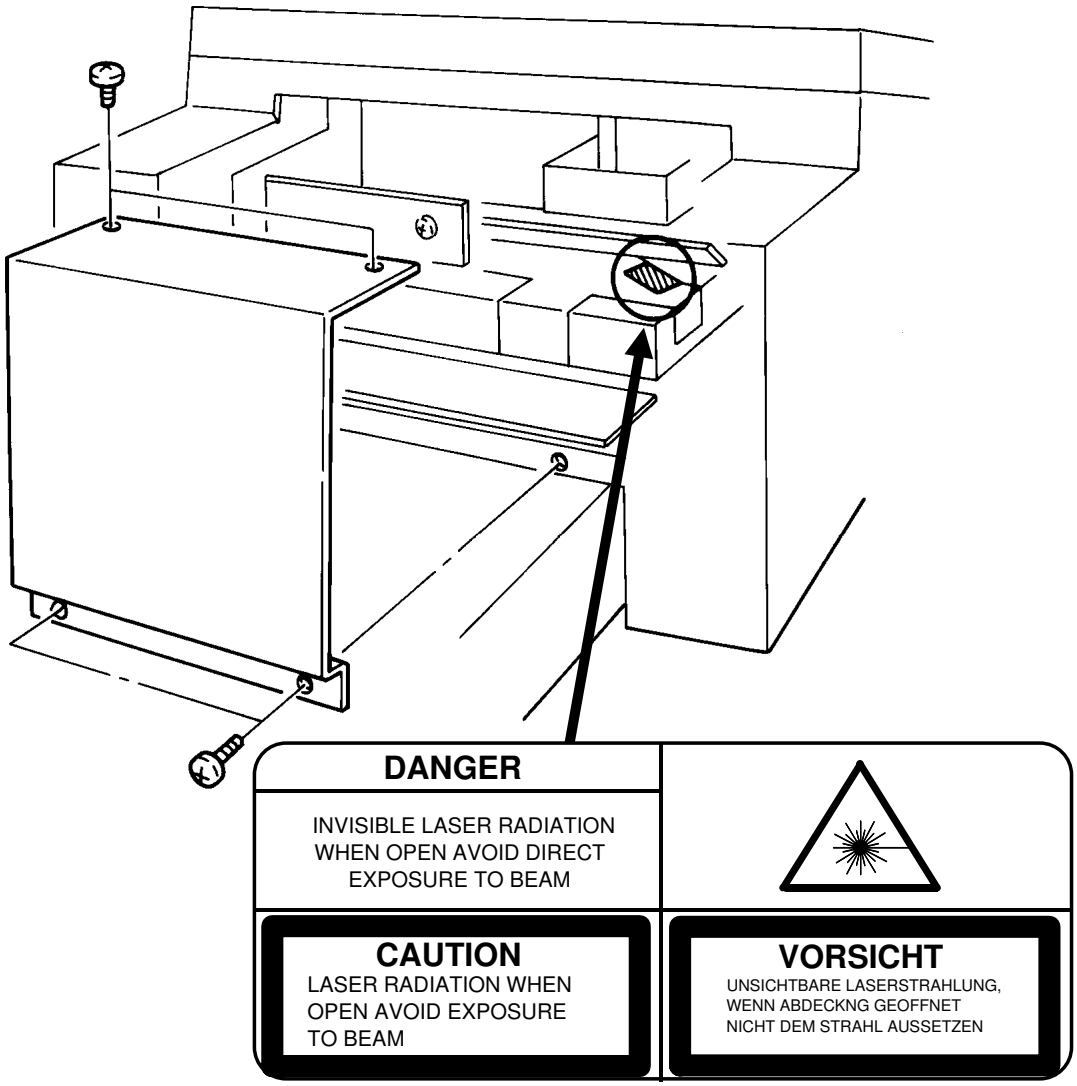
RICOH FAX 4500L

SERVICE MANUAL


DANGER
INVISIBLE LASER RADIATION
WHEN OPEN AVOID DIRECT
EXPOSURE TO BEAM
CAUTION
LASER RADIATION WHEN
OPEN AVOID EXPOSURE
TO BEAM
VORSICHT
UNSICHTBARE LASERSTRAHLUNG,
WENN ABDECKNG GEOFFNET
NICHT DEM STRAHL AUSSETZEN

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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:	20 lb paper	0.05 to 0.2 mm [2 to 8 mils]
	Manual Feed	0.04 to 0.4 mm [1.6 to 16 mils]

Document Feed
Automatic feed, face down

ADF Capacity
50 sheets (using 20 lb paper)

Scanning Method
Flat bed, with CCD

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

Scan Resolution
Main scan: 200 dpi
Sub scan:

Standard	100 dpi
Detail	200 dpi
Fine	400 dpi

Memory Capacity
ECM: 128 kbytes (double buffer)
SAF: Base machine - 1 Mbyte (62 pages), with optional extra 1 Mbyte or 2 Mbytes (max 123 or 185 pages respectively), or 20 Mbyte hard disk (1,200 pages total)

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

Modulation
V.33/V.17 (TCM), V.29 (QAM), V.27ter (PHM), V.21 (FM)

Protocol
Group 3 with ECM, Group 4 kit available

Data Rate
14,400/12,000/9,600/7,200/4,800/2,400 bps; automatic fallback

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

Transmission Time
6 s at 14,400 bps (G3 ECM) 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: Letter, Legal
Lower Cassette: Letter, Legal, A4, B4

Maximum Printout Width
210 mm [8.3 ins]
250 mm [9.8 ins] if a lower cassette is installed

Maximum Printer Resolution
Main scan: 400 dpi
Sub scan: 400 dpi

Power Supply
115 ± 20 Vac, 60 ± 1 Hz

Power Consumption (Base Machine Only)
Standby: 35 W **Transmit:** 40 W
Receive: 180 W **Copying:** 310 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 or hard disk only,
B = With lower cassette only,
C = With Group 4 kit only

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)	O
Hard disk (option only)	O
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 redialing	O
Confidential reception	A
Dual Access	O
Substitute reception	O
Transmission Reserve	X

Communication Features - User Selectable	
Action as a transfer broadcaster	A
Al Redial	O
Alternative Destination	X
Answering machine	X
Authorized Reception	O
Auto-answer delay time	X
Auto dialing (pulse or DTMF)	O
Auto Document	X
Automatic Voice Message	X
Auto-note	X
Batch Transmission (max 200 batches)	O
Broadcasting	O
Chain Dialing	O
Communication Result Display	O
Confidential ID Override	O
Confidential Transmission	O
Direct Fax Number Entry	O
Economy Transmission	O
Economy Transmission Time	O
Forwarding (5 stations)	A
Free Polling	O
Groups (10 groups)	O
Group Transfer Station	O
Hold	X
ID Transmission Option	O
Immediate Redialing	O
Immediate transmission	O
Keystroke Programs	O
Mailbox	X
Memory transmission (this is the default mode)	O
Multi-step Transfer	O
Next Transfer Station	C
Notify	X
On Hook Dial	O
Page Count	O
Personal Codes	O
Personal Codes with Conf ID	O
Polling Reception	O
Polling Transmission	O
Polling tx file lifetime in the SAF	O
Quick Dial (32 stations)	O

Communication Features - User Selectable	
Reception modes (Fax, Tel, ~~Auto~~)	O
Reduction	O
Remote control features	X
Remote Transfer	X
Restricted Access (50 codes, without cards)	O
Secured Polling	O
Secured Polling with Stored ID Override	O
Secure Transmission	O
Send Later	O
Silent ringing detection	X
Speed Dial (100 stations)	O
Telephone Directory	O
Tonal Signal Transmission	O
Transfer Request	O
Transmission Deadline	O
Turnaround Polling	X
Two-step Transfer	C
Voice Request (immed. tx only)	O

Communication Features - Service Selectable	
AI Short Protocol	O
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
Inch-mm conversion	O
MV1200 compatibility	X
Page retransmission	O
Page separation mark	O
Protection against wrong conn.	O
Resol'n stepdown override option	X
Short Preamble	O
Well log	O

Other User Features	
Area Code Prefix	O
Auto Service Call	O
Center mark	O
Checkered mark	O
Clearing a memory file	O
Clearing a polling file	O
Clock	O
Confidential ID	O
Copy mode	O
Counters	O
Country code	O
Destination Check	O
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
Secure ID	O
Speaker volume control	O
Specified Cassette Selection	B
Substitute reception on/off	O
Telephone line type	O
TTI on/off	O
User Function Keys	O
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
TCR	O
Transfer Result Report	O
Transmission Deadline Report	O
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
Quick Dial List	O
Specified Cassette Selection List	B
Speed Dial List	O
TCR	O
Transmission Status Report	X
User Function List	O
User Parameter List	O

Service Mode Features	
Back-to-back test	O
Bit switch programming	O
Buzzer test	O
Cable equalizer	O
Comm. parameter display	O
Counter check	O
DTMF tone test	O
Echo countermeasure	O
Error code display	O
File Transfer	O
LCD contrast adjustment	O
Memory file printout (all files)	O
Modem test	O

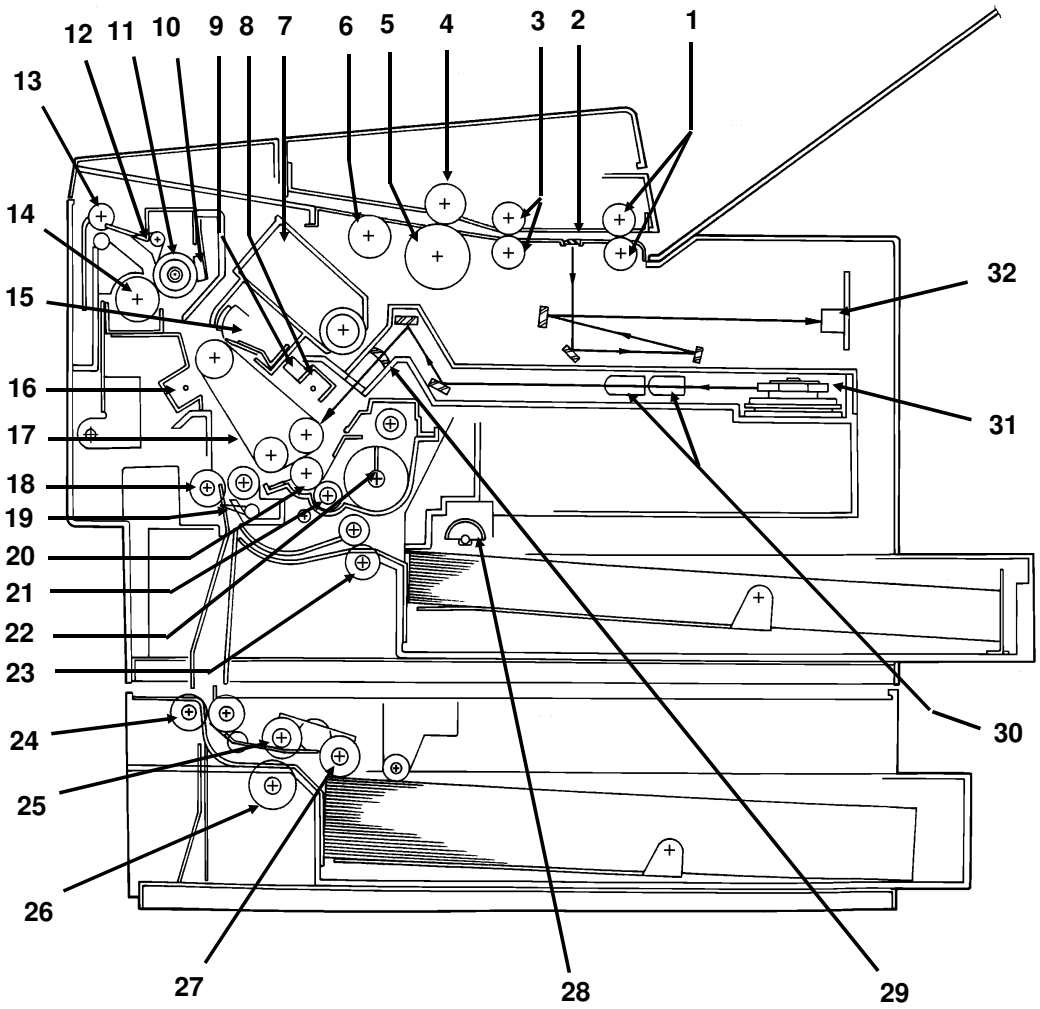
Service Mode Features	
NCU parameters	O
Operation panel test	O
Printer mechanism test	X
Printer test patterns	O
Programmable attenuation	X
Protocol dump list	O
RAM display/rewrite	O
RAM dump	O
RAM test	O
Ringer test	X
Scanner lamp test	O
Scanner mechanism test	O
Sensor initialization	X
Serial number	O
Service monitor report	O
Service station number	O
System parameter list	O
Technical data on the TCR	O
Thermal head parameters	X
Transmission Status Report	X

Memory Files

Max. number of files: 200
Max. number of stations/file: 200
Max. number of stations overall: 500
Max. number of pages overall: 1,200

1.3. COMPONENT LAYOUT

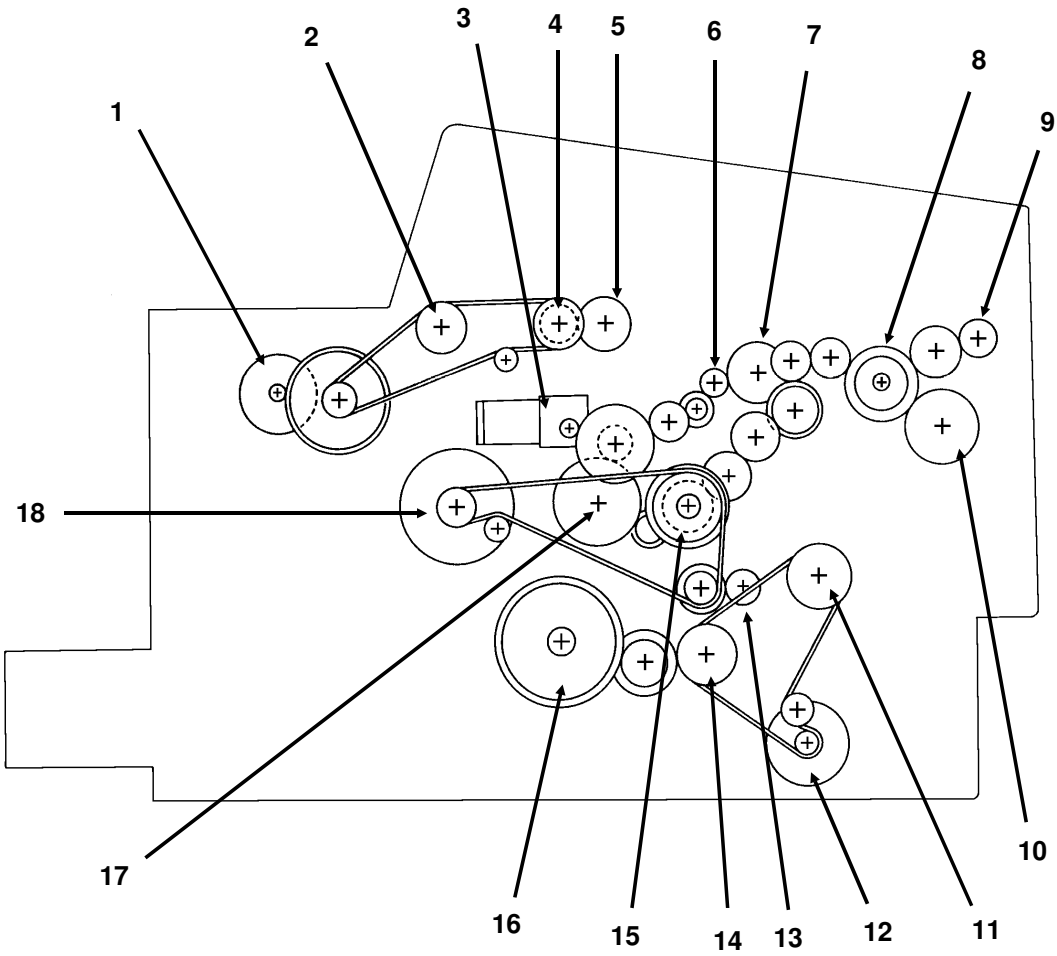
1.3.1. Mechanical Components

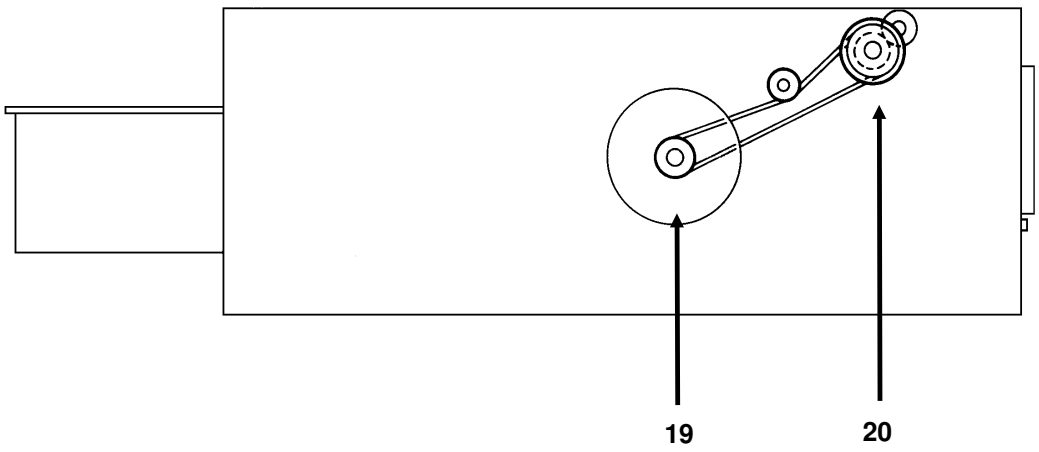


1.	R2 Rollers	Feed the document through the scanner.
2.	Exposure Glass	Exposes the original to light from the xenon lamp.
3.	R1 Rollers	Feed the document through the scanner.
4.	Separation Roller	Allows one page into the scanner.
5.	Document Feed Roller	Feeds the document into the scanner.
6.	Pick-up 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.

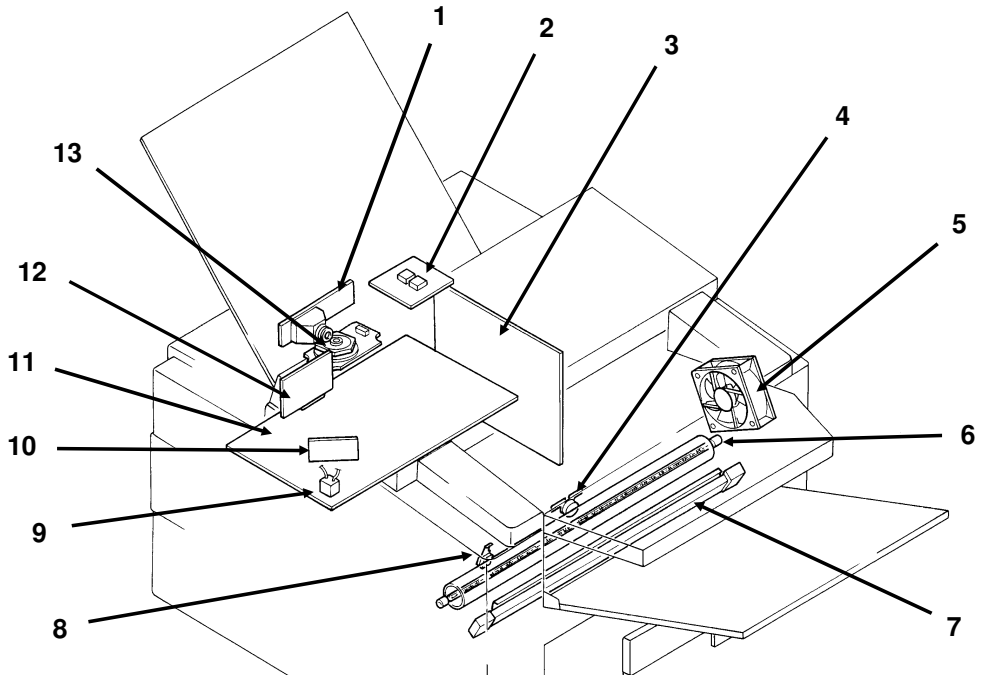
1.3.2. Drive Components

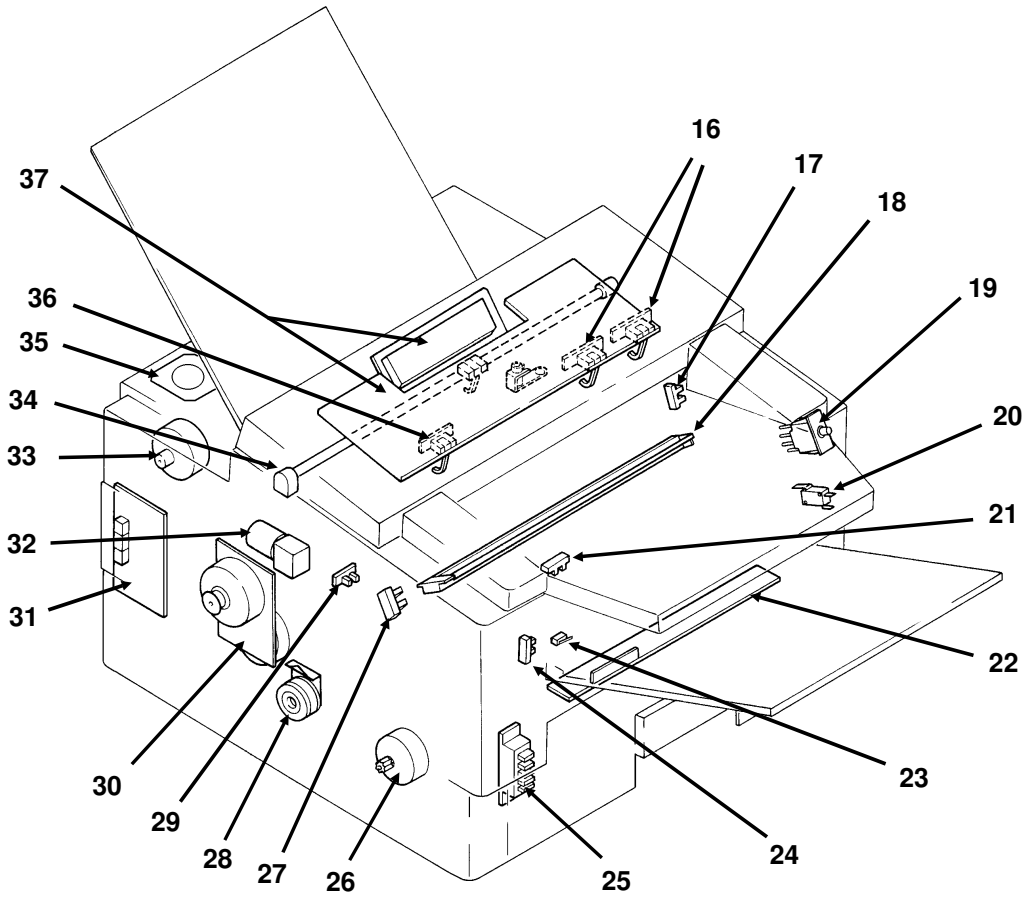


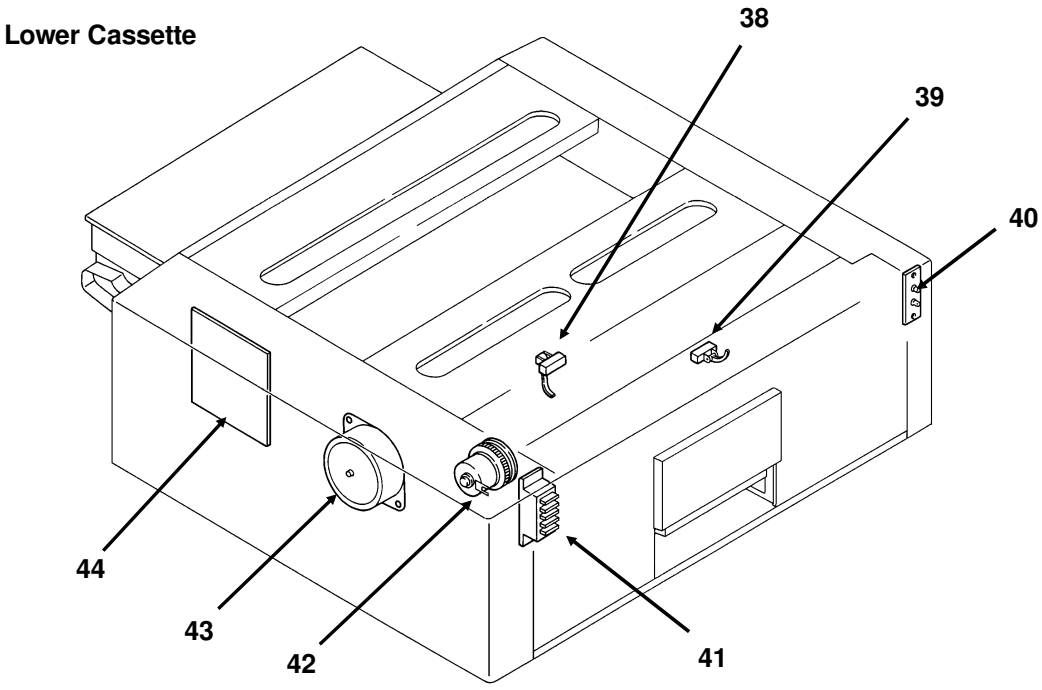


1.	Tx Motor	This stepper motor drives the scanner.
2.	R2 Roller	This feeds the original through the scanner.
3.	Toner Supply Motor	This dc motor drives the toner supply mechanism.
4.	R1 Roller	This feeds the original through the scanner.
5.	Shutter Drive Gear	This ensures that the shutter moves out of 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





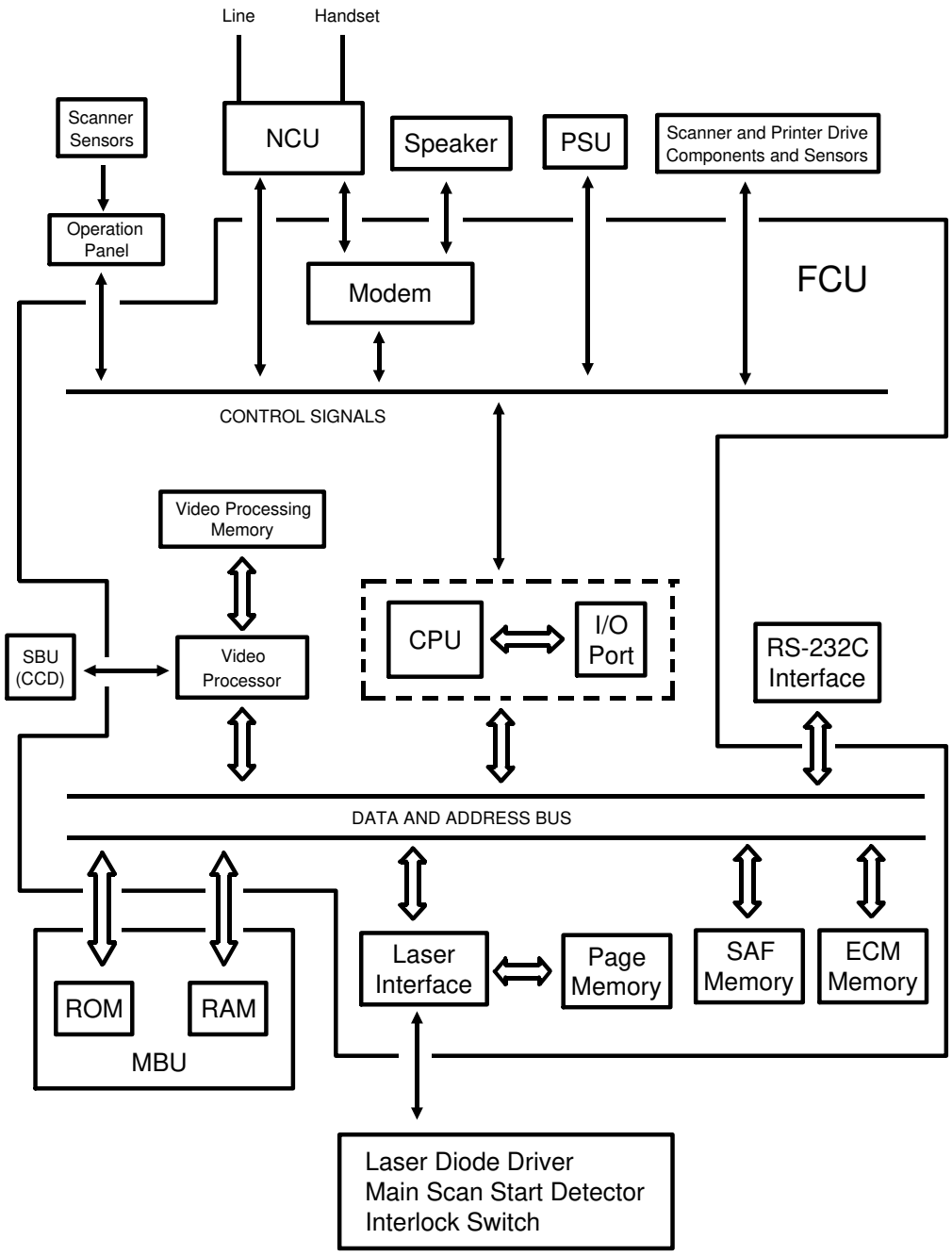


Name	Description	No.
PCBs		
FCU	This board controls the machine.	11
MBU	This board contains the system ROM and RAM for storing system parameters such as bit switch settings and programmed telephone numbers.	12
SBU	This board contains the CCD.	1
OP-PORT	This board controls the operation panel.	37
NCU	This board contains relays and switches for interfacing the machine to the network and the handset.	31
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.	33
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.	32
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"] or A3-width [11.7"] 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.	35
Xenon Lamp	This lamp illuminates the document.	34
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 modem consists of a chip on the FCU board that carries out all the analog and digital functions of a fax modem.

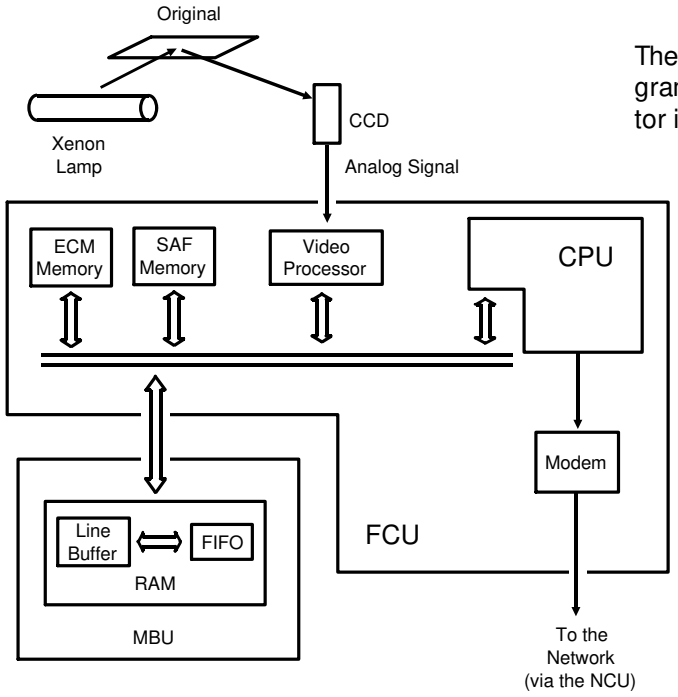
1.5. VIDEO DATA PATH

The following diagrams show the data path for this model.

1.5.1. Transmission

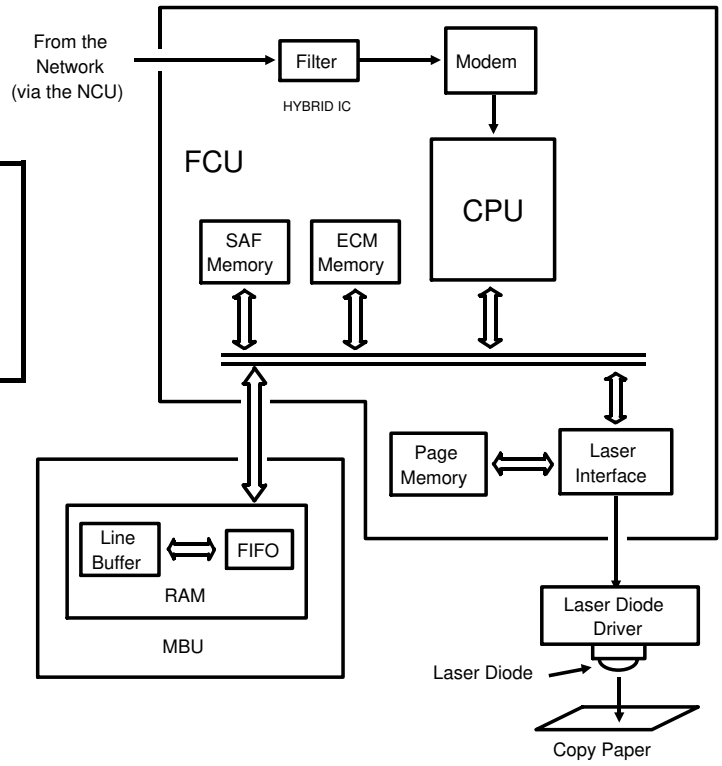
Reference:
Group 3 Facsimile Manual, section 1-3-1

There is no programmable resistor in this model.



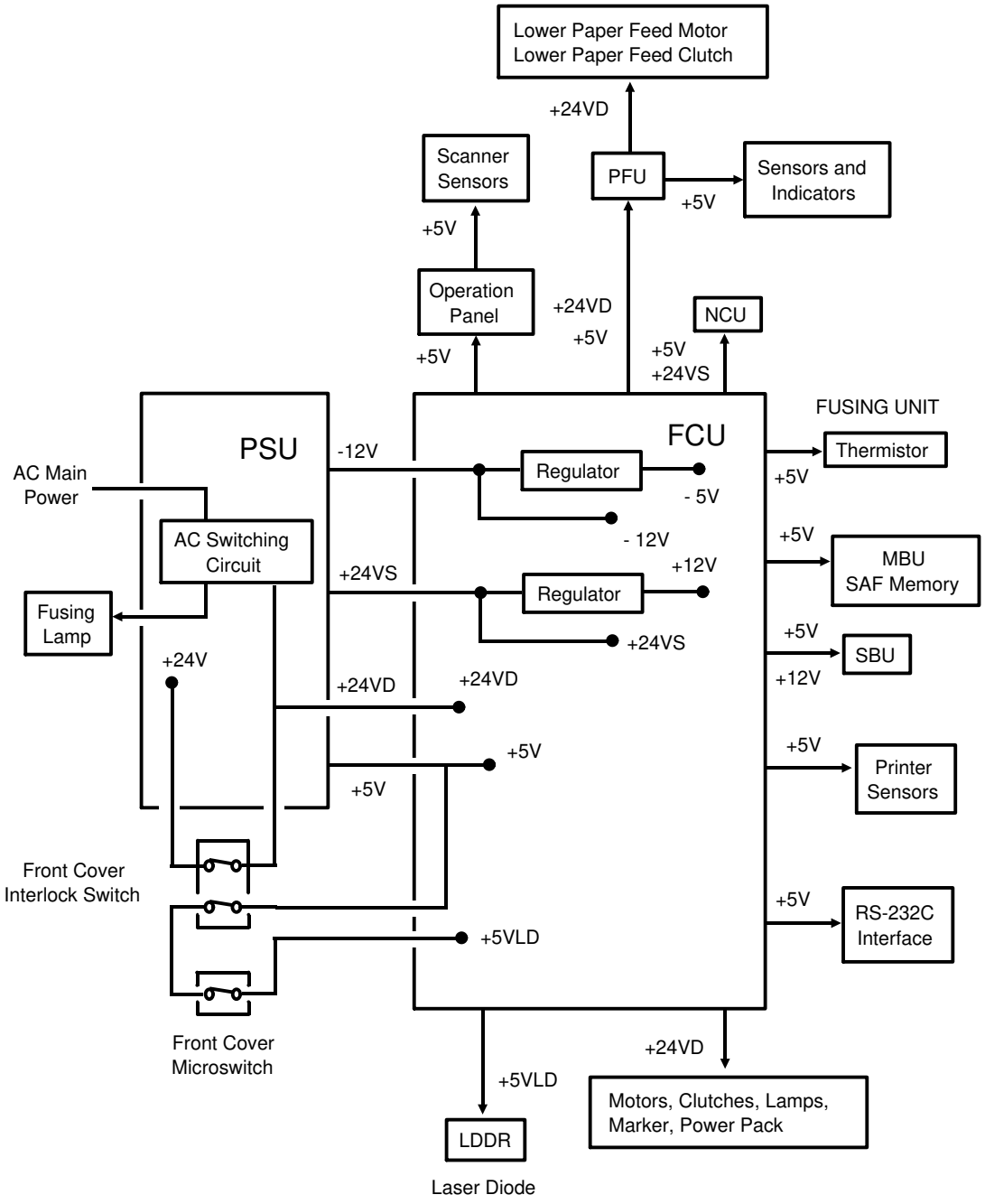
1.5.2. Reception

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



1.6. POWER DISTRIBUTION

1.6.1. Distribution Diagram

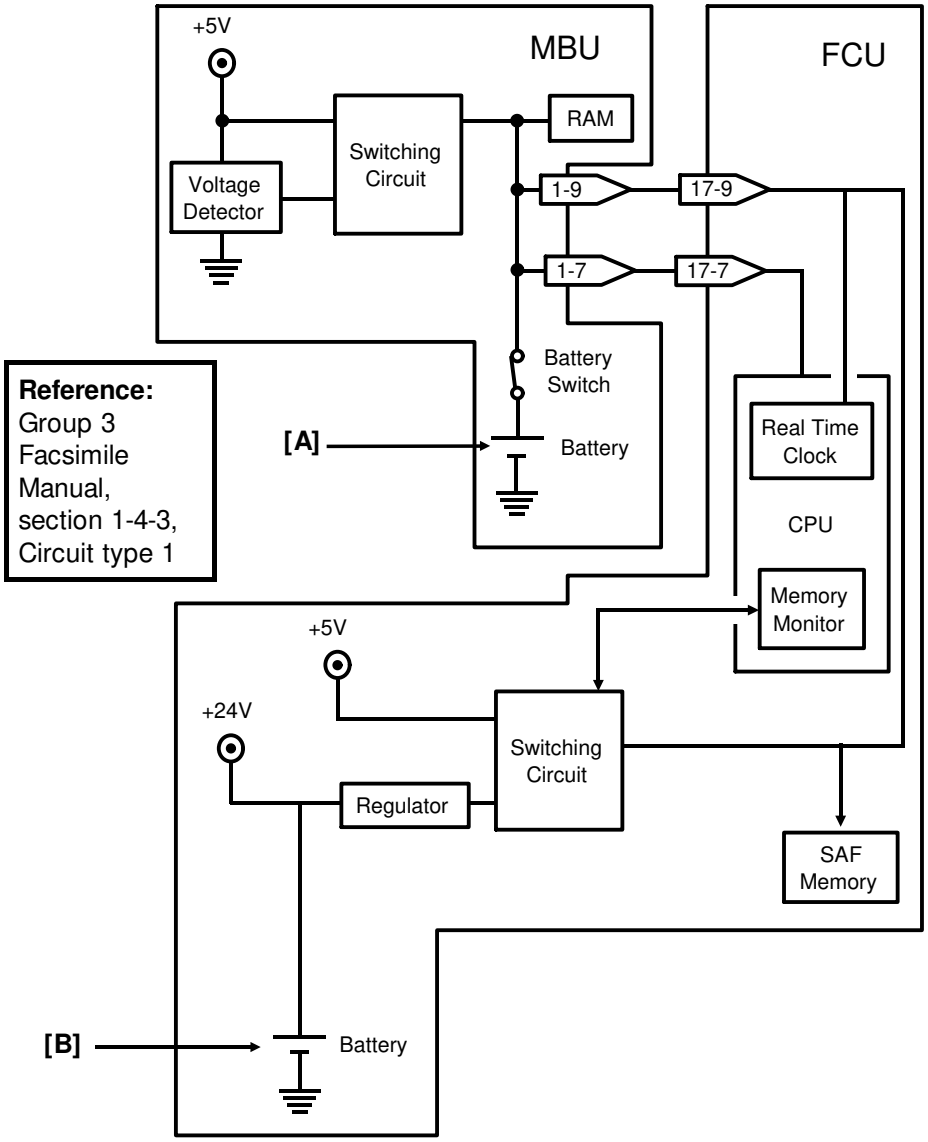


The laser diode is powered by a special + 5V supply, called + 5VLD.

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. CN1-7 tells the cpu whether the back-up power (CN1-9) comes from the battery or from the + 5V power supply.

There is no battery switch for the battery on the FCU.

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

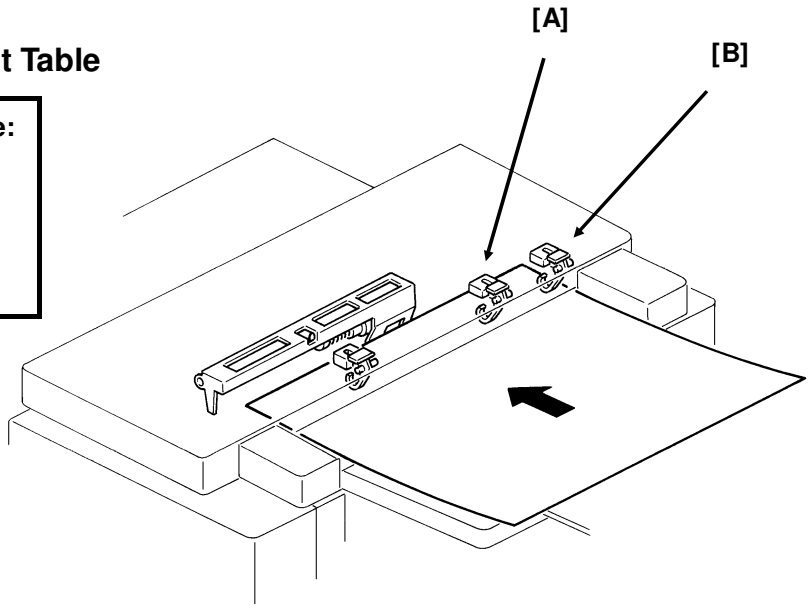
2.1. SCANNER

2.1.1. Mechanisms

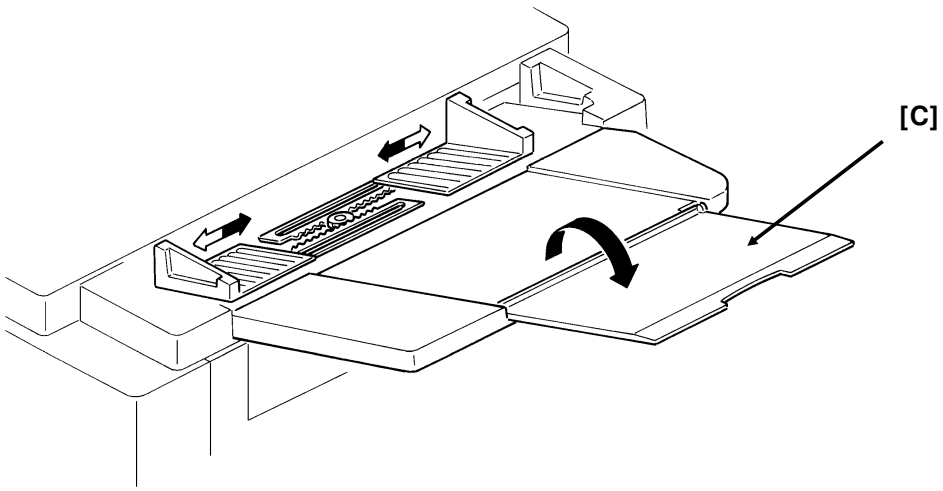
1. Document Detection

Document Table

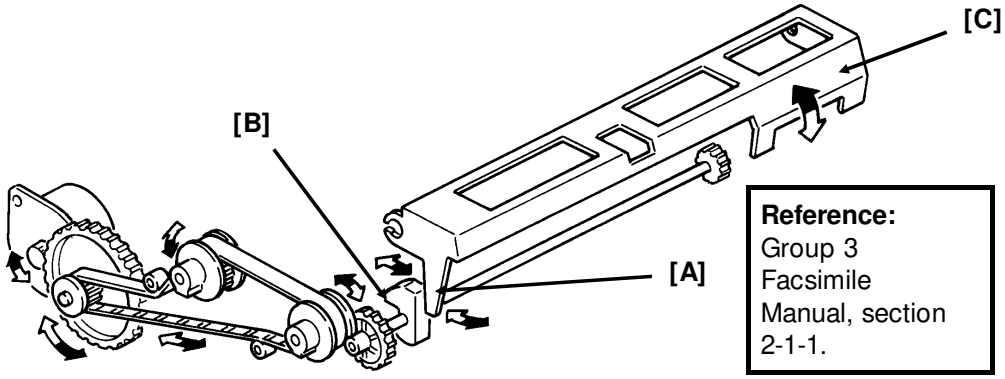
Reference:
Group 3 Facsimile Manual, section 2-1-1.



- The scanner is A3-width [11.7"], with a B4 document width detector [A] and an A3 document width detector [B].
- The scanner contains a xenon lamp.
- There is a fold-down extension [C] to support long documents.



Shutter



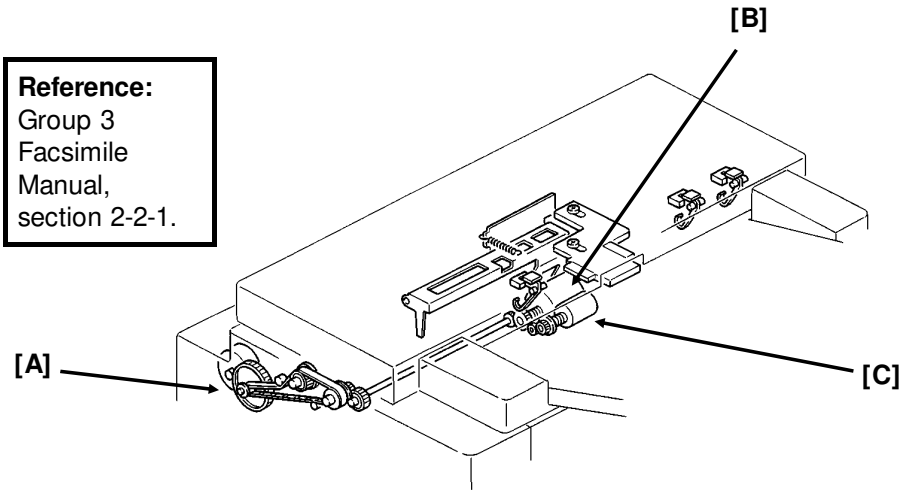
Reference:
Group 3 Facsimile Manual, section 2-1-1.

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 - Immediate transmission: The tx motor feeds the document at 200 lines per inch. The video processor executes OR processing to convert the data into 100 lines per inch. Memory transmission: The motor feeds the document at 100 lines per inch, and no OR processing is needed.
Detail - The tx motor feeds the document at 200 lines per inch. There is no OR processing, and the data is transmitted at 200 lines per inch.
Fine - The tx motor feeds the document and transmits data at 400 lines per inch. If the other terminal cannot receive at this resolution, alternate lines of data are deleted, so the effective resolution of the transmitted data is 200 lines per inch.

Jam Conditions

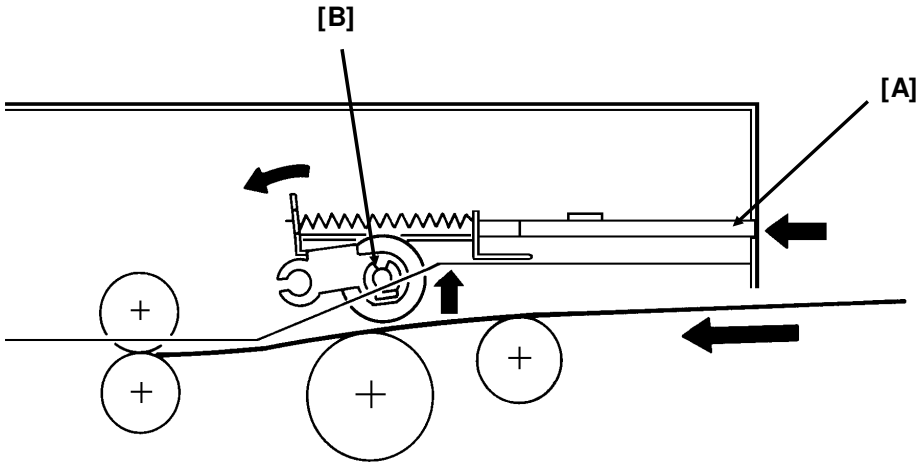
The cpu detects a document jam if one of the following conditions occurs.

- The scan line sensor does not switch on within 5 s of the tx motor starting.
- The scan line sensor does not turn off after the maximum document length has been fed since it turned on; this is 12 s (standard resolution), 24 s (detail), or 48 s (fine) for a 1.2 m long document.
- 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 2 s of the end of stamping, if the document sensor is on.

Separation

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

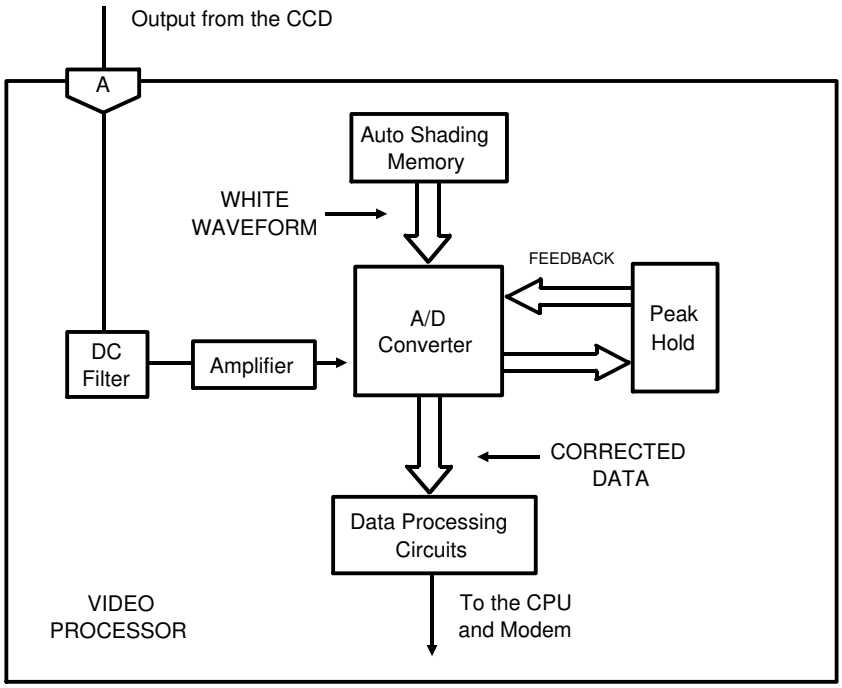
3. Manual Feed



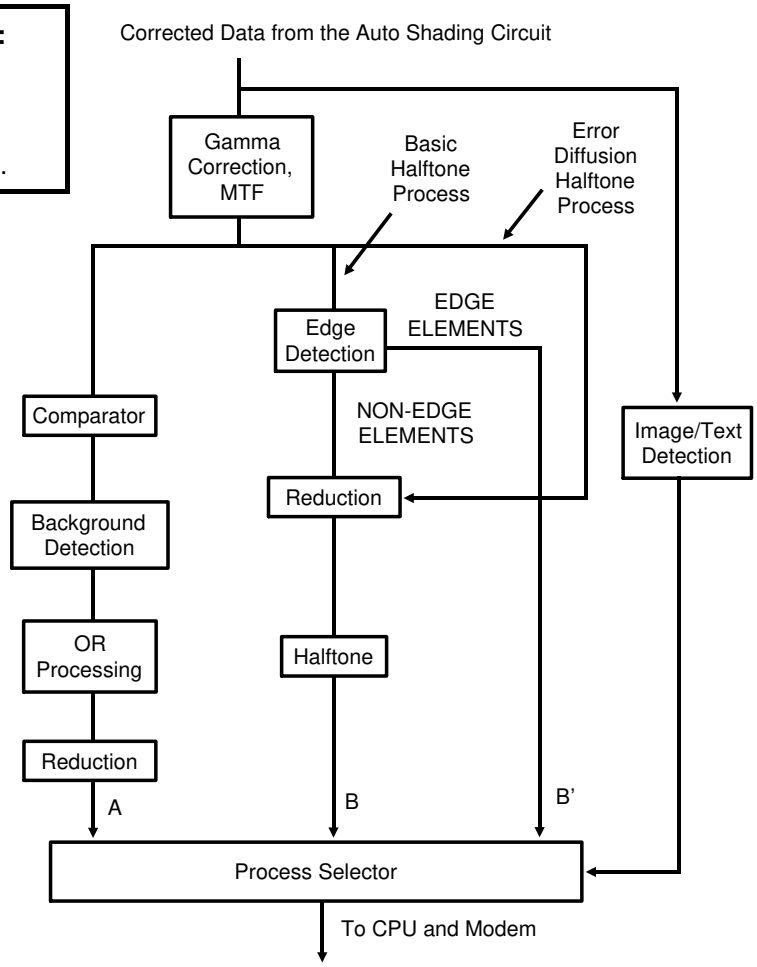
The manual feed button [A] lifts the separation roller [B] out of the document feed path. There is no manual feed switch.

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

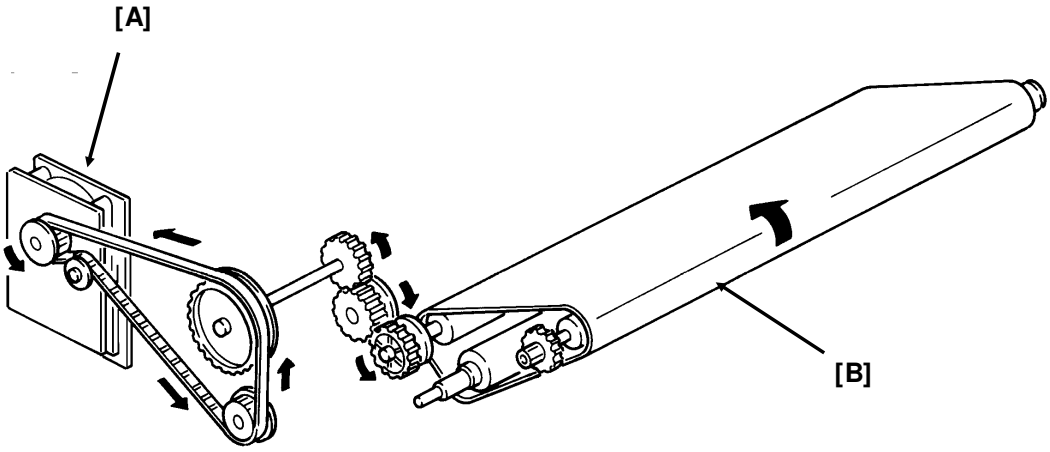
2.2.1. Mechanisms

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.

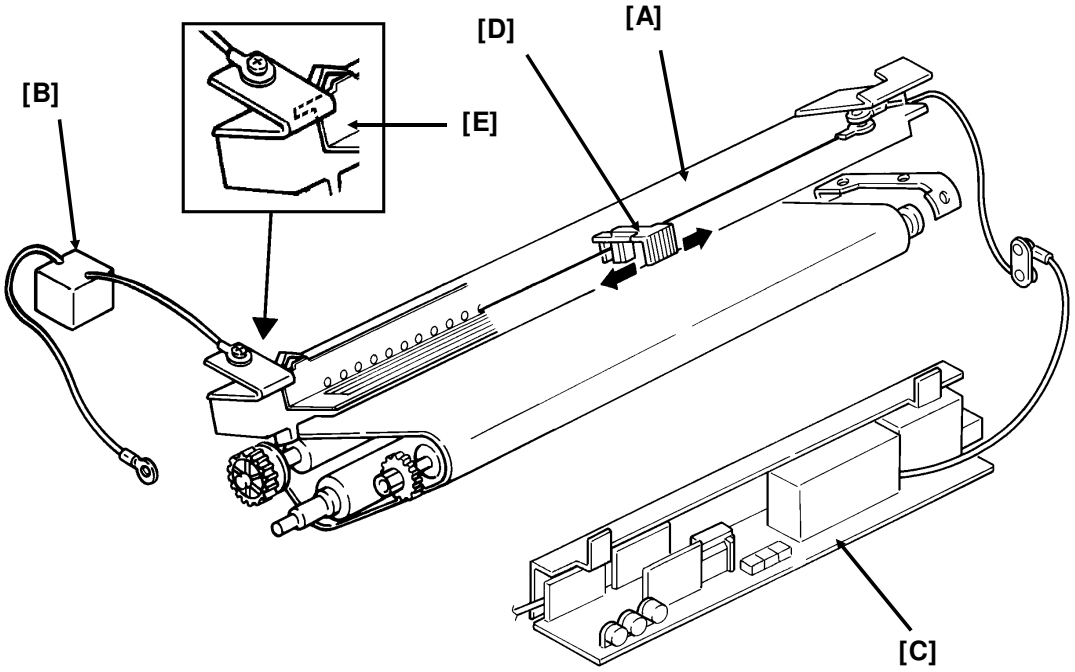


The main motor [A] drives the master belt [B].

- 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].

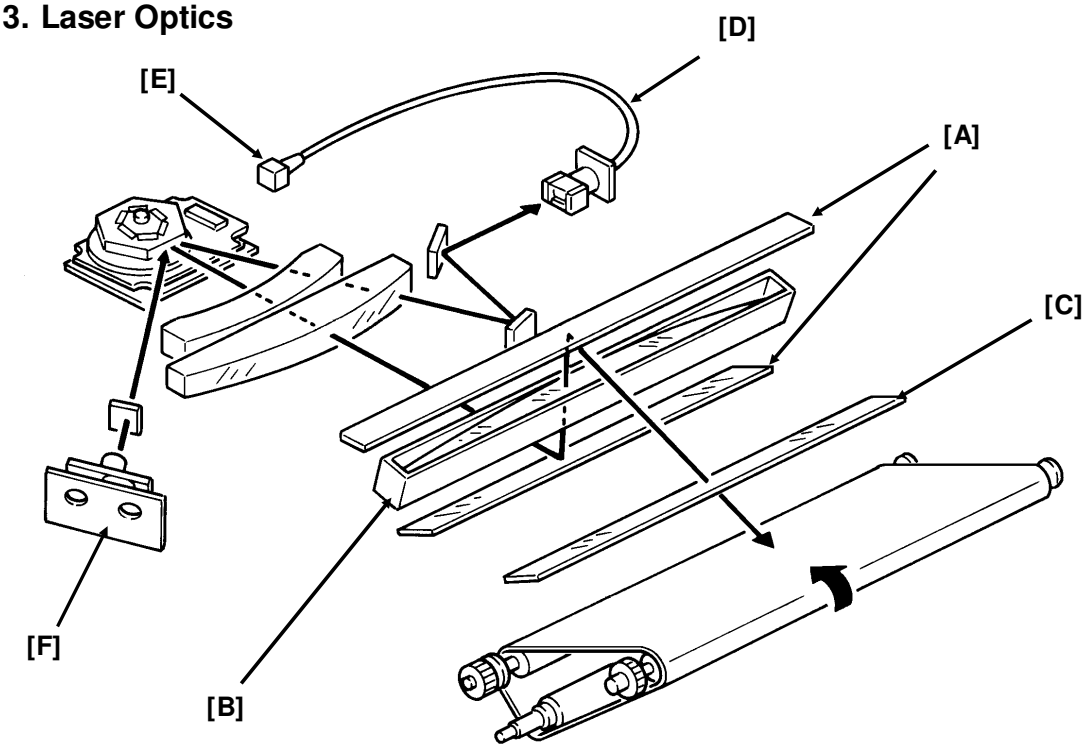
The charge corona switches on at the same time as the laser diode starts its power control procedure.

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 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 fiber [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: 9,267.7 rpm (G3 and G4 l/mm mode), 9448.8 rpm (G4 dpi mode)
- 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

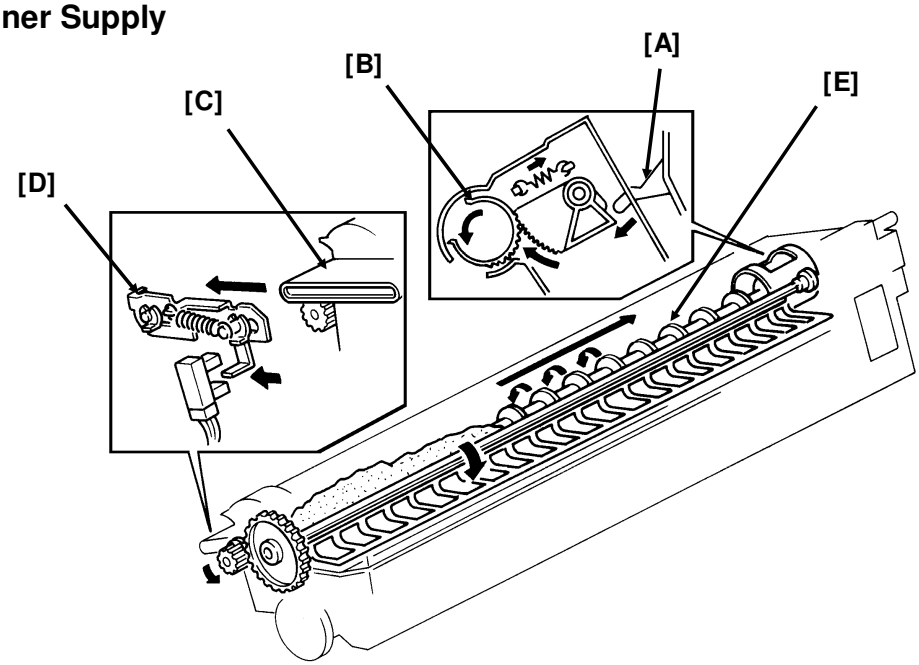
Overview

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.

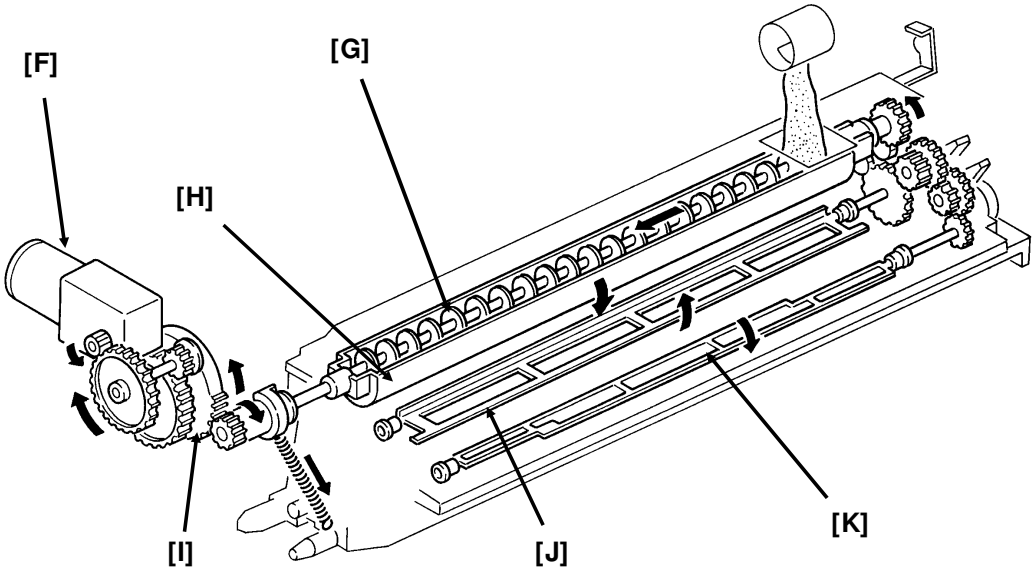
Reference: Group 3 facsimile Manual, section 4-4

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.

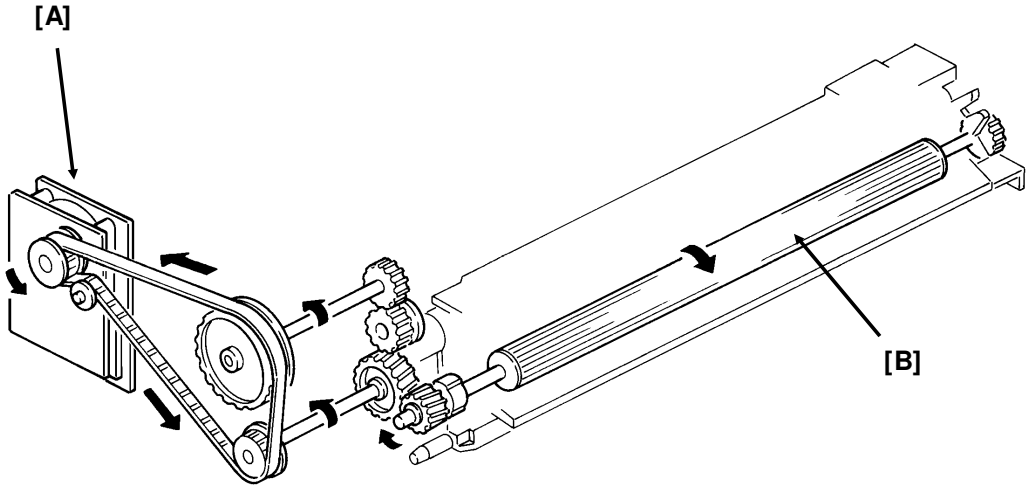
Inside the development unit is another spiral shaft [G]. This shaft, driven by the main motor, distributes toner across the length of trough [H]. The toner supply motor drives gear [I], and once every rotation, it tips the trough upside down, dropping the toner into the development unit. A spring immediately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

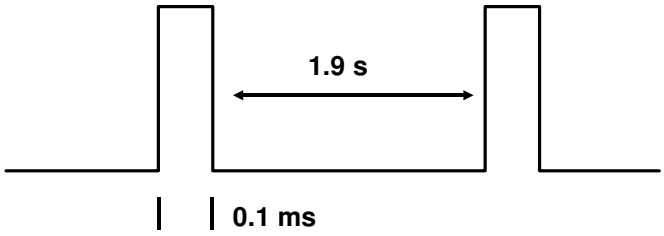


During printing, drive from the main motor at gear [A] drives the development roller [B]. The main motor also drives the master belt, so the development roller and the master belt always move at the same time; therefore, no development clutch is needed.

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.

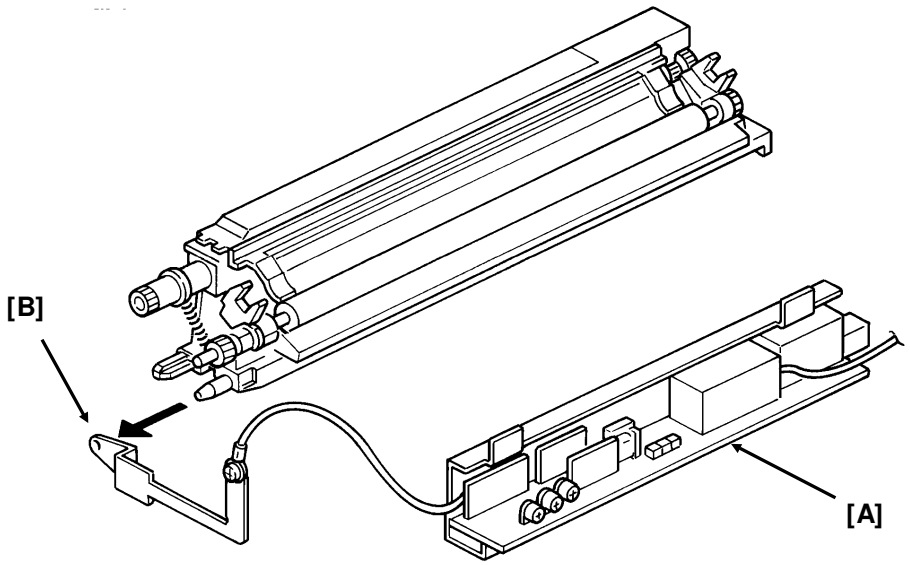


The cpu starts to blink the Add Toner indicator under the following conditions:

- **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, totaled 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)

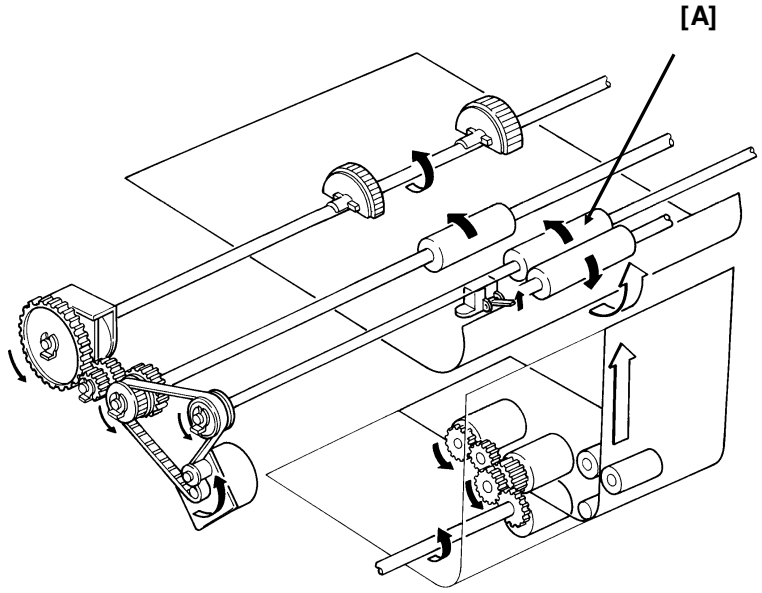
The switching bias is used at the following times:

- 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 a 500-sheet cassette. In some models, the 500-sheet cassette is an optional unit.

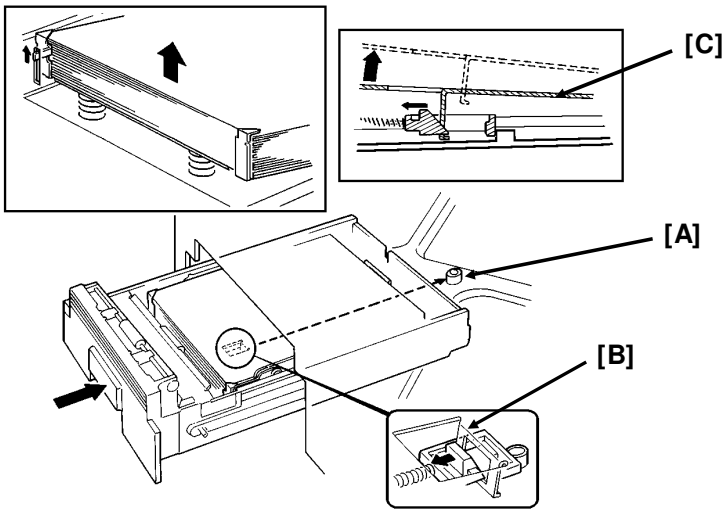
The sizes of paper that the cassettes can take are listed in the specifications (section 1-1).



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].

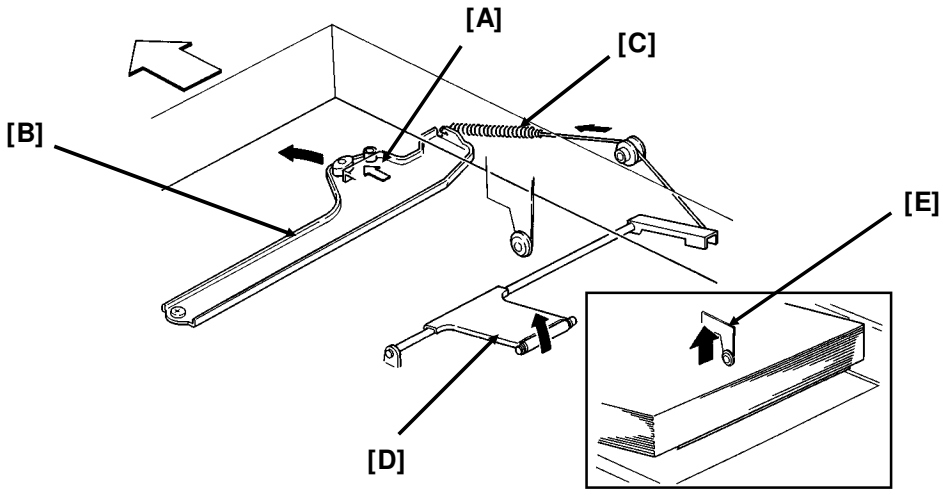
Paper Lift

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



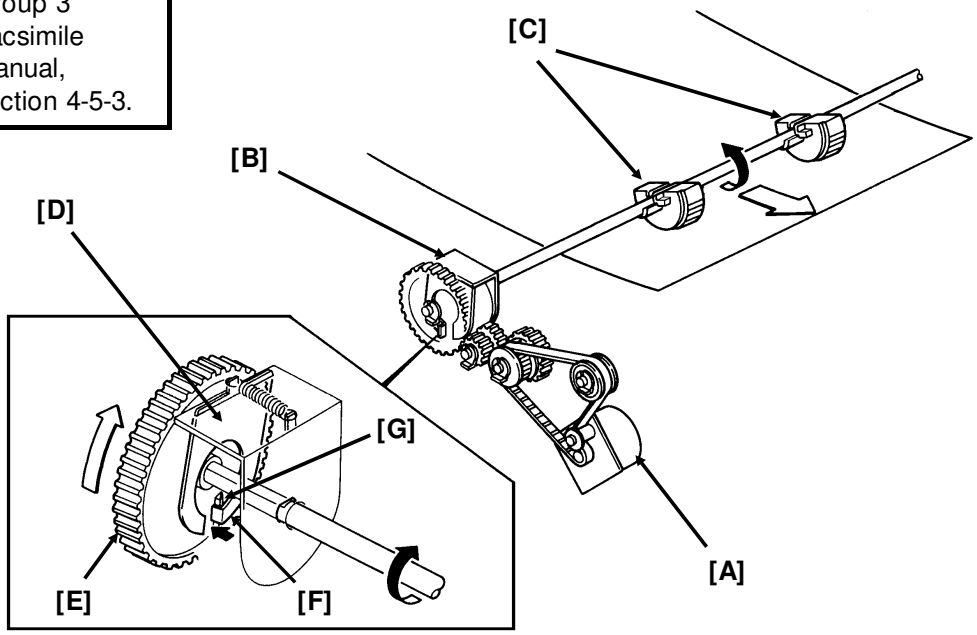
A mechanical paper lift mechanism is used. When the user places the cassette into the machine, a tab [A] on the rear of the cassette pushes a plate [B] towards the rear of the machine as the user slides in the cassette. This plate, driven by a spring [C], forces up the paper lift arm [D]. The paper height 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.

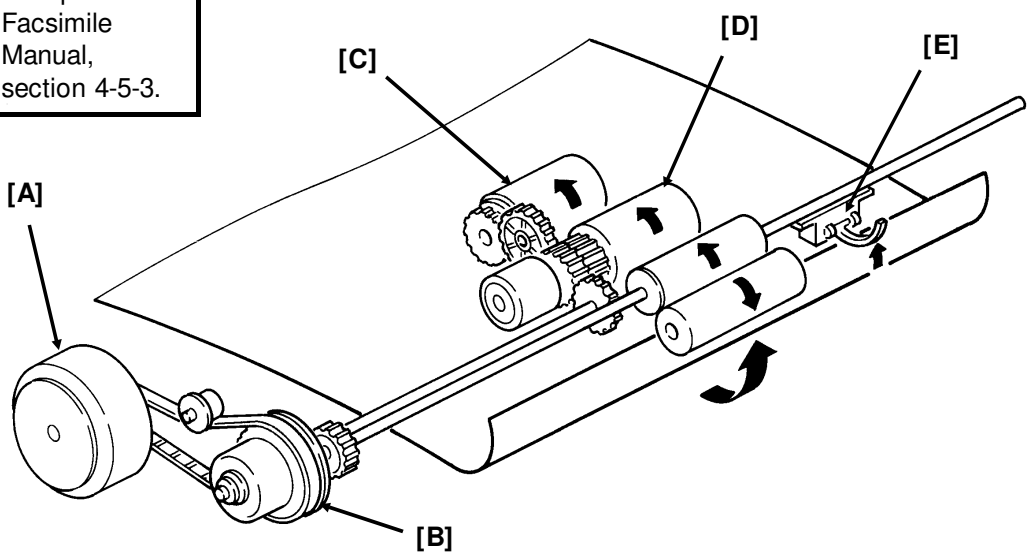
At 0.1 s after the main motor reaches the correct speed, the motor turns at a higher speed (405 pps). This higher speed, used for pick-up and feed, ensures that time is not wasted getting paper into the printer. At the same time, the upper paper feed clutch turns on and paper is fed into the printer.

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

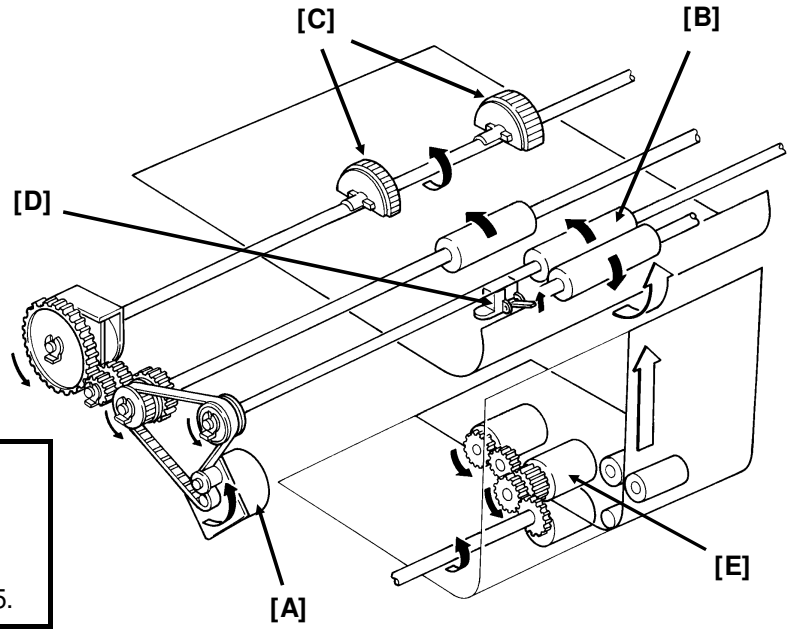
The standard cassette uses a semicircular roller and corner separator method of separation.

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

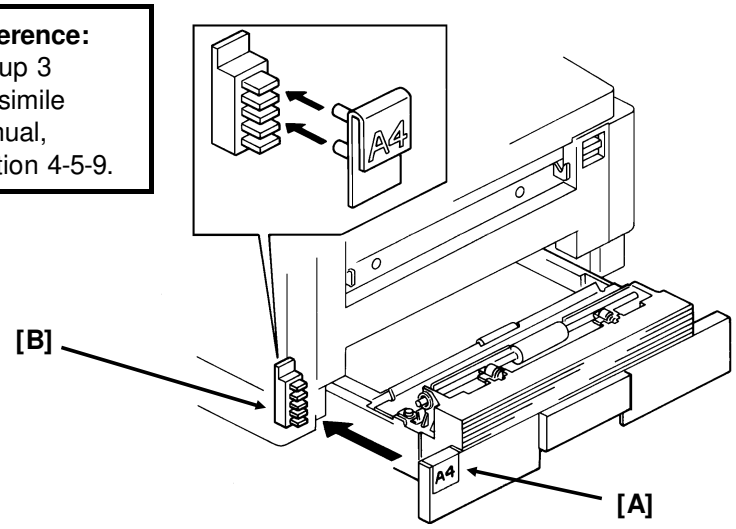
The machine detects a jam if one of the following conditions exists.

- 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

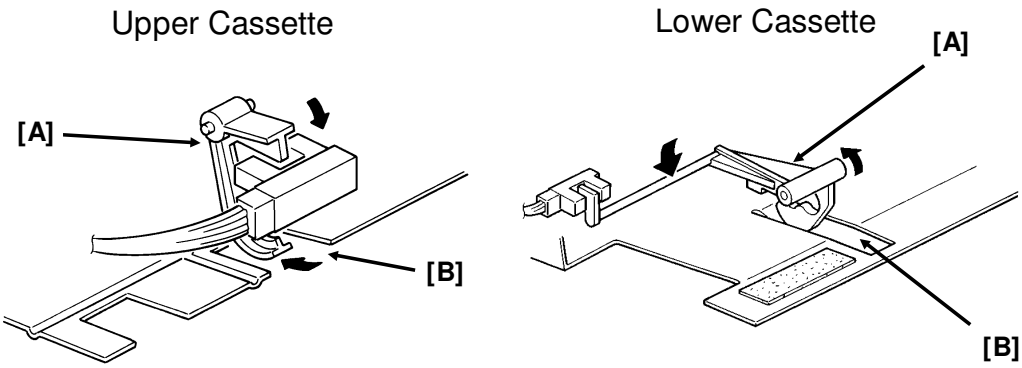
Reference:
Group 3 Facsimile Manual, section 4-5-9.



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 00014F and 000150.

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 00014F	0: Not used	1: 4/3	0: 8/7	1: 12/11
Bit in 000150	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 reducible incoming page lengths		
		Ratio = 4/3	Ratio = 8/7	Ratio = 12/11
A5	148	190.7	163.4	156
B5	182	236	202.3	193.1
Letter	279.4	365.9	313.6	299.3
A4	297	389.3	333.7	318.5
F4, F	330.2	433.6	371.7	354.8
Legal	355.6	467.5	400.7	382.5
B4	364	478.7	410	391.6

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 000151 (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

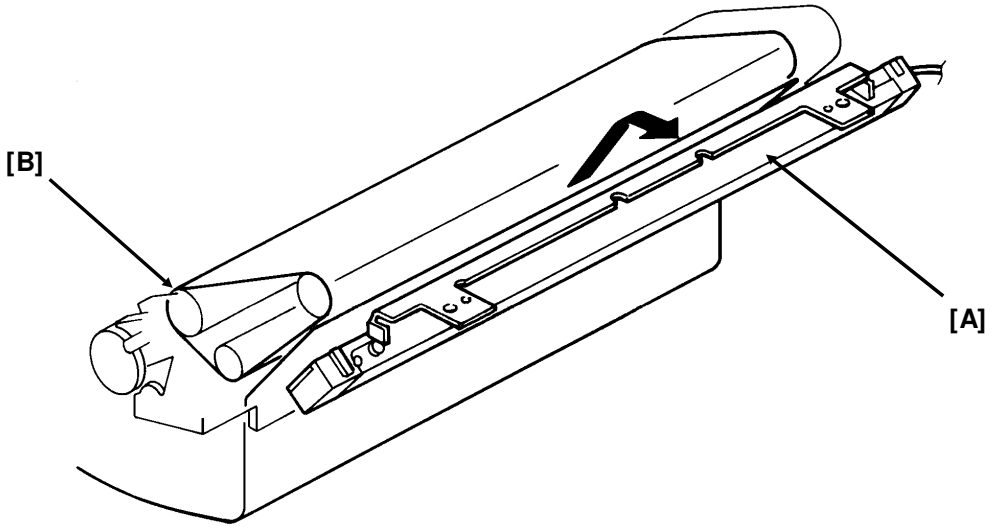
If there are two cassettes in the machine, the paper size to use is decided in accordance with a few simple rules.

- 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

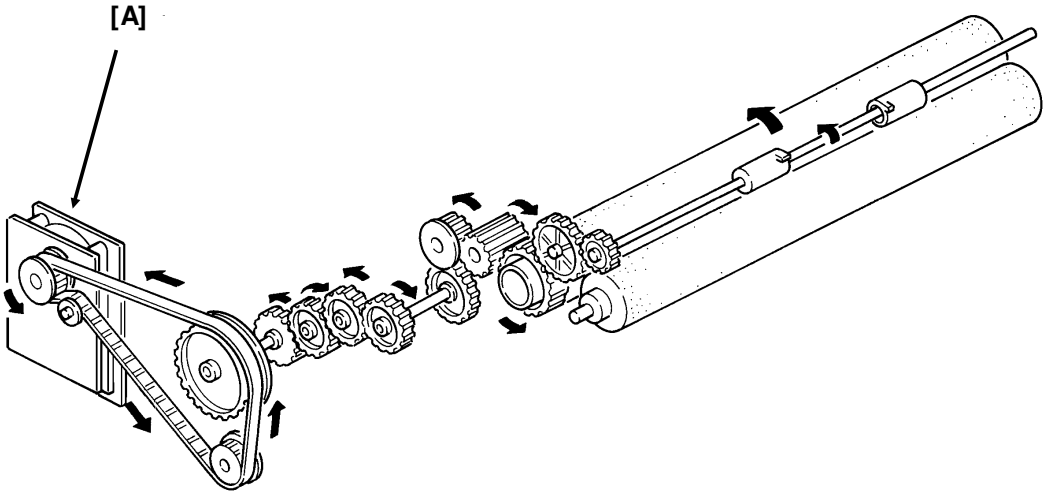


The voltage of the transfer corona unit [A] is between 3.8 and 5.5 kV. It gives a 200 V charge to the paper to pull the negative toner off the master belt. The bend [B] in the master belt also helps the paper to leave the belt. There is no antistatic brush to aid separation.

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: 80 °C
- Printing start temperature: 150 °C
- Maximum printing temperature: 170 °C (monitored by a comparator)
- Thermistor maximum: 280 °C
- Thermostat maximum: 400 °C

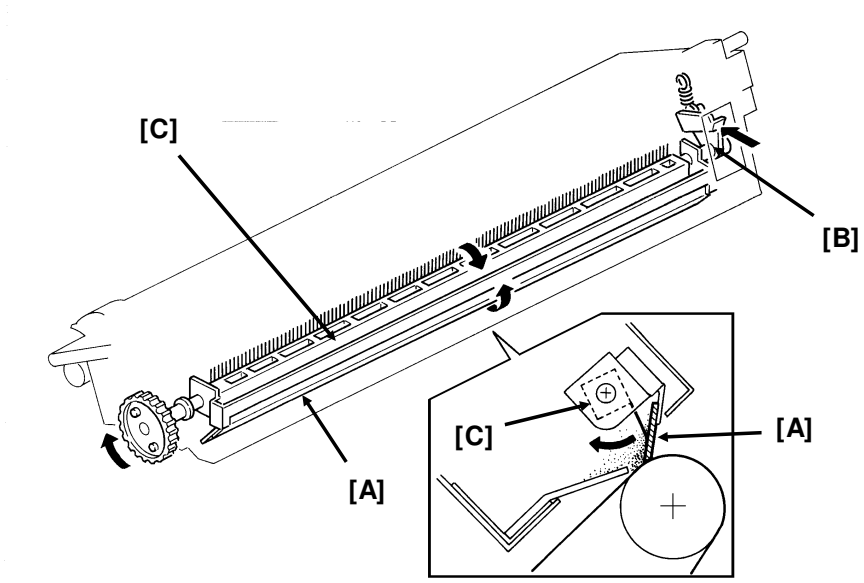
When the main power is switched on, the fusing lamp heats up to 80 °C in about 10 s.

When a ringing signal is detected (or when the user presses Start or Copy for taking a copy), the fusing lamp heats up to 150 °C in about 15 s.

At the end of printing, the ozone fan stays on until the fusing unit temperature has fallen below 150 °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.

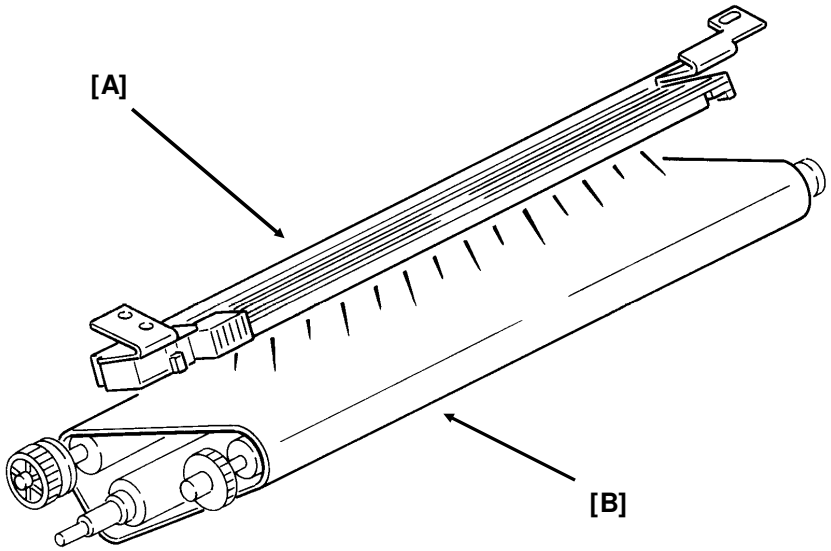
When the CTM is placed inside the machine, a tab on the copy exit cover pushes plate [B], which moves the cleaning blade away from the mylar and against the master belt.

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



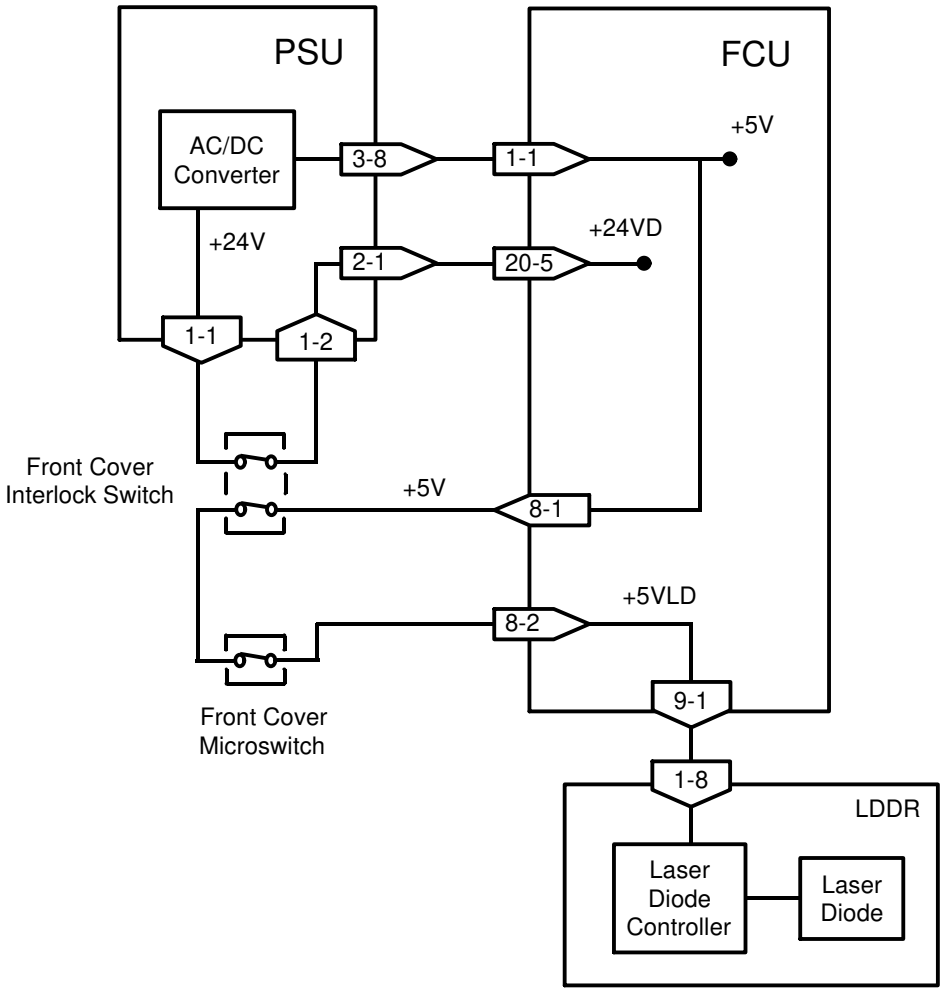
The quenching lamp [A] is an LED array. After quenching, the charge on the master [B] is about -20 V.

Reference: Group 3 Facsimile Manual, section 4-10

2.2.2. Circuits

1. Laser Diode

Laser Diode Drive



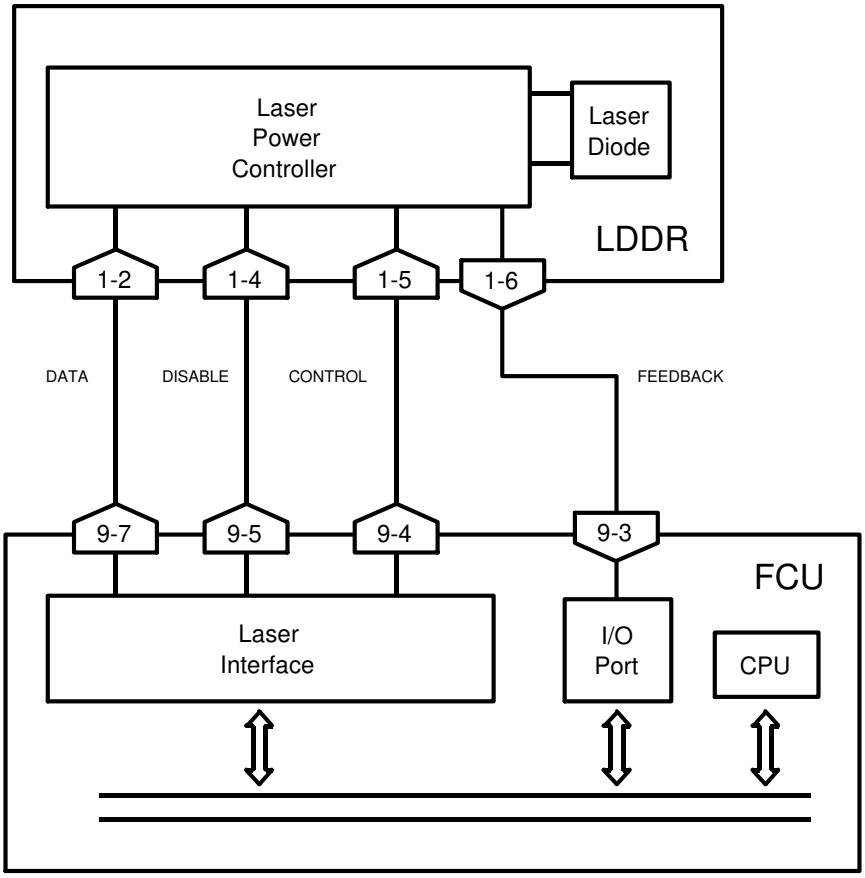
The laser diode is powered by a special + 5V supply, called + 5VLD.

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).

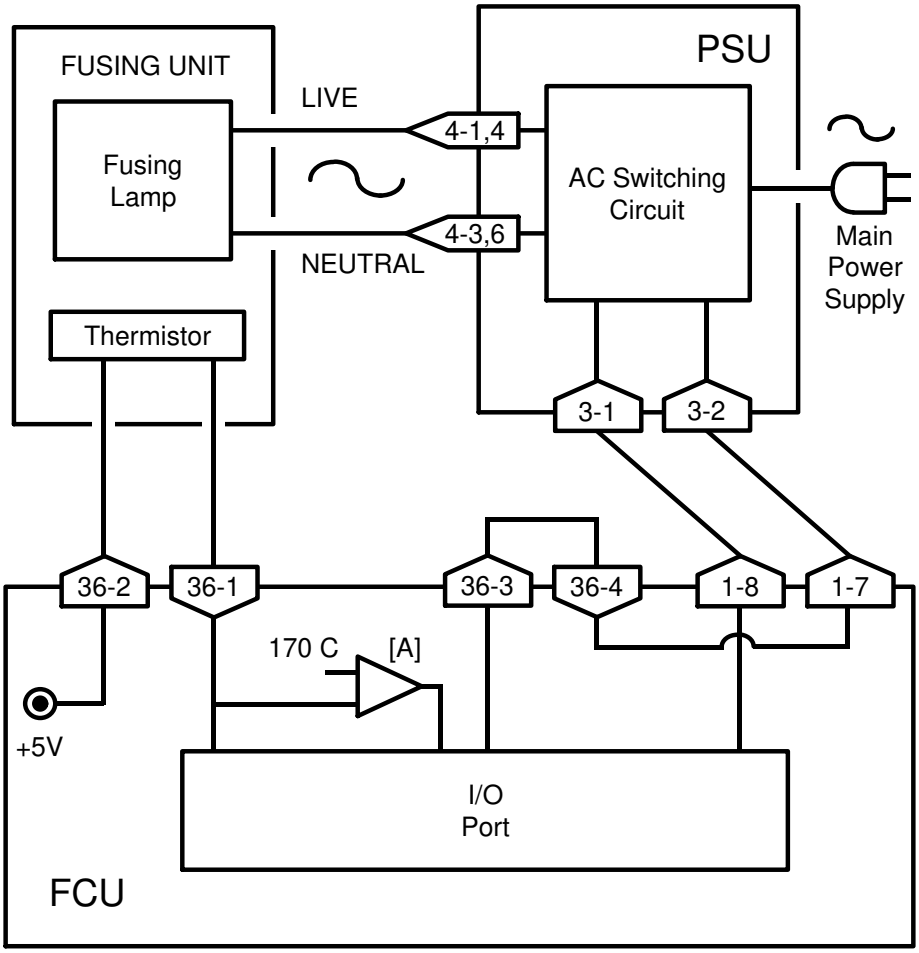
If the cpu determines that laser diode power control has failed, it sends CN9-5 to low, which disables the laser diode.

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 from the comparator [A] remains high if the fusing unit temperature is below 170 °C.
- The I/O Port switches the fusing unit on/off using the signal on CN1-8.
- 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 80 °C, the I/O Port makes CN1-8 go high. This switches on the fusing lamp.
- If the fusing lamp goes above 80 °C, 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. This causes CN1-8 to go low, which switches off the fusing lamp.
- If the comparator fails, there are additional safety cutoffs at 280 °C (thermistor) and at 400 °C (thermostat).

After printing

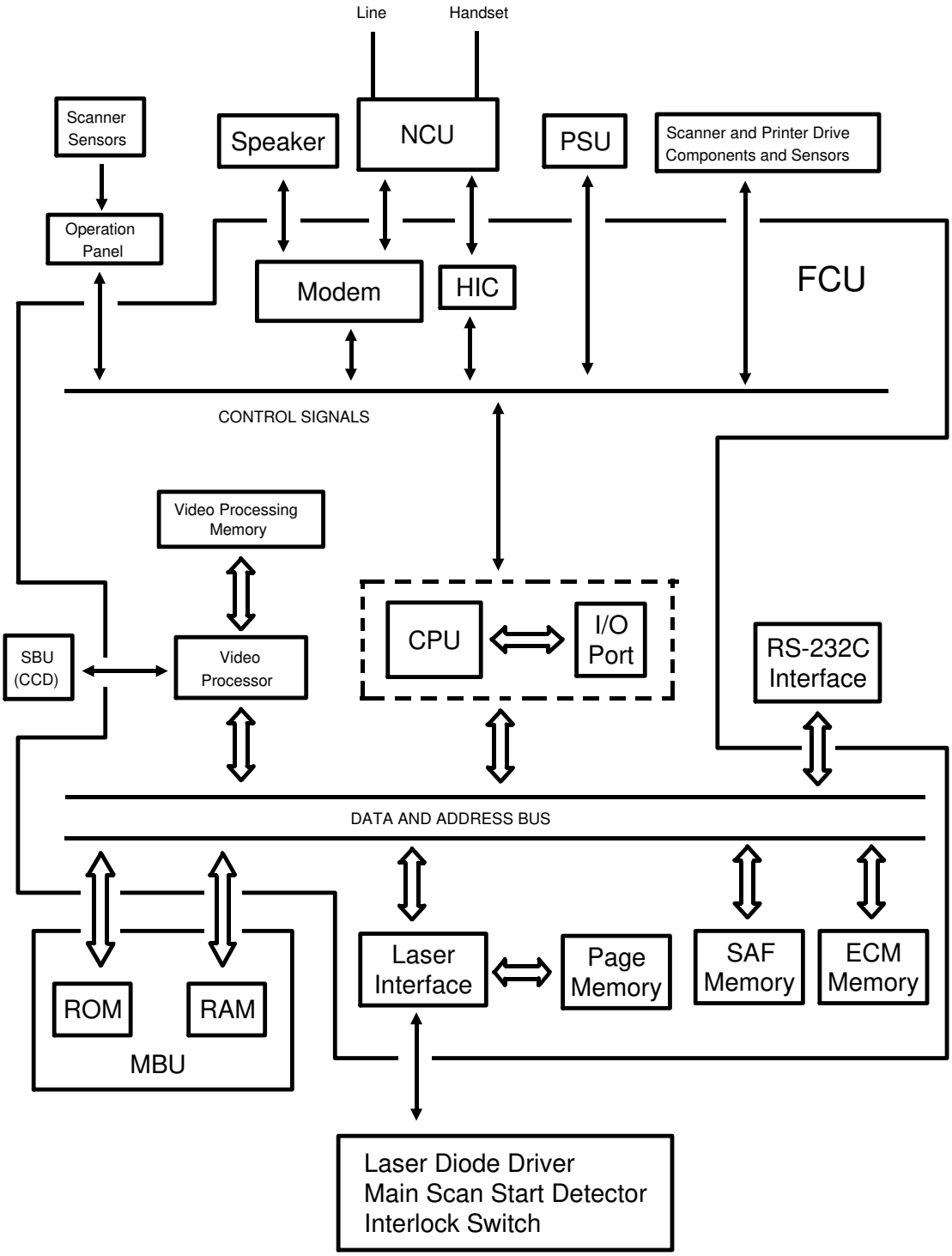
- When the fusing lamp temperature falls back below 150 °C, the ozone fan switches off.

Service Note

When an error 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). Details concerning these errors are given in section 6-3 (Service Call Conditions).

2.3. PCBs AND THEIR FUNCTIONS

2.3.1. FCU



1. CPU (MFCP)

- 65C02 compatible microprocessor
- Interrupt control
- DMA control
- Data compression and reconstruction (high speed MH coding for 2.8-second scanning)
- 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 (MIOP)

- 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

- Modulation/demodulation (analog/digital processes)

5. Video Processor (VPP)

- Analog/digital video signal processing

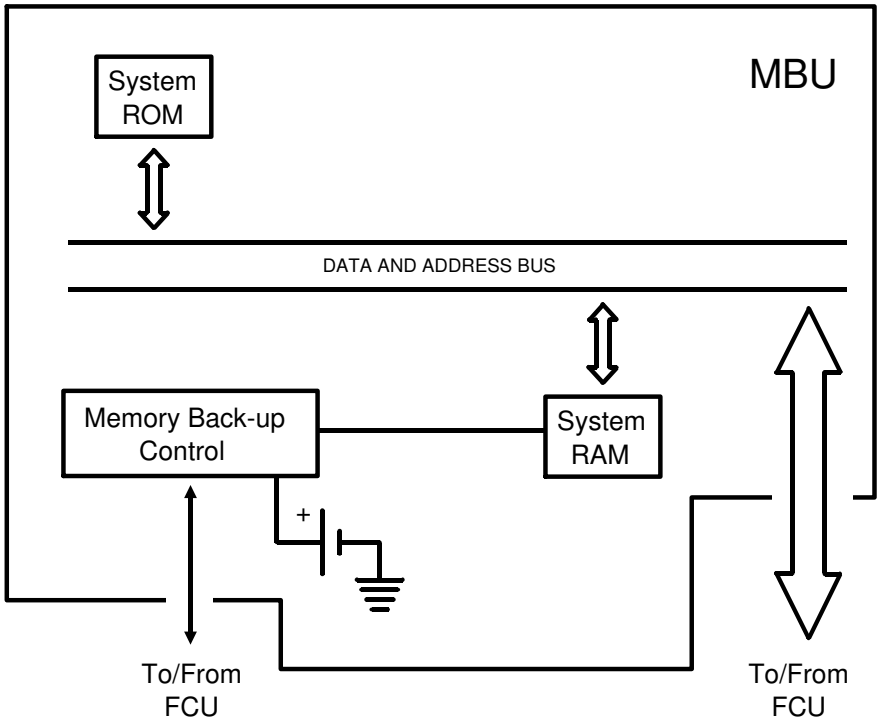
6. Hybrid IC (HIC)

- Filters
- Amplifiers

7. RAM

- 256k for ECM and system RAM (no back-up)
- 1 Mbyte SAF memory (with battery back-up)
- 1 Mbyte page memory
- 24 kbyte image memory for the VPP

2.3.2. MBU



1. System ROM

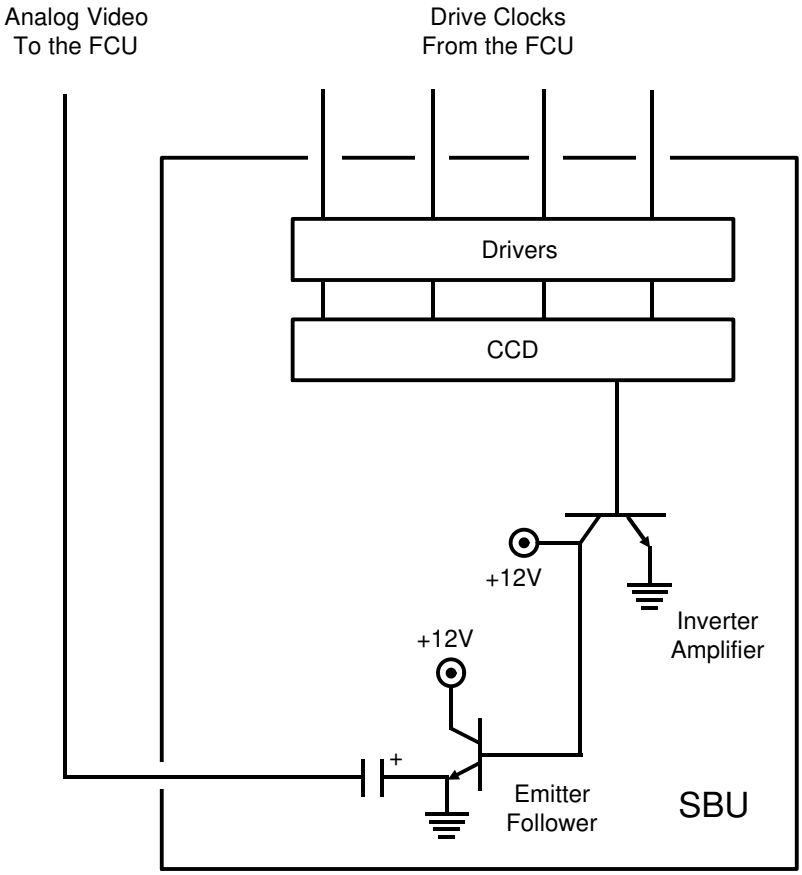
- Contains the software to run the machine

2. System RAM

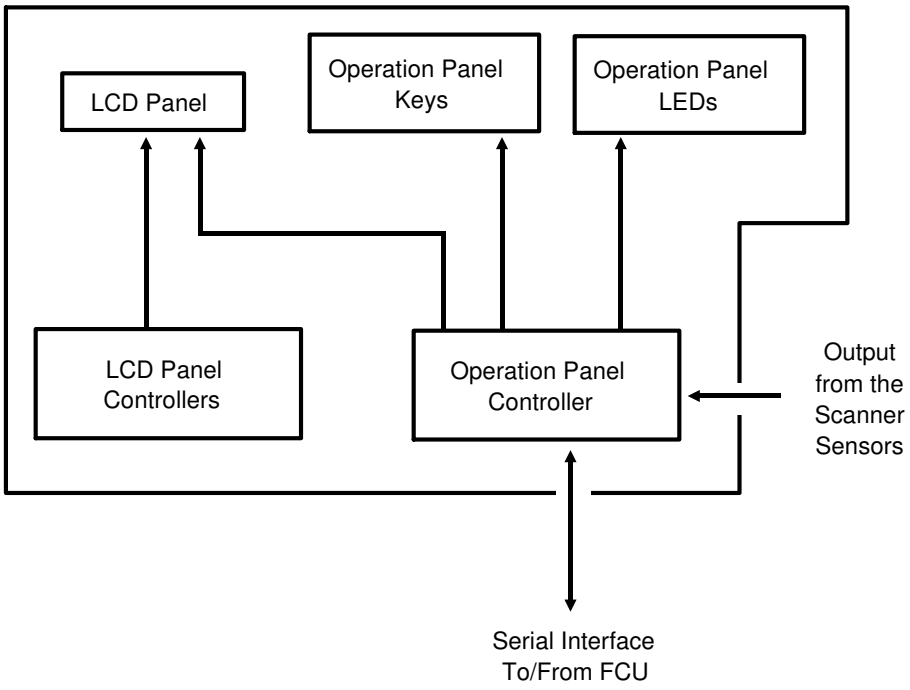
- 1 Mbit SRAM for parameter storage, line buffer, FIFO, SAF memory administration

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

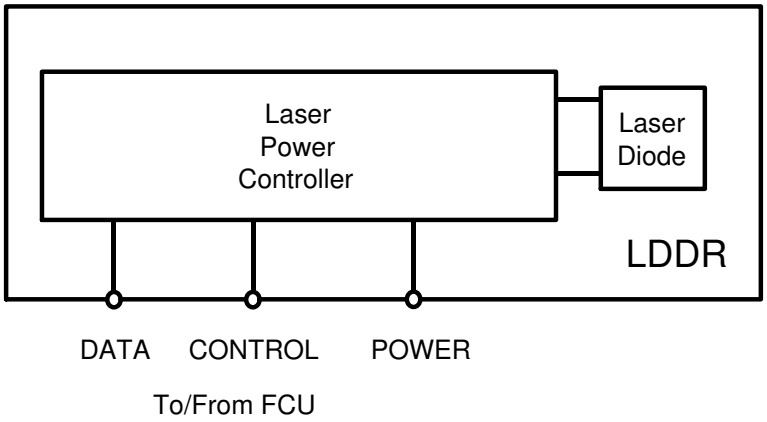
2.3.3. SBU



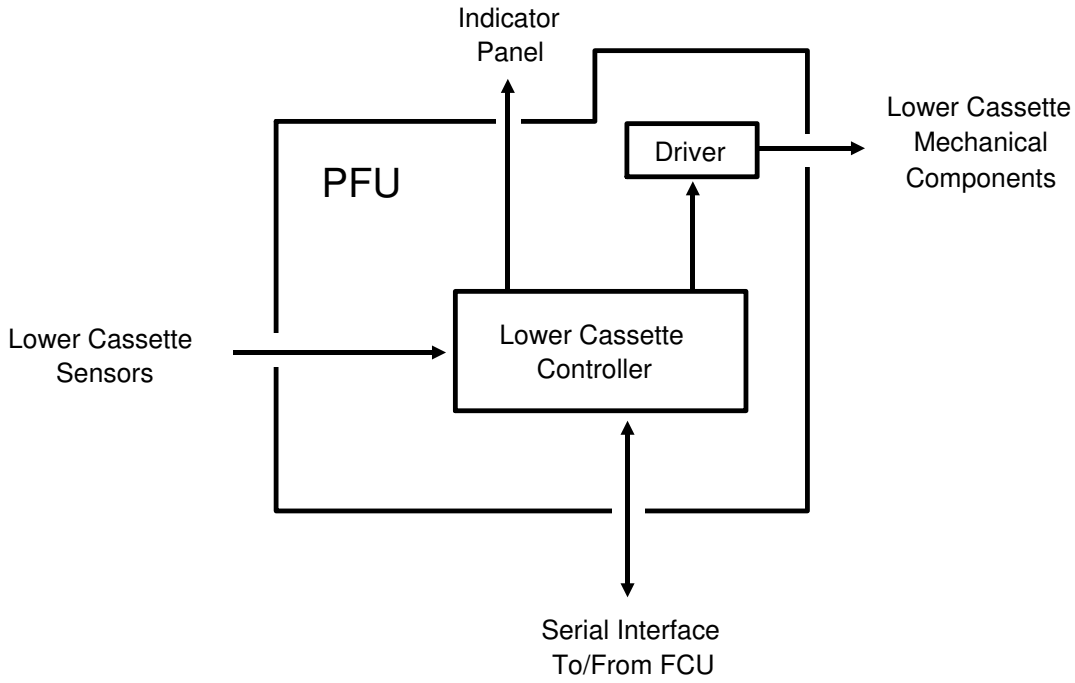
2.3.4. OPU



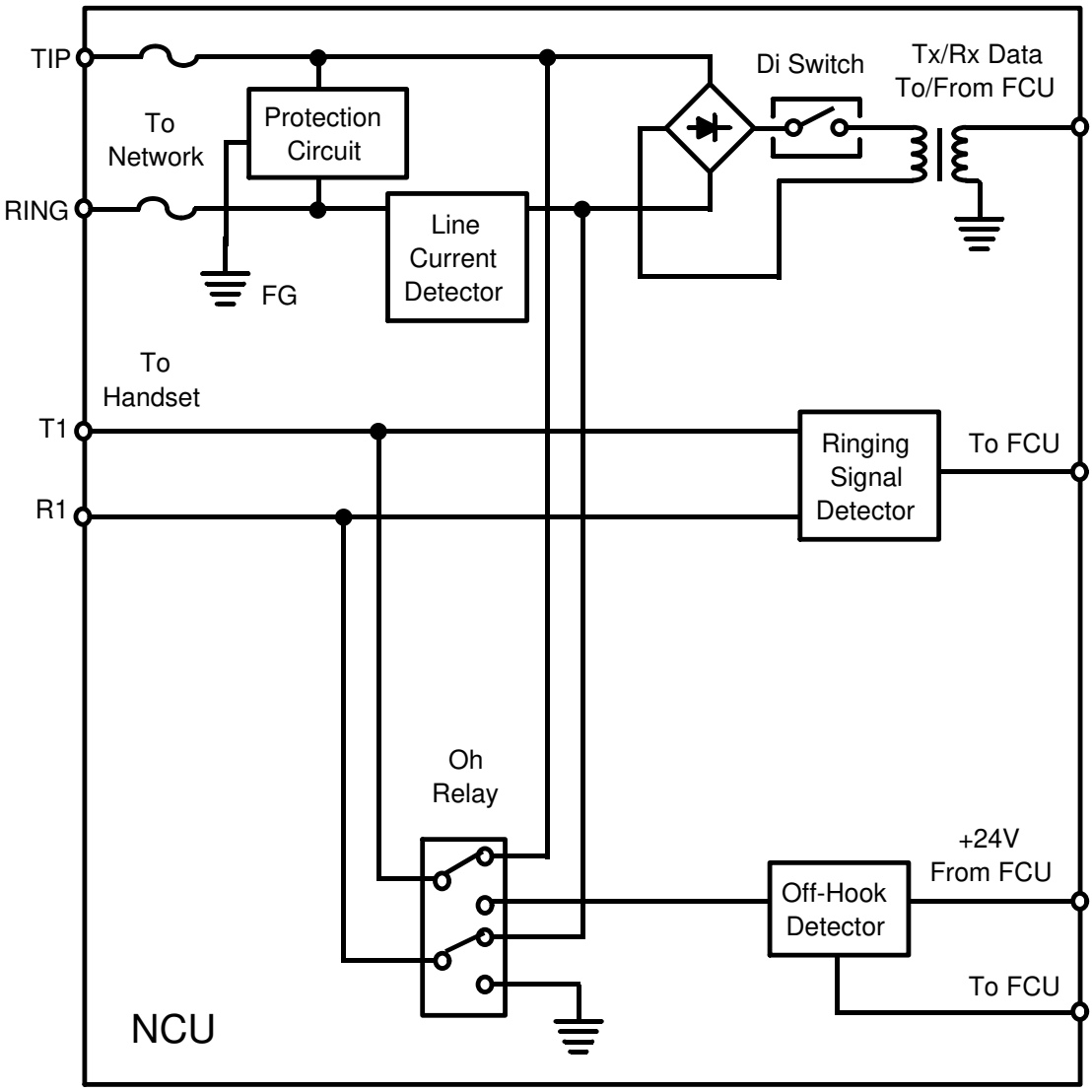
2.3.5. LDDR



2.3.6. PFU

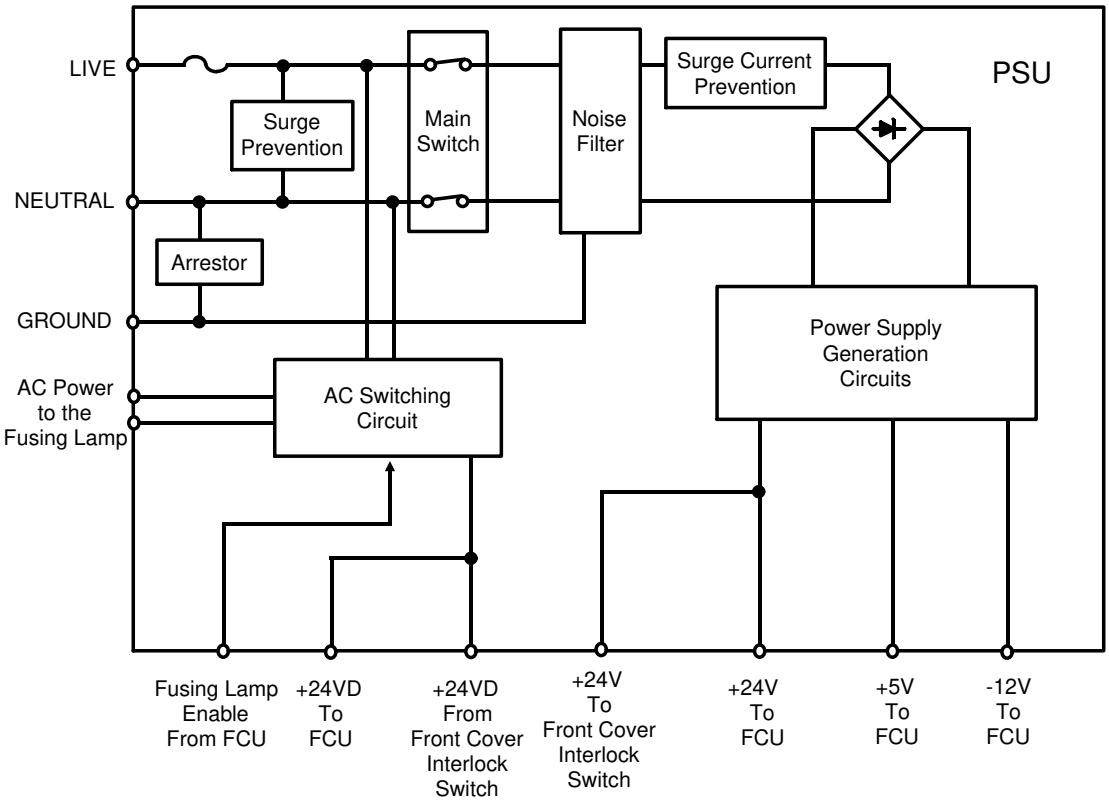


2.3.7. NCU



- 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.

2.3.8. PSU



Overheat Protection in the PSU

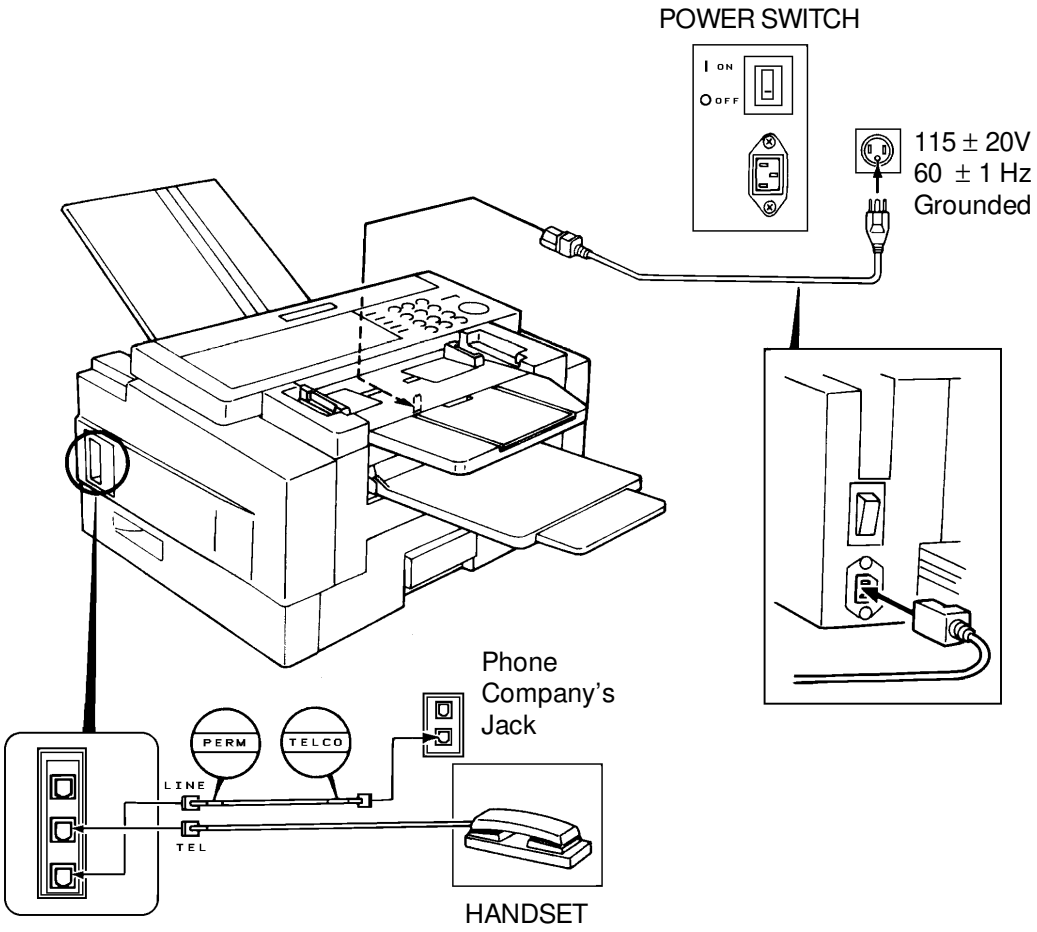
If the PSU thermistor temperature exceeds about 100 °C, the power supply outputs from the PSU are disabled.

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

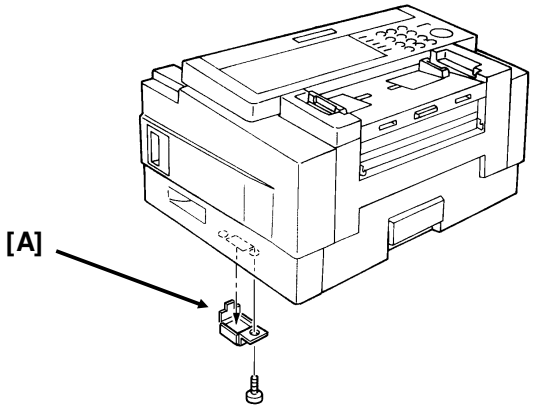
3.1. CONNECTING UP THE MACHINE



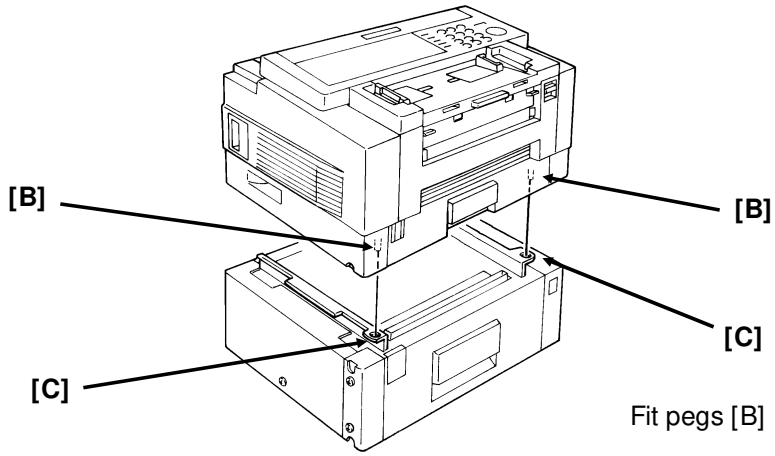
3.2. INSTALLING ADDITIONAL UNITS

3.2.1. Lower Cassette

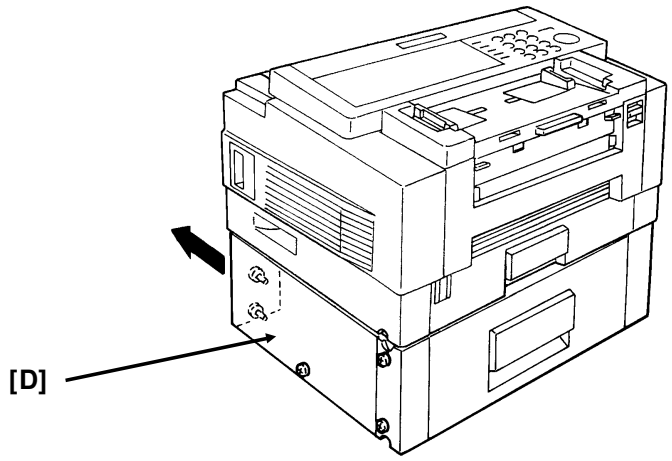
Check whether there are any messages in the memory. If there are, you must install the lower cassette and turn the power back on within an hour.



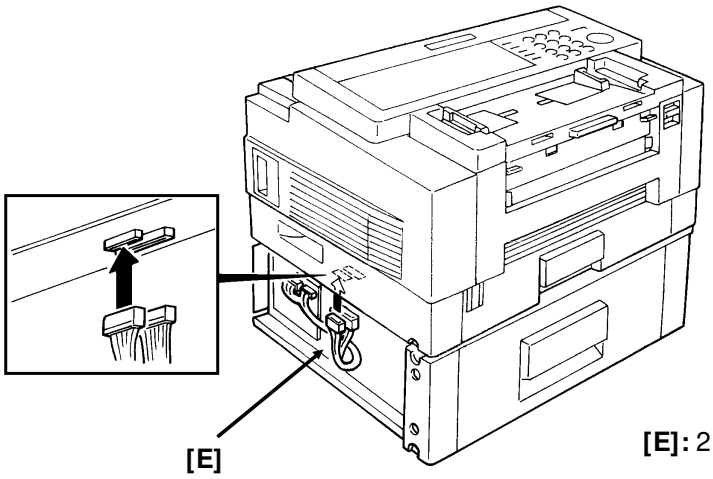
[A]: 1 screw



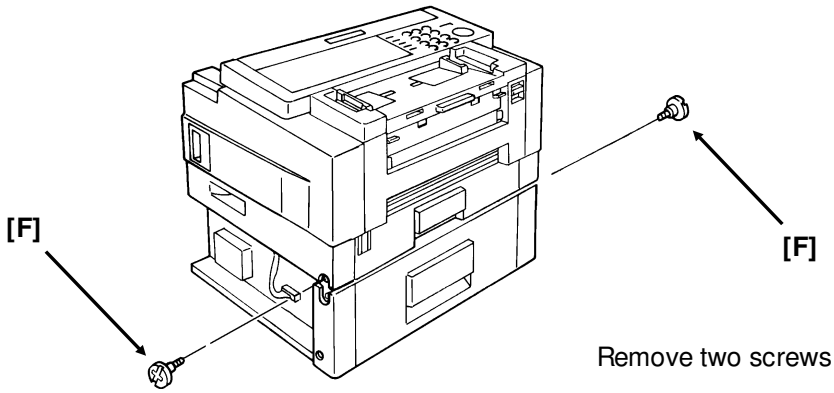
Fit pegs [B] into holes [C].



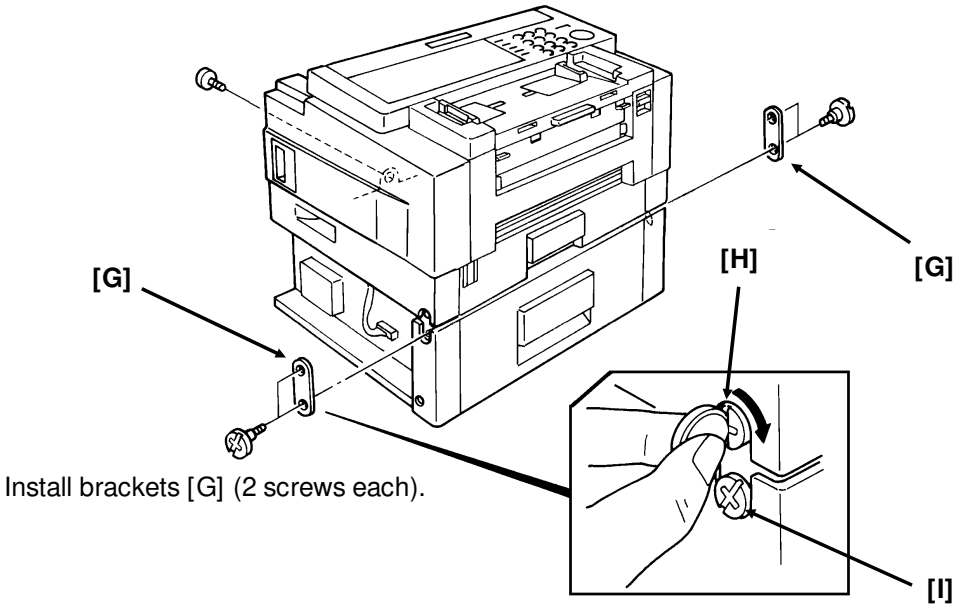
[D]: 5 screws



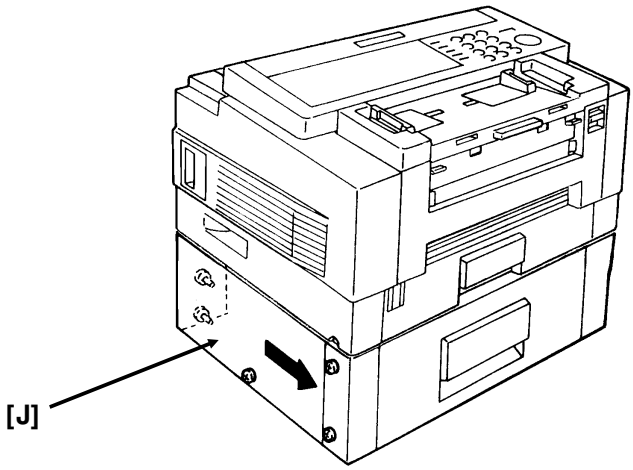
[E]: 2 connectors

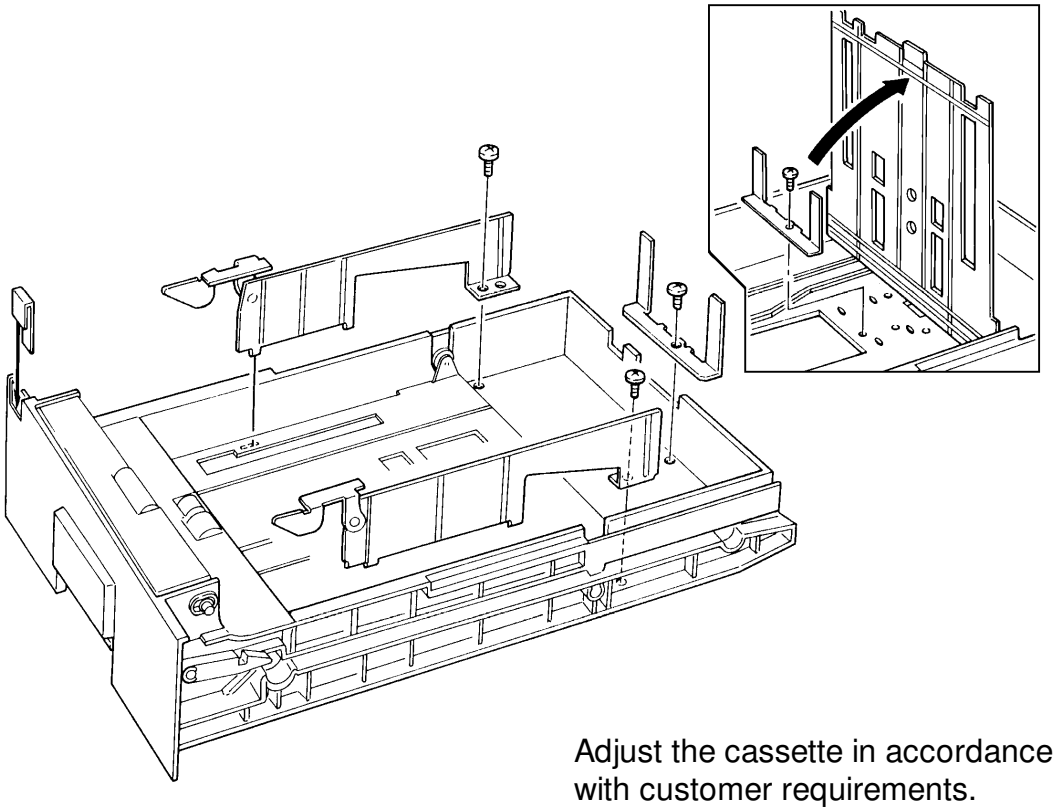


Remove two screws [F].



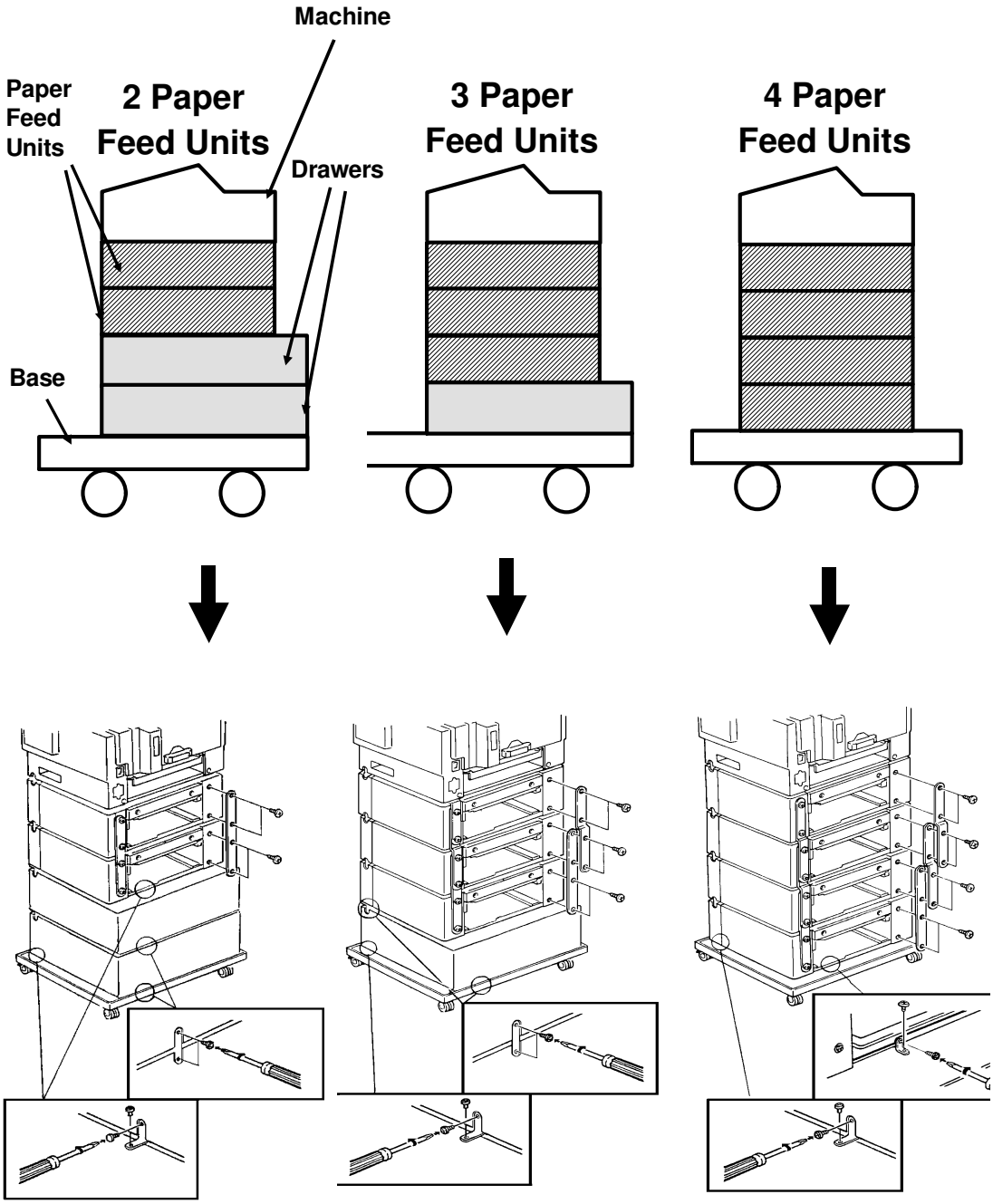
Install brackets [G] (2 screws each).





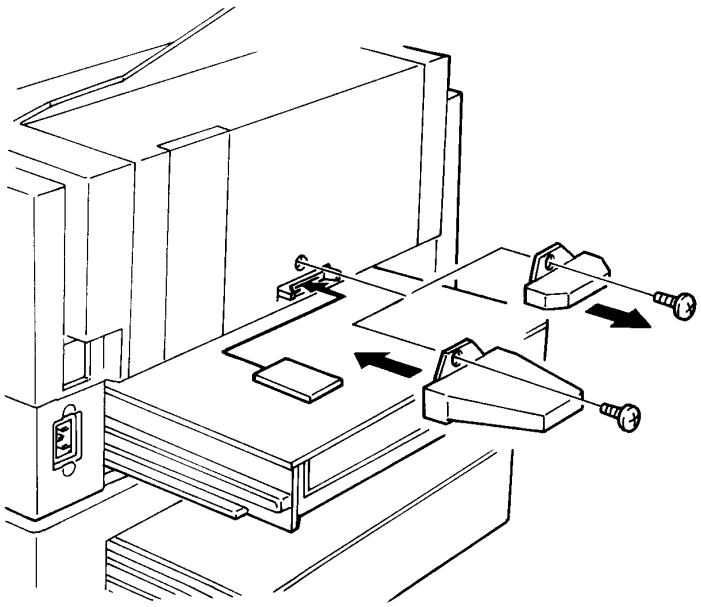
Adjust the cassette in accordance with customer requirements.

Up to 4 of these paper feed units can be added to the machine. However, if more than one is installed, you have to install drawer and base units in one of the following ways.

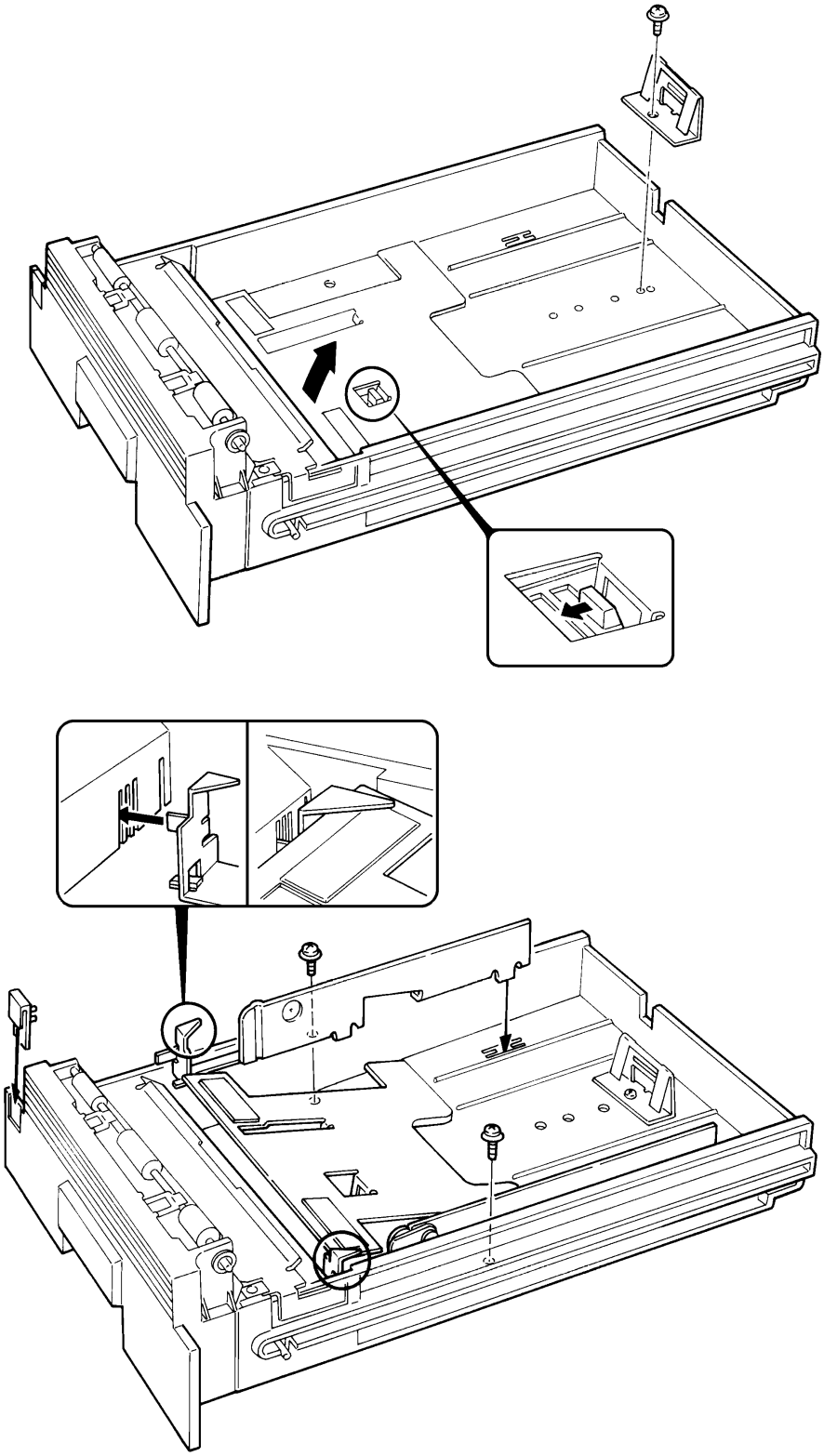


3.2.2. Memory Card

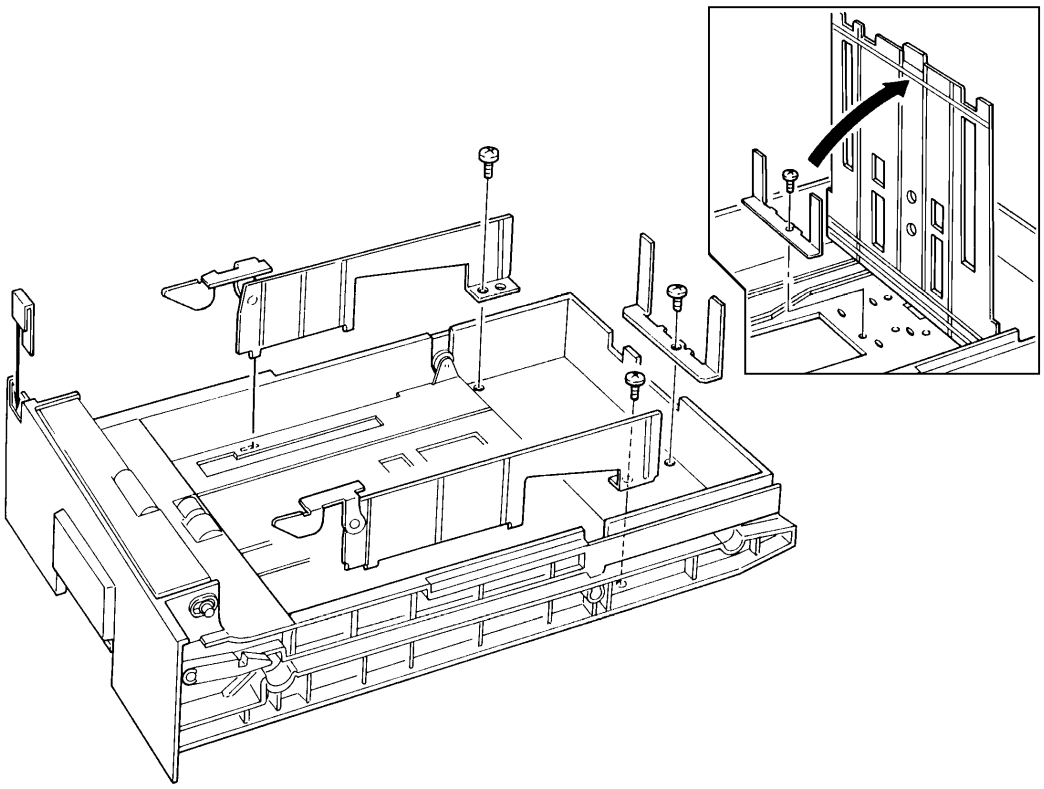
- Turn off the power before installing or removing a memory card.
- Make sure that 100% is displayed on the operation panel before installing or removing a memory card, or data will be lost.



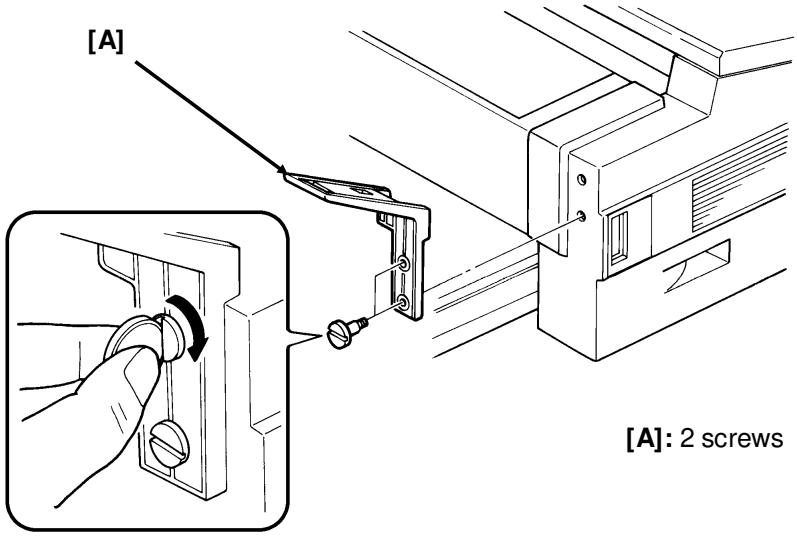
3.2.3. Cassette (250 Sheets)



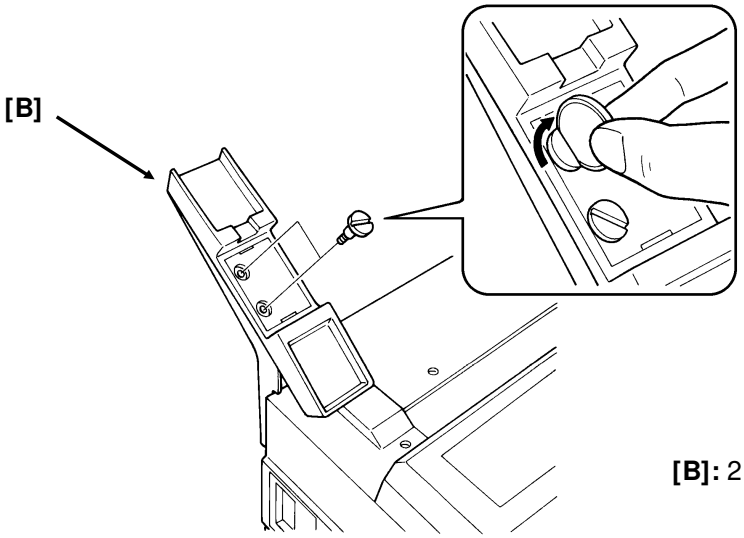
3.2.4. Cassette (500 Sheets)



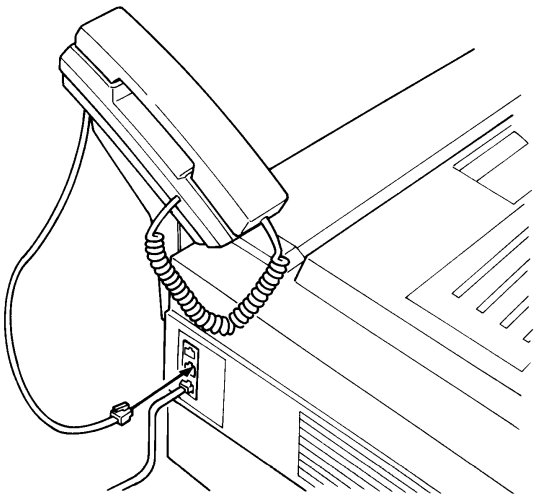
3.2.5. Handset



[A]: 2 screws



[B]: 2 screws



3.2.6. Hard Disk

The installation has three phases.

- SAF Memory Initialization
- Installation Procedure
- Software Initialization

SAF Memory Initialization

1. **Function** **6** **0** **1** **9** **9** **1** then immediately **Yes**

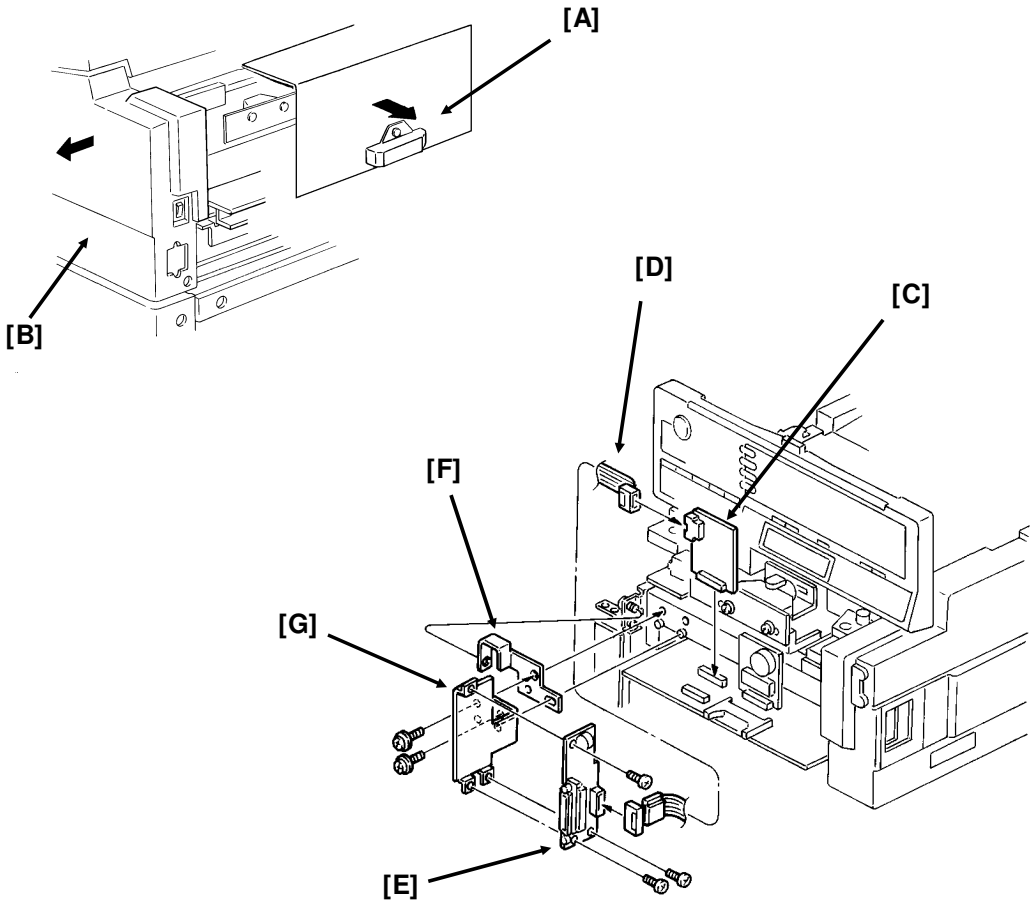
2. **0** **1**

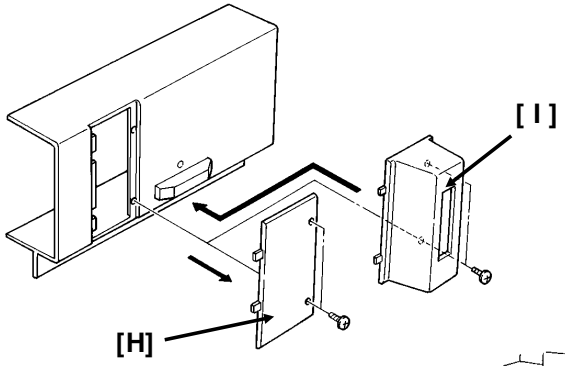
3. Set bit 2 of bit switch 00 to 1.

4. **Yes** **Function**

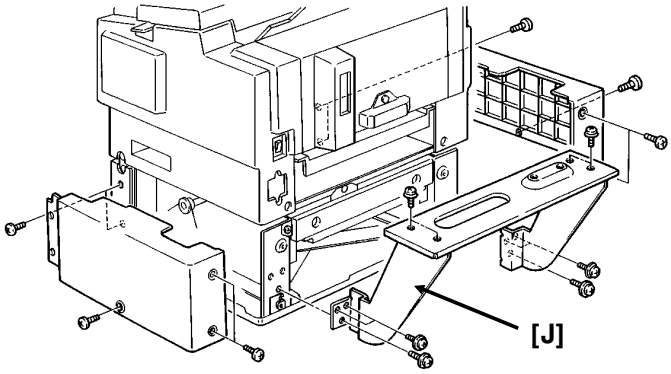
Installation Procedure

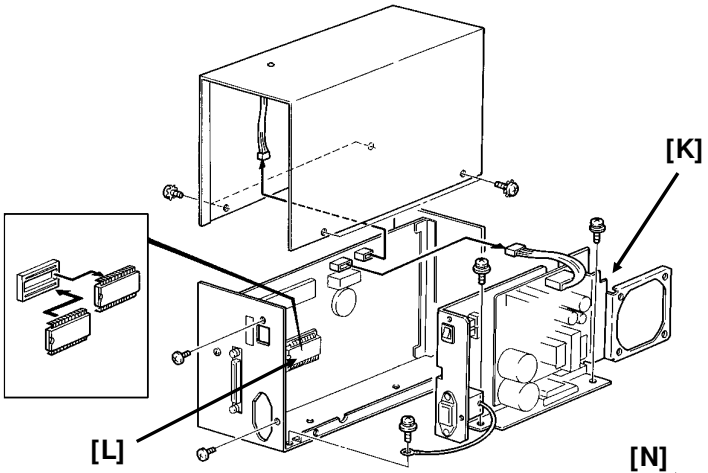
Switch off the power and unplug the machine from the wall socket. Then remove the cassettes.



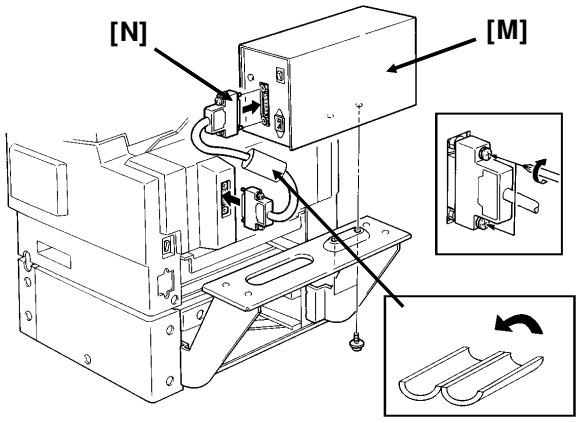


Before attaching [J], remove the side covers of the paper feed unit. Then, after attaching [J], put the covers back.





Change the ROM [L] on the HDIF board before reassembling the hard disk unit.



Caution: Do not plug in or switch on until everything is connected up.

Software Initialization

1. **Function** **6** **0** **1** **9** **9** **1** , then immediately **Yes**
2. **0** **1**
3. Set bit 0 of bit switch 0D to 1.
4. **Yes** **Function**
5. Turn off the power, then turn on the power after a few seconds.
6. **Function** **6** **0** **1** **9** **9** **1** , then immediately **Yes**
7. **0** **1**
8. Set bit 2 of bit switch 00 to 1.
9. **Yes** **Function**
10. Turn off the power.

3.3. INITIAL PROGRAMMING

Check the following:

- Is the country code in the NCU parameters (Function 09, parameter 00) correct for the country of installation? In the USA, it should be 17.
- Do any bit switch or other settings have to be changed to match line conditions or user requirements?
- Have you programmed the serial number (Function 15, section 4-1-18)?

The user should program the following items after installation:

- Telephone Line Type
- RTI, TTI, and CSI
- ID Codes (ID Code, Confidential ID, Memory Lock ID)
- The fax machine's own telephone number
- Date and Time
- Language Selection

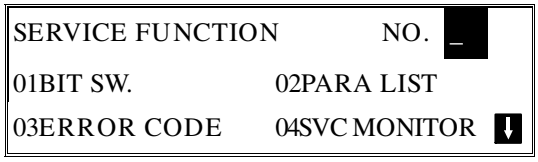
4. SERVICE TABLES AND PROCEDURES

4.1. SERVICE LEVEL FUNCTIONS

To enter service mode, press the following sequence of keys:

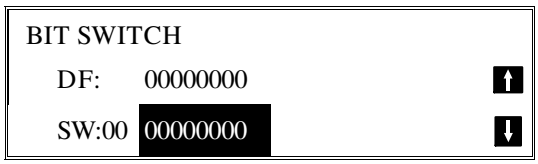
Function 6 0 1 9 9 1

then immediately **Yes**



4.1.1. Bit Switch Programming (Function 01)

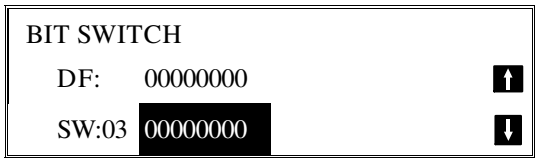
1. After entering service mode, press 0 1



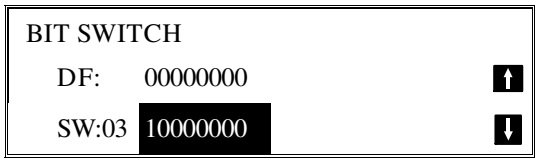
Bit 7 is displayed at the left, and bit 0 at the right. The default settings are shown on the top line, and the current settings on the bottom.

2. • Increment bit switch: ↓
   • Decrement bit switch: ↑

Example:
Display bit switch 3: ↓ x 3



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



4. Either:
   • Adjust more bit switches - go to step 2.
   • Finish - **Yes**

Service Tables and Procedures

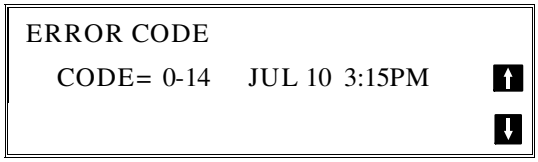
4.1.2. System Parameter List (Function 02)

1. After entering service mode, press **0** **2**

2. **Start**
3. After printing, press **Function**

4.1.3. Error Code Display (Function 03)

1. After entering service mode, press **0** **3**



2. Either:
   - Scroll through the error codes using ↑ and ↓
   - Finish - **Yes**

4.1.4. Service Monitor Report (Function 04)

1. After entering service mode, press **0** **4**

2. **Start**

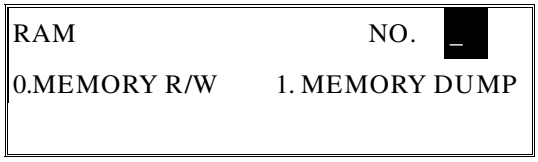
4.1.5. Protocol Dump (Function 05)

1. After entering service mode, press **0** **5**

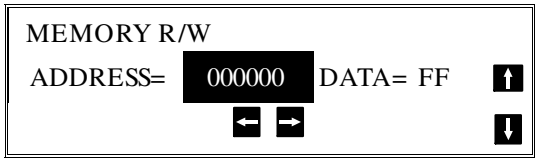
2. **Start**

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

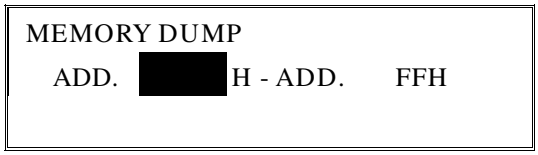
1. After entering service mode, press [0] [6]



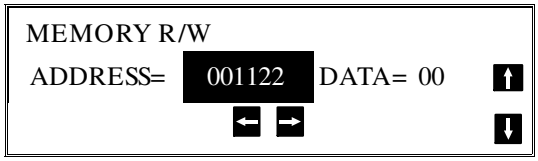
2. Either:
   - Display or rewrite RAM data: [0] Go to step 3.



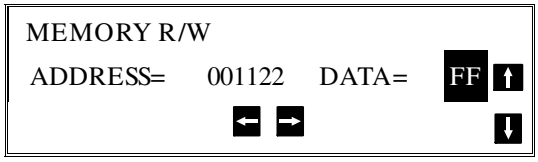
   - Print a RAM dump list: [1] . Go to step 6.



3. Input the address that you wish to see.
   Example: [0] [0] [1] [1] [2] [2]
   If necessary, use [↑] and [↓] to increment or decrement the RAM address.



4. If you wish to change the contents of the RAM address, press [→] to move the cursor to the data side. Then input the new data.
   Example: [F] [F]



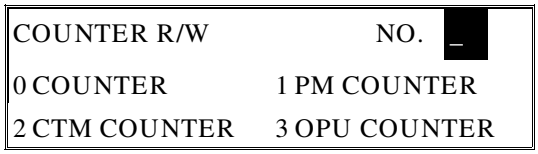
5. Either:
   - View more addresses - [←] then go to step 3.
   - Finish - [Yes] . Go to step 2.

6. Input the range of addresses that you wish to print.
   Example: Addresses 22AA00 to 22BBFF

   [2] [2] [A] [A] [2] [2] [B] [B] [Start]

4.1.7. Checking the Counters (Function 07)

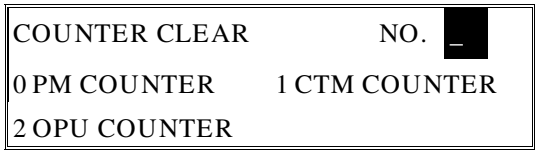
1. After entering service mode, press [0] [7]



2. Either:
   - Check the scanned, printed, transmitted, and received page counters, and the printer and scanner jam counters: [0] . (To see the jam counters, press [0] then [↓] .)
   - Check the PM counter: [1]
   - Check the CTM counter: [2]
   - Check the OPU counter: [3]
3. To change the contents of a counter, press [→] until the required counter is highlighted on the screen, then input the new value.

4.1.8. Clearing the Counters (Function 08)

1. After entering service mode, press [0] [8]

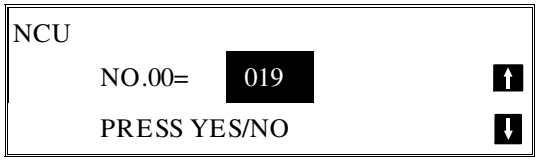


2. Either:
   - Clear the PM counter: [0]
   - Clear the CTM counter: [1]
   - Clear the OPU counter: [2]

4.1.9. NCU Parameters (Function 09)

1. After entering service mode, press [0] [9]

2. [0]



3. Scroll through the parameters using [↑] and [↓] .

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

   [↓] [↓] [↓] [↓] [0] [0] [5] [Yes]

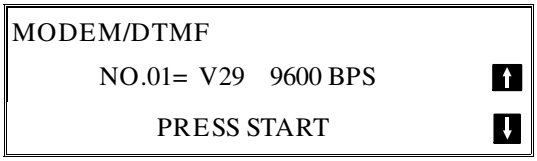
4. To go to the next parameter: [Yes]

5. To finish: [No] [Yes]

Note: Parameter 00 is the Country Code, and Parameter 01 is the Tx Level (Input the value of the Tx level x -1; for example, if the Tx level should be -9 dB, input 9).

4.1.10. Modem/DTMF Tone Tests (Function 09)

1. After entering service mode, press [0] [9] then [1]



2. Scroll through the available tests using [↑] and [↓] .

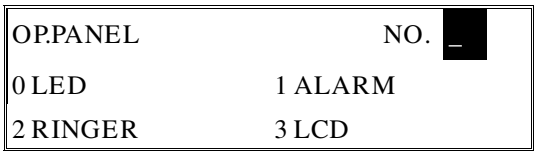
   Example: To do an 1100 Hz tone test. [↓] [↓] [↓] [Start]

   To finish a test: [Stop]

3. To finish: [Yes] x 2

4.1.11. Operation Panel Tests (Function 10)

1. After entering service mode, press [1] [0]



2. Either:

   - Test the LEDs on the operation panel: [0] [Start]
   - Test the alarm tone: [1] [Start]
   - Test the ringer: This test is not used in this machine.
   - Test the LCD: [3] [Start]

3. To finish a test: **Stop**
4. To finish: **Yes** x 2

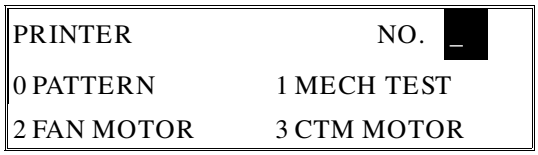
4.1.12. Scanner Tests (Function 11)

1. After entering service mode, press **1** **1**

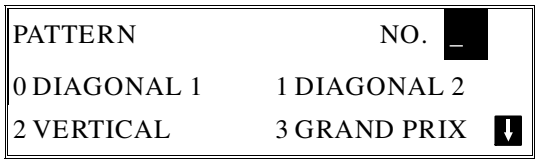
2. Either:
   - Switch on the xenon lamp: **0** **Start**
   - Test the auto document feeder: Place a sheet of paper in the document feeder, then **1** **Start**
3. To finish a test: **Stop**
4. To finish: **Yes** x 2

4.1.13. Printer Tests (Function 12)

1. After entering service mode, press **1** **2**



2. Either:
   - Print a test pattern: **0** . Go to step 3.



   - Test the printer mechanism: **1** **Start**
   - Test the fan motor: **2** **Start**
   - Test the CTM motor: Remove the CTM, then press **3** **Start**

   To finish a test: **Stop**

3. Press a key from 0 to 5, depending on the required pattern. Use ↑ and ↓ to see what patterns are available.
4. **Start**

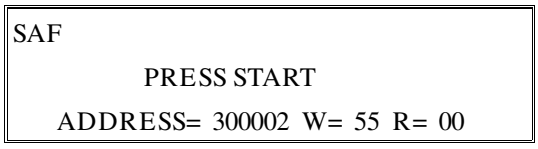
   A test pattern is printed.
5. To finish: **Yes** x 2

4.1.14. RAM Tests (Function 13)

1. After entering service mode, press **1** **3**

2. Either:
   - Test the SRAM: **0** **Start**
   - Test the SAF: **1** **Start**
   - Test the page memory: **2** **Start**

If there is a problem, a display of the following type will occur.

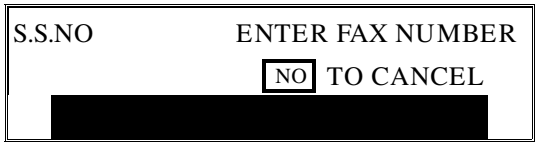


Keep a note of the information on the display, then press **Start** to resume testing.

3. When the test has finished, "OK" is displayed. Press **Yes** to finish.

4.1.15. Service Station Telephone Number (Function 14)

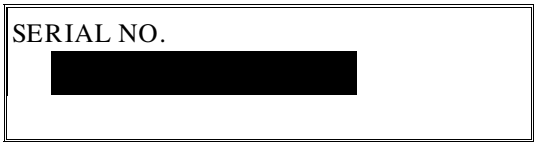
1. After entering service mode, press **1** **4**



2. Input the telephone number of the service station that will receive Auto Service calls from this machine. Then press **Yes** .
   If the ISDN Option kit has been installed, press the Line Selector key to select either G3 or G4 before inputting the number.

4.1.16. Serial Number (Function 15)

1. After entering service mode, press **1** **5**



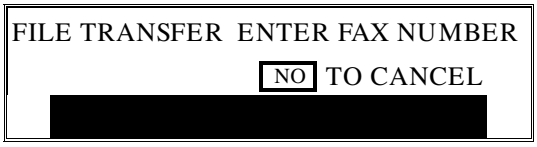
2. Enter the machine's serial no at the keypad.

   To correct a mistake: **No**

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

4.1.17. File Transfer (Function 16)

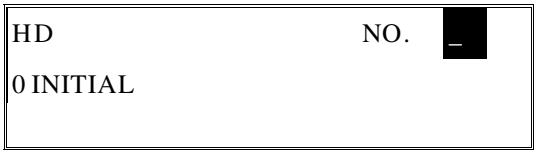
1. After entering service mode, press **1** **6**



2. Input the telephone number of the fax machine to which you wish to transfer all the files. Then press **Yes** **Start** .
   If the ISDN Option kit has been installed, press the Line Selector key to select either G3 or G4 before inputting the number.

4.1.18. Hard Disk Initialization (Function 17)

1. After entering service mode, press **1** **7**



2. **0**

   The hard disk is initialized.

4.1.19. Group 4 Communication Parameters (Function 18)

This function is described in the service manual for the optional ISDN kit.

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.

4.2.1. Bit Switch Definitions

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 TCR 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	Not used	Do not change the factory setting.
4	Inclusion of technical data on the TCR **0:** No **1:** Yes	**1:** Instead of the personal code, the following data are listed on the TCR. First number: Final modem rate (for example, 14.4K means 14,400 bps) Second and third numbers (Rx mode only): These are a measure of the error rate. The left hand figure is the low byte and the right hand figure is the high byte. In general, a larger number means more errors. These numbers are fixed at 0 for tx mode. Fourth number: Cable equalizer; 00 = Equalizer is Off, 01 = Low, 10 = Medium, 11 = High
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.
7	Communication parameter display **0:** Disabled **1:** Enabled	This is a fault-finding aid. The LCD shows the key parameters (see the next page). This is normally disabled because it cancels the CSI display for the user. Make sure that you reset this bit after testing.

Communication parameter display

Mode	DCS: CCITT G3 NSS: Non-standard G3
Modem rate	144S: 14,400 bps with short training (V.17) 144L: 14,400 bps with long training (V.33) 120S: 12,000 bps with short training (V.17) 120L: 12,000 bps with long training (V.33) 96TS: 9,600 bps using TCM, with short training (V.17) 96TL: 9,600 bps using TCM, with long training (V.33) 72TS: 7,200 bps using TCM, with short training (V.17) 72TL: 7,200 bps using TCM, with long training (V.33) 96: 9600 bps 72: 7200 bps 48: 4800 bps 24: 2400 bps
Communica-tion mode	ECM: With ECM SSC: Using SSC EFC: Using EFC NML: With no ECM, SSC, or EFC
Compres-sion mode	MMR: MMR compression MR: MR compression MH: MH compression
Resolution	SSF: Fine, transmitted at 8 x 15.4 dots per mm PSF: Fine, transmitted at 8 x 7.7 dots per mm and smoothed at the rx side DTL: Detail STD: Standard
I/O Rate	0M: 0 ms/line 2/M: 2.5 ms/line 5M: 5 ms/line 10M: 10 ms/line 20M: 20 ms/line 40M: 40 ms/line
Width and reduction	= A4: A4 (8.3"), no reduction = B4: B4 (10.1"), no reduction = A3: A3 (11.7"), no reduction > A4: Reduced to A4 (8.3") before transmission > B4: Reduced to B4 (10.1") before transmission

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/erasing all SAF files **0:** Disabled **1:** Enabled	This bit must be set to 1 before attempting to program dedicated transmission parameters (using Function 31 or 32), or printing all files stored in the SAF memory (using Function 24) or erasing all files stored in the SAF memory (using Function 21). After finishing with these operations, return this bit to 0.
6	Not used	Do not change the factory setting.
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 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 for details.
3 **4**	Not used	Do not change the factory settings.
5	Text/photo determination during scanning **0:** Enabled **1:** Disabled	If this is set at 0, the scanner will detect whether a pixel is part of a photograph or part of a text area, and process it accordingly.
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	Dialing 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 TCR 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 TCR 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	Line error marks on received pages **0:** Disabled **1:** Enabled	If this bit is 1, a mark will be printed on the left edge of the page at any place where a line error occurred in the data. Such errors are caused by a noisy line, for example.
5	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 dialing 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 Not used 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. Note that this machine has jumpers on the NCU for supplying line voltage during 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	AI short protocol (transmission and reception) **0:** Enabled **1:** Disabled	If this bit is 0, the AI Short Protocol feature is switched on.
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 set to 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	Not used	Do not change the factory setting.

Bit Switch 08 (Transmission)

	FUNCTION	COMMENTS
0 **1** **2** **3**	Initial Tx modem rate **Bit 3 Bit 2 Bit 1 Bit 0 Setting (bps)** 1 1 0 1 14,400 1 1 0 0 12,000 1 0 1 1 9,600 TCM 0 0 1 1 9,600 1 0 1 0 7,200 TCM 0 0 1 0 7,200 0 0 0 1 4,800 0 0 0 0 2,400	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.
4	Modem training type when sending at 12,000 or 14,400 bps **0:** Short (V.17) **1:** Long (V.33)	**0:** Training is shorter so communication costs are reduced. However, the communication is not so reliable. **1:** The longer training time ensures a higher reliability for the communication.
5	Not used	Do not change the factory setting.
6 **7**	Cable equalizer (tx mode) **Bit 7 Bit 6 Setting** 0 0 None 0 1 Low 1 0 Medium 1 1 High	Use a higher setting if there is signal loss at higher frequencies because of the length of wire between the modem and the telephone exchange. Also, try using the cable equalizer if one or more of the following symptoms occurs. • Communication error • Modem rate fallback occurs frequently.

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 dialing).
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 dialed telephone number. This does not work for manual dialing. **(1,0) -** The same as above, except that only the last 4 digits are compared. **(1,1) -** The machine will not transmit if the other end does not identify itself with an RTI or CSI. **(0,0) -** Nothing is checked; transmission will always go ahead.
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** **3**	Initial Rx modem rate **Bit 3 Bit 2 Bit 1 Bit 0 Setting (bps)** 1 1 0 1 14,400 1 1 0 0 12,000 1 0 1 1 9,600 TCM 0 0 1 1 9,600 1 0 1 0 7,200 TCM 0 0 1 0 7,200 0 0 0 1 4,800 0 0 0 0 2,400	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.
4	Modem training type when receiving at 12,000 or 14,400 bps **0:** Short (V.17) **1:** Long (V.33)	**0:** Training is shorter so communication costs are reduced. However, the communication is not so reliable. **1:** The longer training time ensures a higher reliability for the communication.
5	Not used	Do not change the factory setting.
6 **7**	Cable equalizer (rx mode) **Bit 7 Bit 6 Setting** 0 0 None 0 1 Low 1 0 Medium 1 1 High	Use a higher setting if there is signal loss at higher frequencies because of the length of wire between the modem and the telephone exchange. Also, try using the cable equalizer if one or more of the following symptoms occurs. • Communication error with error codes such as 0-20, 0-23, etc. • Modem rate fallback occurs frequently.

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	Printout of the message when acting as a transfer broadcasting station **0:** No **1:** Yes	
7	Transmission of the Transfer Result Report to the transfer requesting station **0:** Always **1:** Only if an error occurred	

Bit switch 0C is not used. Do not change any of the factory settings.

Bit Switch 0D

	FUNCTION	COMMENTS
0	Hard disk **0:** Not installed **1:** Installed	Set this bit to 1 if you install a hard disk in the machine.
1	Not used	Do not change the factory settings.
2		
3		
4		
5		
6		
7		

Bit switches 0E to 1D are not used. Do not change any of the factory settings.

Bit Switch 1E		
	FUNCTION	**COMMENTS**
0	Operator call if no response is received in reply to NSF/DIS **0:** Yes **1:** No	Set this bit to 1 if the user complains about the operator call tone form the buzzer when no reply is received to NSF or DIS.
1 **2**	Scrambling method used for secure transmission Bit 2 1 Method 0 0 Type 1 1 0 Type 2 0 1 Type 3 1 1 Type 3	There are three types of scrambling algorithm available for use with this feature. They are all of about the same complexity. The type used is informed in the NSF signal.
3	Secure transmission demonstration **0:** Off **1:** On	If this bit is at 1 and if secure transmission is switched on, received images will be printed out without being unscrambled. This demonstrates what anyone intercepting the signal can expect to pick up.
4 **5** **6**	Not used	Do not change the factory settings.
7	Error report printout **0:** On **1:** Off	If this bit is at 1, the error report will not be printed when an error occurs.

Bit switch 1F is not used. Do not change the factory settings.

4.2.2. Default Settings

SW 00	0 0 0 0 0 0 0 0	SW 10	0 0 0 0 0 0 0 0
SW 01	0 0 0 0 0 1 0 0	SW 11	0 0 0 0 0 0 0 0
SW 02	0 1 0 0 0 0 1 0	SW 12	0 0 0 0 0 0 0 0
SW 03	0 0 0 0 1 0 0 0	SW 13	0 0 0 0 0 0 0 0
SW 04	0 0 0 0 0 0 1 1	SW 14	0 0 0 0 0 0 0 0
SW 05	0 0 1 0 0 0 1 1	SW 15	0 0 0 0 0 0 0 0
SW 06	1 1 1 1 1 1 1 1	SW 16	0 0 0 0 0 0 0 0
SW 07	0 1 0 0 0 1 1 0	SW 17	0 0 0 0 0 0 0 0
SW 08	0 1 0 0 1 1 0 1	SW 18	0 0 0 0 0 0 0 0
SW 09	0 0 0 0 0 0 0 1	SW 19	0 0 0 0 0 0 0 0
SW 0A	0 0 0 0 1 1 0 1	SW 1A	0 0 0 0 0 0 0 0
SW 0B	0 1 0 0 0 0 0 0	SW 1B	0 0 0 0 0 0 0 0
SW 0C	0 0 0 0 0 0 0 0	SW 1C	0 0 0 0 0 0 0 0
SW 0D	0 0 0 0 0 0 0 0	SW 1D	0 0 0 0 0 0 0 0
SW 0E	0 0 0 0 0 0 0 0	SW 1E	0 0 0 0 0 0 0 1
SW 0F	0 0 0 1 0 0 0 1	SW 1F	0 0 0 0 0 0 0 0

4.3. NCU PARAMETERS

The following tables give the RAM addresses and units of calculation of the parameters that the machine uses for ringing signal detection and automatic dialing. The factory settings are also given. Most of these must be changed by RAM read/write (Function 06), but some can be changed using NCU Parameter programming (Function 09); if Function 09 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.

The RAM addresses are quoted as three-figure numbers. When using Function 09, add three zeros. For example, for address 36D, input 00036D

Address	Function	Unit	Remarks
369	Country code [NCU parameters only]	Hex	Function 09 (parameter 00).
36D	Line current detection time	20 ms	Line current is not detected if 36D contains FF.
36E	Line current wait time		
36F	Line current drop detect time		
370	PSTN dial tone upper frequency limit (HIGH)	Hz (BCD)	See Note 2.
371	PSTN dial tone upper frequency limit (LOW)		
372	PSTN dial tone lower frequency limit (HIGH)		
373	PSTN dial tone lower frequency limit (LOW)		
374	PSTN dial tone detection time	20 ms	If 374 contains FF, the machine pauses for the pause time (address 379/37A).
375	PSTN dial tone reset time (HIGH)		
376	PSTN dial tone reset time (LOW)		
377	PSTN dial tone continuous tone time		
378	PSTN dial tone permissible drop time		
379	PSTN wait interval (HIGH)		
37A	PSTN wait interval (LOW)		
37B	Ringback tone detection time	20 ms	Detection is disabled if this contains FF.
37C	PSTN busy tone upper frequency limit (HIGH)	Hz (BCD)	If 37C is FF, detection is disabled. See Note 2.
37D	PSTN busy tone upper frequency limit (LOW)		
37E	PSTN busy tone lower frequency limit (HIGH)		
37F	PSTN busy tone lower frequency limit (LOW)		

Address	Function	Unit	Remarks
380	PABX dial tone upper frequency limit (HIGH)	Hz (BCD)	See Note 2.
381	PABX dial tone upper frequency limit (LOW)		
382	PABX dial tone lower frequency limit (HIGH)		
383	PABX dial tone lower frequency limit (LOW)		
384	PABX dial tone detection time	20 ms	If 384 contains FF, the machine pauses for the pause time (389/38A).
385	PABX dial tone reset time (HIGH)		
386	PABX dial tone reset time (LOW)		
387	PABX dial tone continuous tone time		
388	PABX dial tone permissible drop time		
389	PABX wait interval (HIGH)		
38A	PABX wait interval (LOW)		
38B	PABX ring back tone detection time	20 ms	Detection is disabled if this contains FF.
38C	PABX busy tone upper frequency limit (HIGH)	Hz (BCD)	If this is FF, detection is disabled. See Note 2.
38D	PABX busy tone upper frequency limit (LOW)		See Note 2.
38E	PABX busy tone lower frequency limit (HIGH)		
38F	PABX busy tone lower frequency limit (LOW)		
390	Busy tone ON time: range 1	20 ms	
391	Busy tone OFF time: range 1		
392	Busy tone ON time: range 2		
393	Busy tone OFF time: range 2		
394	Busy tone ON time: range 3		
395	Busy tone OFF time: range 3		
396	Busy tone ON time: range 4		
397	Busy tone OFF time: range 4		
398	Busy tone continuous tone detection time		
399	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
39A	International dial tone upper frequency limit (HIGH)	Hz (BCD)	See Note 2.
39B	International dial tone upper frequency limit (LOW)		
39C	International dial tone lower frequency limit (HIGH)		
39D	International dial tone lower frequency limit (LOW)		
39E	International dial tone detection time	20 ms	If 39E contains FF, the machine pauses for the pause time (3A3/3A4).
39F	International dial tone reset time (HIGH)		
3A0	International dial tone reset time (LOW)		
3A1	International dial tone continuous tone time		
3A2	International dial tone permissible drop time		
3A3	International dial wait interval (HIGH)		
3A4	International dial wait interval (LOW)		
3A5	Country dial tone upper frequency limit (HIGH)	Hz (BCD)	See Note 2.
3A6	Country dial tone upper frequency limit (LOW)		
3A7	Country dial tone lower frequency limit (HIGH)		
3A8	Country dial tone lower frequency limit (LOW)		
3A9	Country dial tone detection time	20 ms	If 3A9 contains FF, the machine pauses for the pause time (3AE/3AF).
3AA	Country dial tone reset time (HIGH)		
3AB	Country dial tone reset time (LOW)		
3AC	Country dial tone continuous tone time		
3AD	Country dial tone permissible drop time		
3AE	Country dial wait interval (HIGH)		
3AF	Country dial wait interval (LOW)		
3B0	Grounding time (ground start mode)	20 ms	The Gs relay is closed for this interval.
3B1	Break time (flash start mode)	1 ms	The Di relay is open for this interval.
3B2	International dial access code	BCD	For a code of 100: 3B2 - F1 3B3 - 00
3B3			

Address	Function	Unit	Remarks
3B4	PABX pause time	20 ms	This time is waited for each pause input after the PSTN access code. Up to 7 of these can be input. If this address contains FF[H], the pause time stored in address 3C9 is used.
3B5	Progress tone detection level, and cadence detection enable flags	Bit 7 Bit 6 dBm 1 1 -49.5 1 0 -40.5 0 1 -32.5 0 0 -26.5	
3B6	CCITT T1 time	2.56 s	
3B7	Max. number of dials per station (not using memory)	1	
3B8	Redial interval (not using memory)	1 min	
3B9	Interval between dialing to different stations	2.56 s	
3BB	Acceptable ringing signal frequency: range 1, upper limit	1000/ N (Hz). N is the value stored using Function 09.	Function 09 (parameter 02).
3BC	Acceptable ringing signal frequency: range 1, lower limit		Function 09 (parameter 03).
3BD	Acceptable ringing signal frequency: range 2, upper limit		Function 09 (parameter 04).
3BE	Acceptable ringing signal frequency: range 2, lower limit		Function 09 (parameter 05).
3BF	Number or rings until a call is detected	1	Function 09 (parameter 06).
3C0	Minimum required length of the first ring	20 ms	See Note 4. Function 09 (parameter 07).
3C1	Minimum required length of the second and subsequent rings		Function 09 (parameter 08).
3C2	Ringing signal detection reset time (LOW)		Function 09 (parameter 09).
3C3	Ringing signal detection reset time (HIGH)		Function 09 (parameter 10).
3C4	Time between opening or closing the Ds relay and opening the Di relay	1 ms	See Notes 3 and 6. Function 09 (parameter 11).
3C5	Break time for pulse dialing		See Note 3. Function 09 (parameter 12).
3C6	Make time for pulse dialing		See Note 3. Function 09 (parameter 13).
3C7	Time between final Di relay closure and Ds relay opening or closing		See Notes 3 and 6. Function 09 (parameter 14).
3C8	Minimum pause between dialed digits (pulse dial mode)	10 ms	See Note 3. Function 09 (parameter 15).
3C9	Time waited when a pause is entered at the operation panel		Function 09 (parameter 16).

Address	Function	Unit	Remarks
3CA	DTMF tone on time	1 ms	Function 09 (parameter 17).
3CB	DTMF tone off time		Function 09 (parameter 18).
3CC	DTMF tone attenuation value	-dBm x 0.5	Function 09 (parameter 19). See Note 5.
3CD	Tx level from the modem	- dBm	Function 09 (parameter 01).
3CE	2100 Hz tone detection level	-1 x 3CD - 0.5N (dB)	N is the value stored in the RAM address.
3CF	1100 Hz tone detection level		
3D0	800 Hz tone detection level		
3D1	Modem turn-on level	-37 - .5N (dBm)	All countries: -43.5 dBm (0B[H]), except for Germany (-48 dBm, 18[H]) USA (-43 dBm, 0C[H]) N is the value stored in the RAM address.
3D9	Acceptable CED detection range; upper frequency (HIGH)	BCD (Hz)	Factory setting: 2200 Hz
3DA	Acceptable CED detection range; upper frequency (LOW)		
3DB	Acceptable CED detection range; lower frequency (HIGH)		Factory setting: 2000 Hz
3DC	Acceptable CED detection range; lower frequency (LOW)		
3DD	CED detection time	20 ms ± 20 ms	Factory setting: 200 ms
3DE	Acceptable CNG detection range; upper frequency (HIGH)	BCD (Hz)	Factory setting: 1200 Hz
3DF	Acceptable CNG detection range; upper frequency (LOW)		
3E0	Acceptable CNG detection range; lower frequency (HIGH)		Factory setting: 1000 Hz
3E1	Acceptable CNG detection range; lower frequency (LOW)		
3E2	CNG detection time	20 ms ± 20 ms	Factory setting: 200 ms
3F2	Modem tx level for image data on the ISDN	- dBm	Function 09 (parameter 20).

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. Pulse dial parameters (addresses 3C4 to 3C9) are the values for 10 pps. If 20 pps is used, the machine automatically compensates.
4. The first ring may not be detected until 1 to 2.5 wavelengths after the time specified by this parameter.
5. The level must be between 0 and 15. The attenuation levels are as follows.
   High frequency tone: - N dBm
   Low frequency tone: - N - 3 dBm
   RAM address 3CC is stored in units of -dBm x 0.5, but if this parameter is stored using Function 09 as parameter 19, the value is in units of -dBm.
6. Europe/Asia models only

The factory settings for the USA are given below. Only those parameters that are enabled are listed here.

- 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.

369		379/37A		389/38A		3A3/3A4		3AE/3AF	
17	11[H]	2 s	100	4s	200	0	0	0	0

3B0		3B1		3B5		3B6		3B7	
0	0	0	0	-49	C0(H)	53 s	53	3	3

3B8		3B9		3BB (Hz)		3BC (Hz)	
5	5	12 s	6	76.9	13	12	83

3BF		3C0		3C1		3C2/3C3		3C4	
1	1	0.2 s	10	0.2 s	10	8 s	400	77 ms	77

3C5		3C6		3C7		3C8		3C9	
64 ms	64	38 ms	38	74 ms	74	0.92 s	92	2.02 s	202

3CA		3CB		3CC		3CD		3CE	
0.1 s	100	0.1 s	100	16	8	9	9	9	0

3CF		3D0		3D1					
9	0	9	0	-43	0C(H)				

4.4. DEDICATED TRANSMISSION PARAMETERS

Each Quick Dial Key and Speed Dial Code has seven 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.

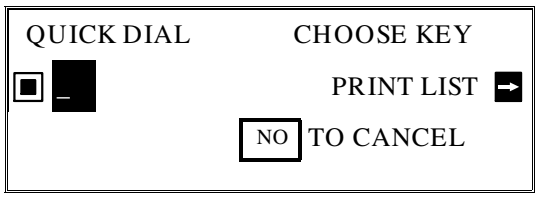
The programming procedure will be explained first. Then, the seven bytes will be described.

4.4.1. Programming Procedure

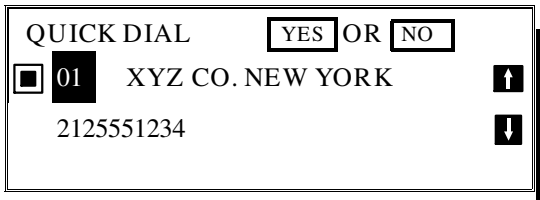
1. Set bit 5 of bit switch 01 to 1.
2. Either use Function 31 (for a Quick Dial number) or Function 32 (for a Speed Dial number)

   Example: Change the Parameters in Quick Dial 10.

3. **Function** **3** **1** **Yes**

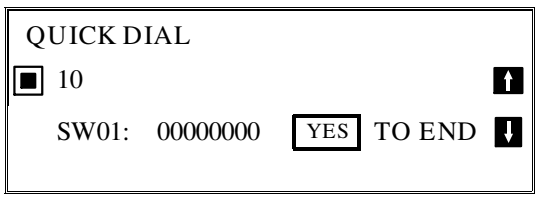


4. Press Quick Dial key **10**



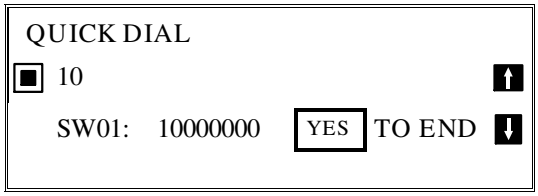
Note: When selecting Speed Dial 10 with Function 32: **1** **0** at the ten key pad.

5. **Yes** four times.



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 1: [7]



7. Either:
   - Select another byte: [↑] or [↓] until the correct byte is displayed. Then go to step 6.
   - Select another Quick Dial Code: [**Yes**] . Go to step 4.
   - Finish: [**Function**]

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

4.4.2. Parameters

Byte 1		
	FUNCTION	**COMMENTS**
0 **1** **2** **3**	Initial Tx modem rate **Bit 3 2 1 0 Setting (bps)** 0 0 0 0 2,400 0 0 0 1 4,800 0 0 1 0 7,200 (V.29) 0 0 1 1 9,600 (V.29) 1 0 1 0 7,200 (TCM) 1 0 1 1 9,600 (TCM) 1 1 0 0 12,000 1 1 0 1 14,400 Other settings: Not used	If training with a particular remote terminal always takes too long, the initial modem rate may be too high. Reduce the initial Tx modem rate using these bits.
4	Modem training type when sending at 12,000 or 14,400 bps **0:** V.17 (short) **1:** V.33 (long)	**0:** Training is shorter so communication costs are reduced. However, the communication is not so reliable. **1:** The longer training time ensures a higher reliability for the communication.
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.

Byte 1		
	FUNCTION	**COMMENTS**
7	Dedicated transmission parameters for this Quick/Speed Dial number **0:** Disabled **1:** Enabled	**0:** The parameters in these seven 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 seven 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	Not used	Do not change the factory setting.
3	Short preamble **0:** Enabled **1:** Disabled	If this bit is 0, Short Preamble is always used when transmitting to this terminal.
4	AI short protocol **0:** Enabled **1:** Disabled	If this bit is 0, AI Short Protocol is always used when transmitting to this terminal.
5	Secure transmission **0:** Disabled **1:** Enabled	If this bit is at 1, secure transmission will always be used when communicating with the number stored in this Quick/Speed Dial.
6 **7**	Cable equalizer **Bit 7 Bit 6 Setting** 0 0 None 0 1 Low 1 0 Medium 1 1 High	Use a higher setting if there is signal loss at higher frequencies because of the length of wire between the modem and the telephone exchange when calling the number stored in this Quick/Speed Dial. Also, try using the cable equalizer if one or more of the following symptoms occurs. • Communication error with error codes such as 0-20, 0-23, etc. • Modem rate fallback occurs frequently.

Byte 3
FUNCTION AND COMMENTS
Tx level 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. The Tx level is the value stored in this byte (in hex code) multiplied by -1.

Byte 4
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 value stored in this byte (in hex code), multiplied by 1 second. **Caution:** Note that if the value of this byte is 0, the T1 timer will be 0 s.

Caution: If the value of byte 4 is 0, the CCITT T1 timer is 0 s. Therefore, every time you program a set of dedicated transmission parameters, be sure to input the correct T1 timer into byte 4.

Bytes 5 to 7 are only used if the ISDN kit has been installed. These bytes are explained in the service manual for the ISDN kit.

4.5. SERVICE RAM ADDRESSES

000140 (Service Switch 00)
TTI printing position (from the left side) BCD: 00 - 98 (mm) [Even numbers only]

000144 (Service Switch 04)
Bit 2: Forwarding 0: Enabled, 1: Disabled
Bit 3: Authorized reception 0: Enabled, 1: Disabled
Bit 6: Continuous polling 0: Disabled, 1: Enabled

000145 (Service Switch 05)
Bit 0: Display of both RTI and CSI on the LCD 0: Disabled, 1: Enabled
Bit 1: Secure reception 0: Disabled, 1: Enabled
Bit 2: Printout of forwarded messages 0: Disabled, 1: Enabled
Bit 3, 4: Recognition of the remote terminal's paper length

Bit 3	Bit 4	Setting
0	0	No limit
1	0	B4
0	1	A4
1	1	Not used

Bit 5: Action when the remaining memory is less than the remaining memory threshold (address 000155) if forwarding is on 0: Disconnection, 1: Normal reception without forwarding

000146 (Service Switch 06)
Maximum number of dialing attempts for TRD Hex: 00 - FF

000147 (Service Switch 07): Number of page retransmission attempts (Hex code)

000148 (Service Switch 08)
Bit 0: Secure transmission 0: Disabled, 1: Enabled
Bit 1: Modem rate after receiving a negative code (RTN or PIN) 0: No change, 1: Fallback
Bit 2: Hang-up decision when a negative code (RTN or PIN) is received
0: No hang-up, 1; Hang-up
Bit 4: Addition of TCF when AI short protocol is being used 0: No, 1: Yes
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

000149 (Service Switch 09)
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
Bit 6: Input of consecutive pauses 0: Enabled, 1: Disabled
Bit 7: G4 Terminal Identification length limit 0: No limit, 1: Up to 7 characters

00014A (Service Switch 0A)
Bit 2: mm-to-inch conversion (transmission) 0: Disabled 1: Enabled
Bit 3: mm-to-inch conversion (printing the contents of a file)
0: Always printed in inch format
1: Depending on the type of paper, mm or inch format is selected
Bit 4: Addition of part of the image data from confidential transmissions on the transmission result report 0: Disabled, 1: Enabled
Bit 5: Addition of Confidential ID to the Personal Code List 0: Disabled, 1: Enabled
Bit 6: CSI programming 0: User level, 1: Service level
Bit 7: Telephone line type selection 0: User level, 1: Service level

00014B (Service Switch 0B): Contrast threshold - Lighten (Hex code, from 00 to 1F)
00: All Black, 1F: All White
00014C (Service Switch 0C): Contrast threshold - Normal (Hex code, from 00 to 1F)
00: All Black, 1F: All White
00014D (Service Switch 0D): Contrast threshold - Darken (Hex code, from 00 to 1F)
00: All Black, 1F: All White

00014E (Service Switch 0E)
After the registration sensor turns on, the machine feeds the paper by this amount before stopping the paper feed motor Hex: 00 - FF (unit = 0.6 mm)

00014F - 000151 (Service Switches 0F to 11): Page separation and data reduction parameters: see section 2-2, "Paper Feed"

000152 (Service Switch 12)
Gap at left margin of printed page Hex: 00 - FF (unit = 0.5 mm)

000153 (Service Switch 13)
Bit 0: Default resolution used for copy mode 0: As selected by the user, 1: Fine
Bits 1, 2: Default network type setting

Bit 1	Bit 2	Default
0	0	Group 3
0	1	Group 4
Other settings		Not used

Bit 3: Port used for Group 3 communication 0: PSTN, 1: ISDN
Bit 4: Addition of TTI during transmission 0: Enabled, 1: Disabled

000154 (Service Switch 14)
Bit 0: Reduction during printing 0: Disabled, 1: Enabled

000155 (Service Switch 15)
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 setting is kept at 0, the machine will detect ringing signals and go into receive mode even if there is no memory space left. This will result in communication failure.

000157 (Service Switch 17)
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.

000158 (Service Switch 18): Number of redialing attempts, including the first dialing attempt (memory tx)
Hex : 00 - FF
000159 (Service Switch 19): Redialing interval (memory tx) Hex: 00 - FF (minutes)

00015B (Service Switch 1B): Transfer Broadcasting
Bit 0: Acceptance of transfer request from abroad 0: Enabled, 1: Disabled
Bit 1: USA network numbering requirements 0: Disabled, 1: Enabled
Bit 2: French network numbering requirements 0: Disabled, 1: Enabled
Bit 3: Spanish network numbering requirements 0: Disabled, 1: Enabled
Bit 4: Area code processing when sending the transfer result report (the machine adjusts the telephone number of the transfer requester before dialing it, to take account of differences in area codes and similar factors) 0: Enabled, 1: Disabled

00015C (Service Switch 1C): Group 4 mode
Bit 0: Automatic fallback (Group 4 to Group 3) 0: Enabled, 1: Disabled
Bit 1: Specified two-step transfer 0: Disabled, 1: Enabled
Bit 3: Call Identification Line (CID) On/Off Selection
0: Disabled; CID always printed
1: Enabled; the user can switch this on or off with a User Parameter setting
CID: This is like the TTI. It contains the Rx Terminal ID, Tx Terminal ID, Date, Time, and any Label Insertions.
Bit 4: Terminal ID Verification 0: Disabled, 1: Enabled
Bit 5: Addition of date information to CSS 0: Disabled, 1: Enabled

00015D (Service Switch 1D): Time for which RDS is enabled after the user has switched it on BCD: 00 - 99 (hours)

00015E (Service Switch 1E)
Bit 5: Transmission of a blank CSI (all spaces) if no CSI is programmed
0: Disabled, 1: Enabled

00045D - 00045F: PM interval

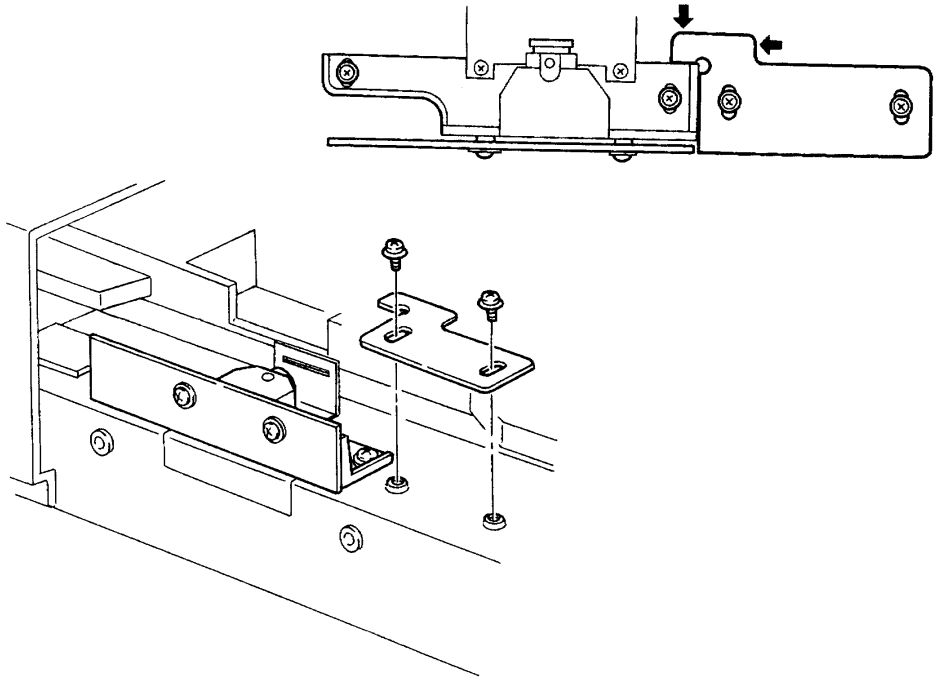
	Bits 7 - 4	Bits 3 - 0
00045D	Tens	Units
00045E	Thousands	Hundreds
00045F	Hundred thousands	Ten thousands

Default Settings

SW 00	0 0 0 1 1 0 0 0	SW 10	0 0 0 0 0 0 0 0
SW 01	0 0 0 0 0 0 0 1	SW 11	0 1 0 0 1 1 1 1
SW 02	0 0 0 0 0 0 0 0	SW 12	0 0 0 0 0 1 1 0
SW 03	0 0 0 0 0 0 0 1	SW 13	0 0 0 0 0 0 0 1
SW 04	0 0 0 0 0 0 0 0	SW 14	0 0 0 0 0 0 0 0
SW 05	0 0 0 0 0 0 1 0	SW 15	0 0 0 0 1 1 0 0
SW 06	0 0 0 0 0 1 0 1	SW 16	0 0 0 0 0 0 1 0
SW 07	0 0 0 0 0 0 1 1	SW 17	0 0 0 0 1 1 1 1
SW 08	0 0 0 0 1 0 0 1	SW 18	0 0 0 0 0 1 0 1
SW 09	0 0 0 0 0 1 1 0	SW 19	0 0 0 0 0 1 0 1
SW 0A	0 0 1 0 1 0 0 0	SW 1A	0 0 0 0 0 0 0 0
SW 0B	0 0 0 1 0 0 1 0	SW 1B	0 0 0 0 0 0 1 0
SW 0C	0 0 0 0 1 1 1 1	SW 1C	0 1 0 0 1 1 1 0
SW 0D	0 0 0 0 1 1 0 1	SW 1D	0 0 1 0 0 1 0 0
SW 0E	0 0 0 1 0 0 0 0	SW 1E	0 0 0 0 0 0 0 0
SW 0F	1 1 1 1 1 1 1 1	SW 1F	0 0 0 0 0 0 0 0

4.6. SPECIAL TOOLS AND LUBRICANTS

- Scan line test chart: P/N H0829502
- 200 dot-per-inch test pattern: P/N A0129110
- Test lead: P/N H0419002
- SBU adjustment knobs: P/N H0129300
- Allen wrench
- Lens block positioning tool: P/N H0829503
  For how to use, see the following diagram



4.7. PM TABLE

Scanner

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

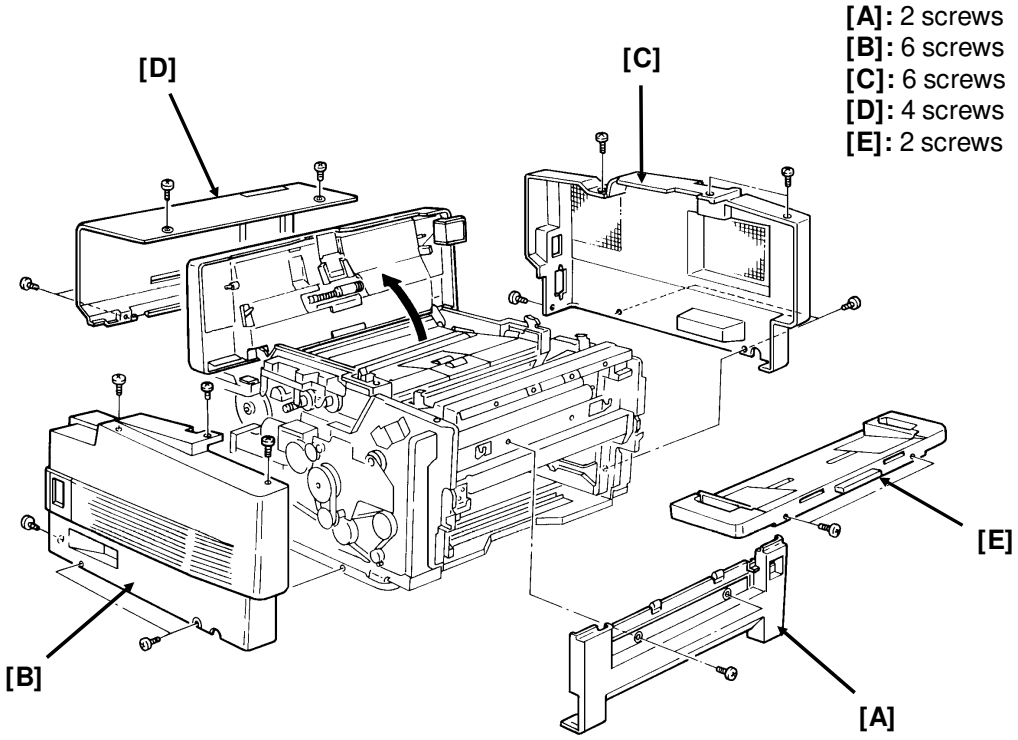
Item	10K	30K	60K	1 year	Notes
Pick-up and Feed Rollers	C	R	R	C	Soft cloth and alcohol
Separation Roller	C	R	R	C	Soft cloth and alcohol
Relay Rollers	C	C	C	C	Soft cloth and alcohol
Separation Torque Limiter		L	R		Use Mobil Temp 78.
Pick-up Torque Limiter		L	R		

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

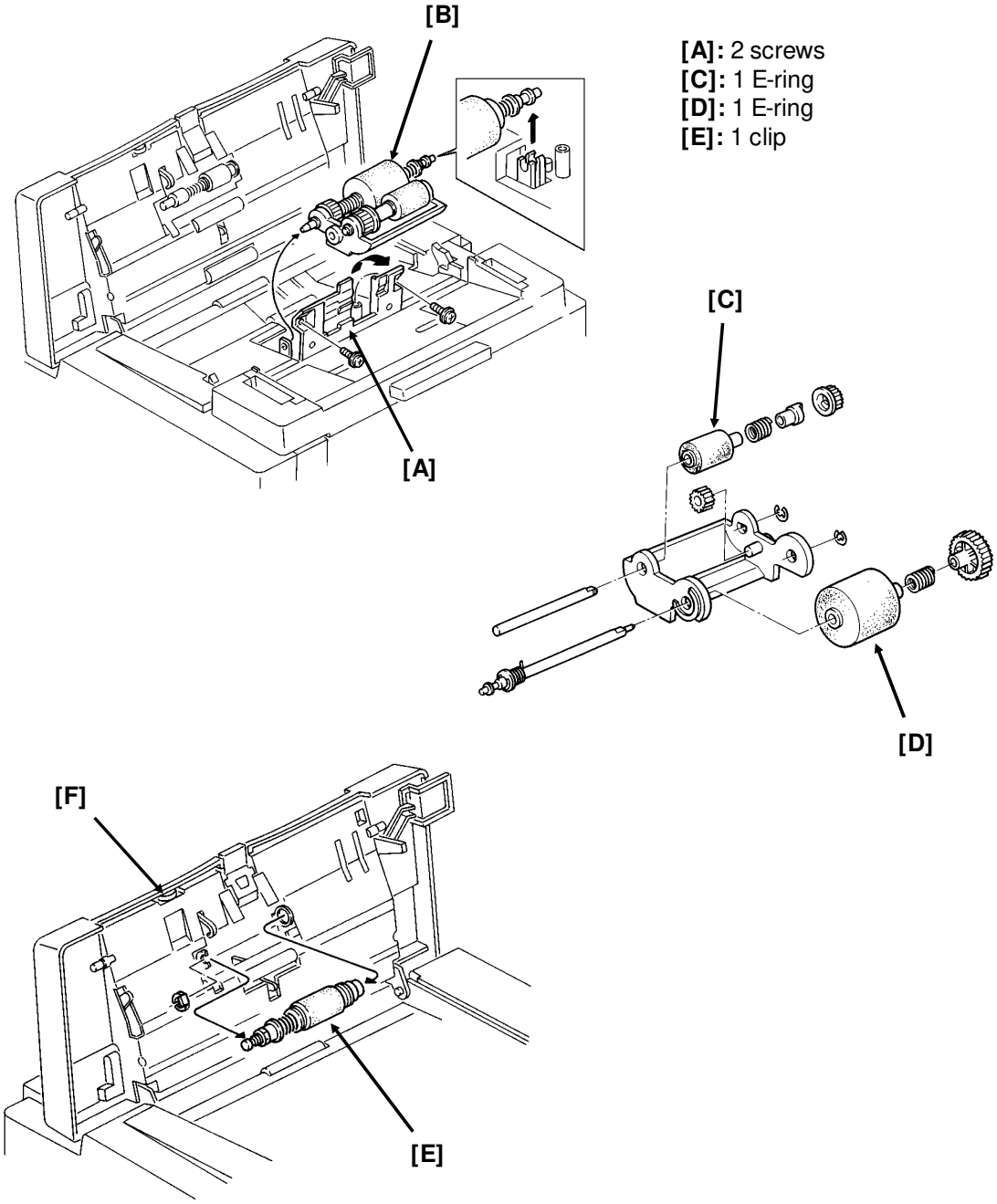


- Front Cover [A], Left Cover [B], Right Cover [C], Rear Cover [D], Document Table [E]

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



- 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 center. 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

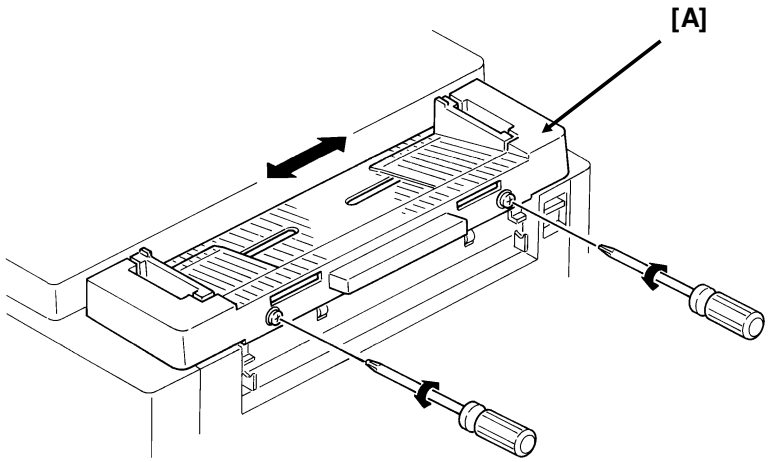
Document Type	Setting
Thin sheets of paper	1 or 2
Thick sheets of paper	4 or 5

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

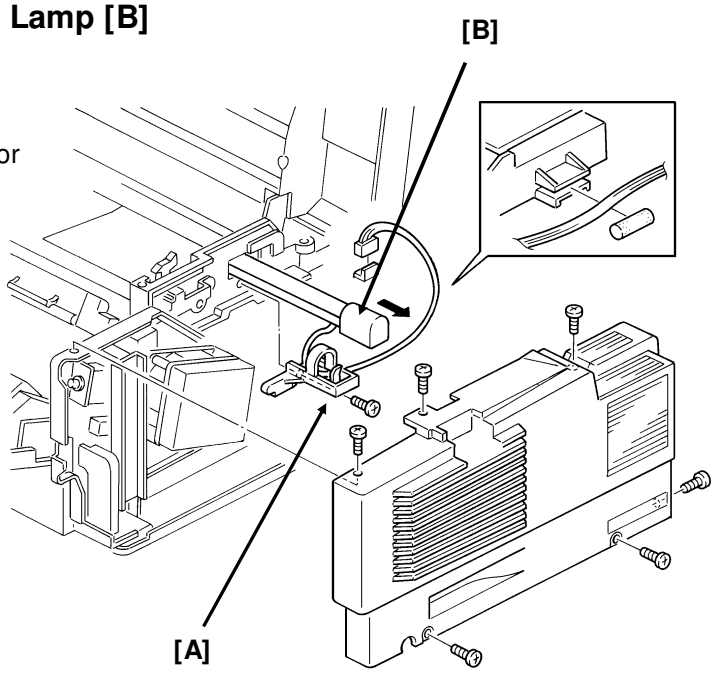


Reassembly:

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

5.2.4. Xenon Lamp [B]

[A]: 1 screw
[B]: 1 connector



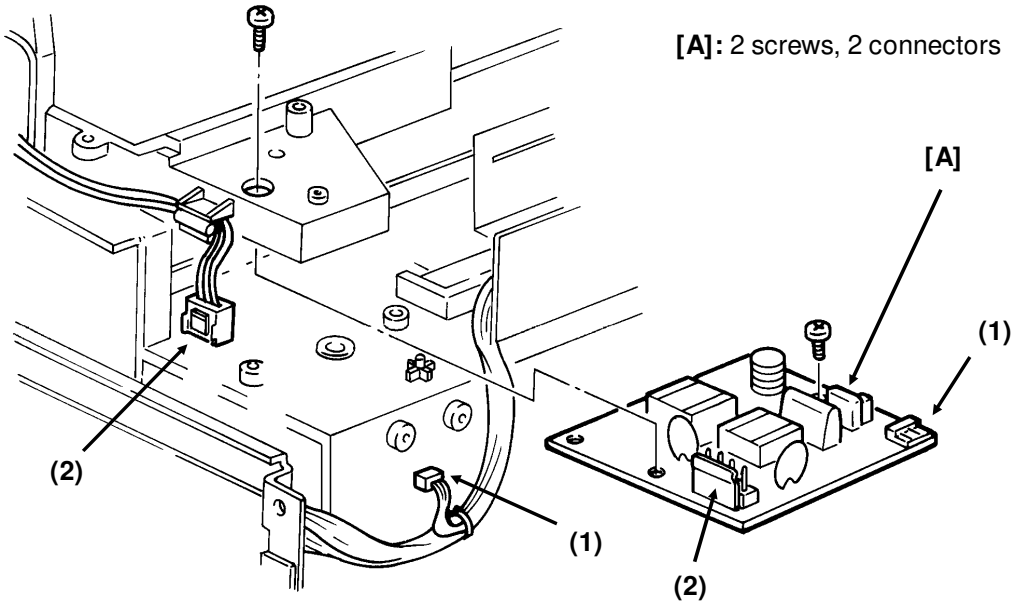
- First, remove the right cover (see section 5-1).

Reassembly

- Test the new lamp before reassembly.

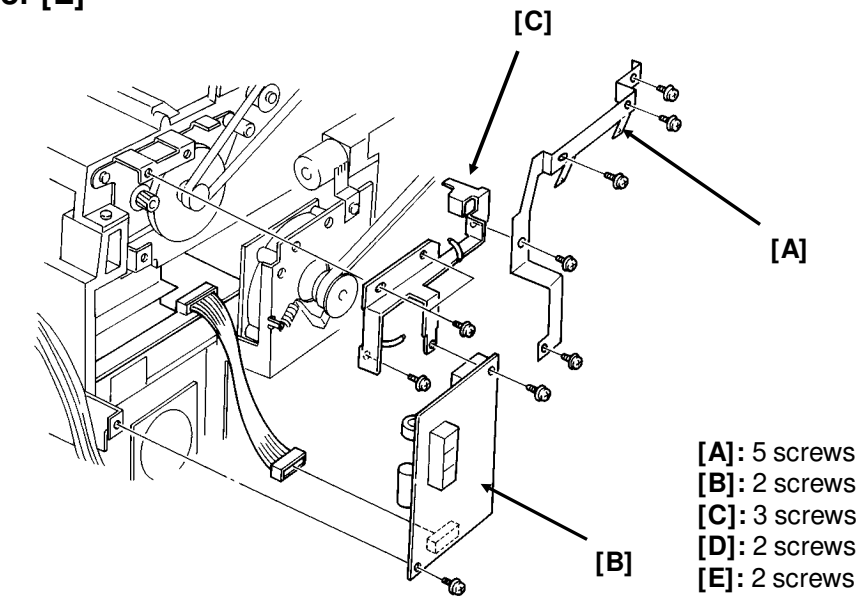
5.2.5. Xenon Lamp Driver [A]

[A]: 2 screws, 2 connectors

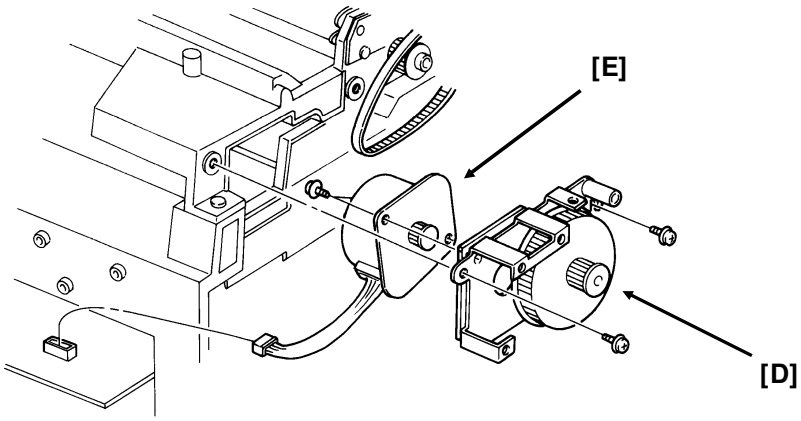


- First, remove the rear and right covers (see section 5-1).

5.2.6. Tx Motor [E]



[A]: 5 screws
[B]: 2 screws
[C]: 3 screws
[D]: 2 screws
[E]: 2 screws

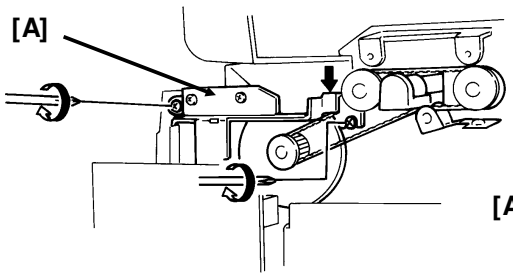


To access this motor, remove the left cover.

Reassembly

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

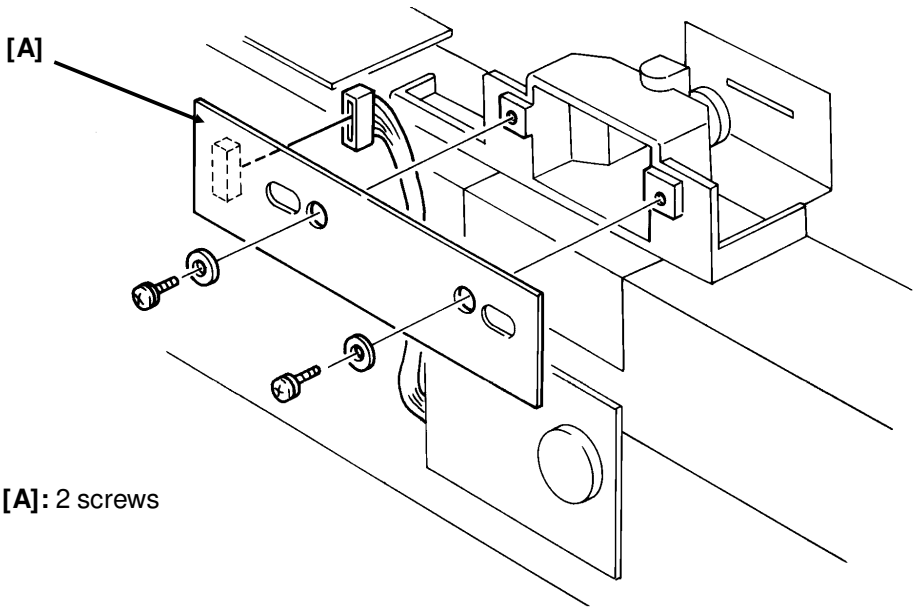
5.2.7. Timing Belt Tension Adjustments



[A]: Loosen 2 screws

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

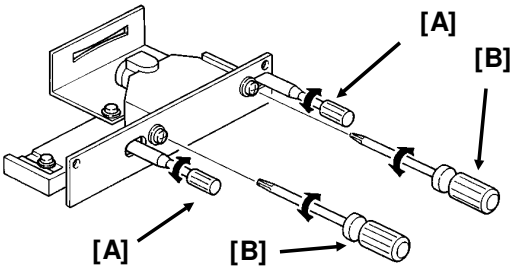
- Scan line test chart: P/N H0829502
- 200 dot-per-inch test pattern: P/N A0129110
- Test lead: P/N H0419002
- SBU adjustment knobs: P/N H0129300
- Allen wrench

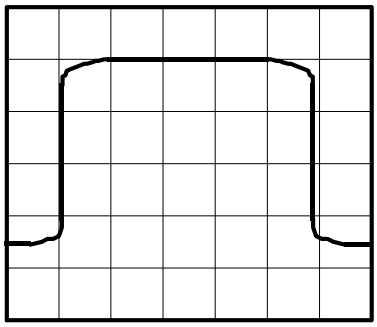
Preparation

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



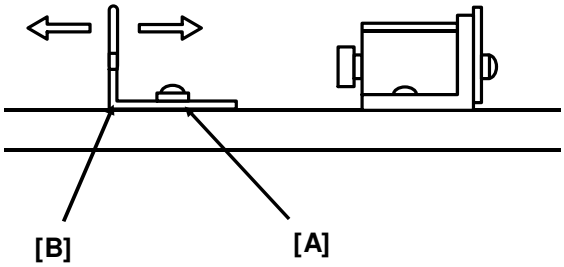


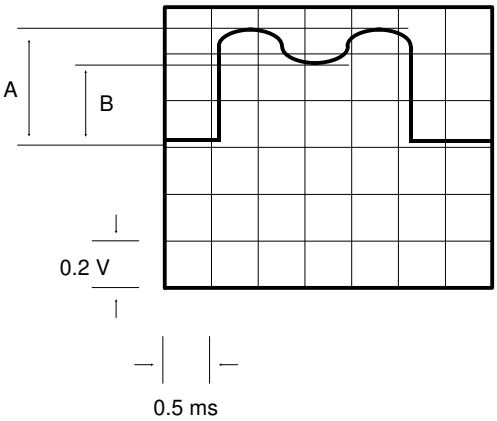
- Fit the adjustment knobs [A] through the slots in the SBU as shown.
- Loosen the SBU securing screws [B].
- Remove any test charts that are on the exposure glass.
- Check that the white level waveform can be seen fully across the oscilloscope. If it cannot be seen properly, turn the adjustment knobs.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

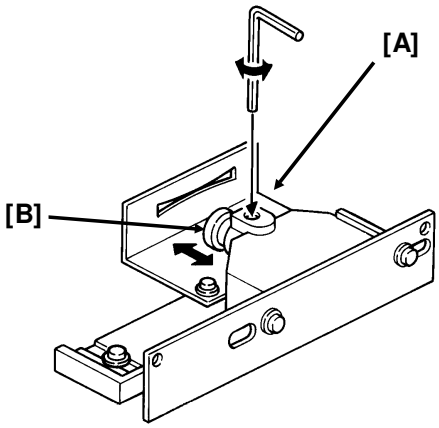
In the oscilloscope waveform, (A-B)/A must be less than 0.25. If it is not, do the following.

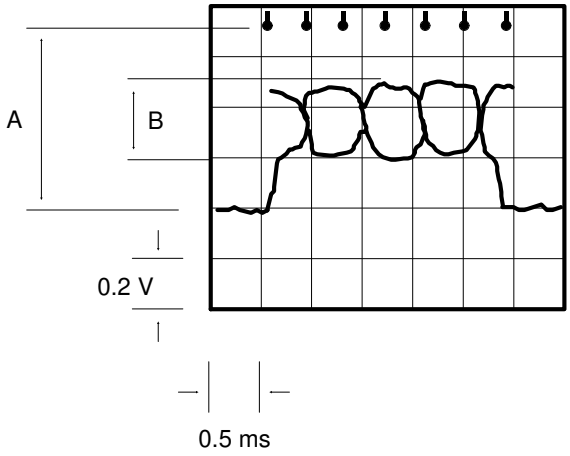




- Remove any test charts that are on the exposure glass.
- Loosen the shading plate securing screws [A].
- Move the shading plate [B] back and forth until the waveform meets the requirements.
- Tighten the shading plate securing screws.

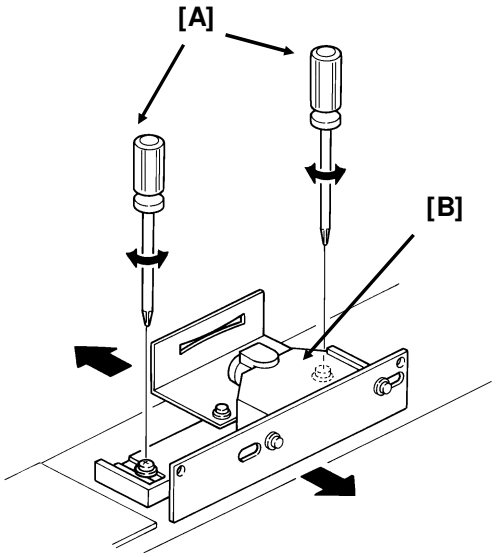
3. Focusing (MTF)

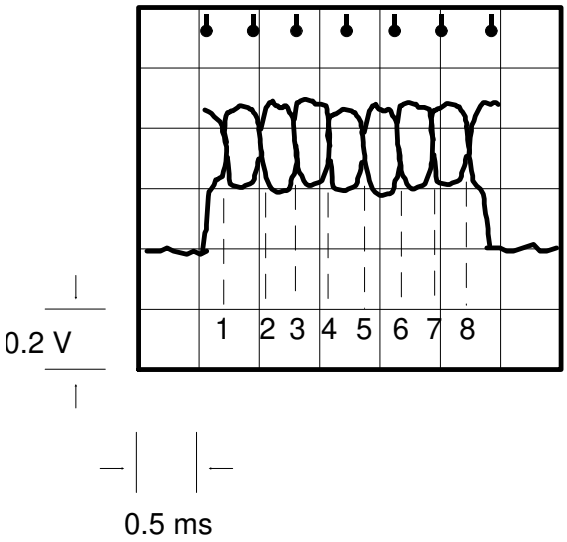




- Place the 200 dpi test pattern on the exposure glass.
- Loosen the lens securing screw [A] (Allen screw).
- Move the lens [B] back and forth until B is maximized (see the diagram on the right).
- Tighten the lens securing screw.

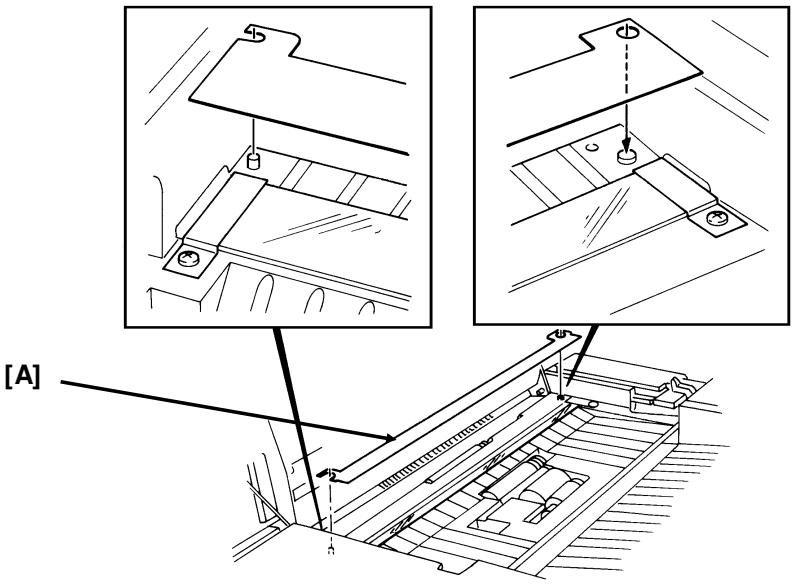
4. Reduction Rate



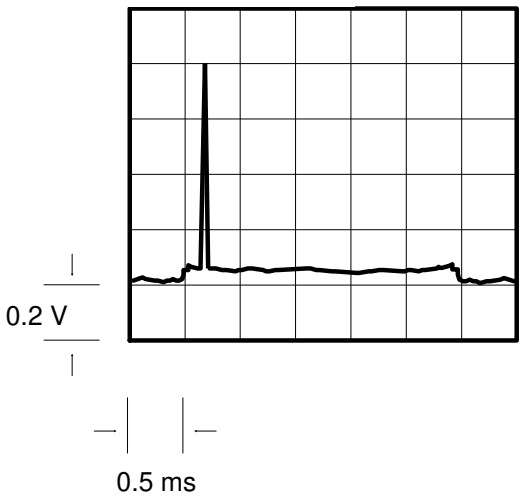


- Place the 200 dpi test pattern on the exposure glass.
- Loosen the lens block securing screws [A].
- Move the lens block [B] back and forth until the signal has 8 or fewer crosspoints.
- Tighten the lens block securing screws.
  Note: Tighten each screw little by little alternately.

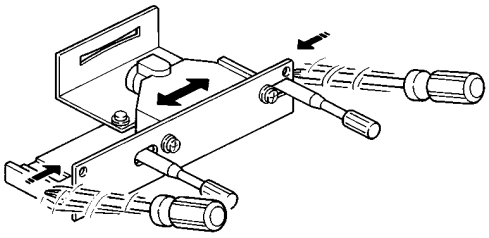
5. Scan Line

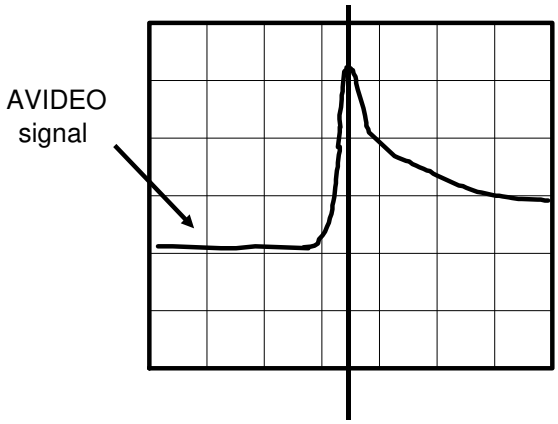


- Place the scan line test chart [A] on the exposure glass as shown.
- Loosen the SBU securing screws (see procedure 1).
- Adjust the waveform with the adjusting knobs until the waveform is as shown on the right.



6. Scan Start Position



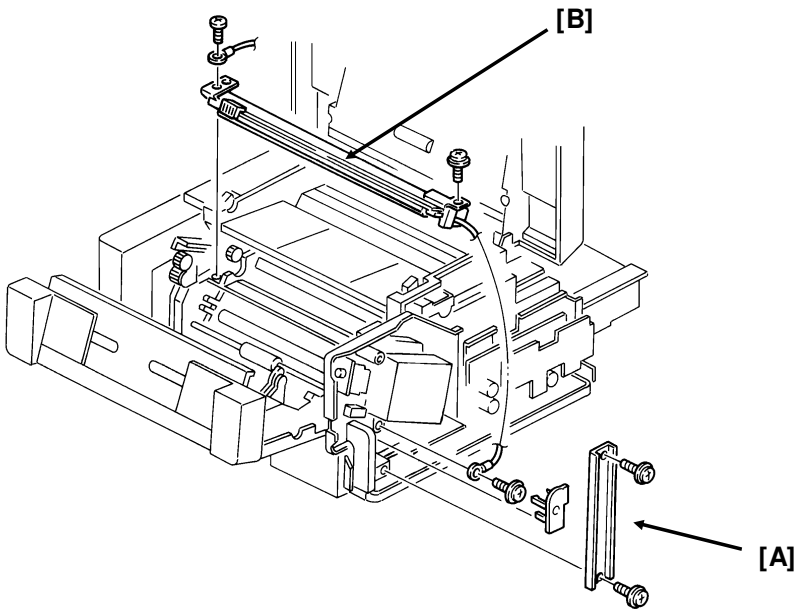


- Place the scan line test chart on the exposure glass as shown on the previous page.
- Connect the oscilloscope to the test lead as follows: Channel 1 to AVIDEO (pin 1 - blue wire), channel 2 to VADJ (pin 2 - red wire), and connect up the ground to pin 4 (black wire).
- Set the oscilloscope scales as 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



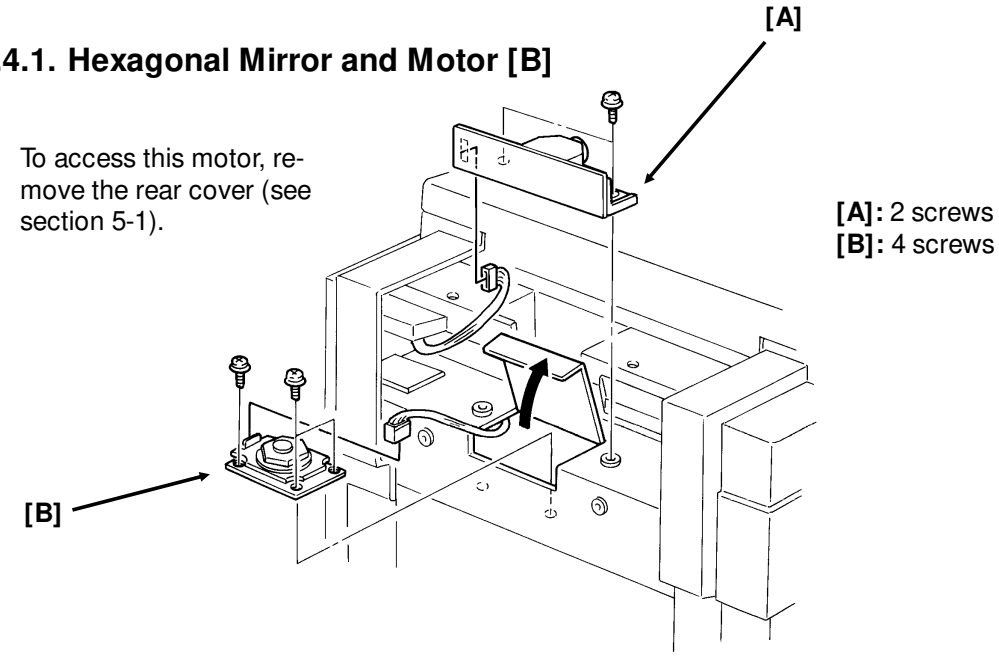
- First, remove the CTM and the master unit, then remove the right cover (see section 5-1).

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.

5.4. EXPOSURE

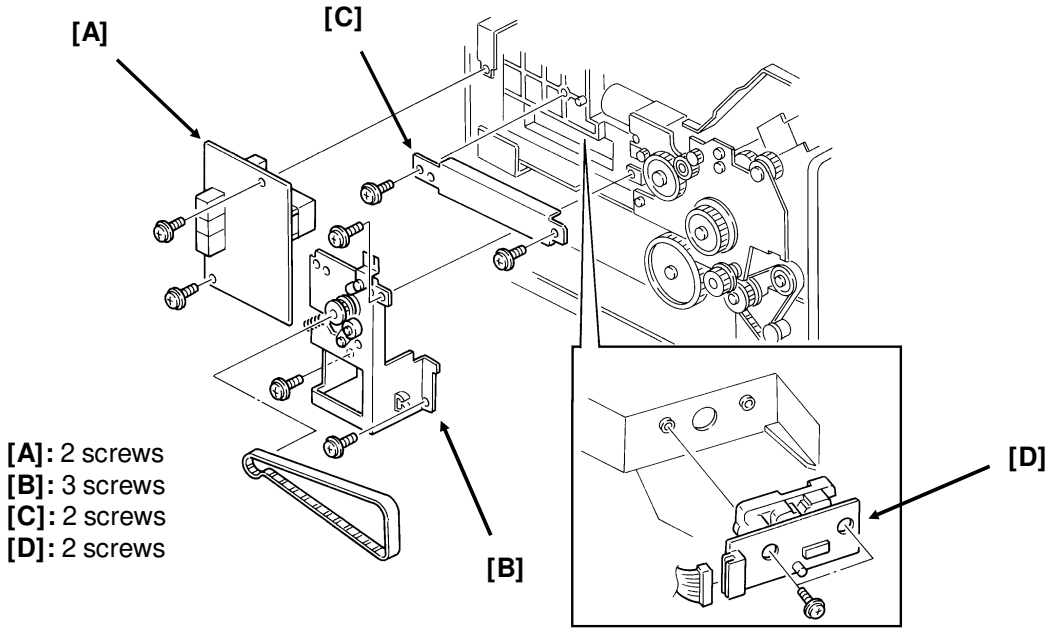
5.4.1. Hexagonal Mirror and Motor [B]

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



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]

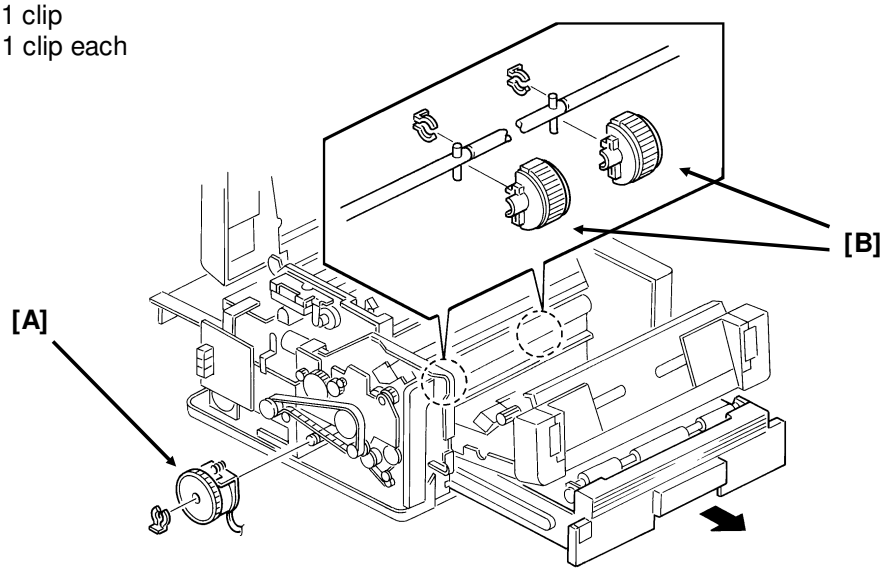


- First, remove the left cover (see section 5-1).

5.5. PAPER FEED (UPPER CASSETTE)

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

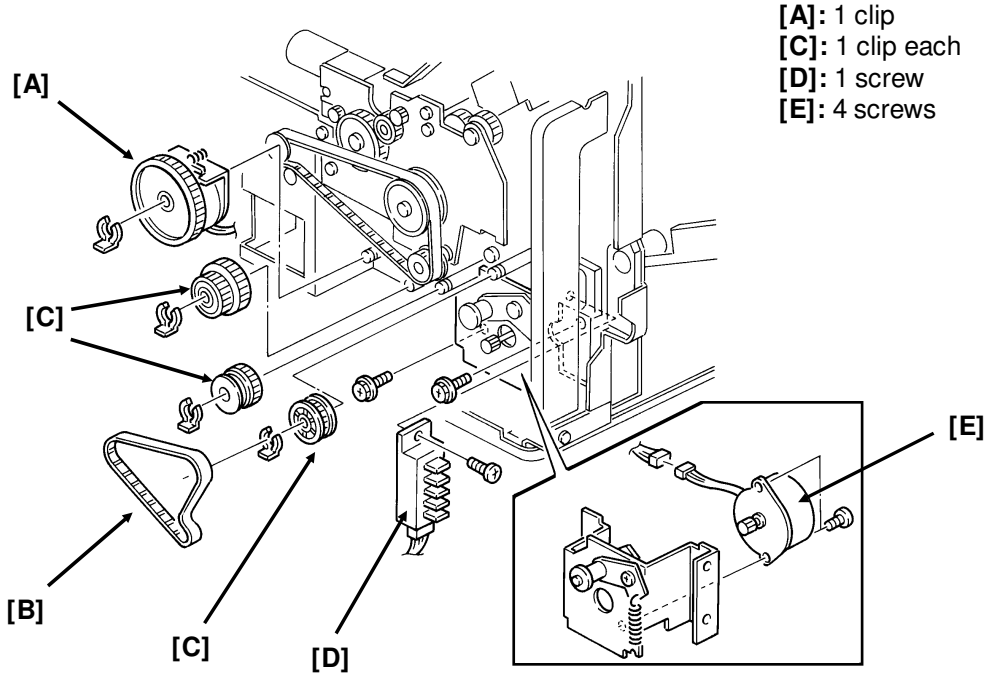
[A]: 1 clip
[B]: 1 clip each



- Remove the cassette and the left cover.

5.5.2. Upper Paper Feed Motor [E]

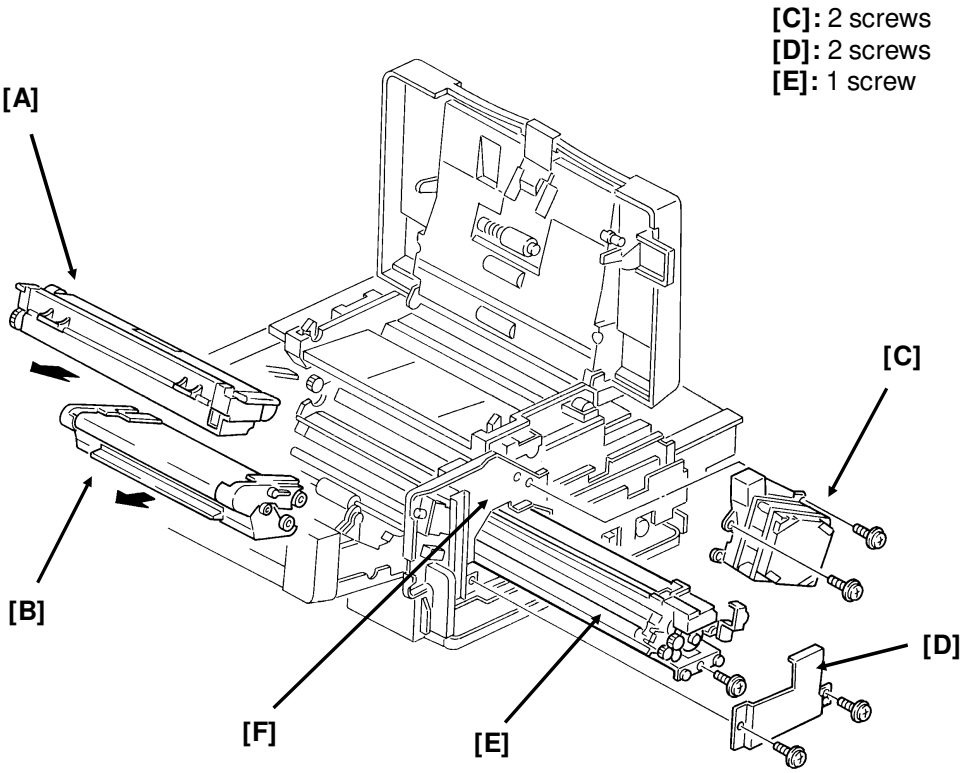
[A]: 1 clip
[C]: 1 clip each
[D]: 1 screw
[E]: 4 screws



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

5.6. DEVELOPMENT

5.6.1. Development Unit [E]

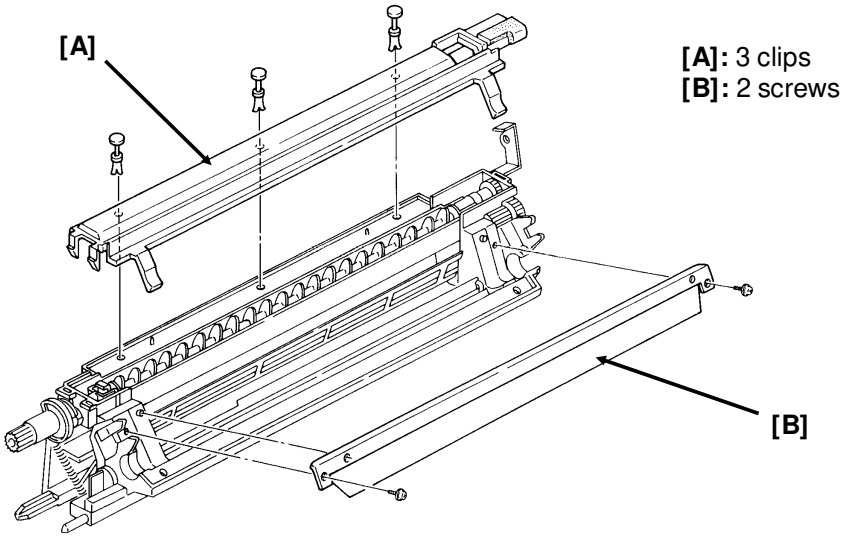


- First, remove the CTM [A] and the master unit [B], and the right cover (see section 5-1).

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 000418 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.

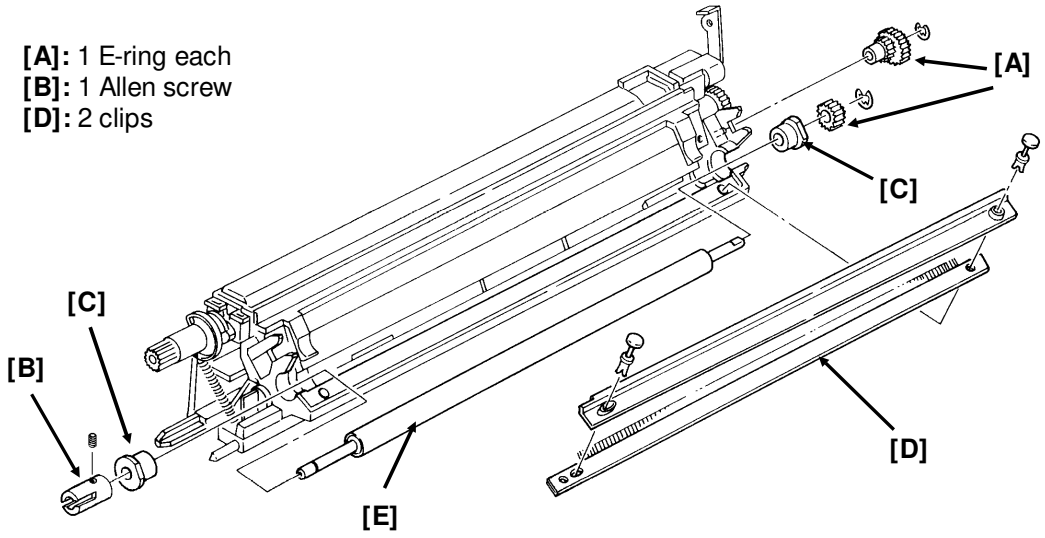
5.6.2. Toner Metering Blade [B]



- 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]



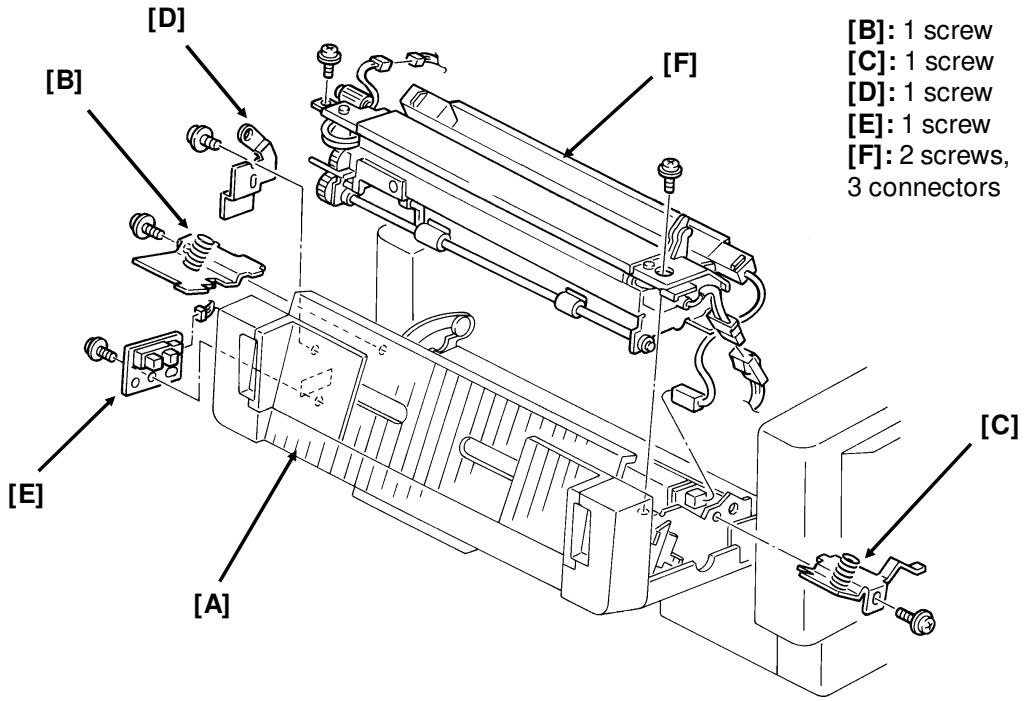
- First, remove the toner metering blade (see section 5-6-2).

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

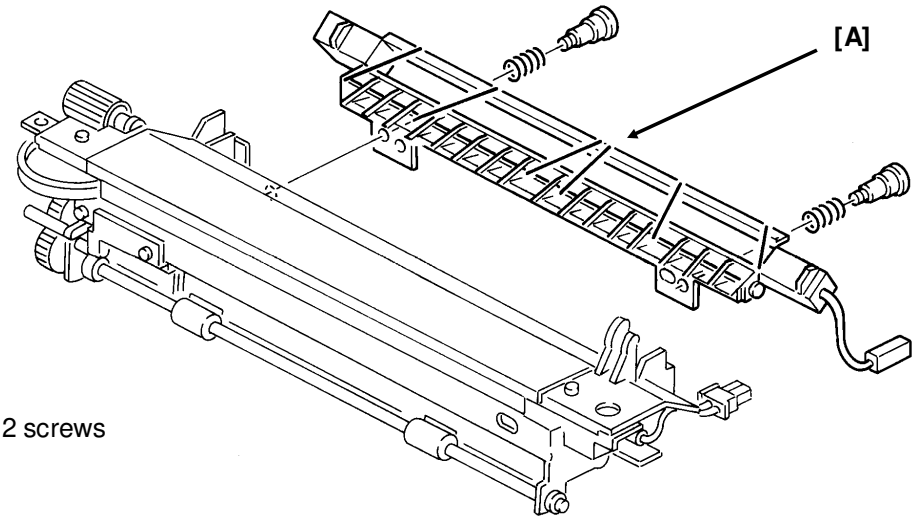
5.7.1. Transfer and Fusing Unit [F]



[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.

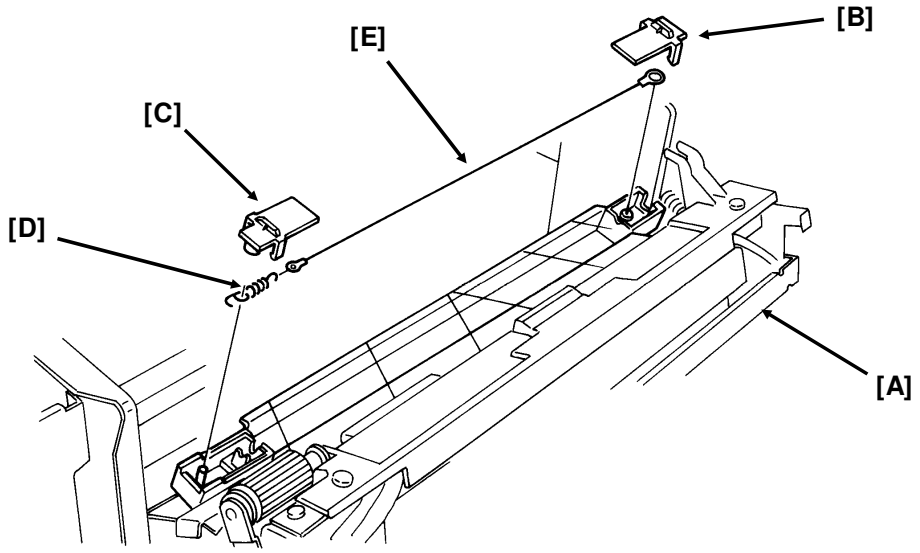
5.7.2. Transfer Corona Unit [A]



[A]: 2 screws

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

5.7.3. Transfer Corona Wire [E]

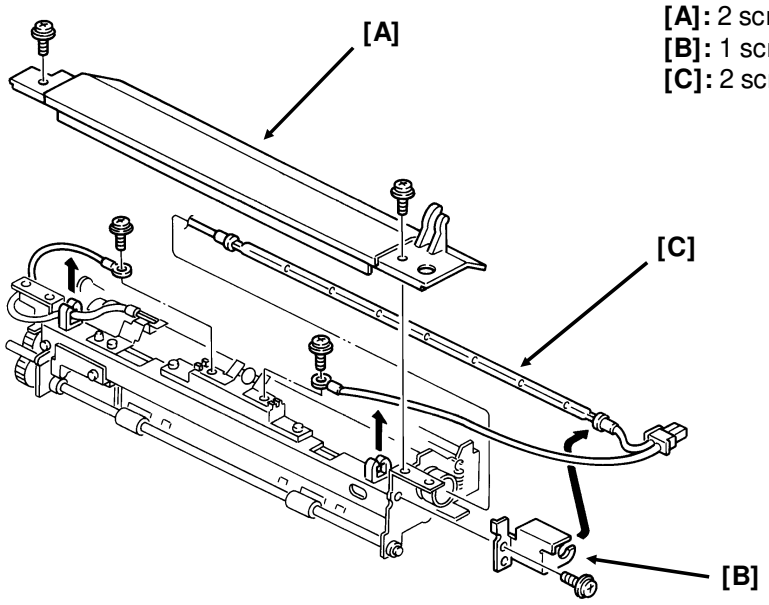


- Open the front cover [A]. Do not remove the transfer/fusing unit.

Reassembly

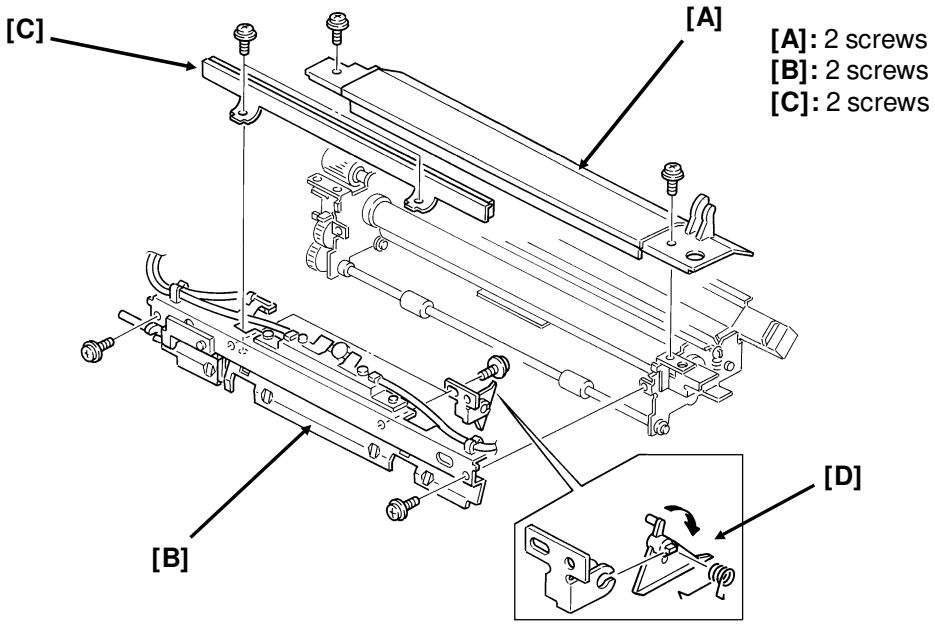
- Do not touch the new corona wire with bare hands.
- Hook the new corona wire into the rear endblock first.
- Set the corona wire in the front endblock groove.
- After installing both ends of the wire, test the action of the tension spring.

5.7.4. Fusing Lamp [C]



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

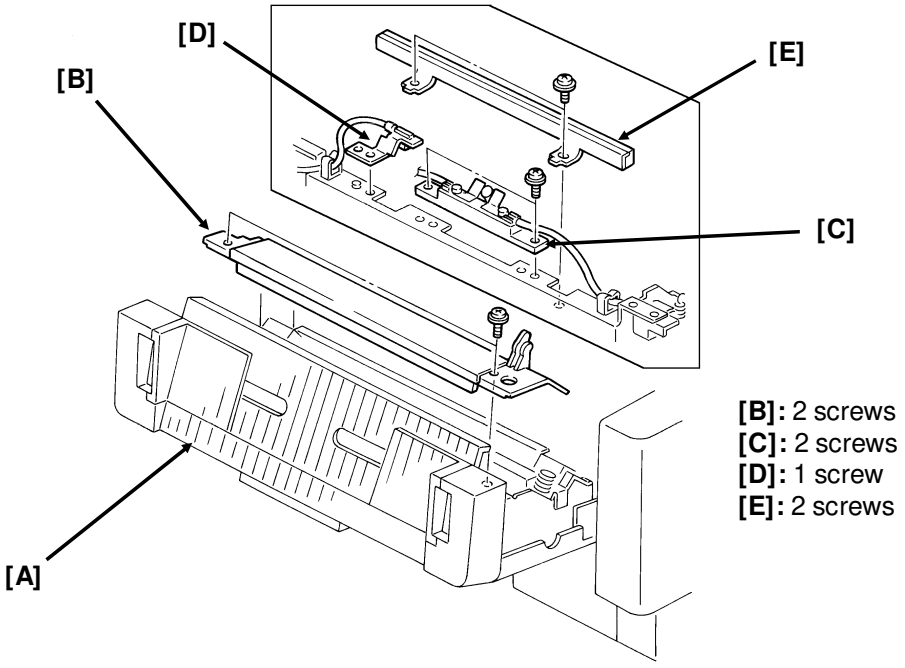
5.7.5. Hot Roller Strippers [D]



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

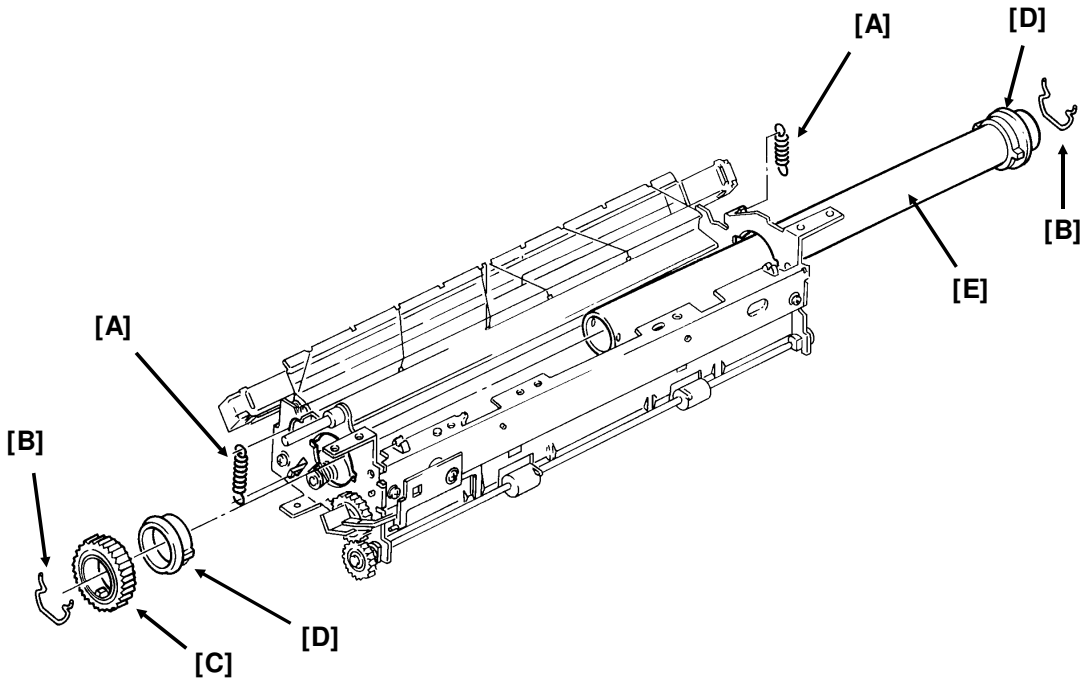
Caution: Be careful not to damage the hot roller.

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]



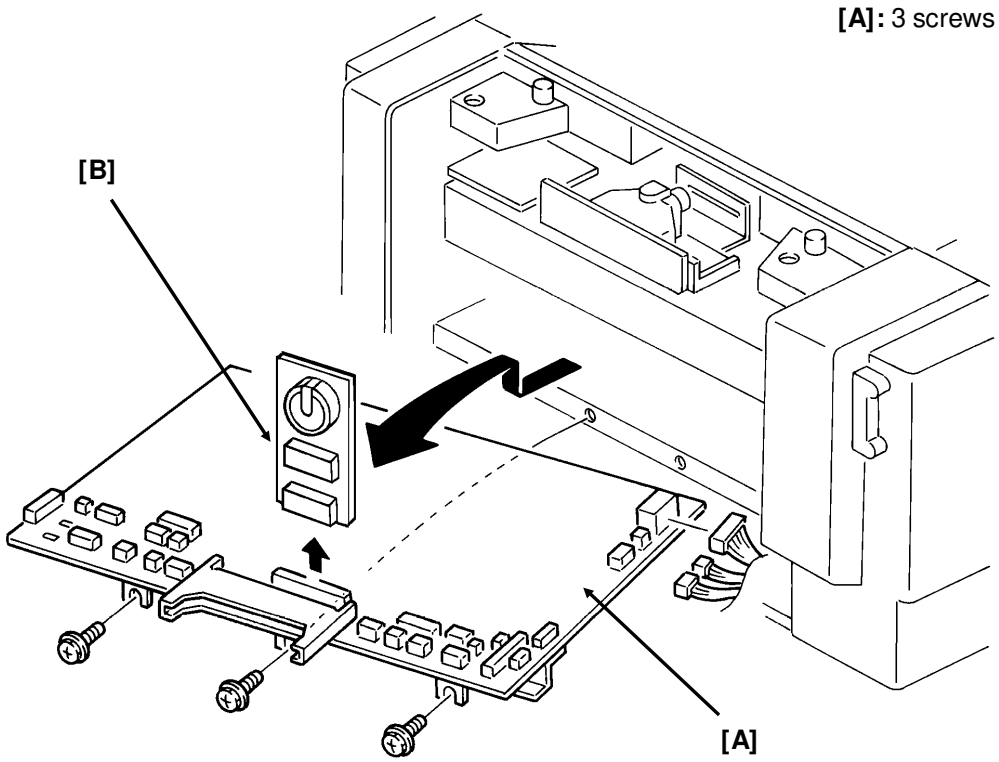
- First, remove the transfer and fusing unit (see section 5-7-1) and take out the fusing lamp (see section 5-7-4).

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 and ID codes (print a User Parameter List; Function 91). Also, if the user has stored some User Function Keys and Function Programs (see the User Function and Quick Dial Lists), 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:

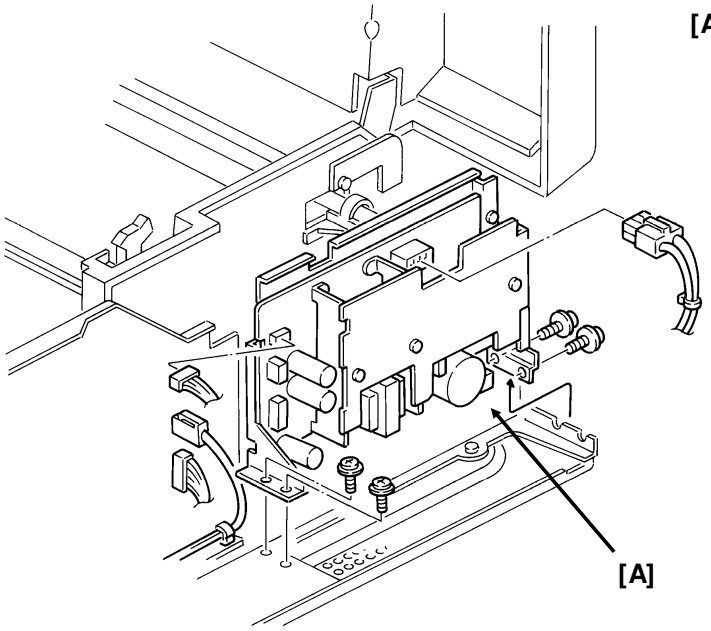
- Reset the RAM on the new MBU board: to do this, set the battery switch to OFF, then switch it back on after a few seconds. Make sure that the switch position is ON.
- On the old MBU board, turn the battery switch to OFF.

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, ID codes, polling reception files, 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.

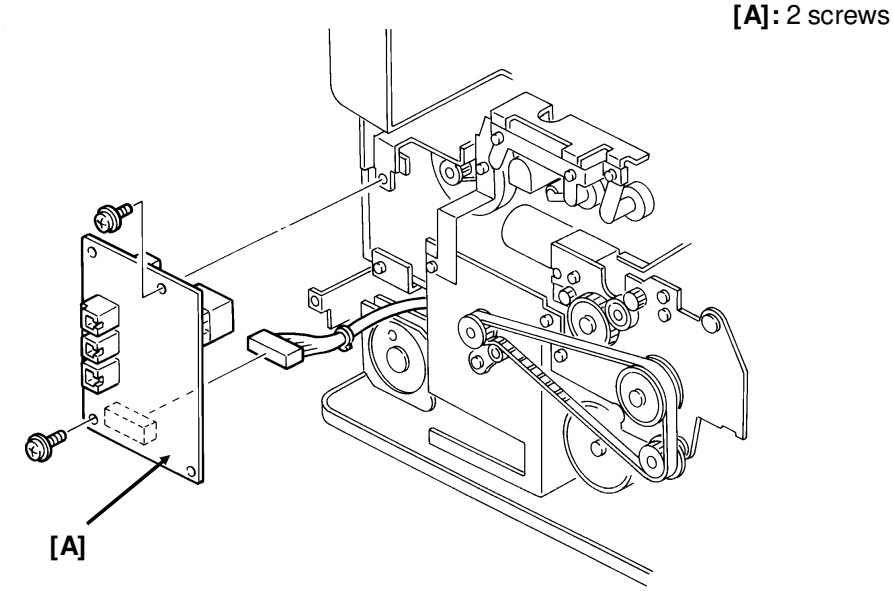
5.8.3. PSU [A]



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

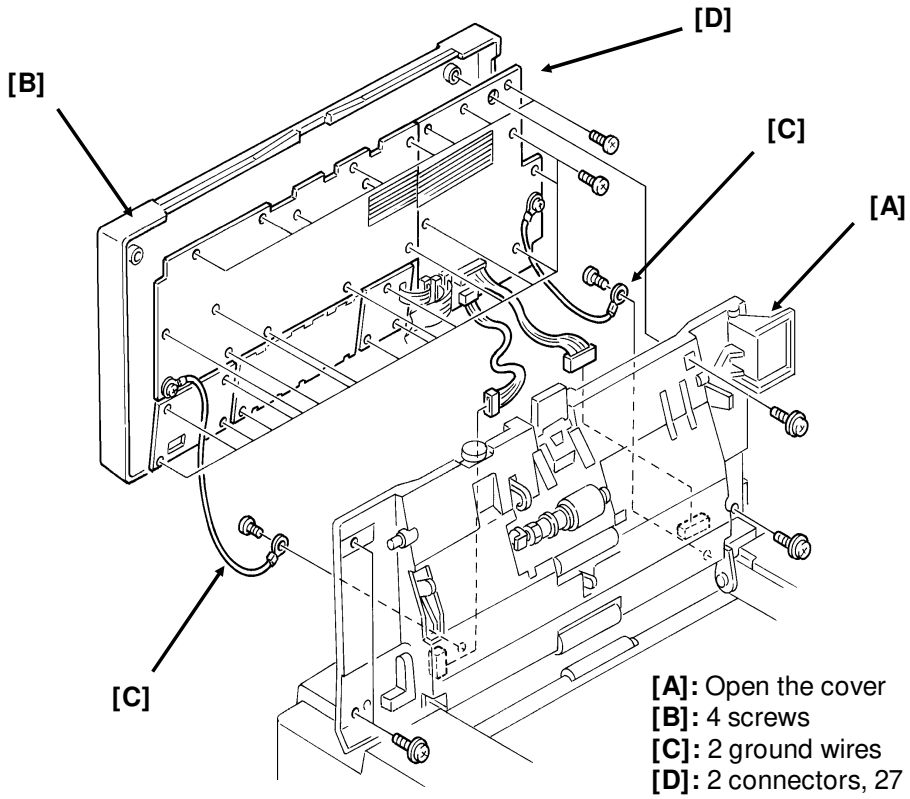
Note: Do not touch the PSU components. They may be hot.

5.8.4. NCU [A]



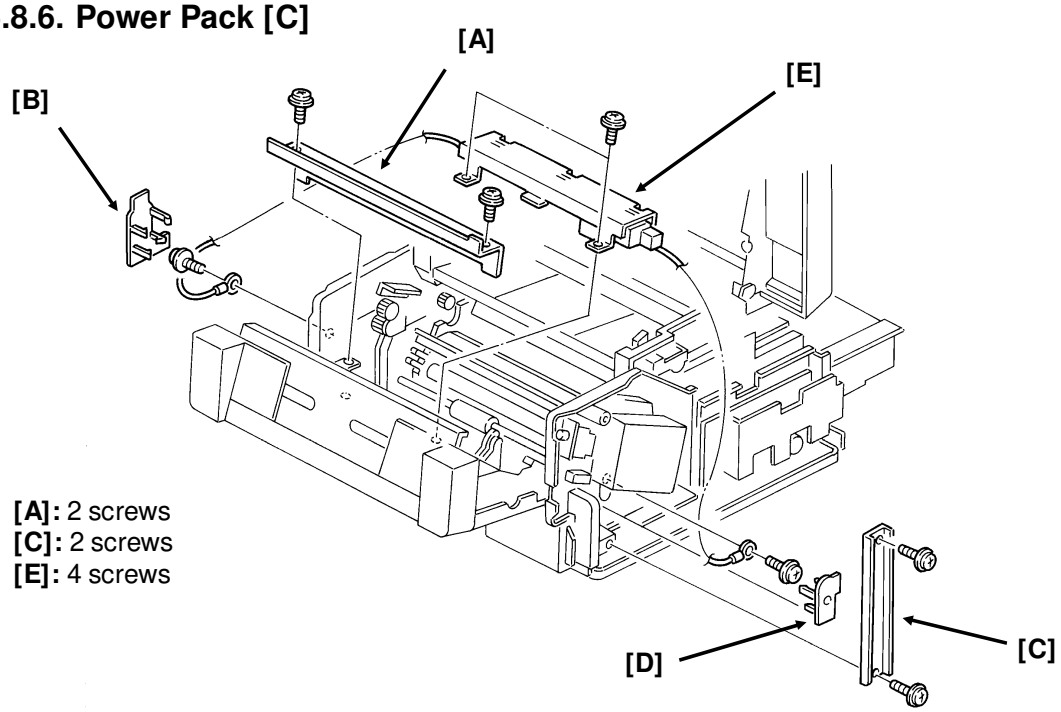
- First, remove the left cover (see section 5-1).

5.8.5. Operation Panel PCB [C]



[A]: Open the cover
[B]: 4 screws
[C]: 2 ground wires
[D]: 2 connectors, 27 screws

5.8.6. Power Pack [C]

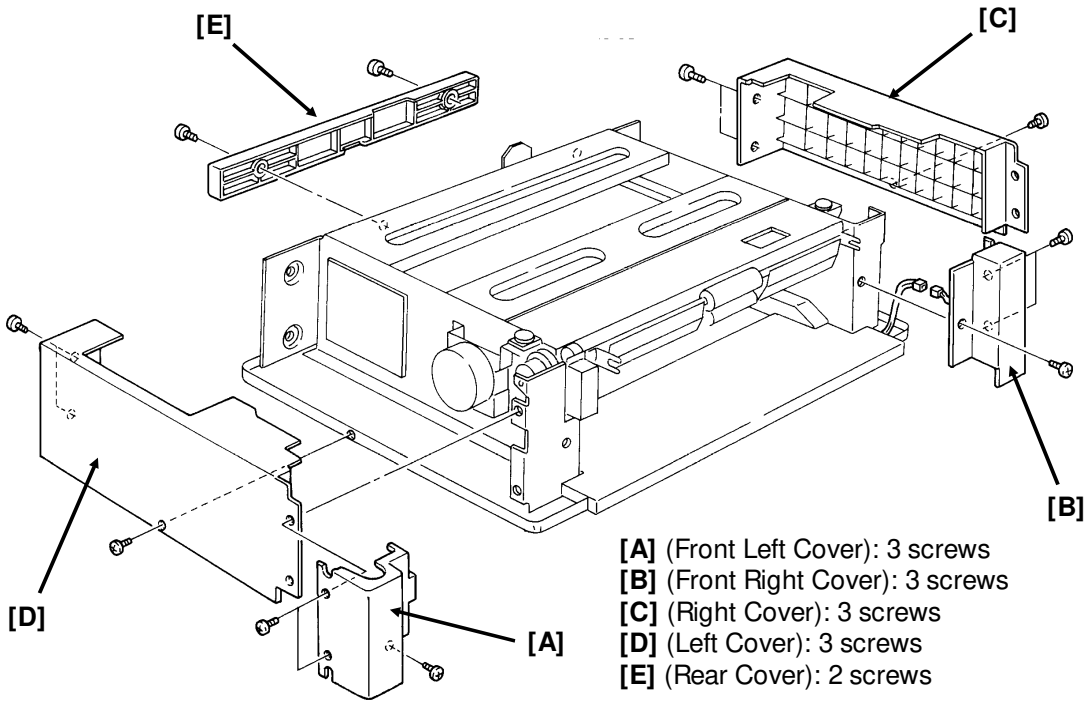


[A]: 2 screws
[C]: 2 screws
[E]: 4 screws

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

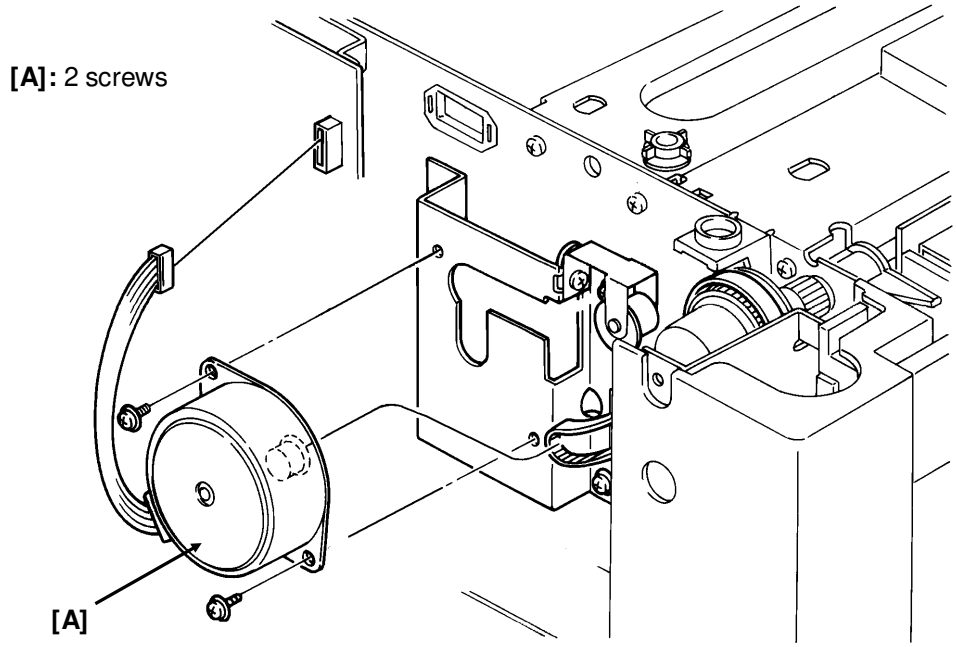
5.9. LOWER CASSETTE

5.9.1. Covers



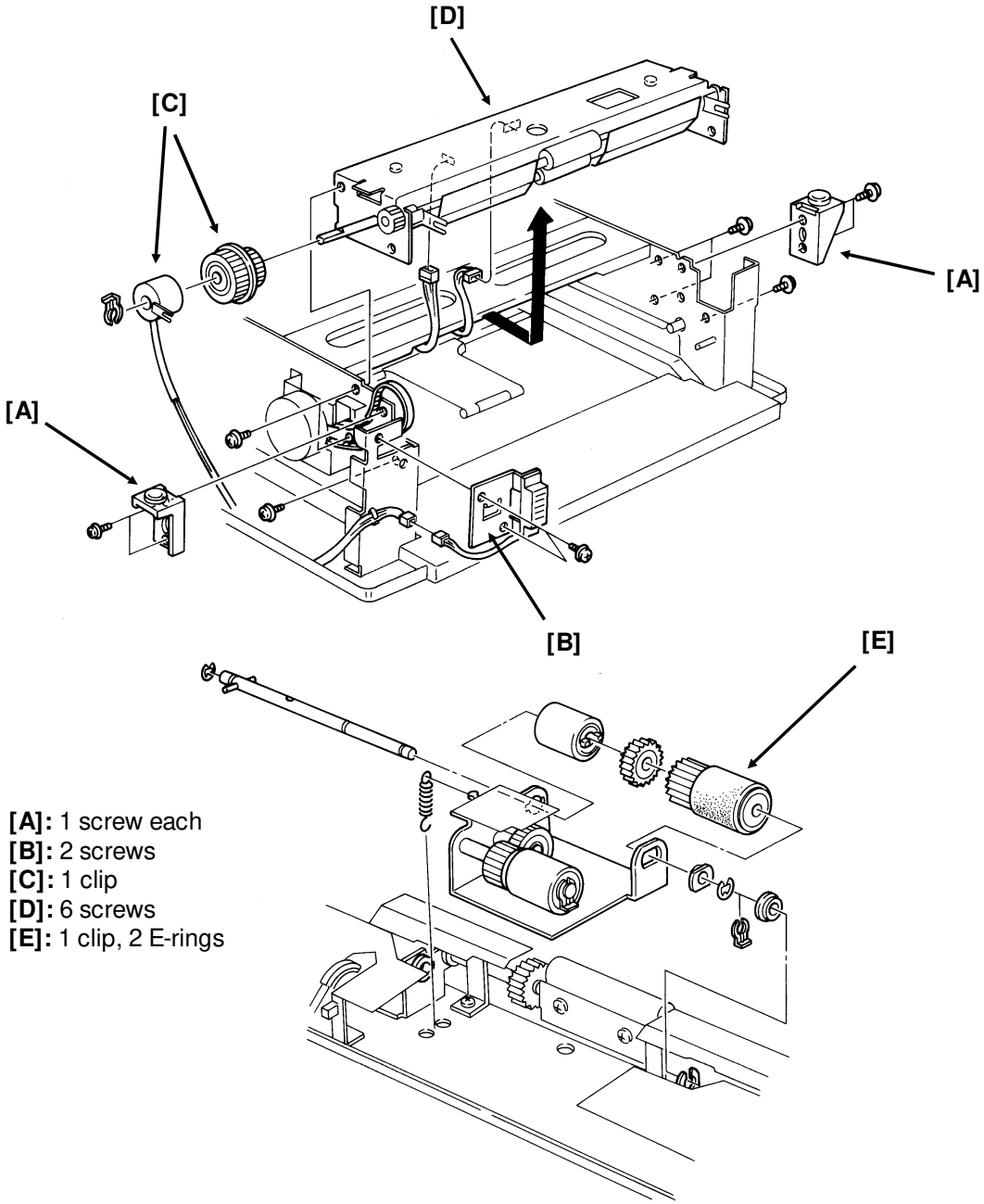
[A] (Front Left Cover): 3 screws
[B] (Front Right Cover): 3 screws
[C] (Right Cover): 3 screws
[D] (Left Cover): 3 screws
[E] (Rear Cover): 2 screws

5.9.2. Paper Feed Motor [A]



- Remove the left cover to access the motor.

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

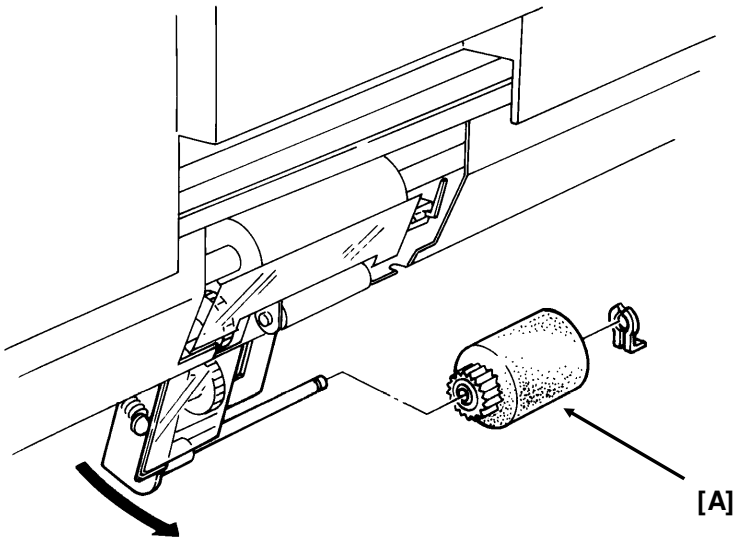


[A]: 1 screw each
[B]: 2 screws
[C]: 1 clip
[D]: 6 screws
[E]: 1 clip, 2 E-rings

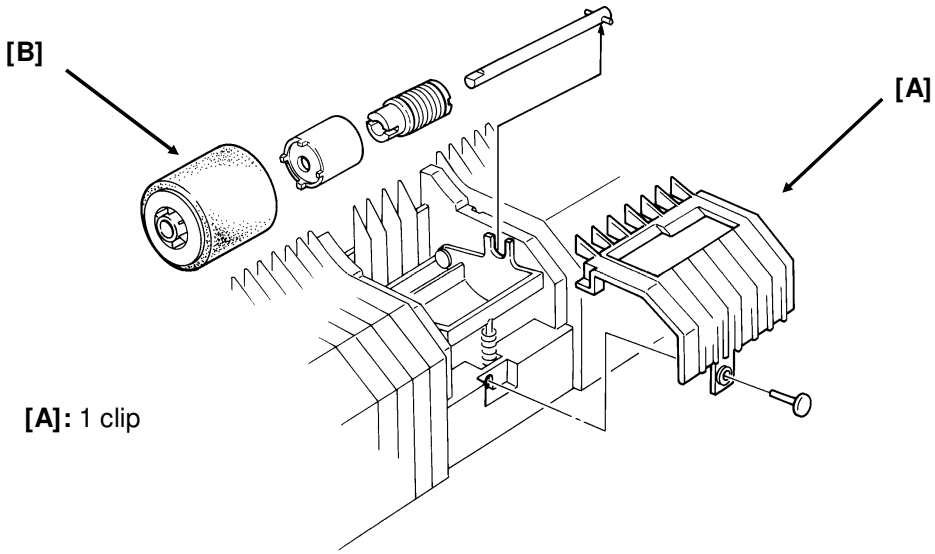
- To access these components, remove the front left, front right, right, and left covers (see section 5-9-1).

5.9.4. Pick-up Roller [A]

[A]: 1 clip



5.9.5. Separation Roller [B]

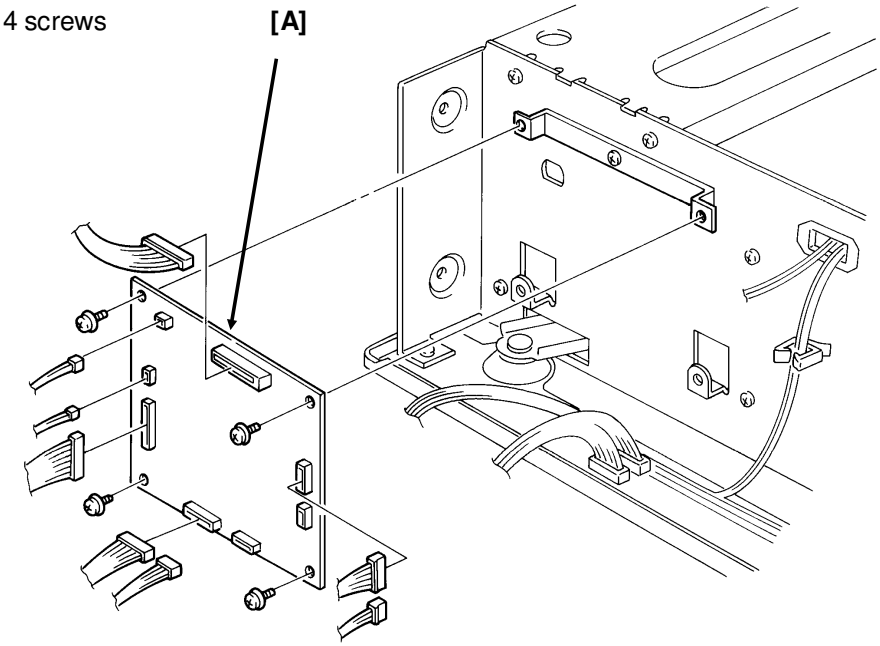


[A]: 1 clip

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

5.9.6. PFU Board [A]

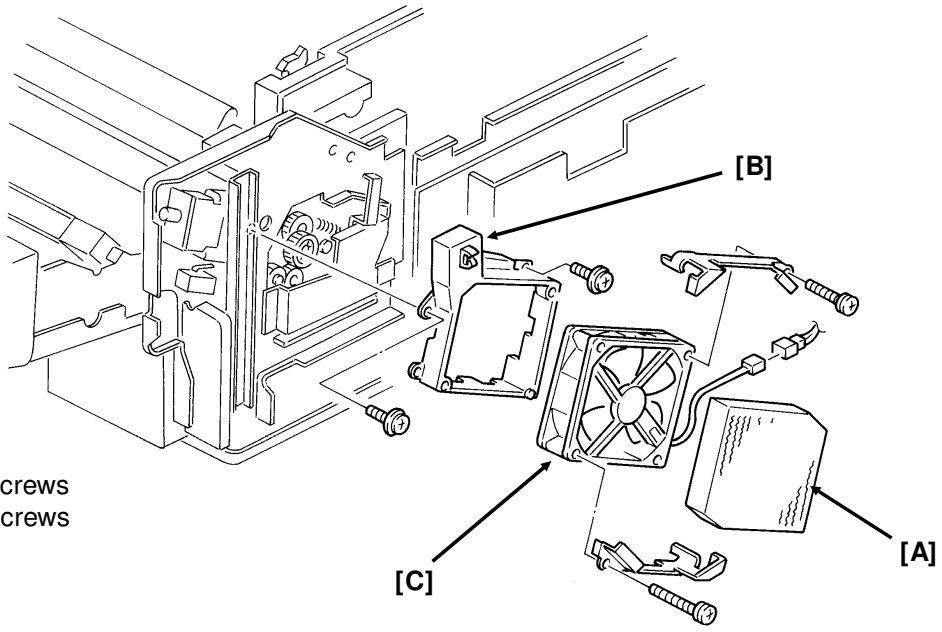
[A]: 4 screws



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

5.10. OTHERS

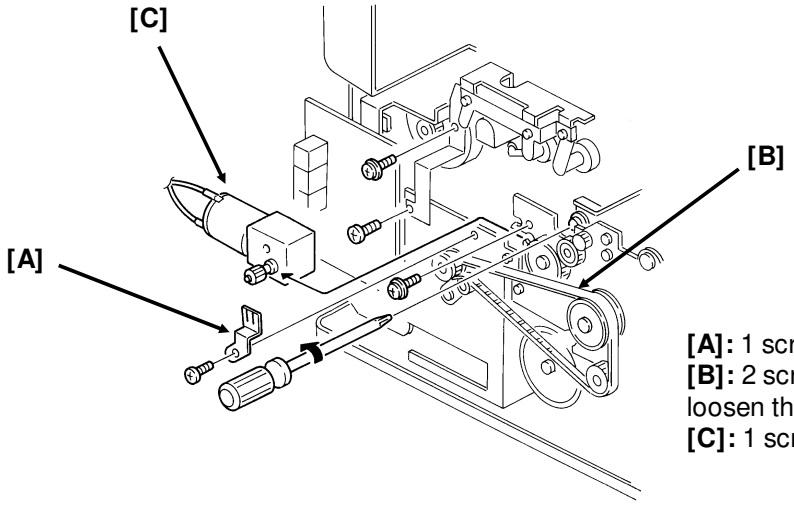
5.10.1. Ozone Filter [A] and Ozone Fan [C]



[B]: 2 screws
[C]: 2 screws

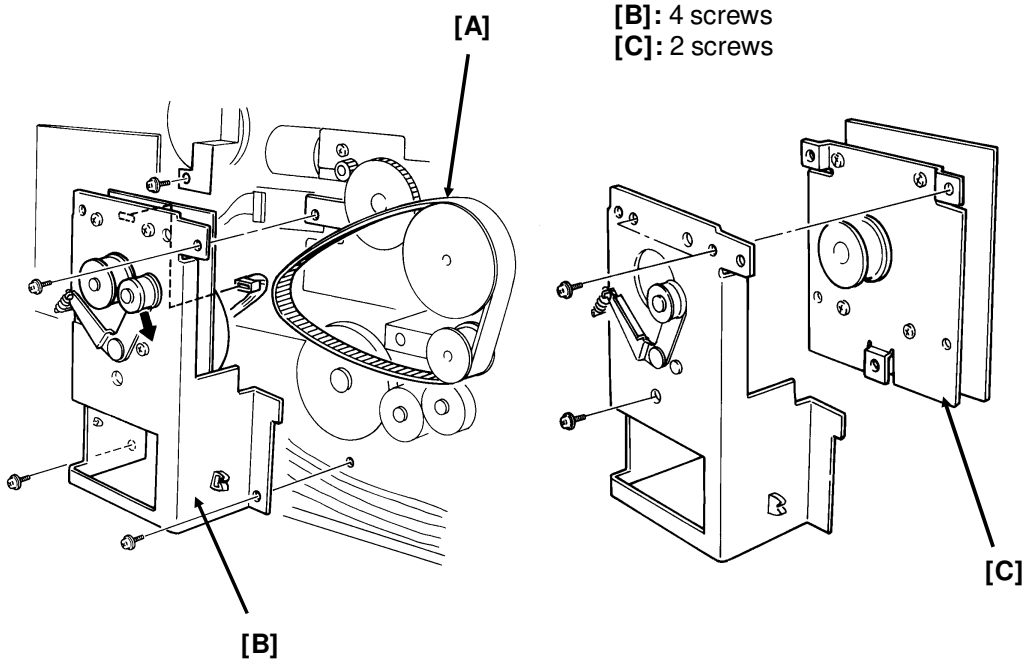
- First, remove the right cover (see section 5-1).

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 4-1-13). 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 4-1-13). 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 4-1-13). 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 4-1-13). 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 4-1-13). 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 4-1-13). 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 4-1-13). 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 4-1-13). 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 4-1-13). 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 fiber 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 5-2-2)?	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 odor		
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.

- 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. This report lists a sub-code, as well as the error message; this sub-code may help you find the problem.
- 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: 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 (sub-code 31)

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.		

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

This error occurs in either of the following conditions:

- Error in the Laser Interface (LIF) chip on the FCU (sub-code 41 or 42)
- Laser power failure (sub-code 43)

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: Hot Roller Down (Error Code 9-22)

This error occurs in any of the following conditions:

Standby mode: If the fusing lamp takes more than 40 s to reach 80 °C (sub-code 01)
During printing: If the fusing lamp takes more than 30 s to rise to 150 °C from 80 °C (sub-code 02)
During printing: If the fusing lamp stays below 150 °C for more than 10 s (sub-code 04)
During printing: If the thermistor is accidentally disconnected (sub-code 07)
After printing: If the fusing lamp takes more than 10 minutes to fall back to 150 °C (sub-code 03)
After printing: If the thermistor is accidentally disconnected for more than 15 s (sub-code 06)
At any time: If the fusing lamp temperature reaches 280 °C (sub-code 05)

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: 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 (sub-code 21)
- If FCU CN2-1 goes back to high for 10 s or more during hexagonal mirror motor operation (sub-code 22)

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: 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 (sub-code 11)
- If FCU CN22-4 goes back to high for 10 s or more during main motor operation (sub-code 12)

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.

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
0-01	DCN received unexpectedly	The other party is out of paper or has a jammed printer. The other party pressed Stop during communication.
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.
0-24	Printer failure occurred while the memory was full during non-ECM reception; negative response returned	There is no memory space available, or substitute reception is disabled. Try the following: Change bit 6 of bit switch 07 to 1. Ask the user to change bit 0 of user parameter 05 to 1.
0-70	A 'disc' signal was received during ISDN G3 reception	Network or remote terminal error.
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".
2-10	The modem cannot enter tx mode	Replace the FCU.
2-11	Only one V.21 connection flag was received	Change the FCU.
2-12	Modem clock irregularity	Replace the FCU.
2-20	Abnormal coding/decoding (cpu not ready)	Check the connections from the FCU to the MBU. Replace the FCU or MBU.
2-50	The machine reset itself	Change the FCU.
4-00	One page took longer than 8 minutes to transmit	Check for a bad line. Try the communication at a lower resolution, or without halftone. Change the FCU.
4-01	Line current was cut	Check the line connector. Check the connection between 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.

Code	Meaning	Suggested Cause/Action
5-20	Storage impossible because of a lack of memory	Temporary memory shortage; otherwise, replace the FCU or memory PCB.
5-21	Memory overflow	
5-25	SAF file access error	Change the FCU, memory card, or hard disk.
5-30	Mode table for the first page to be printed was not effective	Change the FCU.
6-01	ECM - no V.21 signal was received	Try adjusting the rx cable equalizer. Replace the FCU or NCU.
6-02	ECM - EOR was received	
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.
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.
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.
9-17	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.
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.

6.5. ELECTRICAL COMPONENT DEFECTS

6.5.1. Defective Sensor Table

Sensor	Symptoms if Defective
Document sensor	"CLEAR ORIGINAL" or "ENTER FAX NO" is displayed at power-up.
	"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