FX7

RICOH FAX1700L

SERVICE MANUAL

July 30th, 1996
Subject to change

FX7

infotec 3671/3671F

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⚠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.

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.

1. OVERALL MACHINE INFORMATION

1.1. SPECIFICATIONS

Type
Desktop type transceiver

Circuit
PSTN, PABX

Connection
Direct couple

Document Size
Length:
105 - 355.6 mm [4.1 - 14 ins]
(automatic feed)
Up to 600 mm [23.6 ins] (manually assisted)
Width:
148 - 216 mm [5.8 - 8.5 ins]
Thickness:
0.05 to 0.2 mm [2 to 8 mils]
(equivalent to 50 - 90 g/m^2)

Document Feed
Automatic feed, face up

ADF Capacity
30 sheets (using 20 lb. or 80 g/m^2 paper)

Scanning Method
Contact image sensor

Maximum Scan Width
204 mm [8.0 ins]

Scan Resolutions
Main scan: 8 dots/mm [203 dpi]
Sub scan:
Standard - 3.85 lines/mm [98 lpi]
Detail - 7.7 lines/mm [196 lpi]
Fine - 15.4 lines/mm [392 lpi]

Memory Capacity
ECM: 128 kbytes
SAF: 240 kbytes (18 pages/ITU-T #1 test document), extra 1 Mbyte memory card available (102 pages) or 2 Mbyte memory card available (186 pages)

Compression
MH, MR, EFC, MMR, SSC

Protocol
Group 3 with ECM

Modulation
V.17 (TCM), V.29 (QAM), V.27ter (PHM), V.21 (FM)

Data Rate (bps)
14400/12000/9600/7200/4800/2400
Automatic fallback

Transmission Time
6 s at 14,400 bps; Measured with G3 ECM using memory for a ITU-T #1 test document (Slerexe letter) at standard resolution

Printing System
Laser printing, plain paper, dry toner

Paper Size and Capacity
Standard Tray: 150 sheets
(using 20 lb. or 80 g/m^2 paper)
A4, Letter, Legal, F4

Paper Feed Unit (Optional): 250 sheets
(using 20 lb. or 80 g/m^2 paper)
A4, Letter, Legal

Maximum Printing Width
216 mm [8.5 ins]

Print Resolutions
Fax and Copy Mode:
Main scan: 16 dots per mm [406 dpi]
Sub scan: 15.4 lines/mm [391 lpi]

Power Supply
USA: (110 - 120 Vac) ± 10%, 60 ± 3 Hz
Europe/Asia: (220 - 240 Vac) ± 10%, 50/60 ± 3 Hz

Power Consumption (Base Machine Only)
USA: Maximum 390 W
Europe/Asia: Maximum 470 W

Operating Environment
Temperature: 15 - 25 °C [59 - 77 °F]
Humidity: 35 - 70 %Rh

Dimensions (W x D x H)
380 x 341 x 219 mm [15.0 x 13.4 x 8.6 ins]
Excluding handset, trays, and optional units

Weight
Approx. 7 kg [15 lb.]
Excluding consumables, handset, trays, and optional units

1.2. FEATURES

KEY: O = Used, X = Not Used,
A = With optional memory only,
B = With optional paper feed unit only
C = With optional handset only

Equipment	
ADF	O
Book scan	X
Built-in handset	X
Bypass feed: 1 sheet	X
Optional paper feed unit	B
Cabinet	X
Mechanical Counter	X
Cutter	X
Handset	C
Hard disk	X
Manual feed mechanism	X
Marker (Stamp)	X
Monitor speaker	O
Optional printer interface (RS422)	X

Video Processing Features	
Contrast	O
Halftone (Basic & Error Diffusion)	O
MTF	O
Enlarge/Reduction: Three enlargements, 4 reductions (50%-200%)	X
Resolution	O
Smoothing to 16 x 15.4 l/mm	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	X
Answering machine interface	O
Authorized Reception	O

Communication Features - User Selectable	
Auto-answer delay time	O
Auto dialing (pulse or DTMF)	O
Auto Document	X
Auto image density selection	X
Auto paper size selection	X
Automatic Voice Message	X
Batch Transmission (max 35 files)	O
Broadcasting	O
Chain Dialing	O
Communication Result Display	X
Confidential ID Override	O
Confidential Transmission	X
Direct Fax Number Entry	O
Economy Transmission	X
Fax on demand	X
Forwarding	X
Free Polling	O
Groups (3 groups)	O
Group Transfer Station	X
Hold	X
ID Transmission	O
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	O
Quick Dial (10 stations)	O
Reception modes (Fax, Tel, Auto)	O
Length Reduction	O
Remote control features	X
Remote Transfer	X
Restricted Access	X
Secured Polling	O

Communication Features - User Selectable	
Secured Polling with Stored ID Override	O
Secure Transmission	X
Send Later	O
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	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 times	O
Page separation mark	O
Protection against wrong conn.	O
Resol'n stepdown override option	X
Short Preamble	X
Well log	X

Other User Features	
Area code prefix	X
Automatic service call	Service
Center mark	X
Checkered mark	X
Clearing a memory file	O
Clearing a polling file	O
Clock	O

Other User Features	
Confidential ID	X
Copy editing (Erase Center/Margin)	X
Copy mode	O
Copy Mode Restriction	X
Counters	O
Daylight Saving Time	O
Destination Check	X
Direct entry of names	O
File Retention Time	X
File Retransmission	X
Function Programs	X
ID Code	X
Label Insertion	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	O
Own telephone number	O
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
Reduction/Enlargement	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	O
Polling Reserve Report	O
Polling Result Report	O
Power Failure Report	O
TCR (Journal)	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	O
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

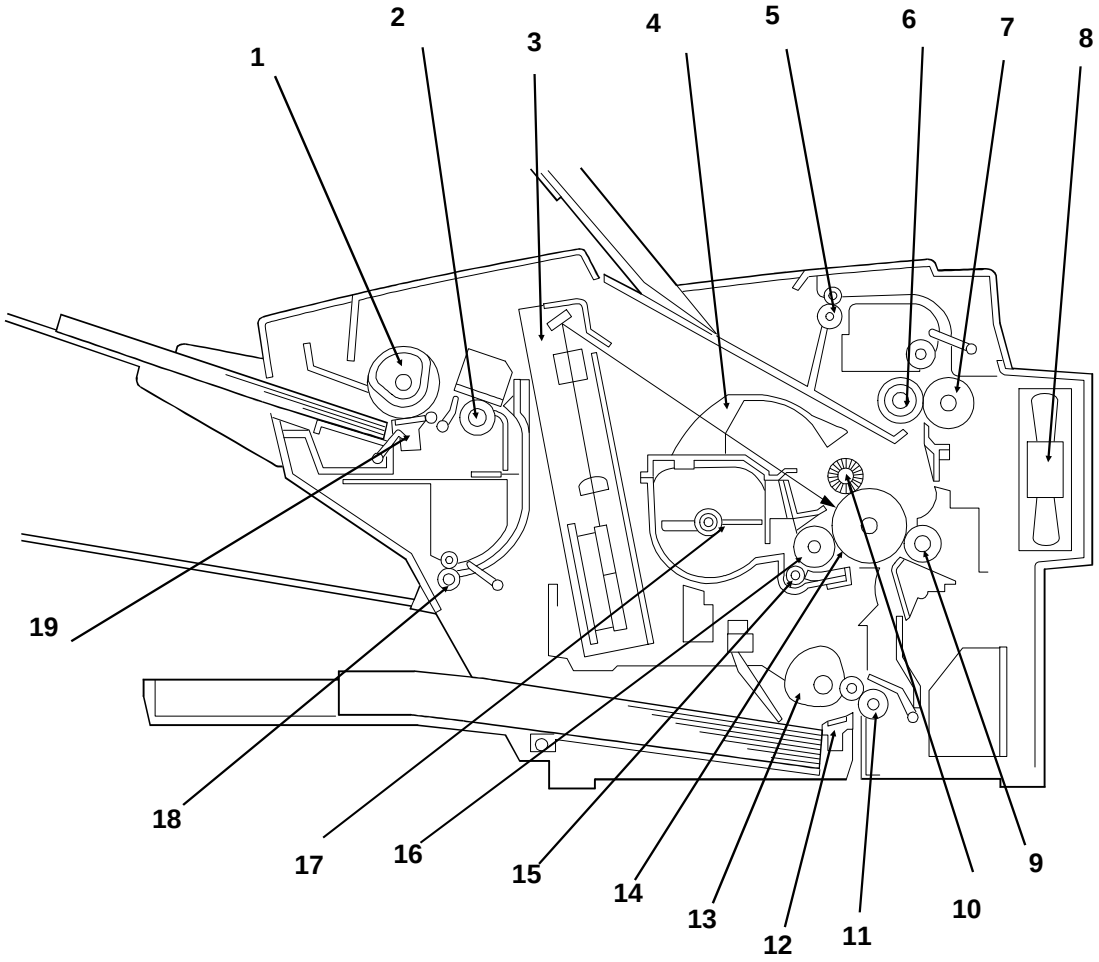
Service Mode Features	
Auto Paper Select test	X
Back-to-back test	X
Bit switch programming	O
Book mode test	X
Buzzer test	O
Cable equalizer	O
Comm. parameter display	O
Counter check	O
Country code	O
DTMF tone test	O
Echo countermeasure	O
Effective term of service calls	O
Error code display	O
Excessive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

Service Mode Features	
File Transfer	O
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	O
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
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: 30
Max. number of stations overall: 100

1.3. COMPONENT LAYOUT



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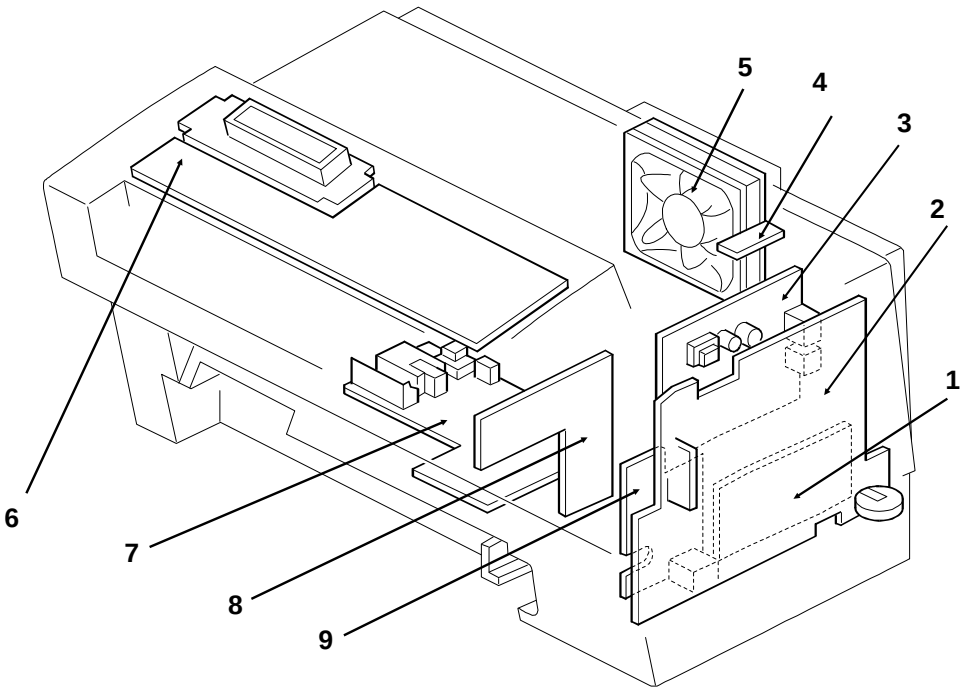
1.3.1. Mechanical Components

No.	Name	Description
1	Document Pick-up Roller	Picks up the top sheet of the document from the document table.
2	Scanner Roller	Feeds the document through the scanner.
3	Laser Unit	Consists of the LDDR (Laser Diode Driver), focusing lens, Fθ Lenses, square mirror motor, and other laser optic components.
4	Development Toner Magazine	Consists of the toner supply mechanisum, the toner tank, and the development unit.
5	Paper Feed-out Roller	Feeds paper out of the machine.
6	Hot Roller	Heat from this roller fuses the toner to the copy paper.
7	Fusing Pressure Roller	Applies pressure to the paper during the fusing process

No.	Name	Description
8	Fusing Fan	Cools the interior of the machine.
9	Transfer Roller	Applies a charge to the paper to pull the toner off the drum and onto the paper.
10	Charge Brush Roller	Applies a charge to the drum.
11	Paper Feed Roller	Feeds paper from the paper tray into the printer.
12	Paper Separation Pad	Allows one sheet into the printer.
13	Paper Pick-up Roller	Picks up the top sheet of paper from the tray.
14	OPC Drum	Organic Photoconductor Drum.
15	Toner Supply Roller	Supplies the toner to the development roller.
16	Development Roller	Applies toner to the latent image on the drum.
17	Toner Agitator	Stirs up toner in the toner tank.
18	Document Feed-out Roller	Feeds the document out of the scanner.
19	Document Separation Pad	Allows one sheet into the scanner.

1.3.2. Electrical Components



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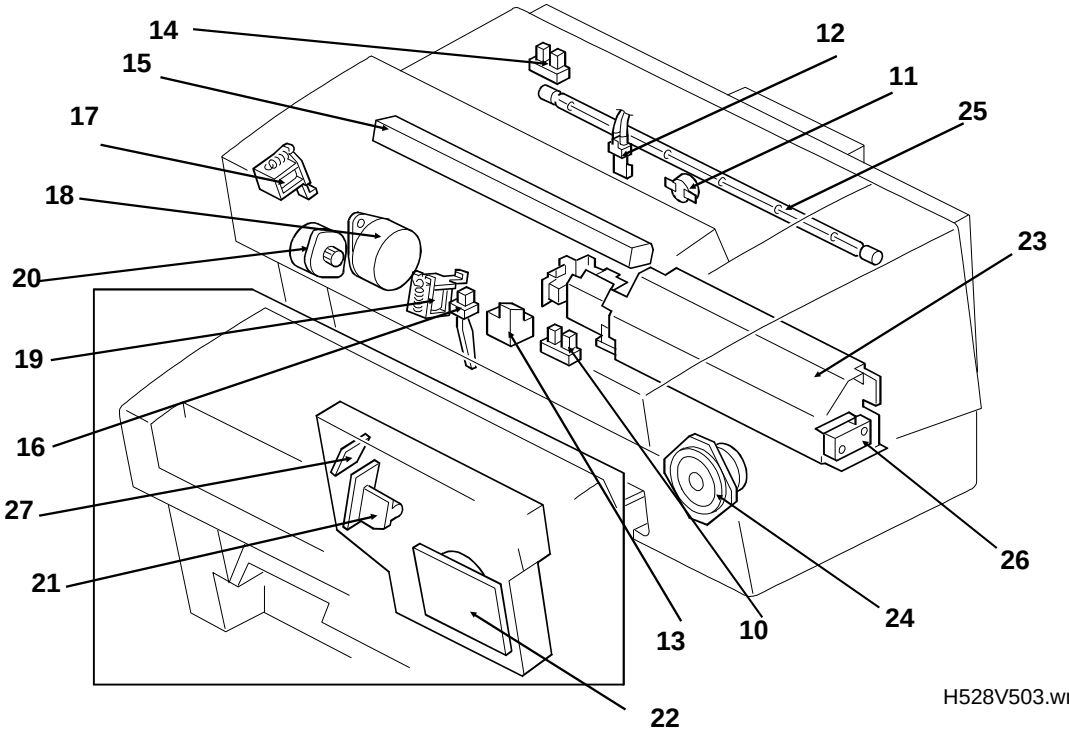

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1. PCBs

No.	Name	Description
1	MCB (Mechacincal Control Board)	Controls the printer part of the machine.
2	FCU (Facsimile Control Unit)	Controls the machine.
3	NCU (Network Control Unit)	Contains a relay and switches to interface the machine to the network and the handset.
4	PCB-R	Contains the resistors in the transfer bias circuit, between the ground plate and ground.
6	OPU (Operation Panel Unit)	Consists of the LCD and the key switches.
7	High-voltage Power Supply	Supplies high voltages to the charge, transfer, and development bias.
8	Scanner Sensor Board	Contains the scanner sensors (document, scan line, document exit), and the ADF cover open sensor.
9	5V Power Board	Generates the +5VE supply.
21	LDDR (Laser Diode Driver)	Drives the laser diode.
23	PSU (Power Supply Unit)	Supplies power to the machine.

2. Motors

No.	Name	Description
20	Tx Motor	Drives the scanner rollers.
18	Main Motor	This DC stepper motor drives the printer mechanism.
22	Square Mirror Motor	This high-speed servomotor drives the square mirror in the laser unit.
5	Fusing Unit Fan Motor	Cools the interior of the machine.

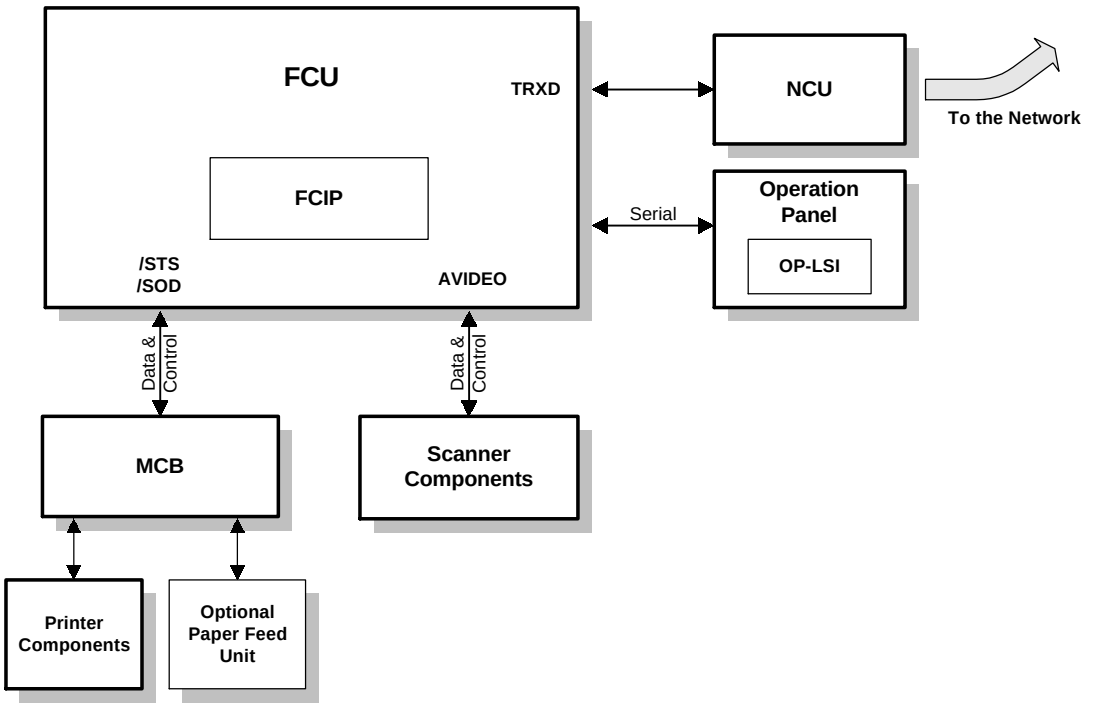
3. Sensors

No.	Name	Description
11	Thermostat	Cuts off the ac power supply to the fusing lamp if the surface temperature exceeds 180°C.
12	Thermistor	Is used to monitor the hot roller surface temparature.
13	Toner End Sensor	Is used to detect the toner end condition.
10	Registration Sensor	Is used to detect when paper is fed into the printer.
14	Paper Exit Sensor	Is used to detect when paper is at the fusing unit.
16	Paper End Sensor	Is used to detect when the paper tray is empty.
27	Synchronization Detector	Is used to synchronize the laser main scan.

4. Others

No.	Name	Description
15	Contact Image Sensor	Reads and converts the light reflected from the document into an analog video signal. An LED array which illuminates the document is included.
17	Document Pick-up Solenoid	When this is energized, tx motor drive is transmitted to the document pick-up roller.
19	Paper Pick-up Solenoid	When this is energized, main motor drive is transmitted to the paper pick-up roller.
25	Fusing Lamp	The heat from this lamp fuses the toner to the paper.
24	Speaker	Allows the user to listen to the condition of the machine and the telephone line.
26	Interlock Switch	If the top cover is open, this switch cuts off the +24V(SW) power supply. This component is also used as a top cover open sensor.

1.4. OVERALL MACHINE CONTROL



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The FCU controls the entire system of the machine.

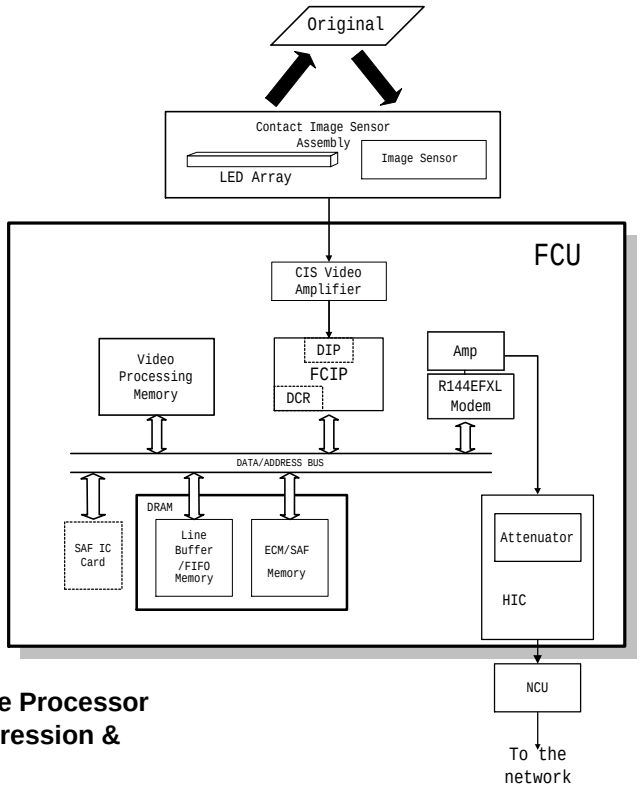
The printer components and the optional paper feed unit are controlled by the MCB. The FCIP in the FCU is connected with the CPU in the MCB through a synchronized 8-bit serial interface. The line synchronization signal for laser printing is sent to the FCIP from the MCB.

The scanner components are controlled by the FCU. Video data coming from the CIS is processed in the FCIP and then sent to the MCB for copying or sent to the NCU through the modem for transmission.

The operation panel is controlled by the FCU through a serial interface.

1.5. VIDEO DATA PATH

1.5.1. Transmission



DIP:Digital Image Processor
DCR:Data Compression & Reconstruction

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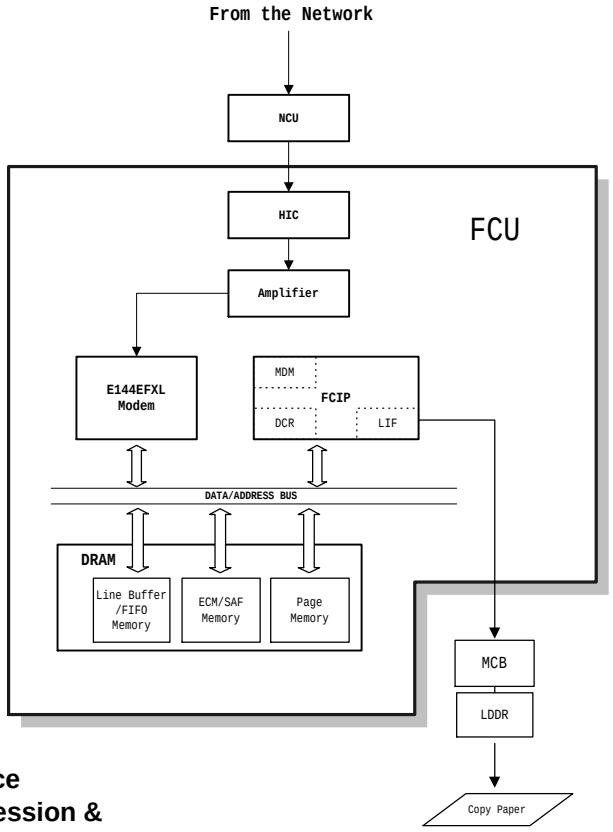
Immediate Transmission:
Scanned data from the contact image sensor passes to the DIP block in the FCIP. After analog/digital video processing, the DCR block compresses the data for transmission. The compressed data then passes either to the FIFO memory or to the ECM memory before it is sent to the telephone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

1.5.2. Reception



LIF: Laser Interface
DCR:Data Compression & Reconstruction
MDM: Modem

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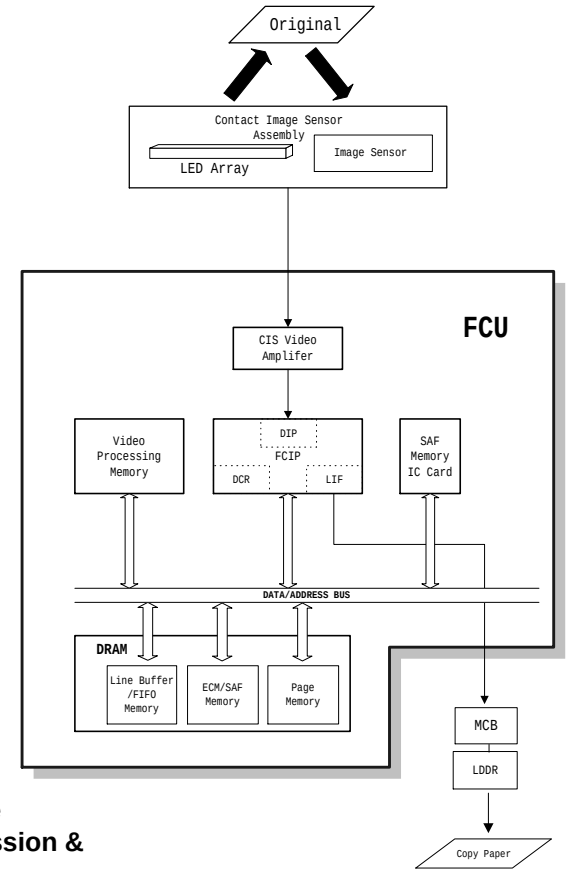
Data from the line passes to the modem through the NCU and hybrid IC. After the modem demodulates the data, the data passes to the DCR block, through either the FIFO or the ECM memory, where the data is decompressed to raster image data.

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 MCB through the LIF block in the FCIP, and then to the LDDR.

1.5.3. Copying



LIF: Laser Interface
DCR:Data Compression & Reconstruction
DIP:Digital Image Processor

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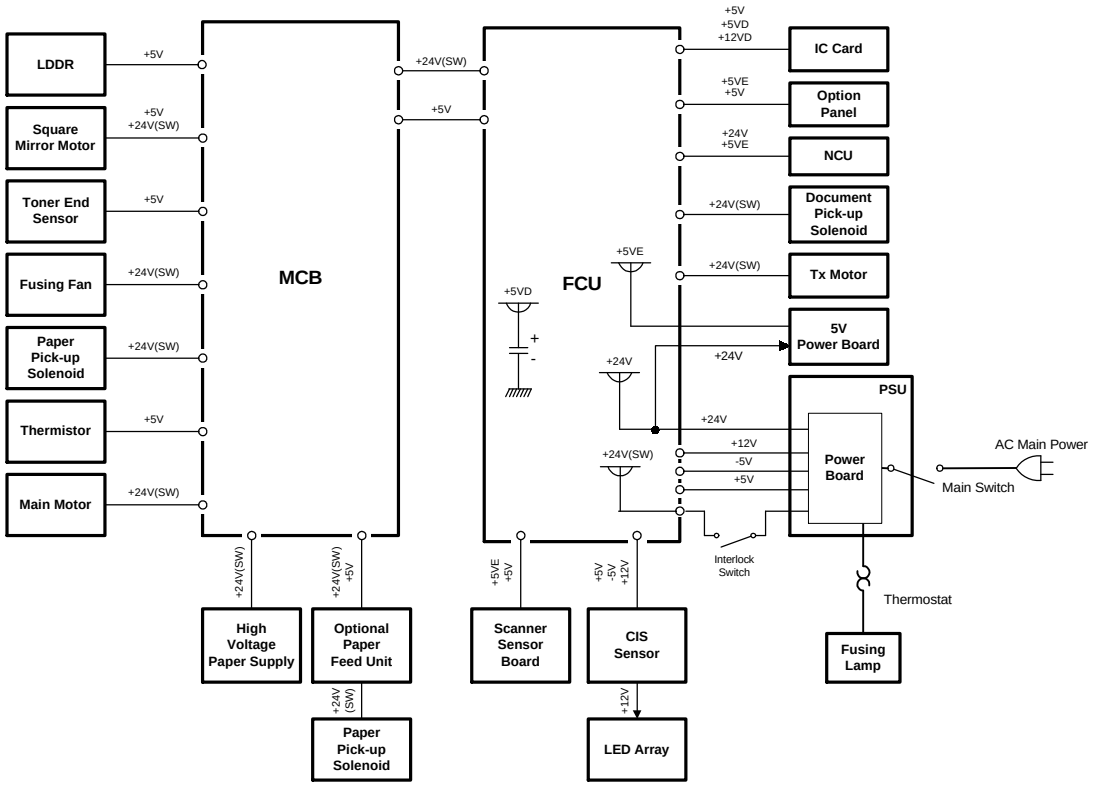
Single copy / Multi-page copy

The scanned data passes to the page memory after video processing in the DIP block in the FCIP. After a page of data has been stored in the page memory, the data is sent to the MCB through the LIF block, and then to the LDDR. This process is the same for multi-page copying.

1.6. POWER DISTRIBUTION

1.6.1. Distribution Diagram



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The PSU supplies +24V, +24V(SW), +12V, and ±5V dc power to the FCU. The +5V Power Board generates +5VE from the +24V suply. The dc supplies are used as follows.

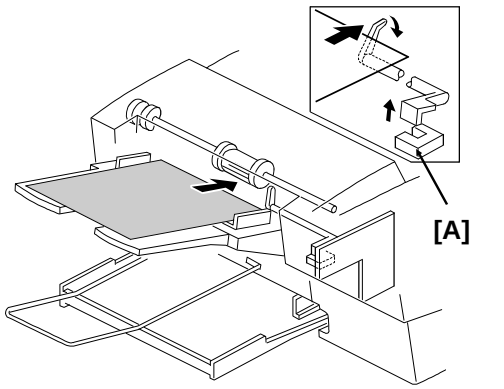
+24V	This is normally on when the main switch is on.
+5VE	This is used for the document sensor, operation panel, and NCU. This is supplied even if the machine is in power saver mode.
+12V	This supplies the LED Array in the CIS.
-5V	This is used for the image sensor.
+5V	This is normally on when the main switch on.
+12VP	This is supplied the to Flash ROM and the optional IC card.
+5VD	This supplies back up power for the system RAM and the optional IC card. A lithium battery is used to generate +5VD.
+24V(SW)	This is interrupted if the interlock switch opens.

2. DETAILED SECTION DESCRIPTIONS

2.1. SCANNER

2.1.1. Mechanisms

1. Document Detection



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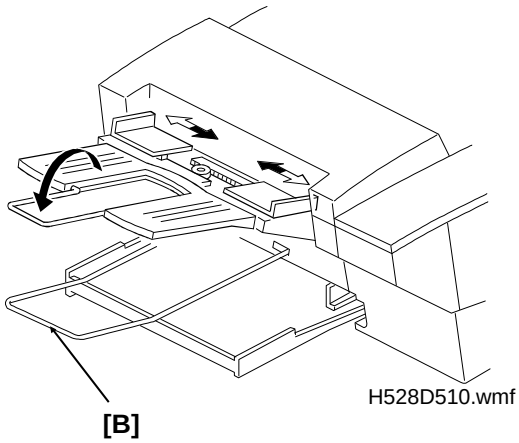

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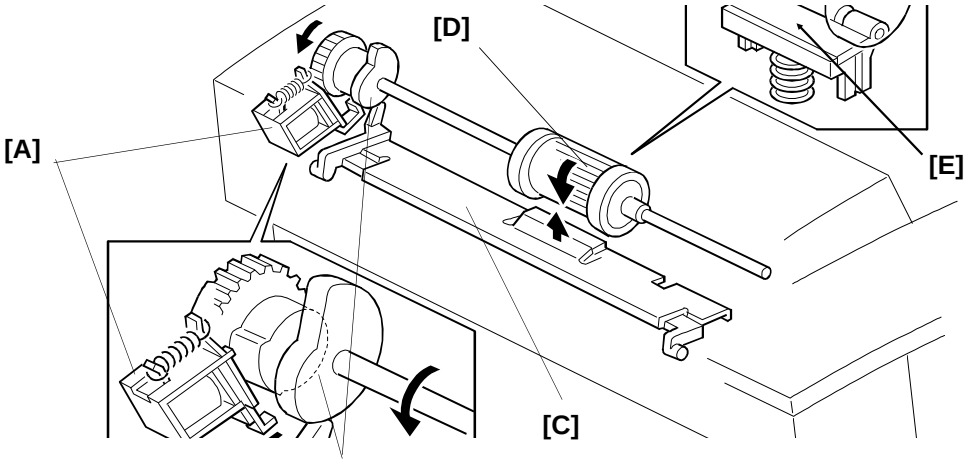
The document sensor [A] detects when a document is placed in the ADF. The fold-out extension [B] helps support longer documents.

2. Pick-up and Separation



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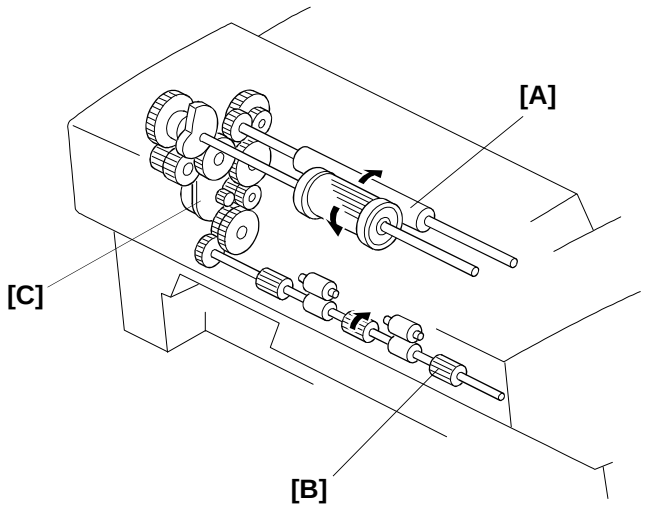
When the document pick-up solenoid [A] is turned on, it allows the tray lifting cam [B] to rotate. This allows the document plate [C] to be pushed up by a spring under the plate. The document pick-up roller [D] feeds the top sheet of the document into the scanner. The separation pad [E] prevents the document pick-up roller from feeding more than one sheet at the time.

3. Drive Mechanism



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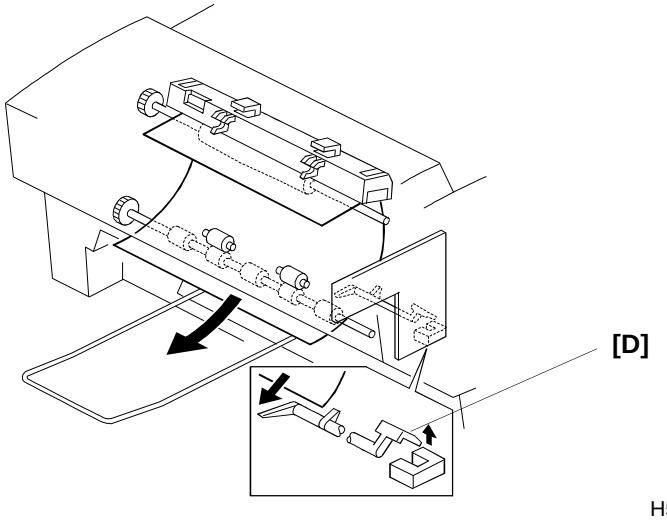
The document is fed into the scanner by the scanner roller [A], and fed out by the exit roller [B]. The tx motor [C] drives the scanner roller and the exit roller.

The document exit sensor detects when the document leaves the scanner.



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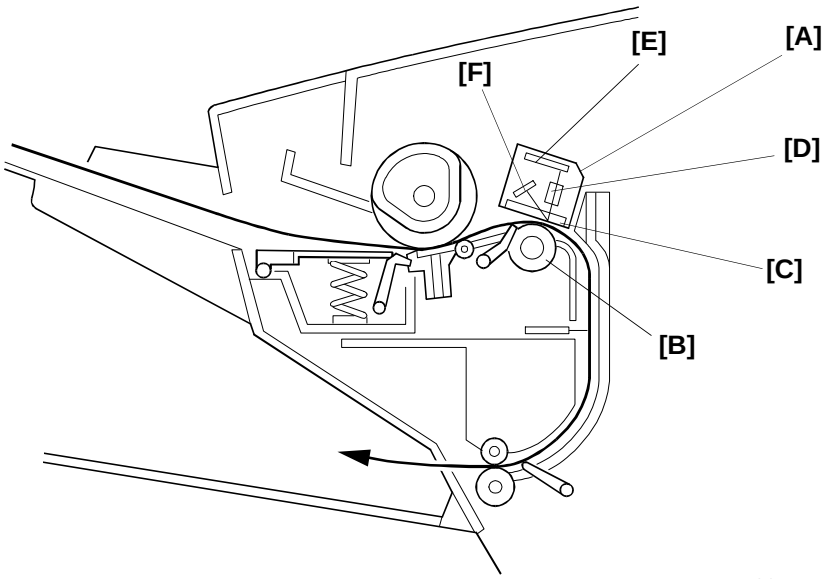
Note: When a communication error occurrs in immediate tx, the machine stops scanning the document, then feeds it out of the scanner.

4. Image Scanning



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The scanner consists of a contact image sensor (CIS) assembly [A] and a scanner roller [B]. Inside the CIS are an exposure glass [C], a rod lens array [D], an image sensor [E], and an LED array [F].

The image sensor consists of a row of 1728 photosensitive elements (216 mm width x 8 dots/mm). Light from the LED array is reflected from the document and focused onto the image sensor by the rod lens array. Because of the short optical path inside the CIS, the focal depth is much shorter than for a CCD type scanner.

The white level adjustment is performed at the factory, then the white level is stored in the FCU's SRAM. The white level must be adjusted when the FCU or the CIS is replaced, or the SRAM is cleared in the field.

The CIS scans the document one line at a time, and outputs an analog signal for each line. The voltage from each element depends on the intensity of the light reflected by the document onto the element; the intensity of the light depends on the darkness of the area reflected.

Cross reference
White level adjustment: Service Tables and Procedures (chapter 4) - Function 10, Shading Test

Standard resolution (Scanning to memory)

- 3.85 line/mm resolution.
- One line is read each motor step.
- Scan speed: 2.75 s /A4 size.
- The tx motor rotates at 800 pps to scan the document into the memory.
- OR processing is always disabled to make scanning faster.

Standard resolution (Immediate tx)

- 3.85 line/mm resolution.
- One line is read every two motor steps.
- Scan speed: 5.5 s /A4 size.
- The tx motor rotates at 400 pps to scan the document.
- OR processing is done, to prevent narrow vertical lines from being broken up (OR processing can be disabled with scanner switch 00, bit 4).

Detail resolution

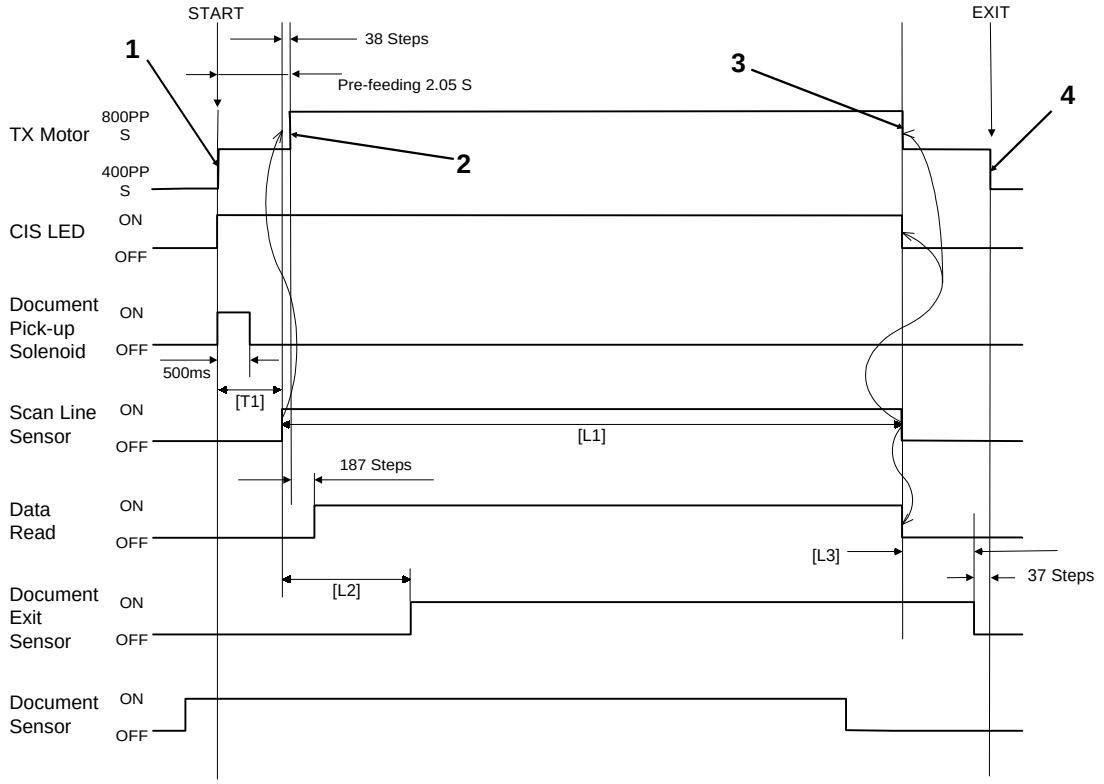
- 7.7 line/mm resolution.
- One line is read every motor step.
- Scan speed: 5.5 s /A4 size.
- The tx motor rotates at 400 pps to scan the document.
- In copy and halftone mode, scanning always uses detail resolution.

Fine resolution

- 15.4 line/mm resolution.
- One line is read every motor step.
- Scan speed: 11.0 s /A4 size.
- The tx motor rotates at 400 pps to scan the document.

2.1.2. Scanner Timing Chart

1. Timing Chart



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The following describes what is happening for the standard resolution at points 1 to 4 on the timing chart.

1. When the Start key is pressed, the pick-up solenoid turn on, then the tx motor feeds the document to the scan line sensor (400 pps).
2. The tx motor feeds the document through the scanner (800 pps).
3. The tx motor feeds the document out of the scanner.
4. The tx motor stops 82 steps after the document exit sensor was turned off.

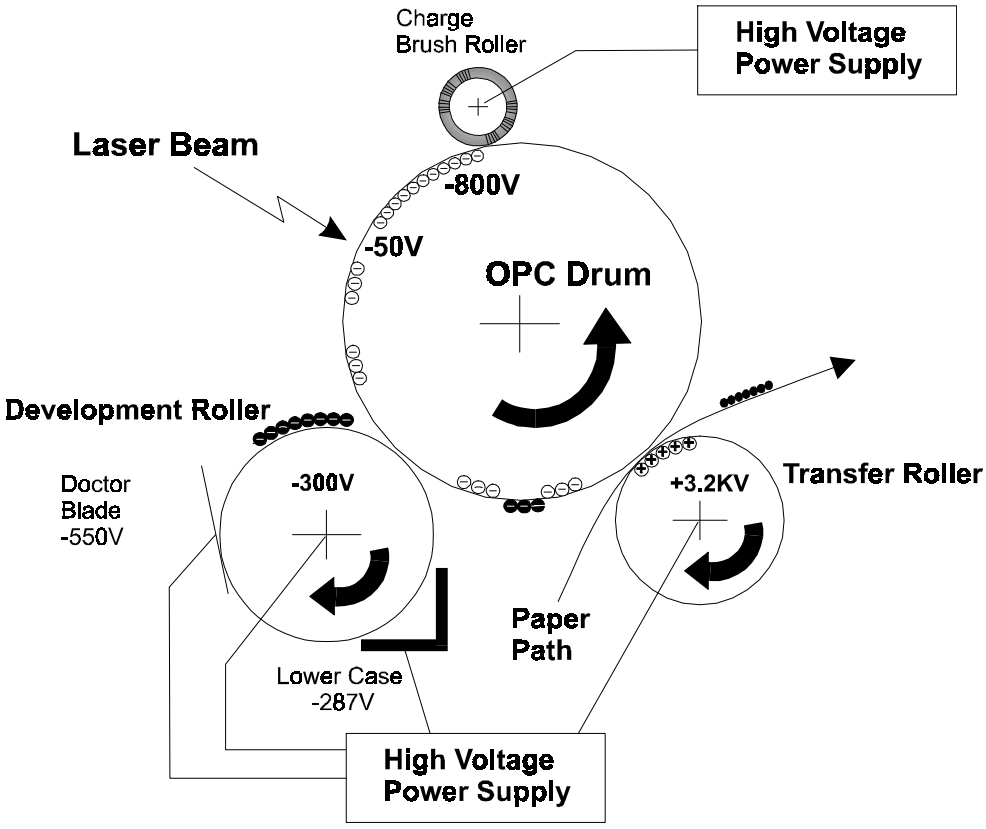
2. Jam Conditions

The main cpu detects a document jam if one of the following conditions occurs.

Jam Condition	Description	Error Code
Non-feed	The scan line sensor does not switch on within 3.9 s [T1] of the tx motor starting. The jam condition is reset when the document, scan line, and exit sensors are turned off.	1-00
Maximum document length exceeded	The scan line sensor does not turn off after the maximum document length [L1] has been fed since it turned on. The jam condition is reset when the document, scan line, and exit sensors are turned off.	1-01
	The document exit sensor does not turn off after the maximum document length [L3] has been fed since the scan line sensor turned off. The jam condition is reset when the document, scan line, and exit sensors are turned off.	1-17
Document jam	The document exit sensor does not turn on when the tx motor has rotated for 160 mm feed length [L2] after the scan line sensor turned on. The jam condition is reset when the document, scan line, and exit sensors are turned off, and the ADF cover opened then closed.	No error code
	When the document exit sensor is off while the scan line sensor goes to off. The jam condition is reset when the document, scan line, and exit sensors are turned off, and the ADF cover opened then closed.	
Cover open	The top cover is opened while the machine is working. The jam condition is reset when the top cover and the ADF cover are closed.	No error code
Others	The scan line, document, or document exit sensor is on during initialization. The jam condition is reset when the document, scan line, and exit sensors are turned off.	No error code

2.2. PRINTING

2.2.1. Printing Process - Overview

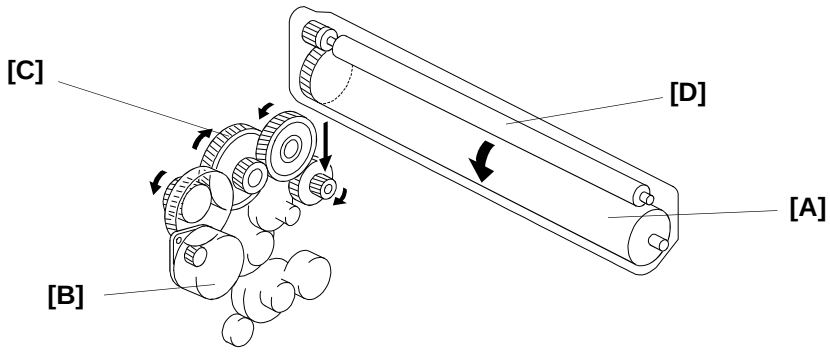


H528D545.wmf

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

- The charge brush roller applies a negative charge to the drum of -350 V to -1350 V, switched at 30 Hz.
- The surface voltage of the drum is approximately -800 V.
- The laser exposed area on the drum drops to about -50 V.
- The development roller carries toner to the latent image on the drum surface. The bias voltages during printing:
  Development roller : -300 V
  Doctor blade: -550V
  Lower case: -287 V
- The transfer roller attracts toner from the drum onto the paper. The bias applied is +3.2 kV.
- This machine has no cleaning unit or waste toner tank.

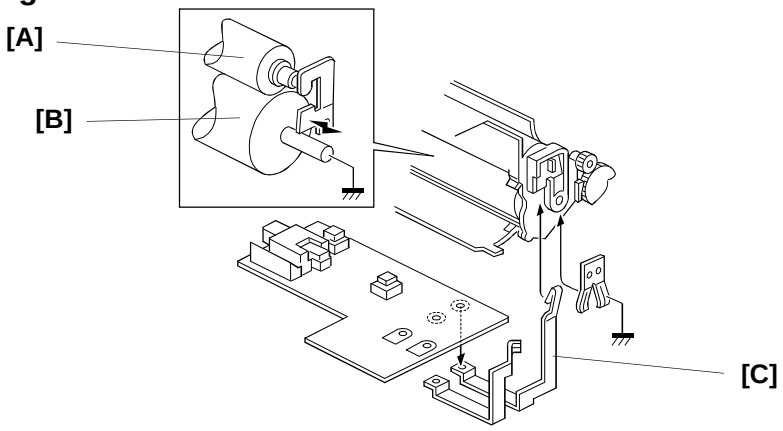
2.2.2. OPC Drum



H528D506.wmf

This machine uses an organic photoconductor drum [A]. The diameter of the drum is 30 mm. It is driven by the main motor [B] through a gear train [C]. The charge brush roller [D] is also driven by the main motor.
The drum cartridge is replaceable by the user.

2.2.3. Charge



H528D517.wmf

The charge brush roller [A] is located in the drum unit. It applies the charge bias in direct contact with the drum [B]. The high voltage power supply applies a high voltage of -350 V to -1350 V, switched at 30 Hz, through plate [C].

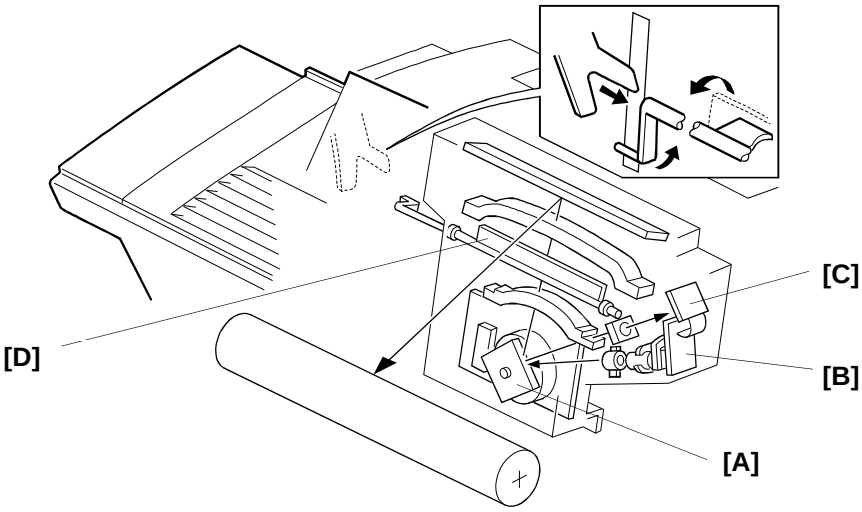
Since the machine uses a charge brush roller, the ozone production is greatly reduced and the charge bias applied to a roller is relatively low compared to that for a corona wire.

The charge brush roller rotates faster than the drum. (The speed ratio is about 4 : 1.)

There is no cleaning mechanism. Also, toner is transferred back to the drum by the transfer roller in cleaning mode. The charge brush roller picks up some of this toner. In extreme cases, this may lead to vertical black lines on copies in areas corresponding to places on the brush that have excessive toner.

2.2.4. Laser Exposure

1. Overview



H528D505.wmf

The components of the laser section create a latent image on the drum. The charge on the exposed areas of the drum drops to about -50 V while non-exposed areas remain at about -800 V.

This machine uses a rotating square mirror [A]. The beam emitted from the LDDR [B] is reflected by the square mirror to the line synchronization detector [C] for line synchronization in the main scan direction. The mirror's rotation speed is 8431.7 rpm.

As a safety feature, the shutter [D] closes to block the laser beam path whenever the top cover is opened.

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

2. Error Conditions

LD Failure:
The mechanical control board detects an LD failure when the laser power is out of the specified range. When this occurs, the machine warns the user on the LCD panel (SC code 2-22).

Mirror Motor Failure:
The machine detects a mirror motor error when the MCB does not detect the line synchronization detector signal within 1 second of the mirror motor being turned on. The machine also detects a mirror motor error when the motor rotation is not within 8431.7 rpm ± 5% at 4.2 seconds after the motor turns on or if the motor is not within 8431.7 rpm ± 3% for more than 0.5 second during mirror motor operation. Since this error is detected with the line synchronization detector signal, the machine may detect LD malfunction as a mirror motor failure. When these errors occur, the machine warns the user on the LCD panel (SC code 3-31).

Cross reference
Service Call Conditions: section 7-3

3. 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)

Note:
- Toner saving mode only works when printing fax messages and reports. (However, toner saving is disabled when receiving a half-tone mode message in NSF/NSS mode.)
- 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.

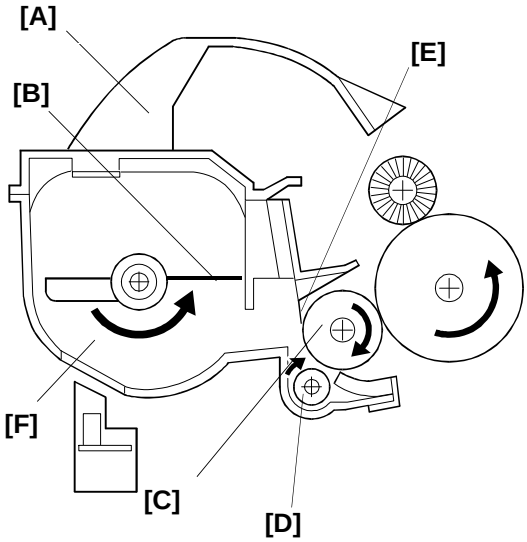
Cross Reference
Toner Saving Mode: User parameter 12, bit 2

Edge Enhancement

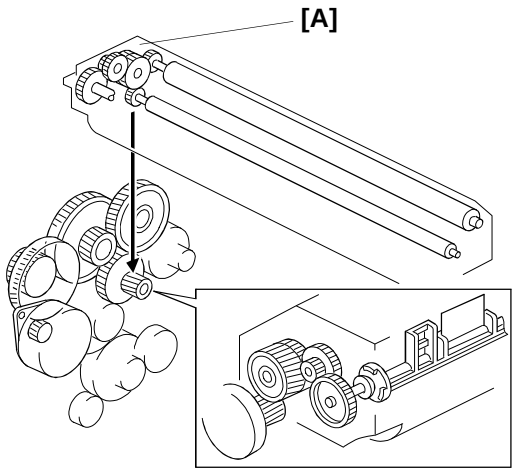
In toner saving mode, the machine prints a black pixel whenever the data changes from white to black in the main scan direction. In this way, edges on the image are printed more clearly.

2.2.5. Development

1. Overview



H528D508.wmf



H528D507.wmf

This machine contains a development toner magazine (DTM) [A], which contains the toner agitator [B], development roller [C], toner supply roller [D], doctor blade [E], and the toner tank [F].

At toner end, the entire DTM is replaced by the user.

There are two rollers in the DTM: the toner application roller [D] and the development roller [C].

The toner agitator [B] stirs the toner and carries it to the toner supply roller [D]. The toner is then carried from the toner supply roller to the development roller. As the development roller turns past the doctor blade [E], only a thin coating of negatively charged toner particles stay adhered.

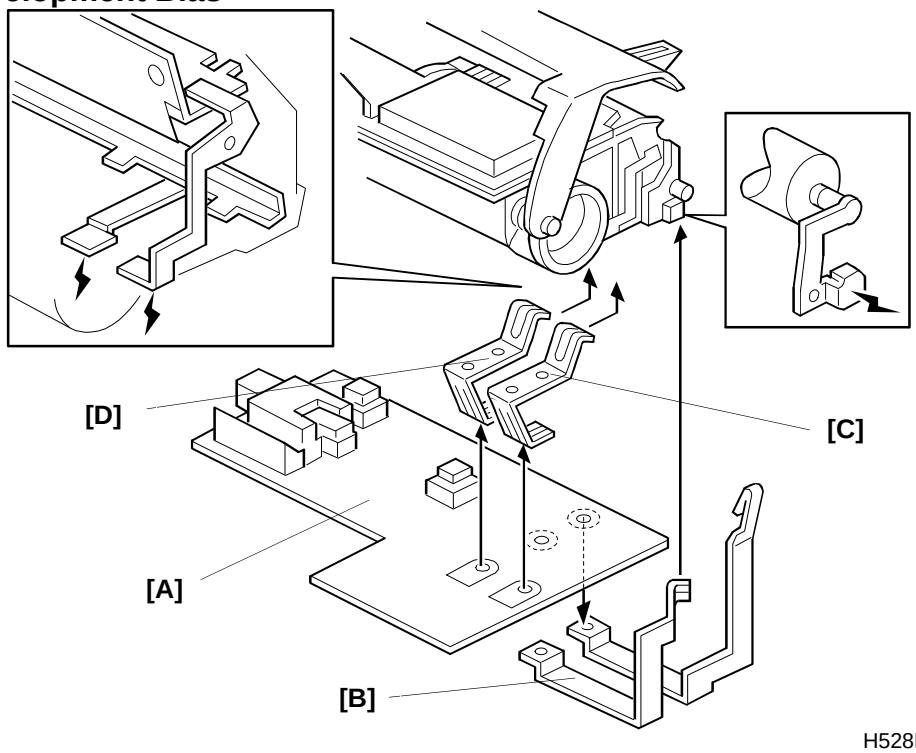
Cross reference
Group 3 Facsimile Manual: section 4-4-2

During printing, a bias voltage of -280 V is applied to the development roller (when a print density setting of Normal is selected). The development bias changes in accordance with the print density selection (user parameter 12, Bit 3 and 4).

Since the laser exposed areas on the drum are reduced to -50 V, the toner is trasnferred from the development roller onto these areas of the latent image as they turn past the drum.

There is no DTM detection in this machine.

2. Development Bias



H528D516.wmf

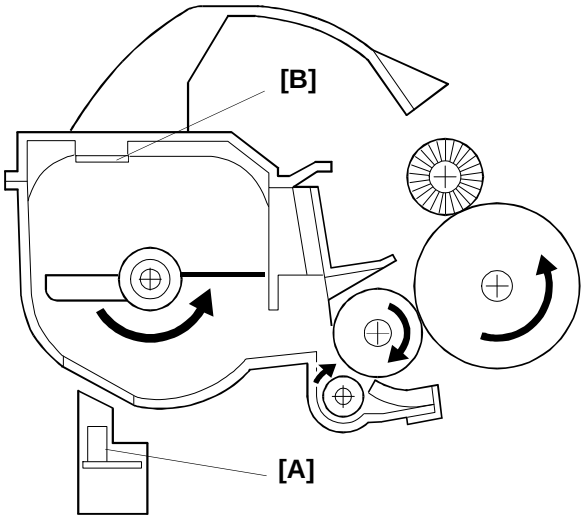
The high voltage power supply [A] applies different voltages to the components of the DTM. The applied voltages are:

- Development roller: -280 V [B] (depending on the user's print density selection)
- Doctor blade: -550 V [C]
- Lower casing: -287 V [D]

The toner is negatively charged by the friction generated by the toner agitator.

3. Toner End Detection

The toner end sensor [A] (a reflective photosensor) is located under the DTM. When the toner is almost empty, the sensor's light is reflected by the mirror [B] at the top of the toner tank. The machine monitors this sensor only when the main motor is on. If the sensor detects the reflected light 5 times in a row, within a specified period, the MCB detects a toner near end condition, and informs the FCU. The machine can then print 100 more sheets, at which time the FCU disables printing (toner end condition). At this time the DTM must be replaced.

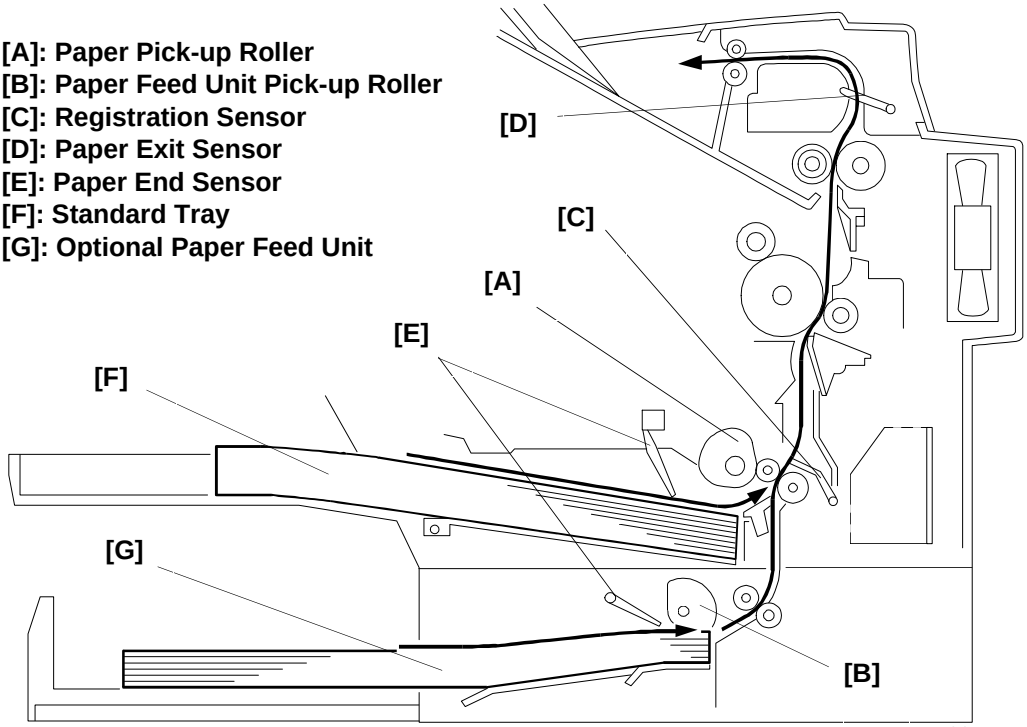


H528D508.wmf

2.2.6. Paper Feed

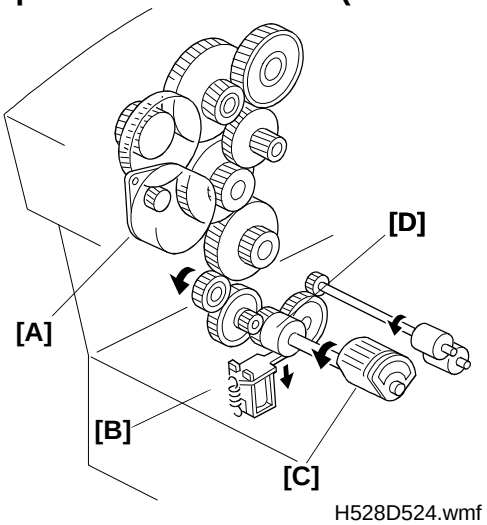
1. Paper Path

[A]: Paper Pick-up Roller
[B]: Paper Feed Unit Pick-up Roller
[C]: Registration Sensor
[D]: Paper Exit Sensor
[E]: Paper End Sensor
[F]: Standard Tray
[G]: Optional Paper Feed Unit

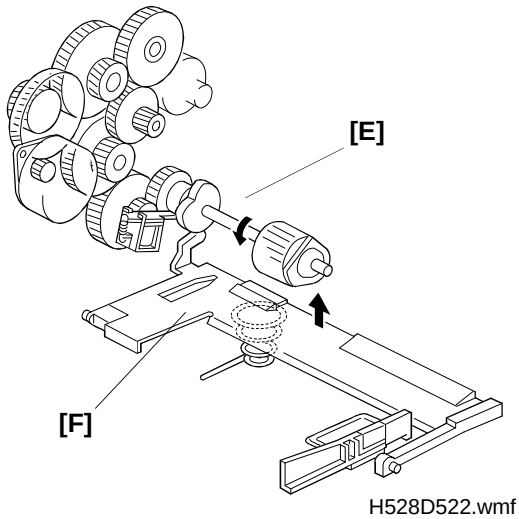


H528D547.wmf

2. Paper Feed Mechanism (Standard Tray)



H528D524.wmf



H528D522.wmf

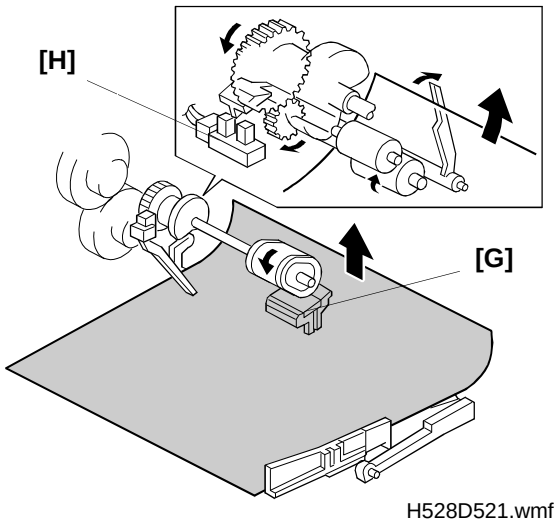
[A]: Main motor

Paper Feed Sequence

When the paper pick-up solenoid [B] is turned on, the motor rotation is transferred to the paper pick-up roller [C] by the spring clutch [D].

When the solenoid is turned on, it allows the tray lifting cam [E] to rotate. This allows the bottom plate [F] to be pushed up by the spring.

The top sheet of paper in the tray is fed by the paper pick-up roller. The paper feed solenoid is then turned off. The separation pad [G] prevents multi-feeding.



H528D521.wmf

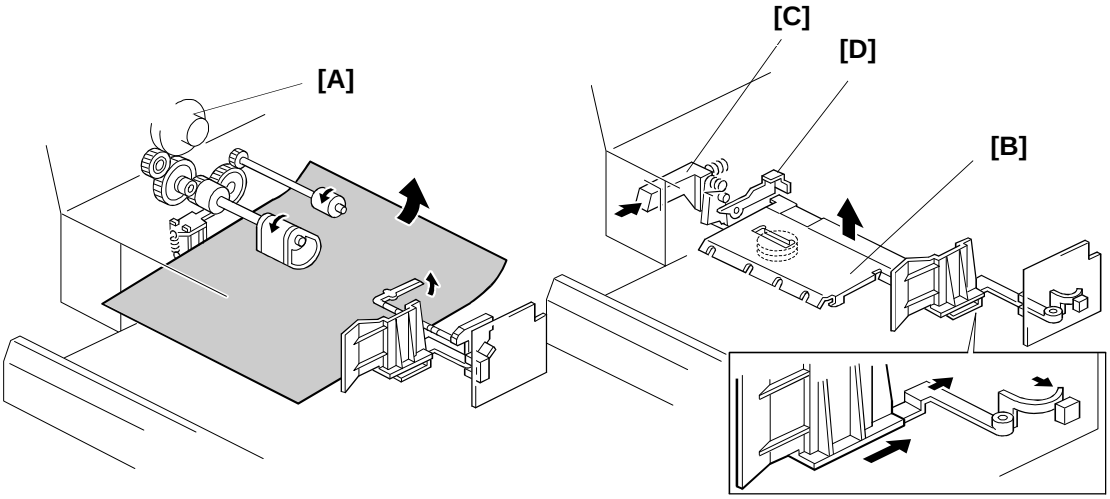
The paper activates the registration sensor [H]. This sensor warns the printer that a sheet of paper is coming, to initialize the laser engine. It is also used for paper size and jam detection. If the paper size is determined not to match the selected paper size, a paper size error is detected. The machine stops printing and indicates the user of the incorrect paper size, but the image data is retained and will be printed out when the paper is reset in the tray.

When the solenoid is turned off, the paper feed roller stops and the bottom plate returns to the original position.

The paper end feeler [I] drops into the slot in the bottom plate to detect paper end when the paper tray is empty.

3. Paper Feed Mechanism (Optional Feed Unit)

Paper Feed Sequence



H528D523.wmf H528D525.wmf

The paper feed sequence for the optional paper feed unit (PFU) is the same as the standard tray except for the following:

- The paper pick-up roller of the PFU is driven by the machine's main motor.
- The bottom plate [B] is lifted up when the release button [C] is pressed.
- A corner separator [D] is used.

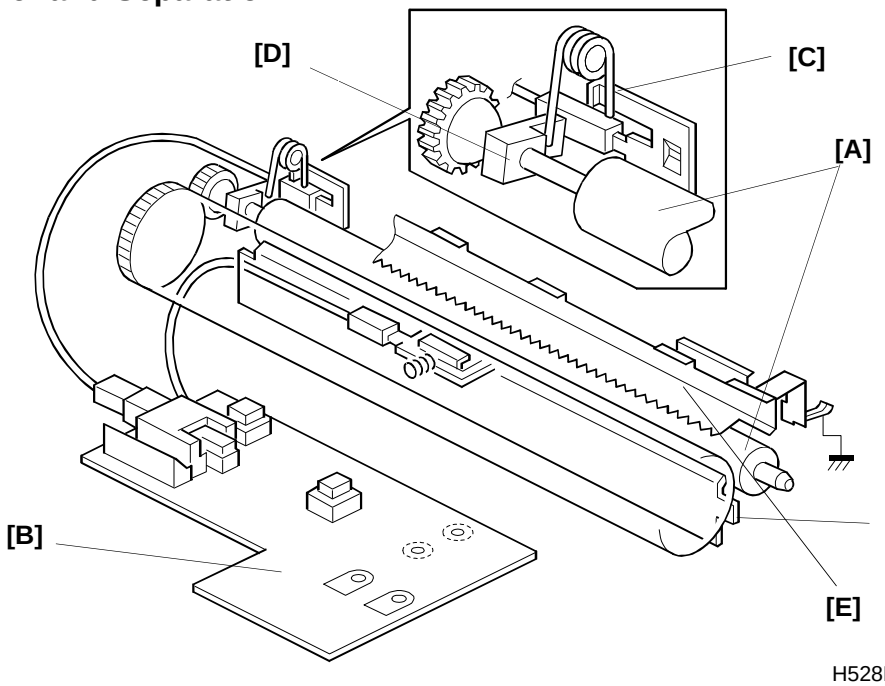
Jam Detection: Registration

Misfeed:
The machine detects a misfeed if the registration sensor does not turn on within 2 seconds (4 seconds for the optional tray) after the paper pick-up solenoid is turned on. A misfeed is also detected if the registration sensor turns on before the paper pick-up solenoid is turned on.
When a misfeed is detected, the machine will finish printing that page before turning off the drive components (error code 9-07 when the paper is fed from the standard tray, or 9-50 when the paper is fed from the paper feed unit).

Paper Jam:
The machine detects a paper jam if the registration sensor is on when the power is turned on or when the upper cover is closed. A jam is also detected if the registration sensor remains on for over 11 seconds. When a jam is detected, it immediately turns off all drive components, except the fusing unit fan.

2.2.7. Transfer

1. Transfer and Separation



H528D518.wmf

A transfer bias of +3.2 kV is applied to the transfer roller [A] from the high voltage supply [B]. This charge is applied through the torsion spring [C] and the conductive supporter [D].

The positively biased transfer roller pulls negatively charged toner onto the paper.

The ground plate [E] and curvature of the drum both help the paper to drop away from the drum.

2. Cleaning Mode

If the paper is smaller than the printed image, or if a paper jam occurs during printing, toner may be transferred to the the transfer roller surface. To prevent 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 charge is applied to the drum, the drum is completely exposed by the laser, and -800 V is applied to the transfer roller. The negatively charged toner on the transfer roller is then transferred back to the drum.

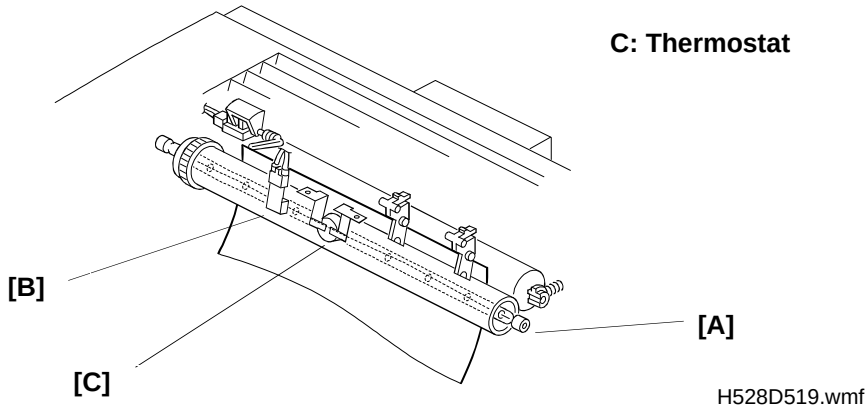
During the cleaning mode, the positive bias of +100 V is applied to the development roller to avoid any toner transfer to the drum.

The machine goes through the cleaning mode in the following conditions:

- At power-up
- When the printer cover is opened and then closed during printing.
- After a printer jam has been cleared.

2.2.8. Fusing

1. Fusing Temperature Control



The power supplied to the lamp [A] is controlled by the MCB. The MCB uses the thermistor [B] to determine when to turn the fusing lamp on and off.

When the main switch is turned on, the machine turns on the fusing lamp and raises the fusing temperature to 181° C. For printing, the machine keeps the fusing temperature at 176° C.

When the printing operation is finished, the machine keeps the fusing temperature at 161° C for 3 minutes (depending on the power saver mode settings).

Points to note:

- Printing temperature: 176° C
- Thermistor maximum: 250° C
- Thermostat maximum: 180° C (the temperature of the hot roller would be about 300° C.

2. Power Saver Mode Settings

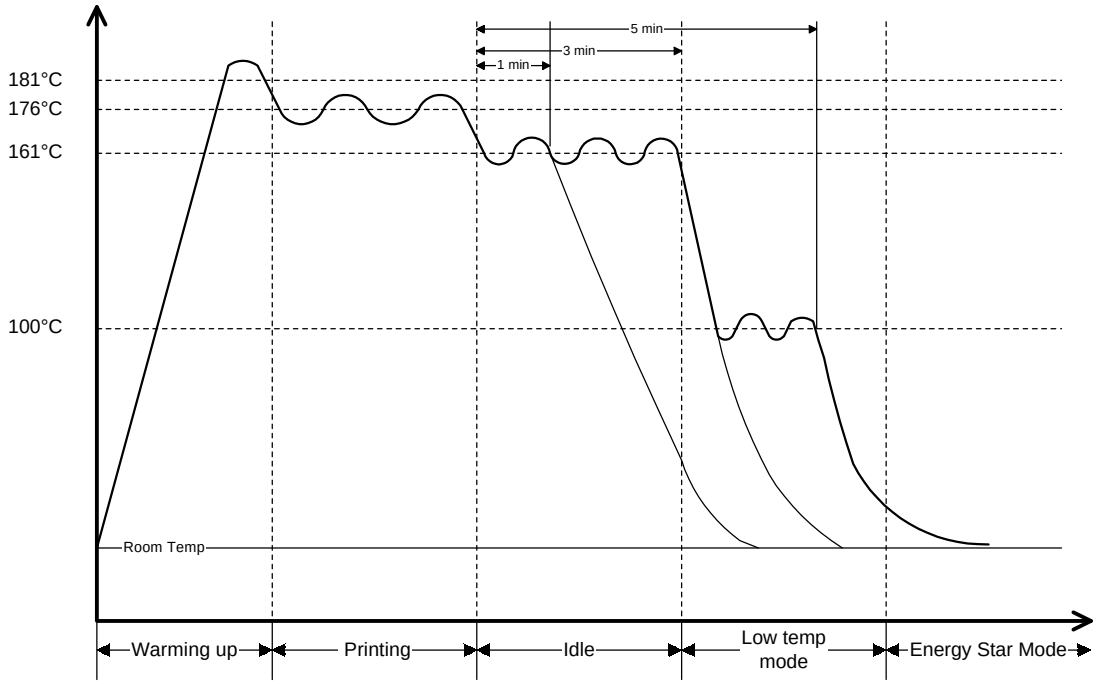
The behaviour of the machine after printing depends on the following:

- User level Power Saver Mode setting (100 ° C or room temperature)
- Power Saver Mode timer (system bit switch 0B, bits 2 and 3)

- User Setting: Fusing Lamp On (100 ° C) -

After printing, the fusing lamp temperature drops to 161° C. Then, the fusing lamp temperature will fall back to 100 ° C after 3 minutes, regardless of the system bit switch setting.

- User Setting: Fusing Lamp Off -



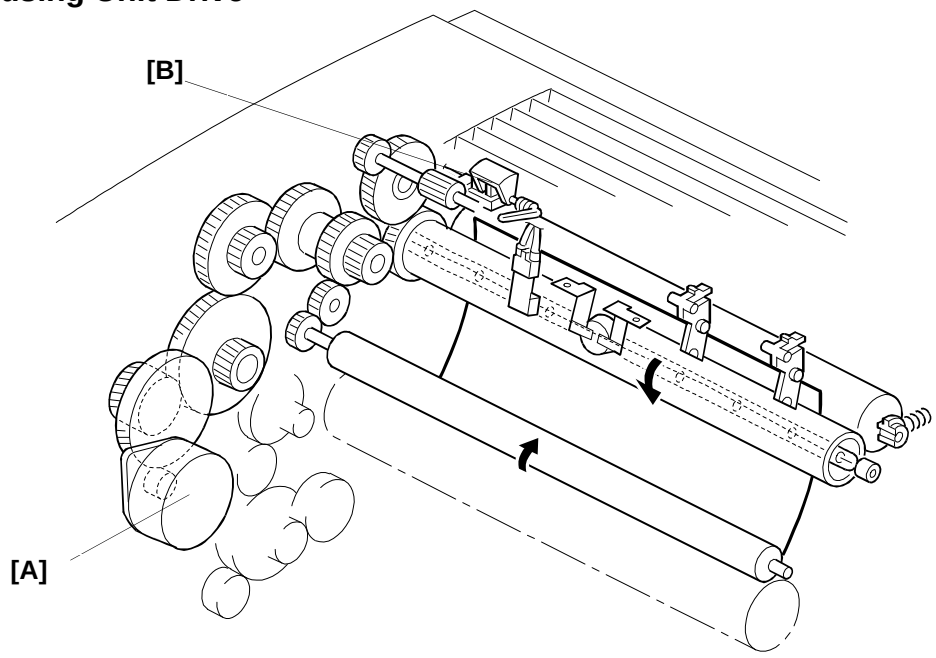
H528D546.wmf

After printing, the fusing lamp temperature drops to 161° C. Then, the fusing lamp temperature will fall back to room temperature after 1 or 3 minutes, depending on the system bit switch setting.

If the system bit switch is set to 5 minutes, the lamp temperature falls back to 100° C after 3 minutes, and then to room temperature after a further 2 minutes.

If the power saver mode timer is set to "no limit", the temperature stays at 161° C for 3 minutes, then goes down and stays at 100° C.

3. Fusing Unit Drive



H528D520.wmf

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

Jam Detection: Paper Exit

The exit sensor detects a jam if it does not turn on between 3.5 and 4.5 seconds after the registration sensor is turned on.
The exit sensor detects a jam if the exit sensor is on when the main switch is turned on or when the printer cover is closed. The sensor will also detect a fusing jam if it does not turn off between 3.4 and 4.7 seconds after the registration sensor is turned off (error code 9-09).

4. Fusing Unit Service Call Conditions

The machine warns the customer on the LCD panel (SC code 0-02) when any of the following conditions occur (error code 9-22).

- When the fusing temperature is below 90° C and does not increase at least 20° C within 12 to 30 seconds after the lamp turns on.
- If the fusing temperature does not exceed 157° C within 60 seconds after the lamp turns on.
- If the fusing temperature drops below 70° C when the low temperature (100° C) is selected in the power saver mode.
- If the fusing temperature drops below 145° C while printing.
- If the fusing temperature exceeds 200° C for more than 50 ms.

Cross reference
Service Call Conditions: Section 7.3
Power Saver Mode: Section 2.3.1

5. Fusing Unit Fan

The fusing unit fan cools the machine. The fan motor turns on for 2 seconds when the machine is turned on. It also turns on during printing and turns off 3 seconds after printing.

The MCB detects a fusing unit fan error when the voltage of the motor falls below 160 mV for more than 2 seconds while turning.

2.2.9. 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 03, 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 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	Not used	Legal	F, F4	A4	Letter	Not used	Not used
Sw 04	0: 4/3		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 paper size. All lengths are in millimeters. The factory setting of the reduction ratio is 4/3.

Copy Paper Type	Copy Paper Length	Maximum reducible incoming page length.		
		Ratio = 4/3	Ratio = 8/7	Ratio= 12/11
A4	297	386.0	330.9	315.8
F/F4	330.2	411.7	368.8	352.2
Letter	279.4	362.6	310.6	296.6
Legal	355.6	411.7	397.9	379.7

Note: The page memory cannot reduce incoming pages longer than 411.7 mm.

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 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.

2.2.10. Paper Size Selection

If the machine has an optional paper feed unit installed, the paper size to use is decided in accordance with the following rules.

- If both trays contain the same paper size, the machine uses the paper in the optional paper feed unit first.
- If the received page has to be split up and printed on two pages, both pages will be the same size.
- If the trays 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			
	Letter	A4	F, F4	Legal
Letter	1	2	3	4
A4	4(R)	1	2	3
F, F4	4(R)	3(R)	1	2
Legal	4(R)	3(R)	2(R)	1

- The paper size priority is graded from 1 to 4.
- R: The data is reduced to fit on the printer paper.

2.3. SYSTEM FEATURES

2.3.1. Power Saver Modes

1. Going into a Power Saver Mode

- Power Saver Timer -

When the power saver timer expires, the machine automatically goes into a Power Saver Mode. During the power saver mode, the fusing lamp is turned off or on according to the User Switch 05, bit 6 setting. All the LEDs on the operation panel are turned off and "SAVING ENERGY" is displayed on the LCD.

The CPU is not turned off during the power saver mode.

The machine returns to the standby mode in the following conditions:

- When the document sensor is activated.
- When any key on the operation panel is pressed.
- When the handset goes off-hook.

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

- Turning the Fusing Lamp On or Off -

The machine will not turn off the fusing lamp if one of the following conditions exists.

- Mechanical error(s)
- Service call error(s)

It takes approximately 50 s to reach the printing temperature from room temperature after the machine turns on the fusing lamp. To avoid any communication error from memory overflow, the machine will not turn off the fusing lamp in the following conditions.

- If the remaining SAF memory is less than 64 kbytes.
- Within 30 minutes after a communication error occurs.

2.3.2. Automatic Service Calls

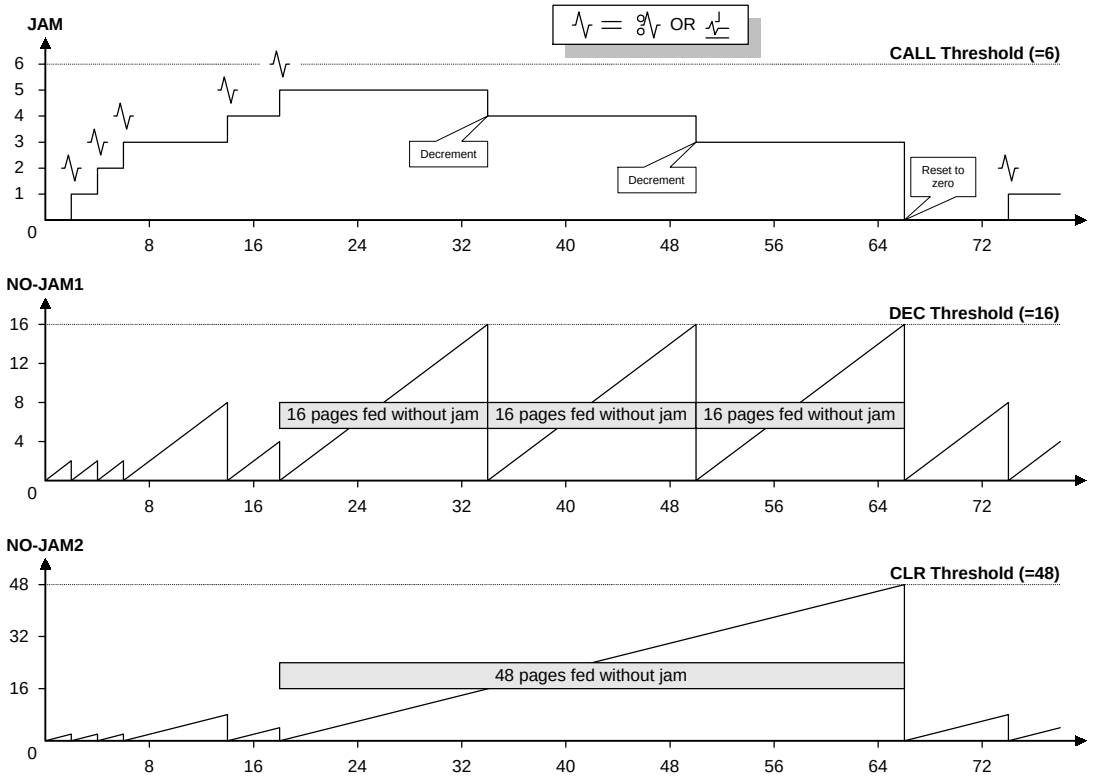
1. Service Call Conditions

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

Service Call Conditions	Error Code	Sub-code 8002F9(H)
Laser diode failure	9-20	22
Fusing lamp failure	9-22	02
Hexagonal mirror motor failure	9-23	31
Fan motor failure	9-34	51
Unexpected printer error (Printer Ready signal not detected.)	9-35	61
Unexpected printer error (Valid signal not detected.)	9-35	62
Excessive jams in the ADF/scanner	None	None
Excessive jams in the printer	None	None
The PM counter has reached the threshold (30,000 prints)	None	None
The PM interval has expired	None	None

Cross reference
Service station number: Service Function 13
Troubleshooting: Chapter 7

2. Excessive Jam Alarms



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-JAM1is 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)	8001E6	8001EA	10 (H)	X
CALL (3 - 15; 0 = Disabled)	8001E7	8001EB	06 (H)	Y
CLR (Low)	8001E8	8001EC	30 (H)	—
(High)	8001E9	8001ED	00 (H)	

Counters	Address (H)		Sys. Para. List
	ADF	Printer	
JAM: Jam counter used to place a service call	8001DF	8001E3	Z
NO-JAM1: Counter used for JAM counter decrement	8001DE	8001E2	—
NO-JAM2: Counter used for clearing the JAM counter	8001E0 (Low)	8001E4 (Low)	—
	8001E1 (High)	8001E5 (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 8002DD(H) 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		800261
Date and time of the next call		
	Year: last two digits of the year (BCD)	800262
	Month: 01 through 12 (BCD)	800263
	Day: 01 through 31 (BCD)	800264
	Hour: 00 through 23 (BCD)	800265

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: 30,000 sheets)

Address (H)	Bits 7 - 4	Bits 3 - 0
800191	Tens	Units
800192	Thousands	Hundreds
800193	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

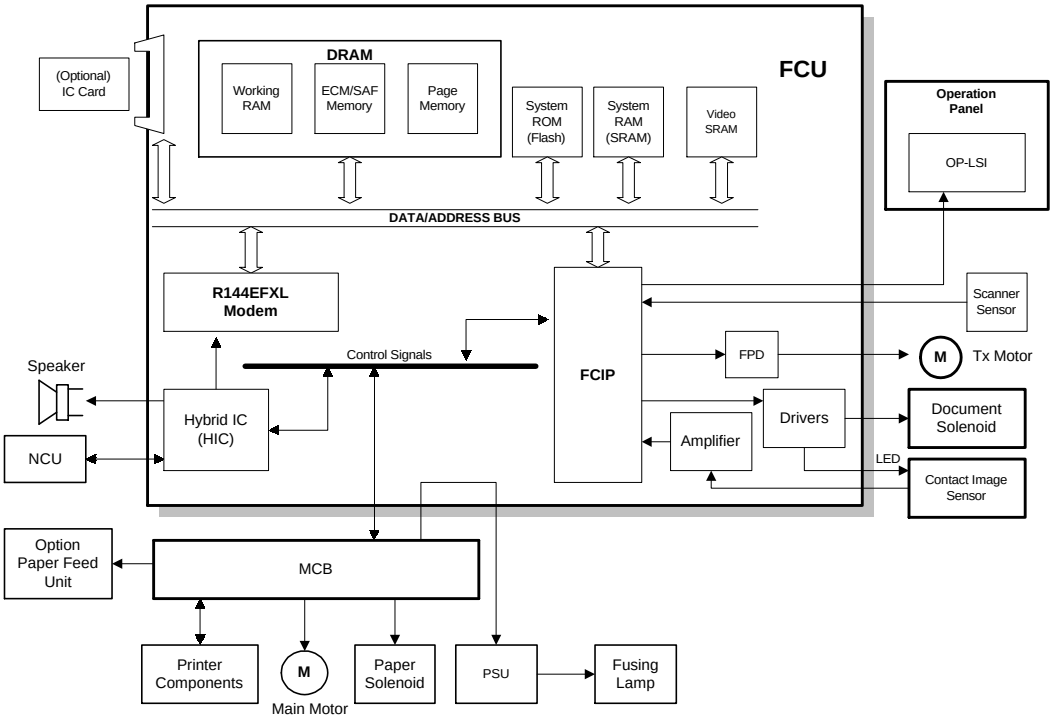
If a time limit for the effectiveness of service calls is programmed, the machine stops making automatic service calls after the time limit.

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)	80026C
Month: 01 through 12 (BCD)	80026D
Day: 01 through 31 (BCD)	80026E

2.4. PCBs

2.4.1. FCU



H528d500.wmf

The FCU (Facsimile Control Unit) contains the FCIP (Facsimile Control and Image Processor), SRAM, System ROM, R144EFXL modem, and Video SRAM.

The CPU core (RU8) in the FCIP controls the entire system of the machine. The printer components are controlled by the CPU in the MCB. The FCIP and the MCB are connected with a serial interface.

The modem inside the FCIP is used for Tone signal and DTMF generation and reception, and V.21 communications. In addition, the Rockwell R144EFXL modem is used for V.17, V29, and V27ter communications.

The SAF memory can be extended by 1 or 2 Mbytes with an IC optional card.

A 512 kB (4 Mbit) Flash ROM is used for the system ROM. Software in this ROM can be rewritten from the IC card slot or by RDS.

1. FCIP (Facsimile Controller and Image Processor)

- CPU (RU8 - Main CPU)
- Modem (V.21, DTMF, and Tone generator)
- Data compression and reconstruction (DCR)
- Digital image processor (DIP)
- Laser interface (LIF)
- DMA controller
- Clock generation (CKG)
- Stepper motor control
- Ringing signal detection

2. Modem (Rockwell R144EFXL)

- V.17, V.29, V27ter modem

3. ROM

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

4. SRAM

- 2 MB SRAM for system and user parameter storage
- Backed up by the battery on the FCU

5. DRAM

- 1.5 MB DRAM shared between the Line Buffer, ECM Buffer, Page Memory, and SAF memory.
- This DRAM is not backed up by the battery.

6. Video SRAM

- 512B SRAM for video processing

7. 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 FCU
- 38.00053 MHz oscillator for the R144EFXL modem
- 27.801 MHz oscillator for the plotter clock to the LIF

8. FPD (Facsimile Power Driver)

- Stepper motor driver

9. HIC (Hybrid IC)

- 2-4 wire switching
- Filters and amplifiers
- Monitor speaker driver

10. CIS Video Amplifer

- Level control for the video signal from the CIS

11. Drivers (Transistors)

- LED array driver
- Document pick-up solenoid driver

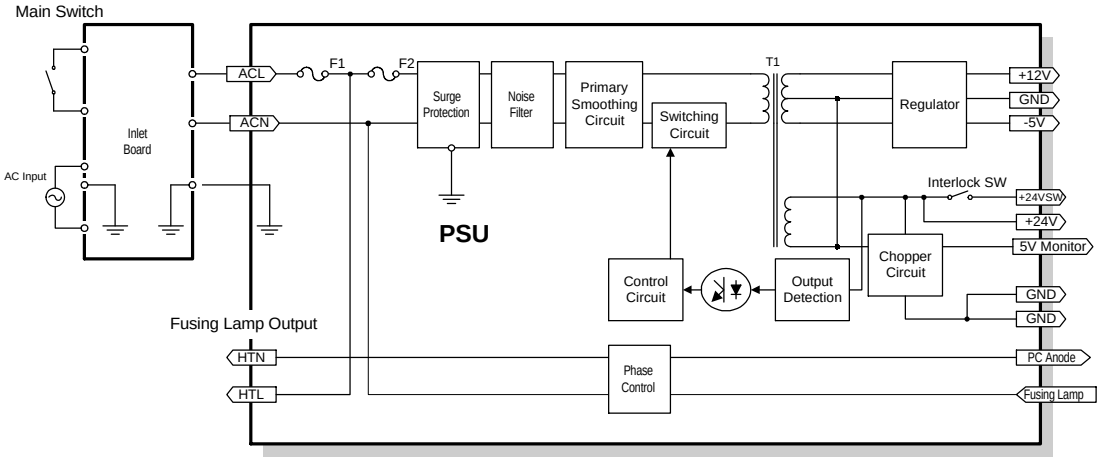
12. Jumpers, Switches, and Test Points

Item	Description
SW1	Switches the backup battery ON/OFF
CN5-1	Analog video signal
CN5-3	COM1 ground
CN5-6	Synchronization signal
CN5-8	Scanner clock
TB1	Switches the power supply to the flash ROM boot block on the FCU 1-2 pins shorted: +5V (the boot block cannot be overwritten) 2-3 pins shorted: +12V (the boot block can be overwritten) **Warning: Do not change this jumper setting, unless the boot block in the Flash ROM needs to be overwritten by Function 12.** **(Refer to Chapter 4 for more details.)**

13. Interlock Switch

- The interlock switch (+24VSW) disables the power supply to the drive components, the printer components, and the high voltage power supply.

2.4.2. PSU

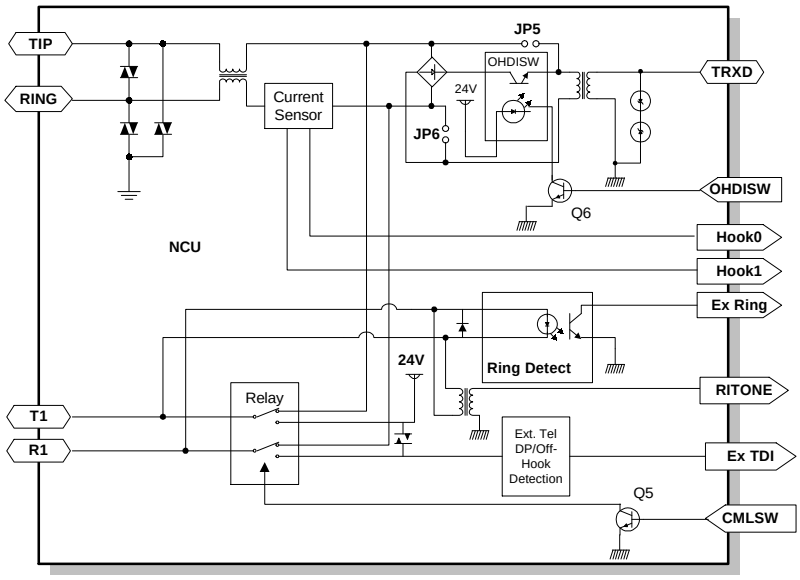


PSU:120V/230V
The values of some parts on the primary side are different between the 120V and 230V versions.

H528D532.wmf

- +24V, +24V(SW), +12V, and ±5V dc generation
- Fusing lamp ac power supply and phase control

2.4.3. NCU (USA)

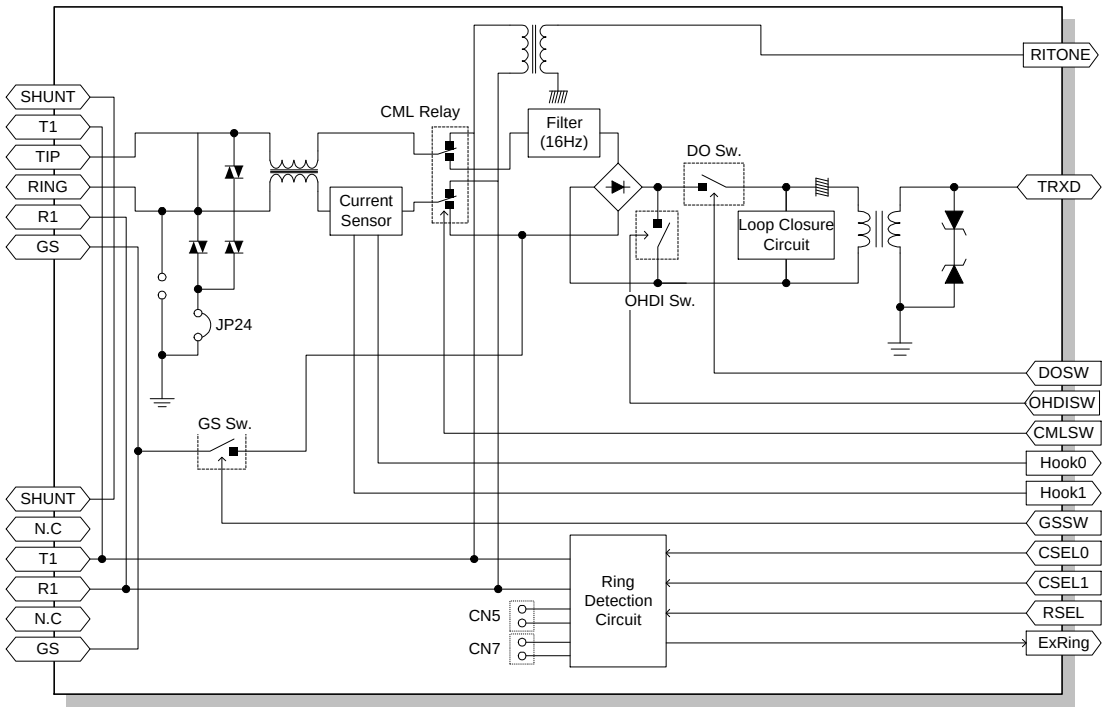


H528d533.wmf

1. Jumpers

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

2.4.4. NCU (Europe/Asia)



H528D534.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.

Refer to section 2.4.4. 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
PABX access method (RAM address 8000AD)	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 800261)	Function 06

Items to Program (User Administrator Level)	Function No.
Clock	Function 91
Initial programming items	Function 61
On/off switches	Function 62
Display/report language	Function 93
Fusing power control during energy saver mode (User parameter switch 05 - bit 6)	Function 63

3.3. INSTALLING OPTIONAL UNITS

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

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 key
- Yes key
- 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 #

```
COM DF   :   0000 0000
BITSW 00:    0000 0000
```

   Example: To see the communication switches : # × 3
   Then scroll through the bit switches.
   Increment bit switch:
   Decrement bit switch:
   Example: Display bit switch 3: x 3

4. Adjust the bit switch.

```
COM DF   :   0000 0000
BITSW 03:    1000 0000
```

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

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

Service Tables

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
   8 0 0 0 2 0
   Note: If you wish to move the cursor, press ▶ .

```
 ADDRESS = 800020
  DATA = 20
```

5. If you wish to change the data, type in the new data.
   Example: 80, press 8 0
   Note: If you wish to move the cursor, press ▶
   Pressing # will increment the number at the cursor by one.
   Pressing * will decrement the number at the cursor by one.

```
 ADDRESS = 800020
  DATA = 80
```

Service Tables

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 immediately 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-DTM          3-OPC
```

3. Either:
   Check the transmitted, received, scanned and printed page counters, and the printer and scanner jam counters - press [0]

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

   (To see the scanned and printed page counters, press [#].

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

   To see the printer and scanner jam counters, press [#] again.)

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

   Check the PM counter - press [1]

```
PM COUNTER:  001234
```

   Check the DTM counter - press [2]

```
DTM COUNTER: 001234
```

   Check the OPC counter - press [3]

```
OPC 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-DETECT
```

Service Tables

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/<  >
 800Hz
```

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: Function

Service Tables

4.1.13. 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

4.1.14. 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-SHADING
```

3. 0
4. ◇

```
                  START
LAMP          0 0 0
```

5. To stop the test, press ▽
6. To finish: No Function

4.1.15. 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-SHADING
```

3. 1

```
                    START
 ADF
```

4. Place a document in the feeder, then press ◇.
5. To stop the test, press ▽.
6. Finish: No Function

4.1.16. Shading Test (Function 10)

Do the following after replacing the contact image sensor or the FCU. (Also after RAM reset level 1.)

1. Function 6 1 9 9 5
   then immediately Yes

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

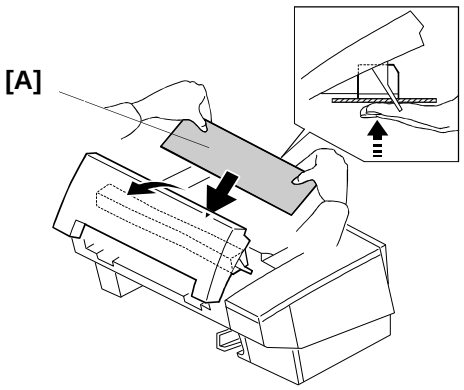
2. 1 0 Yes

```
0-LAMP       1-ADF
2-SHADING
```

3. 2

```
                    START
SHADING
```

4. Open the ADF cover and hold the image sensor shading chart [A] (P/N: H0689300) against the sensor as shown in the diagram.
5. Press ◇.



H528M502.wmf

4.1.17. 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
```

3. 0

```
PATTERN PRINT  KPAD
    0-1
```

5. Press a key from 0 or 1.
6. Press ◇ .
   A test pattern is printed.
7. To finish: No Function

4.1.18. Printer Mechanism Test - Free Run (Function 11)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION   KPAD/NEXT
 9 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

4.1.19. 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 SAF card: Press 2 ◇

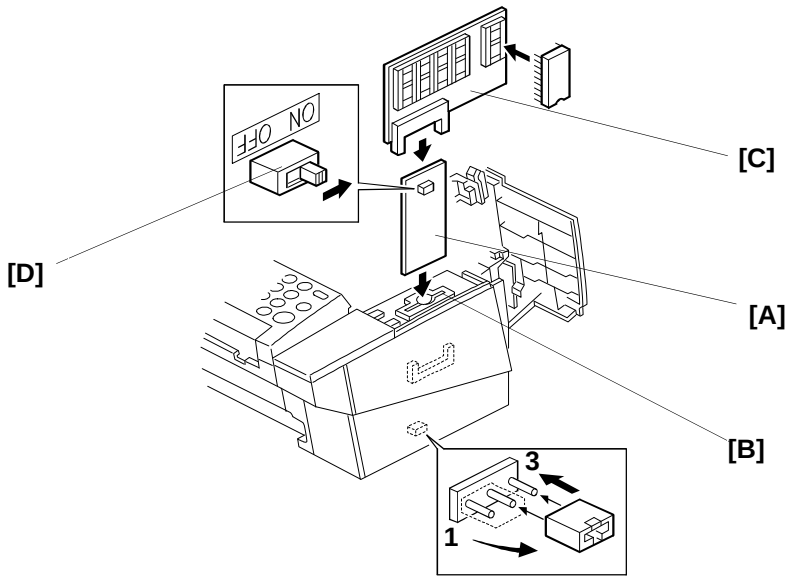
   If test is successful, the display shows "OK".
   If test is unsuccessful, the display shows "ADDRESS=".

4. To finish: No Function.

4.1.20. 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 software from an external medium to the Flash ROM on the machine's FCU. The external medium for the new software can be an FCU or an EPROM board.

1. Turn off the machine.



H528M501.wmf

2. Insert the Flash/SRAM Copy Tool [A] into the IC card slot [B], then connect the 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, press Function.
9. Turn off the machine and disconnect the tool. 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, open the right cover and change the jumper at TB1 on the FCU 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 (pins 1-2 shorted).
- Make sure to set bit 5 of system switch 02 back to 0 when the procedure is completed.

4.1.21. Software Upload (Function 12)

This function copies the software from the machine's built-in FCU to an external FCU.

1. Turn off the machine.
2. Connect the Flash/SRAM Copy Tool and an FCU as shown in the previous 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 and disconnect the tool. Then turn the machine back on again.

4.1.22. SRAM Data Download (Function 12)

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

1. Turn off the machine.
2. Connect the Flash/SRAM Copy Tool [A] and the damaged FCU [C] as shown in section 4.1.20.

   Note: The switch [D] on the tool must be at **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. 5
7. ◇
   If the SRAM data is successfully downloaded, the display shows "**OK**".

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

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

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

8. Finish : Function

9. Turn off the machine and disconnect the tool. Then turn the machine back on.

4.1.23. 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
 RICOH 1234567
```

4. If the display is correct: Yes
5. Finish: Function

4.1.24. Service Station Fax 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 erase the telephone number: press No

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

4. If the display is correct: Yes Function

Service Tables

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 1	RAM Reset **Bit 1 Bit 0 Reset Level** 0 0 No reset 0 1 Reset Level 2 1 0 Reset Level 3 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. **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. After erasing, the machine changes these two bits back to 0 automatically. **No reset:** Normal operation **Cross reference** **RAM Reset Level 1 (Factory reset):** 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 and scan/print registration settings are erased.

System Switch 00		
No	**FUNCTION**	**COMMENTS**
2	Technical data printout on TCR (Journal) **0:** Disabled **1:** Enabled	1: Instead of the personal code, the following data are listed on the TCR for each analog G3 communication. e.g. V33 14 01 03 00 02 **First number:** Final modem type used **Second number:** Final modem rate (for example, 14 means 14.4 kbps) **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 error rate, and an L indicates Rx level.) The left hand figure is the high byte and the right hand figure is the low byte (see the note below this table for how to read this value). If it is a measure of the error rate; a larger number means more errors. **Fifth number (rx mode only):** Total number of error lines that occurred during non-ECM reception. **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 **0:** Measure of error rate (during image data transmission only) **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 **0:** Disabled **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 occurred in the data. Such errors are caused by a noisy line, for example.
5	Communication parameter display **0:** Disabled **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. Be sure to reset this bit to 0 after testing.
6	Protocol dump list output after each communication **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	144: 14400 bps 120: 12000 bps 96: 9600 bps 72: 7200 bps 48: 4800 bps 24: 2400 bps
Communication mode	ECM: With ECM SSC: Using SSC EFC: Using EFC NML: With no ECM, SSC, or EFC
Compression mode	MMR: MMR compression MR: MR compression MH: MH compression
Resolution	SSF: Fine, transmitted at 8 x 15.4 dots per mm DTL: Detail, transmitted at 8 x 7.7 dots per mm STD: Standard, transmitted at 8 x 3.85 dots per mm
I/O rate	0M: 0 ms/line 10M: 10 ms/line 2/M: 2.5 ms/line 20M: 20 ms/line 5M: 5 ms/line 40M: 40 ms/line
Width and reduction	=A4: A4 (8.3"), no reduction >A4: Reduced to A4 (8.3") before transmission

System Switch 01		
No	**FUNCTION**	**COMMENTS**
0	PM call **0:** Disabled **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. **Cross reference** Auto service calls: Section 2.3.2
1-7	Not used	Do not change the settings.

System Switch 02		
No	**FUNCTION**	**COMMENTS**
0	Memory file transfer **0:** Disabled **1:** Enabled	**1:** All messages in the memory are sent to the fax number which is programmed as the service station. Always reset this bit to zero after transfer. **Cross reference** Service station number programming: Function 13
1-2	Not used	Do not change the setting.
3	Memory file printout **0:** Disabled **1:** Enabled	**1:** All SAF files can be printed using Function 54 or 55. Always reset this bit after printing the messages.
4	Not used	Do not change the settings.
5	Software download area **0:** All except the boot block **1:** All areas, including the boot block 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. **1:** Set this bit to 1 only when you need to rewrite the boot block in the Flash ROM using Function 12. **Cross reference** Software Download: Section 4.1.20
6 **7**	Memory read/write by RDS **Bit 7 6 Setting** 0 0 Always disabled 0 1 User selectable 1 0 User selectable 1 1 Always enabled	**(0,0):** All RDS systems are always locked out. **(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. **(1,1):** At any time, an RDS system can access the machine.

System Switch 03		
No	**FUNCTION**	**COMMENTS**
0 **to** **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). This data is only valid if bits 6 and 7 of System Switch 02 are set to "User selectable". The default setting is 24 hours.

System Switch 04		
No	**FUNCTION**	**COMMENTS**
0 **1** **2**	LCD contrast **Bit 2 1 0 Contrast** 0 0 0 Brightest 0 0 1 ↓ ↓ ↓ 1 1 0 ↓ 1 1 1 Darkest	Use these bit switches to adjust the contrast of the LCD on the operation panel.
3	Dedicated transmission parameter programming **0:** Disabled **1:** Enabled	This bit must be set to 1 before changing any dedicated transmission parameters.
4	Not used	Do not change the settings.
5	OPC (DTM) replacement level **0:** User **1:** Service	**0:** The machine asks the user to replace the OPC drum at 20,000 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 8001EE to 8001F0(H). **1:** The machine will not ask the user to replace the drum.
6	CSI programming level **0:** User level **1:** Service level	**1:** The CSI can only be programmed using a service function.
7	Telephone line type programming mode **0:** User level **1:** Service level	**1:** Telephone line type selection can only be programmed using a service function.

System Switch 05		
No	**FUNCTION**	**COMMENTS**
0-1	Not used	Do not change the settings.
2	Display of both RTI and CSI on the LCD **0:** Disabled **1:** Enabled	**1:** Both RTI and CSI will be displayed alternately on the LCD.
3-7	Not used	Do not change the settings.

System Switch 06		
No	**FUNCTION**	**COMMENTS**
0	Use of the Stop key during memory transmission **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.
1-7	Not used	Do not change the settings.

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

System Switch 09		
No	**FUNCTION**	**COMMENTS**
0	Not used	Do not change the setting.
1	Inclusion of communications on the TCR when no image data was exchanged. **0:** Disabled **1:** Enabled	0: Communications which reached phase C (message tx/rx) of the T.30 protocol are listed on the TCR (Journal). **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 **0:** Disabled **1:** Enabled	**0:** Error reports will not be printed. **1:** Error reports will be printed automatically after failed communications.
3	Printing of the error code on the error report **0:** No **1:** Yes	**1:** Error codes are printed on the error reports.
4	Not used	Do not change the setting.
5	Power failure report **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 **0:** RTI > CSI > Dial label > Tel. number **1:** Dial label > Tel. number > RTI > CSI	This bit determines which set of priorities the machine uses when listing remote terminal names on reports. Dial Label: The name stored with the Quick/Speed Dial number by the user.

System Switch 0A		
No	**FUNCTION**	**COMMENTS**
0-3	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	Not used	Do not change the settings.
7		

System Switch 0B		
No	**FUNCTION**	**COMMENTS**
0 **1**	Automatic reset timer **Bit 1 Bit 0 Timer setting** 0 0 1 minute 0 1 3 minutes 1 0 5 minutes 1 1 No limit	**(1, 1):** Automatic reset is disabled. **(Other):** The machine returns to the standby mode when the timer expires after the last operation.
2 **3**	Power Saver Mode timer **Bit 3 Bit 2 Time Limit** 0 0 1 minute 0 1 3 minutes 1 0 5 minutes 1 1 No limit	**(1, 1):** Automatic Power Saver Mode is disabled. **(Other):** The machine goes into a Power Saver Mode when the timer expires after the last operation. **Cross reference** Power Saver Mode: Sections 2.2.8 and 2.3.1
4-7	Not used	Do not change the settings.

System Switch 0C - Not used (do not change the settings)
System Switch 0D - Not used (do not change the settings)
System Switch 0E - Not used (do not change the settings)

System Switch 0F		
No	**FUNCTION**	**COMMENTS**
0 to 7	Country code for functional settings (Hex) 00: France 01: Germany 02: UK 03: Italy 04: Austria 05: Belgium 06: Denmark 07: Finland 08: Ireland 09: Norway 0A: Sweden 0B: Switz. 0C: Portugal 0D: Holland 0E: Spain 0F: Israel 10: Not used 11: USA 12: Asia 13: Japan 14: Hong Kong 15: South Africa 16: Australia 17: New Zealand 18: Singapore 19: Malaysia 1A: China 1B: Taiwan 20: Turkey 21: Greece	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. **Cross reference** 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. Input even numbers only. This setting determines the TTI print start position from the left edge of the paper. If the TTI is moved too far to the right, it may be obscured by the file number which is on the top right of the page.

System Switch 13 - Not used (do not change the settings)
System Switch 14 - Not used (do not change the settings)
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 **Bit 3 2 Setting** 0 0 600 mm 0 1 1000 mm 1 0 Not used 1 1 Not used	If the user wants to send very long documents such as well logs, select a higher setting.
4	OR processing in immediate tx (Standard resolution) **0:** Disabled **1:** Enabled	**0:** The machine scans the document in 3.85 line/mm steps, then transmits or makes copies. **1:** The machine scans the document in 7.7 line/mm steps. Each pair of lines is OR processed before transmission or making copies.
5-7	Not used	Do not change the settings.

Scanner Switch 01 - Not used (do not change the settings)

Scanner Switch 02		
No	**FUNCTION**	**COMMENTS**
0 to 7	Contrast threshold with halftone disabled - Normal setting	The value can be between 00 to FF. For a darker threshold, input a lower value. Default setting - 09(H)

Scanner Switch 03 - Not used (do not change the settings)
Scanner Switch 04 - Not used (do not change the settings)

Scanner Switch 05		
No	**FUNCTION**	**COMMENTS**
0 to 7	Contrast threshold with halftone enabled - Normal setting	The value can be between 00 to 0F. For a darker threshold, input a lower value. Default setting - 07(H)

Scanner Switch 06 - Not used (do not change the settings)
Scanner Switch 07 - Not used (do not change the settings)
Scanner Switch 08 - Not used (do not change the settings)
Scanner Switch 09 - Not used (do not change the settings)
Scanner Switch 0A - Not used (do not change the settings)
Scanner Switch 0B - Not used (do not change the settings)
Scanner Switch 0C - Not used (do not change the settings)
Scanner Switch 0D - Not used (do not change the settings)
Scanner Switch 0E - Not used (do not change the settings)
Scanner Switch 0F - Not used (do not change the settings)

4.2.3. Printer Switches

Printer Switch 00		
No	**FUNCTION**	**COMMENTS**
0	Page separation mark **0:** Disabled **1:** Enabled	**0:** No marks are printed. **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 **0:** Disabled **1:** Enabled	**0:** The next page continues from where the previous page left off. **1:** The final few mm of the previous page are printed at the top of the next page. See section 2.2.9 for details.
2-7	Not used	Do not change the settings.

Printer Switch 01 - Not used (do not change the settings)
Printer Switch 02 - Not used (do not change the settings)

Printer Switch 03		
No	**FUNCTION**	**COMMENTS**
0	Length reduction of received data **0:** Disabled **1:** Enabled	**0:** Incoming pages are printed without length reduction. **Cross reference** Page separation threshold: Printer Sw. 03, bits 4 to 7. **1:** Incoming pages are reduced in the length direction when printing. **Cross reference** Reduction ratio: Printer Switches 04/05 Page separation and data reduction: section 2-2-9
1-3	Not used	Do not change the settings.

Printer Switch 03		
No	**FUNCTION**	**COMMENTS**
4 to 7	Page separation threshold (with reduction disabled in switch 03-0 above) 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. The value of x is determined by these four bits. Hex value of bits 4 to 7 — x (mm) 0 — 0 1 — 1 and so on until F — 15 **Cross reference** Page separation and data reduction: section 2-2-9 Length reduction On/Off: Printer Switch 03, Bit 0	

Printer Switches 04 and 05		
No	**FUNCTION**	**COMMENTS**
0 to 7	Reduction ratios used for different paper sizes (with reduction enabled in switch 03-0 above) 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. **Cross reference** Page separation and data reduction: section 2.2.9. Switch 04/05 — Paper Size Bit 0 — Not used Bit 1 — Not used Bit 2 — LT lengthwise Bit 3 — A4 lengthwise Bit 4 — F/F4 lengthwise Bit 5 — LG lengthwise Bit 6 — Not used Bit 7 — Not used The available paper sizes depend on the machine's country version. $\left(\frac{Sw.04}{Sw.05}\right): \left(\frac{0}{0}\right) = 4/3, \left(\frac{1}{0}\right) = 4/3, \left(\frac{0}{1}\right) = 8/7, \left(\frac{1}{1}\right) = 12/11$	

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

4.2.4. Communication Switches

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

Communication Switch 01		
No	**FUNCTION**	**COMMENTS**
0	ECM **0:** Off **1:** On	If this bit is 0, ECM is switched off for all communications.
1	EFC during transmission **0:** Off **1:** On	If this bit is 0, EFC is switched off during transmission.
2 **3**	Wrong connection prevention method **Bit 3 Bit 2 Setting** 0 0 None 0 1 8 digit CSI 1 0 4 digit CSI 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. **(1,0) -** The same as above, except that only the last 4 digits are compared. **(1,1) -** The machine will not transmit if the other end does not identify itself with an RTI or CSI. **(0,0) -** Nothing is checked; transmission will always go ahead.
4	Operator call if no response is received in reply to NSF/DIS **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 **7**	Maximum printable page length available **Bit 7 Bit 6 Setting** 0 0 No limit 0 1 B4 and A4 1 0 A4 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 **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. The Low and High threshold values depend on the sub-scan resolution, and are as follows. **Resolution** **Standard** **Detail** **Fine** Low settings 3 6 12 High settings 6 12 24
1	Acceptable total error line ratio **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 **0:** Deleted from memory without printing **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 **0:** No hang-up, **1:** Hang-up	**0:** The next page will be sent even if RTN or PIN is received. **1:** The machine will send DCN and hang up if it receives RTN or PIN. This bit is ignored for memory transmissions or if ECM is being used.
4-7	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. This setting is not used if ECM is switched on. Default setting - 03(H)

Communication Switch 04 - Not used (do not change the settings)
Communication Switch 05 - Not used (do not change the settings)

Communication Switch 06		
No	**FUNCTION**	**COMMENTS**
0	Dialing requirements: Germany **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 **0:** Disabled **1:** Enabled	
2	Dialing requirements: Norway **0:** Disabled **1:** Enabled	
3	Dialing requirements: Denmark **0:** Disabled **1:** Enabled	
4	Dialing requirements: France **0:** Disabled **1:** Enabled	
5	Dialing requirements: Switzerland **0:** Disabled **1:** Enabled	
6-7	Not used	Do not change the settings.

Communication Switch 07 - Not used (do not change the settings)
Communication Switch 08 - Not used (do not change the settings)
Communication Switch 09 - Not used (do not change the settings)

Communication Switch 0A		
No	**FUNCTION**	**COMMENTS**
0	Point of resumption of memory transmission upon redialing **0:** From the error page **1:** From page 1	**0:** The transmission begins from the page where transmission failed the previous time. **1:** Transmission begins from the first page.
1-6	Not used	Do not change the settings.
7	Emergency calls using 999 **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 settings)
Communication Switch 0C - Not used (do not change the 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., 0C(H) = 24 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	Minimum 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 setting)

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

4.2.5. G3 Switches

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

G3 Switch 01		
No	**FUNCTION**	**COMMENTS**
0-3	Not used	Do not change the settings.
4	DIS frame length **0:** 6 bytes **1:** 4 bytes	**1:** The 5th and 6th bytes in the DIS frame will not be transmitted (set to 1 if there are communication problems with PC-based faxes which cannot receive the extended DIS frames).
5-7	Not used	Do not change the settings.

G3 Switch 02		
No	**FUNCTION**	**COMMENTS**
0	G3 protocol mode used **0:** Standard and non-standard **1:** Standard only	**1:** Disables NSF/NSS signals (these are used in non-standard mode communication).
1-4	Not used	Do not change the settings.
5	Use of modem rate history when dialing using Quick/Speed dials **0:** Disabled **1:** Enabled	**0:** Communications using Quick/Speed dials always start with the highest modem rate. **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) **0:** Disabled **1:** Enabled	Refer to Appendix B in the Group 3 Facsimile Manual for details about AI Short Protocol.
7	Not used	Do not change the setting.

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

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

G3 Switch 05		
	FUNCTION	**COMMENTS**
0 to 3	Initial Tx modem rate **Bit 3 2 1 0 Setting (bps)** 0 0 0 1 2.4k 0 0 1 0 4.8k 0 0 1 1 7.2k 0 1 0 0 9.6k 0 1 0 1 12.0k 0 1 1 0 14.4k Other settings - Not used	These bits set the initial starting modem rate for transmission. Use the dedicatated transmssion parameters if you need to change this for specific receivers.
4 5	Initial modem type for 9.6 k or 7.2 kbps. **Bit 5 Bit 4 Setting** 0 0 V.29 0 1 V.17 1 0 V.34 1 1 Not used	These bits set the initial modem type for 14.4, 9.6, and 7.2 kbps, if the initial modem rate is set at these speeds.
6-7		Do not change the settings.

G3 Switch 06		
	FUNCTION	**COMMENTS**
0 to 3	Initial Rx modem rate **Bit 3 2 1 0 Setting (bps)** 0 0 0 1 2.4 k 0 0 1 0 4.8 k 0 0 1 1 7.2 k 0 1 0 0 9.6 k 0 1 0 1 12.0k 0 1 1 0 14.4k 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. Use a lower setting if high speeds pose problems during reception.
4 to 7	Modem types available for reception **Bit 7 6 5 4 Setting** 0 0 0 1 V27ter 0 0 1 0 V27ter and V29 0 1 0 0 V27ter, V29, V33, V17 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**
0 **1**	PSTN cable equalizer (tx mode) **Bit 1 Bit 0 Setting** 0 0 None 0 1 Low 1 0 Medium 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. Also, try using the cable equalizer if one or more of the following symptoms occurs. • Communication error • Modem rate fallback occurs frequently.
2 **3**	PSTN cable equalizer (rx mode) **Bit 3 Bit 2 Setting** 0 0 None 0 1 Low 1 0 Medium 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. Also, try using the cable equalizer if one or more of the following symptoms occurs. • 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 - Not used (do not change the settings)
G3 Switch 09 - Not used (do not change the settings)

G3 Switch 0A		
	FUNCTION	**COMMENTS**
0 **1**	Maximum allowable carrier drop during image data reception **Bit 1 Bit 0 Value (ms)** 0 0 200 0 1 400 1 0 800 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.
2-3	Not used	Do not change the settings.
4	Maximum allowable frame interval during image data reception. **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. 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 **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. Refer to error code 0-20.
7	Not used	Do not change the settings.

G3 Switch 0B		
	FUNCTION	**COMMENTS**
0	Protocol requirements: Europe **0:** Disabled **1:** Enabled	Program these bit switches manually to match local requirements.
1	Protocol requirements: Spain **0:** Disabled **1:** Enabled	
2	Protocol requirements: Germany **0:** Disabled **1:** Enabled	
3	Protocol requirements: France **0:** Disabled **1:** Enabled	
4	PTT requirements: Germany **0:** Disabled **1:** Enabled	
5	PTT requirements: France **0:** Disabled **1:** Enabled	
6-7	Not used	Do not change the settings.

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

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

<table>
<tr><th>Address</th><th>Function</th><th>Unit</th><th>Remarks</th></tr>
<tr><td>807F00</td><td>Country code for NCU parameters</td><td colspan="2">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 CC).

Country Decimal Hex
France 00 00
Germany 01 01
UK 02 02
Italy 03 03
Austria 04 04
Belgium 05 05
Denmark 06 06
Finland 07 07
Ireland 08 08
Norway 09 09
Sweden 10 0A
Switzerland 11 0B
Portugal 12 0C
Holland 13 0D
Spain 14 0E
Israel 15 0F
USA 17 11
Asia 18 12
Hong Kong 20 14
South Africa 21 15
Australia 22 16
New Zealand 23 17
Singapore 24 18
Malaysia 25 19
China 26 1A
Taiwan 27 1B
Turkey 32 20
Greece 33 21</td></tr>
<tr><td>807F01</td><td>Line current detection time</td><td rowspan="3">20 ms</td><td rowspan="3">Line current is not detected if 807F01 contains FF.</td></tr>
<tr><td>807F02</td><td>Line current wait time</td></tr>
<tr><td>807F03</td><td>Line current drop detect time</td></tr>
</table>

Address	Function	Unit	Remarks
807F04	PSTN dial tone frequency range (high byte)	Hz (BCD)	See Note 2.
807F05	PSTN dial tone frequency range (low byte)		
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). 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)		

Address	Function	Unit	Remarks
807F22	PABX ringback tone detection time	20 ms	Detection is disabled if this contains FF.
807F23	PABX ringback tone off detection time	20 ms	
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). Tolerance (±) Bit 1 0 0 0 75% 0 1 50% 1 0 25% 1 1 12.5% Bits 7, 6, 5, 4 - number of cycles required for cadence detection		Bits 2 and 3 must always be kept at 0.
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). 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 (LOW)		
807F3E	International dial wait interval (HIGH)		
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 dialing	1 ms	See Note 4. Function 08 (parameter 12).
807F4C	Make time for pulse dialing	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 dialed 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 dialing	-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	International dial access code	BCD	For a code of 100: 807F5B - F1 807F5C - 00
807F5C			
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 0 0 0 -25.0 0 0 1 -35.0 0 1 0 -30.0 1 0 0 -40.0 1 1 0 -49.0 Bits 2, 0 - See Note 3.	
807F5F	Polarity detection	Bit 4 1: Enable: Tx Polarity detection Bit 5 1: Enable: Rx Polarity detection	
807F60 to 807F64	Not used		Do not change the settings.
807F65	Inter-city dial prefix (HIGH)	BCD	For a code of 0: 807F65 - FF 807F66 - F0
807F66	Inter-city 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 **Bit 1 0 Setting** 0 0 200 ms 0 1 800 ms Other Not used Bits 2 and 3 - Handset on-hook detection time **Bit 3 2 Setting** 0 0 200 ms 0 1 800 ms Other Not used 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

Service Tables

Address	Function	Unit	Remarks
807FA6	Not used		Do not change the factory setting.
807FA7			
807FA8			
807FA9			
807FAA	CNG detection time	20 ms ± 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 $_{807FB4}$ - 0.5N $_{807FB5}$ (dB)	
807FB6	PSTN: 2100 Hz tone transmission level	- N $_{807FB4}$ - 0.5N $_{807FB6}$ (dB)	
807FB7	PABX: Tx level from the modem	- dBm	
807FB8	PABX: 1100 Hz tone transmission level	- N $_{807FB7}$ - 0.5N $_{807FB8}$ (dB)	
807FB9	PABX: 2100 Hz tone transmission level	- N $_{807FB7}$ - 0.5N $_{807FB9}$ (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. FF(H) = disabled.
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 x $N_{807F52/807F54}$ dBm
   Low frequency tone: - 0.5 x ($N_{807F52/807F54}$ + 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
8. Settings for Hong Kong, South Africa, Singapore, and Malaysia are the same as the setting for Asia. Settings for Turkey and Greece are the same as the settings for UK.

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 ± 45				
200 (Default)	2100 ± 50				
230	2100 ± 60				
270	2100 ± 70				
2E0	2100 ± 80				
320	2100 ± 90				
380	2100 ± 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 RAM 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	E0H
Sweden	FFH	FFH	FFH	0H	A0H
Switzerland	FFH	FFH	FFH	1H	20H
Portugal	FFH	FFH	FFH	0H	B0H
Holland	FFH	FFH	FFH	1H	40H
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	FFH	FFH
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	40	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	40	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	75	2	100	0	FFH
Germany	105	4	200	0	FFH
UK	FFH	FFH	250	0	FFH
Italy	30	50	200	0	FFH
Austria	39	3	200	0	FFH
Belgium	30	4	200	0	FFH
Denmark	65	4	200	0	FFH
Finland	64H	4	200	0	FFH
Ireland	105	4	200	0	FFH
Norway	55	4	175	0	FFH
Sweden	35	4	200	0	FFH
Switzerland	38	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	72H
Germany	FFH	FFH	FFH	0H	98H
UK	FFH	FFH	FFH	0H	C0H
Italy	FFH	FFH	FFH	0H	40H
Austria	FFH	FFH	FFH	1H	28H
Belgium	FFH	FFH	FFH	0H	50H
Denmark	FFH	FFH	FFH	0H	46H
Finland	FFH	FFH	FFH	FFH	FFH
Ireland	FFH	FFH	FFH	0H	3EH
Norway	FFH	FFH	FFH	0H	F9H
Sweden	FFH	FFH	FFH	0H	32H
Switzerland	50	26H	2H	1H	20H
Portugal	FFH	FFH	FFH	FFH	FFH
Holland	FFH	FFH	FFH	1H	40H
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	807F1B
France	4H	00H	FFH	FFH	100
Germany	4H	00H	FFH	FFH	FFH
UK	4H	00H	FFH	FFH	FFH
Italy	4H	00H	0H	B8H	100
Austria	4H	00H	FFH	FFH	FFH
Belgium	4H	00H	0H	C8H	30
Denmark	4H	00H	0H	D0H	65
Finland	FFH	FFH	FFH	FFH	FFH
Ireland	4H	00H	FFH	FFH	FFH
Norway	4H	00H	FFH	FFH	FFH
Sweden	4H	00H	0H	A0H	40
Switzerland	4H	00H	1H	20H	40
Portugal	FFH	FFH	FFH	FFH	FFH
Holland	4H	00H	1H	40H	55
Spain	4H	00H	FFH	FFH	FFH
Israel	4H	00H	0H	50H	105
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	FFH	FFH	150
New Zealand	FFH	FFH	FFH	FFH	FFH
Singapore	FFH	FFH	FFH	FFH	FFH
Malaysia	FFH	FFH	FFH	FFH	FFH

Country	807F1C	807F1D	807F1E	807F1F	807F20
France	58H	2H	50	2H	100
Germany	FFH	FFH	FFH	FFH	200
UK	FFH	FFH	FFH	FFH	200
Italy	F9H	1H	9	4	200
Austria	FFH	FFH	FFH	FFH	200
Belgium	150	0	30	4	200
Denmark	F4H	1H	65	4	200
Finland	FFH	FFH	FFH	FFH	200
Ireland	FFH	FFH	FFH	FFH	200
Norway	FFH	FFH	FFH	FFH	200
Sweden	00H	1H	40	3	200
Switzerland	EFH	1H	40	4	200
Portugal	FFH	FFH	FFH	FFH	200
Holland	EEH	2H	55	4	200
Spain	FFH	FFH	FFH	FFH	150
Israel	E8H	3H	105	4	200
USA	FFH	FFH	FFH	FFH	200
Asia	FFH	FFH	FFH	FFH	200
Hong Kong	FFH	FFH	FFH	FFH	200
South Africa	FFH	FFH	FFH	FFH	200
Australia	2CH	1H	100	1	150
New Zealand	FFH	FFH	FFH	FFH	200
Singapore	FFH	FFH	FFH	FFH	200
Malaysia	FFH	FFH	FFH	FFH	200

Country	807F21	807F22	807F23	807F24	807F25
France	0	FFH	FFH	FFH	FFH
Germany	0	FFH	FFH	FFH	FFH
UK	0	FFH	FFH	FFH	FFH
Italy	0	FFH	FFH	FFH	FFH
Austria	0	FFH	FFH	FFH	FFH
Belgium	0	FFH	FFH	FFH	FFH
Denmark	0	FFH	FFH	FFH	FFH
Finland	0	FFH	FFH	FFH	FFH
Ireland	0	FFH	FFH	FFH	FFH
Norway	0	FFH	FFH	FFH	FFH
Sweden	0	FFH	FFH	FFH	FFH
Switzerland	0	FFH	FFH	FFH	FFH
Portugal	0	FFH	FFH	FFH	FFH
Holland	0	FFH	FFH	FFH	FFH
Spain	0	FFH	FFH	FFH	FFH
Israel	0	FFH	FFH	FFH	FFH
USA	0	FFH	FFH	FFH	FFH
Asia	0	FFH	FFH	FFH	FFH
Hong Kong	0	FFH	FFH	FFH	FFH
South Africa	0	FFH	FFH	FFH	FFH
Australia	0	FFH	FFH	FFH	FFH
New Zealand	0	FFH	FFH	FFH	FFH
Singapore	0	FFH	FFH	FFH	FFH
Malaysia	0	FFH	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	13H
Austria	FFH	FFH	FFH	FFH	00H
Belgium	FFH	FFH	FFH	FFH	25
Denmark	0H	50H	4H	00H	14H
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	16H
Portugal	FFH	FFH	FFH	FFH	FFH
Holland	FFH	FFH	FFH	FFH	14H
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	10H	11H	14H	FFH	FFH
Austria	0DH	10H	10H	FFH	FFH
Belgium	23	8	8	FFH	FFH
Denmark	14H	FFH	FFH	FFH	FFH
Finland	FFH	FFH	FFH	FFH	FFH
Ireland	25	37	37	18	18
Norway	0	21	0	FFH	FFH
Sweden	12	12	37	FFH	FFH
Switzerland	16H	0DH	0CM	09H	09H
Portugal	FFH	FFH	FFH	FFH	FFH
Holland	14H	FFH	FFH	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	41H	4H
Germany	FFH	FFH	FFH	31H	FFH
UK	FFH	FFH	100	42H	FFH
Italy	FFH	FFH	FFH	40H	FFH
Austria	FFH	FFH	FFH	40H	FFH
Belgium	FFH	FFH	FFH	42H	00H
Denmark	FFH	FFH	FFH	40H	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	FFH	FFH	FFH	40H	FFH
Portugal	FFH	FFH	FFH	FFH	FFH
Holland	FFH	FFH	FFH	40H	FFH
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	807F35	807F36	807F37	807F38	807F39
France	74H	4H	06H	57	58H
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	AAH	04H	00H	42H	E8H
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	FFH	04H	00H	55	EEH
Spain	F0H	4H	00H	75	3FH
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	807F3A	807F3B	807F3C	807F3D	807F3E
France	2	57	6	0	0
Germany	FFH	FFH	FFH	00H	00H
UK	FFH	FFH	FFH	00H	00H
Italy	FFH	FFH	FFH	00H	00H
Austria	FFH	FFH	FFH	00H	00H
Belgium	3H	16	33	00H	00H
Denmark	FFH	FFH	FFH	00H	00H
Finland	FFH	FFH	FFH	00H	00H
Ireland	FFH	FFH	FFH	00H	00H
Norway	FFH	FFH	FFH	00H	00H
Sweden	FFH	FFH	FFH	00H	00H
Switzerland	FFH	FFH	FFH	00H	00H
Portugal	FFH	FFH	FFH	00H	00H
Holland	2H	55	4	00H	00H
Spain	2H	55	5	150	0
Israel	FFH	FFH	FFH	00H	00H
USA	FFH	FFH	FFH	00H	00H
Asia	FFH	FFH	FFH	00H	00H
Hong Kong	FFH	FFH	FFH	00H	00H
South Africa	FFH	FFH	FFH	00H	00H
Australia	FFH	FFH	FFH	00H	00H
New Zealand	FFH	FFH	FFH	00H	00H
Singapore	FFH	FFH	FFH	00H	00H
Malaysia	FFH	FFH	FFH	00H	00H

Country	807F3F	807F40	807F41	807F42	807F43
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	0H	D0H	4H	00H	40
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	807F44	807F45	807F46	807F47	807F48
France	FFH	FFH	FFH	FFH	0
Germany	FFH	FFH	FFH	FFH	00H
UK	FFH	FFH	FFH	FFH	00H
Italy	FFH	FFH	FFH	FFH	00H
Austria	FFH	FFH	FFH	FFH	00H
Belgium	FFH	FFH	FFH	FFH	00H
Denmark	FFH	FFH	FFH	FFH	00H
Finland	FFH	FFH	FFH	FFH	00H
Ireland	FFH	FFH	FFH	FFH	00H
Norway	FFH	FFH	FFH	FFH	00H
Sweden	00H	1H	40	3	200
Switzerland	FFH	FFH	FFH	FFH	00H
Portugal	FFH	FFH	FFH	FFH	00H
Holland	FFH	FFH	FFH	FFH	00H
Spain	FFH	FFH	FFH	FFH	00H
Israel	FFH	FFH	FFH	FFH	00H
USA	FFH	FFH	FFH	FFH	00H
Asia	FFH	FFH	FFH	FFH	00H
Hong Kong	FFH	FFH	FFH	FFH	00H
South Africa	FFH	FFH	FFH	FFH	00H
Australia	FFH	FFH	FFH	FFH	00H
New Zealand	FFH	FFH	FFH	FFH	00H
Singapore	FFH	FFH	FFH	FFH	00H
Malaysia	FFH	FFH	FFH	FFH	00H

Country	807F49	807F4A	807F4B	807F4C	807F4D
France	0	67	65	35	50
Germany	00H	50	61	41	44
UK	00H	252	66	35	44
Italy	00H	58	60	40	44
Austria	00H	53	62	39	50
Belgium	00H	61	67	33	50
Denmark	00H	53	67	33	50
Finland	00H	61	60	42	50
Ireland	00H	255	67	33	50
Norway	00H	61	59	41	50
Sweden	0	100	60	40	70
Switzerland	00H	60	60	40	60
Portugal	00H	61	66	34	50
Holland	00H	58	62	40	42
Spain	00H	75	60	32	75
Israel	00H	61	62	39	50
USA	00H	77	60	41	74
Asia	00H	61	66	34	50
Hong Kong	00H	61	66	34	50
South Africa	00H	61	66	34	50
Australia	00H	255	68	32	70
New Zealand	00H	245	66	34	50
Singapore	00H	61	66	34	50
Malaysia	00H	61	66	34	50

Country	807F4E	807F4F	807F50	807F51	807F52
France	40	0	70	70	12
Germany	46	46	90	90	0CH
UK	27	33	100	100	17
Italy	40	150	70	70	11
Austria	44	46	80	80	11
Belgium	43	26	70	70	11
Denmark	26	26	90	90	17
Finland	40	60	70	75	17
Ireland	30	33	70	70	17
Norway	33	33	70	70	17
Sweden	18	26	70	70	17
Switzerland	26	00H	70	70	8
Portugal	33	33	70	70	17
Holland	33	33	70	70	17
Spain	32	100	70	140	11
Israel	46	101	90	90	17
USA	46	101	100	100	14
Asia	36	101	100	110	0EH
Hong Kong	36	101	100	110	12
South Africa	36	101	100	110	12
Australia	36	101	100	110	14
New Zealand	25	101	100	110	17
Singapore	36	101	100	110	12
Malaysia	36	101	100	110	12

Country	807F53	807F54	807F59	807F5A	807F5B
France	4	34	0	0	FFH
Germany	5	34	15	90	FFH
UK	4	34	15	90	F0H
Italy	4	34	15	90	FFH
Austria	4	34	15	100	FFH
Belgium	4	34	100	90	FFH
Denmark	4	34	15	90	F0H
Finland	4	34	15	90	F9H
Ireland	4	34	15	90	FFH
Norway	4	34	25	90	FFH
Sweden	4	34	15	90	F0H
Switzerland	4	34	10	90	FFH
Portugal	4	34	15	202	FFH
Holland	4	34	15	90	FFH
Spain	4	34	100	90	FFH
Israel	4	34	15	90	FFH
USA	4	34	00H	00H	FFH
Asia	4	34	00H	00H	FFH
Hong Kong	4	34	00H	00H	FFH
South Africa	4	34	00H	00H	FFH
Australia	4	34	00H	00H	FFH
New Zealand	4	34	00H	00H	FFH
Singapore	4	34	00H	00H	FFH
Malaysia	4	34	00H	00H	FFH

Country	807F5C	807F5D	807F5E	807F5F	807F65
France	19H	FFH	20H	10H	FFH
Germany	00H	FFH	20H	10H	FFH
UK	10H	50	C0H	10H	FFH
Italy	00H	FFH	C1H	10H	FFH
Austria	00H	FFH	80H	10H	FFH
Belgium	00H	FFH	80H	10H	FFH
Denmark	9H	FFH	80H	10H	FFH
Finland	90H	100	80H	10H	FFH
Ireland	40H	FFH	40H	10H	FFH
Norway	00H	FFH	20H	10H	FFH
Sweden	09H	FFH	20H	10H	FFH
Switzerland	00H	FFH	20H	10H	FFH
Portugal	00H	FFH	80H	10H	FFH
Holland	00H	FFH	60H	10H	FFH
Spain	07H	FFH	80H	10H	FFH
Israel	00H	FFH	C0H	10H	FFH
USA	FFH	FFH	C0H	10H	FFH
Asia	FFH	FFH	C0H	10H	FFH
Hong Kong	FFH	FFH	C0H	10H	FFH
South Africa	FFH	FFH	C0H	10H	FFH
Australia	FFH	FFH	C0H	10H	FFH
New Zealand	FFH	FFH	C0H	10H	FFH
Singapore	FFH	FFH	C0H	10H	FFH
Malaysia	FFH	FFH	C0H	10H	FFH

Country	807F66	807F72	807F73	807F74	807F75
France	16H	17	28	FFH	00H
Germany	FFH	15H	36H	FFH	00H
UK	FFH	20	84	FFH	00H
Italy	FFH	18	77	FFH	00H
Austria	FFH	13	54	FFH	00H
Belgium	FFH	21	72	FFH	00H
Denmark	FFH	11H	43H	16	24
Finland	FFH	16	56	FFH	00H
Ireland	FFH	36	53H	FFH	00H
Norway	FFH	16	43H	FFH	00H
Sweden	FFH	17	43H	FFH	00H
Switzerland	FFH	16	55	FFH	00H
Portugal	FFH	1AH	53H	16	24
Holland	FFH	16	52	FFH	00H
Spain	FFH	25	43H	FFH	00H
Israel	FFH	16	43H	FFH	00H
USA	FFH	13	83	FFH	00H
Asia	FFH	17	83	FFH	00H
Hong Kong	FFH	17	83	FFH	00H
South Africa	FFH	17	83	FFH	00H
Australia	FFH	14	83	FFH	00H
New Zealand	FFH	17	83	FFH	00H
Singapore	FFH	17	83	FFH	00H
Malaysia	FFH	17	83	FFH	00H

Country	807F76	807F77	807F78	807F79	807F7A
France	2	15	15	04H	1H
Germany	1	7	7	90H	1H
UK	1	10	10	90H	1H
Italy	3	10	10	90H	1H
Austria	1	9	10	90H	1H
Belgium	2	5	10	90H	1H
Denmark	2	10	10	90H	1H
Finland	2	25	25	90H	1H
Ireland	1	10	10	90H	1H
Norway	1	10	10	90H	1H
Sweden	1	5	5	90H	1H
Switzerland	3	10	10	90H	1H
Portugal	1	0FH	0FH	90H	1H
Holland	2	15	15	90H	1H
Spain	2	28H	28H	2CH	1H
Israel	2	14H	14H	90H	1H
USA	1	10	10	90H	1H
Asia	1	10	10	90H	1H
Hong Kong	1	10	10	90H	1H
South Africa	1	10	10	90H	1H
Australia	3	10	10	90H	1H
New Zealand	3	10	10	90H	1H
Singapore	1	10	10	90H	1H
Malaysia	1	10	10	90H	1H

Country	807F81	807F82	807FA1	807FA2	807FA3
France	25	0	02H	00H	04H
Germany	25	00H	02H	00H	04H
UK	25	00H	02H	00H	04H
Italy	25	00H	02H	00H	04H
Austria	25	00H	02H	00H	04H
Belgium	25	00H	02H	00H	04H
Denmark	25	00H	02H	00H	04H
Finland	25	00H	02H	00H	04H
Ireland	25	00H	02H	00H	04H
Norway	25	00H	02H	00H	04H
Sweden	25	00H	02H	00H	04H
Switzerland	25	00H	02H	00H	04H
Portugal	25	00H	02H	00H	04H
Holland	25	00H	02H	00H	04H
Spain	25	00H	02H	00H	04H
Israel	25	00H	02H	00H	04H
USA	25	00H	02H	00H	04H
Asia	25	00H	02H	00H	04H
Hong Kong	25	00H	03H	00H	04H
South Africa	25	00H	03H	00H	04H
Australia	25	00H	02H	00H	04H
New Zealand	25	00H	02H	00H	04H
Singapore	25	00H	03H	00H	04H
Malaysia	25	00H	03H	00H	04H

Country	807FA4	807FA5	807FA6	807FA7	807FA8
France	00H	16	00H	81H	04H
Germany	00H	10	00H	81H	04H
UK	00H	10	00H	81H	04H
Italy	00H	10	00H	81H	04H
Austria	00H	10	00H	81H	04H
Belgium	00H	10	00H	81H	04H
Denmark	00H	10	00H	81H	04H
Finland	00H	10	00H	81H	04H
Ireland	00H	10	00H	81H	04H
Norway	00H	10	00H	81H	04H
Sweden	00H	10	00H	81H	04H
Switzerland	00H	10	00H	81H	04H
Portugal	00H	10	00H	81H	04H
Holland	00H	10	00H	81H	04H
Spain	00H	10	00H	81H	04H
Israel	00H	10	00H	81H	04H
USA	00H	10	00H	81H	04H
Asia	00H	10	01H	81H	04H
Hong Kong	00H	10	01H	E0H	04H
South Africa	00H	10	01H	E0H	04H
Australia	00H	10	00H	81H	04H
New Zealand	00H	10	00H	81H	04H
Singapore	00H	10	01H	E0H	04H
Malaysia	00H	10	01H	E0H	04H

Country	807FA9	807FAA	807FAB	807FAC	807FAD
France	00H	10	23H	91H	32H
Germany	00H	10	23H	91H	32H
UK	00H	10	23H	91H	32H
Italy	00H	10	23H	91H	32H
Austria	00H	10	23H	91H	32H
Belgium	00H	10	23H	91H	32H
Denmark	00H	10	23H	91H	32H
Finland	00H	10	23H	91H	32H
Ireland	00H	10	23H	91H	32H
Norway	00H	10	23H	91H	32H
Sweden	00H	10	23H	91H	32H
Switzerland	00H	10	23H	91H	32H
Portugal	00H	10	23H	91H	32H
Holland	00H	10	23H	91H	32H
Spain	00H	10	23H	91H	32H
Israel	00H	10	23H	91H	32H
USA	00H	10	23H	91H	32H
Asia	00H	10	23H	91H	32H
Hong Kong	00H	10	19H	96H	22H
South Africa	00H	10	19H	96H	22H
Australia	00H	10	23H	91H	32H
New Zealand	00H	10	23H	91H	32H
Singapore	00H	10	19H	96H	22H
Malaysia	00H	10	19H	96H	22H

Country	807FAE	807FAF	807FB1	807FB2	807FB3
France	2FH	0H	00H	11	18
Germany	2FH	0H	00H	11	18
UK	2FH	0H	00H	11	18
Italy	2FH	0H	00H	11	18
Austria	2FH	0H	00H	11	18
Belgium	2FH	0H	00H	11	18
Denmark	2FH	0H	00H	11	18
Finland	2FH	0H	00H	11	18
Ireland	2FH	0H	00H	11	18
Norway	2FH	0H	00H	11	18
Sweden	2FH	0H	00H	11	18
Switzerland	2FH	0H	00H	11	18
Portugal	2FH	0H	00H	11	18
Holland	2FH	0H	00H	11	18
Spain	2FH	0H	00H	11	18
Israel	2FH	0H	00H	11	18
USA	2FH	0H	00H	11	18
Asia	2FH	0H	00H	11	18
Hong Kong	2FH	0H	00H	11	10
South Africa	2FH	0H	00H	11	10
Australia	2FH	0H	00H	11	18
New Zealand	2FH	0H	00H	11	18
Singapore	2FH	0H	00H	11	10
Malaysia	2FH	0H	00H	11	10

Country	807FB4	807FB5	807FB6	807FB7	807FB8
France	9	0	0	10	0
Germany	9	2	00H	6	3
UK	9	02H	00H	8	2
Italy	5	00H	00H	6	0
Austria	8	00H	00H	6	0
Belgium	5	00H	00H	6	0
Denmark	9	00H	00H	10	0
Finland	9	00H	00H	10	0
Ireland	9	00H	00H	10	0
Norway	9	00H	00H	9	2H
Sweden	9	00H	00H	10	0
Switzerland	3	00H	01H	5	1
Portugal	5	00H	00H	6	0
Holland	0BH	00H	00H	7	0
Spain	9	00H	00H	10	0
Israel	12	00H	00H	6	0
USA	9	0	0	9	0
Asia	8	00H	00H	6	0
Hong Kong	6	0	0	6	0
South Africa	6	0	0	6	0
Australia	7	0	01H	11	2
New Zealand	12	0	00H	8	0
Singapore	6	0	0	6	0
Malaysia	6	0	0	6	0

Country	807FB9	807FBD	807FDA		
France	0	11H	53		
Germany	FEH	15H	53		
UK	0	12H	53		
Italy	0	11H	53		
Austria	0	11H	59		
Belgium	0	11H	59		
Denmark	0	11H	53		
Finland	0	11H	53		
Ireland	0	11H	53		
Norway	0	12H	53		
Sweden	0	11H	53		
Switzerland	FFH	11H	92		
Portugal	0	11H	53		
Holland	0	11H	53		
Spain	0	11H	80		
Israel	0	11H	59		
USA	0	16H	53		
Asia	0	16H	47		
Hong Kong	0	0FH	53		
South Africa	0	0FH	53		
Australia	0	0FH	53		
New Zealand	0	12H	53		
Singapore	0	0FH	53		
Malaysia	0	0FH	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 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 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 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. **Range:** 1 to 127 s (01h to 7Fh) 00h or FFh - The local NCU parameter factory setting is used. Do not program a value between 80h and FEh.

Byte 1

	FUNCTION	COMMENTS
0 to 3	Tx level **Bit 3 2 1 0 — Setting (dBm)** 0 0 0 0 — 0 0 0 0 1 — -1 0 0 1 0 — -2 0 0 1 1 — -3 0 1 0 0 — -4 : : 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 **0:** Enabled **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. **1:** When disabling the tx level setting, change all of the bits 0 through 4 to 1.
5 **6**	Cable equalizer **Bit 6 — Bit 5 — Setting** 0 — 0 — None 0 — 1 — Low 1 — 0 — Medium 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. Also, try using the cable equalizer if one or more of the following symptoms occurs. • Communication error with error codes such as 0-20, 0-23, etc. • Modem rate fallback occurs frequently.
7	Cable equalizer setting **0:** Enabled **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. **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 **Bit 3 2 1 0 Setting (bps)** 0 0 0 0 Not used 0 0 0 1 2,400 0 0 1 0 4,800 0 0 1 1 7,200 0 1 0 0 9,600 0 1 0 1 12,000 0 1 1 0 14,400 1 1 1 1 Setting disabled 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.
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 3	DIS/NSF detection method **Bit 3 Bit 2 Setting** 0 0 First DIS or NSF 0 1 Second DIS or NSF 1 0 First DIS or NSF 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 **0:** MH only **1:** All available compression modes	This bit determines the capabilities that are informed to the other terminal during transmission.
6 7	ECM during transmission **Bit 7 Bit 6 Setting** 0 0 Disabled 0 1 Enabled 1 0 Disabled 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 to 3: Not used
Bits 4 and 5: Scanning resolution home position

Bit 5	4	Setting
0	0	Standard
0	1	Detail
1	0	Fine
1	1	Halftone

Bit 6: Transmission mode home position 0: Memory tx, 1: Immediate tx
Bit 7: Not used

8000A1(H) - User parameter switch 01
Bits 0 to 6: Not used
Bit 7: Settings return to home position after transmission 0: Disabled, 1: Enabled

8000A2(H) - User parameter switch 02
Bits 0 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: Not used
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
Bits 0 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 to 5: Not used
Bits 6 and 7: Fusing lamp during the energy saver mode

Bit	7	6	Setting
	0	0	Lamp off
	1	0	Standby temperature (100 °C)

8000A6(H) - User parameter switch 06
Bit 0: TTI 0: Off, 1: On
Bits 1 to 3: Not used
Bit 4: Batch transmission 0: Off, 1: On
Bits 5 to 7: Not used

8000A7(H) - User parameter switch 07
Bits 0 to 7: Not used

8000A8(H) - User parameter switch 08
Bits 0 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
Bit 1: Distinctive Ring Detection (This mode is only used in the US.)
0: Disabled, 1: Enabled
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 (not available in France)
	1	1	Flash start

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

8000B8(H) - User function 62 settings
Bits 0 to 3: Not used
Bit 4: Default setting in the Auto Select mode 0: Auto Receive Mode, 1: Fax Mode
Bits 5 to 7: Not used

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 is 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)

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) - Optional equipment (Read only)

Bit 0: Memory card 0: Not installed, 1: Installed
Bits 1-4: Not used
Bit 5: Optional paper feed unit 0: Not installed, 1: Installed
Bits 6 and 7: Not used

The following counters are listed on the System Parameter List. The names used on the system parameter list are given in brackets.

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

Address	High	Low
800158(H)	Tens digit	Unit digit
800159(H)	Thousands digit	Hundreds 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) - Paper feed counter: standard paper tray

800167 to 800169(H) - Paper feed counter: optional paper feed unit

800170 to 800172(H) - ADF counter (ADF)

800176 to 800178(H) - Printer total jam counter (COPY JAM)

800179 to 80017B(H) - Paper jam counter: standard tray

80017C to 80017E(H) - Paper jam counter: optional paper feed unit

800185 to 800187(H) - Scanner total jam counter (DOC. JAM)

800188 to 80018A(H) - Fusing exit jam counter (EJECT JAM)

80018B to 80018D(H) - Registration jam counter (PAPER JAM)

80018E to 800190(H) - PM counter (PM)

800191 to 800193(H) - PM call interval: default 30,000 (PM DEFAULT)

800194 to 800196(H) - Copy counter (COPY)

800197 to 800199(H) - OPC (master drum) counter (PCU)

80019A to 80019C(H) - DTM counter (TONER)

8001DE to 8001ED(H) - Excessive jam call parameters (Refer to section 2.3.2 for details.)

8001EE to 8001F0(H) - OPC (master drum) replacement interval (default: 20,000 prints)
The machine asks the user to replace the drum at this interval, if bit 5 of system switch 04 is 0.

8001F9 to 800223(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

80024F to 800254(H) - Last RDS operation (Read only)
80024F(H) - Year (BCD)
800250(H) - Month (BCD)
800251(H) - Day (BCD)
800252(H) - Hour
800253(H) - Minute
800254(H) - Second

800256(H) - Daylight saving time setting (User function 62)

80025B(H) - Transmission monitor volume 00 - 07(H)
80025C(H) - Reception monitor volume 00 - 07(H)
80025D(H) - On-hook monitor volume 00 - 07(H)
80025E(H) - Buzzer volume 00 - 07(H)

800261 to 800263(H) - Periodic service call parameters (Refer to section 2.3.2 for details)

80026C to 80026E(H) - Effective term of automatic service calls
(Refer to section 2.3.2 for details)

800296 to 800297(H) - Scanning top margin adjustment
800298 to 800299(H) - Scanning bottom margin adjustment
Refer to section 6.5 for details.

8002C0(H) - Print left margin (standard paper tray)
8002C1(H) - Print left margin (optional paper feed unit)
8002B4(H) - Print top margin (standard paper tray)
8002B5(H) - Print top margin (optional paper feed unit)
Refer to section 6.6 for details.

8002DC(H) - Fusing unit failure
When a service call was caused by a fusing unit failure (code 02)
When a fusing error occurs, the contents of this RAM are changed to 02. 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 8002F9(H) for other hardware failures.)

8002DD(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.

8002F9(H) - Details of the service call (hardware error)
02(H): Fusing unit failure
22(H): Laser power is out of the specified range
31(H): Mirror motor error
51(H): Fan motor error
61(H): Unexpected printer error. (Printer Ready signal is not received.)
62(H): Unexpected printer error. (Valid signal is not received.)

When a service call was caused by a fusing lamp failure (codes 02):
The same code is stored at address 8002DC(H).
After fixing the problem, reset the data at address 8002DC(H) to 00(H), then restart the machine to clear the service call.

When a service call was caused by another hardware failure:
If the problem remains after restarting the machine (power off/on), fix the hardware problem. The service call condition is cleared after power on.

800340 to 800347 (H) - Scanner Video Processing Parameters

Mode	Resolution	Bit no.	7	6	5	4	3	2	1	0
		Address	The functions of each bit are described below this table.							
Text	Standard (Memory tx)	800340(H)	0	0	0	0	0	0	0	0
	Standard (Immediate tx)	800341(H)	0	0	0	0	0	0	0	0
	Detail	800342(H)	0	0	0	0	0	0	0	0
	Fine	800343(H)	0	0	0	0	0	0	0	0
Halftone	Standard (Memory tx)	800344(H)	1	0	0	0	0	0	0	0
	Standard (Immediate tx)	800345(H)	1	0	0	0	0	0	0	0
	Detail	800346(H)	1	0	0	0	0	0	0	0
	Fine	800347(H)	1	0	0	0	0	0	0	0

Bit 0: Not used; do not adjust the factory setting
Bit 1: Not used; do not adjust the factory setting
Bit 2: Threshold value for edge detection — 0: Normal, 1: High
Bit 3: Background detection threshold — 0: Low, 1: High
Bit 4: Edge detection — 1: On
Bit 5: MTF algorithm — 0: Low, 1: High
Bit 6: Not used; do not adjust the factory setting
Bit 7: MTF — 0: Off, 1: On

80224E to 80248D(H) - Latest 64 error codes (Read only)

One error record consists of 6 bytes of data.

First error record start address - 80224E(H)
Second error record start address - 802254(H)
Third error record start address - 80225A(H)
: : :
64th error record start address - 802488(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.]

802A54 to 802C65(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

$$\begin{pmatrix} Bit\,4 \\ Bit\,5 \\ Bit\,6 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} : V.27ter \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} : V.29 \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} : T.B.D.$$

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

$$\begin{pmatrix} Bit\,4 \\ Bit\,5 \\ Bit\,6 \\ Bit\,7 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} : Normal \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix} : Confidential \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix} : Polling \begin{pmatrix} 1 \\ 1 \\ 0 \\ 0 \end{pmatrix} : Transfer$$

$$\begin{pmatrix} Bit\,4 \\ Bit\,5 \\ Bit\,6 \\ Bit\,7 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix} : Forwarding \begin{pmatrix} 1 \\ 0 \\ 1 \\ 0 \end{pmatrix} : \begin{matrix} Automatic \\ Service\ Call \end{matrix}$$

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: Batch transmission 0: Not used, 1: 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 during 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
51st to 53rd byte - 5th error code and page number where the error occurred

F80006 to F8000E(H) - ROM part number and suffix (ASCII)

5. PREVENTIVE MAINTENANCE

5.1. SPECIAL TOOLS AND LUBRICANTS

- Flash/SRAM data copy tool (P/N: A1939353)
- Flash/SRAM data copy board (P/N: H5159500)
- Image Sensor Shading Chart (P/N: H0689300)

5.2. PM TABLE

Scanner

Item	30K	60K	Notes
Exposure Glass	C (user)	C (user)	Soft cloth and water
ADF White Roller	C (user)	C (user)	Soft cloth and water
Document Pick-up Roller	C (user)	C (user)	Soft cloth and water
Separation Pad	C (user)	C (user)	Soft cloth and water

Printer

Item	30K	60K	Notes
Paper Pick-up Roller	C	C	Soft cloth and water
Transfer Unit	R	R	
Fusing Unit	R	R	

Paper Feed Unit (Optional)

Item	30K	60K	Notes
Paper Pick-up Roller	C	C	Soft cloth and water

C: Clean, R: Replace

6. 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.

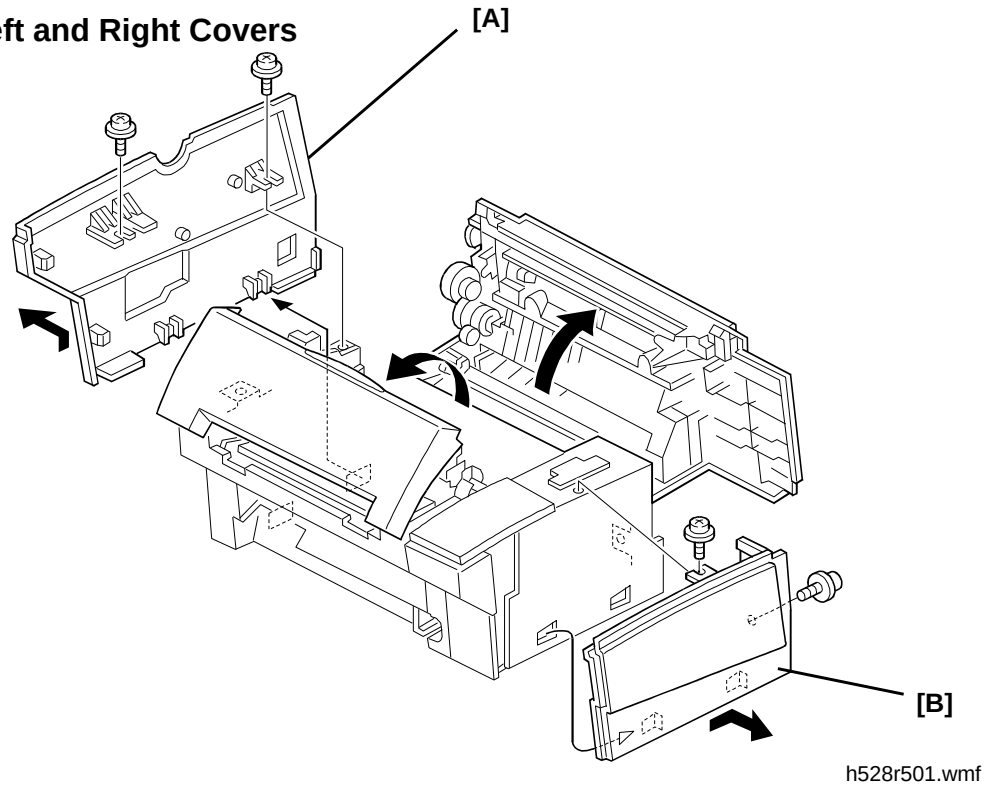
⚠CAUTION

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.

6.1. COVERS

6.1.1. Left and Right Covers

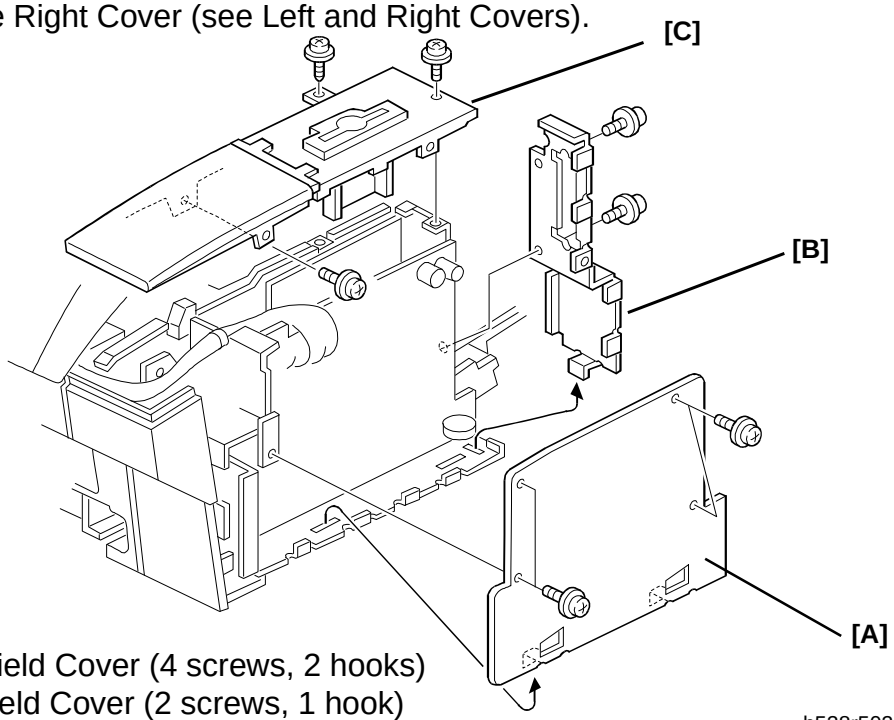


h528r501.wmf

A: Left Cover (2 screws, 2 hooks)
B: Right Cover (2 screws, 2 hooks)

6.1.2. Shield Covers

Remove the Right Cover (see Left and Right Covers).

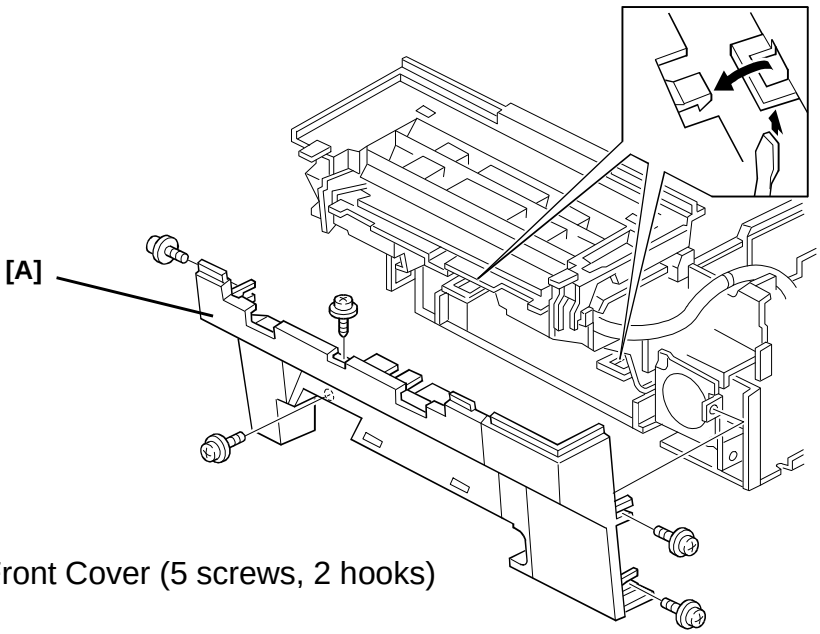


A: Right Shield Cover (4 screws, 2 hooks)
B: Rear Shield Cover (2 screws, 1 hook)
C: Upper Right Cover (3 screws)

h528r502.wmf

6.1.3. Front Cover

Remove the Left and Right Covers (see Left and Right Covers).

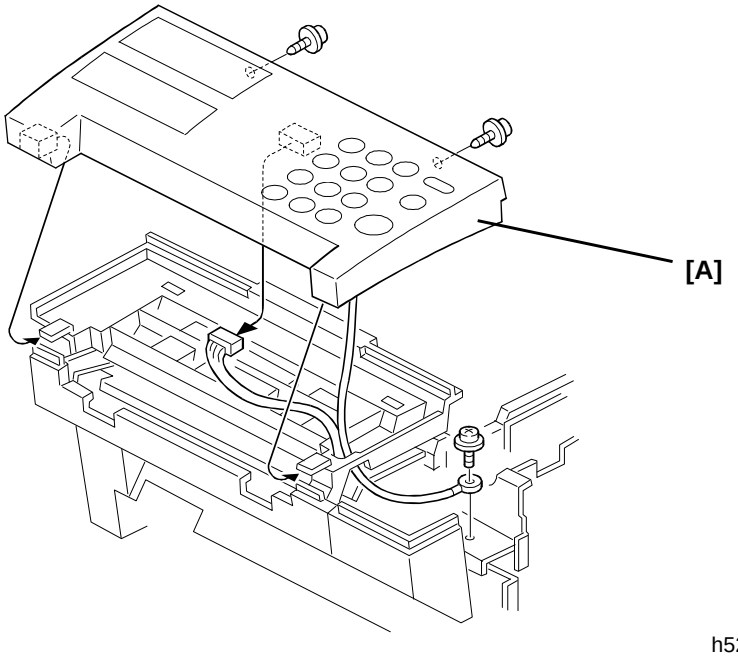


A: Front Cover (5 screws, 2 hooks)

h528r506.wmf

6.1.4. Operation Panel Assembly

Remove the Upper Right Cover (see Shield Covers).



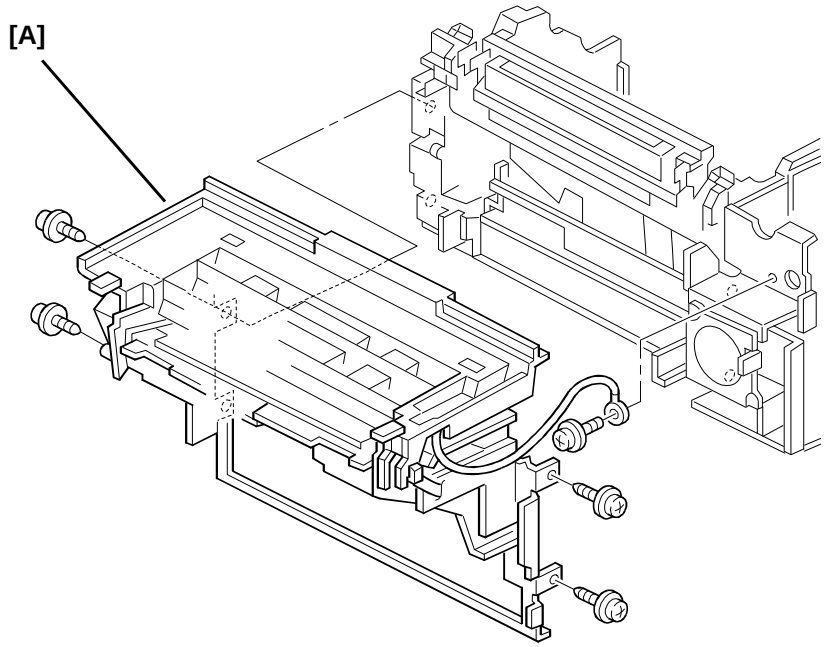
h528r505.wmf

A: Operation Panel Assembly (2 screws, 1 tapping screw with ground wire, 1 connector, 2 hooks)

6.2. SCANNER

6.2.1. Scanner Unit

Remove the following:
Left and Right Covers (see Left and Right Covers)
Right Shield Cover and Upper Right Cover (see Shield Covers)
Operation Panel Assembly (see Operation Panel Assembly)
FCU (see FCU and Mechanical Control Board)

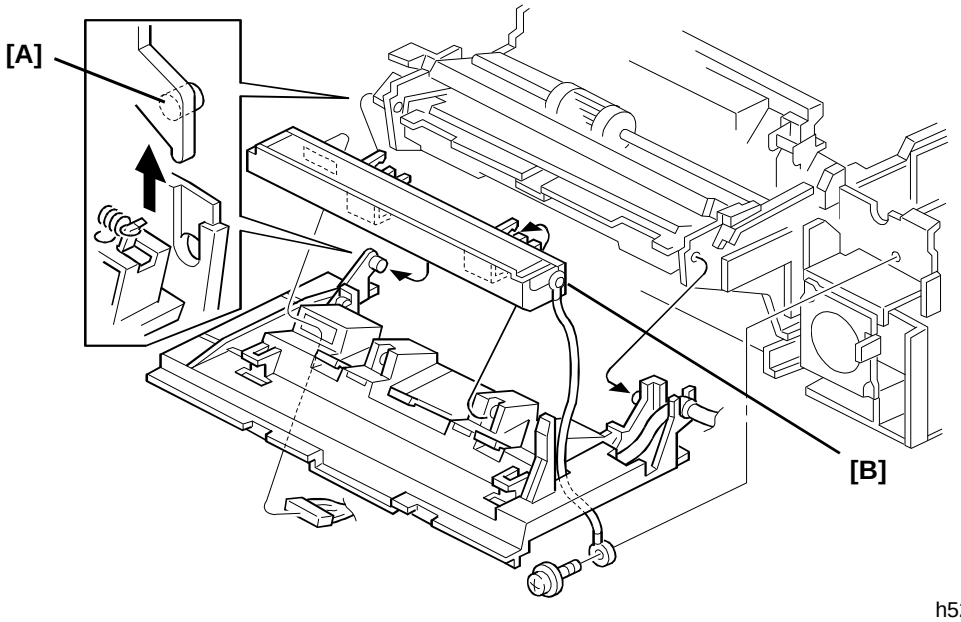


h528r508.wmf

A: Scanner Unit (4 tapping screws, 1 screw with ground wire)

6.2.2. Contact Image Sensor

Remove the Operation Panel (see Operation Panel Assembly).



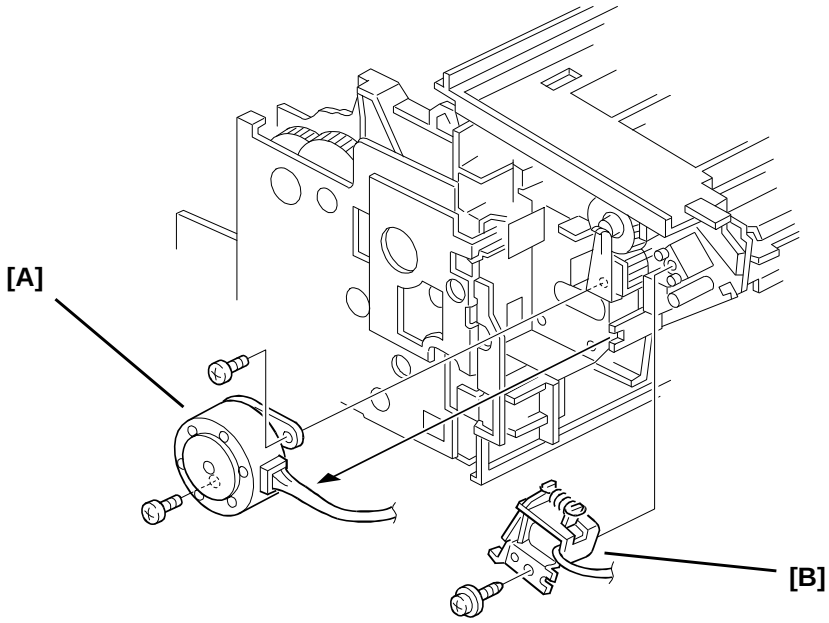
h528r509.wmf

Unhook the left [A] and right pins of the scanner upper cover.
B: Contact Image Sensor Assembly (1 screw with ground wire, 1 connector, 2 hooks)
Contact Image Sensor (3 screws, 1 screw with ground wire)

After replacing the image sensor, do the shading initialization by service function 10-2. (See section 4-1-16 for details.)

6.2.3. Tx Motor and Document Feed Solenoid

Remove the following:
Left Cover and Right Cover (see Left and Right Covers)
Upper Right Cover and Right Shield Cover (see Shield Covers)
Front Cover (see Front Cover)

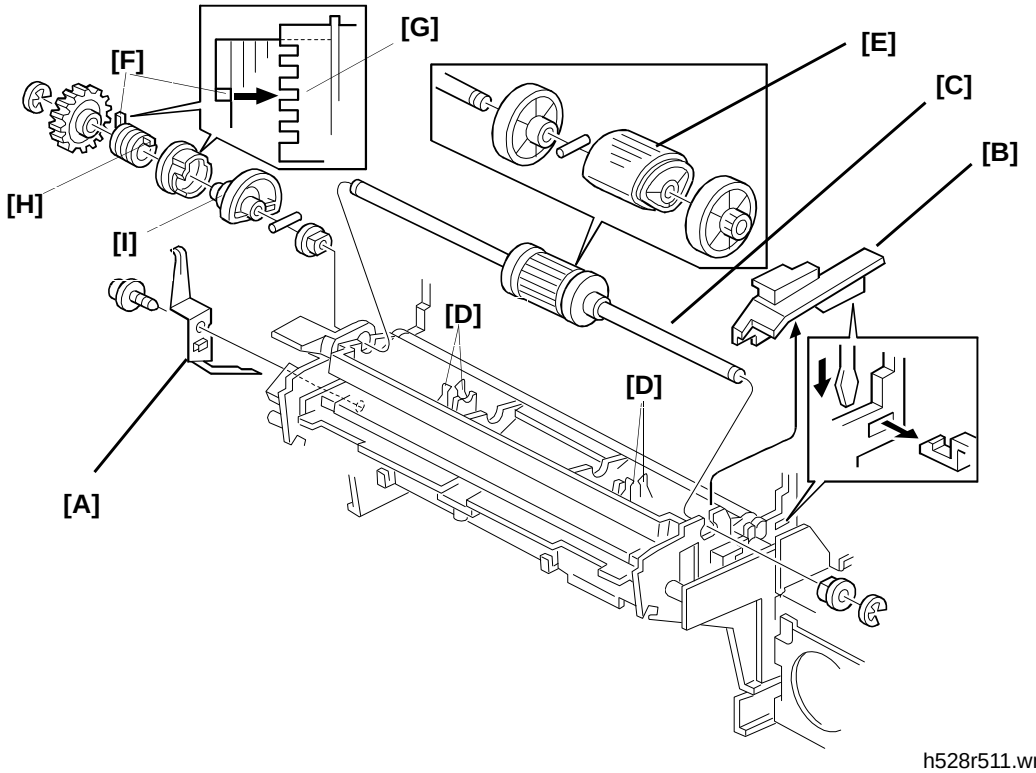


h528r510.wmf

A: Tx Motor (2 screws, 2 wire clamps, 1 connector on the FCU)
B: Document Feed Solenoid (1 tapping screw, 2 wire clamps, 1 connector on the FCU)

6.2.4. Document Pick-up Roller

Remove the scanner upper cover (see Contact Image Sensor).



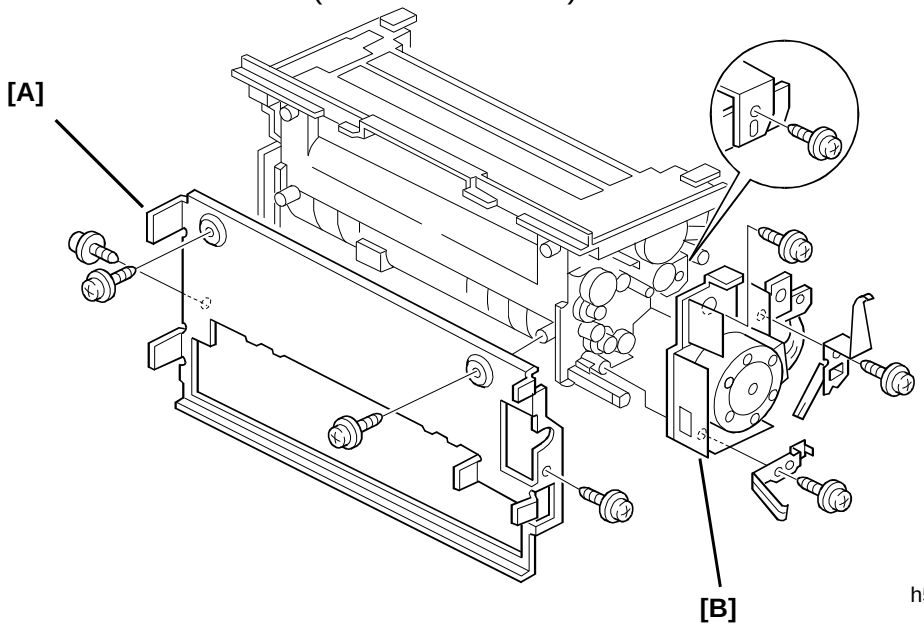
h528r511.wmf

A: Ground Plate (1 tapping screw)
B: Scanner Right Inner Cover (1 hook, 1 pin)
C: Document Pick-up Roller Assembly (2 E-rings, 1 gear, 1 coil spring, 1 spring cover, 1 plastic cam, 1 pin, 2 bushings, 2 hooks)
Note: Be careful not to break the hooks [D] when removing the document pick-up roller assembly.
Slide the Document Feed Roller [E] to the right together with the white plastic roller clipped to the shaft on the right.
Note: Be careful not to drop the pins when disassembling.
E: Document Feed Roller

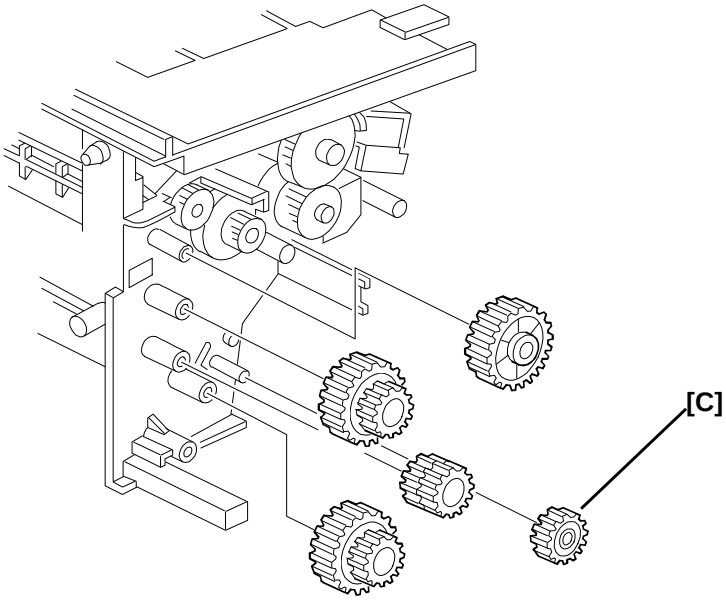
Note: During reassembly, ensure that the end of the spring [F] is placed into any of the five notches [G]. Also ensure that the other end of the spring [H] is placed into the notch on the cam [I].

6.2.5. Document Exit Roller

Remove the Scanner Unit (see Scanner Unit).

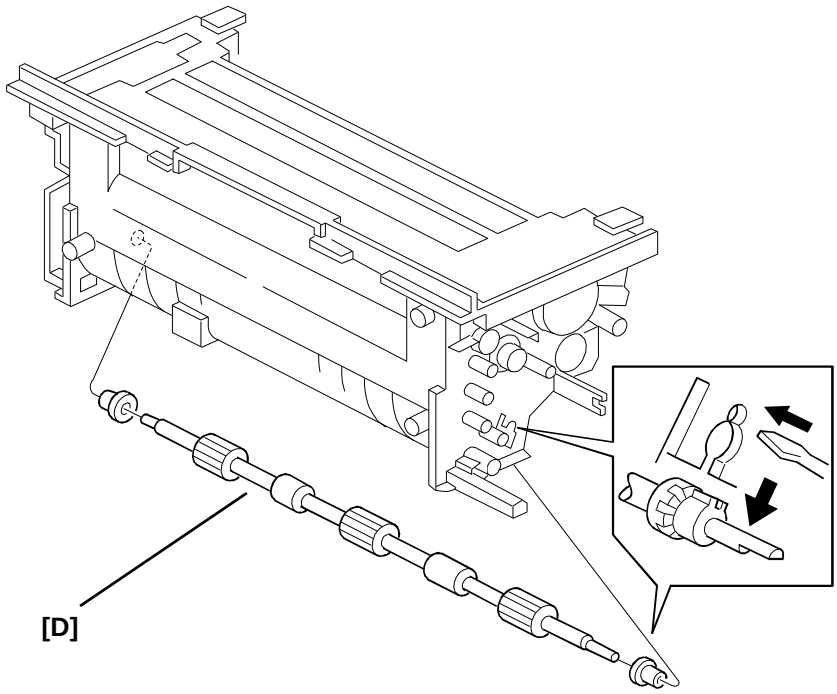


h528r513.wmf



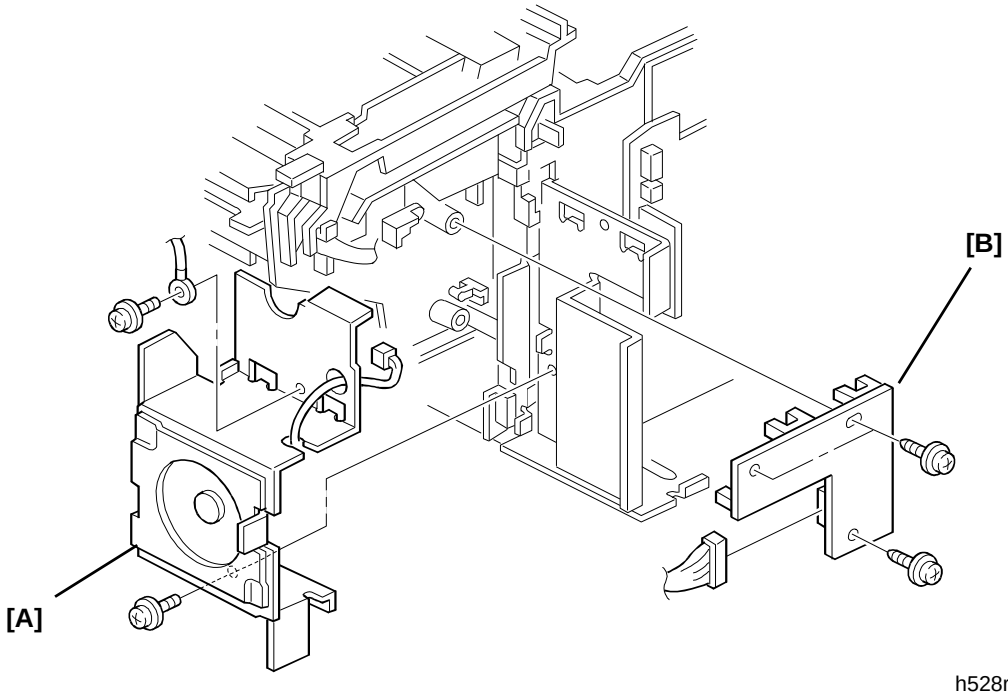
h528r514.wmf

A: Mounting Plate (4 tapping screws)
B: Tx Motor Assembly (3 tapping screw, 1 screw)
C: Exit Roller Drive Gear
D: Document Exit Roller (see the next page)



h528r515.wmf

6.2.6. Document Sensor Board

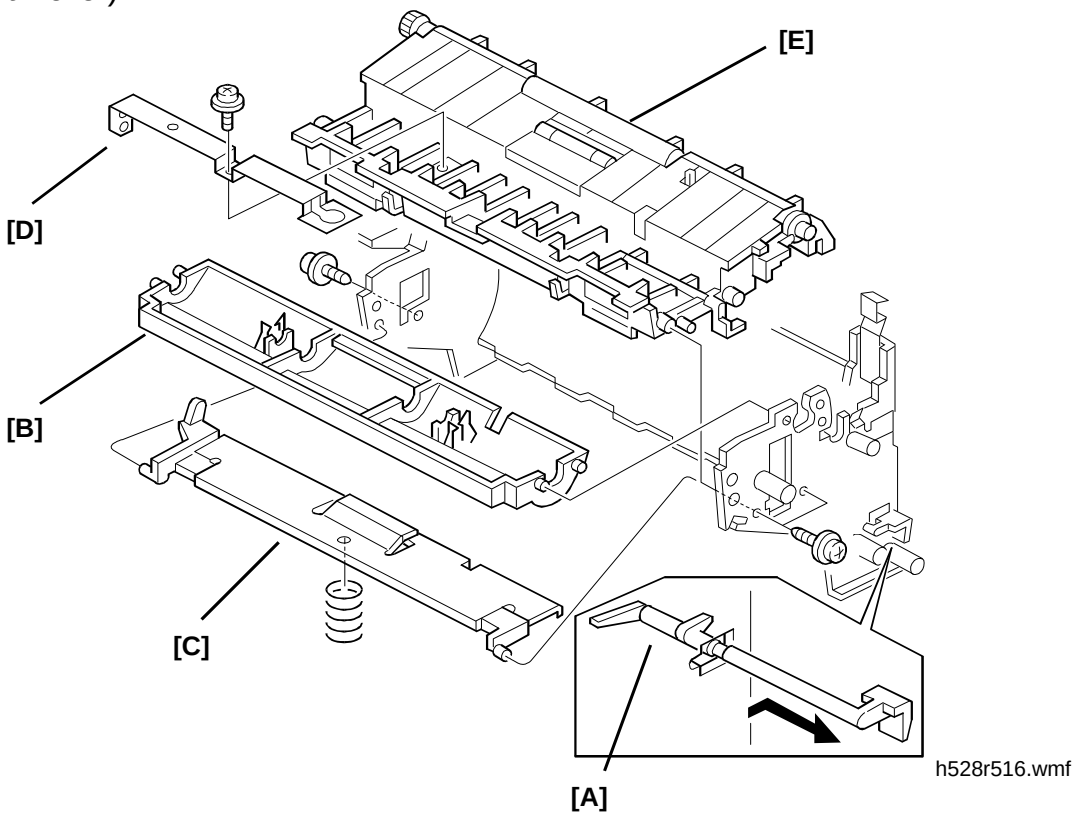


h528r512.wmf

A: Speaker Mount Bracket (1 screw, 1 screw with ground wire, 1 connector)
B: Document Sensor Board (3 tapping screws, 1 connector)

6.2.7. Document Exit Feeler, Document Raising Plate, and Lower Document Feed Guide Assembly

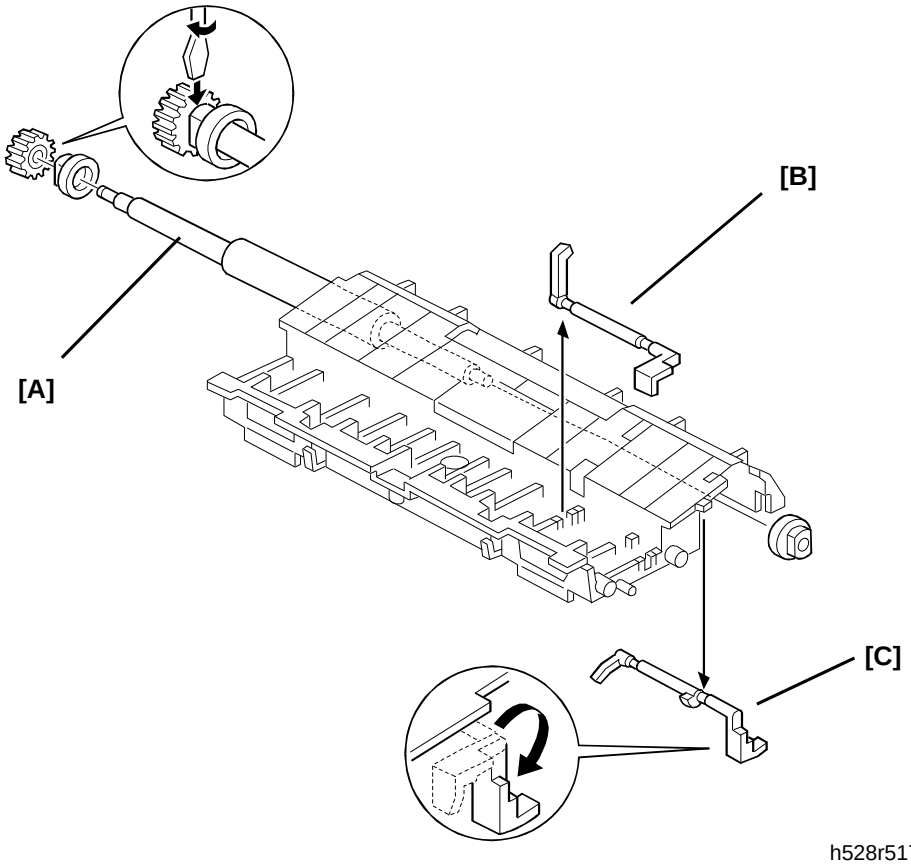
Unhook the scanner upper cover, and remove the document sensor board (see Document Sensor Board) and the document exit roller (see Document Exit Roller).



A: Document Exit Feeler (1 clip): Remove the document feed roller (see Document Feed Roller).
B: Document Upper Guide (4 pins)
C: Document Raising Plate (2 pins)
D: Ground Plate (1 screw)
E: Lower Document Feed Guide Assembly (3 tapping screws)
Note: Be careful not to break the feelers when removing the lower document feed guide assembly.

6.2.8. Platen Roller, Document Set Feeler, and Registration Feeler

Remove the lower document feed guide assembly (see Document Exit Feeler, Document Raising Plate, and Lower Document Feed Guide Assembly).

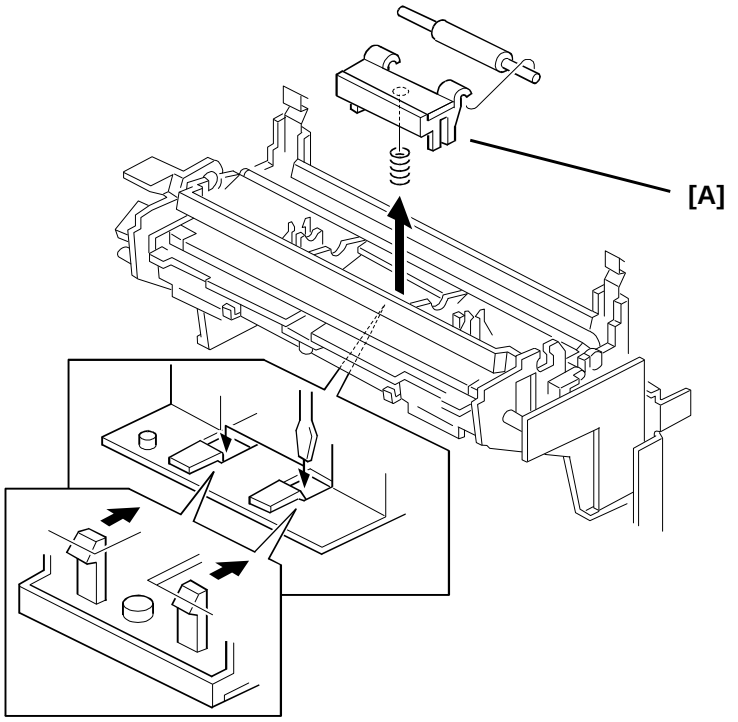


h528r517.wmf

A: Platen Roller (1 clipped gear, 2 bushings)
B: Document Set Feeler (2 hooks)
C: Registration Feeler (2 hooks)
Note: Be careful not to break the hooks.

6.2.9. Friction Pad

Remove the document feed roller (see Document Feed Roller).



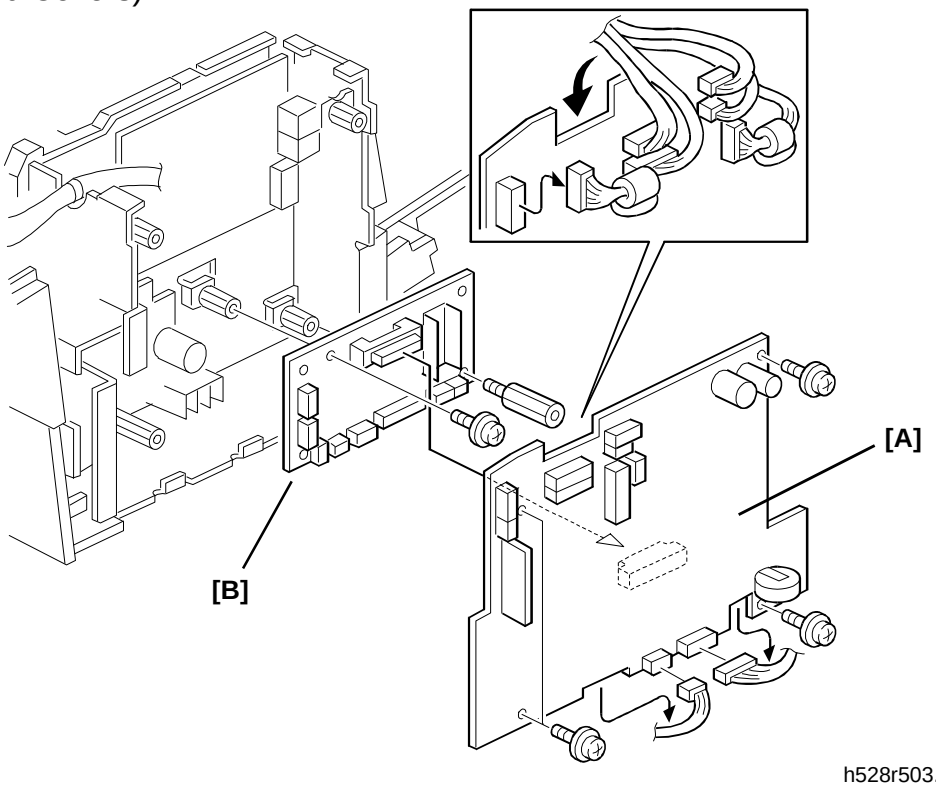
h528r518.wmf

A: Friction Pad (2 hooks)
Note: Be careful not to break the hooks.

6.3. PRINTER

6.3.1. FCU and Mechanical Control Board

Remove the Right Cover (see Left and Right Covers) and Right Shield Cover (see Shield Covers).



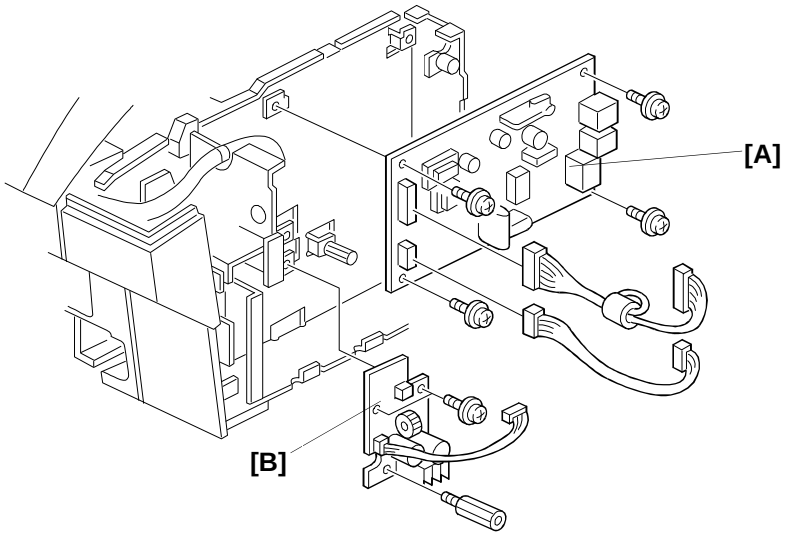
h528r503.wmf

A: FCU (4 screws, 10 connectors on the face, 1 connector on the back)
B: Mechanical Control Board (1 screw, 1 stud, 11 connectors)

After replacing the FCU, do the shading initialization by service function 10-2. (See section 4-1-16 for details.)

6.3.2. NCU and 5V PSU Board

Remove the Right Cover (see Left and Right Covers), Right Shield Cover (see Shield Covers), and FCU (see FCU and Mechanical Control Board).

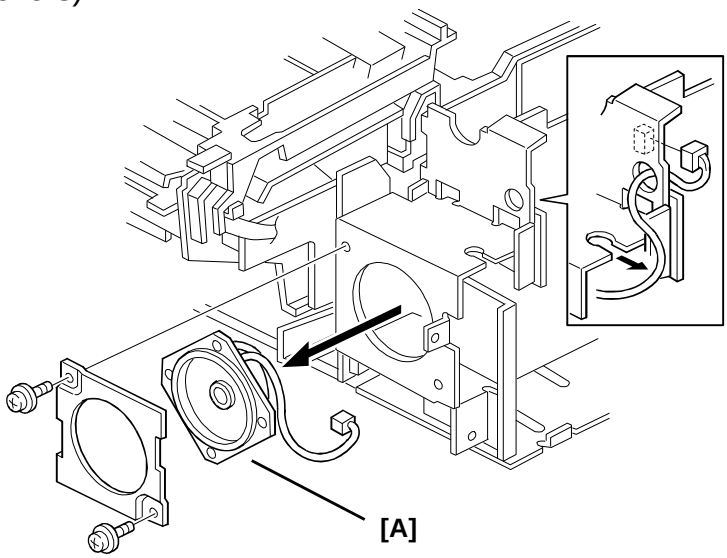


h528r504.wmf

A: NCU (4 screws, 2 connectors)
B: 5V PSU Board (2 screws, 1 stud, 1 connector)

6.3.3. Speaker

Remove the Right Cover (see Left and Right Covers) and Right Shield Cover (see Shield Covers).

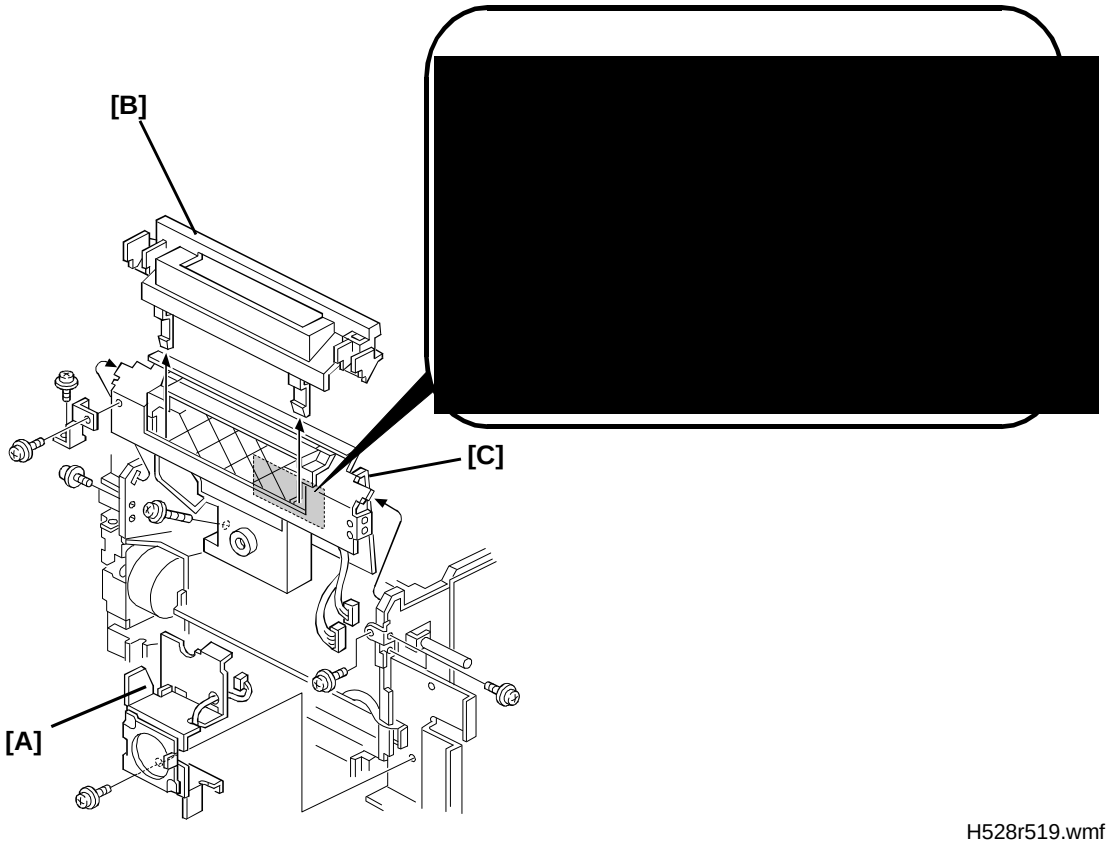


h528r507.wmf

A: Speaker (2 screws, 1 connector).

6.3.4. Optical Unit

Remove the scanner unit (see Scanner Unit), the FCU (see FCU and Mechanical Control Board), and the left cover (see Left and Right Covers).

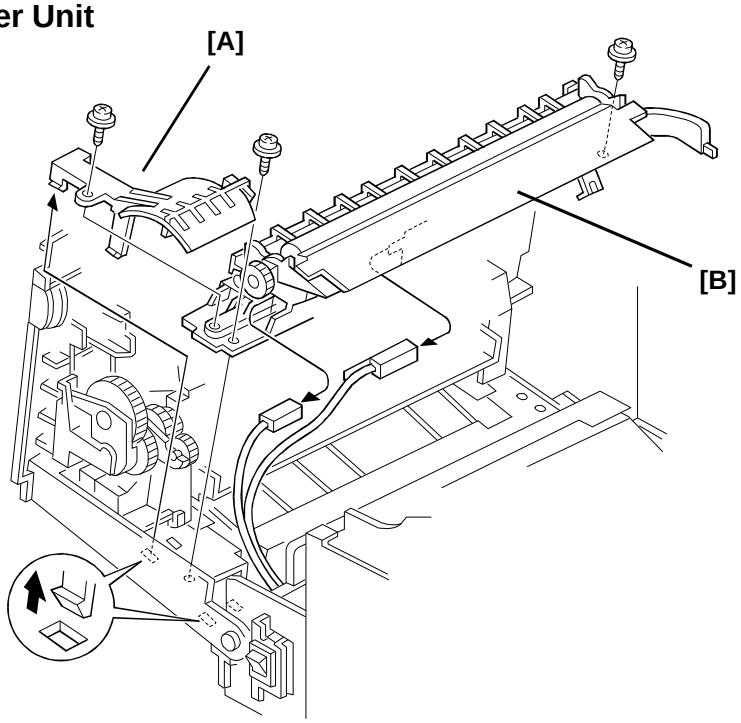


H528r519.wmf

A: Speaker Bracket (1 screw)
B: Optical Unit Upper Cover (2 hooks)
C: Optical Unit (7 screws, 2 hooks, 1 cable clamp)

⚠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.

6.3.5. Transfer Unit

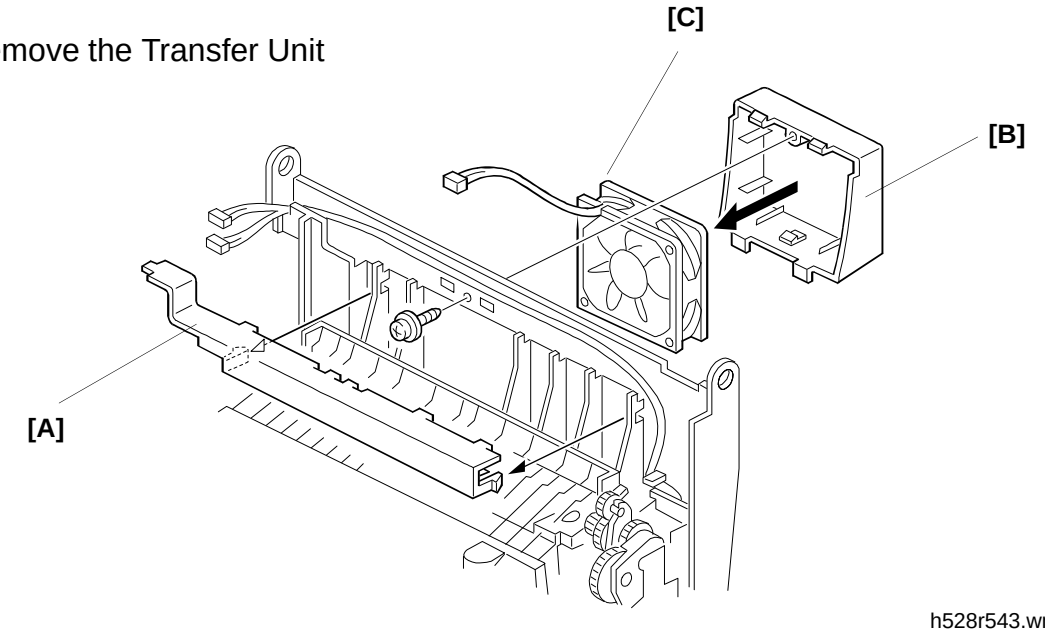


h528r520.wmf

A: Cable Cover 1 (1 screw, 4 hooks)
B: Transfer Unit (2 screws, 2 connectors)

6.3.6. Fusing Unit Fan

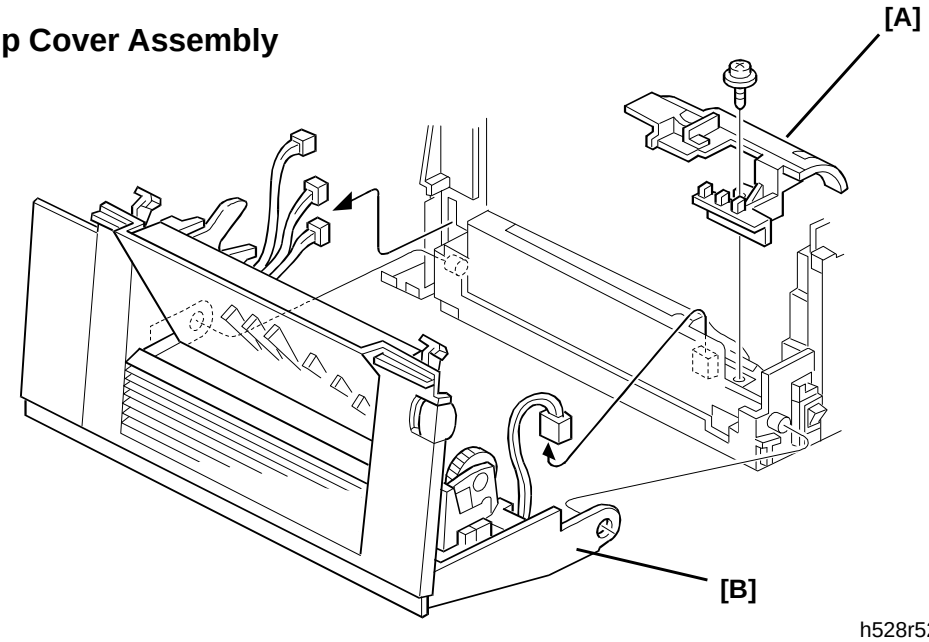
Remove the Transfer Unit



h528r543.wmf

A: Harness Cover (2 hooks)
B: Fusing Unit Fan Cover (1 screw, 2 hooks)
C: Fusing Unit Fan (2 hooks)

6.3.7. Top Cover Assembly

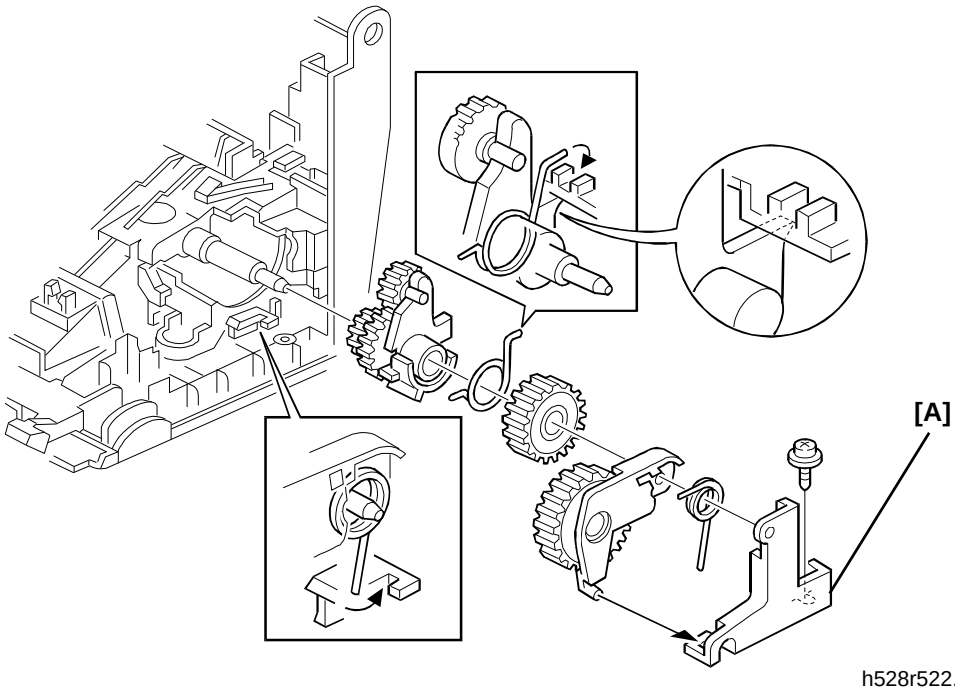


h528r521.wmf

Remove cable cover 1 (see Transfer Unit).

A: Cable Cover 2 (1 screw)
B: Top Cover Assembly (2 pins, 1 harness clamp, 4 connectors)

6.3.8. Fusing Cover Gears

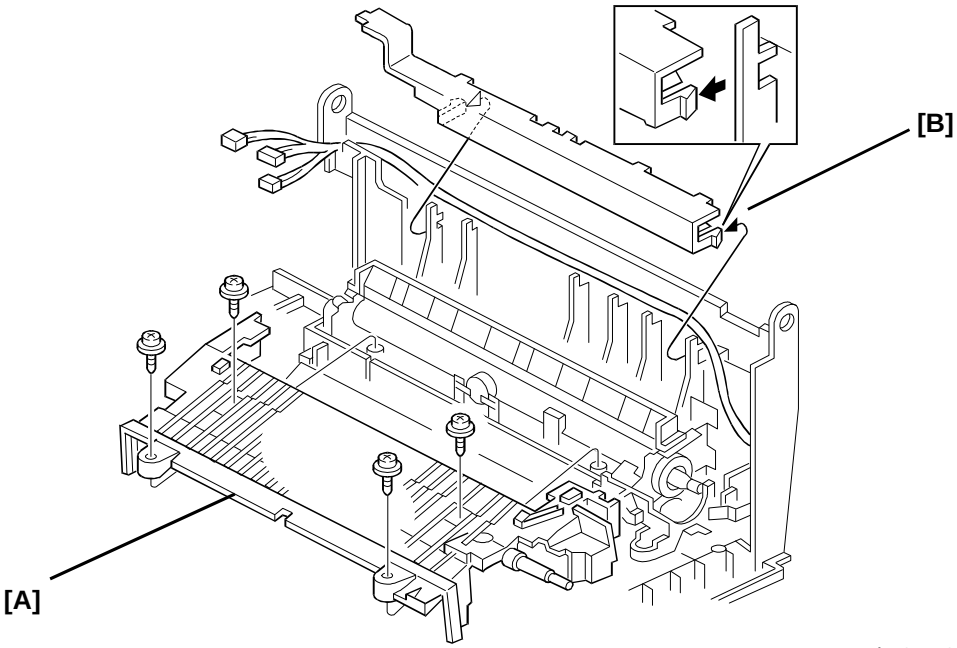


h528r522.wmf

To remove components in the fusing section, remove the top cover assembly first (see Top Cover Assembly).

Remove the gear cover [A] (1 screw), then the inner gears and the torsion springs can be taken off.

6.3.9. Fusing Cover and Harness Cover



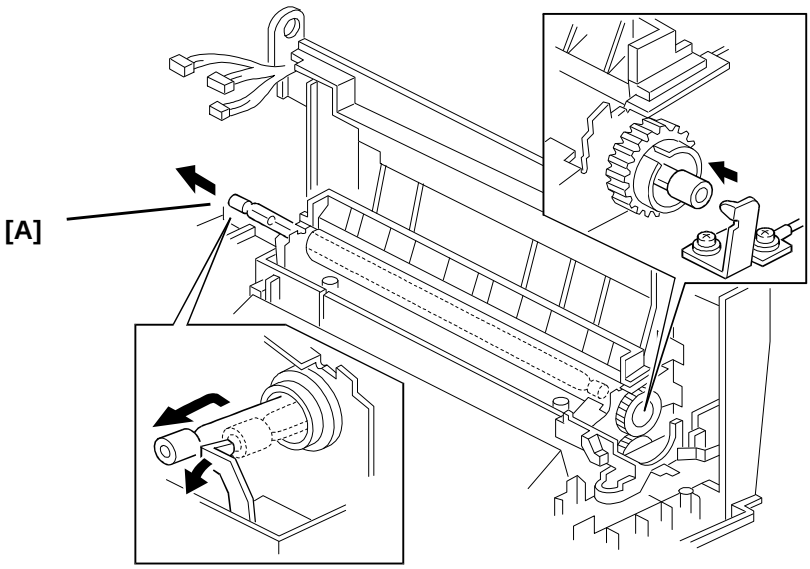
h521r523.wmf

Remove the gear cover (see Fusing Cover Gears).

A: Fusing Cover (4 screws)
B: Harness Cover (2 hooks)

6.3.10. Fusing Lamp

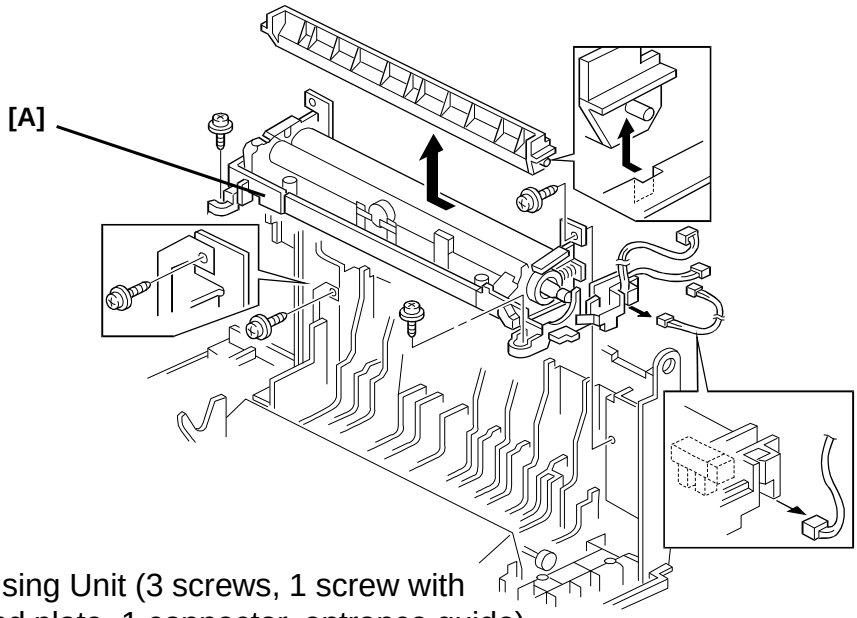
Remove the fusing cover (see Fusing Cover and Harness Cover).



h528r524.wmf

A: Fusing Lamp (2 terminals)

6.3.11. Fusing Unit



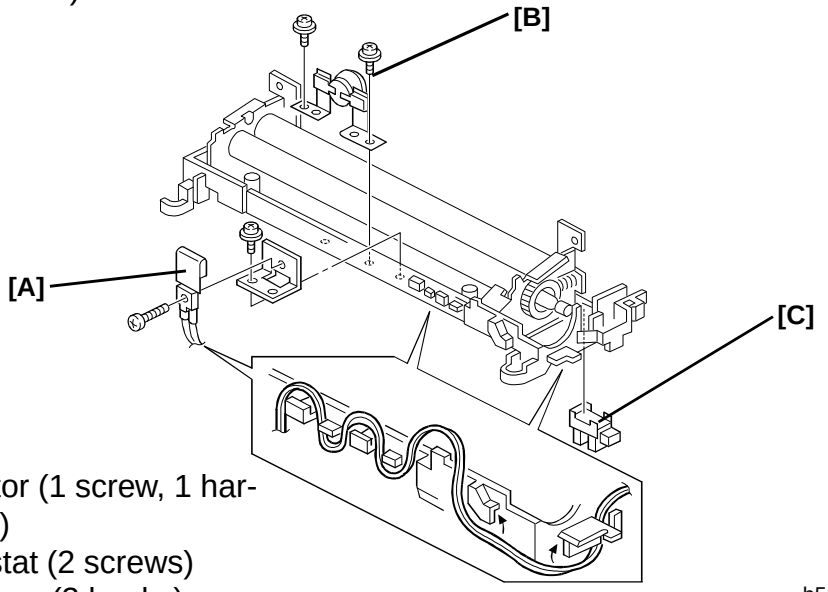
A: Fusing Unit (3 screws, 1 screw with ground plate, 1 connector, entrance guide)

h528r525.wmf

Remove the fusing cover (see Fusing Cover and Harness Cover) and the transfer unit (see Transfer Unit).

6.3.12. Thermistor, Thermostat, and Exit Sensor

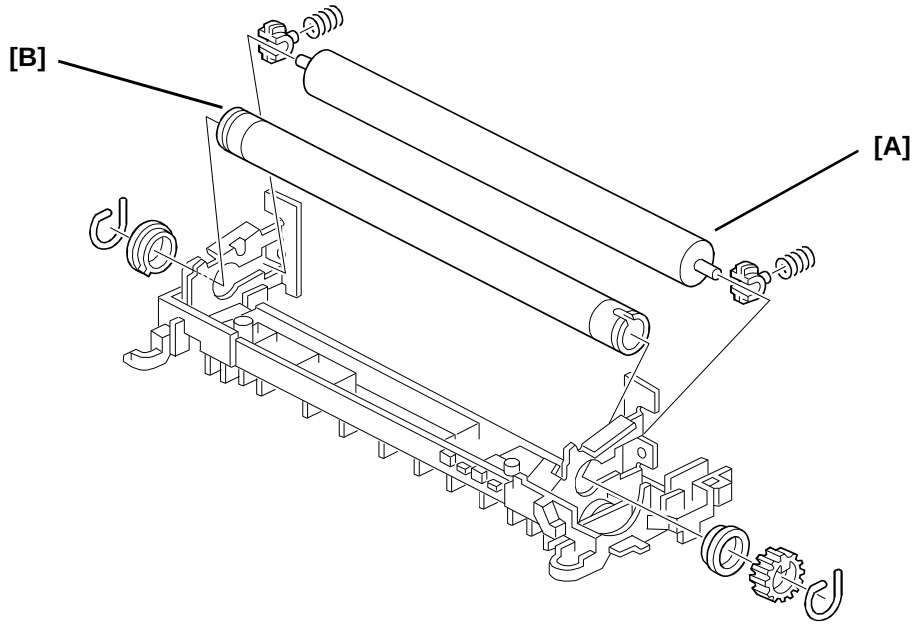
Remove the fusing unit (see Fusing Unit), then remove the thermistor [A] with bracket (1 screw).



A: Thermistor (1 screw, 1 harness clamp)
B: Thermostat (2 screws)
C: Exit Sensor (3 hooks)

h528r526.wmf

6.3.13. Pressure Roller and Hot Roller

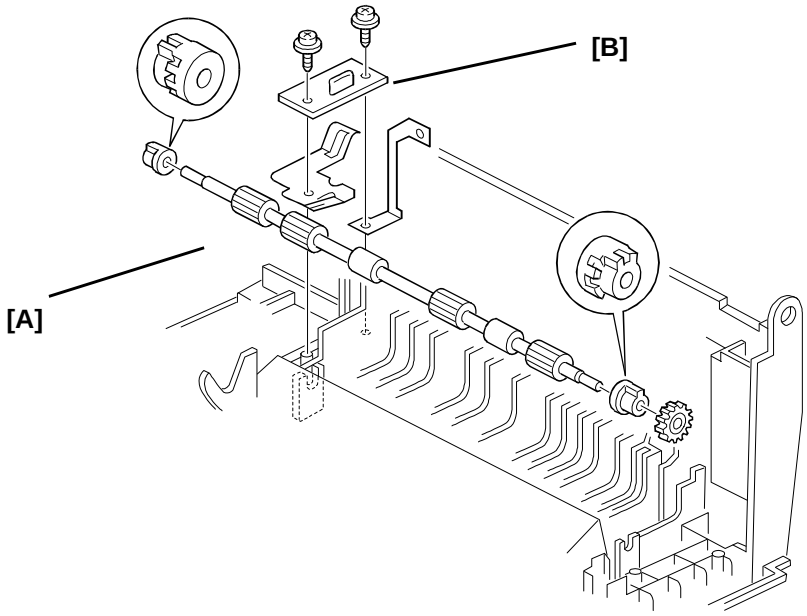


h528r527.wmf

A: Pressure Roller (2 springs, 2 bushings)
B: Hot Roller (2 G-rings, 1 gear, 2 bushings)

6.3.14. Exit Roller and PCB-R

Remove the fusing unit (see Fusing Unit).

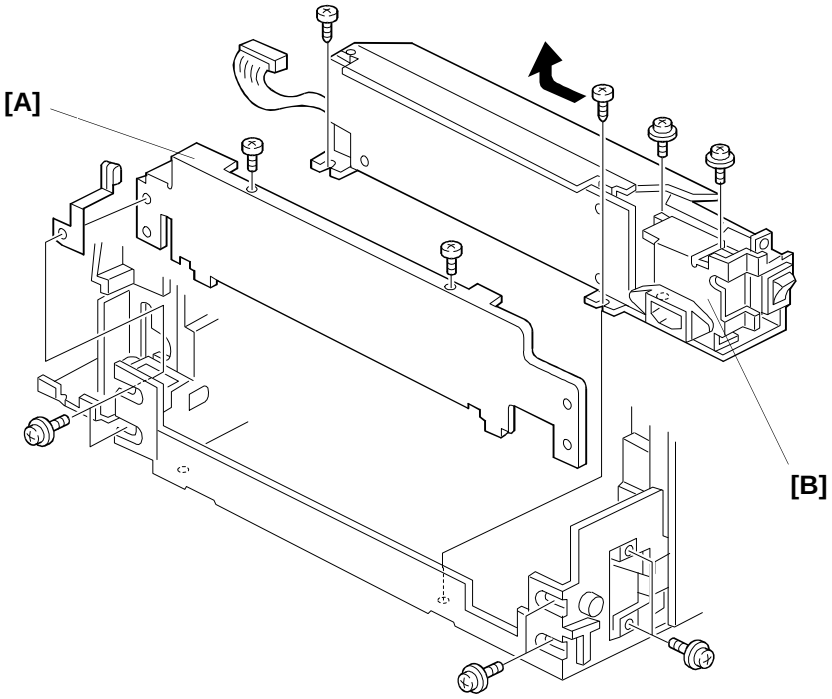


h528r529.wmf

A: Exit Roller (2 bushings, 1 gear)
B: PCB-R (2 screws with ground plate)

6.3.15. PSU

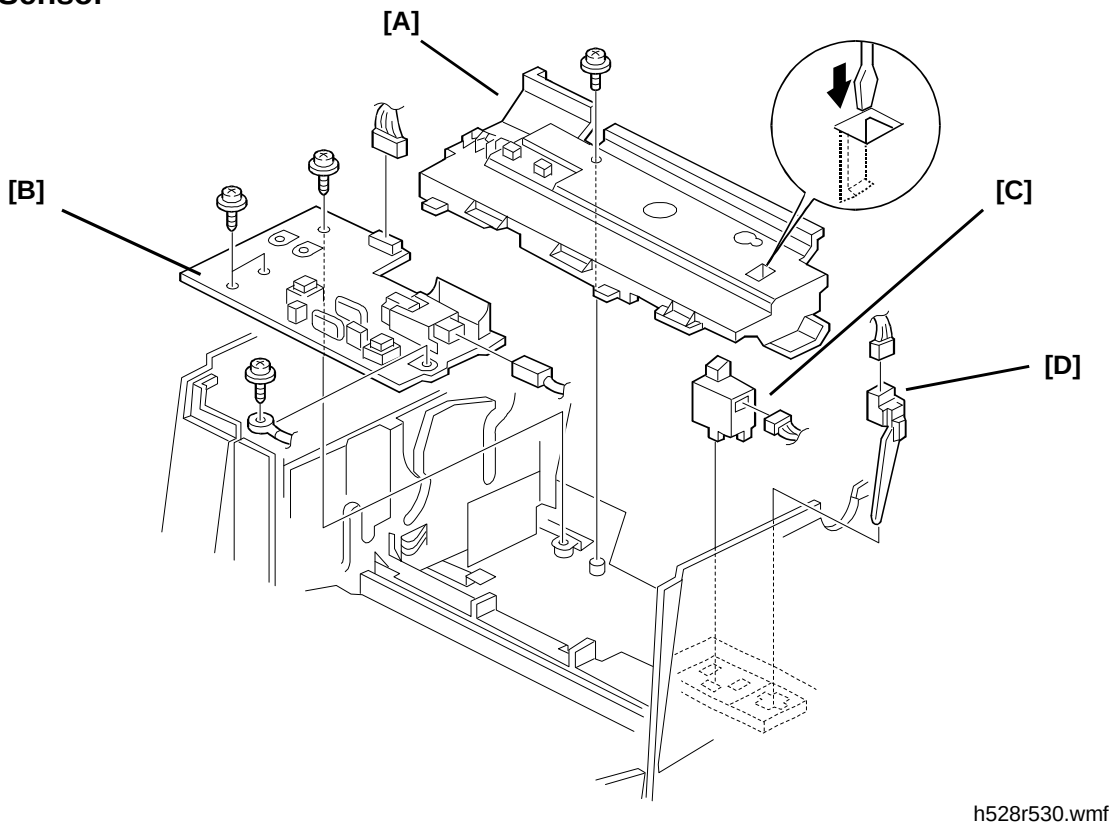
Remove the transfer unit (see Transfer Unit).



h528r528.wmf

A: Bracket (2 screws with washer, 3 screws, 1 screw with ground plate)
B: PSU (4 screws, 1 connector, 1 harness clamp)

6.3.16. High Voltage Power Supply, Toner End Sensor, and Paper End Sensor

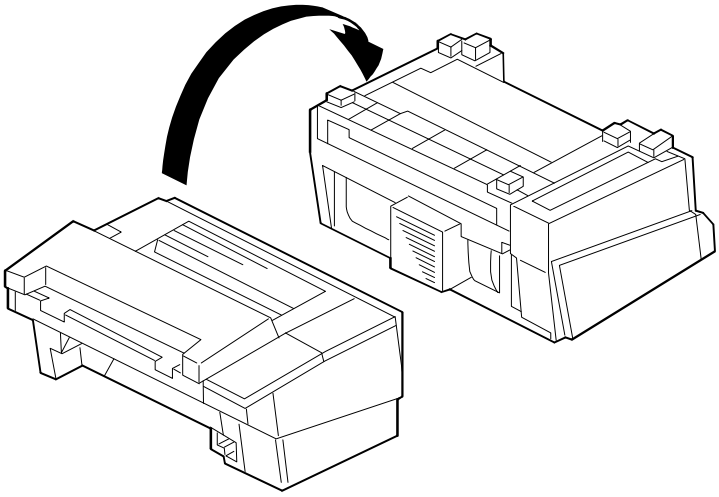


h528r530.wmf

A: Bottom Cover (1 screw, 1 hook)
B: High Voltage Power Supply (3 tapping screws with terminals, 1 screw with cable, 2 connectors)
C: Toner End Sensor (3 hooks)
D: Paper End Sensor (2 hooks)

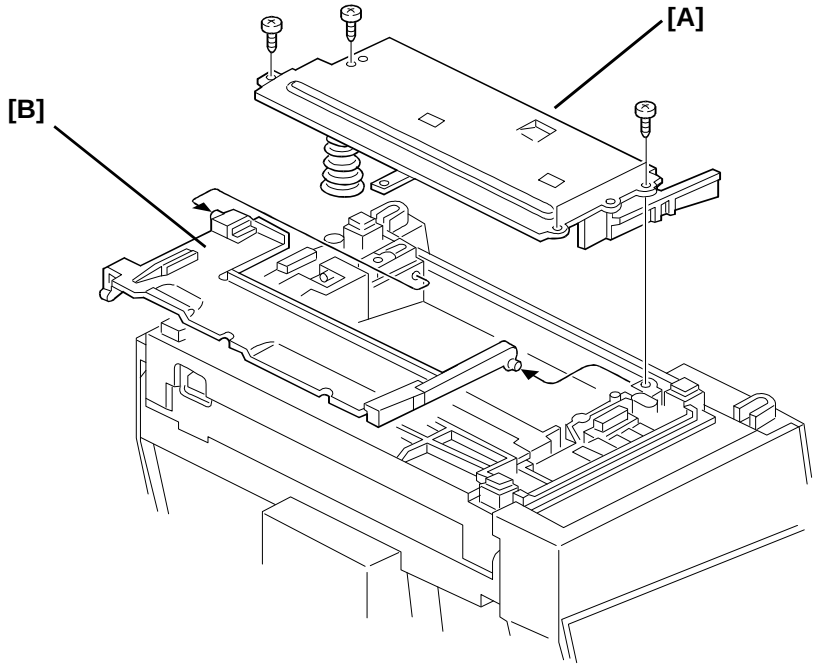
6.4. PAPER FEED SECTION

To disassemble the feed section, turn the machine upside down and approach it from the bottom.



h528r531.wmf

6.4.1. Bottom Plate Assembly and Paper Lifting Plate

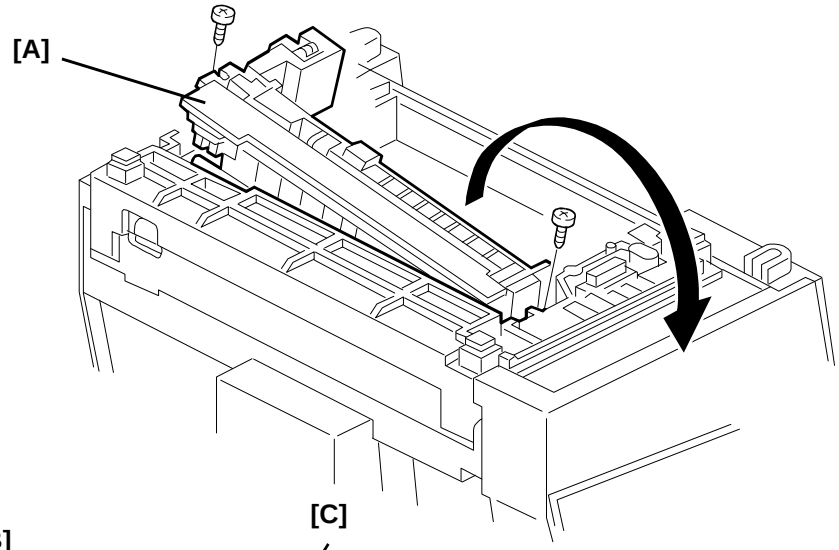


h528r532.wmf

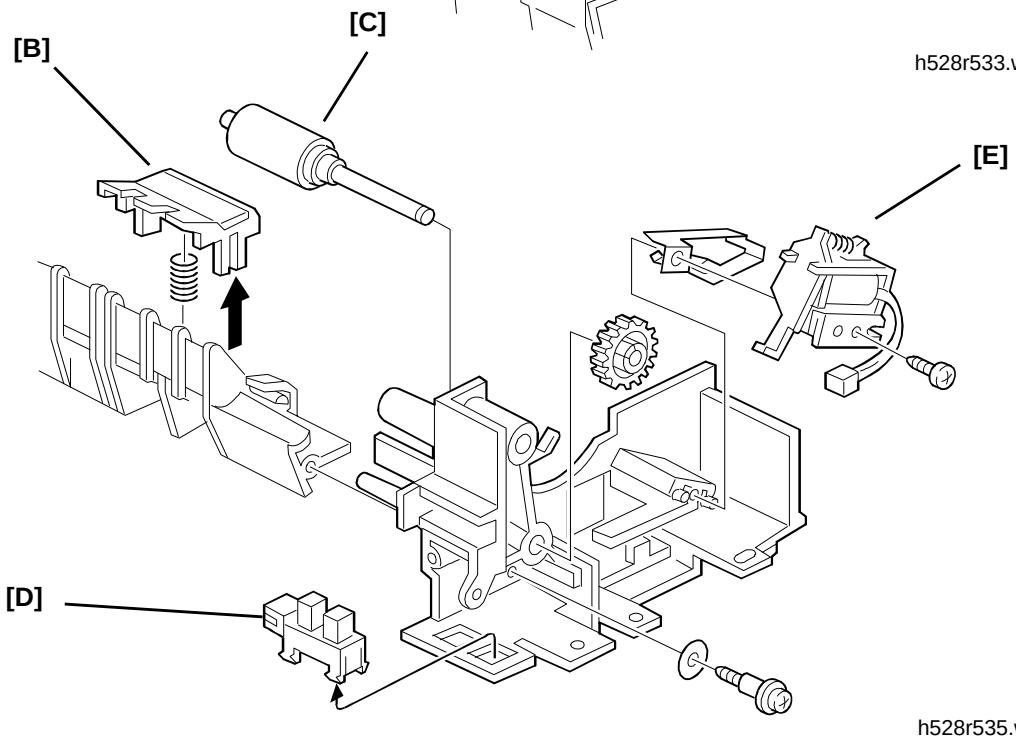
A: Bottom Plate Assembly (4 screws)
B: Paper Raising Plate (2 pins)

6.4.2. Paper Pick-up Solenoid, Registration Sensor, Paper Feed Roller, and Paper Separation Pad

To remove these components, remove 3 screws then turn the paper feed guide assembly [A] upside down as shown in the diagram.



h528r533.wmf



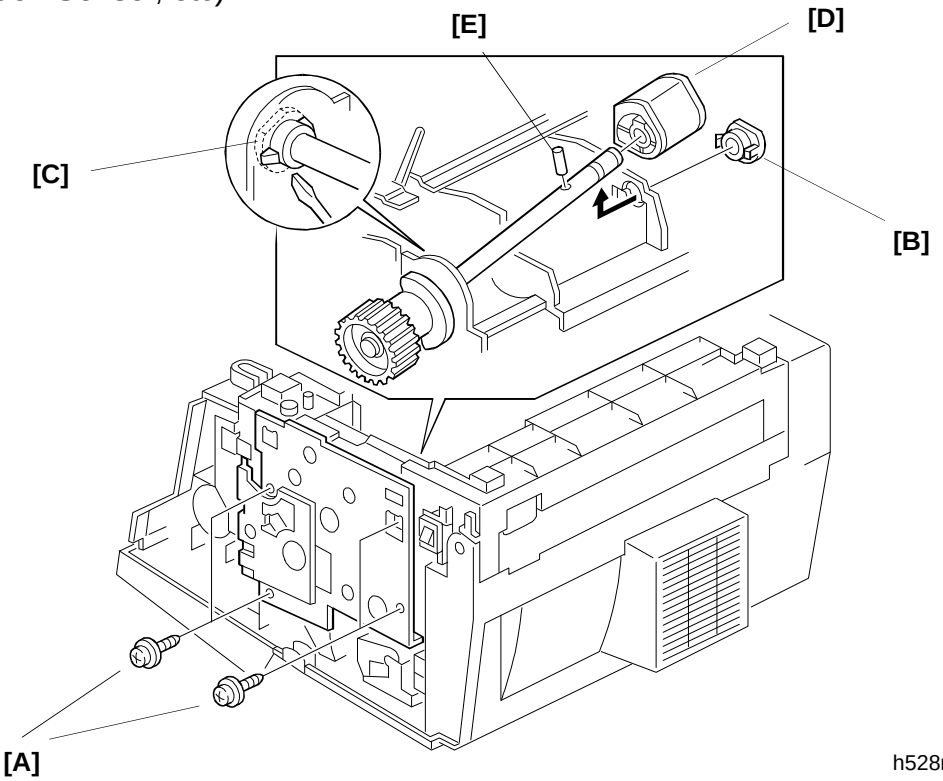
h528r535.wmf

B: Paper Separation Pad (2 hooks)
C: Paper Feed Roller (1 clipped gear)
D: Registration Sensor (4 hooks, 1 connector)
E: Paper Pick-up Solenoid (1 screw with ground plate, 1 connector)

6.4.3. Paper Pick-up Roller

Remove the following:

- Left cover (see Left and Right Covers)
- Bottom plate assembly and paper lifting plate (see Bottom Plate Assembly and Paper Lifting Plate)
- Paper feed guide assembly (see Paper Pick-up Solenoid, and Registration Sensor, etc).

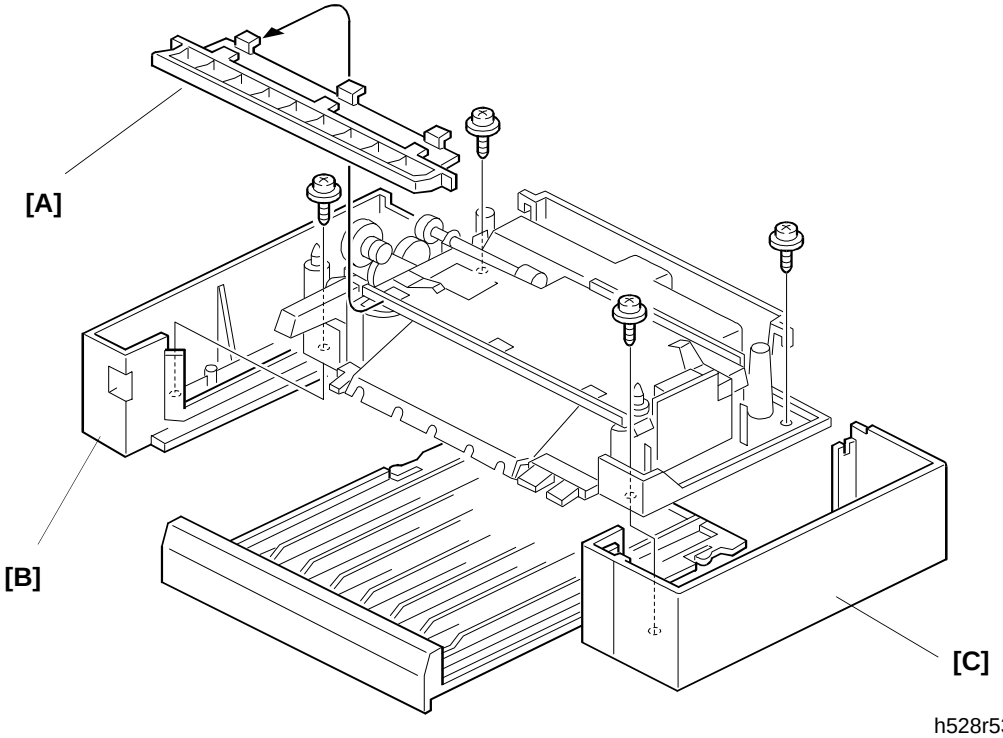


Remove 4 screws [A].
Remove bushing [B] (1 E-ring, 2 hooks).
Unhook the two hooks on bushing [C].
Remove the pick-up roller [D] (1 pin).

Note: Be careful not to drop the pin [E] when removing the pick-up roller.

6.5. 2ND PAPER FEED UNIT

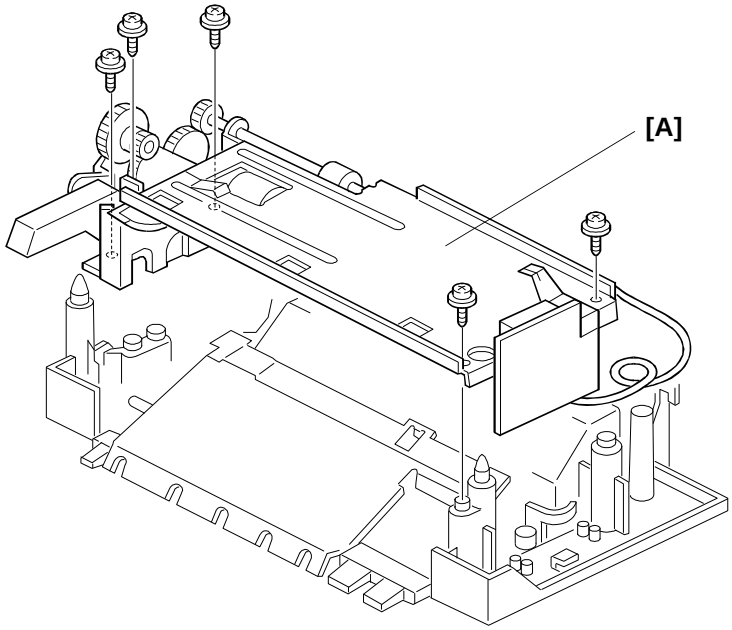
6.5.1. Upper Guard, and Left and Right Covers



h528r537.wmf

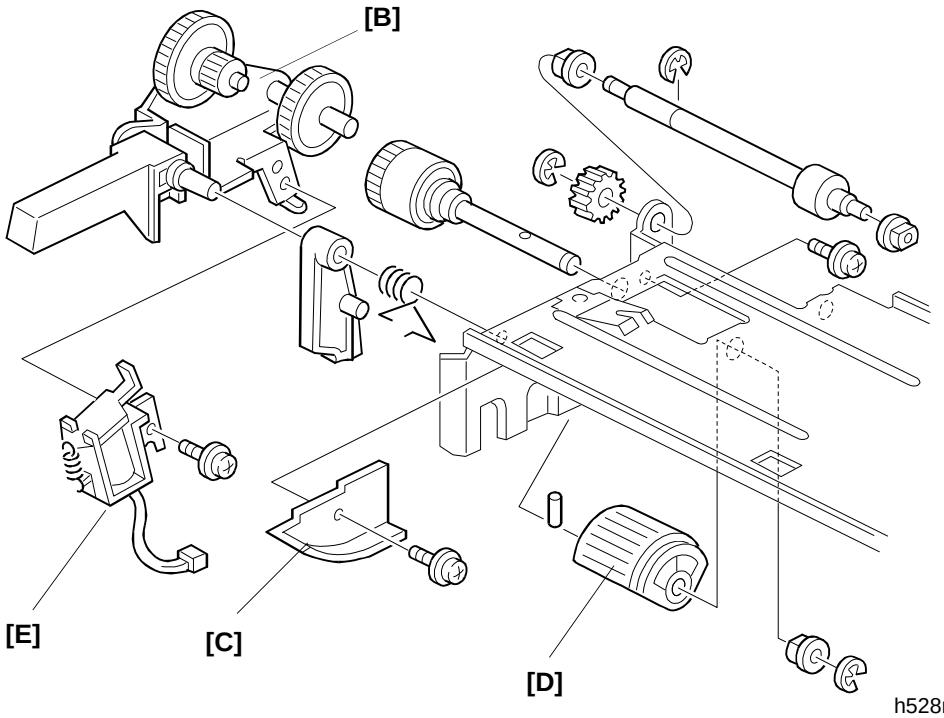
A: Upper Guard (3 hooks)
B: Left Cover (2 screws, 2 pins)
C: Right Cover (2 screws, 2 pins)

6.5.2. Paper Pick-up Roller and Paper Pick-up Solenoid



h528r539.wmf

A: Paper Pick-up Assembly (5 screws, 1 connector)

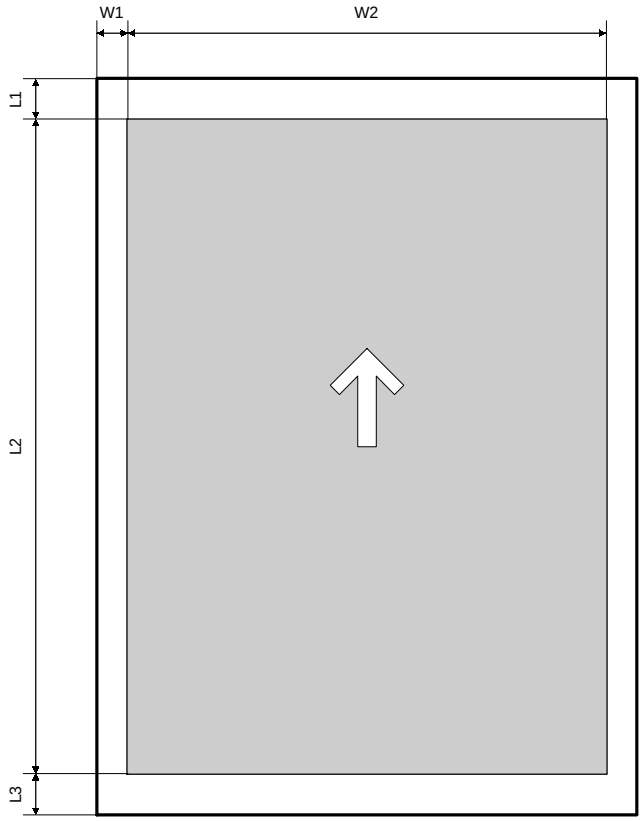


h528r544.wmf

B: Feed Gear Assembly (1 screw, 1 screw with upper left feed guide [C])
D: Pick-up Roller (1 E-ring, 1 bushing, 1 pin)
Note: Be careful not to drop the pin when removing the pick-up roller.
E: Paper Pick-up Solenoid (1 screw)

6.6. IMAGE ADJUSTMENT

6.6.1. Overview



H528R540.wmf

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.

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

⚠CAUTION

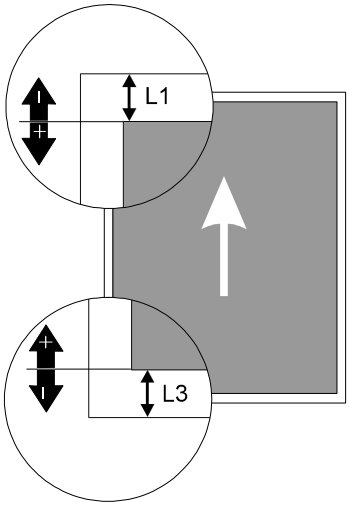
The factory settings may not be the same as the “Initial settings” described in the following procedures. The RAM reset level 1 will reset all the scan and print margin parameters to the “Initial settings.”

6.6.2. Scanner Parameters

1. Contrast

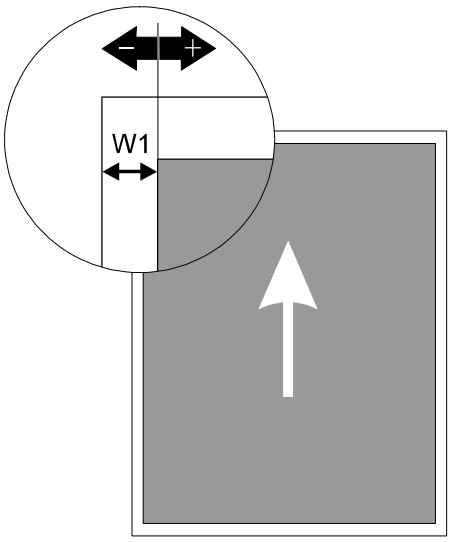
	Text Mode		Halftone Mode	
	Bit Switch	**Initial Setting**	**Bit Switch**	**Initial Setting**
Normal	Scanner 02	09(H)	Scanner 05	07(H)

2. Margins

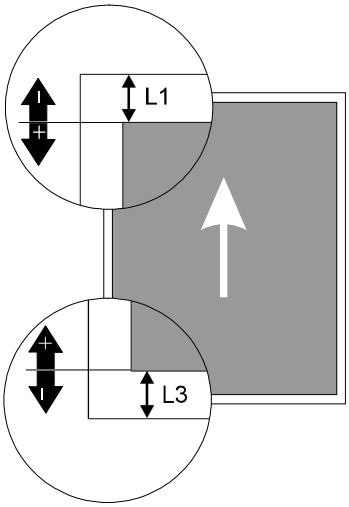
Parameter	Formula	RAM Address	Unit	Initial Setting
W1, W2	Not adjustable			
L1	H528R541.wmf  This parameter changes the number of tx motor steps after the scan line sensor is activated. To increase the margin by x mm: **New setting = Current setting + 7.7x** To decrease the margin by x mm: **New setting = Current setting - 7.7x**	800296(H) (low) 800297(H) (high)	$\frac{1}{7.7}$ *mm*	BB(H) 00(H)
L2	Not adjustable (Original length - L1 - L3)			
L3	This parameter changes the number of tx motor steps after the scan line sensor is deactivated. To increase the margin by x mm: **New setting = Current setting - 7.7x** To decrease the margin by x mm: **New setting = Current setting + 7.7x**	800298(H) (low) 800299(H) (high)	$\frac{1}{7.7}$ *mm*	10(H) 00(H)

6.6.3. Printer Parameters

1. Margins (Main Scan Direction)

Parameter	Formula	RAM Address	Unit	Initial Setting
W1	H528R542.wmf  1. Fax and Copy Mode To increase the margin by x mm: **New setting = Current setting + 0.5x** To decrease the margin by x mm: **New setting = Current setting - 0.5x**	Standard paper tray 8002C0(H) Optional paper feed 8002C1(H)	0.5 mm	05(H) 05(H)
W2	Not adjustable			

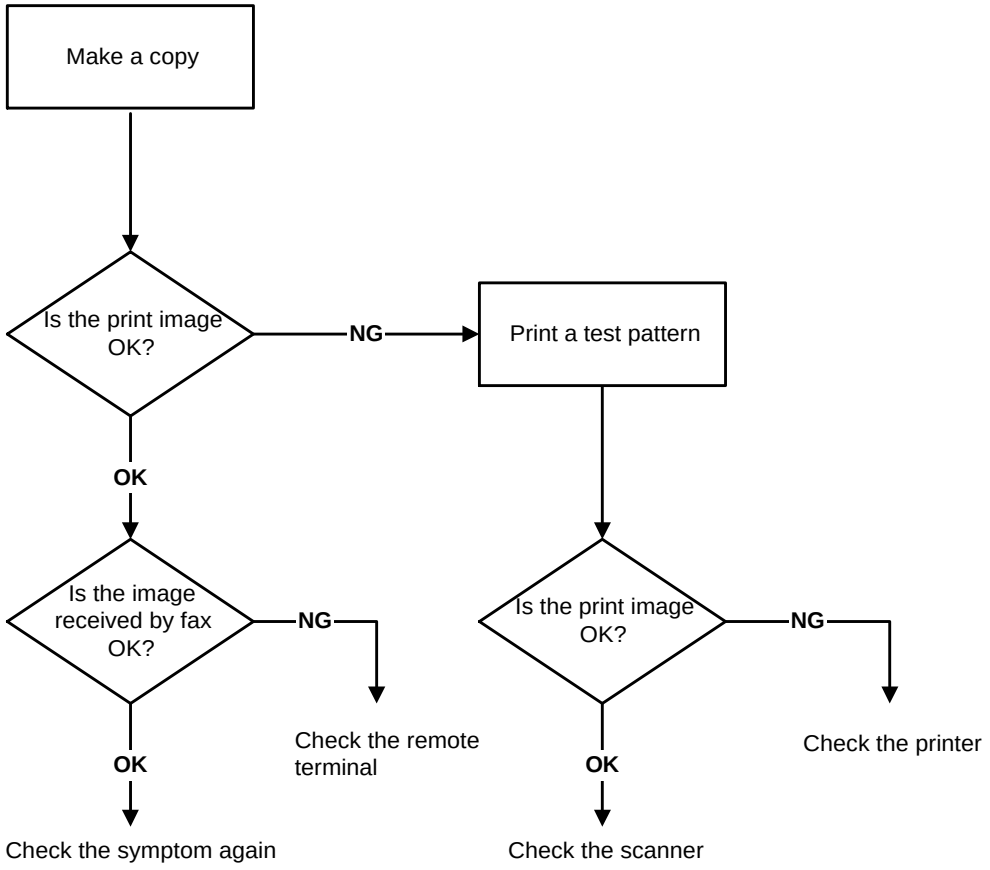
2. Margins (Sub Scan Direction)

Parameter	Formula	RAM Address	Unit	Initial Setting
L1	H528R541.wmf  To increase the margin by x mm: **New setting = Current setting + 0.45x** To decrease the margin by x mm: **New setting = Current setting - 0.45x**	Standard paper tray 8002B4(H) Optional paper feed 8002B5(H)	0.45 mm	06(H) 06(H)
L2	Not adjustable			
L3	Not adjustable			

7. TROUBLESHOOTING

7.1. 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.



H516T514.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.

7.1.1. Blank Copies

Possible Cause (Printer):

- The DTM is not installed.
- Poor drum sensitivity.
- Laser optic components are out of position.
- The proper bias is not applied to the development roller.
- The proper bias is not applied to the transfer roller.

Action:

1. Check if the DTM is installed in the machine.
   If it is, do the following.

2. Print a test pattern, and open the cover in the middle of printing.

3. Check if there is toner adhered to the drum surface.
   If there is, do the following. If not, go to step 4.
   - Check if the transfer roller is installed correctly or not.

4. Check if there is toner on the surface of the development roller.
   If there is, do the following. If not, go to step 5.
   - Check if all the laser optic components are properly positioned.
   - Try replacing the DTM.

5. Check if the toner tank in the DTM is empty or not. (Try replacing the DTM.) If it is, do the following. If not, go to step 6.
   - Check or replace the toner end sensor.

6. If the problem still remains, check the connections behind the high voltage power supply and the power supply itself.

7.1.2. Black Copies

Possible Cause (Scanner)

- The contact image sensor is defective.

Action:

1. Check the connection between the FCU (CN5) and the contact image sensor.
2. 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 DTM are properly connected.
   - If they are, go to step 2.
   - If not, fix the connections.
2. Check the connctions behind the high voltage power supply.
   If the problem still remains, replace the high voltage power supply.

.

7.1.3. Dirty or Dark Background

Possible Cause (Scanner)

- Scanner shading correction error or wrong threshold.

Action:

1. Do the image sensor initialization with service function 10 (Shading Test). (Refer to section 4-1.)
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 DTM.
2. Check if the hot roller surface is dirty or not.
   - If it is, clean the roller
   - If not, go to step 3.
3. Check if all the charge bias terminals on the DTM are properly connected.
   - If they are, check or replace the high voltage power supply.
   - If not, fix the connections.

7.1.4. Uneven Image Density Across the Main Scan

Possible Cause (Scanner)

- Dirty exposure glass
- Partial scanner lamp defect
- Scanner shading correction error or wrong threshold.

Action

- Clean the exposure glass of the image sensor.
- Replace the image sensor.
- Do the image sensor initialization with service function 10 (Shading Test). Refer to section 4-1.

Possible Cause (Printer)

- Poor drum sensitivity.
- Dirty laser optic components.
- The doctor blade is deformed, or incorrectly positioned.
- Uneven toner supply in the toner hopper.

Action:

1. Print a 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 doctor blade, and the toner supply mechanism in the toner hopper. If it is, go to step 3.
3. Check if the toner is evenly distributed on the drum.
   - If it is not, check the drum sensitivity and the laser optic components.
   - If it is, check if there is any dirt on the transfer roller surface.

7.1.5. Vertical Black Lines

Possible Cause (Scanner)

- Defective contact image sensor element(s).
- Dirt or dust on the exposure glass.

Action:

1. Clean the exposure glass.
2. Replace the contact image sensor.

Possible Cause (Printer)

- Dirty hot roller stripper.

Action:

1. Clean the hot roller stripper.

7.1.6. Horizontal Black Lines

Possible Cause (Printer)

- The drum surface is scratched or damaged..

Action:

1. Check that the surface of the drum is not damaged.
   - Change the DTM if it is damaged.

7.1.7. Vertical White Lines

Possible Cause (Scanner)
- Defective image sensor element(s).

Action:
- Replace the image sensor.

Possible Cause (Printer)
- The laser optic components are dirty.

Action:
- Clean the laser optic components.

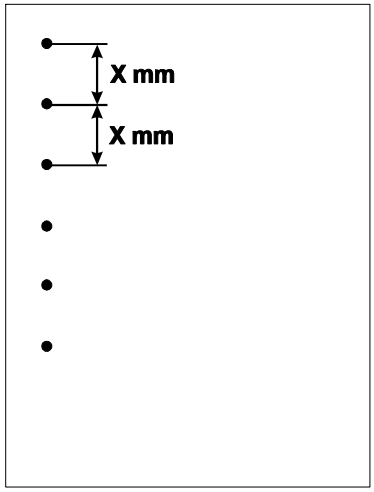
7.1.8. Horizontal White Lines

Possible Cause (Printer)
- The surface of the development roller is damaged or deformed.
- The development bias is not stable.
- Transfer bias 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 high voltage power supply.
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 high voltage power supply.
   - If not, check for damage on the drum surface.

7.1.9. Black Dots/Spots



H516T502.wmf

Possible Cause (Scanner)

- Dust on the exposure glass.

Action:

- Clean the exposure glass.
- Try disabling MTF.

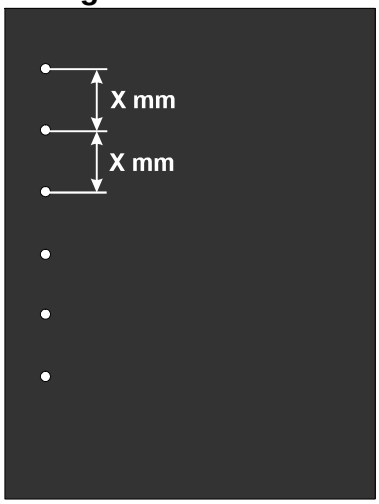
Possible Cause (Printer)

- The drum surface is damaged (this is likely if the dots appear at 94.2 mm intervals).

Action:

- Replace the DTM.

7.1.10. White Spots in Black Image Areas



H516T501.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 51.8 mm intervals).

Action:

- Replace the DTM.

7.1.11. Faint Copies

Possible Causes (Scanner)

- Scanner shading correction error or wrong scan threshold.
- Contact image sensor (LED, sensor element) defect

Action:

- Do the image sensor initialization by service function 10 (Shading Test). (Refer to section 4-1.)
- Adjust the scan threshold settings.
- Replace the image sensor.

Possible Causes (Printer)

- Poor drum sensitivity.
- Dirty laser optic components.
- Incorrect development/ transfer bias.
- 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 connection between the transfer bias terminals and high voltage power supply.
5. Check if the toner on the development roller looks faint or not.
   - If it does, check all the connections between the development roller and the high voltage power supply.
   - If it does not, try replacing the DTM.

7.1.12. 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.

7.1.13. Ghost Image

Possible Cause (Printer)

- Poor drum sensitivity.
- Dirty hot roller

Action:

- Replace the DTM.
- Clean the hot roller surface.

7.1.14. 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.
   - 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.

7.1.15. 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 5-5.)
- Check that the laser optics are aligned correctly.

7.1.16. Misaligned Output (Image shifted vertically)/Reduced Image

Possible Cause:
- Improper print margin (sub scan direction).

Action:
- Adjust the sub scan print margin. (Refer to Section 5-5.)

7.2. MECHANICAL PROBLEMS

7.2.1. ADF/Scanner

1. Non Feed

Possible Cause:

- An incorrect type or size of document is used.
- The operation panel is not properly closed.
- The pick-up and feed rollers are dirty or worn out.
- The document pick-up solenoid is defective.
- The clutch mechanism for document pick-up is defective.
- Incorrect positioning of the separation pad, or the pad is missing.
- The Tx motor is defective.

Action:

1. Check that a correct type of document is being used.
2. Check that the operation panel is securely closed.
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 document pick-up solenoid is working properly.
   - Check the spring clutch mechanism for the pick-up roller and replace it if it is damaged.
   - Check the connection between the FCU (CN7) and the Tx motor.
   - Replace the Tx motor.

2. Jam

Possible Cause:

- An incorrect type or size of document is used.
- The document is too long.
- The scanner rollers (pick-up and feed rollers) are dirty.
- Obstruction in the document paper path.
- The scan line sensor is defective.
- Defective tx 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 Tx motor.

3. Skew

Possible Cause:

- An incorrect type or size of document is used.
- The document guide is not properly set.
- The operation panel is not properly closed.
- The scanner rollers (pick-up and feed 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 operation panel is securely closed and also check that the document guide is properly set.
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

Action:

- Clean or replace the separation pad.

7.2.2. Printer

1. Non-feed

Possible Cause:

- A non-recommended type of paper is being used.
- The paper tray and the paper guide is not properly set.
- The paper pick-up mechanism is not working properly.
- Malfunction in the paper pick-up solenoid.
- Malfunction in the paper feed clutch.
- The paper pick-up roller is not properly set.
- The main 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 tray and the paper guide is correctly set and check that the paper is correctly set.
3. Check that the paper pick-up mechanism (the paper pick-up solenoid and the spring clutch is working properly.
4. Check that the paper pick-up roller is properly installed. Clean or replace if necessary.
5. Check that the registration sensor is working correctly.

2. Paper Jam - Inside the Printer

Possible Cause:

- A non-recommended type of paper is being used.
- The paper, paper tray, and/or the paper guide is not properly set.
- 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 and the paper tray and the paper guide are correctly set.
2. Check for obstructions in the paper path.
3. Check that the registration sensor is working properly.
5. If the problem still remains, do the following.
   - Replace the main motor.
   - Check the FCU output of power and drive signals to the main motor

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 exit sensor is defective.
- 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 exit sensor is working correctly.
6. Check pressure mechanism in the fusing unit.

4. Skew

Possible Cause:

- A non-recommended type of paper is being used.
- Incorrect positioning of the paper guide.
- The paper pick-up rollers are worn out or damaged.
- Obstruction in the paper path.

Action:

1. Check if a correct type of paper is being used.
2. Check that the paper guide is correctly set.
3. Check that the paper pick-up rollers are correctly installed and clean or replace them if necessary.
4. Check for obstructions in the paper path.

5. Multi-feed

Possible Cause:

- A non-recommended type of paper is being used.
- Incorrect positioning of the paper guide and/or the paper is not properly set.

Action:

- Check if a correct type of paper is being used.
- Check that the paper guide and the paper are correctly set.

7.3. SERVICE CALL CONDITIONS

If the Call Service indicator is lit, one of the following conditions has occurred.

Symptom	Error Code	Sub-code	SC Code
Laser diode failure	9-20	22	2-22
Fusing unit failure	9-22	02	0-02
Mirror motor error	9-23	31	3-31
Fusing unit fan motor error	9-34	51	5-51
Unexpected printer error (Printer Ready signal is not detected.)	9-35	61	6-61
Unexpected printer error (Valid signal is not received.)	9-35	62	6-62

To find out which problem has occurred, either:

- See the Auto Service Call report that was sent to the service station by the machine. The sub-code is stored at RAM addresses 8002DC(H) and 8002F9(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: LD Failure (Error Code 9-20)
This error occurs in the following condition: • The laser power is out of the specified range (sub-code 22).
Action:
Check that all the laser optic components are aligned correctly and clean them if necessary. Check the connection between the MCB (CN5) and the LDDR. Check that the square mirror and LDDR are correctly positioned. If the problem still remains, replace the LDDR, MCB or FCU.

Symptom: Fusing Unit Failure (Error Code 9-22)

This error occurs in any of the following conditions:

- When the fusing temperature is below 90° C and does not increase at least 20° C within 12 to 30 seconds after the lamp turns on.
- If the fusing temperature does not exceed 157 °C within 60 seconds after the lamp turns on.
- If the fusing temperature drops below 70 °C when low temperature mode (100 °C) is selected in the power saver mode.
- If the fusing temperature drops below 145 °C while printing.
- If the fusing temperature exceeds 200 °C for more than 50 ms.

Action:

Before checking anything, do the following.
Reset the RAM address 8002DC(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.

1. Check if ac power is supplied to the lamp from the PSU or not.
   If not, replace the PSU.
2. Check the connection between the PSU and the fusing lamp.
3. Check if the thermistor is shorted or not. If it is, replace the thermistor.
4. Check the connection between the MCB (CN2) and the thermistor.
5. Replace the fusing lamp, thermistor, and/or PSU.

Symptom: Mirror Motor Failure (Error Code 9-23)

This error occurs in either of the following conditions:

- When the line synchronization signal is not detected within 1 second of the mirror motor being turned on.
- When the motor rotation is not within 8431.7 rpm ± 5% at 4.2 seconds after the motor turns on or if the motor is not within 8431.7 rpm ± 3% for more than 0.5 second during mirror motor operation.

Action:

1. Check the connection between the MCB (CN10) and the square mirror motor.
2. Replace the square mirror motor.
3. Replace the MCB.

Symptom: Fusing Unit Fan Motor Failure (Error Code 9-34)

This error occurs in either of the following conditions:

- When the voltage of the fusing unit fan motor drops below 160 mV for more than 2 seconds while turning.

Action:

1. Check the connection between the MCB (CN11) and the fusing unit fan motor.
2. Replace the fusing unit fan motor.
3. Replace the MCB.

Symptom: Unexpected printer error (Error Code 9-35)
This error occurs in either of the following conditions: • When the Printer Ready signal is not detected longer than a certain period of time. • When a valid signal from the printer is not detected within a certain period of time.
Action:
1. Check the connection between the FCU (CN1) and the MCB. 2. Replace the MCB. 3. Replace the FCU.

7.4. 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. Check the NCU - FCU connectors. The machine at the other end may be incompatible. Replace the NCU or FCU. Check for DIS/NSF with an oscilloscope. 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. 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. Check the NCU - FCU connectors. Try changing the tx level and/or cable equalizer settings. Replace the FCU or NCU. The other terminal may be faulty; try sending to another machine. If the rx signal is weak or defective, there may be a bad line. **Cross reference** Tx level - NCU Parameter 01 (PSTN), RAM 807FB7 (PABX) Cable equalizer - G3 Switch 07 (PSTN) Dedicated Tx parameters - Section 4-4
0-05	Unsuccessful after modem training at 2400 bps	Check the line connection. Check the NCU - FCU connectors. Try adjusting the tx level and/or cable equalizer. Replace the FCU or NCU. Check for line problems. **Cross reference** See error code 0-04.
0-06	The other terminal did not reply to DCS	Check the line connection. Check the FCU - NCU connectors. Try adjusting the tx level and/or cable equalizer settings. Replace the NCU or FCE. The other end may be defective or incompatible; try sending to another machine. Check for line problems. **Cross reference** 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 FCU - NCU connectors. Replace the NCU or FCU. 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 FCU - NCU connectors. Replace the NCU or FCU. 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/FCU; 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) Dedicated Tx parameters - Section 4-4
0-14	Non-standard post message response code received	Check the FCU - 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 FCU. **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 FCU - NCU connectors. Replace the NCU or FCU. 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. Check the FCU - NCU connectors. Replace the NCU or FCU. Check for line problems. Try calling another fax machine. Try adjusting the reconstruction time for the first line and/or rx cable equalizer setting. **Cross reference** Reconstruction time - G3 Switch 0A, bit 6 Rx cable equalizer - G3 Switch 07 (PSTN)
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 FCU, NCU, & line. Check for line noise or other line problems. Replace the NCU or FCU. The remote machine may be defective or may have disconnected. **Cross reference** 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. Check the FCU - NCU connectors. Replace the NCU or FCU. Defective remote terminal. Check for line noise or other line problems. Try adjusting the acceptable modem carrier drop time. **Cross reference** Acceptable modem carrier drop time - G3 Switch 0A, bits 0 and 1
0-23	Too many errors during reception	Check the line connection. Check the FCU - NCU connectors. Replace the NCU or FCU. Defective remote terminal. Check for line noise or other line problems. Try asking the other end to adjust their tx level. Try adjusting the rx cable equalizer setting and/or rx error criteria. **Cross reference** Rx cable equalizer - G3 Switch 07 (PSTN) 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. Try asking the user to add optional extra memory.

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. Check the FCU - NCU connectors. Try adjusting the tx level and/or cable equalizer settings. The other terminal may not be compatible. **Cross reference** Dedicated tx parameters - Section 4-4
0-52	Polarity changed during communication	Check the line connection. Retry communication.
1-00	Document jam	Incorrectly inserted document or unsuitable document type. Check the ADF drive components and sensors. **Cross reference** ADF mechanical problems - Section 7-2-1
1-01	Document length exceeded the maximum	Try changing the maximum acceptable document length. Divide the document into smaller pieces. Check the ADF drive components and sensors. **Cross reference** Max. document length - Scanner switch 00, bits 2 and 3 ADF mechanical problems - Section 7-2-1
1-10	Paper at the scan line when the power was turned on.	Remove the paper. Check the scan line sensor. **Cross reference** ADF mechanical problems - Section 7-2-1
1-17	Document jam in the feed-out area	Clear any debris from the sensor actuator. Check the ADF drive components and sensors. **Cross reference** ADF mechanical problems - Section 7-2-1
1-20	Paper did not reach the fusing exit at the end of printing	Remove the paper. Check the printer drive components and sensors. **Cross reference** Printer mechanical problems - Section 7-2-2
1-21	Paper present at the fusing exit after printing	Remove the paper. Check the printer drive components and sensors. **Cross reference** Printer mechanical problems - Section 7-2-2
1-30	Paper ran out during printing	Add paper in the paper tray.
1-34	Paper ran out after printing	Add paper in the paper tray.
1-71	The cover was opened during printing	Close the cover.
2-10	The modem cannot enter tx mode	Replace the FCU.
2-11	Only one V.21 connection flag was received	Change the FCU.
2-12	Modem clock irregularity	Replace the FCU.

Code	Meaning	Suggested Cause/Action
2-20	Abnormal coding/decoding (cpu not ready)	Replace the FCU.
2-50	The machine reset itself	Replace the FCU.
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 FCU.
4-01	Line current was cut	Check the line connector. Check the connection between FCU and NCU. Check for line problems. Replace the FCU 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 FCU.
5-10	DCR timer expired	Replace the FCU.
5-20	Storage impossible because of a lack of memory	Temporary memory shortage. Test the SAF memory. Replace the FCU 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 FCU 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 FCU or IC memory card.
5-30	Mode table for the first page to be printed was not effective	Replace the FCU or IC memory card.
6-01	G3 ECM - no V.21 signal was received	Try adjusting the rx cable equalizer. Replace the FCU 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.

Code	Meaning	Suggested Cause/Action
6-04	G3 ECM - RTC not detected	Check the line connection. Check connections from the NCU to the FCU. Check for a bad line or defective remote terminal. Replace the FCU 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 FCU. Check for a bad line or defective remote terminal. Replace the FCU or NCU. Try adjusting the rx cable equalizer **Cross reference** Rx cable equalizer - G3 Switch 07 (PSTN)
6-06	G3 ECM - coding/decoding error	Defective FCU. 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 FCU.
9-07	Paper non-feed or jam at the paper entrance	If the problem persists, replace the FCU. **Cross reference** Paper non-feed - Section 7-2-2 Jam at the paper entrance - Section 7-2-2
9-08	Paper jam inside the development area	If the problem persists, replace the FCU. **Cross reference** Paper jam - Section 7-2-2
9-09	Paper jam in the fusing exit area	If the problem persists, replace the FCU. **Cross reference** Paper jam - Section 7-2-2
9-10	Toner end detected	Replace the DTM.
9-12	Cover open detected during printing	Close the cover, or check the cover sensors.
9-20	Laser diode failure	If the problem persists, replace the MCB. **Cross reference** LD failure - Section 7-3

Code	Meaning	Suggested Cause/Action
9-22	Fusing lamp failure	If the problem persists, replace the MCB. **Cross reference** Fusing lamp failure - Section 7-3
9-23	Polygonal mirror motor failure	If the problem persists, replace the MCB. **Cross reference** Mirror motor failure - Section 7-3
9-34	Fusing unit fan motor error	If the problem persists, replace the MCB. **Cross reference** Fusing unit fan motor error - Section 7-3
9-35	Unexpected printer error	If the problem persists, replace the MCB or FCU. **Cross reference** Fusing unit fan motor error - Section 7-3
9-50	Paper non-feed or jam at the paper entrance (when the paper feed unit is used)	If the problem persists, replace the FCU. **Cross reference** Paper non-feed - Section 7-2-2 Jam at the paper entrance - Section 7-2-2

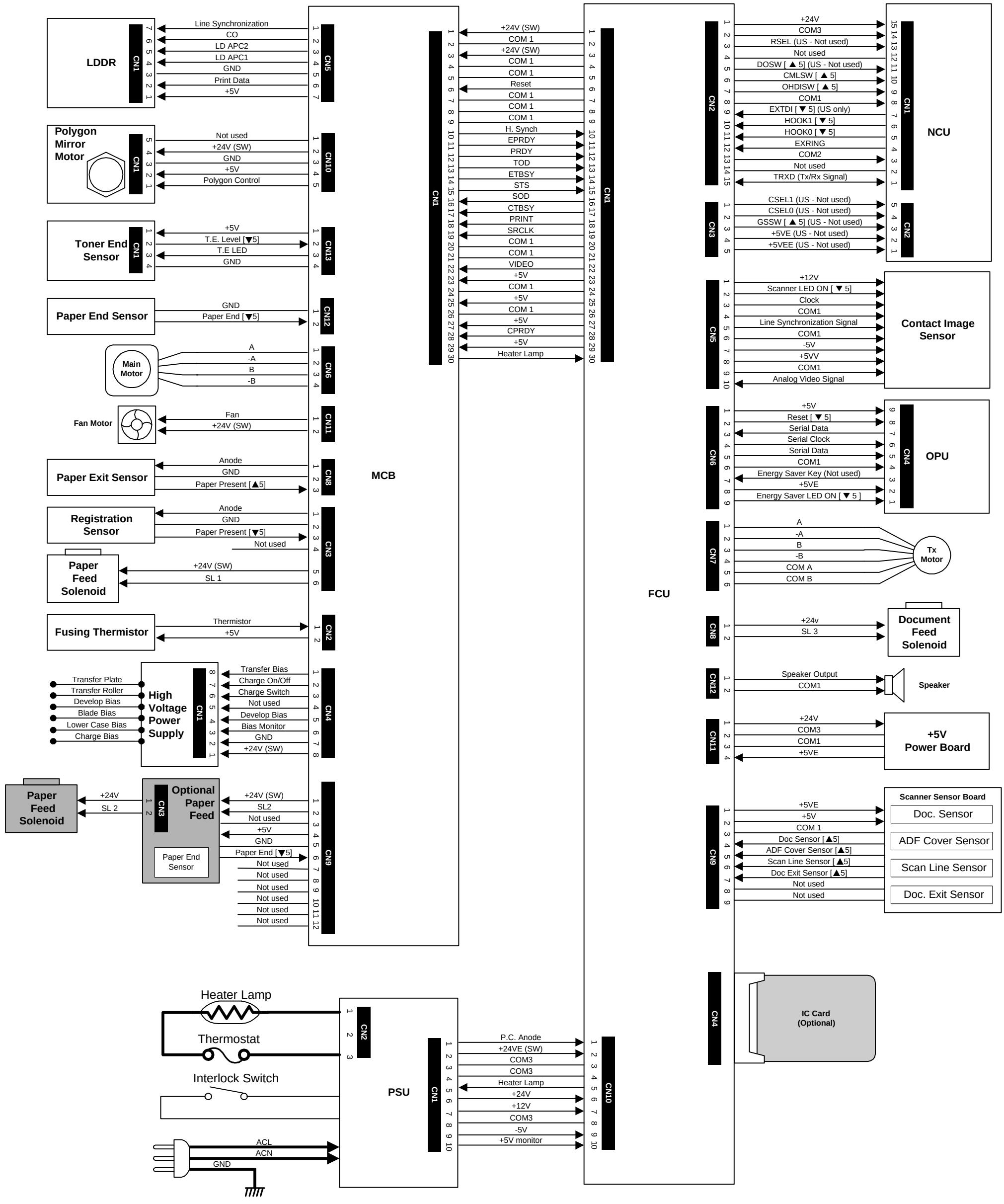
7.5. ELECTRICAL COMPONENT DEFECTS

7.5.1. Defective Sensor Table

Sensor	Symptoms if Defective
Document sensor	"CLEAR ORIGINAL" or "DIAL FAX NO" is displayed at power-up.
	"SET DOCUMENT" is still displayed after a document is placed in the feeder.
Scan line sensor	"CLEAR ORIGINAL" is displayed at power-up.
	"CLEAR ORIGINAL" is displayed soon after the start of copying.
Interlock switches	There is no alarm on opening the cover, and "CLOSE COVER" is not displayed.
	"CLOSE COVER" is displayed at power-up.
Registration sensor Fusing exit sensor	"CLEAR COPY" is displayed at power-up.
	"CLEAR COPY" is displayed soon after the start of copying.
Toner end sensor	Toner end is not indicated.
Paper end sensor - Standard paper tray	The Add Paper indicator lights even if paper is remaining.
	The Add Paper indicator does not light when the paper has run out.

Point-to-Point Diagram
Model:FX7

Issued on: August 28th, 1996
Revision 1.0
Subject to change

Symbol Table

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