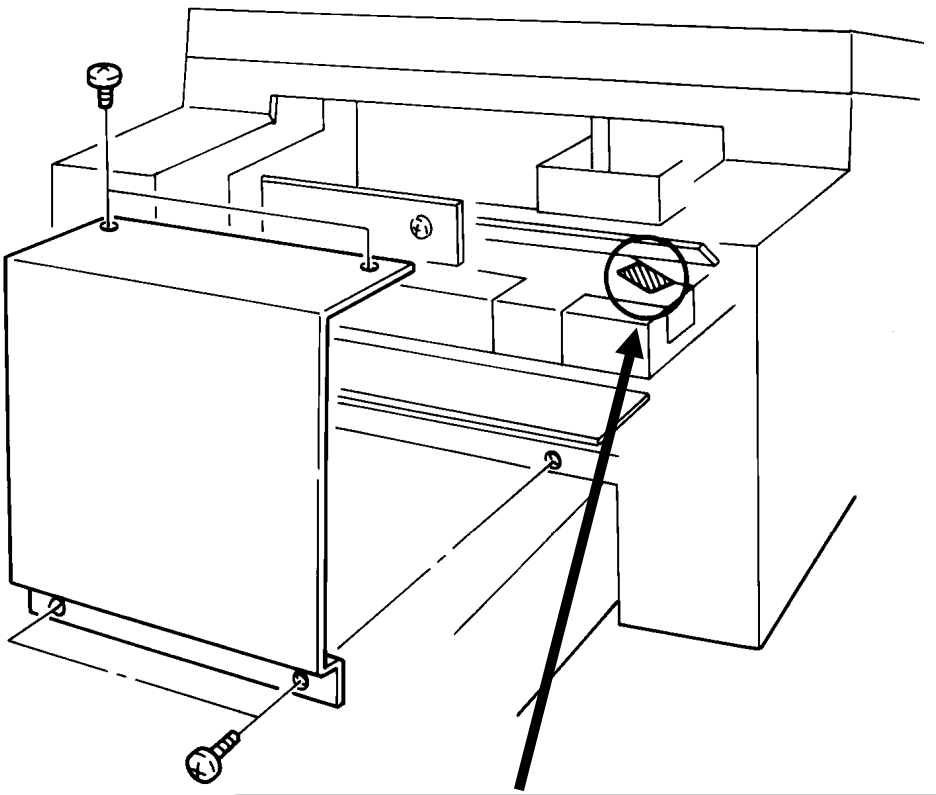
FAX3000L

SERVICE MANUAL

WARNING

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



DANGER INVISIBLE LASER RADIATION WHEN OPEN AVOID DIRECT EXPOSURE TO BEAM	DANGER RAYON LASER INVISIBLE LORS DE L'OUVERTURE EVITER L'EXPOSITION DIRECTE
VORSICHT Unsichtbare Laserstrahlung unter dieser Abdeckung. Nicht in den laserstrahl blicken.	PELIGRO RADIACION LASER INVISIBLE AL ABRIR. EVITAR LA EXPOSICION DIRECTA AL HAZ

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 transceiver

Circuit
PSTN, PABX

Connection
Direct couple

Document Size
Length: 105 - 1200 mm
[4.1 - 47.2 ins]
Up to 100 m [328 ft] after adjustment
Width: 148 - 304 mm
[5.8 - 12.0 ins]
Thickness: 0.05 to 0.2 mm
[2 to 8 mils]

Document Feed
Automatic feed, face down

ADF Capacity
50 sheets (using 80 g/m^2 paper)

Scanning Method
Flat bed, with CCD

Maximum Scan Width
256 mm [10.1 ins] ± 1%

Scan Resolution
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 (double buffer)
SAF: 256 kbytes (14 pages), with optional extra 1 Mbyte or 2 Mbytes (max 71 or 128 pages respectively)

Compression
MH, MR, EFC, MMR, SSC
Storage to SAF memory for tx: MH
MMR only with ECM

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

Protocol
Group 3 with ECM

Data Rate
9600/7200/4800/2400 bps; automatic fall-back

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

Transmission Time
10 s at 9600 bps (G3 ECM using memory) for a CCITT #1 test document (Slerexe letter) using standard resolution

Printing System
Laser printing, using the Ricoh CS (Compact Seamless) Engine, plain paper, dry toner

Paper Size
Standard Cassette
Europe: A4, A5
Asia: A4, A5, F, F4
Lower Cassette
Europe: A4, A5
Asia: A4, A5, F, F4, B4

Maximum Printout Width
210 mm [8.3 ins]

Maximum Printer Resolution
Main scan: 16 dots per mm [406 dpi]
Sub scan: 15.4 lines/mm [392 lpi]

Power Supply
220 - 240 Vac, 50 Hz

Power Consumption (Base Machine Only)
Standby: 35 W
Transmit: 50 W
Receive: 200 W
Copying: 270 W

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

Dimensions (W x D x H)
496 x 459 x 293 mm [19.5 x 18.1 x 11.5 ins]
Excluding handset, trays, and optional units

Weight
19 kg [41.8 lbs]
Excluding handset, trays, and optional units

1.2. FEATURES

KEY: O = Used, X = Not Used,
A = With optional memory only,
B = With lower cassette only,
G = Not used in Germany,
S = Service mode in some countries

Equipment	
ADF	O
Bar code reader	X
Built-in handset	X
Cabinet	X
Connection for ans. machine	X
Connection for handset	O
Cutter	X
Handset (option only in Europe)	O
Hard disk	X
Magnetic card reader	X
Manual feed mechanism	O
Marker	O
Microphone	X
Monitor speaker	O
Remaining memory indicator	O
Speakerphone	X

Video Processing Features	
Contrast	O
Halftone (Basic & Error Diffusion)	O
MTF	O
Reduction	O
Resolution	O
Smoothing to 16 x 15.4 l/mm	O

Communication Features - Auto	
Automatic fallback	O
Automatic redialling	O
Confidential reception	A
Dual Access	O
Substitute reception	O
Transmission Reserve	X

Communication Features - User Selectable	
Action as a transfer broadcaster	X
AI Redial	O
Alternative Destination	O
Answering machine	X
Authorized Reception	O
Auto-answer delay time	X
Auto dialling (pulse or DTMF)	O
Auto Document	O
Automatic Voice Message	X
Auto-note	X
Batch Transmission (max 5 files)	A
Broadcasting	O
Chain Dialling	O
Confidential ID Override	O
Confidential Transmission	O
Forwarding (4 stations)	A
Free Polling	O
Groups (7 groups)	O
Hold	X
Immediate Redialling	O
Immediate transmission	O
Keystroke Programs	O
Mailbox	X
Memory transmission (this is the default mode)	O
Notify	X
On Hook Dial	O (G)
Page Count	O
Personal Codes	O
Personal Codes with Conf ID	O
Polling Reception	O
Polling Transmission	O
Quick Dial (32 stations)	O
Reception modes (Fax, Tel, ~~Auto~~)	O
Reduction	O
Remote control features	X
Remote Transfer	X
Restricted Access (10 codes, without cards)	O
Secured Polling	O
Secured Polling with Stored ID Override	O
Send Later	O

Communication Features - User Selectable	
Silent ringing detection	X
Speed Dial (100 stations)	O
Telephone Directory	O
Tonal Signal Transmission	O
Transfer Request	O
Transmission Deadline	X
Turnaround Polling	X
Voice Request (immed. tx only)	O

Communication Features - Service Selectable	
AI Short Protocol	X
Auto-reduction override option	O
Busy tone detection	O
Closed Network (tx and rx)	O
Continuous Polling Reception	O
Dedicated tx parameters	O
ECM	O
EFC	O
MV1200 compatibility	X
Page retransmission	O
Page separation mark	O
Polling tx file lifetime in the SAF	O
Protection against wrong conn.	O
Resol'n stepdown override option	X
Short Preamble	O
Well log	O

Other User Features	
Auto Service Call	O
Center mark	O
Chequered mark	X
Clearing a memory file	O
Clearing a polling file	O
Clock	O
Confidential ID	O
Copy mode	O
Counters	O
Dialled number check	X
Direct entry of names	O
Function Programs	O
ID Code	O
Label Insertion	O
Language Selection	O
LCD contrast control	Service
Memory Lock	A
Memory Lock ID	A
Modifying a memory file	X
Multi Sort Document Reception	A
Multicopy mode	A
Night Timer	O
Own telephone number	O
Printing a memory file	O
RDS on/off	O
Reception Mode Switching Timer	X
Reception Time (non-memory rx only)	O
Remote ID	X
Reverse Order Printing	A
RTI, TTI, CSI	O (S)
Speaker volume control	O
Specified Cassette Selection	B
Substitute reception on/off	O
Telephone line type	O (S)
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	O
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
Journal	O
Transfer Result Report	X
Transmission Result Report	O

Reports - User-initiated	
Authorized Reception List	O
Charge Control Report	X
File List	O
Forwarding List	A
Group List	O
Personal Code List	O
Program List	O

Reports - User-initiated	
Quick Dial List	O
Specified Cassette Selection List	B
Speed Dial List	O
Journal	O
Transmission Status Report	X
User Function List	X
User Parameter List	O

Service Mode Features	
Back-to-back test	O
Bit switch programming	O
Buzzer test	O
Cable equalizer (rx only)	O
Comm. parameter display	O
DTMF tone test	O
Echo countermeasure	O
Error code display	O
LCD contrast adjustment	O
Memory file forwarding	O
Memory file printout (all files)	O
Modem test	O
NCU parameters	O
Operation panel test	O
Printer mechanism test	X
Printer test patterns	O
Programmable attenuation	X
Protocol dump list	O
RAM display/rewrite	O
RAM dump	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
System parameter list	O
Technical data on the Journal	O
Thermal head parameters	X
Transmission Status Report	X

Memory Files

Max. number of files: 100
Max. number of stations/file: 142
Max. number of stations overall: 299
Max. number of pages overall: 200 (including pages stored as Auto Documents)

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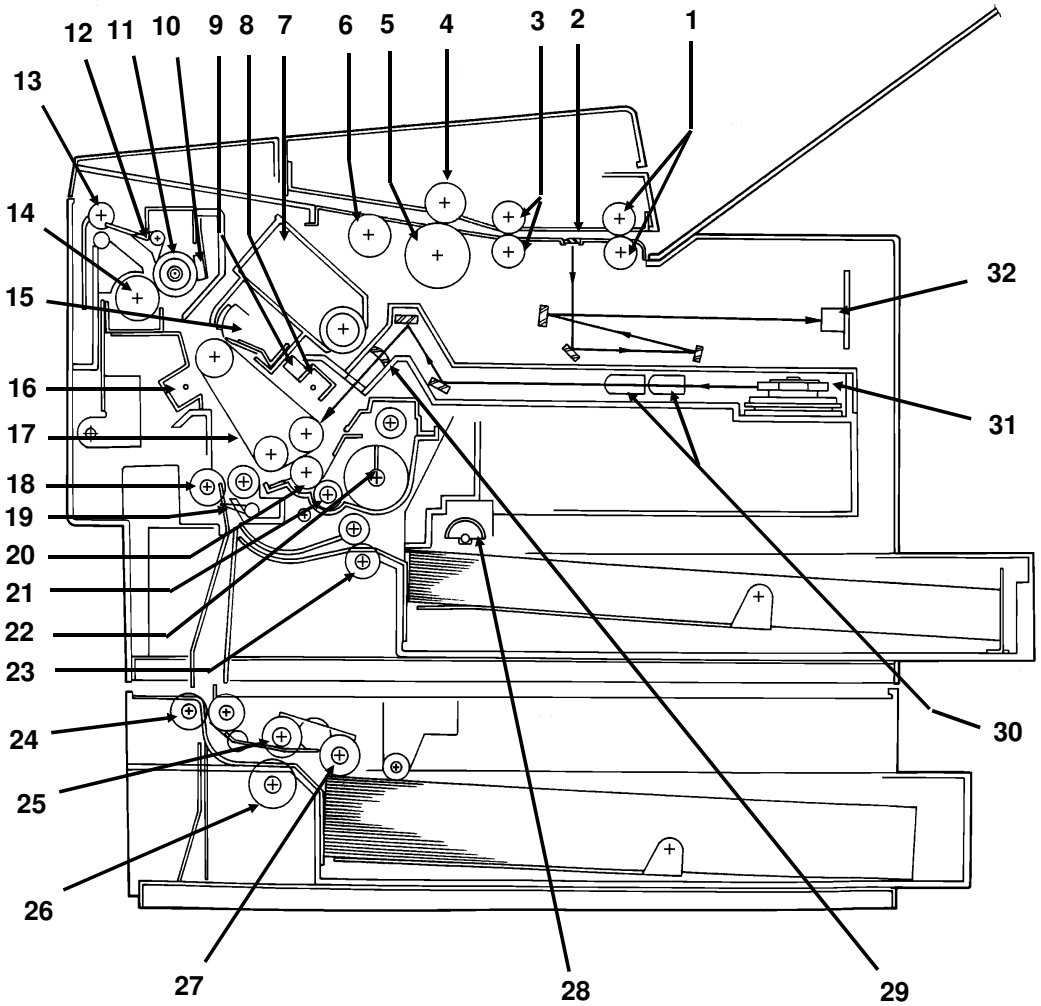
1.3. COMPONENT LAYOUT

1.3.1. Mechanical Components



1.	R2 Rollers	Feed the document through the scanner.
2.	Exposure Glass	Exposes the original to light from the xenon lamp.
3.	R1 Rollers	Feed the document through the scanner.
4.	Separation Roller	Allows one page into the scanner.
5.	Document Feed Roller	Feeds the document into the scanner.
6.	Pick-up Roller	Picks up pages of the document from the document table.
7.	Toner Cartridge	This supplies toner to the development unit. It is part of the CTM (Cleaning/Toner Magazine).
8.	Charge Corona Unit	This applies a charge to the master at the start of the print cycle.
9.	Quenching Lamp	This removes excess charge from the master at the end of the print cycle.
10.	Thermistor	This measures the temperature in the fusing unit.
11.	Hot Roller	Heat from this roller fuses the toner to the copy paper.

12.	Hot Roller Strippers	These take the paper off the hot roller after fusing.
13.	Copy Feed-out Rollers	These feed the paper out of the printer.
14.	Pressure Roller (Fusing)	This applies pressure to the paper during the fusing process.
15.	Cleaning Unit/Used Toner Tank	This removes excess toner from the master after image transfer and stores it. It is part of the CTM (Cleaning/Toner Magazine).
16.	Transfer Corona Unit	This applies a charge to the paper to pull the toner off the master and onto the copy paper.
17.	Master Belt	Also known as the CS (Compact Seamless) Engine. The latent image is written to this organic photoconductor belt.
18.	Registration Roller	This carries out the registration process.
19.	Registration Sensor	This detects when paper is approaching the registration roller.
20.	Development Roller	This roller applies toner to the latent image on the master belt.
21.	Toner Supply Bar	This feeds toner to the development roller.
22.	Toner Mixing Bar	This stirs up the toner in the development unit, so that it does not collect into lumps.
23.	Upper Relay Rollers	These feed paper from the upper cassette into the printer.
24.	Lower Relay Rollers	These feed paper from the lower cassette into the printer.
25.	Lower Paper Feed Roller	This feeds paper out of the lower cassette.
26.	Lower Paper Separation Roller	This ensures that only one sheet of paper at a time leaves the lower cassette.
27.	Lower Paper Pick-up Roller	This picks up the top sheet of paper from the stack in the lower cassette and passes it to the feed roller.
28.	Upper Paper Feed Rollers	These pick up the top sheet of paper from the stack in the upper cassette and feed it into the printer.
29.	Focusing Lens	This focuses the laser beam onto the master belt.
30.	Fθ Lenses	These ensure that the thickness of the laser beam is uniform across the main scan.
31.	Hexagonal Mirror	This passes the laser beam across the master belt.
32.	CCD (Charge Coupled Device)	This converts the light reflected from the document into an analog video signal.

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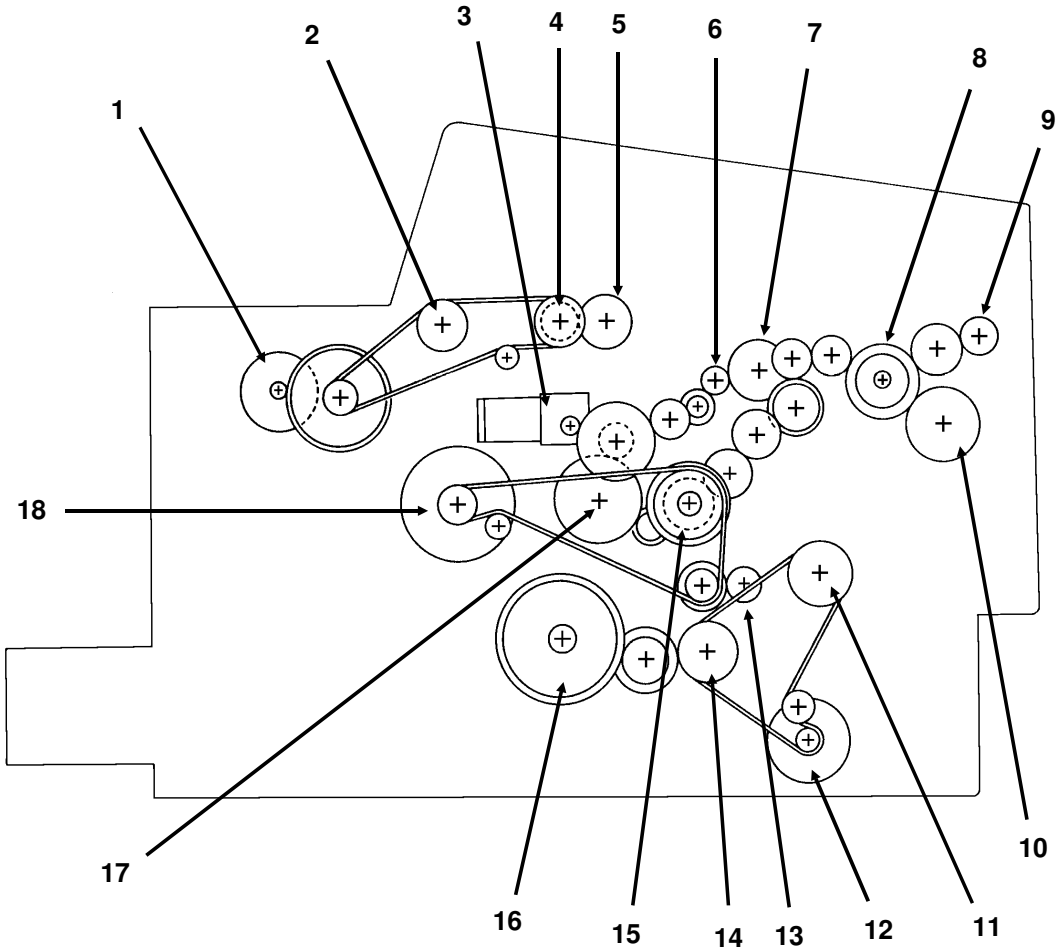
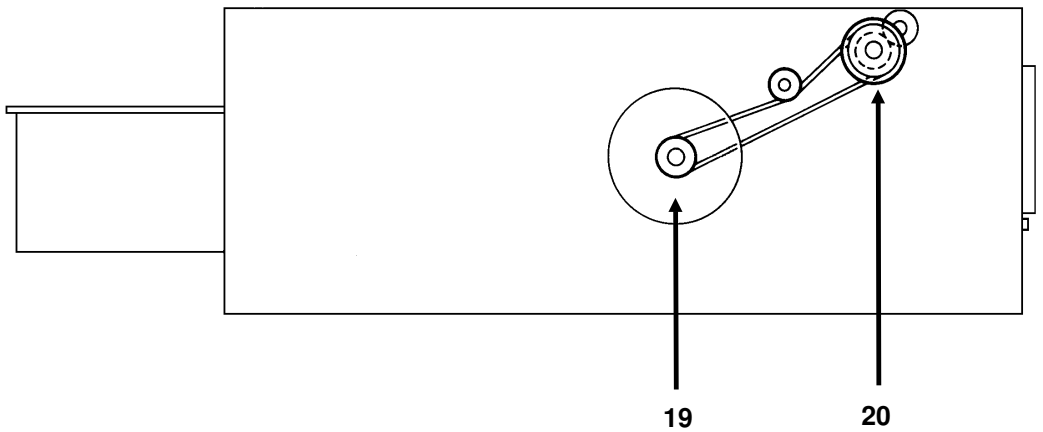
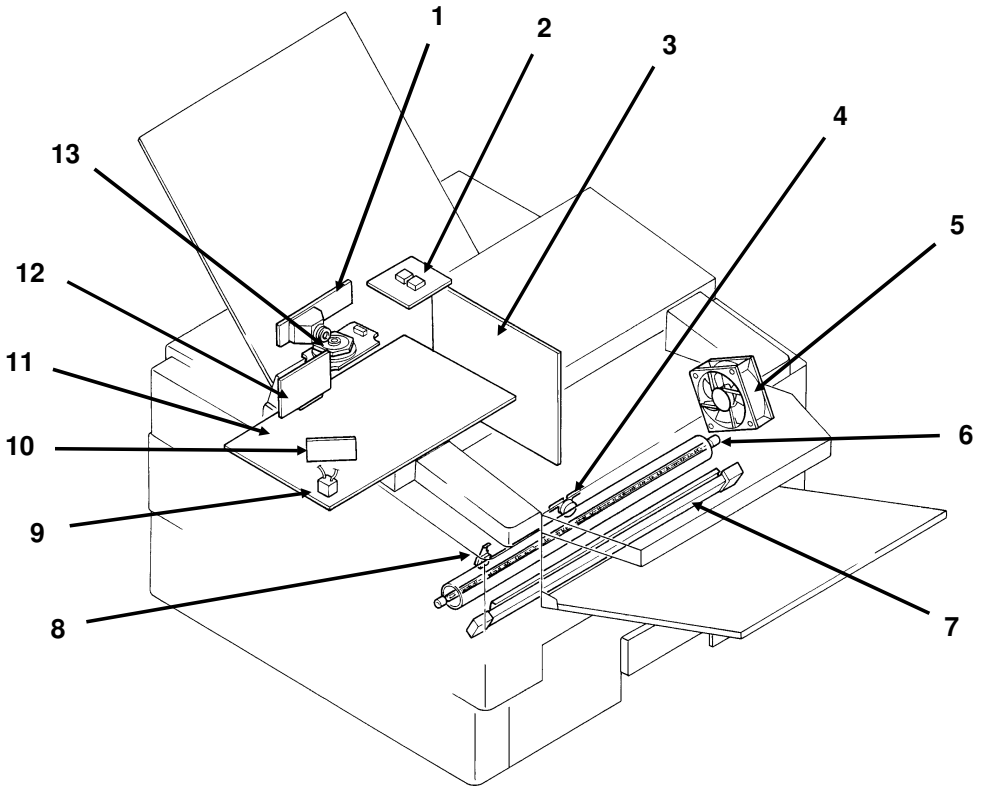
1.3.2. Drive Components

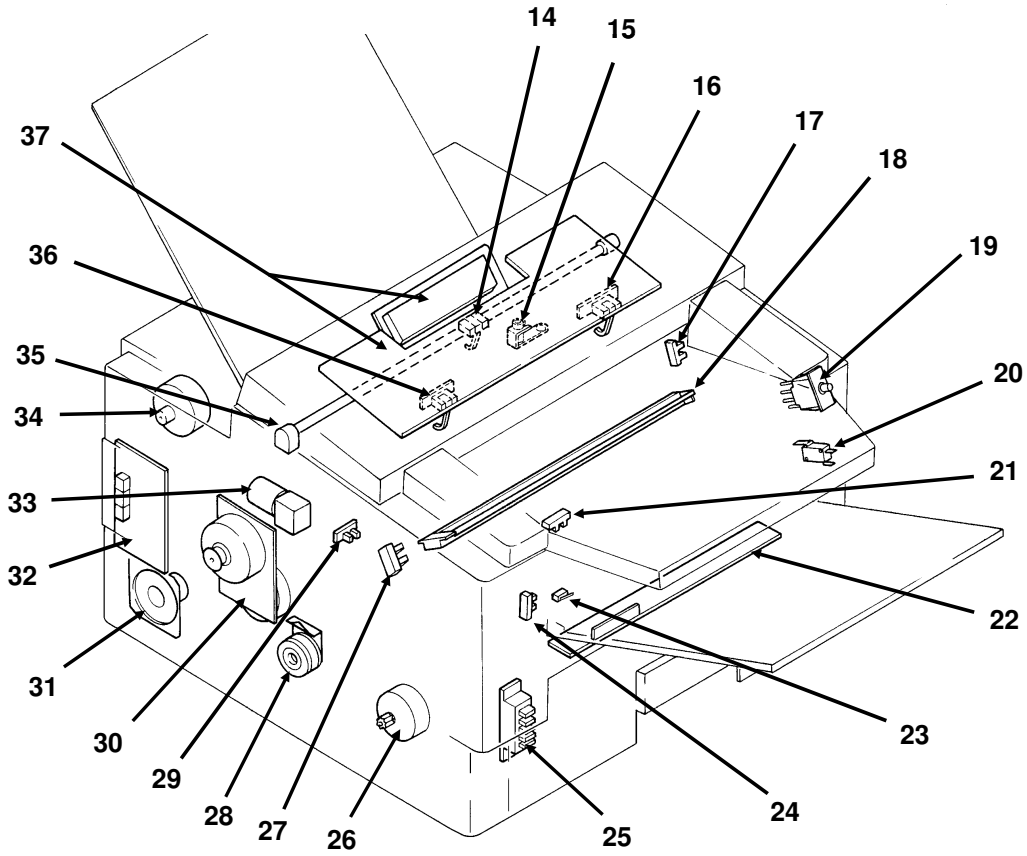


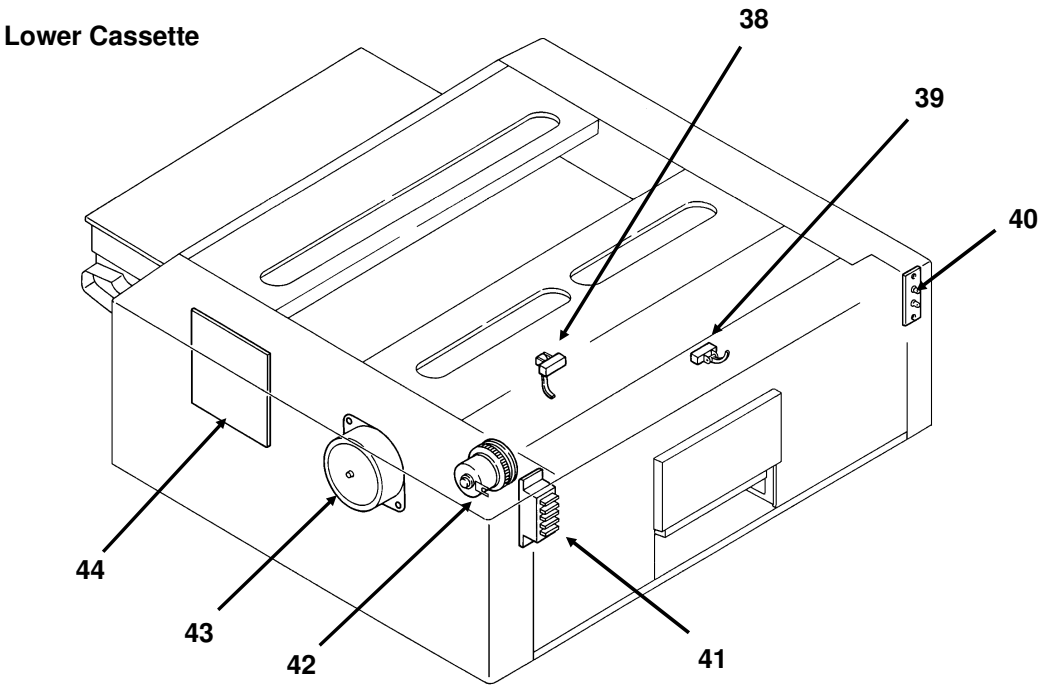


1.	Tx Motor	This stepper motor drives the scanner.
2.	R2 Roller	This feeds the original through the scanner.
3.	Toner Supply Motor	This dc motor drives the toner supply mechanism.
4.	R1 Roller	This feeds the original through the scanner.
5.	Shutter Drive Gear	This ensures that the shutter moves out of the document feed path at the correct time.
6.	Toner Supply Gear (CTM)	This ensures the supply of toner from the CTM into the development unit. It is part of the CTM.
7.	Cleaning Brush Drive Gear	This drives the cleaning brush in the CTM.
8.	Hot Roller	This fuses the toner to the copy paper.
9.	Copy Feed-out Roller	This feeds printouts out of the machine.
10.	Pressure Roller	This applies pressure to the copy paper in the fusing unit.
11.	Registration Roller Drive Gear	This drives the registration roller.
12.	Upper Paper Feed Motor	This drives the paper feed mechanism in the upper cassette.
13.	Development Roller Drive Gear	This drives the development roller.
14.	Upper Paper Feed Roller Drive Gear	This drives the upper paper feed roller.
15.	Master Belt Drive Gear	This drives the master belt.
16.	Paper Feed Clutch	This transfers drive from the upper paper feed motor to the upper paper feed mechanism.
17.	Toner Supply Gear (Development)	This ensures the collection of toner from the CTM, and its distribution across the full length of the development unit.
18.	Main Motor	This brushless dc motor drives the master belt, fusing unit, development unit, and cleaning unit.
19.	Lower Paper Feed Motor	This drives the paper feed mechanism in the lower cassette.
20.	Lower Paper Feed Clutch	This transfers drive from the lower paper feed motor to the lower paper feed mechanism.

1.3.3. Electrical Components





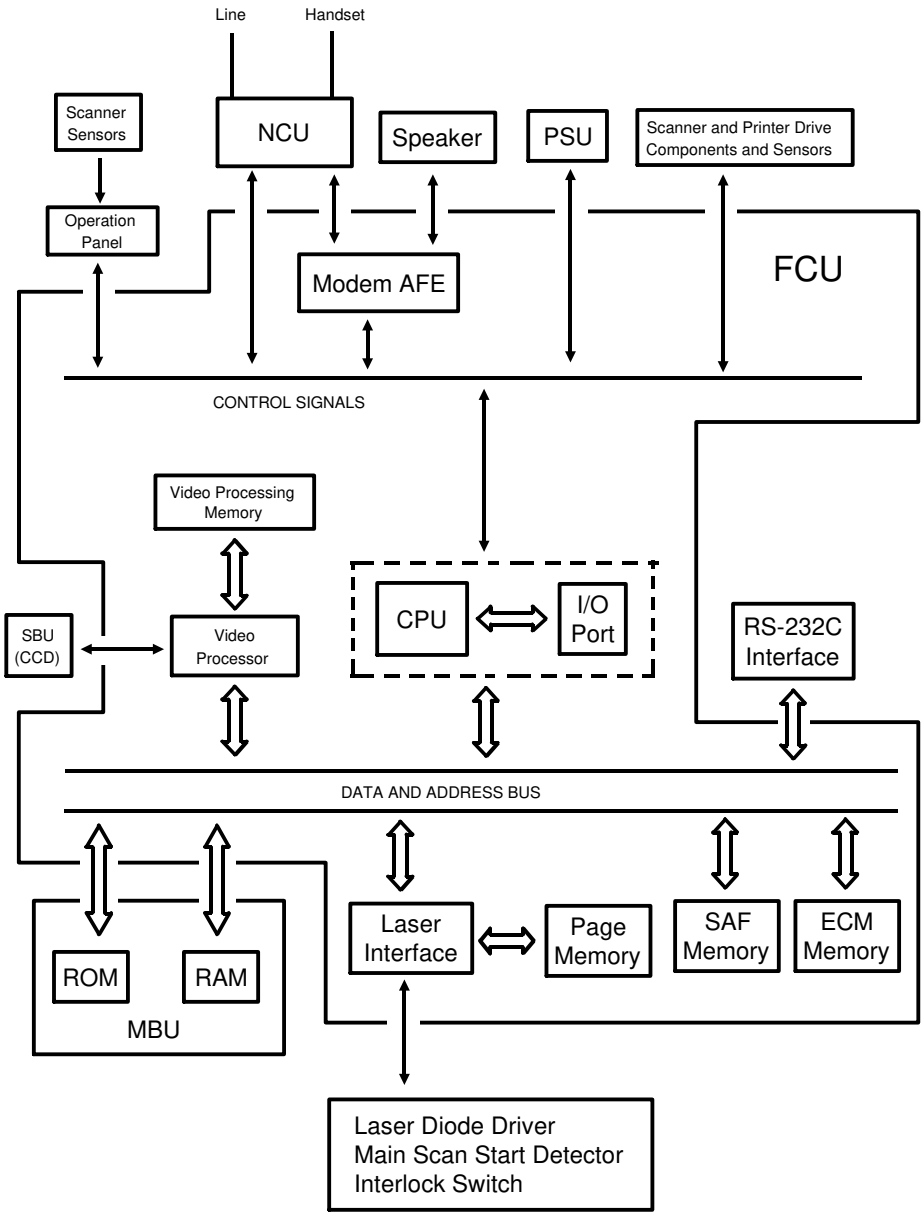


Name	Description	No.
PCBs		
FCU	This board controls the machine.	11
MBU	This board contains the system ROM and RAM for storing system parameters such as bit switch settings and programmed telephone numbers.	12
SBU	This board contains the CCD.	1
OP-PORT	This board controls the operation panel.	37
NCU	This board contains relays and switches for interfacing the machine to the network and the handset.	32
PSU	This board supplies power to the machine.	3
LD Unit	This board drives the laser diode.	10
PFU	This board controls the lower paper feed unit.	44
MOTORS		
Tx Motor	This stepper motor drives the scanner.	34
Main Motor	This dc motor drives the fusing unit, master belt, development roller, and cleaning unit.	30
Upper Paper Feed Motor	This stepper motor drives the upper paper feed mechanism and the registration roller.	26
Lower Paper Feed Motor	This stepper motor drives the lower paper feed mechanism.	43
Toner Supply Motor	This dc motor drives the toner supply mechanism.	33
Hexagonal Mirror Motor	This high-speed dc motor drives the hexagonal mirror in the laser printer optics.	13
Ozone Fan	This removes ozone-laden air from the vicinity of the master unit, and filters out the ozone.	5

Name	Description	No.
CLUTCHES		
Upper Paper Feed Clutch	This transfers drive from the upper paper feed motor to the paper feed roller in the upper cassette.	28
Lower Paper Feed Clutch	This transfers drive from the lower paper feed motor to the paper feed roller in the lower cassette.	42
SENSORS		
Document Sensor	This detects the presence of a document in the feeder.	36
Scan Line Sensor	This detects when a page is approaching the auto shading position.	14
Document Width Sensor	This detects when a B4-width [10.1"] document has been placed in the feeder.	16
Toner Near-end Sensor	This detects when the toner has almost run out.	17
Upper Paper Size Detector	This detects the paper size installed in the upper cassette. The user must install the correct actuator.	25
Upper Paper End Sensor	This detects when the paper in the upper cassette has run out.	29
Registration Sensor	This detects when paper has arrived at the registration rollers.	21
Paper Feed-out Sensor	This detects when the paper has been fed out of the printer.	24
Front Cover Switch	This detects whether the front cover is open or closed.	23
CTM Sensor	This detects when a CTM has been installed in the machine.	27
Lower Paper Size Detector	This detects the paper size installed in the lower cassette. The user must install the correct actuator.	41
Lower Paper End Sensor	This detects when the paper in the lower cassette has run out.	38
Lower Paper Feed Sensor	This sensor detects the presence of paper at the lower paper feed roller.	39
INTERLOCK SWITCHES		
Front Cover Interlock Switches	If the front cover is open, these interlock switches interrupt the +5VLD power supply for the laser diode and the +24VD power supply for the power pack, motors, and other components.	19, 20
OTHERS		
Speaker	This allows the user to listen to the condition of the telephone line.	31
Xenon Lamp	This lamp illuminates the document.	35
Xenon Lamp Driver	This drives the xenon lamp.	2
Charge Corona and Quenching Lamp Unit	The charge corona unit charges the master belt at the start of the print cycle. The quenching lamp removes excess charge from the master belt at the end of the print cycle.	18
Transfer Corona Unit	This pulls the toner off the master and onto the copy paper.	7
Varistor	This ensures that the charge given to the master by the charge corona wire does not exceed -750 Volts.	9
Marker	This stamps a red circle on each page that is successfully fed through the scanner.	15

Name	Description	No.
Power Pack	This supplies high voltages to the corona wires and the development bias terminal.	22
Fusing Lamp	This fuses the toner to the paper.	6
Thermistor	This monitors the temperature inside the fusing unit.	8
Thermostat	This interrupts the ac power supply to the fusing lamp if the temperature exceeds 400 °C.	4
Lower Cassette Indicator Panel	This contains indicators to show the status of the lower cassette.	40

1.4. OVERALL MACHINE CONTROL



The cpu on the FCU board controls the machine, as shown in the above drawing.

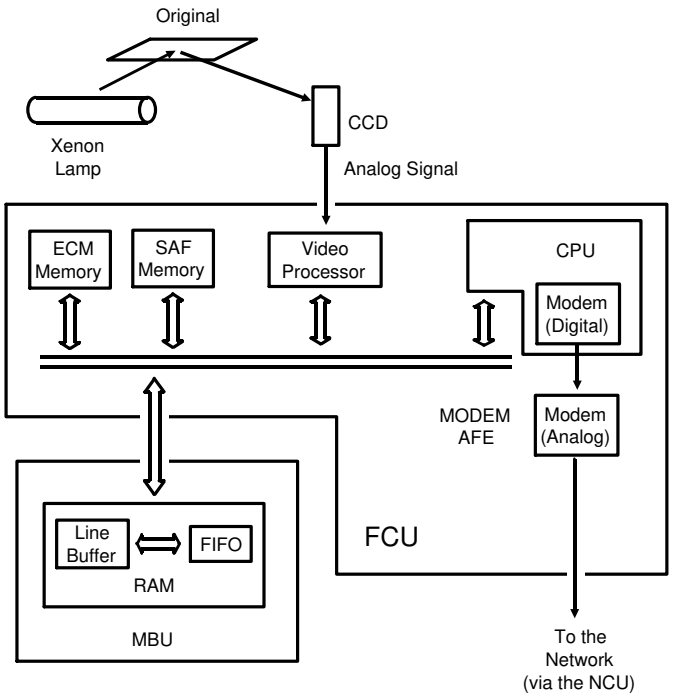
There is no modem board in the machine. The cpu performs the digital functions of a modem and carries out digital to analog conversion of facsimile data. There is a separate analog modem chip, called the Modem AFE, which does the rest of the modem operations.

1.5. VIDEO DATA PATH

The following diagrams show the data path for this model.

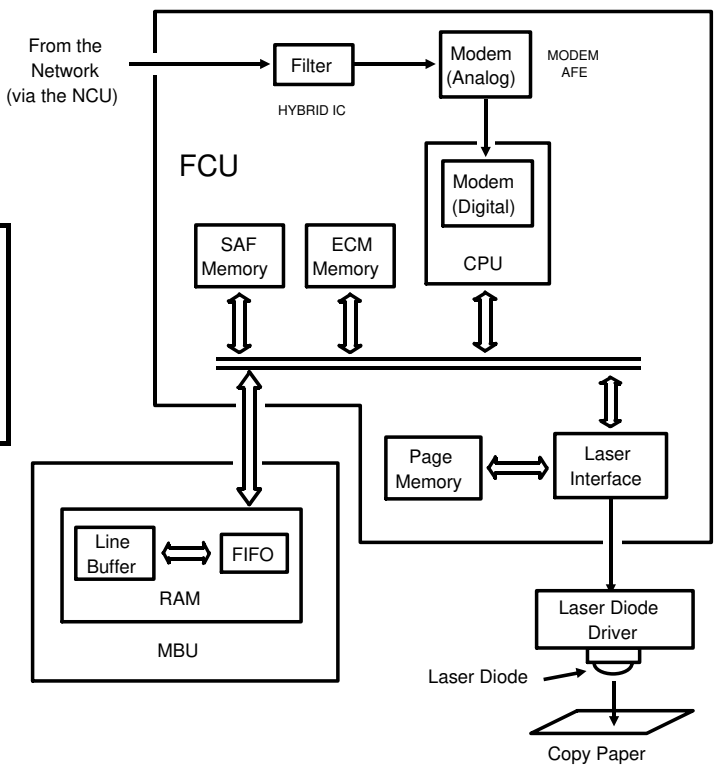
1.5.1. Transmission

Reference:
Group 3 Facsimile Manual, section 1-3-1



1.5.2. Reception

Reference:
Group 3 Facsimile Manual, section 1-3-2



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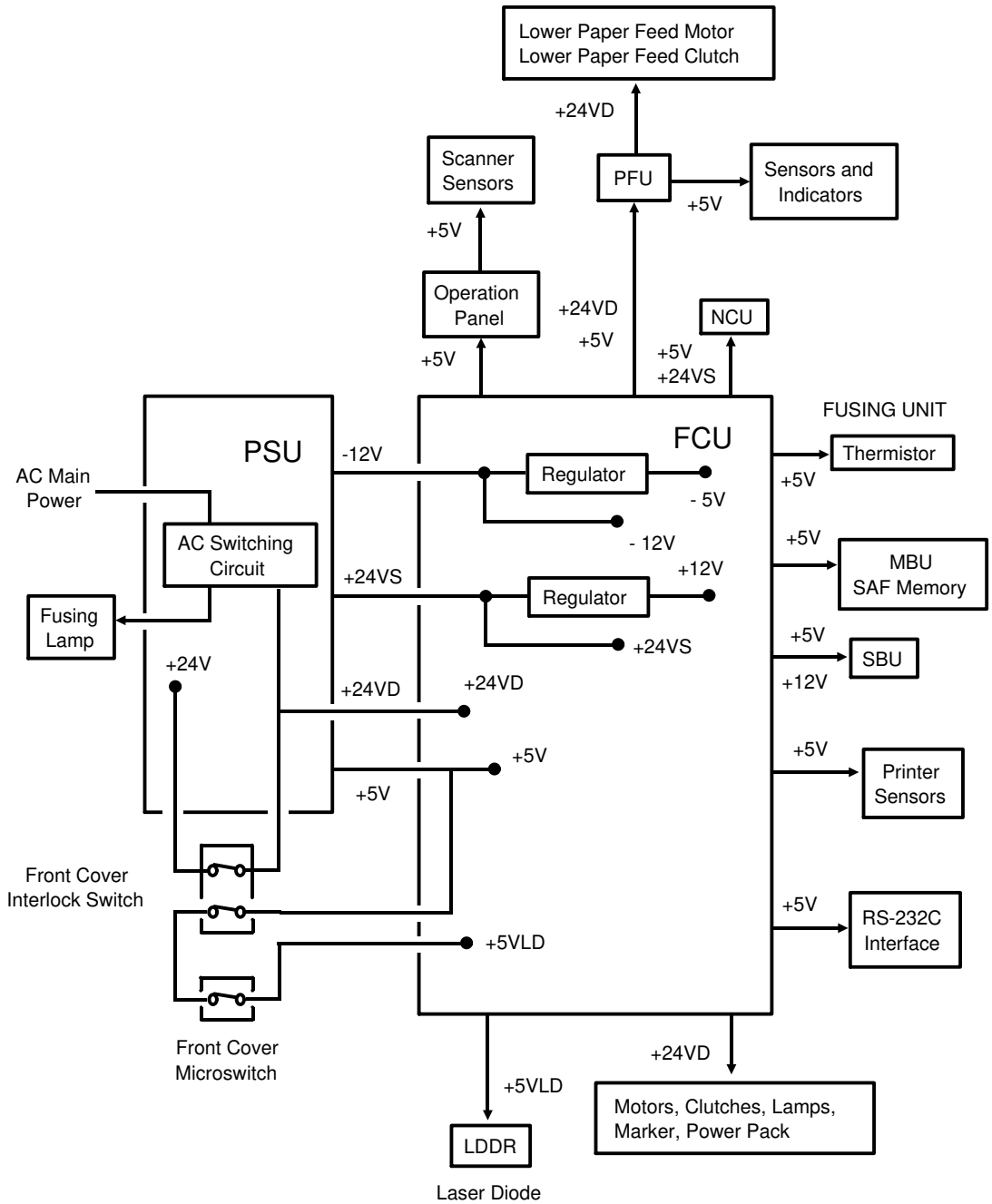
1.6. POWER DISTRIBUTION

1.6.1. Distribution Diagram

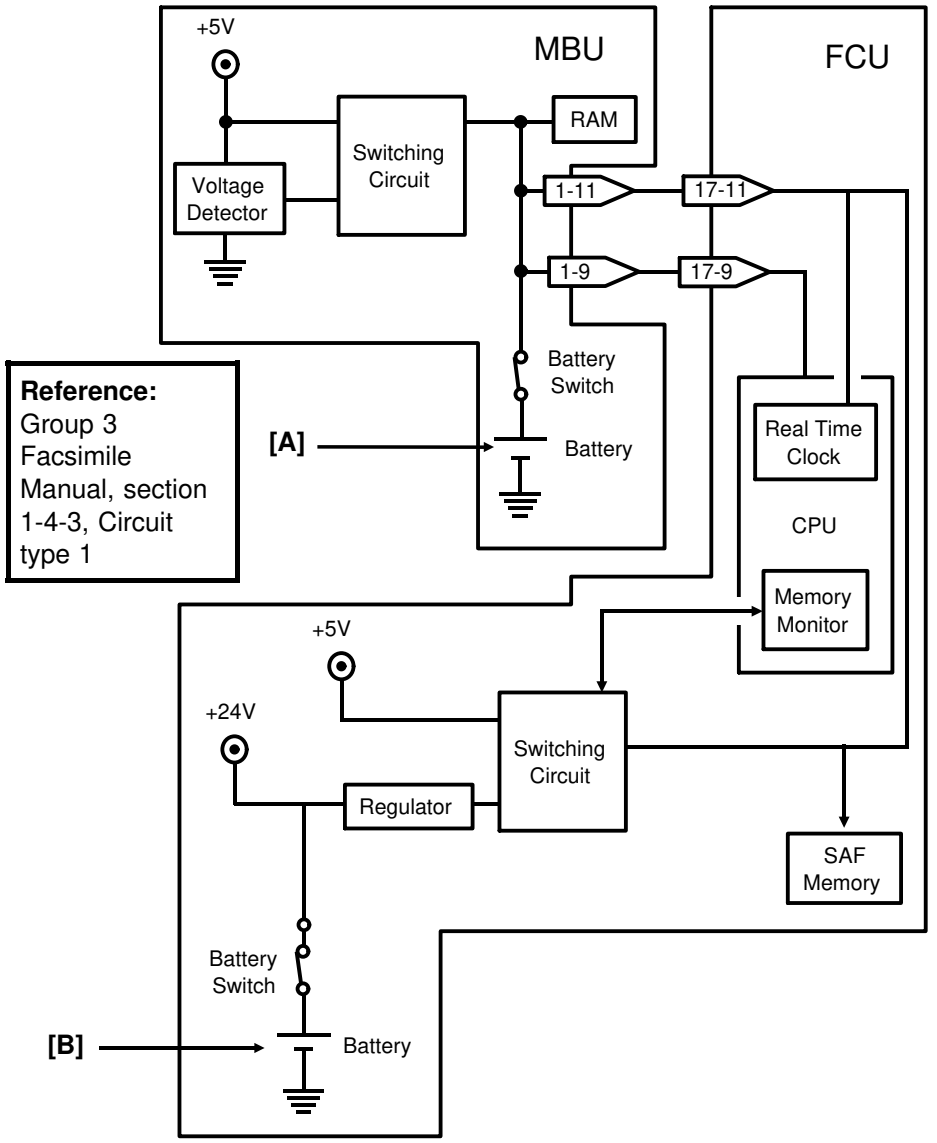


The laser diode is powered by a special +5V supply, called +5VLD.

There are two +24V power supplies:

- +24VS: This is always on when the main switch is on.
- +24VD: This is interrupted if the front cover interlock switch opens. There is no +24VD activation signal from the cpu to the PSU.

1.6.2. Memory Back-up Circuit



The battery [A] on the MBU backs up the RAM on the MBU, which contains system parameters. It also backs up the real time clock in the cpu. This battery is not rechargeable. CN1-9 tells the cpu whether back-up power (CN1-11) comes from the battery or the +5V power supply.

A rechargeable battery [B] on the FCU board backs up the SAF memory and the real time clock for 1 hour. While the main power is on, the +24V supply recharges the battery.

If there is data in the SAF memory, the rechargeable battery [B] also backs up the real time clock, to preserve the MBU battery.

2. DETAILED SECTION DESCRIPTIONS

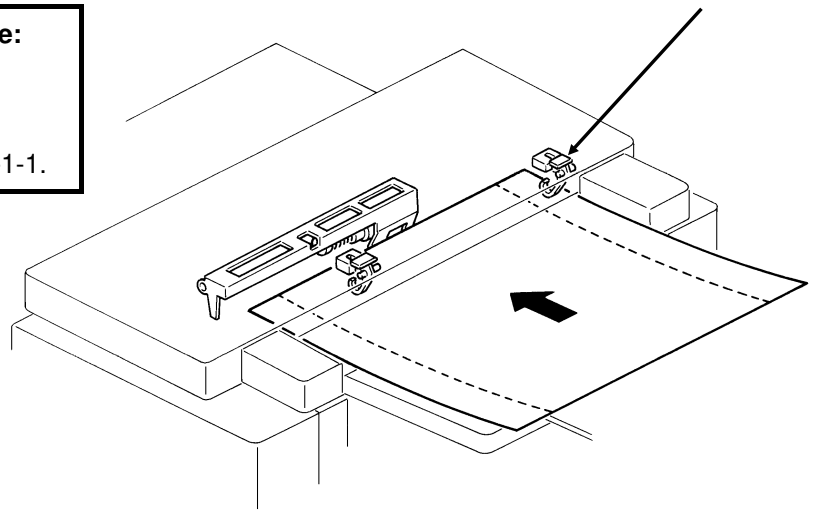
2.1. SCANNER

2.1.1. Mechanisms

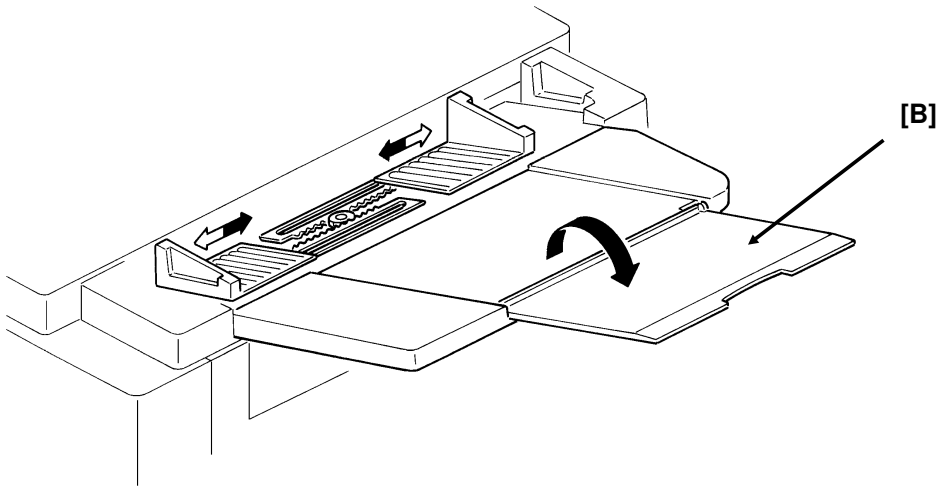
1. Document Detection

Document Table

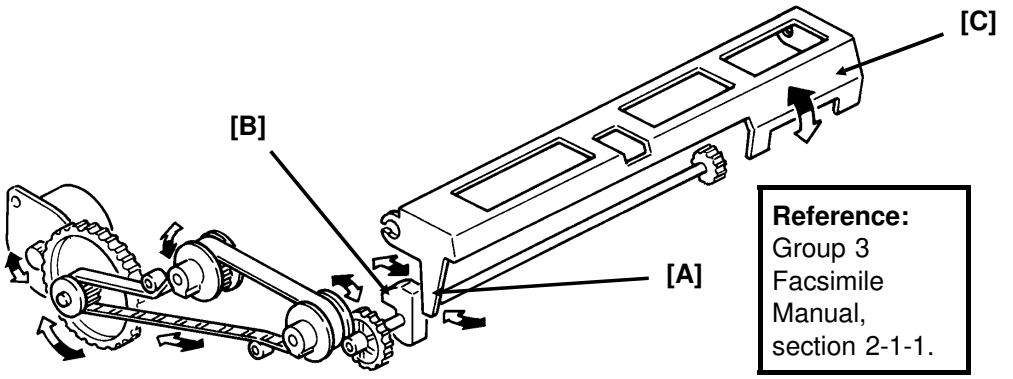
Reference:
Group 3 Facsimile Manual, section 2-1-1.



- The scanner is B4-width [10.1"], with a B4 document width detector [A]. The scanner can feed paper up to 304 mm [12"] wide. However, only 10.1" of this width will be scanned. The extra width allows users to feed wide originals with wide margins, such as computer form printouts.
- The scanner contains a xenon lamp.
- There is a fold-down extension [B] to support long documents.



Shutter



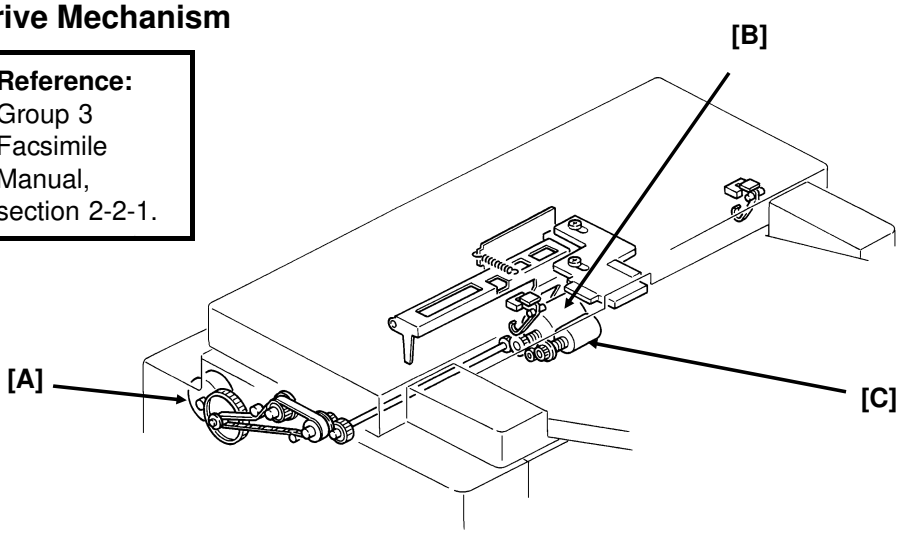
Reference:
Group 3 Facsimile Manual, section 2-1-1.

In standby mode, tab [A] rests on cam [B]. When the tx motor starts, the motor rotates forwards (white arrows), the cam lifts the tab, and the shutter [C] rises. After the last page has been fed through the scanner, the tx motor reverses (black arrows), the cam drops back to the standby position, and the shutter blocks the scanner path again.

2. Pick-up and Feed

Drive Mechanism

Reference:
Group 3 Facsimile Manual, section 2-2-1.



This machine has a Mechanical Clutch Mechanism. The tx motor [A] drives the feed roller [B] and pick-up roller [C].

Resolution

Standard - The tx motor feeds the document at 7.7 lines/mm. The video processor executes OR processing to convert the data into 3.85 lines/mm.
Detail - The tx motor feeds the document at 7.7 lines/mm. There is no OR processing, and the data is transmitted at 7.7 lines/mm.
Fine - The tx motor feeds the document and transmits data at 15.4 lines/mm. If the other terminal cannot receive at this resolution, alternate lines of data are deleted, so the effective resolution of the transmitted data is 7.7 lines/mm.

Jam Conditions

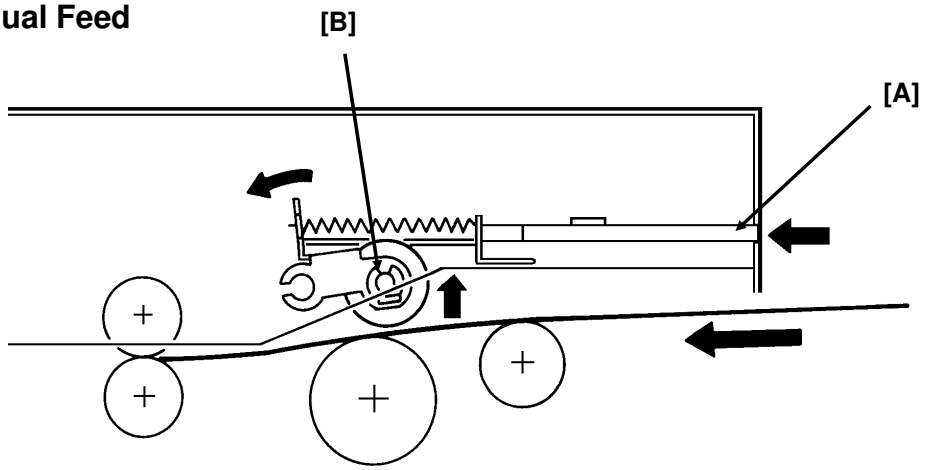
The cpu detects a document jam if one of the following conditions occurs.

- The scan line sensor does not switch on within 9 s of the Start key being pressed.
- The scan line sensor does not turn off after the maximum document length has been fed since it turned on.
- The scan line sensor switches on while the document sensor is off.
- The document width sensor switches on while the document sensor is off.
- The scan line sensor does not turn on within 5 s of the end of stamping, if the document sensor is on.

Separation

Reference: Group 3 Facsimile Manual, section 2-2-2.

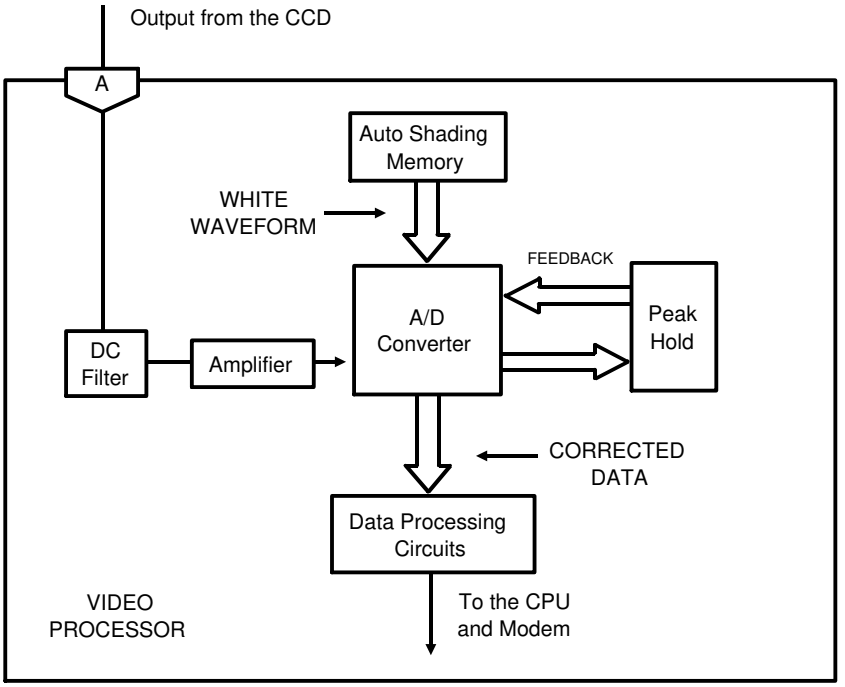
3. Manual Feed



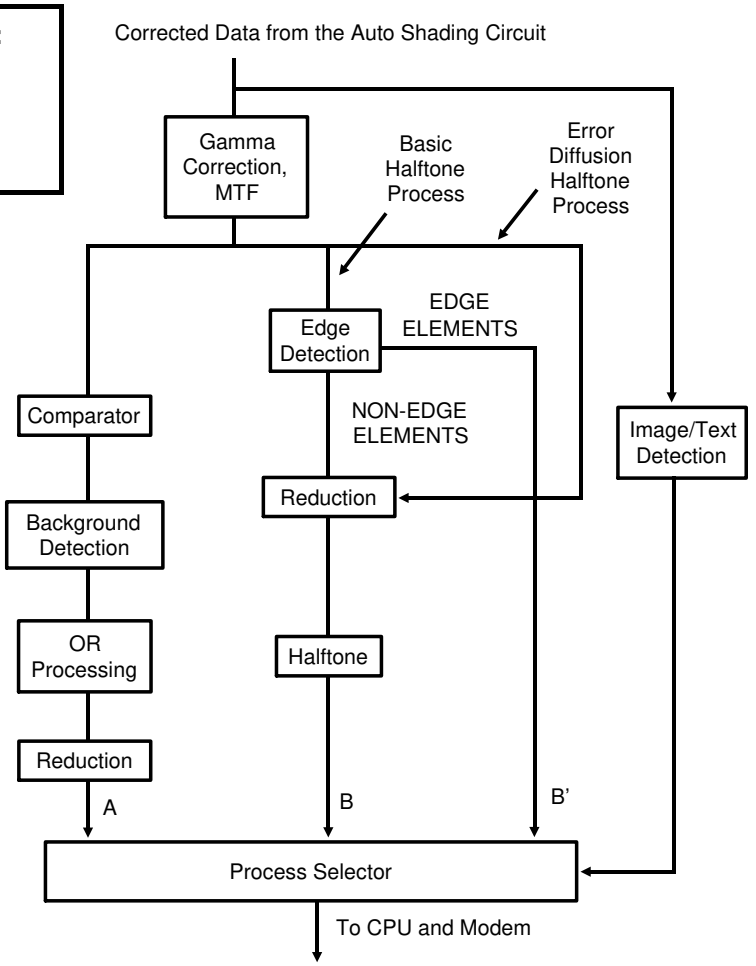
The manual feed button [A] lifts the separation roller [B] out of the document feed path. There is no manual feed switch.

Reference: Group 3 Facsimile Manual, section 2-2-3.

2.1.2. Video Data Processing



Reference:
Group 3 Facsimile Manual, section 2-3



2.2. PRINTER

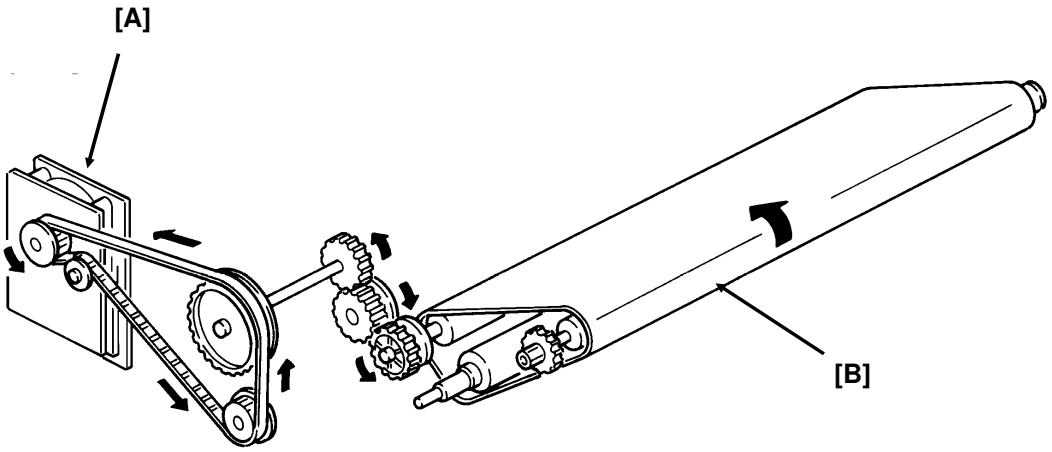
2.2.1. Mechanisms

1. Master Unit

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

The master unit contains a durable OPC master belt. The expected lifetime of each master unit is about 60,000 copies (this is the target value). Because of this long lifetime, the user is not expected to change the master; there is no Replace Master indicator.

The master belt does not have a bond seam, so no master home position detection is needed. There is also no master unit interlock switch; there is an interlock switch on the front cover.

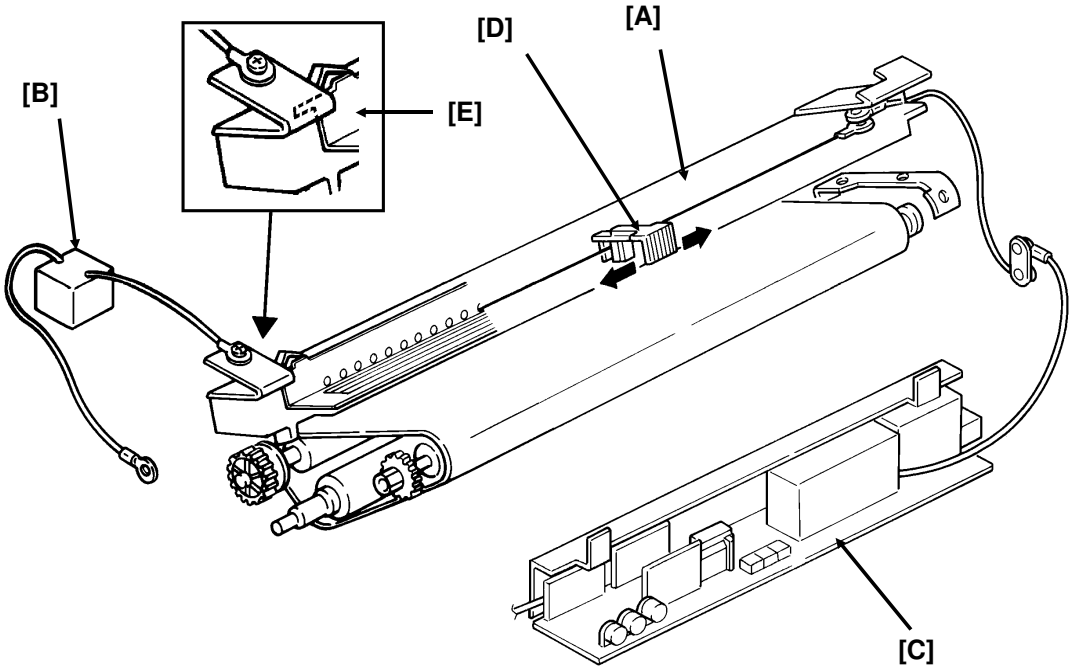


The main motor [A] drives the master belt [B].

- At the start of printing, it turns on briefly and the master belt moves under the quenching lamp to ensure that it is fully discharged.
- Then, when the fusing lamp is at the correct temperature and the page memory contains a complete page of data, and the hexagonal mirror motor is running at the correct speed, the main motor switches on again.
- When the main motor is running at the correct speed, the laser diode turns on for automatic power control.

Reference: Group 3 Facsimile Manual, section 4-1

2. Charge Corona Unit



The charge corona unit [A] gives a -750 V charge to the master belt. The varistor [B] ensures that the charge does not exceed this value.

The connection between the power pack [C] and the corona unit is not broken when the front cover is opened. However, the front cover interlock switch cuts the +24V power line to the power pack if the cover is opened.

The charge corona unit contains a wire cleaner [D].

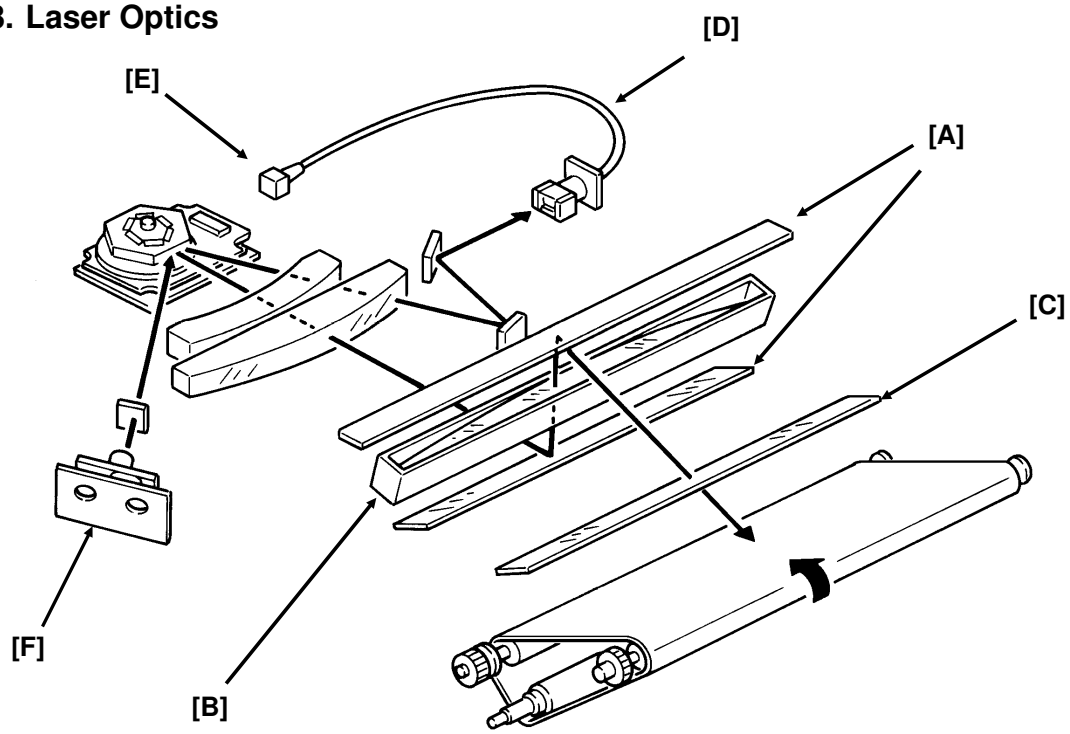
The charge corona switches on at the same time as the laser diode starts its power control procedure.

There is one ozone fan on the right hand side of the machine. It sucks air out of the machine through the ozone filter, which is part of the ozone fan assembly. The ozone fan switches on when a ringing signal is detected, and stays on until the fusing lamp temperature falls back below 130 °C at the end of the printing run.

The inset shows how the grid plate [E] connects to the varistor.

Reference: Group 3 Facsimile Manual, section 4-2

3. Laser Optics



The optics are the same as those illustrated in section 4-3-3 of the Group 3 Facsimile Manual, except that there are two mirrors [A] at the "Second Mirror" position.

Other points to note are as follows:

- The focusing lens [B] is a barrel toroidal lens.
- The shield glass [C] prevents toner from entering the laser optics area, and may need cleaning occasionally.
- An optical fibre [D] passes the reflected laser beam to the main scan start detector [E]. This detector is situated on the laser diode drive board [F], unlike shown in the diagram.
- The strength of the beam is 0.436 mW at a wavelength of 780 nm.
- The dimensions of the dot on the master belt are 65 μm (main scan direction) by 75 μm (sub-scan direction).

The charge on the exposed parts of the belt drops to about -150 V, while non-exposed areas remain at about -750 V.

The laser engine characteristics are as follows (refer to page 4-3-21 of the Group 3 Facsimile manual for background).

- Motor speed: 9,240 rpm
- Motor type: Hexagonal
- LD clock frequency: 5.3311 MHz
- Time between main scan synchronization signals: 1.082 ms
- Number of dots per main scan: 5769

4. Development

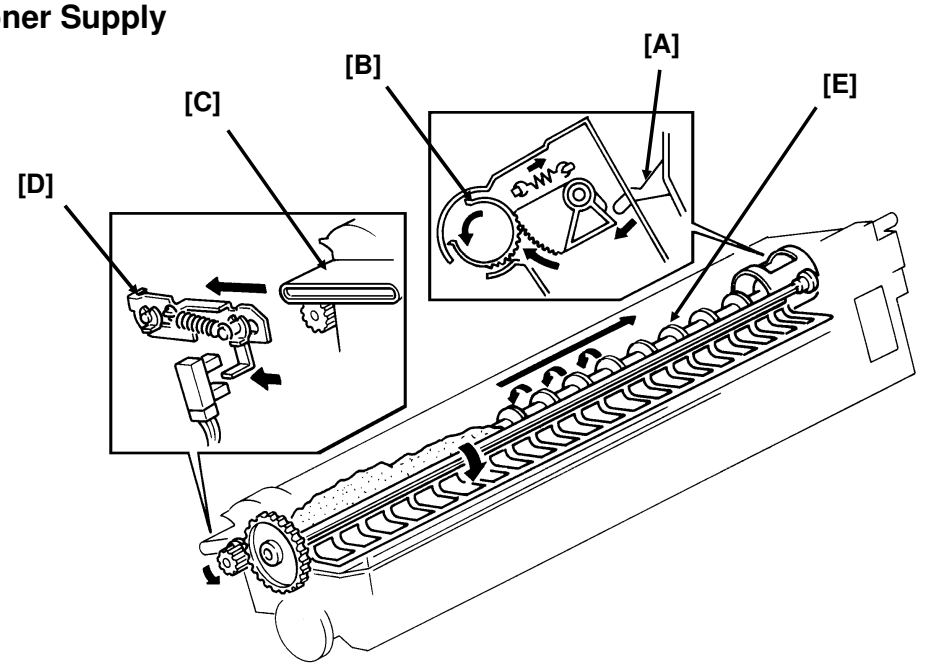
Overview

This machine uses a 'write-to-black' development system using negative toner.

The toner cassette is part of a disposable unit known as the CTM (Cleaning/Toner Magazine). The CTM contains a toner cassette, toner supply mechanism, cleaning unit, and used toner tank. When the toner is all used up, the CTM is replaced.

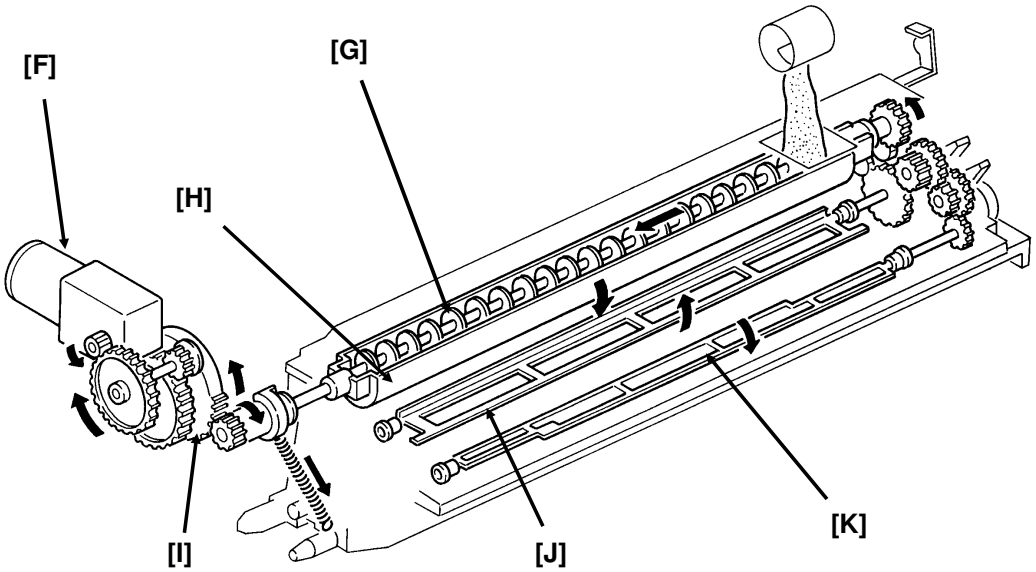
Reference: Group 3 facsimile Manual, section 4-4

Toner Supply



When a new CTM is installed in the machine and the front cover is closed, the main motor and toner supply motor turn on. When the front cover is closed, a tab [A] on the fusing unit cover forces the hopper [B] to open. Also, tab [C] on the CTM pushes bracket [D], which moves the CTM sensor actuator into the sensor.

Continued on the next page



The toner supply motor [F] drives the toner supply shaft ([E] in the diagram on the previous page). This spiral shaft feeds toner to the hopper.

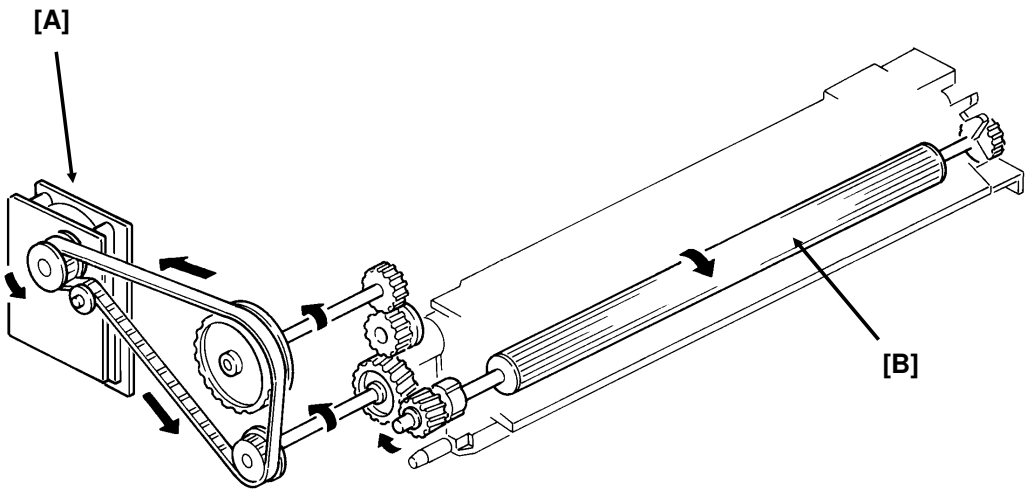
Inside the development unit is another spiral shaft [G]. This shaft, driven by the main motor, distributes toner across the length of trough [H]. The toner supply motor drives gear [I], and once every rotation, it tips the trough upside down, dropping the toner into the development unit. A spring immediately pulls the trough back upright so that it can continue to receive toner.

The toner mixing bar [J], driven by the main motor, keeps the toner agitated as it builds up at the bottom of the development unit. The toner supply bar [K] supplies toner to the development roller.

While toner is being supplied, the main motor is also operating the toner near-end detection mechanism. When a fresh toner cassette is installed, the sensor detects toner near-end, because there is not much toner in the development unit. When some toner has been transferred, the signal from the toner near-end sensor returns to normal. About 22 s after that, the toner supply motor stops and no more toner is transferred into the development unit.

During printing, if toner near-end is detected, the toner supply mechanism will start up again. Toner will be supplied until the sensor signal returns to normal. If the toner cassette in the CTM is empty, no toner will be transferred, and the sensor signal will not return to normal. If the sensor outputs the near-end signal for more than 5 minutes, the cpu blinks the Add Toner indicator. See "Toner Near-end Detection" for more details.

Development Unit Drive

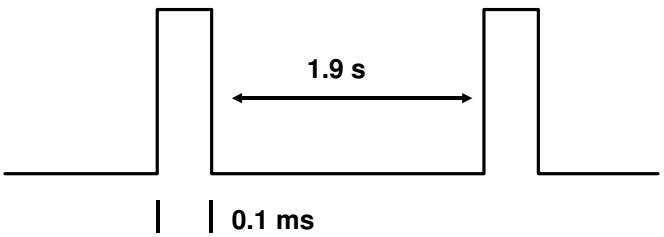


During printing, drive from the main motor at gear [A] drives the development roller [B]. The main motor also drives the master belt, so the development roller and the master belt always move at the same time; therefore, no development clutch is needed.

Toner Near-end Detection

The toner near-end detection mechanism is exactly the same as described in section 4-4-4 of the Group 3 Facsimile Manual. The sensor signal is as shown in the following diagram.

Reference:
Group 3 Facsimile Manual, section 4-4-4.

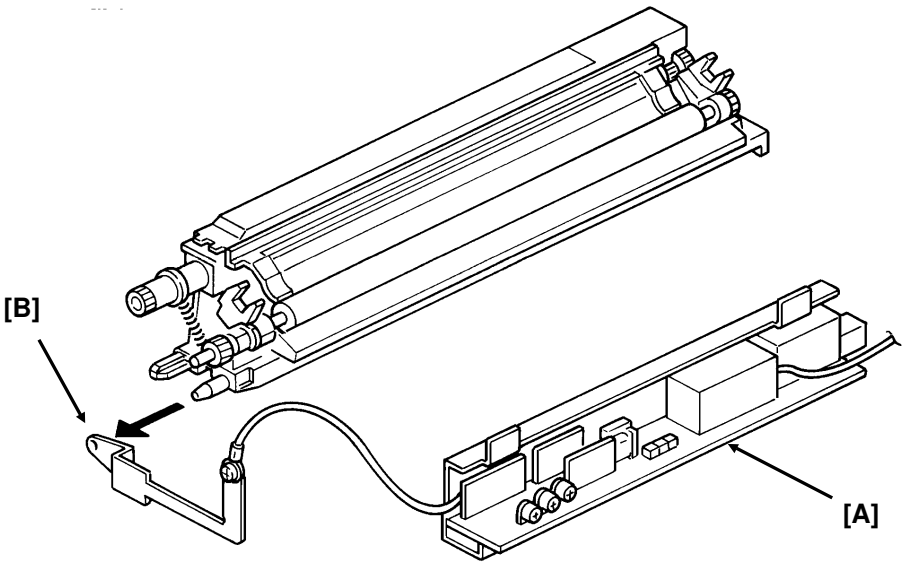


The cpu starts to blink the Add Toner indicator under the following conditions:

- **At power up:** If the sensor output indicates toner near-end for 6 s
- **During printing:** If the sensor output indicates toner near-end for more than 5 minutes, totalled over consecutive print runs (when the motor stops, the sensor mechanism is deactivated, so time between printing runs does not count towards the 5 minute time limit)

After 100 more pages have been printed, the Add Toner indicator remains lit, and printing is disabled until a new CTM has been added.

Development Bias



The development bias and switching bias are supplied from the power pack [A] at the same terminal [B].

- Development bias: - 530 ± 20 Vdc (BIASL)
- Switching bias: +70 ± 20 Vdc (BIASH)

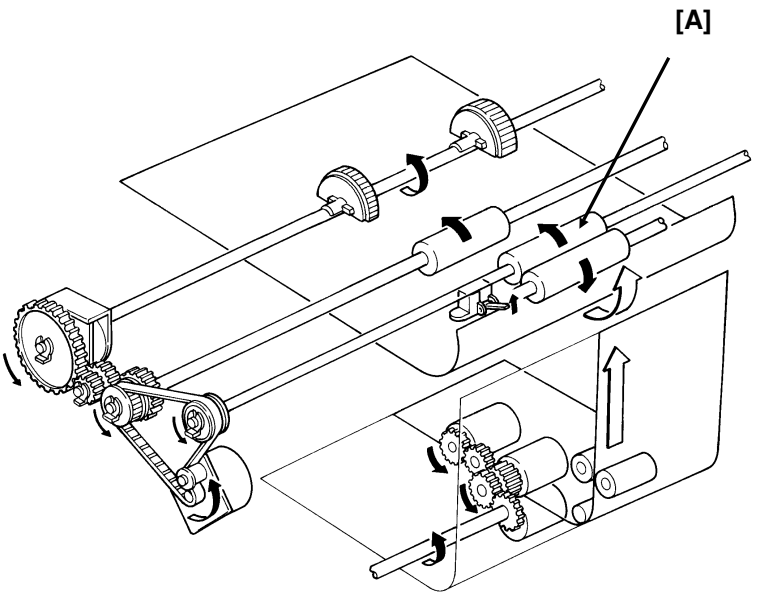
The switching bias is used at the following times:

- Between pages of a print run, while the development bias is off
- While toner is being transferred from the CTM to the development unit

5. Paper Feed

There are two cassettes, a 250-sheet cassette, and an optional 500-sheet cassette.

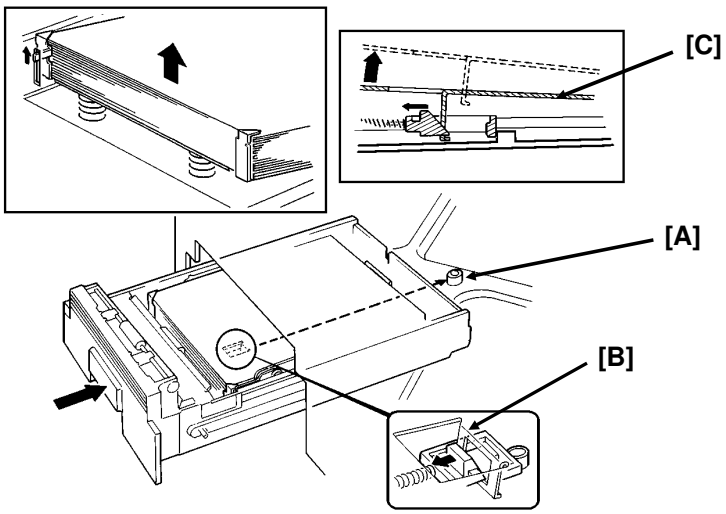
The sizes of paper that the cassettes can take are listed in the specifications (section 1-1).



Paper feeds from the rear towards the front. The lower paper feed path bends upward through the front part of the upper cassette. The two paper feed paths merge just before the registration roller [A].

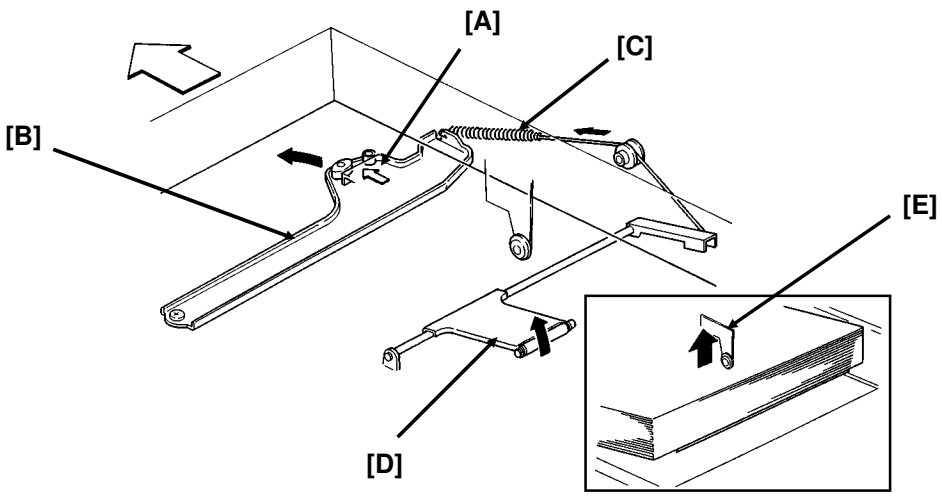
Paper Lift

Standard Cassette



A mechanical paper lift mechanism is used. When the user places the cassette into the machine, a pin [A] in the base of the cassette activates a spring loaded lever mechanism [B], which forces up the paper lift arm [C] until the top of the stack touches the paper height positioner.

Lower Cassette



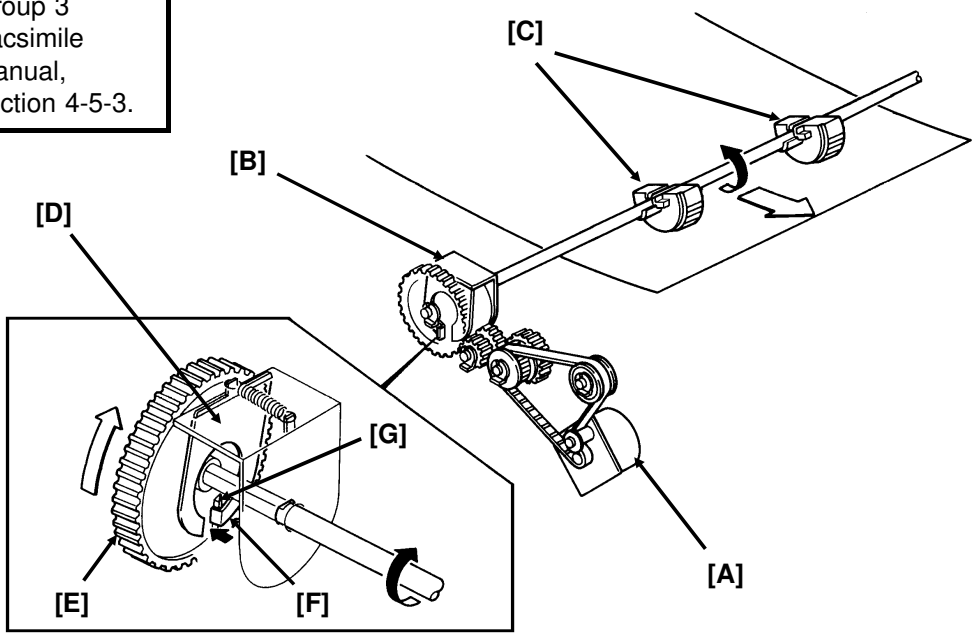
A mechanical paper lift mechanism is used. When the user places the cassette into the machine, a tab [A] on the rear of the cassette pushes a plate [B] towards the rear of the machine as the user slides in the cassette. This plate, driven by a spring [C], forces up the paper lift arm [D]. The paper height positioner [E] ensures that the paper is not pushed up too far.

Reference: Group 3 Facsimile Manual, section 4-5-2.

Pick-up and Feed Mechanism

Standard Cassette (Clutch Driven Single Roller Mechanism)

Reference:
Group 3 Facsimile Manual, section 4-5-3.



The upper paper feed motor [A] drives the pick-up and feed mechanism. The paper feed clutch [B] transfers drive from this motor to the feed rollers [C].

When the paper feed clutch turns on, a metal plate [D] moves away from gear [E]. A pin [F] on this plate releases the gear, and the paper feed roller turns. However, the clutch switches off after only 0.3 s, and a spring forces the plate back to the starting position. After one revolution, the rib [G] on the inside of the gear comes against the pin, and the paper feed roller stops.

When the page memory is full, the upper paper feed motor turns on. At the beginning, it rotates at a slower speed (202.5 pps) to avoid excessive start-up noise and start-up current peak.

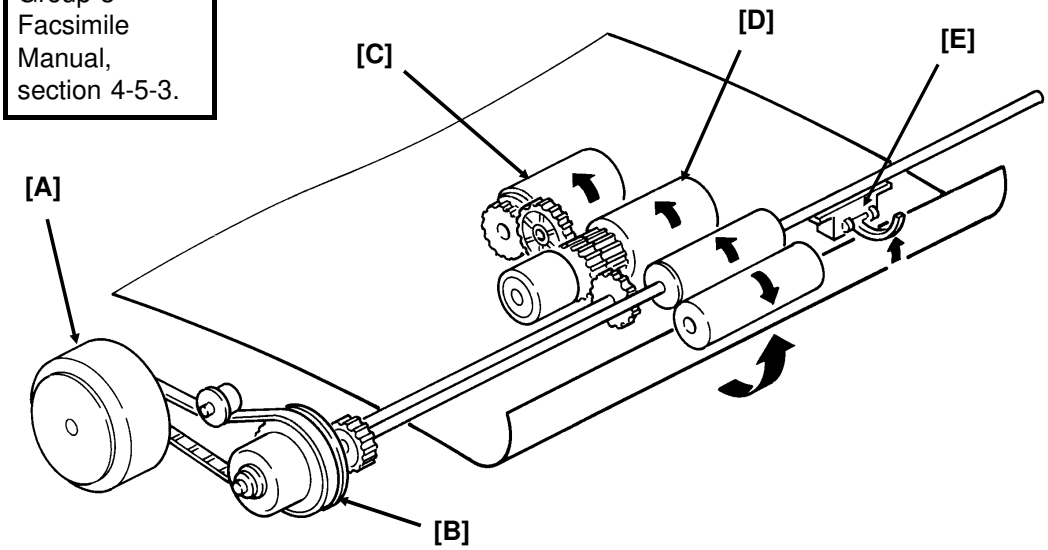
At 0.1 s after the main motor reaches the correct speed, the motor turns at a higher speed (405 pps). This higher speed, used for pick-up and feed, ensures that time is not wasted getting paper into the printer. At the same time, the upper paper feed clutch turns on and paper is fed into the printer.

Shortly after the registration sensor turns on, the main motor has the leading edge of the paper, so the upper paper feed motor rotates at 202.5 pps again to match the feed speed of the main motor.

When the trailing edge of the paper has left the registration sensor, the paper is no longer affected by the upper paper feed motor. The upper paper feed motor goes back to 405 pps ready for feeding the next page.

Lower Cassette (Clutch Driven Two Roller Mechanism)

Reference:
Group 3 Facsimile Manual, section 4-5-3.



The lower paper feed motor [A] drives the lower paper feed mechanism, and the lower paper feed clutch [B] transfers drive from the motor to the lower pick-up [C] and feed [D] rollers at the correct time.

When the page memory is full, the lower paper feed motor turns on. At the beginning, it rotates at a slower speed (266 pps) to avoid excessive start-up noise and start-up current peak. After 0.1 s, the motor rotates at a higher speed (800 pps). This higher speed of rotation, used during pick-up and feed, ensures that little time is wasted in getting paper out of the cassette and into the printer.

When main motor lock is achieved, the lower paper feed clutch turns on and paper is fed into the printer. Shortly after the paper feed sensor [E] is activated, the clutch turns off.

After registration, the upper paper feed and main motors turn on to drive the registration rollers and feed the paper into the printer. However, rollers driven by the lower paper feed motor still hold the trailing edge of the paper. So the lower paper feed motor rotates at 266 pps to match the feed speed of the upper feed and main motors.

When the trailing edge of the paper has left the paper feed sensor, the paper is no longer affected by the lower paper feed motor. The lower paper feed motor goes back to 800 pps ready for feeding the next page.

Separation Mechanism

Standard Cassette

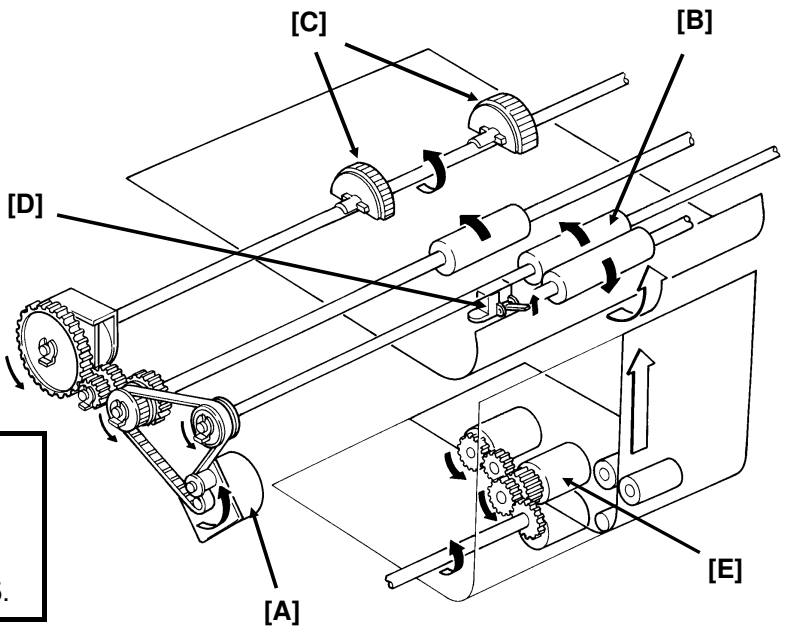
The standard cassette uses a semicircular roller and corner separator method of separation.

Lower Cassette

This cassette uses a feed and reverse roller mechanism.

Reference: Group 3 Facsimile Manual, section 4-5-4.

Registration



Reference: Group 3 Facsimile Manual, section 4-5-5.

Standard Cassette

There is no registration. This is because the upper paper feed motor [A] drives the registration roller [B] and the upper paper feed rollers [C], and there is no registration clutch. This means that the registration roller and the paper feed rollers stop at exactly the same time.

Just after the paper's leading edge reaches the registration sensor [D], the upper paper feed motor stops briefly.

Lower Cassette

The upper paper feed motor is off when the leading edge of the paper activates the registration sensor. The lower paper feed roller [E] continues to feed the paper for a short while after this, so registration is done in the normal manner (see section 4-5-5 of the Group 3 Facsimile Manual).

Jam Detection

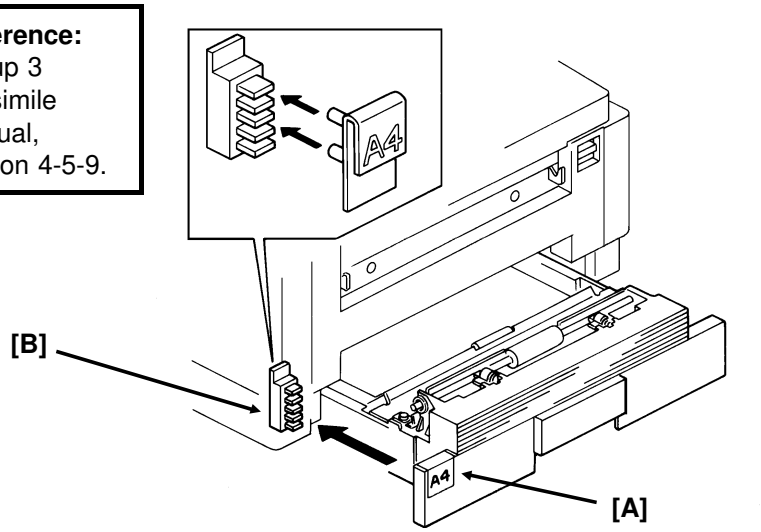
The machine detects a jam if one of the following conditions exists.

- The registration sensor or copy feed-out sensor is activated while the machine is in standby mode.
- The registration sensor still detects paper 9.0 s after the paper feed clutch turned on.
- The copy feed-out sensor still does not detect paper 9.0 s after the paper feed clutch turned on.
- The copy feed-out sensor still detects the presence of paper 9.0 s after it first detected the latest sheet of paper.
- Standard Cassette Only: The registration sensor does not turn on within 2.0 s after the upper paper feed clutch turned on.
- Lower Cassette Only: The lower paper feed sensor does not turn on within 1.2 s after the lower paper feed clutch turned on.

There is no error detection during paper lift.

Paper Size Detection

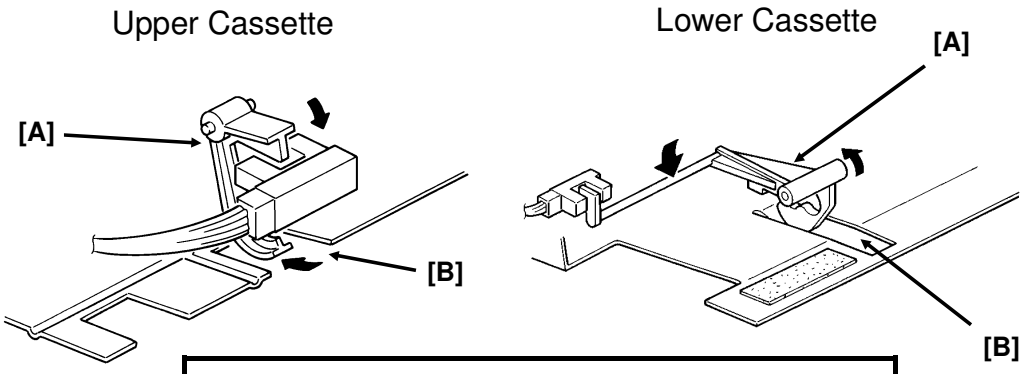
Reference:
Group 3 Facsimile Manual, section 4-5-9.



For both cassettes, the paper size actuator [A] is on the front of the cassette. The paper size sensor [B] is a row of microswitches. The above diagram shows the upper paper size sensor.

The cpu disables paper feed from a cassette if the paper size cannot be detected. If the paper size actuator is missing or broken, or if there is no cassette in the cavity, the Add Paper indicator will light.

Paper End Detection



Reference: Group 3 Facsimile Manual, section 4-5-8.

In both cassettes, the paper end sensor actuator [A] falls through a slot [B] in the bottom of the tray.

There are no paper height sensors or paper near-end sensors.

Page Separation and Data Reduction

Incoming pages that are similar in length to the copy paper may be reduced in the sub-scan direction to fit on the paper. Whether or not this happens depends on the settings of bits 1 and 2 of bit switch 02.

Reduction Enabled

If bit 2 of bit switch 02 is at 0, the data will be reduced in the page memory to fit on the copy paper. However, data will only be reduced if the length of the incoming page is between 5 mm shorter and a certain maximum length. This maximum incoming page length that can be reduced depends on the copy paper size and on the reduction ratio stored in RAM addresses 2404F and 24050.

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

Bit 7:	Not used	Bit 5:	Legal	Bit 3:	A4	Bit 1:	B5
Bit 6:	B4	Bit 4:	F4	Bit 2:	Letter	Bit 0:	A5

The ratio is determined in accordance with the following table.

Bit in 2404F	0: 3/2	1: 4/3	0: 8/7	1: 12/11
Bit in 24050	0	0	1	1

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

Copy Paper Type	Copy Paper Length	Maximum reducable incoming page lengths			
		Ratio = 3/2	Ratio = 4/3	Ratio = 8/7	Ratio = 12/11
A5	148	214.5	190.7	163.4	156
B5	182	265.5	236	202.3	193.1
Letter	279.4	341 [1]	341 [1]	313.6	299.3
A4	297	341 [1]	341 [1]	341 [1]	318.5
F4, F	330.2	341 [1]	341 [1]	341 1	341 [1]
Legal	355.6	341 [1]	341 [1]	341 1	341 [1]
B4	364	341 [1]	341 [1]	341 1	341 [1]

[1]: The page memory cannot reduce incoming pages longer than 341 mm.

The values are calculated as follows.

Maximum incoming page length that can be reduced =
(Copy Paper Length - 5) x Reduction Ratio

For example, for A5 with a reduction ratio of 4/3

Max incoming data length = (148 - 5) x 4/3 = 190.7

Incoming pages that are longer than the maximum length will not be reduced, but will be printed on two pages and treated in accordance with the setting of bit 1 of bit switch 02. If this bit is 1, the bottom few lines of the page will be repeated at the top of the next page. If this bit is 0, the next page will continue from where the first page left off.

Reduction Disabled

If bit 2 of bit switch 02 is at 1, 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 be printed. The value of x can be from 0 to 15 mm. It is determined by the setting of RAM address 24051 (copy mode: bits 3 to 0, receive mode: bits 7 to 4; bits 3 and 7 are the most significant bits).

Hex value	Value of x
0	0
1	1
and so on until	
15	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 bit switch 02, as explained above.

Paper Size Selection

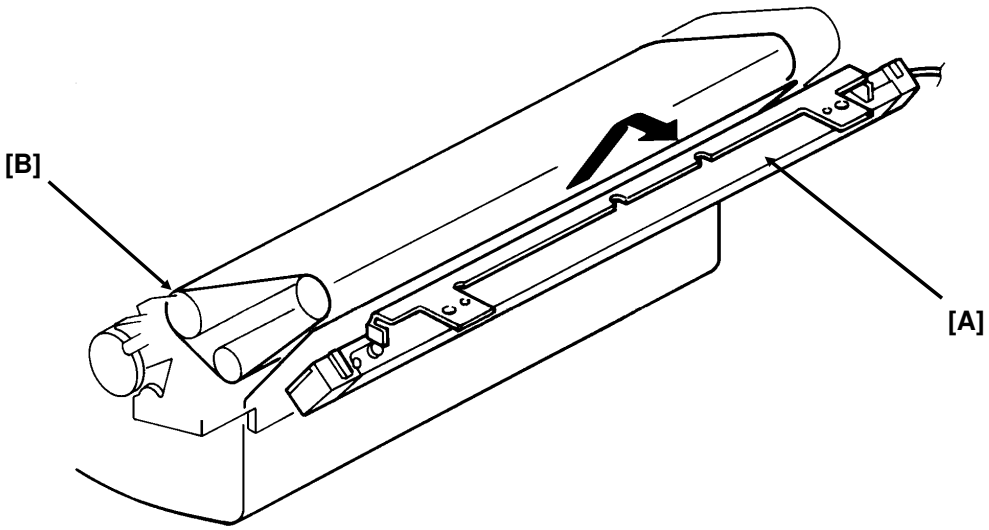
If there are two cassettes in the machine, the paper size to use is decided in accordance with a few simple rules.

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

		Paper Size					
		A5	Letter	A4	F, F4	Legal	B4
Recv'd Fax Message Size	A5	1	2	3	4	5	6
	Letter	6(SR)	1	2	3	4	5
	A4	6(SR)	2(R)	1	3	4	5
	F, F4	6(SR)	5(R)	4(R)	1	2	3
	Legal	6(SR)	5(R)	4(R)	3(R)	1	2
	B4	6(SR)	5(R)	4(R)	3(R)	2(R)	1

- 1 is top priority.
- S: The data has to be separated and printed on more than one page.
- R: The data is reduced to fit on the printer paper.
- If Specified Cassette Selection has been switched on, messages from specified senders will always go to the upper cassette, regardless of the paper size or message size.
- Some of the reports can be printed on A5 paper without page separation. However, if only A5 paper is in the cassettes, reports that need larger paper sizes will require page separation.

6. Transfer Corona Unit

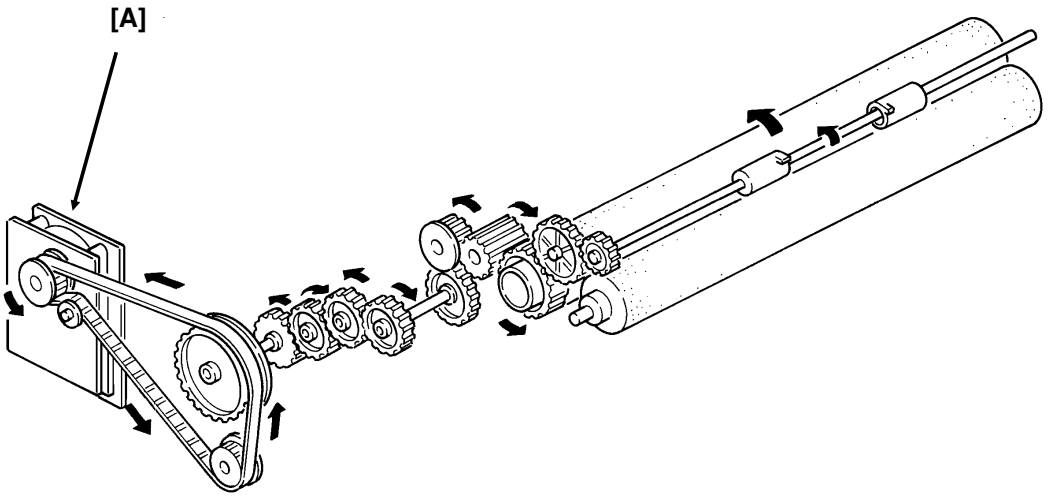


The voltage of the transfer corona unit [A] is between 3.8 and 5.5 kV. It gives a 200 V charge to the paper to pull the negative toner off the master belt. The bend [B] in the master belt also helps the paper to leave the belt. There is no antistatic brush to aid separation.

Reference: Group 3 Facsimile Manual, section 4-6

7. Fusing Unit

Fusing Unit Drive



The main motor [A] drives the fusing unit through a train of gears.

Fusing Unit Control

- Standby temperature: 65 °C
- Printing start temperature: 130 °C
- Maximum printing temperature: 170 °C (monitored by a comparator)
- Thermistor maximum: 220 °C
- Thermostat maximum: 400 °C

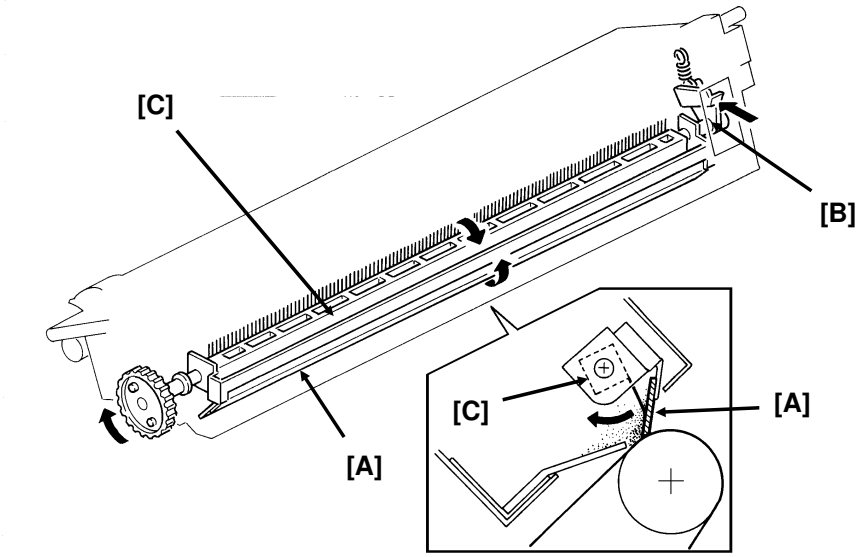
When the main power is switched on, the fusing lamp heats up to 65 °C in about 10 s.

When a ringing signal is detected (or when the user presses Start or Copy for taking a copy), the fusing lamp heats up to 130 °C in about 15 s.

At the end of printing, the ozone fan stays on until the fusing unit temperature has fallen below 130 °C.

Reference: Group 3 Facsimile Manual, section 4-7

8. Cleaning



The CTM contains the cleaning unit and the used toner tank.

When the CTM is out of the machine, the cleaning blade [A] is forced against a mylar plate, which prevents used toner from falling out.

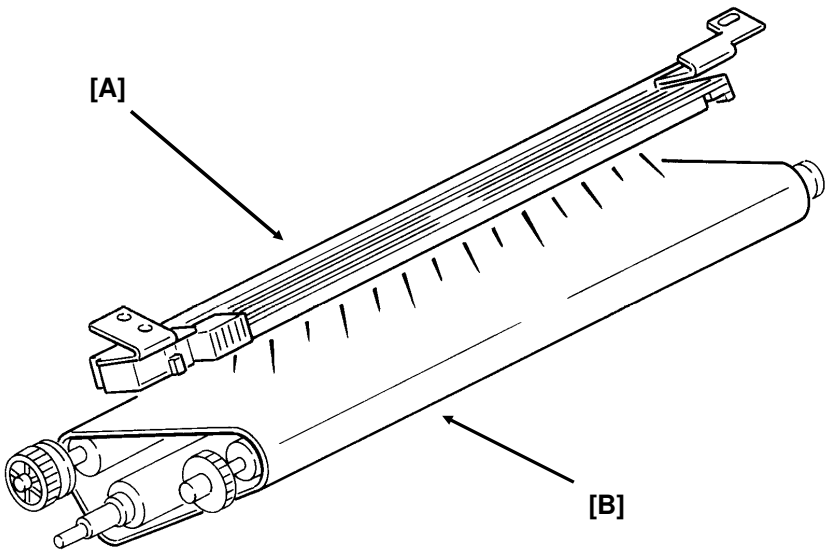
When the CTM is placed inside the machine, a tab on the copy exit cover pushes plate [B], which moves the cleaning blade away from the mylar and against the master belt.

The cleaning blade wipes toner off the master belt as it passes the cleaning unit. The toner goes to the used toner tank. The cleaning roller [C], driven by the main motor removes any toner that may remain attached to the cleaning blade.

There is no toner overflow detection mechanism. This is because the used toner tank is removed with the old CTM when the toner cassette is empty; the toner near-end sensor detects this.

Reference: Group 3 Facsimile Manual, section 4-9

9. Quenching



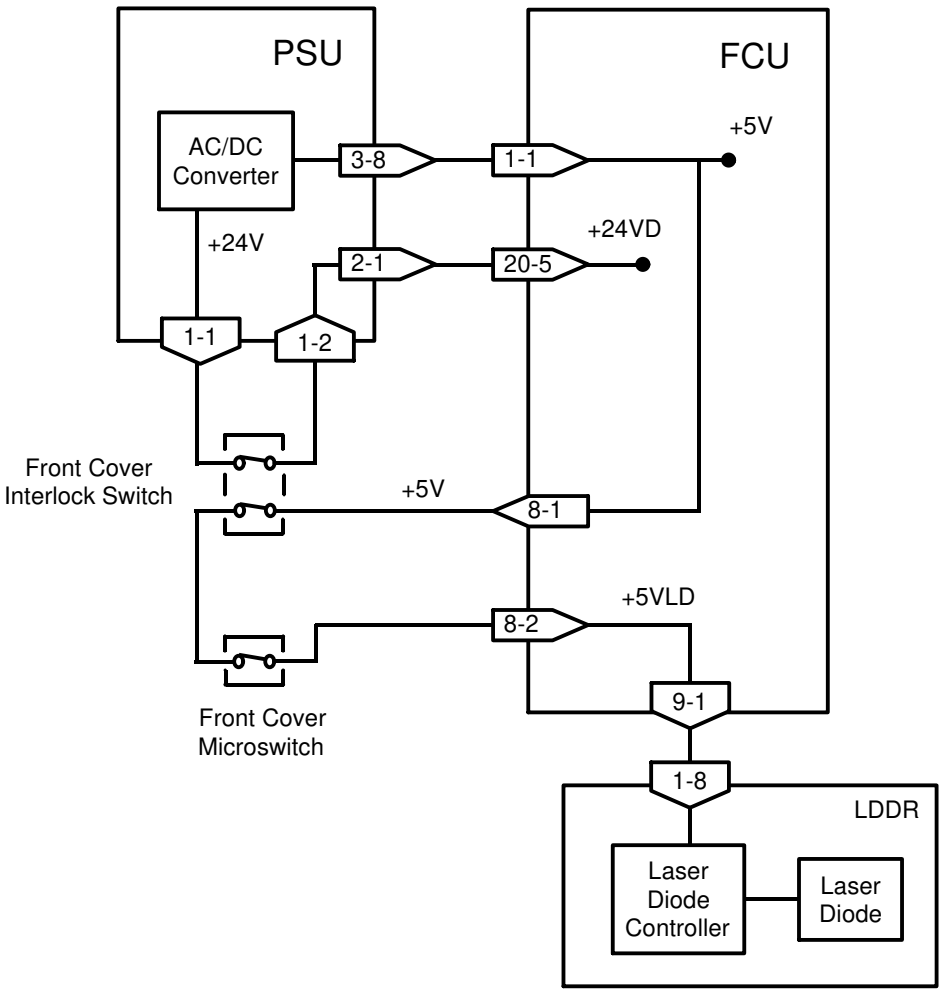
The quenching lamp [A] is an LED array. After quenching, the charge on the master [B] is about -20 V.

Reference: Group 3 Facsimile Manual, section 4-10

2.2.2. Circuits

1. Laser Diode

Laser Diode Drive



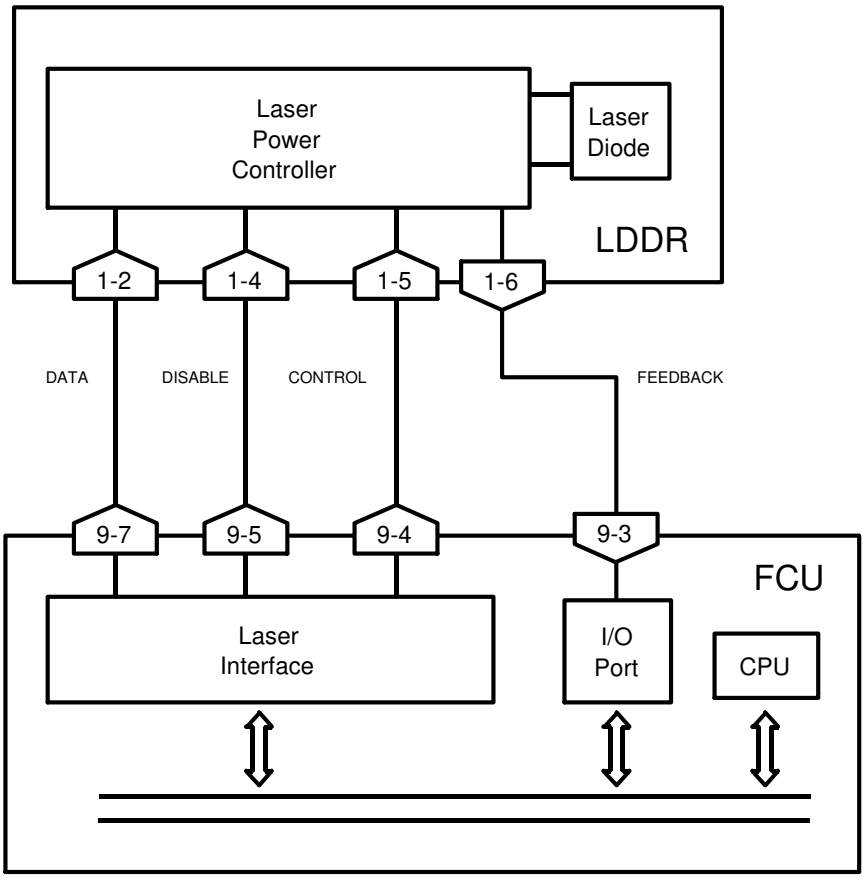
The laser diode is powered by a special +5V supply, called +5VLD.

There are two switches activated by the front cover; the front cover interlock switch, and the front cover microswitch. If either of these switches is open, the power supply to the laser diode is interrupted.

The laser diode is not started until the following conditions have been met:

- The main and hexagonal mirror motors are rotating at the correct speeds
- The page memory contains a complete page
- The fusing lamp is at the printing temperature

Laser Diode Power Control



The Laser Interface sends a constant signal to the laser diode on CN9-7, forcing the diode to stay on. The feedback signal returns to the FCU on CN9-3. If necessary, the cpu adjusts the laser diode power to the correct value by altering the control signal (CN9-4).

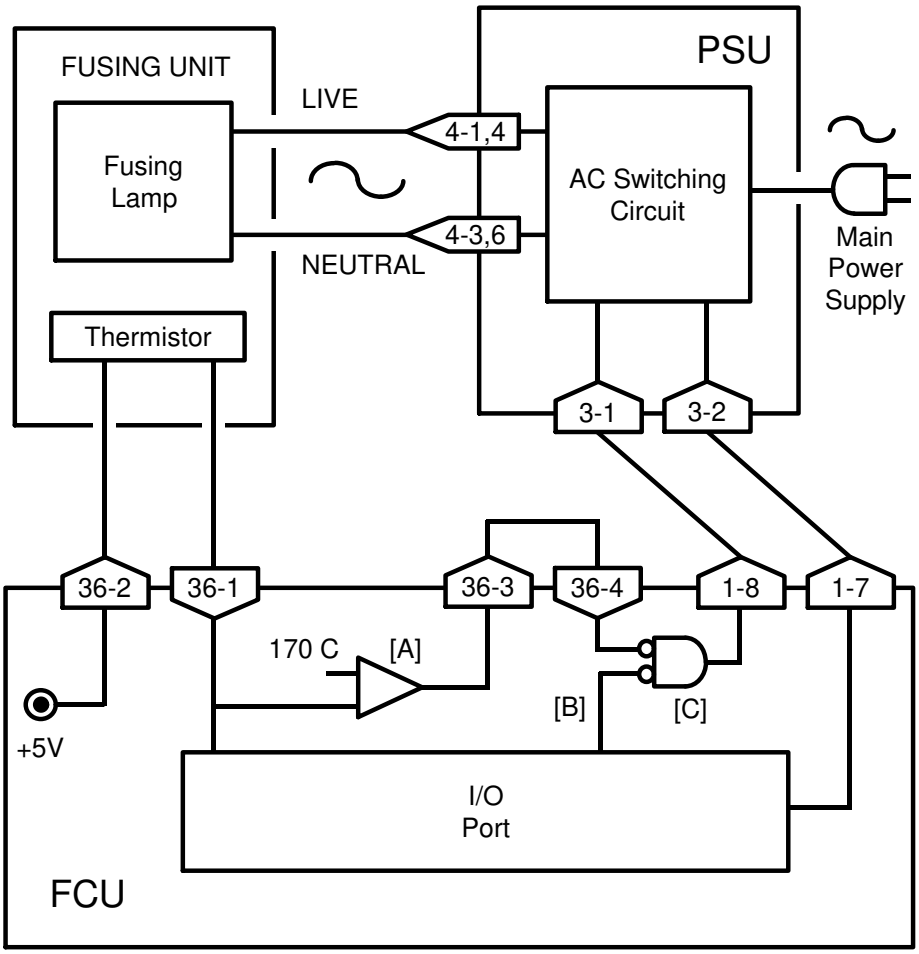
If the cpu determines that laser diode power control has failed, it sends CN9-5 to low, which disables the laser diode.

Service Note

If one of the following occurs, the printer will be disabled, and an Auto Service Call will be sent to the service station (the message will be LD POWER CONTROL FAILURE).

- If there is no response to laser power control (the cpu sends CN9-5 low).
- If the laser diode power supply (+5VLD) is cut.

2. Fusing Unit



The circuit shown in the above diagram controls the fusing unit.

- The I/O Port monitors the fusing unit temperature at CN36-1.
- The signal at CN36-4 (from the comparator [A]) remains low if the fusing unit temperature is below 170 °C.
- The I/O Port switches the fusing unit on/off using signal [B].
- If the thermistor is accidentally disconnected, the link between CN36-3 and CN36-4 will also be broken. When the cpu detects this, an Auto Service Call will be sent.

Standby mode

- If the fusing lamp is below 65 °C, the I/O Port sends signal [B] low, which makes CN1-8 go high. This switches on the fusing lamp.
- If the fusing lamp goes above 65 °C, [B] goes high, and CN1-8 goes low, which switches off the fusing lamp.

Continued on the next page

Printing

- When a ringing signal is detected, CN1-8 goes high, to switch on the fusing lamp. Also, the ozone fan switches on.
- During printing, the temperature is kept at 170 °C. If the temperature rises above 170 °C, the output from the comparator changes state. CN36-4 goes high, while [B] remains low. This causes CN1-8 to go low, which switches off the fusing lamp.
- If the comparator fails, there are additional safety cutoffs at 220 °C (thermistor) and at 400 °C (thermostat).

After printing

- When the fusing lamp temperature falls back below 130 °C, the ozone fan switches off.

Service Note

When one of the following error conditions occurs, the I/O Port switches off the fusing lamp by raising CN1-7 to high. The printer will be disabled, and an Auto Service Call will be sent to the service station (the message will be HOT ROLLER DOWN).

Standby mode
- If the fusing lamp takes more than 30 s to reach 65 °C

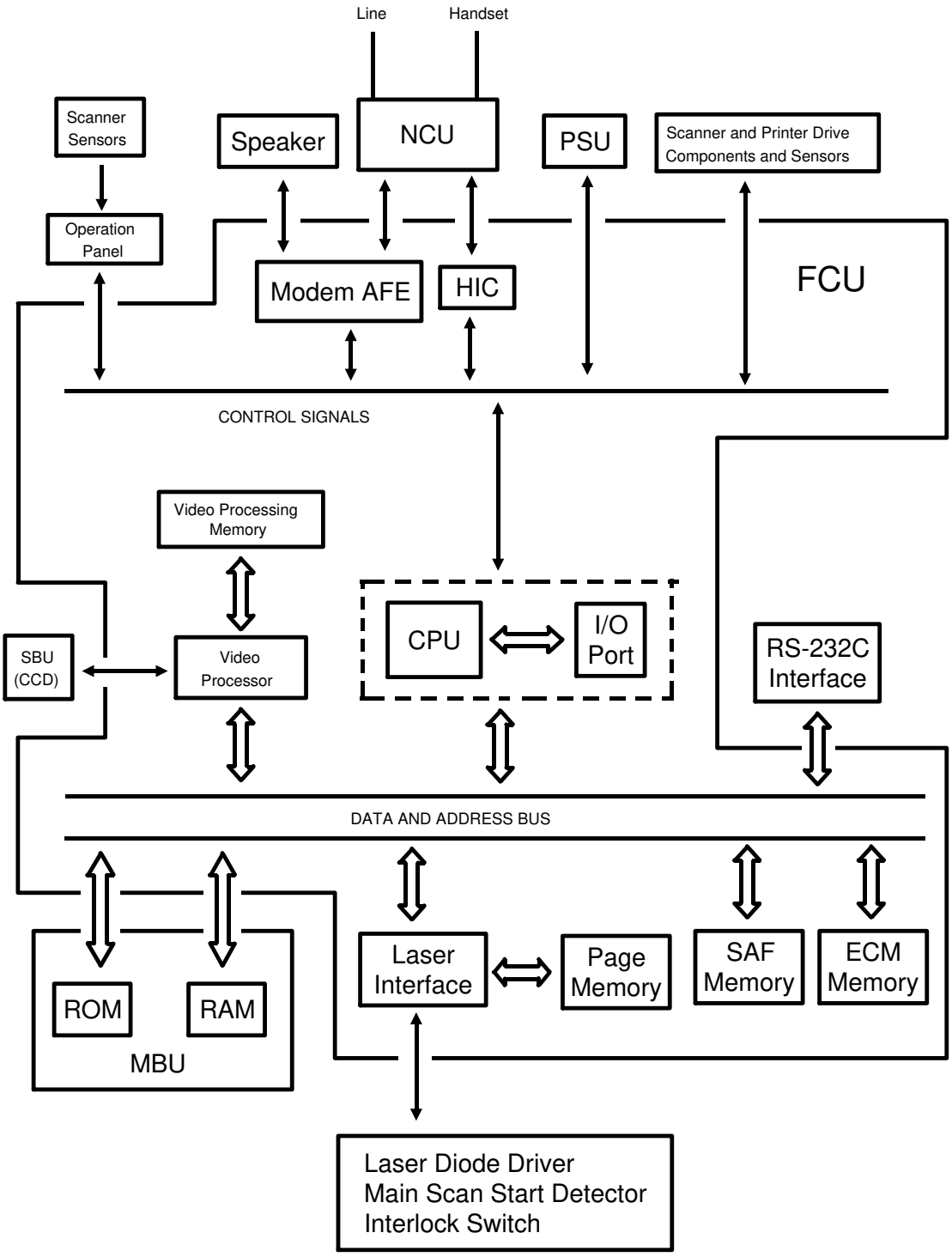
During printing
- If the fusing lamp takes more than 40 s to rise to 130 °C from 65 °C
- If the fusing lamp stays above 170 °C for more than 5 s

After printing
- If the fusing lamp takes more than 10 minutes to fall back to 130 °C

At any time
- If the fusing lamp temperature reaches 220 °C
- If the thermistor is accidentally disconnected (see the previous page for details)

2.3. PCBs AND THEIR FUNCTIONS

2.3.1. FCU



1. CPU (AFSP)

- 65C02 compatible microprocessor
- Interrupt control
- DMA control
- Data compression and reconstruction (high speed MH coding for 4.5-second scanning)
- Modem (digital operations)
- Real time clock (battery backed-up)
- Memory control
- Control of all mechanisms (directly or through other chips)
- NCU control (through the I/O Port)

2. I/O Port (LIOP)

- Clock control
- Sensor monitoring (including A/D conversion where necessary)
- Tone detection
- Motor drive
- Operation panel control
- Laser Interface control

3. Laser Interface (LIF)

- Page memory control
- Laser diode control
- Smoothing

4. Modem Analog Front End (Modem AFE)

- Modem (analog operations)
- Attenuation

5. Video Processor (VPP)

- Analog/digital video signal processing

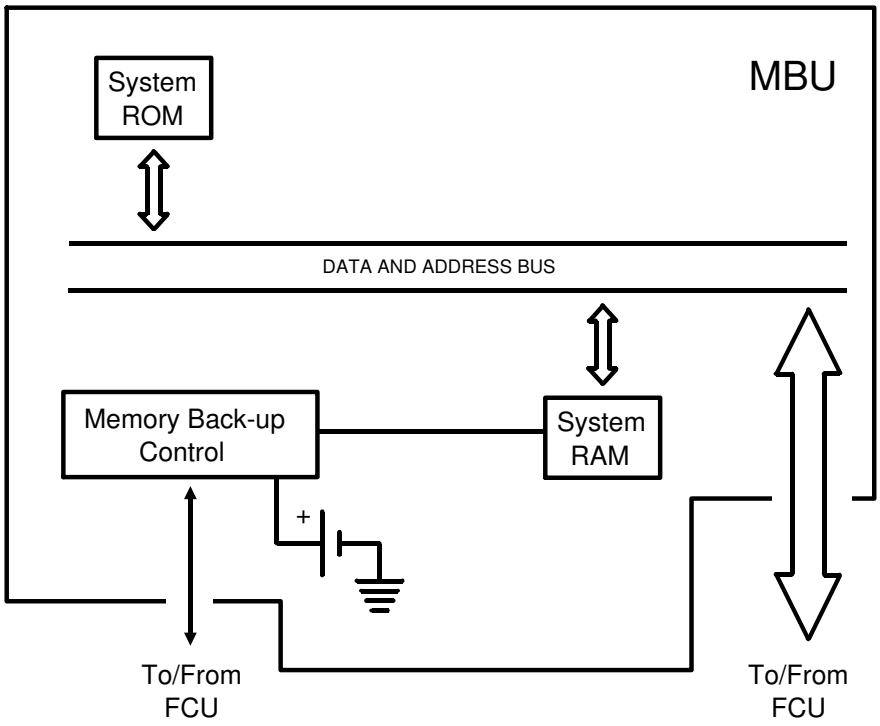
6. Hybrid IC (HIC)

- Filters

7. RAM

- 128k for ECM (no back-up)
- 256k SAF memory (with battery back-up)
- 576k page memory

2.3.2. MBU



1. System ROM

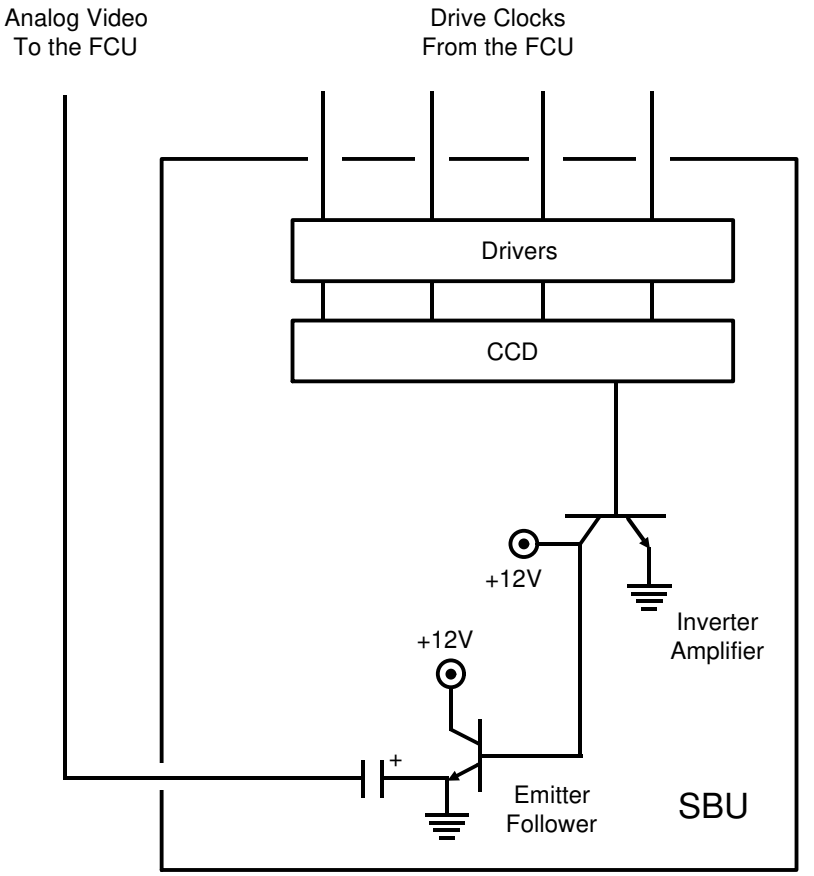
- Contains the software to run the machine

2. System RAM

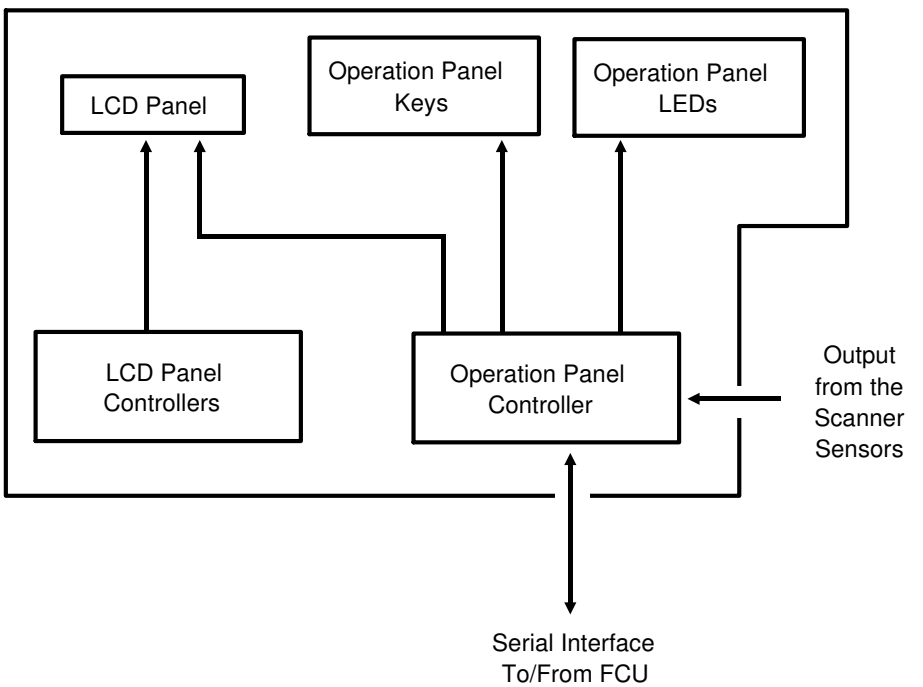
- 32k SRAM and 32k PSRAM for parameter storage, line buffer, FIFO, SAF memory administration

The SRAM is backed up by the battery on the MBU.

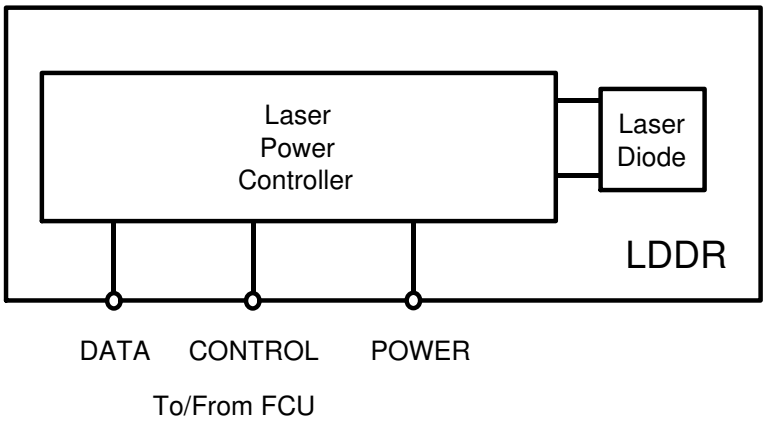
2.3.3. SBU



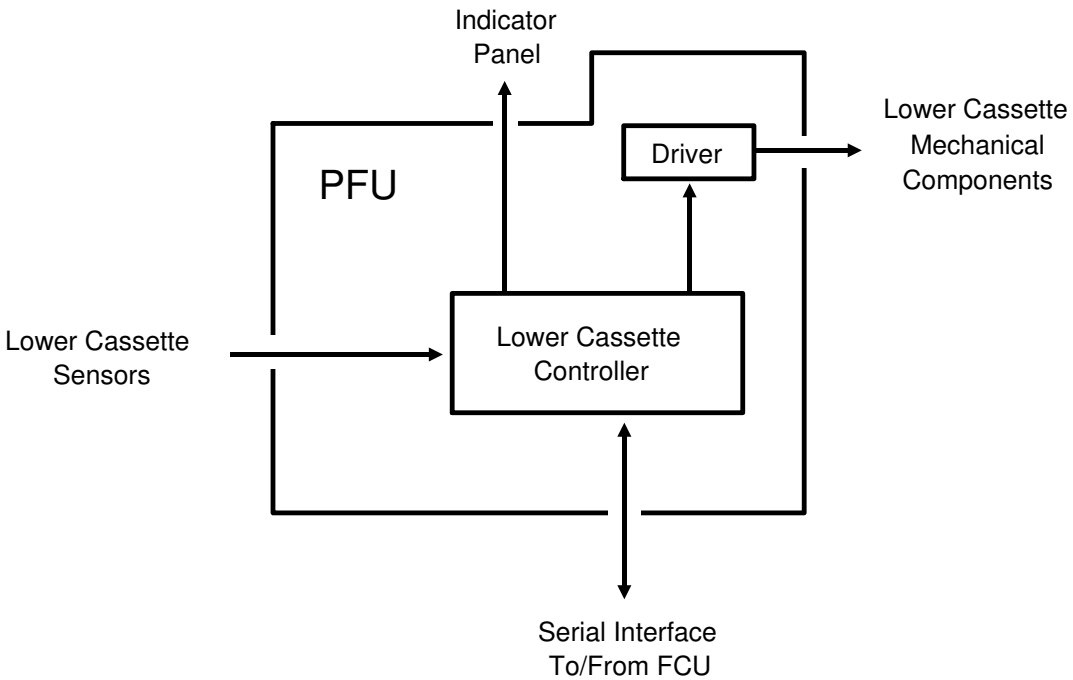
2.3.4. OPU



2.3.5. LDDR

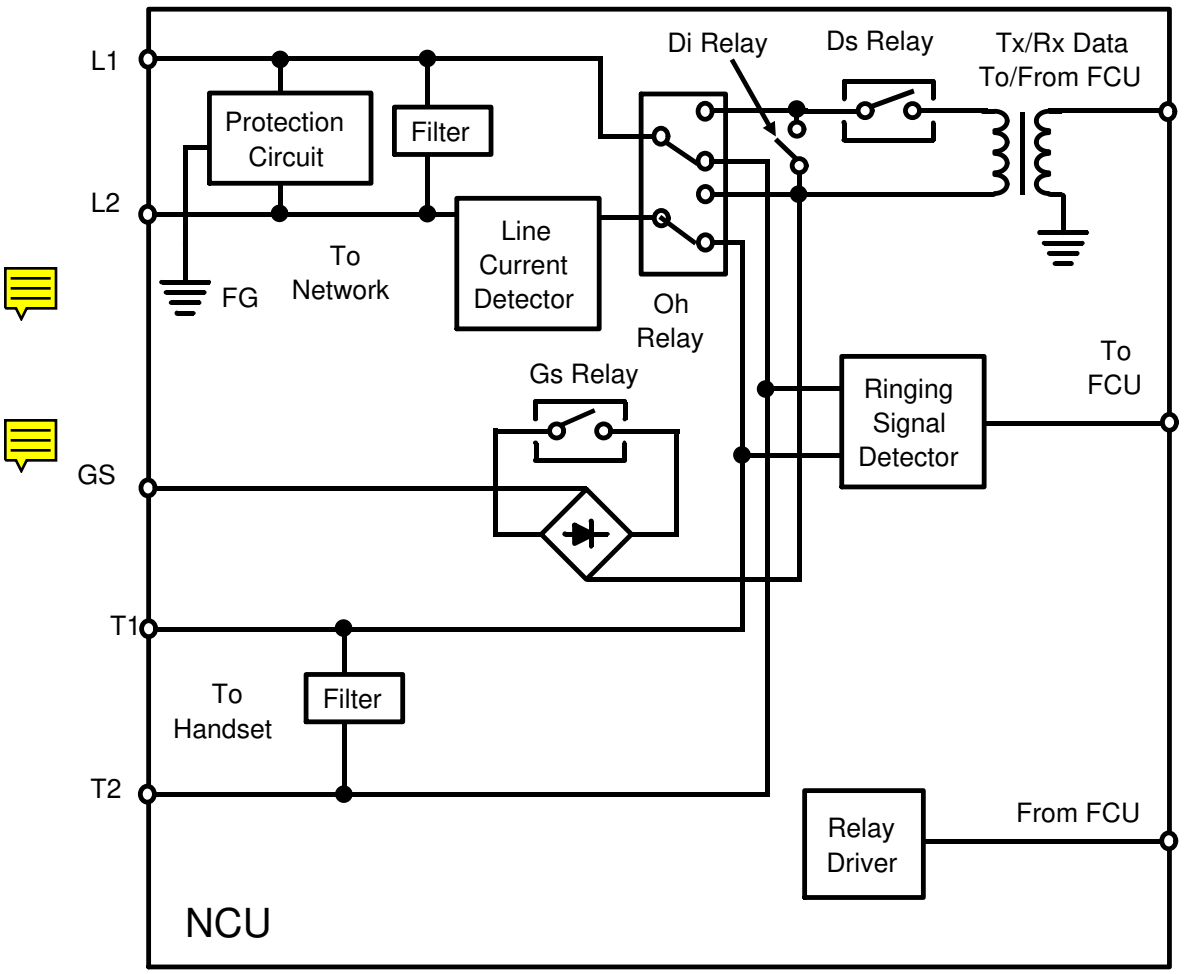


2.3.6. PFU



2.3.7. NCU

1. PCB Block Diagram



- For simplification, relay drive signals and detector outputs to/from the FCU are not shown on this diagram.
- In the above diagram, the relays are shown in the standby position for Auto Receive (Fax) Mode.

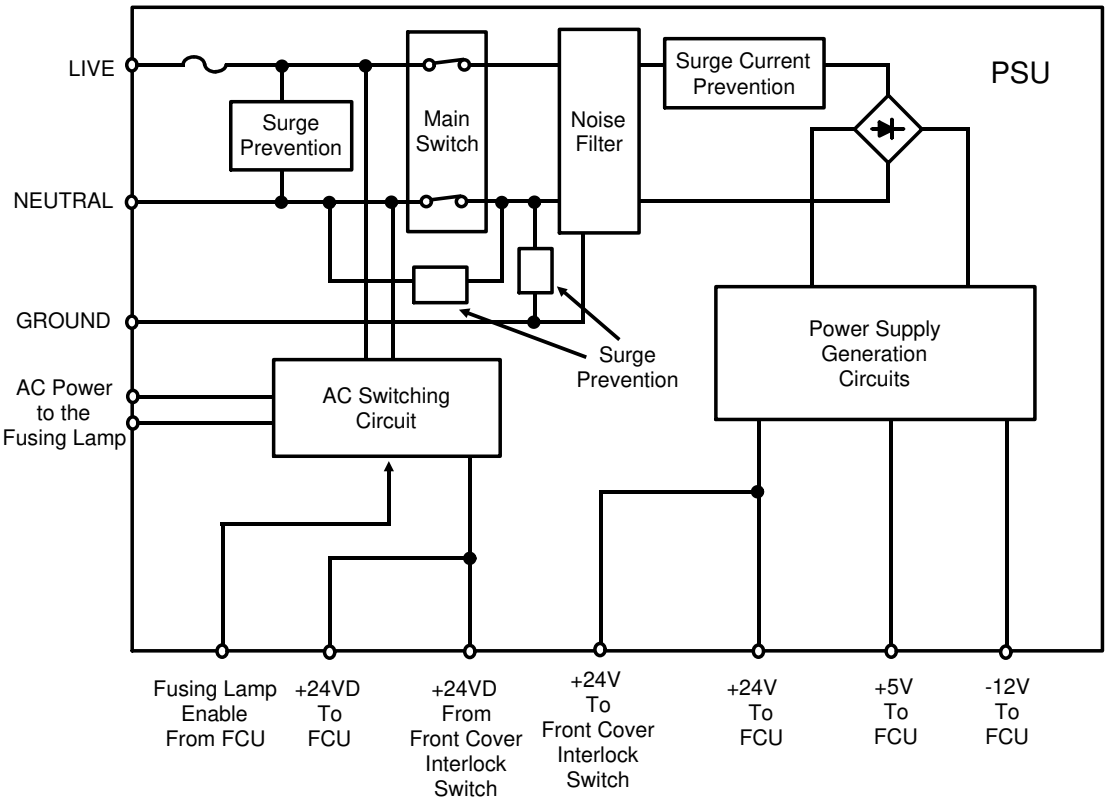
2. Signal and Jumper Settings

The following table shows the jumper positions for each country, and the status of the relay control signals (CN3-A7, B7, and A8). The country is selected by the Country Code for NCU Parameters (NCU Parameter 00; use Function 96).

	Standby Mode			After Ringing Detection			Jumpers						
	CN3-A7	CN3-B7	CN3-A8	CN3-A7	CN3-B7	CN3-A8	TB1 & 2	TB 3	TB 8	TB 4	TB 5	TB 6	JP 1
Germany	X	X	X	O	O	X	O	X	X	X	X	X	X
UK	X	O	X	O	O	X	O	X	X	X	X	X	X
Italy	O	O	X	O	O	X	O	X	X	X	X	X	X
Austria	O	O	X	X	X	X	O	X	X	O	X	X	X
Belgium	O	O	X	X	X	X	O	X	X	X	X	X	X
Denmark	O	O	X	X	X	X	O	X	X	X	X	O	X
Finland	O	O	O	O	O	X	O	X	X	X	X	X	X
Ireland	O	O	X	X	X	O	O	X	X	X	X	X	X
Norway	X	O	X	X	X	O	O	X	X	X	X	X	O
Sweden	X	X	X	X	X	X	O	X	X	X	X	X	X
Switz.	X	O	X	X	X	X	O	O	O	X	X	X	X
Portugal	O	O	X	X	X	X	O	X	X	X	X	O	X
Holland	O	O	X	X	X	O	O	X	X	X	O	X	X
Hg Kong	X	O	X	O	O	X	O	X	X	X	X	X	X
S. Africa	O	O	O	O	O	X	O	X	X	X	X	X	X
Australia	X	O	X	O	O	X	O	X	X	X	X	X	X
N. Z'land	X	O	X	O	O	X	O	X	X	X	X	X	X
Israel	O	O	X	O	O	X	O	X	X	X	X	X	X
Spain	O	O	X	X	X	X	O	X	X	X	X	O	X
Singapore	O	O	X	O	O	X	O	X	X	X	X	X	X
Malaysia	X	O	X	O	O	X	O	X	X	X	X	X	X

Key
Signal Status: O = High, X = Low
Jumper Settings: O = Closed, X = Open

2.3.8. PSU



Overheat Protection in the PSU

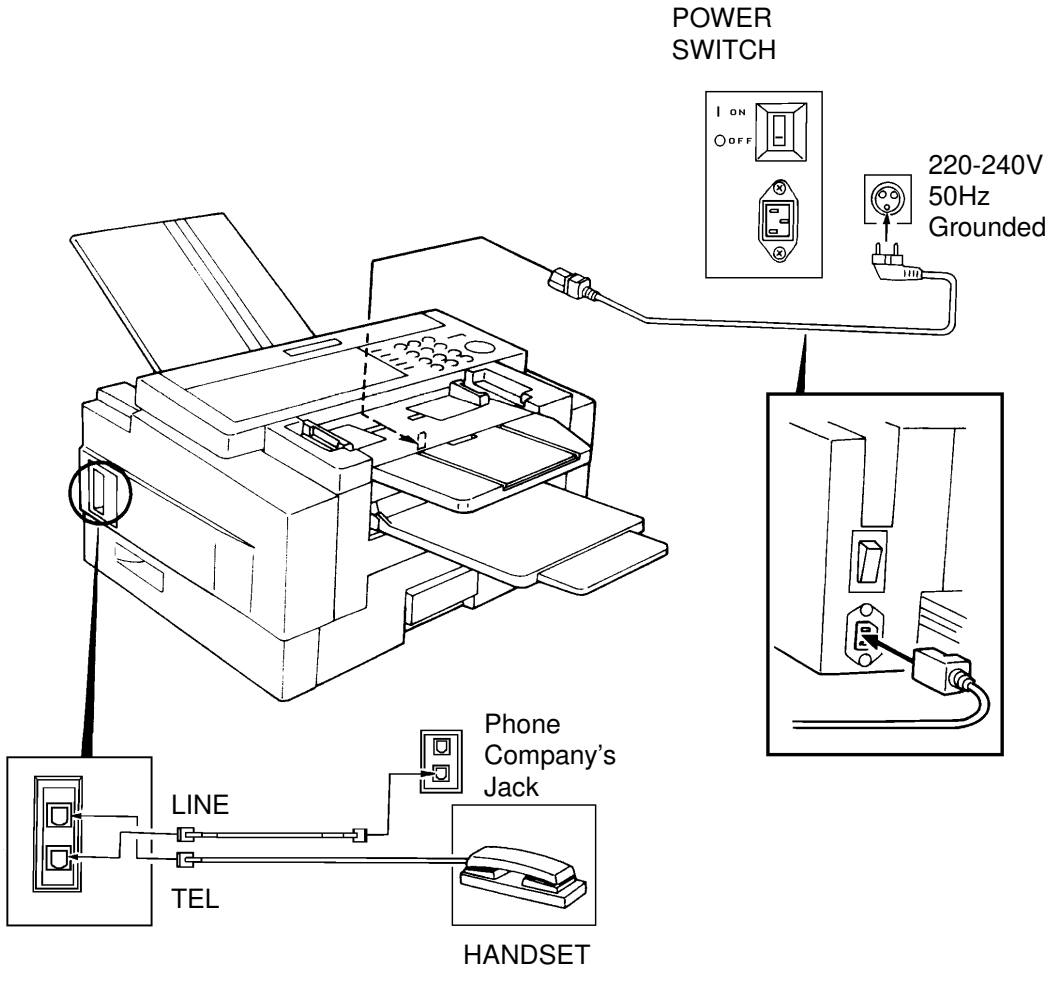
If the PSU thermistor temperature exceeds about 100 °C, the power supply outputs from the PSU are disabled.

If this happens:

1. Switch off the machine.
2. Take out the PSU and examine it for damage. Take care because it may be hot.
3. Put back the PSU and switch the machine on. If the machine does not operate, change the PSU.

3. INSTALLATION

3.1. CONNECTING UP THE MACHINE



Installation Procedure

1. Install the master unit. (refer to the Installation Manual)

2. Install the toner cartrige. (refer to the Installation procedure on the carton box)

3. Install the handset and connect the line. (refer to next page)

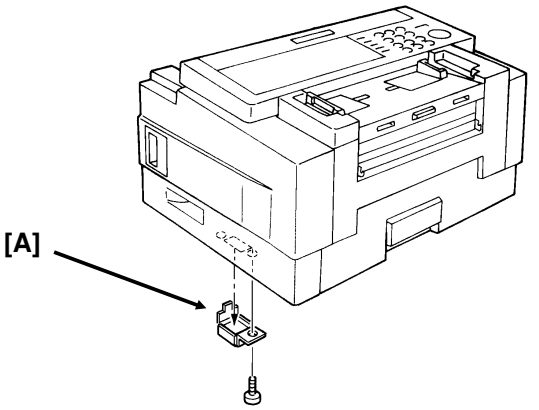
4. Install the paper cassette. (refer to the Operator’s Manual)

5. Attach the trays and document table.

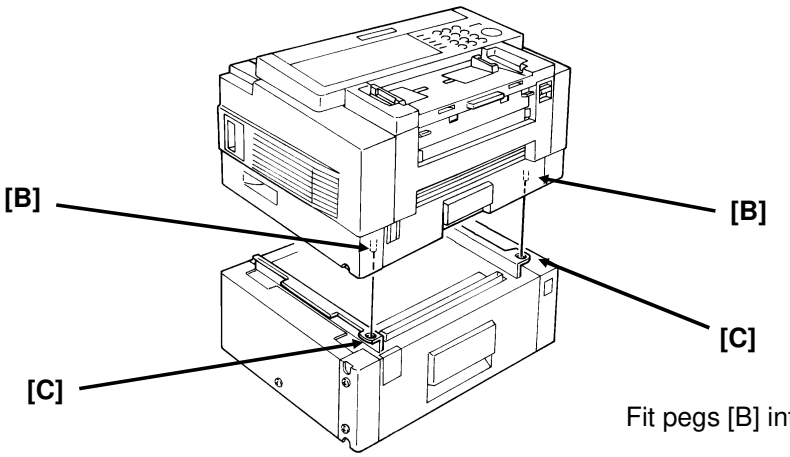
3.2. INSTALLING OPTIONAL UNITS

3.2.1. Lower Cassette

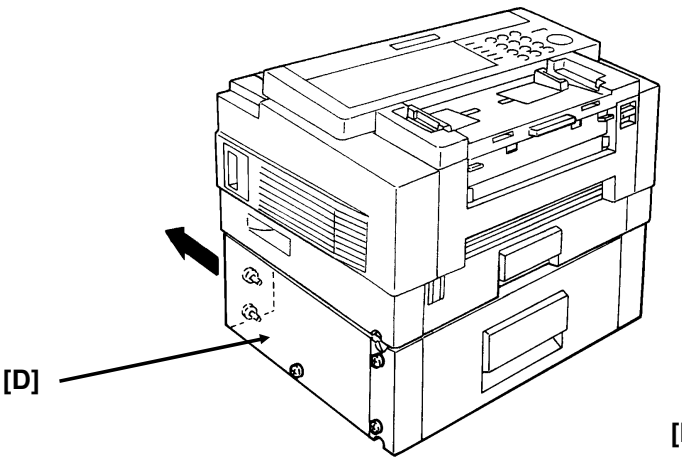
Check whether there are any messages in the memory. If there are, you must install the lower cassette and turn the power back on within an hour.



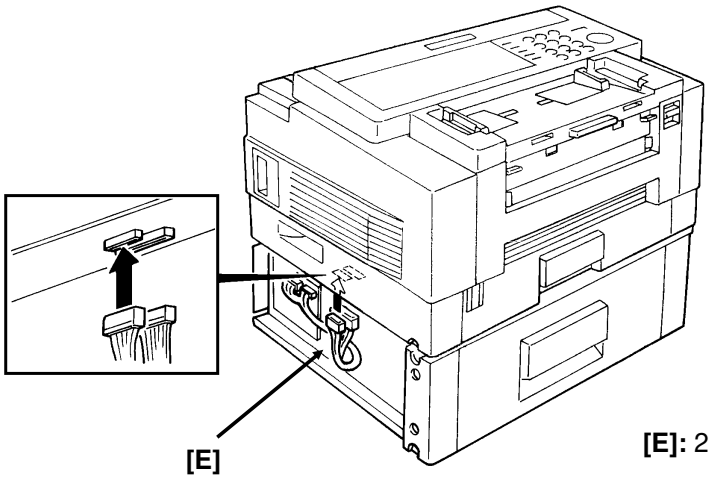
[A]: 1 screw



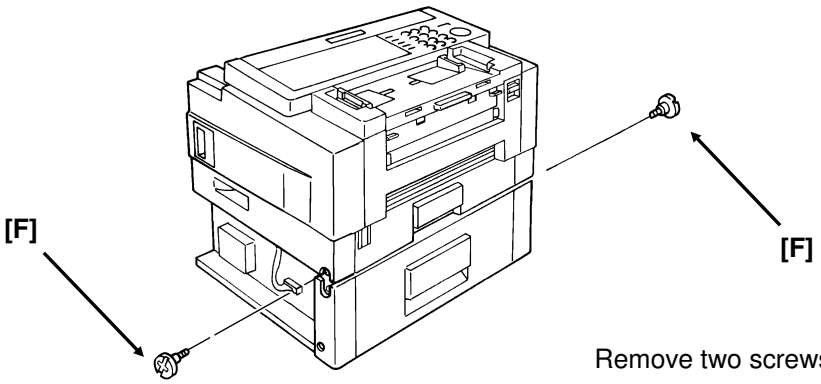
Fit pegs [B] into holes [C].



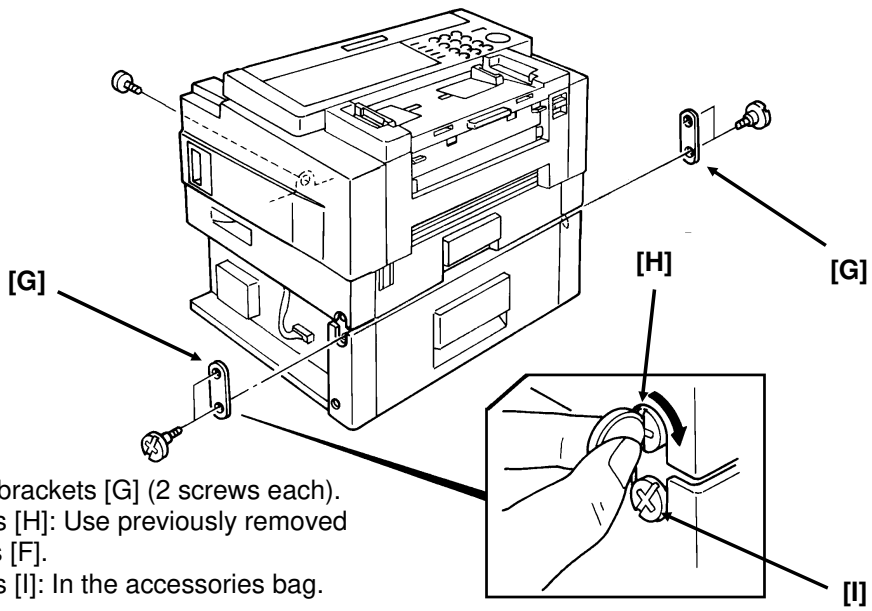
[D]: 5 screws



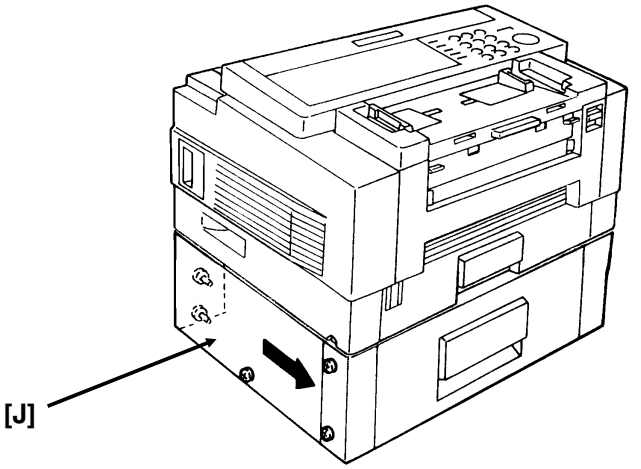
[E]: 2 connectors

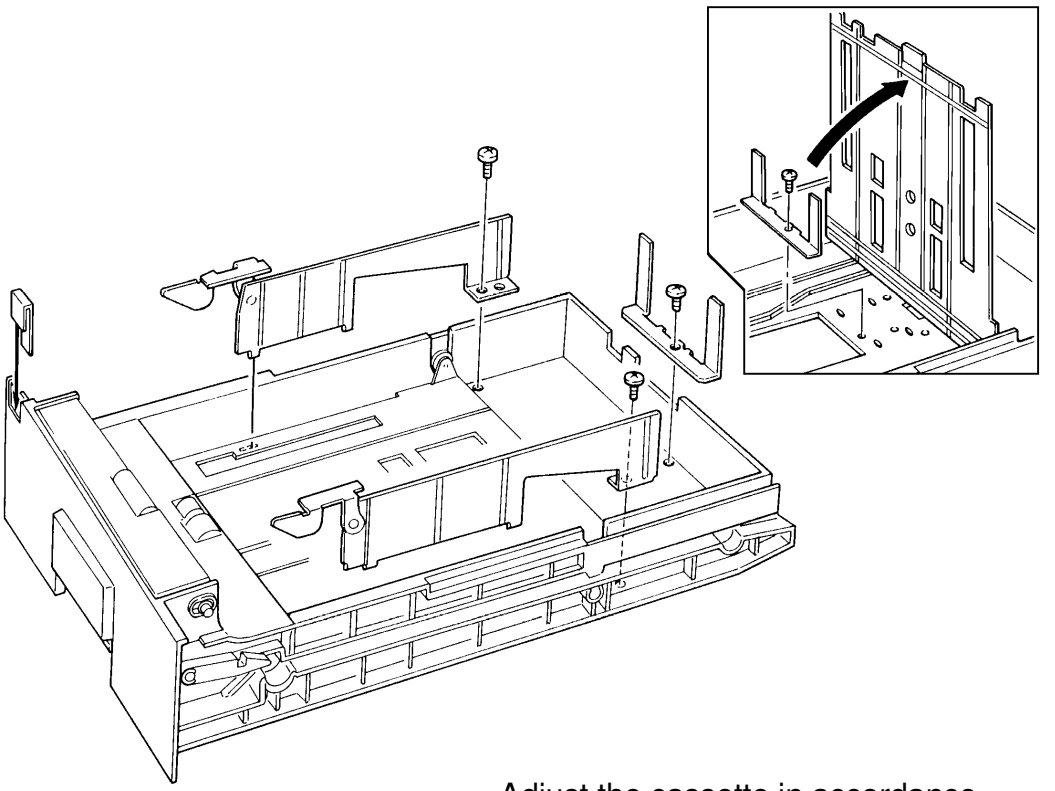


Remove two screws [F].



Install brackets [G] (2 screws each).
Screws [H]: Use previously removed screws [F].
Screws [I]: In the accessories bag.

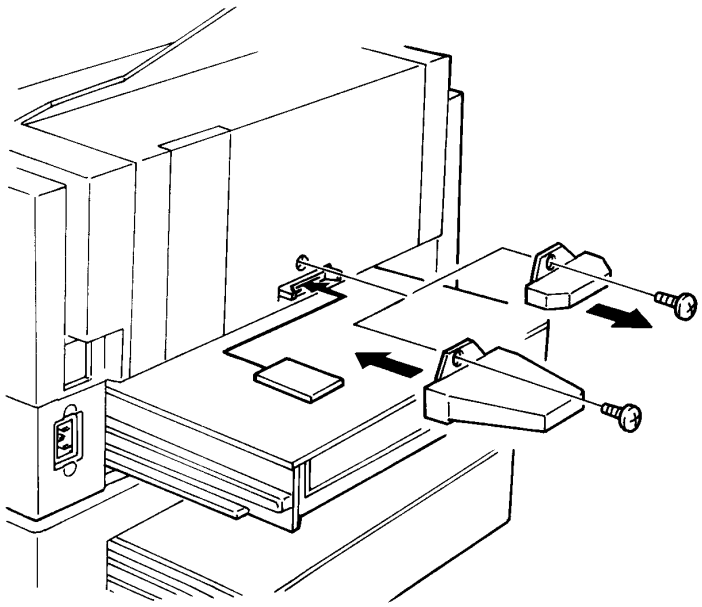




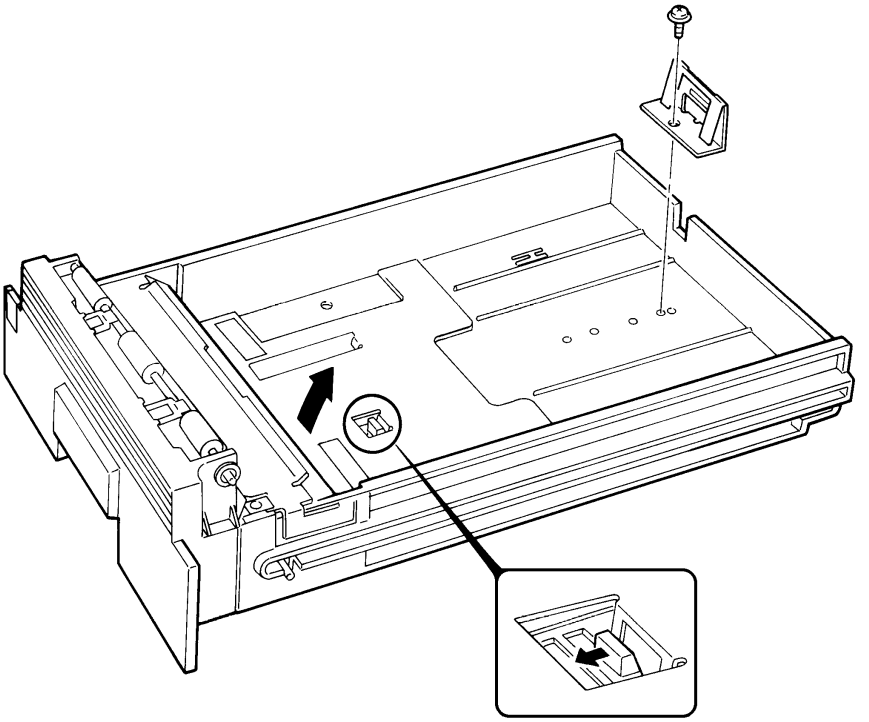
Adjust the cassette in accordance with customer requirements.

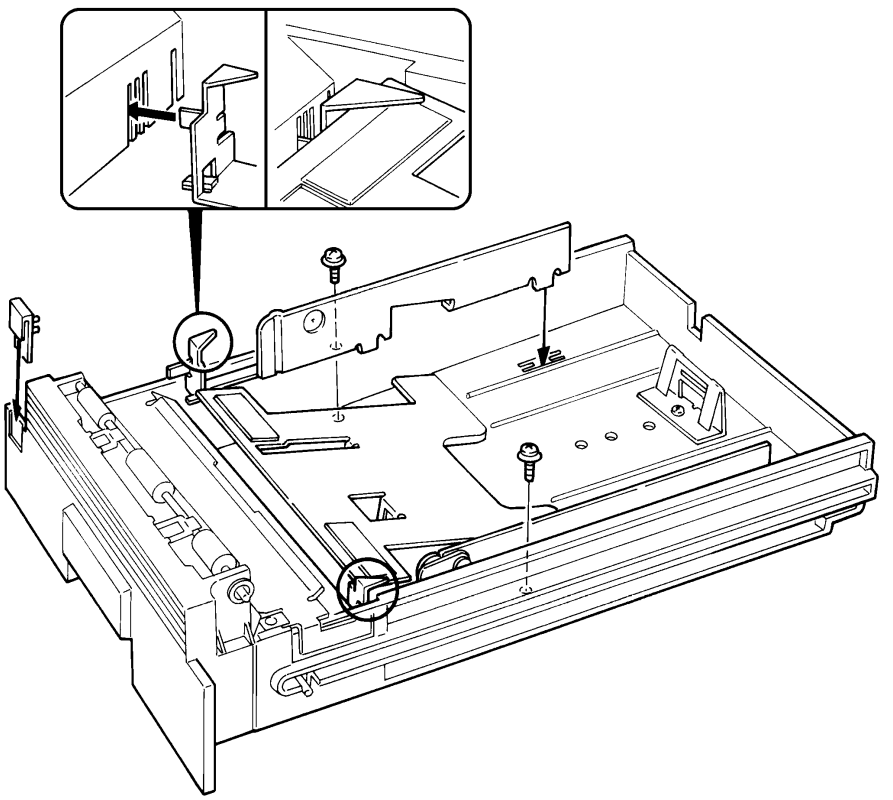
3.2.2. Memory Card

- Turn off the power before installing or removing a memory card.
- Make sure that 100% is displayed on the operation panel before installing or removing a memory card, or data may be lost.

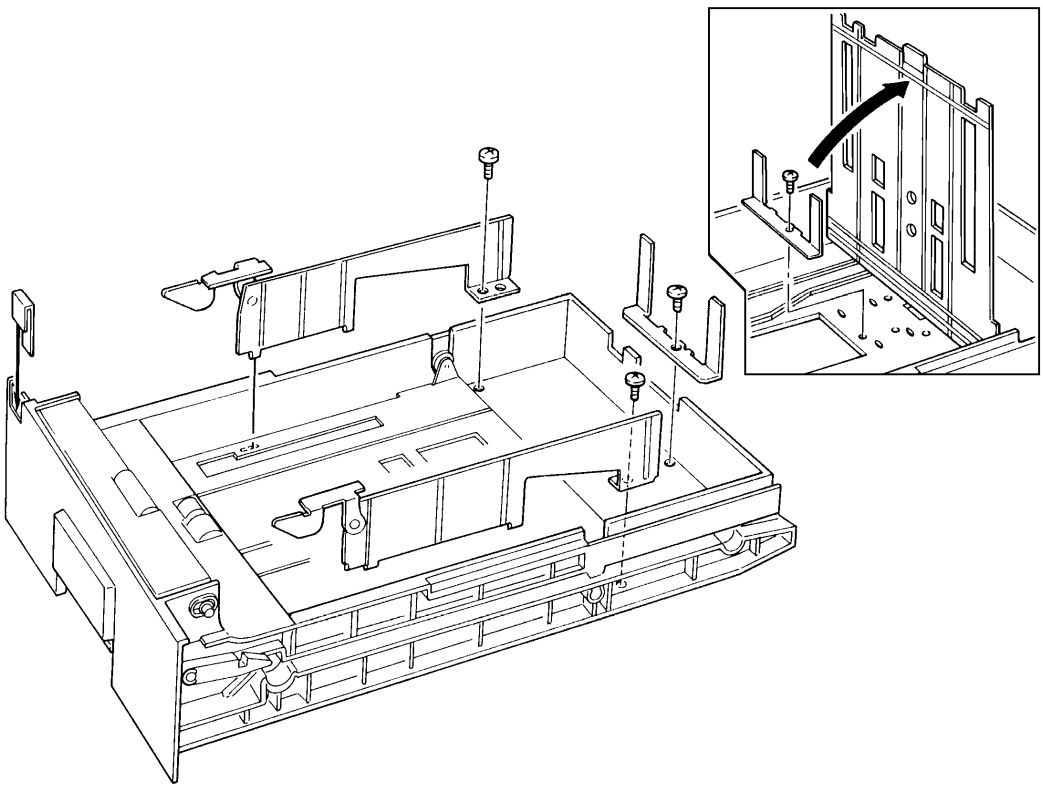


3.2.3. Cassette (250 Sheets)

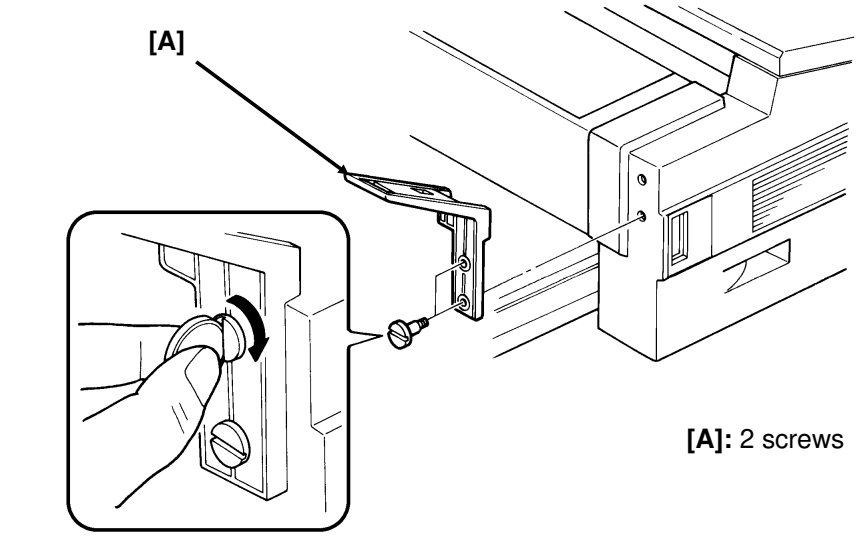




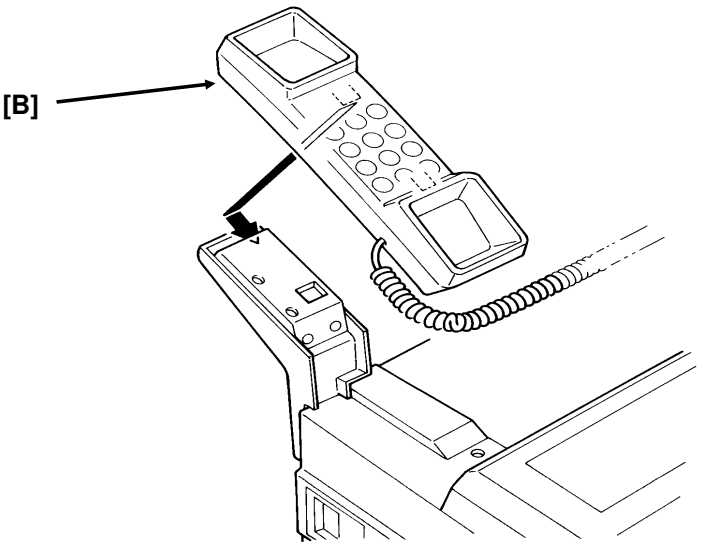
3.2.4. Cassette (500 Sheets)

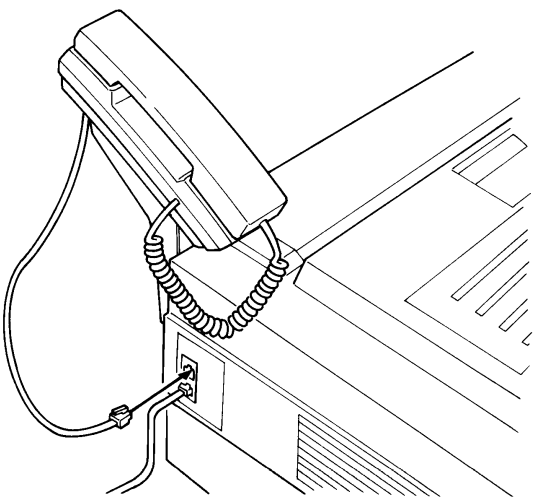


3.2.5. Handset



[A]: 2 screws





3.2.6. Language ROM Selection

The standard ROM contains the following languages: English, German, Italian, Swedish, Spanish. The user can select one of these languages with a user programming function.

If the user wishes to use French, install the French language ROM. This ROM contains the following languages: English, German, Italian, Swedish, French. In the same way as for the standard ROM, the user can select one of these languages with a user programming function.

Note:
- Switch the machine off before changing the ROM.
- Make sure that there are no messages in the memory before you change the ROM, or data will be lost.

3.3. INITIAL PROGRAMMING

Check the following:

- Are the country codes for NCU parameters (Function 96, parameter 00) and bit switch settings (bit switch 0F) correct for the country of installation?
- Are the NCU jumper settings correct for the country of installation (see section 2-3-7)?
- Do any bit switch or other settings have to be changed to match line conditions or user requirements?
- Have the correct operation panel decals and Quick Dial sheets been installed from the language kit?
- Have you programmed the serial number (Function 98, section 4-1-18)?

In some countries, the user cannot program the following items, so program them before you leave the machine.

- Telephone Line Type (Function 71, section 4-1-23)
- CSI (Function 53, section 4-1-22)

The user should program the following items after installation:

- Telephone Line Type (in some countries, this is not a user adjustment)
- RTI, TTI, and CSI (in some countries, CSI is not a user adjustment)
- ID Codes (ID Code, Remote ID, Confidential ID, Memory Lock ID)
- The fax machine's own telephone number
- Date and Time
- Language Selection

4. SERVICE TABLES AND PROCEDURES

4.1. SERVICE LEVEL FUNCTIONS

4.1.1. Bit Switch Programming (Function 91)

1. **Function** **5** **1** **9** **9** **1**
   then immediately **Yes**

```
FUNCTION              Y/▽
9 SERVICE FUNCTIONS
```

2. **9** **1** **Yes**

```
DEFAULT:   0000 0000
BITSW 00:  0000 0000
```

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

3. Increment bit switch: **#**

   Decrement bit switch: *

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

```
DEFAULT:   0000 0000
BITSW03:   0000 0000
```

4. Adjust the bit switch.
   Example: To change the value of bit 7, press **7**

```
DEFAULT:   0000 0000
BITSW03:   1000 0000
```

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

4

4.1.2. System Parameter List (Function 92)

1. **Function** **5** **1** **9** **9** **1**
   then immediately **Yes**

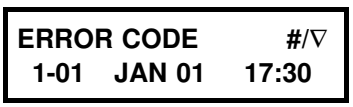
2. **9** **2** **Yes** **Start**

   After printing, press **Function**

4.1.3. Error Code Display (Function 93)

1. **Function** **5** **1** **9** **9** **1**
   then immediately **Yes**

2. **9** **3** **Yes**



3. Either:

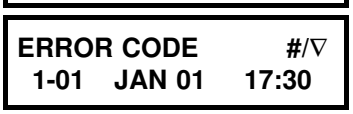
   Scroll through the error codes - **#**

   Finish - **Function**

4.1.4. Service Monitor (Function 93)

1. **Function** **5** **1** **9** **9** **1**
   then immediately **Yes**

2. **9** **3** **Yes**



3. **No/▽** **Start**

4.1.5. Protocol Dump (Function 94)

1. **Function** **5** **1** **9** **9** **1**
   then immediately **Yes**

2. **9** **4** **Yes**

3. **Start**

4.1.6. RAM Display/Rewrite (Function 95)

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

```
FUNCTION          Y/▽
9 SERVICE FUNCTIONS
```

2. [9] [5] [Yes]

```
                  Y/▽
DISPLAY MEMORY
```

3. [Yes]

```
ADDRESS = 2044C
DATA    = 03
```

4. Input the address that you wish to see. **Example:** Address 20202

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

```
ADDRESS = 20202
DATA = 00
```

   Note: The first digit must always be 2.

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

   Example: 80, press [8] [0]

```
ADDRESS = 20202
DATA = 80
```

   Note: If you wish to move the cursor, press [→]

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

4.1.7. RAM Dump (Function 95)

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

```
FUNCTION          Y/▽
9 SERVICE FUNCTIONS
```

2. [9] [5] [Yes]

```
                  Y/▽
DISPLAY MEMORY
```

3. [▽] [Yes]

```
MEMORY DUMP START/N
B=2, ST-0000,END-00FF
```

4. Input the bank number (B) and the start and end addresses. Max. range: 256 bytes
   Example: Start at 1200, end at 12FF.

   The value of B is always 2.

   [1] [2] [0] [0] [1] [2] [F] [F] [Start]

```
MEMORY DUMP START
B=2, ST-1200,END-12FF
```

4.1.8. NCU Parameters (Function 96)

1. **Function** **5** **1** **9** **9** **1**
   then immediately **Yes**

FUNCTION Y/▽
9 SERVICE FUNCTIONS

2. **9** **6** **Yes**

NCU PARAMETER KPAD/Y
NO.00 001

3. Scroll through the parameters - **Yes**

   Enter new values at the keypad.
   Example: Set NCU parameter 04 to 005.

   Yes **Yes** **Yes** **Yes** **0** **0** **5**

NCU PARAMETER KPAD/Y
NO.04 005

4. To finish: **Function**

Note: Parameter 00 is the Country Code, and Parameter 01 is the Tx Level (if the Tx level should be -9 dB, input 9).
Refer to section 4-3 for full details on NCU parameters.

4.1.9. ADF Test (Function 97)

1. **Function** **5** **1** **9** **9** **1**
   then immediately **Yes**

FUNCTION Y/▽
9 SERVICE FUNCTIONS

2. **9** **7** **Yes**

SCN-1 DT-2 PL-3 LD-4
MDM-5 RI-6 CK-7 SN-8

3. **1**

SCANNER TEST KPAD
ADF-1 LAMP-2

4. **1**

5. **Function** **Function**

6. Place a document in the feeder,
   then press **Copy** **Start**

4.1.10. Xenon Lamp Test (Function 97)

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

FUNCTION Y/▽ 9 SERVICE FUNCTIONS

2. [9] [7] [Yes]

SCN-1 DT-2 PL-3 LD-4 MDM-5 RI-6 CK-7 SN-8

3. [1]

SCANNER TEST KPAD ADF-1 LAMP-2

4. [2]

SCANNER LAMP TEST

The xenon lamp lights up for 5 minutes.

4.1.11. DTMF Tone Test (Function 97)

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

FUNCTION Y/▽ 9 SERVICE FUNCTIONS

2. [9] [7] [Yes]

SCN-1 DT-2 PL-3 LD-4 MDM-5 RI-6 CK-7 SN-8

3. [2]

DTMF TEST DUAL-1 SINGLE-2

4. Either:
   - Test dual tones - [1] . Go to step 5.
   - Test single tones - [2] . Go to step 8.

5. The display is as shown opposite.

DUAL TONE PRESS KEYPAD

   Press a key on the ten key pad.

   Example: [1] [Start]

6. To stop the test: [Stop]

7. Either:
   Test another tone: Go to step 5.

   Finish: [Function]

8. The display is as shown opposite.

SINGLE TONE PRESS KEYPAD

Press the required key.

697 Hz	1	852 Hz	3	1209 Hz	5	1477 Hz	7
770 Hz	2	941 Hz	4	1336 Hz	6	1633 Hz	8

Example: To test 1633 Hz, press **8** **Start**

9. To stop the test: **Stop**

10. Either:

Test another tone: Go to step 8.

Finish: **Function**

4.1.12. Printer Test Patterns (Function 97)

1. **Function** **5** **1** **9** **9** **1**
then immediately **Yes**

FUNCTION Y/▽ 9 SERVICE FUNCTIONS

2. **9** **7** **Yes**

SCN-1 DT-2 PL-3 LD-4 MDM-5 RI-6 CK-7 SN-8

3. **3**

PATTERN PRINT KPAD 1-7

4. Press a key from 1 to 7, excluding 5 and 6. (Patterns 5 and 6 are not used in this model.) A test pattern is printed.

4.1.13. Operation Panel Test (Function 97)

1. **Function** **5** **1** **9** **9** **1**
then immediately **Yes**

FUNCTION Y/▽ 9 SERVICE FUNCTIONS

2. **9** **7** **Yes**

SCN-1 DT-2 PL-3 LD-4 MDM-5 RI-6 CK-7 SN-8

3. **4**

4.1.14. Modem Test (Function 97)

1. **Function** **5** **1** **9** **9** **1**
   then immediately **Yes**

```
FUNCTION          Y/▽
9 SERVICE FUNCTIONS
```

2. **9** **7** **Yes**

```
SCN-1 DT-2 PL-3 LD-4
MDM-5 RI-6 CK-7 SN-8
```

3. **5**

```
MODEM TEST
G3-1 TONE-2
```

4. Either:

   Test G3 carrier signals - **1** . Go to step 5.

   Test frequencies - **2** . Go to step 8.

5. The display is as shown opposite.

```
9600-1  7200-2
4800-3  2400-4  300-5
```

   Press the required key.
   Example: Test the 9600 bps carrier **1** **Start**

6. To stop the test: **Stop**

7. Either:
   Test another tone: Go to step 5.

   Finish: **Function**

8. The display is as shown opposite.

```
2100-1  1100-2  800-3
   PRESS KEYPAD
```

   Press the required key.
   Example: To test 1100 Hz, press **2** **Start**

9. To stop the test: **Stop**

10. Either:
    - Test another tone: Go to step 8.
    - Finish: **Function**

4.1.15. Ringer Test (Function 97)

Not used; do not try to use this function.

4.1.16. Buzzer Test (Function 97)

1. **Function** **5** **1** **9** **9** **1**
   then immediately **Yes**

FUNCTION Y/▽ **9 SERVICE FUNCTIONS**

2. **9** **7** **Yes**

SCN-1 DT-2 PL-3 LD-4 **MDM-5 RI-6 CK-7 SN-8**

3. **7**

Press the Stop key to stop the buzzer.

4.1.17. Ozone Fan Test (Function 97)

1. **Function** **5** **1** **9** **9** **1**
   then immediately **Yes**

FUNCTION Y/▽ **9 SERVICE FUNCTIONS**

2. **9** **7** **Yes**

SCN-1 DT-2 PL-3 LD-4 **MDM-5 RI-6 CK-7 SN-8**

3. **8**

Press the Function key to stop the fan.

4.1.18. Serial Number (Function 98)

1. **Function** **5** **1** **9** **9** **1**
   then immediately **Yes**

FUNCTION Y/▽ **9 SERVICE FUNCTIONS**

2. **9** **8** **Yes**

SERIAL # KPAD ■■■■■■■■■■■■

3. Enter the machine's serial no at the keypad.

SERIAL # KPAD/Y/N **7940479186**

To correct a mistake: **No**

4. If the display is correct: **Yes**

4.1.19. Service Station Telephone Number (Function 99)

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

FUNCTION Y/▽
9 SERVICE FUNCTIONS

2. [9] [9] [Yes]

TEL NUMBER KEYPAD

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

TEL NUMBER KPAD/Y/N
2125555242

4. [Yes] [Function]

4.1.20. Bypassing Restricted Access

Use this procedure if the user has switched on Restricted Access. This enables you to use the machine without having to input a Personal Code. It is also useful if the user cannot operate the machine because they cannot remember any of the Personal Codes.

1. [2] [2] [2] [2]
2. Immediately press Quick Dial key [11]

Then operate the machine as you wish. When the machine is returned to standby mode, Restricted Access is reimposed immediately.

4.1.21. Printing all Memory Files (Function 24)

First, set bit 5 of bit switch 01 to 1.

1. [Function] [2] [4] [Yes]

FILE NO

2. Press [No/▽] [Yes] [Start] .

All files in the memory, including confidential messages, will be printed one by one. The files will not be erased.

After you have finished, set bit 5 of bit switch 01 back to 0.

Note: To erase memory files, set bit 2 of bit switch 00 to 1. All files will be erased, and some RAM addresses will also be cleared.

4.1.22. CSI Programming

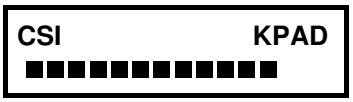
This procedure is for use in countries where CSI programming is a service function.

First, set bit 5 of bit switch 01 to 1.

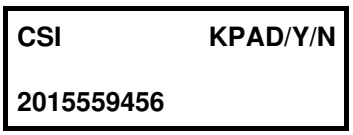
1. **Function** **5** **2** **2** **2** **2**
   5 **3** **Yes**

2. Press **No** twice.

3. Press **Yes** .



4. Input the CSI.
   Note: Not more than 20 digits.



5. Press **Yes** **Function** .

After you have finished, set bit 5 of bit switch 01 back to 0.

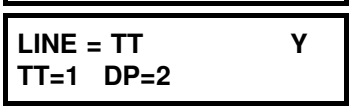
4.1.23. Telephone Line Type Selection

This procedure is for use in countries where telephone line type selection is a service function.

First, set bit 5 of bit switch 01 to 1.

1. **Function** **5** **2** **2** **2** **2**
   7 **1** **Yes**

2. Press **Yes** .



3. Either:

   Select tone dialling - **1** .

   Select pulse dialling - **2** .

   Finish: **Function**

After you have finished, set bit 5 of bit switch 01 back to 0.

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.

Bit Switch 00

	FUNCTION	COMMENTS
0	MTF process **0:** Enabled **1:** Disabled	**0:** The MTF process is used when required by the software. **1:** The MTF process is never used.
1	RAM reset level 2 **1:** Reset	When this bit is set to 1, all items stored in the RAM are reset except the clock, and then this bit changes back to 0 automatically. Also, all image files in the SAF memory are erased.
2	RAM reset level 3 **1:** Reset **Note:** RAM reset level 1 is a RAM adjustment. It is not described in this manual.	When this bit is set to 1, some items stored in the RAM are reset, then this bit changes back to 0. All items are reset except the bit switch and NCU parameter settings, clock, own tel. no., CSI, RTI, TTI, Quick Dials, Speed Dials, Groups, and the Journal memory. Also, all image files in the SAF memory are erased. This bit switch is recommended for use when it is necessary to clear the SAF, as fewer RAMs will need reprogramming.
3	Memory file forwarding **1:** Forward the files	Use this if the printer does not work, but the user wishes to print the files. First, change the fax machine's telephone number (Function 51) to the number to which you wish to forward the files, then set this bit to 1. All files in the memory will be forwarded. This bit resets to 0 automatically. However, you must return the fax machine's telephone number to the original setting. The files stay in memory.
4	Inclusion of technical data on the Journal **0:** No **1:** Yes	**1:** Instead of the personal code, the following data are listed on the Journal as a six-figure number. First two numbers: Final modem rate (for example, 96 means 9,600 bps) Second two numbers (Rx mode only): Rx signal level (Level = 0 - 0.375x, where x is the value on the report; accurate to 3 dB) Third two numbers (Rx mode only): Rx cable equalizer; 00 = Equalizer is Off, 01 = Equalizer is On
5	Monitor speaker during video data communication (tx and rx) **0:** Disabled **1:** Enabled	Used for testing. Set this bit to 1 to hear the fax data signal (phase C of CCITT T.30 protocol). Make sure that you reset this bit after testing.
6	Not used	Do not change the factory setting.

Continued on the next page

Bit Switch 00		
	FUNCTION	**COMMENTS**
7	Communication parameter display **0:** Disabled **1:** Enabled	This is a fault-finding aid. The LCD shows the key parameters (see below). This is normally disabled because it cancels the CSI display for the user. Make sure that you reset this bit after testing.

Communication parameter display

Modem rate (bps)	Sub-scan Resolution	Coding	Width and reduction	Mode	I/O Rate (ms/line)
96: 9600 72: 7200 48: 4800 24: 2400	S: 3.85 l/mm D: 7.7 l/mm F: 15.4 l/mm	1D: MH 2D: MR 1E: MH+EFC 2E: MR+EFC 1C: MH+ECM 2C: MR+ECM MC: MMR+ECM	A: A4 [8.3"] B: B4 [10.1'] C: A3 [11.7"] N: No reduction R: Reduction	DCS: CCITT G3 NSS: Non-standard G3	0M: 0 5M: 5 10M: 10 20M: 20 40M: 40

Bit Switch 01		
	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 brightness of the LCD on the operation panel.
3 **4**	Memory read/write by RDS **Bit 4 3 Setting** 0 0 Always enabled 0 1 User selectable 1 0 User selectable 1 1 Always disabled	**(0,0):** At any time, an RDS system can read or write RAM data such as TTI and bit switches. **(0,1), (1,0):** Normally, RDS systems are locked out, but the user can temporarily switch RDS on to allow an RDS operation to take place. RDS will automatically switch off again after a certain time, which is stored in a RAM address (see section 4-5). Note that, if an RDS operation takes place, RDS will not switch off until this time limit has expired. **(1,1):** All RDS systems are always locked out.
5	Dedicated transmission parameter programming/printing all SAF files **0:** Disabled **1:** Enabled	This bit must be set to 1 before attempting to program dedicated transmission parameters or printing all files stored in the SAF memory. If CSI and /or telephone line type is a service mode in your area, this bit must also be at 1 before programming.
6	Not used	Do not change the factory setting.
Continued on the next page		

Bit Switch 01		
	FUNCTION	**COMMENTS**
7	Auto Service Call for PM **0:** Enabled **1:** Disabled	**0:** The machine will send an Auto Service Call when the PM interval has expired. This interval is adjustable by RAM address. The default setting is every 30,000 copies (based on the Print counter). **1:** The user will do maintenance as explained in the Operator's Manual whenever problems occur.

Bit Switch 02		
	FUNCTION	**COMMENTS**
0	Page separation mark **0:** Enabled **1:** Disabled	**0:** 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:** No marks are printed.
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 2-2-1, subsection 5, for details.
2	Reduction of the length of received data **0:** Enabled **1:** Disabled	This bit determines whether incoming pages are reduced to fit on the copy paper if they are almost the same length as the copy paper in the cassette. See section 2-2-1, subsection 5, for details.
3 **4** **5**	Not used	Do not change the factory settings.
6 **7**	Maximum transmittable document length **Bit 7 6 Setting** 0 0 600 mm 0 1 1200 mm 1 0 14 m 1 1 100 m	If the user wants to send very long documents such as well logs, use the 14 m or 100 m setting.

Bit Switch 03		
	FUNCTION	**COMMENTS**
0	Dialling with the handset off-hook **0:** Enabled **1:** Disabled	If this bit is 1, the user will not be able to dial if the handset is off hook.
1	Lifetime of polling standby files in the memory **0:** Erased after being polled **1:** Kept until user erases	**0:** Messages stored for polling transmission will be erased immediately after polling. **1:** This setting allows the user to keep messages in the memory to be polled by more than one station.
2	Inclusion of communications on the Journal when no image data was exchanged. **0:** No **1:** Yes	If communication did not reach phase 3 of CCITT T.30 protocol (such as for a telephone call), this communication can be listed on the Journal if this bit is at 1.
3	Printing of the error code on the error report **0:** No **1:** Yes	If this bit is 1, error codes are printed on the error reports for the user.
4	Not used	Do not change the factory setting.
5	Printing the TTI in copy mode **0:** No **1:** Yes	If this bit is 1, the TTI stored in the machine is printed at the top of the copy.
6	Printing the received RTI/CSI **0:** No **1:** Yes	In addition to the TTI, the other end's RTI or CSI will be printed on top of the pages that the machine receives.
7	Reconstruction time for the first line in receive mode **0:** 6 s **1:** 10 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.

Bit Switch 04

	FUNCTION	COMMENTS
0 **1**	Compression modes available in receive mode **Bit 1 0 Modes** 0 0 MH only 0 1 MR or MH 1 0 MR or MH, with EFC 1 1 MMR, MR, or MH, with EFC	These bits determine what capabilities are informed to the transmitting side in the protocol exchange.
2	Error counting method **0:** 10 (20) [40] **1:** In accordance with the settings of bits 3 to 7	The machine counts data errors caused by a noisy line or defective machine. **0:** If the count reaches 10 (Standard mode), 20 (Detail mode), or 40 (Fine mode), the machine sends RTN to the other end in reply to the post-message command. As 10 (or 20 or 40) good lines cause the count to decrement, RTN will only occur in bad conditions.
3 **4**	Burst error threshold **Bit 4 3 Threshold** 0 0 3 (6) [12] 0 1 4 (8) [16] 1 0 5 (10) [20] 1 1 6 (12) [24]	If there are more consecutive error lines in the received page than the threshold specified by these bits, the page is rejected. Values in parenthesis are for Detail resolution, and those in square brackets are for Fine resolution.
5 **6** **7**	Error line ratio **Bit 7 6 5 Value** 0 0 0 5% 0 0 1 6% 0 1 0 7% 0 1 1 8% 1 0 0 9% 1 0 1 10%	If the number of error lines divided by the total number of lines reaches the value determined by the settings of these bits, RTN will be sent to the other end.

Bit Switch 05

	FUNCTION	COMMENTS
0 **1**	Compression modes available in transmit mode **Bit 1 0 Modes** 0 0 MH only 0 1 MR or MH 1 0 MR or MH, with EFC 1 1 MMR, MR, or MH, with EFC	These bits determine what capabilities are informed to the receiving side in the protocol exchange.
2	PABX dial tone detection **0:** Enabled **1:** Disabled	**0:** PABX dial tone is detected in accordance with the parameters programmed in RAM. The machine will wait for the dial tone before trying to gain access to the PSTN.
3	PSTN dial tone detection **0:** Enabled **1:** Disabled	**0:** PSTN dial tone is detected in accordance with the parameters programmed in RAM. The machine will wait for the dial tone before dialling out.
4	Busy tone detection **0:** Enabled **1:** Disabled	**0:** Busy tone is detected in accordance with the parameters programmed in RAM. The machine will not have to wait out the CCITT T1 time before hanging up if the line is busy.
5	Not used	Do not change the factory setting.
6 **7**	PSTN access method through PABX **Bit 7 6 Method** 0 0 No PABX 0 1 Loop Start 1 0 Ground Start 1 1 Flash Start	Set these bits to match the type of signal accepted by the PABX. If there is no PABX between the machine and the network, set both bits to 0.

Bit Switch 06

	FUNCTION	COMMENTS
0 **1** **2** **3** **4** **5** **6** **7**	PSTN access number Access No. Hex value of bit switch 0 F0 ↓ ↓ 9 F9 00 00 ↓ ↓ 99 99	Program this bit switch if the machine is behind a PABX. The access number is the number the user must dial to get an outside line. If the machine detects the access number at the start of a telephone number, it will connect with the PABX, pause for a few seconds, then dial the number. Example: If the access number for the PABX is 9, the bit switch must be F9. To do this, set all bits to 1 except bits 1 and 2. If there is no PABX, set all bits to 1.

Bit Switch 07		
	FUNCTION	**COMMENTS**
0	Back to back test **0:** Disabled **1:** Enabled	Set this bit to 1 when you wish to do a back to back test.
1	Short preamble **0:** Enabled **1:** Disabled	If this bit is 0, the Short Preamble feature is switched on.
2	Not used	Do not change the factory setting.
3	Echo countermeasure **0:** Enabled **1:** Disabled	If the setting is 1, the machine will hang up if it receives the same signal twice. If the setting is 0, the machine will ignore echoes from the line.
4	DIS detection number **0:** 1 **1:** 2	The machine will send DCS (G3 set-up signal) if it receives DIS. If echoes are frequent, setting this bit to 1 will allow the machine to wait for the second DIS before sending DCS.
5	ECM **0:** On **1:** Off	If this bit is 0, ECM is switched on.
6	Post-message response timing (rx) **0:** After feed-out **1:** When the leading edge reaches the copy feed-out sensor	**0:** Data cannot be stored in the SAF during reception if the memory is full, so, if this bit is 0, the machine will wait until the page has been fed out. However, communication will take longer to complete. **1:** The post message response is sent earlier, but the paper has not been fed out yet, so if there is a jam after this, data may be lost. This bit is ignored during memory reception.
7	FTZ protocol **0:** Disabled **1:** Enabled	This bit must be set to 1 in Germany.

Bit Switch 08 (Transmission)		
	FUNCTION	**COMMENTS**
0 **1** **2**	Initial Tx modem rate **Bit 2 Bit 1 Bit 0 Setting** 0 1 1 9,600 bps 0 1 0 7,200 bps 0 0 1 4,800 bps 0 0 0 2,400 bps Other settings: Not used	These bits set the initial starting modem rate for transmission. This rate may fall back to a slower rate depending on line conditions and the remote terminal's capabilities.
3 **4** **5** **6** **7**	Not used	Do not change the factory settings.

Bit Switch 09 (Transmission)		
	FUNCTION	**COMMENTS**
0	CNG signal transmission in manual transmission mode **0:** Disabled **1:** Enabled	CNG (calling tone) is normally used by auto-dial fax machines to alert a manual machine operator that an auto-transmitting machine is on the line waiting to transmit. This tone is not needed for manual operation (full number dialling).
1 **2**	Wrong connection prevention method **Bit 2 Bit 1 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 dialled telephone number. This does not work for manual dialling. **(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.
3	Closed network (transmission) **0:** Disabled **1:** Enabled	**1:** Transmission will not go ahead if the ID code of the other terminal does not match the ID code of this terminal. This feature may not be reliable when communicating with another maker's product.
4	Monitor speaker status during memory transmission **0:** Off **1:** On	If this bit is 1, the speaker will operate during memory transmission. Keep this bit at 0 if the user complains about the noise from the speaker.
5 **6** **7**	Not used	Do not change the factory settings.

Bit Switch 0A (Reception)		
	FUNCTION	**COMMENTS**
0 **1** **2**	Initial Rx modem rate **Bit 2 Bit 1 Bit 0 Setting** 0 1 1 9,600 bps 0 1 0 7,200 bps 0 0 1 4,800 bps 0 0 0 2,400 bps Other settings: Not used	The setting of these bits is used to inform the sending machine of the initial starting modem rate for the machine in receive mode. If 9,600 bps presents a problem during reception, use a lower setting.
3 **4** **5**	Not used	Do not change the factory settings.
6	Cable equalizer (rx mode) **0:** Off **1:** On	Set this bit to 1 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.
7	Not used	Do not change the factory setting.

Bit Switch 0B (Reception)

	FUNCTION	COMMENTS
0	Closed network (reception) **0:** Disabled **1:** Enabled	**1:** Reception will not go ahead if the ID code of the other terminal does not match the ID code of this terminal. This feature may not be reliable when communicating with another maker's product.
1	Training error tolerance **0:** Type 1 **1:** Type 2	This bit determines the values available with bits 2 and 3.
2 **3**	Training error tolerance **Bit 3 2 Type 1 Type 2** 0 0 15 14 0 1 10 9 1 0 2 4 1 1 0 1	Type 1 can be used anywhere. Type 2 is normally used only in Europe. If the machine detects more errors during training than the number set by these bits, training fails and the machine will send FTT. The data will be resent at a lower rate.
4	Not used	Do not change the factory settings.
5		
6		
7		

Bit Switch 0C

	FUNCTION	COMMENTS
0	European protocol requirements **0:** Disabled **1:** Enabled	Adjust these bits in accordance with the country of installation.
1	German dialling requirements **0:** Disabled **1:** Enabled	
2	Austrian dialling requirements **0:** Disabled **1:** Enabled	
3	Norwegian dialling and protocol requirements **0:** Disabled **1:** Enabled	
4	Danish dialling requirements **0:** Disabled **1:** Enabled	
5	French requirements **0:** Disabled **1:** Enabled	
6	Swiss requirements **0:** Disabled **1:** Enabled	
7	Not used	Do not change the factory setting.

Bit Switch 0D		
	FUNCTION	**COMMENTS**
0	Not used	Do not change the factory settings.
1		
2		
3		
4		
5		
6	Contents of the top line of the LCD when handset mode is in use **0:** Telephone number dialled **1:** HANDSET MODE	**0:** The telephone number being dialled is displayed. **1:** Only HANDSET MODE is displayed.
7	Not used	Do not change the factory setting.

Bit Switch 0E		
	FUNCTION	**COMMENTS**
0	Not used	Do not change the factory settings.
1		
2		
3		
4		
5	Conditions for reception **0:** Normal **1:** RTI or CSI needed	**1:** If the sending machine does not transmit an RTI or CSI, the call will be rejected, and the machine will send DCN.
6	Not used	Do not change the factory settings.
7		

Bit Switch 0F

	FUNCTION	COMMENTS
0 to 7	Country Code 00: France 10: Not used 01: Germany 11: USA 02: UK 12: Asia 03: Italy 13: Japan 04: Austria 14: Hong Kong 05: Belgium 15: South Africa 06: Denmark 16: Australia 07: Finland 17: New Zealand 08: Ireland 18: Singapore 09: Norway 19: Malaysia 0A: Sweden 0B: Switzerland 0C: Portugal 0D: Holland 0E: Spain 0F: Israel	This country code determines the factory settings of a wide range of bit switches and RAM addresses. However, it has no effect on the NCU parameter settings and communication parameter RAM addresses; these are determined by the setting of NCU parameter 00 (function 96).

Bit Switch 10

	FUNCTION	COMMENTS
0	Pulse dialling method	P=Number of pulses sent out, N=Number dialled.
1	**Bit 1 Bit 0 Setting** 0 0 Normal (P=N) 0 1 Oslo (P=10 - N) 1 0 Sweden (N+1) 1 1 Sweden (N+1)	Do not change the factory settings.
2	Not used	Do not change the factory settings.
3		
4		
5		
6		
7		

Bit switches 11 to 1F are not used.

Factory Settings

The factory settings of all the bit switches are shown below in hexadecimal code. The first digit represents bits 7 to 4, and the second digit represents bits 3 to 0.

Universal version

Switch	Setting	Switch	Setting	Switch	Setting	Switch	Setting
00	00	08	03	10	00	18	00
01	01	09	01	11	00	19	00
02	42	0A	03	12	28	1A	00
03	40	0B	02	13	00	1B	00
04	03	0C	01	14	00	1C	00
05	23	0D	00	15	00	1D	00
06	FF	0E	00	16	00	1E	01
07	06	0F	02	17	00	1F	85

Asia version

Switch	Setting	Switch	Setting	Switch	Setting	Switch	Setting
00	00	08	03	10	00	18	00
01	01	09	01	11	00	19	00
02	42	0A	03	12	28	1A	00
03	08	0B	00	13	00	1B	00
04	03	0C	00	14	00	1C	00
05	23	0D	00	15	00	1D	00
06	FF	0E	00	16	00	1E	01
07	06	0F	12	17	00	1F	85

The following tables show the changes in the factory settings for each country. The settings depend on the country code (bit switch 0F).

Note: Changes to the country code (bit switch 0F) are not included in the following tables.

Table 1: Based on the Universal version

Country	Code	Differences (switch settings given in Hex code)
France	00	Switch 0C: 21
Germany	01	Switch 02: 46, Switch 03: 41, Switch 05: 27, Switch 07: 86, Switch 0C: 03, switch 12: 28, Switch 1D: 08
UK	02	None (the settings for the Universal version are based on those required for the UK)
Italy	03	None
Austria	04	Switch 0C: 05
Belgium	05	None
Denmark	06	Switch 0C: 11
Finland	07	None
Ireland	08	None
Norway	09	Switch 0C: 09
Sweden	0A	Switch 10: 02
Switzerland	0B	Switch 0C: 41
Portugal	0C	None
Holland	0D	None
Spain	0E	None

Table 2: Based on the Asia version (Country code 12)

Country	Code	Differences (switch settings given in Hex code)
Israel	0F	None
Hong Kong	14	
South Africa	15	
Australia	16	
New Zealand	17	
Singapore	18	
Malaysia	19	

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 dialling. The factory settings for each country are also given. Most of these must be changed by RAM read/write (Function 95), but some can be changed using NCU Parameter programming (Function 96); if Function 96 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.

When using RAM read/write, you must add the bank number before the four-digit RAM address number. See section 4-1-6 for details.

Address	Function	Unit	Remarks
413B	Country code [NCU parameters only]	Hex	Function 96 (parameter 00).
413C	Line current detection time	20 ms	Line current is not detected if 413C contains FF.
413D	Line current wait time		
413E	Line current drop detect time		
413F	PSTN dial tone upper frequency limit (HIGH)	Hz (BCD)	See Note 2.
4140	PSTN dial tone upper frequency limit (LOW)		
4141	PSTN dial tone lower frequency limit (HIGH)		
4142	PSTN dial tone lower frequency limit (LOW)		
4143	PSTN dial tone detection time	20 ms	If 4143 contains FF, the machine pauses for the pause time (4147).
4144	PSTN dial tone reset time	160 ms	
4145	PSTN dial tone continuous tone time	20 ms	
4146	PSTN dial tone permissible drop time		
4147	PSTN wait interval	160 ms	
4148	Ringback tone detection time	20 ms	Detection is disabled if this contains FF.
4149	PSTN busy tone upper frequency limit (HIGH)	Hz (BCD)	If 4149 is FF, detection is disabled. See Note 2.
414A	PSTN busy tone upper frequency limit (LOW)		
414B	PSTN busy tone lower frequency limit (HIGH)		
414C	PSTN busy tone lower frequency limit (LOW)		

Address	Function	Unit	Remarks
414D	PABX dial tone upper frequency limit (HIGH)	Hz (BCD)	See Note 2.
414E	PABX dial tone upper frequency limit (LOW)		
414F	PABX dial tone lower frequency limit (HIGH)		
4150	PABX dial tone lower frequency limit (LOW)		
4151	PABX dial tone detection time	20 ms	If 4151 contains FF, the machine pauses for the pause time (4155).
4152	PABX dial tone reset time	160 ms	
4153	PABX dial tone continuous tone time	20 ms	
4154	PABX dial tone permissible drop time		
4155	PABX wait interval	160 ms	
4156	PABX ring back tone detection time	20 ms	Detection is disabled if this contains FF.
4157	PABX busy tone upper frequency limit (HIGH)	Hz (BCD)	If this is FF, detection is disabled. See Note 2.
4158	PABX busy tone upper frequency limit (LOW)		See Note 2.
4159	PABX busy tone lower frequency limit (HIGH)		
415A	PABX busy tone lower frequency limit (LOW)		
415B	Busy tone ON time: range 1	20 ms	
415C	Busy tone OFF time: range 1		
415D	Busy tone ON time: range 2		
415E	Busy tone OFF time: range 2		
415F	Busy tone ON time: range 3		
4160	Busy tone OFF time: range 3		
4161	Busy tone ON time: range 4		
4162	Busy tone OFF time: range 4		
4163	Busy tone continuous tone detection time		
4164	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 detection		

Address	Function	Unit	Remarks
4165	International dial tone upper frequency limit (HIGH)	Hz (BCD)	See Note 2.
4166	International dial tone upper frequency limit (LOW)		
4167	International dial tone lower frequency limit (HIGH)		
4168	International dial tone lower frequency limit (LOW)		
4169	International dial tone detection time	20 ms	If 4169 contains FF, the machine pauses for the pause time (416D).
416A	International dial tone reset time	160 ms	
416B	International dial tone continuous tone time	20 ms	
416C	International dial tone permissible drop time		
416D	International dial wait interval	160 ms	
416E	Country dial tone upper frequency limit (HIGH)	Hz (BCD)	See Note 2.
416F	Country dial tone upper frequency limit (LOW)		
4170	Country dial tone lower frequency limit (HIGH)		
4171	Country dial tone lower frequency limit (LOW)		
4172	Country dial tone detection time	20 ms	If 4172 contains FF, the machine pauses for the pause time (4176).
4173	Country dial tone reset time	160 ms	
4174	Country dial tone continuous tone time	20 ms	
4175	Country dial tone permissible drop time		
4176	Country dial wait interval	160 ms	
4177	Grounding time (ground start mode)	20 ms	The Gs relay is closed for this interval.
4178	Break time (flash start mode)	1 ms	The Di relay is open for this interval.
4179	International dial access code	BCD	For a code of 100: 4179 - F1 417A - 00
417A			
417B	PABX pause time	20 ms	
417C	Progress tone detection level, and cadence detection enable flags	Bit 7 Bit 6 dBm 1 1 -53 1 0 -32.5 0 1 -40.5 0 0 -29 Bits 3, 2, 1, 0 - See Note 3.	
417D	CCITT T1 time	2.56 s	

4

Address	Function	Unit	Remarks
417E	Max. number of dials per station (not using memory)	1	
417F	Redial interval (not using memory)	1 min	
4180	Interval between dialling to different stations	2.56 s	
4181	Tx level from modem	- dBm	Function 96 (parameter 01).
4182	Acceptable ringing signal frequency: range 1, upper limit	1000/ .672N (Hz). N is the value stored using Function 96.	Function 96 (parameter 02).
4183	Acceptable ringing signal frequency: range 1, lower limit		Function 96 (parameter 03).
4184	Acceptable ringing signal frequency: range 2, upper limit		Function 96 (parameter 04).
4185	Acceptable ringing signal frequency: range 2, lower limit		Function 96 (parameter 05).
4186	Number or rings until a call is detected	1	Function 96 (parameter 06).
4187	Minimum required length of the first ring	20 ms	See Note 6. Function 98 (parameter 07).
4188	Minimum required length of the second and subsequent rings		Function 96 (parameter 08).
4189	Ringing signal detection reset time	40 ms	Function 96 (parameter 09).
418A	Time between opening or closing the Ds relay and opening the Di relay	1 ms	See Notes 5 and 8. Function 96 (parameter 10).
418B	Break time for pulse dialling		See Note 5. Function 96 (parameter 11).
418C	Make time for pulse dialling		See Note 5. Function 96 (parameter 12).
418D	Time between final Di relay closure and Ds relay opening or closing		See Notes 5 and 8. Function 96 (parameter 13).
418E	Pause between dialled digits (pulse dial mode)	20 ms	See Note 5. Function 96 (parameter 14).
418F	Time waited when a pause is entered at the operation panel		Function 96 (parameter 15).
4190	DTMF tone on time	1 ms	Function 96 (parameter 16).
4191	DTMF tone off time		Function 96 (parameter 17).
4192	DTMF tone attenuation value	- dBm	Function 96 (parameter 18). See Note 7.
41B3	Max. time limit to dial a number	2.56 s	All countries: 15[H] (53.76 s)
41B4	Max. no of consecutive pauses in a telephone number	Hex	Germany: 1, Others: 250

Notes

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

2. Tone frequencies are stored in BCD in the following format.
   Examples:
   a) 380 Hz HIGH 0 3 LOW 8 0
   b) 1210 Hz HIGH 1 2 LOW 1 0

3. Italy and Belgium only

   RAM address 417C: the lower four bits have the following meaning.
   Bit 3 1: Country dial tone cadence detection enabled
   Bit 2 1: International dial tone cadence detection enabled
   Bit 1 1: PABX dial tone cadence detection enabled
   Bit 0 1: PSTN dial tone cadence detection enabled

   If bit 3 is 1, the functions of the following RAM addresses are changed.
   4172: tolerance for on or off state duration (%), coded as in 4164.
   4174: on time, hex code (unit = 10 ms)
   4175: off time, hex code (unit = 10 ms)

   If bits 2, 1, or 0 are 1, the functions of the following addresses are changed in a similar way to that described for bit 3 = 1.
   Bit 2 = 1: 4169, 416B, 416C
   Bit 1 = 1: 4151, 4153, 4154
   Bit 0 = 1: 4143, 4145, 4146

4. Belgium only

   Address 4144 for DTMF dialling is 3.04 s. This can be adjusted by RAM read/write. However, if pulse dial mode is selected, a value of 20 ms from the ROM is used, and this cannot be adjusted.

5. Pulse dial parameters (addresses 418A to 418F) are the values for 10 pps. If 20 pps is used, the machine automatically compensates.

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

7. N must be between 0 and 15. The attenuation levels are as follows.
   High frequency tone: - N dBm
   Low frequency tone: - N - 3 dBm

8. 418A: Europe - Between Ds opening and Di opening, France - Between Ds closing and Di opening
   418D: Europe - Between Ds closing and Di closing, France - Between Ds opening and Di closing

On the following pages, there are tables of factory settings for each country. To enable the factory settings for a particular nation, program the Country Code (RAM address 413B [use hex codes] or use Function 96 [input the decimal value]) to the appropriate setting. The country code also affects the NCU signal status (see section 2-3-7).

- For each RAM address, there are two columns. The left hand column shows the actual value of the parameter. The right hand column shows the value of the factory setting that is stored in the RAM. The factory settings are quoted either in hexadecimal code (the actual contents of the RAM address) if there is a H after the value in the table, or in decimal (converted from the actual hex contents of the RAM address) if there is no H after the value.
- Some RAMs must be stored using BCD; see the NCU Parameter definition table for details.
- If the table entry is blank, this means that the value is not used.

Country Code for NCU Parameters [or RAM Address 413B, in hex code]:
France: 00, Germany: 01, UK: 02, Italy: 03, Austria: 04, Belgium: 05, Denmark: 06, Finland: 07, Ireland: 08, Norway: 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], Japan: 19 [13], Australia: 22 [16]

Tx Level (RAM Address 4181): All countries 6 (- 6dB), except the UK (10 [-10dB]), USA (9[-9dB]), and Australia (12[-12dB]).

Country	413C		413D		413E		413F/4140		
France							474 Hz	04(H)	74(H)
Germany	1.1 s	55	4.1 s	205	1.06 s	53	498 Hz	04(H)	98(H)
UK/Univ									
Italy							471 Hz	04(H)	71(H)
Austria							512 Hz	05(H)	12(H)
Belgium							471 Hz	04(H)	71(H)
Denmark							512 Hz	05(H)	12(H)
Finland							536 Hz	05(H)	36(H)
Ireland	1.1 s	55	4.1 s	205	1.06 s	53	450 Hz	04(H)	50(H)
Norway							512 Hz	05(H)	12(H)
Sweden							512 Hz	05(H)	12(H)
Switz.	1.1 s	55	4.1 s	205			608 Hz	06(H)	08(H)
Portugal							450 Hz	04(H)	50(H)
Holland							563 Hz	05(H)	63(H)
Spain							480 Hz	04(H)	80(H)
Israel	1.1 s	55	4.1 s	205	1.06 s	53	498 Hz	04(H)	98(H)
USA									
Asia									
Australia							450 Hz	04(H)	50(H)

Country	4141/4142			4143		4144		4145	
France	406 Hz	04(H)	06(H)	2 s	100	12 s	75	1 s	50
Germany	370 Hz	03(H)	70(H)	2.1 s	105	20 s	125	2.1 s	105
UK									
Italy	391 Hz	03(H)	91(H)	2, 50%	21(H)	10.9 s	68	0.6 s	60
Austria	380 Hz	03(H)	80(H)	2.1 s	105	10.1 s	63	0.8 s	40
Belgium	405 Hz	04(H)	05(H)	0.6 s	30	3.04 s	19	0.6 s	30
Denmark	340 Hz	03(H)	40(H)	1.3 s	65	10.1 s	63	1.3 s	65
Finland	315 Hz	03(H)	15(H)	4.1 s	205	10.1 s	63	4.1 s	205
Ireland	200 Hz	02(H)	00(H)	2.1 s	105	10.2 s	64	2.1 s	105
Norway	340 Hz	03(H)	40(H)	1.1 s	55	20 s	125	1.1 s	55
Sweden	340 Hz	03(H)	40(H)	1.92 s	96	5.12 s	32	1.92 s	96
Switz.	338 Hz	03(H)	38(H)	1.92 s	96	10.9 s	68	1.92 s	96
Portugal	300 Hz	03(H)	00(H)	2.1 s	105	9.9 s	62	2.1 s	105
Holland	76 Hz	00(H)	76(H)	1.1 s	55	20 s	125	1.1 s	55
Spain	320 Hz	03(H)	20(H)	1.5 s	75	12.8 s	80	0.72 s	36
Israel	340 Hz	03(H)	40(H)	2.1 s	105	20 s	125	2.1 s	105
USA									
Asia									
Australia	390 Hz	03(H)	90(H)	3.0 s	150	6 s	38	2 s	100

Country	4146		4147		4148		4149/414A		
France	0.04 s	2	0 s	0			474 Hz	04 (H)	74 (H)
Germany	0.08 s	4	4 s	25			510 Hz	05 (H)	10 (H)
UK/Univ			4 s	25			430 Hz	04 (H)	30 (H)
Italy	1 s	100	4 s	25			529 Hz	05 (H)	29 (H)
Austria	0.08 s	4	4 s	25	0.1 s	5	512 Hz	05 (H)	12 (H)
Belgium	0.08 s	4	4 s	25			471 Hz	04 (H)	71 (H)
Denmark	0.08 s	4	4 s	25					
Finland	0.08 s	4	4 s	25					
Ireland	0.08 s	4	4 s	25			430 Hz	04 (H)	30 (H)
Norway	0.08 s	4	4 s	25			512 Hz	05 (H)	12 (H)
Sweden	0.04 s	2	4 s	25			512 Hz	05 (H)	12 (H)
Switz.	0.04 s	2	4 s	25	0.1 s	5	608 Hz	06 (H)	08 (H)
Portugal	0.08 s	4	4 s	25					
Holland	0.08 s	4	4 s	25			563 Hz	05 (H)	63 (H)
Spain	0.1 s	5	3.04 s	19			460 Hz	04 (H)	60 (H)
Israel	0.08 s	4	4 s	25			498 Hz	04 (H)	98 (H)
USA			2.08 s	13					
Asia			2.08 s	13					
Australia	0.02 s	1	3.04 s	19			450 Hz	04 (H)	50 (H)

Country	414B/414C			414D/414E			414F/4150		
France	406 Hz	04(H)	06(H)	900 Hz	09(H)	00(H)	300 Hz	03(H)	00(H)
Germany	350 Hz	03(H)	50(H)						
UK/Univ	360 Hz	03(H)	60(H)						
Italy	329 Hz	03(H)	29(H)	512 Hz	05(H)	12(H)	391 Hz	03(H)	91(H)
Austria	380 Hz	03(H)	80(H)						
Belgium	405 Hz	04(H)	05(H)						
Denmark									
Finland									
Ireland	370 Hz	03(H)	70(H)						
Norway	340 Hz	03(H)	40(H)						
Sweden	340 Hz	03(H)	40(H)						
Switz.	338 Hz	03(H)	38(H)	608 Hz	06(H)	08(H)	338 Hz	03(H)	38(H)
Portugal									
Holland	320 Hz	03(H)	20(H)	563 Hz	05(H)	63(H)	76 Hz	00(H)	76(H)
Spain	380 Hz	03(H)	80(H)						
Israel	370 Hz	03(H)	70(H)	563 Hz	05(H)	63(H)	370 Hz	03(H)	70(H)
USA									
Asia									
Australia	390 Hz	03(H)	90(H)	450 Hz	04(H)	50(H)	390 Hz	03(H)	90(H)

Country	4151		4152		4153		4154		4155	
France	2 s	100	12 s	75	1 s	50	40 ms	2	0 s	0
Germany									4 s	25
UK/Univ									4 s	25
Italy	2 s	100	10.1 s	63	0.18 s	9	80 ms	4	4 s	25
Austria									4 s	25
Belgium									4 s	25
Denmark									4 s	25
Finland									4 s	25
Ireland									4 s	25
Norway									4 s	25
Sweden									4 s	25
Switz.	0.8 s	40	9.9 s	62	0.8 s	40	80 ms	4	4 s	25
Portugal									4 s	25
Holland	1.1 s	55	20 s	125	1.1 s	55	80 ms	4	4 s	25
Spain									3.04 s	19
Israel	2.1 s	105	20 s	125	2.1 s	105	80 ms	4	4 s	25
USA									4 s	25
Asia									4 s	25
Australia	3 s	150	6 s	38	2 s	100	20 ms	1	3.04 s	19

Country	4156		4157/4158			4159/415A		
France								
Germany								
UK/Univ								
Italy								
Austria								
Belgium								
Denmark								
Finland								
Ireland								
Norway								
Sweden								
Switz.			608 Hz	06(H)	08(H)	338 Hz	03(H)	38(H)
Portugal								
Holland								
Spain								
Israel			563 Hz	05(H)	63(H)	370 Hz	03(H)	70(H)
USA								
Asia								
Australia			450 Hz	04(H)	50(H)	390 Hz	03(H)	90(H)

Country	415B		415C		415D		415E		415F	
France	0.5 s	25	0.5 s	25						
Germany	0.24 s	12	0.24 s	12	0.48 s	24	0.48 s	24	0.14 s	7
UK/Univ	0.38 s	19	0.38 s	19	0.4 s	20	0.34 s	17	0.22 s	11
Italy	0.2 s	10	0.2 s	10						
Austria	0.2 s	10	0.2 s	10	0.3 s	15	0.3 s	15	0.4 s	20
Belgium	0.5 s	25	0.5 s	25	0.16 s	8	0.16 s	8		
Denmark										
Finland										
Ireland	0.5 s	25	0.5 s	25	0.74 s	37	0.74 s	37	0.36 s	18
Norway	0.34 s	17	0 s	0						
Sweden	0.24 s	12	0.24 s	12	0.24 s	12	0.74 s	37		
Switz.	0.22 s	11	0.24 s	12	0.3 s	15	0.44 s	22	0.48 s	24
Portugal										
Holland	0.24 s	12	0.24 s	12	0.5 s	25	0.5 s	25		
Spain	0.16 s	8	0.16 s	8	0.16 s	8	0.16 s	8		
Israel	0.24 s	12	0.24 s	12	0.48 s	24	0.48 s	24		
USA										
Asia										
Australia	0.36 s	18	0.36 s	18	0.38 s	19	0.38 s	19	0.24 s	12

Country	4160		4161		4162		4163		4164	
France									4, 12.5	43(H)
Germany	0.48 s	24							3, 50	31(H)
UK/Univ	0.52 s	26					2 s	100	4, 12.5	43(H)
Italy									4, 50	41(H)
Austria	0.4 s	20							4, 25	42(H)
Belgium									4, 12.5	43(H)
Denmark										
Finland										
Ireland	0.36 s	18					0.7 s	35	4, 12.5	43(H)
Norway									4, 75	40(H)
Sweden									4, 12.5	43(H)
Switz.	0.6 s	30	0.16 s	8	0.6 s	30			3, 50	31(H)
Portugal										
Holland									4, 50	41(H)
Spain									4, 50	41(H)
Israel									4, 50	41(H)
USA										
Asia										
Australia	0.24 s	12	0.5 s	25	0.5 s	25			4. 50	41(H)

Country	4165/4166			4167/4168			4169	
France	474 Hz	04(H)	74(H)	406 Hz	04(H)	06(H)	2 s	100
Germany								
UK/Univ								
Italy								
Austria								
Belgium	1160Hz	11(H)	60(H)	1110Hz	11(H)	10(H)	4, 50%	41(H)
Denmark								
Finland								
Ireland								
Norway								
Sweden								
Switz.								
Portugal								
Holland	563 Hz	05(H)	63(H)	76 Hz	00(H)	76(H)	1.1 s	55
Spain	620 Hz	06(H)	20(H)	580 Hz	05(H)	80(H)	1.5 s	75
Israel								
USA								
Asia								
Australia								

Country	416A		416B		416C		416D		416E/416F
France	12 s	75	1 s	50	0.04 s	2	0	0	Only used by Sweden: 512 Hz 416E: 05(H) 416F: 12(H)
Germany							0	0	
UK/Univ							0	0	
Italy							0	0	
Austria							0	0	
Belgium	20 s	125	0.33 s	33	0.69 s	69	0	0	
Denmark							0	0	
Finland							0	0	
Ireland							0	0	
Norway							0	0	
Sweden							0	0	
Switz.							0	0	
Portugal							0	0	
Holland	20 s	125	1.1 s	55	0.08 s	4	0	0	
Spain	12.8 s	80	0.72 s	36	0.1 s	5	3.04 s	19	
Israel							0	0	
USA							0	0	
Asia							0	0	
Australia							0	0	

Country	4170/4171			4172		4173		4174	
France									
Germany									
UK/Univ									
Italy									
Austria									
Belgium									
Denmark									
Finland									
Ireland									
Norway									
Sweden	340 Hz	03(H)	40(H)	1.02 s	51	20 s	125	0.26 s	13
Switz.									
Portugal									
Holland									
Spain									
Israel									
USA									
Asia									
Australia									

Country	4175		4176		4177		4178	
France			0	0	0	0	0	0
Germany			0	0	0.3 s	15	90 ms	90
UK/Univ			0	0	0.3 s	15	90 ms	90
Italy			0	0	0.3 s	15	90 ms	90
Austria			0	0	0.3 s	15	90 ms	90
Belgium			0	0	2 s	100	90 ms	90
Denmark			0	0	0.3 s	15	90 ms	90
Finland			0	0	0.3 s	15	90 ms	90
Ireland			0	0	0.3 s	15	90 ms	90
Norway			0	0	0.5 s	25	90 ms	90
Sweden	0.08 s	4	0	0	0.3 s	15	90 ms	90
Switz.			0	0	0.3 s	15	90 ms	90
Portugal			0	0	0.3 s	15	90 ms	90
Holland			0	0	0.3 s	15	90 ms	90
Spain			0	0	2 s	100	90 ms	90
Israel			0	0	0.3 s	15	90 ms	90
USA			0	0	0	0	0	0
Asia			0	0	0	0	0	0
Australia			0	0	0	0	0	0

Country	4179/417A			417B		417C		417D	
France	19	FF(H)	19(H)			-53	C0(H)	53.8 s	21
Germany	00	FF(H)	00(H)			-53	C0(H)	53.8 s	21
UK/Univ	010	F0(H)	10(H)	1 s	50	-53	C0(H)	53.8 s	21
Italy	00	FF(H)	00(H)			-53	C1(H)	53.8 s	21
Austria	00	FF(H)	00(H)			-53	C0(H)	53.8 s	21
Belgium	00	FF(H)	00(H)			-32.5	84(H)	58.9 s	23
Denmark	009	F0(H)	09(H)			-32.5	80(H)	53.8 s	21
Finland	990	F9(H)	90(H)	2 s	100	-32.5	80(H)	53.8 s	21
Ireland	16	FF(H)	16(H)			-40.5	40(H)	53.8 s	21
Norway	095	F0(H)	95(H)			-32.5	80(H)	53.8 s	21
Sweden	009	F0(H)	09(H)			-32.5	80(H)	53.8 s	21
Switz.	00	FF(H)	00(H)			-40.5	40(H)	92.2 s	36
Portugal	00	FF(H)	00(H)			-32.5	80(H)	53.8 s	21
Holland	09	FF(H)	09(H)			-29	00(H)	53.8 s	21
Spain	07	FF(H)	07(H)			-40.5	40(H)	79.4 s	31
Israel	00	FF(H)	00(H)			-53	C0(H)	58.9 s	23
USA						-53	C0(H)	53.8 s	21
Asia						-53	C0(H)	53.8 s	21
Australia						-53	C0(H)	53.8 s	21

Country	417E		417F		4180		4182 (Hz)		4183 (Hz)	
France	5	5	5	5	7.68 s	3	53.1	28	43.8	34
Germany	4	4	2	2	12.8 s	5	64.7	23	20.7	72
UK/Univ	3	3	2	2	12.8 s	5	19.8	75	11.6	128
Italy	3	3	2	2	17.92s	7	55.1	27	12.7	117
Austria	3	3	2	2	12.8 s	5	70.9	21	40.2	37
Belgium	4	4	6	6	15.36s	6	29.8	50	13.5	110
Denmark	3	3	1	1	12.8 s	5	29.8	50	19.6	76
Finland	3	3	2	2	12.8 s	5	32.3	46	17.3	86
Ireland	3	3	2	2	12.8 s	5	27.1	55	14.4	103
Norway	3	3	2	2	12.8 s	5	64.7	23	17.3	86
Sweden	3	3	2	2	12.8 s	5	30.3	49	19.1	78
Switz.	5	5	1	1	12.8 s	5	59.5	25	19.1	78
Portugal	3	3	1	1	12.8 s	5	64.7	23	12.5	119
Holland	3	3	1	1	12.8 s	5	29.2	51	20.1	74
Spain	3	3	1	1	48.64s	19	29.2	51	19.6	76
Israel	14	14	1	1	12.8 s	5	59.5	25	11.7	127
USA	3	3	5	5	12.8 s	5	23.3	64	11.7	127
Asia	3	3	5	5	12.8 s	5	23.3	64	11.7	127
Australia	10	10	5	5	15.36s	6	73.2	21	9.7	154

Country	4184 (Hz)		4185 (Hz)		4186		4187		4188	
France					1	1	0.1 s	5	0.1 s	5
Germany					1	1	0.2 s	10	0.2 s	10
UK/Univ	49.6	30	17.3	86	1	1	0.2 s	10	0.2 s	10
Italy					2	2	0.2 s	10	0.2 s	10
Austria					1	1	0.2 s	10	0.2 s	10
Belgium					2	2	0.1 s	5	0.2 s	10
Denmark	59.5	25	40.2	37	1	1	0.2 s	10	0.2 s	10
Finland	62.0	24	19.3	77	2	2	0.5 s	25	0.5 s	25
Ireland					1	1	0.2 s	10	0.2 s	10
Norway					1	1	0.3 s	15	0.3 s	15
Sweden	55.1	27	24.0	62	1	1	0.1 s	5	0.1 s	5
Switz.					3	3	0	0	0	0
Portugal	59.5	25	40.2	37	1	1	0.2 s	10	0.2 s	10
Holland	59.5	25	40.2	37	1	1	0.2 s	10	0.2 s	10
Spain	39.2	38	19.3	77	2	2	0.2 s	10	0.2 s	10
Israel					2	2	0.1 s	5	0.1 s	5
USA	74.4	20	22.2	67	1	1	0.2 s	10	0.2 s	10
Asia	57.2	26	22.2	67	1	1	0.2 s	10	0.2 s	10
Australia					3	3	0.2 s	10	0.2 s	10

Country	4189		418A		418B		418C		418D	
France	3.8 s	95	67 ms	67	67 ms	67	33 ms	33	50 ms	50
Germany	8 s	200	53 ms	53	57 ms	57	41 ms	41	50 ms	50
UK/Univ	8 s	200	255ms	255	61 ms	61	33 ms	33	50 ms	50
Italy	8 s	200	61 ms	61	60 ms	60	40 ms	40	50 ms	50
Austria	8 s	200	53 ms	53	61 ms	61	39 ms	39	50 ms	50
Belgium	8 s	200	61 ms	61	67 ms	67	33 ms	33	50 ms	50
Denmark	8 s	200	53 ms	53	67 ms	67	33 ms	33	50 ms	50
Finland	8 s	200	61 ms	61	56 ms	56	42 ms	42	50 ms	50
Ireland	8 s	200	255ms	255	67 ms	67	33 ms	33	50 ms	50
Norway	8 s	200	61 ms	61	59 ms	59	41 ms	41	50 ms	50
Sweden	8 s	200	100ms	100	60 ms	60	40 ms	40	70 ms	70
Switz.	8 s	200	60 ms	60	60 ms	60	40 ms	40	60 ms	60
Portugal	8 s	200	61 ms	61	66 ms	66	34 ms	34	50 ms	50
Holland	8 s	200	61 ms	61	61 ms	61	39 ms	39	50 ms	50
Spain	6 s	150	75 ms	75	60 ms	60	33 ms	33	75 ms	75
Israel	8 s	200	61 ms	61	61 ms	61	39 ms	39	50 ms	50
USA	8 s	200	80 ms	80	62 ms	62	41 ms	41	80 ms	80
Asia	8 s	200	61 ms	61	66 ms	66	34 ms	34	50 ms	50
Australia	8 s	200	255ms	255	66 ms	66	34 ms	34	70 ms	70

Country	418E		418F		4190		4191		4192	
France	0.8 s	40	0	0	70 ms	70	70 ms	70	15	15
Germany	0.92 s	46	0.92 s	46	90 ms	90	90 ms	90	7	7
UK/Univ	0.54 s	27	0.66 s	33	0.1 s	100	0.1 s	100	9	9
Italy	0.8 s	40	3 s	150	70 ms	70	70 ms	70	6	6
Austria	0.88 s	44	0.92 s	46	70 ms	70	70 ms	70	6	6
Belgium	0.86 s	43	0.52 s	26	70 ms	70	70 ms	70	6	6
Denmark	0.52 s	26	0.52 s	26	90 ms	90	90 ms	90	9	9
Finland	0.8 s	40	1.2 s	60	70 ms	70	75 ms	75	9	9
Ireland	0.6 s	30	0.66 s	33	70 ms	70	70 ms	70	9	9
Norway	0.66 s	33	0.66 s	33	70 ms	70	70 ms	70	9	9
Sweden	0.8 s	40	0.52 s	26	70 ms	70	70 ms	70	9	9
Switz.	0.52 s	26	0	0	70 ms	70	70 ms	70	6	6
Portugal	0.66 s	33	0.66 s	33	70 ms	70	70 ms	70	9	9
Holland	0.66 s	33	0.66 s	33	70 ms	70	70 ms	70	9	9
Spain	0.64 s	32	2 s	100	70 ms	70	0.14 s	140	6	6
Israel	0.92 s	46	2.02 s	101	90 ms	90	90 ms	90	6	6
USA	0.8 s	40	2.02 s	101	0.1 s	100	0.1 s	100	8	8
Asia	0.72 s	36	2.02 s	101	0.1 s	100	0.11 s	110	6	6
Australia	0.8 s	40	2.02 s	101	0.1 s	100	0.11 s	110	10	10

Additional NCU Parameters

V.21 detection level (RAM Address 4193, hex code):
All countries 73(H), except Germany, which is 7B(H).

Rx data detection level (RAM Address 4194, hex code):
All countries 73(H), except Germany, which is 7B(H).

800 Hz tx level (RAM Address 4195/4196, hex code):
All countries 31BF(H), except Germany, which is 2641(H).

1100 Hz tx level (RAM Address 4197/4198, hex code):
All countries 31BF(H), except Germany, which is 2917(H).

2100 Hz tx level (RAM Address 4199/419A, hex code):
All countries 31BF(H), except Germany, which is 3774(H).

4.4. DEDICATED TRANSMISSION PARAMETERS

Each Quick Dial Key and Speed Dial Code has three 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 three bytes will be described.

4.4.1. Programming Procedure

1. Set bit 5 of bit switch 01 to 1.
2. Either use Function 32 (for a Quick Dial number) or Function 33 (for a Speed Dial number)

   Example: Change the Parameters in Quick Dial 10.

3. [Function] [3] [2] [Yes]

   ```
   QUICK ■      QUICK/▽
   PRINT LIST ▽
   ```

4. Press Quick Dial key [10]

   ```
   QUICK 10          Y/N
   SET PARAMETER?
   ```

   Note: When selecting Speed Dial 10 with Function 33: [1] [0] at the ten key pad

5. [Yes]

   ```
   TX PARAMETER 1    Y
                1111 1111
   ```

6. The settings for byte 1 are now displayed. Press a number from 0 to 7 corresponding to the bit that you wish to change.

   Example: Change bit 7 to 0: [7]

   ```
   TX PARAMETER 1    Y
                0111 1111
   ```

7. Either:

   - Select another byte: [Yes] until the correct byte is displayed. Then go to step 6. If you press Yes while byte 3 is displayed, you can go back to step 4 and select another number.
   - Finish: [Function]

8. After finishing, set bit 5 of bit switch 01 to 0.

4.4.2. Parameters

Byte 1		
	FUNCTION	**COMMENTS**
0 **1**	Initial Tx modem rate **Bit 1 Bit 0 Setting** 0 0 9,600 bps 0 1 7,200 bps 1 0 4,800 bps 1 1 2,400 bps	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.
2 **3** **4** **5**	Tx level **Bit 2 3 4 5 Level** **(dBm)** 0 0 0 0 0 0 0 0 1 -1 0 0 1 0 -2 0 0 1 1 -3 and so on until 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.
6	Not used	Do not change the factory setting.
7	Dedicated transmission parameters for this Quick/Speed Dial number **0:** Disabled **1:** Enabled	**0:** The parameters in these three bytes will be ignored. The current settings of the relevant bit switches, NCU parameters, and RAM addresses will be used. **1:** The parameters in these three bytes will be used when transmitting to the fax number stored in the Quick Dial Key or Speed Dial Code that these bytes are allocated to.

Byte 2		
	FUNCTION	**COMMENTS**
0	DIS/NSF detection method **0:** First DIS or NSF **1:** Second DIS or NSF	Set this bit to 1 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.
1	ECM during transmission **0:** Enabled **1:** Disabled	For example, if ECM is switched on but is not wanted when sending to a particular terminal, set this bit to 1.
2 **3** **4**	Not used	Do not change the factory settings.
Continued on the next page		

Byte 2		
	FUNCTION	**COMMENTS**
5 **6**	Compression modes available in transmit mode **Bit 6 5 Modes** 0 0 MMR, MR, or MH 0 1 MR or MH 1 0 MH only 1 1 MH only	These bits determine the capabilities that are informed to the other terminal during transmission.
7	Short preamble **0:** Disabled **1:** Enabled	If this bit is 1, Short Preamble is always used when transmitting to this terminal.

Byte 3
FUNCTION AND COMMENTS
CCITT T1 timer If you wish to use a different T1 timer than the NCU parameter setting when sending to a particular terminal, adjust this byte. The T1 timer is the BCD value of this byte, multiplied by 2.56 seconds. **Caution:** Note that if the value of this byte is 0, the T1 timer will be 35 s.

Caution: If the value of byte 3 is 0, the CCITT T1 timer is 35 s, which may not be appropriate for your area. Therefore, every time you program a set of dedicated transmission parameters, be sure to check the contents of byte 3 and adjust if necessary.

4.5. USEFUL RAM ADDRESSES

4044
Bit 2: Forwarding 0: Enabled, 1: Disabled
Bit 3: Authorized reception 0: Enabled, 1: Disabled
Bit 6: Continuous polling 0: Disabled, 1: Enabled

4045
Bit 0: Display of both RTI and CSI on the LCD 0: Disabled, 1: Enabled
Bit 2: Printout of forwarded messages 0: Disabled, 1: Enabled

4047: Number of page retransmission attempts (Hex code)

4048
Bit 5: Stop key during memory transmission 0: Disabled, 1: Enabled
Bit 6: First page to be retransmitted (memory tx)
0: The page that was not sent correctly, 1: Page 1

4049
Bit 0: Keystroke Program execution method
0: Press the programmed Quick Dial Key
1: Press the programmed Quick Dial Key then the Start key
Bit 2: RDS 0: Enabled, 1: Disabled
Bit 3: On-hook dial 0: Enabled, 1: Disabled

404B: Contrast threshold - Lighten (Hex code, from 00 to 1F) 00: All Black, 1F: All White
404C: Contrast threshold - Normal (Hex code, from 00 to 1F) 00: All Black, 1F: All White
404D: Contrast threshold - Darken (Hex code, from 00 to 1F) 00: All Black, 1F: All White

404F - 4051: Page separation and data reduction parameters: see section 2-2-1, "Paper Feed"

4053
Bit 0: Default resolution used for copy mode 0: As selected by the user, 1: Fine

4054
Bit 0: Reduction during printing 0: Disabled, 1: Enabled

4055
The amount of remaining memory below which ringing detection (and therefore substitute reception) is disabled if the printer is out of action (hex code, from 00 to FF, unit = kbytes)
- One page is about 24 kbytes
- If this 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.

4057
Image/Text detection threshold in halftone mode (Hex: 00 - 1F)
- 01: Almost all the data will be processed without halftone, even if the fax message contains photographs.
- The threshold increases with increments in the setting from 01 to 1F.
- 00, 1F: Almost all the data will be halftone processed, even if the fax message contains only text.

4058: Number of redialling attempts, including the first dialling attempt (memory tx)
Hex : 00 - FF
4059: Redialling interval (memory tx) Hex: 00 - FF (minutes)
405D: Time for which RDS is enabled after the user has switched it on BCD: 00 - 99 (hours)

410E - 4110: PM interval

	Bits 7 - 4	Bits 3 - 0
410E	Tens	Units
410F	Thousands	Hundreds
4110	Hundred thousands	Ten thousands

Factory Settings

The factory settings of the above RAM addresses are shown below in hexadecimal code. The first digit represents bits 7 to 4, and the second digit represents bits 3 to 0.

Universal version

RAM	Setting	RAM	Setting	RAM	Setting
4044	31	404C	0D	4054	00
4045	00	404D	0B	4055	40
4047	03	404F	FF	4057	0C
4048	08	4050	00	4058	05
4049	1A	4051	0A	4059	05
404B	0F	4053	00	405D	24

Asia version

RAM	Setting	RAM	Setting	RAM	Setting
4044	31	404C	0D	4054	00
4045	00	404D	0B	4055	00
4047	03	404F	FF	4057	0C
4048	08	4050	00	4058	05
4049	1A	4051	0A	4059	05
404B	0F	4053	00	405D	24

The following tables show the changes in the factory settings with the different country code settings.

Table 1: Based on the Universal version

Country	Code	Differences (switch settings given in Hex code)
France	00	None
Germany	01	4045: 01
UK	02	None (the settings for the Universal version are based on those required for the UK)
Italy	03	None
Austria	04	4049: 1B
Belgium	05	None
Denmark	06	None
Finland	07	None
Ireland	08	None
Norway	09	None
Sweden	0A	None
Switzerland	0B	None
Portugal	0C	None
Holland	0D	None
Spain	0E	None

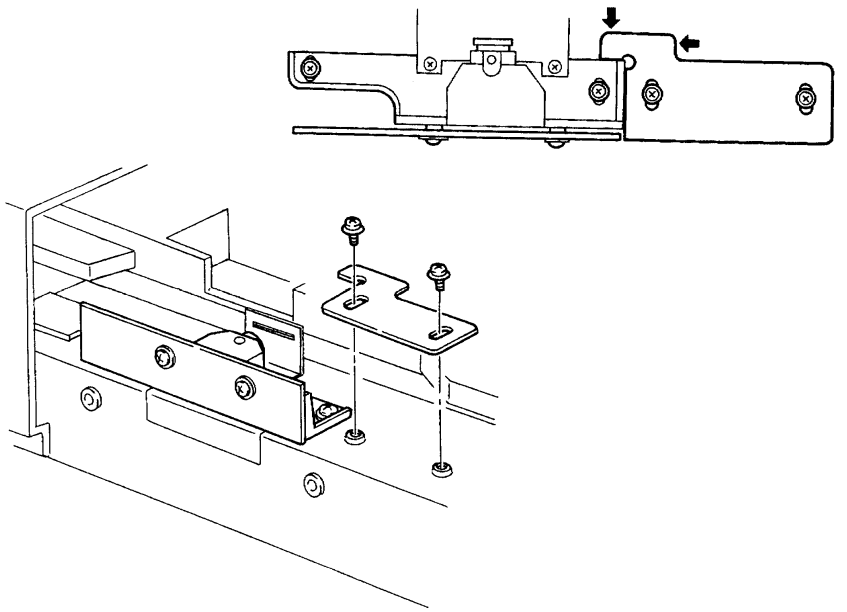
Table 2: Based on the Asia version (Country code 12)

Country	Code	Differences (switch settings given in Hex code)
Israel	0F	None
Hong Kong	14	
South Africa	15	
Australia	16	
New Zealand	17	
Singapore	18	
Malaysia	19	

Note: When programming a RAM address, you have to enter the bank number before the four-digit RAM address. In this machine, the bank number is always 2. For example, to program RAM address 4044 using Function 95, you have to input 24044.

4.6. SPECIAL TOOLS AND LUBRICANTS

- Scan line test chart: P/N H0819502
- 8 line/mm test pattern: P/N H0419001
- Test lead: P/N H0419002
- SBU adjustment knobs: P/N H0129300
- Allen wrench
- Lens block positioning tool: P/N H0819503
  For how to use, see the following diagram



4.7. PM TABLE

Scanner

C: Clean, L: Lubricate, R: Replace

Item	10K	30K	60K	1 year	Notes
Exposure Glass	C	C	C	C	Soft cloth and alcohol
R1 and R2 Rollers	C	C	C	C	Soft cloth and alcohol
Pick-up Torque Limiter		L	L		Use Mobil Temp 78.
White Plate	C	C	C	C	Soft cloth and water
Feed Roller	C	R	R	C	Soft cloth and water
Pick-up Roller	C	R	R	C	Soft cloth and water
Separation Roller	C	R	R	C	Soft cloth and water
Shutter Torque Limiter		L	L		Use Mobil Temp 78.

Printer and Upper Cassette

Item	10K	30K	60K	1 year	Notes
Paper Feed Roller	C	C	R	C	Soft cloth and alcohol
Relay Roller	C	C	C	C	Soft cloth and alcohol
Registration Rollers	C	C	C	C	Soft cloth and alcohol
Thermistor		C	C		Soft cloth and alcohol
Hot Roller Strippers		C	C		Cotton swab and alcohol
Feed-out Roller	C	C	C	C	Soft cloth and alcohol
Hot Roller			R		Soft cloth and alcohol
Pressure Roller (Fusing)			R		
Thermostat		C	C		Soft cloth and alcohol
Cleaning Pad	R	R	R		
Transfer Corona Unit	C	C	R	C	Soft cloth/cotton swab and alcohol
Charge Corona Unit	C	C	R		
Corona Wires	C	C		C	
Quenching Lamp	C	C	C	C	
Laser Optics Shield Glass	C	C	C	C	
Development Unit			R		
Ozone Filter	R	R	R		

Lower Cassette

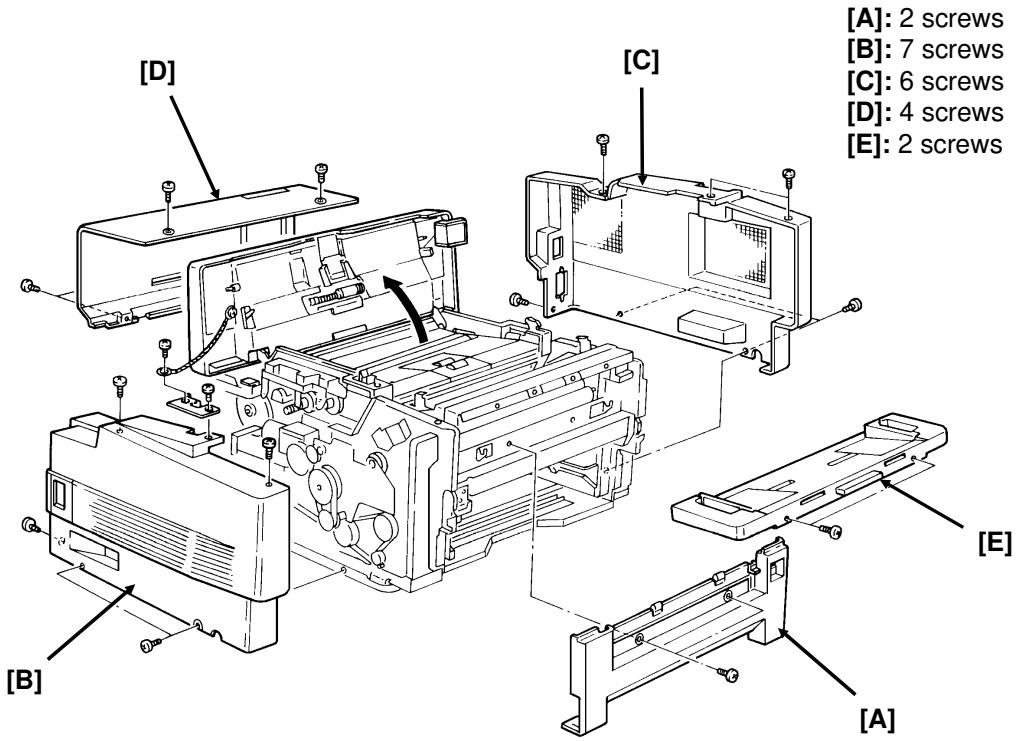
Item	10K	30K	60K	1 year	Notes
Pick-up and Feed Rollers	C	R	R	C	Soft cloth and alcohol
Separation Roller	C	R	R	C	Soft cloth and alcohol
Relay Rollers	C	C	C	C	Soft cloth and alcohol
Separation Torque Limiter		L	R		Use Mobil Temp 78.
Pick-up Torque Limiter		L	R		

Other

Item	10K	30K	60K	1 year	Notes
Exterior and Covers	C	C	C	C	Soft cloth and water

5. REPLACEMENT AND ADJUSTMENT

5.1. COVERS

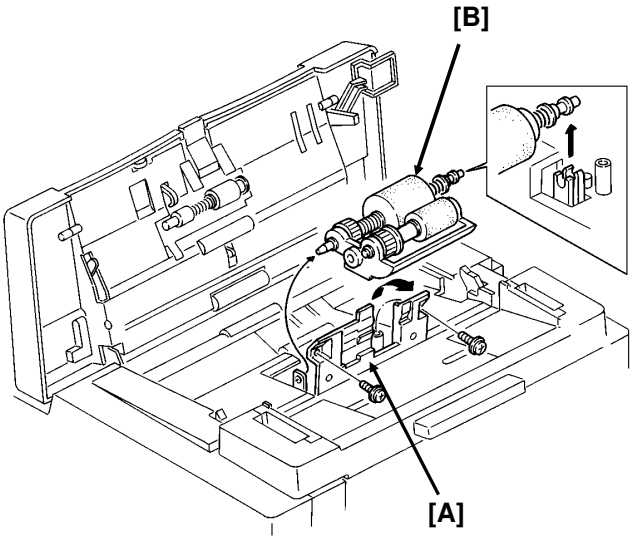


- Front Cover [A], Left Cover [B], Right Cover [C], Rear Cover [D], Document Table [E]

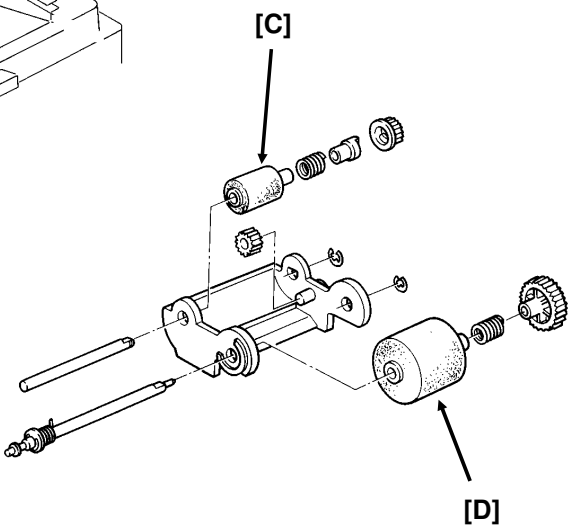
Note: If you remove the document table, adjust the document table position on replacement (see section 5-2-3).

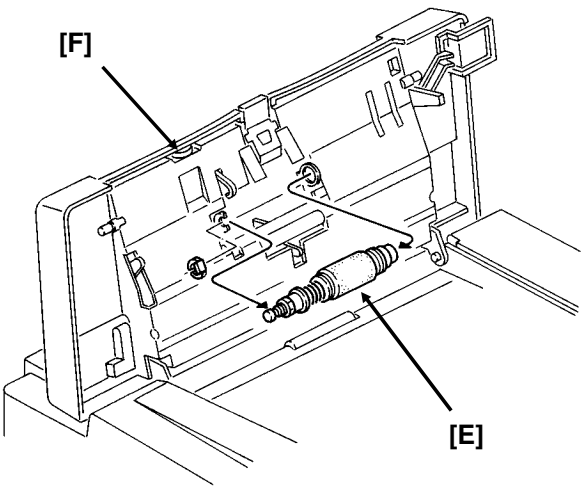
5.2. ADF/SCANNER

5.2.1. Document Feed [C], Pick-up [D], and Separation [E] Rollers



[A]: 2 screws
[C]: 1 E-ring
[D]: 1 E-ring
[E]: 1 clip





- First, remove the document tray and open the ADF cover (see section 5-1).

Caution: Do not touch the rubber surface of the new rollers, or document feed errors will develop sooner than normal.

5.2.2. Separation Roller Adjustment

The separation pressure can be adjusted to correct double feed or non-feed problems, or to customize the machine to meet user requirements if non-standard paper types are often scanned.

Adjust the pressure with knob [F] (see the previous page); the standard setting is at the centre. Numbers 1 to 5 are printed by the scale. Rotate the knob until the arrow points to the number that you want to select. Use trial and error until document feed is satisfactory. Some guidelines are given below.

1. Adjustment to match the document type

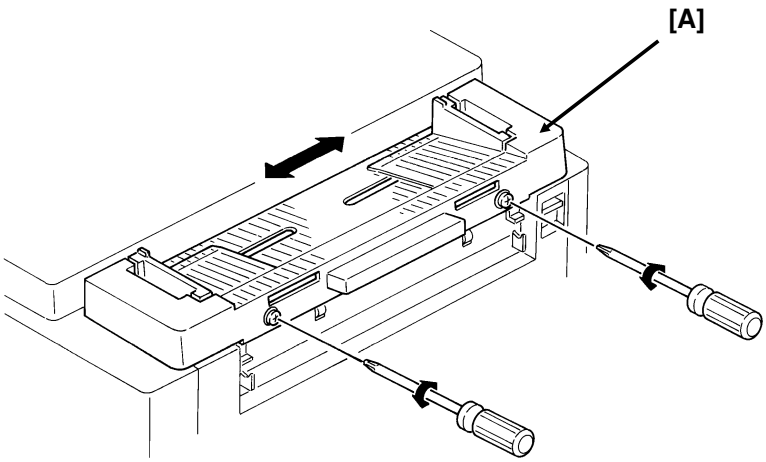
Document Type	Setting
Thin sheets of paper	1 or 2
Thick sheets of paper	4 or 5

2. Adjustment in response to a problem

Problem	Setting
Multi-feed - Thin sheets	1 or 2
Multi-feed - Thick sheets	4 or 5
Non-feed	4 or 5
Document jam	1 or 2

The factory setting is 3.

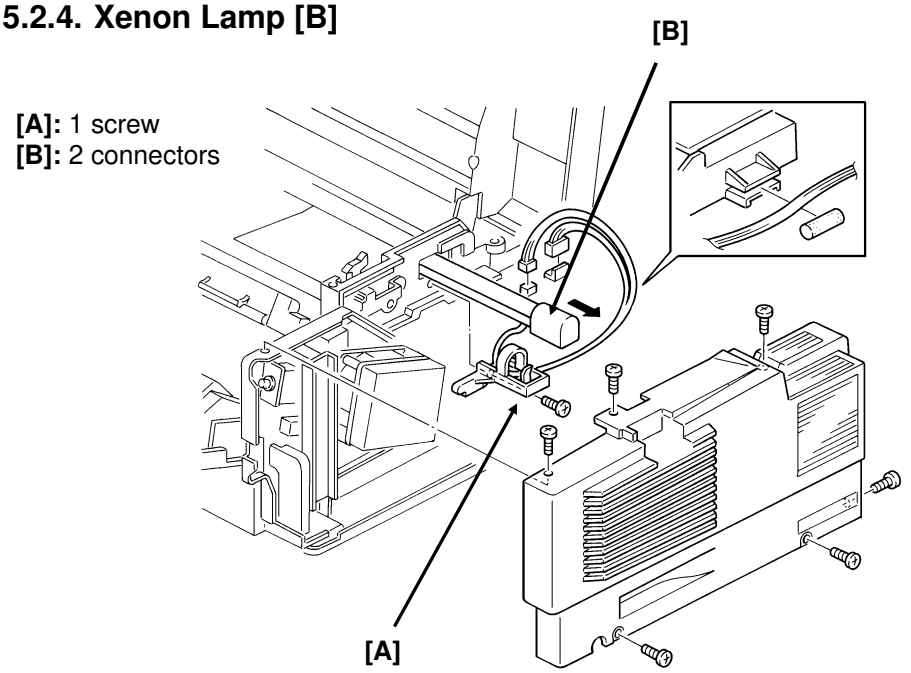
5.2.3. Document Table Adjustment



Reassembly:

- Make a test copy. Adjust the position of the document table [A] so that the centre of the document coincides with the centre of the copy.

5.2.4. Xenon Lamp [B]

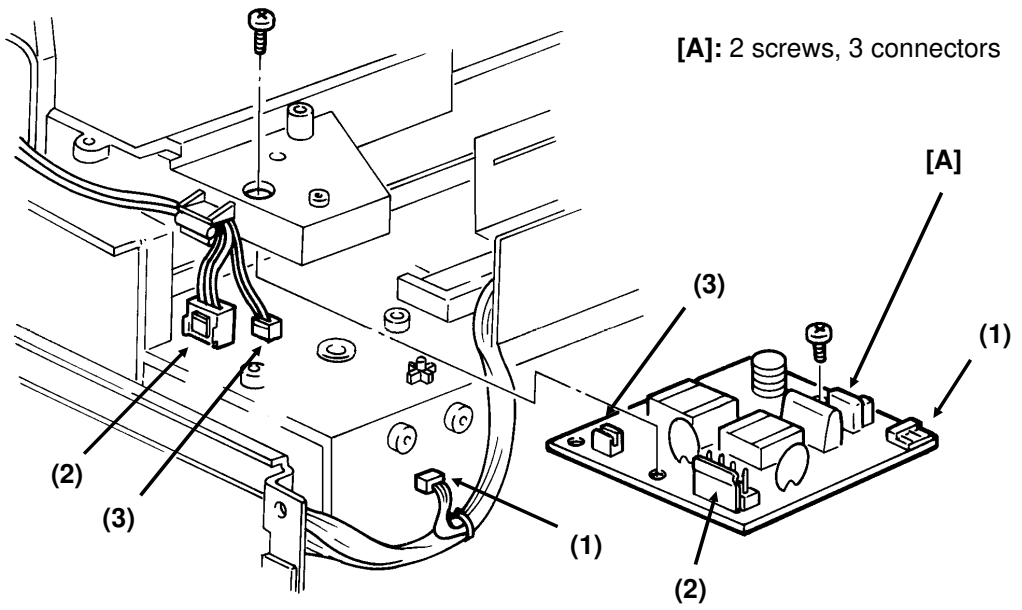


- First, remove the right cover (see section 5-1).

Reassembly

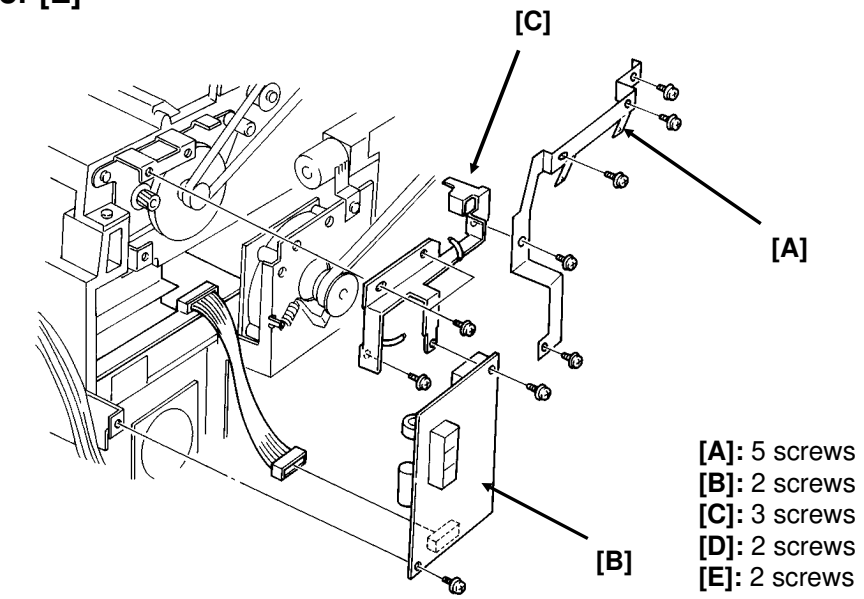
- Test the new lamp before reassembly.

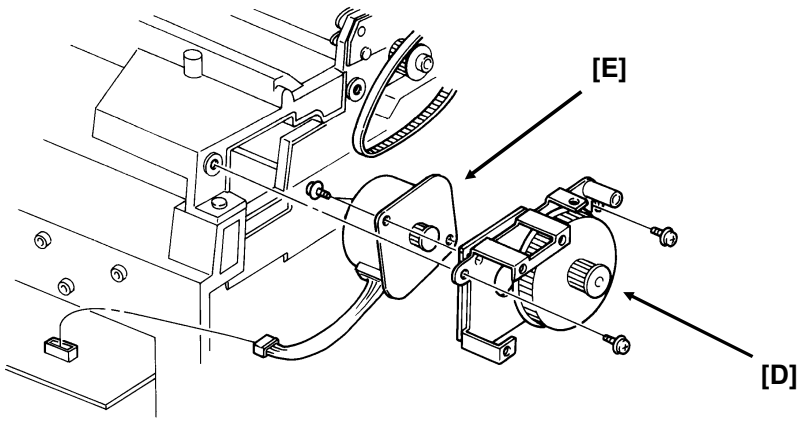
5.2.5. Xenon Lamp Driver [A]



- First, remove the rear and right covers (see section 5-1).

5.2.6. Tx Motor [E]



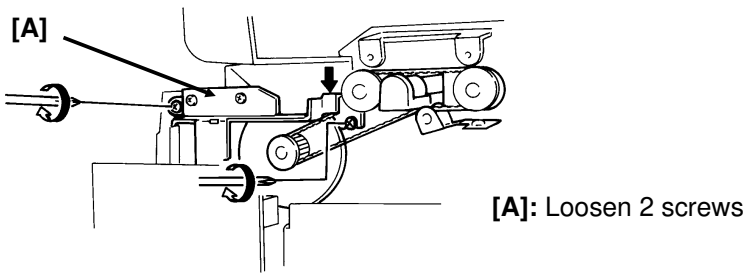


To access this motor, remove the left cover.

Reassembly

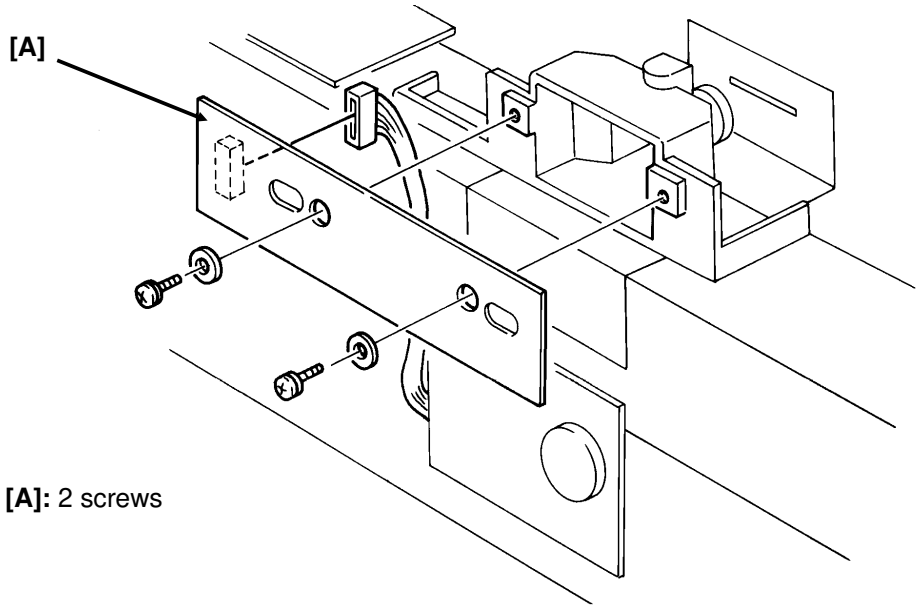
- Before replacing the left cover, adjust the timing belts as shown below.

5.2.7. Timing Belt Tension Adjustments



Adjust the position of bracket [A] until the tension is satisfactory.

5.2.8. SBU [A]



[A]: 2 screws

- First, remove the rear cover (see section 5-1).

After installing a new SBU, do the adjustments on the following pages, in sequential order.

5.2.9. SBU Adjustments

Tools Required

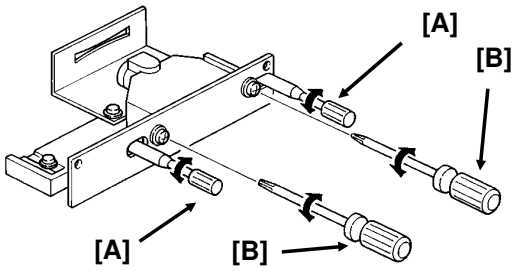
- Scan line test chart: P/N H0819502
- 8 line/mm test pattern: P/N H0419001
- Test lead: P/N H0419002
- SBU adjustment knobs: P/N H0129300
- Allen wrench

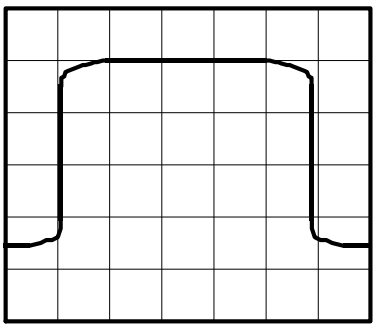
Preparation

1. Remove the rear cover (see section 5-1).
2. Set the oscilloscope scale to 0.2 V/unit (vertical) and 0.5 ms/unit (horizontal).
3. Connect the test lead to CN12 on the FCU.
4. Connect the oscilloscope probe to pin 1 (blue wire) and the ground to pin 4 (black wire).
5. Clean the white pressure plate with a soft cloth and alcohol.
6. Light the xenon lamp (see section 4-1-10).

Adjustments

1. White Level



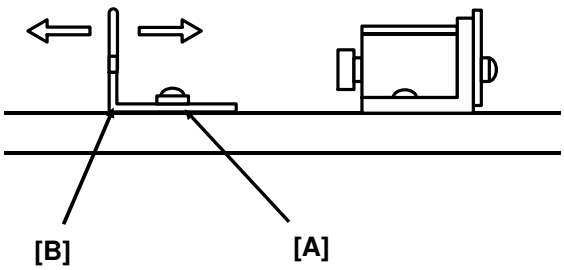


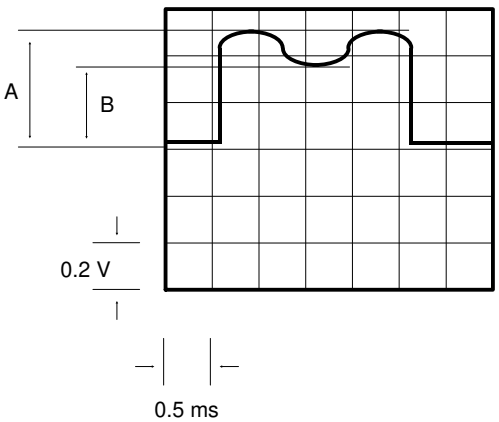
- Fit the adjustment knobs [A] through the slots in the SBU as shown.
- Loosen the SBU securing screws [B].
- Remove any test charts that are on the exposure glass.
- Check that the white level waveform can be seen fully across the oscilloscope. If it cannot be seen properly, turn the adjustment knobs.
- Carefully tighten the SBU securing screws.

If the waveform has irregular patches, the lens, mirror, exposure glass, white pressure plate, or CCD may be dirty.
If the waveform level is lower at the ends than in the middle, the xenon lamp may be wearing out.
If the waveform has sharp peaks or dropouts, the CCD may be defective.

2. Flatness

In the oscilloscope waveform, (A-B)/A must be less than 0.25. If it is not, do the following.

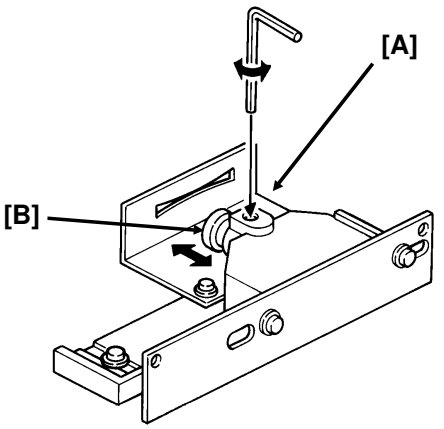


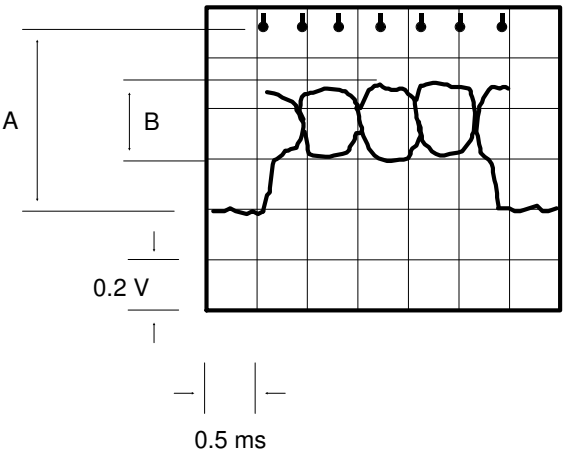


- Remove any test charts that are on the exposure glass.
- Loosen the shading plate securing screws [A].
- Move the shading plate [B] back and forth until the waveform meets the requirements.
- Tighten the shading plate securing screws.

5

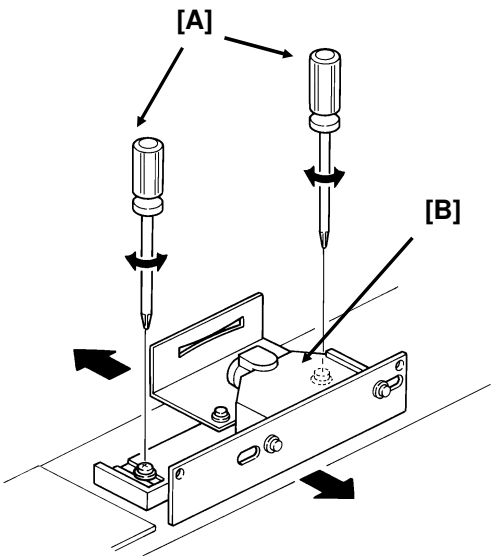
3. Focusing (MTF)

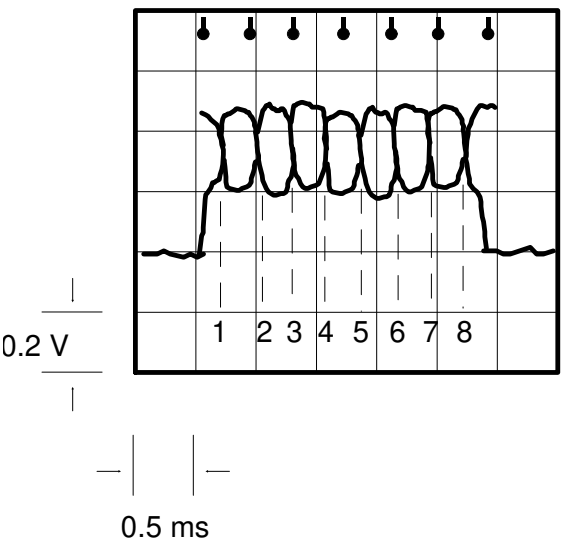




- Place the 8 line/mm test pattern on the exposure glass.
- Loosen the lens securing screw [A] (Allen screw).
- Move the lens [B] back and forth until B is maximized (see the diagram on the right).
- Tighten the lens securing screw.

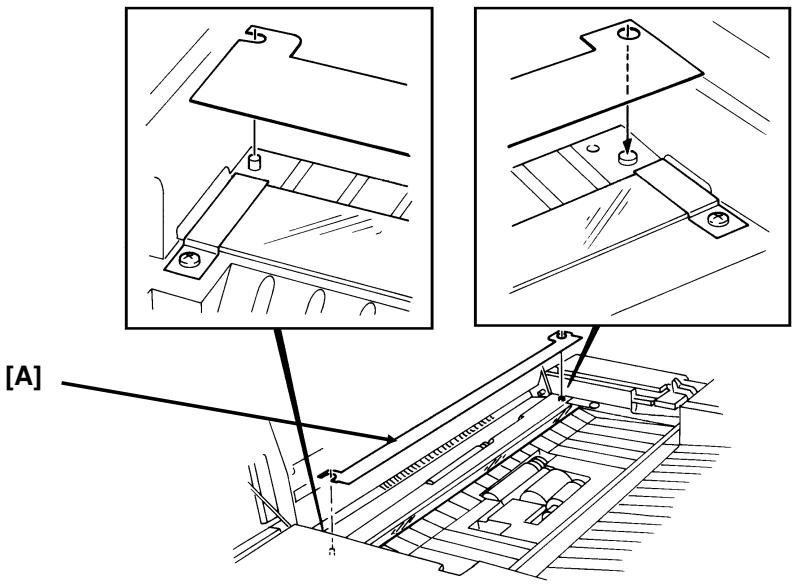
4. Reduction Rate



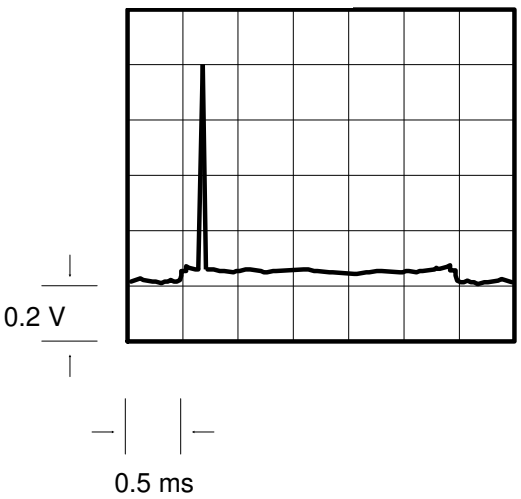


- Place the 8 line/mm test pattern on the exposure glass.
- Loosen the lens block securing screws [A].
- Move the lens block [B] back and forth until the signal has 8 or fewer crosspoints.
- Tighten the lens block securing screws.
  Note: Tighten each screw little by little alternately.

5. Scan Line

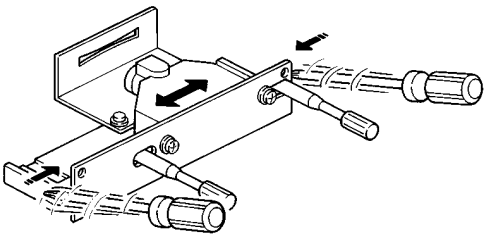


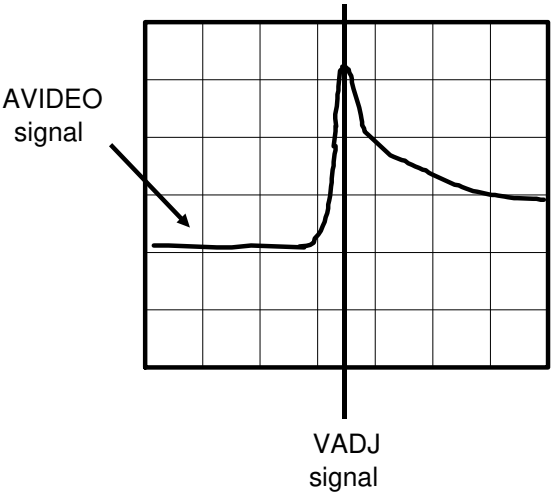
- Place the scan line test chart [A] on the exposure glass as shown.
- Loosen the SBU securing screws (see procedure 1).
- Adjust the waveform with the adjusting knobs until the waveform is as shown on the right.



5

6. Scan Start Position



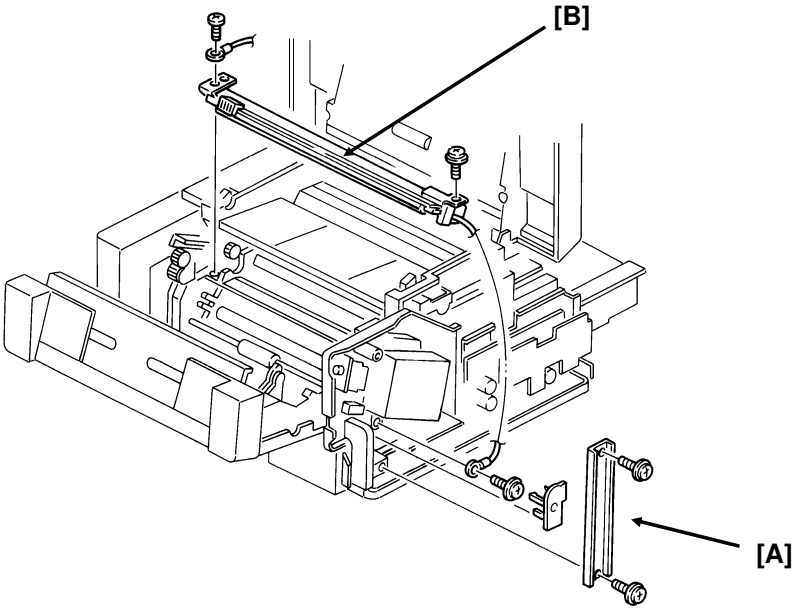


- Place the scan line test chart on the exposure glass as shown on the previous page.
- Connect the oscilloscope to the test lead as follows: Channel 1 to AVIDEO (pin 1 - blue wire), channel 2 to VADJ (pin 2 - red wire), and connect up the ground to pin 4 (black wire).
- Set the oscilloscope scales as follows:
  Vertical - CH1 0.2 V/unit, CH2 2 V/unit; Horizontal - 2 μs/unit.
- Gently tap the SBU as shown in the diagram above left, until the waveform is as shown in the diagram above right.
  The peak of AVIDEO must be within 4 bits of the peak of VADJ.
- Reset the oscilloscope to the original settings and repeat procedure 5 (Scan Line) on the previous page. It may be necessary to recheck procedures 5 and 6 until the scan line is perfectly positioned.
- Tighten the SBU securing screws.

5.3. CHARGE/QUENCHING

5.3.1. Charge Corona/Quenching Lamp Unit [B]

[A]: 2 screws
[B]: 3 screws



- First, remove the CTM and the master unit, then remove the right cover (see section 5-1).

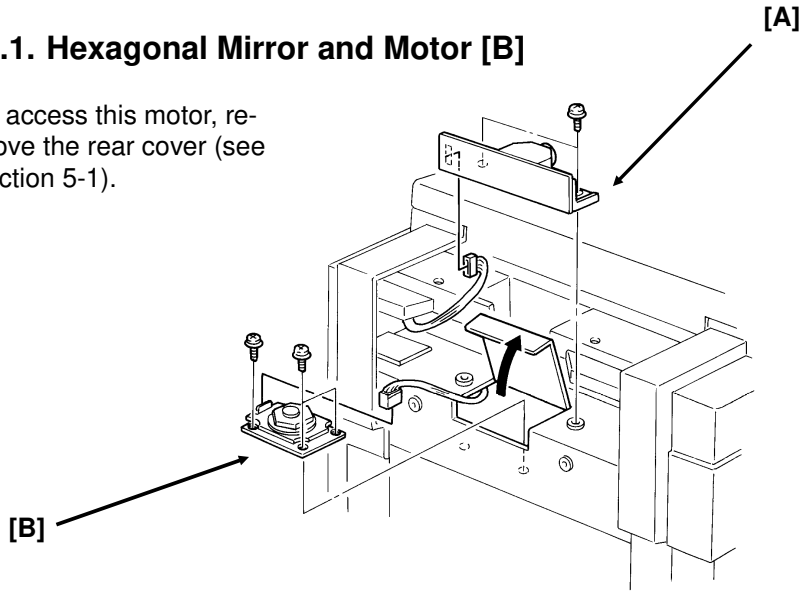
Caution: Do not expose the master unit to bright light or sunlight.
Keep the master unit in a shaded place, and cover it with paper.
Do not touch the surface of the master belt.

5

5.4. EXPOSURE

5.4.1. Hexagonal Mirror and Motor [B]

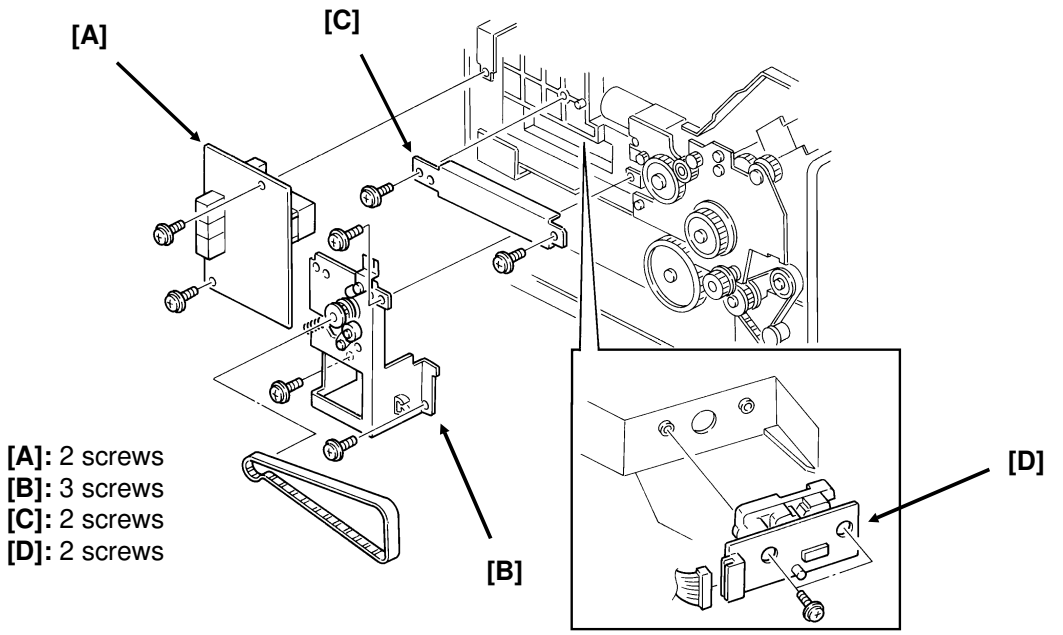
To access this motor, remove the rear cover (see section 5-1).



[A]: 2 screws
[B]: 4 screws

Caution: Do not touch the faces of the mirror.
If you need to clean the mirror, use an air brush or a soft cloth.
When replacing the lens block [A], use the lens block positioning tool. See section 4-6.

5.4.2. Laser Diode Unit [D]



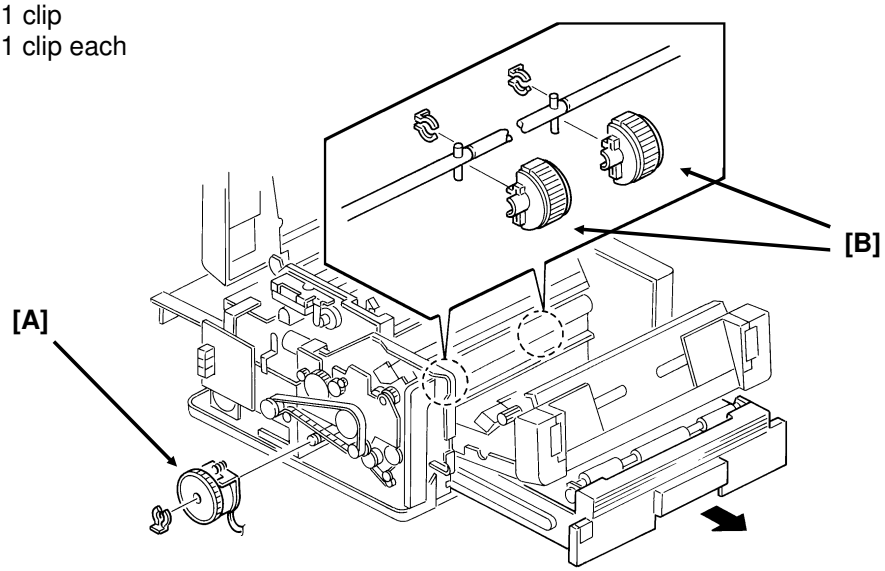
[A]: 2 screws
[B]: 3 screws
[C]: 2 screws
[D]: 2 screws

- First, remove the left cover (see section 5-1).

5.5. PAPER FEED (UPPER CASSETTE)

5.5.1. Upper Paper Feed Clutch [A] and Rollers [B]

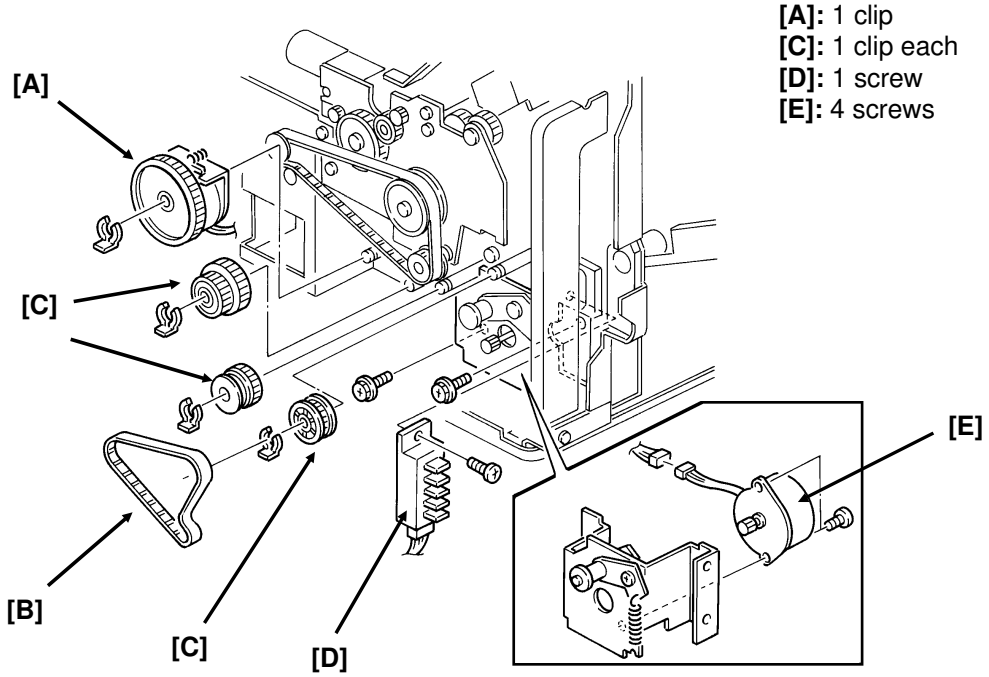
[A]: 1 clip
[B]: 1 clip each



- Remove the cassette and the left cover.

5.5.2. Upper Paper Feed Motor [E]

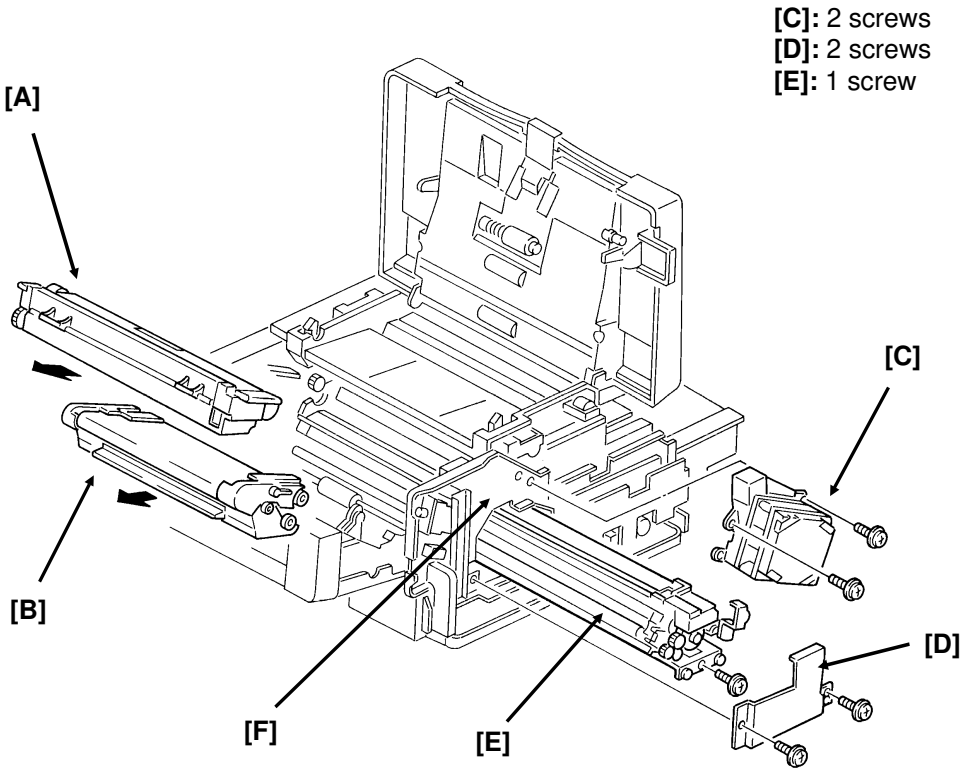
[A]: 1 clip
[C]: 1 clip each
[D]: 1 screw
[E]: 4 screws



- First, remove the left cover (see section 5-1).

5.6. DEVELOPMENT

5.6.1. Development Unit [E]

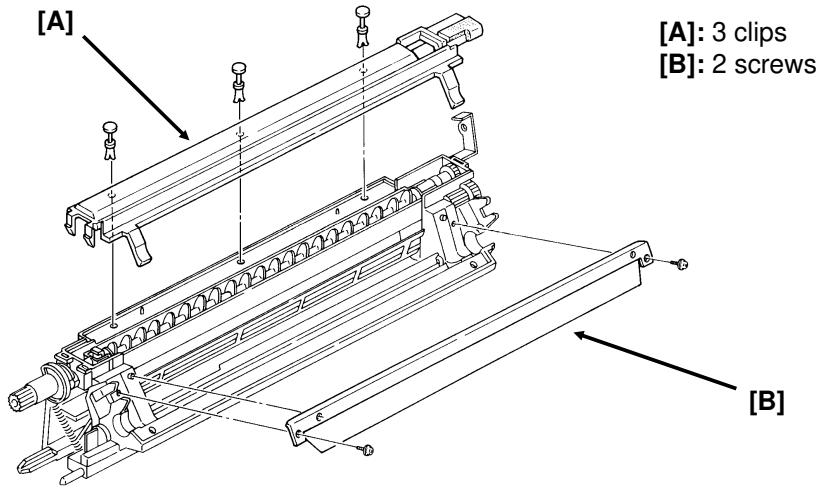


- First, remove the CTM [A] and the master unit [B], and the right cover (see section 5-1).

Caution: Do not expose the master unit to bright light or sunlight.
Keep the master unit in a shaded place, and cover it with paper.
Do not touch the surface of the master belt.

- Before sliding out the development unit, tap location [F] to dislodge any remaining toner.
- After sliding out the development unit, place a sheet of paper under the toner duct to catch any toner that may drop out.
- After replacing the development unit, do the following, or the machine will not supply enough toner to the hopper.
  1. Open the front cover, then turn the power on.
  2. Change the value of RAM address 24D67 to 40[H].
  3. Switch the power off while keeping the front cover open.
  4. Reassemble the machine, and put back the CTM and master unit.
  5. Close the front cover.
  6. Switch the power on.

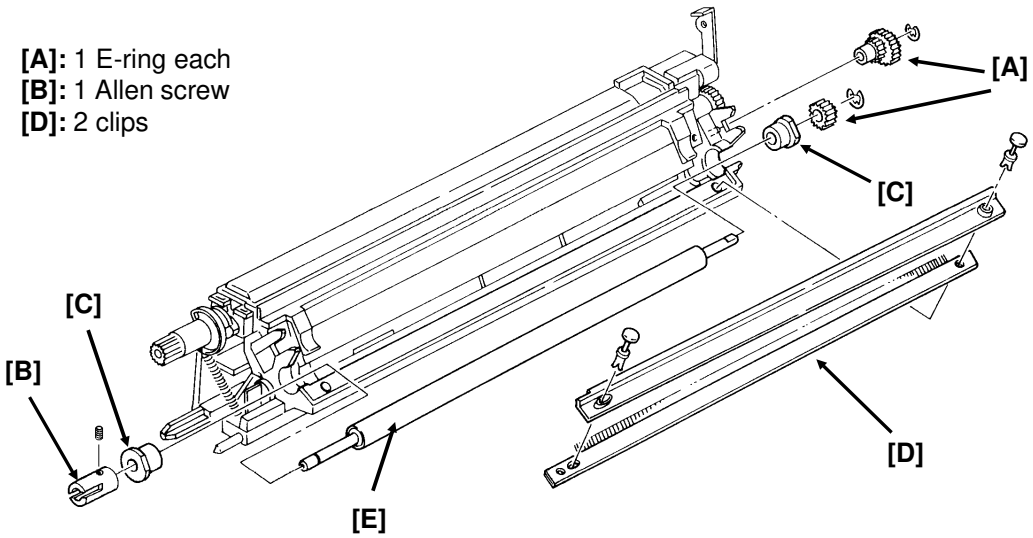
5.6.2. Toner Metering Blade [B]



- First, remove the development unit (see section 5-6-1).

Caution: Do not touch or bend the new blade.
Do not touch the development roller.
Do not scrape the blade against the development roller.

5.6.3. Bias Brush [D] and Development Roller [E]



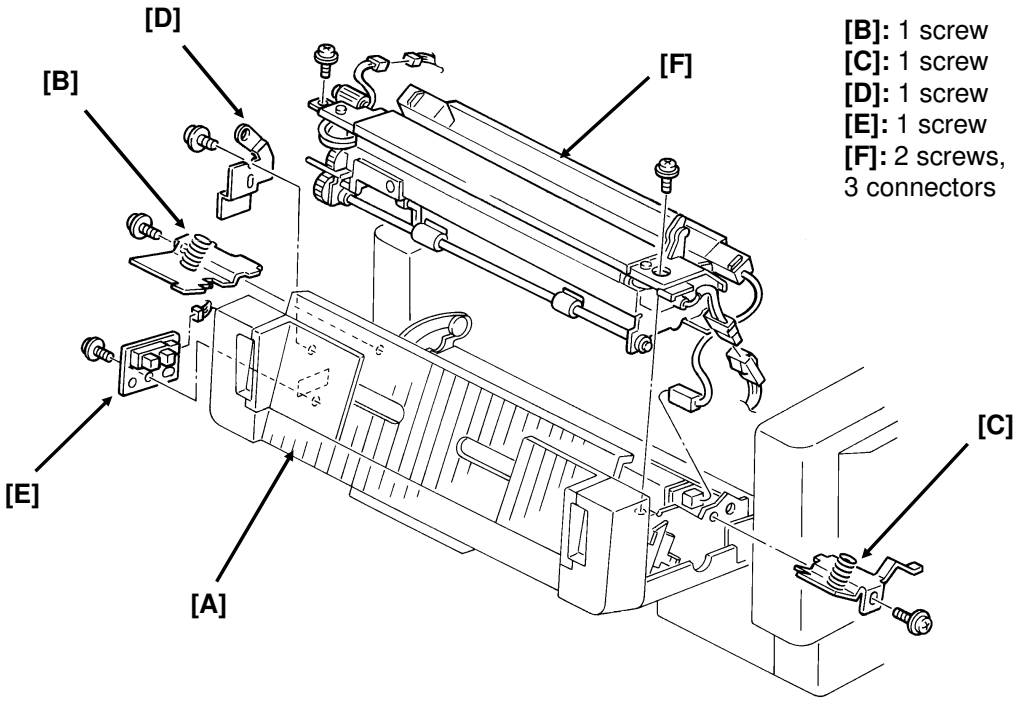
- First, remove the toner metering blade (see section 5-6-2).

Caution: Do not touch the surface of the new development roller.

- On reassembly, make sure that the bristles of the bias brush are tucked under the leading edge of the development roller.

5.7. TRANSFER/FUSING UNIT

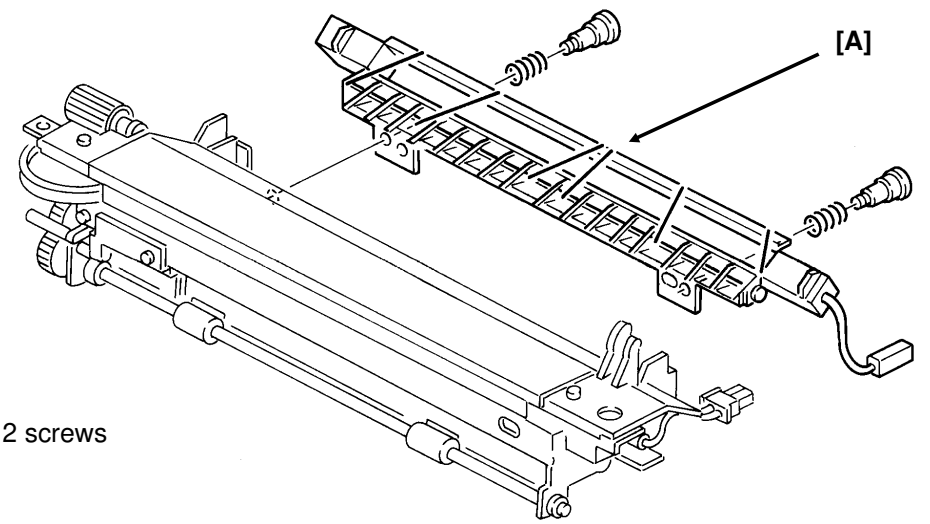
5.7.1. Transfer and Fusing Unit [F]



[B]: 1 screw
[C]: 1 screw
[D]: 1 screw
[E]: 1 screw
[F]: 2 screws, 3 connectors

- Open the front cover [A] to access this unit.

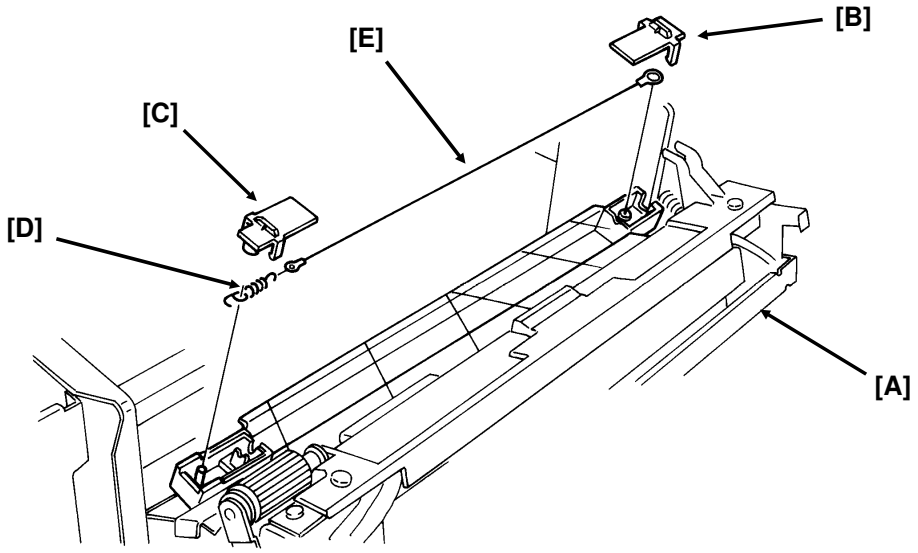
5.7.2. Transfer Corona Unit [A]



[A]: 2 screws

- First, remove the transfer and fusing unit (see section 5-7-1).

5.7.3. Transfer Corona Wire [E]

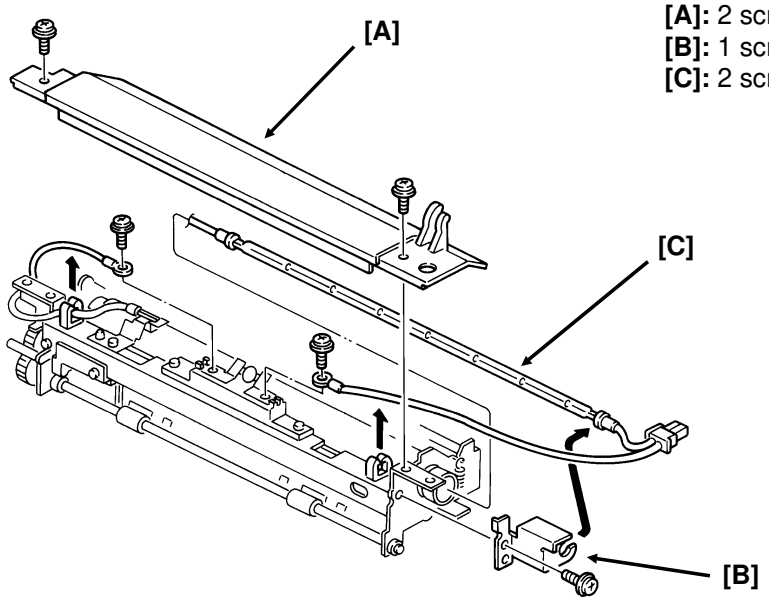


- Open the front cover [A]. Do not remove the transfer/fusing unit.

Reassembly

- Do not touch the new corona wire with bare hands.
- Hook the new corona wire into the rear endblock first.
- Set the corona wire in the front endblock groove.
- After installing both ends of the wire, test the action of the tension spring.

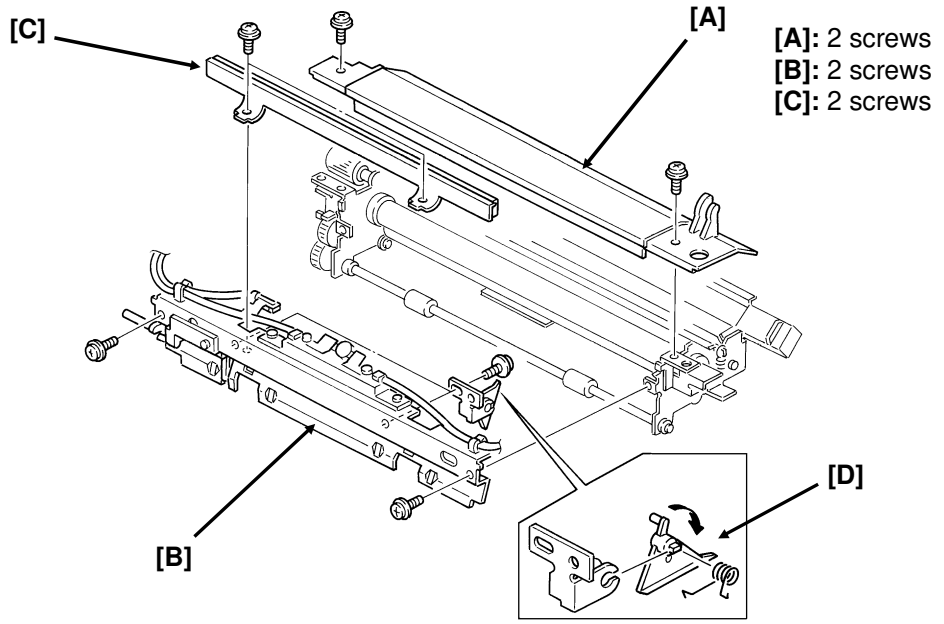
5.7.4. Fusing Lamp [C]



[A]: 2 screws
[B]: 1 screw
[C]: 2 screws

- First, remove the transfer and fusing unit (see section 5-7-1).

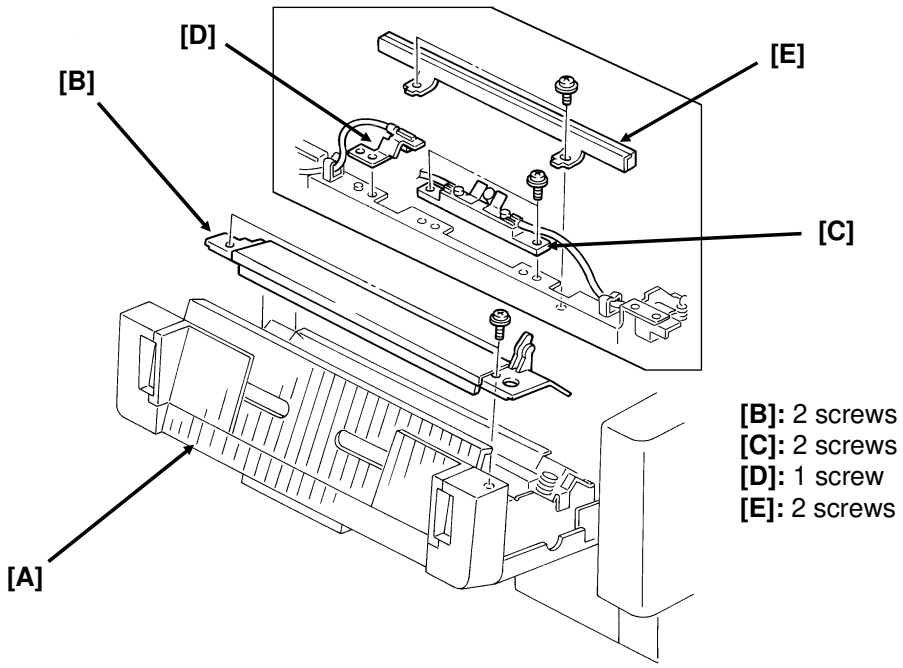
5.7.5. Hot Roller Strippers [D]



- Take out the fusing unit to access these components (section 5-7-1).

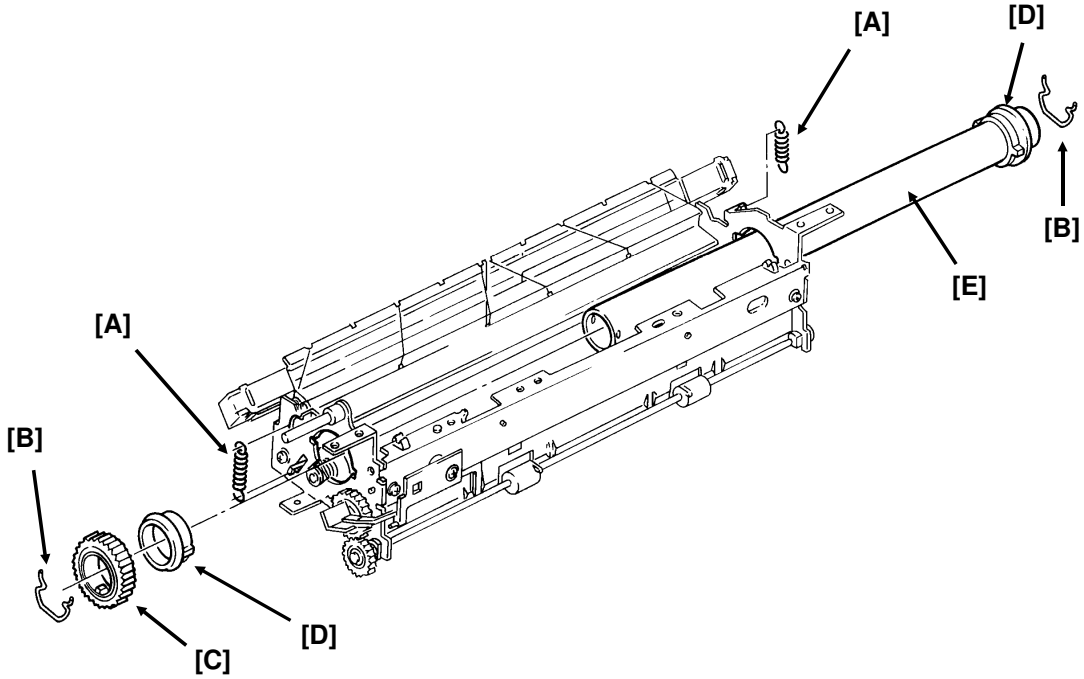
Caution: Be careful not to damage the hot roller.

5.7.6. Thermostat [C], Thermistor [D], and Cleaning Pad [E]



- Open the front cover [A] to access these components.

5.7.7. Hot Roller [E]



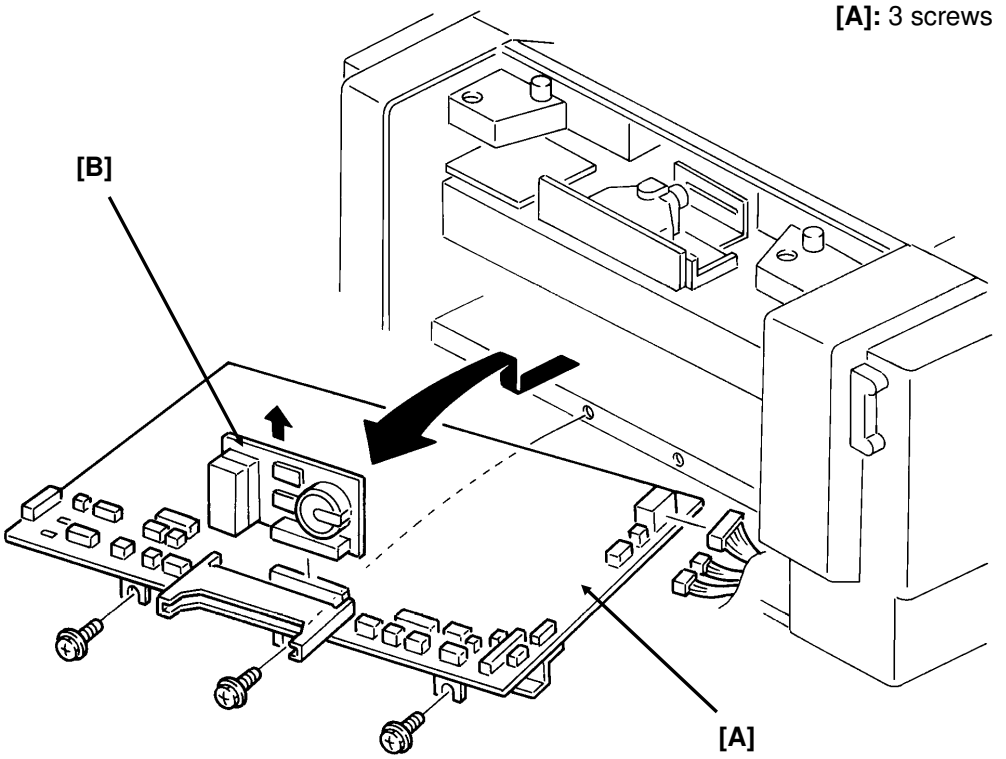
- First, remove the transfer and fusing unit (see section 5-7-1) and take out the fusing lamp (see section 5-7-4).

Reassembly

- Do not take the paper off the new roller until the roller has been installed. The paper prevents damage to the roller during installation.
- Do not hit or scratch the teflon coating of the new roller.

5.8. PCBs

5.8.1. FCU [A]



If possible, print a File List and all the messages stored in the memory before starting.

- Remove the left and rear covers to access the FCU.

Caution: Do not dislodge the jumper switch on the MBU board, or the machine will have to be reprogrammed.

Reassembly:

The SAF memory has been erased. The user must reprogram files for transmission that were erased, and must also contact the senders of messages that were received into memory and erased (see the File List). Polling transmission files have also been lost.

5.8.2. MBU [B]

See the previous diagram; the MBU is item [B].

Before removal, do the following.

- If possible, print all the user reports and give them to the user.
- If possible, make a note of the user's current on/off switch settings (Function 61) and ID codes (Function 52). Also, if the user has stored some Auto Documents and Function Programs (see the Quick Dial List), make a note of where each of these were stored.
- If possible, print the following reports and keep them for reference: System Report, Service Monitor Report, Telephone List (service mode, with dedicated tx parameters).

Reassembly:

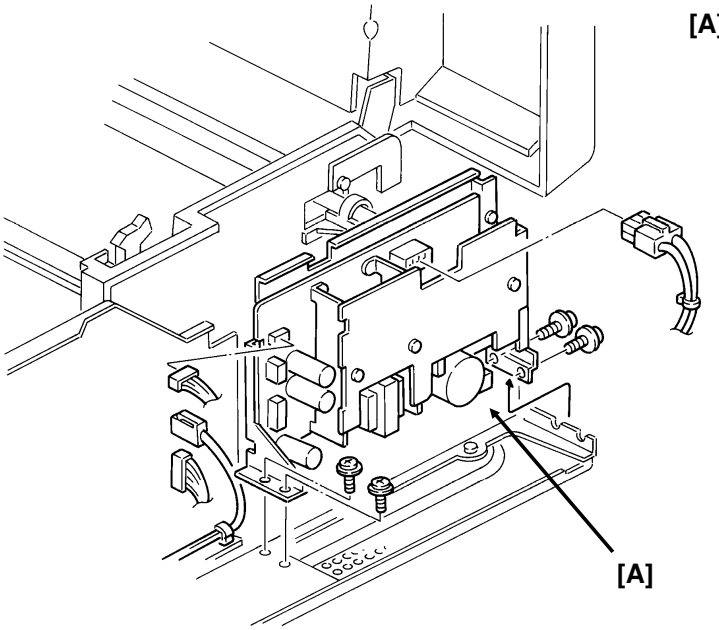
- Reset the RAM on the new MBU board: to do this, set the battery switch to OFF, then switch it back on after a few seconds. Make sure that the switch position is ON.
- On the old MBU board, turn the battery switch to OFF.

After reassembly:

- Make a few copy and communication tests.
- Reprogram the following: RAM addresses that had been changed from the factory settings before the MBU failed, dedicated tx parameters, items listed on the System Report, serial number.
- Instruct the user to reprogram the following items: Quick/Speed/Group Dial, date and time, keystroke programs, polling reception files, ID codes, Personal Codes, User Parameters, and other user functions.

- The SAF memory has been erased. The user must reprogram files for transmission that were erased, and must also contact the senders of messages that were received into memory and erased (see the File List). Polling transmission files have also been lost.

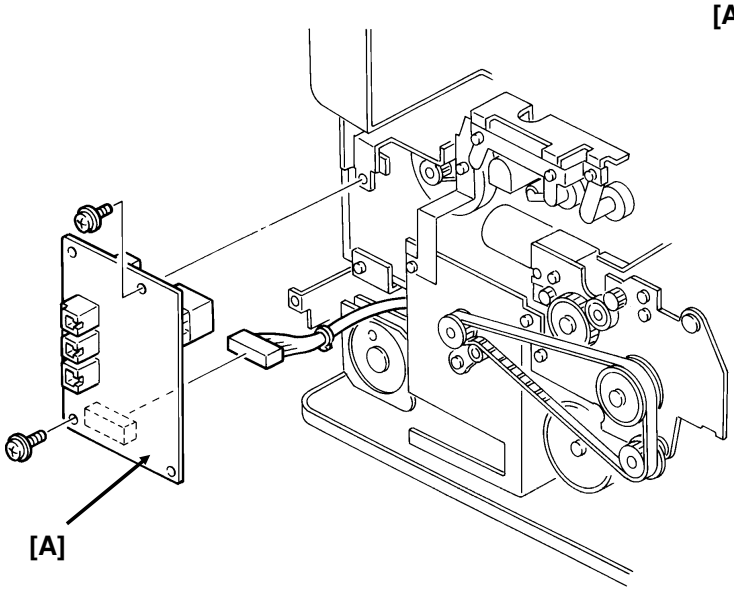
5.8.3. PSU [A]



- First, remove the right cover (see section 5-1).

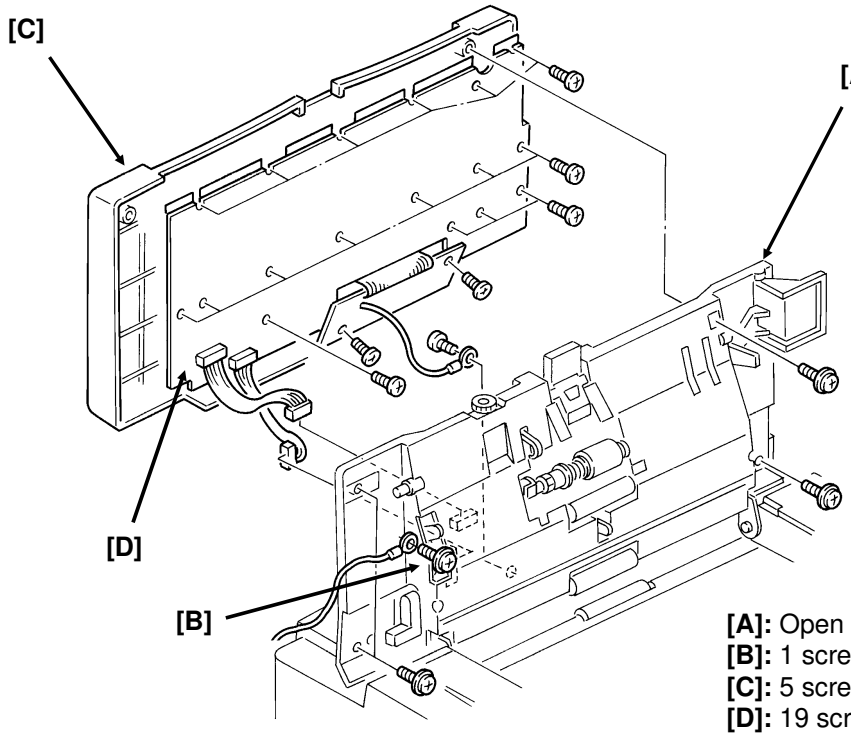
Note: Do not touch the PSU components. They may be hot.

5.8.4. NCU [A]



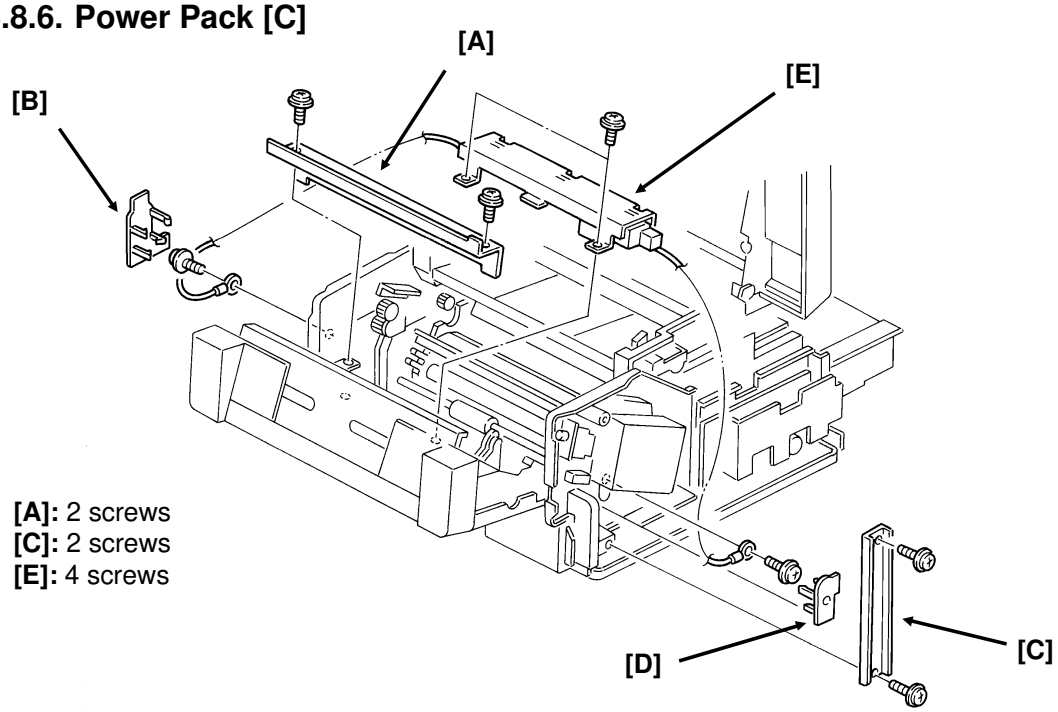
- First, remove the left cover (see section 5-1).

5.8.5. Operation Panel PCB [C]



[A]: Open the cover
[B]: 1 screw
[C]: 5 screws
[D]: 19 screws

5.8.6. Power Pack [C]

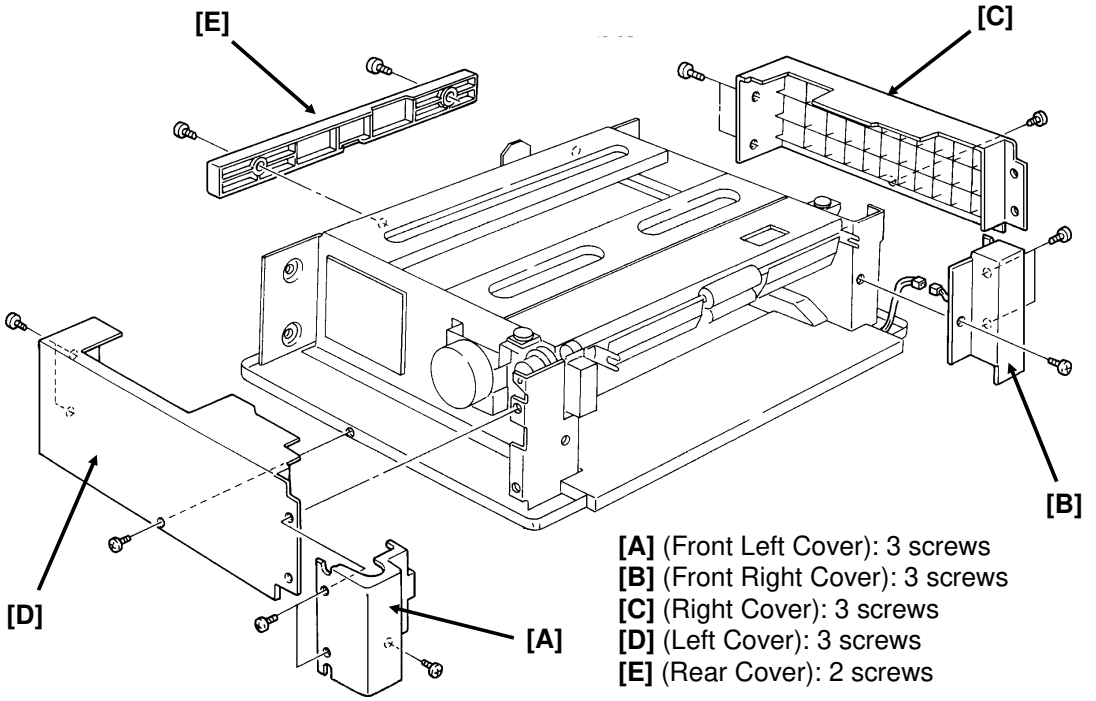


[A]: 2 screws
[C]: 2 screws
[E]: 4 screws

- Remove the right and left covers (see section 5-1), and open the front cover.

5.9. LOWER CASSETTE

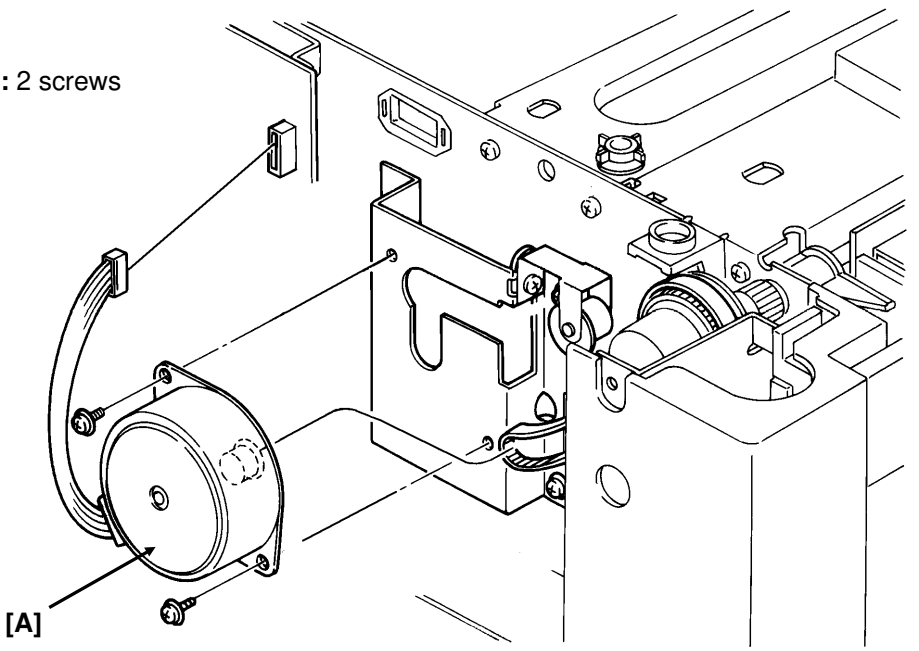
5.9.1. Covers



[A] (Front Left Cover): 3 screws
[B] (Front Right Cover): 3 screws
[C] (Right Cover): 3 screws
[D] (Left Cover): 3 screws
[E] (Rear Cover): 2 screws

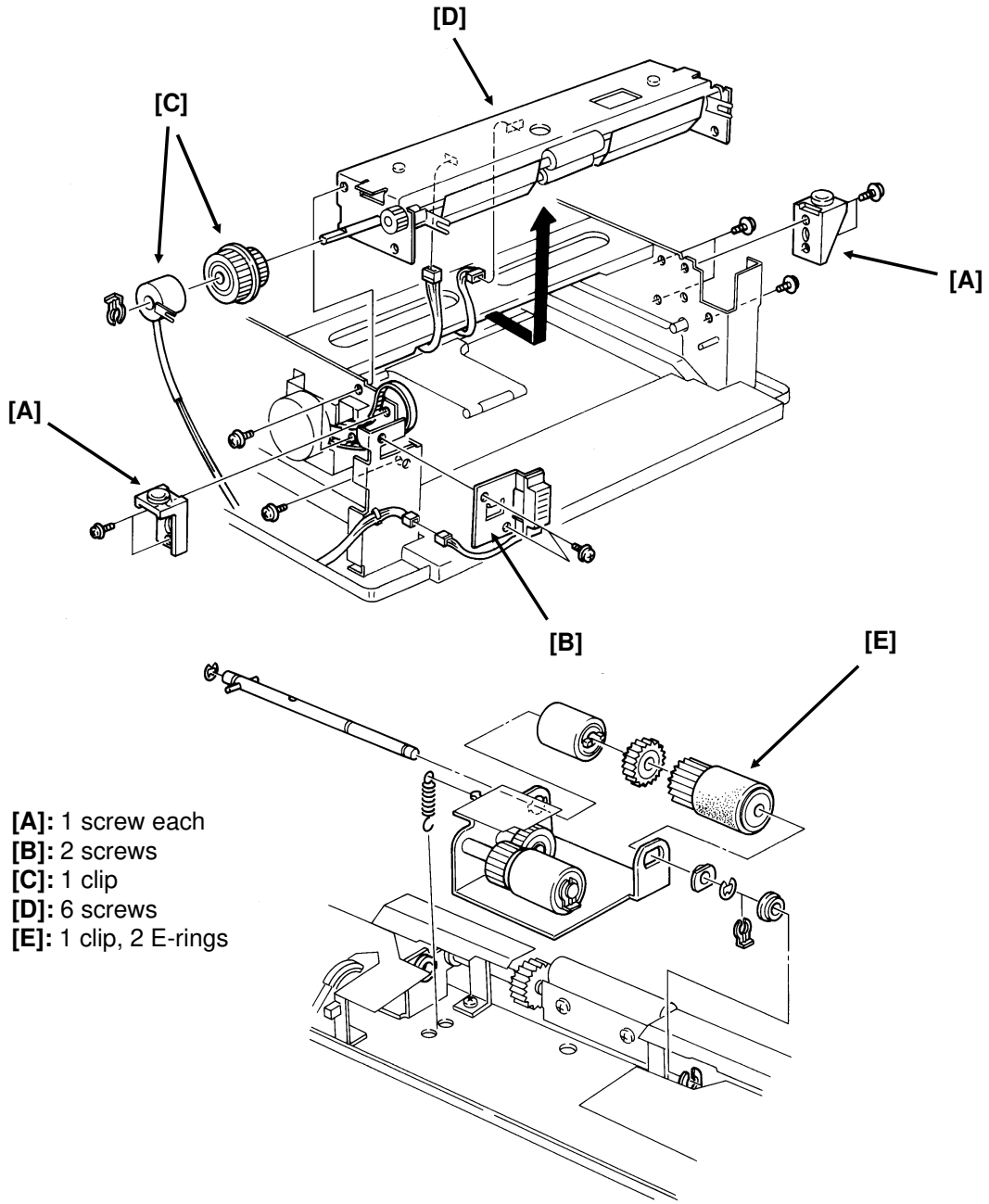
5.9.2. Paper Feed Motor [A]

[A]: 2 screws



- Remove the left cover to access the motor.

5.9.3. Paper Feed Clutch [C] and Paper Feed Roller [E]

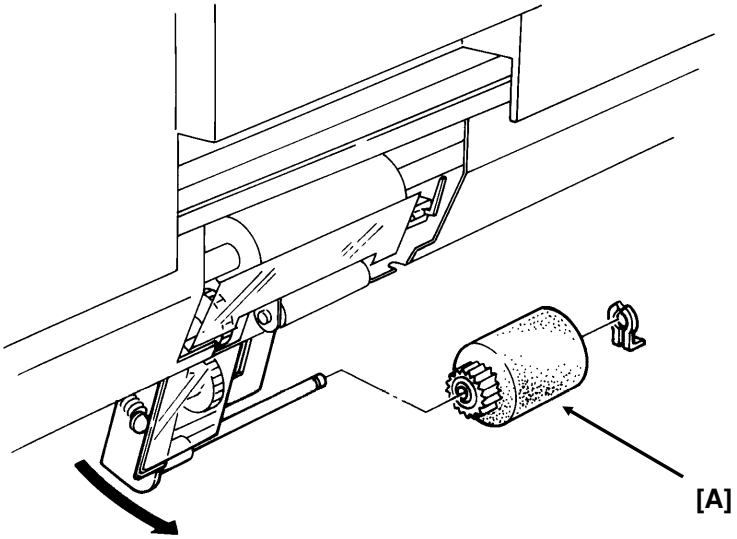


[A]: 1 screw each
[B]: 2 screws
[C]: 1 clip
[D]: 6 screws
[E]: 1 clip, 2 E-rings

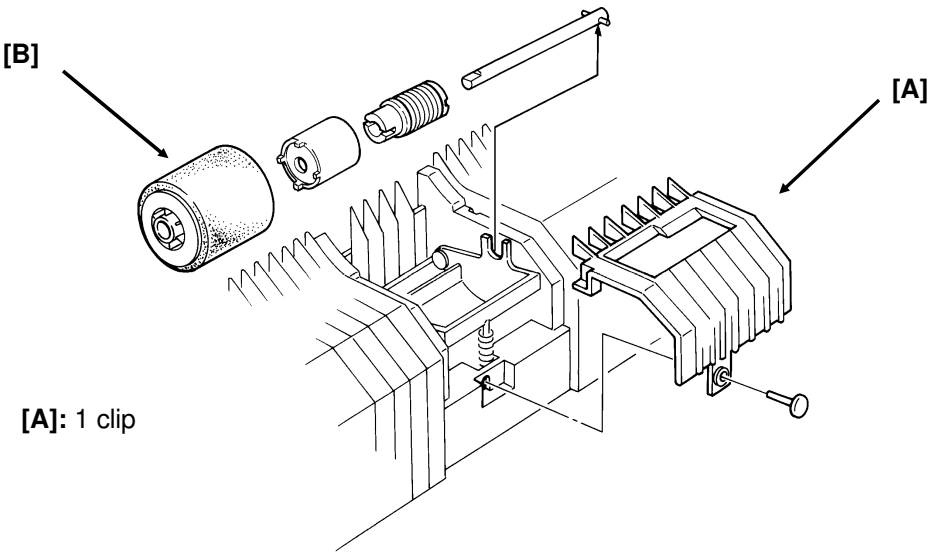
- To access these components, remove the front left, front right, right, and left covers (see section 5-9-1).

5.9.4. Pick-up Roller [A]

[A]: 1 clip



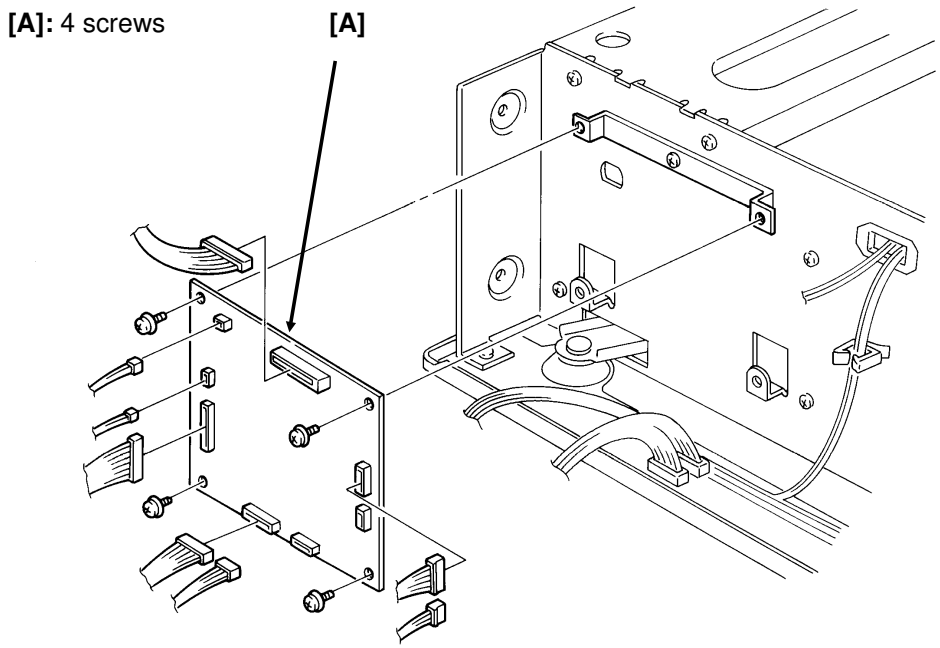
5.9.5. Separation Roller [B]



[A]: 1 clip

- This component is inside the cassette. Remove the cassette to access it.

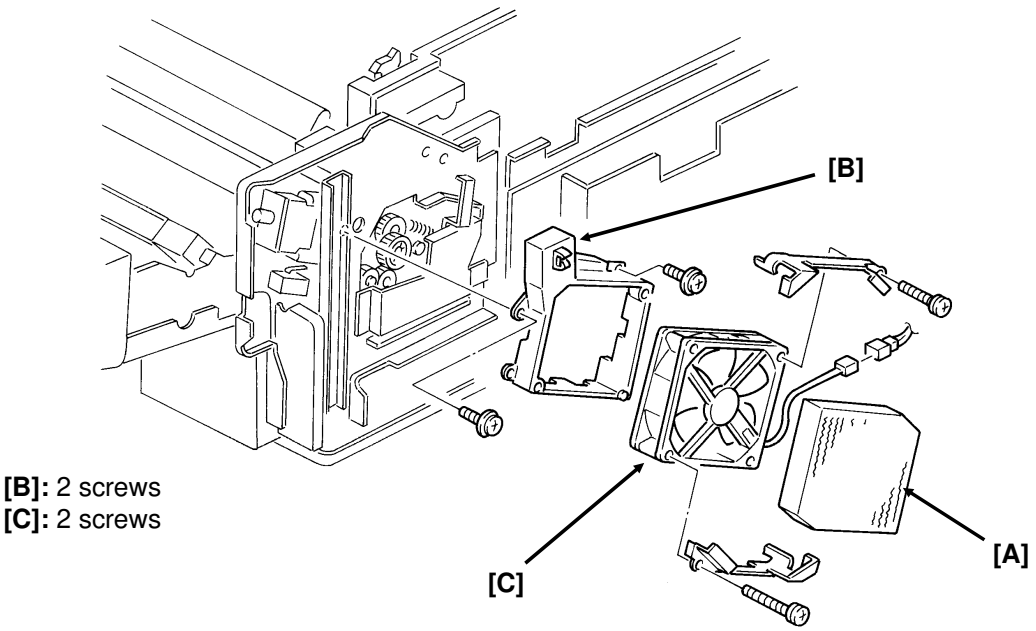
5.9.6. PFU Board [A]



- Remove the left cover to access this component (see section 5-9-1).

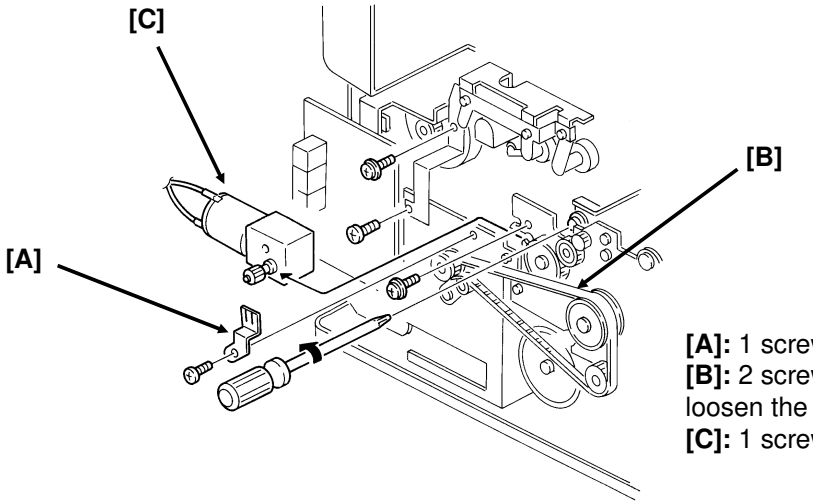
5.10. OTHERS

5.10.1. Ozone Filter [A] and Ozone Fan [C]



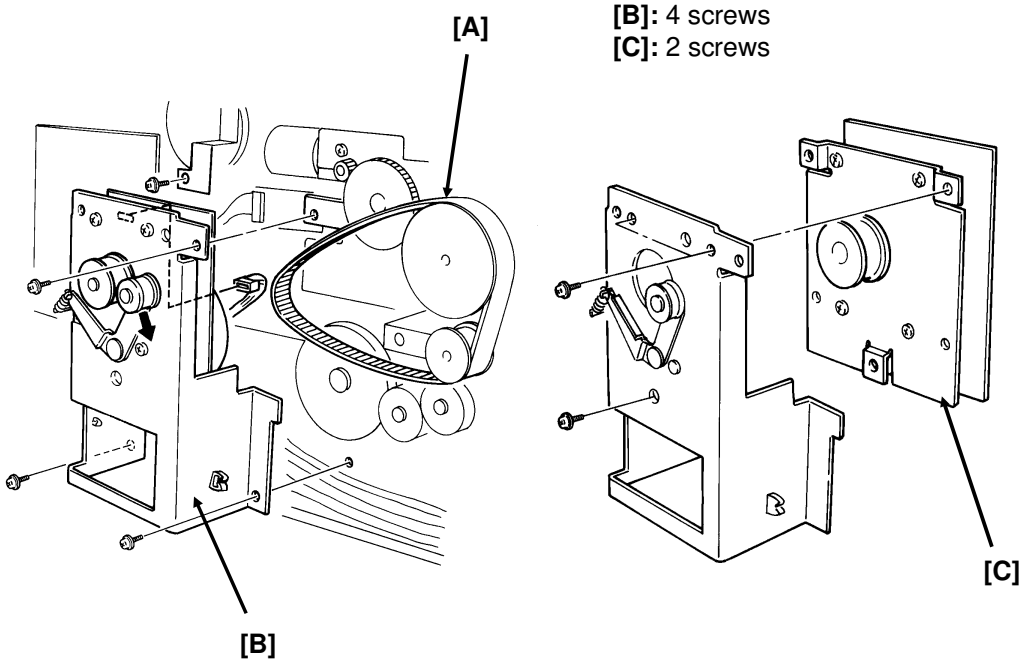
- First, remove the right cover (see section 5-1).

5.10.2. Toner Supply Motor [C]



- First, remove the left cover (see section 5-1).

5.10.3. Main Motor [C]



- First, remove the left cover (see section 5-1).

6. TROUBLESHOOTING

6.1. COPY QUALITY TROUBLESHOOTING

If there is a copy quality problem that cannot be solved easily, try using the following troubleshooting flow chart, while referring to the point-to-point diagram. The flow chart may not be exhaustive, but it may help you to find the problem.

Symptom: Blank copies		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4-1-12). Is it OK?	There may be a scanner problem; go to step 15.	Go to step 2.
2. Is the master installed correctly?	Go to step 3.	Install it properly.
3. Does the master rotate correctly during the copy cycle?	Go to step 4.	Correct any problems with the mechanism.
4. Is the master grounded properly?	Go to step 5.	Check the grounding wire, terminals and plates. Clean or replace if necessary.
5. Are any of the laser optical components broken, blocked, or misaligned?	Correct the problem.	Go to step 6.
6. Are the transfer corona unit and wire correctly installed?	Check the connections between the corona wire and the FCU. Go to step 7.	Correct the problem.
7. Does the FCU output the power and corona trigger signal to the power pack?	Clean the transfer corona unit. Go to step 8.	Change the FCU.
8. Does the problem go away if you change the power pack?	Finished.	Go to step 9.
9. Does the development bias terminal reach the correct voltage (about -530 Vdc)?	Go to step 12.	Go to step 10. Do not adjust the variable resistors on the power pack.
10. Does the FCU output the power and bias trigger signal to the power pack?	Clean the area around the bias terminal. Go to step 11.	Change the FCU.
11. Does the problem go away if you change the power pack?	Finished.	Clean the development roller. Go to step 12.
12. Does the development roller attract toner?	Check all LDDR - FCU - interlock switch connections. Go to step 13.	Replace the roller.

Symptom: Blank copies		
Check	**Action if Yes**	**Action if No**
13. Is the laser diode unit screwed in properly?	Go to step 14.	Install it properly.
14. Do the interlock switches close when the cover is closed, and do they pass power to the LDDR?	Change the LD unit, FCU, master unit, or varistor.	Change them.
15. Check the FCU - SBU connection. Is there a signal from the SBU (AVIDEO)?	Go to step 16.	Light the xenon lamp. Align the SBU (see section 5-2-9); replace the FCU or SBU if impossible.
16. Does the problem only occur when printing from memory?	Check the connection to the memory card. Change the memory card, FCU, or MBU.	Go to step 17.
17. If the problem only occurs during communication, check the FCU - NCU - line connections. Check for severe line problems. If the problem cannot be found, replace the NCU or FCU.		

Symptom: Black copies		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4-1-12). Is it OK?	There may be a scanner problem; go to step 10.	Go to step 2.
2. Are the charge corona unit and wire correctly installed?	Check the connections between the corona wire and the FCU. Go to step 3.	Correct the problem.
3. Does the FCU output the power and corona trigger signal to the power pack?	Clean the charge corona unit. Go to step 4.	Change the FCU.
4. Does the problem go away if you change the power pack?	Finished.	Go to step 5.
5. Is the varistor shorted?	Change the varistor.	Go to step 6.
6. Is the master grounded properly?	Go to step 7.	Check the grounding wire, terminal and plate. Clean or replace if necessary.
7. Does the development bias terminal reach the correct voltage (about -530 Vdc)?	Go to step 10.	Go to step 8. Do not adjust the variable resistors on the power pack.
8. Does the FCU output the power and bias trigger signal to the power pack?	Clean the area around the bias terminal. Go to step 9.	Change the FCU.
9. Does the problem go away if you change the power pack?	The laser beam may always be on. Change the FCU or LD unit.	Clean the development roller. Go to step 10.
10. Check the connections from the FCU to the xenon lamp. Does the lamp work?	Go to step 12.	Go to step 11.

Symptom: Black copies		
Check	**Action if Yes**	**Action if No**
11. Does the FCU output the power and drive signals to the lamp driver?	Change the xenon lamp or the drive board.	Change the FCU.
12. Check the FCU - SBU connection. Is there a signal from the SBU (AVIDEO)?	Go to step 13.	Light the xenon lamp. Align the SBU (see section 5-2-9); replace the FCU or SBU if impossible.
13. Does the problem only occur when printing from memory?	Check the connection to the memory card. Change the memory card, FCU, or MBU.	Go to step 14.
14. If the problem only occurs during communication, check the FCU - NCU - line connections. Check for severe line problems. If the problem cannot be found, replace the NCU or FCU.		

Symptom: Faint copy		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4-1-12). Is it OK?	There may be a scanner problem; go to step 7.	Go to step 2.
2. Try the following steps (a to f) to solve the problem. If they fail, check the connections through the machine between the FCU, toner near-end sensor, and toner supply motor. Then go to step 3. a) Replace the master. b) If the Add Toner indicator is lit, add toner. c) Clean or replace the corona wires. d) Clean the toner metering blade (soft cloth and alcohol). e) If the copy paper is damp, replace it. f) If the toner contains dirt or paper particles, replace it.		
3. Has the toner run out even though the Add Toner indicator is not lit?	Check the sensor actuator mechanism. Change the sensor if necessary.	Go to step 4.
4. Does the toner supply motor turn just after the main power is switched on?	Go to step 5.	Change the toner supply motor or the FCU.
5. Work through steps 4 to 12 of "Blank copies".		
6. Change the varistor, FCU, or LD unit .		
7. Clean the exposure glass and the white plate in the scanner.		

Symptom: Faint copy at leading or trailing edge		
Check	**Action if Yes**	**Action if No**
The paper in the cassette may be curled at the leading edge The paper in the cassette may be damp. The paper may be too thick or too thin. Instruct the user how to store paper, and instruct them to use recommended types and weights of copy paper.		

Symptom: Dirty background all over the copy		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4-1-12). Is it OK?	There may be a scanner problem; go to step 13.	Go to step 2.
2. Try the following steps (a to f) to solve the problem. If they fail, go to step 3. a) Clean the quenching lamp and cleaning blade. b) Tighten the toner metering blade securing screws (see section 5-6-2). c) If the toner contains dust or paper particles, change the CTM. d) Clean the area around the bias terminal of the development unit. e) If the pattern is constant down the page, clean the laser optics with a blower brush, or clean or replace the corona wires.		
3. Is the master grounded properly?	Go to step 4.	Check the grounding wire, terminals and plates. Clean or replace if necessary.
4. Is the varistor shorted?	Change the varistor.	Go to step 5.
5. Does the development bias terminal give a constant correct voltage (about -530 Vdc)?	Go to step 8.	Go to step 6. Do not adjust the variable resistors on the power pack.
6. Does the FCU output constant power and bias trigger signals to the power pack?	Clean the area around the bias terminal. Go to step 7.	Change the FCU.
7. Does the problem go away if you change the power pack?	Finished.	Go to step 8.
8. Are the charge corona unit and wire correctly installed?	Check the connections between the corona wire and the FCU. Go to step 9.	Correct the problem.
9. Does the FCU output constant power and corona trigger signals to the power pack?	Clean the charge corona unit. Go to step 10.	Change the FCU.
10. Does the problem go away if you change the power pack?	Finished.	Go to step 11.
11. Does the quenching lamp operate correctly?	Go to step 13.	Check the connections between the FCU and lamp. Go to step 12.
12. Does the FCU send constant power and drive signals to the lamp?	Replace the quenching lamp.	Replace the FCU.
13. Try replacing the master unit.		
14. Clean the scanner optics, exposure glass, and white plate. Check the SBU white waveform for peaks, dropouts, or noise in the signal. Change the SBU or FCU if such wave patterns are present. Adjust the RAM addresses containing contrast threshold levels.		

Symptom: Stray toner flecks fused into the copy		
Check	**Action if Yes**	**Action if No**
1. Clean the inside of the machine, especially around the development and transfer unit. Clean the cleaning blade. Clean the rollers in the fusing unit.		
2. Replace the master unit or CTM.		

Symptom: Previous copy shows faintly		
Check	**Action if Yes**	**Action if No**
1. Does the quenching lamp operate correctly?	Clean or replace the master.	Check the connections between the FCU and lamp. Go to step 2.
2. Does the FCU send constant power and drive signals to the lamp?	Replace the quenching lamp.	Replace the FCU.

Symptom: Density changes gradually across the printout		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4-1-12). Is it OK?	There may be a scanner problem; go to step 3.	Go to step 2.
2. Check that the charge corona wire is clean and that it is installed correctly. Check that none of the laser optic components are out of position. Check that toner is being distributed evenly across the development unit. If it is not, change the CTM, development unit, or toner supply motor. Try changing the master unit, quenching lamp, or the charge corona wire.		
3. The xenon lamp may need to be changed.		
4. Is the SBU scan line alignment is correct (see section 5-2-9)?	Change the FCU.	Change the SBU.

Symptom: Uneven density in vertical bands		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4-1-12). Is it OK?	There may be a scanner problem; go to step 3.	Go to step 2.
2. Clean or change the charge corona wire. Clean or change the quenching lamp. Clean the laser optic components with a blower brush or dry cloth. Check that toner is being distributed evenly across the development unit. If it is not, change the CTM, development unit, or toner supply motor.		
3. Clean the exposure glass, white plate, and scanner optics. Change the xenon lamp, especially if bands appear on the sides of copies made using copy mode.		
4. Are there any bands in the SBU white waveform (see section 5-2-9)?	Change the SBU.	Change the FCU.

Symptom: Uneven density in horizontal bands		
Check	**Action if Yes**	**Action if No**
1. Does the xenon lamp flicker?	Change the lamp.	Go to step 2.
2. Is there a clear boundary between the bands?	Clean the charge and transfer corona units (there could be a leak, so check if any Auto Service Calls were made).	Clean the development unit, its bearings, and drive mechanism. or replace the master unit and/or development unit.

Symptom: Thin vertical white lines		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4-1-12). Is it OK?	There may be a scanner problem; go to step 5.	Go to step 2.
2. Clean the grid plate, toner metering blade, and laser optics. Clean or replace the corona wires. Add toner if the toner supply is getting low. Check for foreign objects around the master that could cause leakage of charge form the belt.		
3. Is the surface of the hot roller scratched?	Replace the component that is damaging the hot roller, then replace the hot roller. If the hot roller strippers are badly stained with toner, replace them, and the thermistor (or FCU or PSU).	Go to step 4.
4. Is the master scratched?	Replace the component that is doing the damage, then replace the master.	Finished
5. Clean the white pressure plate above the exposure glass.		
6. Are there any peaks in the SBU white waveform (see section 5-2-9)?	Change the SBU.	Change the FCU.

Symptom: Fuzzy vertical white lines		
Check	**Action if Yes**	**Action if No**
Clean or replace the corona wires.		

Symptom: Wavy vertical black lines or bands		
Check	**Action if Yes**	**Action if No**
The cleaning blade or toner metering blade may be dirty or damaged. Replace the hexagonal mirror motor.		

Symptom: Vertical dotted lines		
Check	**Action if Yes**	**Action if No**
1. If the master is scratched, replace the master, and the component that is scratching it.		
2. If the development roller is scratched, replace the roller, and the component that is scratching it.		
3. Clean the corona wires.		

Symptom: Vertical black band at the left or right edge of the printout		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4-1-12). Is it OK?	There may be a scanner problem; go to step 3.	Go to step 2.
2. Make sure that the charge corona wire cleaner is at home position. Clean the laser optics with a blower brush or soft dry cloth.		
3. Clean the scanner optics. Replace the xenon lamp.		

Symptom: Vertical black lines or bands at constant positions on the copy		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4-1-12). Is it OK?	There may be a scanner problem; go to step 5.	Go to step 2.
2. Clean the thermistor, hot and pressure rollers, and hot roller strippers. Change the cleaning pad if it is dirty. Is the surface of the hot roller scratched?	Replace the component that is damaging the hot roller, then replace the hot roller. If the hot roller strippers are badly stained with toner, replace them, and the thermistor (or FCU or PSU).	Go to step 3.
3. Is the master scratched?	Replace the component that is doing the damage, then replace the master.	Go to step 4.
4. Clean the corona wires and guide plates in the paper feed path. Clean the quenching lamp. Replace the toner metering blade if it is damaged. Clean the laser optics carefully with a blower brush or soft dry cloth. If the problem remains, change the FCU or LD unit.		
5. Clean the white pressure plate above the exposure glass.		
6. Are there any peaks in the SBU white waveform (see section 5-2-9)?	Change the SBU.	Change the FCU.

Symptom: Black stripes at the left and right edges of printouts		
Check	**Action if Yes**	**Action if No**
Clean the following components, or change them if the problem remains: Master unit, quenching lamp, xenon lamp, development roller.		

Symptom: Defects at repeating intervals on the printout		
Check	**Action if Yes**	**Action if No**
There is a defect on the master belt or on one of the rollers (the most likely ones are the hot roller, pressure roller, or development roller		

Symptom: Black streaks at the leading edge		
Check	**Action if Yes**	**Action if No**
Clean the hot roller strippers or change the master unit.		

Symptom: Black spots at the leading edge		
Check	**Action if Yes**	**Action if No**
Clean inside the machine, especially around the fusing unit and transfer unit entrances. Clean the transfer corona wire and check that it is installed properly. If the problem remains, change the transfer corona wire or the power pack.		

Symptom: Horizontal white lines or stripes across printouts		
Check	**Action if Yes**	**Action if No**
1. Make sure that the user is using the correct type of copy paper, and storing it in a dry place.		
2. Does the printout have a crease mark where the white band appears?	Check the paper feed mechanism and path from paper feed through transfer; correct any faults.	Go to step 3.
3. Does the development bias terminal stay at a constant voltage (about -530 Vdc)?	Go to step 6.	Go to step 4. Do not adjust the variable resistors on the power pack.
4. Does the FCU output the power and bias trigger signal to the power pack?	Clean the area around the bias terminal. Go to step 5.	Change the FCU.
5. Does the problem go away if you change the power pack?	Finished.	Clean the development roller. Go to step 6.
6. Clean the transfer corona unit (wire, endblocks, casing). Check and replace any parts that may be causing the corona charge to leak.		
7. Check that the development roller and master unit are both rotating smoothly, and that the start and stop at the same time. If there are any problems, do the following: a) Check the roller, master unit, and drive mechanism for any defective components, such as gears. b) Try changing the main motor.		

Symptom: Black page with horizontal white stripes		
Check	**Action if Yes**	**Action if No**
Replace the optic fibre cable from the main scan start detector. If the problem remains, change the LD unit or FCU.		

Symptom: Random black spots on the printout		
Check	**Action if Yes**	**Action if No**
The grid plate may not be grounded properly. If the problem cannot be corrected, try changing the charge corona unit, which contains the grid plate. If the surface of the development roller is dirty, clean it. The laser diode may be out of control. Change the LDDR or FCU.		

Symptom: Horizontal black stripes		
Check	**Action if Yes**	**Action if No**
1. Is the Call Service indicator lit?	Replace the LD unit or FCU.	Go to step 2.
2. Check that the master unit is installed properly and correctly grounded. Change the master unit if it is damaged. If the problem only occurs in copy mode, the xenon lamp may be flickering: change the lamp, driver, or FCU. If the problem remains, go to step 3.		
3. Does the development bias terminal stay at a constant voltage (about -530 Vdc)?	Go to step 6.	Go to step 4. Do not adjust the variable resistors on the power pack.
4. Does the FCU output the power and bias trigger signal to the power pack?	Clean the area around the bias terminal. Go to step 5.	Change the FCU.
5. Does the problem go away if you change the power pack?	Finished.	Clean the development roller. Go to step 6.
6. Check that the toner metering blade is screwed in securely.		

Symptom: White spots in black areas		
Check	**Action if Yes**	**Action if No**
Clean the development roller (soft cloth and alcohol). Clean the corona wires. If the problem cannot be solved, change the development unit, master, or power pack.		

Symptom: Data missing at the leading edge		
Check	**Action if Yes**	**Action if No**
1. Does the problem only occur during copying?	Go to step 2.	Go to step 3.
2. Check that the scan line sensor is in the correct position. Try changing the FCU.		
3. Is the correct type of copy paper being used, and is it curled at the leading edge? Check for dust on the rollers in the paper feed path. Lower cassette: Is the registration mechanism working correctly?		

Symptom: Part of the copy missing at the left or right edges		
Check	**Action if Yes**	**Action if No**
1. Does the problem only occur during copying?	Go to step 2.	Go to step 3.
2. Check the scanner optic path. Change the SBU or FCU.		
3. Check the laser optic path. Change the FCU.		

Symptom: Distorted printout		
Check	**Action if Yes**	**Action if No**
1. Does the problem only occur during copying?	Go to step 2.	Go to step 3.
2. Check that the document feed mechanism is operating smoothly.		
3. Poorly installed or defective hexagonal mirror motor. Blockage in the paper path. Check that the main motor, gears, rollers, and drive belts are moving smoothly.		

Symptom: Fuzzy copy		
Check	**Action if Yes**	**Action if No**
1. Does the problem only occur during copying?	Go to step 8.	Check the connections between the ozone fan and the FCU. Go to step 2.
2. Does the ozone fan turn on?	Go to step 4.	Go to step 3.
3. Does the fan receive the power and drive signals?	Replace the fan.	Replace the FCU (or PSU).
4. Change the ozone filter. Check for obstructions between the transfer unit and the fusing unit. Check that the master is grounded properly. Change the master unit. Clean or replace the corona wires. Clean the laser optics carefully with a blower brush or soft dry cloth. If the problem remains, go to step 5.		
5. Does the development bias terminal stay at a constant voltage (about -530 Vdc)?	Go to step 8.	Go to step 6. Do not adjust the variable resistors on the power pack.
6. Does the FCU output the power and bias trigger signal to the power pack?	Clean the area around the bias terminal. Go to step 7.	Change the FCU.
7. Does the problem go away if you change the power pack?	Finished.	Clean the development roller.
8. Clean the scanner optics and the xenon lamp. Check the SBU waveforms, especially MTF and reduction rate (section 5-2-9).		

Symptom: Unfused copy		
Check	**Action if Yes**	**Action if No**
Clean the thermistor in the fusing unit. Check the pressure roller spring mechanism. Change the thermistor, fusing unit, FCU, or PSU.		

Symptom: Jitter, image stretched down the page		
Check	**Action if Yes**	**Action if No**
1. Does the problem only occur during copying?	Go to step 3.	Go to step 2.
2. Check the paper feed drive mechanism (motors, gears, timing belts). Check for obstructions in the paper feed path. Jitter: Try changing the LD unit or FCU.		
3. Check the document feed drive mechanism (motors, gears, timing belts). Check the tx motor timing belt tension (see section 5-2-7). Replace the FCU or tx motor if the motor is making abnormal noise.		

Symptom: Magnification or reduction, filled-in characters		
Check	**Action if Yes**	**Action if No**
Adjust the SBU reduction rate (see section 5-2-9). If the problem only occurs in copy mode, check the paper size sensors. Replace the sensors or the FCU (or the PFU for the lower cassette).		

Symptom: Misaligned output - data shifted to the left or right		
Check	**Action if Yes**	**Action if No**
1. Check that the laser diode unit is screwed in properly. Check that the laser optics are not misaligned. Try changing the LD unit or FCU.		
2. Adjust the SBU scan start position (see section 5-2-9). Check that the scanner optics are not misaligned. Check that the document table is aligned properly (see section 5-2-3). Try changing the LD unit or FCU.		

6.2. MECHANICAL PROBLEMS

The following flow charts may help you find the problem. They do not include such obvious steps as checking the power connection or changing the PSU or FCU if nothing appears on the operation panel.

6.2.1. ADF/Scanner

Symptom: Non feed		
Check	**Action if Yes**	**Action if No**
1. Are the covers closed properly?	Go to step 2.	Close the covers securely.
2. Are the pick-up and feed rollers clean?	Go to step 3.	Clean the rollers with a soft cloth and water. Replace them if they are damaged.
3. Is the shutter mechanism blocked? (If the shutter does not lift up after pressing Start, the tx motor may be defective; see step 10.)	Free the mechanism.	Go to step 4.
4. Is the problem corrected by adjusting the separation roller (see section 5-2-2)?	Finished	Put the separation roller adjustment back to the original setting. Try replacing the separation roller. If that does not help, go to step 5.
5. Are the gears and spring clutches clean and working properly?	Go to step 6.	Clean the gears and clutches. Remove any debris from the mechanism.
6. Are the connections between the operation panel, FCU, and document sensor loose?	Connect the cables properly.	Go to step 7.
7. Does the LCD prompt change when a document is placed in the feeder?	Go to step 8.	Replace the document sensor, operation panel PCB, or FCU.
8. Are the connections between the PSU and FCU and the tx motor loose?	Connect the cables properly.	Go to step 9.
9. Does the tx motor work?	This troubleshooting procedure has finished.	Go to step 10.
10. Does the FCU receive +24V from the PSU?	Go to step 11.	Change the PSU.
11. Does the FCU output power and phase drive signals to the tx motor?	Replace the tx motor.	Replace the FCU.

Symptom: Skew caused by the scanner mechanism		
Check	**Action if Yes**	**Action if No**
1. Are the scanner rollers clean?	Replace the separation roller and or separation plate.	Clean the rollers using a oft cloth and water

Symptom: Jam		
Check	**Action if Yes**	**Action if No**
1. Are the scanner rollers clean?	Go to step 2.	Clean the rollers using a soft cloth and water
2. Is the document feed path blocked?	Go to step 3.	Remove any debris.
3. Is the scanner mechanism in good shape, and is the tx motor timing belt tension correct?	Go to step 4.	Correct the problem.
4. Are the connections between the operation panel, FCU, document width sensor, and scan line sensor loose?	Connect the cables properly.	Go to step 5.
5. Does the operation panel PCB receive signals from the scan line sensor and the document width sensor?	Replace the operation panel PCB or FCU.	Replace the document width sensor and/or scan line sensor.

Symptom: Abnormal noise		
Check	**Action if Yes**	**Action if No**
1. Is the machine assembled properly.	Go to step 2.	Correct the problem.
2. Are the springs and clutches in the feed/pick-up mechanism clean?	Replace the tx motor or the FCU.	Clean them.

Symptom: Double feed		
Check	**Action if Yes**	**Action if No**
1. Is the problem solved by cleaning or lubricating the separation roller?	Finished	Try cleaning or replacing the separation plate. If that does not help, go to step 2.
2. Does adjusting the separation roller solve the problem (see section 5-2-x)?	Finished	Put the adjustment back to the original position, and replace the separation roller .

Symptom: Dirty document		
Check	**Action if Yes**	**Action if No**
Clean the rollers and guide plates using a soft cloth and water.		

Symptom: Second page not fed in		
Check	**Action if Yes**	**Action if No**
1. Clean the rollers using a soft cloth and water.		
2. Are the connections between the operation panel, FCU, and scan line sensor loose?	Connect the cables properly.	Go to step 3.
3. Does the operation panel PCB receive signals from the scan line sensor?	Replace the operation panel PCB or FCU.	Replace the scan line sensor.

6.2.2. Printer

Symptom: Non-feed		
Check	**Action if Yes**	**Action if No**
1. Check that non-feed is not due to another problem, such as "Call Service" being lit, or the power cord not being plugged in. Check that the feed-in area is not jammed with debris. Check that the covers are closed properly. Clean or replace the pick-up and feed rollers, and check that the paper lift and feed mechanisms are working properly. Lower cassette: Check the separation roller and spring clutch. Clean/replace if necessary. If the problem only happens during communication, check the connections between the FCU, NCU, and telephone line.		
2. Are the connections between the FCU and the upper paper size and end sensors loose? If the problem is in the lower cassette, check the connections from the FCU to the PFU and lower paper size and end sensors.	Connect the cables properly.	Go to step 3.
3. Do the upper or lower cassettes' Add Paper indicators light even if paper is present?	Go to step 4.	Go to step 7.
4. Do the upper or lower cassettes' Add Paper indicators light when the cassettes are installed in the machine?	Go to step 5.	Go to step 6.
5. Do the signals from the paper size sensor change when the cassette is installed?	Change the PFU (lower cassette only) or FCU.	Change the sensor and/or the actuator mechanism.
6. Does the signal from the paper end sensor change when paper is added?	Change the PFU (lower cassette only) or FCU.	Change the sensor and/or the actuator mechanism.
7. Are the connections between the PSU, FCU, front cover switch and front cover interlock switch cover loose?	Connect the cables properly.	Go to step 8.
8. Does the signal from the front cover switch change when the cover is closed?	Go to step 9.	Change the switch and/or the actuator mechanism.
9. Does the front cover interlock switch pass +24V and +5V from the FCU through to the FCU?	Go to step 10.	Change the switch and/or the actuator mechanism.

Symptom: Non-feed		
Check	**Action if Yes**	**Action if No**
10. Do the upper and lower paper feed motors and clutches operate?	Go to step 15	Go to step 11 (motors) or 13 (clutches).
11. Are the connections between the FCU and the upper and lower paper feed motors loose?	Connect the cables properly.	Go to step 12.
12. Does the FCU output power and drive signals to the motors?	Replace the defective motor.	Replace the FCU.
13. Are the connections between the FCU and the upper and lower paper feed clutches loose?	Connect the cables properly.	Go to step 14.
14. Does the FCU output power and drive signals to the clutches?	Replace the defective clutch.	Replace the FCU.
15. If the main and paper feed motors do not turn on but are in good condition, the basic starting conditions for printing may not have been met. The conditions are as follows: The fusing lamp must be at the correct temperature. See "Service Call Conditions: Hot Roller Down". The hexagonal mirror motor must have reached the correct speed. See "Service Call Conditions: Mirror Motor Locked". One page must have been stored in the page memory. Check the connections between the components of the video data path (see section 1-5-2) and replace any defective PCBs.		

Symptom: Copy Jam - General		
Check	**Action if Yes**	**Action if No**
1. Is the printer jammed with debris?	Clear the debris.	Go to step 2.
2. Is the correct type of paper being used, and is it correctly loaded in the cassette?		
3. Is a paper jam indicated when the power is switched on, even if there is no jam.	Go to step 4.	Go to step 5.
4. Does the FCU receive the correct signals from the registration, lower paper feed, and copy feed-out sensors?	Change the PFU (lower cassette only) and/or FCU.	Change the defective sensor.
5. Is the correct paper size sensor actuator being used?	Go to step 6.	Install the correct actuator.

Symptom: Copy Jam - General

Check	Action if Yes	Action if No
6. Is the paper size sensor (upper/lower) outputting the correct signals for the installed actuator? The signals that should be seen are shown in the following table.	If you suspect that the FCU or PFU is processing the sensor signals wrongly, change the FCU and/or PFU.	Change the sensor.

FCU Connector (Upper Cassette)	29-4	29-3	29-2
PFU Connector (Lower Cassette)	4-6	4-5	4-4
A5	L	L	L
Letter	H	L	L
A4	L	H	L
F, F4	L	H	H
Legal	H	H	L
B4	H	L	H

7. Are the connections between the FCU and the main motor loose?	Connect the cables properly.	Go to step 8.
8. Does the main motor work?	Go to step 10.	Go to step 9.
9. Does the FCU output power and drive signals to the main motor?	Replace the main motor.	Replace the FCU.
10. Do the upper/lower paper feed motors and clutches work? See steps 10 to 14 of "Non-feed".		

Symptom: Copy jam in the paper feed entrance (error code 9-07)

Check	Action if Yes	Action if No
1. Clean the rollers in the paper feed entrance. Replace any defective rollers		
2. Check the registration sensor and lower paper feed sensor (see steps 3 and 4 of "Copy jam - General").		
3. Do the upper/lower paper feed motors and clutches work? See steps 10 to 14 of "Non-feed".		

Symptom: Copy jam inside the machine (error code 9-08)

Check	Action if Yes	Action if No
1. Clean the registration rollers (metal rollers - soft cloth and alcohol, rubber rollers - soft cloth and water). Check the paper feed path and mechanism, especially the area around the entrance to the transfer/fusing unit. Check the fusing unit drive mechanism. Replace the pressure springs or fusing unit rollers or gears if necessary.		
2. Check the registration sensor and copy feed-out sensor (see steps 3 and 4 of "Copy jam - General").		

Symptom: Copy jam at the feed-out area (error code 9-09)		
Check	**Action if Yes**	**Action if No**
1. Clean the rollers in the copy feed-out area.		
2. Check the copy feed-out sensor (see steps 3 and 4 of "Copy jam - General").		

Symptom: Double feed		
Check	**Action if Yes**	**Action if No**
Upper cassette: Check the corner separator mechanism and side fences, and replace if necessary. Lower cassette: Clean, lubricate, or replace the separation roller.		

Symptom: Dog-eared copies		
Check	**Action if Yes**	**Action if No**
Excessive copy paper curl Defective hot roller stripper Incorrect corner separator/side fence position		

Symptom: Wrinkled copies		
Check	**Action if Yes**	**Action if No**
Check whether the problem can be solved by using another stack of paper. Check paper transport through the printer and replace the defective component. Replace the fusing unit pressure springs, or the entire fusing unit.		

Symptom: Soiled copy paper		
Check	**Action if Yes**	**Action if No**
Clean the rollers in the printer. If the dirt is part of the image, then clean the ADF and scanner rollers. Also, see Copy Quality Troubleshooting (section 6-1).		

Symptom: Dirt along the leading edge on the reverse side		
Check	**Action if Yes**	**Action if No**
See "Soiled Copy Paper" above. Clean the following components: transfer corona unit and vicinity, paper feed path, registration rollers (soft dry cloth), feed-out rollers.		

Symptom: Skew caused by the printer mechanism		
Check	**Action if Yes**	**Action if No**
Clean the rollers in the cassettes and paper feed path. Replace any defective rollers.		

Symptom: Ozone odour		
Check	**Action if Yes**	**Action if No**
1. Is the ozone fan working?	Change the ozone filter.	Go to step 2.
2. Does the FCU send power and drive signals to the fan?	Change the ozone fan.	Change the FCU.

6.3. SERVICE CALL CONDITIONS

If the Call Service indicator is lit, one of the following conditions has occurred. In the following list, the messages printed on the Auto Service Call printout are given followed by an explanation in brackets if necessary.

- Mirror Motor Locked (hexagonal mirror motor lock failure)
- Hot Roller Down (fusing lamp failure)
- LD Power Control Failure (laser diode power control failure)
- Main Motor Locked (main motor lock failure)
- Charger Leak (transfer corona charge leak)

To find out which problem has occurred, either:

- See the Auto Service Call report that was sent to the service station for the problem with the machine.
- Check the error code history using function 93.
- Try to clear the service call condition: switch the power off, wait 10 seconds, then switch back on.

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: Mirror Motor Locked (Error Code 9-23)

This error occurs in either of the following conditions:

- If FCU CN2-1 does not go low within 10 s of the hexagonal mirror motor being switched on
- If FCU CN2-1 goes back to high for 10 s or more during hexagonal mirror motor operation

Check	Action if Yes	Action if No
1. Check the connections through the machine between the PSU, FCU, interlock switches, hexagonal mirror motor and laser diode unit.		
2. Does the FCU receive +24V from the PSU?	Go to step 3.	Change the PSU or the front cover interlock switch.
3. Does the FCU send +24V to the motor?	Replace the motor and driver.	Replace the FCU.

Symptom: Hot Roller Down (Error Code 9-22)

For the error conditions that lead to this problem, see section 2-2-2.

Check	Action if Yes	Action if No
Is the fusing unit thermistor disconnected (FCU CN36)? Is the thermistor open or shorted? If so replace it. Otherwise clean it. Replace the fusing lamp if it is open circuit. Replace the thermostat if it is broken. Replace the FCU or PSU. Replace the front cover interlock switch if it does not pass +24V from the PSU to the FCU.		

Symptom: LD Power Control Failure (Error Code 9-20)

Check	Action if Yes	Action if No
1. Do the front cover interlock switch and front cover microswitch both pass +5V?	Replace the FCU or laser diode drive board.	Replace the defective switch or actuator mechanism.

Symptom: Main Motor Locked (Error Code 9-24)

This error occurs in either of the following conditions:

- If FCU CN22-4 does not go low within 10 s of the main motor being switched on
- If FCU CN22-4 goes back to high for 10 s or more during main motor operation

Check	Action if Yes	Action if No
1. Check that the mechanism is not obstructed.		
2. Does the front cover interlock switch pass +24V?	Replace the FCU or the main motor.	Replace the defective switch mechanism.

Symptom: Charger Leak (Error Code 9-17)

This error occurs if FCU CN23-3 stays high for 3 s or more while the transfer corona is on

Check	Action if Yes	Action if No
Clean the transfer corona wire and unit. Check that the FCU outputs the power and trigger signals to the power pack. If not, replace the FCU. Replace the FCU, power pack or transfer corona unit if the problem still occurs.		

6.4. ERROR CODES

If an error code occurs, retry the communication. If the same problem occurs, try to fix the problem as suggested below. Note that error codes 4-00, 01, 02, and 10 only appear in the error code display and on the service report.

Code	Meaning	Suggested Cause/Action
0-00	DIS/NSF not detected within 40 s of Start being pressed	Check the line connection. Check the NCU - FCU connectors. The machine at other end may be incompatible. Replace the FCU or NCU. 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 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 (use NCU parameter 01 or a dedicated tx parameter for that address). 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.
0-05	Unsuccessful after modem training at 2400 bps	Check the line connection. Check the NCU - FCU connectors. Try adjusting the tx level (use NCU parameter 01 or a dedicated tx parameter for that address). Replace the FCU or NCU. Check for line problems.
0-06	The other terminal did not reply to DCS	Check the line connection. Check the FCU - NCU connectors. Try adjusting the tx level (use NCU parameter 01 or a dedicated tx parameter for that address). Replace the NCU or FCU. The other end may be defective or incompatible; try sending to another machine. Check for line problems.
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.

Code	Meaning	Suggested Cause/Action
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 (use NCU parameter 01 or a dedicated tx parameter for that address). The other end may have a defective modem/NCU/FCU; try sending to another machine. Check for line problems and noise.
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 (use NCU parameter 01 or a dedicated tx parameter for that address). Replace the NCU or FCU.
0-15	The other end does not have the confidential or transfer function	Incompatible remote terminal. Remote terminal memory 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 (use NCU parameter 01 or a dedicated tx parameter for that address). 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.
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. Change the reconstruction time from 6 s to 10 s (bit switch 03, bit 7). Switch the rx cable equalizer on (bit switch 0A, bit 6).
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.
0-22	The signal from the other end was interrupted for more than 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.

Code	Meaning	Suggested Cause/Action
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. Ask the other end to adjust their tx level.
1-00	Document jam	Improperly inserted document or unsuitable document type. Clean the document jam sensor. See "Mechanical Operation - Document Jam".
1-01	Document length exceeded the maximum	Divide the document into smaller pieces. Clean the sensors in the ADF/scanner. See "Mechanical Operation - Document Jam".
1-10	Document in the scanning position at power-up	Clear debris from the sensor actuators. Clean the sensors in the ADF/scanner. Check the connections between the sensors and the FCU. Replace defective sensor, operation panel board, or FCU.
1-17	Document jam in the feed-out area	
1-20	Printer jam - paper did not reach the exit	Clear any debris from the sensors and the paper path. Clean the sensors in the printer. Check that the copy tray is not overloaded. Check the paper feed mechanism and paper path for faults. Check the connections from the FCU to the rx motor and printer sensors. Replace the rx motor, printer jam sensor, or FCU.
1-21	Printer jam - paper stuck at the exit	
1-30	Paper ran out during printing	Add paper. If paper is present, clean the paper end sensor and check the sensor circuit for defects. Replace the FCU or paper end sensor (or the PFU if the problem is in the lower cassette).
1-33	Paper end was detected when the machine was switched on	
1-34	Paper end was detected at the end of printing	
1-71	The printer cover was opened during printing	Check whether the user opened the cover during printing. Check the cover lock mechanism. Check the cover switch position and actuation. Check connections between the cover switch and the FCU. Replace the cover switch or the FCU.
2-00	An RST7.5 interrupt occurred while the modem was in use	Replace the FCU.
2-10	The modem cannot enter tx mode	
2-12	Modem clock irregularity	
2-20	Abnormal coding/decoding (cpu not ready)	Check the connections from the FCU to the MBU. Replace the FCU or MBU.

Code	Meaning	Suggested Cause/Action
2-31	Line connection failure (dc loop can't be closed)	Check the connections from the FCU to the NCU/line. Try the communication again. Replace the FCU or NCU.
2-32	Line connection failure (dc loop can't be opened)	Check the connections from the FCU to the NCU/line. Replace the NCU or 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 the FCU and the 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.	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.
5-20	Storage impossible because of a lack of memory	Temporary memory shortage; otherwise, replace the FCU or memory PCB.
5-21	Memory overflow	
5-22	The memory filled up while the second or later page of a document was being scanned	
5-23	The image quality of a confidential or substitute reception file was no good	Contact the sender and ask them to resend the message if necessary.
5-24	Same as code 5-22	
6-05	Facsimile data frame not received within 18 s of CFR, but there was no line fail (G3 ECM)	Check the line connection. Check connections from the FCU to the NCU. Check for a bad line or defective remote terminal. Replace the FCU, NCU or MBU. Switch the rx cable equalizer on (bit switch 0A, bit 6).
6-06	Coding/decoding error (G3 ECM)	Defective FCU. The other terminal may be defective.
6-08	PIP/PIN received in reply to PPS.NULL (G3 ECM)	The other end pressed Stop during communication. The other terminal may be defective.
6-09	ERR received (G3 ECM)	Check for a noisy line. Adjust the tx levels of the communicating machines. See code 6-05.

Code	Meaning	Suggested Cause/Action
6-10	Error frames still received at the other end after all communication attempts at 2400 bps (G3 ECM)	Check for line noise. Adjust the tx level (use NCU parameter 01or the dedicated tx parameter for that address). Check the line connection. Defective remote terminal.
6-11	Printer failed while receiving the second or later block of MMR coded ECM data (the reference line has already been erased from memory, so the data coming in after the printer error is not stored by substitute reception)	Return the printer to normal operation. Then contact the other end and ask them to resend the data. Check the copy feed-out sensor and the copy paper feed path. Replace the FCU.
6-99	V.21 signal not received at the expected time	Try again. The other end may be defective or the line may be bad. Otherwise, replace the NCU or FCU.
9-00	The machine sent PIN because a service call condition or printer error occurred during rx, and substitute rx was disabled	See "Service Call Conditions" (section 6-3). Check for a printer problem (see section 6-2-2).
9-02	DMA transfer to the printer failed	Defective FCU or MBU.
9-07	Copy jam at the cassette entrance	See section 6-2-2. If the problem remains, replace the FCU.
9-08	Copy jam inside the machine	See section 6-2-2. If the problem remains, replace the FCU.
9-09	Copy jam in the copy feed-out area	See section 6-2-2. If the problem remains, replace the FCU.
9-10	Toner end detected	Add toner. If toner is present, replace the toner near-end sensor, FCU, or development unit. If toner cannot be transferred from the CTM, change the CTM, CTM motor, or FCU.
9-12	Cover open	Check all the covers, and check that a CTM is installed. If all covers are closed, a cover switch may be defective. If the CTM is installed, the CTM sensor may be defective. Change the FCU or PSU (or PFU if there is a lower cassette in this machine).
9-13	Laser diode error	Change the FCU or the LDDR.
9-17	Transfer corona power leak	See section 6-3 (Charger Leak). If the problem remains, replace the FCU.
9-20	Laser diode power control failed	See section 6-3 (LD Power Control Failure). If the problem remains, replace the FCU.
9-22	Fusing lamp failure	See section 6-3 (Hot Roller Down). If the problem remains, replace the FCU.

Code	Meaning	Suggested Cause/Action
9-23	Hexagonal mirror motor lock failure, or laser main scan synch failure	See section 6-3 (Mirror Motor Locked). If the problem remains, replace the FCU.
9-24	Main motor lock failed	See section 6-3 (Main Motor Locked). If the problem remains, replace the FCU.
9-60	The machine sent PIN/DCN because of a mechanical error during reception, even though there was memory space available.	Repair the mechanical problem, then ask the other end to resend the message. Change the FCU.
9-61	The machine sent PIN/DCN because the memory filled up, even though the mechanism was not defective; the page was not printed	Check the paper feed path and printer for errors (if substitute reception has occurred). Make room in the memory, then ask the other end to resend the message. Change the FCU.
9-62	A mechanical error occurred after the memory filled up, so the data could not be backed up during reception	Check the machine for other problems and other error codes, and free up some memory space. Then ask the other party to resend. Change the FCU.
9-63	Same as 9-61, except that the page was printed (the page may contain errors or may not be complete)	See code 9-61
9-70	The machine sent a negative response (RTN or PIN), but paper feed was normal.	Check the machine for other problems and other error codes. Change the FCU.

6.5. ELECTRICAL COMPONENT DEFECTS

6.5.1. Defective Sensor Table

Sensor	Symptoms if Defective
Document sensor	"CLEAR ORIGINAL" or "TRANSMIT DIAL" is displayed at power-up.
	"READY SET DOCUMENT" is still displayed after a document is placed in the feeder.
Document width sensor	Reduction should take place if the original is wide enough to actuate the sensor and the copy paper is not wide enough to. However, there is no reduction.
	"CLEAR ORIGINAL" is displayed at power-up.
Scan line sensor	"CLEAR ORIGINAL" is displayed at power-up.
	"CLEAR ORIGINAL" is displayed soon after the start of copying.
Front cover sensor	There is no alarm on opening the cover, and "CLOSE COVER" is not displayed.
	"CLOSE COVER" is displayed at power-up.
CTM sensor	"ADD TONER" is displayed at power-up.
Toner near-end sensor	Toner is never transferred from the CTM to the development unit.
Upper paper size sensor	"ADD PAPER" is displayed at power-up.
	Page separation may be done even if the original is the same size as the copy paper.
Upper paper end sensor	The Replace Paper indicator lights even if paper is remaining.
	The Replace Paper indicator does not light when the paper has run out.
Lower paper size sensor	"ADD PAPER" is displayed at power-up.
	Page separation may be done even if the original is the same size as the copy paper.
	If the original and the paper in the two cassettes are all of the same size, paper will be fed from the upper cassette.
Lower paper end sensor	The Replace Paper indicator on the lower cassette's operation panel lights even if paper is remaining.
	The Replace Paper indicator on the lower cassette's operation panel does not light when the paper has run out.
Registration sensor Copy feed-out sensor	"CLEAR COPY" is displayed at power-up.
	"CLEAR COPY" is displayed soon after the start of copying.

Sensor	Symptoms if Defective
Lower paper feed sensor	The Copy Jam indicator on the lower cassette's operation panel lights at power-up.
	The Copy Jam indicator on the lower cassette's operation panel lights soon after the start of copying.

6.5.2. Blown Fuse Table

The only service-replaceable fuse is the following.

Fuse	Symptoms if Defective
PSU - F1	No power to the machine