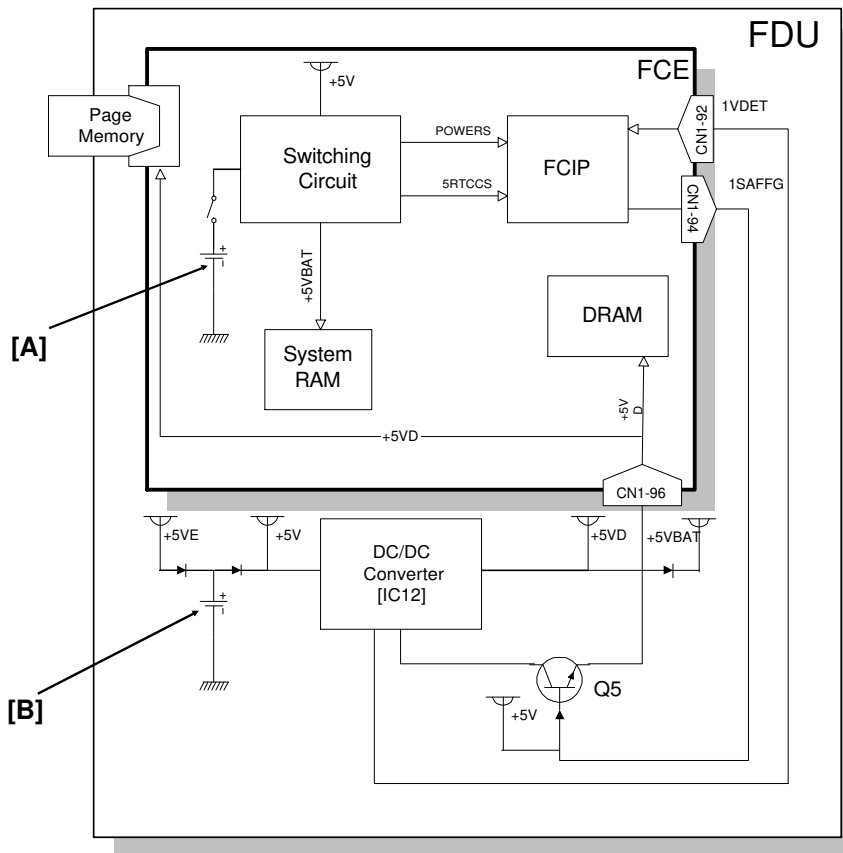


H521V511.wmf

The +5VBAT supply from the lithium battery [A] backs up the system RAM which contains system parameters and programmed telephone numbers, and the real time clock in the main cpu. The 5RTCCS signal tells the main cpu whether the back-up power (+5VBAT) is coming from the battery or from the +5V power supply.

A rechargeable lithium battery [B] and the dc/dc converter on the FDU back up the DRAM (SAF memory) for one hour, if there is data in the SAF memory and the power is switched off. While the main power is on, the +5VE supply recharges the battery. The battery recharges in one or two days.

The battery [B] generates about 3 volts (max. 3.2 volts). The dc/dc converter (IC12) lifts this voltage to 5 volts so it can be used as the +5VD supply for SAF backup. The CPU monitors the voltage of the +5VD supply with the 1VDET signal. When the battery has run down, and the voltage is lower than 4.4 volts, the CPU stops the dc/dc converter by dropping 1SAFFG to low and the machine stops backing up the memory.

There is no battery switch for the battery [B].

# 2. DETAILED SECTION DESCRIPTIONS

## 2.1. SCANNER

### 2.1.1. Overview

### 1. Book Scanner
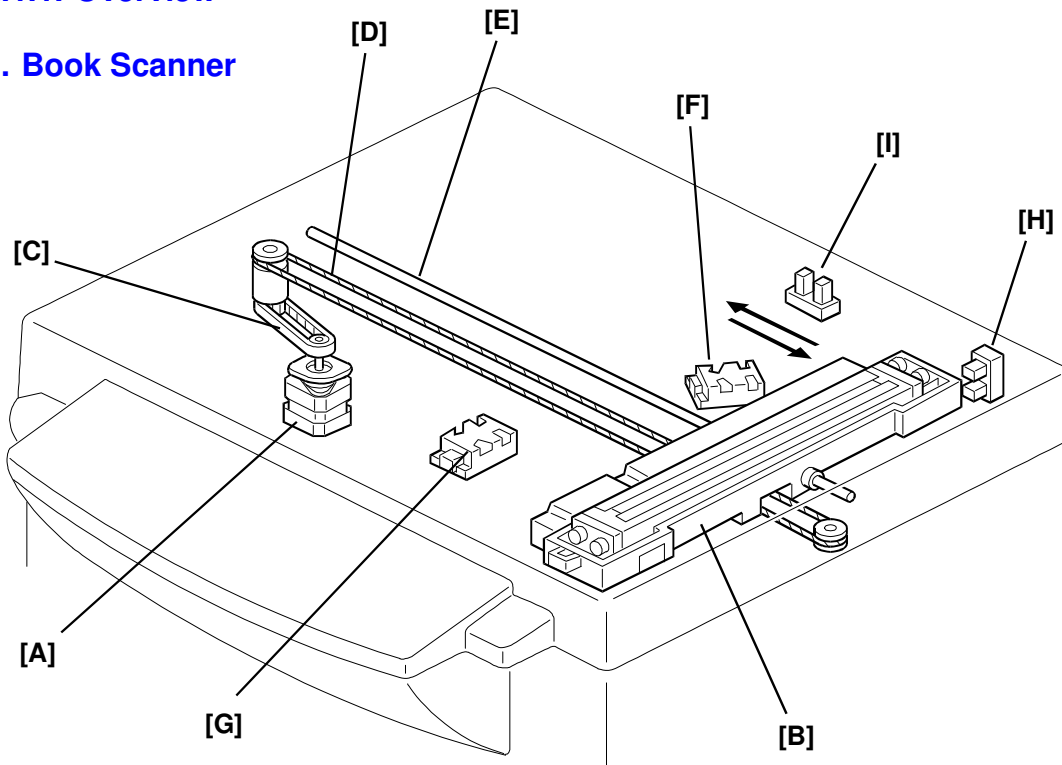


H521D011.wmf

The scanner motor [A] drives the scanner [B] through the timing belt [C] and drive wire [D]. The shaft [E] guides scanner movement in the sub-scan direction. Inside the scanner [B] are a contact image sensor (containing a sensor element and xenon lamp) and a xenon lamp driver.

The scanner [B] consists of a contact image sensor and a xenon lamp driver.

The original width sensor [F] and length sensor [G] together detect the size of the original placed on the exposure glass.

The scanner home position sensor [H] allows the scanner return to the same position after scanning.

The platen cover switch [I] detects if the cover is opened or not.

## 2. ADF



H521D008.wmf
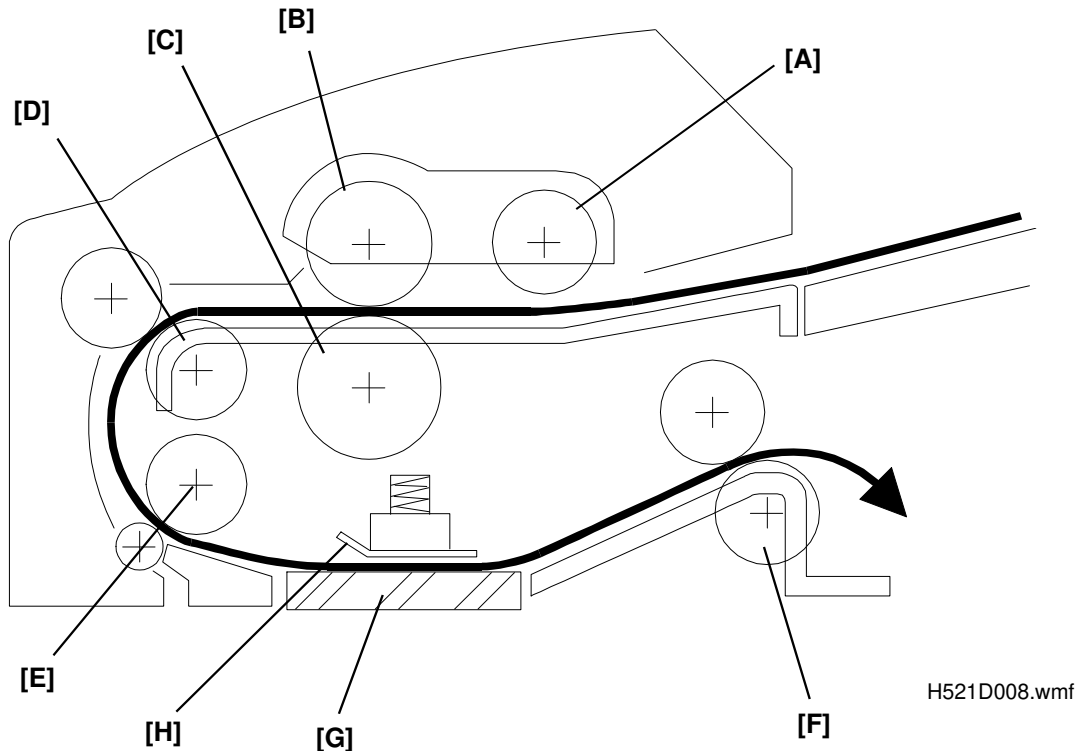
The sheet through type ADF feeds the document from the top page of the document stack on the table.

The pick-up [A] and feed roller [B] feed the original into the scanner, and the separation roller [C] helps to feed one sheet at a time. Then, the R0 [D], R1 [E], and R2 [F] rollers feed the document through the scanner.

At the time of scanning the document, the scanner ([B] on the previous page) moves down to the scanning position under the exposure glass [G]. The shading plate [H] pushes the document to the exposure glass at the scan line, so that the document is within the image sensor's range of focus.

After scanning, the ADF feeds out the document onto the platen cover, and the scanner moves back to its home position at the right end of the scanner.

Unlike a copier's ADF, this ADF does not have a document length sensor. So, some of the copier features are not available when the ADF is used. Refer to "Original Detection - ADF" later in this chapter.

## 2.1.2. Original Detection

### 1. Book Scanner
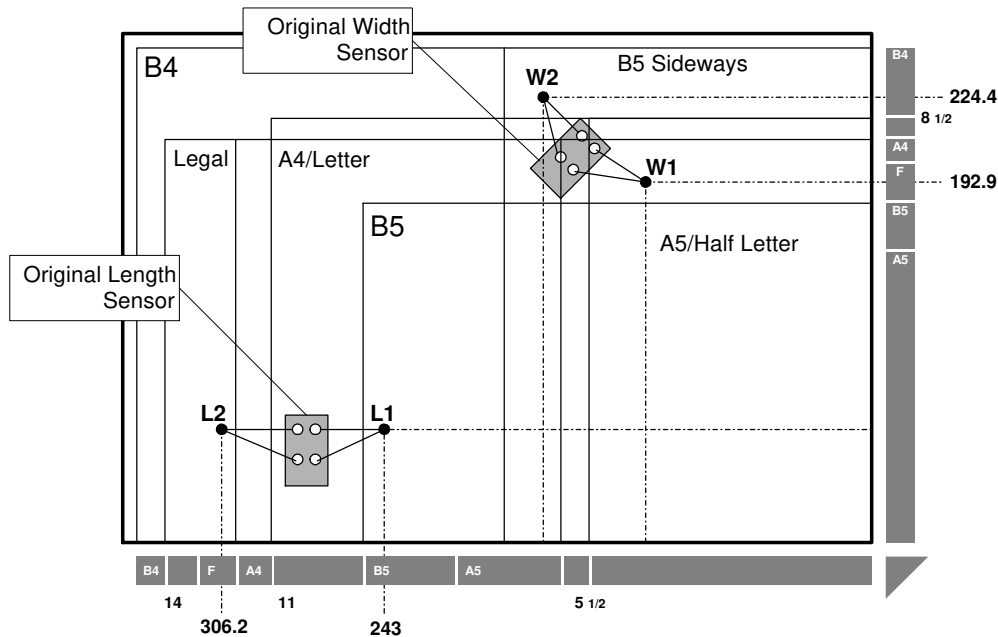


H521D502.wmf

The original width and length sensors each have two sets of photoemitter and receiver. The actual detection points on the exposure glass are W1, W2, L1 and L2 in the diagram. The cpu continuously checks the sensor outputs when the platen cover is open. The machine uses the paper size detected just before the platen cover is closed (or before pressing the Start key if the platen cover is kept open). The table below shows the paper size detected for each set of sensor outputs, and the data width selected for a fax transmission.

| Sensor Outputs | | | | USA | Europe and Asia | Data Width in Fax Tx |
| W1 | W2 | L1 | L2 | | | |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | B4 Lengthwise | B4 Lengthwise | 256 mm |
| 0 | 1 | 0 | 1 | Letter Lengthwise (Note 1) | A4 Lengthwise (Note 1) | 216 mm |
| 1 | 1 | 0 | 1 | B5 Lengthwise | B5 Lengthwise | 216 mm |
| 0 | 0 | 1 | 1 | B5 Sideways | B5 Sideways | 256 mm |
| 0 | 1 | 1 | 1 | Half-Letter Sideways (Note 1) | A5 Sideways (Note 1) | 216 mm |
| 0 | 1 | 0 | 0 | Legal Lengthwise (Note 1) | F/F4 Lengthwise (Note 1) | 216 mm |
| 1 | 1 | 1 | 1 | Size not detected (Note 2) | A5 Lengthwise or Size not detected (Note 3) | 216 mm (US) 216 or 256 mm (Other) (Note 4) |

**Sensor output:** 0 = Original present; 1 = Original not present

## Notes

1. The setting of System Switch 0D determines which paper size is detected (USA standard or ISO standard) for each sensor output combination. However, changing a setting will cause some copier functions to not work correctly. (For example, if A4 is selected in the USA model, automatic paper select does not work. This is because A4 size paper is not available for printing with the USA model.)

2. USA: For both Fax and Copier operations, the machine will ask the user to choose a scanning area which is equivalent to Half-letter sideways, Letter, or Legal.

3. If bit 4 of System Switch 0D is 0, the machine uses A5 lengthwise for copier operations (e.g., enlargement to A4 size using a fixed zoom rate). But, in Fax mode, the machine will ask the user to choose a scanning area which is equivalent to an available original size.
   If bit 4 of System Switch 0D is 1, the machine will ask the user to choose a scanning area which is equivalent to an available original size, for both Fax and Copier operations.

4. The following table shows which data width is used depending on what original size the user has selected.

| Data Width | Original Size Selected |
|------------|------------------------|
| 216 mm | Letter, Legal, Half-letter sideways (US) F/F4, A4, B5 lengthwise, A5 sideways (Europe/Asia) |
| 256 mm | B4, B5 sideways |

## 2. ADF
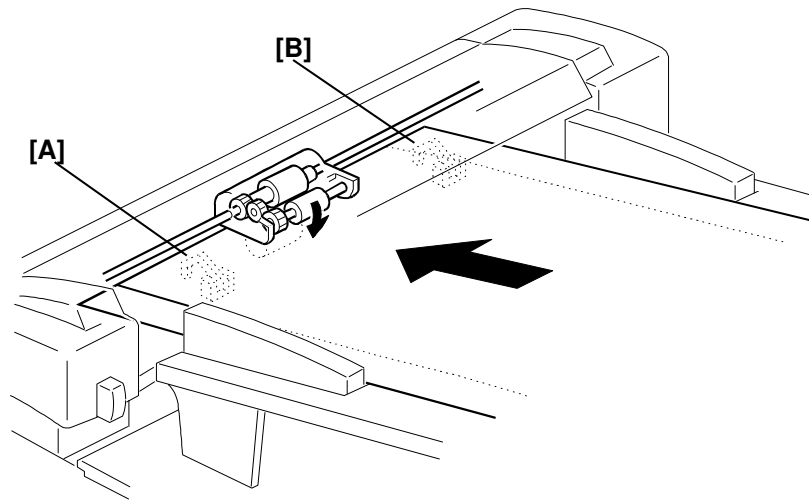


H521D006.wmf

When using the ADF, the machine can only detect the document width. Unlike a copier's ADF, the machine cannot detect the document length, because there is no length sensor.

As a result, the following copier functions cannot be used when using the ADF, since these functions require the document length before proceeding.
- Automatic paper selection
- Erase border/center

The document sensor [A] and B4 width sensor [B] detect the document width.
- When the document sensor is activated but the B4 width sensor is not, the machine treats the document width as either A4 (210 mm) or Letter/Legal (216 mm).
- When both sensors are activated, the machine treats the document width as B4 (256 mm).

The setting of system switch 0C bit 3 determines whether an International or US paper size is detected.

## 2.1.3. Scanning

### 1. Contact Image Sensor
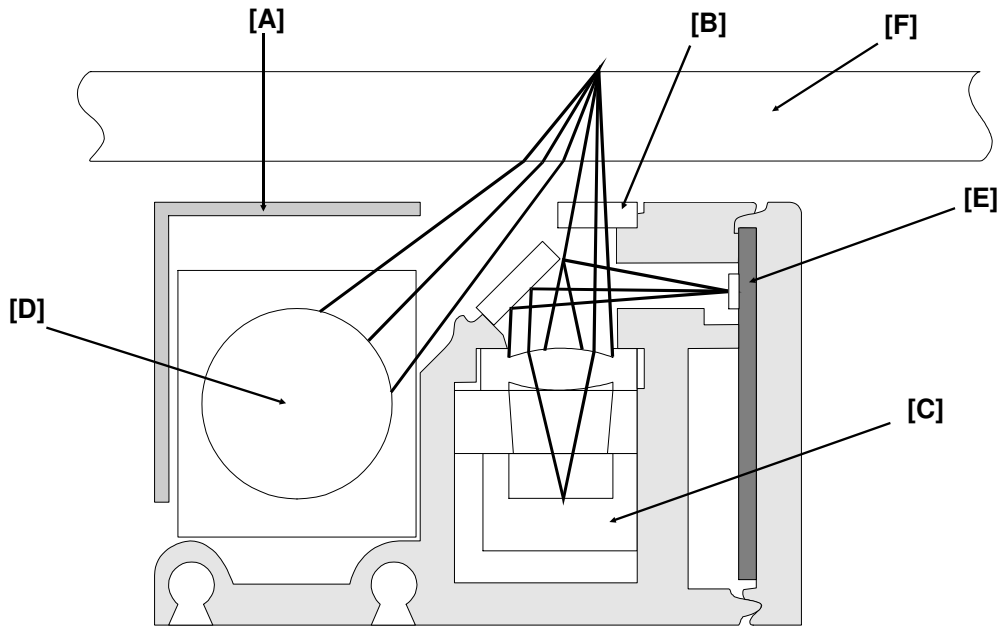


H521D512.wmf

The contact image sensor (CIS) assembly [A] consists of an exposure glass [B], a roof mirror lens array [C], a xenon lamp [D], and an image sensor [E]. The CIS moves under the exposure glass when scanning a book original, or stays at the ADF scan line when scanning a sheet original using the ADF.

The image sensor is a row of 4096 photosensitive elements (B4 width x 16 dots/mm). The roof mirror lens array focuses the light reflected from the document onto the image sensor.

Because of the short optical path inside the CIS, the focal depth is much shorter than for a CCD type scanner. Because of this, two springs at each end of the CIS push it against the exposure glass [F], so that the distance from the original is kept the same all the time. However in book scanning mode, if the original is out of the CIS's focal range, the scanned image may get darker.

Because the analog output signal is a sawtooth waveform, data sampling timing should be adjusted whenever a new CIS is installed in the machine. Refer to section 5.2.1 for more details.

## 2. Main Scan Resolution and Width (Book Scanner)

### Fax Mode

B4 (256 mm/10.1" width) Original
The machine scans 256 mm (10.1") width at 16 dot/mm resolution, then convert it into 8 dots/mm resolution before transmission.

A4 (210 mm/8.3")/ Letter (216 mm/8.5") Original
The machine scans either 216 mm (8.5") or 210 mm (8.3") width at 16 dot/mm resolution, depending on the settings of System Switch 0D bits 0 to 5, then converts the data into 8 dot/mm resolution before transmission. However, the original width of the A4/Letter size specified in the T.30 protocol is 216 mm. So, the following diagrams explain the actual scanned width in each paper size.

Letter size:
The machine scans and transmits the whole width of the original.
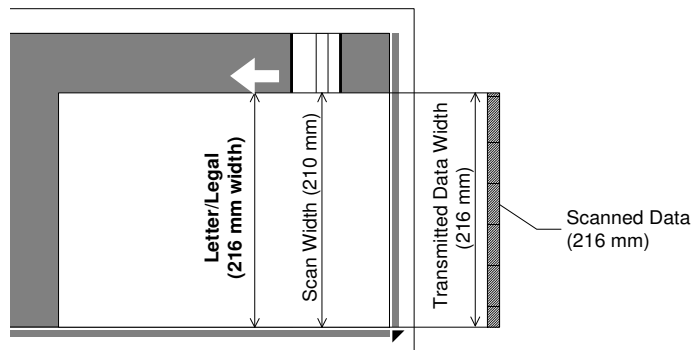
A4 size:
The machine scans 213 mm from the front end of the scanning area, and adds 3 mm of white data at the beginning of each line to get a 216 mm width of data for transmission.
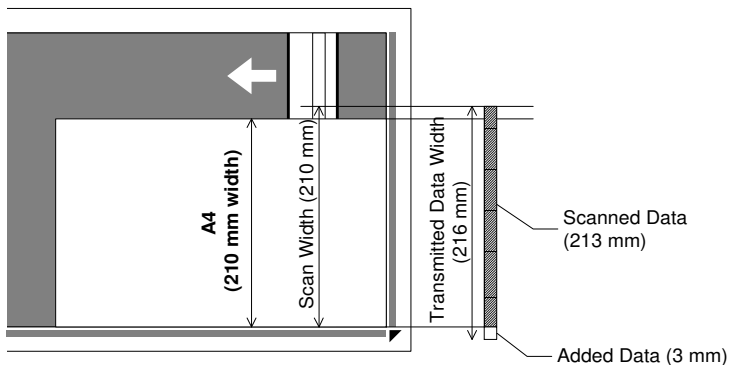
H521D503.wmf

### Copy Mode

The machine scans 256 mm (B4 width) at 16 dot/mm resolution. Then, each scanned line is stored in the page memory for printing.

## 3. Main Scan Resolution and Width (ADF)

**Fax Mode**
- The machine scans either 216 mm (A4/Letter) or 256 mm (B4) at 16 dot/mm resolution, depending on the document width detected. Then each line is converted into 8 dot/mm resolution before transmission.

**Copy Mode**
- The machine scans the document width at 16 dot/mm resolution.

## 4. Sub Scan Resolutions and Length (Book Scanner)

**Fax Mode**
- The machine scans at 15.4 lines/mm, then it converts the resolution before transmission if necessary (refer to "Sub Scan Resolution Conversion" later in this chapter). The scan length is the length of the original detected by the original length sensors (refer to "Original Detection").

**Copy Mode**
- The machine scans the number of lines required for printing. For example, to print an A4 size copy, 292 x 15.4 lines are scanned (292 mm = A4 length less the top and bottom margins of 2 mm each - the margins are adjustable by RAM address).
  Sub scan resolution depends on the selected reproduction ratio. It is controlled by the motor speed, and not by image processing. At higher motor speeds, more scan lines are omitted, and the effect of this is a lower reproduction ratio. There is a range of resolutions from 2.82 s per A4 page (3.85 lines/mm) for a 50% reproduction ratio up to 11.3 s per page (15.4 lines/mm) for 200%. See "Drive Mechanism" for how the motor speed varies with reproduction ratio.

## 5. Sub Scan Resolutions and Length (ADF)

**Fax Mode**
- The machine scans at 15.4 lines/mm, then it converts the resolution for transmission if necessary (refer to "Sub Scan Resolution Conversion" later in this chapter).
  The machine scans the full document length except for the top and bottom margins. However, the length should not exceed the maximum length programmed by Scanner Switch 00, bits 2 and 3.

**Copy Mode**
- See "Sub Scan Resolutions and Length (Book Scanner)" above.
  If the original is longer than the paper length, the excess part is lost.

## 6. Sub Scan Resolution Conversion

Since the scanner always scans at 15.4 line/mm resolution, sub scan resolution has to be converted when transmitting to a terminal which is not capable of higher resolutions.

**Standard:** The first and third lines in each four-line group are OR processed for transmission. Other lines are deleted.

| Feed | | Transmit |
|------|---|----------|
| 1st Line | 15.4 l/mm | |
| 2nd Line | 15.4 l/mm  Cut | OR Processing |
| 3rd Line | 15.4 l/mm | 3.85 l/mm |
| 4th Line | 15.4 l/mm  Cut | |
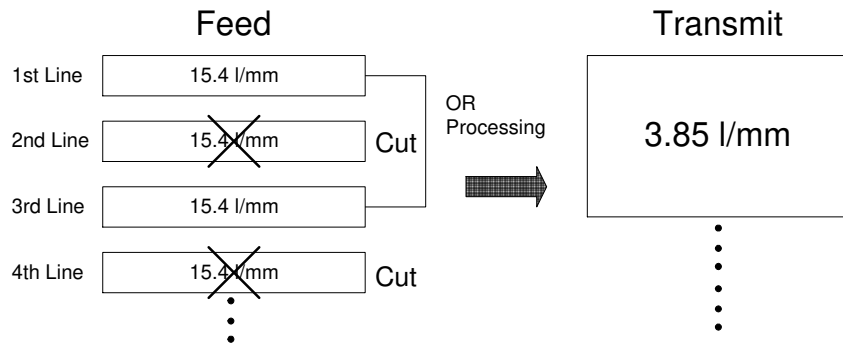
H521D513.wmf

**Detail:** Pairs of lines are OR processed for transmission.

| Feed | | Transmit |
|------|---|----------|
| 1st Line | 15.4 l/mm | |
| 2nd Line | 15.4 l/mm | OR Processing → 7.7 l/mm |
| 3rd Line | 15.4 l/mm | |
| 4th Line | 15.4 l/mm | OR Processing → 7.7 l/mm |
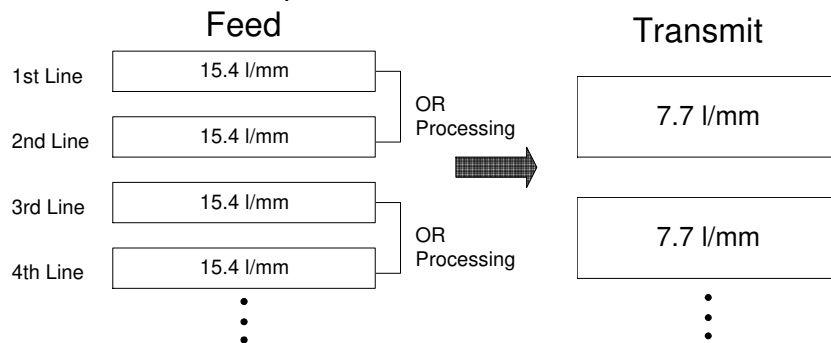
H521D514.wmf

**Fine:** All the scanned lines are transmitted.

| Feed | Transmit |
|------|----------|
| 1st Line  15.4 l/mm | 15.4 l/mm |
| 2nd Line  15.4 l/mm | 15.4 l/mm |
| 3rd Line  15.4 l/mm | 15.4 l/mm |
| 4th Line  15.4 l/mm | 15.4 l/mm |
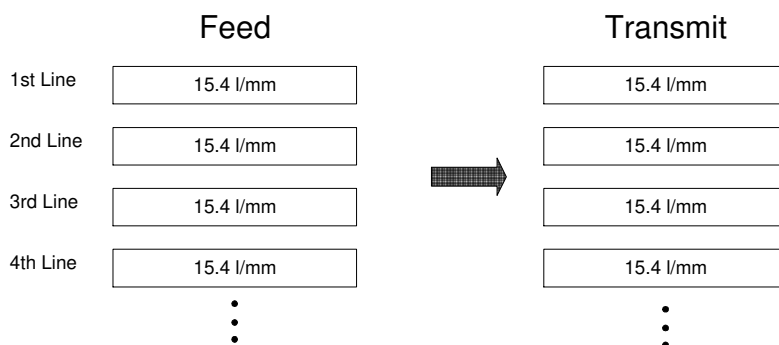
H521D515.wmf

In memory transmission, if the other terminal cannot receive a message at Fine resolution, alternate lines (even-numbered lines) are deleted before transmission.

## 2.1.4. Drive Mechanism

### 1. Book Scanner
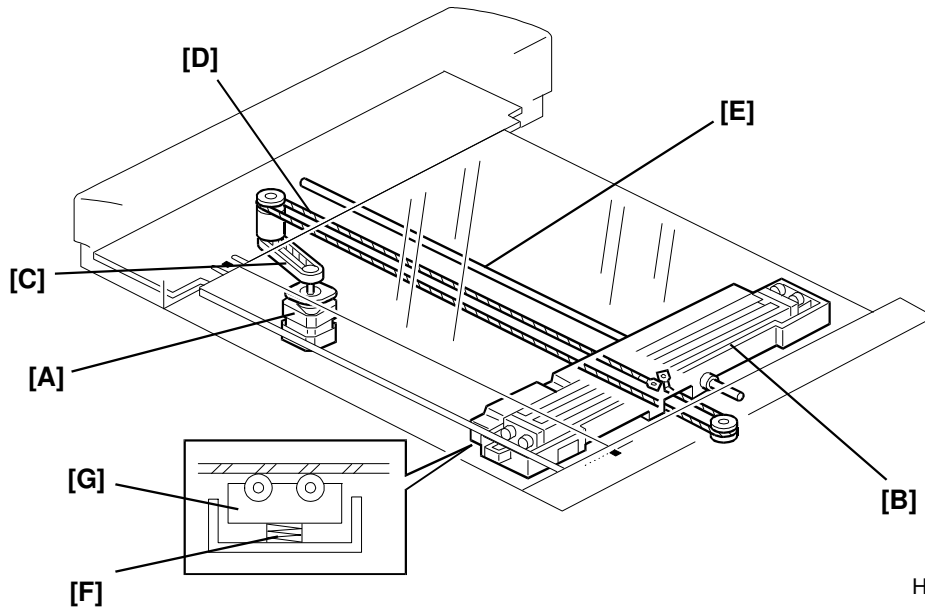


H521D012.wmf

The book scanner motor [A] drives the scanner [B] through the timing belt [C] and drive wire [D]. The scanner moves along the guide shaft [E].

The spring [F] pushes up the contact image sensor [G] to the exposure glass, so that the distance from the image sensor to the exposure glass surface is constant during scanning.

The motor speed depends on the selected resolution. For reference, the following table shows the speed for scanning an A4 size original.

- Fax mode

| | |
|---|---|
| Standard | 5.65 s |
| Detail | 5.65 s |
| Fine | 11.30 s |

- Copy Mode

| Reduction | Scan Speed (/A4) | Full Size and Enlargement | Scan speed (/A4) |
|---|---|---|---|
| 50 % reduction | 2.82 s | Full size | 5.65 s |
| 65 % reduction | 3.67 s | 115 % | 6.50 s |
| 71 % reduction | 4.01 s | 121 % | 6.84 s |
| 74 % reduction | 4.18 s | 122 % | 6.89 s |
| 77 % reduction | 4.35 s | 141 % | 7.97 s |
| 82 % reduction | 4.63 s | 155 % | 8.76 s |
| 87 % reduction | 4.91 s | 200 % | 11.30 s |
| 93 % reduction | 5.25 s | | |

## 2. ADF
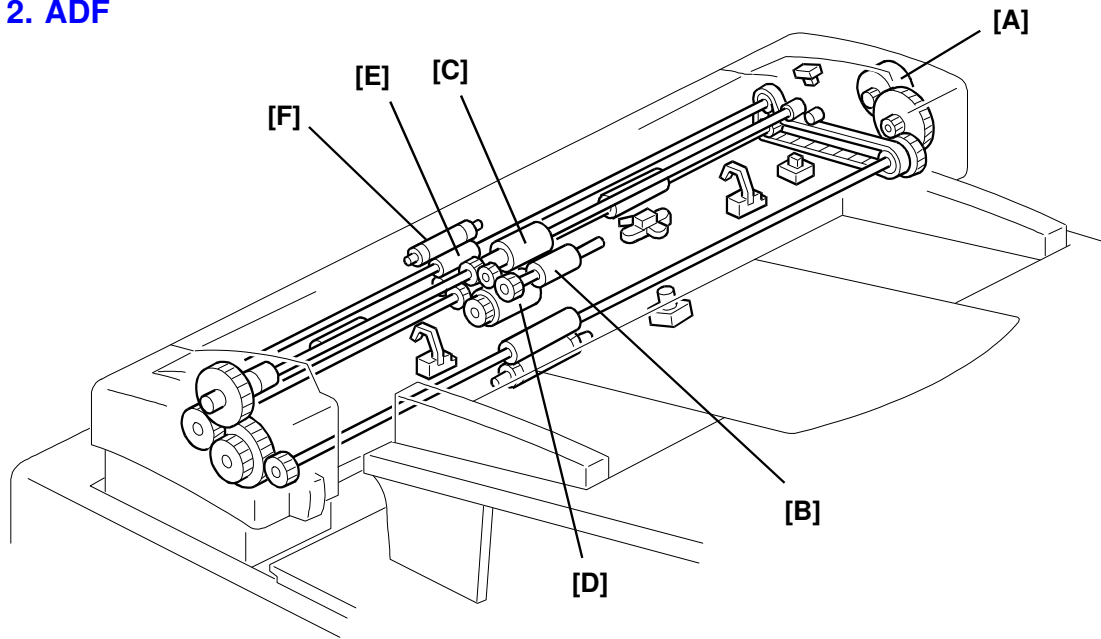


H521D005.wmf

The ADF motor [A] drives the pick-up roller [B], the feed roller [C], the R0 roller [D], the R1 roller [E], and the R2 roller [F].

The motor speed varies in the same way that the book scanner motor does (see the previous page).

---

**Cross reference**
Maximum document length: Scanner Switch 00, bits 2 and 3.

---

## 3. Scanner Position Fine Adjustment



H521D521.wmf
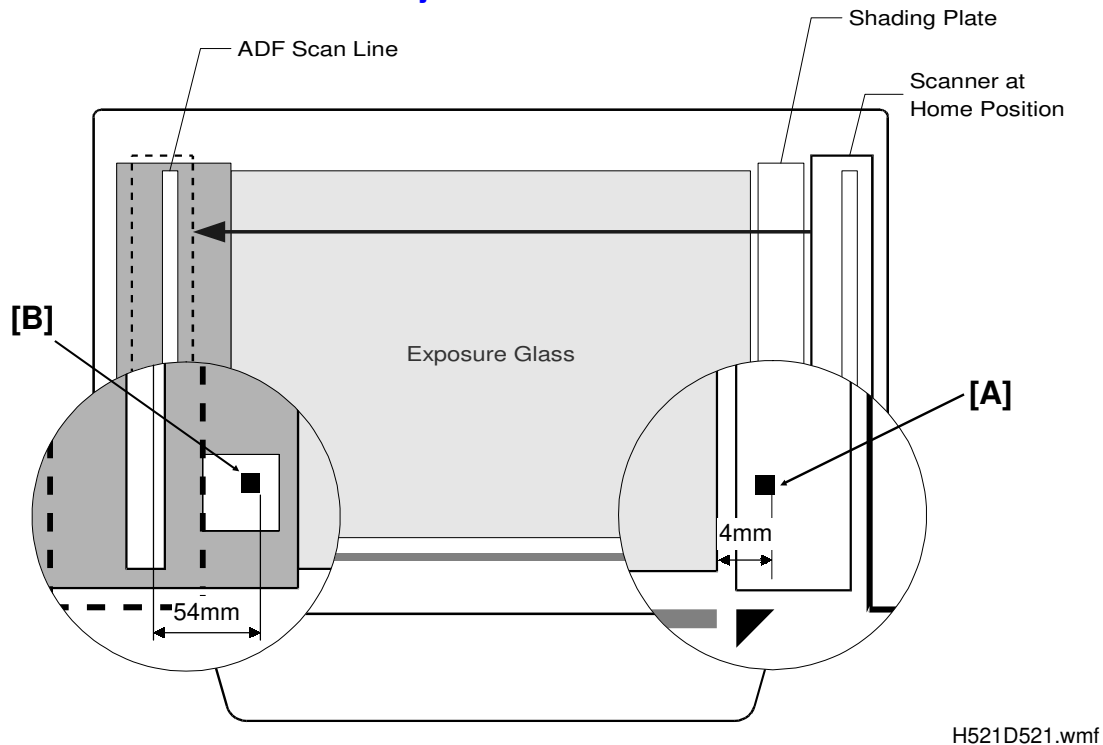
Two square black marks [A] and [B] (2 x 2 mm) are used to move the scanner to the exact scan start position. At the start of scanning, the scanner moves from the scanner home position, and looks for the appropriate mark, which depends on the scanning mode (book or ADF). The machine uses the black mark to move to the exact scan start position, which is nearby.

- Book Scanner
  When the machine detects the right edge of the black mark [A], it moves another 4 mm to the scan start position.

- ADF
  When the machine detects the right edge of the black mark [B], it moves another 54 mm to the scan start position.

If the black mark cannot be found, scanning continues, but error code 1-09 is generated and stored in the error code memory area.

---
**Cross-reference**
Image Adjustment: Section 5.11
---

## 2.1.5. Pick-up and Feed (ADF)
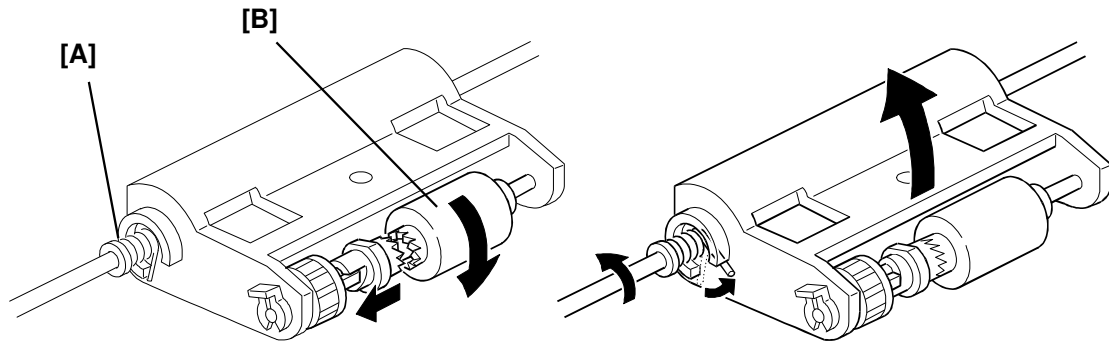


H521D007.wmf                    H521D009.wmf

When the ADF motor starts, the mechanical clutch [A] moves the pick-up roller [B] down to the document. Then, the machine feeds the top page of the document. After the last page is scanned, the ADF motor reverses briefly to move the pick-up roller back to the standby position.

## 2.1.6. Separation Mechanism (ADF)
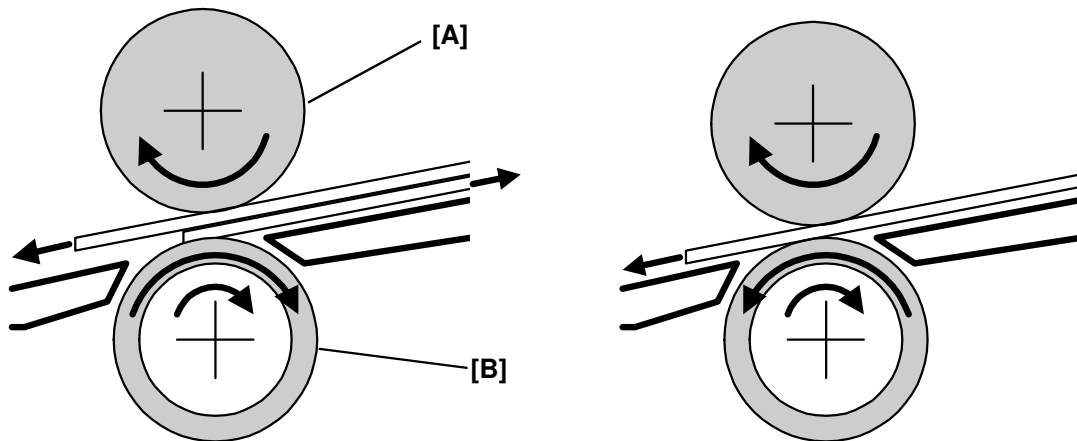


H521D511.wmf

The feed roller [A] and the separation roller [B] prevent more than one sheet of paper from feeding into the scanner at once.

When the feed roller feeds a sheet of paper, both the feed and the separation rollers rotate in the feed-in direction. However, if two or more sheets are between these rollers, the separation roller rotates in the feed-out direction to prevent the lower sheet from being fed into the scanner.

**Cross reference**
Separation mechanism: Group 3 Facsimile Manual, page 2-2-14.

### 2.1.7. Stamping (ADF)



[A]
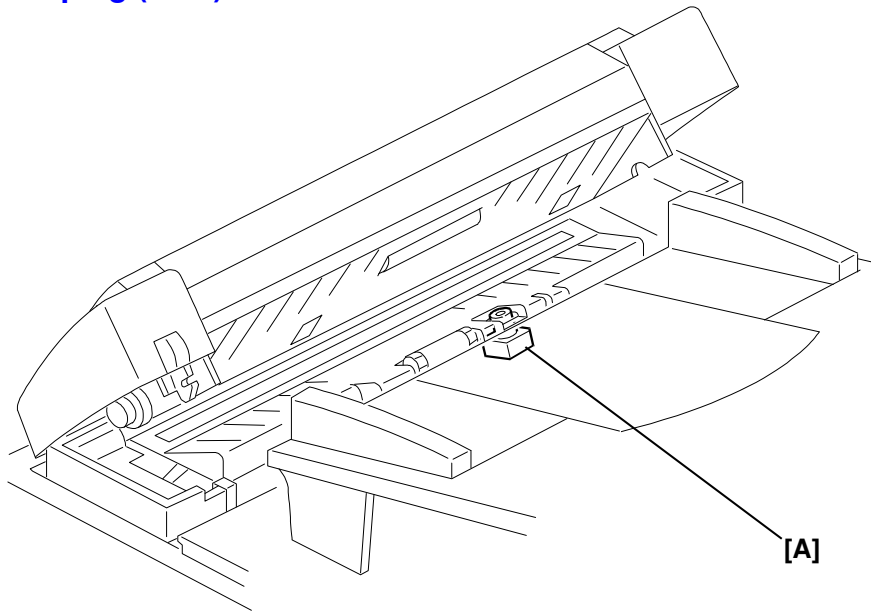
H521D010.wmf

The machine always stops feeding at the stamping position.

If the Stamp LED is turned on, the machine activates the stamper solenoid [A] for 500 ms after the page was transmitted (immediate transmission) or stored (memory transmission) successfully. Then the page is fed out of the scanner.

If the Stamp LED is turned off, the machine feeds out the page without stamping.

## 2.1.8. Error Conditions

### 1. Book Scanner

The main cpu detects an error if one of the following conditions occurs.

| Condition | Description | Error Code |
|---|---|---|
| Black mark not detected | The scanner did not detect the black mark at scanning start position correction. The machine does not stop scanning even if this error was detected. | 1-09 |
| Incorrect home position sensor condition | The scanner home position sensor did not turn on after the motor moved 480 mm back to the home position after scanning. | 9-11 |
| | The scanner home position sensor stayed on after the motor moved 20 mm from the home position at the start of scanning. | |
| | The scanner could not go to the home position at power on. | |
| Cover open | While the machine is working, the printer cover is open and the interlock switches turn off. | No error code |

### 2. ADF

The main cpu detects an error if one of the following conditions occurs.

| Jam Condition | Description | Error Code |
|---|---|---|
| Non-feed | The scan line sensor does not switch on within 3.7 s of the ADF motor starting. | 1-00 |
| Incorrect sensor conditions | The scan line sensor switches on while the document sensor is off. | |
| | The document width sensor switches on while the document sensor is off. | |
| | The scanner home position sensor did not turn on after the motor moved 480 mm back to the home position after scanning using ADF. | 9-11 |
| Maximum document length exceeded | The scan line sensor does not turn off after the maximum document length has been fed since it turned on; this is after 23 s at standard and detail resolution, or 46 s at fine resolution (these times are for a 1.2 m long document). | 1-01 |
| Black mark not detected | The scanner does not detect the black mark at scanning start position correction. A document jam is not detected for this error code, and scanning continues as normal. | 1-09 |

| Jam Condition | Description | Error Code |
|---|---|---|
| Error during feed-out | When the final page of the document has been fed out of the scanner, or when a jammed document has been removed, the ADF motor reverses. The error occurs if a document is placed into the feeder while the motor is rotating. | No error code |
| Cover open | While the machine is working, the ADF cover and/or printer cover are open. | No error code |

## 2.1.9. Video Processing

## 1. Analog Signal Processing
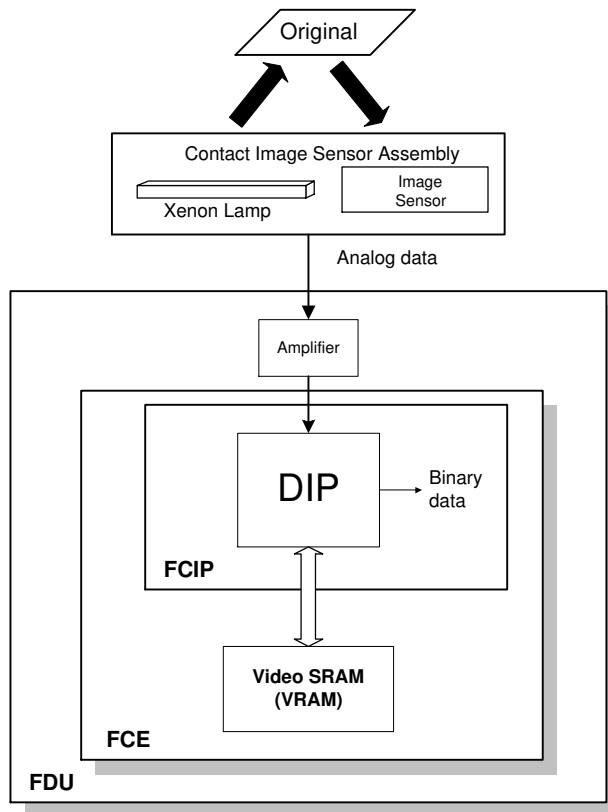


H521D519.wmf

The analog video signal from the contact image sensor assembly is amplified in the FDU, then transferred to the DIP (Digital Image Processor) inside the FCIP.

## 2. Digital Video Processing Steps

### Overview
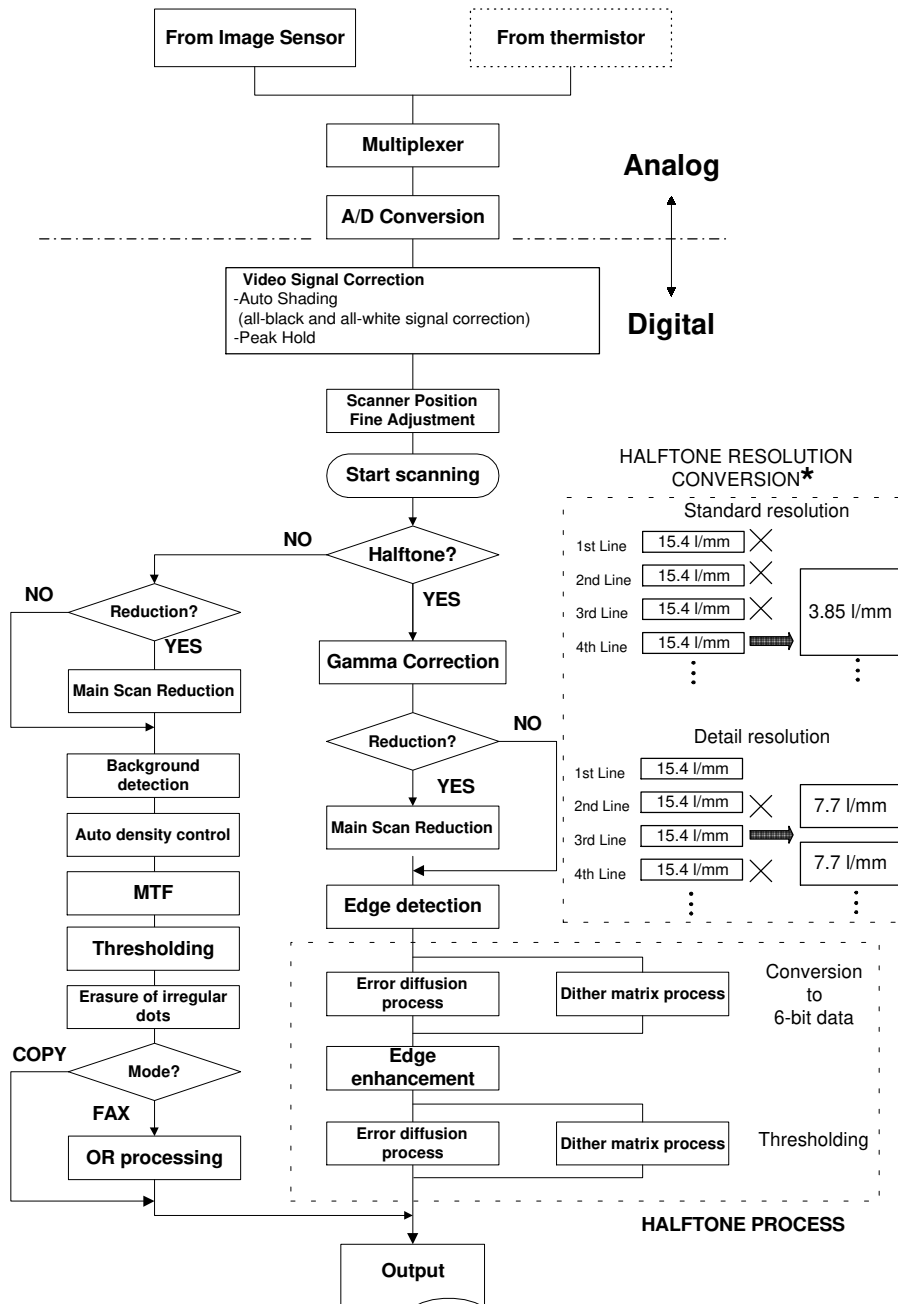


H521D520.wmf

\* In fax mode, if halftone is selected at standard or detail resolution, sub scan resolution is converted as shown in the diagram, before any digital image processing is done.

The analog signal from the CIS is first converted into an 8-bit digital signal. Then it passes through some digital processes that depend on the selected scanning modes. To process the data, the DIP uses a dedicated 8 kb video SRAM (VRAM).

## Details

**Cross-reference**
Group 3 Facsimile Manual: section 2-3

The DIP carries out the following image processing on the data (refer to the flow chart on the previous page).

## Sampling Clock Selection
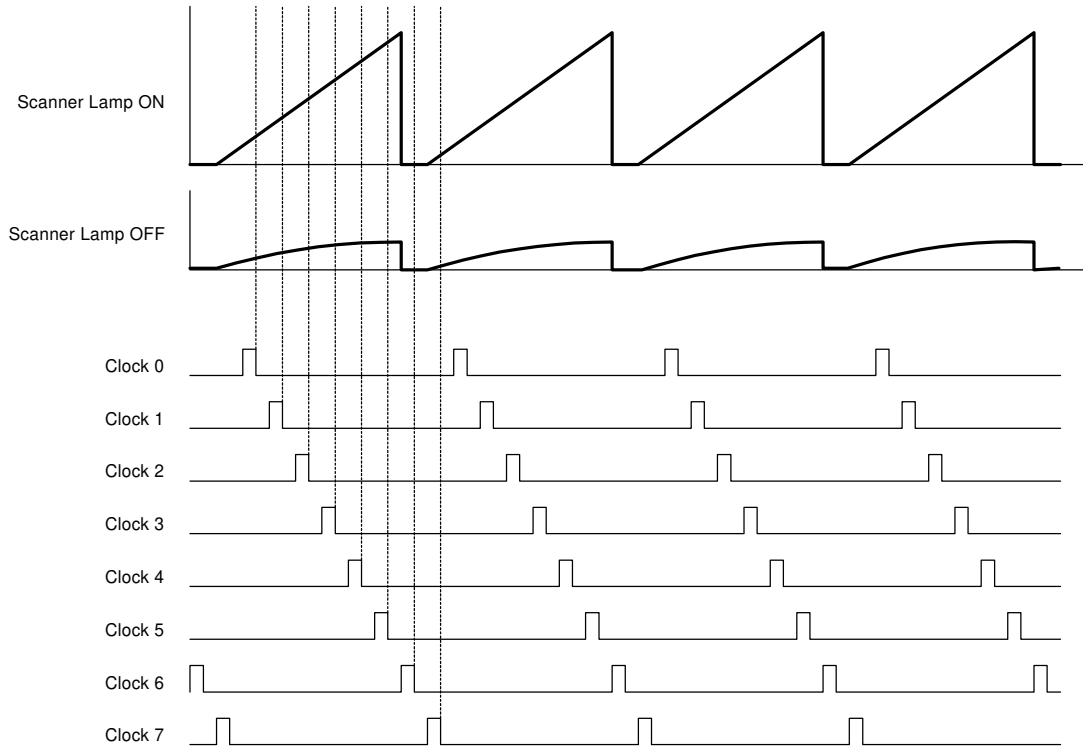


H521D510.wmf

The image sensor output is a sawtooth waveform. So the sensor output level depends on the sampling clock selected as shown in the above diagram.

The clock is adjusted at the factory. But in the field, the clock should be reset using service function 10-4 whenever the image sensor is replaced. Refer to section 4.1.19 for the procedure.

## Preliminary Processing

1. A/D conversion
   - The multiplexer selects the data from the image sensor, then the DIP converts this to an 8- bit digital signal.

2. Video signal correction
   - The image sensor corrects for the gound level and amplification ratio by itself.
   - The machine reads all-black and all-white waveforms before the scanner moves to scan the document.
     First, the image sensor reads the white plate that is behind the exposure glass, with the lamp off. The machine stores the output data in the VRAM (this is the all-black waveform). The image sensor then reads the white plate with the lamp on, and the machine stores this data (this is the all-white waveform).
     Then, the machine starts scanning the document. The data output from each element on the image sensor is compared with the above stored values, and corrected (this is Auto shading).
   - The all-white waveform is also used as a peak level for the peak hold function.

## If Halftone was not selected

1. Background detection
   - Each pixel is tested in relation to its neighbours to determine if it is background noise and should be eliminated.

2. Auto density control
   - The most suitable threshold value is calculated from the density that is detected from a fixed area on each original.

3. MTF

MTF (Modulation Transfer Function) can reproduce details such as thin lines, points, and complex characters.

4. Thresholding
   - Each video data element is compared against the threshold level, which depends on the contrast selected by the user. If an element is lighter than the threshold level, it is converted to a white (0). Otherwise, it becomes a black (1).

5. Erasure of irregular dots

■ :Black dot

Black to White

White to Black
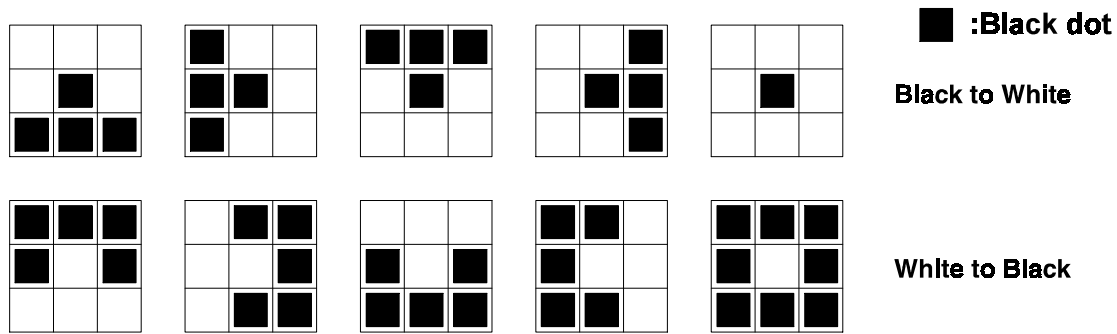
H521D522.wmf

- If an element after being converted to white or black by the above thresholding is irregular against the surrounded pixels, it is output in the opposite color. The central pixel is compared with the surrounding eight pixels to determine whether this process is necessary. There are ten cases, as shown below, in which conversion is done. This results in a noise-free and clean image.

5. OR processing
- When the user selects a resolution that is less than the resolution used by the scanner, the DIP will either do OR processing and/or skip alternate lines of data to convert the scanned resolution into the resolution required for transmission. (See "Sub Scan Resolution Conversion" in section 2-1-1.)

**If Halftone was selected**

1. Gamma correction
- Gamma correction corrects the response of the image sensor to the various shades in the gray scale from black to white.

2. Edge detection
- Edge detection preserves the sharpness of image outlines. Each element is tested to determine whether it is on a boundary of two areas of sharp contrast.

3. Halftone process
- The data is converted to six-bit (0 - 63) for halftone processing. In addition, if error diffusion was selected, each element is corrected using the differences between it and the surrounding elements. This process reduces the differences in contrast between light and dark areas of a halftone image.
- Edge enhancement is done - As a result of the edge detection, if the element is on a boundary, the element goes directly to white or black, without thresholding (see below).
- The data is thresholded. Each pixel is compared with the corresponding element in a dither matrix or using error diffusion. The resulting data is one-bit (0 or 1).

## 3. Video Processing Parameters

Some of the parameters used for digital image processing can be changed by RAM addresses. See section 5-11-4 for details.

1. Contrast

RAM addresses 8003FD to 80040E

2. Image processing parameters

RAM addresses 80040F to 800426

## 2.2. PRINTING

### 2.2.1. Printing Process - Overview
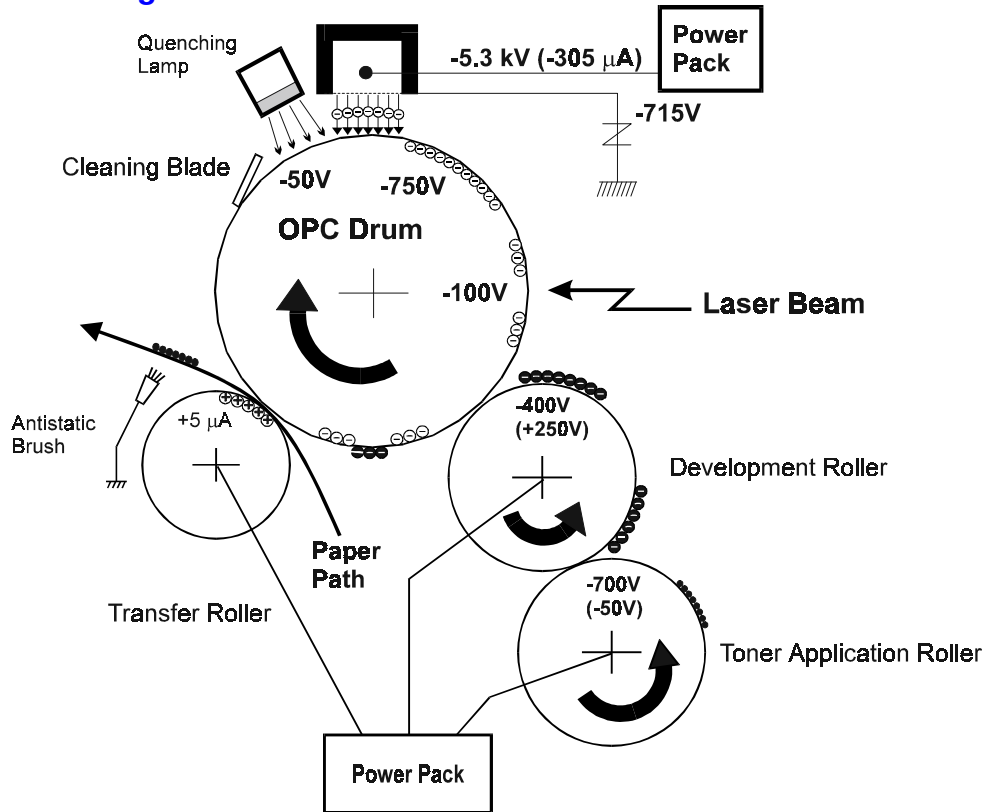


H521D637.wmf

This machine uses a "write to black" system, using negative toner.

*   The charge corona wire gives the drum surface a negative charge of -750 V.
*   The exposed area on the drum drops to about -100 V.
*   The development roller carries toner to the latent image on the drum surface.

    Development bias (during printing):
        Toner application roller : -700 V
        Development roller: -400 V

    Switching bias:
        Toner application roller : -50 V
        Development roller: +250 V

*   The transfer roller pulls the toner from the drum onto the paper.

    A constant current of +5 µA is applied. The antistatic brush helps to separate the paper from the drum.

*   The cleaning blade removes any toner remaining on the drum after the image is transferred to the paper.
*   The quenching lamp reduces the negative charge on the drum to about -50 V.

## 2.2.2. OPC Drum



H521D604.wmf
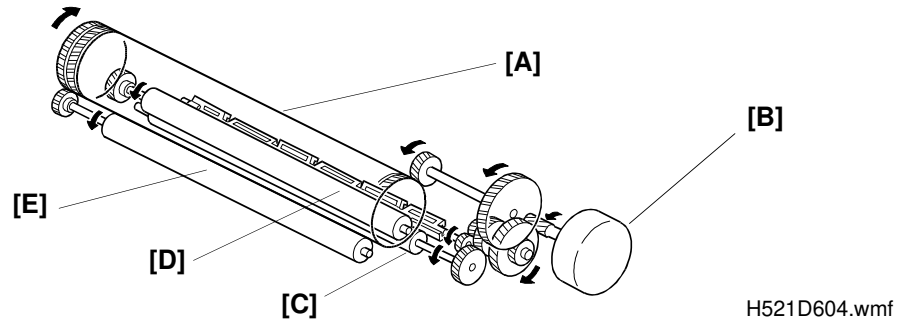
An organic photoconductor drum [A] is used in this machine. The diameter of the drum is 30 mm. It is driven by the main motor [B] through a gear train. The toner application roller [C], development roller [D], and transfer roller [E] are also driven by the same gear train. The drum unit is replaceable by the customer.

## 2.2.3. Charge



H521D605.wmf
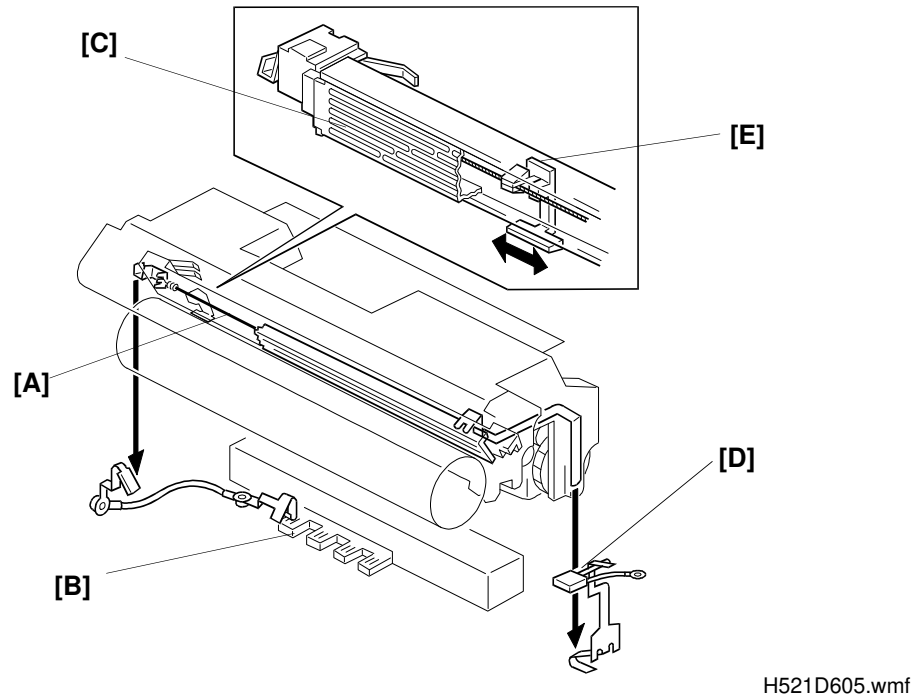
The CTM contains a charge corona unit. The corona wire [A] generates -ve ions when the power pack [B] applies a constant current of -305 ± 5 μA (the voltage is about -5.3 kV) . The grid plate [C] ensures that the charge is uniformly spread out. The zener diode [D] ensures that the charge on the drum does not exceed -750 ± 50 V.

The charge corona unit contains a wire cleaner [E] for user maintenanace.

The ozone fan on the left hand side of the machine provides air flow to the charge corona unit, and the ozone filter (a paper filter coated with carbon) decomposes the ozone generated around the drum by the corona discharge.

**Charger Leak Detection:**

The machine detects a charger leak error when the FDU CN21-8 stays low for 3 seconds or more (6 seconds or more at power on) either while in standby mode or while the corona wire is being charged. When this occurs, the machine warns the customer by lighting the Call Service indicator (error code 9-17).

**Charge Control**



H521D657.wmf
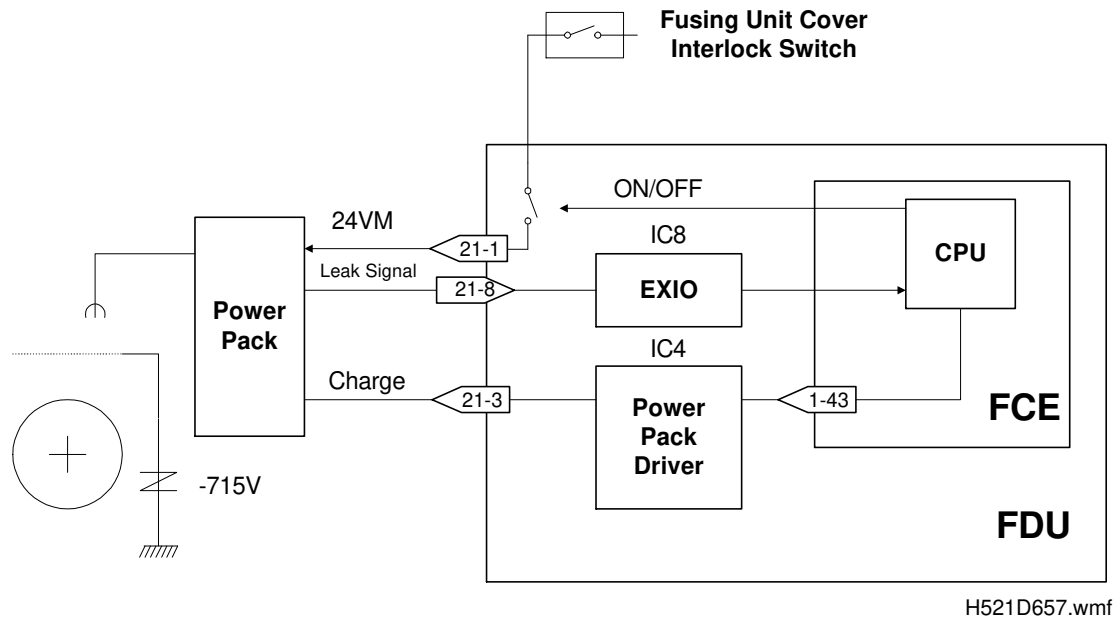
In this machine, a higher corona wire current is used to counter black bands on copies. The charge on the drum exceeds the zener diode voltage as a result of this higher current.

## 2.2.4. Laser Exposure
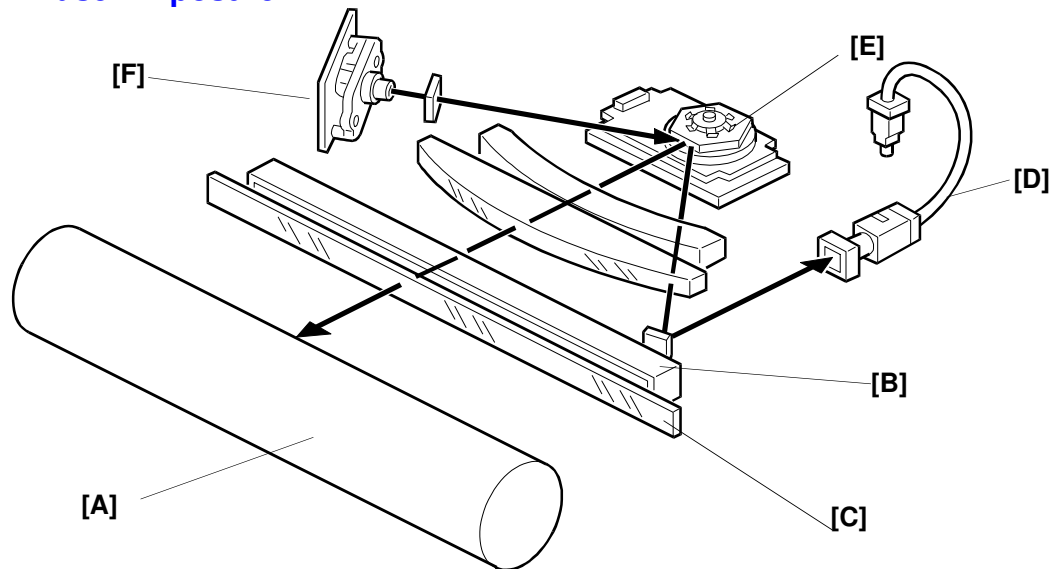


H521D606.wmf

## 1. Overview

The components of the laser section are the same as those described in the section 4-3-3 of the Group 3 Facsimile manual. The drum [A] is positioned in the same plane as the laser unit, so there is no mirror to change the optical path.

Points to note:
- The focusing lens [B] is a barrel toroidal lens.
- The shield glass [C] prevents toner and dust from entering the laser optics area.
- An optical fiber [D] passes the reflected laser beam to the laser sychronization detector circuit in the FDU.
- The shape of the mirror [E] is hexagonal.
- The strength of the beam emitted from the LD unit [F] is 5 mW at a wavelength of 780 nm.
- The dimensions of the dot on the drum are 85 $\mu$m by 85 $\mu$m.

The hexagonal mirror motor speed depends on the printing resolution:
- Copy and G3 l/mm mode (16 x 15.4 dots/mm):   10402 rpm
- Printer mode (300 dpi):               7977.8 rpm

The charge on the exposed section of the drum drops to about -100 V while non-exposed areas it remains at about -750 V.

| **Cross-reference** |
| :--- |
| Group 3 Facsimile Manual: section 4-3-3 |

## 2. Block Diagram
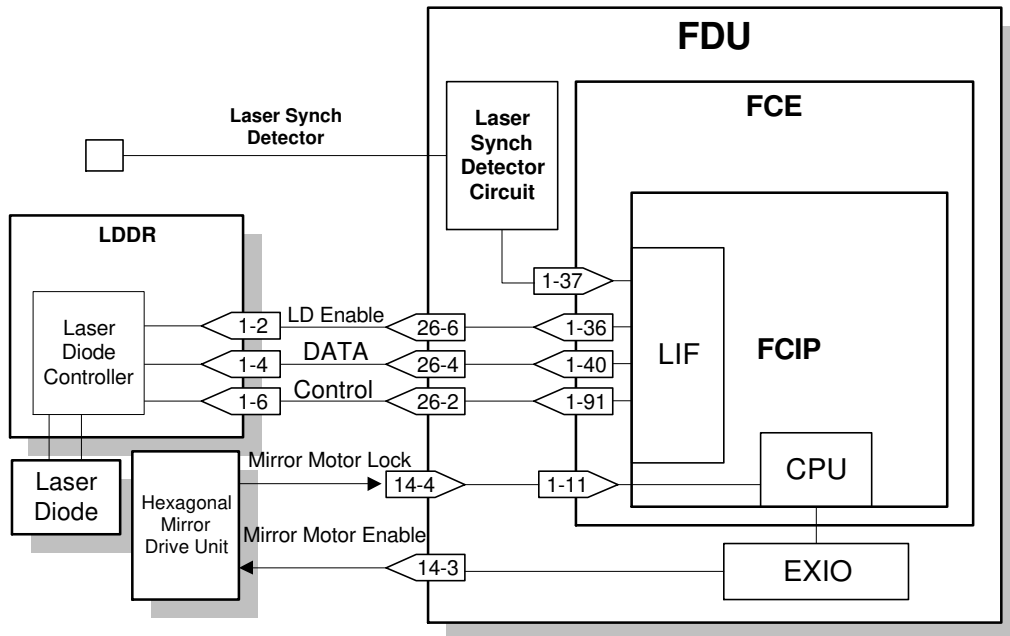


H521D648.wmf

The LIF block in the FCIP monitors and controls the laser diode power (FDU CN26-2) and transfers data for printing to the laser diode (FDU CN26-4).

**Cross-reference**
Group 3 Facsimile Manual: page 4-3-13

## 3. Error Conditions

**LD Failure Detection:**
The machine detects LD failure when the Laser Synchronization signal is not detected within 10 ms of the LD ready signal. When this occurs, the machine warns the customer with the Call Service indicator (error code 9-20).

**Mirror Motor Error:**
The machine detects a mirror motor error when FDU CN14-4 does not go low within 10 seconds of the hexagonal mirror motor being turned on.
The machine also detects a mirror motor error when FDU CN14-4 goes back to high for 3 seconds or more during mirror motor operation. When either of these errors occurs, the machine warns the customer with the Call Service indicator (error code 9-23).

## 4. Print Density Adjustment

The FCIP controls print image density by changing the laser pulse width to adjust the width of the dots across the page. The beam strength is not adjusted in this model.

The following table shows the relationship between the pulse width and the image density.

| Mode | | | Image Density | | |
|---|---|---|---|---|---|
| | | | Normal | Lighten | Darken |
| Copy Mode | Normal | | 80 % | 40 % | 160 % |
| | Halftone | | 80 % | 40 % | 160 % |
| Enlarge in Copying | 115 % | Normal | 100 % | 40 % | 160 % |
| | | Halftone | 80 % | 40 % | 160% |
| | 122 % | Normal | 100 % | 50 % | 150 % |
| | | Halftone | 83 % | 50 % | 150 % |
| | 141 % | Normal | 100 % | 43 % | 157 % |
| | | Halftone | 86 % | 43 % | 157 % |
| | 200 % | Normal | 100 % | 40 % | 160 % |
| | | Halftone | 80 % | 40 % | 160 % |
| Fax Mode | Normal | | 100 % | 40 % | 160 % |
| | Halftone | | 20 % | 20 % | 100 % |

To change the pulse width, the duty cycle of the laser pulse is changed. For example, to make the print density 40% of normal, the laser is only kept on for 40% of the normal duration for each pixel.

## 5. Enlargement

For enlargement, the FCIP controls the magnification ratio by changing the interval between pulses in the laser clock signals. So, for example, the clock signal pulse interval for 200% enlargement is twice as long as the interval for normal (100%) image reproduction. This makes each image pixel for 200% enlargement become twice as long as each pixel for normal image reproduction.

During copying, a main scan resolution of 16 dots/mm is used, and smoothing is not done on images of this resolution. In enlargement, since each pixel is enlarged, video processing such as smoothing cannot be done.

## 6. Toner Saving Mode

In this machine, toner saving is done by reducing the number of dots actually printed, not by varying the development bias. In toner saving mode, the image data is filtered through the following four-line matrix.

```
1st line              1 0 1 0 1 0 1 0 1 0 . . . . .
2nd line              0 0 0 0 0 0 0 0 0 0 . . . . .
3rd line              0 1 0 1 0 1 0 1 0 1 . . . . .
4th line              0 0 0 0 0 0 0 0 0 0 . . . . .
```

(1: Actual data printed, black or white; 0: Always a white pixel)

**Notes:**
- Toner saving mode only works when printing fax messages and reports. (However, toner saving is disabled in NSF/NSS halftone mode, that is, when bit 126 of the NSF/NSS frame is set to 1.)
- When toner saving mode is selected, the print image density is automatically set to "Normal"; in some cases, the image may become invisible if the Lighter setting is used.

---
**Cross Reference**
Toner Saving Mode: User parameter 12, bit 2

---

### Edge Enhancement

In toner saving mode, the machine prints a black pixel whenever the data changes from white to black in the main scan direction. In this way, edges on the image are printed more clearly.

## 2.2.5. Toner Supply
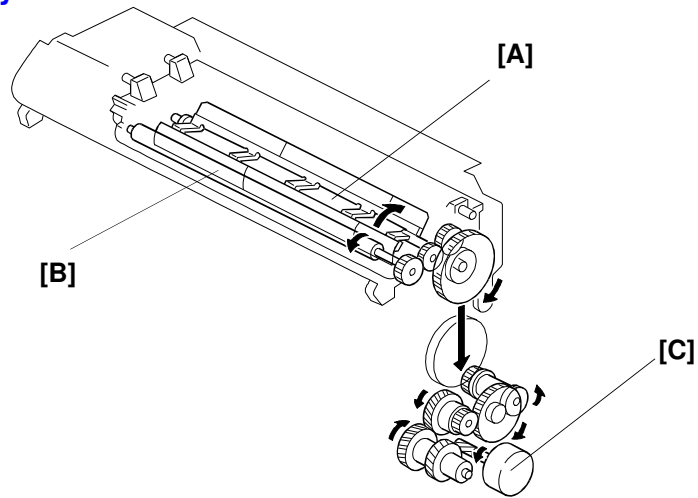


H521D617.wmf

This machine uses monocomponent toner, which is composed of resin and ferrite. The toner mixing bar [A] stirs and carries toner to the toner supply roller [B]. The toner supply roller supplies toner to the development unit.

The main motor [C] drives the toner supply mechanism through a gear train.
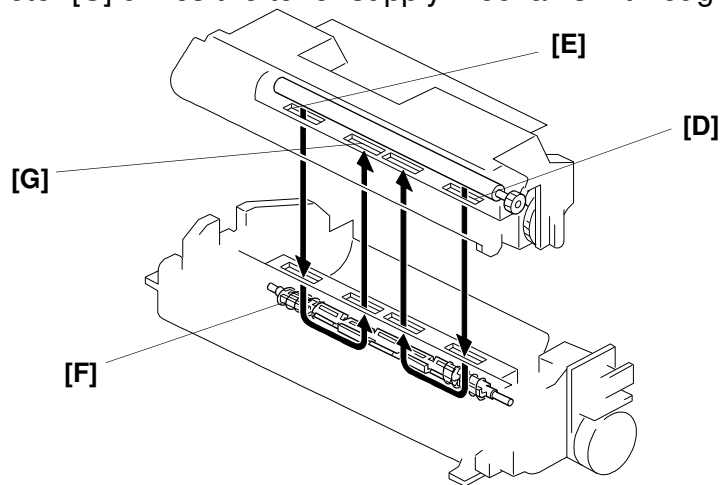


H521D649.wmf

Toner is supplied to the development unit from the outer openings [D, E] of the CTM. The spiral mechanism [F] on the toner supply bar distributes toner through the development unit.

Openings in the central area of the CTM [G] allow toner to circulate upwards from the development unit. This circulation prevents excessive toner supply to the development unit and ensures that the toner remains fresh (this helps to prevent blurred images).

**Initial Toner Supply Mode**

When the first CTM is installed in a new machine, the machine automatically supplies toner to the development unit for 90 seconds. This will also be done automatically after a RAM reset level 1 or 2 is performed.

Initial toner supply mode must also be executed by a technician when the development unit is replaced.

---
**Cross-reference**
Initial toner supply mode: RAM address 8003C1 (See sections 4-5 and 5-4-5 for details)

---

**CTM Detection**

At the following times, the machine detects whether a CTM is installed by checking the power supply to the quenching lamp (this is part of the CTM).
- At power-up.
- When the machine comes back to normal mode from the Level 2 Power Saver Mode.
- When the cover is opened and then closed.

The machine disables all printing processes if a CTM is not installed.

### Toner End Detection
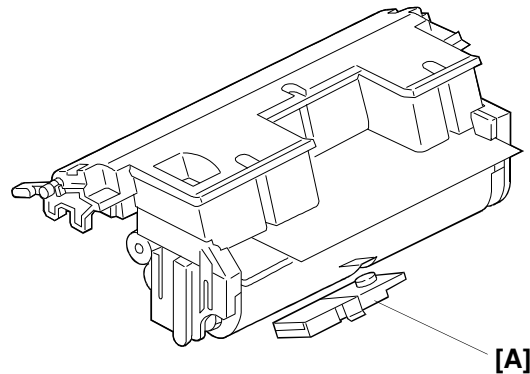


[A]                    H521D624.wmf

Toner near-end is detected by the toner end sensor [A], which is located below the toner tank.
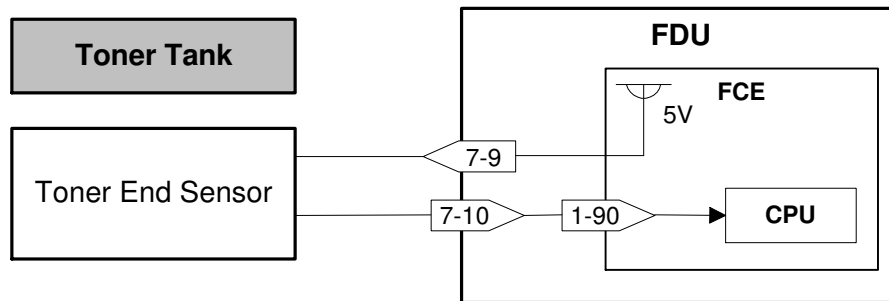


H521D660.wmf

While the main motor is rotating, the machine detects toner end by the voltage output from the toner end sensor . The voltage from the sensor is close to 5 V when the toner tank is full and becomes low when toner is almost empty.

**Toner near-end condition:** When the cpu detects a low output from the toner end sensor for more than 30 s, the cpu starts to blink the Add Toner indicator. This is the toner near-end condition.

**Toner end condition:** After toner near-end is detected, the machine can print 100 more sheets, then the cpu disables printing (this is the toner end condition).

The machine clears the toner near-end or toner end condition when the power is switched off and back on or when the cover is opened and closed, if the output from the toner end sensor goes back high again.

However, when the machine is turned off/on or when the cover is opened and then closed, the machine requires about 30 s to check for a toner near-end condition again. So, if the user prints something within this 30 s period without changing the CTM, the machine will allow the printout to be made, but the print quality may be poor.

## 2.2.6. Development



H521D616.wmf
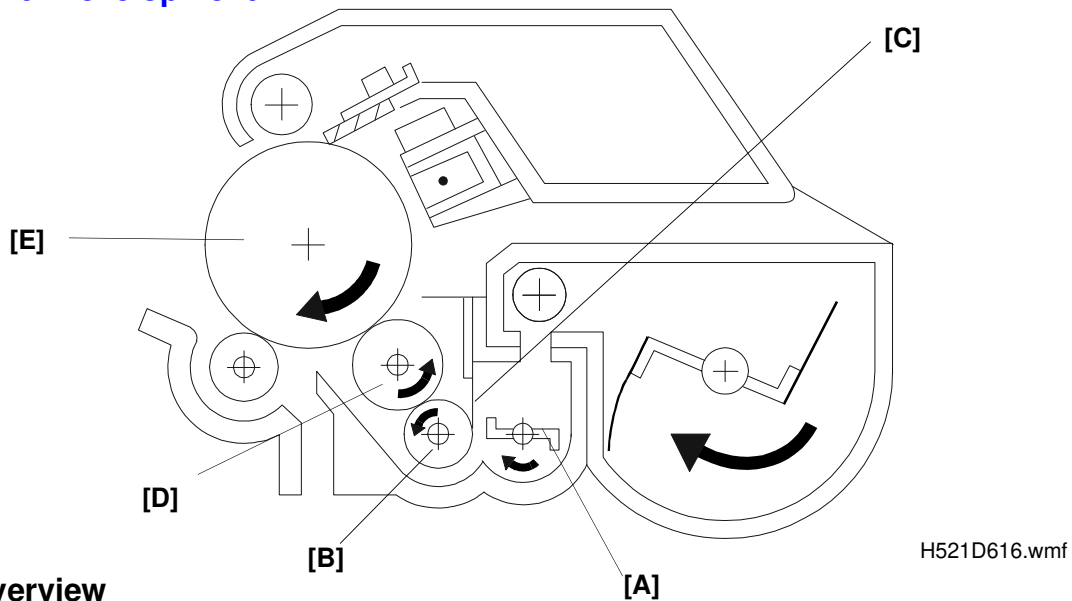
## Overview

There are two development rollers in the development unit: the Toner Application Roller and the Development Roller.

The toner supply bar [A] stirs and carries toner to the toner application roller [B]. Toner is attracted to the toner application roller because it has a magnetic layer. As the toner application roller turns past the toner metering blade [C], only a thin coating of negatively charged toner particles stays adhered. (Refer to section 4-4-2 of the Group 3 Facsimile manual.)

During printing, a bias voltage of -700 V is applied to the toner application roller and another bias voltage of -400 V is applied to the development roller. The toner is carried from the toner application roller to the development roller [D] by the potential difference between these two rollers.

The exposed area on the drum [E] is at -100 V. The development roller applies toner to these areas of the latent image as they turn past the drum.

The development roller is made of a soft rubber so it does not damage the surface of the drum. The development roller is provided as a separate spare part because it always contacts the toner application roller, and so may become dented.

The speed ratio between the drum, development roller, and the toner application roller is about 1 : 1 : 3. The toner application roller rotates three times as fast as the development roller, so it deposits a layer of toner three times as thick on the development roller. This leads to a clearer image. Also, the toner application roller rotates in the opposite direction to the development roller, which helps to keep the toner level on the development roller.

## Development Bias
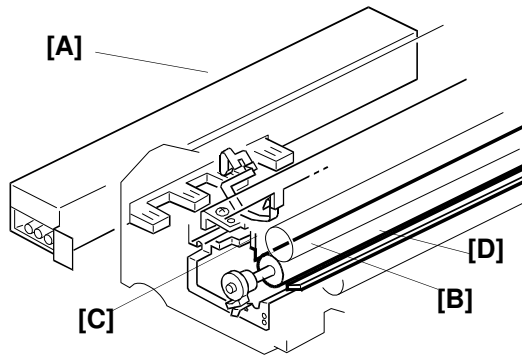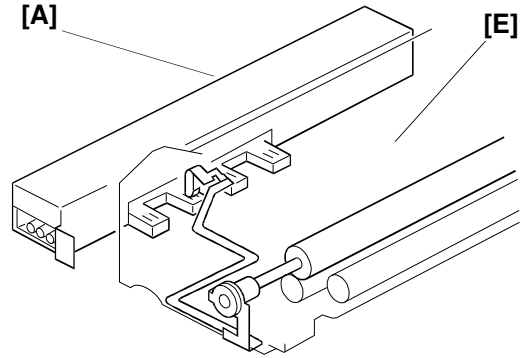


H521D618.wmf                                    H521D619.wmf

The power pack [A] applies one bias voltage to the toner application roller [B], toner metering blade [C], and bias brush [D], and a different voltage to the development roller [E].

## Bias Control (During Printing)

A charge of -700 ± 40 V is applied to the toner application roller, and -400 ±10 V is applied to the development roller. Toner transfers from the toner application roller to the development roller and on to the laser-exposed areas drum as shown below.
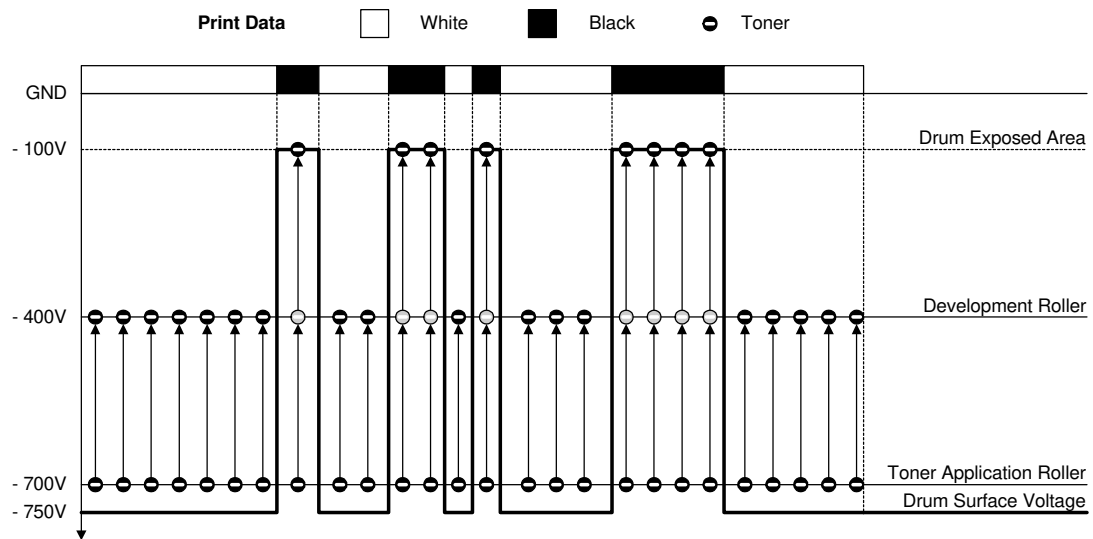


H521D655.wmf

## Bias Control (After Each Page)

After each page, the machine removes toner from the development roller and returns it to the development unit. To do this, -400V is applied to the development roller, but no bias is applied to the toner application roller.

Toner does not transfer to the development roller at "A", but remains on the toner application roller when it passes between the two rollers.

The remaining toner on the development roller does not transfer to the drum at "B", but transfers to the toner application roller at "C".

In some cases, positively charged toner may transfer to the drum in this condition. So, a positive current is applied to the transfer roller after each page, so that the positively charged toner does not transfer to the transfer roller.

**Drum**
- 750 V

- 400V

**Development Roller**

**A**

**B**

- 400V

**C**

**Toner Application Roller**

GND

H521D651.wmf

Toner

GND

Toner Application Roller

- 400V

Development Roller

- 750 V

Drum Surface Voltage
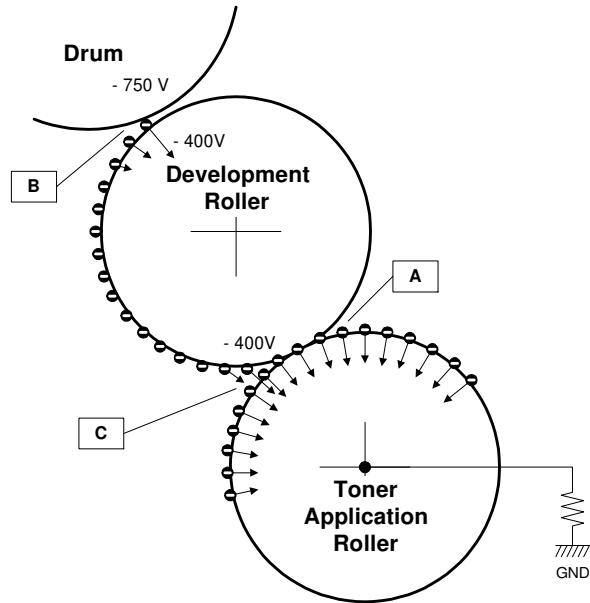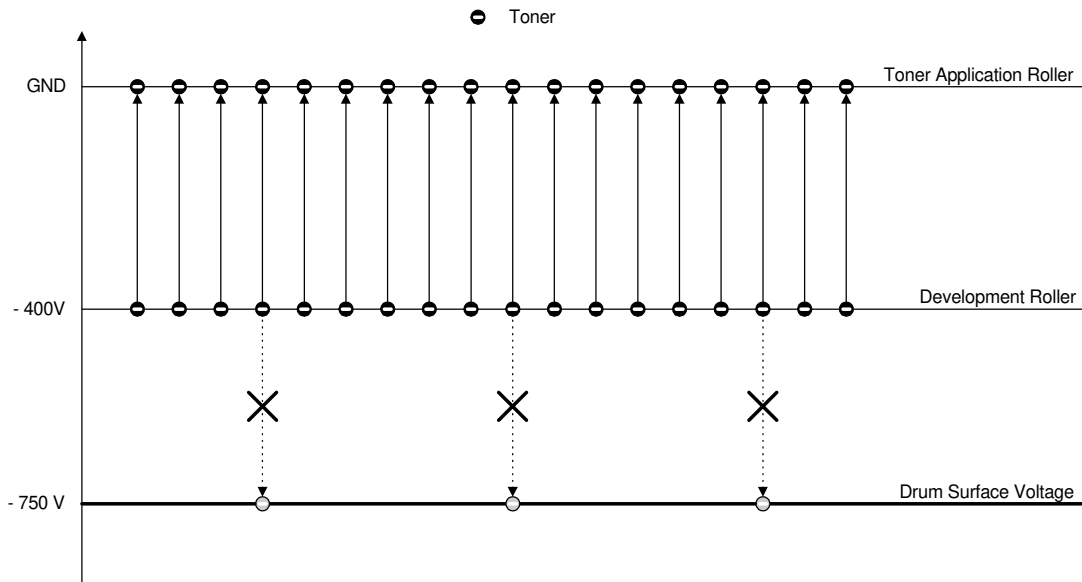
H521D656.wmf

## Bias Control (Other)

At the start and the end of any print process (including the cleaning and initial toner supply modes), -50 ± 50 V is applied to the toner application roller, and +250 ± 15 V is applied to the development roller. This is to avoid any toner transfer to the drum.
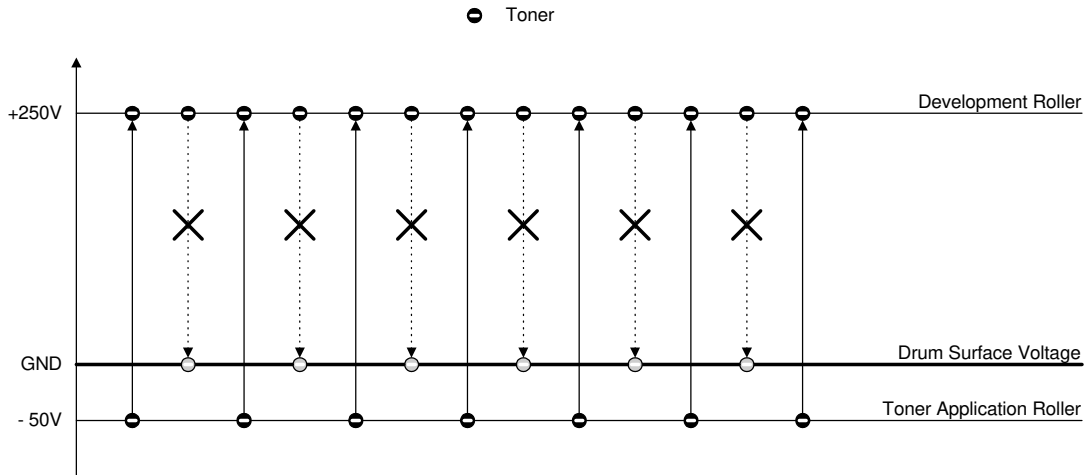


h521d650.wmf

Note that the voltage difference between the toner application and development rollers is kept the same as in printing, at 300 V. This keeps the same amount of toner on the development roller at all times during the print run.

## Bias Control Circuit
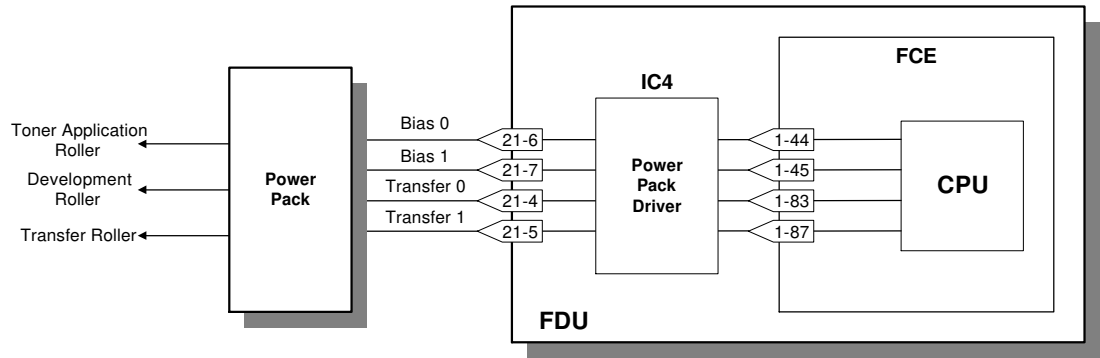


H521D652.wmf

The cpu controls the voltages to the toner application and development rollers using the Bias 0 and Bias 1 signals as shown in the following table.

| In | Bias 0 | Low | High | Low | High |
|---|---|---|---|---|---|
| | Bias 1 | Low | Low | High | High |
| Out | Toner Application Roller | - 700 V | - 50 V | Off | Off |
| | Development Roller | -400 V | + 250 V | -400 V | Off |

## 2.2.7. Paper Feed

## 1. Overview
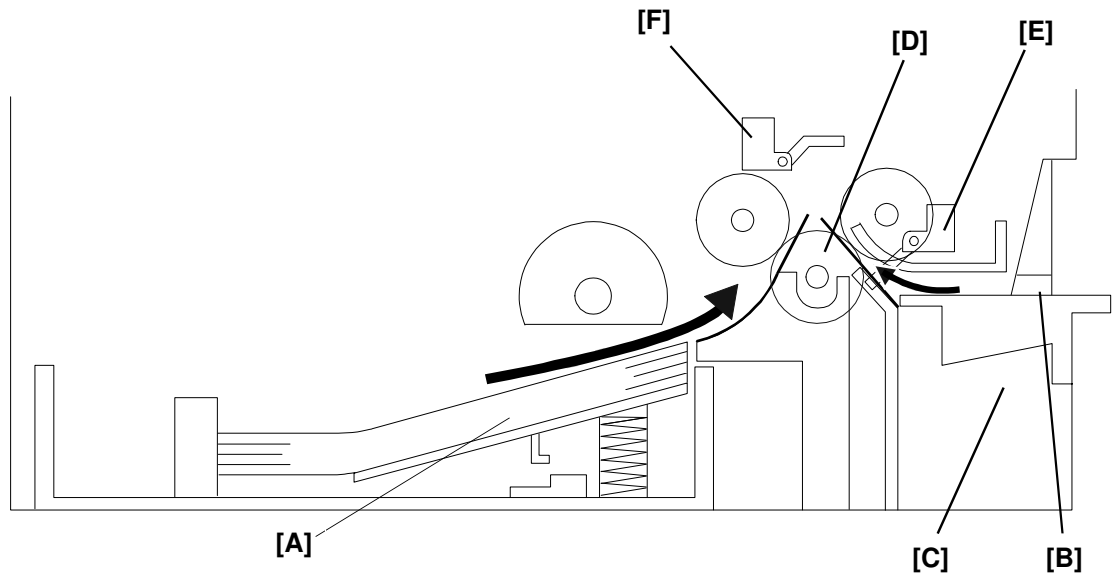


H521D015.wmf

The standard cassette [A] holds 250 sheets and the bypass feed slot [B] feeds 1 sheet at a time. The bypass feed slot can only be used in copy mode. An optional 100 sheet cassette can be fitted into cavity [C].

The registration roller [D] rotates clockwise when the standard cassette is used. It rotates counter-clockwise when the bypass feed slot [B] or the 100 sheet cassette is used.

When a sheet of paper is placed in the bypass feed slot, the bypass feed sensor [E] is turned on, and the machine prefeeds the paper until the registration sensor [F] is turned on.

## 2. Paper Lift Mechanism

### Standard and Optional 100 Sheet Cassette



H521D016.wmf

H521D609.wmf
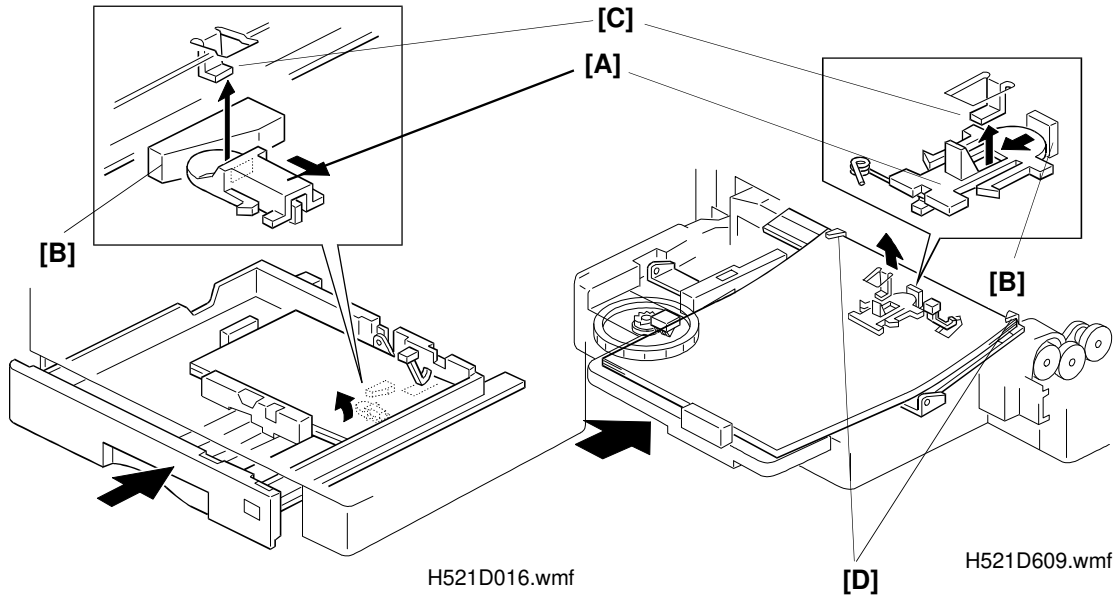
When the cassette is closed after paper is loaded, the slide lock [A] is pushed by the projection [B] and comes off the bottom hook [C].

Once the slide lock comes off, the bottom plate is raised by the pressure springs and the top sheet pushes up against the corner separators [D]. This keeps the stack of paper at the correct height.

## 3. Paper Size and Paper End Detection

### Standard Cassette/Optional Universal Cassette

The paper size detector [A] is located at the front of the cassette.
The machine determines which size cassette is installed by monitoring three microswitches.
The machine informs the customer with the Add Paper indicator if the paper size cannot be detected.
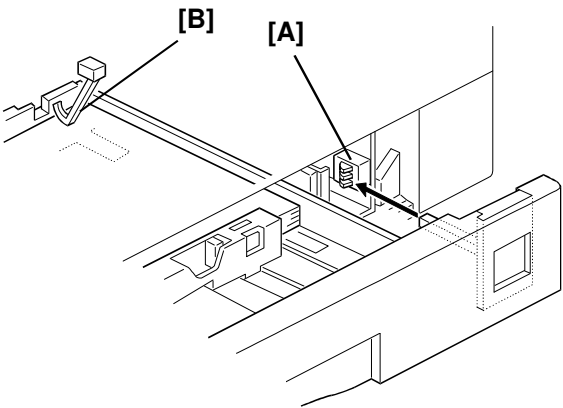
When the cassette runs out of paper, the paper end sensor actuator [B] drops through a slot in the bottom plate.

H521D018.wmf

Selectable cassette paper sizes:
- USA model: Letter, Half-Letter, Legal
- Europe/Asia model: A4, A5, B4, B5, F, F4

The following diagram shows the relationship between the activated microswitches and the selected paper size.

| Microswitch | USA Model | Europe/Asia Model |
|---|---|---|
| 000 | ----- | ----- |
| 001 | Legal | F/F4 |
| 010 | ----- | B4 |
| 011 | Letter | ----- |
| 100 | ----- | B5 |
| 101 | ----- | A4 |
| 110 | Half-Letter | B5 sideways |
| 111 | ----- | A5 |

**Example: Letter size paper**

**Microswitches**

☐ : 0: High

■ : 1: Low
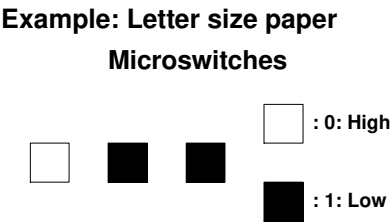
H521D658.wmf

**Note:** "-----" indicates that the machine detects that a cassette is not installed.

### Bypass Feed Slot

This machine does not detect paper width when the bypass feed slot is used. The maximum feed length for bypass feed is 600 mm. The minimum feedable paper size is 100 mm (width) and 148 mm (length).

### Optional 100 Sheet Cassette

The paper size detector [A] is located at the left hand side of the 100 sheet cassette. The microswitches work in the same way as in the standard cassette.

### Note:

B4 and B5 sideways paper cannot be used with the 100 sheet cassette.

When the 100 sheet cassette runs out of paper, the paper end sensor actuator [B] drops through a slot to detect paper end.

H521D611.wmf
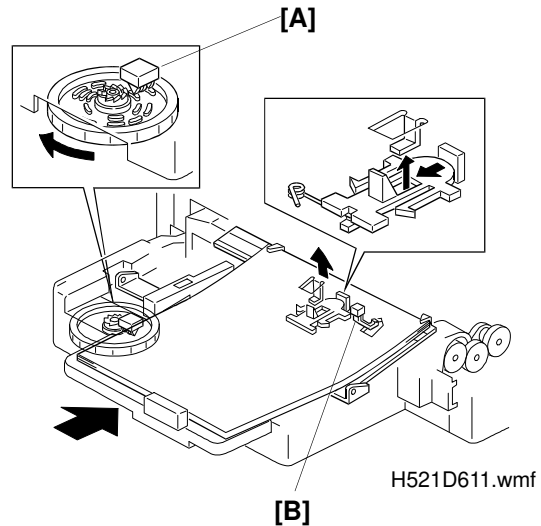
### Paper Size / End Detection

H521D659.wmf
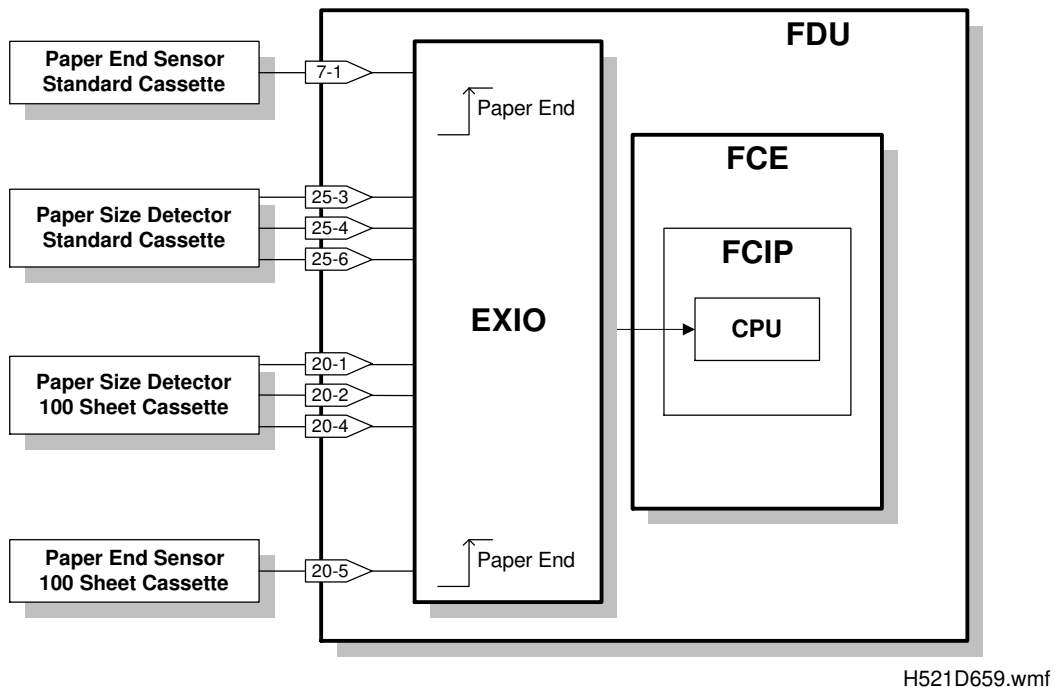
## 4. Pick-up and Separation

### Standard and Optional 100 Sheet Cassettes

The pick-up and separation mechanism is a corner separator type.

> **Cross-reference**
> Group 3 Facsimile Manual: section 4-5-4

The paper feed motor starts to rotate when the printer is ready for printing.

### By-pass Feed Slot

There is no pick-up or separation system in the by-pass feed slot. Only one sheet can be fed from this slot.

## 5. Drive Mechanism

### Standard Cassette
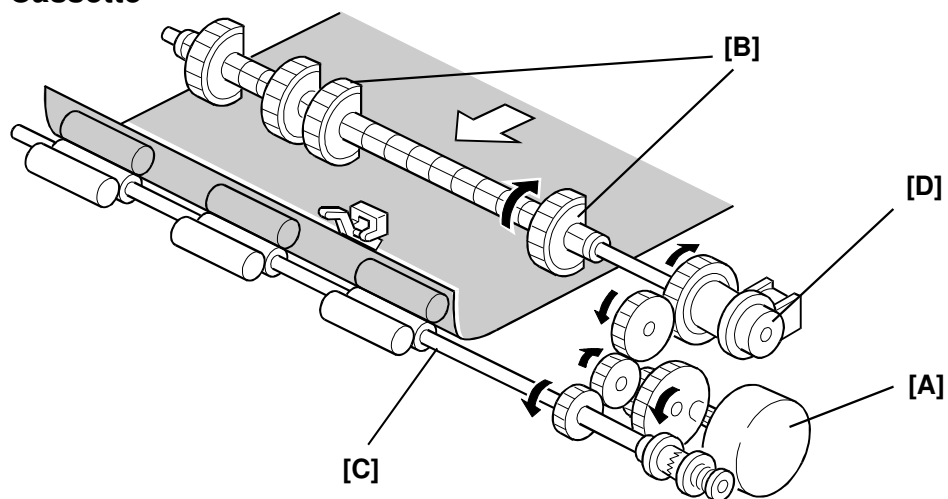


H521D017.wmf

The paper feed motor [A] drives the pick-up and feed mechanism. When the standard cassette is used, the paper feed motor turns clockwise, driving the paper feed rollers [B] and the registration roller [C], as shown in the diagram.

The paper feed clutch [D] turns on to allow the paper feed roller to turn only once for each sheet of paper.

While the registration roller turns counter-clockwise, paper cannot be fed into the machine from the optional 100 sheet cassette or bypass feed slot. This means that if a sheet of paper is placed in the bypass feed slot during printing from the standard cassette, this sheet will not be fed into the machine.

**Bypass Feed Slot**
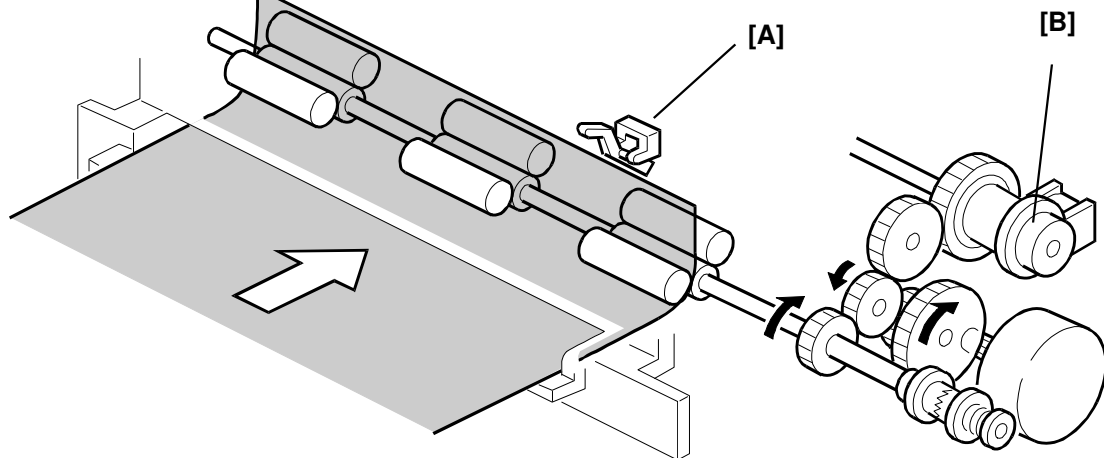


H521D019.wmf

When a sheet of paper is placed in the bypass feed slot, the bypass feed sensor is turned on. The machine turns the paper feed motor counter-clockwise to prefeed the paper until the registration sensor [A] is turned on, or for 1 second, whichever is first.

The paper feed clutch [B] is kept off to prevent any drive from being transmitted to the paper feed rollers for the standard cassette when the paper feed motor turns counter-clockwise.

If a sheet of paper remains in the bypass feed slot for longer than the Auto Reset Time (System Switch 0B), the machine will automatically feed it out. The machine will not print incoming messages while there is a sheet of paper in the bypass feed slot, so feeding out the page after the Auto Reset Time allows incoming faxes to be printed even if someone leaves paper in the bypass feed slot.

Sheets of paper longer than about 60 cm cannot be fed from the bypass feed slot, or a paper jam will occur (error code 9-81).

Note that the bypass feed slot can only be used for copying and for printing from the PC using the optional printer interface.

## Optional 100 Sheet Cassette



H521D614.wmf
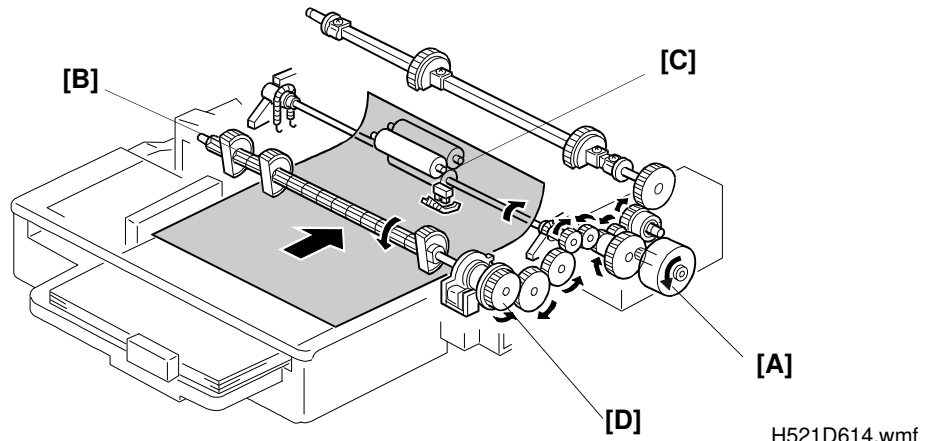
When the machine feeds a sheet of paper from the 100 sheet cassette, the paper feed motor [A] turns counter-clockwise to drive the paper feed rollers [B] and the registration roller [C] as shown in the diagram.

The paper feed clutch [D] ensures that the paper feed roller rotates only once for each sheet of paper.

## Paper Feed Priority

If there is an optional cassette installed in the machine, the priority for paper feed is decided in accordance with the following rules.
- The paper in the bypass feed slot has the first priority (for copying and printing from a PC only).
- If the cassettes contain the same paper size, the 100 sheet cassette is used first.
- If the cassettes contain different sizes, the machine selects the paper size as explained in section 2-2-13, "Paper Size Selection".

## 2.2.8. Registration
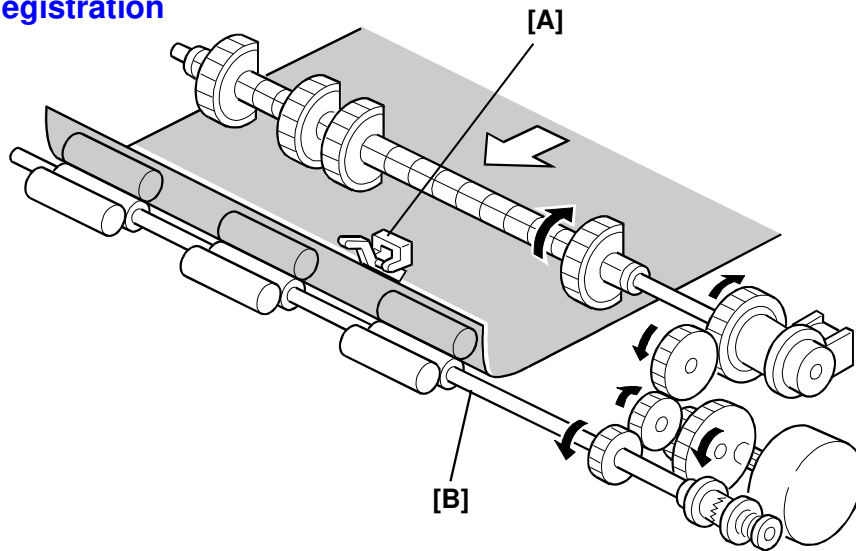


H521D017.wmf

The registration sensor [A] is positioned above the registration roller [B].

When a cassette (Standard, Universal, or 100 Sheet Cassette) is used, the machine stops the paper feed motor for a few moments when the registration sensor is turned on.

When the bypass feed slot is used, the machine prefeeds the paper until the registration sensor is turned on (or for 1 second, whichever comes first).

Then, the paper feed motor starts rotating immediately after laser scaninng starts.

When the leading edge touches the pressure rollers, the momentum of the paper corrects any skew.

When the fusing unit cover is opened, the door end pushes the spring lever [C] and the release lever [D] as shown in the diagram. This releases drive applied to the registration roller and allows the registration roller to rotate freely, making it easier for a user to remove jammed paper.

This can be done manually by removing the by-pass feed slot cover and pushing the release lever [D].
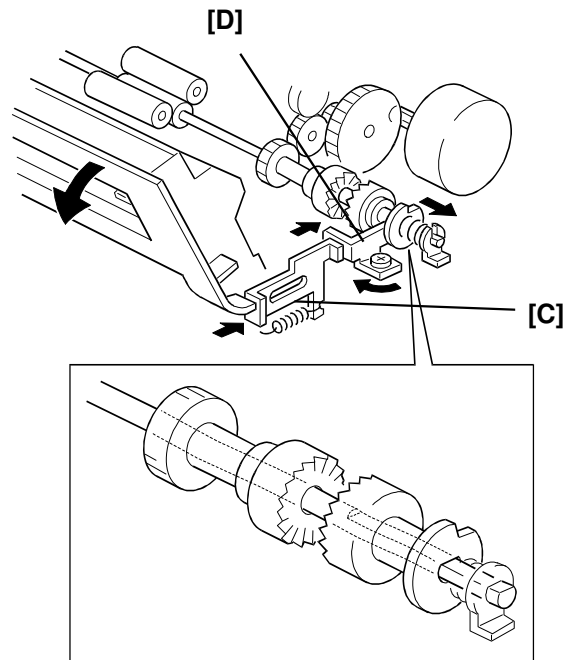


H521D024.wmf

## Jam Detection

|  | **Condition** | Error Code |
|---|---|---|
| When the standard cassette is used | When the registration sensor is not turned on within 2.0 seconds of the paper feed clutch turning on. | 9-07 |
| When the standard, 100 sheet cassette, or bypass feed slot is used | When the paper feed out sensor is not turned on within 2.6 seconds after the paper feed motor starts to feed paper for printing (not for prefeed). | 9-08 |
|  | When the registration sensor is not turned off within X seconds after it turned on.<br>X seconds = (paper length / 67.546) + 3 seconds<br>(67.546 mm/ s : paper feed speed) | 9-08 |
| When the bypass feed slot is used | When the registration sensor is not turned on within 2 seconds after the paper feed motor starts rotating for printing.<br>(This error is not generated during prefeed, to allow the users to change their minds after putting paper in this slot. When the bypass feed sensor is turned on, the machine prefeeds the paper for up to 1 second and stops feeding even if the registration sensor is not turned on. If the registration sensor did not turn on at prefeed, the machine checks for the above error.) | 9-80 |
|  | When the bypass feed sensor is not turned off within 11.9 seconds after it is turned on.<br>Using the same formula as above (error code 9-08), it works out that individual sheets cannot be longer than about 60 cm. | 9-81 |
| When the 100 sheet cassette is used. | When the registration sensor is not turned on within 2.0 seconds of the paper feed clutch turning on. | 9-82 |

## 2.2.9. Transfer and Separation
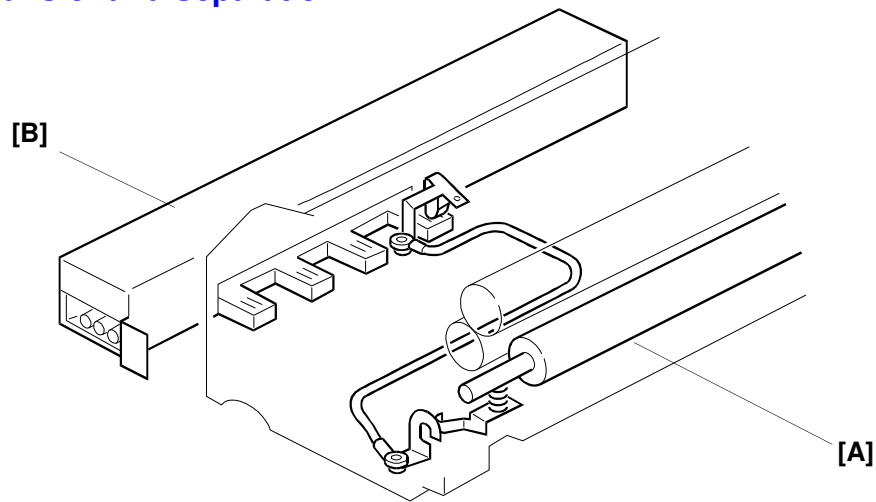


H521D620.wmf

Instead of using a transfer corona wire, this machine uses a transfer roller, which touches the drum surface.

A constant current of $+5 \pm 0.2$ μA is applied to the transfer roller [A] from the power pack [B]. The positively biased transfer roller pulls negatively charged toner off the drum. The curvature of the drum and the antistatic brush helps the paper to drop away from the drum.

Temperature and humidity have less effect on the supply of ions when the transfer current is held constant. With a constant voltage, ions may dissipate in some conditions.
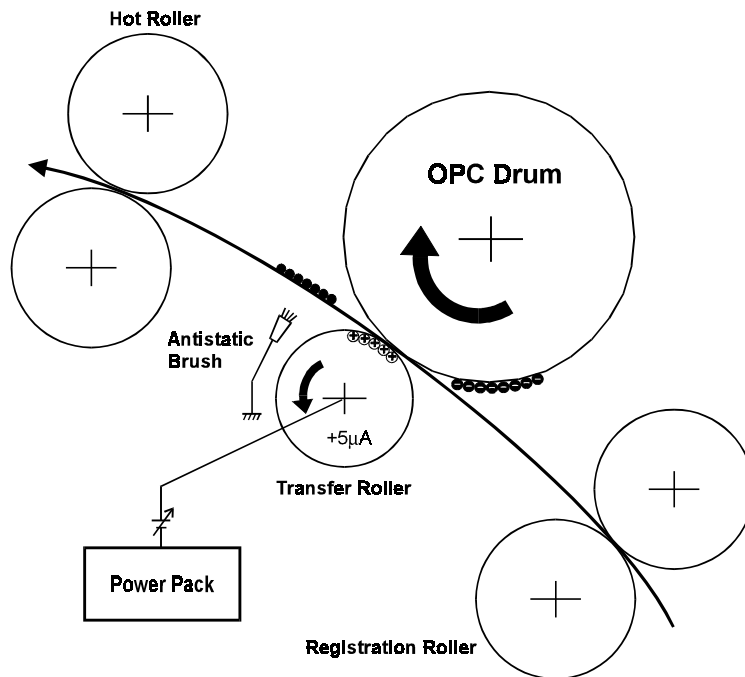


H521D653.wmf

### Cleaning Mode

If the paper size is smaller than the printed image, or if a paper jam occurs during printing, toner may be transferred to the the roller surface. To prevent this toner from transferring to the back side of copies, the transfer roller has to be cleaned before the next printing run.

While the machine is in the cleaning mode, the power pack supplies -1000V± 50V to the transfer roller, and charges the drum to -750 V. The negatively charged toner on the transfer roller is then transferred back to the drum.

The machine goes through the cleaning mode in the following conditions:
- At power-up (the process starts when the fusing temperature reaches half of the standby temperature)
- When the cover is opened and then closed during the printing process.
- After a printer jam has been cleared.
- After the bypass feed slot has been used (each page): This is done only if printer switch 00 bit 3 is set to 1.

The cpu controls the transfer roller voltage through the power pack using the Transfer 0 and Transfer 1 signals as shown below (for a circuit diagram, see Bias Control in section 2-2-6).

| In | Transfer 0 | Low | High | Low | High |
|-----|-----|-----|-----|-----|-----|
|  | Transfer 1 | Low | Low | High | High |
| Out | Transfer Roller | + 5 µA | - 1000 V | Off | Off |

## Timing Chart: Cleaning Mode
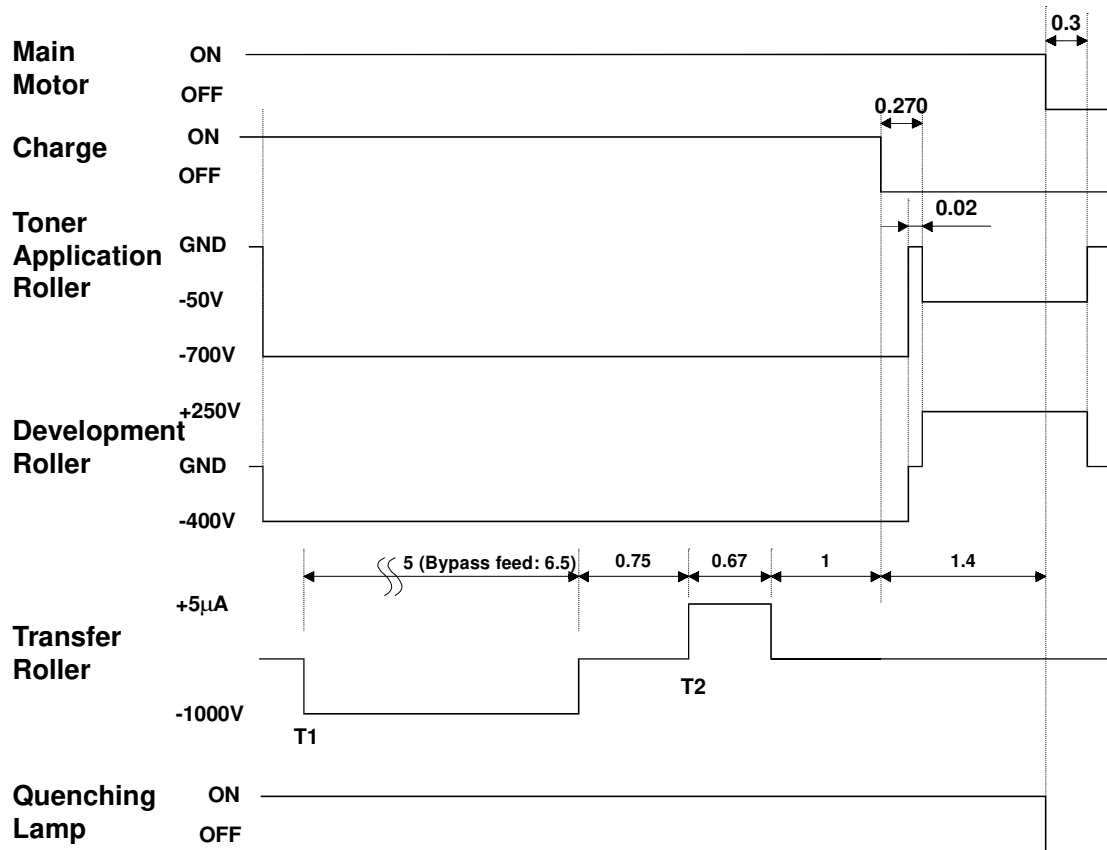


H521D663.wmf

Before cleaning starts, the main motor, charge corona, and quenching lamp turn on.

T1. Cleaning bias is applied to the transfer roller.

T2. A positive constant current of $+5 \pm 0.2$ μA is applied to transfer back to the drum any toner which is positively charged by the transfer roller.

## 2.2.10. Cleaning

The cleaning unit and the used toner tank are contained in the CTM.

The cleaning blade [A] removes any toner remaining on the drum after the image is transferred to the paper. A magnetic roller [B] then brings the toner into the used toner tank [D]. The mylar blade [C] scrapes the toner off the magnetic roller into the used toner tank [D].

When the CTM is removed from the machine, the cleaning roller cover [E] is closed by a spring. This prevents removed toner from falling out of the unit.
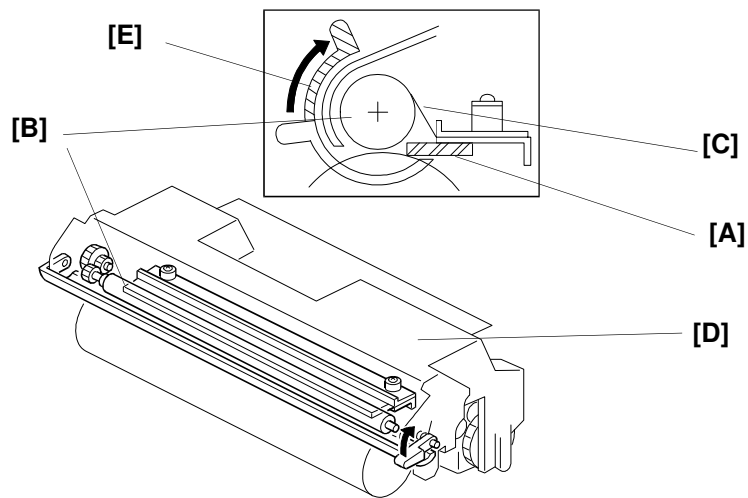
H521D621.wmf

There is no used toner overflow detection mechanism because the used toner tank is large enough for the lifetime of the CTM.

## 2.2.11. Fusing

### Fusing Lamp Control

When the main switch is turned on, the machine turns on the fusing lamp and raises the fusing temperature to 80 °C in about 6 s. For printing, the machine raises the fusing temperature to 185 °C.

When the Power Saver Key is pressed or the power saver timer expires, the machine goes into a power saver mode. In Level 2 Power Saver Mode, the fusing lamp is turned off. For Power Saver Mode Level 1, the user can select whether to keep the fusing lamp off, or at 80 °C or at 145 °C.

> **Cross Reference:**
> Power Saver Modes: Section 2-3

If the printing operation continues for more than 3 minutes, the machine keeps the fusing temperature at 175°C.

Points to Note:
- Standby temperature: 145 °C
- Printing start temperature: 160 °C
- Printing temperature: 185 °C (monitored by a comparator)
- Thermistor maximum: 250 °C
- Thermostat maximum: 150 °C (the temperature of the hot roller would be about 400 °C)
- Thermofuse maximum: 169 °C (the temperature of the hot roller would be about 400 °C) - The thermofuse is not used in USA models.
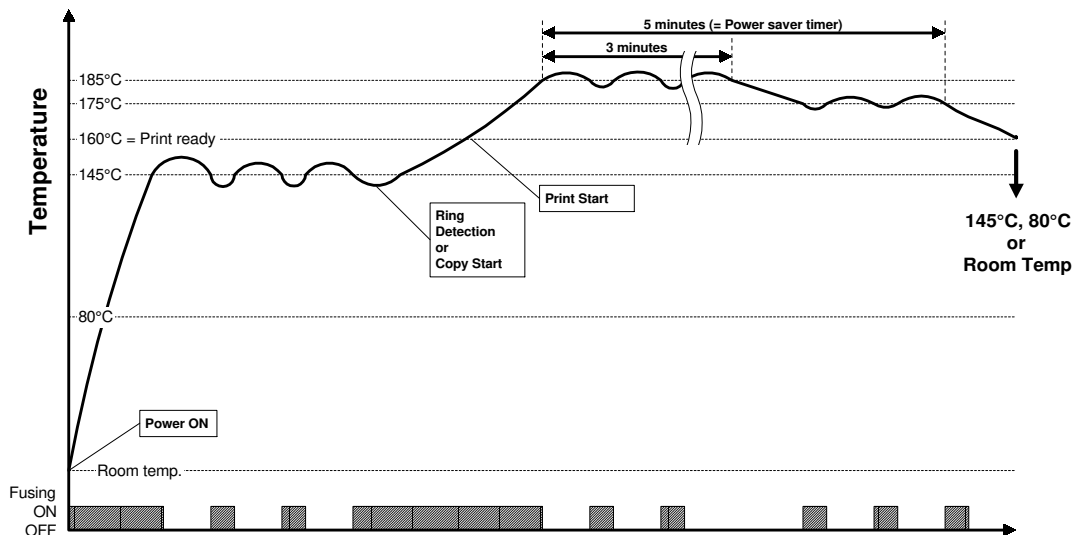
H521D654.wmf

## Fusing Control



H521D662.wmf

During normal operation, the cpu controls the fusing lamp based on input from the thermistor using the above circuit.

When the machine switches on, or when it comes back from the Level 2 Power Saver Mode, it checks whether the thermistor circuit is intact by temporarily closing the initial detect switch circuit on the FDU. If the thermistor is connected properly, the machine begins normal operation. If it is not, an Auto Service Call (error code 9-22, sub-code 09) is generated.

As a backup safety measure, when the temperature of the hot roller reaches about 400 °C, the thermostat and/or the thermofuse open (the thermofuse is not installed in USA models).

The machine turns on the cooling fan when the fusing temperature reaches 120 °C. It is turned off when the fusing temperature drops below 120 °C.

**Fusing Unit Drive**
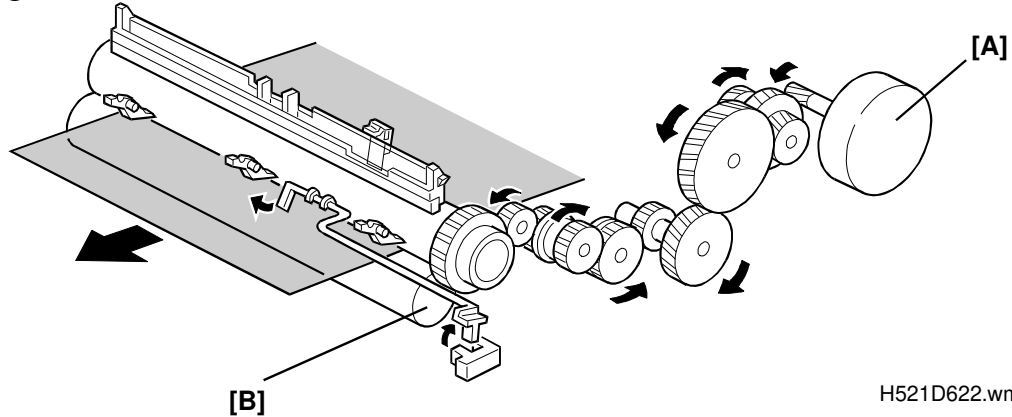


H521D622.wmf

The main motor [A] drives the fusing unit through a gear train. The paper feed-out sensor [B] detects when the paper is fed out of the unit.

**Jam Detection - Paper Feed Out**

The machine detects a paper jam when the paper feed out sensor is not turned off within X seconds or more after it is turned on (error Code 9-09).

X seconds = (paper length / 67.546) + 3 seconds

(67.546 mm/s is the paper feed speed)

These conditions are the same for the standard (universal) cassette, bypass feed, and optional 100 sheet cassette.

## Service Call Conditions

| | **Conditions** | **Error Code (9-22)** |
|---|---|---|
| At power on | If there is any problem with the thermistor. (This detection is also done when the machine comes back to the normal mode from the Power Saver Mode Level 2.) | Sub-code 09 |
| Standby mode | If the fusing temperature stays below 80 °C for more than 18 seconds when power saver standby temperature (80 °C) is selected in Power Saver Mode Level 1. Or, if the fusing temperature stays below 145 °C for more than 25 seconds when the standby temperature (145 °C) is selected in Power Saver Mode Level 1. | Sub-code 05 |
| | If the fusing temperature takes more than 40 seconds to reach 160 °C from the standby temperature. | Sub-code 02 |
| During printing | If the fusing temperature stays above 185 °C for more than 40 seconds. | Sub-code 01 |
| | If the fusing temperature comes below 140 °C during printing. | Sub-code 07 |
| After printing | If the fusing temperature takes more than 20 minutes to go down to below 100 °C when the machine goes into the Power Saver Mode Level 1. (When fusing lamp OFF is selected for Power Saver Mode Level 1.) | Sub-code 03 |
| | Either: If the fusing temperature takes more than 20 minutes to go down to below 100 °C when the machine goes into the Power Saver Mode Level 1 (when the power saver standby temperature of 80 °C is selected for Power Saver Mode Level 1.) Or: If the fusing temperature takes more than 5 minutes to go down to the standby temperature (145 °C) when the standby temperature is selected for Power Saver Mode Level 1. | Sub-code 04 |
| At any time | If the fusing temperature reaches 250°C. | Sub-code 08 |

## 2.2.12. Page Separation and Data Reduction

Incoming pages that are only slightly longer than the copy paper may be reduced in the sub-scan direction. Whether or not this happens depends on the settings of printer bit switches 04 and 05.

**Reduction Enabled**

If bit 0 of printer switch 03 is at 1 (Enabled), the data will be reduced in the page memory to fit on the copy paper. However, data will only be reduced if the length of the incoming page is between 5 mm shorter and a certain maximum length. This maximum incoming page length that can be reduced depends on the copy paper size and on the reduction ratio stored in printer switches 04 and 05.

Each paper size can be programmed with a separate reduction ratio. In each of the two bit switches, there is one bit for each possible paper size. The combination of the bit settings determines the ratio for that paper size.

| Bit No. Switch No. | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| | Not used | B4 | Legal | F | A4 | B5 Letter | B5 sideways | A5 sideways HLT |
| Sw 04 | 0: 3/2 | | 1: 4/3 | 0: 8/7 | | 1: 12/11 | | |
| Sw 05 | 0: | | 0: | 1: | | 1: | | |

The following table shows the maximum incoming page length that can be reduced for each copy paper size. All length are in millimeters. The factory setting of the reduction ratio is 4/3.

USA Model

| Copy Paper Type | Copy Paper Length | Maximum reducible incoming page lengths | | |
|---|---|---|---|---|
| | | Ratio = 4/3 | Ratio = 8/7 | Ratio = 12/11 |
| Half-Letter | 139.5 | 179.0 | 153.2 | 146.5 |
| Letter | 279.2 | 365.2 | 313.0 | 298.7 |
| Legal | 355.6 | 467.0 | 400.3 | 382.1 |

Europe/Asia Model

| Copy Paper Type | Copy Paper Length | Maximum reducible incoming page lengths | | |
|---|---|---|---|---|
| | | Ratio = 4/3 | Ratio = 8/7 | Ratio = 12/11 |
| A5 | 147.8 | 190.1 | 162.9 | 155.3 |
| B5 | 181.8 | 235.8 | 201.8 | 192.5 |
| A4 | 296.9 | 388.8 | 333.2 | 318.2 |
| F/F4 | 330.1 | 433.2 | 371.2 | 354.3 |
| B4 | 363.9 | 478.2 | 409.9 | 391.1 |

Incoming pages that are longer than the maximum length will not be reduced, but will be printed on two pages and treated in accordance with the setting of bit 1 of bit printer switch 00. If this bit is 1, the bottom few lines of the page will continue from where the first page left off.

### Reduction Disabled

If bit 0 of printer switch 03 is at 0 (Disabled), the data will not be reduced. However, if the incoming page is up to x mm longer than the copy paper, the excess portion will not printed. The value of x can be from 0 to 15 mm. It is determined by the setting of bits 4 to 7 of printer switch 03.

| Hex value | Value of X |
|:---:|:---:|
| 0 | 0 |
| 0 | 1 |
| and so on until ||
| F | 15 |

Messages more than x mm longer than the copy paper will be printed out on two pages in accordance with the setting of bit 1 of printer switch 00 as explained earlier.

## 2.2.13. Paper Size Selection

If there is an optional cassette installed in the machine, the paper size to use is decided in accordance with the following rules.

- If both cassettes contain the same paper size, the 100 sheet cassette will be used.
- If the received page has to be split up and printed on two pages, both pages will be the same size.
- If the cassettes contain different sizes, the paper size chosen for printing the received fax message is selected in accordance with the following table of priorities. The table assumes that reduction is enabled and that the reduction ratio is 4/3.

| Received Fax Message Size | Selected Paper Size | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | HLT | A5 | LT | A4 | F,F4 | LG | B5 | B4 |
| Half-Letter | 1 | 2 sideways | 3 | 4 | 5 | 6 | 7 sideways | 8 |
| A5 sideways | | 1 sideways | 2 | 3 | 4 | 5 | 6 sideways | 7 |
| Letter | 7(SR) | 6(SR) sideways | 1 | 2 | 3 | 4 | 8(SR) sideways | 5 |
| A4 | 7(SR) | 6(SR) sideways | 5(R) | 1 | 2 | 3 | 8(SR) sideways | 4 |
| F, F4 | 7(SR) | 6(SR) sideways | 5(R) | 4(R) | 1 | 2 | 8(SR) sideways | 3 |
| Legal | 7(SR) | 6(SR) sideways | 5(R) | 4(R) | 3(R) | 1 | 8(SR) | 2 |
| B5 sideways | | | | | | | 1 sideways | 2 |
| B4 | | | | | | | 2(SR) sideways | 1 |

- The paper size priority is graded from 1 to 5.
- S: The data has to be separated and printed on more than on page.
- R: The data is reduced to fit on the printer paper.
- Some of the reports can be printed on A5 paper without page separation. However, if only A5 paper is in the cassettes, reports that need larger paper sizes will require page separation.

## 2.3. SYSTEM FEATURES

### 2.3.1. Power Saver Modes



h521d625.wmf

The machine has three levels of power saver mode as shown below.

|  | Normal | Level 0 | Level 1 | Level 2 |
|---|---|---|---|---|
| Main CPU | ON | ON | ON | OFF |
| Power Saver CPU | OFF | OFF | OFF | ON |
| Power Saver LED | OFF | ON | ON | ON |
| LCD/LED | ON | OFF | OFF | OFF |
| +5V Power Supply | ON | ON | ON | OFF |
| +24VM Power Supply | ON | ON | ON | OFF |
| Fusing Lamp | ON | Standby temp. or OFF | Standby temp. or OFF | OFF |
| +24VM Power Supply | ON | ON | ON | OFF |

In power saver mode levels 0 and 1, the main CPU monitors and controls the system. The fusing lamp is either turned off or kept at the standby temperature, depending on the setting of User Parameter Switch 05, bits 6 and 7.

In level 2, the main CPU and dc power supplies are shut down. The power saver CPU monitors the power saver key, incoming calls, and the document sensor. When the power saver CPU detects activity at one of these, it activates the +5V supply with the WAKEUP signal to start up the main CPU.

The following sections explain how the machine controls these three modes. Note that power saver mode does not operate if an optional printer interface or RS232C kit is installed.

## 1. Going into a Power Saver Mode

The flow chart on the next page explains how the machine goes into a power saver mode, depending on parameter settings and other machine conditions.

**Entering Power Saver Mode from Standby**

**- Power Saver Timer -**
When the power saver timer expires since the last time a condition #1 operation was detected (see the flow chart), the machine automatically goes into a Power Saver Mode. See the point marked 1 on the flow chart.

> **Cross Reference**
> Power saver timer initial setting: System Switch 0B, bits 2 and 3
> (1 minute, 3 minutes, 5 minutes, or Unlimited: Timer disabled)

**- Power Saver Key -**
When this key is pressed, the machine checks if there are any background operations in progress (these are the condition #2 operations on the flow chart). If there are none, the machine will automatically go into a Power Saver Mode. See point 2 on the flow chart.

**Which Power Saver Mode is Selected?**

If User Switch 05, bits 6 and 7 are set to maintain the fusing lamp at a certain temperature during Power Saver Mode, the machine enters Power Saver Mode Level 1. See point 3 on the flow chart.

If User Switch 05, bits 6 and 7 are set to keep the fusing lamp off during Power Saver Mode, the machine checks for events listed on the flow chart as condition #3 events (see point 4 on the flow chart). If none exist, the machine goes to Power Saver Level 2. If one or more does exist, the machine enters Power Saver Level 1 until the conditions are all cleared. then it goes to Power Saver Level 2.

See the next flow chart for more details on how the machine changes from Level 1 to Level 2.

> **Cross Reference**
> Fusing lamp control during Power Saver Mode: User Switch 05, bits 6 and 7
> (On at printing temperature, On at standby temperature, or Off)

> **Note**
> The "optional equipment" in condition #3 is either a Printer Interface or a RS232C Interface.
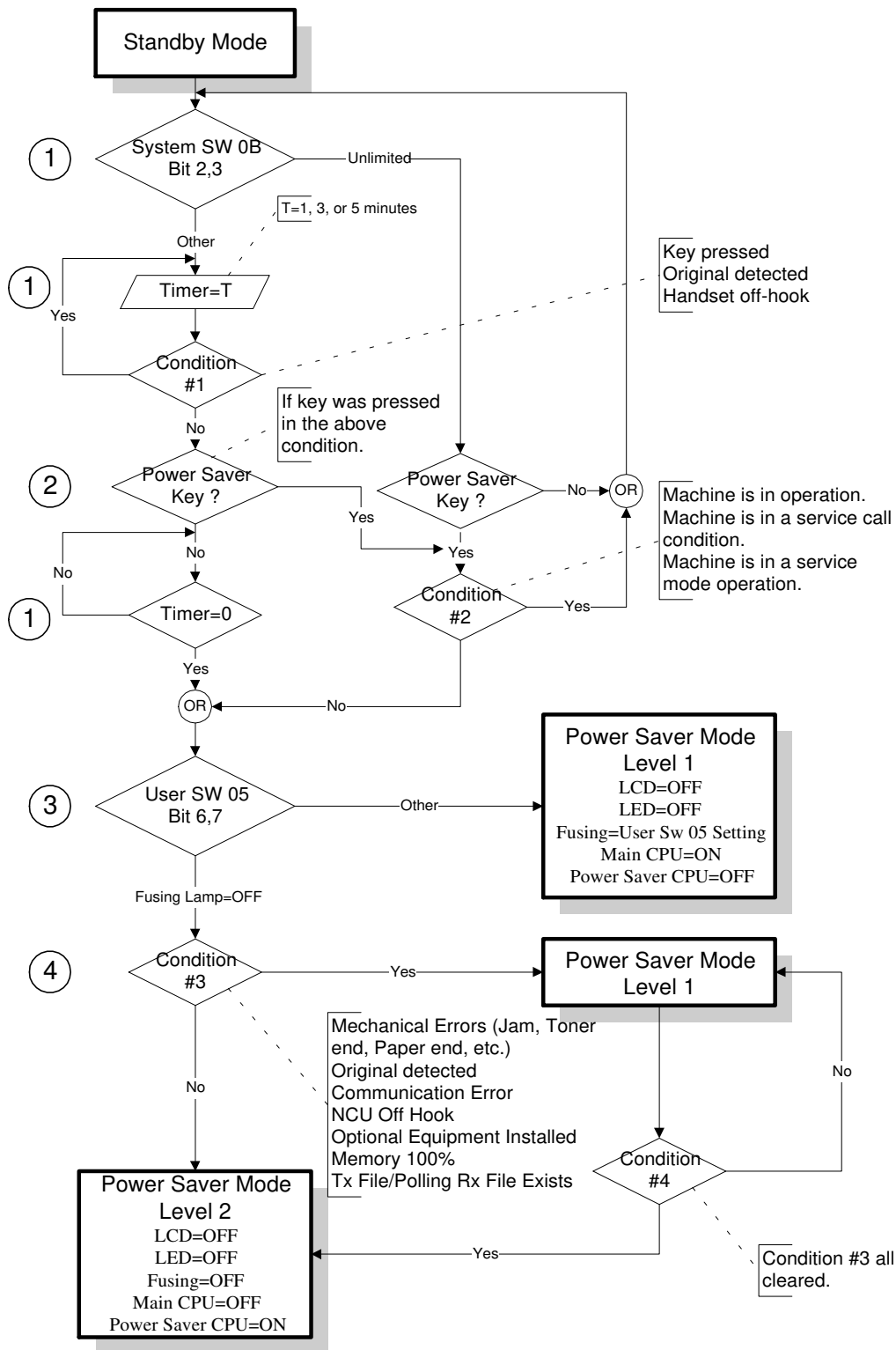
h521d626.wmf

## 2. Going into Level 2 Mode from Level 1 Mode

The flow chart on the next page shows in more detail how the machine goes from Power Saver Mode Level 1 to Level 2.

The machine will not go into Level 2 power saver mode if one of the following conditions exists.
- Either a tx/rx/polling file is stored in the memory.
- SAF memory not empty
- Mechanical error(s)
- NCU off-hook
- Optional equipment installed (a printer interface and/or a RS232C interface)

**If there is a tx file in the memory**

The machine stays in Power Saver Mode Level 1 until it is time to send the message. The machine then enters Level 0 while the message is sent. See point 1 on the flow chart.

**When the Power Saver timer expires**

When the power saver timer expires after the machine entered Level 1 for the first time (or, if a tx file was present, after the message was transmitted), the machine will enter Level 2 if both of the following are met:
- User Switch 05, bits 6 and 7 specify Fusing Lamp Off
- No condition #1 restrictions exist.

See point 2 on the flow chart.

```
┌─────────────────────────┐
│   Power Saver Mode      │
│       Level 1           │
│      LCD=OFF            │
│      LED=OFF            │
│ Fusing=User SW 05 Setting│
│     Main CPU=ON         │
│   Power Saver CPU=OFF   │
└─────────────────────────┘
```

System SW 0B Bit 2,3  
T=1, 3, or 5 minutes

( 1 )    Tx file in memory ?  ──No──▶  Timer=T    ( 2 )

Yes

Tx time ?  ──No──▶

Yes

Timer=0  ──No──▶

Yes

```
┌─────────────────────────┐
│   Power Saver Mode      │
│       Level 0           │
│      LCD=OFF            │
│      LED=OFF            │
│ Fusing=User SW 05 Setting│
│     Main CPU=ON         │
│   Power Saver CPU=OFF   │
└─────────────────────────┘
```

User SW 05 Bit 6,7  ──No──▶  OR

Fusing Lamp=OFF

Condition #1  ──Yes──▶

Mechanical Errors  
Original detected  
Communication Error  
NCU Off-Hook  
Optional Equipment Installed  
Memory 100%  
Tx File/Polling Rx File Exists

No

```
┌───────────────────────┐
│ Message Transmission  │
└───────────────────────┘
```

```
┌─────────────────────────┐
│   Power Saver Mode      │
│       Level 2           │
│      LCD=OFF            │
│      LED=OFF            │
│     Fusing=OFF          │
│    Main CPU=OFF         │
│   Power Saver CPU=ON    │
└─────────────────────────┘
```

h521d627.wmf

**2-62**

## 3. Receiving a Fax Message in Power Saver Mode

The flow chart on the next page explains how the machine receives a fax message while it is in a power saver mode.

**Ring Detection**

While the machine is in a power saver mode, the power saver CPU monitors ringing signals from the line. When the power saver CPU has detected two ringing signals, it activates the +5V supply to the main CPU and passes the ring detection process to the main CPU.

After the main CPU has detected a ringing signal, the machine goes to Power Saver Mode Level 0 and receives the fax into memory. Level 0 mode looks the same as the previous mode for users, but all the system components are active in the background for receiving a fax message.

See point 1 on the flow chart.

**Printing**

If either of the following conditions is not met (condition #1 on the flow chart), the machine will print out the fax message then return to Power Saver Mode in the manner described in the previous two flow charts in this section.
- Power Saver mode is activated during the Night Timer period
- The machine is currently in the Night Timer period.

If both conditions are met, the machine returns to Power Saver Mode as described in the previous two flow charts in this section. It will print the fax message after the Night Timer expires.

See point 2 on the flow chart.

---
**Cross Reference**
Night Timer On/Off: User Function 62
Programming the Night Timer period: User Function 72
---

```
┌──────────────────────┐              ┌──────────────────────┐
│  Power Saver Mode     │              │  Power Saver Mode     │
│  Level 2              │              │  Level 1              │
│  LCD=OFF              │              │  LCD=OFF              │
│  LED=OFF              │              │  LED=OFF              │
│  Fusing=OFF           │              │  Fusing=User SW 05    │
│  Main CPU=OFF         │              │    Setting            │
│  Power Saver CPU=ON   │              │  Main CPU=ON          │
└──────────────────────┘              │  Power Saver CPU=OFF  │
                                      └──────────────────────┘
```

Ring Detection — No / Yes

```
┌──────────────────────┐
│  Power Saver Mode     │
│  Level 0              │
│  LCD=OFF              │
│  LED=OFF              │
│  Fusing=OFF           │
│  Main CPU=ON          │
│  Power Saver CPU=OFF  │
└──────────────────────┘
```

Memory Reception

Power Saver Mode is enabled by User Function 62, and the machine is in a Night Timer period.

Condition #1 — No / Yes

Fusing Heat-up Message Printout

Power Saving Mode Program

h521d628.wmf

**2-64**

## 4. Sending a Fax Message or Copying in Power Saver Mode

The flow chart on the next page explains how the machine wakes up from power saver mode upon a manual operation, and how it comes back to a power saver mode.

### Manual Wakeup Conditions

While the machine is in a power saver mode, either the power saver CPU (Level 2) or the main CPU (Level 1) monitors signals from the following (condition #1 on the flow chart).
- Power saver key
- Document sensor
- Off-hook detector on the NCU

When a signal from one of these has been detected, the CPU wakes up all the components and the machine enters normal operating mode, even during the Night Timer period.

After operations have been finished, the machine goes back to a power saver mode as explained in the previous sections.

```
┌──────────────────────┐                    ┌──────────────────────┐
│  Power Saver Mode     │                    │  Power Saver Mode     │
│      Level 2          │                    │      Level 1          │
│    LCD=OFF            │                    │    LCD=OFF            │
│    LED=OFF            │                    │    LED=OFF            │
│    Fusing=OFF         │                    │ Fusing=User SW 05 Setting │
│    Main CPU=OFF       │                    │    Main CPU=ON        │
│ Power Saver CPU=ON    │                    │ Power Saver CPU=OFF   │
└──────────────────────┘                    └──────────────────────┘
```

No

Condition #1 ──── No

┌─────────────────────────┐
│ Power Saver key pressed │
│ Document set in ADF     │
│ NCU off-hook            │
└─────────────────────────┘

Yes

```
┌──────────────────────┐
│    Normal Mode        │
│    LCD=ON             │
│    LED=ON             │
│    Fusing=ON          │
│    Main CPU=ON        │
│ Power Saver CPU=OFF   │
└──────────────────────┘
```

```
┌──────────────────────┐
│ Phone communication   │
│  Fax transmission     │
│   Making copies       │
│       etc.            │
└──────────────────────┘
```

No

Operation
Finished ?

Yes

Message received
in memory ?

Yes                                    No

Message Printout

```
┌──────────────────────┐
│    Standby Mode       │
└──────────────────────┘
```

```
┌──────────────────────┐
║  Power Saving         ║
║  Mode Program         ║
└──────────────────────┘
```

h521d629.wmf

**2-66**

## 2.3.2. Automatic Service Calls

## 1. Service Call Conditions

The machine makes an automatic service call when one of the following conditions occurs.

| Service Call Conditions | Error Code | Sub-code (8003B5H) |
|---|---|---|
| Charge corona unit failure | 9-17 | 11 or 12 |
| Laser diode failure | 9-20 | 21 |
| Fusing lamp failure | 9-22 | 01 to 09 |
| Polygonal mirror motor failure | 9-23 | 31 or 32 |
| Main motor failure | 9-24 | 41 or 42 |
| Excessive jams in the ADF/scanner | None | None |
| Excessive jams in the printer | None | None |
| The PM counter has reached the threshold (60,000 prints) | None | None |
| The PM interval has expired | None | None |

**Cross reference**
Service station number: Service Function 13
Troubleshooting: Chapter 6

## 2. Excessive Jam Alarms



H521D635.WMF
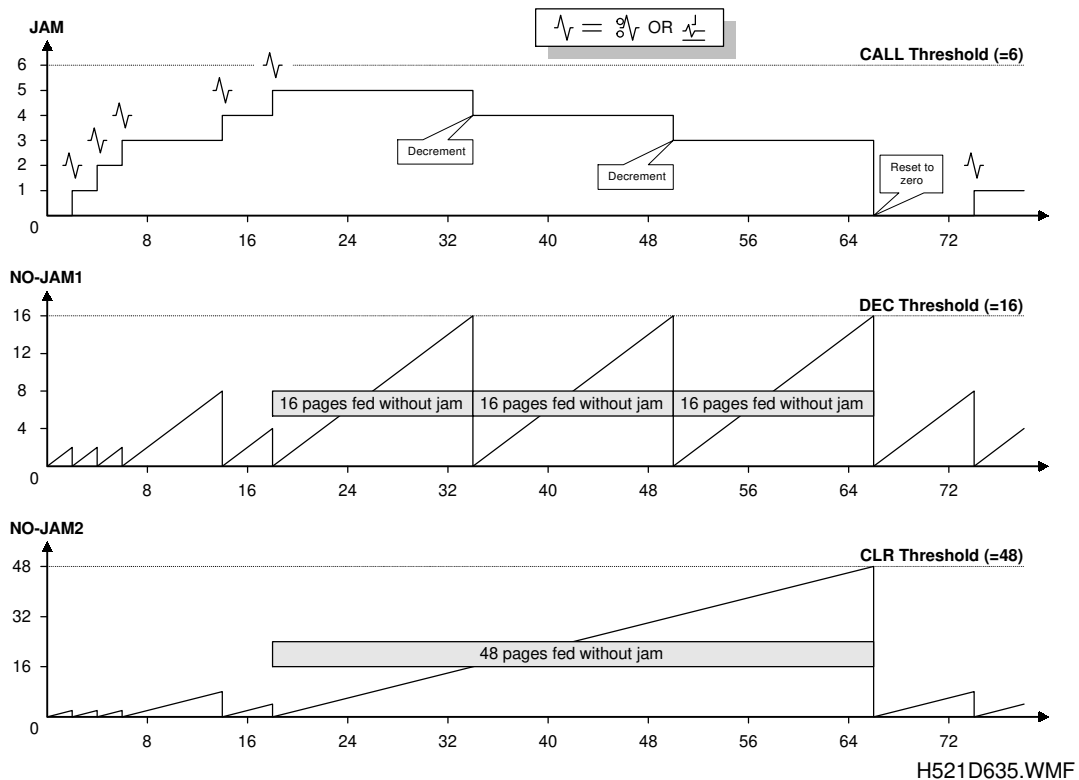
The excessive jam alarm automatically notifies the service station when the machine's scanner or printer frequently has jam problems.

Each type of jam has three counters allocated to it (JAM, NO-JAM1, NO-JAM2). Each of these counters has a threshold value (CALL, DEC, and CLR respectively; these can be adjusted.) The machine uses these counters to monitor jams as follows.

**Each time a jam occurs:** The JAM counter is increased by 1, and NO-JAM1 and NO-JAM2 are both set to zero. When JAM reaches CALL (6 by default), the machine sends an Auto Service Report with a System Parameter List.

**If a sheet of paper is fed without a jam occuring:** NO-JAM1 and NO-JAM2 are both incremented by 1. When NO-JAM1 reaches DEC (16 by default), NO-JAM1 is set to zero, and JAM is decremented by 1. When NO-JAM2 reaches CLR (48 by default), NO-JAM2 and JAM are both reset to zero.

The CALL, DEC, and CLR thresholds can be adjusted for each type of jam by rewriting RAM data. The addresses of these thresholds are given on the next page.

| Parameters | | Address (H) | | Initial Settings | Sys. Para. List |
|---|---|---|---|---|---|
| | | ADF | Printer | | |
| **DEC** (1 - 255; 0 = Disabled) | | 8001DD | 8001E1 | 10 (H) | X |
| **CALL** (3 - 15; 0 = Disabled) | | 8001DE | 8001E2 | 06 (H) | Y |
| **CLR** | (Low) | 8001DF | 8001E3 | 30 (H) | — |
| | (High) | 8001E0 | 8001E4 | 00 (H) | |

| Counters | Address (H) | | Sys. Para. List |
|---|---|---|---|
| | ADF | Printer | |
| **JAM:** Jam counter used to place a service call | 8001D6 | 8001DA | Z |
| **NO-JAM1:** Counter used for JAM counter decrement | 8001D5 | 8001D9 | — |
| **NO-JAM2:** Counter used for clearing the JAM counter | 8001D7 (Low) 8001D8 (High) | 8001DB (Low) 8001DC (High) | — |

The system parameter list gives the current DEC and CALL thresholds and JAM counter value as X, Y, and Z respectively.

The Call Service indicator does not light for an excessive jam alarm, and the machine can be operated normally after the automatic service call has been made. Also, the counters related to the jam location are reset to zero automatically after the call. Then the alarm is disabled until either bit 3 or bit 4 of address 80033d is reset to zero.

### 3. Periodic Service Call

The periodic service call notifies the condition of the machine to the service station. The call is made periodically at a time interval programmed in the following RAM addresses.

| Parameters | Address (H) |
|---|---|
| Call interval: 01 through 15 month(s) (BCD) 00: Periodic Service Call Disabled | 800256 |
| Date and time of the next call | |
| Year: last two digits of the year (BCD) | 800257 |
| Month: 01 through 12 (BCD) | 800258 |
| Day: 01 through 31 (BCD) | 800259 |
| Hour: 00 through 23 (BCD) | 80025A |

To change these settings after programming, change the call interval. Then the machine automatically changes the remaining parameters by referring to the interval and the current date and time.

The Call Service indicator does not light for a periodic service call, so that the machine can be operated normally after it has sent the service call.

## 4. PM Call

If PM call is enabled, the machine will make an automatic service call when the PM counter reaches the PM threshold.

Program the PM call interval at the following RAM addresses.
(Default setting: 60,000 sheets)

| Address (H) | Bits 7 - 4 | Bits 3 - 0 |
|:-----------:|:----------:|:----------:|
| 800194 | Tens | Units |
| 800195 | Thousands | Hundreds |
| 800196 | Hundred thousands | Ten thousands |

**Cross reference**
PM call enable/disable: System switch 01, bit 0

The Call Service indicator does not light for a PM service call, and the machine can be operated normally after it has made the service call.

## 5. Effective Term of Service Calls

If a time limit for the effectiveness of service calls is programmed, the machine stops making automatic service calls after the time limit.

Program the time limit at the following addresses. This function is disabled when all of these addresses are 00(H).

|  | Address (H) |
|:---|:---:|
| Year: last two digits of the year (BCD) | 800261 |
| Month: 01 through 12 (BCD) | 800262 |
| Day: 01 through 31 (BCD) | 800263 |

## 2.4. PCBs

### 2.4.1. FCE
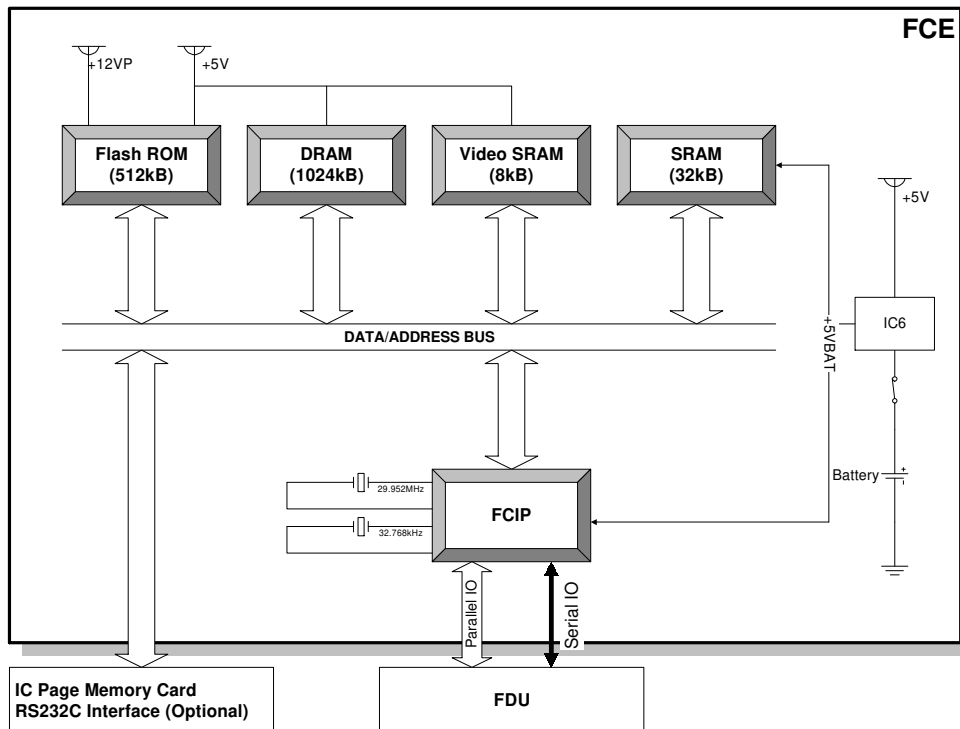


h521d630.wmf

### 1. FCIP (Facsimile Controller and Image Processor)

- CPU
- Modem (V.29, V.27, V.21)
- Data compression and reconstruction
- Digital image processor
- Laser interface
- DMA controller
- Clock generation
- Stepper motor control
- Serial interface to the FDU
- DRAM backup control
- Ringing signal/Tone detection
- Fusing lamp control

### 2. ROM

- 512 kB (4 Mbit) flash ROM for system software storage.

### 3. DRAM
- 1024 kB DRAM shared between the Line Buffer (32 kB), ECM Buffer (64 kB or 128 kB), Page Memory (3 MB), and SAF memory (576 kB).
- Backed up by the battery on the FDU.

### 4. SRAM
- 32 kB SRAM for system and user parameter storage.
- Backed up by the battery on the FCE.

### 5. Video SRAM
- 8 kB SRAM for video processing.

### 6. Oscillators
- 29.952 MHz oscillator for system clock generation.
- 32.768 MHz oscillator for the real time clock. This is backed up by the battery on the FCE.

### 7. Jumpers, Switches, and Test Points

| Item | Description |
|------|-------------|
| SW1 | Switches the backup battery ON/OFF |

## 2.4.2. FDU
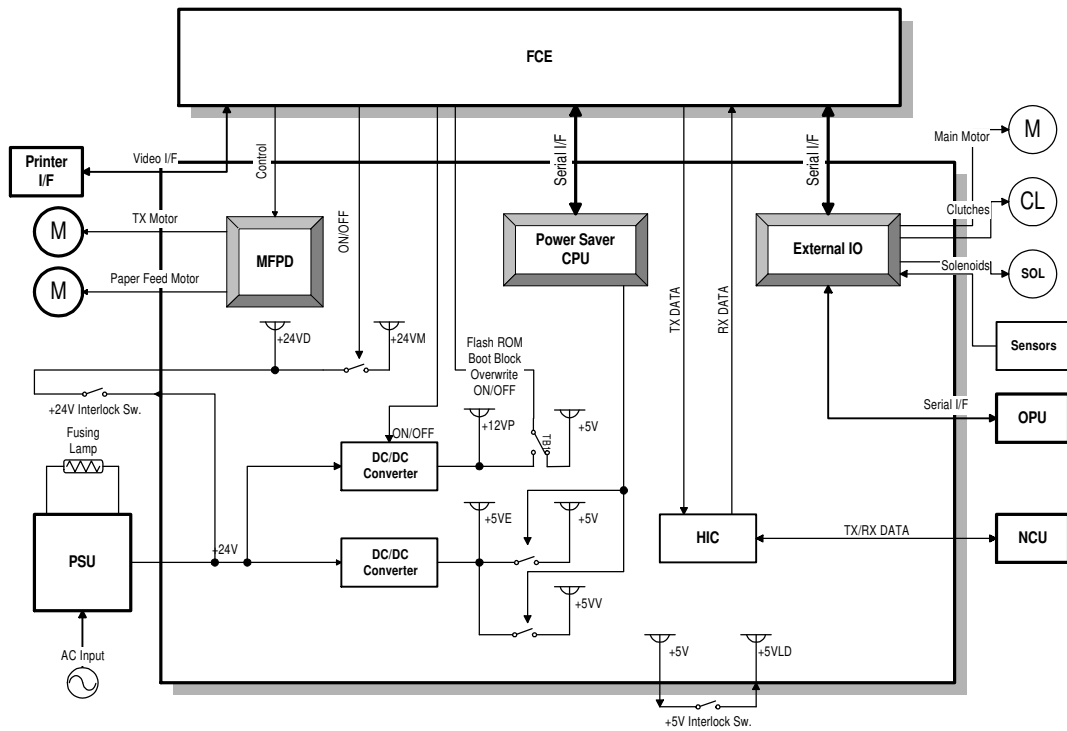


h521d631.wmf

### 1. Power Saver CPU
- 4 bit CPU for controlling the machine during power saver mode.

### 2. FPD (Facsimile Power Driver)
- Stepper motor driver.

### 3. EXIO (External I/O)
- Serial interface to the FCE and OPU.
- Parallel interface to the main motor, clutches, and sensors.

### 4. HIC (Hybrid IC)
- 2-4 wire switching
- Filters and amplifiers
- Monitor speaker driver

### 5. DC/DC Converters
- +5V generation
- +12V generation

### 6. Interlock Switches
- The fusing unit interlock switch (+24V) disables the power supply to the drive components and the power pack.
- The fusing unit interlock switch (+5V) disables the power supply to the laser diode unit.

### 7. Jumpers, Switches, and Test Points

| Item | Description |
|------|-------------|
| TP1 | COM2 ground |
| TP2 | COM1 ground |
| TP3 | +5VE |
| TP4 | -5V |
| TP7 | Laser synchronization signal |
| TP6 | Scanner clock |
| TP8 | Scanner clock |
| TP9 | Analog video signal input from the Contact Image Sensor |
| CN40-1 | Analog video signal |
| CN40-2 | Scanner clock |
| CN40-3 | Synchronization signal |
| CN40-4 | COM1 ground |
| TB1 | Switches the power supply to the flash ROM boot block on the FCE<br>1-2 pins shorted: +12V (the boot block can be overwritten)<br>2-3 pins shorted: +5V (the boot block cannot be overwritten)<br>**Warning: Do not change this jumper setting, unless the boot block in the Flash ROM needs to be overwritten by Function 12.**<br>**(Refer to Chapter 4.1.20 for more details.)** |

### 2.4.3. PSU
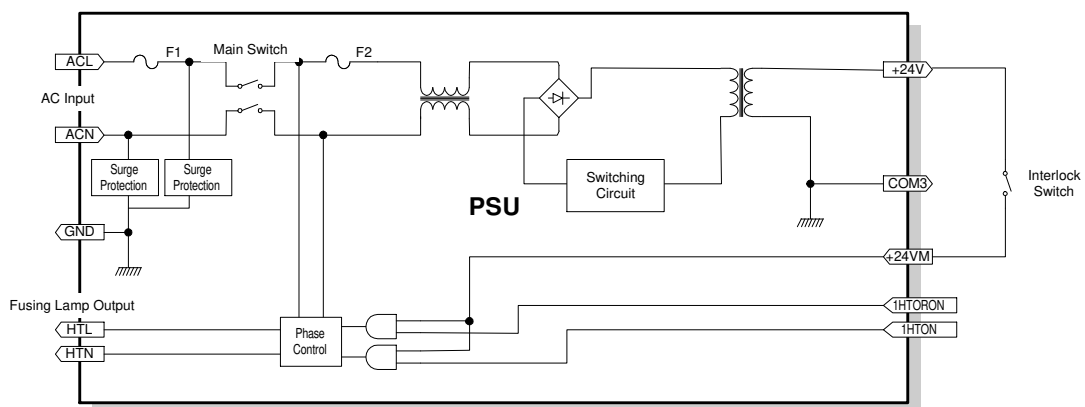


h521d632.wmf

- +24Vdc generation
- Fusing lamp ac power supply and control.

## 2.4.4. NCU (USA)



h521d633.wmf
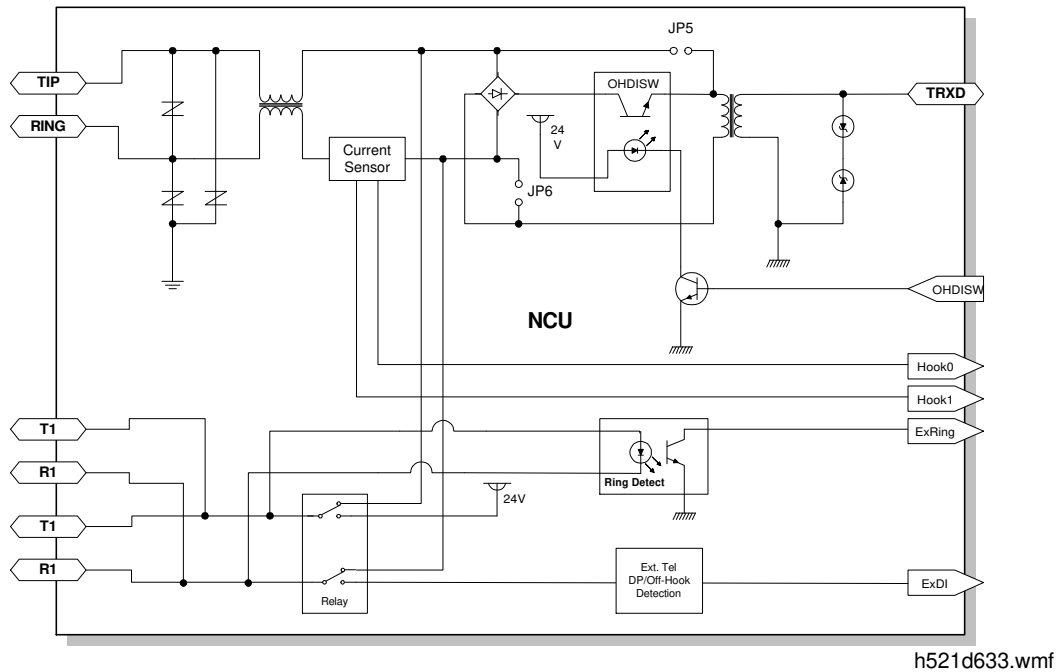
## 1. Jumpers

| Item | Description |
|------|-------------|
| JP5 | These jumpers should be shorted when the machine is connected to a dry |
| JP6 | line. |

## 2.4.5. NCU (Europe/Asia)



H521D634.WMF
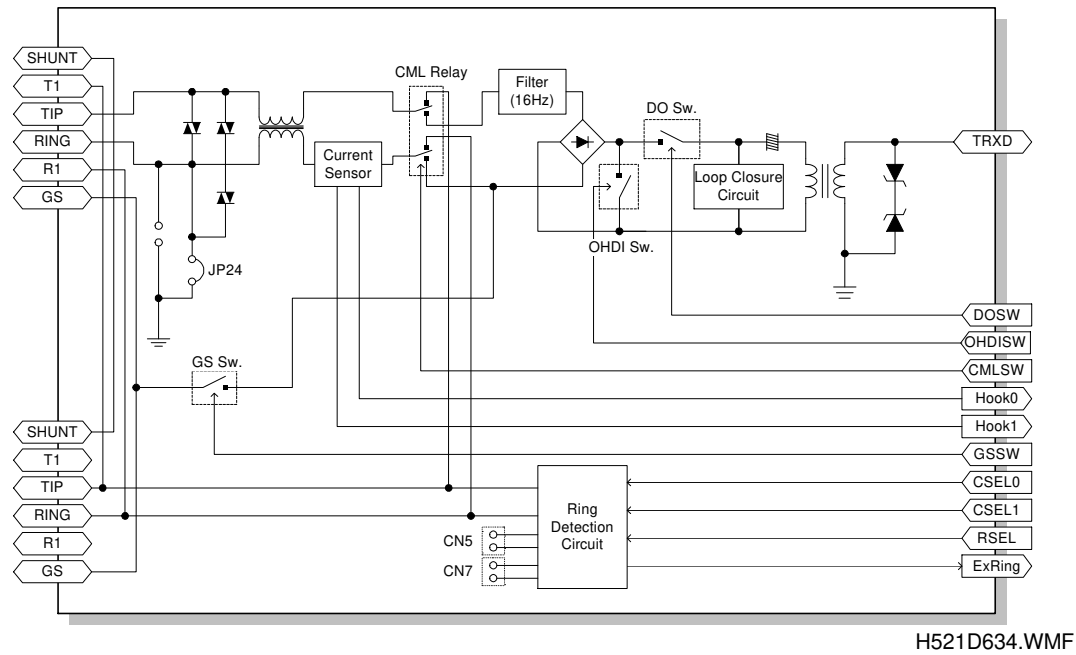
## 1. Control Signals and Jumpers

| Country | CSEL0 CN2-4 | CSEL1 CN2-5 | RSEL CN1-13 | JP24 | CN5 | CN7 |
|---------|-------|-------|-------|------|-----|-----|
| Germany | L | H | H | S | O | O |
| Holland | L | H | H | S | O | O |
| Austria | L | H | H | S | O | O |
| Italy | L | L | L | S | O | O |
| Spain | L | L | L | S | O | O |
| Ireland | H | L | L | S | S | S |
| Finland | L | H | L | O | O | O |
| Switzerland | L | H | L | O | O | O |
| Other | L | H | L | S | O | O |
| | | | | | | |
| | **L: Low, H: High** | | | **S: Short, O: Open** | | |

# 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.

**Note:** The red clip [A] (P/N H5211161) prevents the scanner from moving during transportation. This clip has to be removed at installation, and it has to be installed again before transportation.

[A]
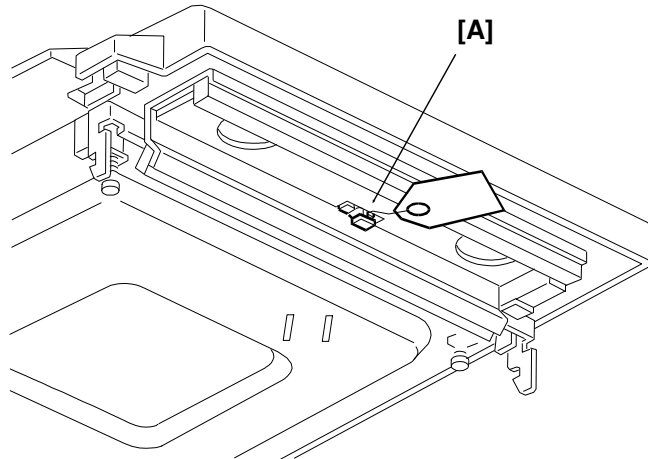
H521I501.wmf

Refer to section 2.4.5 for how to set up the NCU hardware in each country.

## 3.2. INITIAL PROGRAMMING

| Items to Program (Service Level) | Function No. |
|---|---|
| Country code (NCU parameter 00) | Function 08 |
| Country code (System switch 0F) | Function 01 |
| Protocol requirements (G3 switch 0B) | Function 01 |
| PABX access code (RAM address 8000BB) | Function 06 |
| Machine's serial number | Function 14 |
| Service station's fax number | Function 13 |
| PM call (System switch 01 - bit 0) | Function 01 |
| Periodic service call (RAM address 800256) | Function 06 |

| Items to Program (User Administrator Level) | Function No. |
|---|---|
| Clock | Function 91 |
| Initial programming items (IDs) | Function 61 |
| On/off switches | Function 62 |
| Display/report language | Function 93 |
| PABX access method (User parameter switch 13 - bits 0, 1) | Function 63 |
| Fusing power control during power saver mode (User parameter switch 05 - bit 6) | Function 63 |

## 3.3. OPTIONAL UNITS

| ⚠CAUTION |
|---|
| **Before installing an optional unit, do the following.**<br>**1. Print out all the messages stored in the memory.**<br>**2. Print out the lists of user programmed items and the system**<br>　　**parameter list.**<br>**3. Turn off the main switch, and disconnect the power plug.** |

### 3.3.1. Counter

H165i501.wmf

**[A]**
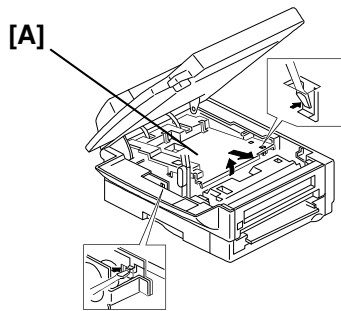
**Remove the inner cover [A].**

H165i502.wmf

**[C]**　　　　　　　　**[B]**

**[D]**
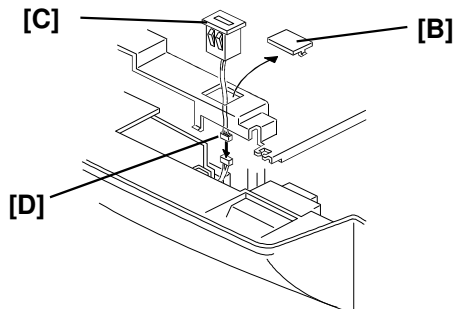
**Remove the small cover [B] from the inner cover, and install the counter [C].**

**Connect the harness [D] to the FDU, then put back the inner cover [A].**

**Plug in the machine and turn on the main switch.**

**Make some copies and check if the counter works. If it does not, check the connection from the counter to the FDU.**

## 3.3.2. Printer Interface
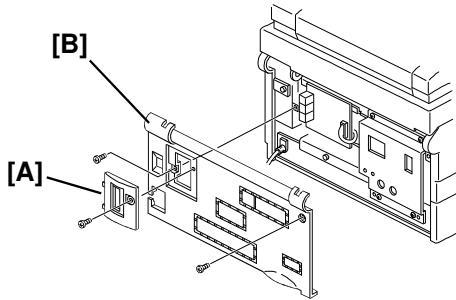
H144i501.wmf
**Remove the NCU cover [A] (1 screw)
and the left cover [B] (2 screws).**
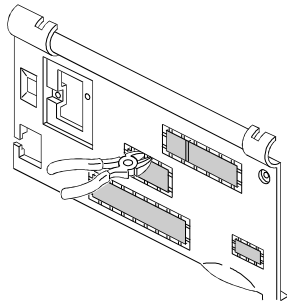
H144i502.wmf
**Cut off the shaded parts of the left cover.**
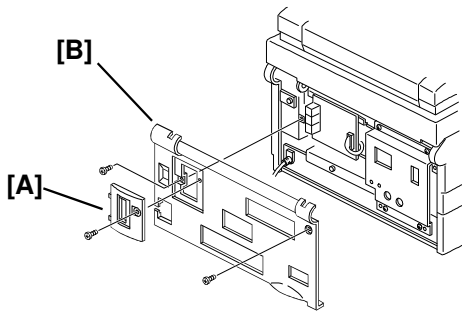
H144i504.wmf
**Put back the left cover [B] (2 screws)
and the NCU cover [A] (1 screw).**
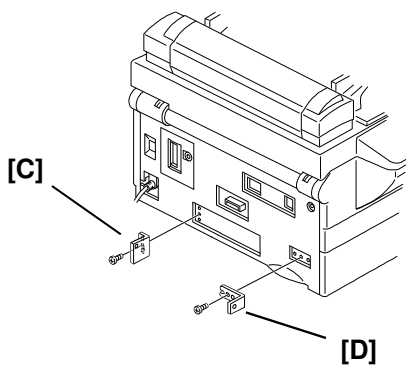
H144i503.wmf
**Install two brackets [C] and [D] (1 screw
each).**
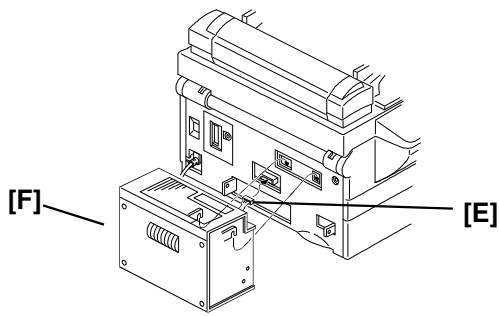
H144i505.wmf

**Connect the harness [E] to the FDU, and hook up the printer interface unit [F] to the machine.**

[F]

[E]
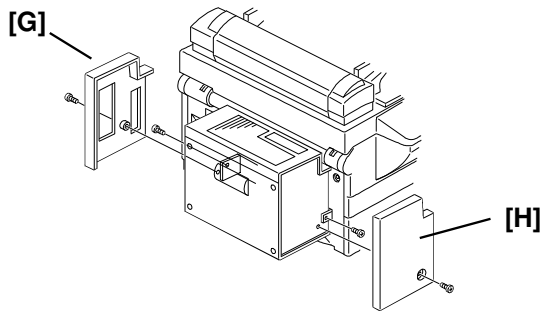
H144i506.wmf

**Secure the unit with two screws, and install the side covers [G] and [H].**

[G]

[H]

After installing the interface unit, do the following:
- Connect a printer cable (parallel cable) from the machine to a PC.
- Plug in the machine and turn on the main switch.
- Check if the On Line indicator on the operation panel is lit or not. If it is not, check the harness connection from the printer interface unit to the FDU.
- Enter user function 36 and print a setup sheet or a test pattern to check the controller. (Refer to the Operation Manual for the procedures.)
- Print a page from the PC to check the parallel interface.

# 4. SERVICE TABLES AND PROCEDURES

## 4.1. SERVICE LEVEL FUNCTIONS

> In this section, frequently used keys are referred to with the following symbols.
>
> ⬙ - Start key
> ⬗ - Stop key
> Function - Function key
> Yes - Yes key
> No - No key
> ⬘ - Up arrow key
> ⬙ - Down arrow key
> ▶ - Right arrow key
> ◀ - Left arrow key

### 4.1.1. Bit Switch Programming (Function 01)

1. Function 6 1 9 9 5 then immediately Yes

```
FUNCTION   KPAD/NEXT
   SERVICE FUNCTIONS
```

2. 0 1 Yes

```
SYS DF   :   0000 0000
BITSW 00:    0000 0000
```

   Bit 7 is displayed at the left, and bit 0 at the right.

3. Scroll through the bit switch menu: * or #

```
SYS DF   :   0000 0000
BITSW03:     0000 0000
```

   **Example:** To see the communication bit switches : # × 3
   Scroll through the bit switches:

   Increment bit switch: ▶

   Decrement bit switch: ◀

   **Example:** Display bit switch 3: ▶ x 3

4. Adjust the bit switch.

   **Example:** To change the value of bit 7, press 7

```
SYS DF   :   0000 0000
BITSW03:     1000 0000
```

5. Either:
   - Adjust more bit switches - go to step 3.
   - Finish - [Function]

## 4.1.2. System Parameter List (Function 02)

1. [Function] [6] [1] [9] [9] [5] then immediately [Yes]

   ```
   FUNCTION   KPAD/NEXT
      SERVICE FUNCTIONS
   ```

2. [0] [2] [Yes] [◇]

3. Finish: [Function]

## 4.1.3. Error Code Display (Function 03)

1. [Function] [6] [1] [9] [9] [5] , then immediately [Yes]

   ```
   FUNCTION   KPAD/NEXT
      SERVICE FUNCTIONS
   ```

2. [0] [3] [Yes]

   ```
   ERROR CODE      <>
    1-01  JAN 01 17:30
   ```

3. Either:

   Scroll through the error codes - [▶] or [◀]

   Finish - [Function]

## 4.1.4. Service Monitor Report (Function 04)

1. [Function] [6] [1] [9] [9] [5]

   then immediately [Yes]

   ```
   FUNCTION   KPAD/NEXT
      SERVICE FUNCTIONS
   ```

2. [0] [4] [Yes] [◇]

3. Finish: [Function]

### 4.1.5. Protocol Dump (Function 05)

1. [Function] [6] [1] [9] [9] [5] then immediately [Yes]

```
FUNCTION   KPAD/NEXT
   SERVICE FUNCTIONS
```

2. [0] [5] [Yes]

```
                  START
PROTOCOL DUMP
```

3. [◇]

4. Finish: [Function]

### 4.1.6. RAM Display/Rewrite (Function 06)

1. [Function] [6] [1] [9] [9] [5] then immediately [Yes]

```
FUNCTION   KPAD/NEXT
   SERVICE FUNCTIONS
```

2. [0] [6] [Yes]

```
0-MEM.R/W 1-MEM.DUMP
```

3. [0]

```
 ADDRESS = 000000
   DATA    = 00
```

4. Input the address that you wish to see.
   **Example:** Address 800020

```
 ADDRESS = 202020
   DATA = 20
```

       [8] [0] [0] [0] [2] [0]

  **Note:** To move the cursor, press [▶]

5. If you wish to change the data, type in the new data.

```
 ADDRESS = 202020
   DATA = 80
```

  **Example:** 80, press [8] [0]
  **Note:** If you wish to move the cursor, press [▶]

6. Either:
   • View more addresses - go to step 4.
   • Finish - [Function]

### 4.1.7. RAM Dump (Function 06)

1. [Function] [6] [1] [9] [9] [5] then immedi-
ately [Yes]

```
FUNCTION    KPAD/NEXT
 SERVICE FUNCTIONS
```

2. [0] [6] [Yes]

```
0-MEM.R/W 1-MEM.DUMP
```

3. [1]

```
MEMORY DUMP   START/N
ADD.000000 - 0000FF
```

4. Enter the first four digits of the start and
end addresses . For example, enter
"8000" for start address 800000(H), and
enter 8001 for end address 8001FF(H).
Then, press "Start" to print the dump list.

```
MEMORY DUMP   START/N
ADD. 800000- 8001FF
```

**Example:** Start at 800000, end at 8001FF.
[8] [0] [0] [0] [8] [0] [0] [1] [◇] .

```
MEMORY DUMP
```

5. Finish: [Function]

### 4.1.8. Counter Display/Rewrite (Function 07)

1. [Function] [6] [1] [9] [9] [5]
then immediately [Yes]

```
FUNCTION    KPAD/NEXT
   SERVICE FUNCTIONS
```

2. [0] [7] [Yes]

```
0-COUNTER      1-PM
 2-CTM         3-OPU
```

3. Either
Check the scanned, printed, transmitted,
and received page counters, and the

printer and scanner jam- press [0]

```
TX:        012345
RX:        012345
```

(To see the transmitted and received page counters, press `#`.

```
SCAN    :    012345
PRINT   :    012345
```

To see the printer and scanner jam counters, then press `#` again.)

```
S.JAM:       000000
P.JAM:       000000
```

Check the PM counter - press `1`

```
PM COUNTER: 001234
```

Check the CTM counter - press `2`

```
CTM COUNTER: 001234
```

Check the OPU counter - press `3`

```
OPU COUNTER:       001234
```

4. To change the contents of a counter, input the new value, then press `Yes`

5. To finish: `Function`

### 4.1.9. NCU Parameters (Function 08)

1. `Function` `6` `1` `9` `9` `5`
   then immediately `Yes`

```
FUNCTION   KPAD/NEXT
   SERVICE FUNCTIONS
```

2. `0` `8` `Yes`

3. `0`

```
0-NCU          1-MODEM
2-DTMF         3-DETCT
```

4. Scroll through the parameters using `▶` or `◀` . If you want to change a value, enter the new value at the keypad, then press `Yes`
   **Example:** Set NCU parameter 04 to 005.
   `▶` `▶` `▶` `▶` `0` `0` `5` `Yes`

```
NCU            KPAD/<>
   NO.04 = 005
```

5. To finish : `No` `Function` .

**Note:** Parameter CC is the Country Code, Parameter 01 is the Tx Level. Refer to section 4.3 for full details on NCU parameters.

### 4.1.10. Modem Test (Function 08)

1. [Function] [6] [1] [9] [9] [5]
   then immediately [Yes]

```
FUNCTION    KPAD/NEXT
    SERVICE  FUNCTIONS
```

2. [0] [8] [Yes]

```
0-NCU       1-MODEM
 2-DTMF     3-DETECT
```

3. [1]

```
MODEM  TEST  START/<>
  V17  14400BPS
```

4. Scroll through the available tests using [▶] or [◀]

5. [◇]

6. To stop the test: [▽]

7. To finish: [No] [Function]

### 4.1.11. DTMF Tone Test (Function 08)

1. [Function] [6] [1] [9] [9] [5]
   then immediately [Yes]

```
FUNCTION    KPAD/NEXT
    SERVICE  FUNCTIONS
```

2. [0] [8] [Yes]

```
0-NCU       1-MODEM
 2-DTMF     3-DETECT
```

3. [2]

```
 DTMF  TEST   START/<>
   TONE   0
```

4. Scroll through the available tests using [▶] or [◀]

5. [◇]

6. To stop the test: [▽]

7. To finish: [No] [Function]

## 4.1.12. Modem Detection Test (Function 08)

**Note:** This function can be used only when G3 bit switch 0B bit 5 (French PTT requirements) is 1 in European models. It cannot be used in USA models.

1. [Function] [6] [1] [9] [9] [5]

   then immediately [Yes]

```
FUNCTION   KPAD/NEXT
   SERVICE FUNCTIONS
```

2. [0] [8] [Yes]

```
0-NCU      1-MODEM
 2-DTMF    3-DETECT
```

3. [3]

```
MODEM DET   START/<>
 V21 300BPS
```

4. Scroll through the available tests using ▶ or ◀

5. ◇

6. To stop the test: ▽

7. To finish: [No] [Function]

## 4.1.13. Ringer Test (Function 08)

1. [Function] [6] [1] [9] [9] [5]

   then immediately [Yes]

```
FUNCTION   KPAD/NEXT
   SERVICE FUNCTIONS
```

2. [0] [8] [Yes]

```
0-NCU      1-MODEM
 2-DTMF    3-DETECT
```

3. [4]

```
            START
  RINGER
```

5. ◇

6. To stop : ▽

7. To finish: [No] [Function]

**4-7**

### 4.1.14. Operation Panel Test (Function 09)

1. [Function] [6] [1] [9] [9] [5]
   then immediately [Yes]

```
FUNCTION    KPAD/NEXT
   SERVICE FUNCTIONS
```

2. [0] [9] [Yes]

```
0-LED/LCD
```

3. [0]

4. [◇]

5. To stop the test, press [▽]

6. To finish: [No] [Function]

### 4.1.15. LED Array Test (Function 10)

1. [Function] [6] [1] [9] [9] [5]
   then immediately [Yes]

```
FUNCTION    KPAD/NEXT
   SERVICE FUNCTIONS
```

2. [1] [0] [Yes]

```
0-LAMP      1-ADF
2-BOOK      3-SELECT
```

3. [0]
4. [◇]

```
              START
LAMP          000
```

The LED array and fusing lamp both turn
on. The video peak level detected by the
image sensor is displayed on the bottom
line.

5. To stop the test: [▽]

6. To finish: [No] [Function]

### 4.1.16. ADF Test (Function 10)

1. [Function] [6] [1] [9] [9] [5]

   then immediately [Yes]

```
FUNCTION    KPAD/NEXT
   SERVICE FUNCTIONS
```

2. [1] [0] [Yes]

```
0-LAMP       1-ADF
2-BOOK       3-SELECT
```

3. [1]

```
                    START
  ADF
```

4. Place a document in the feeder,

   then press ⬦.
   All sheets in the ADF will be fed.

5. To stop the test: ⬦

6. Finish: [No] [Function]

### 4.1.17. Book Mode Scanner Mechanism Test (Function 10)

1. [Function] [6] [1] [9] [9] [5]

   then immediately [Yes]

```
FUNCTION    KPAD/NEXT
   SERVICE FUNCTIONS
```

2. [1] [0] [Yes]

```
0-LAMP       1-ADF
2-BOOK       3-SELECT
```

3. [2]

```
                    START
  BOOK
```

4. Press ⬦ .
   One book mode scan cycle is
   performed, then the machine stops.
   If you wish to stop the test before

   this, press ⬦ .

5. Finish: [No] [Function]

### 4.1.18. Auto Paper Select Mode Test (Function 10)

1. Function 6 1 9 9 5

   then immediately Yes

   ```
   FUNCTION   KPAD/NEXT
     SERVICE FUNCTIONS
   ```

2. 1 0 Yes

   ```
   0-LAMP      1-ADF
   2-BOOK      3-SELECT
   ```

3. 3

   ```
                  START
    APS
   ```

4. Press ◇ .

   ```
                   STOP
    APS   00000100
   ```

   The current output of the document size sensors is displayed.
   First four digits: Not used
   5th digit: W1
   6th digit: W2
   7th digit: L1
   8th digit: L2

   See "Original Detection" (section 2.1.2) for the functions of W1, W2, L1, and L2.

5. To stop the test: ▽

6. Finish: No Function

### 4.1.19. Image Sensor Signal Check/Sampling Clock Reset (Function 10)

1. Function 6 1 9 9 5

   then immediately Yes

   ```
   FUNCTION   KPAD/NEXT
     SERVICE FUNCTIONS
   ```

2. 1 0 Yes

   ```
   0-LAMP      1-ADF
   2-BOOK      3-SELECT
   ```

3. 4

   ```
                  START
    VIDEO
   ```

4. Press 〔⬙〕 .

```
                          STOP
VIDEO   AAA   BBB   CDE
```

Five numbers are displayed on the bottom line of the LCD.
- AAA: Sensor output while the lamp is on. This should be between 160 and 225.
- BBB: Sensor output while the lamp is off. This should be between 8 and 28.
- C: Not used.
- D: Result

| Result | Error Details | Possible Cause |
|--------|---------------|----------------|
| 0 | OK | |
| 1 | BBB was out of the specified range | The image sensor is defective. |
| 2 | AAA was out of the specified range | The image sensor, Xe lamp, FCE, or FDU is defective. |
| 3 | Both A and B were out of the specified range. | |

- E: Selected clock (from 0 to 7)

5. To stop the test: 〔⬙〕

6. Finish: 〔No〕 〔Function〕

## 4.1.20. Printer Test Patterns (Function 11)

1. 〔Function〕 〔6〕 〔1〕 〔9〕 〔9〕 〔5〕
   then immediately 〔Yes〕

```
FUNCTION   KPAD/NEXT
  SERVICE FUNCTIONS
```

2. 〔1〕 〔1〕 〔Yes〕

```
0-PATTERN   1-MECH
2-RAM
```

3. 〔0〕

```
PATTERN PRINT  KPAD
      0-4
```

5. Press a key from 〔0〕 to 〔4〕.

6. Press 〔⬙〕 .
   A test pattern is printed.

7. To finish: 〔No〕 〔Function〕

### 4.1.21. Printer Mechanism Test - Free Run (Function 11)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION   KPAD/NEXT
   SERVICE FUNCTIONS
```

2. 1 1 Yes

```
0-PATTERN   1-MECH
```

3. 1

```
              START
 MECH
```

4. ⬦

5. To stop the test, press ⬡.

6. To finish: No Function

### 4.1.22. RAM Tests (Function 12)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION   KPAD/NEXT
   SERVICE FUNCTIONS
```

2. 1 2 Yes

```
0-SRAM        1-SAF
2-SAFCARD     3-M->R
```

3. Either:

   Test the SRAM:      Press 0 ⬦.
   Test the SAF:       Press 1 ⬦.
   Test the IC card:   Press 2 ⬦.

   If the test is successful, the display shows "OK".
   If the test is not successful, the display shows "ADDRESS =" and the defective memory address.

4. To finish: No Function

**4-12**

## 4.1.23. Software Download (Function 12)

Instead of replacing an EPROM to update the machine's software, use this procedure to update the software in the machine's Flash ROM.
This function copies new software from an external medium to the Flash ROM on the machine's FCE. The external medium for new software can be an FCE or an EPROM board.

1. Turn off the machine, remove the NCU cover, the left cover, and the front cover, then remove the IC page memory card from the FCE.

**Do this only if rewriting the boot block. See the note at the end of this procedure.**

[B]

[A]

[C]

[D]
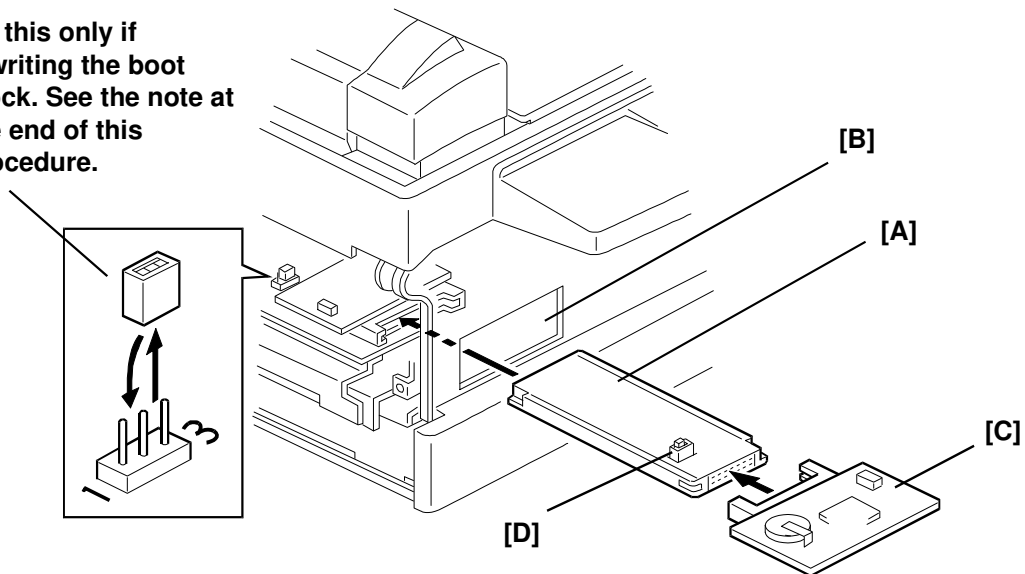
H521M501.wmf

2. Insert the Flash/SRAM Copy Tool [A] into the IC card slot [B], then connect the FCE or EPROM board with new software [C] to the opposite side of the tool.

   **Note:**    The switch [D] on the tool [A] must be at the **ON** position.

3. Turn on the machine.

4. [Function] [6] [1] [9] [9] [5]
   then immediately [Yes]

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

5. [1] [2] [Yes] [▶]

```
0-SRAM         1-SAF
2-SAFCARD      3-M->R
```

6. [4]

7. ⟨◇⟩

   If the software is successfully downloaded, the display shows "**OK**".

```
OK!!
COPY    MACH <- FLROM
```

   If the software download fails, the display
   shows "**NG**".

```
NG!!
COPY    MACH <- FLROM
```

8. To finish, Function .

9. Turn off the machine, put the IC card back in the card slot on the FCE,
   then turn the machine back on.

10. Print out the system parameter list and check the ROM version on it.

**Note:**  In rare cases, the boot block will have to be rewritten. In such cases,
         you must do the following in addition to the above procedure.
   - Before step 1, change the jumper at TB1 on the FDU as shown in
     the diagram on the previous page.
   - After step 3, set bit 5 of system switch 02 to 1.
   - Before switching on the machine again in step 9, put TB1 back to
     the default position (2-3 pins shorted).

11. Put back the front, left, and NCU covers.

---
⚠**CAUTION**

**If the IC card is missing, the machine will only be able to make partial
copies of each original because of a lack of page memory.**

---

### 4.1.24. Software Upload (Function 12)

This function copies the software from the machine's built-in FCE to an exter-
nal FCE.

1. Turn off the machine, remove the NCU, left, and front covers, then re-
   move the IC card from the FCE.

2. Connect the Flash/SRAM Copy Tool and an FCE as shown in the pre-
   vious section.

   **Note:**  The switch [D] on the tool must be at the OFF position.

3. Turn on the machine.

4. Function 6 1 9 9 5

   then immediately Yes

```
FUNCTION   KPAD/NEXT
   SERVICE FUNCTIONS
```

5. 1 2 Yes

```
0-SRAM          1-SAF
2-SAFCARD       3-M->R
```

6. 3 ◇

   If the software is successfully uploaded,
   the display shows "**OK**".

```
OK!!
COPY   MACH -> FLROM
```

   If the software upload fails, the display
   shows "**NG**".

```
NG!!
COPY   MACH -> FLROM
```

7. Finish : Function

8. Turn off the machine, put back the IC card and covers, and turn on again.

---

⚠**CAUTION**

**If the IC card is missing, the machine will only be able to make partial
copies of each original because of a lack of page memory.**

---

### 4.1.25. SRAM Data Download (Function 12)

This function copies all the data stored in the SRAM on an external FCE to
the machine's FCE. Use this after replacing a damaged FCE to save any pre-
vious settings that were programmed in the damaged FCE.

1. Turn off the machine.

2. Connect the Flash/SRAM Copy Tool [A] and the damaged FCE [C] as
   shown in section 4.1.22.

   **Note:**   The setting of switch [D] on the tool will not affect the result of
              this procedure.

3. Turn on the machine.

4. Function 6 1 9 9 5

   then immediately Yes

```
FUNCTION   KPAD/NEXT
   SERVICE FUNCTIONS
```

5. 1 2 Yes ▶

```
0-SRAM          1-SAF
2-SAFCARD       3-M->R
```

6. 5

7. ◇

   If the SRAM data is successfully down-
   loaded, the display shows "**OK**".

```
OK!!
COPY    MACH <- SRAM
```

   If the download fails, the display shows
   "**NG**".

```
NG!!
COPY    MACH <- SRAM
```

8. Finish : Function

9. Turn off the machine, put back the IC card and the covers, then turn it
   back on.

---

⚠**CAUTION**

**If the IC card is missing, the machine will only be able to make partial
copies of each original because of a lack of page memory.**

---

### 4.1.26. Serial Number (Function 14)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
    SERVICE FUNCTIONS
```

2. 1 4 Yes

```
SERIAL #        KPAD
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■
```

3. Enter the machine's serial number at the
   keypad.

   To correct a mistake: No

```
SERIAL #    KPAD/Y/N
 7940479186
```

4. If the display is correct: Yes

5. Finish: Function

### 4.1.27. Service Station Telephone Number (Function 13)

1. [Function] [6] [1] [9] [9] [5]
   then immediately [Yes]

```
FUNCTION    KPAD/NEXT
   SERVICE FUNCTIONS
```

2. [1] [3] [Yes]

```
S.S. NO.         KPAD
 _
```

3. Input the telephone number of the service station that will receive Auto Service calls from this machine.

   To clear the telephone number: press [No]

```
S.S. NO.         KPAD
 2125555242
```

4. If the display is correct: [Yes] [Function]

## 4.2. BIT SWITCHES

| ⚠WARNING |
|---|
| **Do not adjust a bit switch that is described as "Not used", as this may cause the machine to malfunction or to operate in a manner that is not accepted by local regulations. Such bits are for use only in other areas, such as Japan.** |

**Note:** Default settings for bit switches are not listed in this manual. Refer to the System Parameter List printed by the machine.

### 4.2.1. System Switches

| System Switch 00 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0**<br><br>**1** | RAM Reset<br><br>**Bit 1  Bit 0  Reset Level**<br>0    0    No reset<br>0    1    Reset Level 2<br>1    0    Reset Level 3<br>1    1    Not used | **Reset Level 3:** Erases all image data files stored in the SAF memory and communication files (e.g., polling rx files). This setting is recommended for use when it is necessary to clear the SAF.<br>**Reset Level 2:** In addition to those items erased by Reset Level 3, the following items are erased: own telephone number, bit switches, RTI/TTI/CSI, Report data, programmed telephone numbers (Quick/Speed/ Groups, service station, etc.), NCU parameters, personal codes.<br><br>After erasing, the machine changes these two bits back to 0 automatically.<br><br>**No reset:** Normal operation<br><br>**Cross reference**<br>**RAM Reset Level 1 (Factory reset):**<br>Change the data in RAM address 800000(H) to FF(H), then turn the machine off and on. In addition to those items erased by Reset Level 2, the clock, scan/print registration settings, printing density settings, and video processing parameters are erased. |

| System Switch 00 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| 2 | Technical data printout on TCR (Journal)<br>**0:** Disabled<br>**1:** Enabled | 1: Instead of the personal code, the following data are listed on the TCR for each analog G3 communication.<br>e.g. V.29  14  01  03  00  02<br>**First number:** Final modem type used<br>**Second number:** Final modem rate (for example, 14 means 14.4 kbps)<br>**Third and fourth numbers:** Line quality data. Either a measure of the error rate or the rx level is printed, depending on the bit 3 setting below. (An M on the report indicates that it is an error rate, and an L indicates an Rx level.) The left hand figure is the high byte and the right hand figure is the low byte (refer to the note below this table for how to read the rx level). If it is a measure of the error rate, a larger number means more errors.<br>**Fifth number (rx mode only):** Total number of error lines that occurred during non-ECM reception.<br>**Sixth number (rx mode only):** Total number of burst error lines that occurred during non-ECM reception. The fifth and sixth numbers are fixed at 00 for transmission records and ECM reception records. |
| 3 | Line quality data output method<br>**0:** Measure of error rate (during image data transmission only)<br>**1:** Rx level | This bit determines the data type to be printed on the TCR (Journal) when technical data printout is enabled by bit 2 above. |
| 4 | Line error marks<br>**0:** Disabled<br>**1:** Enabled | If this bit is 1, a mark will be printed on the left edge of the page at any place where a line error occured in the data. Such errors are caused by a noisy line, for example. |
| 5 | Communication parameter display<br>**0:** Disabled<br>**1:** Enabled | This is a fault-finding aid. The LCD shows the key parameters (see the next page). This is normally disabled because it cancels the CSI display for the user.<br>Be sure to reset this bit to 0 after testing. |
| 6 | Protocol dump list output after each communication<br>**0:** Off  **1:** On | This is only used for communication troubleshooting. It shows the content of the transmitted facsimile protocol signals. Always reset this bit to 0 after finishing testing. |
| 7 | Not used. | Do not change the settings. |

How to calculate the rx level listed on the TCR (when bit 2 of system switch 00 is set to 1)

**Example:** V29 96 **L 01 0C** 00 00

The four-digit hexadecimal value (N) after L indicates the rx level. Divide the decimal value of N by -16 to get the rx level.

In this example, the decimal value of 010C(H) is 268.
So, the actual rx level is 268/16 = -16.75 dB.

## Communication  Parameters

| Mode | DCS: ITU-T standard | NSS: Non-standard G3 |
|---|---|---|
| Modem rate | 96: 9600 bps<br>72: 7200 bps<br>48: 4800 bps<br>24: 2400 bps | |
| Communication mode | ECM: With ECM<br>EFC: Using EFC | SSC: Using SSC<br>NML: With no ECM, SSC, or EFC |
| Compression mode | MMR: MMR compression<br>MR: MR compression<br>MH: MH compression | |
| Resolution | SSF: Fine, transmitted at 8 x 15.4 dots per mm<br>DTL: Detail, transmitted at 8 x 7.7 dots per mm<br>STD: Standard, transmitted at 8 x 3.85 dots per mm | |
| I/O rate | 0M: 0 ms/line<br>2/M: 2.5 ms/line<br>5M: 5 ms/line | 10M: 10 ms/line<br>20M: 20 ms/line<br>40M: 40 ms/line |
| Width and reduction | =A4: A4 (8.3"), no reduction<br>=B4: B4 (10.1"), no reduction<br>>A4: Reduced to A4 (8.3") before transmission | |

| System Switch 01 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0** | PM call<br>**0:** Disabled<br>**1:** Enabled | This bit switch determines whether the machine will send an Auto Service Call to the service station when it is time for PM.<br>Cross reference<br>Auto service calls: Section 2.3.2 |
| **1 to 7** | Not used | Do not change the settings. |

| System Switch 02 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| 0 | Memory file transfer<br>**0:** Disabled<br>**1:** Enabled | **1:** All messages in the memory (including confidential rx messages) are sent to the fax number which is programmed as the service station.<br>Always reset this bit to zero after transfer.<br>**Cross reference**<br>Service station number programming: Function 13 |
| 1 | Programmed data transfer (Back-to-back)<br>**0:** Disabled<br>**1:** Enabled | Do the following steps to transfer the data.<br>1. Connect two machines of the same type back to back and enable back-to-back communication on both machines. (For this machine, set bit 7 of the G3 bit switch 00 to 1.)<br>2. Set this switch to 1 on the receiving machine.<br>3. Insert a sheet of paper in the ADF, and press Start on both machines. The data is transferred.<br>4. Disable back-to-back comminication and set this bit to 0 after finishing. |
| 2 | Not used | Do not change the setting. |
| 3 | Memory file printout<br>**0:** Disabled<br>**1:** Enabled | **1:** All SAF files, including confidential messages, can be printed using Function 51.<br>Always reset this bit after printing the messages. |
| 4 | Not used | Do not change the settings. |
| 5 | Software download area<br>**0:** All except the boot block<br>**1:** All areas, including the boot block<br><br>Keep this bit at 0 except for the rare cases when the Flash ROM boot block has to be rewritten. | **0:** This is the normal setting. For normal software downloads, do not change this bit switch.<br>**1:** Set this bit to 1 only when you need to rewrite the boot block in the Flash ROM using Function 12.<br>**Cross reference**<br>Software Download: Section 4.1.20 |
| 6<br><br>7 | Memory read/write by RDS<br>**Bit 4  3    Setting**<br>   0  0   Always disabled<br>   0  1   User selectable<br>   1  0   User selectable<br>   1  1   Always enabled | **(0,0):** All RDS systems are always locked out.<br>**(0,1), (1,0):** Normally, RDS systems are locked out, but the user can temporarily switch RDS on to allow RDS operations to take place. RDS will automatically be locked out again after a certain time, which is stored in System Switch 03 (see below). Note that if an RDS operation takes place, RDS will not switch off until this time limit has expired.<br>**(1,1):** At any time, an RDS system can access the machine. |

| System Switch 03 | | |
| --- | --- | --- |
| **No** | **FUNCTION** | **COMMENTS** |
| **0**<br><br>**to**<br><br>**7** | Length of time that RDS is temporarily switched on when bits 6 and 7 of System Switch 02 are set to "User selectable" | 00 - 99 hours (BCD).<br><br>This data is only valid if bits 6 and 7 of System Switch 02 are set to "User selectable". |

| System Switch 04 | | |
| --- | --- | --- |
| **No** | **FUNCTION** | **COMMENTS** |
| **0**<br><br>**1**<br><br>**2** | LCD contrast<br>**Bit  2  1  0      Contrast**<br>　　   0  0  0    Brightest<br>　　   0  0  1      ↓<br>　　   ↓              ↓<br>　　   1  1  0      ↓<br>　　   1  1  1    Darkest | Use these bit switches to adjust the contrast of the LCD on the operation panel. |
| **3** | Dedicated transmission parameter programming<br>**0:** Disabled  **1:** Enabled | This bit must be set to 1 before changing any dedicated transmission parameters |
| **4** | Not used | Do not change the factory setting. |
| **5** | OPC (master drum) replacement level<br>**0:** User<br>**1:** Service | **0:** The machine asks the user to replace the OPC drum at 30,000 print intervals (default interval). After the user replaces the drum, the machine asks the user if the drum is replaced or not. If the user answers yes, the machine resets the OPC counter to zero. The drum replacement interval is programmed at addresses 8001E5 to 8001E7(H). Refer to section 4.5 for more details.<br>**1:** The machine will not ask the user to replace the drum. |
| **6** | CSI programming level<br>**0:** User level<br>**1:** Service level | **1:** The CSI can only be programmed using a service function. |
| **7** | Telephone line type programming mode<br>**0:** User level<br>**1:** Service level | **1:** Telephone line type can only be selected with a service function. |

| System Switch 05 | | |
| --- | --- | --- |
| **No** | **FUNCTION** | **COMMENTS** |
| **0**<br><br>**1** | Not used | Do not change the settings. |
| **2** | Display of both RTI and CSI on the LCD<br>**0:** Disabled  **1:** Enabled | **1:** Both RTI and CSI will be displayed alternately on the LCD. |

| System Switch 05 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| 3 to 7 | Not used | Do not change the settings. |

| System Switch 06 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| 0 | Use of the Stop key during memory transmission<br>**0:** Disabled **1:** Enabled | **1:** Memory transmissions can be stopped by pressing the Stop key. However, users might accidentally cancel another person's memory transmission in progress. |
| 1 to 7 | Not used | Do not change the settings. |

| |
|---|
| **System Switch 07** - Not used (do not change the factory settings) |
| **System Switch 08** - Not used (do not change the factory settings) |

| System Switch 09 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| 0 | Not used | Do not change the factory settings. |
| 1 | Inclusion of communications on the TCR when no image data was exchanged.<br>**0:** Disabled **1:** Enabled | 0: Communications which reached phase C (message tx/rx) of the T.30 protocol are listed on the TCR (Journal).<br>**1:** Communications which reached phase A (call setup) of T.30 protocol are listed on the TCR (Journal). This will include telephone calls. |
| 2 | Automatic error report printout<br>**0:** Disabled **1:** Enabled | **0:** Error reports will not be printed.<br>**1:** Error reports will be printed automatically after failed communications. |
| 3 | Printing of the error code on the error report<br>**0:** No **1:** Yes | **1:** Error codes are printed on the error reports. |
| 4 | Not used | Do not change the factory settings. |
| 5 | Power failure report<br>**0:** Disabled **1:** Enabled | **1:** A power failure report will be automatically printed after the power is switched on if a fax message disappeared from the memory when the power was turned off last. |
| 6 | Not used | Do not change the settings. |
| 7 | Priority given to various types of remote terminal ID when printing reports<br>**0:** RTI > CSI > Dial label > Tel. number<br>**1:** Dial label > Tel. number > RTI > CSI | This bit determines which set of priorities the machine uses when listing remote terminal names on reports.<br><br>Dial Label: The name stored with the Quick/Speed Dial number by the user. |

| System Switch 0A | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0** **to** **3** | Not used | Do not change the settings. |
| **4** | Dialing on the ten-key pad when the handset is off-hook **0:** Disabled **1:** Enabled | **1:** The user can dial on the machine's ten-key pad when the handset is off-hook. |
| **5** | On hook dial **0:** Disabled **1:** Enabled | **0:** On hook dial is disabled. |
| **6** **7** | Not used | Do not change the settings. |

| System Switch 0B | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0** **1** | Automatic reset timer<br>**Bit 1**   **Bit 0**   **Timer setting**<br>0      0      1 minute<br>0      1      3 minutes<br>1      0      5 minutes<br>1      1      No limit | **(1, 1):** Automatic reset is disabled.<br>**(Other):** The machine returns to the standby mode when the timer expires after the last operation. |
| **2** **3** | Power Saver mode timer<br>**Bit 3**   **Bit 2**   **Time Limit**<br>0      0      1 minute<br>0      1      3 minutes<br>1      0      5 minutes<br>1      1      No limit | **(1, 1):** Automatic Power Saver mode is disabled.<br>**(Other):** The machine goes into a Power Saver mode when the timer expires after the last operation.<br>**Cross reference**<br>Power Saver modes: Section 2.3.1 |
| **4** **to** **7** | Not used | Do not change the settings. |

| System Switch 0C | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0** **to** **3** | Original size groups to be used in ADF size detection.<br>Bit 0 to 2: Not used<br>Bit 3: A4 or Letter        0: A4, 1: Letter | |
| **4** **to** **7** | Not used | Do not change the settings. |

| System Switch 0D | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0 to 5** | Original size groups to used in book original size detection.<br>(Refer to section 2.1.2 Original Detection for the details.)<br>Bit 0: Not used<br><br>Bits 1 and 2: Legal/F       Bit 2  Bit 1   Size<br>                            0      0     Not used<br>                            0      1     Legal<br>                            1      0     F<br>                            1      1     Not used<br>Bit 3: A4 or Letter          0: A4, 1: Letter<br>Bit 4: A5 lengthwise or size not detected<br>                            0: A5 lengthwise (Europe/Asia only)<br>                            1: Size not detected<br>Bit 5: HLT sideways or A5 sideways      0: A5sideways , 1: HLT sideways | |
| **6 7** | Not used | Do not change the settings. |

| System Switch 0E | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0** | Not used | Do not change the settings. |
| **1** | Automatic cassette switchover<br>**0:** Disabled<br>**1:** Enabled | If this is enabled, the machine will automatically switch over to the other cassette if paper runs out, if an optional cassette is installed and the paper is of the same size. |
| **2** | Copy count progress display<br>**0:** Count up<br>**1:** Count down | This bit determines how the copy count on the LCD behaves during copying. |
| **3 to 7** | Not used | Do not change the settings. |

| System Switch 0F | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0 to 7** | Country code for functional settings (Hex)<br><br>00: France    10: Not used<br>01: Germany  11: USA<br>02: UK          12: Asia<br>03: Italy       13: Japan<br>04: Austria   14: Hong Kong<br>05: Belgium  15: South Africa<br>06: Denmark  16: Australia<br>07: Finland   17: New Zealand<br>08: Ireland   18: Singapore<br>09: Norway   19: Malaysia<br>0A: Sweden  1A: China<br>0B: Switz.    1B: Taiwan<br>0C: Portugal  20: Turkey<br>0D: Holland<br>0E: Spain<br>0F: Israel | This country code determines the factory settings of bit switches and RAM addresses. However, it has no effect on the NCU parameter settings and communication parameter RAM addresses.<br><br>**Cross reference**<br>NCU country code: Function 08, parameter CC |

| System Switch 10 - Not used (do not change the settings) |
|---|
| **System Switch 11** - Not used (do not change the settings) |

| System Switch 12 | |
|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0 to 7** | TTI printing position in the main scan direction | 08 to 92 (BCD) mm. Enter even numbers only.<br>This setting determines the TTI print start position from the left edge of the paper. If moved across to the right too far, the TTI may be obscured by the file number on the top right of the page. |

| System Switch 13 - Not used (do not change the settings) |
|---|

| System Switch 14 | |
|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0 to 7** | Wait time between pages in printer mode (with an optional printer interface unit) | 05 to 64 (H) (5 to 100s) - This setting determines the machine's wait time between pages in printer mode. |

| |
|---|
| **System Switch 15** - Not used (do not change the settings) |
| **System Switch 16** - Not used (do not change the settings) |
| **System Switch 17** - Not used (do not change the settings) |
| **System Switch 18** - Not used (do not change the settings) |
| **System Switch 19** - Not used (do not change the settings) |
| **System Switch 1A** - Not used (do not change the settings) |
| **System Switch 1B** - Not used (do not change the settings) |
| **System Switch 1C** - Not used (do not change the settings) |
| **System Switch 1D** - Not used (do not change the settings) |
| **System Switch 1E** - Not used (do not change the settings) |
| **System Switch 1F** - Not used (do not change the settings) |

## 4.2.2. Scanner Switches

| Scanner Switch 00 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0** | Not used | Do not change the settings. |
| **1** | Not used | Do not change the settings. |
| **2** **3** | Maximum transmittable document length<br>**Bit 3  2    Setting**<br>     0   0      600 mm<br>     0   1     1200 mm<br>     1   0       14 m<br>     1   1      Not used | If the user wants to send very long documents such as well logs, select 14 m or a higher setting. |
| **4** | OR processing in immediate tx<br>**0:** Disabled  **1:** Enabled | 0: The machine scans once every 4 motor steps (Standard), or once every 2 motor steps (Detail), and transmits the line without OR processing. The motor step is always 1/15.4 lines/mm.<br>1: The machine OR processes the scanned lines as explained in section 2.1.3 - 6 "Sub-scan Resolution Conversion". Toner may be used up quicker if OR processing is enabled. |
| **5 to 7** | Not used | Do not change the settings. |

| |
|---|
| **Scanner Switch 01** - Not used (do not change the factory settings). |
| **Scanner Switch 02** - Not used (do not change the factory settings). |
| **Scanner Switch 03** - Not used (do not change the factory settings). |
| **Scanner Switch 04** - Not used (do not change the factory settings). |
| **Scanner Switch 05** - Not used (do not change the factory settings). |
| **Scanner Switch 06** - Not used (do not change the factory settings). |
| **Scanner Switch 07** - Not used (do not change the factory settings). |
| **Scanner Switch 08** - Not used (do not change the factory settings). |
| **Scanner Switch 09** - Not used (do not change the factory settings). |
| **Scanner Switch 0A** - Not used (do not change the factory settings). |
| **Scanner Switch 0B** - Not used (do not change the factory settings). |
| **Scanner Switch 0C** - Not used (do not change the factory settings). |
| **Scanner Switch 0D** - Not used (do not change the factory settings). |
| **Scanner Switch 0E** - Not used (do not change the factory settings). |
| **Scanner Switch 0F** - Not used (do not change the factory settings). |

## 4.2.3. Printer Switches

| Printer Switch 00 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0** | Page separation mark<br>**0:** Disabled<br>**1:** Enabled | **0:** No marks are printed.<br>**1**: If a received page has to be printed out on two sheets, an "x" inside a small box is printed at the bottom right hand corner of the first sheet, and a "2" inside a small box is printed at the top right hand corner of the second sheet. This helps the user to identify pages that have been split up. |
| **1** | Repetition of data when the received page is longer than the printer paper<br>**0:** Disabled  **1:** Enabled | **0:** The next page continues from where the previous page left off.<br>**1:** The final few mm of the previous page are printed at the top of the next page.<br>See section 2.2.12 for details. |
| **2** | Not used | Do not change the settings. |
| **3** | Cleaning mode after bypass feed<br>**0:** Disabled<br>**1:** After each page is fed from the bypass feed slot | **0:** Cleaning mode is not done at all if bypass feed is used.<br>**1:** Cleaning mode is done every time after a sheet of paper is fed from the bypass feed slot. |
| **4 to 7** | Not used | Do not change the settings. |

| |
|---|
| **Printer Switch 01** - Not used (do not change the factory settings). |
| **Printer Switch 02** - Not used (do not change the factory settings). |

| Printer Switch 03 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0** | Length reduction of received data<br>**0:** Disabled<br>**1:** Enabled | **0:** Incoming pages are printed without length reduction.<br>**Cross reference**<br>Page separation threshold: Printer Sw. 03, bits 4 to 7.<br>**1:** Incoming pages are reduced in the length direction when printing.<br>**Cross reference**<br>Reduction ratio: Printer Switch 04/05<br>Page separation and data reduction: section 2.2.12 |
| **1**<br>**2**<br>**3** | Not used | Do not change the settings. |
| **4**<br>**to**<br>**7** | Page separation threshold (with reduction disabled in switch 03-0 above)<br><br>If the incoming page is up to x mm longer than the copy paper, the excess portion will not be printed. If the incoming page is more than x mm longer than the copy paper, the excess portion will be printed on the next page.<br>The value of x is determined by these four bits.<br><br>Hex value of bits 4 to 7        x (mm)<br>       0                      0<br>       1                      1<br>and so on until<br>       F                    15<br><br>**Cross reference**<br>Page separation and data reduction: Section 2.2.12<br>Length reduction On/Off: Printer Switch 03, Bit 0 |

| **Printer Switches 04 and 05** | |
| --- | --- |
| **No** | **FUNCTION** / **COMMENTS** |

| **No** | **FUNCTION** | **COMMENTS** |
| --- | --- | --- |
| **0**<br><br>**to**<br><br>**7** | Reduction ratios used for different paper sizes (with reduction enabled in switch 03-0 above)<br><br>If reduction is enabled, the data will be reduced in the length direction before printing. These switches determine the maximum reduction ratio for each paper size.<br><br>**Cross reference**<br>Page separation and data reduction: section 2.2.12.<br><br>Switch 04/05   US              Europe         Asia<br>Bit 0             HLT sideways  A5 sideways  A5 sideways<br>Bit 1             Not used       B5 sideways  B5 sideways<br>Bit 2             LT lengthwise  B5 lengthwise  B5 lengthwise<br>Bit 3             Not used       A4 lengthwise  A4 lengthwise<br>Bit 4             Not used       Not used      F/F4 lengthwise<br>Bit 5             LG lengthwise  Not used      Not used<br>Bit 6             Not used       B4 lengthwise  B4 lengthwise<br>Bit 7             Not used       Not used      Not used<br><br>The available paper sizes depends on the machine's country version.<br><br>$\left(\dfrac{Sw.04}{Sw.05}\right) : \left(\dfrac{0}{0}\right) = \dfrac{4}{3},\ \left(\dfrac{1}{0}\right) = \dfrac{4}{3},\ \left(\dfrac{0}{1}\right) = \dfrac{8}{7},\ \left(\dfrac{1}{1}\right) = \dfrac{12}{11}$ |

| |
| --- |
| **Printer Switch 06** - Not used (do not change the factory settings). |
| **Printer Switch 07** - Not used (do not change the factory settings). |
| **Printer Switch 08** - Not used (do not change the factory settings). |
| **Printer Switch 09** - Not used (do not change the factory settings). |
| **Printer Switch 0A** - Not used (do not change the factory settings). |
| **Printer Switch 0B** - Not used (do not change the factory settings). |
| **Printer Switch 0C** - Not used (do not change the factory settings). |
| **Printer Switch 0D** - Not used (do not change the factory settings). |
| **Printer Switch 0E** - Not used (do not change the factory settings). |
| **Printer Switch 0F** - Not used (do not change the factory settings). |

## 4.2.4. Communication Switches

| Communication Switch 00 | | |
|---|---|---|
| No | FUNCTION | COMMENTS |
| 0<br><br>1 | Compression modes available in receive mode<br>**Bit 1   0   Modes**<br>    0    0    MH only<br>    0    1    MH/MR<br>    1    0    MH/MR/MMR<br>    1    1    Not used | These bits determine the compression capabilities to be declared in phase B (handshaking) of the T.30 protocol. |
| 2<br><br>3 | Compression modes available in transmit mode<br>**Bit 3   2   Modes**<br>    0    0    MH only<br>    0    1    MH/MR<br>    1    0    MH/MR/MMR<br>    1    1    Not used | These bits determine the compression capabilities to be used in transmission and to be declared in phase B (handshaking) of the T.30 protocol.<br>**Cross reference**<br>EFC compression in transmission: Communication Switch 01, bit 1. |
| 4<br>5<br>6<br>7 | Not used | Do not change the settings. |

| No | FUNCTION | COMMENTS |
|---|---|---|
| **Communication Switch 01** | | |
| 0 | ECM<br>**0:** Off  **1:** On | If this bit is 0, ECM is switched off for all communications. |
| 1 | EFC during transmission<br>**0:** Off  **1:** On | If this bit is 0, EFC is switched off during transmission. |
| 2<br><br>3 | Wrong connection prevention method<br>**Bit 3  Bit 2    Setting**<br>0      0      None<br>0      1      8 digit CSI<br>1      0      4 digit CSI<br>1      1      CSI/RTI | **(0,1) -** The machine will not transmit if the last 8 digits of the received CSI do not match the last 8 digits of the dialed telephone number. This does not work for manual dialing.<br>**(1,0) -** The same as above, except that only the last 4 digits are compared.<br>**(1,1) -** The machine will not transmit if the other end does not identify itself with an RTI or CSI.<br>**(0,0) -** Nothing is checked; transmission will always go ahead. |
| 4 | Operator call if no response is received in reply to NSF/DIS<br>**0:** Disabled    **1:** Enabled | Set this bit to 1 if the user expects to receive phone calls at the same number which the machine is connected to. |
| 5 | Not used | Do not change the setting. |
| 6<br><br>7 | Maximum printable page length available<br>**Bit 7  Bit 6    Setting**<br>0      0      No limit<br>0      1      B4 and A4<br>1      0      A4<br>1      1      Not used | The setting determined by these bits is informed to the transmitting terminal in the pre-message protocol exchange (in the DIS/NSF frames). |

| Communication Switch 02 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0** | Burst error threshold<br>**0:** Low   **1:** High | If there are more consecutive error lines in the received page than the threshold, the machine will send a negative response.<br>The Low and High threshold values depend on the sub-scan resolution, and are as follows.<br>**Resolution          Standard     Detail**<br>Low settings            3                 6<br>High settings           6                 12 |
| **1** | Acceptable total error line ratio<br>**0:** 5%   **1:** 10% | If the error line ratio of a page exceeds the acceptable ratio, RTN will be sent to the other end. |
| **2** | Treatment of pages received with errors during G3 reception<br>**0:** Deleted from memory without printing<br>**1:** Printed | **0:** Pages received with errors are not printed. |
| **3** | Hang-up decision when a negative code (RTN or PIN) is received during G3 immediate transmission<br>**0:** No hang-up, **1:** Hang-up | **0:** The next page will be sent even if RTN or PIN is received.<br>**1:** The machine will send DCN and hang up if it receives RTN or PIN.<br><br>This bit is ignored for memory transmissions or if ECM is being used. |
| **4 to 7** | Not used | Do not change the settings. |

| Communication Switch 03 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0 to 7** | Maximum number of page retransmissions in a G3 memory transmission | 00 - FF (Hex) times.<br>This setting is not used if ECM is switched on. |

| | |
|---|---|
| **Communication Switch 04** - Not used (do not change the factory settings). | |
| **Communication Switch 05** - Not used (do not change the factory settings). | |

| Communication Switch 06 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0** | Dialing requirements: Germany<br>**0:** Disabled  **1:** Enabled | These switches are automatically set to the settings required by each country after a country code (System Switch 0F) is programmed. |
| **1** | Dialing requirements: Austria<br>**0:** Disabled  **1:** Enabled | |
| **2** | Dialing requirements: Norway<br>**0:** Disabled  **1:** Enabled | |
| **3** | Dialing requirements: Denmark<br>**0:** Disabled  **1:** Enabled | |
| **4** | Dialing requirements: France<br>**0:** Disabled  **1:** Enabled | |
| **5** | Dialing requirements: Switzerland<br>**0:** Disabled  **1:** Enabled | |
| **6**<br>**7** | Not used | Do not change the settings. |

| |
|---|
| **Communication Switch 07** - Not used (do not change the factory settings). |
| **Communication Switch 08** - Not used (do not change the factory settings). |
| **Communication Switch 09** - Not used (do not change the factory settings). |

| Communication Switch 0A | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0** | Point of resumption of memory transmission upon redialing<br>**0:** From the error page<br>**1:** From page 1 | **0:** The transmission begins from the page where transmission failed the previous time.<br>**1:** Transmission begins from the first page. |
| **1**<br>**to**<br>**6** | Not used | Do not change the settings. |
| **7** | Emergency calls using 999<br>**0:** Enabled  **1:** Disabled | If this bit is at 1, the machine will not allow you to dial 999 at the auto-dialer. This is a PTT requirement in the UK and some other countries. |

| |
|---|
| **Communication Switch 0B** - Not used (do not change the factory settings). |
| **Communication Switch 0C** - Not used (do not change the factory settings). |

| Communication Switch 0D | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0 to 7** | The amount of remaining memory below which ringing detection (and therefore reception into memory) is disabled | 00 to FF (Hex), unit = 2 kbytes (e.g., 40(H) = 128 kbytes) One page is about 24 kbytes. If this setting is kept at 0, the machine will detect ringing signals and go into receive mode even if there is no memory space left. This will result in communication failure. |

| Communication Switch 0E | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0 to 7** | Minumum interval between automatic dialing attempts | 06 to FF (Hex), unit = 2 s (e.g., 06(H) = 12 s) This value is the minimum time that the machine waits before it dials the next destination. |

| Communication Switch 0F - Not used (do not change the factory settings). |
|---|

| Communication Switch 10 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0 to 7** | Memory transmission: Maximum number of dialing attempts to the same destination | 01 - FF (Hex) times |

| Communication Switch 11 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0 to 7** | Immediate transmission: Maximum number of dialing attempts to the same destination | 01 - FF (Hex) times |

| Communication Switch 12 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0 to 7** | Memory transmission: Interval between dialing attempts to the same destination | 00 - FF (Hex) minutes |

| Communication Switch 13 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0 to 7** | Immediate transmission: Interval between dialing attempts to the same destination | 00 - FF (Hex) minutes |

| |
|---|
| **Communication Switch 14** - Not used (do not change the factory settings). |
| **Communication Switch 15** - Not used (do not change the factory settings). |
| **Communication Switch 16** - Not used (do not change the factory settings). |
| **Communication Switch 17** - Not used (do not change the factory settings). |
| **Communication Switch 18** - Not used (do not change the factory settings). |
| **Communication Switch 19** - Not used (do not change the factory settings). |
| **Communication Switch 1A** - Not used (do not change the factory settings). |
| **Communication Switch 1B** - Not used (do not change the factory settings). |
| **Communication Switch 1C** - Not used (do not change the factory settings). |
| **Communication Switch 1D** - Not used (do not change the factory settings). |
| **Communication Switch 1E** - Not used (do not change the factory settings). |
| **Communication Switch 1F** - Not used (do not change the factory settings). |

## 4.2.5. G3 Switches

| G3 Switch 00 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| 0<br><br>1 | Monitor speaker during communication (tx and rx)<br>**Bit 1  Bit 0    Setting**<br>0      0      Disabled<br>0      1      Up to Phase B<br>1      0      All the time<br>1      1      Not used | (0, 0): The monitor speaker is disabled all through the communication.<br>**(0, 1):** The monitor speaker is on up to phase B in the T.30 protocol.<br>**(1, 0):** Used for testing. The monitor speaker is on all through the communication.<br>Make sure that you reset these bits after testing. |
| 2 | Monitor speaker during memory transmission<br>**0:** Disabled  **1:** Enabled | **1:** The monitor speaker is enabled during memory transmission. |
| 3 to 6 | Not used | Do not change the settings. |
| 7 | Back to back test<br>**0:** Disabled<br>**1:** Enabled | Set this bit to 1 when you wish to do a back to back test.<br>**115 V model:** Be sure to connect jumpers JP5 and JP6 on the NCU before doing the test.<br>**220 V model:** Be sure to apply dc voltage between wires L1 and L2 on the NCU. |

| G3 Switch 01 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| 0 to 3 | Not used | Do not change the settings. |
| 4 | DIS frame length<br>**0:** 6 bytes  **1:** 4 bytes | **1:** The 5th and 6th bytes in the DIS frame will not be transmitted (set this bit to 1 when there are communication problems with PC-based faxes). |
| 5<br>6<br>7 | Not used | Do not change the settings. |

| G3 Switch 02 | | |
| --- | --- | --- |
| No | FUNCTION | COMMENTS |
| 0 | G3 protocol mode used<br>**0:** Standard and non-standard<br>**1:** Standard only | **1:** Disables NSF/NSS signals (these are used in non-standard mode communication) |
| 1 to 4 | Not used | Do not change the settings. |
| 5 | Use of modem rate history during AI short protocol<br>**0:** Disabled<br>**1:** Enabled | **0:** Communications using AI short protocol always start with the highest modem rate.<br>**1:** The machine uses the modem rate history for communications with the same machine when determining the most suitable rate for the current communication. |
| 6 | AI short protocol (transmission and reception)<br>**0:** Disabled  **1:** Enabled | Refer to Appendix B in the Group 3 Facsimile Manual for details on AI short protocol. |
| 7 | Not used | Do not change the setting. |

| G3 Switch 03 | | |
| --- | --- | --- |
| No | FUNCTION | COMMENTS |
| 0 | DIS detection number (Echo countermeasure)<br>**0:** 1<br>**1:** 2 | **0:** The machine will hang up if it receives the same DIS frame twice.<br>**1:** Before sending DCS, the machine will wait for the second DIS which is caused by echo on the line. |
| 1<br>2 | Not used | Do not change the setting. |
| 3 | ECM frame size in tx (bytes)<br>**0:** 256    **1:** 64 | 1: The machine transmits with a frame size of 64 bytes in ECM. Set this bit to 1 when the other terminal has only a 64 byte ECM frame size. |
| 4 | CTC transmission conditions<br>**0:** Ricoh mode (PPR x 1)<br>**1:** ITU-T mode (PPR x 4) | When using ECM, the machine will choose a slower modem rate after receiving PPR once (Ricoh mode) or four times (ITU-T mode).<br>ITU-T: New acronym for the CCITT. |
| 5 | Modem rate used for the next page after receiving a negative code (RTN or PIN)<br>**0:** No change  **1:** Fallback | **1:** The machine's tx modem rate will fall back before sending the next page if a negative code is received. This bit is ignored if ECM is being used. |
| 6<br>7 | Not used | Do not change the setting. |

| G3 Switch 04 | | |
|---|---|---|
| | **FUNCTION** | **COMMENTS** |
| **0 to 3** | Training error detection threshold | 00 - 0F (Hex); 0 - 15 bits<br>If the number of error bits in the received TCF is below this threshold, the machine informs the sender that the training has succeeded. |
| **4 to 7** | Not used | Do not change the settings. |

| G3 Switch 05 | | |
|---|---|---|
| **No** | **FUNCTION** | **COMMENTS** |
| **0 to 3** | Initial Tx modem rate<br>**Bit 3 2 1 0　Setting (bps)**<br>　　0 0 0 1　2.4k<br>　　0 0 1 0　4.8k<br>　　0 0 1 1　7.2k<br>　　0 1 0 0　9.6k<br>Other settings - Not used | These bits set the initial starting modem rate for transmission. |
| **4 to 7** | Not used | Do not change the settings. |

| G3 Switch 06 | | |
|---|---|---|
| | **FUNCTION** | **COMMENTS** |
| **0 to 3** | Initial Rx modem rate<br>**Bit 3 2 1 0　Setting (bps)**<br>　　0 0 0 1　2.4 k<br>　　0 0 1 0　4.8 k<br>　　0 0 1 1　7.2 k<br>　　0 1 0 0　9.6 k<br>Other settings - Not used | The setting of these bits is used to inform the transmitting terminal of the available modem rate for the machine in receive mode. |
| **4 to 7** | Modem types available for reception<br>**Bit 7 6 5 4　Setting**<br>　　0 0 0 1　V27ter<br>　　0 0 1 0　V27ter, V29<br>Other settings - Not used | The setting of these bits is used to inform the transmitting terminal of the available modem type for the machine in receive mode. |

| G3 Switch 07 | | | |
|---|---|---|---|
| | **FUNCTION** | | **COMMENTS** |
| | PSTN cable equalizer (tx mode) | | Use a higher setting if there is signal loss at higher frequencies because of the length of wire between the modem and the telephone exchange. |
| | **Bit 1** **Bit 0** | **Setting** | |
| **0** | 0    0 | None | |
| | 0    1 | Low | Also, try using the cable equalizer if one or more of the following symptoms occurs. |
| **1** | 1    0 | Medium | |
| | 1    1 | High | |
| | | | • Communication error |
| | | | • Modem rate fallback occurs frequently. |
| | PSTN cable equalizer (rx mode) | | Use a higher setting if there is signal loss at higher frequencies because of the length of wire between the modem and the telephone exchange. |
| | **Bit 3** **Bit 2** | **Setting** | |
| **2** | 0    0 | None | |
| | 0    1 | Low | Also, try using the cable equalizer if one or more of the following symptoms occurs. |
| **3** | 1    0 | Medium | |
| | 1    1 | High | |
| | | | • Communication error with error codes such as 0-20, 0-23, etc. |
| | | | • Modem rate fallback occurs frequently. |
| **4-7** | Not used | | Do not change the settings. |

| G3 Switch 08 | | | |
|---|---|---|---|
| | **FUNCTION** | | **COMMENTS** |
| | PABX cable equalizer (tx mode) | | Use a higher setting if there is signal loss at higher frequencies because of the length of wire between the modem and the telephone exchange. |
| **0** | **Bit 1** **Bit 0** | **Setting** | |
| | 0    0 | None | |
| **1** | 0    1 | Low | Also, try using the cable equalizer if one or more of the following symptoms occurs. |
| | 1    0 | Medium | |
| | 1    1 | High | |
| | | | • Communication error |
| | | | • Modem rate fallback occurs frequently. |
| | PABX cable equalizer (rx mode) | | Use a higher setting if there is signal loss at higher frequencies because of the length of wire between the modem and the telephone exchange. |
| | **Bit 3** **Bit 2** | **Setting** | |
| **2** | 0    0 | None | |
| | 0    1 | Low | Also, try using the cable equalizer if one or more of the following symptoms occurs. |
| **3** | 1    0 | Medium | |
| | 1    1 | High | |
| | | | • Communication error with error codes such as 0-20, 0-23, etc. |
| | | | • Modem rate fallback occurs frequently. |
| **4-7** | Not used | | Do not change the settings. |

| G3 Switch 09 - Not used (do not change the factory settings). |
|---|

**G3 Switch 0A**

|   | FUNCTION | COMMENTS |
|---|---|---|
| 0<br><br>1 | Maximum allowable carrier drop during image data reception<br>**Bit 1    Bit 0    Value (ms)**<br>  0        0          200<br>  0        1          400<br>  1        0          800<br>  1        1          Not used | These bits set the acceptable modem carrier drop time. Try using a longer setting if error code 0-22 is frequent. |
| 2<br>3 | Not used | Do not change the settings. |
| 4 | Maximum allowable frame interval during image data reception.<br>**0:** 5 s    **1:** 13 s | This bit set the maximum intervals between each EOL signal (end-of-line) or intervals between each ECM frame from the other end.<br>Try using a longer setting if error code 0-21 is frequent. |
| 5 | Not used | Do not change the settings. |
| 6 | Reconstruction time for the first line in receive mode<br>**0:** 6 s    **1:** 12 s | When the sending terminal is controlled by a computer, there may be a delay in receiving page data after the local machine accepts set-up data and sends CFR. If this occurs, set this bit to 1 to give the sending machine more time to send data.<br>Refer to error code 0-20. |
| 7 | Not used | Do not change the settings. |

**G3 Switch 0B**

|   | FUNCTION | COMMENTS |
|---|---|---|
| 0 | Protocol requirements:<br>Europe<br>**0:** Disabled  **1:** Enabled | Manually set these bit switches to the appropriate settings after a country code (System Switch 0F) is programmed. |
| 1 | Protocol requirements:<br>Norway<br>**0:** Disabled  **1:** Enabled |  |
| 2 | Protocol requirements:<br>Germany<br>**0:** Disabled  **1:** Enabled |  |
| 3 | Protocol requirements:<br>France<br>**0:** Disabled  **1:** Enabled |  |
| 4 | PTT requirements: Germany<br>**0:** Disabled  **1:** Enabled |  |
| 5 | PTT requirements: France<br>**0:** Disabled  **1:** Enabled |  |

| **G3 Switch 0B** | | |
|---|---|---|
| | **FUNCTION** | **COMMENTS** |
| **6** | Not used | Do not change the settings. |
| **7** | | |

| **G3 Switch 0C** | | |
|---|---|---|
| | **FUNCTION** | **COMMENTS** |
| **0**<br><br>**1** | Pulse dialing method<br>**Bit 1  Bit 0  Setting**<br>0        0      Normal (P=N)<br>0        1      Oslo (P=10 - N)<br>1        0      Sweden (N+1)<br>1        1      Not used | P=Number of pulses sent out, N=Number dialed. |
| **2 to 7** | Not used | Do not change the settings. |

| **G3 Switch 0D** - Not used (do not change the factory settings). |
|---|
| **G3 Switch 0E** - Not used (do not change the factory settings). |
| **G3 Switch 0F** - Not used (do not change the factory settings). |

## 4.3. NCU PARAMETERS

The following tables give the RAM addresses and units of calculation of the parameters that the machine uses for ringing signal detection and automatic dialing. The factory settings for each country are also given. Most of these must be changed by RAM read/write (Function 06), but some can be changed using NCU Parameter programming (Function 08); if Function 08 can be used, this will be indicated in the Remarks column. The RAM is programmed in hex code unless (BCD) is included in the Unit column.

| Address | Function | Unit | Remarks |
|---|---|---|---|
| 807F00 | Country code for NCU parameters | Use the Hex value to program the country code directly into this address, or use the decimal value to program it using Function 08 (parameter C.C.).<br><br>**Country　Decimal　Hex**<br>France　　　00　　00<br>Germany　　01　　01<br>UK　　　　02　　02<br>Italy　　　03　　03<br>Austria　　04　　04<br>Belgium　　05　　05<br>Denmark　　06　　06<br>Finland　　07　　07<br>Ireland　　08　　08<br>Norway　　09　　09<br>Sweden　　10　　0A<br>Switzerland　11　　0B<br>Portugal　　12　　0C<br>Holland　　13　　0D<br>Spain　　　14　　0E<br>Israel　　　15　　0F<br>USA　　　17　　11<br>Asia　　　18　　12<br>Hong Kong　20　　14<br>South Africa　21　　15<br>Australia　22　　16<br>New Zealand　23　　17<br>Singapore　24　　18<br>Malaysia　　25　　19 | |
| 807F01 | Line current detection time | 20 ms | Line current is not detected if 807F01 contains FF. |
| 807F02 | Line current wait time | | |
| 807F03 | Line current drop detect time | | |
| 807F04 | PSTN dial tone frequency range (high byte) | Hz (BCD) | See Note 2. |
| 807F05 | PSTN dial tone frequency range (low byte) | | |

| Address | Function | Unit | Remarks |
|---|---|---|---|
| 807F06 | Not used | | Do not change the factory setting. |
| 807F07 | | | |
| 807F08 | PSTN dial tone detection time | 20 ms | If 807F08 contains FF, the machine pauses for the pause time (address 807F0D / 807F0E).<br><br>See Note 3 (Italy). |
| 807F09 | PSTN dial tone reset time (LOW) | | |
| 807F0A | PSTN dial tone reset time (HIGH) | | |
| 807F0B | PSTN dial tone continuous tone time | | |
| 807F0C | PSTN dial tone permissible drop time | | |
| 807F0D | PSTN wait interval (LOW) | | |
| 807F0E | PSTN wait interval (HIGH) | | |
| 807F0F | PSTN ringback tone detection time | 20 ms | Detection is disabled if this contains FF. |
| 807F10 | PSTN ringback tone off detection time | 20 ms | |
| 807F11 | PSTN detection time for silent period after ringback tone detected (LOW) | 20 ms | |
| 807F12 | PSTN detection time for silent period after ringback tone detected (HIGH) | 20 ms | |
| 807F13 | PSTN busy tone frequency range (high byte) | Hz (BCD) | If 807F13 is FF, detection is disabled. See Note 2. |
| 807F14 | PSTN busy tone frequency range (low byte) | | |
| 807F15 | Not used | | Do not change the factory settings. |
| 807F16 | | | |
| 807F17 | PABX dial tone frequency range (high byte) | Hz (BCD) | See Note 2. |
| 807F18 | PABX dial tone frequency range (low byte) | | |
| 807F19 | Not used | | Do not change the factory settings. |
| 807F1A | | | |
| 807F1B | PABX dial tone detection time | 20 ms | If 807F1B contains FF, the machine pauses for the pause time (807F20 / 807F21). |
| 807F1C | PABX dial tone reset time (LOW) | | |
| 807F1D | PABX dial tone reset time (HIGH) | | |
| 807F1E | PABX dial tone continuous tone time | | |
| 807F1F | PABX dial tone permissible drop time | | |
| 807F20 | PABX wait interval (HIGH) | | |
| 807F21 | PABX wait interval (LOW) | | |
| 807F22 | PABX ringback tone detection time | 20 ms | Detection is disabled if this contains FF. |
| 807F23 | PABX ringback tone off detection time | 20 ms | |

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| Address | Function | Unit | Remarks |
|---------|----------|------|---------|
| 807F24 | PABX detection time for silent period after ringback tone detected (LOW) | 20 ms | |
| 807F25 | PABX detection time for silent period after ringback tone detected (HIGH) | 20 ms | |
| 807F26 | PABX busy tone frequency range (high byte) | Hz (BCD) | If this is FF, detection is disabled. See Note 2. |
| 807F27 | PABX busy tone frequency range (low byte) | | See Note 2. |
| 807F28 | Not used | | Do not change the factory settings. |
| 807F29 | | | |
| 807F2A | Busy tone ON time: range 1 | 20 ms | |
| 807F2B | Busy tone OFF time: range 1 | | |
| 807F2C | Busy tone ON time: range 2 | | |
| 807F2D | Busy tone OFF time: range 2 | | |
| 807F2E | Busy tone ON time: range 3 | | |
| 807F2F | Busy tone OFF time: range 3 | | |
| 807F30 | Busy tone ON time: range 4 | | |
| 807F31 | Busy tone OFF time: range 4 | | |
| 807F32 | Busy tone continuous tone detection time | | |
| 807F33 | Busy tone signal state time tolerance for all ranges, and number of cycles required for detection (a setting of 4 cycles means that ON-OFF-ON or OFF-ON-OFF must be detected twice).<br><br>Tolerance ($\pm$)<br>Bit   1  0<br>      0  0   75%          Bits 2 and 3 must always<br>      0  1   50%          be kept at 0.<br>      1  0   25%<br>      1  1   12.5%<br><br>Bits 7, 6, 5, 4 - number of cycles required for cadence detection | | |
| 807F34 | International dial tone frequency range (high byte) | Hz (BCD) | See Note 2. |
| 807F35 | International dial tone frequency range (low byte) | | |
| 807F36 | Not used | | Do not change the factory settings |
| 807F37 | | | |

| Address | Function | Unit | Remarks |
|---------|----------|------|---------|
| 807F38 | International dial tone detection time | 20 ms | If 807F38 contains FF, the machine pauses for the pause time (807F3D / 807F3E).<br><br>See Note 3 (Belgium). |
| 807F39 | International dial tone reset time (LOW) | | |
| 807F3A | International dial tone reset time (HIGH) | | |
| 807F3B | International dial tone continuous tone time | | |
| 807F3C | International dial tone permissible drop time | | |
| 807F3D | International dial wait interval (HIGH) | | |
| 807F3E | International dial wait interval (LOW) | | |
| 807F3F | Country dial tone upper frequency limit (HIGH) | Hz (BCD) | See Note 2. |
| 807F40 | Country dial tone upper frequency limit (LOW) | | |
| 807F41 | Country dial tone lower frequency limit (HIGH) | | |
| 807F42 | Country dial tone lower frequency limit (LOW) | | |
| 807F43 | Country dial tone detection time | 20 ms | If 807F43 contains FF, the machine pauses for the pause time (807F48 / 807F49). |
| 807F44 | Country dial tone reset time (LOW) | | |
| 807F45 | Country dial tone reset time (HIGH) | | |
| 807F46 | Country dial tone continuous tone time | | |
| 807F47 | Country dial tone permissible drop time | | |
| 807F48 | Country dial wait interval (LOW) | | |
| 807F49 | Country dial wait interval (HIGH) | | |
| 807F4A | Time between opening or closing the Ds relay and opening the Di relay | 1 ms | See Notes 4 and 7. Function 08 (parameter 11). |
| 807F4B | Break time for pulse dialling | 1 ms | See Note 4. Function 08 (parameter 12). |
| 807F4C | Make time for pulse dialling | 1 ms | See Note 4. Function 08 (parameter 13). |
| 807F4D | Time between final Di relay closure and Ds relay opening or closing | 1 ms | See Notes 4 and 7. Function 08 (parameter 14). |
| 807F4E | Minimum pause between dialled digits (pulse dial mode) | 20 ms | See Note 4. Function 08 (parameter 15). |
| 807F4F | Time waited when a pause is entered at the operation panel | | Function 08 (parameter 16). See Note 4. |
| 807F50 | DTMF tone on time | 1 ms | Function 08 (parameter 17). |
| 807F51 | DTMF tone off time | | Function 08 (parameter 18). |

| Address | Function | Unit | Remarks |
|---|---|---|---|
| 807F52 | Tone attenuation value in DTMF signals | -dBm x 0.5 | Function 08 (parameter 19). See Note 6. |
| 807F53 | Tone attenuation value difference between high frequency tone and low frequency tone in DTMF signals | -Nx0.5 (dB) | Function 08 (parameter 20). See Note 6. |
| 807F54 | PSTN: DTMF tone attenuation level after dialling | -dBm x 0.5 | Function 08 (parameter 21). See Note 6. |
| 807F55 to 807F58 | Not used | | Do not change the settings. |
| 807F59 | Grounding time (ground start mode) | 20 ms | The Gs relay is closed for this interval. |
| 807F5A | Break time (flash start mode) | 1 ms | The OHDI relay is open for this interval. |
| 807F5B<br>807F5C | International dial access code | BCD | For a code of 100:<br>    807F5B - F1<br>    807F5C - 00 |
| 807F5D | PSTN access pause time | 20 ms | This time is waited for each pause input after the PSTN access code. Up to 7 of these can be input. If this address contains FF[H], the pause time stored in address 807F4F is used. |
| 807F5E | Progress tone detection level, and cadence detection enable flags | Bit 7 Bit 6 Bit 5    dBm<br>   0     0     0     -25.0<br>   0     0     1     -35.0<br>   0     1     0     -30.0<br>   1     0     0     -40.0<br>   1     1     0     -49.0<br><br>Bits  2, 0 - See Note 3. | |
| 807F5F | Polarity detection | Bit 4  1: Enable: Tx Polarity detection<br>Bit 5  1: Enable: Rx Polarity detection | |
| 807F60 to 807F64 | Not used | | Do not change the settings. |
| 807F65 | Intercity dial prefix (HIGH) | BCD | For a code of 0:<br>    807F65 - FF<br>    807F66 - F0 |
| 807F66 | Intercity dial prefix (LOW) | BCD | |
| 807F67 to 807F71 | Not used | | Do not change the settings. |

| Address | Function | Unit | Remarks |
|---|---|---|---|
| 807F72 | Acceptable ringing signal frequency: range 1, upper limit | 1000/ N (Hz). | Function 08 (parameter 02). |
| 807F73 | Acceptable ringing signal frequency: range 1, lower limit | | Function 08 (parameter 03). |
| 807F74 | Acceptable ringing signal frequency: range 2, upper limit | | Function 08 (parameter 04). |
| 807F75 | Acceptable ringing signal frequency: range 2, lower limit | | Function 08 (parameter 05). |
| 807F76 | Number or rings until a call is detected | 1 | Function 08 (parameter 06). |
| 807F77 | Minimum required length of the first ring | 20 ms | See Note 5. Function 09 (parameter 07). |
| 807F78 | Minimum required length of the second and subsequent rings | 20 ms | Function 08 (parameter 08). |
| 807F79 | Ringing signal detection reset time (LOW) | 20 ms | Function 08 (parameter 09). |
| 807F7A | Ringing signal detection reset time (HIGH) | | Function 08 (parameter 10). |
| 807F7B to 807F80 | Not used | | Do not change the settings. |
| 807F81 | Interval between dialing the last digit and switching the Oh relay over to the external telephone when dialing from the operation panel in handset mode. | 20 ms | Factory setting: 500 ms |
| 807F82 | Bits 0 and 1 - Handset off-hook detection time<br>**Bit    1    0    Setting**<br>       0    0    200 ms<br>       0    1    800 ms<br>       Other    Not used<br><br>Bits 2 and 3 - Handset on-hook detection time<br>**Bit    3    2    Setting**<br>       0    0    200 ms<br>       0    1    800 ms<br>       Other    Not used<br><br>Bits 4 to 7 - Not used | | |
| 807FA1 | Acceptable CED detection range (high byte) | BCD (Hz) | See Note 2. |
| 807FA2 | Acceptable CED detection range (low byte) | | |
| 807FA3 | Not used | | Do not change the factory setting. |
| 807FA4 | | | |
| 807FA5 | CED detection time | 20 ms ± 20 ms | Factory setting: 200 ms |

| Address | Function | Unit | Remarks |
|---------|----------|------|---------|
| 807FA6 | Not used | | Do not change the factory setting. |
| 807FA7 | | | |
| 807FA8 | | | |
| 807FA9 | | | |
| 807FAA | CNG detection time | 20 ms $\pm$ 20 ms | Factory setting: 200 ms |
| 807FAB | CNG on time | 20 ms | Factory setting: 500 ms |
| 807FAC | CNG off time | 20 ms | Factory setting: 200 ms |
| 807FAD | Number of CNG cycles required for detection | | The data is coded in the same way as address 807F33. Factory setting: 23(H) |
| 807FAE | Not used | | Do not change the settings. |
| 807FAF | | | |
| 807FB0 | | | |
| 807FB1 | | | |
| 807FB2 | | | |
| 807FB3 | Detection time for 800 Hz AI short protocol tone | 20 ms | Factory setting: 360 ms |
| 807FB4 | PSTN: Tx level from the modem | - dBm | Function 08 (parameter 01). |
| 807FB5 | PSTN: 1100 Hz tone transmission level | \- $N_{807FB4}$ - 0.5$N_{807FB5}$ (dB) | |
| 807FB6 | PSTN: 2100 Hz tone transmission level | \- $N_{807FB4}$ - 0.5$N_{807FB6}$ (dB) | |
| 807FB7 | PABX: Tx level from the modem | - dBm | |
| 807FB8 | PABX: 1100 Hz tone transmission level | \- $N_{807FB7}$ - 0.5$N_{807FB8}$ (dB) | |
| 807FB9 | PABX: 2100 Hz tone transmission level | \- $N_{807FB7}$ - 0.5$N_{807FB9}$ (dB) | |
| 807FBA to 807FBC | Not used | | Do not change the settings. |
| 807FBD | Modem turn-on level (incoming signal detection level) | -37-0.5N (dBm) | |
| 807FDA | T.30 T1 timer | 1 s | |

**Notes**

1. If a setting is not required, store FF in the address.

2. Tone frequencies are stored as look-up tables in hex code. For each parameter, there is a look-up table for each country that uses it. The tables are given following this page. For each parameter, do not input a RAM value that is not included in the table.

3. Italy and Belgium only

   RAM address 807F5E: the lower four bits have the following meaning.
   Bit 2  1: International dial tone cadence detection enabled (Belgium)
   Bit 1  Not used
   Bit 0  1: PSTN dial tone cadence detection enabled (Italy)

   If bit 0 or bit 2 is set to 1, the functions of the following RAM addresses are changed.
   807F08 (if bit 0 = 1) or 807F38 (if bit 2 = 1): tolerance for on or off state duration (%), and number of cycles required for detection, coded as in address 807F33.
   807F0B (if bit 0 = 1) or 807F3B (if bit 2 = 1): on time, hex code (unit = 20 ms)
   807F0C (if bit 0 = 1) or 807F3C(if bit 2 = 1): off time, hex code (unit = 20 ms)

4. Pulse dial parameters (addresses 807F4A to 807F4F) are the values for 10 pps. If 20 pps is used, the machine automatically compensates.

5. The first ring may not be detected until 1 to 2.5 wavelengths after the time specified by this parameter.

6. The calculated level must be between 0 and 10.
   The attenuation levels calculated from RAM data are:
   High frequency tone: $- 0.5 \times N_{807F52/807F54}$ dBm
   Low frequency tone: $- 0.5 \times (N_{807F52/807F54} + N_{807F53})$ dBm
   Note: $N_{807F52}$, for example, means the value stored in address 807F52(H)

7. 807F4A: Europe - Between Ds opening and Di opening, France - Between Ds closing and Di opening
   807F4D: Europe - Between Ds closing and Di closing, France - Between Ds opening and Di closing

## Tone Detection Frequency Ranges

- PSTN Dial Tone (807F04 - 807F05) -

| France | | Germany | | Italy | |
|---|---|---|---|---|---|
| **RAM Value [H]** | **Range (Hz)** | **RAM Value [H]** | **Range (Hz)** | **RAM Value [H]** | **Range (Hz)** |
| 040 | 415 - 465 | 060 | 400 - 480 | 030 (Default) | 410 - 440 |
| 050 | 410 - 470 | 070 | 390 - 485 | 040 | 400 - 450 |
| 060 (Default) | 400 - 475 | 080 | 385 - 490 | 050 | 395 - 455 |
| 070 | 395 - 480 | 090 (Default) | 380 - 495 | 060 | 385 - 460 |
| 080 | 390 - 485 | 0A0 | 370 - 500 | 070 | 380 - 465 |
| 090 | 380 - 490 | 0B0 | 365 - 505 | 080 | 375 - 470 |
| 0A0 | 375 - 495 | 0C0 | 360 - 510 | 090 | 365 - 475 |
| 0B0 | 465 - 500 | 0D0 | 350 - 515 | | |
| | | 0E0 | 345 - 520 | | |

| Austria, Belgium | | Denmark | | Finland | |
|---|---|---|---|---|---|
| **RAM Value [H]** | **Range (Hz)** | **RAM Value [H]** | **Range (Hz)** | **RAM Value [H]** | **Range (Hz)** |
| 0A8 | 380 - 505 | 0B0 | 360 - 505 | 0C8 | 340 - 520 |
| 0B8 | 370 - 515 | 0C0 | 350 - 515 | 0D8 | 330 - 525 |
| 0C8 (Default) | 365 - 520 | 0D0 (Default) | 340 - 520 | 0E8 | 325 - 535 |
| 0D8 | 355 - 530 | 0E0 | 335 - 525 | 0F8 (Default) | 315 - 540 |
| 0E8 | 345 - 535 | 0F0 | 325 - 530 | 108 | 310 - 545 |
| 0F8 | 340 - 540 | 100 | 320 - 540 | 118 | 300 - 550 |
| 108 | 335 - 545 | 110 | 310 - 545 | 128 | 295 - 555 |
| 118 | 320 - 550 | 120 | 305 - 550 | 138 | 285 - 560 |
| | | | | 148 | 275 - 565 |

| Ireland | | Norway | | Sweden | |
|---|---|---|---|---|---|
| **RAM Value [H]** | **Range (Hz)** | **RAM Value [H]** | **Range (Hz)** | **RAM Value [H]** | **Range (Hz)** |
| 098 | 255 - 425 | 0A0 | 355 - 475 | 070 | 380 - 465 |
| 0A8 | 245 - 430 | 0B0 | 345 - 490 | 080 | 375 - 470 |
| 0B8 | 235 - 440 | 0C0 | 335 - 500 | 090 | 365 - 475 |
| 0C8 | 225 - 445 | 0D0 | 325 - 505 | 0A0 (Default) | 360 - 480 |
| 0D8 | 210 - 450 | 0E0 (Default) | 320 - 510 | 0B0 | 355 - 485 |
| 0E8 (Default) | 200 - 455 | 0F0 | 310 - 515 | 0C0 | 345 - 490 |
| | | 100 | 305 - 520 | 0D0 | 335 - 500 |
| | | 110 | 290 - 525 | 0E0 | 330 - 505 |
| | | | | 0F0 | 320 - 510 |

| Switzerland | | Portugal | | Holland | |
|---|---|---|---|---|---|
| RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) |
| 0F0 | 385 - 560 | 090 | 315 - 440 | 120 | 290 - 580 |
| 100 | 380 - 565 | 0A0 | 305 - 450 | 130 | 280 - 585 |
| 110 | 370 - 570 | 0B0 (Default) | 295 - 455 | 140 (Default) | 270 - 590 |
| 120 (Default) | 365 - 575 | 0C0 | 285 - 465 | 150 | 265 - 595 |
| 130 | 355 - 580 | 0D0 | 275 - 470 | 160 | 255 - 600 |
| 140 | 350 - 585 | 0E0 | 270 - 475 | | |
| 150 | 340 - 590 | 0F0 | 260 - 480 | | |
| 160 | 330 - 595 | 100 | 250 - 490 | | |
| 170 | 325 - 600 | | | | |

| Spain | | Israel | | Australia | |
|---|---|---|---|---|---|
| RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) |
| 0B0 | 320 - 480 | 0AA | 350 - 490 | FFFF (Default) | Tone not detected |
| 0C0 | 310 - 490 | 0BA (Default) | 340 - 500 | 0C0 | 190 - 425 |
| 0D0 | 305 - 495 | 0CA | 335 - 510 | 0D0 | 170 - 435 |
| 0E0 (Default) | 295 - 500 | 0DA | 325 - 515 | 0E0 | 160 - 440 |
| 0F0 | 285 - 510 | 0EA | 320 - 520 | 0F0 | 135 - 435 |
| 100 | 275 - 515 | 0FA | 310 - 525 | 100 | 130 - 430 |
| 110 | 265 - 520 | 10A | 300 - 530 | | |
| 120 | 255 - 525 | | | | |
| 130 | 245 - 530 | | | | |

- PABX Dial Tone (807F17 - 807F18) -

| Italy | | Belgium | | Denmark | |
|---|---|---|---|---|---|
| RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) |
| 098 | 405 - 495 | 0A8 | 370 - 505 | 0B0 | 360 - 505 |
| 0A8 | 395 - 505 | 0B8 | 380 - 515 | 0C0 | 350 - 515 |
| 0B8 (Default) | 375 - 515 | 0C8 (Default) | 365 - 520 | 0D0 (Default) | 340 - 520 |
| 0C8 | 370 - 520 | 0D8 | 355 - 530 | 0E0 | 335 - 525 |
| 0D8 | 360 - 525 | 0E8 | 345 - 535 | 0F0 | 325 - 530 |
| 0E8 | 355 - 530 | 0F8 | 340 - 540 | 100 | 320 - 540 |
| 0F8 | 345 - 540 | 108 | 335 - 545 | 110 | 310 - 545 |
| 108 | 340 - 545 | 118 | 320 - 550 | 120 | 305 - 550 |

| Sweden | | Switzerland | | Australia | |
|---|---|---|---|---|---|
| RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) |
| 070 | 380 - 465 | 0F0 | 385 - 560 | FFFF (Default) | Tone not detected |
| 080 | 375 - 470 | 100 | 380 - 565 | 030 | 405 - 445 |
| 090 | 365 - 475 | 110 | 370 - 570 | 040 | 415 - 455 |
| 0A0 (Default) | 360 - 480 | 120 (Default) | 365 - 575 | 050 | 400 - 460 |
| 0B0 | 355 - 485 | 130 | 355 - 580 | 060 | 390 - 465 |
| 0C0 | 345 - 490 | 140 | 350 - 585 | 070 | 385 - 470 |
| 0D0 | 335 - 500 | 150 | 340 - 590 | 080 | 380 - 475 |
| 0E0 | 330 - 505 | 160 | 330 - 595 | 090 | 370 - 480 |
| 0F0 | 320 - 510 | 170 | 325 - 600 | 0A0 | 365 - 485 |

| Holland | | Israel | | | |
|---|---|---|---|---|---|
| RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) |
| 120 | 290 - 580 | 040 | 380 - 430 | | |
| 130 | 280 - 585 | 050 (Default) | 365 - 435 | | |
| 140 (Default) | 270 - 590 | 060 | 355 - 440 | | |
| 150 | 265 - 595 | 070 | 350 - 445 | | |
| 160 | 255 - 600 | 080 | 340 - 550 | | |
| | | 090 | 335 - 555 | | |
| | | 0A0 | 325 - 565 | | |

- International Dial Tone (807F34 - 807F35) -

| Belgium | | Holland | | Spain | |
|---|---|---|---|---|---|
| RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) |
| 08A | 1110 - 1160 | FFFF (Default) | Tone not detected | 0C0 | 550 - 645 |
| 0AA (Default) | 1105 - 1165 | 112 | 305 - 590 | 0D0 | 545 - 650 |
| 0CA | 1100 - 1170 | 122 | 315 - 595 | 0E0 | 540 - 655 |
| 0EA | 1095 - 1175 | 132 | 320 - 600 | 0F0 | 535 - 660 |
| 10A | 1090 - 1180 | 142 | 300 - 605 | 100 | 525 - 665 |
| 12A | 1085 - 1185 | 152 | 290 - 610 | 110 | 520 - 670 |
| 14A | 1080 - 1190 | 162 | 285 - 615 | 120 | 515 - 675 |
| | | 188 | 270 - 620 | 130 | 510 - 680 |
| | | 198 | 260 - 625 | 140 | 505 - 685 |
| | | 1A8 | 250 - 630 | | |

📝  - PSTN Busy Tone (807F13 - 807F14)

| France | | Germany | | U. K. | |
|---|---|---|---|---|---|
| RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) |
| 042 | 415 - 465 | 058 | 400 - 480 | 0A0 | 330 - 470 |
| 052 | 410 - 470 | 068 | 390 - 485 | 0B0 | 320 - 460 |
| 062 | 400 - 475 | 078 | 385 - 490 | 0C0 (Default) | 300 - 480 |
| 072 (Default) | 395 - 480 | 088 (Default) | 380 - 495 | 0D0 | 290 - 485 |
| 082 | 390 - 485 | 098 | 370 - 500 | 0E0 | 285 - 490 |
| 092 | 380 - 490 | 0A8 | 365 - 505 | 0F0 | 275 - 495 |
| 0A2 | 375 - 495 | 0B8 | 360 - 510 | 100 | 265 - 500 |
| 0B2 | 365 - 500 | 0C8 | 350 - 515 | 110 | 255 - 505 |
|  |  | 0D8 | 345 - 520 |  |  |

| Italy | | Austria | | Belgium | |
|---|---|---|---|---|---|
| RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) |
| 030 | 410 - 440 | 0E0 | 370 - 555 | 042 | 405 - 460 |
| 040 (Default) | 400 - 450 | 0F0 | 360 - 560 | 052 (Default) | 400 - 465 |
| 050 | 395 - 455 | 100 | 355 - 565 | 062 | 395 - 475 |
| 060 | 385 - 460 | 110 | 345 - 570 | 072 | 390 - 480 |
| 070 | 380 - 465 | 120 | 340 - 575 | 082 | 380 - 485 |
| 080 | 375 - 470 | 130 (Default) | 330 - 580 | 092 | 375 - 490 |
| 090 | 365 - 475 | 140 | 325 - 585 | 0A2 | 365 - 495 |
|  |  | 150 | 315 - 590 |  |  |
|  |  | 160 | 310 - 595 |  |  |

| Denmark | | Ireland | | Norway | |
|---|---|---|---|---|---|
| RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) |
| 040 | 395 - 450 | 02E | 395 - 425 | 0A4 | 355 - 475 |
| 050 | 390 - 460 | 03E (Default) | 385 - 435 | 0B4 | 345 - 490 |
| 060 | 385 - 465 | 04E | 380 - 440 | 0C4 | 335 - 500 |
| 070 (Default) | 375 - 470 | 05E | 370 - 445 | 0D4 | 325 - 505 |
| 080 | 370 - 475 | 06E | 365 - 450 | 0E4 | 320 - 510 |
| 090 | 365 - 480 | 07E | 355 - 455 | 0F4 (Default) | 310 - 515 |
|  |  | 08E | 350 - 465 | 104 | 305 - 520 |
|  |  |  |  | 114 | 290 - 525 |

| Sweden | | Switzerland | | Holland | |
|---|---|---|---|---|---|
| **RAM Value [H]** | **Range (Hz)** | **RAM Value [H]** | **Range (Hz)** | **RAM Value [H]** | **Range (Hz)** |
| 030 (Default) | 410 - 440 | 0F0 | 385 - 560 | 0F0 | 335 - 540 |
| 040 | 400 - 450 | 100 | 380 - 565 | 100 | 325 - 545 |
| 050 | 395 - 455 | 110 | 370 - 570 | 110 | 320 - 555 |
| 060 | 385 - 460 | 120 (Default) | 365 - 575 | 120 | 310 - 560 |
| 070 | 380 - 465 | 130 | 355 - 580 | 130 | 300 - 565 |
| 080 | 375 - 470 | 140 | 350 - 585 | 140 (Default) | 295 - 570 |
| 090 | 365 - 475 | 150 | 340 - 590 | 150 | 285 - 575 |
| | | 160 | 330 - 595 | | |
| | | 170 | 325 - 600 | | |

| Spain | | Israel | | Australia | |
|---|---|---|---|---|---|
| **RAM Value [H]** | **Range (Hz)** | **RAM Value [H]** | **Range (Hz)** | **RAM Value [H]** | **Range (Hz)** |
| 0A8 | 330 - 470 | 040 | 380 - 430 | 028 | 405 - 445 |
| 0B8 | 320 - 460 | 050 (Default) | 365 - 435 | 038 | 415 - 455 |
| 0C8 | 300 - 480 | 060 | 355 - 440 | 048 (Default) | 400 - 460 |
| 0D8 (Default) | 290 - 485 | 070 | 350 - 445 | 058 | 390 - 465 |
| 0E8 | 285 - 490 | 080 | 340 - 450 | 068 | 385 - 470 |
| 0F8 | 275 - 495 | 090 | 335 - 455 | 078 | 380 - 475 |
| 108 | 265 - 500 | 0A0 | 325 - 465 | 088 | 370 - 480 |
| 118 | 255 - 505 | | | 098 | 365 - 485 |

| Portugal | | **RAM Value [H]** | **Range (Hz)** | **RAM Value [H]** | **Range (Hz)** |
|---|---|---|---|---|---|
| **RAM Value [H]** | **Range (Hz)** | | | | |
| FFFF (Default) | Tone not detected | | | | |
| 070 | 415 - 515 | | | | |
| 080 | 410 - 520 | | | | |
| 090 | 405 - 525 | | | | |
| 0A0 | 395 - 530 | | | | |
| 0B0 | 390 - 535 | | | | |
| 0C0 | 385 - 540 | | | | |
| 0D0 | 380 - 545 | | | | |

- PABX Busy Tone (807F26 - 807F27)

| Italy | | Denmark | | Switzerland, Israel | |
|---|---|---|---|---|---|
| RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) |
| 030 (Default) | 410 - 440 | 030 | 405 - 445 | 0F0 | 385 - 560 |
| 040 | 400 - 450 | 040 | 415 - 455 | 100 | 380 - 565 |
| 050 | 395 - 455 | 050 (Default) | 400 - 460 | 110 | 370 - 570 |
| 060 | 385 - 460 | 060 | 390 - 465 | 120 (Default) | 365 - 575 |
| 070 | 380 - 465 | 070 | 385 - 470 | 130 | 355 - 580 |
| 080 | 375 - 470 | 080 | 380 - 475 | 140 | 350 - 585 |
| 090 | 365 - 475 | 090 | 370 - 480 | 150 | 340 - 590 |
| | | 0A0 | 365 - 485 | 160 | 330 - 595 |

| Australia | | | | | |
|---|---|---|---|---|---|
| RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) |
| 038 (Default) | 395 - 450 | | | | |
| 048 | 390 - 460 | | | | |
| 058 | 385 - 465 | | | | |
| 068 | 375 - 470 | | | | |
| 078 | 370 - 475 | | | | |
| 088 | 365 - 480 | | | | |
| | | | | | |
| | | | | | |

- CED [2100 Hz] (807FA1 - 807FA2) -

| All Areas | | | | | |
|---|---|---|---|---|---|
| RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) | RAM Value [H] | Range (Hz) |
| 1F0 | $2100 \pm 45$ | | | | |
| 200 (Default) | $2100 \pm 50$ | | | | |
| 230 | $2100 \pm 60$ | | | | |
| 270 | $2100 \pm 70$ | | | | |
| 2E0 | $2100 \pm 80$ | | | | |
| 320 | $2100 \pm 90$ | | | | |
| 380 | $2100 \pm 100$ | | | | |
| | | | | | |

## Default Settings

The factory settings are quoted either in hexadecimal code (the actual contents of the RAM address) if there is a H after the value in the table, or in decimal (converted from the actual hex contents of the RAM address) if there is no H after the value.

Some RAMs must be stored using BCD; see the NCU Parameter definition table for details.

| Country | 807F01 | 807F02 | 807F03 | 807F04 | 807F05 |
|---------|--------|--------|--------|--------|--------|
| France | FFH | FFH | FFH | 0H | 60H |
| Germany | FFH | FFH | FFH | 0H | 90H |
| UK | FFH | FFH | FFH | FFH | FFH |
| Italy | FFH | FFH | FFH | 0H | 30H |
| Austria | FFH | FFH | FFH | 0H | C8H |
| Belgium | FFH | FFH | FFH | 0H | C8H |
| Denmark | FFH | FFH | FFH | 0H | D0H |
| Finland | FFH | FFH | FFH | 0H | F8H |
| Ireland | FFH | FFH | FFH | 0H | E8H |
| Norway | FFH | FFH | FFH | 0H | C0H |
| Sweden | FFH | FFH | FFH | 0H | A0H |
| Switzerland | FFH | FFH | FFH | 1H | 20H |
| Portugal | FFH | FFH | FFH | 0H | B0H |
| Holland | FFH | FFH | FFH | 1H | F0H |
| Spain | FFH | FFH | FFH | 0H | E0H |
| Israel | FFH | FFH | FFH | 0H | BAH |
| USA | FFH | FFH | FFH | FFH | FFH |
| Asia | FFH | FFH | FFH | FFH | FFH |
| Hong Kong | FFH | FFH | FFH | FFH | FFH |
| South Africa | FFH | FFH | FFH | FFH | FFH |
| Australia | FFH | FFH | FFH | 1H | 10H |
| New Zealand | FFH | FFH | FFH | FFH | FFH |
| Singapore | FFH | FFH | FFH | FFH | FFH |
| Malaysia | FFH | FFH | FFH | FFH | FFH |

| Country | 807F06 | 807F07 | 807F08 | 807F09 | 807F0A |
|---|---|---|---|---|---|
| France | 4H | 00H | 75 | F4H | 1H |
| Germany | 4H | 00H | 105 | CFH | 3H |
| UK | FFH | FFH | FFH | FFH | FFH |
| Italy | 4H | 00H | 21H | 21H | 2H |
| Austria | 4H | 00H | 38 | F4H | 1H |
| Belgium | 4H | 00H | 35 | 20H | 03H |
| Denmark | 4H | 00H | 65 | C2H | 1H |
| Finland | 4H | 00H | 125 | F4H | 1H |
| Ireland | 4H | 00H | 105 | C2H | 1H |
| Norway | 4H | 00H | 55 | B6H | 3H |
| Sweden | 4H | 00H | 35 | 00H | 1H |
| Switzerland | 4H | 00H | 40 | 21H | 2H |
| Portugal | 4H | 00H | 105 | C2H | 1H |
| Holland | 04H | 00H | 75 | EEH | 2H |
| Spain | 4H | 00H | 75 | 3FH | 2H |
| Israel | 4H | 00H | 105 | E8H | 3H |
| USA | FFH | FFH | FFH | FFH | FFH |
| Asia | FFH | FFH | FFH | FFH | FFH |
| Hong Kong | FFH | FFH | FFH | FFH | FFH |
| South Africa | FFH | FFH | FFH | FFH | FFH |
| Australia | 4H | 00H | 150 | 2CH | 1H |
| New Zealand | FFH | FFH | FFH | FFH | FFH |
| Singapore | FFH | FFH | FFH | FFH | FFH |
| Malaysia | FFH | FFH | FFH | FFH | FFH |

| Country | 807F0B | 807F0C | 807F0D | 807F0E | 807F0F |
|---|---|---|---|---|---|
| France | 50 | 2 | 0 | 0 | FFH |
| Germany | 105 | 4 | 200 | 0 | FFH |
| UK | FFH | FFH | 250 | 0 | FFH |
| Italy | 30 | 50 | 200 | 0 | FFH |
| Austria | 40 | 4 | 200 | 0 | FFH |
| Belgium | 30 | 4 | 200 | 0 | FFH |
| Denmark | 65 | 4 | 200 | 0 | FFH |
| Finland | 205 | 4 | 200 | 0 | FFH |
| Ireland | 105 | 4 | 200 | 0 | FFH |
| Norway | 55 | 4 | 200 | 0 | FFH |
| Sweden | 40 | 3 | 200 | 0 | FFH |
| Switzerland | 40 | 2 | 200 | 0 | 5 |
| Portugal | 105 | 4 | 200 | 0 | FFH |
| Holland | 55 | 4 | 200 | 0 | FFH |
| Spain | 50 | 5 | 150 | 0 | FFH |
| Israel | 105 | 4 | 200 | 0 | FFH |
| USA | FFH | FFH | 100 | 0 | FFH |
| Asia | FFH | FFH | 200 | 0 | FFH |
| Hong Kong | FFH | FFH | 100 | 0 | FFH |
| South Africa | FFH | FFH | 100 | 0 | FFH |
| Australia | 100 | 8 | 150 | 0 | FFH |
| New Zealand | FFH | FFH | 200 | 0 | FFH |
| Singapore | FFH | FFH | 100 | 0 | FFH |
| Malaysia | FFH | FFH | 100 | 0 | FFH |

| Country | 807F10 | 807F11 | 807F12 | 807F13 | 807F14 |
|---|---|---|---|---|---|
| France | FFH | FFH | FFH | 0H | 52H |
| Germany | FFH | FFH | FFH | 0H | 88H |
| UK | FFH | FFH | FFH | 0H | C0H |
| Italy | FFH | FFH | FFH | 0H | 30H |
| Austria | FFH | FFH | FFH | 0H | E8H |
| Belgium | FFH | FFH | FFH | 0H | 52H |
| Denmark | FFH | FFH | FFH | 0H | 50H |
| Finland | FFH | FFH | FFH | FFH | FFH |
| Ireland | FFH | FFH | FFH | 0H | 3EH |
| Norway | FFH | FFH | FFH | 0H | C0H |
| Sweden | FFH | FFH | FFH | 0H | 32H |
| Switzerland | 50 | F4H | 1H | 1H | 20H |
| Portugal | FFH | FFH | FFH | FFH | FFH |
| Holland | FFH | FFH | FFH | 1H | 0AH |
| Spain | FFH | FFH | FFH | 0H | D8H |
| Israel | FFH | FFH | FFH | 0H | 50H |
| USA | FFH | FFH | FFH | FFH | FFH |
| Asia | FFH | FFH | FFH | FFH | FFH |
| Hong Kong | FFH | FFH | FFH | FFH | FFH |
| South Africa | FFH | FFH | FFH | FFH | FFH |
| Australia | FFH | FFH | FFH | 0H | 38H |
| New Zealand | FFH | FFH | FFH | FFH | FFH |
| Singapore | FFH | FFH | FFH | FFH | FFH |
| Malaysia | FFH | FFH | FFH | FFH | FFH |

| Country | 807F15 | 807F16 | 807F17 | 807F18 | 807F19 |
|---|---|---|---|---|---|
| France | 4H | 00H | 2H | F0H | 4H |
| Germany | 4H | 00H | FFH | FFH | FFH |
| UK | 4H | 00H | FFH | FFH | FFH |
| Italy | 4H | 00H | 0H | B8H | 4H |
| Austria | 4H | 00H | FFH | FFH | FFH |
| Belgium | 4H | 00H | 0H | C8H | 4H |
| Denmark | 4H | 00H | 0H | D0H | 4H |
| Finland | FFH | FFH | FFH | FFH | FFH |
| Ireland | 4H | 00H | FFH | FFH | FFH |
| Norway | 4H | 00H | FFH | FFH | FFH |
| Sweden | 4H | 00H | 0H | A0H | 4H |
| Switzerland | 4H | 00H | 1H | 20H | 4H |
| Portugal | FFH | FFH | FFH | FFH | FFH |
| Holland | 4H | 00H | 1H | F0H | 04H |
| Spain | 4H | 00H | FFH | FFH | FFH |
| Israel | 4H | 00H | 0H | 50H | 4H |
| USA | FFH | FFH | FFH | FFH | FFH |
| Asia | FFH | FFH | FFH | FFH | FFH |
| Hong Kong | FFH | FFH | FFH | FFH | FFH |
| South Africa | FFH | FFH | FFH | FFH | FFH |
| Australia | 4H | 00H | 0H | 50H | 4H |
| New Zealand | FFH | FFH | FFH | FFH | FFH |
| Singapore | FFH | FFH | FFH | FFH | FFH |
| Malaysia | FFH | FFH | FFH | FFH | FFH |

| Country | 807F1B | 807F1C | 807F1D | 807F1E | 807F1F |
|---|---|---|---|---|---|
| France | 100 | 58H | 2H | 50 | 2H |
| Germany | FFH | FFH | FFH | FFH | FFH |
| UK | FFH | FFH | FFH | FFH | FFH |
| Italy | 100 | F9H | 1H | 9 | 4 |
| Austria | FFH | FFH | FFH | FFH | FFH |
| Belgium | 30 | 150 | 0 | 30 | 4 |
| Denmark | 65 | F4H | 1H | 65 | 4 |
| Finland | FFH | FFH | FFH | FFH | FFH |
| Ireland | FFH | FFH | FFH | FFH | FFH |
| Norway | FFH | FFH | FFH | FFH | FFH |
| Sweden | 40 | 00H | 1H | 40 | 3 |
| Switzerland | 40 | EFH | 1H | 40 | 4 |
| Portugal | FFH | FFH | FFH | FFH | FFH |
| Holland | 55 | EEH | 2H | 55 | 4 |
| Spain | FFH | FFH | FFH | FFH | FFH |
| Israel | 105 | E8H | 3H | 105 | 4 |
| USA | FFH | FFH | FFH | FFH | FFH |
| Asia | FFH | FFH | FFH | FFH | FFH |
| Hong Kong | FFH | FFH | FFH | FFH | FFH |
| South Africa | FFH | FFH | FFH | FFH | FFH |
| Australia | 150 | 2CH | 1H | 100 | 1 |
| New Zealand | FFH | FFH | FFH | FFH | FFH |
| Singapore | FFH | FFH | FFH | FFH | FFH |
| Malaysia | FFH | FFH | FFH | FFH | FFH |

| Country | 807F20 | 807F21 | 807F22 | 807F23 | 807F24 |
|---|---|---|---|---|---|
| France | 0 | 0 | FFH | FFH | FFH |
| Germany | 200 | 0 | FFH | FFH | FFH |
| UK | 200 | 0 | FFH | FFH | FFH |
| Italy | 200 | 0 | FFH | FFH | FFH |
| Austria | 200 | 0 | FFH | FFH | FFH |
| Belgium | 200 | 0 | FFH | FFH | FFH |
| Denmark | 200 | 0 | FFH | FFH | FFH |
| Finland | 200 | 0 | FFH | FFH | FFH |
| Ireland | 200 | 0 | FFH | FFH | FFH |
| Norway | 200 | 0 | FFH | FFH | FFH |
| Sweden | 200 | 0 | FFH | FFH | FFH |
| Switzerland | 200 | 0 | FFH | FFH | FFH |
| Portugal | 200 | 0 | FFH | FFH | FFH |
| Holland | 200 | 0 | FFH | FFH | FFH |
| Spain | 150 | 0 | FFH | FFH | FFH |
| Israel | 200 | 0 | FFH | FFH | FFH |
| USA | 200 | 0 | FFH | FFH | FFH |
| Asia | 200 | 0 | FFH | FFH | FFH |
| Hong Kong | 200 | 0 | FFH | FFH | FFH |
| South Africa | 200 | 0 | FFH | FFH | FFH |
| Australia | 150 | 0 | FFH | FFH | FFH |
| New Zealand | 200 | 0 | FFH | FFH | FFH |
| Singapore | 200 | 0 | FFH | FFH | FFH |
| Malaysia | 200 | 0 | FFH | FFH | FFH |

| Country | 807F26 | 807F27 | 807F28 | 807F29 | 807F2A |
|---|---|---|---|---|---|
| France | FFH | FFH | FFH | FFH | 25 |
| Germany | FFH | FFH | FFH | FFH | 12 |
| UK | FFH | FFH | FFH | FFH | 19 |
| Italy | 0H | 30H | 4H | 00H | 15 |
| Austria | FFH | FFH | FFH | FFH | 10 |
| Belgium | FFH | FFH | FFH | FFH | 25 |
| Denmark | 0H | 50H | 4H | 00H | 12 |
| Finland | FFH | FFH | FFH | FFH | FFH |
| Ireland | FFH | FFH | FFH | FFH | 25 |
| Norway | FFH | FFH | FFH | FFH | 10 |
| Sweden | FFH | FFH | FFH | FFH | 12 |
| Switzerland | 1H | 20H | 4H | 00H | 24 |
| Portugal | FFH | FFH | FFH | FFH | FFH |
| Holland | FFH | FFH | FFH | FFH | 12 |
| Spain | FFH | FFH | FFH | FFH | 8 |
| Israel | 0H | 50H | 4H | 00H | 12 |
| USA | FFH | FFH | FFH | FFH | FFH |
| Asia | FFH | FFH | FFH | FFH | FFH |
| Hong Kong | FFH | FFH | FFH | FFH | FFH |
| South Africa | FFH | FFH | FFH | FFH | FFH |
| Australia | 0H | 38H | 4H | 00H | 12 |
| New Zealand | FFH | FFH | FFH | FFH | FFH |
| Singapore | FFH | FFH | FFH | FFH | FFH |
| Malaysia | FFH | FFH | FFH | FFH | FFH |

| Country | 807F2B | 807F2C | 807F2D | 807F2E | 807F2F |
|---|---|---|---|---|---|
| France | 25 | FFH | FFH | FFH | FFH |
| Germany | 12 | 24 | 24 | 7 | 24 |
| UK | 19 | 20 | 17 | 11 | 26 |
| Italy | 15 | FFH | FFH | FFH | FFH |
| Austria | 10 | 15 | 15 | 20 | 20 |
| Belgium | 25 | 8 | 8 | FFH | FFH |
| Denmark | 12 | 8 | 23 | FFH | FFH |
| Finland | FFH | FFH | FFH | FFH | FFH |
| Ireland | 25 | 37 | 37 | 18 | 18 |
| Norway | 0 | 25 | 0 | FFH | FFH |
| Sweden | 12 | 12 | 37 | FFH | FFH |
| Switzerland | 30 | 15 | 22 | 11 | 11 |
| Portugal | FFH | FFH | FFH | FFH | FFH |
| Holland | 12 | 25 | 25 | FFH | FFH |
| Spain | 8 | FFH | FFH | FFH | FFH |
| Israel | 12 | 24 | 24 | FFH | FFH |
| USA | FFH | FFH | FFH | FFH | FFH |
| Asia | FFH | FFH | FFH | FFH | FFH |
| Hong Kong | FFH | FFH | FFH | FFH | FFH |
| South Africa | FFH | FFH | FFH | FFH | FFH |
| Australia | 12 | 25 | 25 | FFH | FFH |
| New Zealand | FFH | FFH | FFH | FFH | FFH |
| Singapore | FFH | FFH | FFH | FFH | FFH |
| Malaysia | FFH | FFH | FFH | FFH | FFH |

| Country | 807F30 | 807F31 | 807F32 | 807F33 | 807F34 |
|---|---|---|---|---|---|
| France | FFH | FFH | FFH | 42H | 4H |
| Germany | FFH | FFH | FFH | 30H | FFH |
| UK | FFH | FFH | 100 | 42H | FFH |
| Italy | FFH | FFH | FFH | 40H | FFH |
| Austria | FFH | FFH | FFH | 41H | FFH |
| Belgium | FFH | FFH | FFH | 43H | 00H |
| Denmark | FFH | FFH | FFH | 42H | FFH |
| Finland | FFH | FFH | FFH | FFH | FFH |
| Ireland | FFH | FFH | 35 | 43H | FFH |
| Norway | FFH | FFH | FFH | 40H | FFH |
| Sweden | FFH | FFH | FFH | 42H | FFH |
| Switzerland | 8 | 30 | FFH | 51H | FFH |
| Portugal | FFH | FFH | FFH | FFH | FFH |
| Holland | FFH | FFH | FFH | 41H | 1H |
| Spain | FFH | FFH | FFH | 41H | 0H |
| Israel | FFH | FFH | FFH | 41H | FFH |
| USA | FFH | FFH | FFH | FFH | FFH |
| Asia | FFH | FFH | FFH | FFH | FFH |
| Hong Kong | FFH | FFH | FFH | FFH | FFH |
| South Africa | FFH | FFH | FFH | FFH | FFH |
| Australia | FFH | FFH | FFH | 41H | FFH |
| New Zealand | FFH | FFH | FFH | FFH | FFH |
| Singapore | FFH | FFH | FFH | FFH | FFH |
| Malaysia | FFH | FFH | FFH | FFH | FFH |

| Country | 807F36 | 807F37 | 807F38 | 807F39 | 807F3A |
|---|---|---|---|---|---|
| France | 4H | 06H | 75 | 58H | 2 |
| Germany | FFH | FFH | FFH | FFH | FFH |
| UK | FFH | FFH | FFH | FFH | FFH |
| Italy | FFH | FFH | FFH | FFH | FFH |
| Austria | FFH | FFH | FFH | FFH | FFH |
| Belgium | 04H | 00H | 42H | E8H | 3H |
| Denmark | FFH | FFH | FFH | FFH | FFH |
| Finland | FFH | FFH | FFH | FFH | FFH |
| Ireland | FFH | FFH | FFH | FFH | FFH |
| Norway | FFH | FFH | FFH | FFH | FFH |
| Sweden | FFH | FFH | FFH | FFH | FFH |
| Switzerland | FFH | FFH | FFH | FFH | FFH |
| Portugal | FFH | FFH | FFH | FFH | FFH |
| Holland | 04H | 00H | 55 | EEH | 2H |
| Spain | 4H | 00H | 75 | 80H | 2H |
| Israel | FFH | FFH | FFH | FFH | FFH |
| USA | FFH | FFH | FFH | FFH | FFH |
| Asia | FFH | FFH | FFH | FFH | FFH |
| Hong Kong | FFH | FFH | FFH | FFH | FFH |
| South Africa | FFH | FFH | FFH | FFH | FFH |
| Australia | FFH | FFH | FFH | FFH | FFH |
| New Zealand | FFH | FFH | FFH | FFH | FFH |
| Singapore | FFH | FFH | FFH | FFH | FFH |
| Malaysia | FFH | FFH | FFH | FFH | FFH |

| Country | 807F3B | 807F3C | 807F3D | 807F3E | 807F3F |
|---|---|---|---|---|---|
| France | 75 | 2 | 0 | 0 | FFH |
| Germany | FFH | FFH | 00H | 00H | FFH |
| UK | FFH | FFH | 00H | 00H | FFH |
| Italy | FFH | FFH | 00H | 00H | FFH |
| Austria | FFH | FFH | 00H | 00H | FFH |
| Belgium | 16 | 33 | 00H | 00H | FFH |
| Denmark | FFH | FFH | 00H | 00H | FFH |
| Finland | FFH | FFH | 00H | 00H | FFH |
| Ireland | FFH | FFH | 00H | 00H | FFH |
| Norway | FFH | FFH | 00H | 00H | FFH |
| Sweden | FFH | FFH | 00H | 00H | 0H |
| Switzerland | FFH | FFH | 00H | 00H | FFH |
| Portugal | FFH | FFH | 00H | 00H | FFH |
| Holland | 55 | 4 | 00H | 00H | FFH |
| Spain | 36 | 5 | 150 | 0 | FFH |
| Israel | FFH | FFH | 00H | 00H | FFH |
| USA | FFH | FFH | 00H | 00H | FFH |
| Asia | FFH | FFH | 00H | 00H | FFH |
| Hong Kong | FFH | FFH | 00H | 00H | FFH |
| South Africa | FFH | FFH | 00H | 00H | FFH |
| Australia | FFH | FFH | 00H | 00H | FFH |
| New Zealand | FFH | FFH | 00H | 00H | FFH |
| Singapore | FFH | FFH | 00H | 00H | FFH |
| Malaysia | FFH | FFH | 00H | 00H | FFH |

| Country | 807F41 | 807F42 | 807F43 | 807F44 | 807F45 |
|---|---|---|---|---|---|
| France | FFH | FFH | FFH | FFH | FFH |
| Germany | FFH | FFH | FFH | FFH | FFH |
| UK | FFH | FFH | FFH | FFH | FFH |
| Italy | FFH | FFH | FFH | FFH | FFH |
| Austria | FFH | FFH | FFH | FFH | FFH |
| Belgium | FFH | FFH | FFH | FFH | FFH |
| Denmark | FFH | FFH | FFH | FFH | FFH |
| Finland | FFH | FFH | FFH | FFH | FFH |
| Ireland | FFH | FFH | FFH | FFH | FFH |
| Norway | FFH | FFH | FFH | FFH | FFH |
| Sweden | 4H | 00H | 40 | 00H | 1H |
| Switzerland | FFH | FFH | FFH | FFH | FFH |
| Portugal | FFH | FFH | FFH | FFH | FFH |
| Holland | FFH | FFH | FFH | FFH | FFH |
| Spain | FFH | FFH | FFH | FFH | FFH |
| Israel | FFH | FFH | FFH | FFH | FFH |
| USA | FFH | FFH | FFH | FFH | FFH |
| Asia | FFH | FFH | FFH | FFH | FFH |
| Hong Kong | FFH | FFH | FFH | FFH | FFH |
| South Africa | FFH | FFH | FFH | FFH | FFH |
| Australia | FFH | FFH | FFH | FFH | FFH |
| New Zealand | FFH | FFH | FFH | FFH | FFH |
| Singapore | FFH | FFH | FFH | FFH | FFH |
| Malaysia | FFH | FFH | FFH | FFH | FFH |

| Country | 807F46 | 807F47 | 807F48 | 807F49 | 807F4A |
|---|---|---|---|---|---|
| France | FFH | FFH | 0 | 0 | 67 |
| Germany | FFH | FFH | 00H | 00H | 50 |
| UK | FFH | FFH | 00H | 00H | 252 |
| Italy | FFH | FFH | 00H | 00H | 58 |
| Austria | FFH | FFH | 00H | 00H | 53 |
| Belgium | FFH | FFH | 00H | 00H | 61 |
| Denmark | FFH | FFH | 00H | 00H | 53 |
| Finland | FFH | FFH | 00H | 00H | 61 |
| Ireland | FFH | FFH | 00H | 00H | 255 |
| Norway | FFH | FFH | 00H | 00H | 61 |
| Sweden | 40 | 3 | 200 | 0 | 100 |
| Switzerland | FFH | FFH | 00H | 00H | 60 |
| Portugal | FFH | FFH | 00H | 00H | 61 |
| Holland | FFH | FFH | 00H | 00H | 58 |
| Spain | FFH | FFH | 00H | 00H | 75 |
| Israel | FFH | FFH | 00H | 00H | 61 |
| USA | FFH | FFH | 00H | 00H | 77 |
| Asia | FFH | FFH | 00H | 00H | 61 |
| Hong Kong | FFH | FFH | 00H | 00H | 61 |
| South Africa | FFH | FFH | 00H | 00H | 61 |
| Australia | FFH | FFH | 00H | 00H | 255 |
| New Zealand | FFH | FFH | 00H | 00H | 245 |
| Singapore | FFH | FFH | 00H | 00H | 61 |
| Malaysia | FFH | FFH | 00H | 00H | 61 |

| Country | 807F4B | 807F4C | 807F4D | 807F4E | 807F4F |
|---|---|---|---|---|---|
| France | 65 | 35 | 50 | 40 | 0 |
| Germany | 61 | 41 | 44 | 46 | 46 |
| UK | 66 | 35 | 44 | 27 | 33 |
| Italy | 60 | 40 | 44 | 40 | 150 |
| Austria | 62 | 39 | 50 | 44 | 46 |
| Belgium | 67 | 33 | 50 | 43 | 26 |
| Denmark | 67 | 33 | 50 | 26 | 26 |
| Finland | 60 | 42 | 50 | 40 | 60 |
| Ireland | 67 | 33 | 50 | 30 | 33 |
| Norway | 59 | 41 | 50 | 33 | 33 |
| Sweden | 60 | 40 | 70 | 18 | 26 |
| Switzerland | 60 | 40 | 60 | 26 | 00H |
| Portugal | 66 | 34 | 50 | 33 | 33 |
| Holland | 62 | 40 | 42 | 33 | 33 |
| Spain | 60 | 32 | 75 | 32 | 100 |
| Israel | 62 | 39 | 50 | 46 | 101 |
| USA | 60 | 41 | 74 | 46 | 101 |
| Asia | 66 | 34 | 50 | 36 | 101 |
| Hong Kong | 66 | 34 | 50 | 36 | 101 |
| South Africa | 66 | 34 | 50 | 36 | 101 |
| Australia | 68 | 32 | 70 | 36 | 101 |
| New Zealand | 66 | 34 | 50 | 36 | 101 |
| Singapore | 66 | 34 | 50 | 36 | 101 |
| Malaysia | 66 | 34 | 50 | 36 | 101 |

| Country | 807F50 | 807F51 | 807F52 | 807F53 | 807F54 |
|---|---|---|---|---|---|
| France | 70 | 70 | 12 | 4 | 34 |
| Germany | 90 | 90 | 0CH | 5 | 34 |
| UK | 100 | 100 | 17 | 4 | 34 |
| Italy | 70 | 70 | 11 | 4 | 34 |
| Austria | 80 | 80 | 11 | 4 | 34 |
| Belgium | 70 | 70 | 11 | 4 | 34 |
| Denmark | 90 | 90 | 17 | 4 | 34 |
| Finland | 70 | 75 | 17 | 4 | 34 |
| Ireland | 70 | 70 | 17 | 4 | 34 |
| Norway | 70 | 70 | 17 | 4 | 34 |
| Sweden | 70 | 70 | 17 | 4 | 34 |
| Switzerland | 70 | 70 | 8 | 4 | 34 |
| Portugal | 70 | 70 | 17 | 4 | 34 |
| Holland | 70 | 70 | 17 | 4 | 34 |
| Spain | 70 | 140 | 12 | 4 | 34 |
| Israel | 90 | 90 | 17 | 4 | 34 |
| USA | 100 | 100 | 14 | 4 | 34 |
| Asia | 100 | 110 | 12 | 4 | 34 |
| Hong Kong | 100 | 110 | 12 | 4 | 34 |
| South Africa | 100 | 110 | 12 | 4 | 34 |
| Australia | 100 | 110 | 14 | 4 | 34 |
| New Zealand | 100 | 110 | 17 | 4 | 34 |
| Singapore | 100 | 110 | 12 | 4 | 34 |
| Malaysia | 100 | 110 | 12 | 4 | 34 |

| Country | 807F59 | 807F5A | 807F5B | 807F5C | 807F5D |
|---|---|---|---|---|---|
| France | 0 | 0 | FFH | 19H | FFH |
| Germany | 15 | 90 | FFH | 00H | FFH |
| UK | 15 | 90 | F0H | 10H | 50 |
| Italy | 15 | 90 | FFH | 00H | FFH |
| Austria | 15 | 100 | FFH | 00H | FFH |
| Belgium | 100 | 90 | FFH | 00H | FFH |
| Denmark | 15 | 90 | F0H | 9H | FFH |
| Finland | 15 | 90 | F9H | 90H | 100 |
| Ireland | 15 | 90 | FFH | 16H | FFH |
| Norway | 25 | 90 | F0H | 95H | FFH |
| Sweden | 15 | 90 | F0H | 09H | FFH |
| Switzerland | 10 | 90 | FFH | 00H | FFH |
| Portugal | 15 | 202 | FFH | 00H | FFH |
| Holland | 15 | 90 | FFH | 9H | FFH |
| Spain | 100 | 90 | FFH | 07H | FFH |
| Israel | 15 | 90 | FFH | 00H | FFH |
| USA | 00H | 00H | FFH | FFH | FFH |
| Asia | 00H | 00H | FFH | FFH | FFH |
| Hong Kong | 00H | 00H | FFH | FFH | FFH |
| South Africa | 00H | 00H | FFH | FFH | FFH |
| Australia | 00H | 00H | FFH | FFH | FFH |
| New Zealand | 00H | 00H | FFH | FFH | FFH |
| Singapore | 00H | 00H | FFH | FFH | FFH |
| Malaysia | 00H | 00H | FFH | FFH | FFH |

| Country | 807F5E | 807F5F | 807F65 | 807F66 | 807F72 |
|---------|--------|--------|--------|--------|--------|
| France | 80H | 10H | FFH | 16H | 17 |
| Germany | C0H | 10H | FFH | FFH | 23 |
| UK | C0H | 10H | FFH | FFH | 20 |
| Italy | 81H | 10H | FFH | FFH | 18 |
| Austria | C0H | 10H | FFH | FFH | 13 |
| Belgium | 04H | 10H | FFH | FFH | 21 |
| Denmark | 80H | 10H | FFH | FFH | 11H |
| Finland | 40H | 10H | FFH | FFH | 16 |
| Ireland | 80H | 10H | FFH | FFH | 36 |
| Norway | 40H | 10H | FFH | FFH | 16 |
| Sweden | 40H | 10H | FFH | FFH | 17 |
| Switzerland | 80H | 10H | FFH | FFH | 16 |
| Portugal | 40H | 10H | FFH | FFH | 1AH |
| Holland | 00H | 10H | FFH | FFH | 16 |
| Spain | 80H | 10H | FFH | FFH | 25 |
| Israel | C0H | 10H | FFH | FFH | 16 |
| USA | C0H | 10H | FFH | FFH | 13 |
| Asia | C0H | 10H | FFH | FFH | 17 |
| Hong Kong | C0H | 10H | FFH | FFH | 17 |
| South Africa | C0H | 10H | FFH | FFH | 17 |
| Australia | C0H | 10H | FFH | FFH | 14 |
| New Zealand | C0H | 10H | FFH | FFH | 17 |
| Singapore | C0H | 10H | FFH | FFH | 17 |
| Malaysia | C0H | 10H | FFH | FFH | 17 |

| Country | 807F73 | 807F74 | 807F75 | 807F76 | 807F77 |
|---------|--------|--------|--------|--------|--------|
| France | 23 | FFH | 00H | 2 | 15 |
| Germany | 43H | FFH | 00H | 1H | 7 |
| UK | 84 | FFH | 00H | 1 | 10 |
| Italy | 77 | FFH | 00H | 2 | 10 |
| Austria | 54 | FFH | 00H | 1 | 9 |
| Belgium | 72 | FFH | 00H | 2 | 5 |
| Denmark | 43H | 16 | 24 | 2 | 10 |
| Finland | 56 | FFH | 00H | 2 | 25 |
| Ireland | 53H | FFH | 00H | 1 | 10 |
| Norway | 43H | FFH | 00H | 1 | 10 |
| Sweden | 43H | FFH | 00H | 1 | 5 |
| Switzerland | 43H | FFH | 00H | 3 | 1 |
| Portugal | 53H | 16 | 24 | 1 | 0FH |
| Holland | 52 | FFH | 00H | 2 | 15 |
| Spain | 43H | FFH | 00H | 2 | 28H |
| Israel | 43H | FFH | 00H | 2 | 14H |
| USA | 83 | FFH | 00H | 1 | 10 |
| Asia | 83 | FFH | 00H | 1 | 10 |
| Hong Kong | 83 | FFH | 00H | 1 | 10 |
| South Africa | 83 | FFH | 00H | 1 | 10 |
| Australia | 83 | FFH | 00H | 3 | 6 |
| New Zealand | 83 | FFH | 00H | 3 | 10 |
| Singapore | 83 | FFH | 00H | 1 | 10 |
| Malaysia | 83 | FFH | 00H | 1 | 10 |

| Country | 807F78 | 807F79 | 807F7A | 807F81 | 807F82 |
|---------|--------|--------|--------|--------|--------|
| France | 5 | 04H | 1H | 25 | 0 |
| Germany | 7 | 90H | 1H | 25 | 00H |
| UK | 10 | 90H | 1H | 25 | 00H |
| Italy | 10 | 90H | 1H | 25 | 00H |
| Austria | 10 | 90H | 1H | 25 | 00H |
| Belgium | 10 | 90H | 1H | 25 | 00H |
| Denmark | 10 | 90H | 1H | 25 | 00H |
| Finland | 25 | 90H | 1H | 25 | 00H |
| Ireland | 10 | 90H | 1H | 25 | 00H |
| Norway | 10 | 90H | 1H | 25 | 00H |
| Sweden | 5 | 90H | 1H | 25 | 00H |
| Switzerland | 1 | 90H | 1H | 25 | 00H |
| Portugal | 0FH | 90H | 1H | 25 | 00H |
| Holland | 15 | 90H | 1H | 25 | 00H |
| Spain | 28H | 2CH | 1H | 25 | 00H |
| Israel | 14H | 90H | 1H | 25 | 00H |
| USA | 10 | 90H | 1H | 25 | 00H |
| Asia | 10 | 90H | 1H | 25 | 00H |
| Hong Kong | 10 | 90H | 1H | 25 | 00H |
| South Africa | 10 | 90H | 1H | 25 | 00H |
| Australia | 6 | 90H | 1H | 25 | 00H |
| New Zealand | 10 | 90H | 1H | 25 | 00H |
| Singapore | 10 | 90H | 1H | 25 | 00H |
| Malaysia | 10 | 90H | 1H | 25 | 00H |

| Country | 807FA1 | 807FA2 | 807FA3 | 807FA4 | 807FA5 |
|---------|--------|--------|--------|--------|--------|
| France | 02H | 00H | 04H | 00H | 30 |
| Germany | 02H | 00H | 04H | 00H | 10 |
| UK | 02H | 00H | 04H | 00H | 10 |
| Italy | 02H | 00H | 04H | 00H | 10 |
| Austria | 02H | 00H | 04H | 00H | 10 |
| Belgium | 02H | 00H | 04H | 00H | 10 |
| Denmark | 02H | 00H | 04H | 00H | 10 |
| Finland | 02H | 00H | 04H | 00H | 10 |
| Ireland | 02H | 00H | 04H | 00H | 10 |
| Norway | 02H | 00H | 04H | 00H | 10 |
| Sweden | 02H | 00H | 04H | 00H | 10 |
| Switzerland | 02H | 00H | 04H | 00H | 10 |
| Portugal | 02H | 00H | 04H | 00H | 10 |
| Holland | 02H | 00H | 04H | 00H | 10 |
| Spain | 02H | 00H | 04H | 00H | 10 |
| Israel | 02H | 00H | 04H | 00H | 10 |
| USA | 02H | 00H | 04H | 00H | 10 |
| Asia | 02H | 00H | 04H | 00H | 10 |
| Hong Kong | 03H | 00H | 04H | 00H | 10 |
| South Africa | 03H | 00H | 04H | 00H | 10 |
| Australia | 02H | 00H | 04H | 00H | 10 |
| New Zealand | 02H | 00H | 04H | 00H | 10 |
| Singapore | 03H | 00H | 04H | 00H | 10 |
| Malaysia | 03H | 00H | 04H | 00H | 10 |

| Country | 807FA6 | 807FA7 | 807FA8 | 807FA9 | 807FAA |
|---|---|---|---|---|---|
| France | 01H | 60H | 04H | 00H | 10 |
| Germany | 01H | 60H | 04H | 00H | 10 |
| UK | 01H | 60H | 04H | 00H | 10 |
| Italy | 01H | 60H | 04H | 00H | 10 |
| Austria | 01H | 60H | 04H | 00H | 10 |
| Belgium | 01H | 60H | 04H | 00H | 10 |
| Denmark | 01H | 60H | 04H | 00H | 10 |
| Finland | 01H | 60H | 04H | 00H | 10 |
| Ireland | 01H | 60H | 04H | 00H | 10 |
| Norway | 01H | 60H | 04H | 00H | 10 |
| Sweden | 01H | 60H | 04H | 00H | 10 |
| Switzerland | 01H | 60H | 04H | 00H | 10 |
| Portugal | 01H | 60H | 04H | 00H | 10 |
| Holland | 01H | 60H | 04H | 00H | 10 |
| Spain | 01H | 60H | 04H | 00H | 10 |
| Israel | 01H | 60H | 04H | 00H | 10 |
| USA | 01H | 60H | 04H | 00H | 10 |
| Asia | 01H | 60H | 04H | 00H | 10 |
| Hong Kong | 01H | E0H | 04H | 00H | 10 |
| South Africa | 01H | E0H | 04H | 00H | 10 |
| Australia | 01H | 60H | 04H | 00H | 10 |
| New Zealand | 01H | 60H | 04H | 00H | 10 |
| Singapore | 01H | E0H | 04H | 00H | 10 |
| Malaysia | 01H | E0H | 04H | 00H | 10 |

| Country | 807FAB | 807FAC | 807FAD | 807FAE | 807FAF |
|---|---|---|---|---|---|
| France | 19H | 96H | 22H | FFH | 0H |
| Germany | 19H | 96H | 22H | FFH | 0H |
| UK | 19H | 96H | 22H | FFH | 0H |
| Italy | 19H | 96H | 22H | FFH | 0H |
| Austria | 19H | 96H | 22H | FFH | 0H |
| Belgium | 19H | 96H | 22H | FFH | 0H |
| Denmark | 19H | 96H | 22H | FFH | 0H |
| Finland | 19H | 96H | 22H | FFH | 0H |
| Ireland | 19H | 96H | 22H | FFH | 0H |
| Norway | 19H | 96H | 22H | FFH | 0H |
| Sweden | 19H | 96H | 22H | FFH | 0H |
| Switzerland | 19H | 96H | 22H | FFH | 0H |
| Portugal | 19H | 96H | 22H | FFH | 0H |
| Holland | 19H | 96H | 22H | FFH | 0H |
| Spain | 19H | 96H | 22H | FFH | 0H |
| Israel | 19H | 96H | 22H | FFH | 0H |
| USA | 19H | 96H | 22H | FFH | 0H |
| Asia | 19H | 96H | 22H | FFH | 0H |
| Hong Kong | 19H | 96H | 22H | FFH | 0H |
| South Africa | 19H | 96H | 22H | FFH | 0H |
| Australia | 19H | 96H | 22H | FFH | 0H |
| New Zealand | 19H | 96H | 22H | FFH | 0H |
| Singapore | 19H | 96H | 22H | FFH | 0H |
| Malaysia | 19H | 96H | 22H | FFH | 0H |

| Country | 807FB1 | 807FB2 | 807FB3 | 807FB4 | 807FB5 |
|---|---|---|---|---|---|
| France | 04H | 00H | 10 | 10 | 0 |
| Germany | 04H | 00H | 10 | 9 | 2 |
| UK | 04H | 00H | 10 | 8 | 00H |
| Italy | 04H | 00H | 10 | 5 | 00H |
| Austria | 04H | 00H | 10 | 5 | 00H |
| Belgium | 04H | 00H | 10 | 5 | 00H |
| Denmark | 04H | 00H | 10 | 9 | 00H |
| Finland | 04H | 00H | 10 | 9 | 00H |
| Ireland | 04H | 00H | 10 | 9 | 00H |
| Norway | 04H | 00H | 10 | 10 | 00H |
| Sweden | 04H | 00H | 10 | 9 | 00H |
| Switzerland | 04H | 00H | 10 | 3 | 00H |
| Portugal | 04H | 00H | 10 | 5 | 00H |
| Holland | 04H | 00H | 10 | 5 | 00H |
| Spain | 04H | 00H | 10 | 9 | 00H |
| Israel | 04H | 00H | 10 | 12 | 00H |
| USA | 04H | 00H | 10 | 9 | 0 |
| Asia | 04H | 00H | 10 | 5 | 00H |
| Hong Kong | 04H | 00H | 10 | 6 | 0 |
| South Africa | 04H | 00H | 10 | 6 | 0 |
| Australia | 04H | 00H | 10 | 7 | 2 |
| New Zealand | 04H | 00H | 10 | 12 | 0 |
| Singapore | 04H | 00H | 10 | 6 | 0 |
| Malaysia | 04H | 00H | 10 | 6 | 0 |

| Country | 807FB6 | 807FB7 | 807FB8 | 807FB9 | 807FBD |
|---|---|---|---|---|---|
| France | 0 | 10 | 0 | 0 | 0FH |
| Germany | 00H | 6 | 3 | FEH | 20H |
| UK | 00H | 8 | 2 | 0 | 0FH |
| Italy | 00H | 6 | 0 | 0 | 0FH |
| Austria | 00H | 6 | 0 | 0 | 0FH |
| Belgium | 00H | 6 | 0 | 0 | 0FH |
| Denmark | 00H | 10 | 0 | 0 | 0FH |
| Finland | 00H | 10 | 0 | 0 | 0FH |
| Ireland | 00H | 10 | 0 | 0 | 0FH |
| Norway | 00H | 9 | 2H | 0 | 0FH |
| Sweden | 00H | 10 | 0 | 0 | 0FH |
| Switzerland | 01H | 5 | 1 | FFH | 0FH |
| Portugal | 00H | 6 | 0 | 0 | 0FH |
| Holland | 00H | 7 | 0 | 0 | 0FH |
| Spain | 00H | 10 | 0 | 0 | 0FH |
| Israel | 00H | 6 | 0 | 0 | 0FH |
| USA | 0 | 9 | 0 | 0 | 10H |
| Asia | 00H | 6 | 0 | 0 | 0FH |
| Hong Kong | 0 | 6 | 0 | 0 | 0FH |
| South Africa | 0 | 6 | 0 | 0 | 0FH |
| Australia | 00H | 11 | 2 | 0 | 0FH |
| New Zealand | 00H | 8 | 0 | 0 | 0FH |
| Singapore | 0 | 6 | 0 | 0 | 0FH |
| Malaysia | 0 | 6 | 0 | 0 | 0FH |

| Country | 807FDA | | | | |
|---|---|---|---|---|---|
| France | 53 | | | | |
| Germany | 53 | | | | |
| UK | 53 | | | | |
| Italy | 53 | | | | |
| Austria | 59 | | | | |
| Belgium | 59 | | | | |
| Denmark | 53 | | | | |
| Finland | 53 | | | | |
| Ireland | 53 | | | | |
| Norway | 53 | | | | |
| Sweden | 53 | | | | |
| Switzerland | 92 | | | | |
| Portugal | 53 | | | | |
| Holland | 53 | | | | |
| Spain | 80 | | | | |
| Israel | 59 | | | | |
| USA | 53 | | | | |
| Asia | 47 | | | | |
| Hong Kong | 53 | | | | |
| South Africa | 53 | | | | |
| Australia | 53 | | | | |
| New Zealand | 53 | | | | |
| Singapore | 53 | | | | |
| Malaysia | 53 | | | , | |

## 4.4. DEDICATED TRANSMISSION PARAMETERS

Each Quick Dial Key and Speed Dial Code has four bytes of programmable parameters allocated to it. If transmissions to a particular machine often experience problems, store that terminal's fax number as a Quick Dial or Speed Dial, and adjust the parameters allocated to that number.

The programming procedure will be explained first. Then, the four bytes will be described.

### 4.4.1. Programming Procedure

1. Set bit 3 of System Bit Switch 04 to 1.

2. Either use Function 31 (for a Quick Dial number) or Function 32 (for a Speed Dial number)

   **Example:** Change the Parameters in Quick Dial 10.

3. [Function] [3] [1] [Yes]

4. Press Quick Dial key 10.

   **Note:** When selecting Speed Dial 10 with Function 32, press [1] [0] at the ten key pad.

5. Press [Yes] four times.

6. The settings for byte 0 are now displayed. Press a number from 0 to 7 corresponding to the bit that you wish to change.

   Example: Change bit 7 to 1: Press 7

7. To scroll through the parameter bytes, either:

   Select the next byte: [▶]

            or

   Select the previous byte: [◀]
   until the correct byte is displayed. Then go back to step 6.

8. After the setting is changed, press [Yes] .

9. To finish, press [Function] .

10. After finishing, reset bit 3 of System Bit Switch 04 to 0.

## 4.4.2. Parameters

The initial settings of the following parameters are all FF(H) - all the parameters are disabled.

| Byte 0 |
| --- |
| **FUNCTION AND COMMENTS** |
| CCITT T1 time<br>If the connection time to a particular terminal is longer than the NCU parameter setting , adjust this byte. The T1 time is the value stored in this byte (in hex code), multiplied by 1 second.<br>**Range:**<br>1 to 127 s (01h to 7Fh)<br>00h or FFh - The local NCU parameter factory setting is used.<br>Do not program a value between 80h and FEh. |

| Byte 1 | | |
| --- | --- | --- |
| | **FUNCTION** | **COMMENTS** |
| **0 to 3** | Tx level<br>**Bit 3 2 1 0    Setting (dBm)**<br>  0 0 0 0      0<br>  0 0 0 1      -1<br>  0 0 1 0      -2<br>  0 0 1 1      -3<br>  0 1 0 0      -4<br>        :<br>        :<br>  1 1 1 1      -15 | If communication with a particular remote terminal often contains errors, the signal level may be inappropriate. Adjust the Tx level for communications with that terminal until the results are better. |
| **4** | Tx level setting<br>**0:** Enabled<br>**1:** Disabled (bits 0 to 4 must all be at 1 to disable) | **0:** When enabling the tx level setting, change this bit to 0, then change the settings of bits 0 through 3 above.<br>**1:** When disabling the tx level setting, change all of the bits 0 through 4 to 1. |
| **5**<br><br>**6** | Cable equalizer<br>**Bit 6  Bit 5   Setting**<br>  0    0    None<br>  0    1    Low<br>  1    0    Medium<br>  1    1    High | Use a higher setting if there is signal loss at higher frequencies because of the length of wire between the modem and the telephone exchange when calling the number stored in this Quick/Speed Dial.<br><br>Also, try using the cable equalizer if one or more of the following symptoms occurs.<br>  • Communication error with error codes such as 0-20, 0-23, etc.<br>  • Modem rate fallback occurs frequently. |
| **7** | Cable equalizer setting<br>**0:** Enabled<br>**1:** Disabled (bits 5 to 7 must all be at 1 to disable) | **0:** When enabling the cable equalizer setting, change this bit to 0, then change the settings of bits 5 and 6 above.<br>**1:** When disabling the cable equalizer setting, change all of the bits 5, 6 and 7 to 1. |

| Byte 2 | | |
|---|---|---|
| | **FUNCTION** | **COMMENTS** |
| **0 to 3** | Initial Tx modem rate<br><br>**Bit 3 2 1 0   Setting (bps)**<br>0 0 0 0     Not used<br>0 0 0 1     2,400<br>0 0 1 0     4,800<br>0 0 1 1     7,200<br>0 1 0 0     9,600<br>0 1 0 1     12,000 (reserved)<br>0 1 1 0     14,400 (reserved)<br><br>1 1 1 1     Setting disabled<br><br>Other settings:    Not used | If training with a particular remote terminal always takes too long, the initial modem rate may be too high. Reduce the initial Tx modem rate using these bits.<br><br>**Note:** 12,000 and 14,400 bps speeds are not available with this machine. |
| **4 to 7** | Not used | Do not change the settings. |

| Byte 3 | | |
|---|---|---|
| | **FUNCTION** | **COMMENTS** |
| **0** | Not used | Do not change the settings. |
| **1** | Not used | |
| **2**<br><br>**3** | DIS/NSF detection method<br>**Bit 3  Bit 2      Setting**<br>0        0        First DIS or NSF<br>0        1        Second DIS or NSF<br>1        0        First DIS or NSF<br>1        1        Setting disabled | **(0, 1):** Use this setting if echoes on the line are interfering with the set-up protocol at the start of transmission. The machine will then wait for the second DIS or NSF before sending DCS or NSS. |
| **4** | Not used | Do not change the settings. |
| **5** | Compression modes available in transmit mode<br>**0:** MH only<br>**1:** All available compression modes | This bit determines the capabilities that are informed to the other terminal during transmission. |
| **6**<br><br>**7** | ECM during transmission<br>**Bit 7  Bit 6      Setting**<br>0        0        Disabled<br>0        1        Enabled<br>1        0        Disabled<br>1        1        Setting disabled | For example, if ECM is switched on but is not wanted when sending to a particular terminal, use the setting of (0, 0). |

## 4.5.  SERVICE RAM ADDRESSES

> ⚠**CAUTION**
>
> **Do not change the settings which are marked as "Not used" or "Read only."**

**800000(H) - RAM Reset Level 1**
Change the data at this address to 00 (H), then switch the machine off and on to reset all the system settings.

> ⚠**CAUTION**
>
> **Before using this RAM, print the settings of all the system parameters (System Parameter List).**

**800001 to 800004(H) - ROM version (Read only)**
    800001(H) - Revision number (BCD)
    800002(H) - Year (BCD)
    800003(H) - Month (BCD)
    800004(H) - Day (BCD)

**800006 to 800016(H)** - Machine's serial number (17 digits - ASCII)

**800018(H)** - Total program checksum (low)
**800019(H)** - Total program checksum (high)

**80001A(H)** - Boot program checksum (low)
**80001B(H)** - Boot program checksum (high)

**80001C(H)** - Main program checksum (low)
**80001D(H)** - Main program checksum (high)

**80001E(H)** - RDS program update counter (Hex)

**800020 to 80003F(H)** - System bit switches
**800040 to 80004F(H)** - Scanner bit switches
**800050 to 80005F(H)** - Printer bit switches
**800060 to 80007F(H)** - Communication bit switches
**800080 to 80008F(H)** - G3 bit switches

**8000A0(H) - User parameter switch 00**
Bit 0: Stamp home position                      0: Disabled, 1: Enabled
Bits 1 and 2: Scanning contrast home position
    Bit   2   1   Setting
          0   0   Normal
          0   1   Lighten
          1   0   Darken
Bit 3: Do not adjust
Bits 4 and 5: Scanning resolution home position
    Bit   5   4   Setting
          0   0   Standard
          0   1   Detail
          1   0   Fine
Bit 6: Transmission mode home position     0: Memory tx, 1: Immediate tx
Bit 7: Halftone home position    0: Disabled, 1: Enabled

**8000A1(H) - User parameter switch 01**
Bit 0: Auto Image Density home position      0: Off, 1: On
Bit 1: Auto Paper Select home position      0: Off, 1: On
Bit 2: Copy/Fax key home position        0: Off, 1: On
Bits 3 to 6: Not used
Bit 7: Settings return to home position after transmission        0: Disabled, 1: Enabled

**8000A2(H) - User parameter switch 02**
Bit 0: Not used
Bit 1: Center mark printing on received copies        0: Disabled, 1: Enabled
Bit 2: Not used
Bit 3: TSI inclusion in transmitted messages       0: Disabled, 1: Enabled
Bits 4 to 7: Not used

**8000A3(H) - User parameter switch 03** (Automatic report printout)
Bit 0: Transmission result report (memory transmissions)    0: Off, 1: On
Bit 1: Not used
Bit 2: Memory storage report       0: Off, 1: On
Bit 3: Polling reserve report (polling reception)       0: Off, 1: On
Bit 4: Polling result report (polling reception)       0: Off, 1: On
Bit 5: Transmission result report (immediate transmissions)    0: Off, 1: On
Bit 6: Not used
Bit 7: TCR (Journal)          0: Off, 1: On

**8000A4(H) - User parameter switch 04**
Bit 0: Not used
Bits 1 to 6: Not used
Bit 7: Inclusion of a sample image on reports        0: Off, 1: On

**8000A5(H) - User parameter switch 05**
Bit 0: Substitute reception         0: Off, 1: On
Bit 1: Memory reception if no RTI or CSI received        0: Possible, 1: Impossible
Bits 2 and 3: Not used
Bits 4 and 5: Not used
Bits 6 and 7: Fusing lamp control during energy saver mode
        Bit    7    6    Setting
               0    0    Lamp off
               0    1    Power saver standby tempreature (80 °C)
               1    0    Standby temperature (145 °C)
               1    1    Not used

**8000A6(H) - User parameter switch 06**
Bit 0: TTI default          0: Off, 1: On
Bit 1 to 7: Not used

**8000A7(H) - User parameter switch 07**
Bits 0 to 2: Not used
Bit 3: Automatic reduction before transmission      0: Off, 1: On
Bits 4 to 7: Not used

**8000A8(H) - User parameter switch 08**
Bit 0 and 1: Not used
Bits 2 and 3: Authorized reception

| Bit | 3 | 2 | Setting |
|-----|---|---|---------|
|     | X | 0 | Disabled |
|     | 0 | 1 | Faxes from senders whose RTIs/CSIs are specified for this feature are accepted. |
|     | 1 | 1 | Faxes from senders whose RTIs/CSIs are not specified for this feature are accepted. |

Bits 4 to 7: Not used

**8000A9(H) - User parameter switch 09**
Bits 0 to 7: Not used

**8000AA(H) - User parameter switch 10**
Bits 0 to 6: Not used
Bit 7: Halftone type          0: Error diffusion, 1: Dither

**8000AB(H) - User parameter switch 11**
Bits 0 to 7: Not used

**8000AC(H) - User parameter switch 12**
Bits 0 and 1: Not used
Bit 2: Toner saving mode          0: Disabled, 1: Enabled
Bits 3 and 4: Printout image density (Fax mode)

| Bit | 4 | 3 | Setting |
|-----|---|---|---------|
|     | 0 | 0 | Normal |
|     | 0 | 1 | Lighten |
|     | 1 | 0 | Darken |
|     | 1 | 1 | Not used |

Bits 5 to 7: Not used

**8000AD(H) - User parameter switch 13**
Bits 0 and 1: PSTN access method from behind a PABX

| Bit | 1 | 0 | Setting |
|-----|---|---|---------|
|     | 0 | 0 | PSTN |
|     | 0 | 1 | Loop start |
|     | 1 | 0 | Ground start |
|     | 1 | 1 | Flash start |

**8000AE - 8000AF(H) - User parameter switches 14 to 15**
Not used

**8000B1(H) -** Maximum number of copies          1 - 99 (BCD)
**8000B2(H) -** Center erase width          1 - 50 mm (BCD)
**8000B3(H) -** Border erase width          1 - 50 mm (BCD)

**8000B9(H) - User function 62 settings**
Bit 0: Night timer      0: Disabled, 1: Enabled
Bits 1 to 3: Not used
Bit 4: RDS operation      0: Not acceptable, 1: Acceptable for the limit specified by system switch 03
Bits 5 and 6: Not used
Bit 7: Daylight saving time      0: Disabled, 1: Enabled

**8000BA(H) - User function 62 settings**
Bit 0: Not used
Bit 1: Dialing type      0: Pulse dialing (10 pps), 1: Tone (DTMF) dialing
Bits 2 to 7: Not used

**8000BB(H) - PSTN access number for loop start**

| Access number | Hex value to program (BCD) |
|---|---|
| 0 | F0 |
| ⇩ | ⇩ |
| 0 | F0 |
| 00 | 00 |
| ⇩ | ⇩ |
| 99 | 99 |

**8000C8 to 8000DB(H)** - RTI (Max. 20 characters - ASCII) - **Note 1**
**8000DC to 8000EF(H)** - CSI (Max. 20 characters - ASCII)
**8000F0 to 80010F(H)** - TTI (Max. 32 characters - ASCII) - **Note 1**
**800110(H)** - Number of CSI characters (Hex)

**Note 1**: If the number of characters are less than the maxumum (20 for RTI, 32 for TTI), add a stop code (FF[H]) after the last character.

**800111 to 80011F(H)** - Service station's fax number (Service function 13)

**800120 to 80012E(H)** - Own fax number (User function 61)

**80012F(H)** - ID code (low - Hex)
**800130(H)** - ID code (high - Hex)

**800140 to 800146(H) - Last power off time (Read only)**
    800140(H) - Year (BCD)
    800141(H) - Month (BCD)
    800142(H) - Day (BCD)
    800143(H) - 00: Monday, 01: Tuesday, 02: Wednesday, ......., 06: Sunday
    800144(H) - Hour
    800145(H) - Minute
    800146(H) - Second

**800150(H) - Installed equipment (Read only)**
    Bits 0-2: Not used
    Bit 3: ADF                  0: Not installed, 1: Installed
    Bit 4: 100 sheet cassette      0: Not installed, 1: Installed
    Bits 5-7: Not used

**800151(H) - Installed equipment**
    Bit 0: Not used
    Bit 1: Printer interface      0: Not installed, 1: Installed
    Bits 2-6: Not used
    Bit 7: IC page memory card        0: Not installed, 1: Installed

The following counters are listed on the System Parameter List. The names used on this report are given in parentheses below.

**800158 to 80015A(H)** - Tx counter (TX)

| Address | High | Low |
|---|---|---|
| 800158(H) | Tens digit | Unit digit |
| 800159(H) | Thousands digit | Hundrets digit |
| 80015A(H) | Millions digit | Ten thousands digit |

**Note:** The following counters have the same data format as above.

**80015B to 80015D(H)** - Rx counter (RX)

**80015E to 800160(H)** - Scan counter (SCN)

**800161 to 800163(H)** - Print counter (PRT)

**800164 to 800166(H)** - Printer interface output counter (PRN)

**800167 to 800169(H)** - Paper feed counter (standard cassette) (UPPER CASSETTE)

**80016D to 80016F(H)** - Paper feed counter (100-sheet cassette) (OPEN CASSETTE)

**800170 to 800172(H)** - Paper feed counter (bypass feed) (BY-PASS)

**800173 to 800175(H)** - ADF counter (ADF)

**800176 to 800178(H)** - Book scan counter (BOOK)

**800179 to 80017B(H)** - ADF scan total jam counter (DOC. JAM)

**80017C to 80017E(H)** - Printer total jam counter (COPY JAM)

**80017F to 800181(H)** - Paper jam counter (standard cassette) (UPPER CST JAM)

**800185 to 800187(H)** - Paper jam counter (optional 100 sheet cassette) (OPEN CST JAM)

**800188 to 80018A(H)** - Bypass jam counter (BY-PASS JAM)

**80018B to 80018D(H)** - Fusing exit jam counter (EJECT JAM)

**80018E to 800190(H)** - Registration jam counter (PAPER JAM)

**800191 to 800193(H)** - PM counter (PM)

**800194 to 800196(H)** - PM call interval (default 60,000) (PM DEFAULT)

**800197 to 800199(H)** - Copy counter (COPY)

**80019A to 80019C(H)** - OPC (master drum) counter (PCU)

**80019D to 80019F(H)** - CTM counter (TONER)

**8001D5 to 8001E4(H)** - Excessive jam call parameters (Refer to section 2.3.2 for details.)

**8001E5 to 8001E7(H)** - OPC (master drum) replacement interval (default: 30,000 prints)
The machine asks the user to replace the drum at this interval, if bit 3 of system bit switch 04 is 0.

**8001F1 to 80021A(H) - Night timer period (User function 71)**
    8001F1 to 8001F3(H) - Setting #1 for Monday
    8001F4 to 8001F6(H) - Setting #2 for Monday
    8001F7 to 8001F9(H) - Setting #1 for Tuesday
    8001FA to 8001FC(H) - Setting #2 for Tuesday
    8001FD to 8001FF(H) - Setting #1 for Wednesday
    800200 to 800202(H) - Setting #2 for Wednesday
    800203 to 800205(H) - Setting #1 for Thursday
    800206 to 800208(H) - Setting #2 for Thursday
    800209 to 80020B(H) - Setting #1 for Friday
    80020C to 80020E(H) - Setting #2 for Friday
    80020F to 800211(H) - Setting #1 for Saturday
    800212 to 800214(H) - Setting #2 for Saturday
    800215 to 800217(H) - Setting #1 for Sunday
    800218 to 80021A(H) - Setting #2 for Sunday

    **Program format**
    First byte - Hour (BCD)
    Second byte - Minute (BCD)
    Third byte - 00(H): Timer start time, 01(H): Timer end time

**800245 to 80024C(H) - Last RDS operation (Read only)**
    800245(H) - Year (BCD)
    800246(H) - Month (BCD)
    800247(H) - Day (BCD)
    800248(H) - 00: Monday, 01: Tuesday, 02: Wednesday, ......., 06: Sunday
    800249(H) - Hour
    80024A(H) - Minute
    80024B(H) - Second

**80024D(H)** - Daylight saving time setting (User function 62)

**800250(H)** - Transmission monitor volume     00 - 07(H)
**800251(H)** - Reception monitor volume     00 - 07(H)
**800252(H)** - On Hook monitor volume     00 - 07(H)
**800254(H)** - Buzzer volume     00 - 07(H)
**800255(H)** - Key acknowledgement tone volume     00 - 07(H)

**800256 to 80025A(H)** - Periodic service call parameters (Refer to section 2.3.2 for details)

**800261 to 800263(H)** - Effective term of automatic service calls (Refer to section 2.3.2 for details)

**8002A5 to 8002A6(H)** - ADF mode: scan top margin adjustment
**8002A7 to 8002A8(H)** - ADF mode: scan bottom margin adjustment
Refer to section 5.12 for details.

**8002A9 to 8002AA(H)** - Book mode: scan top margin adjustment
**8002AB(H)** - Book mode: scan bottom margin adjustment
Refer to section 5.12 for details.

**80034D(H)** - Print top margin (standard cassette)
**800352(H)** - Print top margin (optional 100 sheet cassette)
**800353(H)** - Print top margin (bypass feeder)

**800357(H)** - Print left margin (standard cassette)
**80035C(H)** - Print left margin (optional 100 sheet cassette)
**80035D(H)** - Print left margin (bypass feeder)
Refer to section 5.12 for details about these parameters.

**800363(H)** - Print bottom margin (bypass feeder)
Refer to section 5.12 for details about this parameter.

### 8003C1(H) - Initial Toner Supply
Bit 3: Initial toner supply 0: Off, 1: On
Whenever the development unit is replaced, do the following procedure.
1. Make sure that a new development unit, drum, and CTM are correctly installed.
2. Turn on the machine and change this bit to 1.
3. Turn off the machine.
4. Turn on the machine. The machine starts filling up the empty development unit hopper with new toner. (This bit is reset to zero automatically.)
5. Make test copies or test patterns to check the print quality.

### 80033C(H) - Fusing unit failure details
01(H) - The fusing lamp temperature stayed above 175 °C while printing.
02(H) - The fusing lamp temperature did not reach 150 °C before starting printing.
03(H) - The fusing lamp temperature did not go down to 80 °C while in standby mode (when fusing lamp OFF was selected for power saver mode)
04(H) - The fusing lamp temperature did not go down to 80 °C while in standby mode (when fusing lamp Standby (80 °C) was selected for power saver mode)
05(H) - The fusing lamp temperature stayed below 80 °C while in standby mode (when fusing lamp Standby (80 °C) was selected for power saver mode)
07(H) - The fusing lamp temperature came below 140 °C during printing
08(H) - The fusing lamp temperature exceeded 250 °C
09(H) - A fusing thermistor error was detected

### When a service call was caused by a fusing unit failure (codes 01 - 09):
After fixing the problem, reset the data at this address to 00(H), then restart the machine to clear the service call. (Refer to address 8003B5(H) for other hardware failures.)

### 80033D(H) - Excessive jam alarm
Bit 3: Scanner excessive jam alarm  1: An alarm has occurred
Bit 4: Printer excessive jam alarm  1: An alarm has occurred
Either or both of these bits will change to 1 when an excessive jam alarm occurs. Reset each bit to 0 when you have solved the problem. The machine will not be able to detect excessive jams in future if you do not reset these bits.

### 8003AD(H) - Sensor status (standard cassette and internal printer mechanism)
Bit 0 to 3: Paper size sensor
(**Note**: Available paper sizes depend on the country for which the machine is designed.)

$$\begin{pmatrix} Bit\,0 \\ Bit\,1 \\ Bit\,2 \\ Bit\,3 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix} : \begin{matrix} HLT \\ sideways \end{matrix} \quad \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix} : \begin{matrix} A5 \\ sideways \end{matrix} \quad \begin{pmatrix} 1 \\ 1 \\ 0 \\ 0 \end{pmatrix} : \begin{matrix} B5 \\ sideways \end{matrix} \quad \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix} : \begin{matrix} LT \\ lengthwise \end{matrix} \quad \begin{pmatrix} 1 \\ 0 \\ 1 \\ 0 \end{pmatrix} : \begin{matrix} A4 \\ lengthwise \end{matrix}$$

$$\begin{pmatrix} Bit\,0 \\ Bit\,1 \\ Bit\,2 \\ Bit\,3 \end{pmatrix} = \begin{pmatrix} 0 \\ 1 \\ 1 \\ 0 \end{pmatrix} : \begin{matrix} F/F4 \\ lengthwise \end{matrix} \quad \begin{pmatrix} 1 \\ 1 \\ 1 \\ 0 \end{pmatrix} : \begin{matrix} Legal \\ lengthwise \end{matrix} \quad \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix} : \begin{matrix} B4 \\ lengthwise \end{matrix} \quad \begin{pmatrix} 1 \\ 0 \\ 0 \\ 1 \end{pmatrix} : \begin{matrix} B5 \\ lengthwise \end{matrix} \quad \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix} : \begin{matrix} Cassette \\ not\ installed \end{matrix}$$

Bit 4: Paper end sensor        1: Paper end
Bit 5: Registration sensor       1: Paper present
Bit 6: Fusing exit sensor        1: Paper present
Bit 7: Standard cassette availability      0: Available, 1: Not available (jam, no paper, etc.)

### 8003B2(H) - Sensor status (optional 100 sheet cassette)
Bit 0 to 3: Paper size sensor
(**Note**: Available paper sizes depend on the country for which the machine is designed.)

$$\begin{pmatrix} Bit\,0 \\ Bit\,1 \\ Bit\,2 \\ Bit\,3 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix} : \begin{matrix} HLT \\ sideways \end{matrix} \quad \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix} : \begin{matrix} A5 \\ sideways \end{matrix} \quad \begin{pmatrix} 1 \\ 1 \\ 0 \\ 0 \end{pmatrix} : \begin{matrix} B5 \\ sideways \end{matrix} \quad \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix} : \begin{matrix} LT \\ lengthwise \end{matrix} \quad \begin{pmatrix} 1 \\ 0 \\ 1 \\ 0 \end{pmatrix} : \begin{matrix} A4 \\ lengthwise \end{matrix}$$

$$\begin{pmatrix} Bit\,0 \\ Bit\,1 \\ Bit\,2 \\ Bit\,3 \end{pmatrix} = \begin{pmatrix} 0 \\ 1 \\ 1 \\ 0 \end{pmatrix} : \begin{matrix} F/F4 \\ lengthwise \end{matrix} \quad \begin{pmatrix} 1 \\ 1 \\ 1 \\ 0 \end{pmatrix} : \begin{matrix} Legal \\ lengthwise \end{matrix} \quad \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix} : \begin{matrix} B4 \\ lengthwise \end{matrix} \quad \begin{pmatrix} 1 \\ 0 \\ 0 \\ 1 \end{pmatrix} : \begin{matrix} B5 \\ lengthwise \end{matrix} \quad \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix} : \begin{matrix} Cassette \\ not\ installed \end{matrix}$$

Bit 4: Paper end sensor        1: Paper end
Bit 5: Not used
Bit 6: Not used
Bit 7: Cassette availability      0: Available, 1: Not available (jam, no paper, etc.)

### 8003B3(H) - Sensor status (bypass feed)
Bit 0 to 3: Not used
Bit 4: Paper in the bypass feeder      1: Paper not present
Bit 5: Bypass feed sensor       1: Paper present
Bit 6: Not used
Bit 7: Bypass feed availability      0: Available, 1: Not available (jam, no paper, etc.)

**8003B5(H) - Details of the service call (hardware error)**
01(H) - The fusing lamp temperature stayed above 175 °C while printing.
02(H) - The fusing lamp temperature did not reach 150 °C before starting printing.
03(H) - The fusing lamp temperature did not go down to 100 °C while in standby mode (when fusing lamp OFF and fusing standby temperature  80 °C were selected for power saver mode)
04(H) - The fusing lamp temperature did not go down to 100 °C while in standby mode (when power saver standby temperature 80 °C was selected for power saver mode), or The fusing lamp temperature did not go down to 145 °C while in standby mode (when fusing standby temperature 145 °C were selected for power saver mode)
05(H) - The fusing lamp temperature stayed below standby temperature (80 °C or 145 °C) while in standby mode (when fusing lamp OFF was not selected).
07(H) - The fusing lamp temperature came below 140 °C while printing
08(H) - The fusing lamp temperature exceeded 250 °C
09(H) - A fusing thermistor error was detected
11(H) - Charge leak current was detected while the charge corona unit was activated
12(H) - Charge leak current was detected while the charge corona unit was not activated
21(H) - The laser synchronization signal was not detected during printing
31(H) - Polygonal mirror motor startup error
32(H) - Polygonal mirror motor error during printing
41(H) - Main motor startup error
42(H) - Main motor error during printing
71(H) - Scanner home position was not detected correctly. Refer to section 6.3 for more details.

**When a service call was caused by a fusing lamp failure (codes 01 - 09):**
The same code is stored at address 80033C(H).
After fixing the problem, reset the data at address 80033C(H) to 00(H), then restart the machine to clear the service call.

**When a service call was caused by another hardware failure (codes 11 - 71):**
If the problem remains after restarting the machine (power off/on), fix the hardware problem. The service call condition is cleared after power up.

**8003FD to 800426 (H) - Scanner Video Processing Parameters**
See section 5.11.4 for details.

**80183D to 8019BD(H) - Latest 64 error codes (Read only)**

One error record consists of 6 bytes of data.

First error record start address - 80183D(H)
Second error record start address - 801844(H)
Third error record start address - 80184A(H)
                :                :                :
64th error record start address - 8019B8(H)

The format is as follows:
1st byte - Minute (BCD)
2nd byte - Hour (BCD)
3rd byte - Day (BCD)
4th byte - Month (BCD)
5th byte - Error code (low) [If the error code is 1-23, 23 is stored here.]
6th byte - Error code (high) [If the error code is 1-23, 01 is stored here.]

**802043 to 802255(H) - Latest 10 error communication records**

One error communication record consists of 53 bytes. The format is as follows:

1st byte - Header
Bit 0: Communication result      0: OK, 1: NG
Bit 1: Document jam          1: Occurred
Bits 2 - 3: Not used
Bit 4: Technical data printout instead of personal codes    0: No, 1: Yes
Bit 5: Type of technical data                            0: Rx level, 1: Measure of error rate
Bit 6: Error report          0: Not printed, 1: Printed
Bit 7: Data validity          0: Not valid, 1: Valid

2nd to 5th bytes -  Date and time when the communication started
              2nd byte - Month (BCD)
               3rd byte - Day (BCD)
              4th byte - Hour (BCD)
              5th byte - Minute (BCD)

6th and 7th bytes - Communication time
              6th byte - Minutes (BCD)
              7th byte - Seconds (BCD)

8th byte - Number of pages transmitted or received (Hex)

9th and 10th bytes  - Personal code or number of total/burst error lines
If bit 4 of the 1st byte is 0:
       9th byte - Personal code (low - BCD)
      10th byte - Personal code (high - BCD)
If bit 4 of the 1st byte is 1:
     9th byte - Number of total error lines (Hex)
    10th byte - Number of burst error lines (Hex)

11th byte - File number (low - Hex)
12th byte - File number (high - Hex)

13th and 14th bytes - Rx level or measure of error rate
If bit 5 of the 1st byte is 0:

    13th byte - Rx level (low - Hex)
    14th byte - Rx level (high - Hex)

If bit 4 of the 1st byte is 1:

    13th byte - Measure of error rate (low - Hex)
    14th byte - Measure of error rate (high - Hex)

15th byte - Final modem rate
Bits 0 to 2: Final modem speed

$$\begin{pmatrix} Bit\,0 \\ Bit\,1 \\ Bit\,2 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} : 2.4k \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} : 4.8k \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} : 7.2k \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} : 9.6k \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix} : 12.0k \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} : 14.4k$$

Bit 3: Not used
Bits 4 to 6: Final modem type

$$\begin{pmatrix} Bit\,4 \\ Bit\,5 \\ Bit\,6 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} : V.27ter \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} : V.29 \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} : V.33$$

Bit 7: Not used

16th byte to 35th byte - Remote terminal's ID (RTI, TSI or CSI) (ASCII)

36th byte - Communication mode #1
Bits 0 - 1: Resolution used

$$\begin{pmatrix} Bit\,0 \\ Bit\,1 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \end{pmatrix} : Standard \begin{pmatrix} 0 \\ 1 \end{pmatrix} : Detail, \begin{pmatrix} 1 \\ 1 \end{pmatrix} : Fine$$

Bit 2: Not used
Bit 3: ECM                    0: Off, 1: On
Bits 4 to 7: Communication mode used

$$\begin{pmatrix} Bit\,4 \\ Bit\,5 \\ Bit\,6 \\ Bit\,7 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} : Normal \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix} : Not\,used \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix} : Polling \begin{pmatrix} 1 \\ 1 \\ 0 \\ 0 \end{pmatrix} : Not\,used$$

$$\begin{pmatrix} Bit\,4 \\ Bit\,5 \\ Bit\,6 \\ Bit\,7 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix} : Not\,used \begin{pmatrix} 1 \\ 0 \\ 1 \\ 0 \end{pmatrix} : \begin{matrix} Automatic \\ Service\,Call \end{matrix}$$

37th byte - Communication mode #2
Bit 0: Tx or Rx              0: Tx, 1: Rx
Bit 1: Reduction in Tx         0: Not reduced, 1: Reduced
Bit 2: Not used
Bit 3: Send later transmission         0: Not used, 1: Used
Bit 4: Transmission from         0: ADF, 1: Memory
Bits 5 to 7: Not used

38th byte - Number of errors duing communication (Hex)

39th to 41st byte - 1st error code and page number where the error occurred
    39th byte - Page number where the error occurred (Hex)
    40th byte - Error code (low - BCD)
    41st byte - Error code (high - BCD)
42th to 44th byte - 2nd error code and page number where the error occurred
45th to 47th byte - 3rd error code and page number where the error occurred
48th to 50th byte - 4th error code and page number where the error occurred
51tst to 53rd byte - 5th error code and page number where the error occurred

**F80006 to F8000E(H) - ROM version number (BCD) - Read only**

**F80006 to F8000E(H) - ROM release date (BCD) - Read only**

**F80006 to F8000E(H) - ROM part number and suffix (ASCII) - Read only**

## 4.6. SPECIAL TOOLS AND LUBRICANTS

- Flash/SRAM data copy harness (P/N: H5159100)
- Launa Oil - 40 (P/N: 54429103) for scanner guide shaft

## 4.7. PM TABLE

**Scanner**

| Item | 30K | 60K | 90K | 1 year | Notes |
|---|---|---|---|---|---|
| Exposure Glass | C (user) | C (user) | C (user) | C | Soft cloth and water |
| Platen Cover | C (user) | C (user) | C (user) | C | Soft cloth and water |
| Shading Plate | C | C | C | C | Soft cloth and water |

**ADF**

| Item | 30K | 60K | 90K | 1 year | Notes |
|---|---|---|---|---|---|
| Exposure Glass | C (user) | C (user) | C (user) | C | Soft cloth and water |
| R0 and R2 Rollers | C (user) | C (user) | C (user) | C | Soft cloth and water |
| R1 Roller | C | C | C | C | |
| Shading Plate | C (user) | C (user) | C (user) | C | Soft cloth and water |
| ADF Roller Assy | R | R | R | C | Soft cloth and water |
| Separation Roller | R | R | R | C | Soft cloth and water |

**Printer**

| Item | 30K | 60K | 90K | 1 year | Notes |
|---|---|---|---|---|---|
| Paper Feed Roller | | | | C | Soft cloth and water |
| Registration Roller | C (user) | C (user) | C (user) | C | Soft cloth and water |
| Fusing Thermistor | | R | | | |
| Hot Roller Strippers | | R | | | |
| Hot Roller | | R | | | |
| Pressure Roller (Fusing) | | R | | | |
| Cleaning Pad | R (user) Replaced when a new CTM (toner cassette) is installed. | | | | A cleaning pad is enclosed in the master unit. |
| Transfer Roller | | R | | | Dry cloth |
| Development Unit | | R | | | |

**100 Sheet Cassette (Optional Kit)**

| Item | 10K | 30K | 60K | 1 year | Notes |
|---|---|---|---|---|---|
| Feed Roller | | | | C | Soft cloth and water |

**C: Clean, R: Replace**

# 5. REPLACEMENT AND ADJUSTMENT

⚠️WARNING
The machine contains a laser beam generator. Laser beams can cause permanent eye damage. Do not open the laser unit or look along the laser beam path while the main power is on.

⚠️CAUTION
Before starting disassembly, be sure to print all message files in the SAF memory. Then, turn off the main switch and disconnect the power cord for safety.

**Lithium Battery:** 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.

## 5.1. EXTERIOR

### 5.1.1. ADF
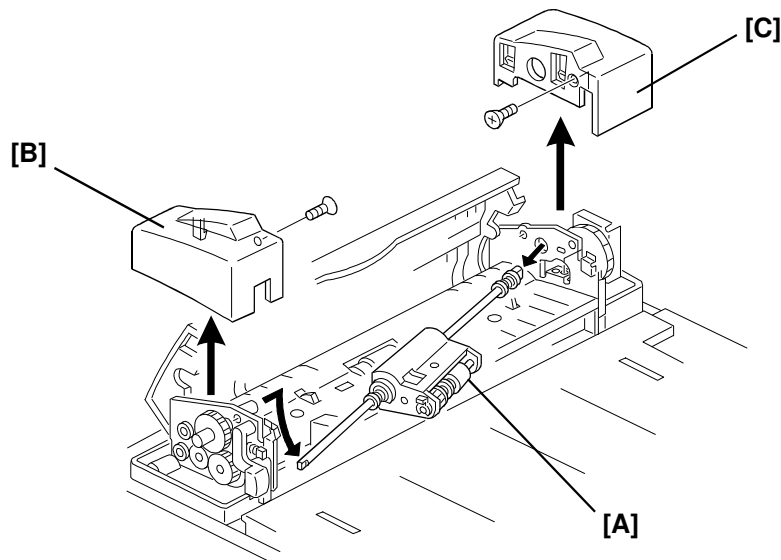


H521R515.wmf

First, remove the ADF roller assembly [A].
A: ADF Roller Assembly
B: ADF Upper Front Cover (1 screw, 1 hook)
C: ADF Upper Rear Cover (1 screw, 2 hooks)
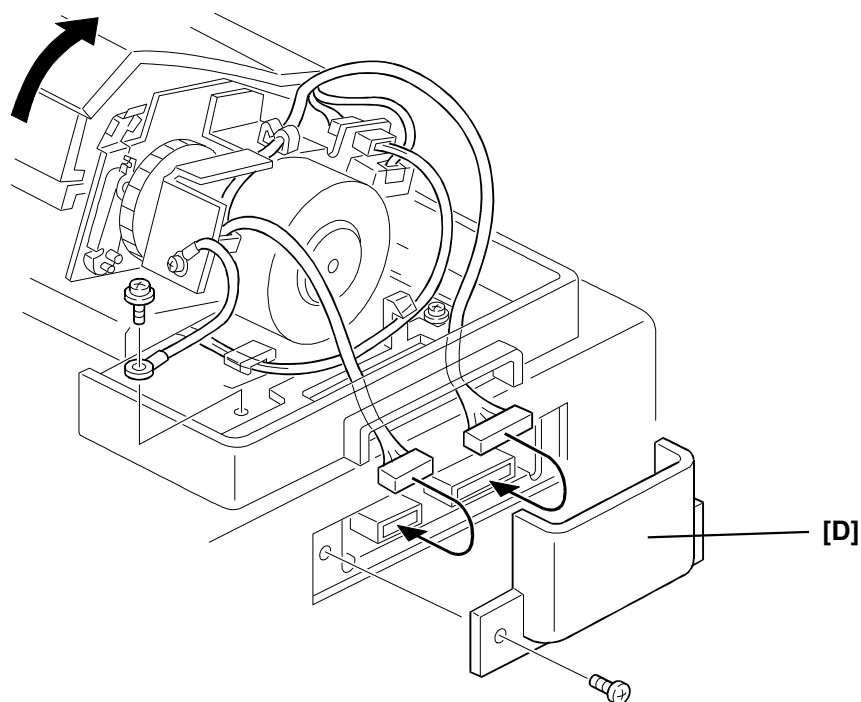
H521R516.wmf

**Remove the connector cover, then remove the harness and a ground wire.**
**D: Connector Cover (1 screw)**
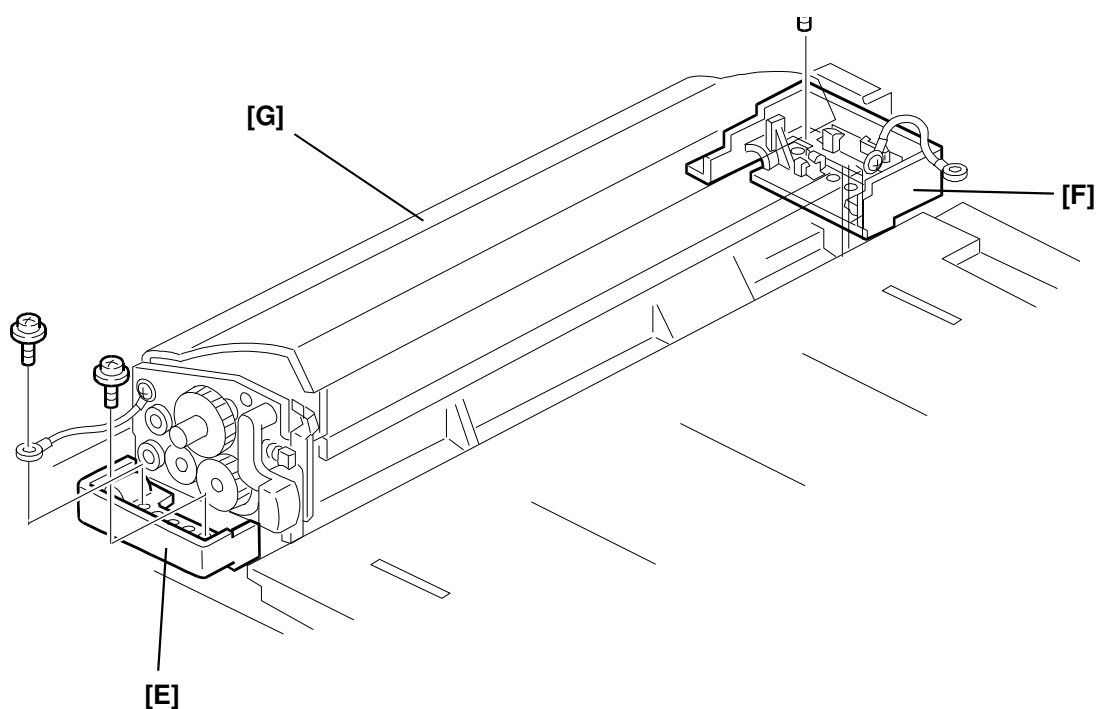


H521R517.wmf

**E: ADF Lower Front Cover (2 screws, 1 grounding wire)**
**F: ADF Lower Rear Cover (2 screws, 1 grounding wire)**
**G: ADF Unit (2 connectors)**

## 5.1.2. Operation Panel and Copy Tray

[A]

[B]
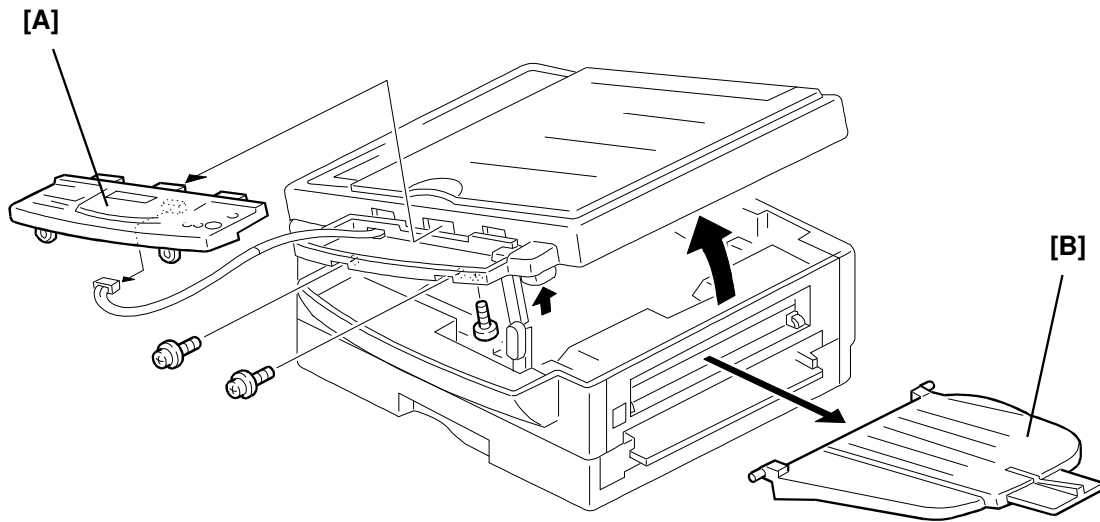
H521R501.wmf

**A: Operation Panel Assembly (2 tapping screws)**
**B: Copy Tray**

## 5.1.3. Platen Cover and Original Scales

[A]

[B]

[C]
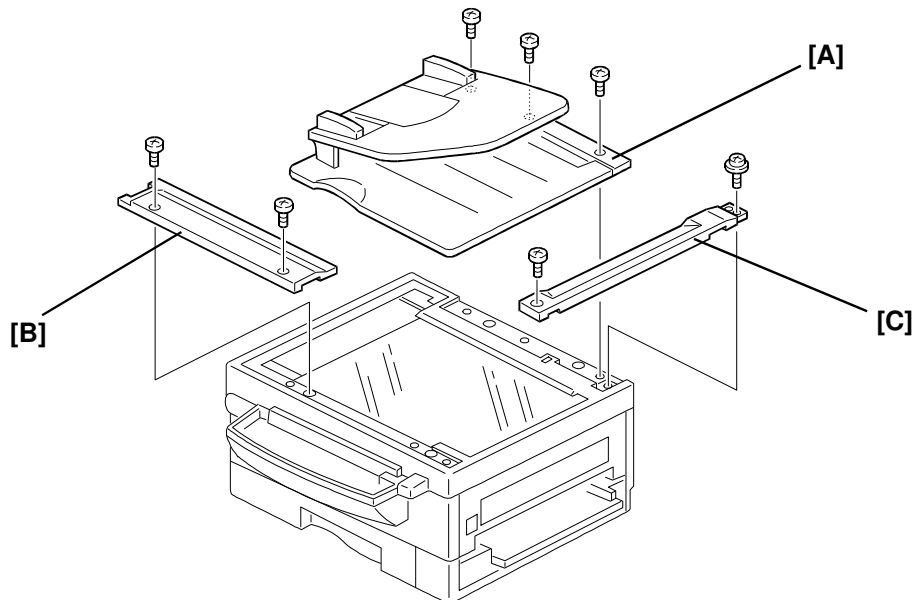
H521R014.wmf

**A: Platen Cover (3 tapping screws)**
**B: Horizontal Scale (2 silver screws)**
**C: Vertical Scale (1 silver screw, 1 screw)**

## 5.1.4. Top Cover and Exposure Glass
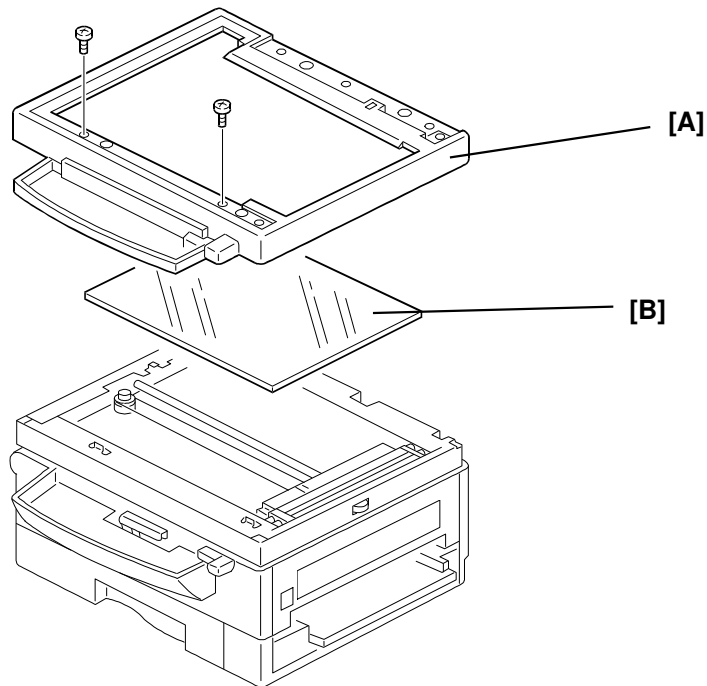


H521R015.wmf

**A: Top Cover (2 screws)**
**B: Exposure Glass**

## 5.1.5. Left, Front, and Rear Cover
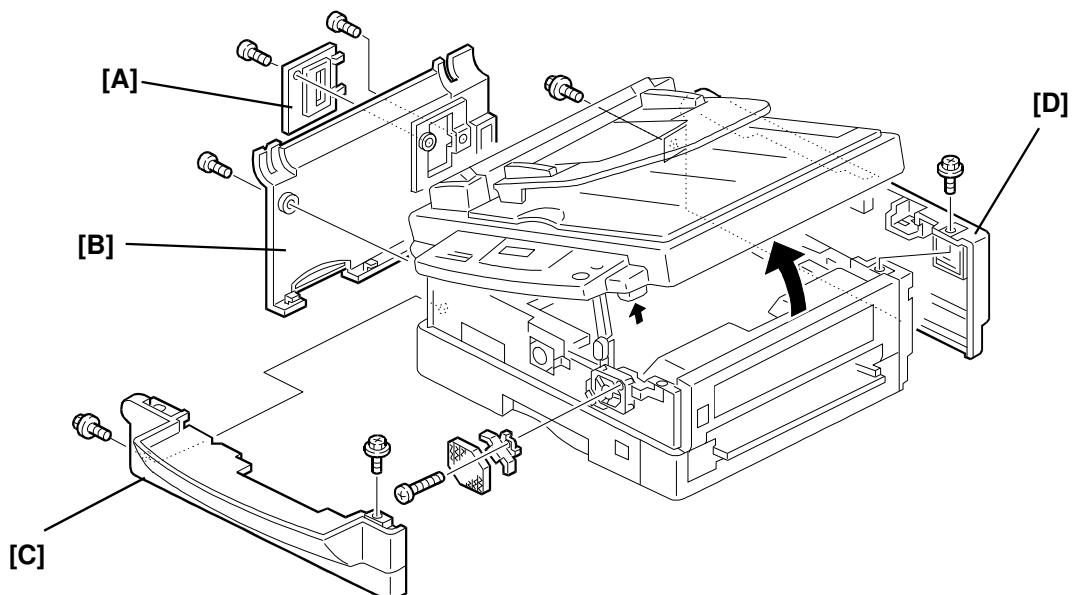


H521R504.wmf

**A: NCU Cover (1 silver screw),     B: Left Cover (2 black screws)**
**C: Front Cover (2 black screws, 2 positioning hooks)**
**D: Rear Cover (2 black screws, 3 positioning hooks)**

## 5.2. SCANNER

### 5.2.1. Contact Image Sensor
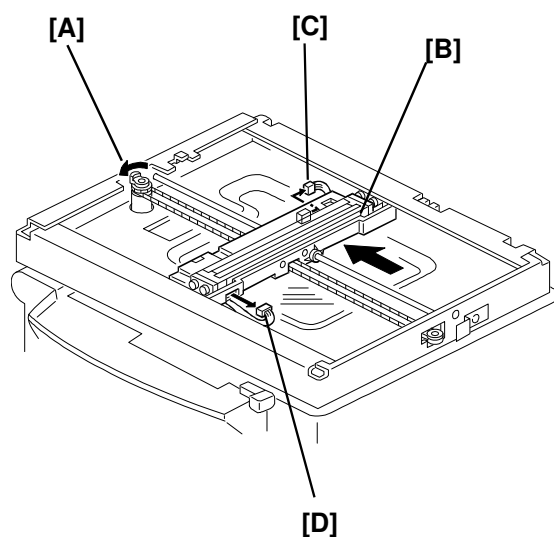
H521R016.wmf                         H521R017.wmf

**Turn the gear [A] anti-clockwise to move the image sensor [B] to the middle of scanning path.**
**Then disconnect harnesses [C] and [D].**
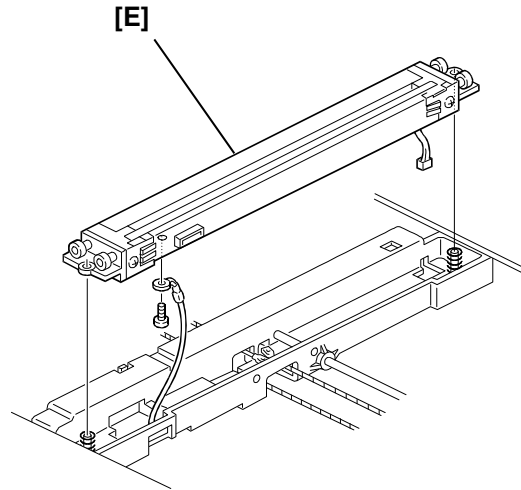
**E: Contact Image Sensor Assembly (1 tapping screw, 1 grounding wire)**

After replacing the image sensor, do the following.

1. Reset the sensor clock signal using service function 10-4.
   (See section 4-1-19; the clock is reset automatically when this function is used.)

2. Make some test copies using book scanner and ADF mode.
   A blank copy might be made when using the ADF after replacing the image sensor. Refer to section 6.1.1 for more details.

**Note for the scanner guide shaft replacement**
If you replace the scanner guide shaft, put Launa Oil 40 on all surfaces of the shaft (P/N: 54429103 - Launa Oil 40).

## 5.2.2. Fluorescent Lamp Stabilizer
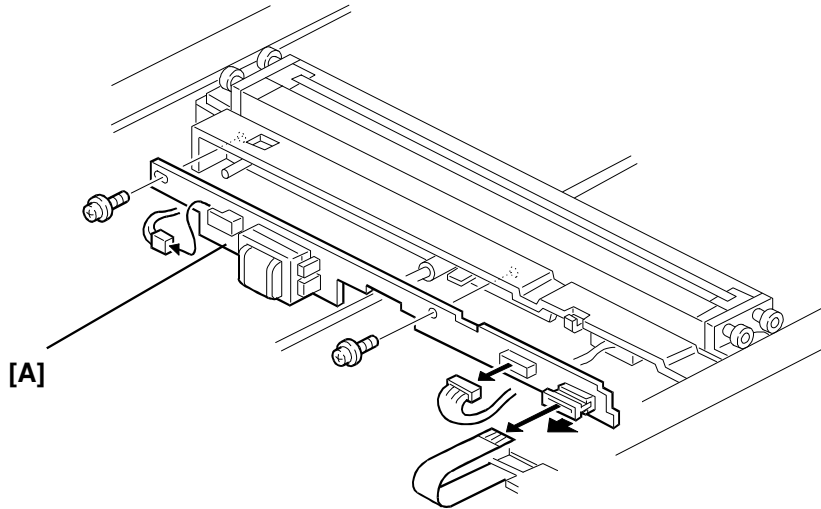
H521R018.wmf

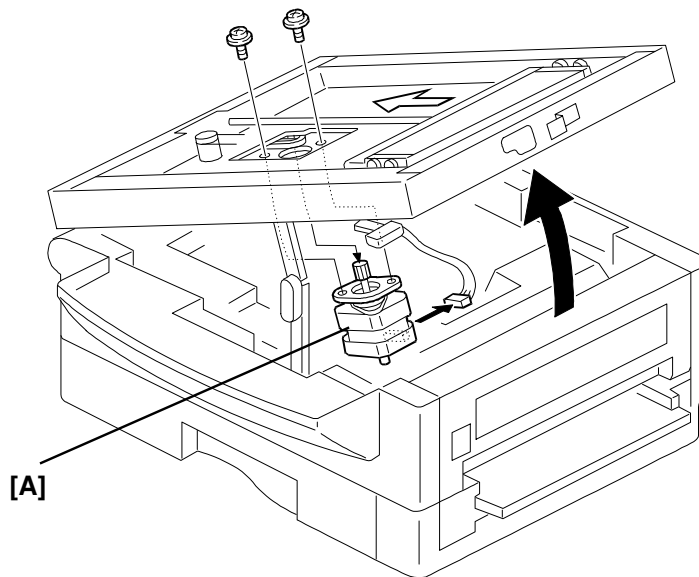**A: Fluorescent Lamp Stabilizer (2 tapping screws, 3 connectors)**


## 5.2.3. Original Size, Platen Cover, and Scanner Home Position Sensors
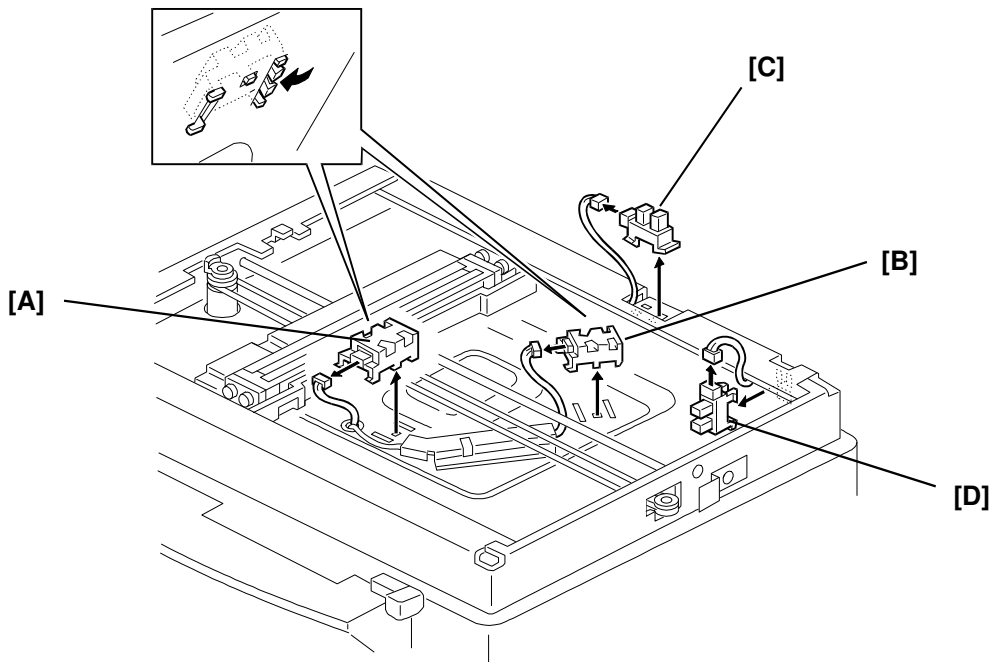
H521R019.wmf

**A: Original Length Sensor (1 connector, 6 hooks)**
**B: Original Width Sensor (1 connector, 6 hooks)**
**C: Platen Cover Sensor (1 connector, 3 hooks)**
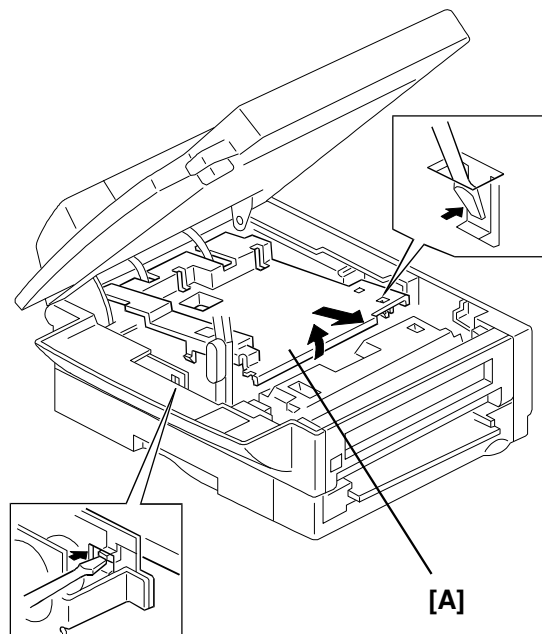**D: Scanner Home Position Sensor (1 connector, 3 hooks)**

### 5.2.4. Scanner Motor



H521R020.wmf

**A: Scanner Motor (2 screws, 1 connector, 1 timing belt)**
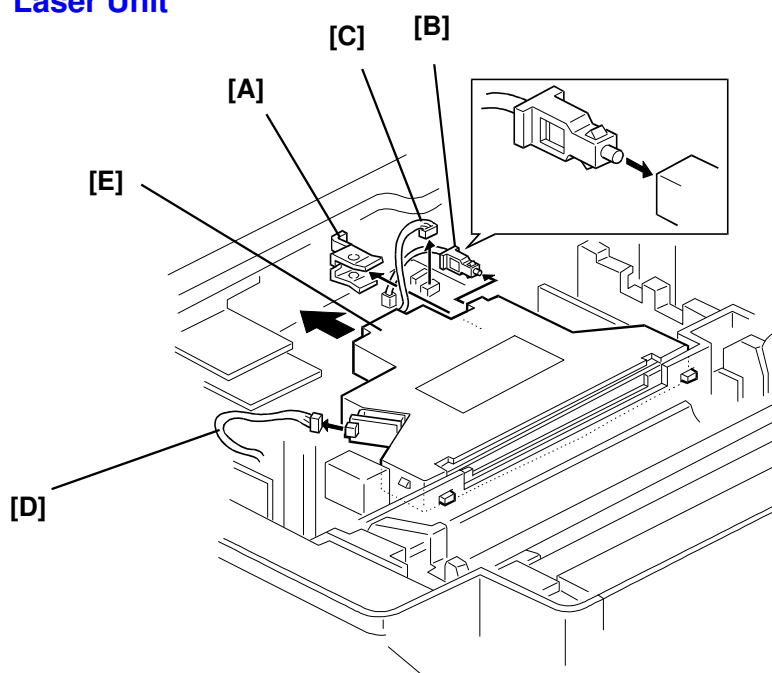
# 5.3. LASER PRINTING COMPONENTS

### 5.3.1. Inner Cover



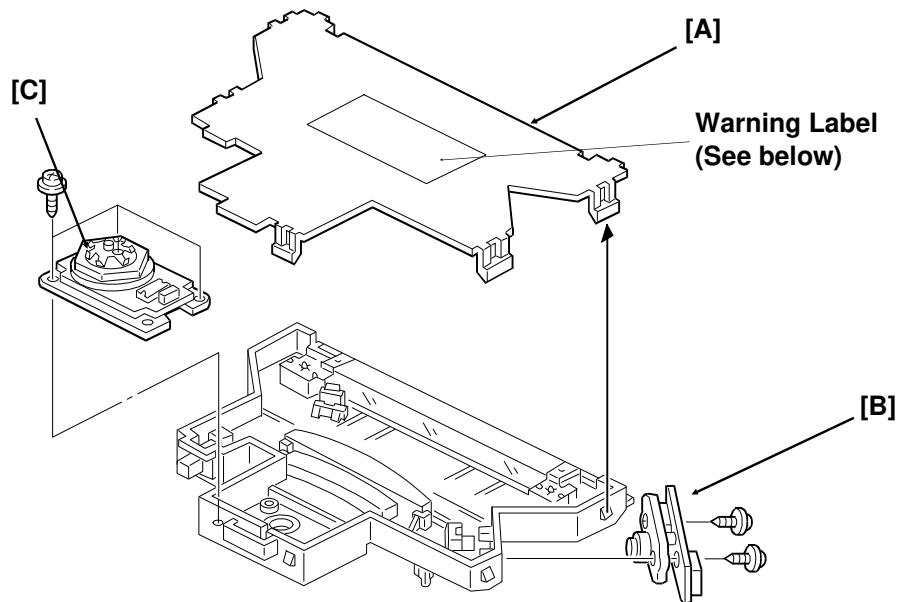H521R511.wmf

**A: Inner Cover (3 hooks)**

## 5.3.2. Laser Unit



H521R022.wmf

**First, remove the clip [A] and harnesses [B], [C], and [D], then remove the Laser Unit [E].**
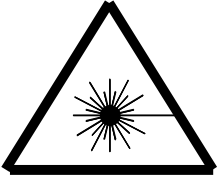
### 5.3.3. Laser Diode Unit and Hexagonal Mirror Motor



H521R620.wmf

**A: Laser Unit Cover (7 hooks)**
**B: Laser Diode Unit (2 tapping screws)**
**C: Hexagonal Mirror Motor (3 tapping screws)**

⚠**WARNING**

**Laser beams can cause permanent eye damage. Do not open the laser unit or look along the laser beam path while the main power is on.**



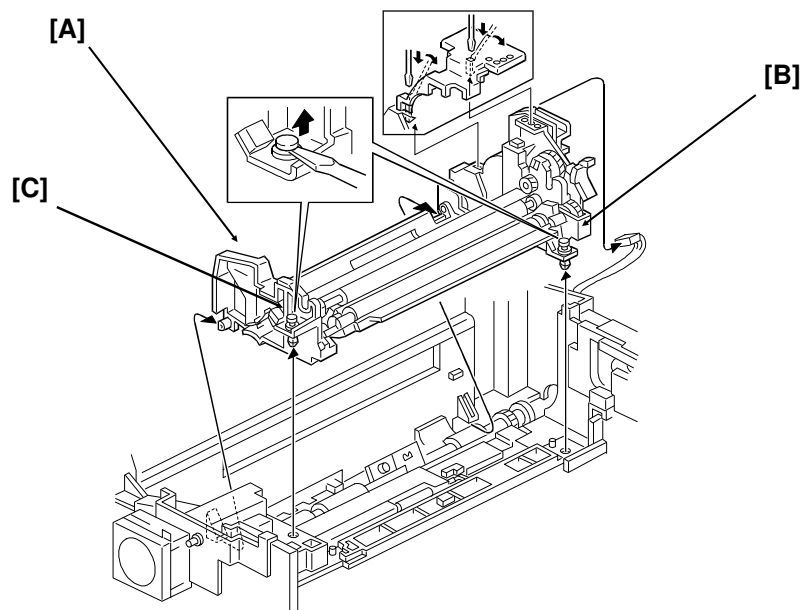| DANGER | |
| --- | --- |
| INVISIBLE LASER RADIATION WHEN OPEN AVOID DIRECT EXPOSURE TO BEAM | |
| **CAUTION** INVISIBLE LASER RADIATION WHEN OPEN AVOID EXPOSURE TO BEAM | **VORSICHT** UNSICHTBARE LASERSTRAHLUNG, WENN ABDECKNG GEOFFNET NICHT DEM STRAHL AUSSETZEN |

H521R647.wmf

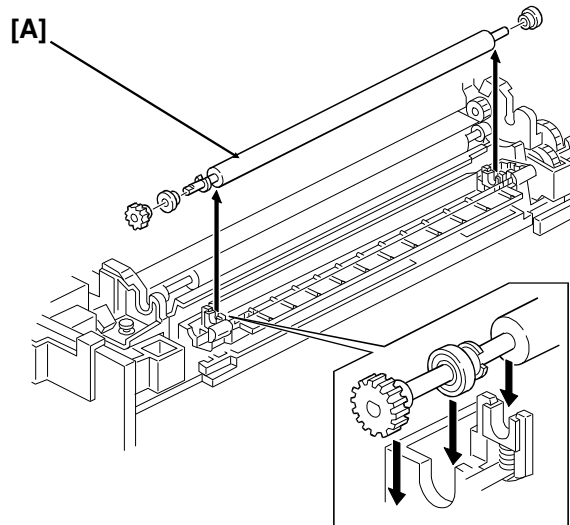## 5.4. DEVELOPMENT
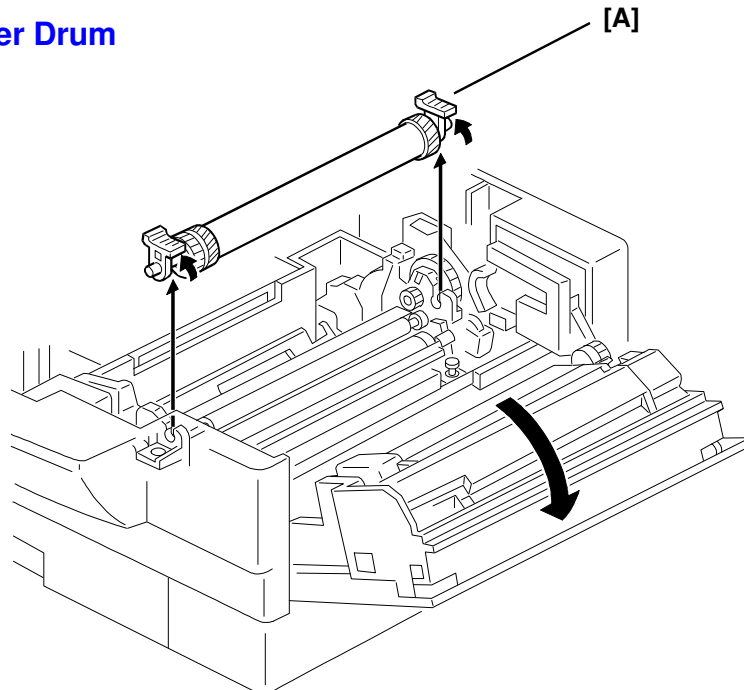
### 5.4.1. Master Drum



H521R023.wmf

**A: Master Drum**

### 5.4.2. Development Unit



H521R621.wmf

**Release the clips [B] and [C], then remove the development unit [A].**
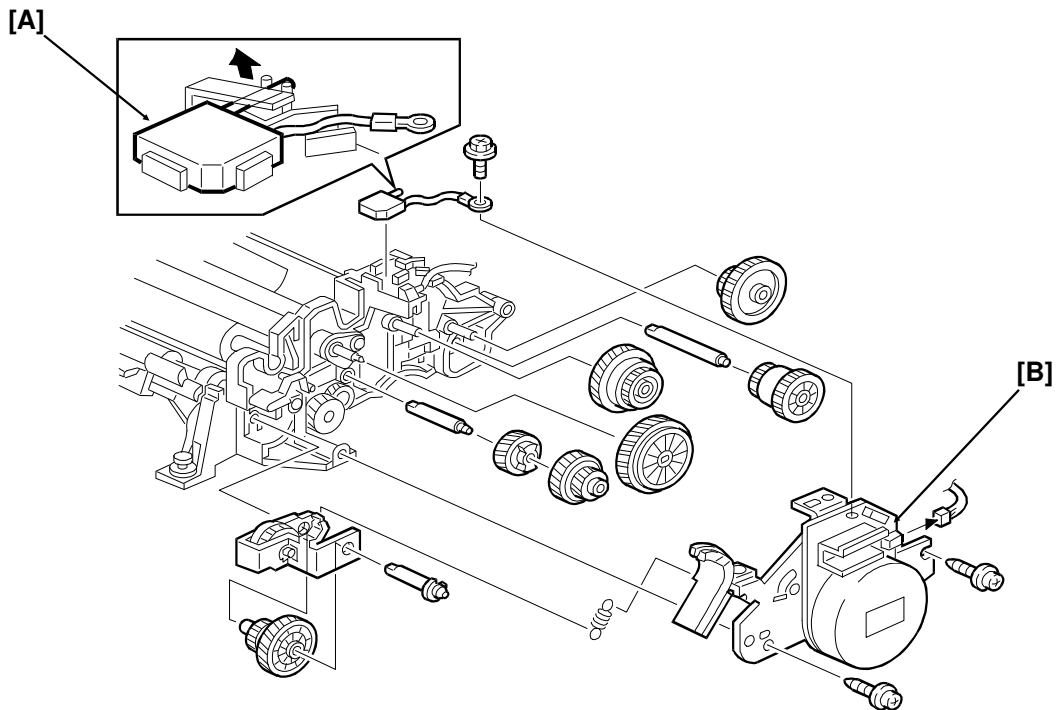**A: Development Unit (2 clips, 1 connector)**

## 5.4.3. Transfer Roller

[A]

H521R622.wmf

**A: Transfer Roller (1 gear, 2 spacers)**

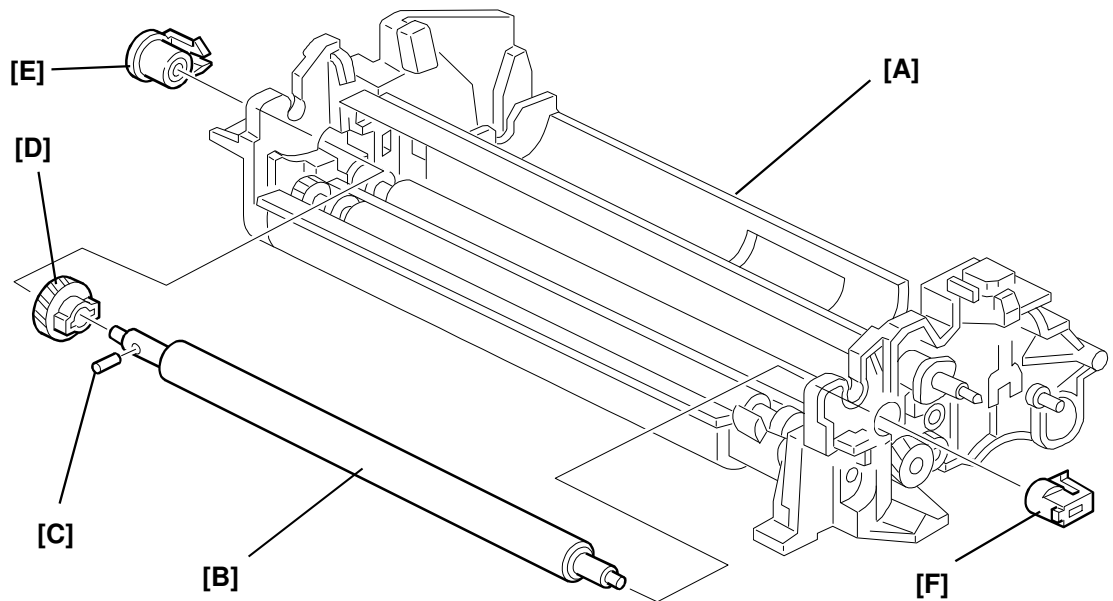## 5.4.4. Main Motor and Gears

[A]

[B]

H521R623.wmf

**First, remove the zener diode [A], then remove the main motor assembly [B].**
**Note: Once the main motor assembly is removed, the gears and the shafts will come off the unit easily.**
**A: Zener Diode (1 screw)**
**B: Main Motor Assembly (2 tapping screws, 1 connector, 1 spring)**

## 5.4.5. Replacing the Development Unit



H521R646.wmf

**The spare development unit does not come with the development roller installed. So, assemble the roller first as shown above just before replacing the unit.**
**A: Development Unit**
**B: Development Roller (Rubber)**
**C: Pin**
**D: Development Roller Gear**
**E, F: Bushings**

After every 60,000 prints, the following parts have to be replaced:
- Development unit [A]
- Development roller [B] (A development roller comes with the parts [C] through [F]. Check for the assembly part number of [B] through [F] in the parts catalog.)
- Transfer roller (refer to section 5.4.3)
- Zener diode (refer to section 5.4.4)

A new development unit does not come with the transfer roller unit, main motor and gears, development roller [B], or the parts labelled [C] to [F] in the above illustration. To install a new development unit, do the following:

1. Install a new development roller into the new development unit as shown above.

2. Install a new transfer roller, a new zener diode, a main motor, and gears as described in the previous sections.

Continued on the next page

3. Check the electrical resistance of the following.
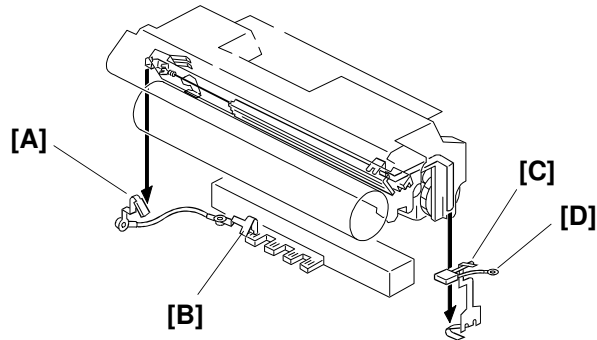
## Charge bias terminals/Zener diode

H521R656.wmf

**A: Bias terminal to the CTM**
**B: Bias terminal from the power pack**
**C, D: Zener diode terminals**

**Criteria**
**A - B: 0 Ω**
**C - D: The resistance varies depend-
ing on the voltage applied between
the terminals.**

## Toner application roller bias terminals

H521R657.wmf

**A: Bias terminal from the power pack**
**B: Toner application roller shaft**
**C: Toner metering blade**
**D: Bias brush**

**Criteria**
**A - B: Less than 1 kΩ**
**A - C: Less than 1 kΩ**
**A - D: Less than 1 kΩ**
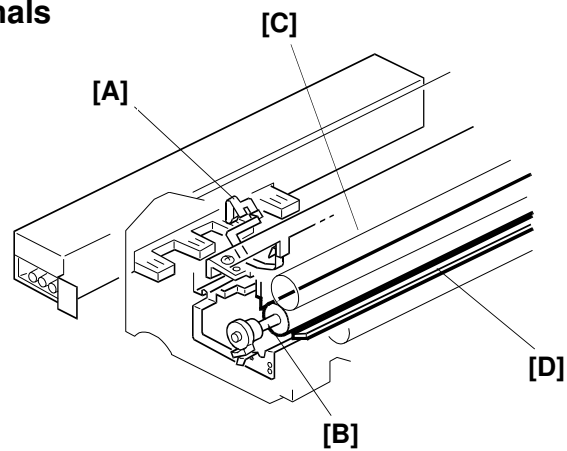
## Development roller bias terminals

H521R658.wmf

**A: Bias terminal from the power pack**
**B: Development roller shaft**

**Criteria**
**A - B: Less than 1 kΩ**
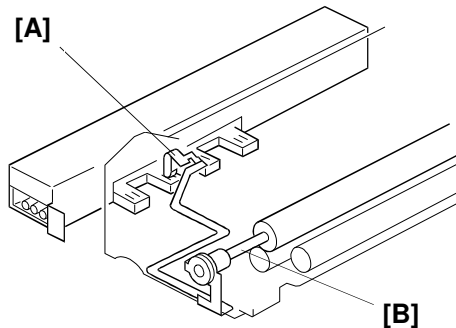
## Transfer roller bias terminals

H521R659.wmf

**A: Bias terminal from the power pack**
**B: Transfer roller shaft**

**Criteria**
**A - B: Less than 10 kΩ**

**Note: Check the resistance while push-
ing the roller shaft down to the roller
holder.**
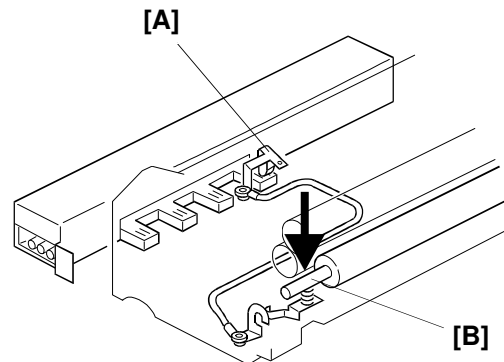
4. Install the new development unit into the machine.

5. Install the drum and CTM, and check that the following points are connected to frame ground.
   - Drum shaft
   - Main motor bracket
   - Antistatic brush on the transfer roller unit

## Initial Toner Supply
After installing a new development unit, do the following:
1. Set bit 3 of RAM address 8003C1 to 1.
2. Turn of the machine and wait for 10 seconds.
3. Turn on the machine.
4. The machine will supply new toner to the development unit.

## 5.5. FUSING

### 5.5.1. Thermistor

**[B]**

**[A]**
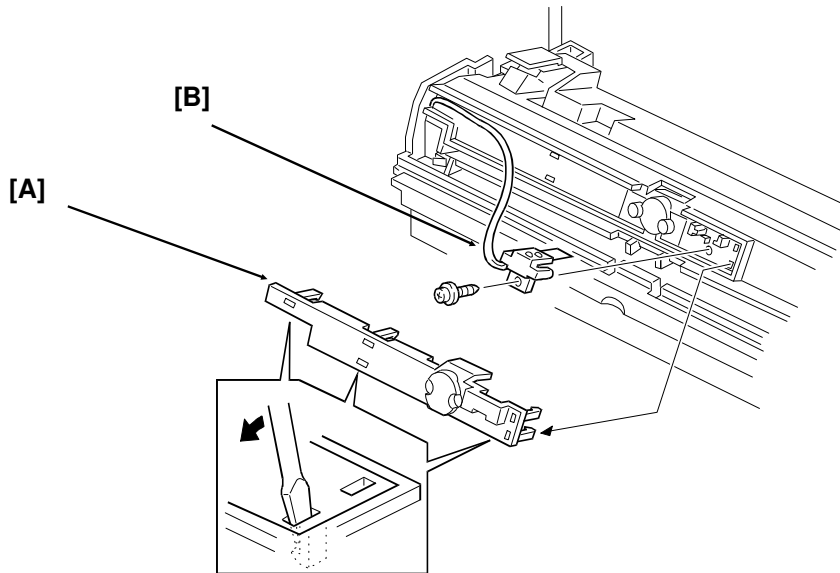
H521R036.wmf

**A: Thermistor Cover (6 hooks), B: Thermistor (1 tapping screw, 1 connector)**

### 5.5.2. Fusing Unit

**Preparation - Right hand side**

**[B]**

**[C]**

**[D]**

**[A]**
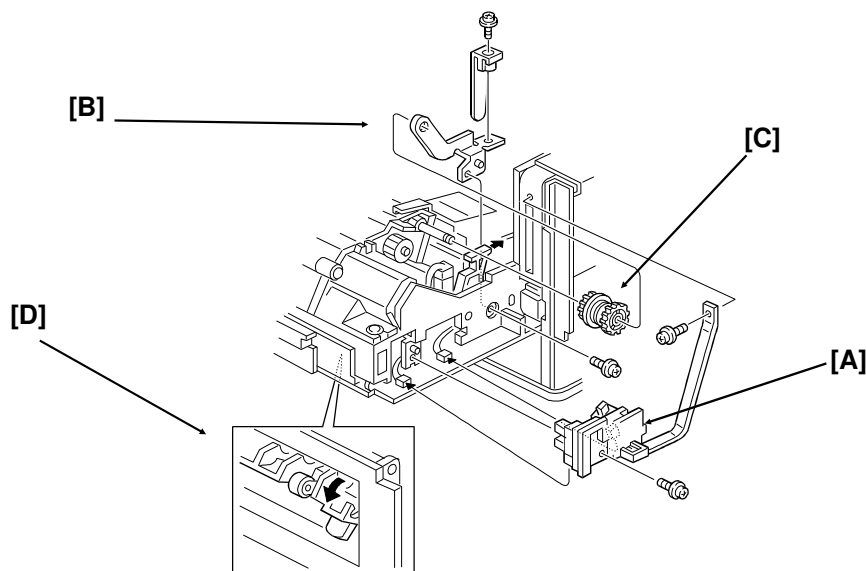
H521R625.wmf

**First, open the fusing exit cover [D], then remove the sensor assembly [A], bracket [B], and gear [C].**
**A: Feed-out Sensor/Exit Cover Switch (2 tapping screws, 2 connectors)**
**B: Bracket (1 screw), C: Gear**

## Preparation - Left hand side
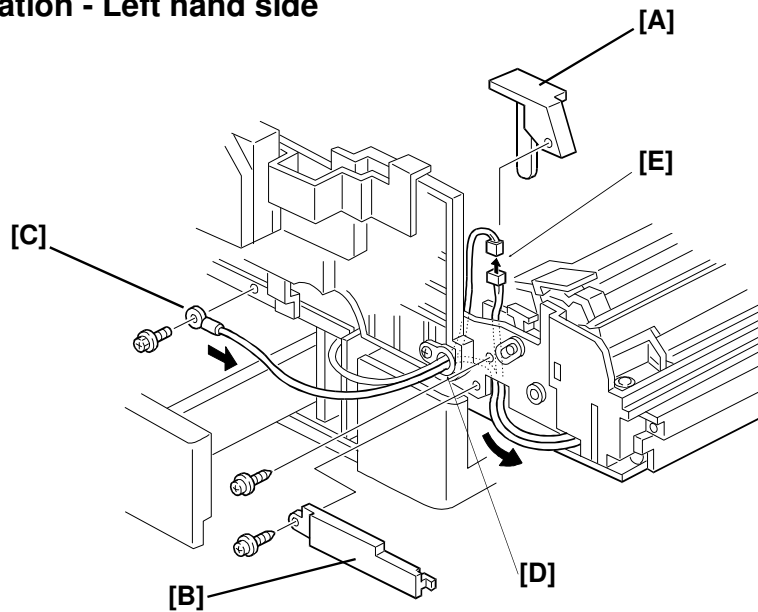


H521R034.wmf

**First, remove the ground wire [A], fusing unit fulcrum [B], then cover [C].**
**Note: Put back the bracket [D] after removing the ground wire [A].**
**A: Harness Cover A (1 tapping screw)**
**B: Harness Cover B (1 tapping screw)**
**C: Ground Wire (1 screw)**
**D: Pull out the Fusing Unit Fulcrum (1 tapping screw)**
**E: Diaconnect the Thermistor Harness**

## Fusing Unit Removal
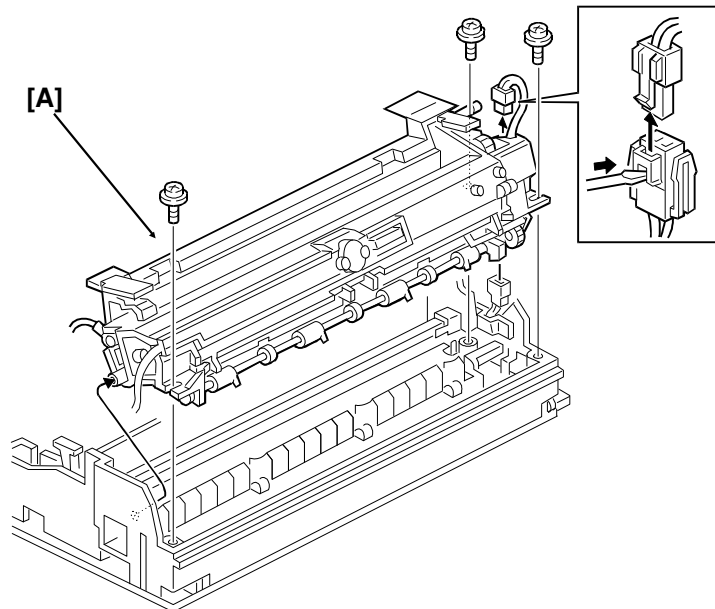


H521R035.wmf

**A: Fusing Unit (3 screws, 2 connectors)**

## 5.5.3. Hot Roller Strippers
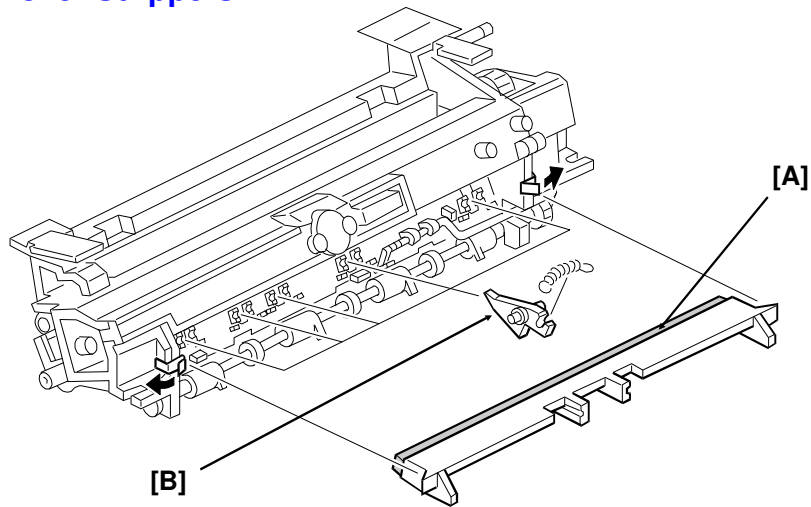


H521R037.wmf

**Remove the cleaning felt if it is still in the unit, then remove the strippers.**
**A: Cleaning Felt**
**B: Hot Roller Strippers (1 spring each)**

| ⚠️**CAUTION** |
|---|
| **Be careful not to lose the springs.** |

## 5.5.4. Fusing Lamp
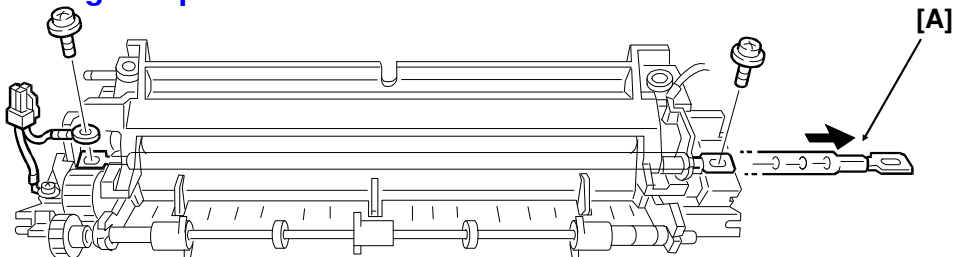


H521R629.wmf

**115 V Models**          **A: Fusing Lamp (2 screws)**
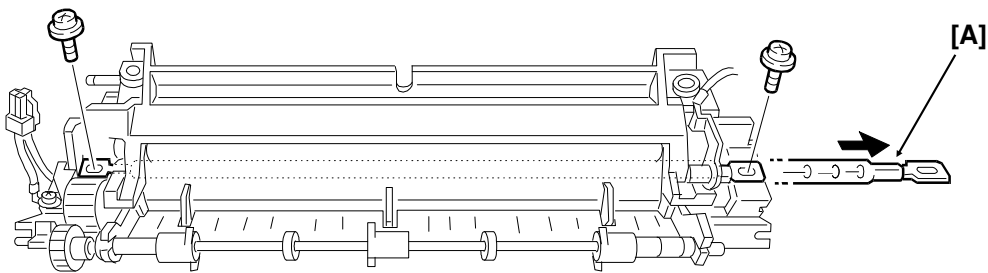


H521R652.wmf

**220 V Models**          **A: Fusing Lamp (2 screws)**

| ⚠️**CAUTION** |
|---|
| **Be careful not to touch the glass surface.** |

**5 - 17**

### 5.5.5. Hot Roller
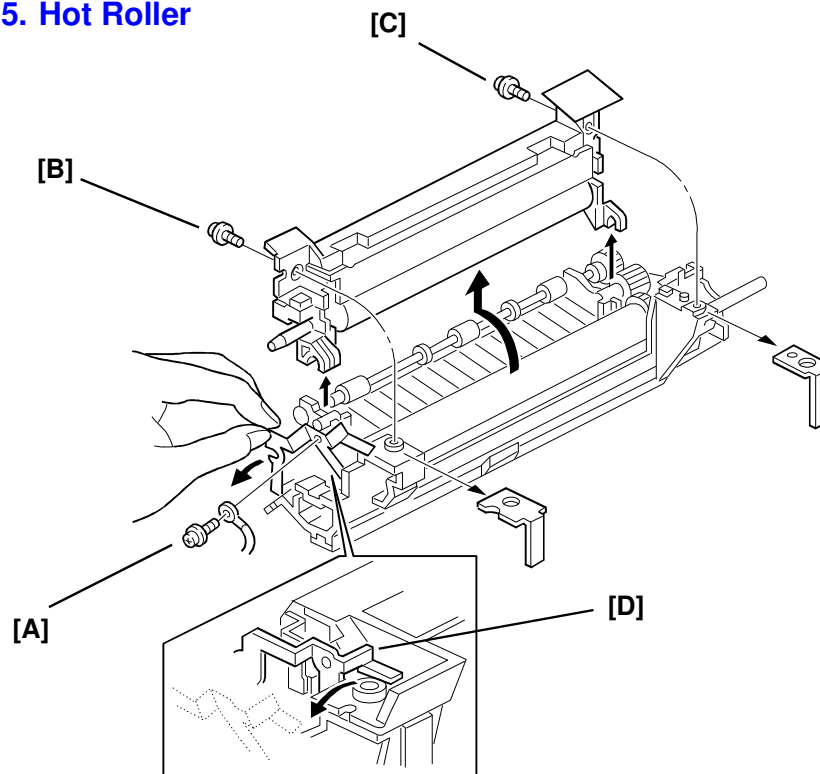


H521R630.wmf

First, remove the tapping screw [A], then remove the tapping screws [B] and [C]. The fusing upper and lower units come apart after the ground plate [D] has been released from the shaft.

⚠️**CAUTION**

**Do not bend the ground plate too much.**

Then, remove the bracket [A] then the roller [B].
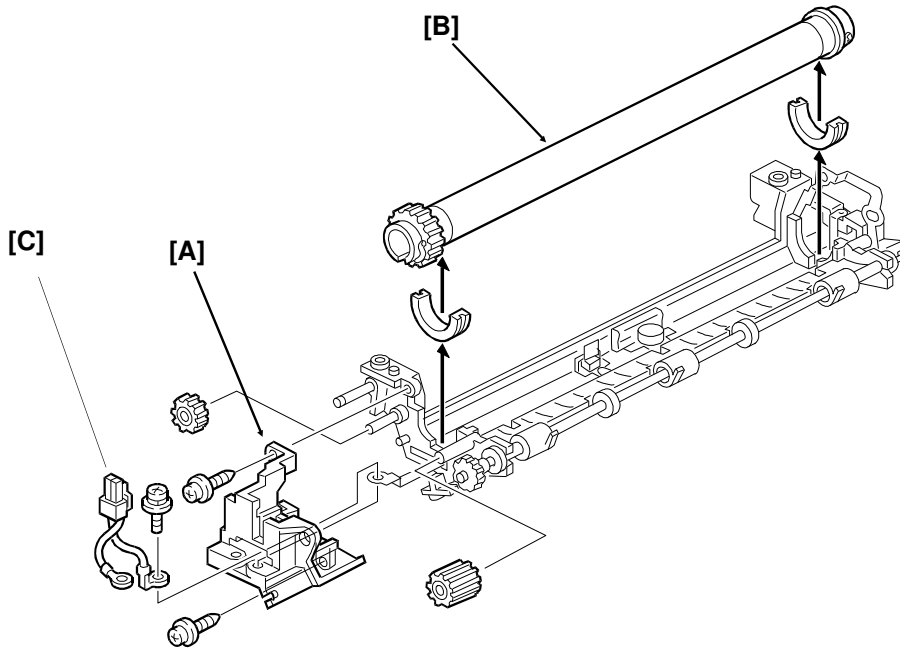


H521R631.wmf

**115 V Models**
**A: Bracket (3 screws, 2 of which are tapping screws)**
**B: Hot Roller**                                    **C: Fusing Lamp Connector (1 screw)**
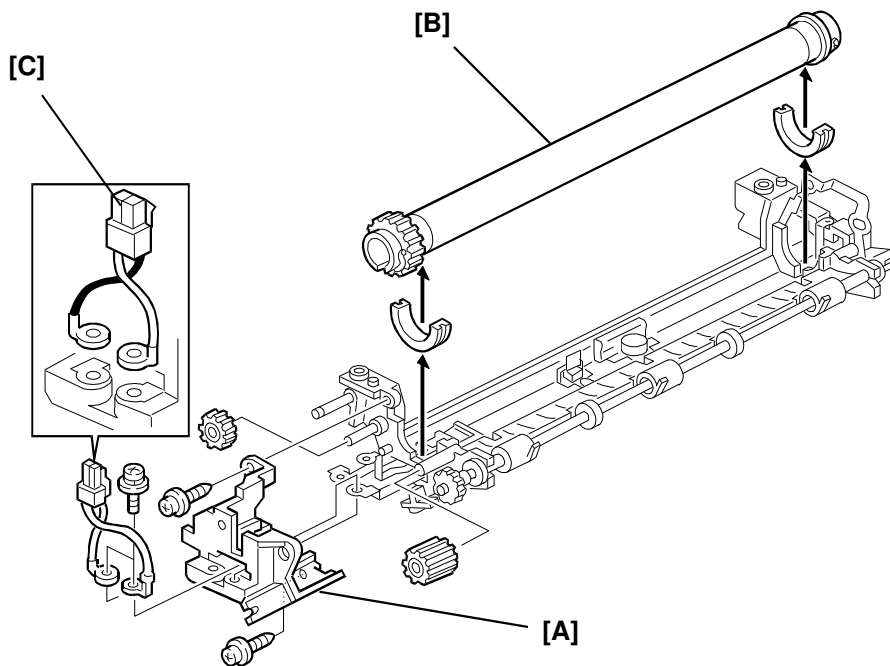


H521R653.wmf

**220 V Models**
**A: Bracket (3 screws, 2 of which are tapping screws)**
**B: Hot Roller**                                    **C: Fusing Lamp Connector (2 screws)**

## 5.5.6. Pressure Roller
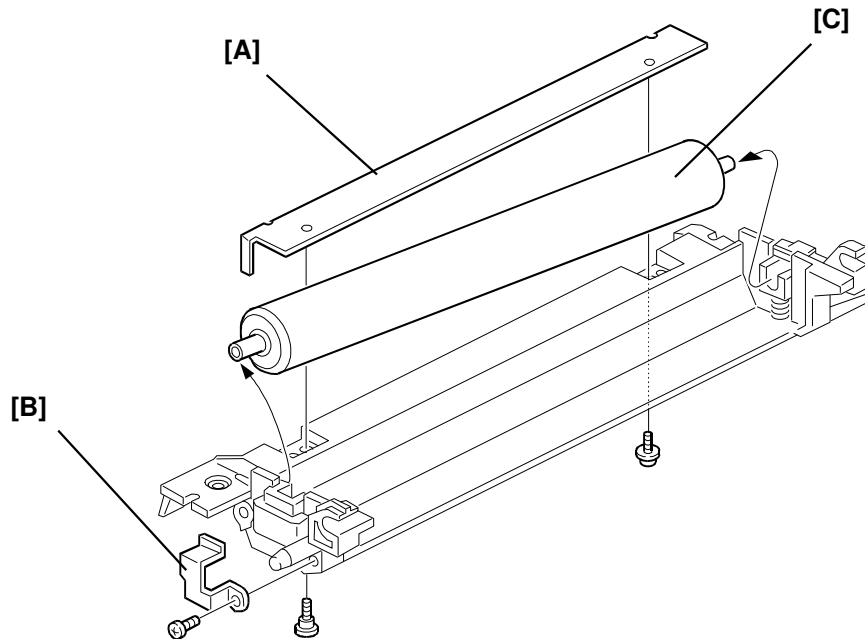


H521R632.wmf

A: Bracket (2 screws, 1 of which is a stepped screw)
B: Bracket (1 tapping screw)
C: Pressure Roller

## 5.5.7. Thermostat and Thermofuse
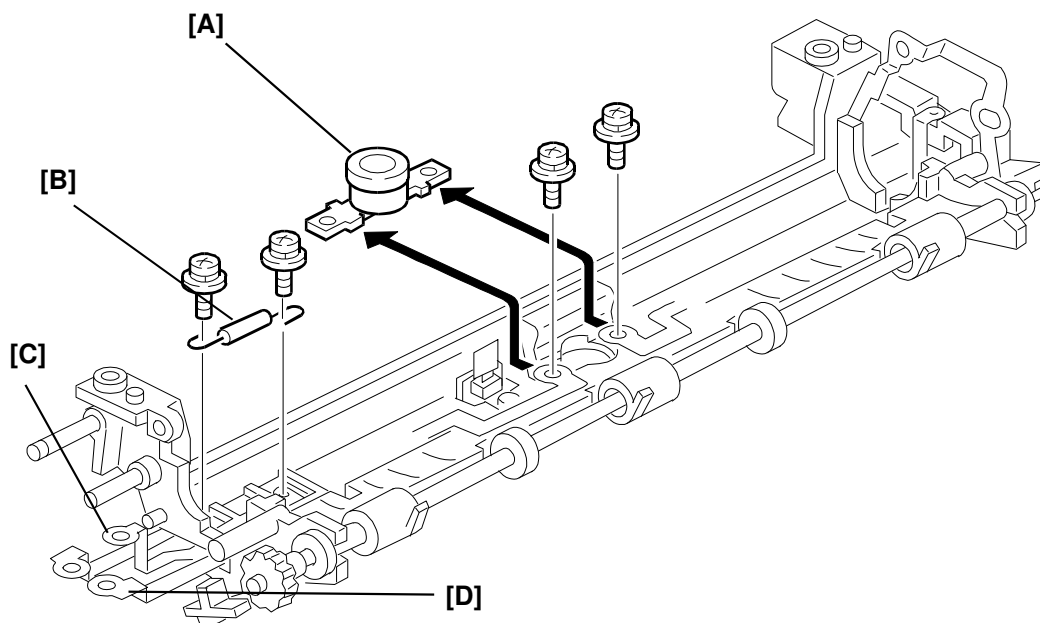


H521R654.wmf

A: Thermostat (2 screws)
B: Thermofuse (2 screws) - 220V models only
C, D: Terminal Plates for the Thermofuse - 220V models only

## 5.6. PAPER FEED

### 5.6.1. Paper Feed Roller and Clutch
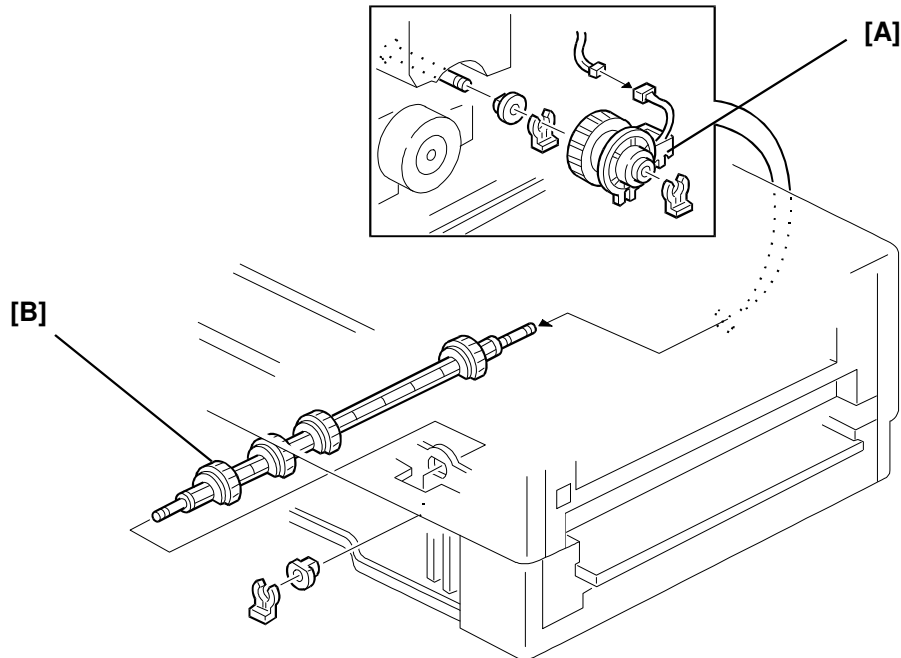


H521R027.wmf

**A: Paper Feed Clutch (1 clip, 1 connector)**
**B: Paper Feed Roller (1 clip and 1 bushing at each end)**

### 5.6.2. Paper End Sensor
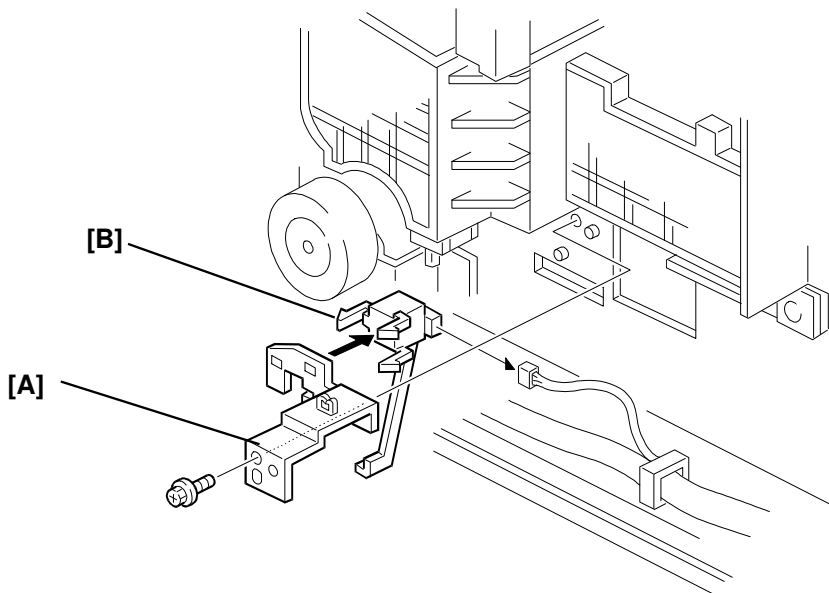


H521R030.wmf

**First, remove the bracket [A], then remove the sensor [B].**
**A: Bracket (1 screw), B: Paper End Sensor (3 hooks)**

**5 - 21**

### 5.6.3. Registration Sensor and Pressure Rollers
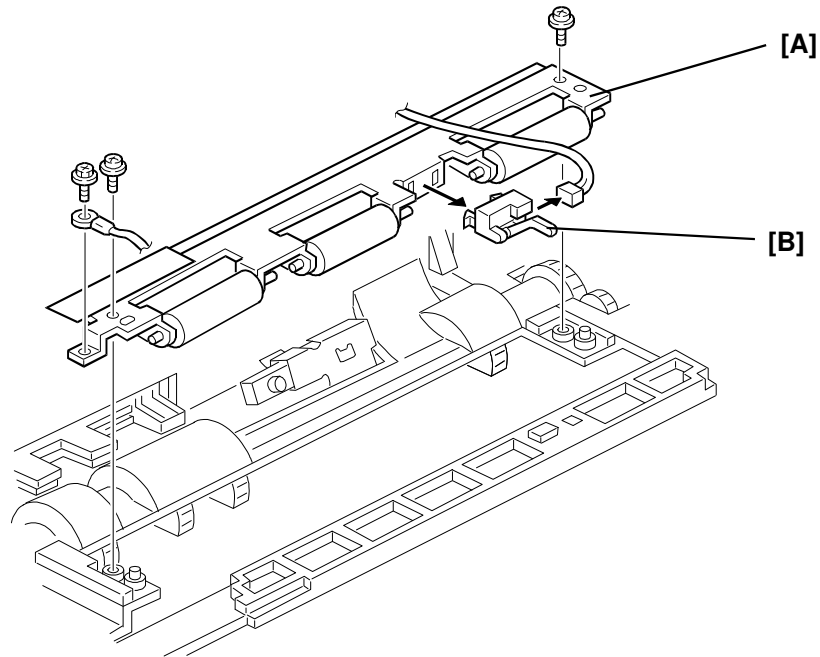


H521R029.wmf

**First, remove the CTM, master drum, and development unit.**
**A: Pressure Rollers with Bracket (3 screws, 2 of which are tapping screws)**
**B: Registration Sensor (2 hooks, 1 connector)**

### 5.6.4. Paper Feed Motor, Gears and Registration Roller
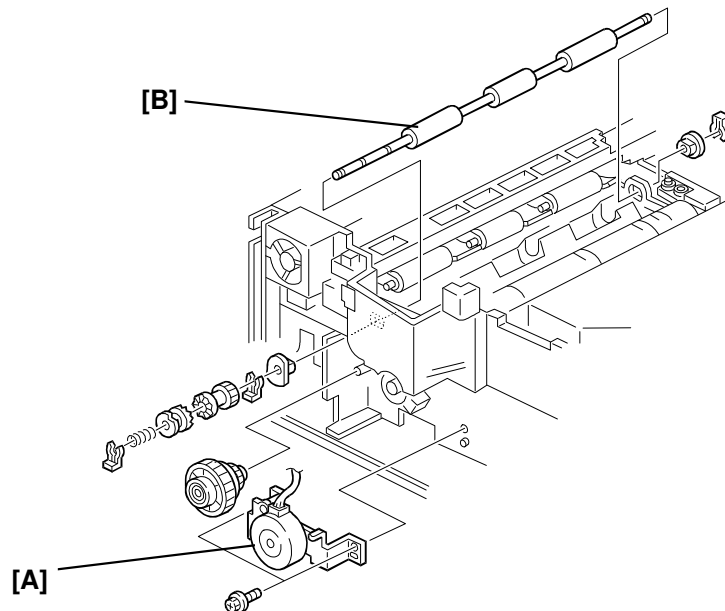


H521R032.wmf

**First, remove the registration pressure rollers.**
**A: Paper Feed Motor (2 screws)**
**B: Registration Roller (2 clips, 1 spring, 2 gears, 2 bushings)**

### 5.6.5. Bypass Feed Sensor
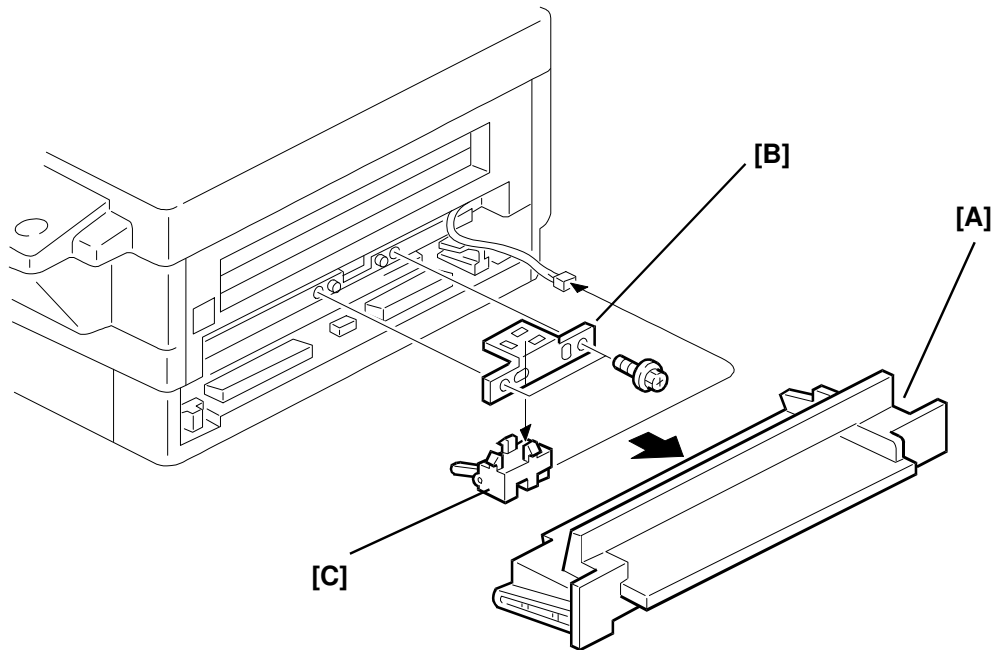
H521R031.wmf

The optional 100 sheet cassette interface [D] should be put back as shown in the dia-
gram (the triangle mark has to be at the left hand side of the connector.
A: Bypass Feed Table
B: Bracket (2 screws)
C: Bypass Feed Sensor (3 hooks)

### 5.6.6. Paper Size Sensor
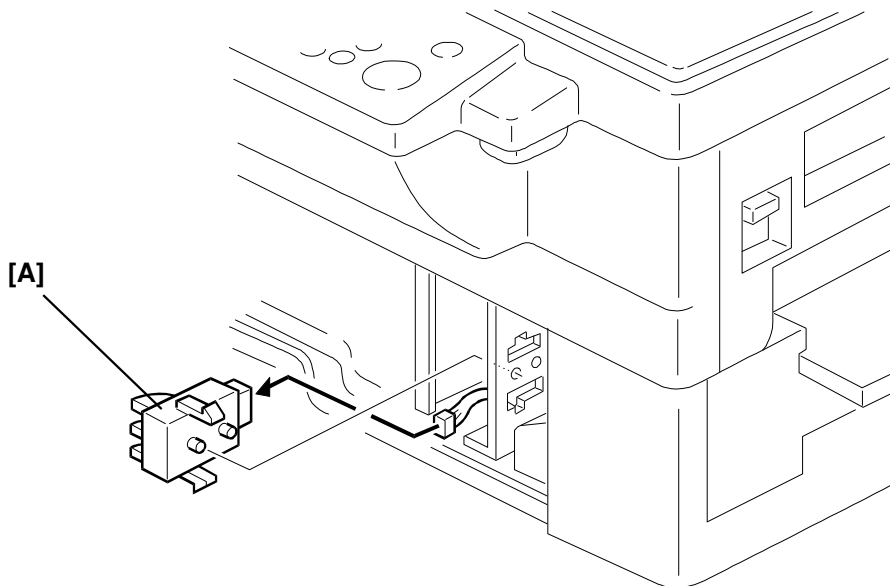
H521R028.wmf

A: Paper Size Sensor (2 hoooks)

## 5.7. PCBs

### 5.7.1. PSU
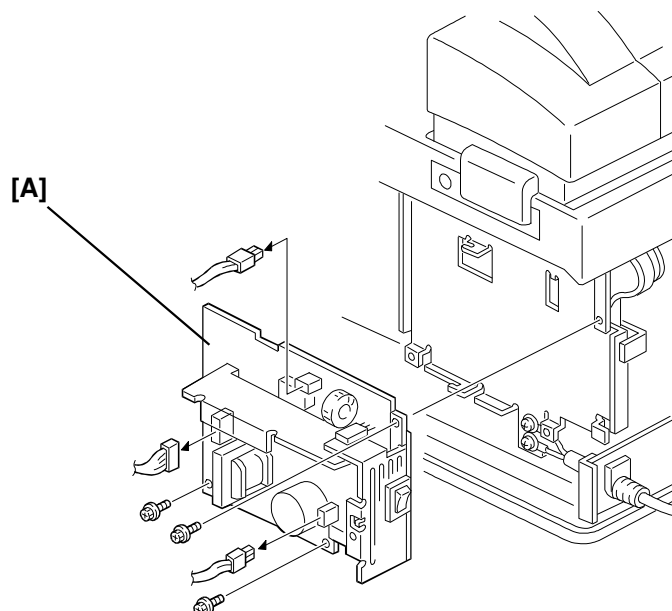


H521R047.wmf

**A: PSU (3 screws, 2 hooks, 3 connectors)**

### 5.7.2. NCU
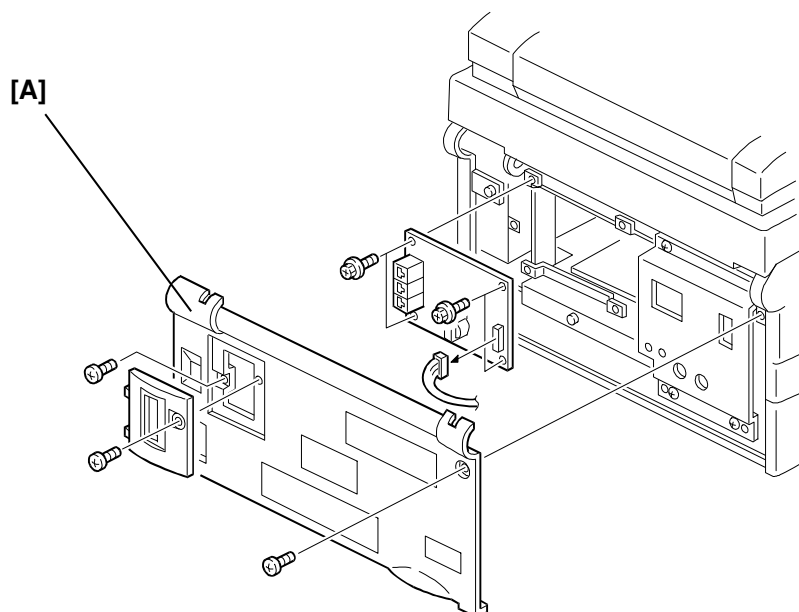


H521R044.wmf

**A: NCU (4 screws, 1 connector)**

## 5.7.3. FDU and FCE
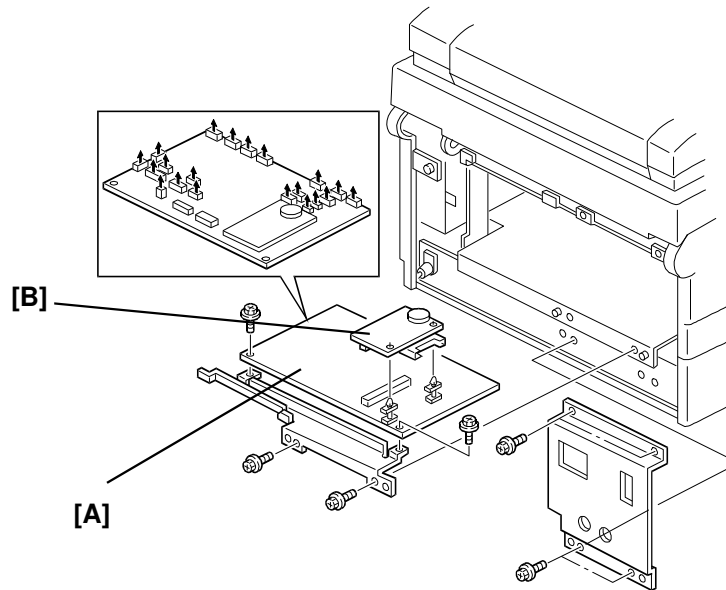


H521R045.wmf

**Note: The NCU should be removed first.**
**A: FDU (2 screws)**
**B: FCE (2 screws)**
**After installing the new FCE, transfer the RAM data from the old FCE using service function 12 (refer to section 4.1.22).**

## Harness Connections from the FDU
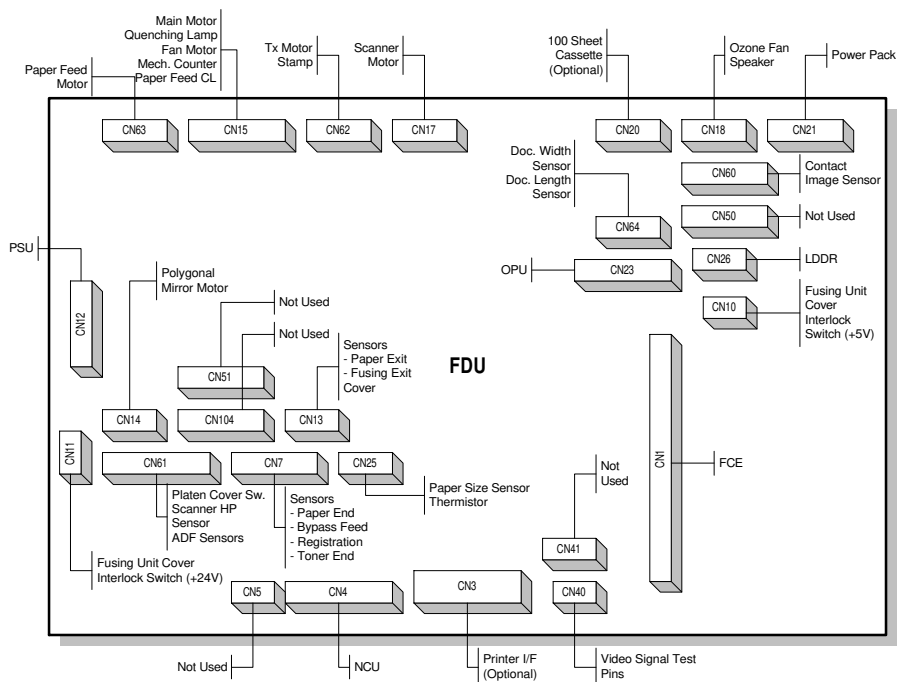


H521R545.wmf

### 5.7.4. Power Pack
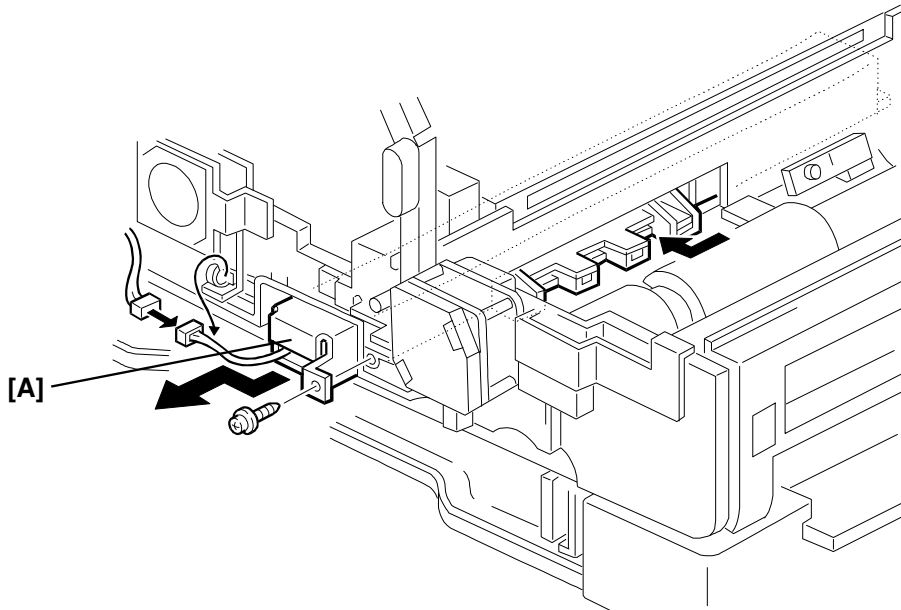


H521R026.wmf

**A: Power Pack (1 tapping screw, 1 connector)**

## 5.8. OTHERS

### 5.8.1. Ozone Filter and Fan Motor
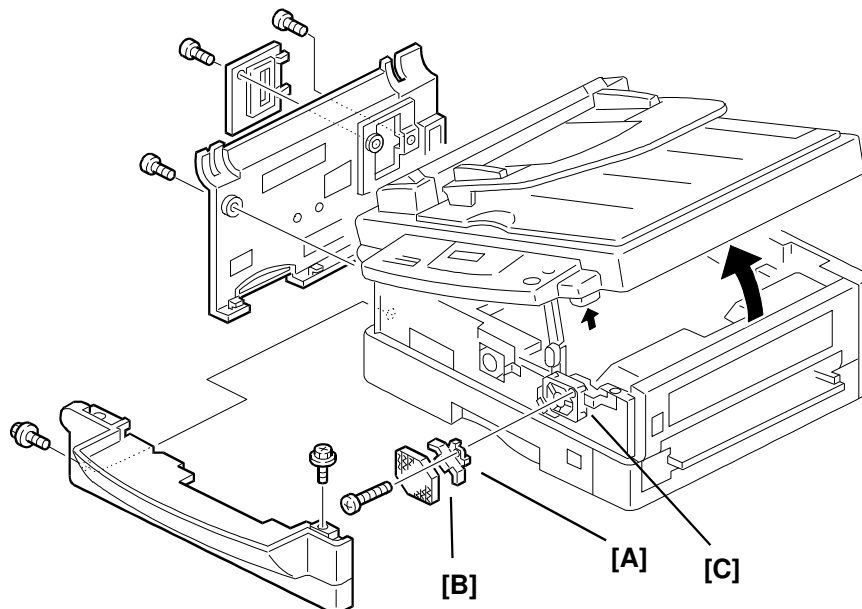


H521R525.wmf

Remove the bracket [A], then the ozone filter [B] and the fan motor [C] can be removed.

## 5.8.2. Toner End Sensor
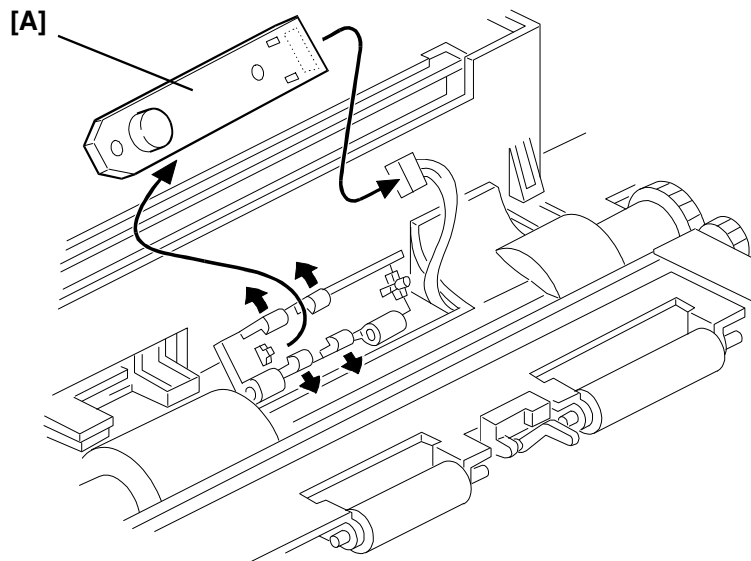


H521R024.wmf

**A: Toner End Sensor (1 connector)**

## 5.9. ADF

## 5.9.1. ADF Roller Asssembly and Covers
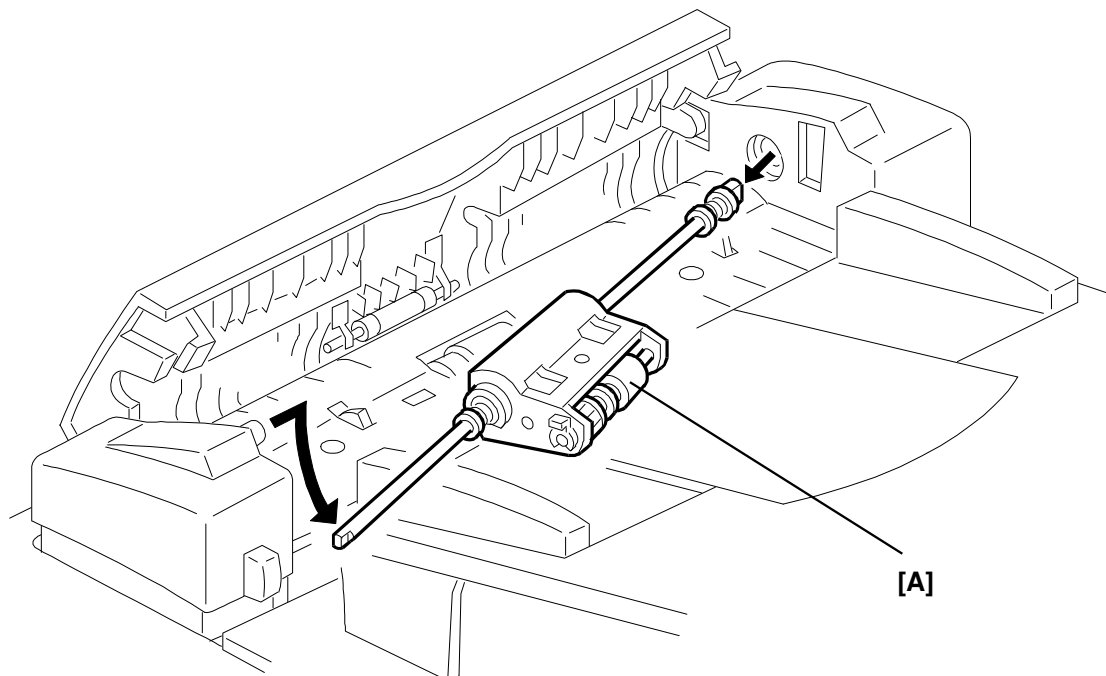


H521R001.wmf

**A: ADF Roller Assembly**

## 5.9.2. Pick-up Roller
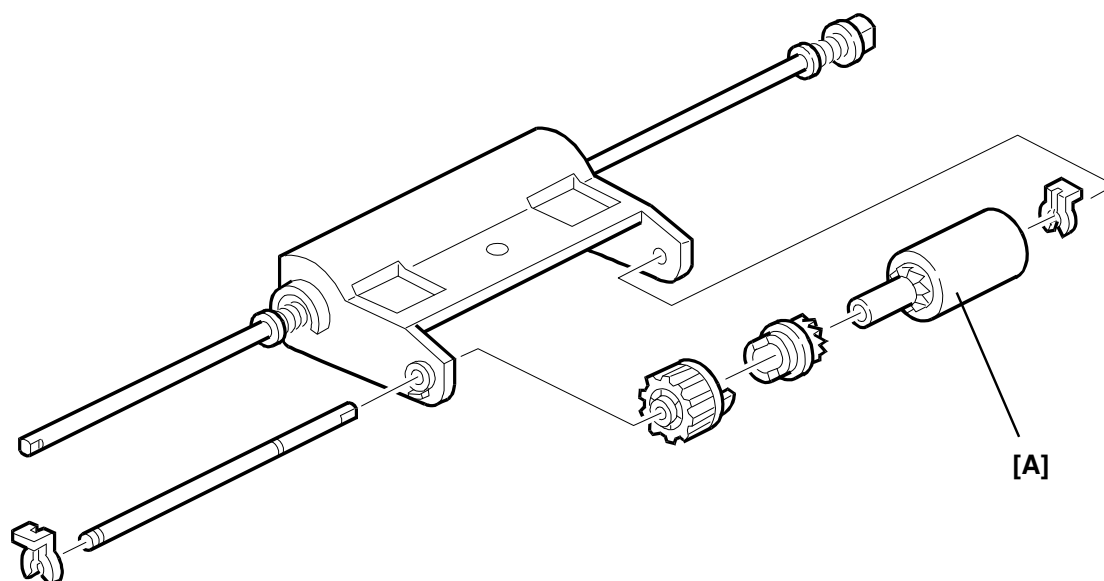
H521R002.wmf

**A: Pick-up Roller (2 clips, 2 gears)**

## 5.9.3. Feed Roller

[A]
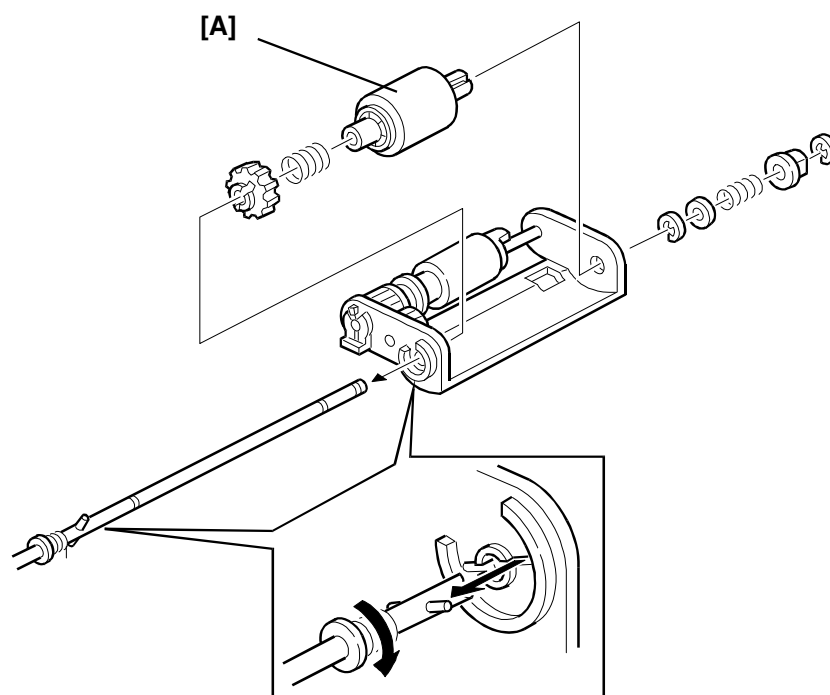
H521R003.wmf

**A: Feed Roller (1 clip, 1 gear, 2 springs, 2 E-rings, 1 washer)**

## 5.9.4. Separation Roller
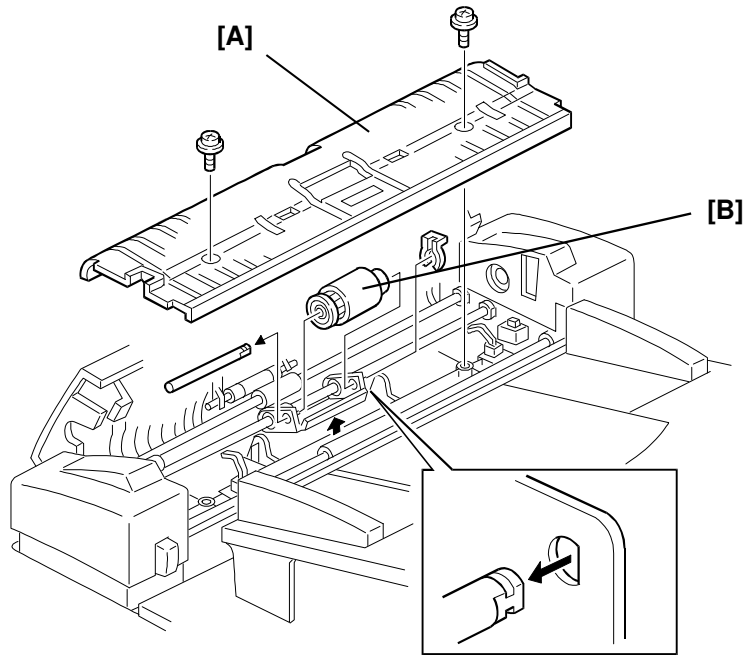


H521R004.wmf

**A: Upper Guide Plate (2 tapping screws), B: Separation Roller (1 clip)**

## 5.9.5. ADF Motor and Covers
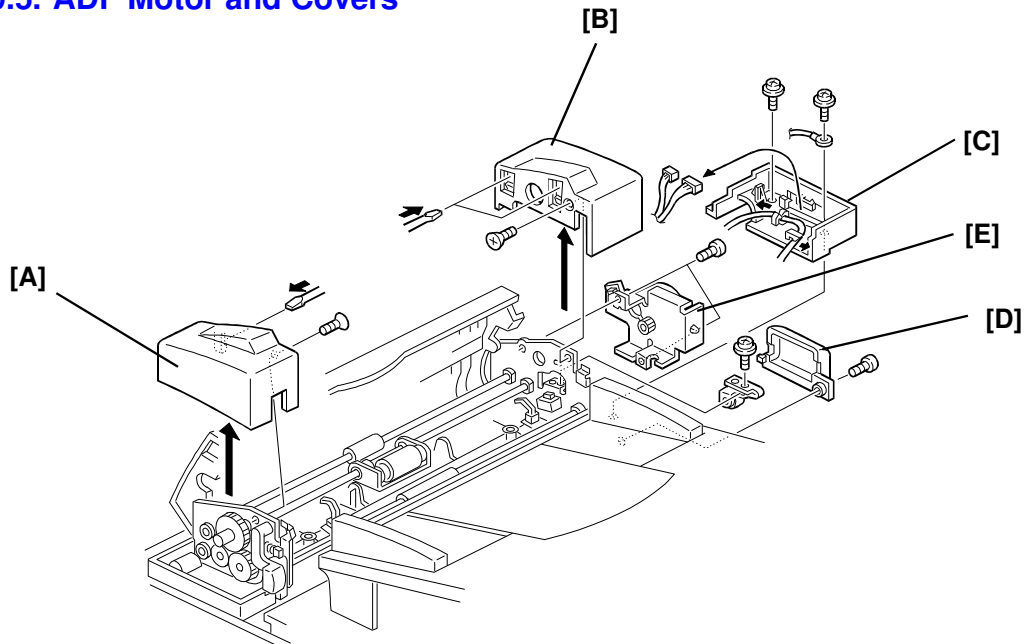


H521R005.wmf

**A: ADF Upper Front Cover (1 screw, 1 hook)**
**B: ADF Upper Rear Cover (1 screw, 2 hooks)**
**C: ADF Lower Rear Cover (2 screws)**
**D: Connector Cover (1 screw)**
**E: ADF Motor (2 screws)**

## 5.9.6. R0 and R1 Rollers
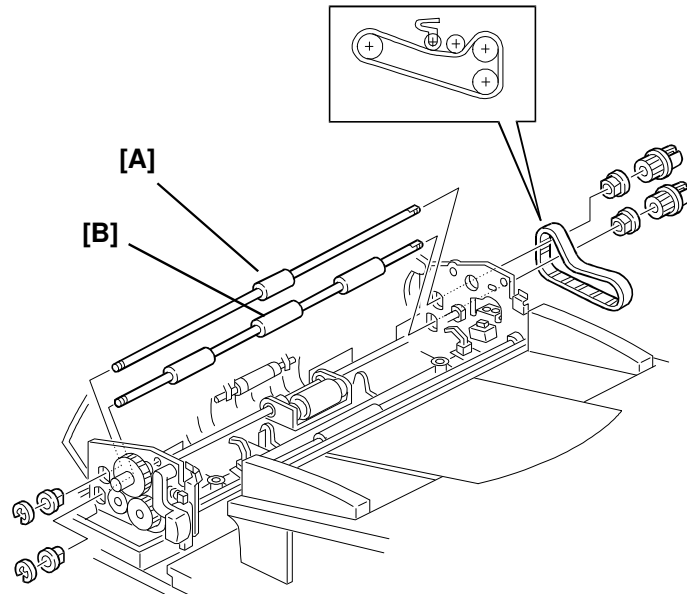
H521R006.wmf

**A: R0 Roller (1 E-ring, 1 gear, 2 bushings)**
**B: R1 Roller (1 E-ring, 1 gear, 2 bushings)**

## 5.9.7. R2 Roller
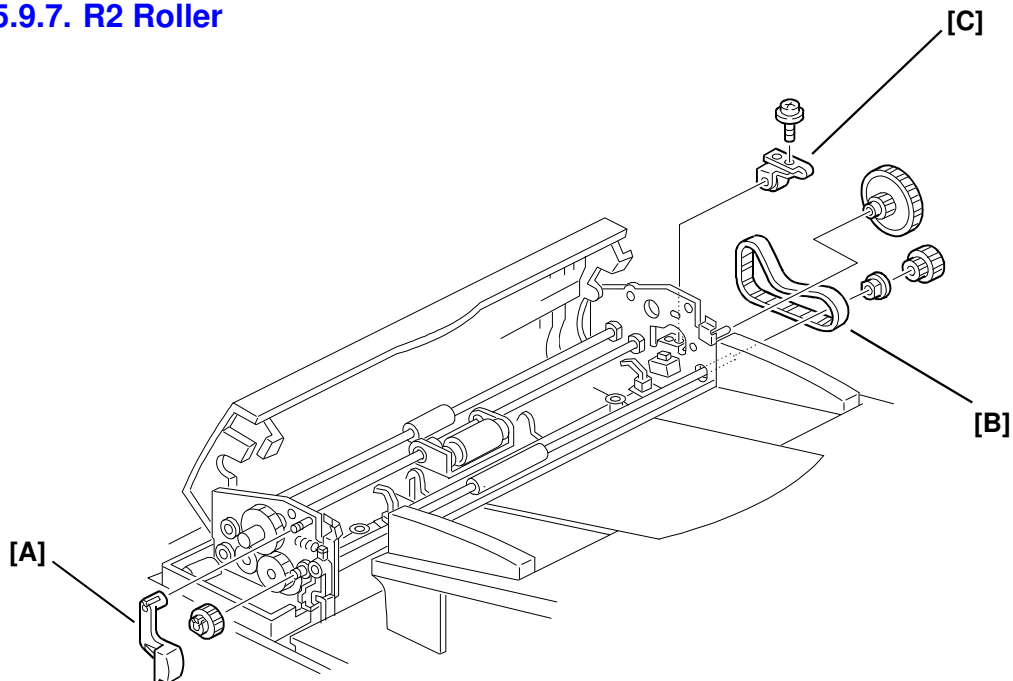
H521R007.wmf

**A: ADF Release Lever**
**B: Timing Belt**
**C: Tensioning Roller Ass'y (1 screw)**        

[A]

[B]
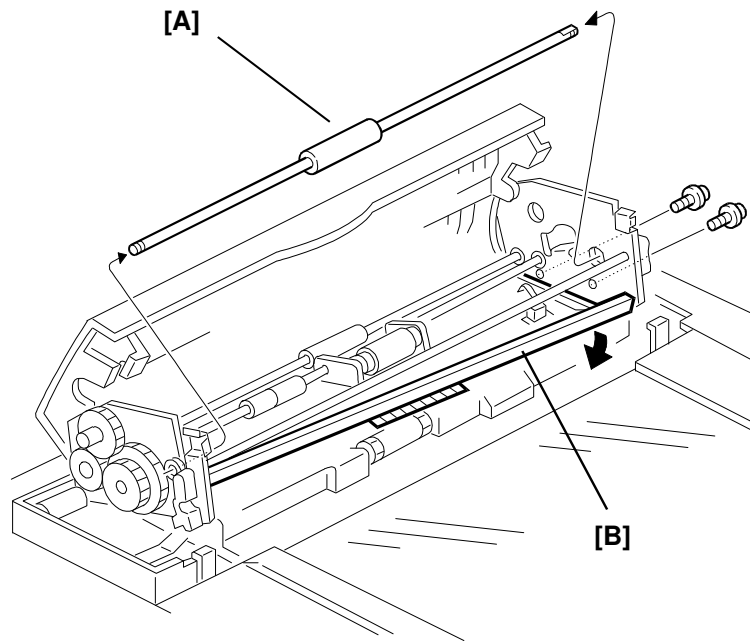
H521R008.wmf

**Remove the R2 roller [A] while lowering the guide plate [B].**

### 5.9.8. Document Sensor and Width Sensor

[B]

[A]
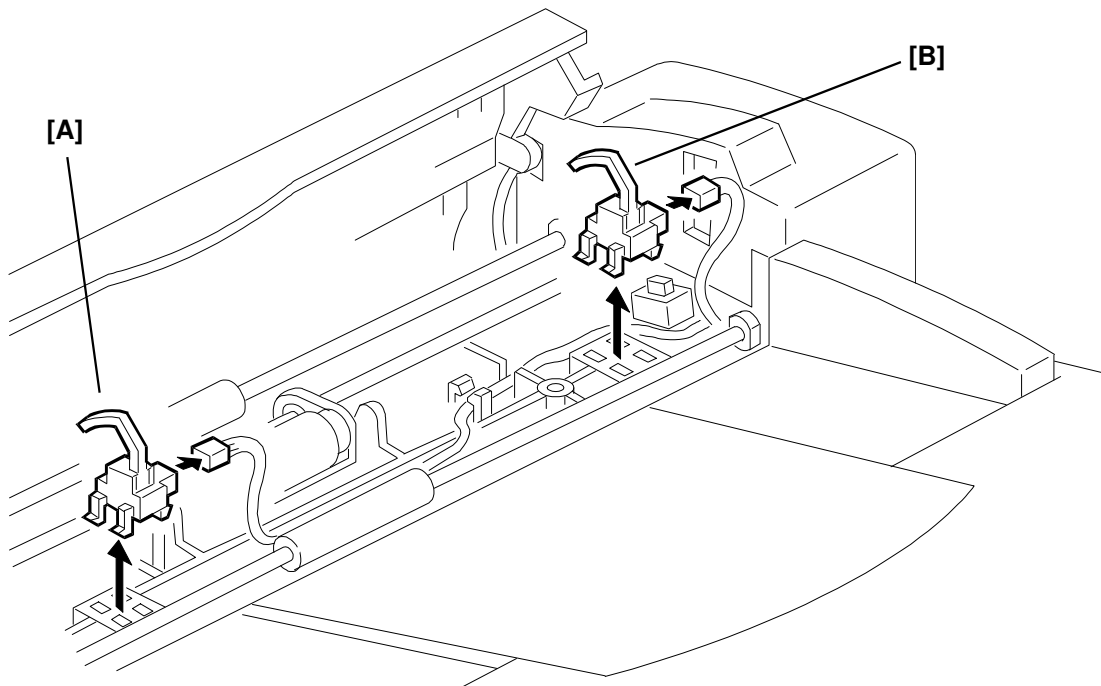
H521R009.wmf

**A: Document Sensor**
**B: B4 Width Sensor**

### 5.9.9. Scan Line Sensor

[A]
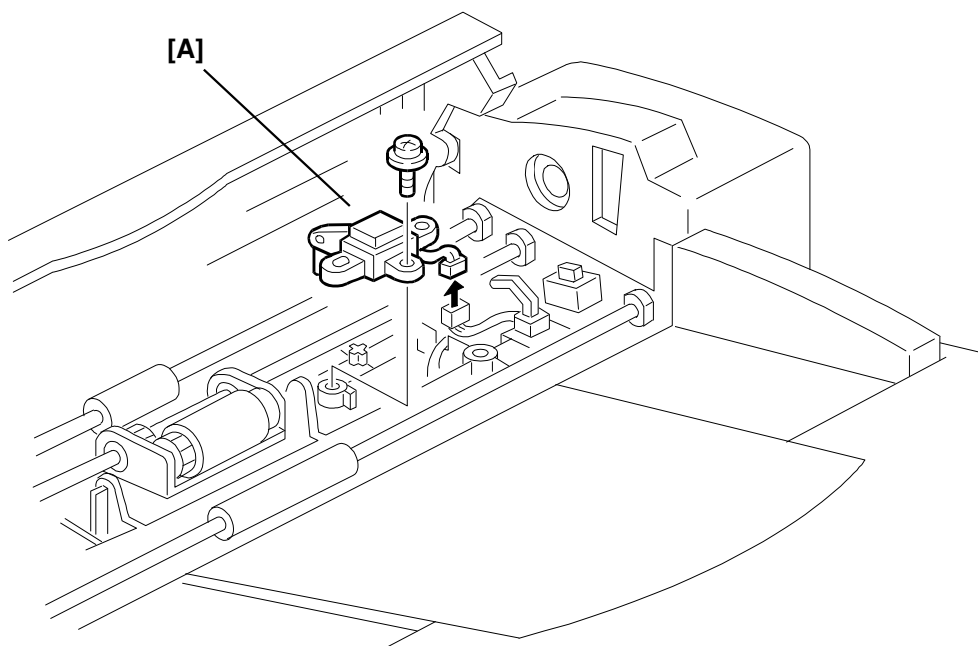
H521R010.wmf

**A: Scan Line Sensor (1 screw)**

### 5.9.10. Cover Sensors

[A]
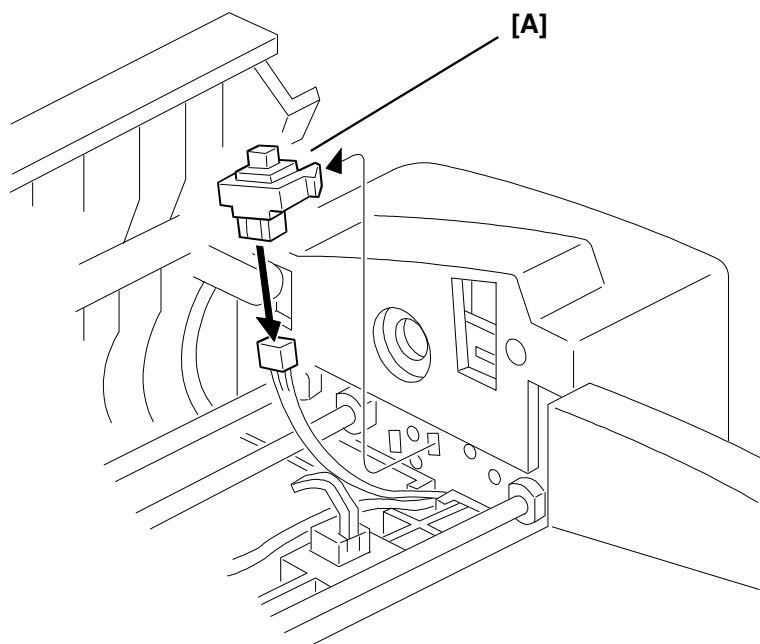
H521R011.wmf

**A: ADF Cover Switch**          **Continued on the next page**

H521R012.wmf
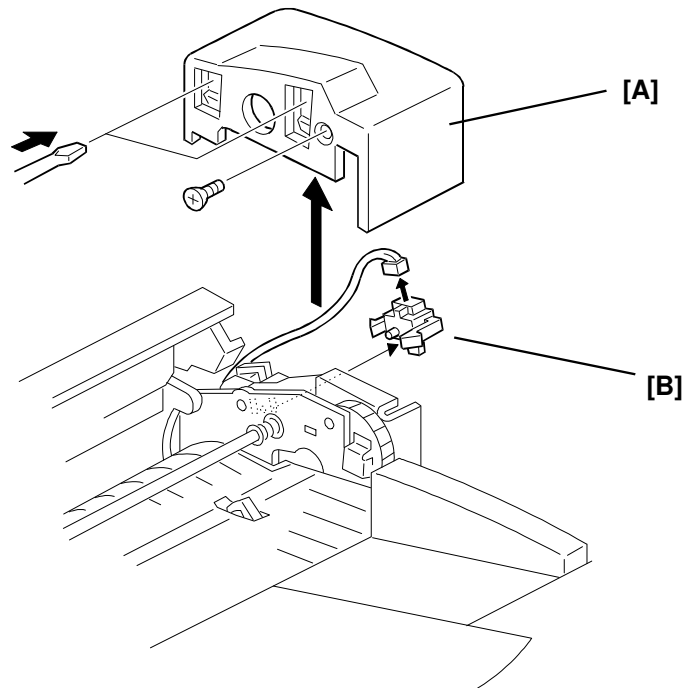
**A: Upper Rear Cover (1 screw, 2 hooks)**
**B: ADF Switch**

## 5.10. 100 SHEET PAPER CASSETTE (OPTIONAL)

### 5.10.1. Relay Connector and Gear Cover
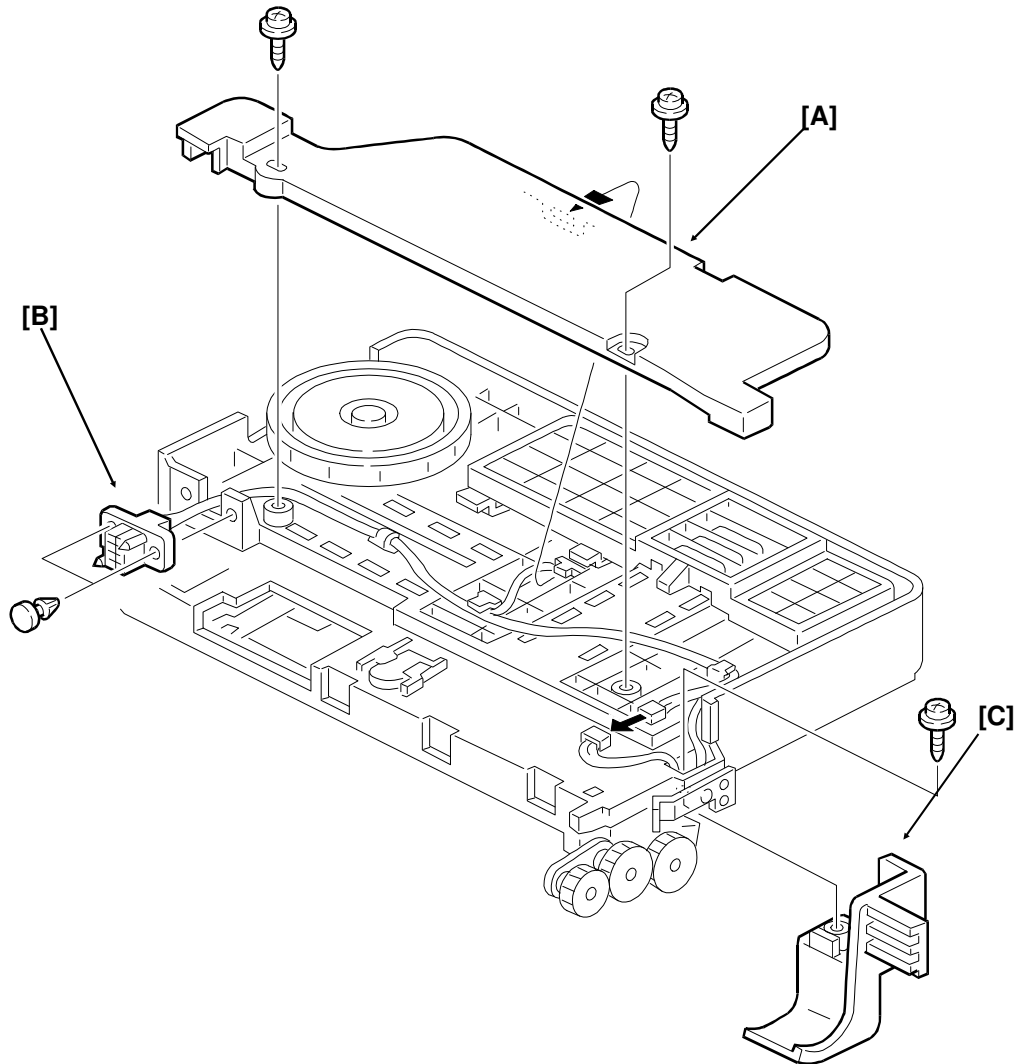


H521R642.wmf

**Turn the cassette upside down.**
**A: Harness Cover (2 screws)**
**B: Interface Connector (2 clips)**
**C: Gear Cover (1 screw)**

## 5.10.2. Paper End Sensor and Drive Components
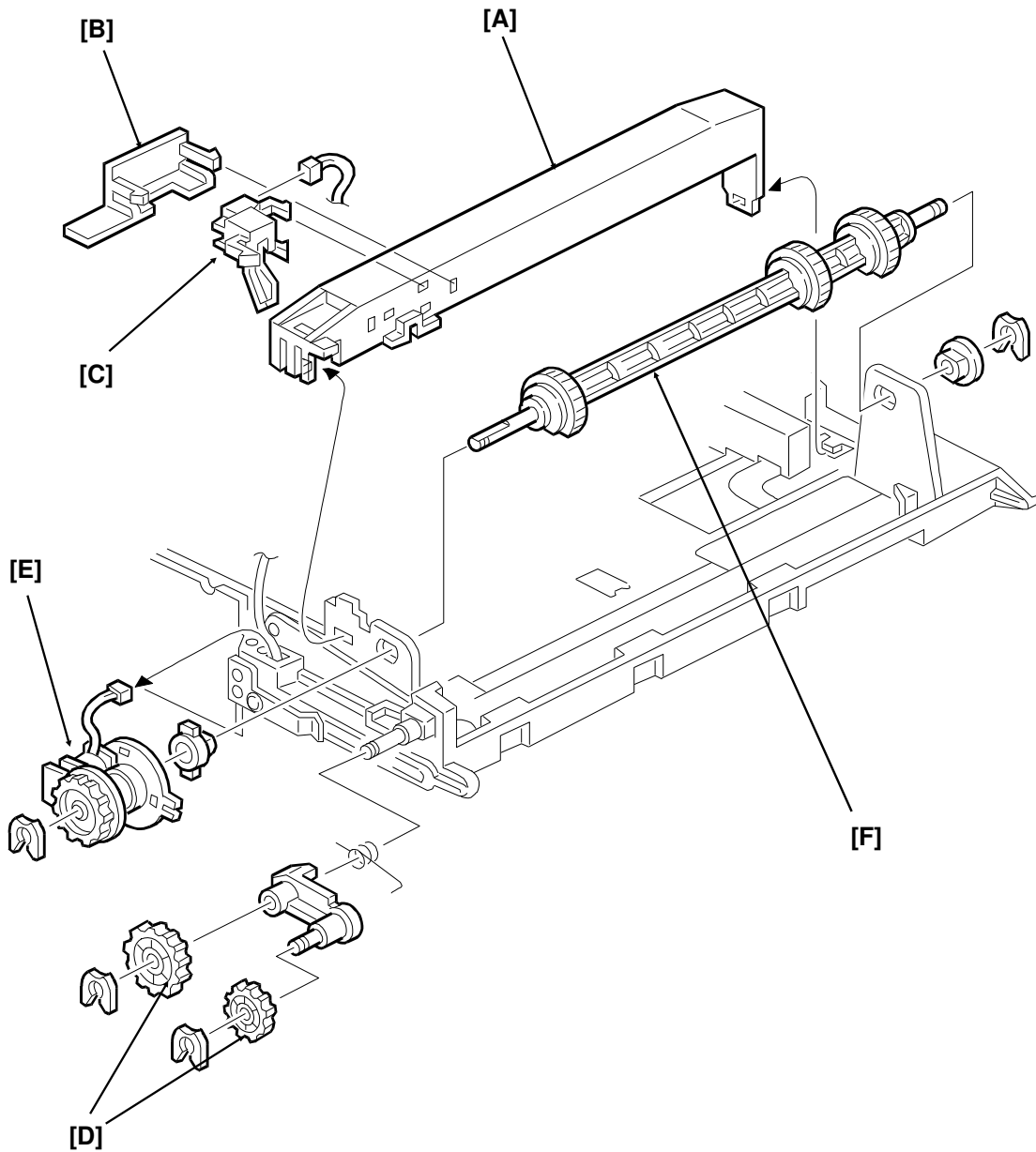
H521R643.wmf

**Paper End Sensor**
**First, remove the stay [A] and the cover [B], then remove the sensor [C].**
**Paper Feed Clutch and Rollers**
**First, remove the gears [D], then remove the clutch [E] and roller [F].**
**A: Sensor Stay (1 hook)**
**B: Sensor Cover (2 hooks)**
**C: Paper End Sensor (3 hooks)**
**D: Idle Gears (1 clip each)**
**E: Paper Feed Clutch (1 clip)**
**F: Feed Roller (1 clip, 2 bushings)**

## 5.10.3. Paper Size Sensor
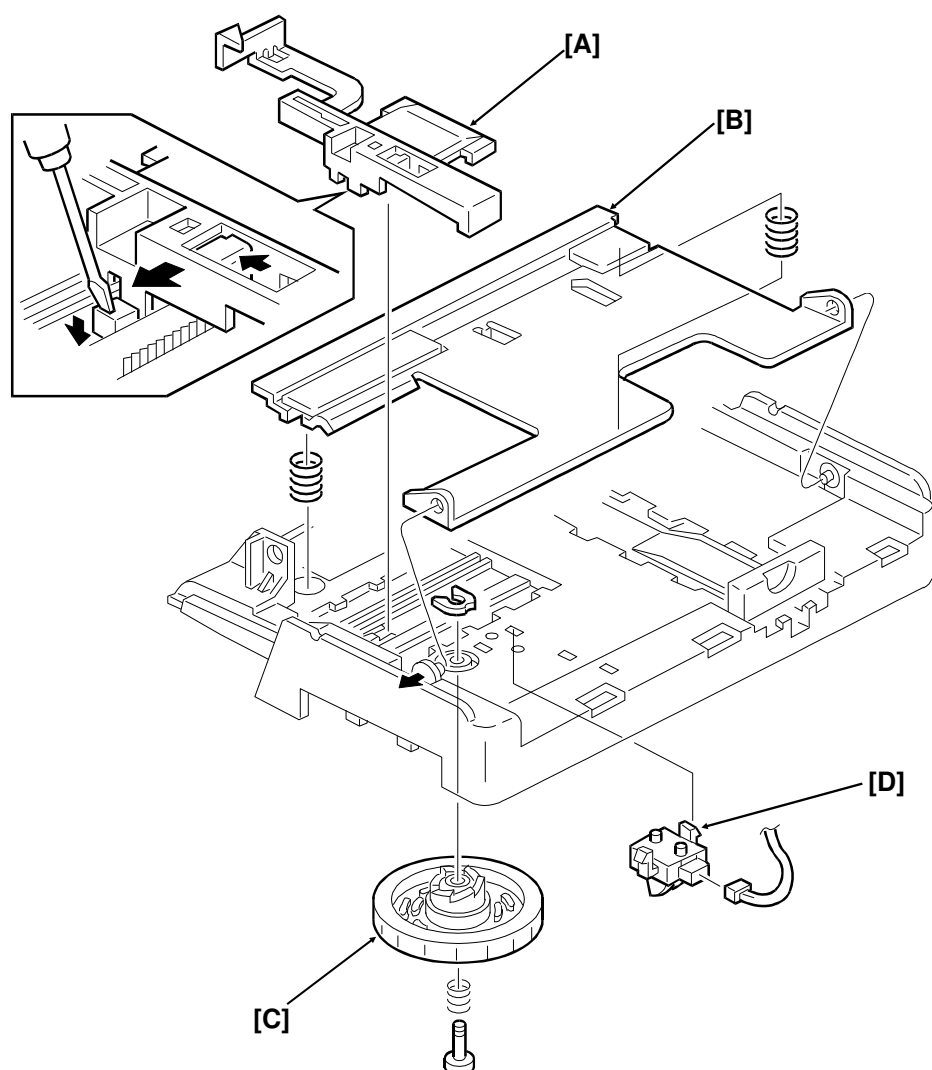


H521R644.wmf

**A: Paper Guide**
**B: Bottom Plate (2 springs)**
**C: Paper Size Indicator (1 clip, 1 spring)**
**D: Paper Size Sensor (2 hooks)**

# 5.11. IMAGE ADJUSTMENT

## 5.11.1. Overview

This section explains how to adjust various scanning and printing parameters. Among these are the margin parameters shown in the diagram below, which are named in accordance with the table below the diagram.
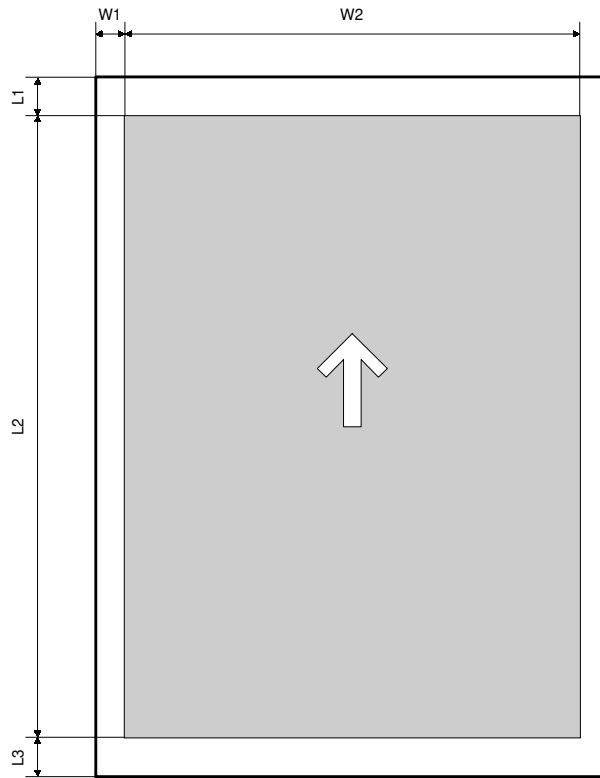
H521R650.wmf

| Parameters | Description | Adjustable by | | |
|:---:|:---|:---:|:---:|:---:|
| | | **Fax - Tx** | **Fax - Rx** | **Copying** |
| W1 | Left margin | Not adjustable | Printer | Printer |
| W2 | Print/Scan width | Not adjustable | Not adjustable | Not adjustable |
| L1 | Top margin | Scanner | Printer | Scanner/Printer |
| L2 | Print/Scan length | Not adjustable | Not adjustable | Not adjustable |
| L3 | Bottom margin | Scanner | Not adjustable | Scanner/Printer (Bypass only) |

---

⚠**CAUTION**

**The factory settings may not be the same as the "Initial settings" described in the following procedures. The RAM reset level 0 will reset all the scan and print margin parameters to the "Initial settings."**

---
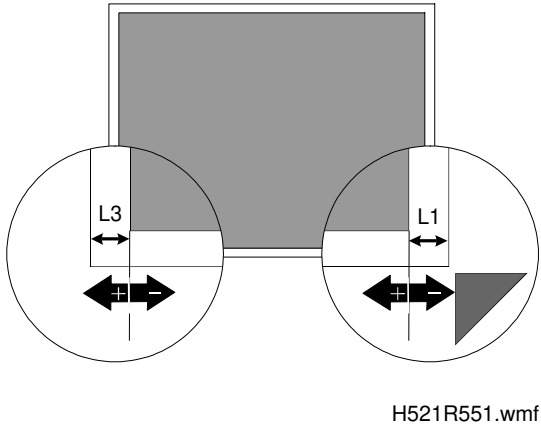
## 5.11.2. Scanner Parameters

### 1. Contrast
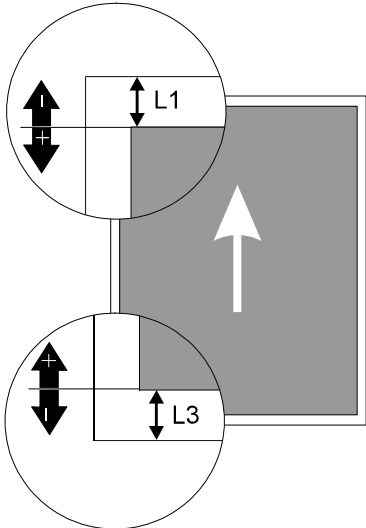
|        | Text Mode | | Halftone Mode | |
|--------|-----------|-----------------|------------|-----------------|
|        | **Bit Switch** | **Initial Setting** | **Bit Switch** | **Initial Setting** |
| **Normal** | Scanner 02 | 08(H) | Scanner 05 | 07(H) |
| **Lighten** | Scanner 03 | 0B(H) | Scanner 06 | 08(H) |
| **Darken** | Scanner 04 | 06(H) | Scanner 07 | 06(H) |

### 2. Margins

**Book Scanner**
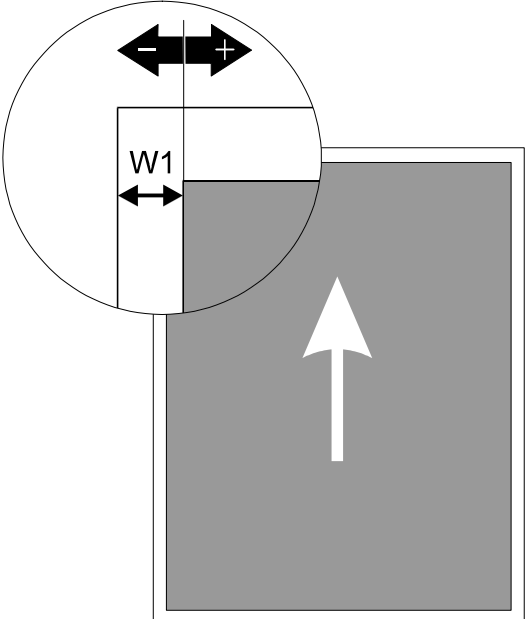
| Parameter | Formula | RAM Address | Unit | Initial Setting |
|-----------|---------|-------------|------|-----------------|
| **W1** | Not adjustable | | | |
| **W2** | Not adjustable | | | |
| **L1** |  H521R551.wmf This parameter changes the number of tx motor steps after the black mark for fine positioning was detected. To increase the margin by x mm: **New setting = Current setting + 15.4x** To decrease the margin by x mm: **New setting = Current setting - 15.4x** | 8002A9(H) (low) 8002AA(H) (high) | $\dfrac{1}{15.4}\,mm$ | 41(H) [65(D)] |
| **L2** | Not adjustable (Original length - L1 - L3) | | | |
| **L3** | To increase the margin by x mm: **New setting = Current setting - 15.4x** To decrease the margin by x mm: **New setting = Current setting + 15.4x** | 8002AB(H) | $\dfrac{1}{15.4}\,mm$ | 7F(H) [127(D)] |

## ADF
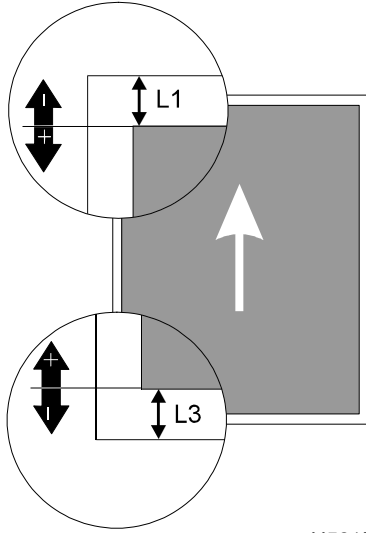
| Parameter | Formula | RAM Address | Unit | Initial Setting |
|---|---|---|---|---|
| **W1, W2** | Not adjustable | | | |
| **L1** | <br><br>H521R651.wmf<br><br>This parameter changes the number of tx motor steps after the scan line sensor is activated.<br>To increase the margin by x mm:<br>**New setting = Current setting + 7.7x**<br>To decrease the margin by x mm:<br>**New setting = Current setting - 7.7x**<br>Initial setting of L1: 2 mm | 8002A5(H) (low) 8002A6(H) (high) | $\frac{1}{7.7}\,mm$ | 81(H) [129(D)] |
| **L2** | Not adjustable (Original length - L1 - L3) | | | |
| **L3** | This parameter changes the number of tx motor steps after the scan line sensor is deactivated.<br>To increase the margin by x mm:<br>**New setting = Current setting - 7.7x**<br>To decrease the margin by x mm:<br>**New setting = Current setting + 7.7x**<br>Initial setting of L3: 2 mm | 8002A7(H) (low) 8002A8(H) (high) | $\frac{1}{7.7}\,mm$ | 4D(H) [77(D)] |

## 5.11.3. Printer Parameters

## 1. Margin (Main Scan Direction)

| Parameter | Formula | RAM Address | Unit | Initial Setting |
|---|---|---|---|---|
| **W1** | H521R648.wmf<br><br>W1<br><br>To increase the margin by x mm:<br>**New setting = Current setting + x/0.5**<br>To decrease the margin by x mm:<br>**New setting = Current setting - x/0.5**<br>Initial setting of W1: 2 mm | Standard cassette: 800357(H)<br><br>100 sheet cassette: 80035C(H)<br><br>Bypass feed: 80035D(H) | 0.5 mm | 05(H)<br><br>Min: 0<br>Max: 64(H) |
| **W2** | Not adjustable | | | |

## 2. Margin (Sub Scan Direction)

| Parameter | Formula | RAM Address | Unit | Initial Setting |
|---|---|---|---|---|
| L1 | <br><br>H521R651.wmf<br><br>To increase the margin by x mm:<br>**New setting = Current setting + x/0.66**<br>To decrease the margin by x mm:<br>**New setting = Current setting - x/0.66**<br>Initial setting of L1: 2 mm | Standard cassette: 80034D(H)<br><br>100 sheet cassette: 800352(H)<br><br>Bypass feeder: 800353(H) | 0.66 mm | 03(H)<br><br>07(H)<br><br>00(H)<br><br>Max: 30(H) 19.8 mm |
| L2 | Not adjustable | | | |
| L3 | This is only adjustable in bypass feed mode.<br><br>To increase the margin by x mm:<br>**New setting = Current setting - x/0.338**<br>To decrease the margin by x mm:<br>**New setting = Current setting + x/0.338**<br><br>**Example:** To increase the margin by 5 mm.<br>5/0.338 ≈ 14.8 ≈ 15(D) = F(H)<br>**New setting** = 3B - F = 2C(H) | 800363(H) | 0.338 mm | 3B(H) |

## 5.11.4. Scanner Video Processing Parameters

## 1. Contrast

| Mode | Address | Threshold Value (H) | Range |
|---|---|---|---|
| **Copy Mode, without Halftone, Auto Image Density on** | | | |
| Darken | 8003FDH | 08 | 00 - 0F |
| Normal | 8003FEH | 0C | |
| Lighten | 8003FFH | 0F | |
| **Copy Mode, without Halftone, Auto Image Density off** | | | |
| Darken | 800400H | 08 | 00 - 1F (Note 1) |
| Normal | 800401H | 0F | |
| Lighten | 800402H | 16 | |
| **Copy Mode, with Halftone, Auto Image Density off** | | | |
| Darken | 800403H | 05 | 00 - 0F |
| Normal | 800404H | 09 | |
| Lighten | 800405H | 0D | |
| **Fax Mode, without Halftone, Auto Image Density on** | | | |
| Darken | 800406H | 06 | 00 - 0F |
| Normal | 800407H | 0A | |
| Lighten | 800408H | 0E | |
| **Fax Mode, without Halftone, Auto Image Density off** | | | |
| Darken | 800409H | 0D | 00 - 1F (Note 1) |
| Normal | 80040AH | 0F | |
| Lighten | 80040BH | 11 | |
| **Fax Mode, with Halftone, Auto Image Density off** | | | |
| Darken | 80040CH | 03 | 00 - 0F |
| Normal | 80040DH | 07 | |
| Lighten | 80040EH | 0B | |

**Notes:**
1. The range of these parameters are different (00 to 1F) from others, because a different video process parameter is changed using these RAMs.
2. A smaller setting leads to a darker image.

## 2. Image Processing Parameters Adjustment

The tables in the following pages show the following video processing parameter settings for each of scanning mode.
One byte of parameter is assigned for each mode, and they all have the same definitions as follows.

| Bit No. | FUNCTION | COMMENTS |
|---|---|---|
| 0 | Edge detection during the halftone process<br>　0: Off　　1: On | This bit can be used in halftone mode only.<br>0: The image becomes lighter, and thin lines become paler.<br>1: Suitable for most photo originals. |
| 1 | Auto image density during the normal image process<br>　0: Off　　1: On | Do not change the setting. |
| 2 | Edge detection threshold during the halftone process<br>　0: Normal　　1: High | 0: The image becomes lighter (suitable for enlarged copies).<br>1: The image becomes darker (suitable for full-size copies). |
| 3 | Background detection threshold during the normal image process<br>　0: High　　1: Low | 0: Suitable for originals that have dark background (e.g. newspaper)<br>1: Suitable for most originals. |
| 4 | Edge enhancement during the halftone process<br>　0: Off　　1: On | 0: Suitable for photo originals (default setting).<br>1: Suitable for originals with photo and text. The edges of text become much sharper, but moire might appear in photo areas. |
| 5 | MTF algorithm<br>　0: Low　　1: High | The "High" setting enhances the thickness of thin lines and dots more than the "Low" setting. |
| 6 | MTF algorithm<br>　0: Low　　1: High | Only one of these bits is used for each scanning mode; see the notes at the end of the parameter setting table for details. |
| 7 | MTF<br>　0: Off　　1: On | In ADF mode, the MTF process is disabled.<br>0: In halftone mode, the image becomes lighter. In normal mode, thin lines may not be reprouced clearly.<br>1: The thickness of thin lines and dots are enhanced, but small letters might become filled in. |

## Copy Mode Parameters

| | | | Mode | Address | bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | bit 2 | bit 1 | bit 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W/O HALFTONE | AID ON | BOOK MODE | Full Size | 80040FH | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| | | | 115%-155% Enlargement | 800410H | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| | | | 200% Enlargement | 800411H | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| | | ADF MODE | Full Size | 800412H | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| | | | 115%-155% Enlargement | 800413H | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| | | | 200% Enlargement | 800414H | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| | AID OFF | BOOK MODE | Full Size | 800415H | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| | | | 115%-155% Enlargement | 800416H | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| | | | 200% Enlargement | 800417H | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| | | ADF MODE | Full Size | 800418H | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 115%-155% Enlargement | 800419H | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 200% Enlargement | 80041AH | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| HALFTONE | | BOOK MODE | Full Size | 80041BH | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| | | | 115%-155% Enlargement | 80041CH | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | | 200% Enlargement | 80041DH | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | ADF MODE | Full Size | 80041EH | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | | 115%-155% Enlargement | 80041FH | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | | 200% Enlargement | 800420H | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

## Notes

1. Bits in the shaded part of the table must not be changed.

2. Bit 6 is for the "Darken" setting, and bit 5 is for other contrast settings.

| | Mode | | Address | bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | bit 2 | bit 1 | bit 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W/O HALFTONE | AID ON | Book mode | 800421H | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| | | ADF mode | 800422H | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | AID OFF | Book mode | 800423H | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | ADF mode | 800424H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HALFTONE | | Book mode | 800425H | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | ADF mode | 800426H | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

## Notes

1. Bits in the shaded part of the table must not be changed.

2. Bit 6 is for "Standard" and "Detail" resolutions, and bit 5 is for "Fine" resolution.

# 6. TROUBLESHOOTING

## 6.1. COPY QUALITY TROUBLESHOOTING

If there is a copy quality problem that cannot be solved easily, try using the following troubleshooting procedures, while referring to the point-to-point diagram. The procedures may not be exhaustive, but they may help you to find the problem.

```
        ┌──────────────┐
        │  Make a copy │
        └──────┬───────┘
               │
               ▼
         ╱ Is the print ╲          ┌──────────────────┐
        ╱   image      ╲──NG──────▶│ Print a test     │
        ╲   OK?        ╱           │ pattern          │
         ╲            ╱            └────────┬─────────┘
              │                             │
              OK                            ▼
              │                      ╱ Is the print ╲
              ▼                     ╱   image       ╲──NG──┐
       ╱ Is the image ╲            ╲   OK?         ╱       │
      ╱ received by fax ╲──NG──┐    ╲             ╱        │
      ╲   OK?          ╱       │         │                 │
       ╲              ╱        │         OK                ▼
            │                  ▼         │          Check the printer
            OK          Check the remote ▼
            │           terminal      Check the scanner
            ▼
      Check the symptom again
```
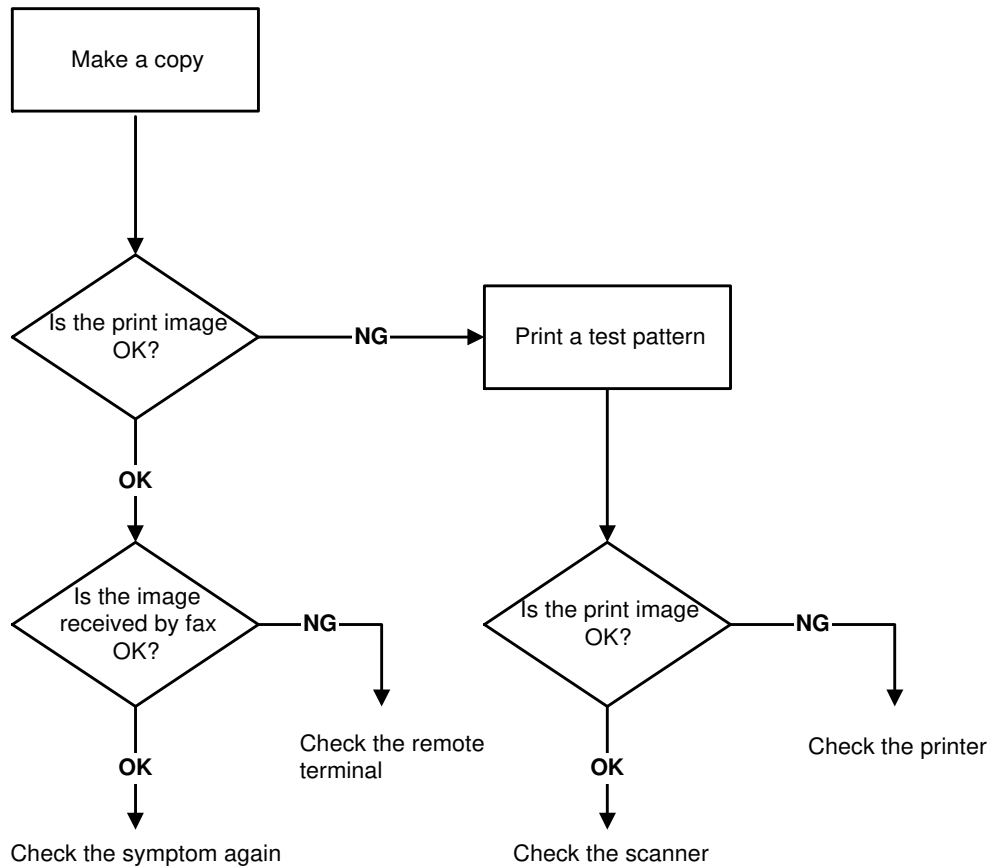
h521t614.wmf

First, distinguish whether the problem is caused by the remote terminal or by your machine. If the problem is caused by your machine, distinguish whether it is due to a scanner problem or a printer problem.

### 6.1.1. Blank Copies

**Possible Cause (Scanner):**
- Malfunction in the scanner drive mechanism.
- Obstructions in the scanner drive path.

**Action:**

1. Do the ADF test (service function 10) and check that the scanner moves correctly. Also, check for any obstrctions in the scanner drive path.

2. If the problem occurs only during ADF copying, check that the scanner moves to the correct ADF scanning position.

**Possible Cause (Printer):**
- Poor drum sensitivity.
- Laser optic components are out of position.
- The proper bias voltages are not applied to the toner application roller and/or the development roller.
- The proper current is not applied to the transfer roller.

**Action:**

1. Print a test pattern, and open the cover in the middle of printing.

2. Check if there is toner adhered to the drum surface.
   If there is, do the following. If not, go to step 3.
   - Check if the transfer roller is installed correctly or not.
   - Check if the development unit is installed correctly or not.
   - Check if the resistance between the transfer bias terminal on the development unit and the transfer roller shaft is less than 10 kOhm or not, while pushing the roller shaft down to the roller holder.
   - If the resistance is OK, check the connections behind the power pack and the power pack itself.

3. Check if there is  toner on the surface of the development roller.
   If there is, do the following. If not, go to step 4.
   - Check if all the laser optic components are properly positioned.
   - Try replacing the drum.

4. Check if the toner cartridge is empty or not. If it is, do the following. If not, go to step 5.
   - Check or replace the toner end sensor.

5. Do the following.

- Check that the development unit is correctly installed or not.
- Check if the resistance between the development roller bias terminal on the development unit and the development roller shaft, the toner metering plate, and the bias brush are less than 1 kOhm or not.
- Check if the resistance between the toner application roller bias terminal on the development unit and the toner application roller shaft is less than 1 kOhm or not.
- If all the resistances are OK, check the connections behind the power pack and the power pack itself.

## 6.1.2. Black Copies

**Possible Cause (Scanner)**
- The contact image sensor is defective.
- The xenon lamp, or the xenon lamp driver is defective.

**Action:**

1. Check the connection between the FDU (CN60) and the contact image sensor.

2. Do the ADF lamp test (service function 10) and check that the xenon lamp is working properly.

3. Check that the two springs which push up the contact image sensor against the exposure glass are correctly installed.

4. Replace the contact image sensor.

**Possible Cause (Printer)**
- The charge is not properly applied.

**Action:**

1. Check if all the charge bias terminals on the development unit and the CTM, and the charge wire are properly connected or not.
   - If they are, go to step 2.
   - If not, fix the connections.

2. Check if the zener diode is not shorted.
   - If the zener diode is shorted, replace the zener diode.
   - If it is not, go to step 3.

3. Check the connections behind the power pack.

### 6.1.3. Dirty Background
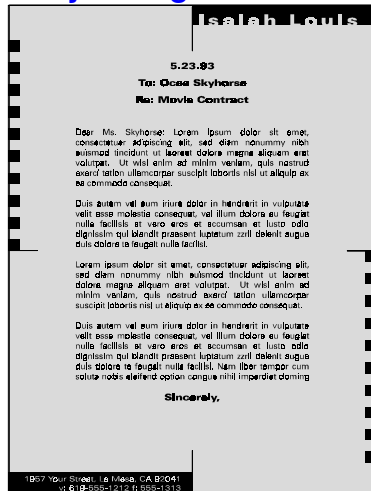


h521t607.wmf
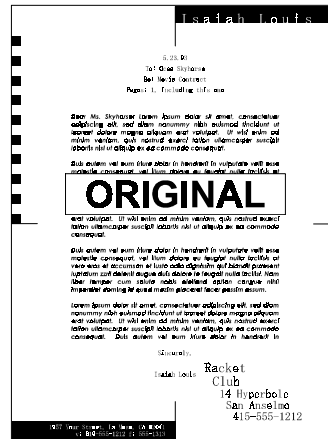


h521t612.wmf

**Possible Cause (Scanner)**
- Scanner shading correction error or wrong threshold.

**Action:**

1. Clean the shading plate (for both book and ADF).

2. Adjust the scanner contrast threshold settings.

**Possible Cause (Printer)**
- Poor drum sensitivity.
- The charge is not properly applied.
- The hot roller is dirty.

**Action:**

1. Try replacing the drum.

2. Check if the hot roller surface is dirty or not.
   - If it is, clean the roller or replace the cleaning pad.
   - If not, go to step 3.

3. Check if all the charge bias terminals on the development unit and the CTM, and the charge wire are properly connected or not.
   - If they are, check or replace the power pack.
   - If not, fix the connections.

### 6.1.4. Uneven Image Density
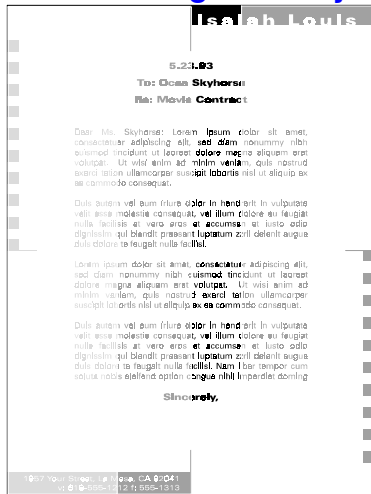


h521t608.wmf                                        h521t612.wmf
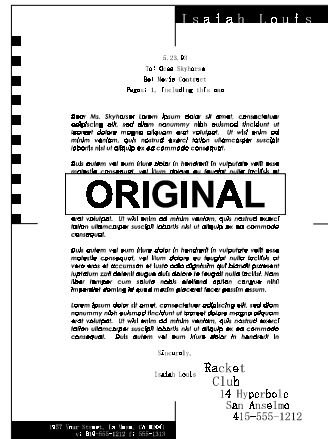
**Possible Cause (Scanner)**
- Dirty exposure glass

**Action**
- Clean the exposure glass (for both book and ADF).
- Replace the image sensor.

**Possible Cause (Printer)**
- Poor drum sensitivity.
- Dirty laser optic components.
- The toner metering blade is deformed, or incorrectly positioned.
- Uneven toner supply in the development toner hopper.
- Quenching lamp defect.

**Action:**

1. Print a solid black test pattern, and open the cover in the middle of printing.

2. Check if the toner is evenly distributed on the development roller.
   - If it is not, check the toner metering blade, and the toner supply mechanism in the toner hopper. If yes, go to step 3.
   - If the image is lighter in the center of the image, toner may be low. Replace the CTM and supply more toner.
3. Check if the toner is evenly distributed on the drum.
   - If it is not, check the drum sensitivity, the laser optic components, and the quenching lamp on the CTM.
   - If it is, check if there is any dirt on the transfer roller surface.

## 6.1.5. Vertical Black Lines
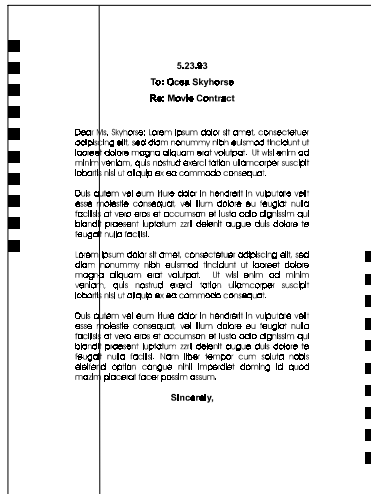
h521t603.wmf
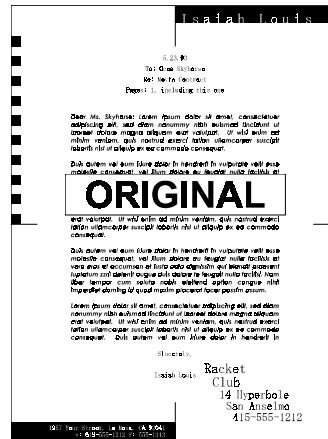
h521t612.wmf

### Possible Cause (Scanner)

When the problem occurs during book copying:
- Defective contact image sensor element(s).

When the problem occurs during ADF copying:
- Dirt or dust on the ADF exposure glass.
- Dirty white plate in the ADF.

### Action:

1. Clean the exposure glass and the shading plate (for both book and ADF).

2. Replace the contact image sensor.

### Possible Cause (Printer)
- Damaged cleaning blade.
- Dirty hot roller stripper(s).

### Action:

1. Replace the CTM.

2. Clean the hot roller strippers.

## 6.1.6. Horizontal Black Lines
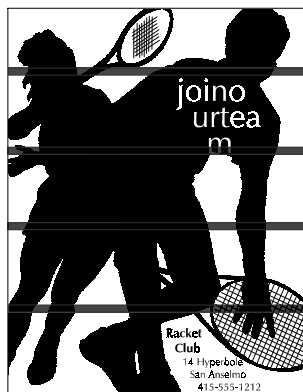
h521t610.wmf                                    h521t611.wmf
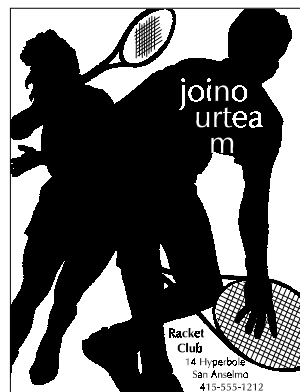
**Possible Cause (Printer)**
- The drum surface is scratched or damaged.
- Charge corona leak failure.

**Action:**

1. Check that the surface of the drum is not damaged.
   - Change the drum if it is damaged.

2. If the problem still remains, do the following.
   - Clean the charge wire.
   - Change the CTM.

## 6.1.7. Vertical White Lines
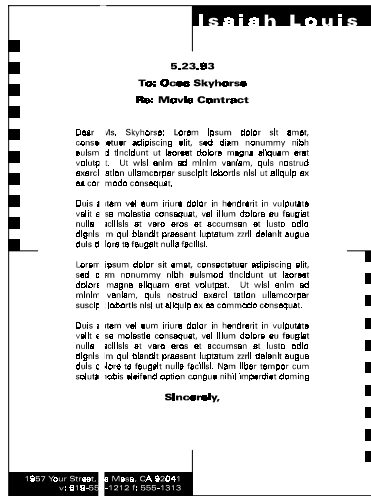


h521t606.wmf
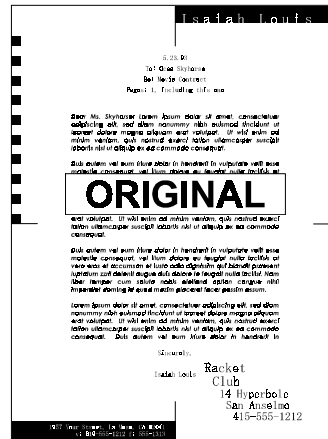


h521t612.wmf

**Possible Cause (Scanner)**
- Defective image sensor element(s).

**Action:**
- Replace the image sensor.

**Possible Cause (Printer)**
- The laser optic components are dirty.
- The hot roller stripper scrapes off toner from the print paper.

**Action:**
- Clean the laser optic components.
- Check the hot roller stripper mechanism. Clean the strippers and re-place them if they are damaged.

## 6.1.8. Horizontal White Lines
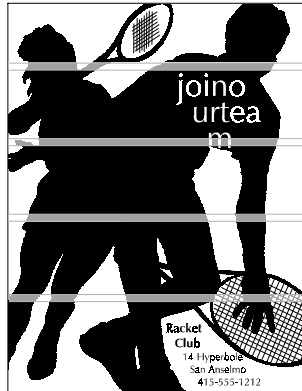


h521t609.wmf                                    h521t611.wmf

**Possible Cause (Printer)**
- The surface of the development roller is damaged or deformed.
- The development bias is not stable.
- Transfer current is not stable.

**Action:**

1. Print a test pattern, and open the cover in the middle of printing.

2. Check if horizontal white lines (where toner is not adhered) appear on the drum surface or not.
   - If they do, go to step 3.
   - If not, check the transfer roller surface and the transfer bias terminals connections. If they are OK, check or replace the power pack.

3. Check if horizontal white lines (where toner is not adhered) appear on the development roller surface or not.
   - If they do, check if the development roller surface is not deformed. If it is OK, check or replace the power pack.
   - If not, check for damage on the drum surface.

### 6.1.9. Black Dots/Spots
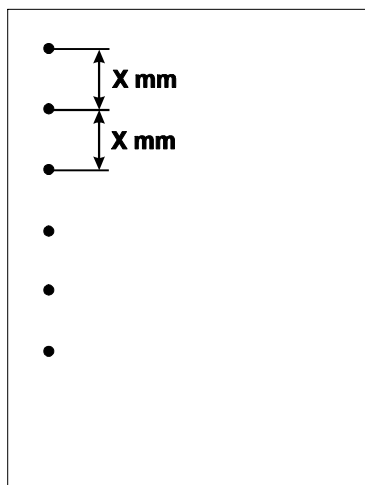


h521t602.wmf

**Possible Cause (Scanner)**
- Dust on the exposure glass.

**Action:**
- Clean the exposure glass.
- Try disabling MTF.

**Possible Cause (Printer)**
- The drum surface is damaged (this is likely if the dots appear at 94.2 mm intervals).

**Action:**
- Replace the drum.

## 6.1.10. White Spots in Black Image Areas
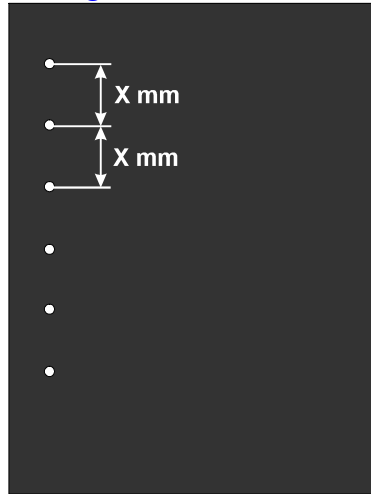


h521t601.wmf

**Possible Cause (Printer)**

- The drum surface is damaged (this is likely if the dots appear at 94.2 mm intervals).
- The development roller surface is damaged (this is likely if the dots appear at 62.8 mm intervals).
- The toner application roller surface is damaged (this is likely if the dots appear at about 16.75 mm intervals).

**Action:**

- Replace the drum.
- Clean the surface of the development roller and change the roller if it is damaged.
- Change the development unit.

## 6.1.11. Faint Copies
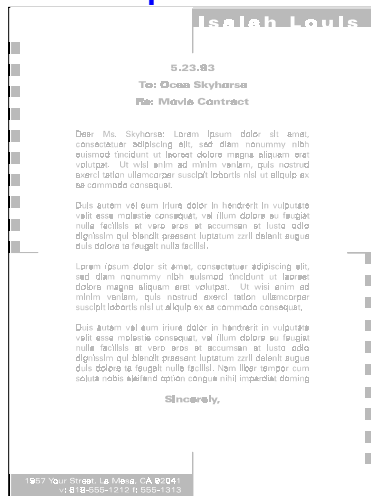


h521t604.wmf
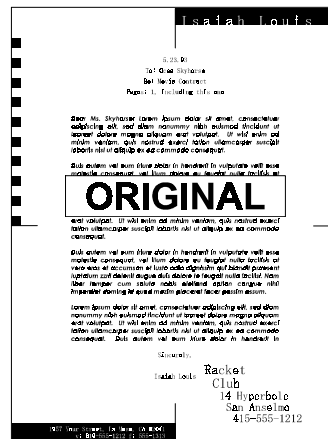


h521t612.wmf

### Possible Causes (Scanner)
- Dirty shading plate and/or exposure glass
- Wrong scan threshold
- Contact image sensor (xenon lamp, sensor element) defect

### Action:
- Clean the white plate (for both book and ADF).
- Clean the exposure glass.
- Adjust the scan threshold settings.
- Replace the image sensor.

### Possible Causes (Printer)
- Poor drum sensitivity.
- Dirty laser optic components.
- Incorrect development/ transfer bias
- Defective quenching lamp
- Low toner
- Low fusing temperature

**Action:**

1. Check whether the toner saving feature has not been selected with the user parameters. (If it has been selected, there is no problem.)

2. Print a test pattern, and open the cover in the middle of printing.

3. Check if the toner on the paper at the entrance of the fusing unit looks faint or not.
   - If it does, check or replace the fusing lamp, thermistor, and PSU.
   - If it does not, go to step 4.

4. Check if the toner on the drum looks faint or not.
   - If it does, go to step 5.
   - If it does not, check the contacts between the transfer bias terminals and power pack.

5. Check if the toner on the development roller looks faint or not.
   - If it does, check all the contacts between the development and toner application rollers' bias terminals.
   - If it does not, try replacing the CTM and drum.

### 6.1.12. Vertical Black Band
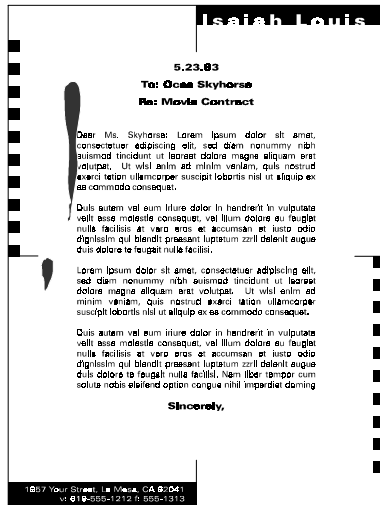
h521t605
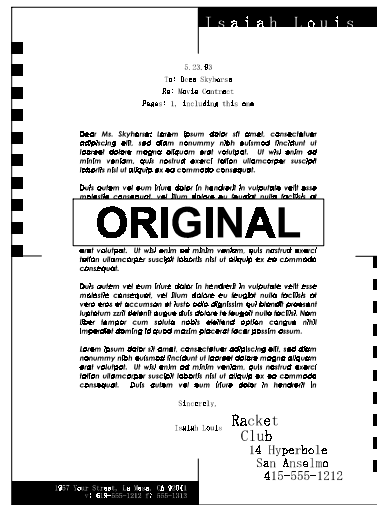
h521t612

## Possible Cause (Printer)
- Dirty charge corona wire.
- The toner metering blade is deformed, damaged, or incorrectly positioned.

## Action:
- Clean the charge corona wire. The wire cleaner is on the CTM.
- Replace the CTM.
- Check the toner metering blade and replace if it is damaged.

## 6.1.13. Unfused Copies

**Possible Cause (Printer)**
- The thermistor is defective.
- The fusing pressure roller spring mechanism is defective.
- The wrong type of toner is being used.
- A non-recommended type of paper is being used.

## Action:

1. Check if the correct type of paper and toner are being used.
   - If it is, go to step 2.
   - If not, use recommended types of paper and toner.

2. Try replacing the fusing lamp and the roller.

## 6.1.14. Ghost Image

**Possible Cause (Printer)**
- Poor drum sensitivity.
- The cleaning blade is deformed or incorrectly positioned.
- Dirty hot roller

**Action:**
- Clean the cleaning blade.
- Replace the CTM.
- Clean the hot roller surface and/or replace the cleaning pad.
- Replace the drum.

## 6.1.15. Toner on the Back of the Printer Paper

**Possible Cause (Printer)**
- Dirty transfer roller
- Dirty fusing pressure roller

**Action:**

1. Check if the transfer roller is dirty with toner or not.
   - If it is, clean the roller surface.
     1) Take the roller off the machine.

     2) Gently tap the roller shaft to remove the toner.

     3) Turn the roller against a clean sheet of paper to let the toner transfer onto the paper.

   - If not, go to step 2.

2. Check if the fusing pressure roller is dirty with toner or not.
   - If it is, clean the fusing pressure roller.
   - If not, check for any other dirty rollers and clean them.

## 6.1.16. Misaligned Output (Data shifted to the right or left)

**Possible Cause (Scanner)**
- Incorrect setting of the document guide.

**Action:**
- Align each side of the document to the document guides.

**Possible Cause (Printer)**
- The laser optics are misaligned.
- Improper print margin setting (main scan direction).

**Action:**
- Adjust the main scan print margin. (Refer to Section 5-12.)
- Check that the laser optics are aligned correctly.

## 6.1.17. Misaligned Output (Image shifted vertically)/Reduced Image

**Possible Cause:**
- Improper print margin (sub scan direction).
- Dirty registration roller.

**Action:**
- Adjust the sub scan print margin. (Refer to Section 5-12.)
- Clean the registration roller.

## 6.2. MECHANICAL PROBLEMS

### 6.2.1. ADF

### 1. Non Feed

**Possible Cause:**
- An incorrect type or size of document is used.
- The ADF roller assembly is not properly installed.
- The pick-up and feed rollers are dirty or worn out.
- The mechanical clutch mechanism for document pick-up is defective.
- The ADF motor is defective.
- The platen cover sensor is defective.

**Action:**

1. Check that a correct type of document is being used.

2. Check that the ADF roller assembly is properly installed. Replace the assembly if it is damaged.

3. If the problem still remains, do the following.
   - Clean the pick-up and feed rollers with a soft cloth and water, and replace them if they are damaged.
   - Check the spring mechanism of the pick-up roller and replace it if it is damaged.
   - Check the connection between the FDU (CN62) and the ADF motor.
   - Check that the platen cover sensor is working properly and replace if it is damaged.
   - Replace the ADF motor.

## 2. Jam

**Possible Cause:**
- An incorrect type or size of document is used.
- The document is too long.
- The ADF rollers (pick-up, feed, R0, R1, and R2 rollers) are dirty.
- Obstruction in the document paper path.
- The scan line sensor is defective.
- Defective ADF motor

**Action:**

1. Check that a correct type of document is being used, and that the document length is within the maximum setting.

2. Check for obstructions in the paper path.

3. If the problem still remains, do the following.
   - Clean the rollers with a soft cloth and water, and replace them if they are damaged.
   - Check that the scan line sensor is working correctly.
   - Replace the ADF motor.

## 3. Skew

**Possible Cause:**
- An incorrect type or size of document is used.
- The document guide is not properly set.
- The ADF cover is not properly closed.
- The ADF roller assembly is not properly installed.
- The scanner rollers (pick-up, feed, R0, R1, and R2 rollers) are dirty.
- Obstruction in the document paper path.

**Action:**

1. Check that a correct type of document is being used.

2. Check that the ADF cover is securely closed and check that the document guide is properly set. Also, check that the ADF roller assembly is properly installed.

3. Check for obstructions in the paper path.

4. If the problem still remains, do the following.

Clean the rollers with a soft cloth and water, and replace them if they are damaged.

## 4. Multi-feed

**Possible Cause:**
- An incorrect type or size of document is used.
- The separation roller is worn or dirty.

**Action:**
- Clean or replace the separation roller.
- Check that the spring under the separation roller is properly installed.

## 6.2.2. Book Scanner

### 1. Abnormal Noise

**Possible Cause:**
- Obstruction in the scanner drive path.
- Malfunction in the scanner drive components.

**Action:**
- Do the scanner test (service function 10) and check that the scanner moves correctly. If not, check that the scanner drive components are working properly, and also check for obstructions in the scanner drive path.
- If there is noise coming from the guide shaft, lubricate all surfaces of the shaft with Launa oil (refer to section 5.2.1 for details).

### 2. Scanner Home Position Error (Error Code 9-11)

**Possible Cause:**
- The scanner drive wire is out of position.
- The scanner drive wire is damaged or broken.
- Malfunction in the scanner drive components.
- Obstruction in the scanner drive path.
- The red clip which secures the scanner has not been removed. (This clip should be removed at installation.)

**Action:**
- Check that the scanner drive components are in the correct position.
- Check that the scanner drive wire is positioned correctly.
- Check for obstructions in the scanner drive path.
- Check that the spring which secures the drive wire to the scanner is working properly and replace if it is damaged.
- Check that the red clip which secures the scanner has been removed. (Refer to the Appendix A of the Opertaor's Manual for details.)

## 3. Automatic Paper Selection Error

**Possible Cause:**
- Defective book original size sensor(s).
- Improper bit switch setting for original size detection.

**Action:**
- Check that the book original size sensors are working properly and replace any defective sensor.
- Check that settings of system switch 0D match the paper sizes being used.

## 4. Scanning Start Position Error (Error Code 1-09)

**Cause:**
- The shading plate is dirty.
- The image sensor element is defective.

**Action:**
- Clean the shading plate, especially around the black mark (for both book and ADF).
- Replace the image sensor.

### 6.2.3. Printer

### 1. Non-feed

**Possible Cause:**
- A non-recommended type of paper is being used.
- The paper cassette end fence is not properly set.
- The paper lift mechaninsm (slide lock) is not working properly.
- Malfunction in the paper feed clutch.
- The paper feed roller(s) is not properly set.
- The paper feed motor is defective.
- The registration sensor is defective.

**Action:**

1. Check that a correct type of paper is being used.

2. Check that the paper cassette end fence is correctly set and check the paper lift mechanism (slide lock and the springs).

3. Check that the feed clutch for the cassette that was used is working properly.

4. Check that the paper feed roller(s) is properly installed. Clean or replace if necessary.

5. Check the registration roller and its mechanism. Clean or replace if necessary.

6. Check that the registration sensor is correctly working.

7. If the problem still remains, do the following.
   - Check the connections between the FDU (CN63) and the paper feed motor.
   - Replace the paper feed motor.

## 2. Paper Jam - Inside the Printer

**Possible Cause:**
- A non-recommended type of paper is being used.
- The paper end fence and/or the paper guides in the cassette is not properly set.
- The registraton roller is dirty.
- The registration sensor is defective.
- Obstruction in the paper path.
- The main motor is defective.

**Action:**

1. Check if a correct type of paper is being used, and check that the paper end fence and the paper guides are correctly set.

2. Check for obstructions in the paper path.

3. Check the registration roller and its mechanism. Clean or replace if necessary.

4. Check that the registration sensor is working properly.

5. If the problem still remains, do the following.
   - Check the connections between the FDU (CN15) and the main motor.
   - Replace the main motor.
   - Check the FDU output of power and drive signals to the main motor (CN15-1, 3). If signals are not output, replace the FDU or FCE.
   - Check the fusing unit drive mechanism. Check that all the gears are properly installed.

### 3. Jam - Fusing Exit

**Possible Cause:**
- A non-recommended type of paper is being used.
- Obstruction in the paper path.
- The registration sensor is defective.
- Malfunction in the fusing drive mechanism.
- The paper feed out sensor is defective.
- Malfunction in the hot roller stripper(s) mechanism.
- Malfunction in the pressure mechanism in the fusing unit.

**Action:**

1. Check if a correct type of paper is being used.

2. Check for obstructions in the paper path.

3. Check that the registration sensor is working correctly.

4. Check all the gears in the fusing drive mechanism.

5. Check that the paper feed out sensor is working correctly.

6. Check the hot roller strippers and the pressure mechanism in the fusing unit.

## 4. Skew

**Possible Cause:**
- A non-recommended type of paper is being used.
- Incorrect positioning of the paper guides in the paper cassette.
- The corner separators are out of position.
- The paper feed rollers are worn out or damaged.
- Obstruction in the paper path.
- Malfunction in the registration mechanism.

**Action:**

1. Check if a correct type of paper is being used.

2. Check that the paper guides and the corner separators in the paper cassette are correctly set.

3. Check that the paper feed rollers are correctly installed and clean or replace them if necessary.

4. Check for obstructions in the paper path.

5. Check the registration mechanism and clean or replace the rollers if necessary.

## 5. Multi-feed

**Possible Cause:**
- A non-recommended type of paper is being used.
- Incorrect positioning of the paper guides and/or end fence in the paper cassette.

**Action:**
- Check if a correct type of paper is being used.
- Check that the paper guides and the end fence are correctly set.

## 6.3. SERVICE CALL CONDITIONS

If the Call Service indicator is lit, one of the following conditions has occurred.

| Symptom | Error Code | Sub-code | SC-code |
|---|---|---|---|
| Scanner home position error | 9-11 | 71 | 7-71 |
| Charge leak current detected while the charge corona unit was activated. | 9-17 | 11 | 1-11 |
| Charge leak current detected while the charge corona unit was not activated. | 9-17 | 12 | 1-12 |
| Laser diode failure | 9-20 | 21 | 2-21 |
| Fusing unit failure (fusing lamp at high temperature during printing) | 9-22 | 01 | 0-01 |
| Fusing unit failure (fusing lamp not at printing temperature after warm-up) | 9-22 | 02 | 0-02 |
| Fusing unit failure (fusing lamp at high temperature in power saver mode) | 9-22 | 03 | 0-03 |
| Fusing unit failure (fusing lamp at high temperature in power saver mode) | 9-22 | 04 | 0-04 |
| Fusing unit failure (fusing lamp at low temperature in power saver mode) | 9-22 | 05 | 0-05 |
| Fusing unit failure (fusing lamp at low temperature during printing) | 9-22 | 07 | 0-07 |
| Fusing unit failure (fusing lamp at an extremely high temperature) | 9-22 | 08 | 0-08 |
| Fusing unit failure (thermistor error) | 9-22 | 09 | 0-09 |
| Hexagonal mirror motor startup error | 9-23 | 31 | 3-31 |
| Hexagonal mirror motor error while printing | 9-23 | 32 | 3-32 |
| Main motor startup error | 9-24 | 41 | 4-41 |
| Main motor error while printing | 9-24 | 42 | 4-42 |

To find out which problem has occurred, either:
- See the Auto Service Call report that was sent to the service station by the machine. This report lists a sub-code, as well as the error message; this sub-code may help you find the problem.
  Or, check the sub-code stored at RAM addresses 80033C(H) and 8003B5(H).
- Check the error code history using service function 03.
- Try to clear the service call condition (for failures which are not related to the fusing unit): switch the power off, wait 10 seconds, then switch back on.
- An SC-code is displayed on the LCD panel when the error occurs.

If the problem remains, work through the appropriate troubleshooting procedure from the following pages.

After each troubleshooting attempt, reset the machine and try to operate it. If the machine still does not work, continue troubleshooting.

**Symptom:** Scanner Home Position Error (Error Code 9-11)

This error occurs in either of the following conditions:

- If FDU CN61-5 stays low after the motor has moved 480 mm back to the home position after scanning
- If FDU CN61-5 stays high after the motor has moved 20 mm from the home position at the start of scanning
- If FDU CN61-5 stays low at power on

| Check | Action if Yes | Action if No |
|---|---|---|
| 1. Is the scanner at the home position when the error occurs ? | Remove the scanner securing clip if it is still installed. Otherwise, check the sensor output at CN61-5. Then go to step 2. | Turn off the machine and turn it back on with the platen cover open. Then go to step 3. |
| 2. Is the sensor output low ? | Replace the sensor. | Replace the FDU or FCE. |
| 3. Does the same error happen ? | Open the scanner and check where the scanner is when the error happened. | Try to run the scanner several times. If the problem remains, go back to step 3. |
| 4. Is there any blockage between the sensor's photoemitter and receiver ? | Clean the sensor. | Go to step 5. |
| 5. Is there any blockage in the scanner mechanism ? | Clean the scanner or remove the blockage. | Go to step 6. |
| 6. Push down the contact image sensor until it stops. Is the vertical stroke more than 2 mm ? | Check the scanner drive mechanism, and fix it if any problem is found. | Take out the image sensor and adjust the position of the sensor harness or ground wire under the image sensor. |

**Symptom:** Charger Leak (Error Code 9-17)

This error occurs in either of the following conditions:

- If FDU CN21-8 stays low for 3 s or more while the charge corona is on (sub-code 11)
- If FDU CN21-8 stays low for 3 s or more while the charge corona is off (sub-code 12)

| Check | Action if Yes | Action if No |
|---|---|---|
| 1. Clean the charge corona wire and unit. Check the if the charge wire is cut off and replace the CTM if it is broken. | | |
| 2. If the sub-code is 11, do the following. If the sub-code is 12, go to step 5. | | |
| 3. Are all of the charge bias terminals connected ? | Go to step 4. | Secure the connections and/or replace the CTM or development unit. |
| 4. Replace the power pack. Does the problem still remain? | Replace the FDU or FCE. | |
| 5. If the sub-code is 12, do the following. | | |

| **Symptom:** Charger Leak (Error Code 9-17) | | |
|---|---|---|
| 6. Does CN21-3 stay low while in standby mode ? | Replace the FDU or FCE. | Go to step 7. |
| 7. Does CN21-8 stay low while in standby mode ? | Replace the power pack. | |

| **Symptom:** LD Failure (Error Code 9-20) | | |
|---|---|---|
| This error occurs in the following condition: | | |
| • The laser synchronization signal was not detected within 10 ms of the start of printing (sub-code 21) | | |
| **Check** | **Action if Yes** | **Action if No** |
| Check that all the laser optic components are aligned correctly and clean them if necessary.<br>Check that the optical fibre is properly set.<br>Check the connection between the FDU (CN26) and the LDDR.<br>Check that the polygonal mirror motor and LDDR are correctly positioned.<br>If the problem still remains, replace the LDDR, FDU or FCE. | | |

| **Symptom:** Fusing Unit Failure (Error Code 9-22) | | |
|---|---|---|
| This error occurs in any of the following conditions: | | |
| • During printing: If the fusing lamp stays above 185 °C for more than 60 s (sub-code 01) | | |
| • Before start printing: If the fusing lamp takes more than 40 s to reach 160 °C (sub-code 02) | | |
| • Power saver mode (fusing lamp OFF selected): If the fusing lamp takes more than 20 minutes to fall back to 100 °C. (sub-code 03) | | |
| • Power saver mode (fusing lamp Power Saver Standby selected): If the fusing lamp takes more than 20 minutes to fall back to 100 °C. (sub-code 04)<br>Power saver mode (fusing lamp Standby selected): If the fusing lamp takes more than 5 minutes to fall back to 145 °C. (sub-code 04) | | |
| • Power saver mode (fusing lamp Power Saver Standby selected): If the fusing lamp stays below 80 °C for more than 18 s. (sub-code 05)<br>Power saver mode (fusing lamp Standby selected): If the fusing lamp stays below 145 °C for more than 25 s. (sub-code 05) | | |
| • During printing: If the fusing lamp stays below 140 °C for more than 1 s (sub-code 07) | | |
| • At any time: If the fusing lamp temperature reaches 250 °C (sub-code 08) | | |
| • At power on: If a thermistor defect (disconnection) is detected (sub-code 09) | | |
| **Check** | **Action if Yes** | **Action if No** |
| Before checking anything, do the following.<br>Reset the RAM address 80033C(H) to 00(H), then switch the power off, wait for a few seconds, then switch back on. If the problem remains, check the following points. | | |
| **Sub-code 01, 03, 04:** | | |
| 1. Replace the fusing lamp, thermistor, PSU, FDU and/or FCE. | | |
| **Sub-code 02, 05, 07:** | | |
| 1. Check if the fusing lamp, thermostat, and/or the thermofuse is(are) open or not.<br> - If yes, replace the defective component(s).<br> - If no, go to step 2. | | |

| **Symptom:** Fusing Unit Failure (Error Code 9-22) |
|---|
| 2. Check if ac power is supplied to the lamp from the PSU or not.<br>   - If yes, go to step 3.<br>   - If no, replace the PSU. |
| 3. Check if FDU CN12-1 and/or FDU CN12-2 stays low during printing.<br>   - If yes, replace the PSU, FDU, or FCE.<br>   - If no, check the connection from the PSU to the lamp. |
| **Sub-code 08:** |
| 1. Check for any defects in the machine, and replace the defective parts.<br>   If any damage could not be found, go to step 2. |
| 2. Check if the thermistor is shorted or not.<br>   - If yes, replace the thermistor.<br>   - If no, try replacing the FDU and/or FCE |
| **Sub-code 09:** |
| 1. Check the connection between the FDU (CN25) and the thermistor. |

| **Symptom:** Polygonal Mirror Motor Failure (Error Code 9-23) |||
|---|---|---|
| This error occurs in either of the following conditions:<br>• If FDU CN14-4 does not go low within 10 s of the polygonal mirror motor being switched on (sub-code 31)<br>• If FDU CN14-4 goes back to high for 3 s or more during polygonal mirror motor operation (sub-code 32) |||
| **Check** | **Action if Yes** | **Action if No** |
| 1. Check the connection between the FDU (CN14) and the polygonal mirror motor. |||
| 2. Check that +24VM from the FDU (CN14-1) is supplied to the polygonal mirror motor. | Replace the polygonal mirror motor. | Replace the FDU.<br>If the problem still remains, replace the FCE. |

| **Symptom:** Main Motor Failure (Error Code 9-24) |||
|---|---|---|
| This error occurs in either of the following conditions:<br>• If FDU CN15-4 does not go low within 10 s of the main motor being switched on (sub-code 41)<br>• If FDU CN15-4 goes back to high for 3 s or more during main motor operation (sub-code 42) |||
| **Check** | **Action if Yes** | **Action if No** |
| 1. Check that the main motor drive mechanism is not obstructed. |||
| 2. Check that all the main motor drive gears are correctly installed. |||
| 3. Replace the main motor. Does the problem still remain? | Replace the FDU.<br>If the problem still occurs, replace the FCE. | |

## 6.4. ERROR CODES

If an error code occurs, retry the communication. If the same problem occurs,
try to fix the problem as suggested below. Note that error codes 4-00, 01, 02,
and 10 only appear in the error code display and on the service report.

| Code | Meaning | Suggested Cause/Action |
|------|---------|------------------------|
| 0-00 | DIS/NSF not detected within 40 s of Start being pressed | Check the line connection.<br>Check the NCU - FDU connectors.<br>The machine at the other end may be incompatible.<br>Replace the NCU or FCE.<br>Check for DIS/NSF with an oscilloscope.<br>If the rx signal is weak, there may be a bad line. |
| 0-01 | DCN received unexpectedly | The other party is out of paper or has a jammed printer.<br>The other party pressed Stop during communication. |
| 0-03 | Incompatible modem at the other end | The other terminal is incompatible. |
| 0-04 | CFR or FTT not received after modem training | Check the line connection.<br>Check the NCU - FDU connectors.<br>Try changing the tx level and/or cable equalizer settings.<br>Replace the FCE or NCU.<br>The other terminal may be faulty; try sending to another machine.<br>If the rx signal is weak or defective, there may be a bad line.<br>**Cross reference**<br>Tx level - NCU Parameter 01 (PSTN), RAM 807FB7 (PABX)<br>Cable equalizer - G3 Switch 07 (PSTN), G3 Switch 08 (PABX)<br>Dedicated Tx parameters - Section 4-4 |
| 0-05 | Unsuccessful after modem training at 2400 bps | Check the line connection.<br>Check the NCU - FDU connectors.<br>Try adjusting the tx level and/or cable equalizer.<br>Replace the FCE or NCU.<br>Check for line problems.<br>**Cross reference**<br>See error code 0-04. |
| 0-06 | The other terminal did not reply to DCS | Check the line connection.<br>Check the FDU - NCU connectors.<br>Try adjusting the tx level and/or cable equalizer settings.<br>Replace the NCU or FCE.<br>The other end may be defective or incompatible; try sending to another machine.<br>Check for line problems.<br>**Cross reference**<br>See error code 0-04. |

| Code | Meaning | Suggested Cause/Action |
|------|---------|------------------------|
| 0-07 | No post-message response from the other end after a page was sent | Check the line connection. Check the FDU - NCU connectors. Replace the NCU or FCE. The other end may have jammed or run out of paper. The other end user may have disconnected the call. Check for a bad line. The other end may be defective; try sending to another machine. |
| 0-08 | The other end sent RTN or PIN after receiving a page, because there were too many errors | Check the line connection. Check the FDU - NCU connectors. Replace the NCU or FCE. The other end may have jammed, or run out of paper or memory space. Try adjusting the tx level and/or cable equalizer settings. The other end may have a defective modem/NCU/FDU; try sending to another machine. Check for line problems and noise. **Cross reference** Tx level - NCU Parameter 01 (PSTN), RAM 807FB7 (PABX) Cable equalizer - G3 Switch 07 (PSTN), G3 Switch 08 (PABX) Dedicated Tx parameters - Section 4-4 |
| 0-14 | Non-standard post message response code received | Check the FDU - NCU connectors. Incompatible or defective remote terminal; try sending to another machine. Noisy line: resend. Try adjusting the tx level and/or cable equalizer settings. Replace the NCU or FCE. **Cross reference** See error code 0-08. |
| 0-15 | The other end does not have the confidential or transfer function | The other terminal does not have the confidential rx or transfer function, or the other terminal's memory is full. |
| 0-16 | CFR or FTT not detected after modem training in confidential or transfer mode | Check the line connection. Check the FDU - NCU connectors. Replace the NCU or FCE. Try adjusting the tx level and/or cable equalizer settings. The other end may have disconnected, or it may be defective; try calling another machine. If the rx signal level is too low, there may be a line problem. **Cross reference** See error code 0-08. |
| 0-17 | Communication was interrupted by pressing the Stop key. | If the Stop key was not pressed and this error keeps occurring, replace the operation panel or OPU. |

| Code | Meaning | Suggested Cause/Action |
|------|---------|------------------------|
| 0-20 | Facsimile data not received within 6 s of retraining | Check the line connection.<br>Check the FDU - NCU connectors.<br>Replace the NCU or FCE.<br>Check for line problems.<br>Try calling another fax machine.<br>Try adjusting the reconstruction time for the first line and/or rx cable equalizer setting.<br>**Cross reference**<br>Reconstruction time - G3 Switch 0A, bit 6<br>Rx cable equalizer - G3 Switch 07 (PSTN), G3 Switch 08 (PABX) |
| 0-21 | EOL signal (end-of-line) from the other end not received within 5 s of the previous EOL signal | Check the connections between the FDU, NCU, & line.<br>Check for line noise or other line problems.<br>Replace the NCU or FCE.<br>The remote machine may be defective or may have disconnected.<br>**Cross reference**<br>Maximum interval between EOLs and ECM frames - G3 Bit Switch 0A, bit 4 |
| 0-22 | The signal from the other end was interrupted for more than the acceptable modem carrier drop time (default: 0.2 s) | Check the line connection.<br>Check the FDU - NCU connectors.<br>Replace the NCU or FCE.<br>Defective remote terminal.<br>Check for line noise or other line problems.<br>Try adjusting the acceptable modem carrier drop time.<br>**Cross reference**<br>Acceptable modem carrier drop time - G3 Switch 0A, bits 0 and 1 |
| 0-23 | Too many errors during reception | Check the line connection.<br>Check the FDU - NCU connectors.<br>Replace the NCU, FDU or FCE.<br>Defective remote terminal.<br>Check for line noise or other line problems.<br>Try asking the other end to adjust their tx level.<br>Try adjusting the rx cable equalizer setting and/or rx error criteria.<br>**Cross reference**<br>Rx cable equalizer - G3 Switch 07 (PSTN), G3 Switch 08 (PABX)<br>Rx error criteria - Communication Switch 02, bits 0 and 1 |
| 0-24 | Printer failure occurred while the memory was full during non-ECM reception; negative response returned | There is no memory space available, or substitute reception is disabled.<br>Try changing the post-message command tx timing.<br>Try asking the user to add optional extra memory.<br>**Cross reference**<br>Post-message command tx timing - |

| Code | Meaning | Suggested Cause/Action |
|------|---------|------------------------|
| 0-30 | The other terminal did not reply to NSS(A) in AI short protocol mode | Check the line connection.<br>Check the FDU - NCU connectors.<br>Try adjusting the tx level and/or cable equalizer settings.<br>The other terminal may not be compatible.<br>**Cross reference**<br>Dedicated tx parameters - Section 4-4 |
| 0-52 | Polarity changed during communication | Check the line connection.<br>Retry communication. |
| 1-00 | Document jam | Incorrectly inserted document or unsuitable document type.<br>Check the ADF drive components and sensors.<br>**Cross reference**<br>ADF mechanical problems - Section 6-2-1 |
| 1-01 | Document length exceeded the maximum | Try changing the maximum acceptable document length.<br>Divide the document into smaller pieces.<br>Check the ADF drive components and sensors.<br>**Cross reference**<br>Max. document length - Scanner switch 00, bits 2 and 3<br>ADF mechanical problems - Section 6-2-1 |
| 1-09 | Scanning start position mark not detected (scanning continues as normal) | Clean the start position mark (square black mark) and the area surrounding it.<br>Replace the image sensor.<br>**Cross reference**<br>Book scanner mechanical problem - Section 6-2-2 |
| 1-10 | Paper at the scan line when the power was turned on. | Remove the paper.<br>Check the scan line sensor.<br>**Cross reference**<br>ADF mechanical problems - Section 6-2-1 |
| 1-17 | Document jam in the feed-out area | Clear any debris from the sensor actuator.<br>Check the ADF drive components and sensors.<br>**Cross reference**<br>ADF mechanical problems - Section 6-2-1 |
| 1-20 | Paper did not reach the fusing exit at the end of printing | Remove the paper.<br>Check the printer drive components and sensors.<br>**Cross reference**<br>Printer mechanical problems - Section 6-2-2 |
| 1-21 | Paper present at the fusing exit after printing | Remove the paper.<br>Check the printer drive components and sensors.<br>**Cross reference**<br>Printer mechanical problems - Section 6-2-2 |
| 1-30 | Paper ran out during printing | Add paper in the cassette. |
| 1-34 | Paper ran out after printing | Add paper in the cassette. |
| 1-71 | The cover was opened or the cassette was pulled out during printing | Close the cover or put back the cassette. |

| Code | Meaning | Suggested Cause/Action |
|------|---------|------------------------|
| 2-10 | The modem cannot enter tx mode | Replace the FCE. |
| 2-11 | Only one V.21 connection flag was received | Change the FCE. |
| 2-12 | Modem clock irregularity | Replace the FCE. |
| 2-20 | Abnormal coding/decoding (cpu not ready) | Replace the FCE. |
| 2-50 | The machine reset itself | Replace the FCE. |
| 4-00 | One page took longer than 8 minutes to transmit | Check for a bad line. Try the communication at a lower resolution, or without halftone. Change the FCE. |
| 4-01 | Line current was cut | Check the line connector. Check the connection between FDU and NCU. Check for line problems. Replace the FDU or the NCU. |
| 4-02 | The other end cut the received page as it was longer than the maximum limit. | Split the page into smaller pieces, or ask the other end to change their maximum receive length setting, then resend. |
| 4-10 | Communication failed because of ID Code mismatch (Closed Network) or Tel. No./CSI mismatch (Protection against Wrong Connections) | Get the ID Codes the same and/or the CSIs programmed correctly, then resend. The machine at the other end may be defective. |
| 5-00 | Data reconstruction not possible | Replace the FCE. |
| 5-10 | DCR timer expired | Replace the FCE. |
| 5-20 | Storage impossible because of a lack of memory | Temporary memory shortage. Test the SAF memory. Replace the FCE or optional IC card. |
| 5-21 | Memory overflow | |
| 5-22 | Mode table overflow after the second page of a scanned document | Wait for the messages which are currently in the memory to be sent or delete some files from memory. |
| 5-23 | Print data error when printing a substitute rx or confidential rx message | Test the SAF memory. Ask the other end to resend the message. Replace the FCE or IC memory card. |
| 5-24 | Memory overflow after the second page of a scanned document | Try using a lower resolution setting. Wait for the messages which are currently in the memory to be sent or delete some files from memory. |
| 5-25 | SAF file access error | Replace the FCE or IC memory card. |
| 5-30 | Mode table for the first page to be printed was not effective | Replace the FCE or IC memory card. |

| Code | Meaning | Suggested Cause/Action |
|------|---------|------------------------|
| 6-01 | G3 ECM - no V.21 signal was received | Try adjusting the rx cable equalizer. Replace the FCE, FDU or NCU. |
| 6-02 | G3 ECM - EOR was received | |
| 6-03 | G3 ECM - non-standard V.21 code received | The other terminal may be defective. |
| 6-04 | G3 ECM - RTC not detected | Check the line connection. Check connections from the NCU to the FDU. Check for a bad line or defective remote terminal. Replace the FCE, FDU or NCU. |
| 6-05 | G3 ECM - facsimile data frame not received within 18 s of CFR, but there was no line fail | Check the line connection. Check connections from the NCU to the FDU. Check for a bad line or defective remote terminal. Replace the FCE, FDU or NCU. Try adjusting the rx cable equalizer **Cross reference** Rx cable equalizer - G3 Switch 07 (PSTN), G3 Switch 08 (PABX) |
| 6-06 | G3 ECM - coding/decoding error | Defective FDU. The other terminal may be defective. |
| 6-08 | G3 ECM - PIP/PIN received in reply to PPS.NULL | The other end pressed Stop during communication. The other terminal may be defective. |
| 6-09 | G3 ECM - ERR received | Check for a noisy line. Adjust the tx levels of the communicating machines. See code 6-05. |
| 6-10 | G3 ECM - error frames still received at the other end after all communication attempts at 2400 bps | Check for line noise. Adjust the tx level (use NCU parameter 01 or the dedicated tx parameter for that address). Check the line connection. Defective remote terminal. |
| 6-11 | G3 ECM - printing impossible because of a missing first line in the MMR coding | Check for problems in the printer mechanism. |
| 6-21 | V.21 flag detected during high speed modem communication | The other terminal may be defective or incompatible. |
| 6-39 | V.21 signal not stopped within 6 s | Replace the FCE. |
| 9-07 | Paper non-feed or jam at the cassette entrance | If the problem persists, replace the FDU. **Cross reference** Paper non-feed - Section 6-2-2 Jam at the cassette entrance - Section 6-2-2 |
| 9-08 | Paper jam inside the development area | If the problem persists, replace the FDU. **Cross reference** Paper jam - Section 6-2-2 |
| 9-09 | Paper jam in the fusing exit area | If the problem persists, replace the FDU. **Cross reference** Paper jam - Section 6-2-2 |

| Code | Meaning | Suggested Cause/Action |
|------|---------|------------------------|
| 9-10 | Toner end detected | Replace the CTM. |
| 9-11 | Home position not detected in book scanner mode | If the problem persists, replace the FCE. <br> **Cross reference** <br> Charge corona failure - Section 6-3 |
| 9-12 | Cover open detected during printing | Close the cover, or check the cover sensors. |
| 9-17 | Charge corona unit failure | If the problem persists, replace the FCE. <br> **Cross reference** <br> Charge corona failure - Section 6-3 |
| 9-20 | Laser diode failure | If the problem persists, replace the FCE. <br> **Cross reference** <br> LD failure - Section 6-3 |
| 9-22 | Fusing lamp failure | If the problem persists, replace the FCE. <br> **Cross reference** <br> Fusing lamp failure - Section 6-3 |
| 9-23 | Hexagonal mirror motor failure | If the problem persists, replace the FCE. <br> **Cross reference** <br> Mirror motor failure - Section 6-3 |
| 9-24 | Main motor failure | If the problem persists, replace the FCE. <br> **Cross reference** <br> Main motor failure - Section 6-3 |
| 9-80 | Bypass feed - paper non-feed or jam at the entrance | Check the registration roller and sensor. <br> **Cross reference** <br> Printer mechanical problems - Section 6-2-2 |
| 9-81 | Bypass feed - paper length exceeds the maximum limit (600 mm) | Check the paper feed mechanism and sensors. <br> **Cross reference** <br> Printer mechanical problems - Section 6-2-2 |
| 9-82 | Optional 100 sheet cassette - paper non-feed or jam at the cassette entrance | Check the paper feed mechanism and sensors. <br> **Cross reference** <br> Printer mechanical problems - Section 6-2-2 |
| 9-83 | Optional 100 sheet cassette - paper length exceeds the maximum limit (600 mm) | Check the paper feed mechanism and sensors. <br> **Cross reference** <br> Printer mechanical problems - Section 6-2-2 |

## 6.5. ELECTRICAL COMPONENT DEFECTS

### 6.5.1. Defective Sensor Table

| Sensor | Status | Symptoms if Defective |
|---|---|---|
| ADF document sensor | ON | "CLEAR ORIGINAL" or "DIAL FAX NO" is displayed at power-up. |
| | OFF | "SET DOCUMENT" is still displayed after a document is placed in the feeder. |
| ADF scan line sensor | ON | "CLEAR ORIGINAL" is displayed at power-up. |
| | OFF | "CLEAR ORIGINAL" is displayed soon after the start of copying. |
| ADF document width sensor | ON | "CLEAR ORIGINAL" is displayed at power-up. |
| | OFF | Only A4/Letter width can be scanned. |
| ADF cover switch | ON | No error message appears if the cover is opened. |
| | OFF | "CLOSE COVER" is displayed at power on. |
| ADF release switch | ON | No error message is displayed if the cover is opened. |
| | OFF | "CLOSE COVER" is displayed at power on. |
| Book scanner home position sensor | ON | SC code 7-71 is displayed soon after starting a copy operation. (Error code 9-11) |
| | OFF | SC code 7-71 is displayed soon after power on. (Error code 9-11) |
| Platen cover sensor | ON (Open) | ADF does not work. |
| | OFF (Close) | The Automatic Paper Select function does not work correctly. The original size is not reset even if an original of a different size is placed under the platen cover. |
| Book original size sensors | --- | The Automatic Paper Select does not work correctly. |
| Interlock switches | ON | There is no alarm on opening the cover, and "CLOSE COVER" is not displayed. |
| | OFF | "CLOSE COVER" is displayed at power-up. |
| Registration sensor Fusing exit sensor | ON | "CLEAR COPY" is displayed at power-up. |
| | OFF | "CLEAR COPY" is displayed after the start of copying. |
| Bypass feed sensor | ON | "CLEAR COPY" is displayed after the automatic reset timer expires. |
| | OFF | Bypass feed cannot be used. |
| Toner end sensor | ON | "ADD TONER" is displayed. |
| | OFF | Toner end is not indicated. |
| Paper size sensor - Standard cassette | --- | "ADD PAPER" or the wrong paper size is displayed at power-up. |
| | --- | Page separation may be done even if the original is the same size as the copy paper. |

| Sensor | Status | Symptoms if Defective |
|---|---|---|
| Paper end sensor - Standard cassette | ON | The Add Paper indicator lights even if paper is remaining. |
| | OFF | The Add Paper indicator does not light when the paper has run out. |
| Paper size sensor - 100 sheet cassette | --- | "ADD PAPER" or the wrong size is displayed at power-up. |
| | --- | Page separation may be done even if the original is the same size as the copy paper. |
| Paper end sensor - 100 sheet cassette | ON | The Add Paper indicator on the lower cassette's operation panel lights even if paper is remaining. |
| | OFF | The Add Paper indicator on the lower cassette's operation panel does not light when the paper has run out. |
| Thermistor | Open | SC code 0*09 is displayed at power on. (Error code 9-22) |
| | Short | SC code 0*08 is displayed at power on. (Error code 9-22) |
| Thermostat | Open | SC code 0*xx is displayed at power on or at the start of printing depending on the fusing standby temperature setting. |

## 6.5.2. Blown Fuse Table

The only service-replaceable fuses are the following.

| Fuse | Symptoms if Defective |
|---|---|
| PSU - F1/ F2/F3 | No power to the machine. (F3 - 220V PSU only) |
| Thermofuse (Not installed in the US model.) | Fusing power is not supplied. |

# Point-to-Point Diagram
# Model: LSO (MV310)

Issued on: May 22nd, 1995
Revision 1.0
Subject to change

## NCU

**CN1**
- +24V
- COM3
- RSEL (US - Not used)
- Not used
- DOSW [ ▲ 5] (US - Not used)
- CMLSW [ ▲ 5]
- OHDISW [ ▲ 5]
- COM1
- EXTDI [ ▼ 5] (US only)
- HOOK1 [ ▼ 5]
- HOOK0 [ ▼ 5]
- EXRING
- COM2
- Not used
- TRXD (Tx/Rx Signal)

**CN4** 1–15

**CN2**
- CSEL1 (US - Not used)
- CSEL0 (US - Not used)
- GSSW [ ▲ 5] (US - Not used)
- +5VE (US - Not used)
- +5VEE (US - Not used)

**CN5** 1–5

## Xe Lamp Driver

Xe Lamp — AC / AC

Contact Image Sensor:
- COM3
- +24VM
- Clock
- COM1
- Line Synchronization Signal
- +5VV
- -5V
- +5VV
- COM1
- Analog Video Signal

**CN60**
- COM3
- +24VM
- Scanner Lamp ON [ ▼ 5]
- Clock
- COM1
- Line Synchronization Signal
- +5VV
- -5V
- +5VV
- COM1
- Analog Video Signal

(pins 1–11)

## Tx Motor

**CN62**
- A
- COM12
- AB
- B
- COM34
- BB

(pins 1–6)

Stamp
- Stamp ON [ ▼ 24]
- +24VD
(pins 7–8)

## Document Width Sensor

**CN64**
- COM1
- +5V
- 5SIZE 3 [ ▼5]
- 5SIZE 2 [ ▼5]
(pins 1–4)

## Document Length Sensor
- COM1
- +5V
- 5SIZE 1 [ ▼5]
- 5SIZE 0 [ ▼5]
(pins 5–8)

## OPU

**CN1 / CN23**
- +5V
- Reset [ ▼ 5]
- Serial Data
- Serial Clock
- Serial Data
- COM1
- Energy Saver Key [ ▼ 5]
- +5VE
- Energy Saver LED ON [ ▼ 5]
- Document Sensor ON [ ▼ 5]
- COM1

## Ozone Fan Motor

**CN18**
- +24VM
- Fan Motor ON [ ▼ 24]
(pins 1–2)

Monitor Speaker
- Speaker Output
- COM1
(pins 3–4)

## Printer Interface (Optional)

**CN3**
- COM1
- PIF Reset [ ▼ 5]
- Printer Interface Installed [ ▼ 5]
- Not used
- Print Data [ ▼ 5]
- Not used
- Line Synchronization Signal [ ▼ 5]
- Horizontal Synchronization Signal
- Vertical Synchronization Signal
- Print Start [ ▼ 5]
- Controller Ready [ ▼ 5]
- Printer Ready [ ▼ 5]
- Serial Clock
- Serial Data (Command)
- Serial Data (Status)
- Interrupt [ ▲ 5]
- +5V
- COM3
- COM3
- +24V

(pins 1–20)

## RS232C Interface (Optional)

**CN3 / FCE**
- COM1
- 5WR [ ▼ 5]
- COM1
- 5RD [ ▼ 5]
- +5V
- D0
- 5RSRES [ ▼ 5]
- D1
- 5EXCS0 [ ▼ 5]
- D2
- A0
- D3
- A1
- D4
- A2
- D5
- A3
- D6
- 1DEIT2 [ ▲ 5]
- D7

**FCE CN1** — 100 pins
**CN2** — 68 pins

IC Card (Optional)

## Symbol Table

| Symbol | Meaning |
|---|---|
| ▬▬ | AC Line |
| ── | DC Line |
| ←→ | Signal Direction |
| ▲ | Active High |
| ▼ | Active Low |
| [ ] | Voltage |

## FDU

## PSU

**CN12**
- Fusing Lamp ON [ ▲ 5]
- Power to the Fusing Lamp ON [ ▲ 5]
- COM3
- +24V
- +24V
- COM3
- +24VM
- COM3
(pins 1–8)

PSU CN1 — ACL / ACN / GND
PSU CN2 — ACL / ACN

**CN13**
- COM1
- Paper Present [ ▼ 5]
- +5V
→ Fusing Exit Sensor
- Cover Open [ ▼ 5]
- COM1
→ Fusing Exit Cover Sensor

**CN25**
- +5V
- Thermistor Output → Fusing Thermistor
- CAS0 [ ▼ 5]
- CAS1 [ ▼ 5]
- COM1
- CAS2 [ ▼ 5]
→ Paper Size Sensor (Standard Cassette)

**CN10**
- +5V
- Not used
- +5VLD
→ Top Cover Interlock Switch / Front Cover Interlock Switch

**CN11**
- +24VD
- +24V

**CN21 / Power Pack CN1**
- +24V P.P.
- COM3
- Charge [ ▼ 24]
- Transfer Bias 0 [ ▼ 24]
- Transfer Bias 1 [ ▼ 24]
- Development Bias 0 [ ▼ 24]
- Development Bias 1 [ ▼ 24]
- Charger Leak [ ▼ 24]
(pins 1–8)

Charge / Development / Toner Application / Transfer
C / B2 / B1 / T

**CN14** — Polygonal Mirror Motor
- +24VM
- COM3
- Motor Enable [ ▼ 24]
- Motor Lock [ ▼ 5]
- Motor Clock

**CN26** — LDDR
- +5VLD
- 5APC Sampling Hold [ ▼ 5]
- COM1
- Print Data [ ▼ 5]
- COM1
- LD Enable [ ▼ 5]

**PI1** — Laser Syncronization Signal (Optical Fibre)

### Charge Bias (C)

| Charge Bias (C) | |
|---|---|
| Charge = H | OFF |
| Charge = L | - 305µA |

### Toner Application Bias (B1)/ Development Bias (B2)

| | Bias 1 = H | Bias 1 = L |
|---|---|---|
| Bias 0 = H | OFF/OFF | - 50V/ +250V |
| Bias 0 = L | OFF/-400V | -700V/ - 400V |

### Transfer Bias (T)

| | Bias 1 = H | Bias 1 = L |
|---|---|---|
| Bias 0 = H | OFF | - 1000V |
| Bias 0 = L | OFF | +5µA |

**CN17** — Scanner Motor
- A
- COM12
- AB
- B
- COM34
- BB
(pins 1–6)

**CN15** — Main Motor
- +24VM
- COM3
- Motor Enable [ ▼ 24]
- Motor Lock [ ▼ 5]
- Quenching Lamp Enable [ ▼ 24]
- +24VD
- Fan Motor Enable [ ▲ 24] → Fusing Fan Motor
- COM3
- +24VD → Mechanical Counter (Optional)
- Count-up [ ▼ 24]
- Clutch On [ ▼ 24] → Paper Feed Clutch
- +24VD

Quenching Lamp

**CN63** — Paper Feed Motor
- A
- +24VMM
- AB
- B
- +24VMM
- BB
(pins 1–6)

**CN61**
- COM1
- Cover Open [ ▲5V] → Platen Cover Switch
- +5V
- COM1
- Scanner at Home Position [ ▲5V] → Scanner HP Sensor
- +5V
- Original Present [ ▼5V] → Document Sensor
- COM1
- +5V
- Original Present [ ▲5V] → Scan Line Sensor
- COM1
- B4 Original Present [ ▼5V] → B4 Width Sensor
- +5V
- Cover Open [ ▲5V]
- COM1
(pins 1–15)

ADF Cover Switch / ADF Release Switch

**CN7**
- Paper End [ ▲ 5]
- COM1
→ Paper End Sensor (Standard Cassette)
- COM1
- Paper Present [ ▼ 5]
- +5V
→ Bypass Feed Sensor
- +5V
- Paper Present [ ▼ 5]
- COM1
→ Registration Sensor
- Toner End Sensor Output
- Not used
- COM1
→ Toner End Sensor
(pins 1–12)

**CN20**
- CAS4 [ ▼ 5]
- CAS5 [ ▼ 5]
- COM1
- CAS6 [ ▼ 5]
→ Paper Size Sensor
- Paper End [ ▲ 5]
- COM1
→ Paper End Sensor
- Clutch ON [ ▼ 24]
- +24VM
→ Paper Feed Clutch
(pins 1–8)

100 Sheet Cassette (Optional)

**CN1** (100 pins)