RICOH MV715

SERVICE MANUAL

IMPORTANT SAFETY NOTICES

PREVENTION OF PHYSICAL INJURY

1. Before disassembling or assembling parts of the machine and peripherals, make sure that the power cord is unplugged.
2. The wall outlet should be near the machine and easily accessible.
3. Note that some components of the machine and the paper tray unit are supplied with electrical voltage even if the main switch is turned off.
4. If any adjustment or operation check has to be made with the exterior covers off or open while the main switch is turned on, keep hands away from electrified or mechanically driven components.
5. The inside and metal parts of the fusing unit become extremely hot while the machine is operating. Be careful to avoid touching those components with your bare hands.
6. Deactivating interlock switches for test purposes will cause the charge corona wire and transfer corona wire to be loaded with high voltage.

HEALTH SAFETY CONDITIONS

1. Never operate the machine without the ozone filter installed.
2. Always replace the ozone filter with the specified one at the specified interval.
3. Toner is non-toxic, but if you get it in your eyes by accident, it may cause temporary eye discomfort. Try to remove it with eye drops or flush with water as first aid. If unsuccessful, get medical attention.

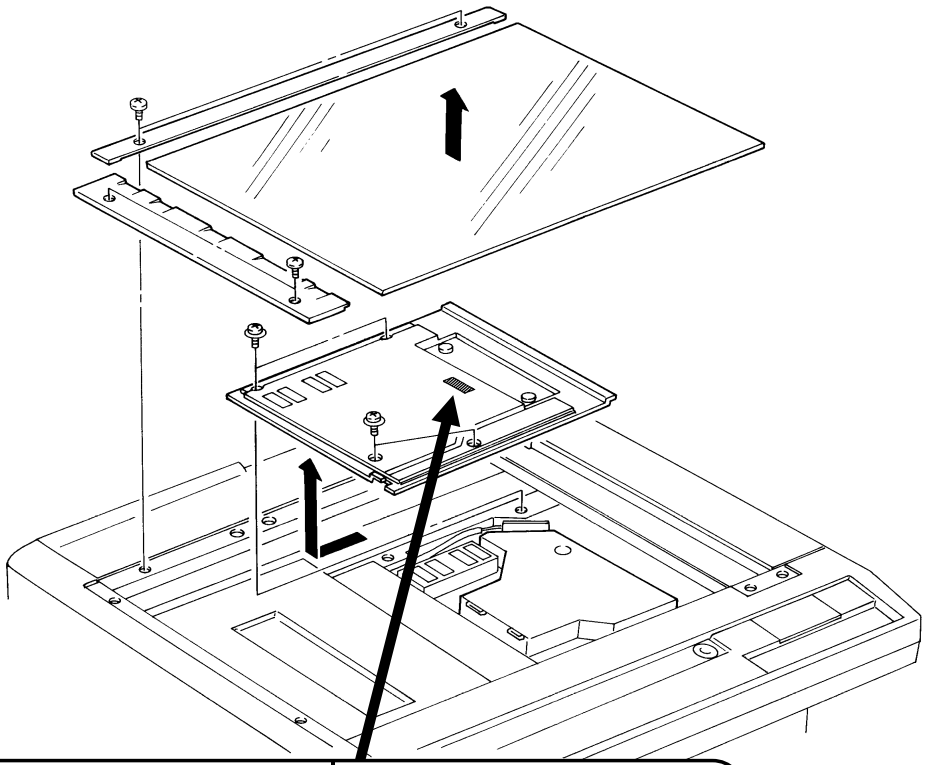
OBSERVANCE OF ELECTRICAL SAFETY STANDARDS

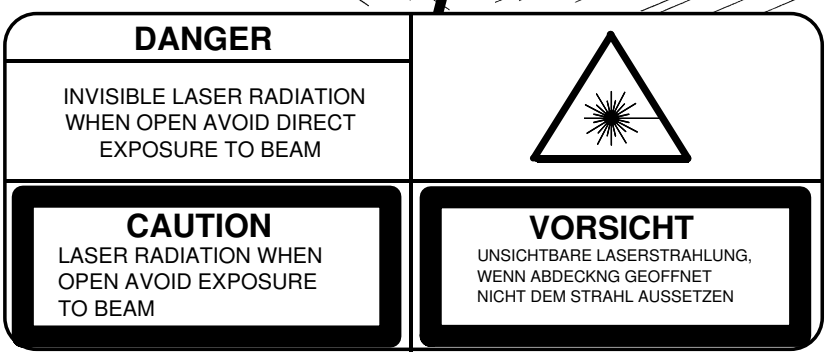
1. The machine and its peripherals must be installed and maintained by a customer service representative who has completed the training course on those models.
2. The machine contains a lithium battery for memory back-up. The danger of explosion exists if a battery of this type is incorrectly replaced. Replace only with the same or an equivalent type recommended by the manufacturer. Discard used batteries in accordance with the manufacturer's instructions.

SAFETY AND ECOLOGICAL NOTES FOR DISPOSAL

1. Do not incinerate the toner cartridge or the used toner. Toner dust may ignite suddenly when exposed to open flame.
2. Dispose of used toner and organic photoconductor belts according to local regulations. (These are non-toxic supplies.)
3. Dispose of replaced parts in accordance with local regulations.

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





Lithium Batteries (Memory Back-up)

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

1. OVERALL MACHINE INFORMATION

1.1. SPECIFICATIONS

Type
Desktop transceiver

Circuit
PSTN, PABX

Connection
Direct couple

Document Size
Smaller than 297 x 432 mm [11 x 17"]

Scanning Method
Flat bed, with CCD

Maximum Scan Width
297 mm [11.7 ins] ± 1%

Scan Resolution
Main scan:
Standard/Detail 200 dpi
Superfine 400 dpi
Sub scan:
Standard 100 dpi
Detail 200 dpi
Superfine 400 dpi

Memory Capacity
ECM: 128 kbytes (double buffer)
SAF: Base machine - 1 Mbyte (56 pages), with optional extra 1 Mbyte or 2 Mbytes (max 112 or 168 pages respectively), or 40 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 an OPC belt, plain paper, dry toner

Paper Size
Europe: A4, A5, B4, A3, B5
Asia: A4, A5, F, F4, B4
N. America, Taiwan: Letter, Legal, Double Letter

Paper Weight
60 g/m^2 - 90 g/m^2
16 lb - 24 lb

Maximum Printout Width
291 mm

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

Power Supply
N. America, Taiwan: 110 - 115 Vac, 60 Hz
Other Areas: 220 - 240 Vac, 50 Hz

Power Consumption (Base Machine Only)
Standby: 230 W **Transmit:** 250 W
Receive: 500 W **Copying:** 670 W
Maximum for Receive or Copying: 1500 W

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

Dimensions (W x D x H)
620 x 660 x 540 mm [24.4 x 26.0 x 21.3 ins]
Excluding handset, trays, and optional units

Weight
53 kg [117 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,
G = Not used in Germany,
S = Service mode in some countries

Equipment	
ADF(optional)	O
Built-in handset	X
Cabinet	X
Connection for handset	O
Duplex unit (option)	O
Handset (option only in Europe)	O
Hard disk (option)	O
ISDN G4 kit (option)	O
Magnetic card reader	X
Manual feed mechanism	X
Marker (built into the optional ADF)	O
Memory card for 400dpi reception (option)	O
Monitor speaker	O
Platen cover (option)	O
Printer interface (option)	O
Remaining memory indicator	O
SAF memory card - 1MB/2MB (option)	O
Sorter (3-bins) (optional)	O

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

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

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

Communication Features - User Selectable	
Reception modes (Fax & Tel only)	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)	X

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	X

Other User Features	
Area Code Prefix	O
Auto Service Call	O
Center mark	O

Other User Features	
Chequered mark	O
Clearing a memory file	O
Clearing a polling file	O
Clock	O
Confidential ID	O
Copy/Fax Switch	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
Night Timer	O
Own telephone number	O
Printing a memory file	O
RDS on/off	O
Reception Mode Switching Timer	X
Reception Time (non-memory rx only)	O
Remote ID	X
Reverse Order Printing	A
RTI, TTI, CSI	O (S)
Speaker volume control	O
Specified Cassette Selection	O
Substitute reception on/off	O
Telephone line type	O (S)
TTI on/off	O
User Function Keys	O
User Parameters	O
Wild Cards	O

Reports - Automatic	
Charge Control Report	X
Confidential File Report	O
Error Report	O
Memory Storage Report	O
Mode Change Report	X
Polling Clear Report	O
Polling Reserve Report	O

Reports - Automatic	
Polling Result Report	O
Power Failure Report	O
TCR (Journal)	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	O
Speed Dial List	O
TCR (Journal)	O
Transmission Status Report	X
User Function List	O
User Parameter List	O

Copier Features	
Auto/manual paper select	O
Directional Magnification	O
Double copies	O
Duplex (optional duplex unit required)	O
Erase Border/Center	O
Interrupt	O
Mirror	O
Mode clear	O
Multiple copies (up to 99)	O
Positive/Negative	O
Reduction/Enlargement	O
Sorting/Stacking (optional sorter required)	O
Standby	O
Text/Photo mode	O
Two single copies	O
Zoom	O

Service Mode Features	
Back-to-back test	O
Bit switch programming	O

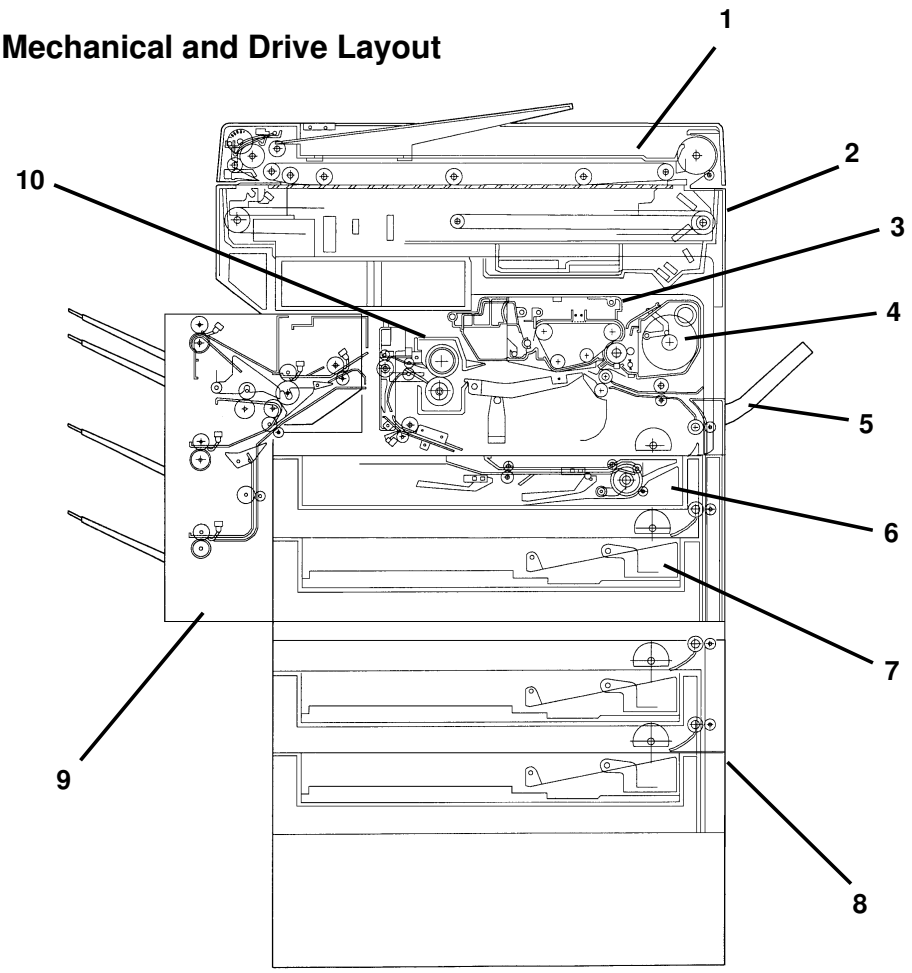
Service Mode Features	
Buzzer test	O
Cable equalizer	O
Comm. parameter display	O
Counter check	O
DTMF tone test	O
Echo countermeasure	O
Energy saving mode	O
Error code display	O
File Transfer	O
LCD contrast adjustment	O
Memory file printout (all files)	O
Modem test	O
NCU parameters	O
Operation panel test	O
Printer mechanism test	O
Printer test patterns	O
Programmable attenuation	X
Protocol dump list	O
RAM display/rewrite	O
RAM dump	O
RAM test	O
Ringer test	X
Scanner lamp test	O
Scanner mechanism test	O
Sensor initialization	X
Serial number	O
Service monitor report	O
Service station number	O
SP modes	O
System parameter list	O
Technical data on the Journal	O
Thermal head parameters	X
Transmission Status Report	X

Memory Files

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

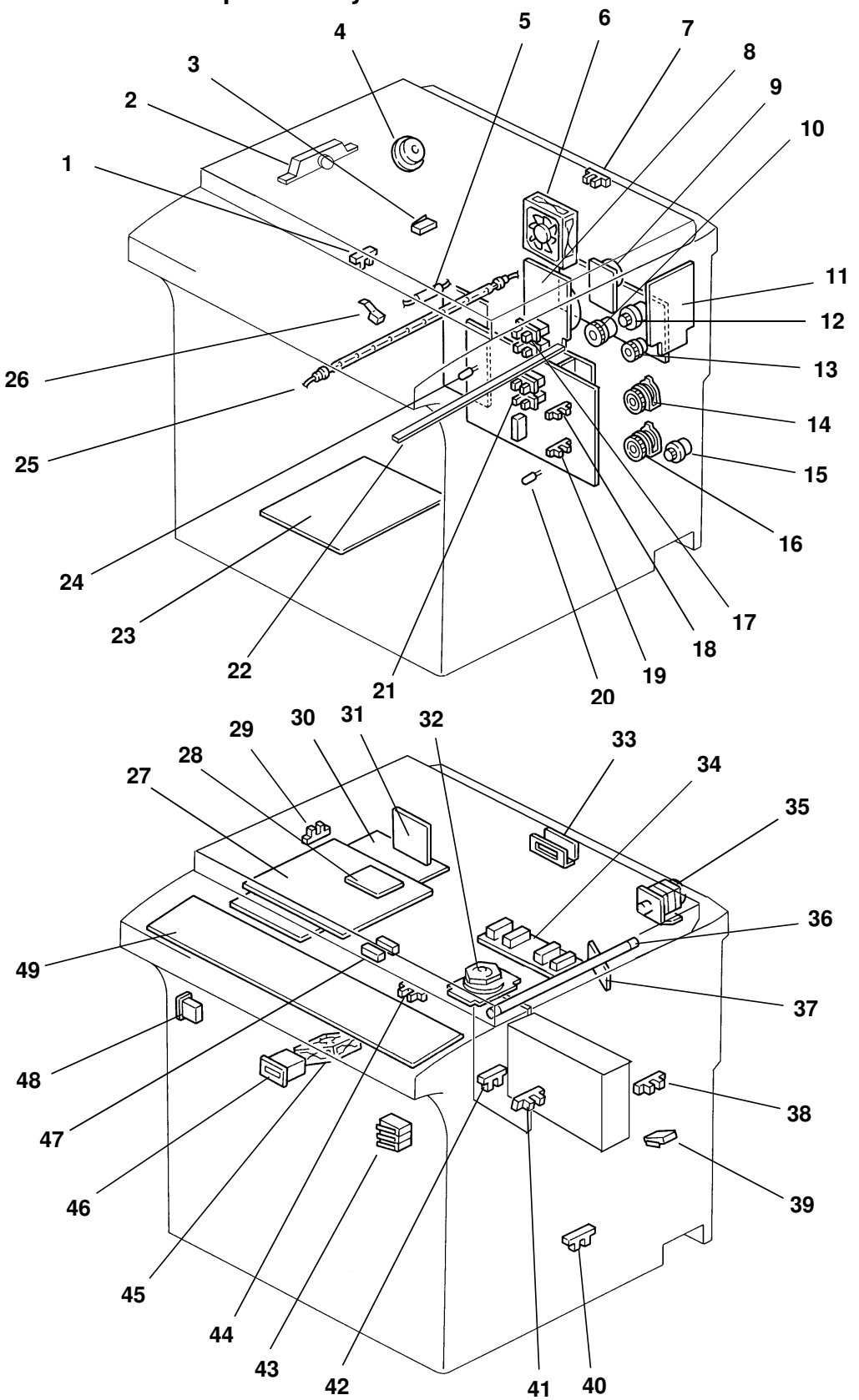
1.3. COMPONENT LAYOUT

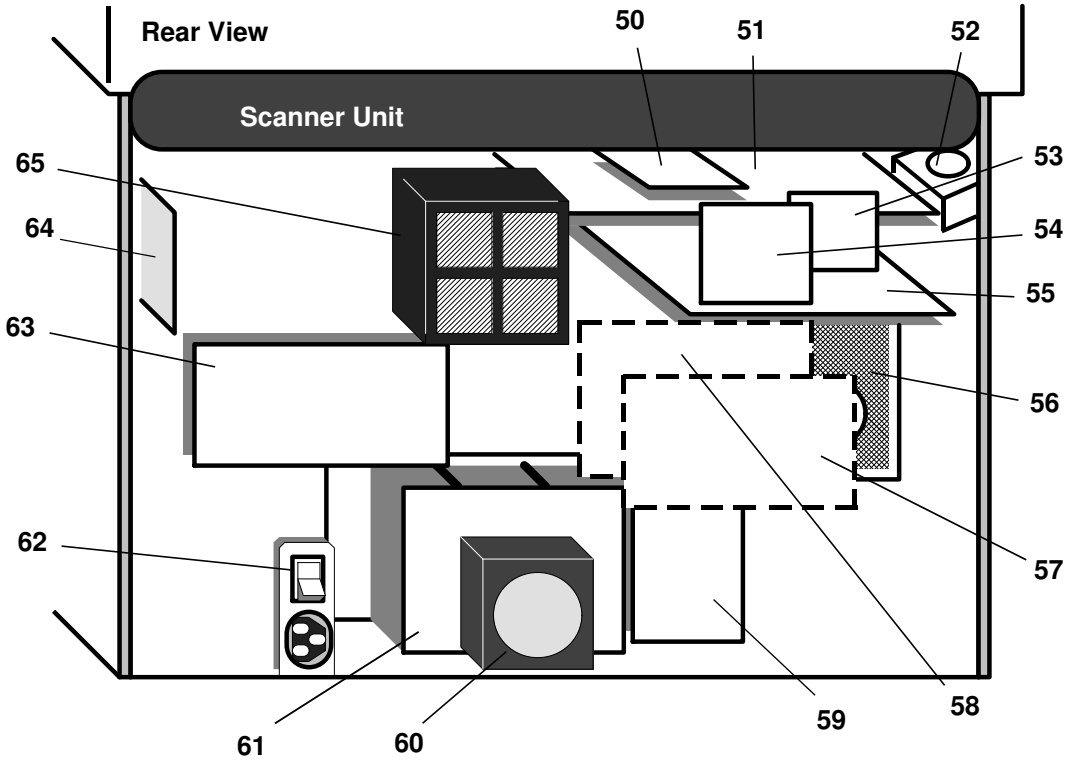
1.3.1. Mechanical and Drive Layout



1	Automatic Document Feeder (Option)	This allows easy faxing or copying of multipage originals.
2	Scanner	This scans the original on the exposure glass.
3	Master Unit	This contains the master belt, cleaning unit, and charge corona wires.
4	Development Unit	This contains the development roller and the toner supply mechanism. It transfers toner to the copy paper.
5	By-pass Feed Station	This allows the user to feed non-standard types of copy paper into the machine.
6	Duplex Tray (Option)	This allows double-sided copies to be made from single-sided or book originals. If installed, the duplex tray always goes in the first paper feed station.
7	Second Paper Feed Station	The base machine contains the first and second paper feed stations.
8	Paper Feed Unit (Option)	This optional unit contains the third and fourth paper feed stations.
9	Three-bin Sorter (Option)	This allows sorting and stacking of copies. However, this sorter only has three bins.
10	Fusing Unit	This fuses the toner to the copy paper.

1.3.2. Electrical Component Layout





Name	Description	No
PCBs		
FCU	This board contains the main cpu, and controls the machine, in conjunction with the SPU.	30, 55
SPU	This board contains the slave cpu.	27, 51
MBU-F	This board contains the system ROM and RAM for storing system parameters and programmed telephone numbers. The RAM has battery back-up.	31, 54
MBU-S	This board contains additional software for mechanical control and some RAM that has no battery back-up.	28, 50
OP-PORT	This board controls the operation panel.	49
SBU	This board contains the CCD, some preliminary video processing circuits, and the circuit for the laser main scan start detector.	2
NCU	This board contains relays and switches for interfacing the machine to the PSTN and the handset.	59
IOU	This board contains drivers for motors and clutches, and it passes sensor status data on to the FCU, through the SPU.	63
LDDR	This board drives the printer's laser diode.	37
Xenon Lamp Driver	This supplies power to the xenon lamp.	33
Power Pack	This supplies high voltage power to the corona wires and the development bias terminal.	11, 64
PSU	This board supplies power to the machine.	61
HDD (Option)	This board controls the optional hard disk.	56
Printer Controller and Option I/F (Option)	This board allows the machine to be connected to an IBM PC or compatible computer.	57 53
CIG4 (Option)	This board lets the machine communicate using G4 signals.	58

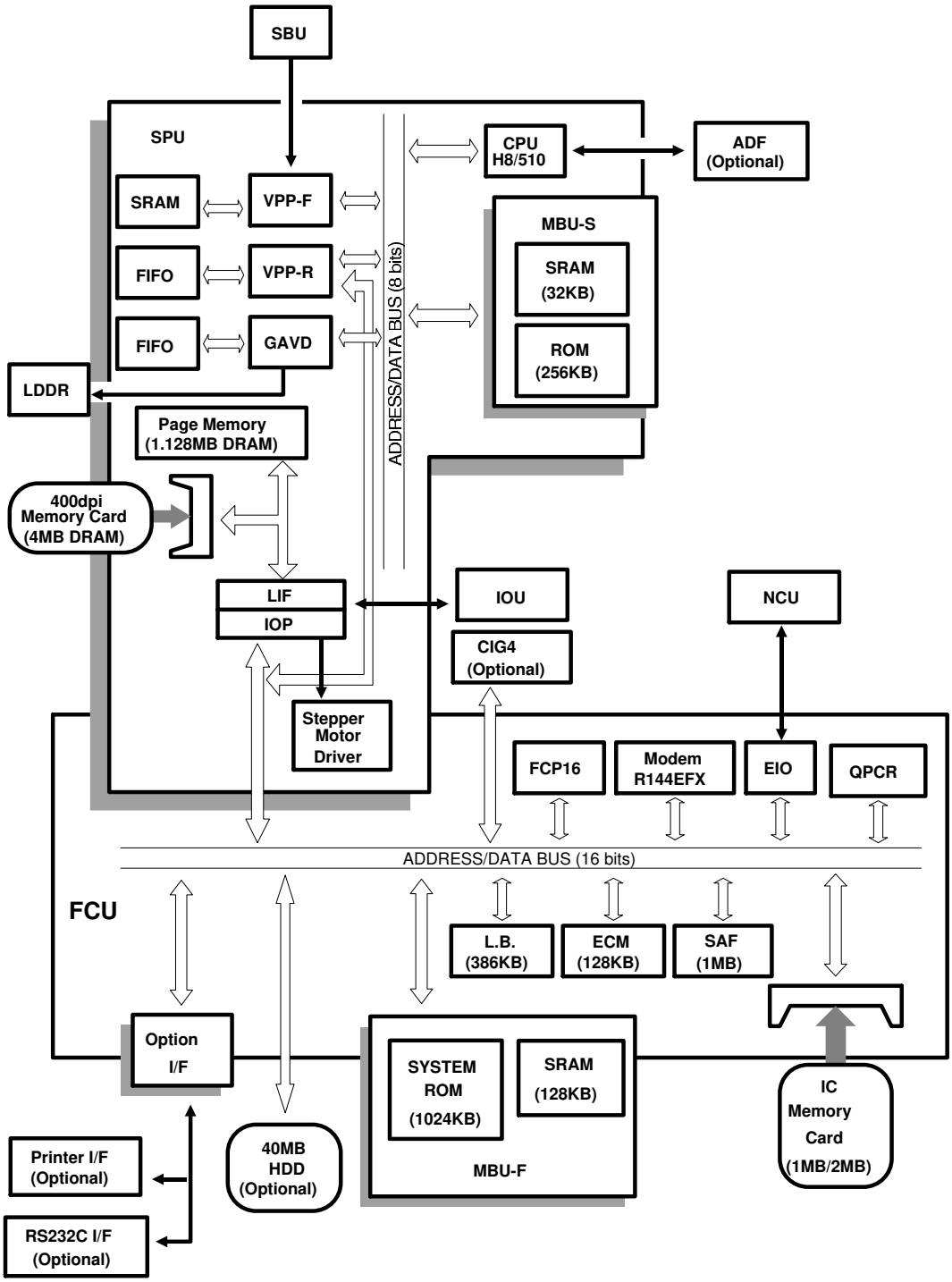
Name	Description	No
MOTORS		
Main Motor	This motor drives the mechanisms in the first and second paper feed station, and all mechanisms in the main body except for the master unit and the scanner.	8
Master Unit Drive Motor	This motor drives the master belt.	9
Scanner Motor	This motor drives the scanner.	35
Polygonal Mirror Motor	This motor rotates the printer's polygonal mirror.	32
CLUTCHES		
First Paper Feed Clutch	This transfers drive from the main motor to the first paper feed station.	14
Second Paper Feed Clutch	This transfers drive from the main motor to the second paper feed station.	16
By-pass Paper Feed Clutch	This transfers drive from the main motor to the by-pass paper feed station.	13
First Relay Clutch	This transfers drive from the main motor to the first relay roller, which feeds paper up from the second paper feed station.	15
Development Clutch	This transfers drive from the main motor to the development unit.	12
Registration Clutch	This transfers drive from the main motor to the registration roller.	10
SENSORS		
Platen Cover Sensor	This sensor informs the machine when the cover has been closed when copying book originals. The machine then checks the size of the original.	7
Original Length Sensor	This detects the length of the page now on the exposure glass.	34
Original Width Sensor	This detects the width of the page now on the exposure glass.	47
Scanner Home Position Sensor	This detects when the scanner mechanism has returned to its home position.	29
First Paper Size Sensor	This detects the size of paper in the cassette at the first paper feed station.	17
Second Paper Size Sensor	This detects the size of paper in the cassette at the second paper feed station.	21
First Paper End Sensor	This detects when the cassette at the first paper feed station is empty.	18
By-pass Feed Sensor	This detects when paper has been inserted at the by-pass feed station. There is also a by-pass paper width sensor in the right hand side of the bypass feed table.	41
By-pass Feed Cover Sensor	This detects when the by-pass feed cover has been opened.	38
Second Paper End Sensor	This detects when the cassette at the second paper feed station is empty.	19
First Relay Sensor	This detects misfeeds near the first relay roller.	40
Registration Sensor	This detects when misfeeds near the registration roller, and controls first relay clutch off timing.	42
Fusing Exit Sensor	This detects when paper is being fed out of the fusing unit.	1

Name	Description	No
Toner End Sensor	This detects when the supply of toner in the development unit has run low. The sensor is in the base of the development unit.	20
Toner Overflow Sensor	This detects when the used toner tank in the cleaning unit is full.	44
SAFETY SWITCHES		
Front Cover Safety Switch	This interrupts the +24VIL supply to the mechanisms, quenching lamp and power pack, and the LD5V supply to the LDDR (laser diode driver).	43
Right Cover Safety Switch	This interrupts the +24VIL supply to the mechanisms, quenching lamp and power pack.	39
Fusing Exit Cover Safety Switch	This interrupts the +24VIL supply to the mechanisms, quenching lamp and power pack.	3
OTHERS		
Main Switch	If this switch is off, all power to the machine is off.	62
Operation Switch	If this switch is off, the machine can only receive and print incoming fax messages.	48
Scanner Fan	This cools the inside of the scanner.	45
Ozone Fan and Ozone Filter	The fan cools the inside of the printer, and the filter removes ozone generated by the corona wires.	65, 6
PSU Fan	This cools the PSU.	60
Xenon Lamp	This lamp illuminates the original that is on the exposure glass.	36
Fusing Lamp	This lamp supplies heat for the fusing process.	25
Fusing Unit Thermistor	This monitors the temperature in the fusing unit, allowing the cpu to switch the fusing lamp off if the temperature is too high.	26
Fusing Unit Thermofuse	This fuse breaks if the temperature in the fusing unit exceeds 149°C.	5
Development Unit Thermistor	This monitors the temperature inside the machine, allowing the cpu to adjust the development bias for temperature.	24
Quenching Lamp	This removes excess charge from the master belt at the end of the copy cycle.	22
Tray Heater	This keeps paper in the cassettes dry.	23
Monitor Speaker	This allows the operator to listen to tones on the telephone line during PSTN communications.	4
Total Copy Counter	This mechanical counter shows how many printouts the machine has made (including copy mode, fax mode, and printer mode)	46
FCU Fan	This cools the inside of the machine.	52

The components of the following optional units are illustrated in separate sections of this manual.

- Paper Feed Unit (third and fourth paper feed stations)
- Duplex Tray
- Sorter
- Automatic Document Feeder

1.4. OVERALL SYSTEM CONTROL



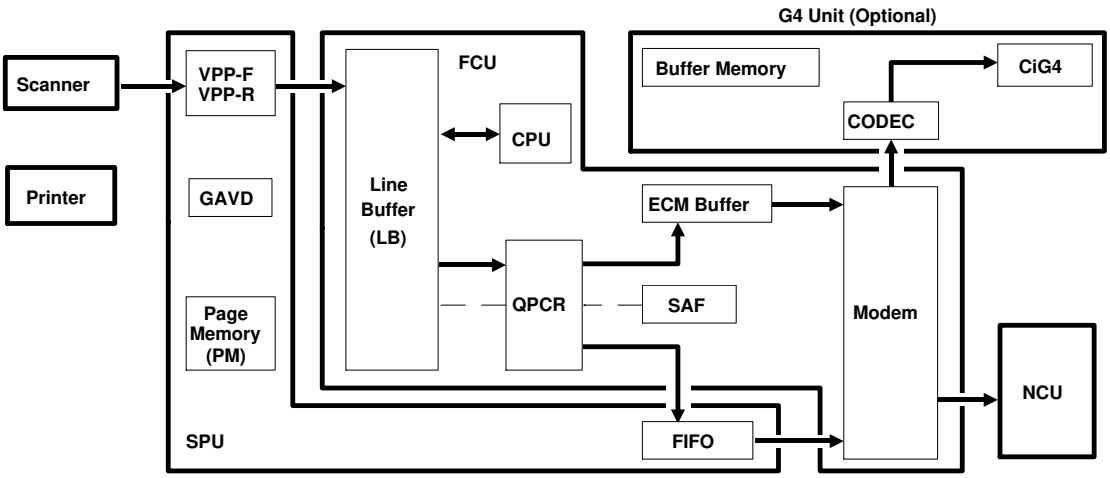
The main components are two major PCBs, the FCU and the SPU. The main cpu (FCP16) on the FCU controls the machine. However, the slave cpu (H8/510) on the SPU controls much of the image processing for scanning and printing (excluding compression), and shares mechanical control with the main cpu.

1.5. VIDEO DATA PATH

Dashed lines indicate the data path to and from the SAF memory if memory transmission or memory reception is used.

Refer to section 2.11 "PCBs and their Functions" for the functions of the chips in the following diagrams.

1.5.1. Transmission (G3)

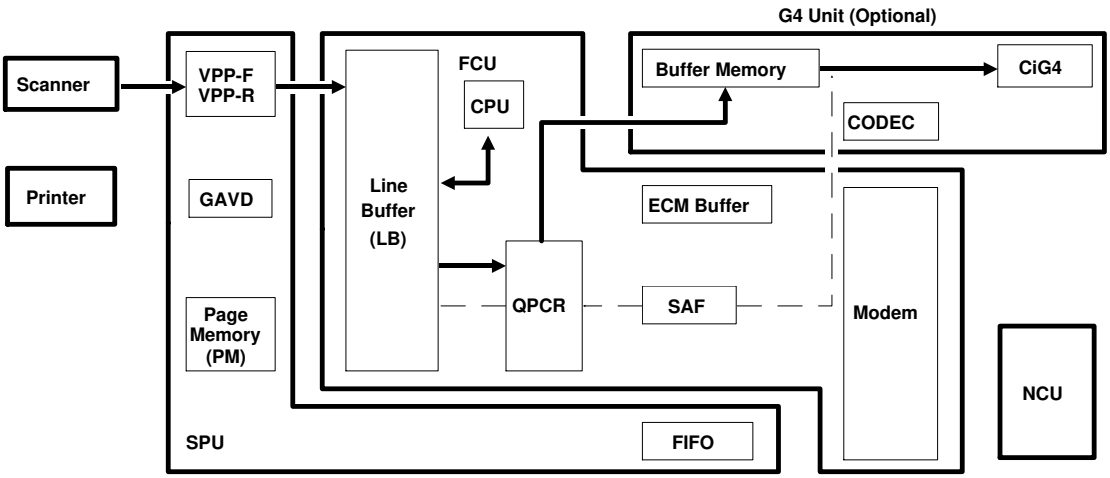


Scanned raster data is sent to the QPCR through the line buffer, after analog/digital video processing in the VPP-F and VPP-R. In the QPCR, the data is compressed. The compressed data is sent to the modem through the FIFO or ECM memory. The modulated data passes to the line through the NCU.

If G3 transmission is done over the ISDN through the optional G4 unit, the modulated data is sent to the codec. The codec converts the data back into digital, and the CIG4 converts this data into a format that is suitable for transmission over an ISDN.

Memory transmission:
Processed video data is sent to the CPU, where high-speed MH compression is done before the data is stored in the SAF memory.

1.5.2. Transmission (G4)

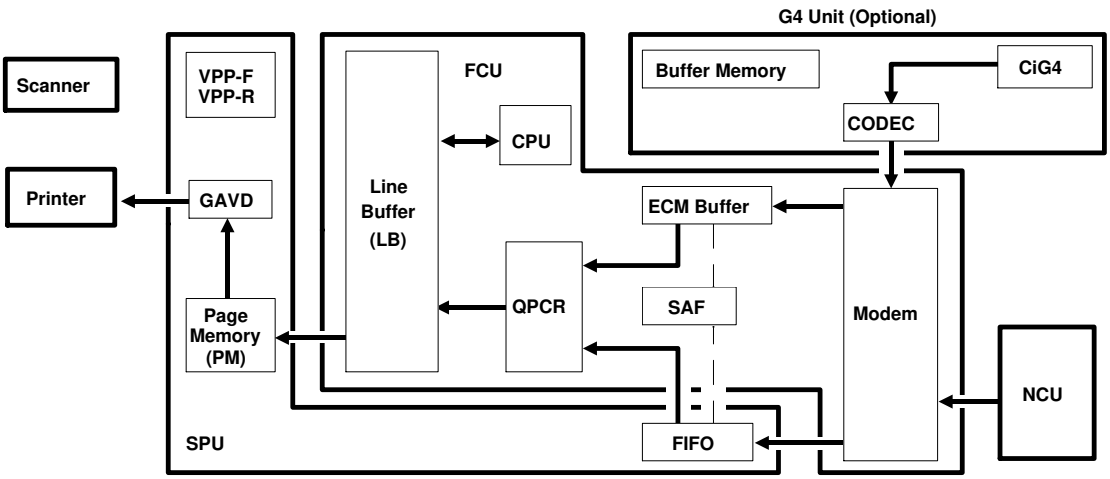


The processes up to compression and memory storage are the same as for G3 transmission (see the previous page).

The compressed data passes to the buffer memory through the line buffer. Then, the data is enclosed in HDLC frames in the CIG4 and sent to the ISDN line.

Memory transmission:
If the data compression mode that was selected for transmission is MH, the data passes directly to the CIG4 from the SAF (this is because the data is MH compressed by the CPU before it is stored in the SAF). If the compression mode is different, the stored data is reconstructed then compressed using the required compression mode, then sent to the G4 unit for transmission.

1.5.3. Reception (G3)

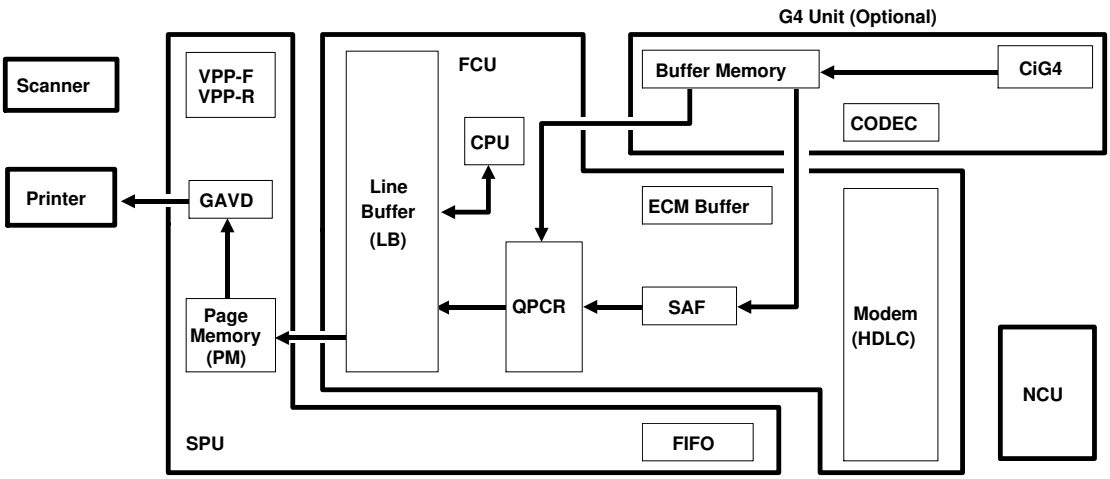


G3 data coming in from the PSTN passes to the modem through the NCU. G3 data coming in from the ISDN is extracted from the protocol frames in the CIG4, converted to analog by the codec, and passed to the modem.

The modem converts the analog data to digital. Then, the data passes to the QPCR, through either the FIFO or the ECM memory, where the data is decompressed to raster image data. The raster data is stored in the page memory for printing. After a page of data has been stored in the page memory, the data is sent to the printer through the GAVD.

Substitute reception:
The demodulated data is stored in the SAF memory without decompression.

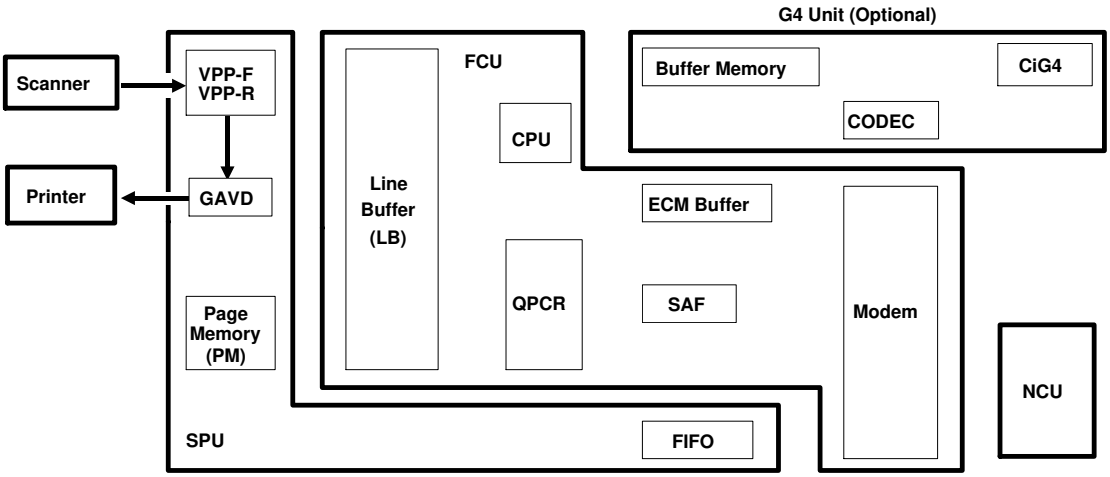
1.5.4. Reception (G4)



The data is extracted from the HDLC frames in the CIG4, and stored in the buffer memory. Then, the data is sent to the printer after decompression in the QPCR. The rest of the process is the same as described for G3 reception on the previous page.

Substitute reception:
The demodulated data is stored in the SAF memory without decompression.

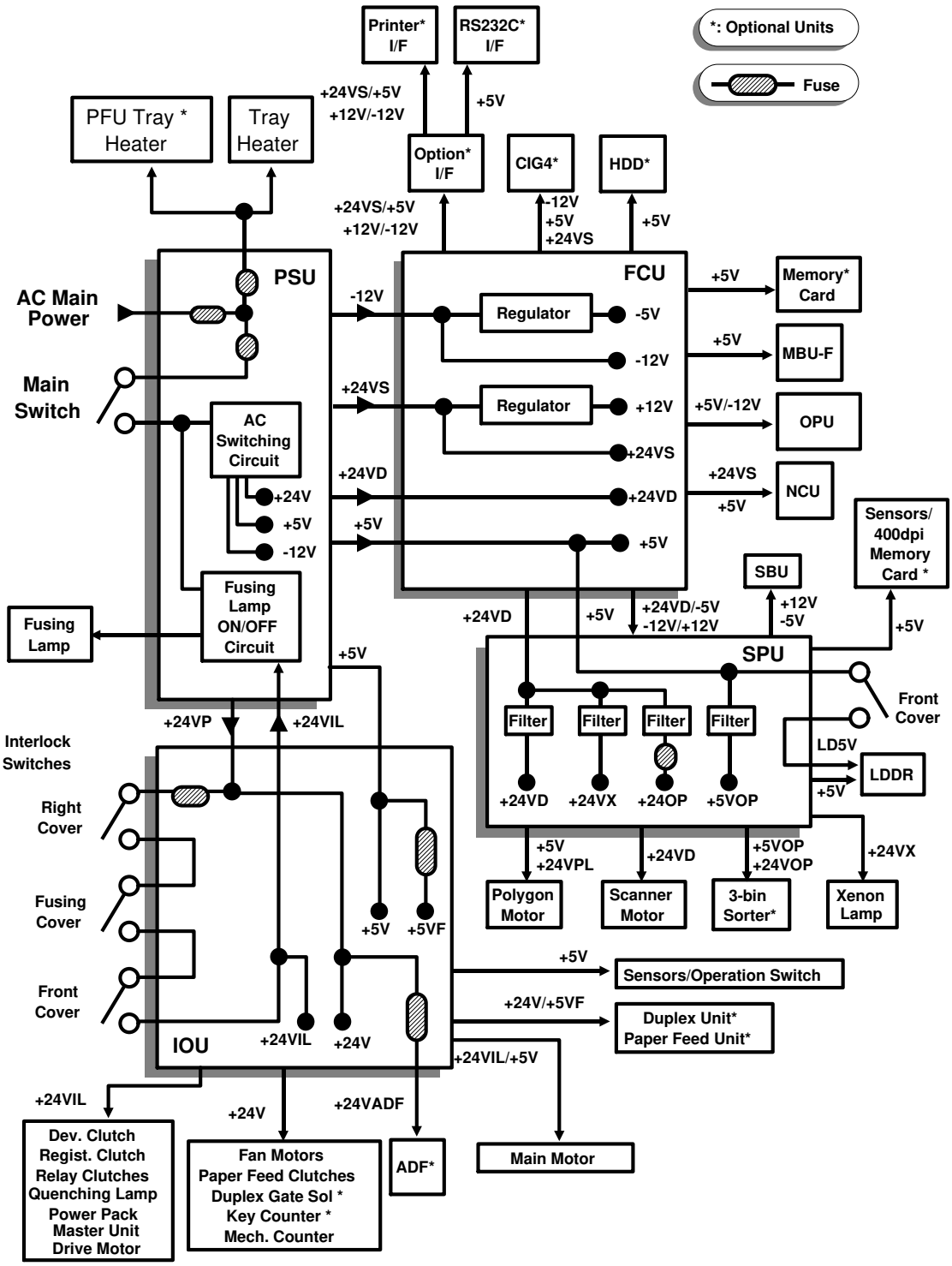
1.5.5. Copying



The scanned data is immediately sent to the printer after video processing in the VPP-F, VPP-R and GAVD.

1.6. POWER DISTRIBUTION

1.6.1. Distribution Diagram



The PSU supplies power to the machine through the FCU and the IOU boards, except the ac power to the fusing lamp, which it supplies directly. The FCU contains regulators that provide other voltages that the PSU does not supply.

The +24V Supplies

The ac switching circuit on the PSU generates one +24V supply. However, the PSU generates three different +24V supplies.

- +24VS (to the FCU): This is used as the power for the components that have lower power consumption (e.g., NCU board). This is always on when the main power is on.
- +24VD (to the FCU): This passes through the FCU unchanged and supplies the SPU, where it is used as the power for the scanner and printer drive components that have higher power consumption (e.g., motors). In the SPU, it is further divided into individual supplies for scanner and printer components. +24VD is always on when the main power is on. However, the SPU switches these supplies on/off for individual components.
- +24VP (to the IOU): This passes through three safety switches, so that it is interrupted if the front cover, right cover, or fusing unit cover are opened. Before passing through the safety switches, +24VADF branches off to power the automatic document feeder. This does not mean that the machine can transmit documents using the ADF while the covers are opened, because the SPU disables the ADF while the covers are opened. +24VP is renamed +24VIL after it has passed through the safety switches, and passed to the fusing lamp ON/OFF switch on the PSU, which switches off the fusing lamp while the covers are opened.

The +24VOP supply for the sorter and the +24VADF supply for the automatic document feeder are both protected by fuses.

The Operation Switch

The operation switch acts like a sensor; it does not physically cut any power lines. If the cpu detects that it is off, the fusing lamp, fans, and operation panel are turned off.

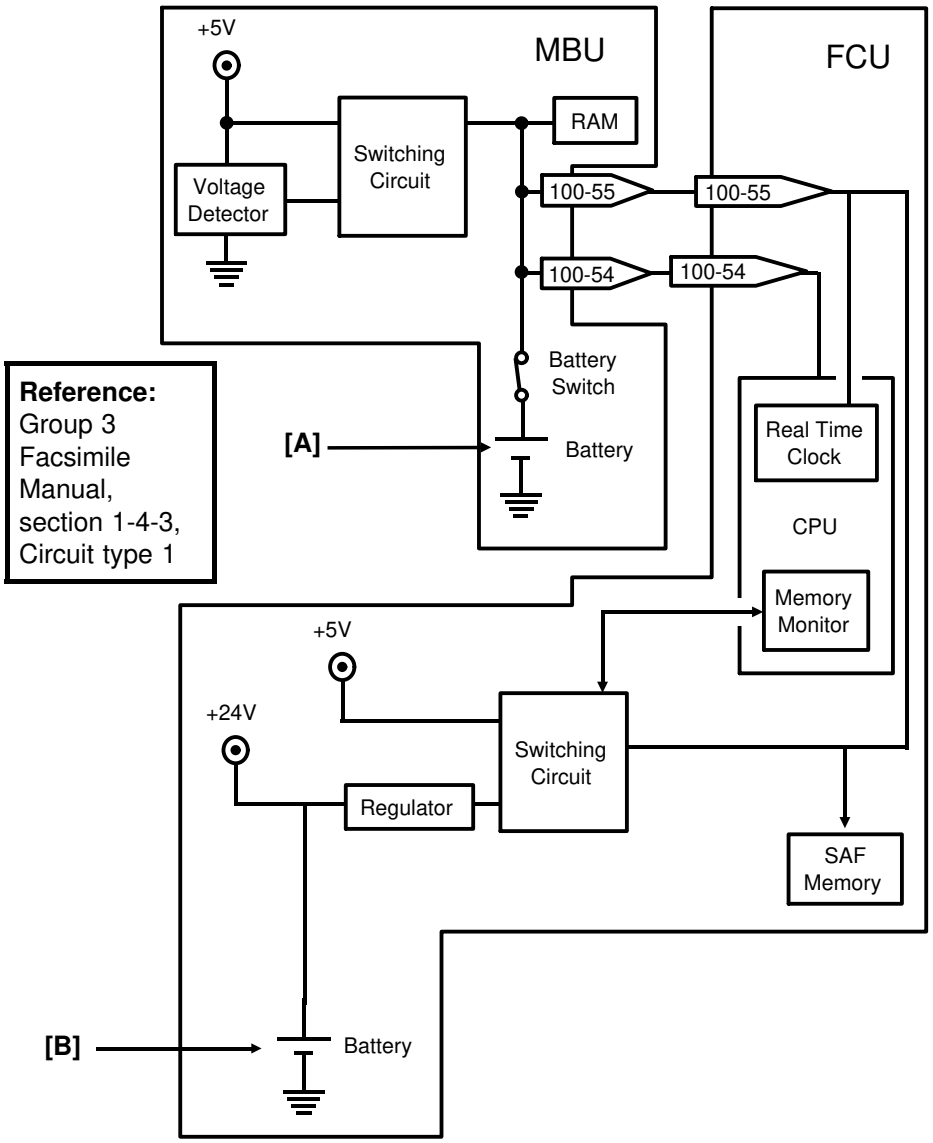
Copier Standby Mode

If the user selects Standby Mode on the operation panel, the machine is unaffected, except that the operation panel is disabled.

The Main Switch

Even if the main switch is turned off, main power still passes to the tray heater and, if installed, to the tray heater in the optional paper feed unit.

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. CN100-54 tells the cpu whether the back-up power (CN100-55) comes from the battery or from the +5V power supply.

A rechargeable battery [B] on the FCU board backs up the SAF memory and the real time clock for 1 hour. While the main power is on, the +24V supply recharges the battery. There is no battery switch.

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

1.6.3. Power Saving Modes

The machine has three different features to save power, as follows:

1. Operation Switch

If the operation switch is turned off, the machine shuts off the power to the operation panel (except for the Power LED), fusing lamp, and the fans. In this condition, copying, fax transmission, and printer output are disabled. However, incoming fax messages are stored in the memory, then printed after warming up. After printing, the machine shuts off the power to the operation panel, fusing lamp, and the fans.

Status	Op. Panel	Fusing Lamp Fans	Copying Fax Tx	Fax Rx	Printer I/F
Operation Switch - OFF	OFF	OFF	Disabled	Printing after warming up	Controller Ready but no printing

2. Standby Mode

If the Standby key is activated, the machine only disables the operation panel. In this condition, copying and fax transmission are disabled, but fax reception and printer output are possible as normal. However, if “Energy Saving Mode” is selected by the printer SP mode parameter No.51 (see section 4.3.2 for details), the power to the fusing lamp and the fans are reduced to 70% while the Standby key is activated. In this condition, printer output is disabled and incoming fax messages are stored in the memory and printed after warming up.

Status	Op. Panel	Fusing Lamp/ Fans	Copying Fax Tx	Fax Rx	Printer I/F
Standby Mode **Normal**	OFF	ON (100%)	Disabled	Immediate Rx	Controller Ready
Standby Mode **Energy Saving**	OFF	ON (70%)	Disabled	Printing after warming up	Controller Ready but no printing

3. Night Timer

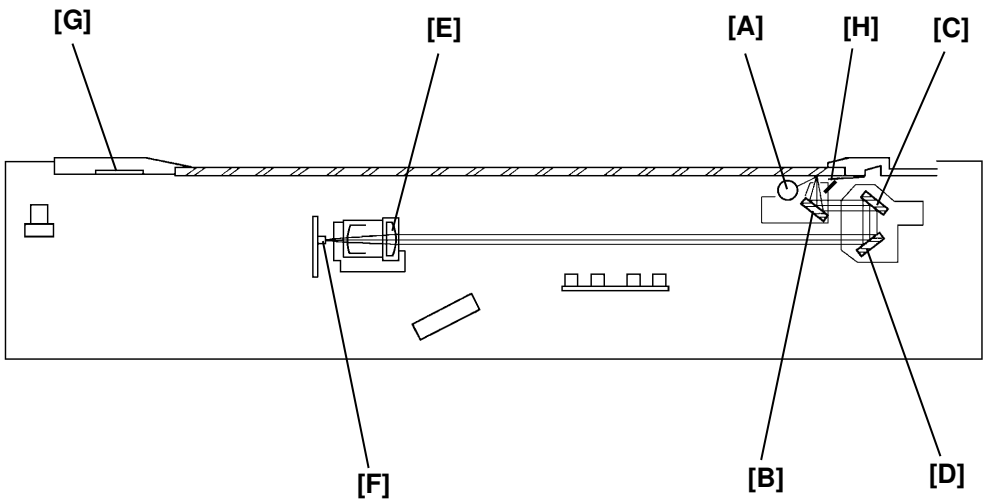
While Night Timer is activated, the machine disables power to the fusing lamp and fans. In this condition, copying, fax transmission and printer output are disabled. Incoming fax messages are all stored in the memory, and printed after Night Timer is deactivated.

Status	Op. Panel	Fusing Lamp Fans	Copying Fax Tx	Fax Rx	Printer I/F
Night Timer - ON	“Night Timer”	OFF	Disabled	Substitute Rx	Controller Ready but no printing

2. DETAILED SECTION DESCRIPTIONS

2.1. SCANNING

2.1.1. Overview



During scanning, an image of the original is reflected on to the CCD of the SBU (sensor board unit) via the optics assembly as follows:

Xenon Lamp [A] ⇒ Original ⇒ First Mirror [B] ⇒ Second Mirror [C] ⇒ Third Mirror [D] ⇒ Lens [E] ⇒ CCD [F]

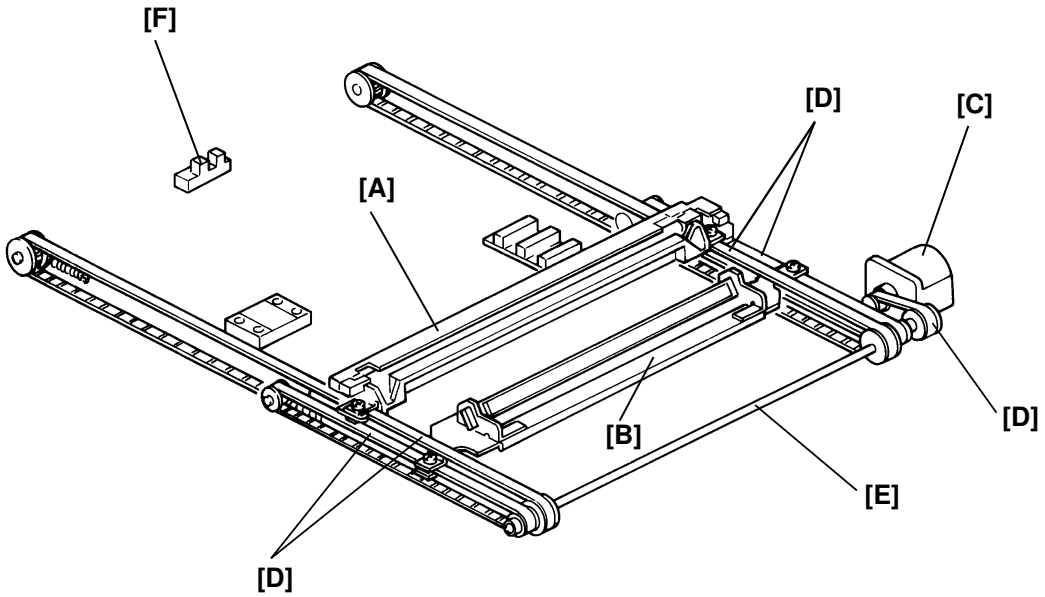
Light from a band across the entire width of the original is focused on the CCD by the lens. The CCD converts the light intensity into an analog electrical signal.

In full size mode the scanning resolution is 400 dpi (15.7 dots/mm) in both the main scan and sub scan directions.

The white plate [G] is scanned prior to scanning the original. The data from the white plate scan is used as a reference value to correct variations in the xenon lamp intensity or irregularities in the light striking the CCD.

The reflector [H] in the first scanner improves the quality of light at the original.

2.1.2. Scanner Drive

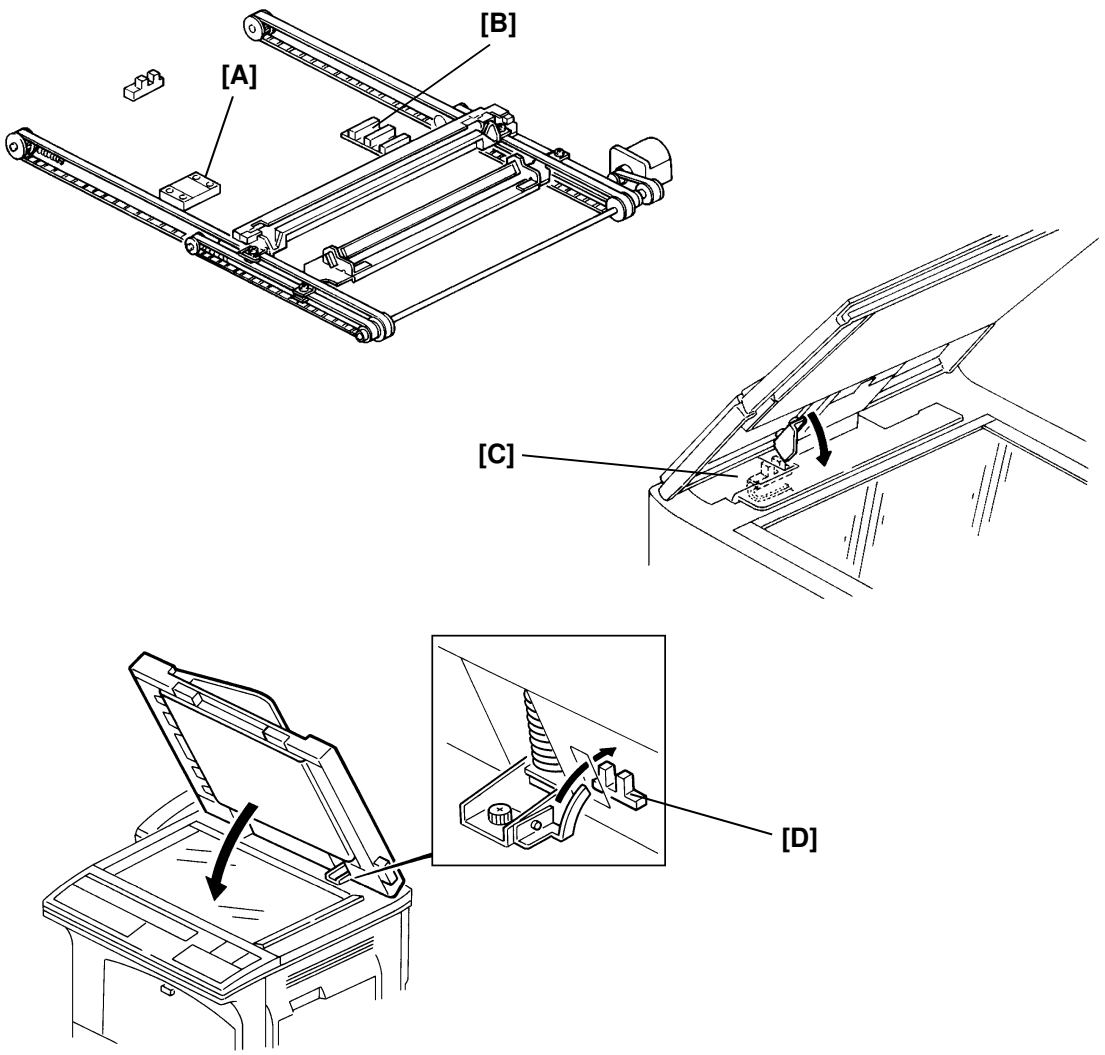


There are two scanners: the first scanner [A] which consists of the xenon lamp and the first mirror, and the second scanner [B] which consists of the second and third mirrors. Both scanners are driven by the scanner motor [C] through five timing belts [D] and drive shaft [E].

There is a scanner home position sensor [F] in the left center of the scanner unit. It is actuated by an actuator below the first scanner. However, the first scanner is in the right side of the unit when in standby mode, to prevent the second scanner from blocking the light to the original width sensors and original length sensors.

After turning on the power, the first scanner moves to the left, then activates the scanner home position sensor, then returns it to the right side for standby.

2.1.3. Original Size Detection in Platen Mode

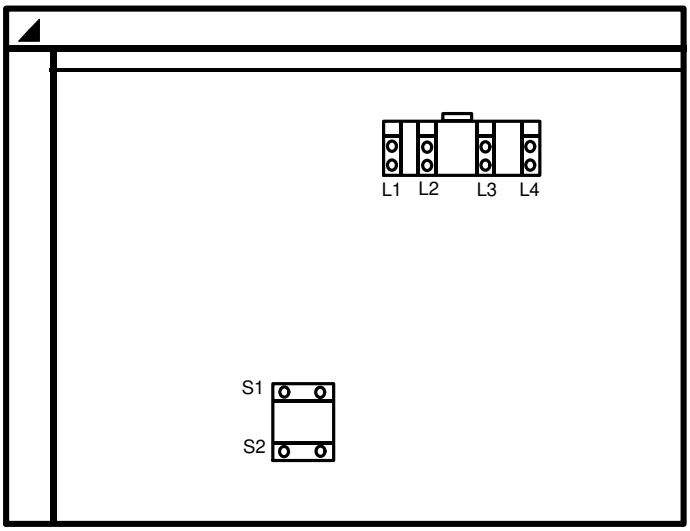


An original width sensor [A] and an original length sensor [B] are under the exposure glass. The original width sensor consists of two reflective photosensors. The original length sensor consists of four reflective photosensors.

While the main switch is on and the platen cover (document feeder) is open, these sensors are active and the cpu on the SPU board receives their output signals. The paper size is decided when the platen cover sensor [C] turns on (When the document feeder is installed, it is done when the scanner setup sensor [D] turns on). This is when the platen cover (document feeder) is lowered to about 10 cm (4") above the exposure glass.

When a copy is made with the platen cover (document feeder) open, the cpu checks the original size when the Start key is pressed.

The illustration shows the location of the original width and length sensors. The table shows the sensor output (HIGH, LOW) for each original size.



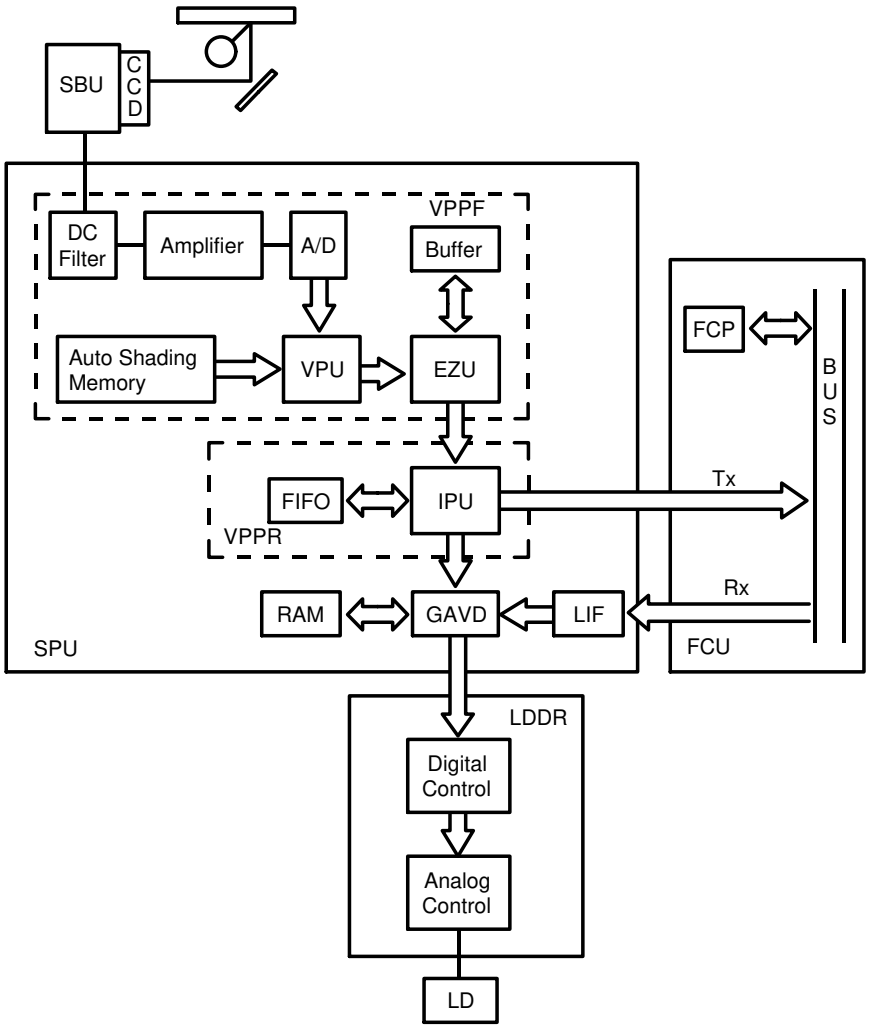
Sensors / Original Size	Original Width Sensor		Original Length Sensor			
	S1	S2	L1	L2	L3	L4
11" x 17"	O	O	O	O	O	O
10" x 14"	O	X	O	O	O	O
8 1/2" x 14"	X	X	O	O	O	O
8 1/2" x 11"	X	X	O	O	O	X
8" x 10"	X	X	O	X	X	X
11" x 8 1/2"	O	O	X	X	X	X
A3	O	O	O	O	O	O
B4	O	X	O	O	O	O
A4	O	O	X	X	X	X
A4	X	X	O	O	X	X
B5	O	X	X	X	X	X
B5	X	X	O	X	X	X
F	X	X	O	O	O	X
APS Test (Function 11-3-90)	Bit 5	Bit 6	Bit 2	Bit 3	Bit 0	Bit 1

O: Low X: High
Sensor outputs are low when activated.

Note: In case of other combinations, "CANNOT DETECT ORIGINAL SIZE" will be indicated.

2.2. IMAGE PROCESSING

2.2.1. Overview



SBU (Sensor Board Unit)

The SBU has a CCD which generates an analog video signal. The analog video signal is transferred to the SPU board.

SPU (Scanner Printer Unit)

The SPU uses 3 LSIs for image processing: VPP-F, VPP-R, and GAVD. The functions of each LSI are as follows.

VPP-F (Video Processing Peripheral - Front)

- Auto shading
- Main-scanning magnification
- Mirror image
- γ correction

VPP-R (Video Processing Peripheral - Rear)

- MTF correction
- Dithering
- Background detection
- Edge detection
- Error diffusion
- Halftone processing
- OR processing

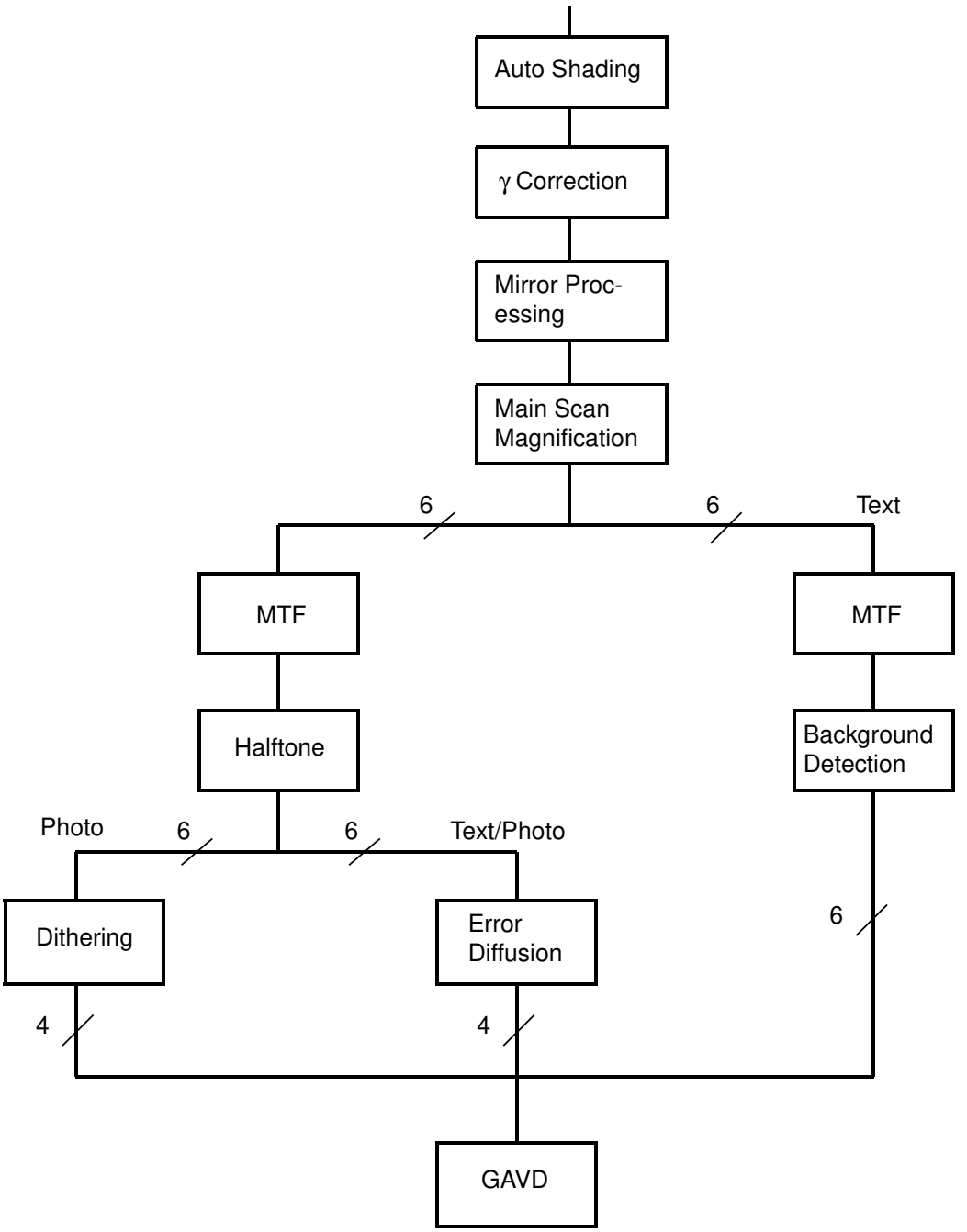
GAVD (Gate Array VD)

- Printer start position (main scan)
- LD video signal control
- Center erasing
- Image leading and side registration
- Margin generation
- Border erasing

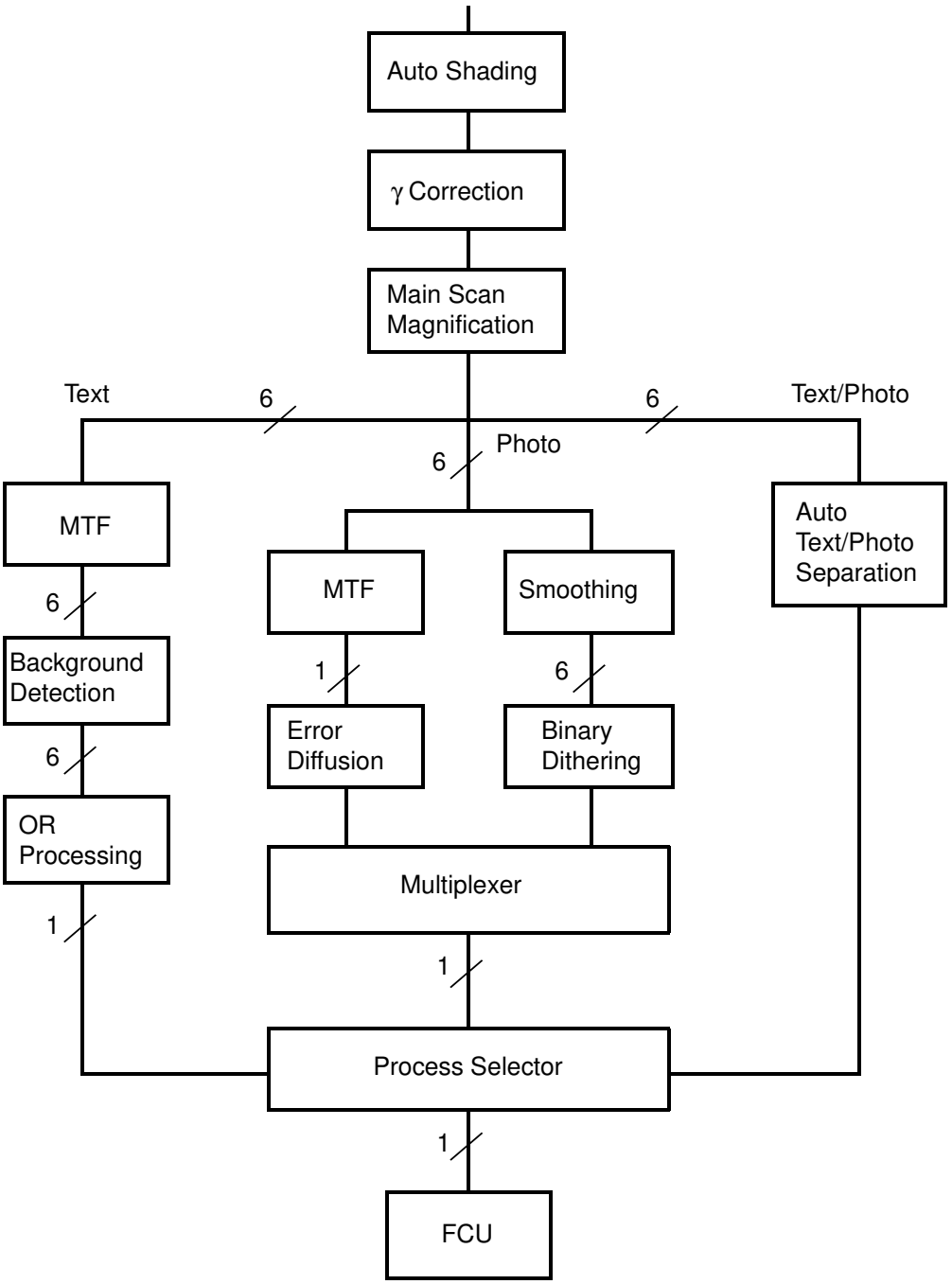
In copy mode, the video processing is done by 64 level gray scale processing. For fax mode, the video processing is done by binary processing.

2.2.2. Video Data Processing

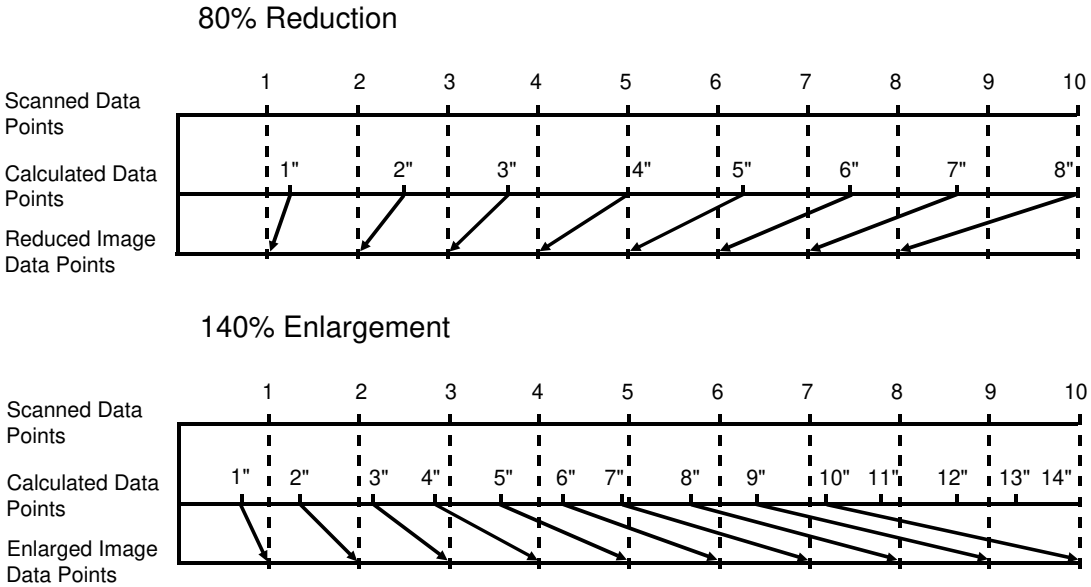
– Copy –



– Fax –


Auto Shading
γ Correction
Main Scan Magnification
Text
6
6
Text/Photo
6
Photo
MTF
MTF
Smoothing
Auto Text/Photo Separation
6
1
6
Background Detection
Error Diffusion
Binary Dithering
6
OR Processing
Multiplexer
1
1
Process Selector
1
FCU

2.2.3. Main Scan Magnification



– Copy mode –

Reduction and enlargement in the sub scan direction are done by changing the scanner speed. However, reduction and enlargement in the main scan direction are handled by the SPU.

Scanning and laser writing are done at a fixed pitch (the CCD elements cannot be squeezed or expanded). So, to reduce or enlarge an image, the VPPR calculates imaginary points that would correspond to physical enlargement or reduction of the image. It then calculates the correct image density for each of the imaginary points based on the image data of the nearest four true points. The calculated image then becomes the new (reduced or enlarged) image data.

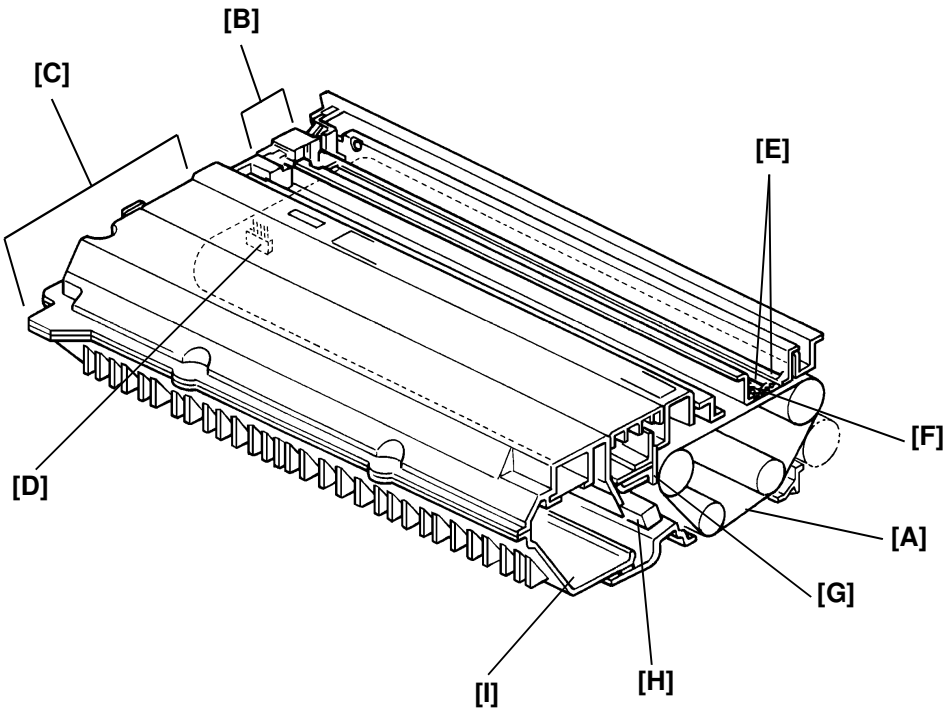
– Fax mode –

In the fax mode, there is no enlargement. Reduction is done in both the sub scan and main scan directions.

Reduction in the sub scan direction is done by deleting lines in the same way as described in the Group 3 Facsimile manual. For the main scan direction, the procedure is the same as the copy mode.

2.3. MASTER UNIT

2.3.1. Overview



The master unit consists of the master belt [A], the charge corona unit [B], and the cleaning section [C].

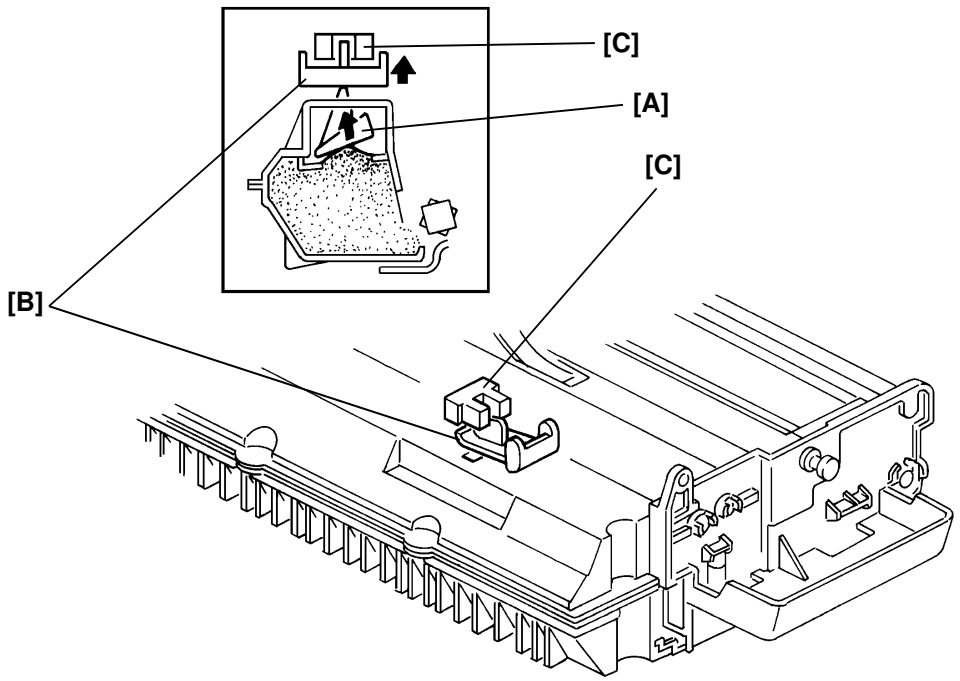
The master is an organic-photoconductive belt. There is no need to feed the master to any special position to start printing because there is no bond seam to avoid.

The master bias (which is fixed at –150 volts) is applied to the base material of the master belt through the conductive brush [D]. This is to reduce toner attraction to the non image areas on the master belt.

The charge corona wires [E] generate a corona of negative ions and the stainless steel grid plate [F] ensures that the master belt receives a uniform negative charge.

The cleaning blade [G] removes any toner remaining on the master belt after the image is transferred to the paper. The toner collection bar [H] carries the toner cleaned from the master belt to the used toner tank [I].

2.3.2. Used Toner Overflow Detection

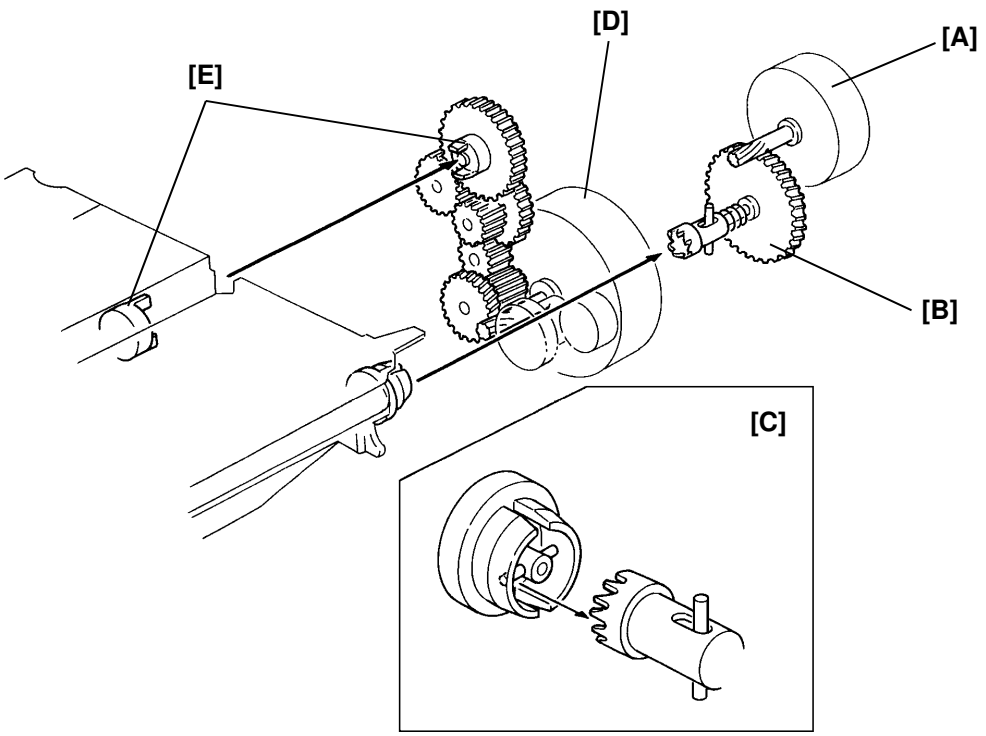


When the used toner piles up, the pressure of the used toner pushes up the movable plate [B]. Up to 100 prints can be made after the actuator moves into the used toner overflow sensor [C]. At this time, printing is disabled, and the display on the operation panel instructs the operator to replace the master unit.

This condition can be cleared by replacing the master unit.

Also, the master counter is cleared automatically by replacing the master unit.

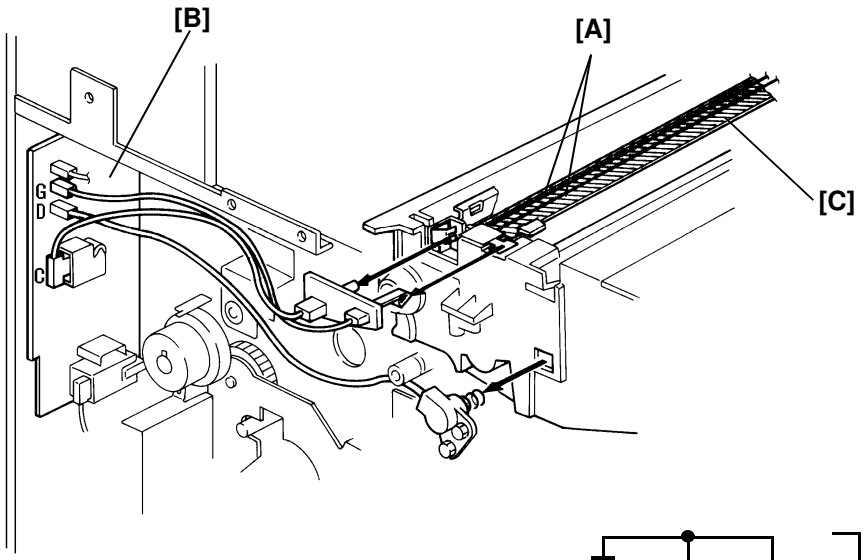
2.3.3. Drive Mechanism

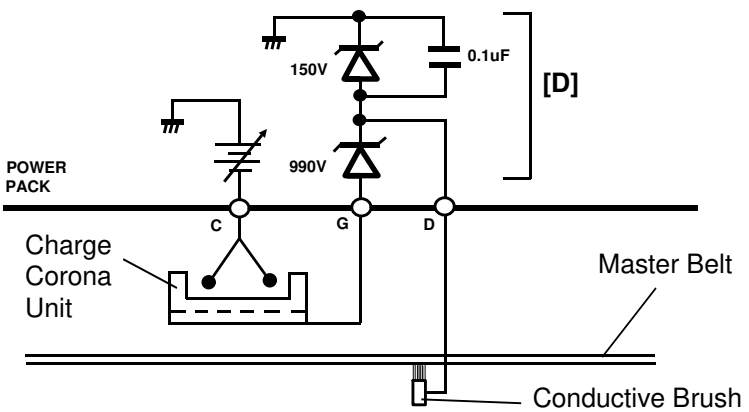


An independent master belt motor [A] drives the master belt through the master belt drive gear [B] and a coupling mechanism [C].

The main motor [D] supplies drive to the toner collection bar through a series of gears and the coupling mechanism [E].

2.4. CHARGE





This machine uses a double wire scorotron to charge the master. The corona wires [A] generate a corona of negative ions when the power pack [B] applies a high voltage (–6.7 kV). Then the master belt receives a negative charge through the grid plate [C]. The grid plate ensures that the charge is uniformly spread out.

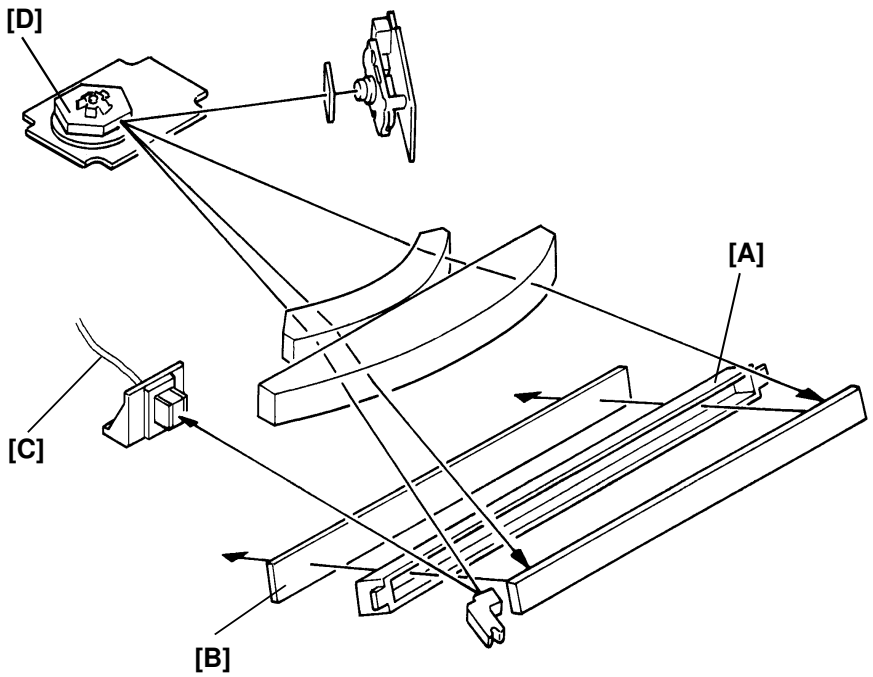
The grid plate is grounded through the zener assembly [D] on the power pack which ensures that the charge on the belt does not exceed –1140 V.

The ozone fan located on the rear frame provides an air flow to the charge corona unit to prevent uneven build-up of negative ions that can cause an uneven charge on the master surface.

The ozone filters (paper filter with active carbon) located above the charge corona unit and on the ozone fan decompose the ozone around the master generated by the corona discharge. The ozone filters decrease in efficiency over time as they get dirty. The ozone filters should be replaced every 60,000 copies.

2.5. LASER EXPOSURE

2.5.1. Overview



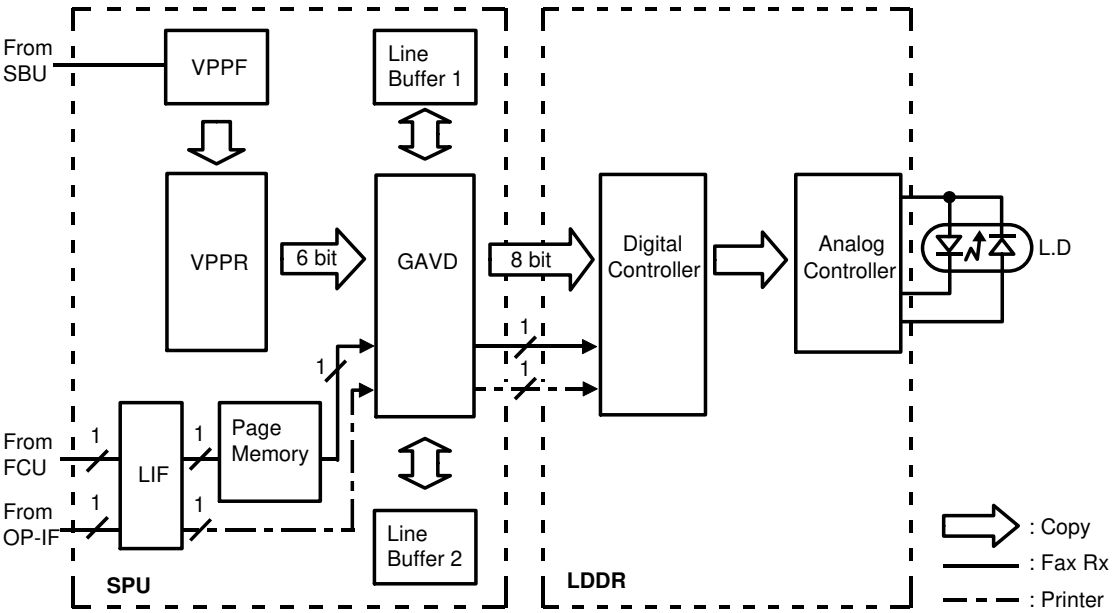
The components of the laser section are the same as those described in the Group 3 Facsimile manual. There are no unique parts.

Points to note:

- The focusing lens [A] is a barrel toroidal lens.
- The shield glass [B] prevents toner and dust from entering the laser optics area.
- An optical fiber [C] passes the reflected laser beam to the main scan start detector circuit in the SBU.
- The strength of the beam is 1.37 mW at a wavelength of 780 nm.
- The dimensions of the dot on the master belt are 69 µm (main scan direction) by 75 µm (sub-scan direction).
- The shape of the polygonal mirror [D] is hexagonal.
- There are four polygon motor speeds:
  G3/G4 l/mm mode: 13132.44 rpm
  Copy and G4 dpi mode: 13385.83 rpm
  Image Rotation mode: 13644.10 rpm
  Printer mode (300 dpi printing): 10039.37 rpm

The charge on the exposed parts of the belt drops to about –290 V, while non-exposed areas remain at about –1140 V.

2.5.2. Laser Exposure Control



– Copy mode –

The VPP-R sends 6 bits of video data to the GAVD, which then stores the data in one of two line buffers. The two line buffers are used alternately and hold one scan line of video data each.

When it is time for the line to be written to the master belt, the data in the line buffer returns to the GAVD. The GAVD controls the printing start timing and applies the erase center or erase border processing if selected by the user. Then, the GAVD sends the data to the LDDR.

– Fax mode –

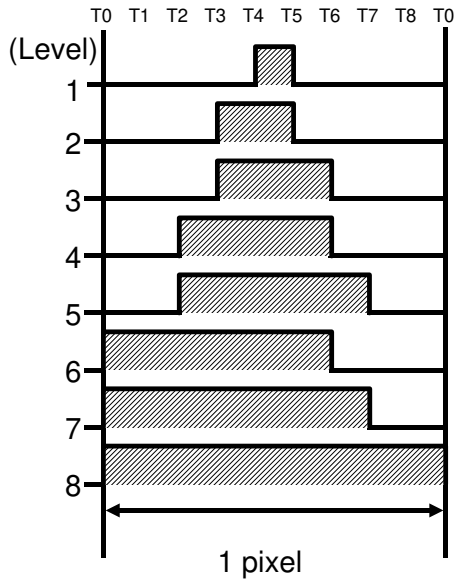
The LIF sends the received data to the page memory as a one bit signal. After one page of data has been stored the page memory, the memory sends it to the GAVD. The GAVD controls the printing start timing.

– Printer mode –

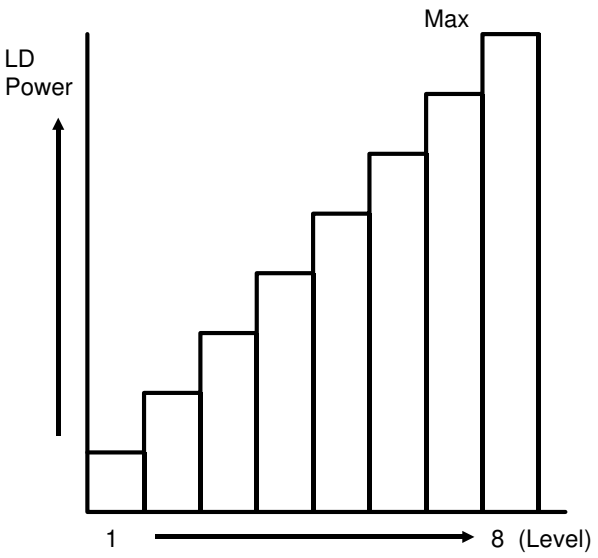
The data from the OP-IF (option interface board) goes to the LIF. Then the LIF sends the data to the GAVD. The GAVD controls the printing start timing.

The LDDR has a digital controller and an analog controller. The data from the SPU goes to the digital controller, where the pulse width modulation, laser power modulation, and γ correction are performed. The corrected data goes to the analog controller, where digital/analog conversion is performed. Then the data is output to the laser diode for printing. Also, the analog controller performs the APC (Auto Power Control).

2.5.3. 64 Level Gray Scale Control



Pulse Width Modulation



Laser Power Modulation

– Copy mode –

Laser output is controlled by both pulse width and laser power modulations, These modulations can be each changed over 8 levels. Thus, by combining these two, a total of 64 levels of gray can be realized.

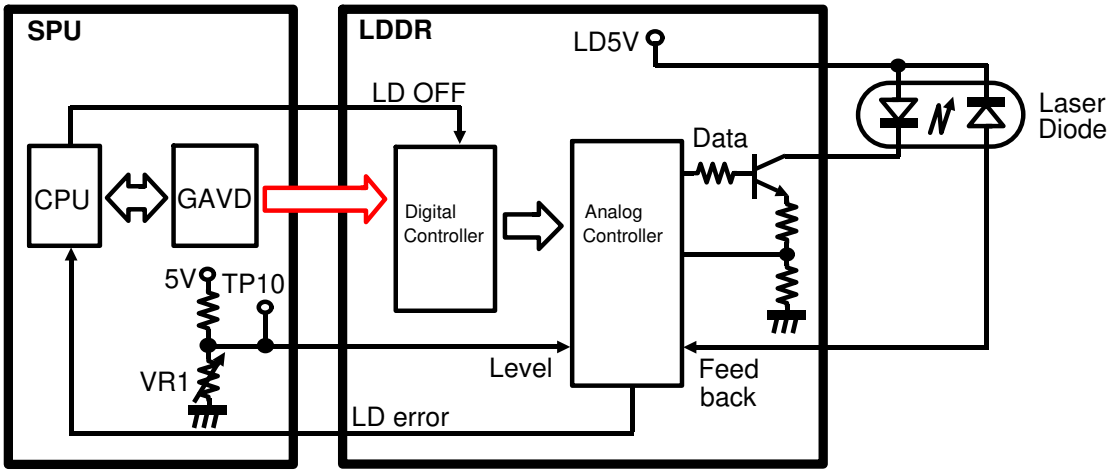
The modulation is done using the upper 3 bits (DAT2 ~ 4) of the 8 bit video data from the SPU for laser power modulation and using the lower 3 bits (DAT5 ~ 7) for pulse width modulation. Then the modulated data is sent to the analog controller, which controls the laser power level and exposure timing.

Video data signals 0 and 1 (DAT0 and 1) are used for changing the image density by using a γ curve.

– Fax and Printer modes –

The video processing for fax mode is done by binary processing. So, the pulse width and laser power modulations are very simple. When a black dot is printed, both modulations use only Level 8 (full power and full time).

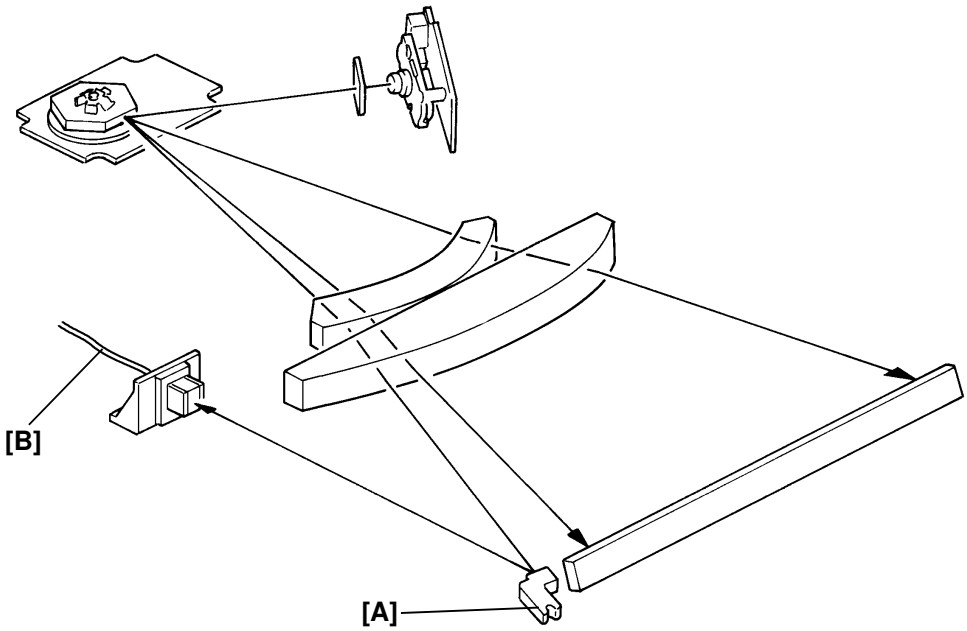
2.5.4. Auto Power Control (APC)

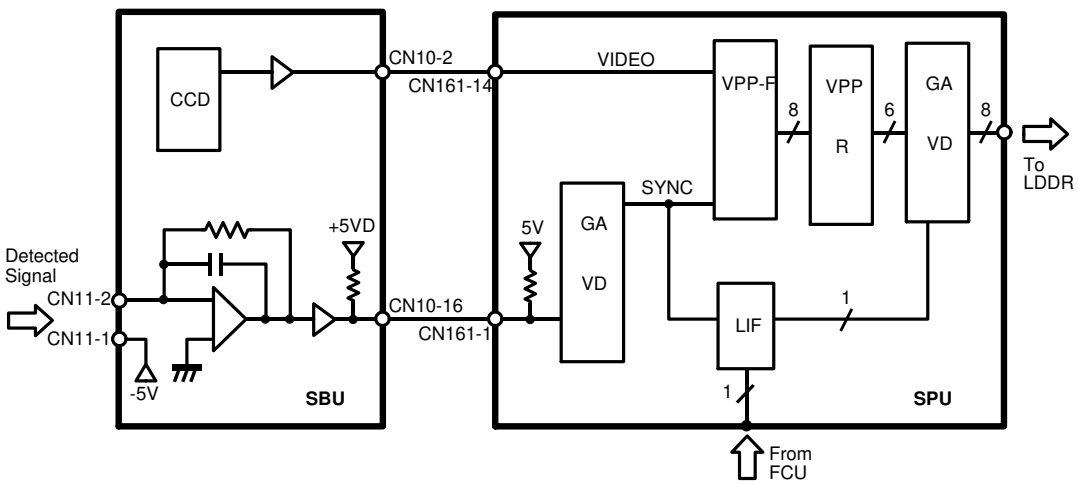


The analog controller on the LDDR sends a constant signal to the laser diode. The feedback signal returns to the analog controller. If necessary, the analog controller adjusts the laser diode power to the correct value according to the level signal adjusted by VR1 in the factory (the standard value is 1 V). The corrected value is applied to the laser diode through the data signal.

When the laser diode power control has failed and the cpu on the SPU receives the LD ERROR signal from the analog controller, the cpu disables the laser diode using the LD OFF signal.

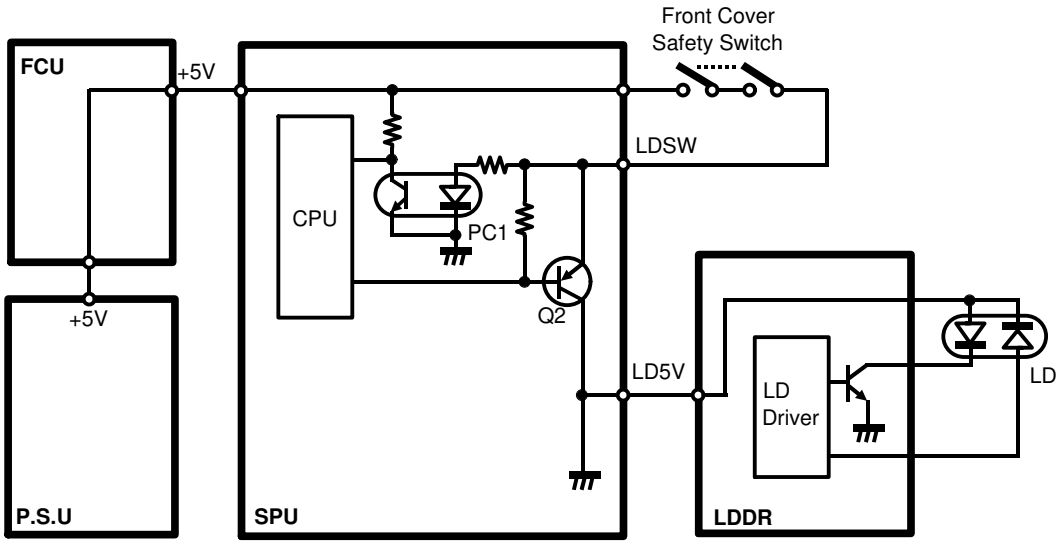
2.5.5. Main Scan Start Detector





At the start of each scan line, the main scan start detector mirror [A] reflects the laser beam to the main scan start detector circuit on the SBU through the main scan start detector cable [B]. Activation of this detector signals the start of main scan writing by the laser beam.

2.5.6. Laser Diode Drive



There are two switches located at the front door. These two switches are installed in series on the LDSW line coming from the SPU.

When the front door is opened, the power supply to the laser diode is interrupted.

2.5.7. Inch - mm Conversion

This function is used only for fax mode.

In Group 3 standards, the printer is designed to operate in dot per mm format, and assumes that each received page is in a dot per mm layout. In Group 4 standards, the printer is designed to operate in dot per inch format.

The space between each pixel for both the mm system and the inch system are as follows.

	mm system			inch system		
	Resolution	Main Scan	Sub-Scan	Resolution	Main Scan	Sub-Scan
Standard	8x3.85 l/mm	0.1250 mm/dot	0.2600 mm/dot	200x100 dpi	0.1270 mm/dot	0.2540 mm/dot
Detail	8x7.7 l/mm	0.1250 mm/dot	0.1300 mm/dot	200x200 dpi	0.1270 mm/dot	0.1270 mm/dot
Super Fine	8x15.4 l/mm	0.1250 mm/dot	0.0649 mm/dot	200x400 dpi	0.1270 mm/dot	0.0635 mm/dot

For Group 3 communications, the inch - mm conversion should be performed. Otherwise, a distorted image will be printed.

– Reception –

The inch - mm conversion is performed by changing the polygon mirror motor rotation speed irrespective of the transmission mode. It is changed from 13132.44 rpm (G3 and G4 l/mm mode) to 13385.83 rpm (G4 dpi mode).

– Transmission –

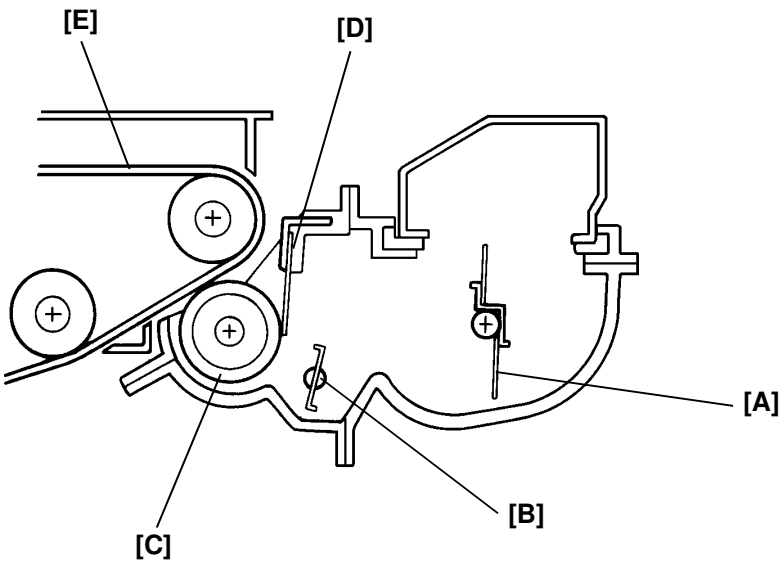
The inch - mm conversion is performed by the VPPF, or the cpu on the FCU, or the QPCR depending on the transmission mode as follows.

- G3 Immediate: Main scan - VPPF
  Sub scan - cpu
  Memory: Main scan - cpu
  Sub scan - cpu
- G4 Immediate: Main scan - VPPF
  Sub scan - cpu
  Memory: Main scan - QPCR
  Sub scan - cpu

Inch - mm conversion causes a slight enlargement in the main scan direction and a slight reduction in the sub scan direction.

2.6. DEVELOPMENT

2.6.1. Overview

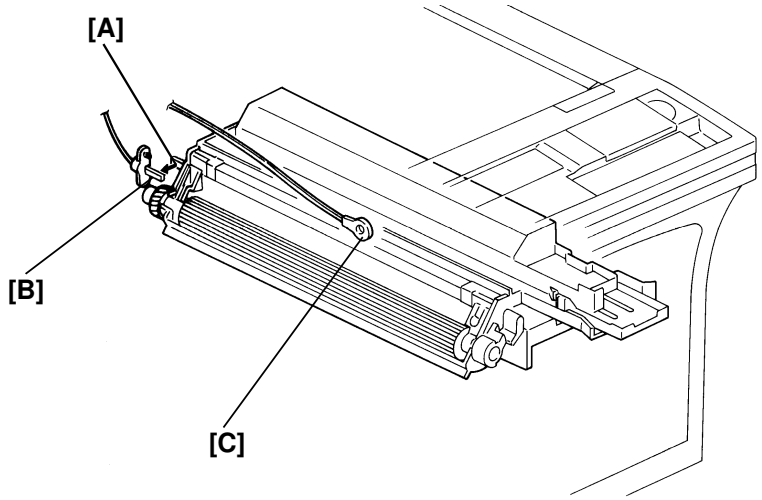


The development unit transforms the invisible electrostatic latent image on the master surface into a visible toner image.

This machine uses monocomponent toner, which is composed of resin and ferrite. The toner mixing bar [A] stirs and carries toner to the toner supply bar [B]. The toner supply bar carries toner to the development roller [C]. Toner is attracted to the development roller because the roller has a magnetic layer and the ferrite in the toner can be magnetized. As the development roller turns past the toner metering blade [D], only a thin coating of negatively charged toner particles stays adhered to the development roller.

Then, the development roller turns past the master belt [E]. The development roller applies toner to the latent image on the master belt, making it a visible toner image.

2.6.2. Development Bias

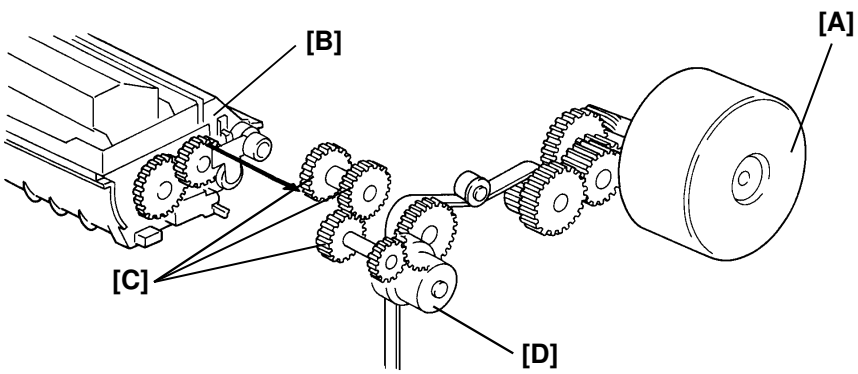


When the development unit is installed, the bias plate [A], located at the rear of the development unit is in contact with the bias terminal [B], so that the development bias can be applied to the development roller, toner metering blade, and the bias brush.

The bias is –790 V and it is supplied by the power pack.

There is a development unit thermistor [C] located above the development unit. This thermistor checks the temperature inside the machine. If the thermistor senses a temperature below 20°C, the development bias is changed to –660 V.

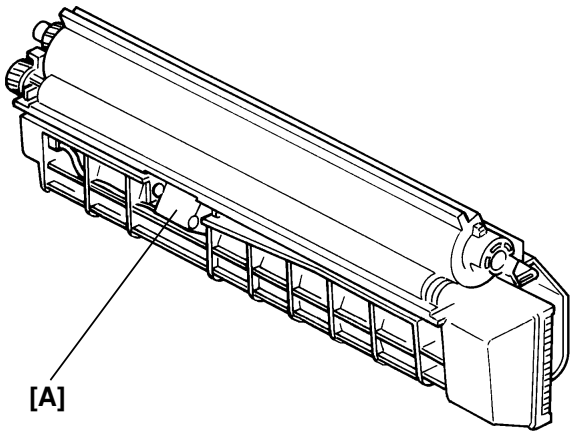
2.6.3. Drive Mechanism



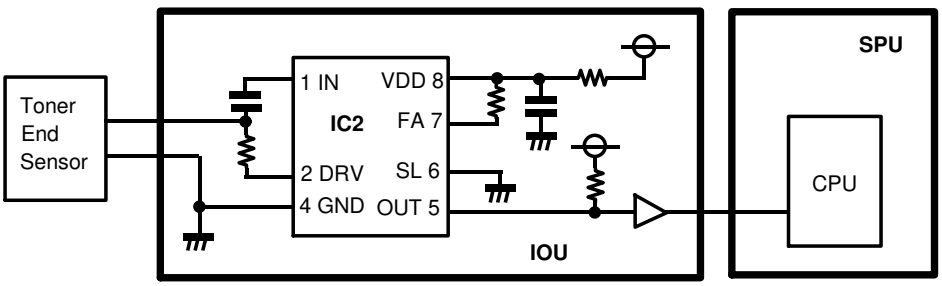
The main motor [A] drives the development roller [B] through the gear trains [C], and the development clutch [D].

The development clutch switches on and off at the same time as the master unit motor.

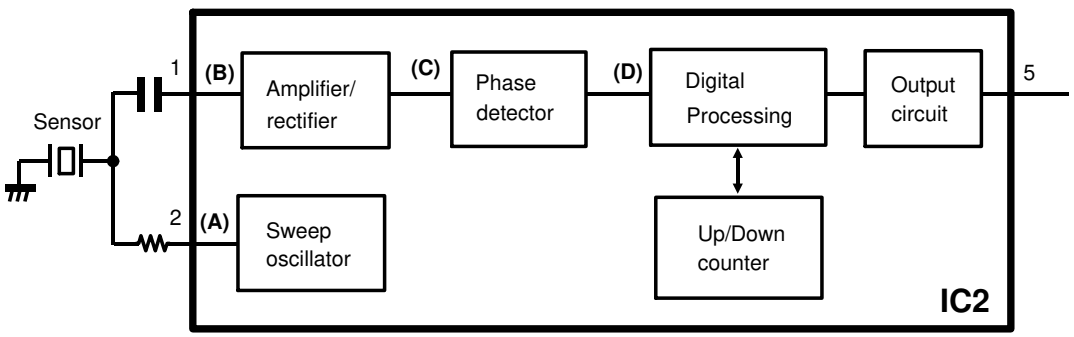
2.6.4. Toner End Detection



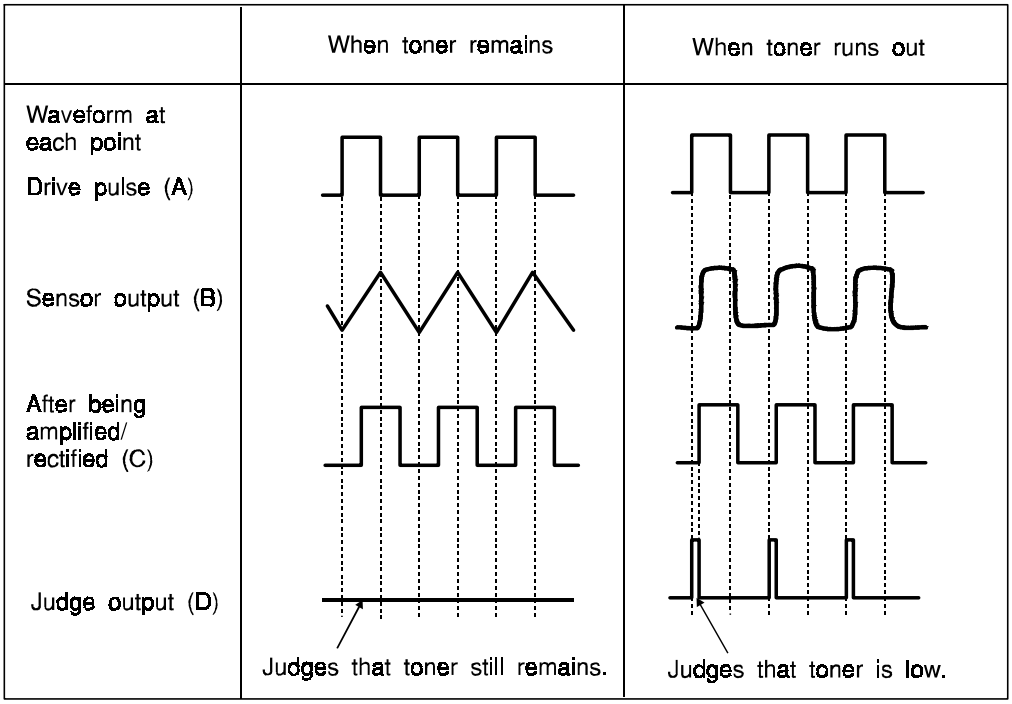
Toner near-end is detected by the toner end sensor [A] which is located below the development unit.



The toner end detection circuit diagram is shown above.



The toner end detection circuit is organized as shown above. The sweep oscillator outputs a signal of 4 to 8 kHz at 0.2 s intervals at pin 2. This signal passes to the sensor, which emits it into the development unit.



The toner in the development unit reflects the signal back to the sensor, and this signal passes back to the detector circuit at pin 1. The difference in phase between the original signal (pin 2) and the return signal (pin 1 after being amplified and rectified) depends on the amount of the toner remaining in the development unit.

When the phase difference falls below a certain threshold, the circuit detects that toner is low and increments the up/down counter by "1".

The circuit evaluates the last sixteen samples, and outputs a decision at pin 5 in accordance with the following counter values.

8/16 counts or less : Toner still remains.

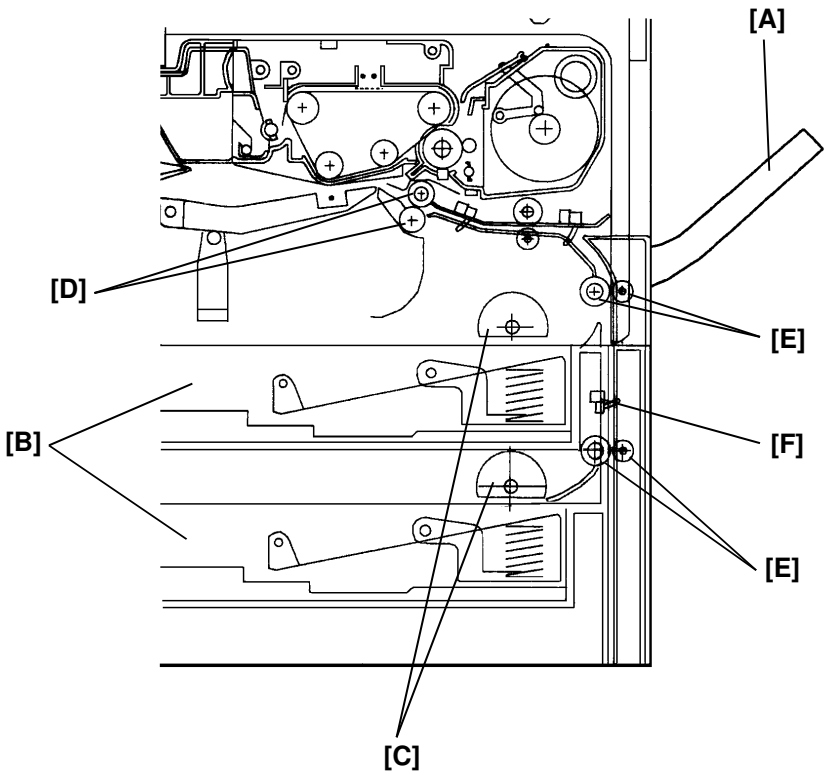
12/16 counts or more : Toner has run out (Toner near end condition).

9/16 to 11/16 counts : Retain the previous status.

When cpu detects this signal, the Add Toner indicator on the operation panel starts blinking. This is the toner near-end condition. At 50 copies after the toner near-end condition occurs, the Add Toner indicator stays on and copying is then disabled.

2.7. PAPER FEED

2.7.1. Overview



There are two cassettes and a by-pass feed table [A].

The first and second cassettes [B] each hold 250 sheets. The by-pass feed table can hold 1 sheet.

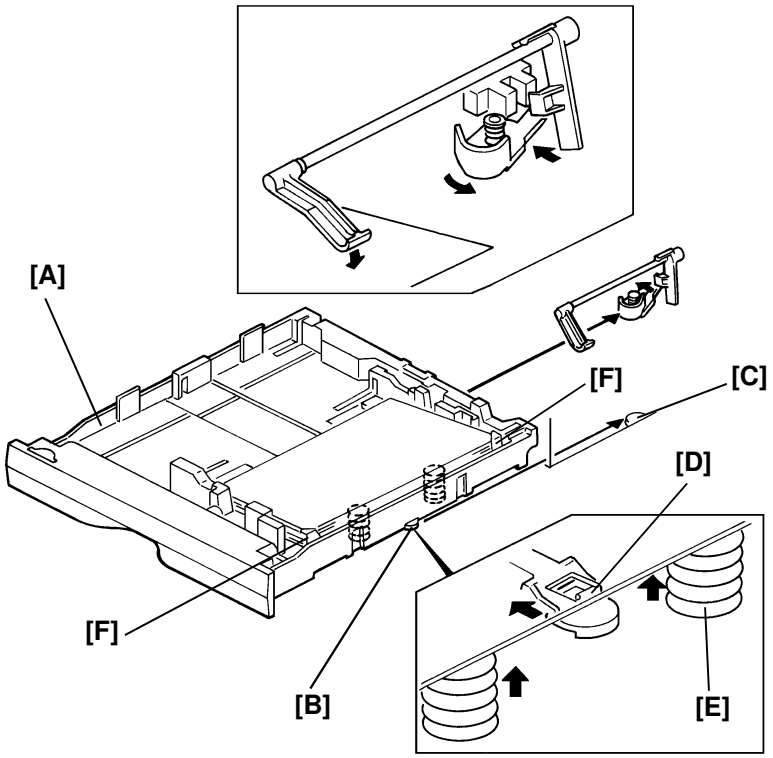
Rotation of the semicircular feed rollers [C] drives the top sheet of paper from the cassette to the registration rollers [D] through the relay rollers [E].

The cassette has two corner separators (see [F] in the diagram on the next page), which help to allow only one sheet to feed. They also serve to set the height of the paper stack.

When the cassette is closed after the paper is loaded, the paper size actuator located at the rear of the cassette pushes the paper size sensor. This informs the cpu on the SPU board what paper size is loaded in the cassette and that the cassette is in place.

There is a relay sensor [F] located between the relay rollers. This sensor is used for paper jam detection.

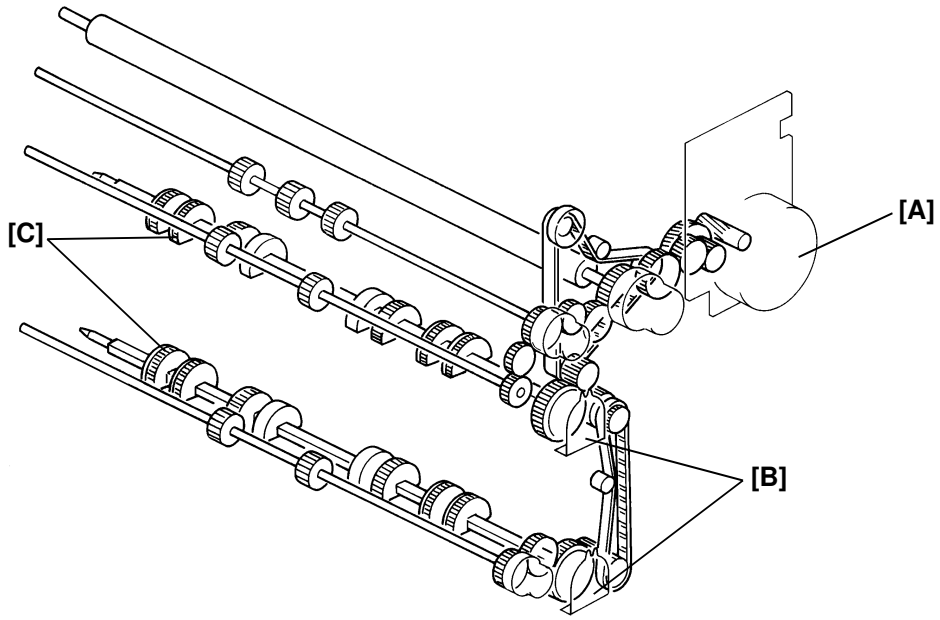
2.7.2. Paper Lift Mechanism



When the cassette [A] is closed after paper is loaded, the plate release slider [B], which is mounted on the bottom part of the cassette, is pushed by the projection [C] on the main frame and the release slider comes off the bottom plate hook [D].

Once the release slider comes off, the bottom plate is raised by the pressure springs [E] and the top sheet pushes up the corner separators [F]. This keeps the stack of paper at the correct height.

2.7.3. Paper Feed Drive Mechanism



The main motor [A] drives the pick-up and feed mechanism of both the first and second cassettes. The paper feed clutches [B] transfer drive from this motor to the feed rollers [C].

The paper feed clutch turns on and the semicircular rollers start rotating, then paper starts to feed.

The paper feed clutch on timing depends on the following modes.

– Copy mode –

When the scanner home position sensor is activated.

– Fax mode –

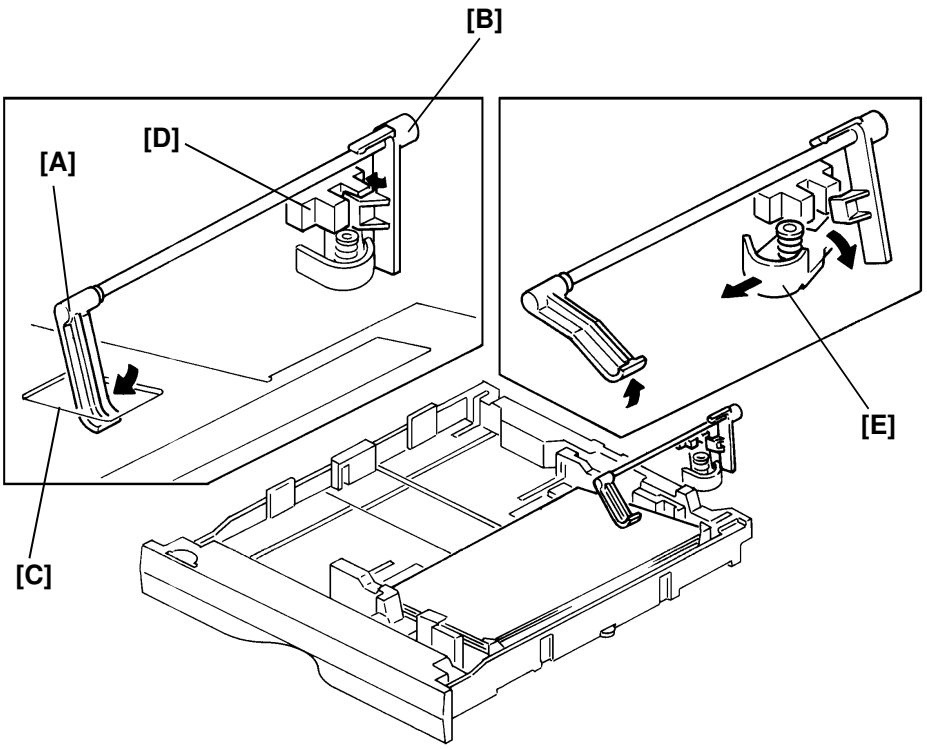
When one page of data has been stored in the page memory.

– Printer mode –

When the cpu on the SPU receives the paper feed request signal from the optional printer controller.

The first (second) paper feed clutch stays on for 300 milliseconds. This allows the feed rollers to rotate only one revolution.

2.7.4. Paper End Detection

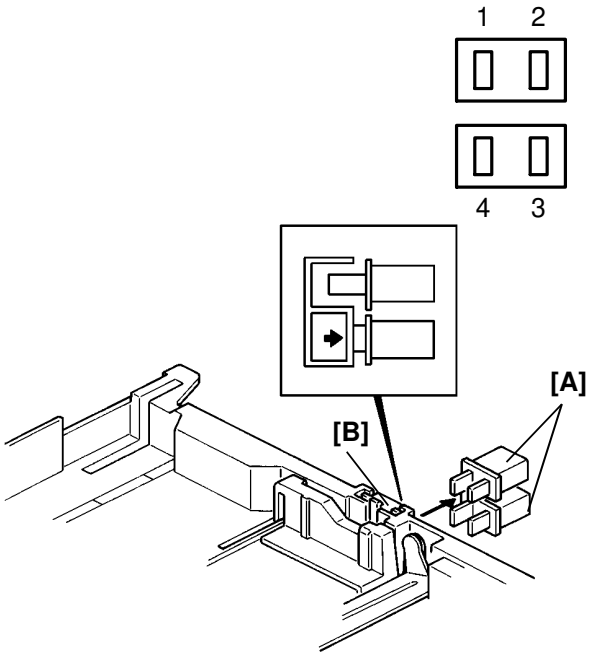


The paper end feeler [A] is on the same shaft as the paper end actuator [B]. When the cassette runs out of paper, the paper end feeler drops through a slot [C] in the cassette bottom plate. The paper end actuator pivots into the paper end sensor [D].

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

The paper end actuator is in contact with the lever [E]. When the cassette is taken out, the lever turns as shown by the arrow in the figure. Then the lever pushes up the actuator. At the same time, the feeler is rotated upwards. This mechanism is necessary to prevent the feeler from getting damaged by the cassette body.

2.7.5. Paper Size Detection



Size \ SW	1	2	3	4
A3 ◪, 11"x17"	●	●	❍	●
A4 ◪, 8 1/2"x11"	●	●	●	❍
A4 ◪, 11"x8 1/2"	❍	●	●	●
A5 ◪	●	❍	●	●
B4 ◪, 8 1/2"x14"	❍	●	❍	❍
B5 ◪	❍	❍	❍	●
F ◪ (8 1/2"x13")	❍	❍	●	❍

●: ON (Not pushed) ❍: OFF (Pushed)

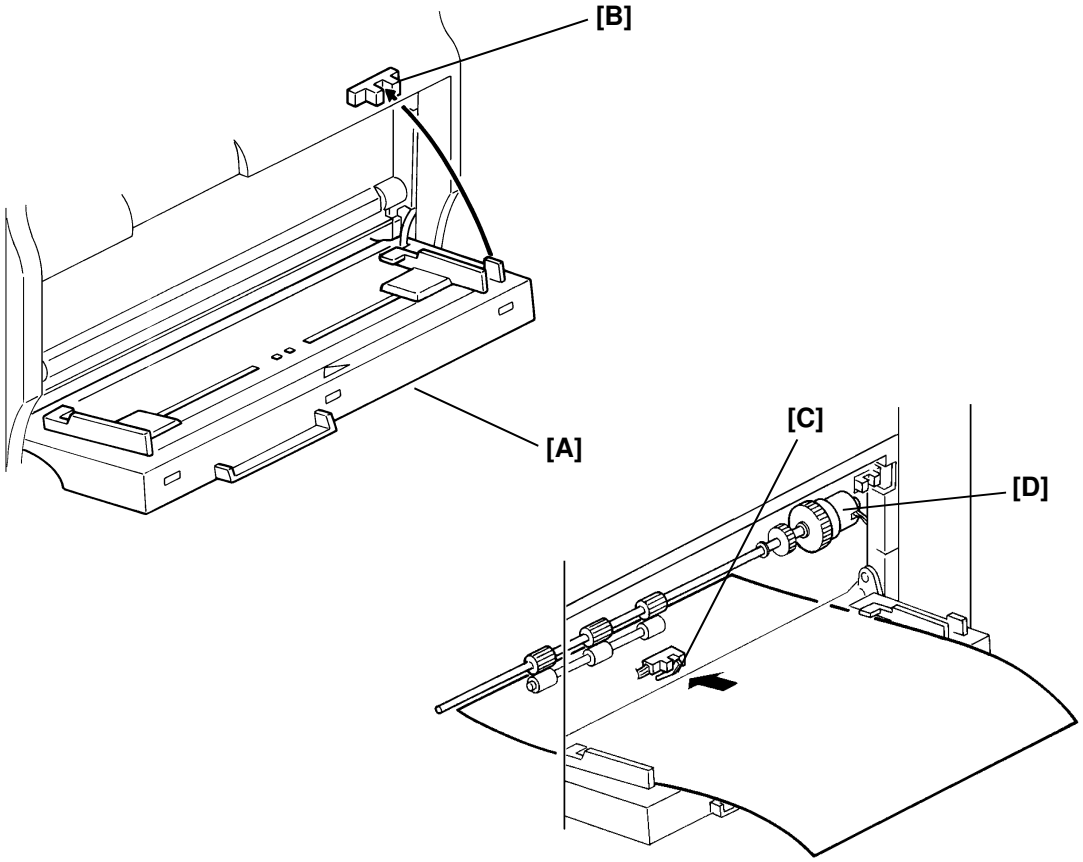
Four paper size sensors (microswitches) [A] are on the rear side plate of the main frame. The sensors are actuated by a paper size actuator [B] which is on the rear of the cassette.

Each paper size has its own actuator, with a unique combination of notches. To determine which size cassette has been installed, the cpu reads which micro switches have been deactivated by the actuator.

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 installed, the Add Paper indicator will light.

For the A3/A4 version machine, the American standard paper sizes can also be available by using RAM address 080269(H) (refer to section 4.7).

2.7.6. By-pass Feed Table



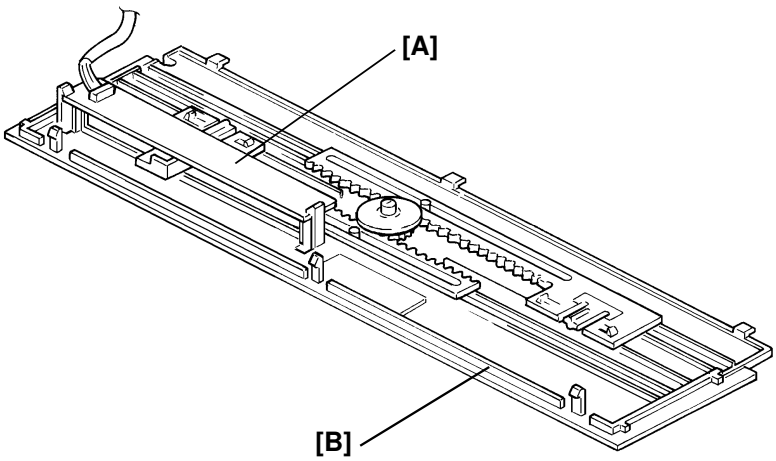
The by-pass feed table [A] can load only one sheet of paper.

When the by-pass feed table is opened, the by-pass feed cover sensor [B] is disabled and "LOAD PAPER" and "BYPASS FEED NON STANDARD SIZE" will appear in the LCD. The Add Paper indicator will also light. When the paper is set in the by-pass feed table and the leading edge of paper activates the by-pass feed sensor [C], the main motor is energized for the paper pre-feeding.

After the Start key is pressed, the cpu energizes the by-pass feed clutch [D] and the by-pass feed relay roller starts rotating. Then the paper is fed to the registration roller.

The bypass feed table is not used in fax mode. When the machine receives a fax message while the by-pass feed table is opened without any paper in the by-pass feed table, the paper will be fed from the cassette. If paper is set in the by-pass feed table, the incoming data will be stored in the memory.

2.7.7. By-pass Feed Paper Width Detection



In by-pass feed mode, the cpu on the SPU needs paper width data in order to decide the master belt exposure area in the main scan direction.

The paper width switch [A] is a slide switch located inside the by-pass feed table [B]. It measures the paper width manually. This switch has four contacts which are connected to ground by a slider. The slider moves when the user positions the manual feed guide against the paper, and the cpu on the SPU determines the paper width based on the information from the IOU board about which of the contacts is grounded.

When the by-pass feed table is opened, the display shows "BYPASS FEED NON STANDARD SIZE", and the customer can inform the cpu on the SPU of any paper width data through the operation panel. This will override the data from the sensor.

2.7.8. Page Separation and Data Reduction

This function is used only for fax mode.

Incoming pages that are only slightly longer than 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 (reduction enabled), the data will be reduced in the page memory to fit on the copy paper. However, data will only be reduced if the length of the incoming page is between 5 mm shorter and a certain maximum length. This maximum incoming page length that can be reduced depends on the copy paper size and on the reduction ratio stored in RAM addresses 08004F and 080050.

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 No. / RAM Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	A3 ▭ 11"x7"	B4 ▭	8 1/2"x14"	F4 ▭	A4 ▭	8 1/2"x11"	B5 ▯, A4 ▯, 11"x8 1/2"	A5 ▯
Bit in 08004F(H)	0: 4/3	1: 4/3	0: 8/7	1: 12/11				
Bit in 080050(H)	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 millimeters. The factory setting of the reduction ratio is 4/3.

(with standard page memory: 1.128 MB)

Copy Paper Type	Copy Paper Length	Maximum reducable 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	467.5	410	391.6
A3	420	467.5	467.5	452.7
Double Letter	431.8	467.5	467.5	465.6

(with optional page memory for 400 dpi reception)

Copy Paper Type	Copy Paper Length	Maximum reducable 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
A3	420	551.9	474.3	452.7
Double Letter	431.8	551.9	487.8	465.6

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 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 (reduction disabled), the data will not be reduced. However, if the incoming page is up to x mm longer than the copy paper, the excess portion will not be printed. The value of x can be from 0 to 15 mm. It is determined by the setting of RAM address 080051.

Hex value	Value of x
00	0
01	1
and so on until	
OF	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.

2.7.9. Page Size Selection

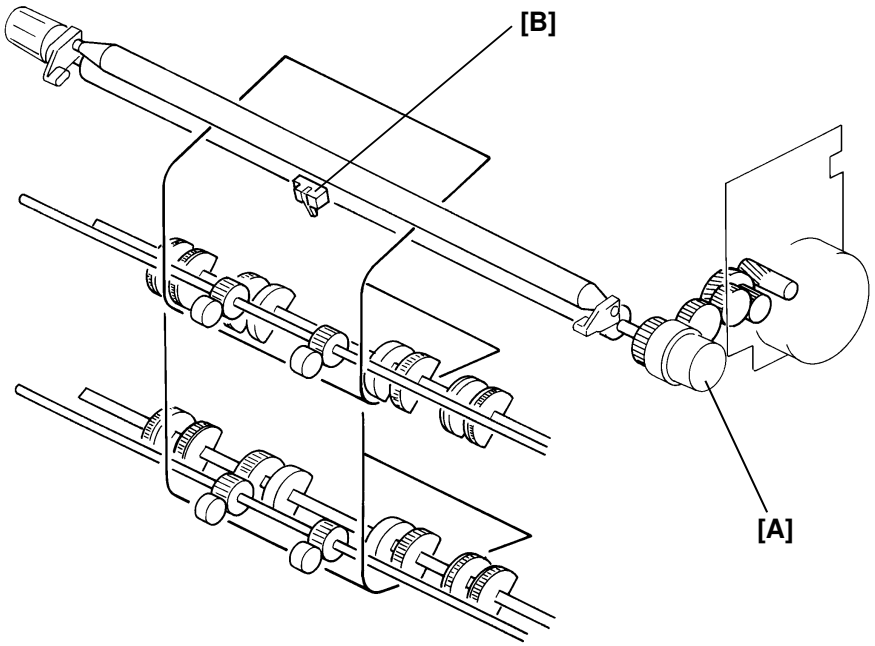
If there are two cassettes more in the machine, the paper size to use is decided in accordance with a few simple rules.

- If two cassettes contain the same paper size, the upper 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.

Recv'd Fax message size	A3	B4	A4	A4	B5	A5	11"x17"	8.5"x11"	11"x8.5"	8.5"x14"
Selected Paper Size	A3	B4	A4	A4	B5	A5	11"x17"	8.5"x11"	11"x8.5"	8.5"x14"
	A4 S	A3	A4 RO	A4 RO	B4	A4	A3	A4	8.5"x11" RO	8.5"x11" S
	A4 S,RO	11"x17"	11"x8.5"	A3 RO	A4	A4 RO	11"x8.5" S	11"x8.5" RO	A4	11"x8.5" S,RO
	8.5"x11" RE	B5 S	8.5"x11" RO	11"x17" RO	A4 RO	8.5"x11"	8.5"x11" S,RO	A4 RO	A4 RO	A4 S
	11"x8.5" S	B5 S,RO	A3	11"x8.5" RO	11"x8.5"	11"x8.5" RO	A4 S	A3 RO	A3	A4 S,RO
	B4 S,RO	A4 S	11"x17"	8.5"x11"	8.5"x11" RO	11"x14"	A4 S,RO	8.5"x14"	11"x17"	B4
		A4 S,RO	B4 RO	8.5"x14"	A3	B5	B4 S,RO	11"x17" RO	B4 RO	A3
		11"x8.5" S	8.5"x14" RO	B4	11"x17"	B4	8.5"x14" S,RO	B4	8.5"x14" RO	11"x17"
		8.5"x11" S,RO		A5 S	8.5"x14" RO	A3		A5 S		A5 S
		8.5"x14" S,RO		B5 S		11"x17"		B5 S		B5 S

- The sizes in the top row have top priority, and those in the bottom row have lowest priority.
- S: The data has to be separated and printed on more than one page.
- RE: The data is reduced to fit on the printer paper.
- RO: The data is rotated to fit on the printer paper.
- If Specified Cassette Selection has been switched on, messages from specified senders will always go to the second cassette, regardless of the paper size or message size.

2.8. REGISTRATION

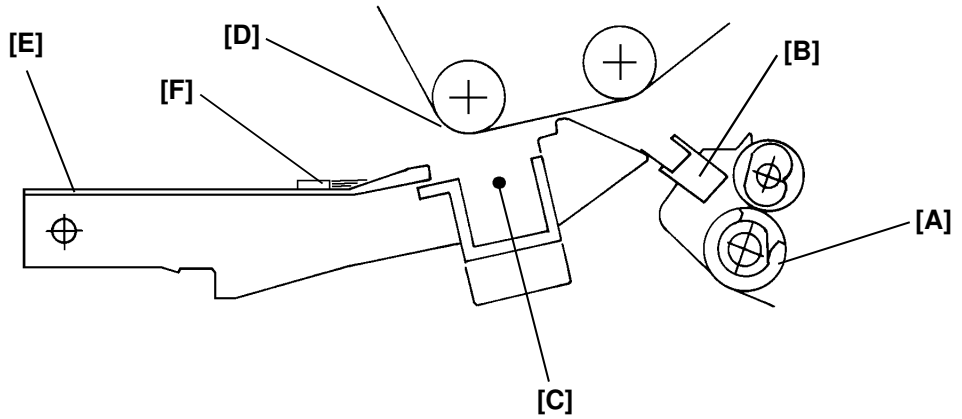


The registration clutch [A] is located on the lower registration roller shaft. The registration sensor [B] is positioned just before the registration rollers.

When the paper leading edge activates the registration sensor, the registration clutch turns off and the registration rollers do not turn. The relay roller clutch stays on for 230 milliseconds after the registration clutch is off. The registration clutch then turns on to feed the paper.

This delay allows time for the paper to press against the registration rollers and buckle slightly to correct skew.

2.9. TRANSFER AND SEPARATION



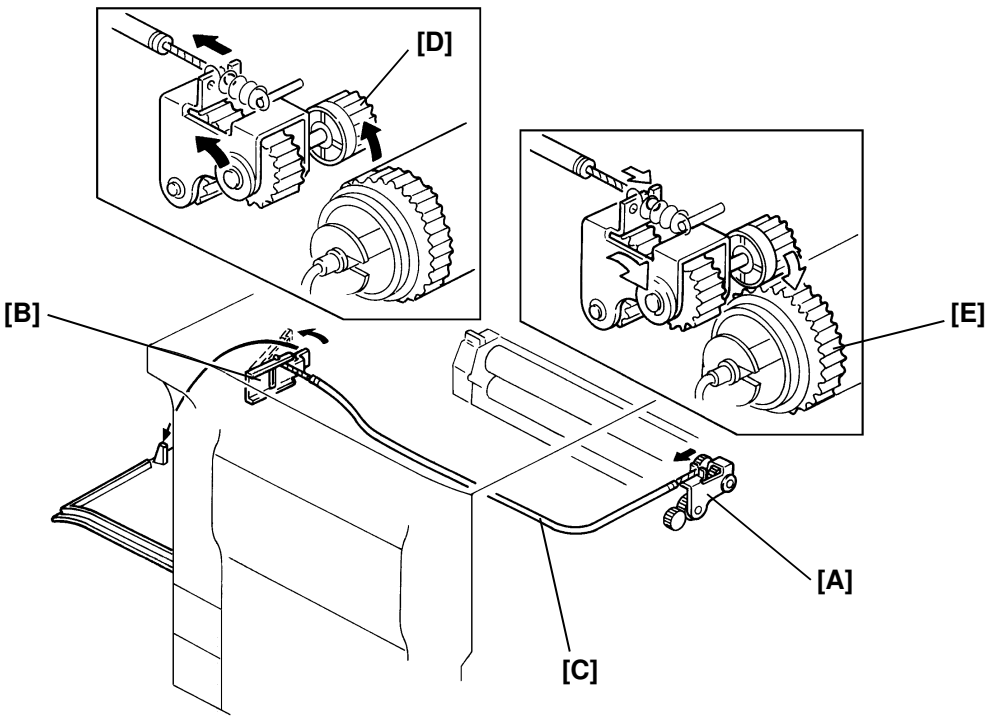
The registration rollers [A] feed the copy paper through the transfer entrance guide [B] to the transfer section. A high positive voltage (+5.1 kV) is applied to the transfer corona wire [C], and it generates positive ions. They are applied to the copy paper to pull the negative toner off the master belt.

After image transfer, the copy paper drops away from the master belt due to the bend [D] in the master belt. The copy paper is then transferred to the transfer guide [E].

There is a antistatic brush [F] on the transfer guide to remove the excess charge from the copy paper.

2.10. FUSING

2.10.1. Fusing Drive Mechanism

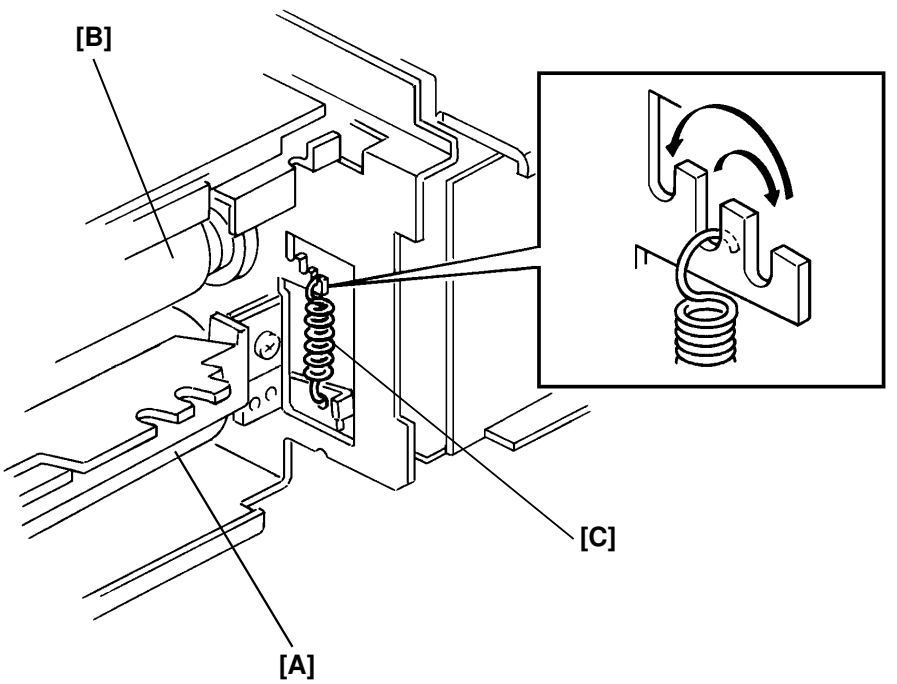


The main motor drives the fusing unit through a gear train.

The joint bracket [A] and the front cover switch lever [B] are connected together with the wire cable [C]. The fusing joint bracket contains the fusing drive gear [D]. When the front cover is closed, the front cover switch lever is pressed and the fusing drive gear with the joint bracket moves against the hot roller gear [E] to drive the hot roller.

When the front cover is opened, the front cover switch lever moves to the front. The joint bracket also moves away from the hot roller gear and releases the fusing drive.

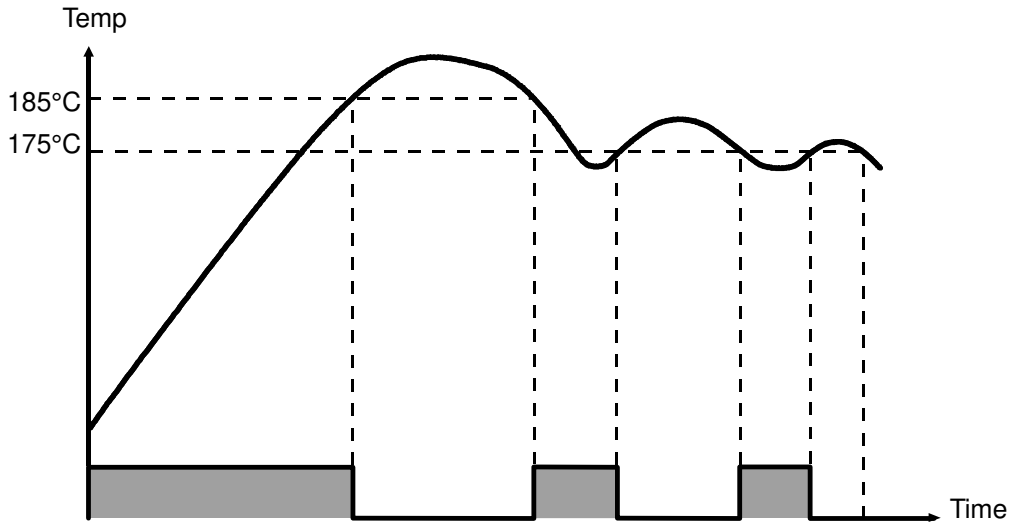
2.10.2. Pressure Roller



The pressure roller [A] is made of rubber with a silicone tube coating. Pressure is constantly applied between the hot roller [B] and the pressure roller. There is no pressure release mechanism.

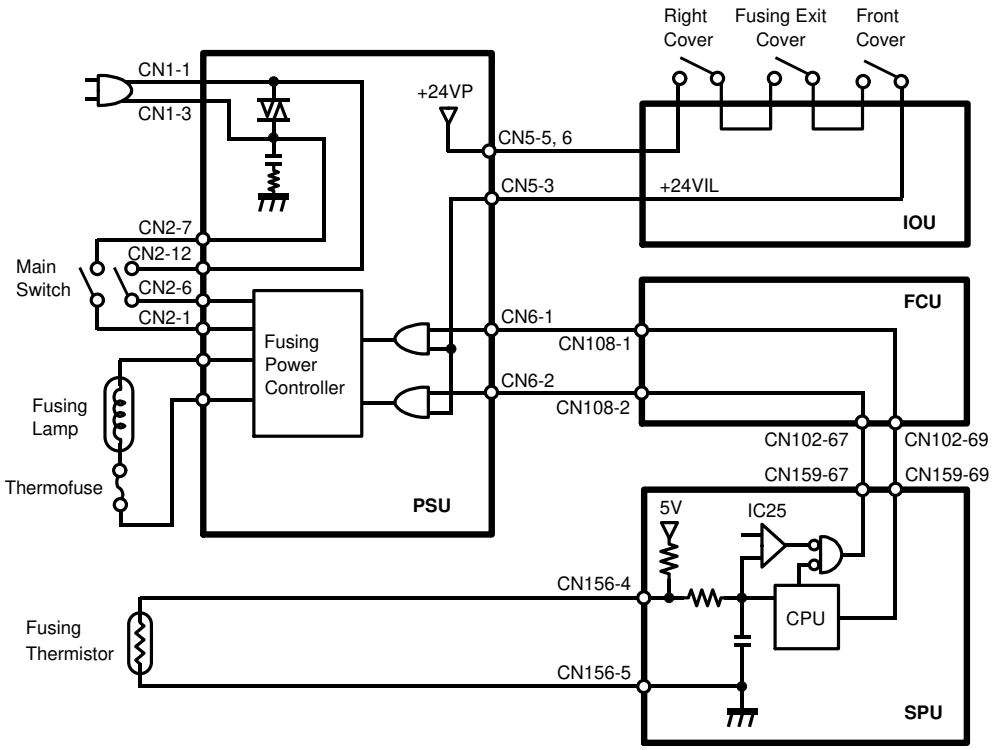
The pressure can be changed by adjusting the position of the pressure springs [C]. The middle position is the normal setting. The higher position increases the pressure (to correct for unfused copies). The lower position decreases the pressure (to correct for creased copies).

2.10.3. Fusing Lamp Control



When the main and operation switches are turned on, the fusing lamp will be switched on. The cpu on the SPU raises the fusing temperature to 185°C within 5 minutes from the time that the switches have been turned on. After 5 minutes, the cpu keeps the temperature at 175°C. The same is done when the Clear Modes/Stand-by key is pressed to enter Standby mode. However, when the operation switch is turned off, the fusing lamp will also be turned off.

2.10.4. Fusing Circuit



The cpu on the SPU controls the fusing lamp. To do so, it monitors the resistance of the fusing thermistor through the comparator (IC25).

To turn on the fusing lamp, the cpu drops CN159-69 from 5 volts to 0 volt. This signal is sent to the Fusing Power Controller on the PSU via the FCU. The Fusing Power Controller then provides the ac power to the fusing lamp.

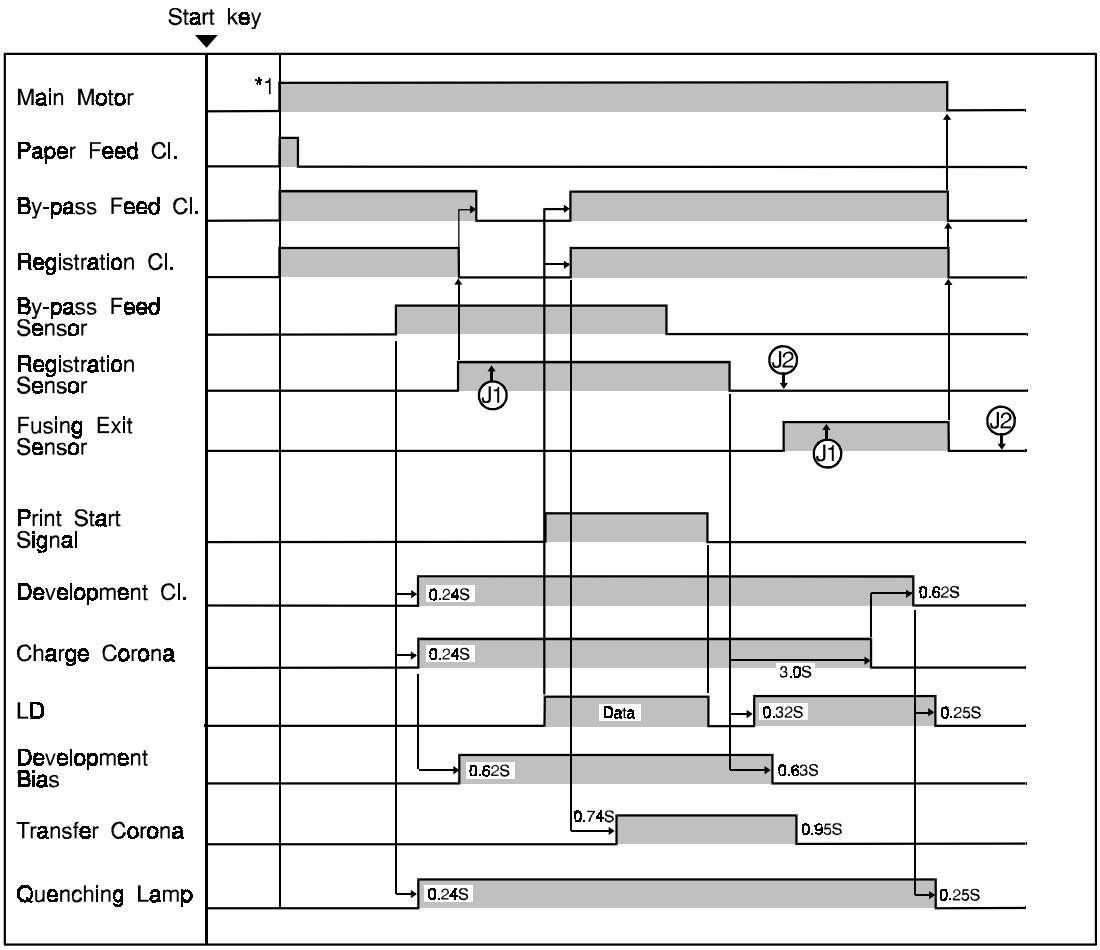
When one of the interlock switches (right cover, fusing exit cover, and front cover switch) is interrupted, the +24 VIL supply for the Fusing Power Controller will be cut and fusing lamp operation is impossible. Fusing lamp operation is also impossible if the thermistor detects a temperature higher than 225°C. At this time, the comparator sends a high signal at CN159-67 to the Fusing Power Controller.

The thermofuse provides back-up protection against overheating. It will open if the temperature of the fuse rises to 169°C. The fusing lamp then turns off.

There are two types of Auto Service Call conditions, as follows. The error code is 9-22.

1. If the thermistor detects a temperature higher than 225°C (sub-code 01).
2. If the temperature takes more than 60 seconds to reach 185°C from power up (sub-code 02).

2.10.5. Paper Feed and Misfeed Detection Timing



*1: The main motor starts rotating at the same time as the scanner home position sensor is interrupted.

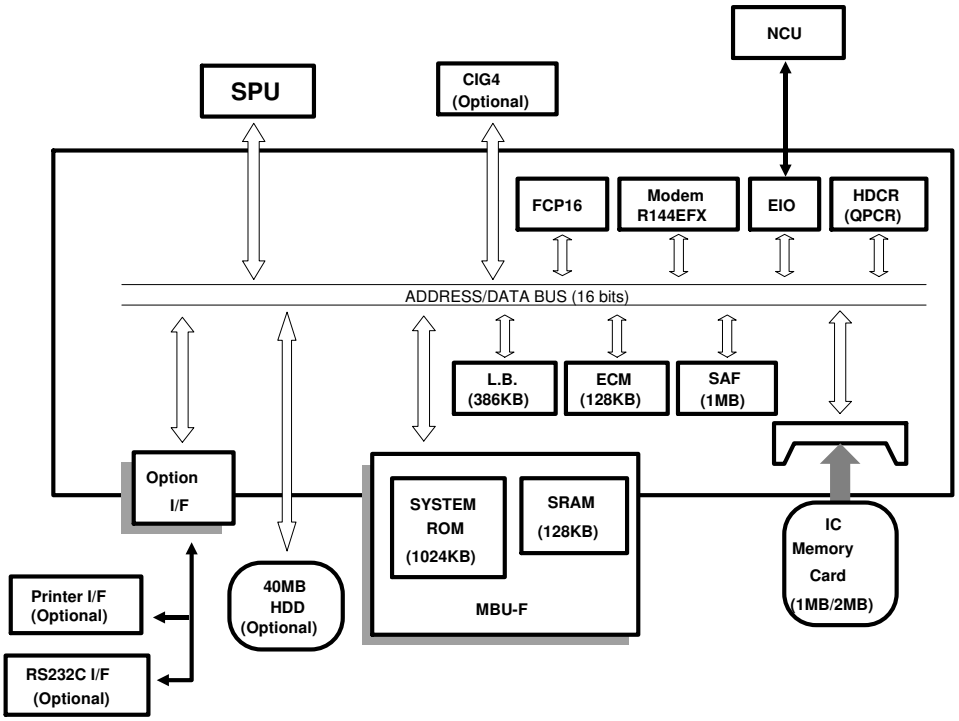
J1: The leading edge of the paper does not reach the sensor within 0.7 seconds after the expected time.

J2: The trailing edge of the paper has not passed the sensor within 0.7 seconds after the expected time.

If a copy jam is detected, the appropriate Misfeed Location indicator on the operation panel will light and the Misfeed indicator will also start blinking.

2.11. PCBs AND THEIR FUNCTIONS

2.11.1. FCU



1. CPU (FCP16)

- Data compression (High speed MH coding for scanning)
- DMA control
- Interrupt control
- Memory interface (DRAM, SRAM, ROM, Optional HDD)
- System clock generation
- HDLC framing
- Real time clock (Battery backed-up)
- Memory and clock back-up control
- Ring detection
- Tone detection
- Operation panel serial interface

2. QPCR

- Data compression and reconstruction (MH, MR and MMR)
- EOL, tag-bit, and fill-bit processing

3. Modem (Rockwell R144EFX)

- CCITT Group 3 communication (V.21, V.33, V.17, V.29, V.27ter)
- HDLC framing
- Tone generation and detection
- Equalization

4. EIO

- NCU control
- Speaker volume control
- Modem equalizer control

5. RAMs

- 1 MB DRAM for SAF (an additional 1MB or 2MB IC card available)
  If an optional hard disk is installed, this DRAM is used as cache memory.
- 512 kB DRAM for ECM (128 kB) and line buffer (384 kB)
- These DRAMs are all battery backed-up.

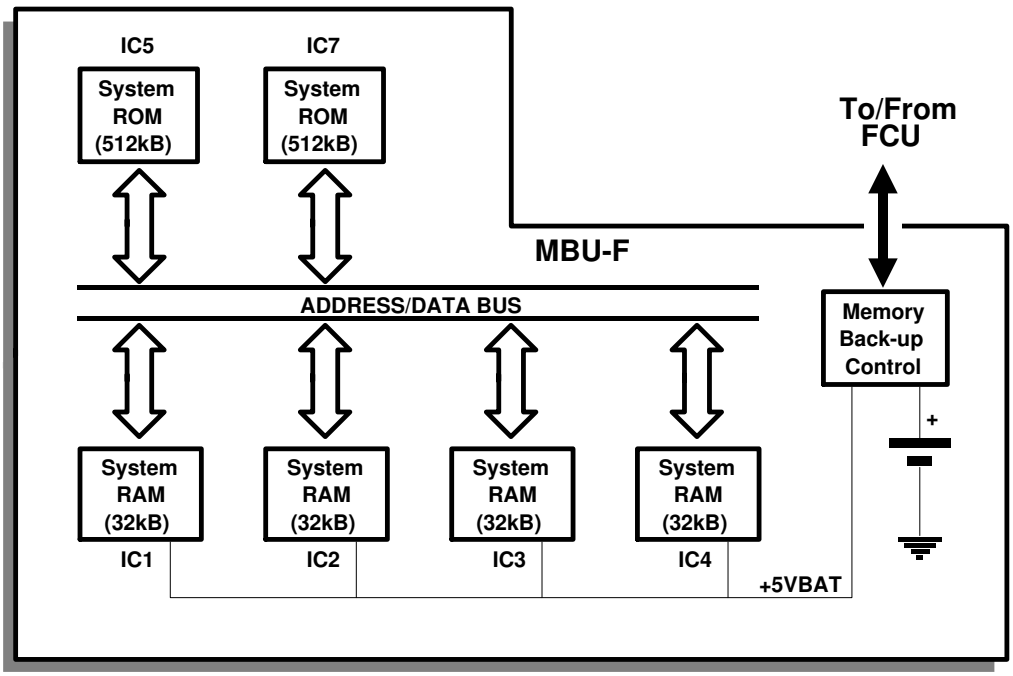
6. Hybrid IC (HIC)

- Filters
- Amplifiers

7. Jumpers and Test Pins

Address	Description
VC1	Variable capacitor for real time clock oscillator adjustment (do not touch this in the field).
TP1	Buzzer output (High)
TP2	Buzzer output (Low)
TP14	+5V input from the PSU
TP15	–12V input from the PSU
TP16	+24VD input from the PSU
TP17	+12V generated in the FCU
TP18	+24VS input from the PSU
TP19	–5V generated in the FCU
TP20	COM1 ground (+5V line)
TP21	COM1 ground (+5V line)

2.11.2. MBU-F



1. System ROMs

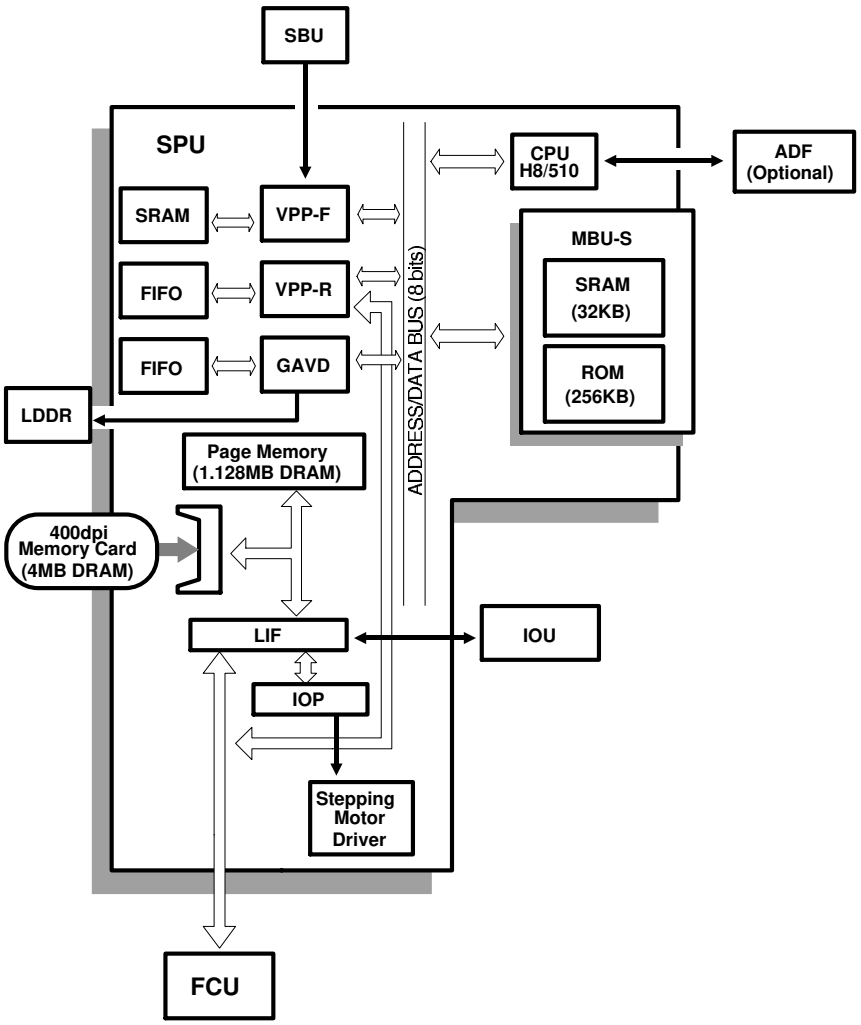
- 512 kB EPROMs contain software to run the machine, except scanner and printer control.

2. System RAMs

- 32 kB SRAMs (128 kB in total) for user/system parameter storage

3. Battery for SRAM back-up

2.11.3. SPU



1. CPU (H8/510)

- AD converter for thermistor and thermosensors
- Asynchronous serial interface to the ADF and the Printer Controller
- Sensor monitoring (through the IOP)
- Drive components control (through the IOP)
- 3-bin sorter control
- Polygon motor control
- LIF control

2. Page Memory

- 1.128 MB DRAM (standard)
- Additional 4 MB DRAM memory card (optional) for 200 x 400 dpi and 400 x 400 dpi reception

3. Stepper Motor Driver

4. Laser Interface (LIF)

- Page memory control
- DMA control
- Smoothing
- Image rotation
- Sub-scan reduction
- Line synchronization
- Scanner motor control
- Laser diode control
- Clock generation for system and polygon motor
- Printer controller interface
- VPP, GAVD, MBU-S, FCU interface

5. VPP-F

- Shading correction
- Gamma conversion
- Main scan zooming (25% - 400%)
- Mirroring
- Main scan line synchronization control
- SBU (CCD) drive signal generation
- Negative/positive processing
- Test pattern generation
- SRAM control
- CPU interface

6. VPP-R

- MTF
- Halftone processing (Error diffusion/Dither)
- Edge detection
- OR processing
- 2 levels (black and white) or 16 levels gray scale output
- Test pattern generation
- FIFO control
- CPU interface

7. GAVD

- Printer clock generation
- Printer margin adjustment
- Printer main scan start position adjustment
- Test pattern generation

- FIFO control
- CPU interface
- Erasing Center/Border

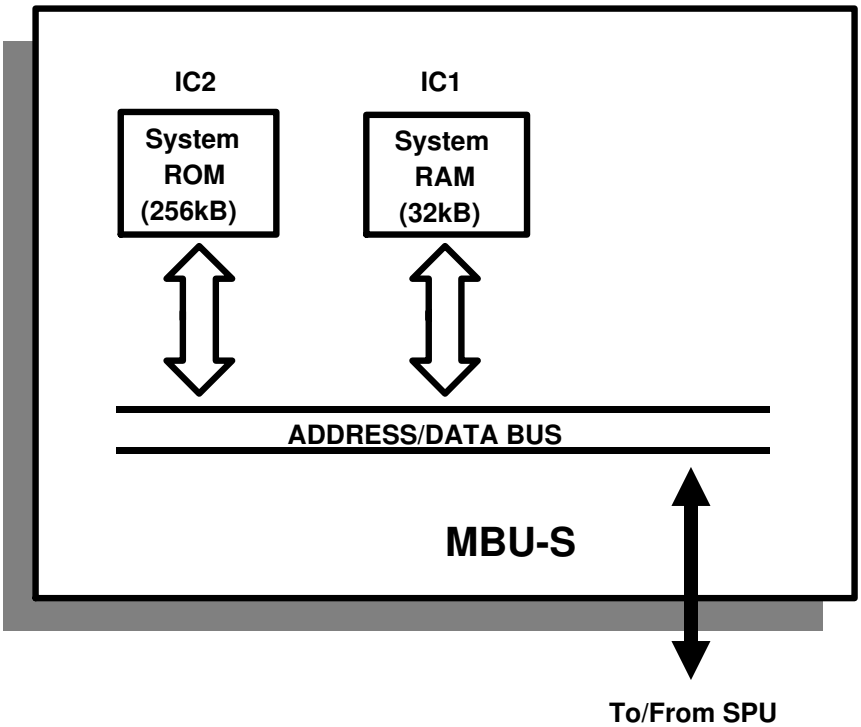
8. IOP

- Serial interface to IOU (sensor status input, device control signals)

9. Jumpers and Test Pins

Address	Description
TP1	5CSGAVD - factory use only
TP2	5CSVPPR - factory use only
TP3	5CSVPPF - factory use only
TP4	5CSLIF - factory use only
TP5	5PEGATE - factory use only
TP6	5PLGATE - factory use only
TP7	XPFGATE (Inverted) - factory use only
TP8	5PMSYNC - factory use only
TP9	–12V input from the FCU
TP10	Reference voltage for LD power control (VREF)
TP11	5SCLOCK - factory use only
TP12	5SLGATE - factory use only
TP13	5SFGATE - factory use only
TP14	5SLSYNC - factory use only
TP15	HREF/ADVRT - factory use only
TP16	Analog video data input
TP17	+24V input from the FCU
TP18	COM3 ground
TP19	-5V input from the FCU
TP20	Video data (VD0)
TP23	COM1 ground
TP24	+5V input from the FCU
TP25	DTVLD - factory use only
TP26	LSYNRB - factory use only
VR1	Variable resistor for VREF adjustment
F1	Fuse for +24V supply to the optional sorter

2.11.4. MBU-S



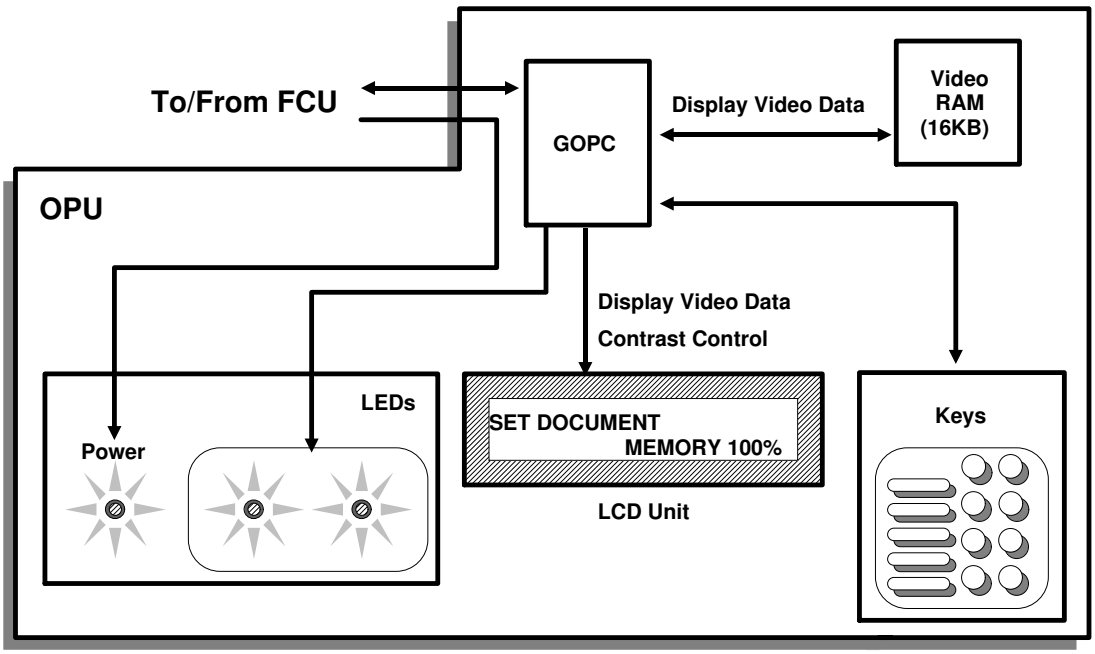
1. System ROM

- 256 kB EPROM contains all the mechanical control software

2. System RAM

- 32 kB SRAM

2.11.5. OP-PORT



1. GOPC

- LCD/LED drive
- Switch scanning
- LCD contrast control

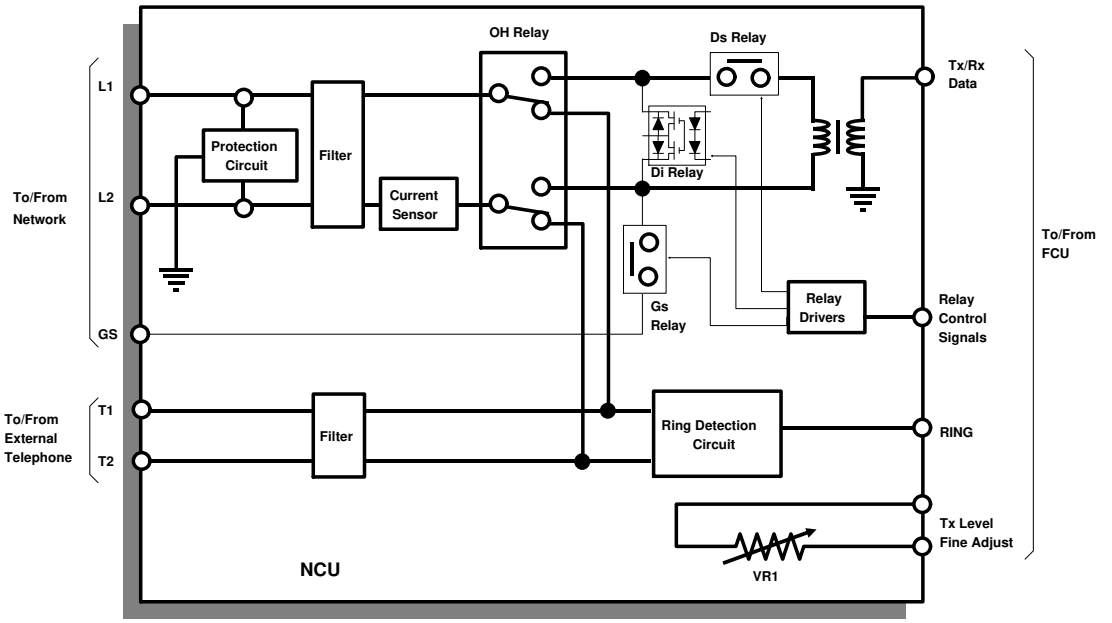
2. LCD

- 48 x 240 dot graphic LCD

3. SRAM

- Video RAM for LCD

2.11.6. NCU - Europe/Asia

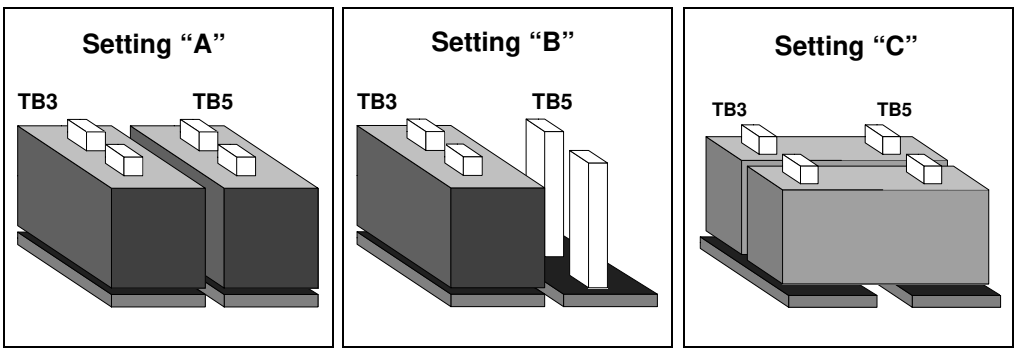


1. Signal and Jumper Settings

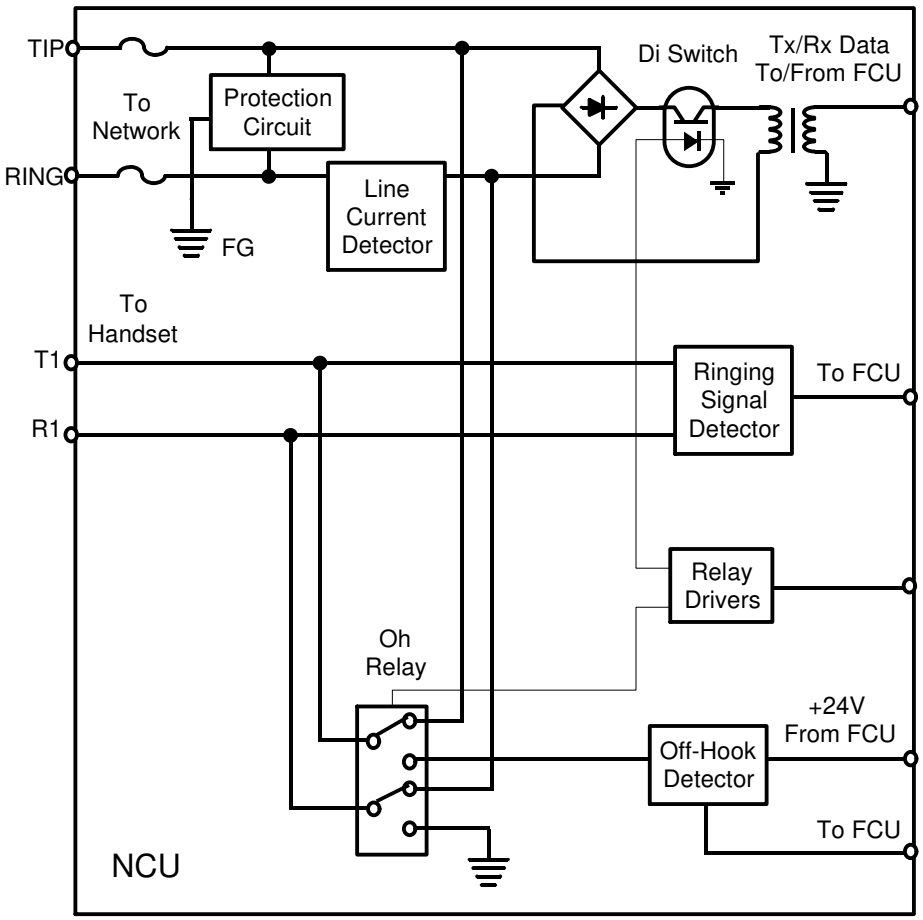
The following table shows the jumper positions for each country, and the status of the relay control signals (CN3-A7, B7 and A8). The country is selected by the Country Code for NCU Parameters (NCU Parameter 00; use Function 09).

	Standby Mode			After Ring Detection			Jumpers and Wires							
	CN-3			CN-3			TB1	TB2	TB3	TB5	TB4	TB7	TB8	TP
Country	A7	B7	A8	A7	B7	A8								2-3
Germany	L	L	L	H	H	L	O	S	A		S	O	S	S
U.K.	L	H	L	H	H	L	O	S	A		S	O	S	S
Italy	H	H	L	H	H	L	O	S	B		S	O	S	S
Austria	H	H	L	L	L	L	O	S	A		S	O	S	S
Belgium	H	H	L	L	L	L	O	S	A		S	O	S	S
Denmark	H	H	L	L	L	L	O	S	A		O	O	S	S
Finland	H	H	L	H	H	L	O	S	A		S	O	S	O
Ireland	H	H	L	L	L	H	O	S	C		S	O	S	S
Norway	L	H	L	L	L	H	O	S	A		S	O	S	S
Sweden	H	L	L	L	L	L	O	S	A		S	O	S	S
Switzerland	L	H	L	L	L	L	S	S	A		O	S	S	S
Portugal	H	H	L	L	L	L	O	S	A		S	O	S	S
Holland	H	H	L	L	L	H	O	S	A		S	O	S	S

	Standby Mode			After Ring Detection			Jumpers and Wires							
	CN-3			CN-3			TB1	TB2	TB3	TB5	TB4	TB7	TB8	TP
Country	A7	B7	A8	A7	B7	A8								2-3
Spain	H	H	L	L	L	L	O	S	B		S	O	S	S
Israel	H	H	L	H	H	L	O	S	A		S	O	S	S
Asia	L	H	L	H	H	L	O	S	A		S	O	S	S
Hong Kong	L	H	L	H	H	L	O	S	A		S	O	S	S
S. Africa	H	H	L	H	H	L	O	S	C		S	O	S	S
Australia	L	H	L	H	H	L	O	S	A		S	O	O	S
New Zea-land	L	H	L	H	H	L	O	S	A		S	O	S	S
Singapore	H	H	L	H	H	L	O	S	A		S	O	S	S
Malaysia	L	H	L	H	H	L	O	S	A		S	O	S	S
Turkey (U.K.)	L	H	L	H	H	L	O	O	A		S	O	S	S
	In Turkey, use the “U.K.” country code, and change NCU parameters manually.													
Key	**H = High; L = Low**						**O = Open; S = Short. For “A”, “B” and “C” in the TB3/TB5 columns, refer to the following diagrams.**							



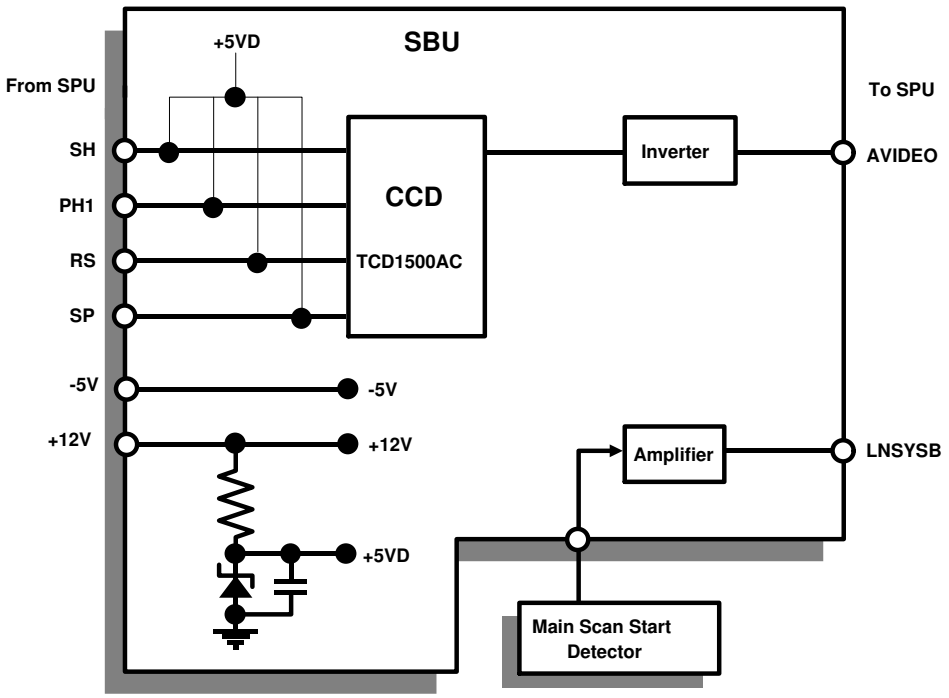
2.11.7. NCU - USA



1. Jumpers and Test Pins

Address	Description
F1	Fuse - 250V; 3.15A
F2	
J1	Jumper
J2	When connecting the machine to a dry line, set the jumper so that the pins #1 and #2 are shorted.

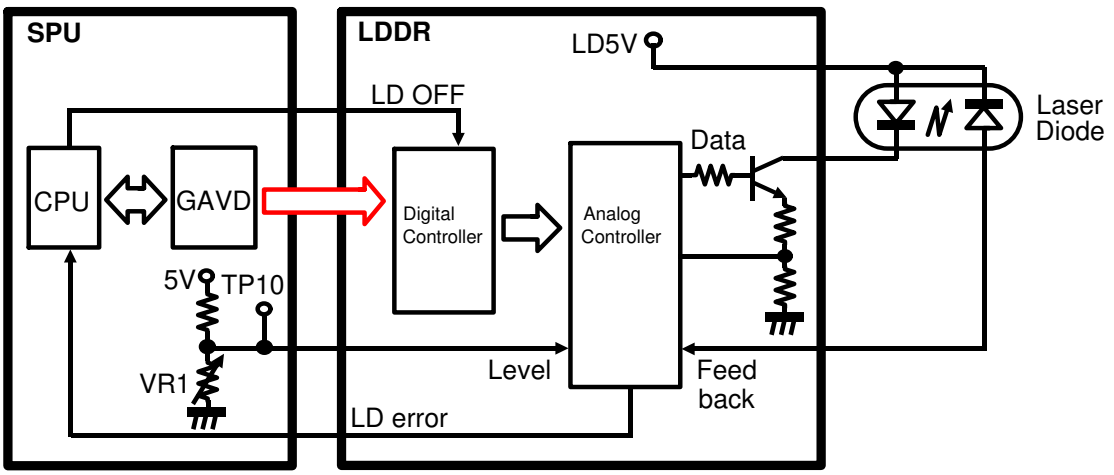
2.11.8. SBU



1. Jumpers and Test Pins

Address	Description
TP1	Frame ground
TP2	Line synchronization signal output to the SPU
TP3	Line synchronization signal input from the LDDR
TP4	CCD analog output
TP5	COM1 ground
TP6	Analog video output from to the SPU
TP7	SH signal from SPU - factory use only
TP8	+5VD generated in the SBU
TP9	-5V input from the SPU
TP10	+12V input from the SPU
TP11	COM1 ground
TP12	+5VD supply test pin
TP13	Frame ground
TP14	RS signal from the SPU - factory use only
TP15	SP signal from the SPU - factory use only

2.11.9. LDDR



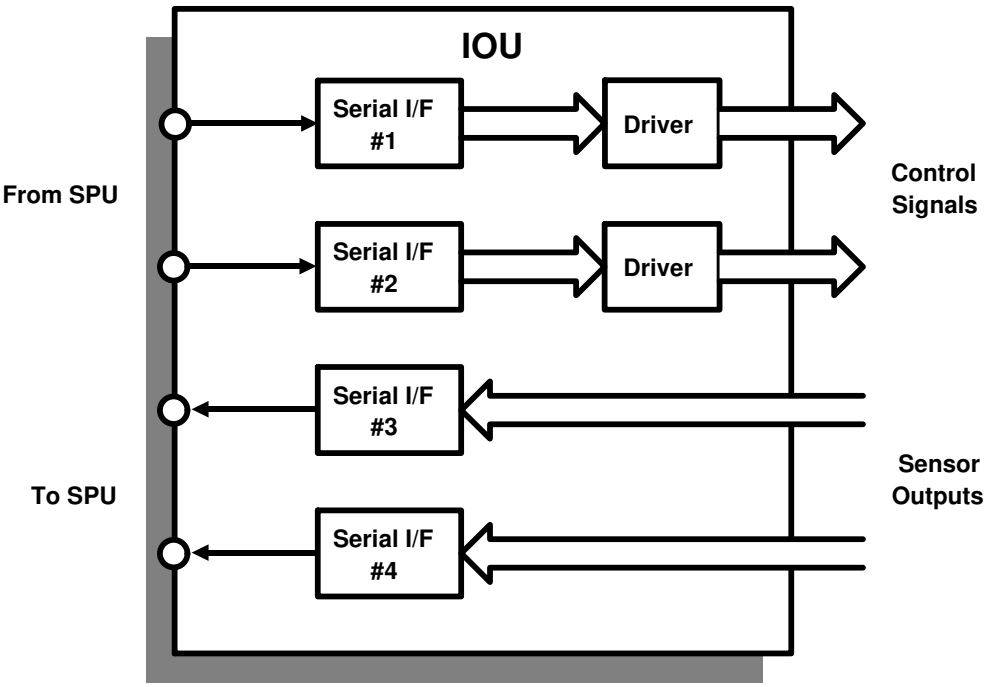
1. Digital Controller - RS5C178

- 5-bit pulse width modulation

2. Analog Controller

- Laser power modulation

2.11.10. IOU



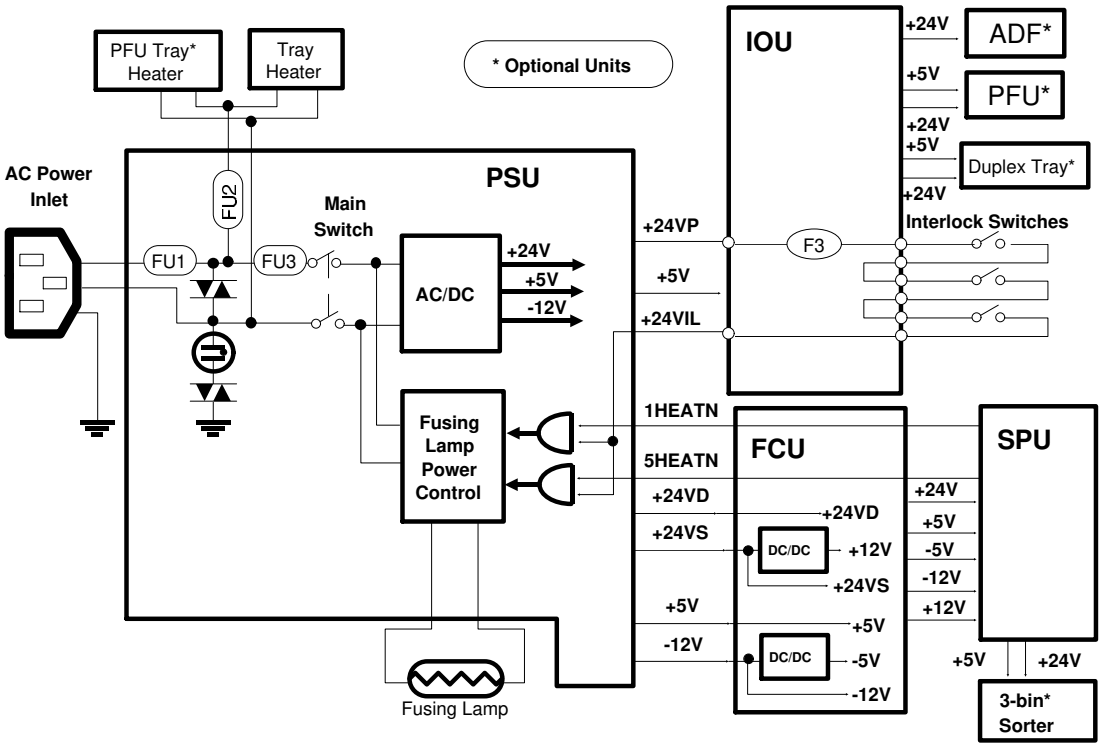
1. EIO

- Serial interface to SPU
- Sensors/Peripherals interface

2. Jumpers and Test Pins

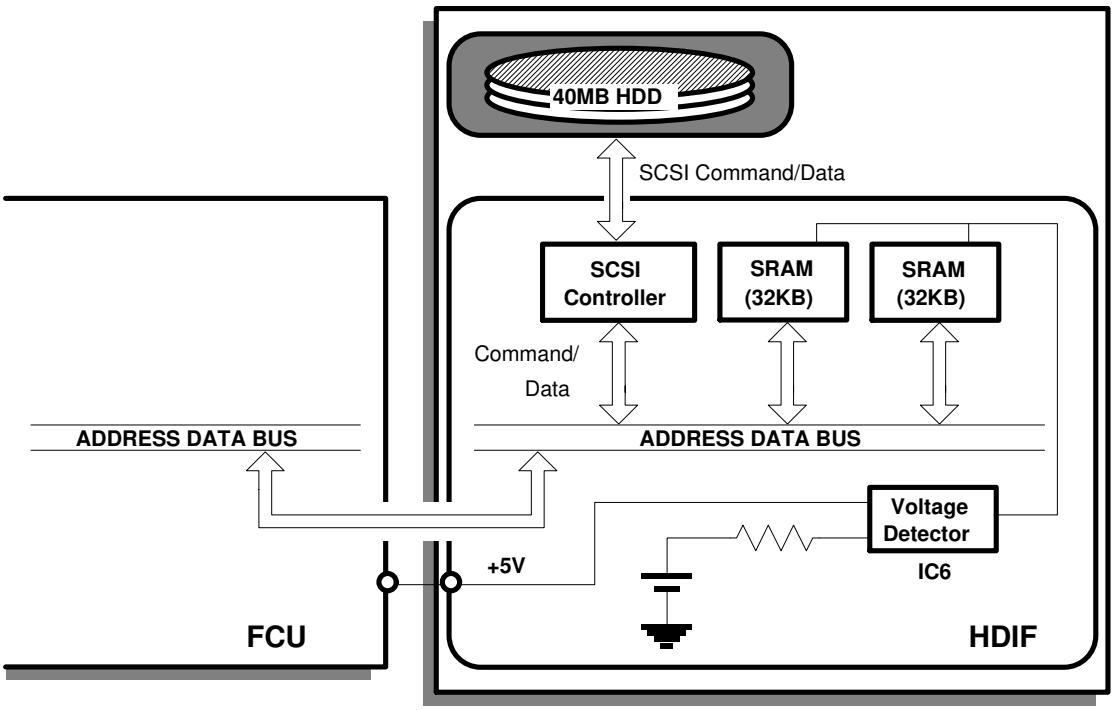
Address	Description
LED1	Lights when +24VIL is coming back from the interlock switches
TP1	+24VIL (Interlock) test pin
TP3	+24VADF (+24V supply to the ADF) test pin
TP4	+5VF (+5V supply for the duplex unit and PFU) test pin
TP5	COM1 ground
TP6	+5V input from the PSU
TP7	+24VP (+24V input from the PSU) test pin
TP8	COM3 ground test pin
F1	Fuse for +24V supply to the ADF
F2	Fuse for +24VP input from the PSU
F3	Fuse for +5VF

2.11.11. PSU



- DC power generation (+24V, +5V, -12V)
- AC power supply to tray heaters
- AC power supply and control to fusing lamp

2.11.12. HDD (Optional)



1. Hard Disk Interface

- SCSI interface μPD72111
- Host interface
- SRAM for storing file attribute information (battery backed-up)

2. Hard Disk Drive

- 40MB SCSI hard disk drive for image data storage

3. Battery for SRAM Back-up

4. Jumpers

Address	Description
TB1	Jumper switch for SRAM back-up battery.

3. INSTALLATION

3.1. ENVIRONMENT

1. Temperature Range:	17°C to 28°C (63°F to 82°F)
2. Humidity Range:	40% to 70% RH
3. Ambient Illumination:	Less than 1,500 lux (Do not expose to direct sunlight.)
4. Ventilation:	- Minimum space 20 m^3 - Room air should turn over at least 30 m^3/hr/person
5. Ambient Dust:	Less than 0.15 mg/m^3 (4 x 10^{-3}oz/yd^3)

6. If the place of installation is air conditioned or heated, place the machine as follows:

   a) Where it will not be subjected to sudden temperature changes.

   b) Where it will not be directly exposed to cool air from an air conditioner in the summer.

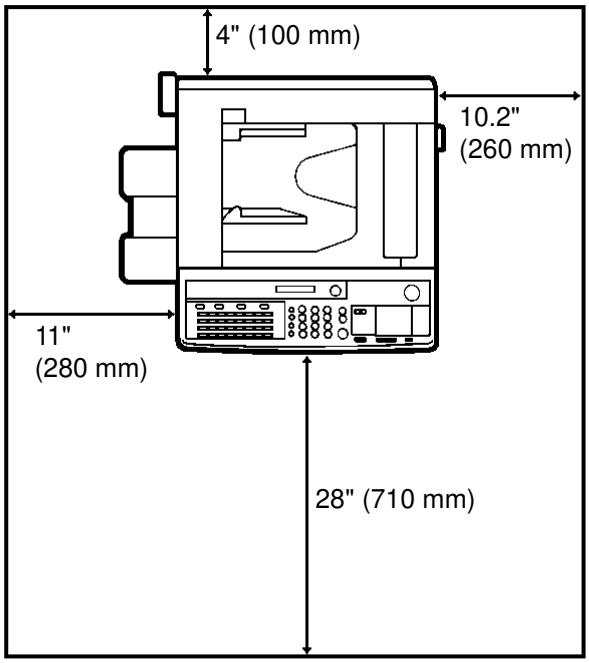
   c) Where it will not be directly exposed to reflected heat from a space heater in winter.

7. Avoid placing the machine in an area filled with corrosive gas.

8. Avoid any area where the machine may be subject to frequent vibration.

3.2. SPACE REQUIREMENTS AND MACHINE LEVEL

3.2.1. Space Requirements



Note: A space of at least 4" (10 cm) at the rear of the machine is necessary for smooth air inlet into the machine.

3.2.2. Machine Level

1. Front to back: Within 5 mm (0.2") of level
2. Right to left: Within 5 mm (0.2") of level

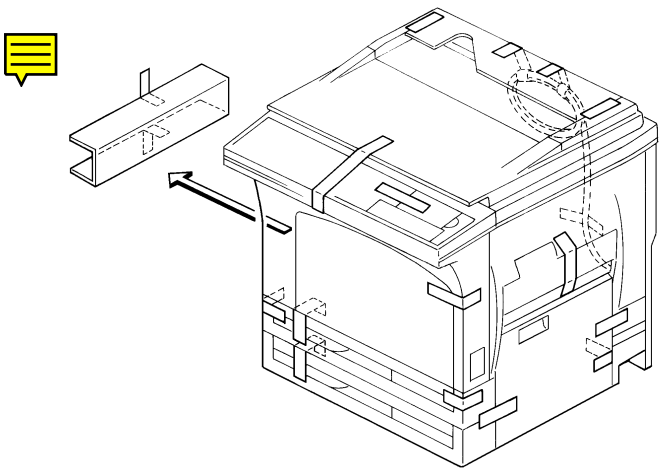
3.3. POWER REQUIREMENTS

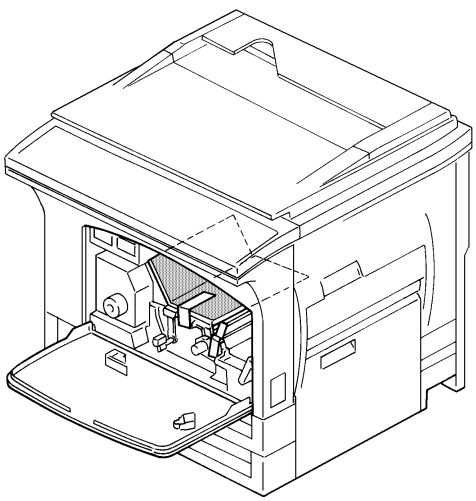
1. Input voltage level: 115 V / 60 Hz: More than 12 A
   220 ~ 240 V / 50 Hz: More than 8 A
2. Permissible voltage fluctuation: ±10%
3. Extension cord: Not recommended
4. Make sure that the wall-outlet is near the machine and easily accessible.
   - Be sure to ground the machine. (Ground it to the ground terminal of the power outlet.)
   - Make sure the plug is firmly inserted in the outlet.
   - Avoid multi-wiring.
5. Do not set anything on the power cord.

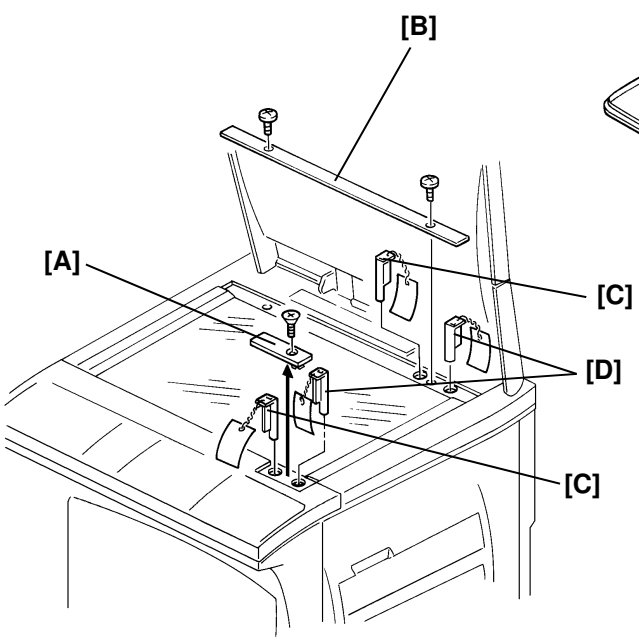
3.4. INSTALLING PROCEDURE

3.4.1. Main Installation Procedure

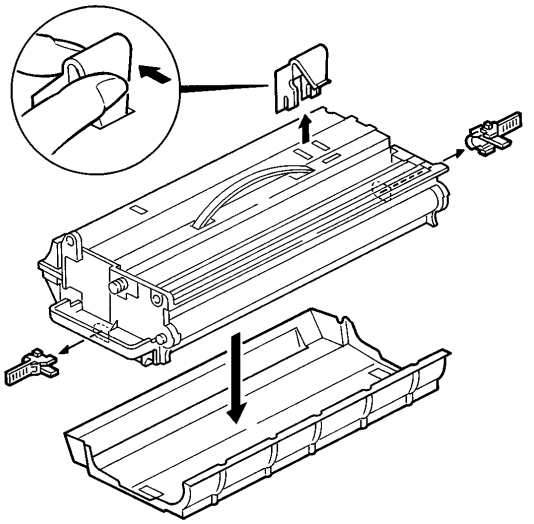
Note: Keep the shipping retainers after installing the machine.
They will be reused if in the future the machine is transported to another location.
Proper reinstallation of the shipping retainers is required in order to avoid any transport damage.



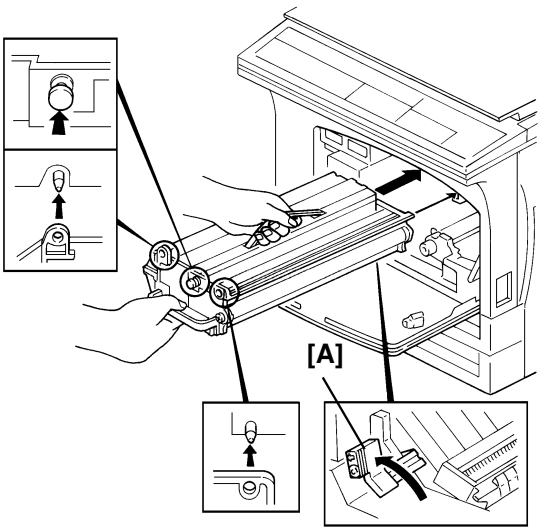




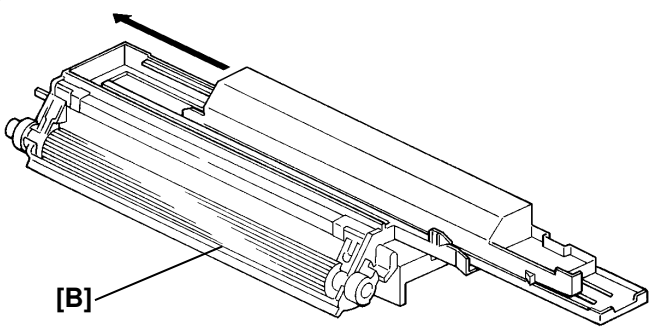
Remove items [A] to [D].
[A]: 1 screw
[B]: 2 screws
Shipping retainers **[C]** and **[D]**
[C]: Black
[D]: Red



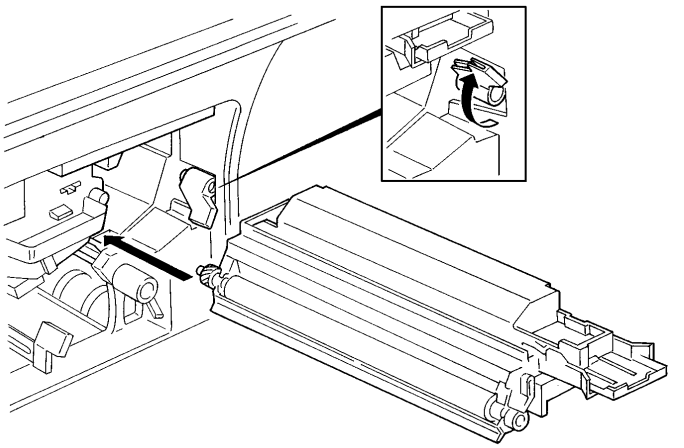
Note: Do not touch the master belt and avoid exposing it to light.

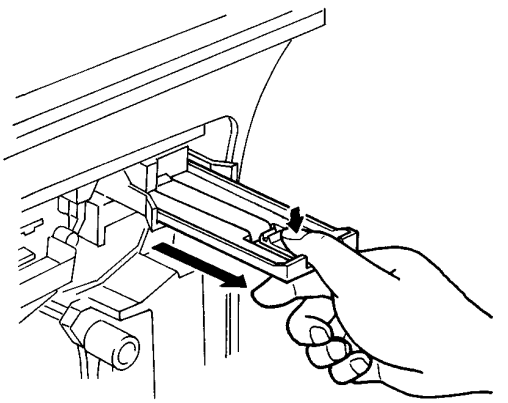


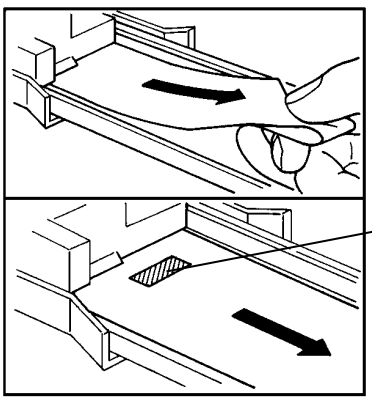
Lower the transport guide by turning the C1 lever [A] to the left before inserting the master unit.



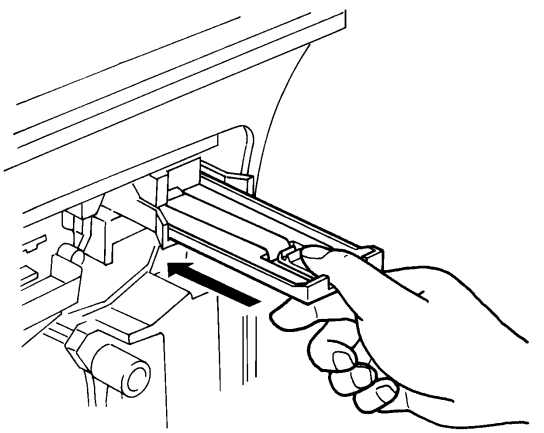
Note: Do not touch the development roller [B].

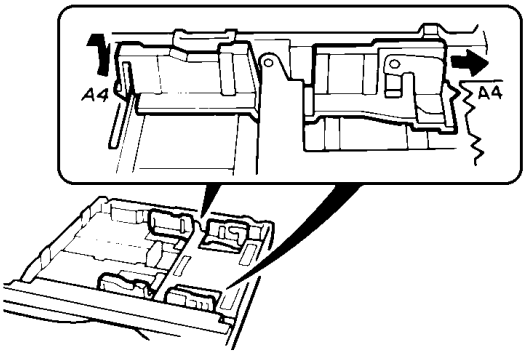


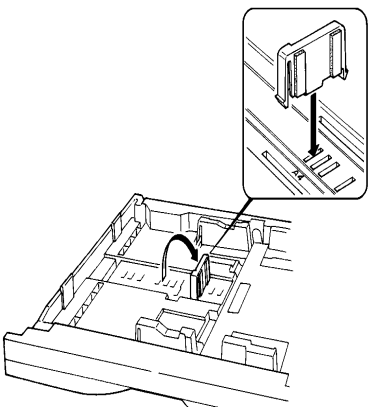


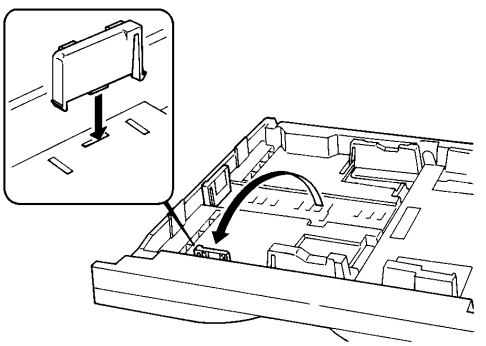


Pull the seal until you see the mark [A].

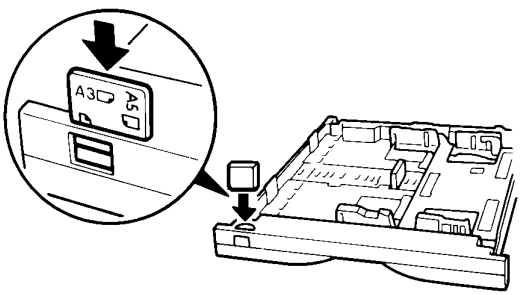


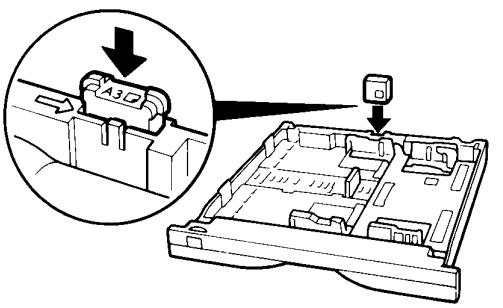






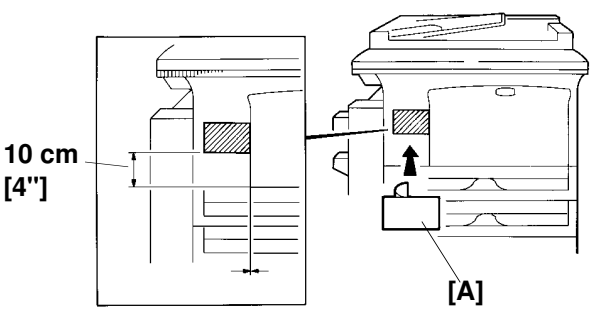
A3 paper only



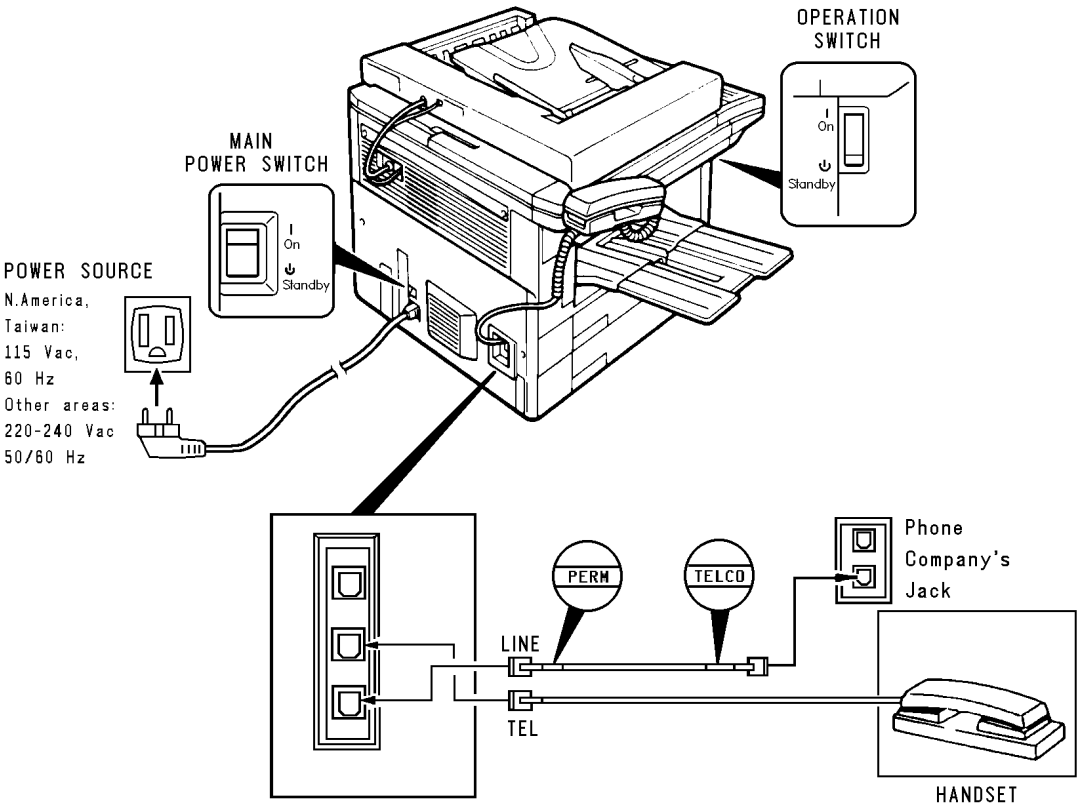


Adjust the cassette side fences in accordance with customer requirements, as illustrated above.

- OEM Versions Only -



Attach the brand name decal [A] which is included in the brand kit as shown above.

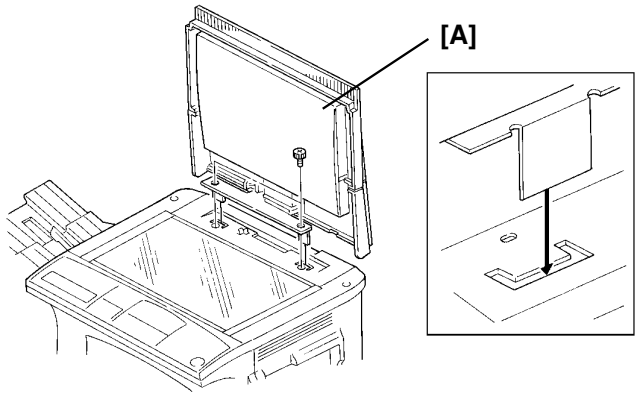


After setting up the machine, perform the following items.

- Clock Adjustment (User Function 92)
- RTI, TTI, CSI Setting (User Function 61; CSI is also Service Function 19 in some countries)
- Telephone Line Type (Service Function 20)
- Service Station Telephone Number (Service Function 14)
- Country Code Setting (Bit Switch 0F)
- Country Code Setting (NCU Parameter 00, Service Function 09; RAM Address 080301, Service Function 06)
- NCU Jumper Settings
- Copy Quality Check
- Fax Communication Check
- Install the operation panel decal from the language kit.

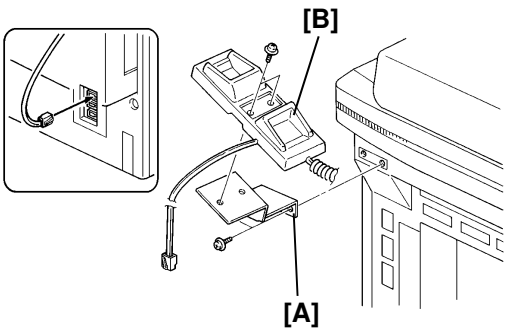
Note: Print out the values of the image adjustment settings (RAM addresses 080400(H) ~ 0805FF(H); use Service Function 06) and tape them under the operation panel. These values will be needed if a RAM clear has to be done at a later date, and the settings are identical for each machine.

3.4.2. Platen Cover (Option)



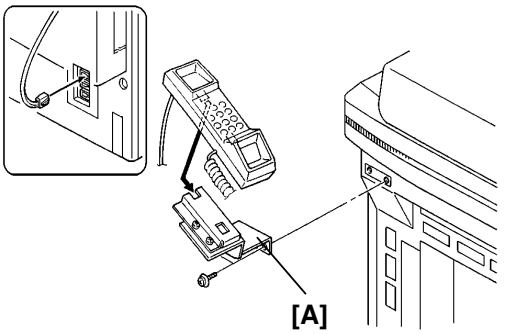
[A]: 2 screws

3.4.3. Handset (Option)



(USA version)

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

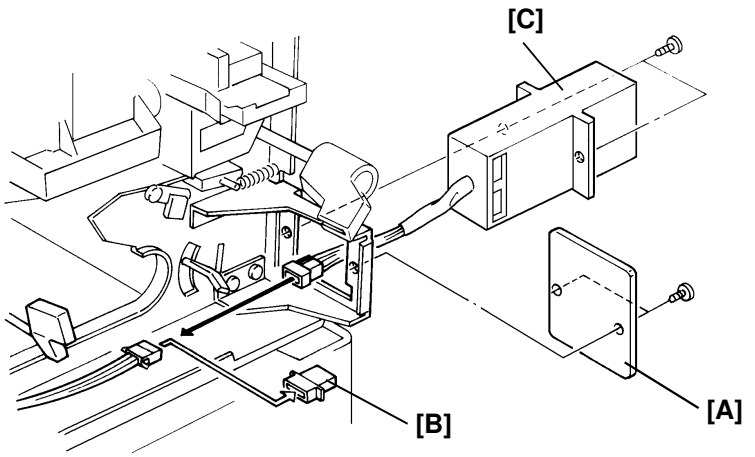


(Europe version)

[A]: 2 screws

3.4.4. Key Counter (Option)

Remove the operation panel and the front cover first (see section 5.1).

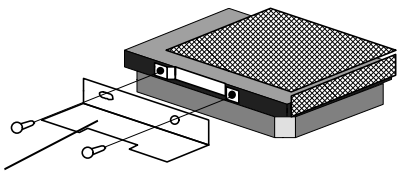


[A]: 3 screws
[C]: 2 screws

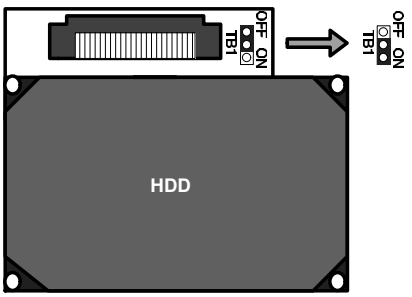
3.4.5. 40MB Hard Disk (Option)

Note: If a printer interface unit or G4 board are installed, remove them before doing the following procedure.

Caution: Make sure that 100% is displayed on the operation panel before installing a hard disk, or data may be lost.



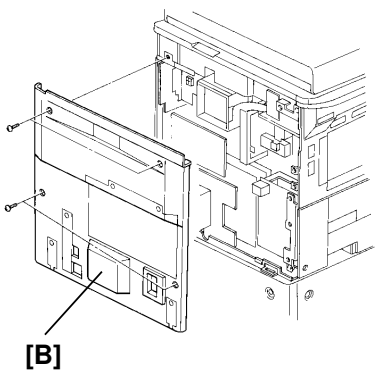
1. Attach the bracket [A] to the hard disk unit (2 small screws), and change the TB1 jumper setting to the ON position.



Caution: The initial setting of TB1 is at the OFF position.
If the TB1 setting is OFF, data stored in the Hard Disk will be lost whenever the machine's main switch is turned off.

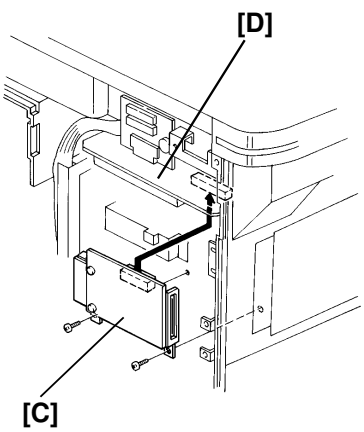
2. Set bit 0 of bit switch 0D to "1".
3. Turn off the main switch, and unplug the machine from the wall socket.

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



4. Remove the rear cover [B] (4 screws).
5. Connect the hard disk [C] to CN 101 on the FCU [D].

   Note: Make sure the hard disk connector is plugged into the FCU connector correctly.



6. Tighten the two screws that secure the hard disk.
7. Put back the rear cover [A] (4 screws).
8. Plug the machine into the wall socket and turn on the main switch.
9. Enter the service mode and format the hard disk (function 17).

Caution: Do not turn off the switch until format is completed. Formatting the hard disk takes about 10 minutes.

10. Print the system parameter list and make sure that the Total Memory Size indicates “HD”.

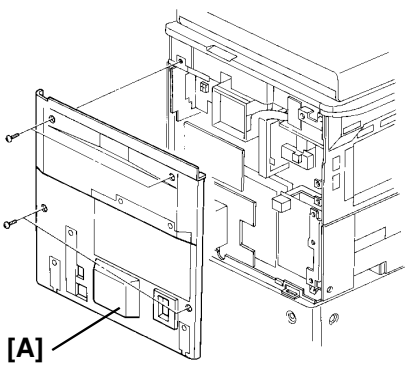
11. Go to the standby mode and make sure that the remaining memory indicator shows “100%”.

3.4.6. Memory Board for 400 dpi Reception (Option)

1. Turn off the main switch, and unplug the machine from the wall socket.

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

2. Remove the rear cover [A] (4 screws).

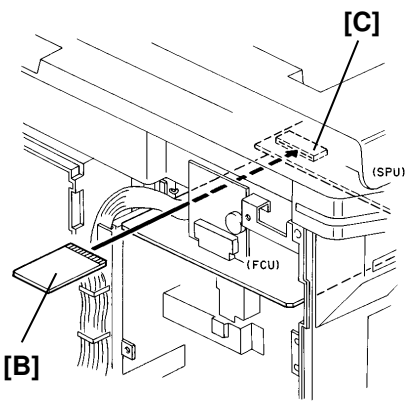


3. Plug the 400dpi card [B] into connector CN160 [C] on the SPU.

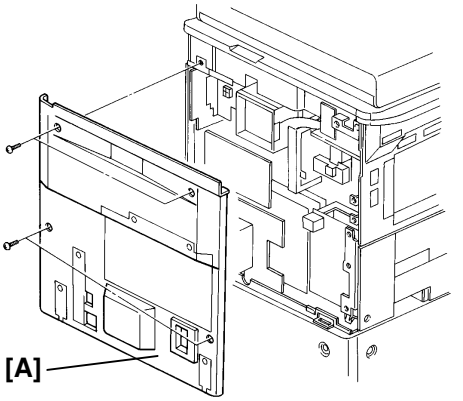
4. Put back the rear cover (4 screws).

5. Plug the machine into the wall socket and turn on the main switch.

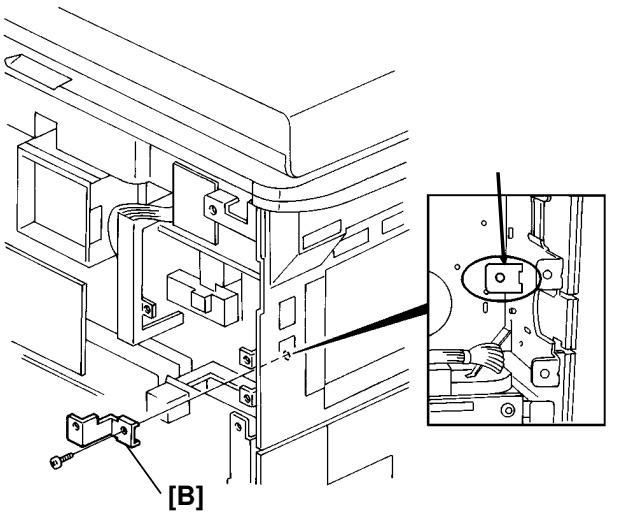
6. Make sure that bit 7 of RAM address 0800E5(H) is set to “1”.



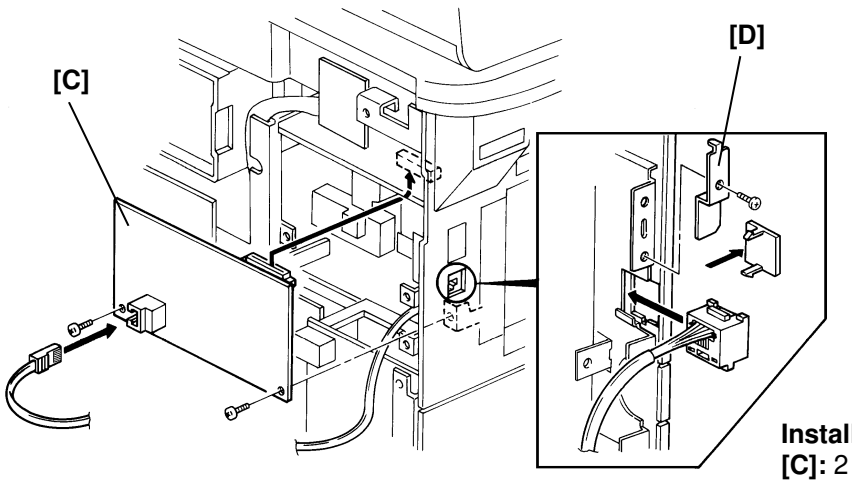
3.4.7. ISDN-G4 Board (Option)



[A]: 4 screws



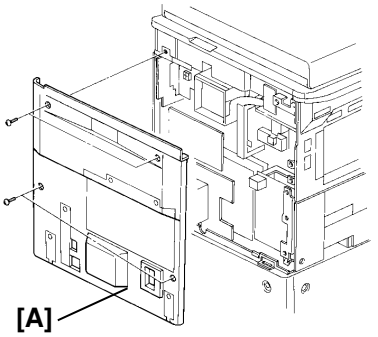
Install [B]: 1 screw

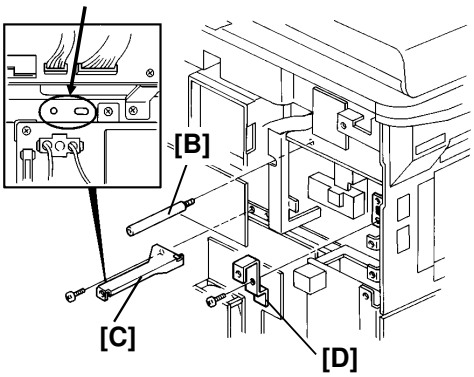


Install [C] and [D].
[C]: 2 screws, 1 connector
[D]: 1 screw

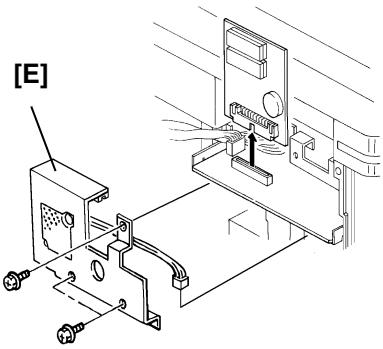
After the hardware installation, program the G4 parameter switches, internal switches, and ISDN service modes as explained in the service manual for the G4 kit.

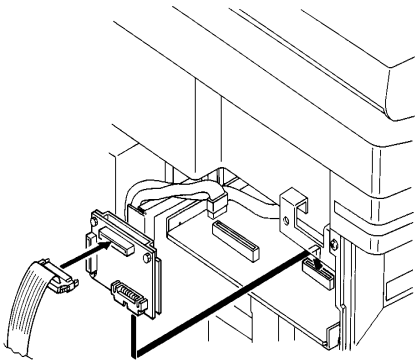
3.4.8. Printer Interface Board (Option)



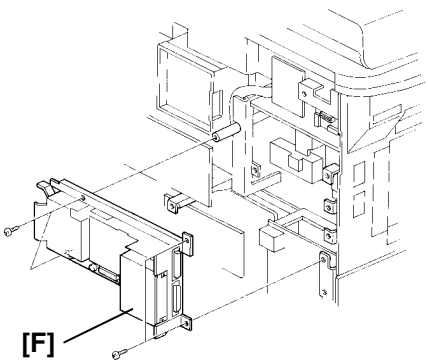


Install [B], [C] and [D]





[USA/Taiwan]



[A]: 4 screws

[B]: 1 screw

[C]: 1 tapping screw

[D]: 1 screw

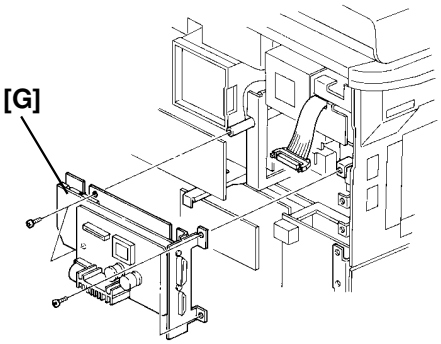
[E]: 3 screws, 1 connector

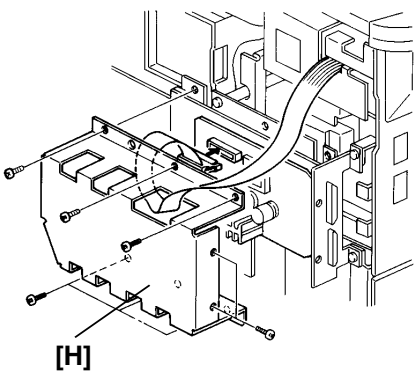
[F]: 4 screws, 1 connector

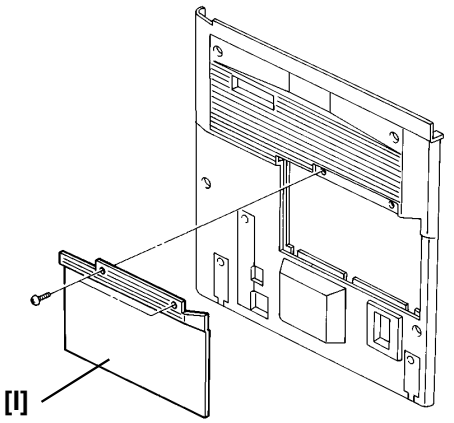
[G]: 3 screws

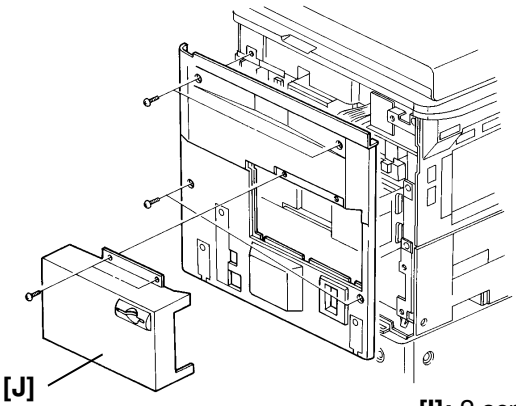
[H]: 8 screws

[Other countries]





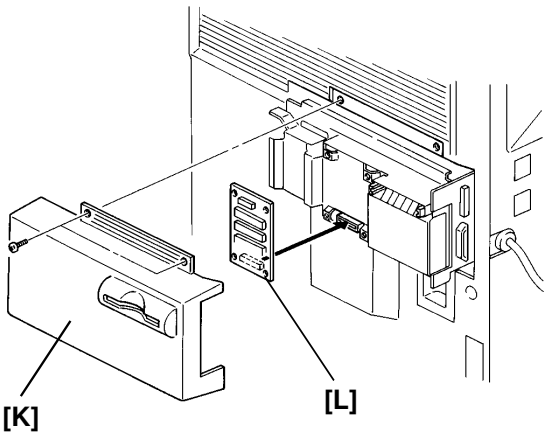




[I]: 2 screws

[J]: 2 screws

Optional memory installation (USA only)



[K]: 2 tapping screws

[L]: 4 screws

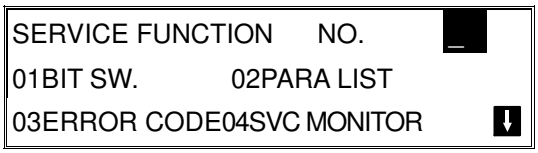
4. SERVICE TABLES AND PROCEDURES

4.1. SERVICE LEVEL FUNCTIONS

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

Function 6 0 1 9 9 1

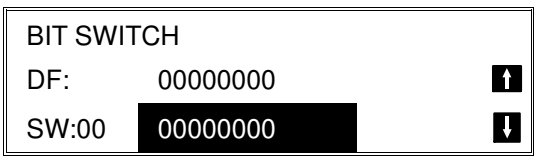
then immediately **Yes**



To exit service mode, press **Function**

4.1.1. Bit Switch Programming (Function 01)

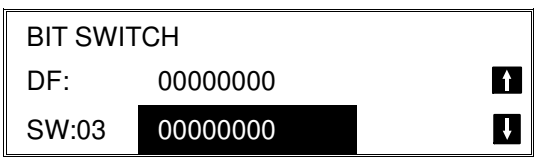
1. After entering service mode, press **0** **1**



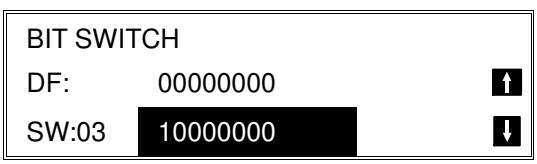
Bit 7 is displayed at the left, and bit 0 at the right. The default settings are shown on the top line, and the current settings on the bottom.

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**

4.1.2. System Parameter List (Function 02)

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

G3 SYSTEM PARAMETER LIST PRESS "START"

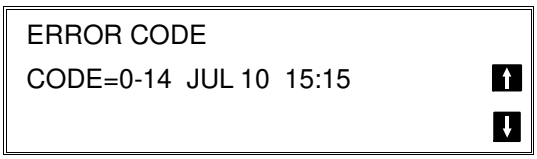
2. **Start**

Refer the following table for the meaning of each counters in the list.

Counter Name	Meaning
SCN Counter	Scanned page counter (sum of fax transmission, copying, and scanning OMR sheets)
PRT Counter	Printed page counter (sum of fax reception, copying, printing from printer controller, and printing reports)
TX Counter	Transmitted page counter
RX Counter	Received page counter
PM Counter	Printed page counter used for PM auto service call (the counter value is the same as the PRT Counter)
PM Default	Threshold number of printed pages for PM call. (The default value is 60,000 pages.)
PCU Counter	Master unit counter, which indicates how many pages have been printed with the currently installed master unit. This counter is reset to zero if the master unit is pulled out of the machine after “Used Toner Tank Full” is detected.
SC Counter	Service call counter
CPY Counter	Copied page counter
ADF Counter	ADF counter
DOC. JAM	ADF jam counter
COPY JAM	Jam counter for jams at the registration and relay area
PAPER JAM	Jam counter for jams at the fusing exit
CST 1 JAM	Jam counter for the first paper feed station.
CST 2 JAM	Jam counter for the second paper feed station.
CST 3 JAM	Jam counter for the third paper feed station.
CST 4 JAM	Jam counter for the fourth paper feed station.
BOTH CST JAM	Total of paper feed jams in all paper feed stations
PRN Counter	PC printer output counter
PPC1 Counter	Reserved for future use
PPC2 Counter	Reserved for future use
PPC3 Counter	Reserved for future use
PPC4 Counter	Reserved for future use

4.1.3. Error Code Display (Function 03)

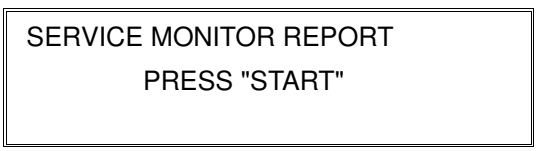
1. After entering service mode, press **0** **3**



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

4.1.4. Service Monitor Report (Function 04)

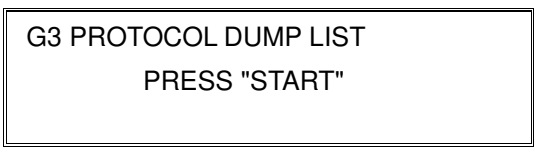
1. After entering service mode, press **0** **4**



2. **Start**

4.1.5. Protocol Dump (Function 05)

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

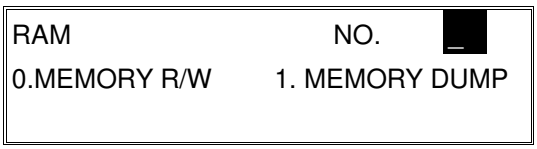


2. **Start**

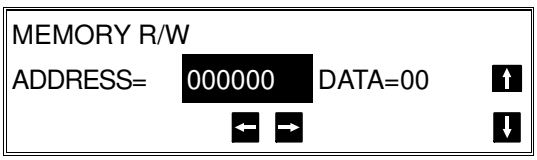
4.1.6. RAM Display/Rewrite/Printout (Function 06)

Note: A list of useful RAM addresses is included later in this chapter.

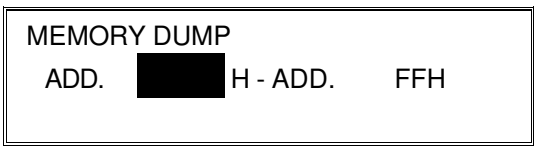
1. After entering service mode, press [0] [6]



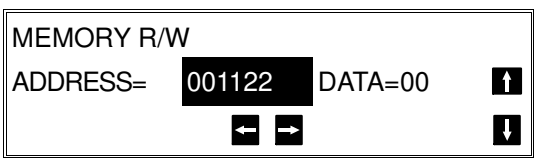
2. Either:
   - Display or rewrite RAM data: [0] Go to step 3.



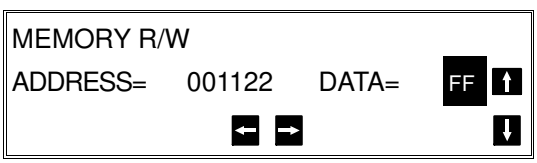
   - Print a RAM dump list: [1]. Go to step 6.



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]

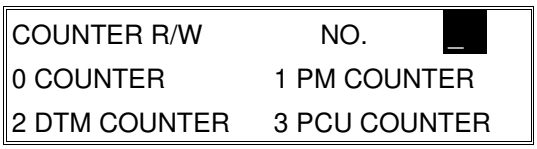


5. Either:
   - View more addresses - [←] then go to step 3.
   - Finish - [Yes] . Go to step 2.

6. Input the range of addresses that you wish to print.
   Example: Addresses 080A00 to 080BFF
   [0] [8] [0] [A] [0] [8] [0] [B] [Start]

4.1.7. Checking the Counters (Function 07)

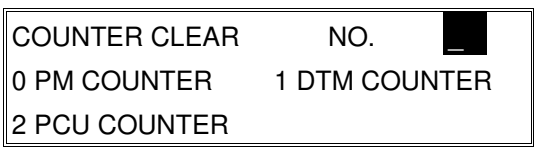
1. After entering service mode, press [0] [7]



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 Development Unit counter: [2]
   - Check the Master Unit 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)

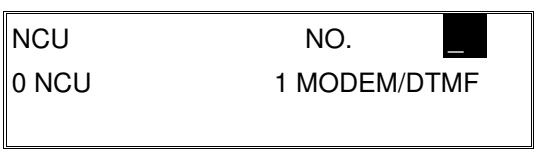
1. After entering service mode, press [0] [8]



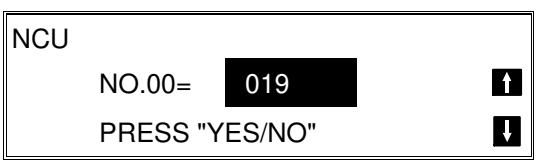
2. Either:
   - Clear the PM counter: [0]
   - Clear the Development Unit counter: [1]
   - Clear the Master Unit counter: [2]

4.1.9. NCU Parameters (Function 09)

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



2. [0]



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

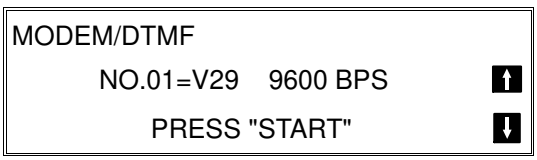
   Enter new values at the keypad where necessary.
   Example: Set NCU parameter 04 to 005.

   [↓] [↓] [↓] [↓] [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 multiplied by -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]



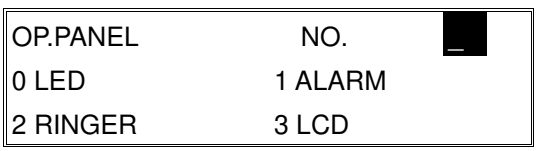
2. Scroll through the available tests using [↑] and [↓] .

   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)

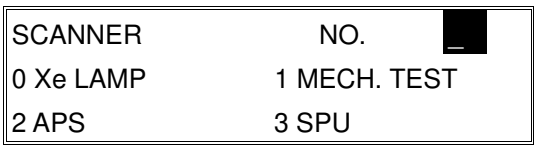
1. After entering service mode, press [1] [0]



2. Either:
   - Test the LEDs on the operation panel: [0] [Start]
   - Test the alarm tone: [1] [Start]
   - Test the ringer: [2] [Start]
   - Test the LCD: [3]
3. To finish a test: [Stop] [Yes]
4. Either:
   - Do another test. Go to step 2.
   - To finish: [Yes]

4.1.12. Xenon Lamp Test (Function 11)

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



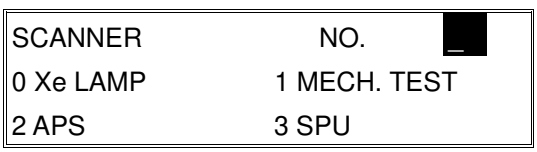
2. [0]

3. [Start]

4. To end the test: [Stop]
5. To return to the main service mode menu: [Yes]

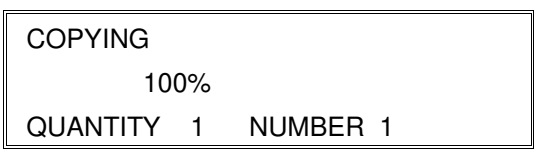
4.1.13. Scanner Mechanism Test - Free Run (Function 11)

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



2. [1]

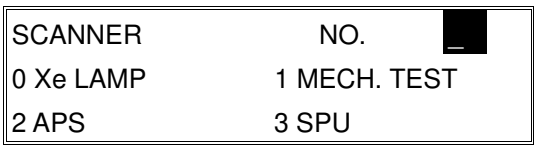
3. [Start]



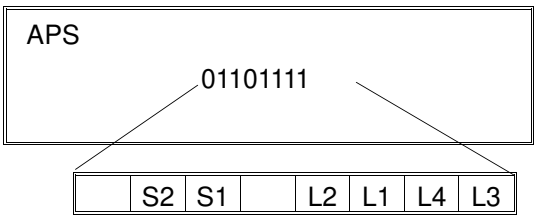
4. To end the test: [Stop]
5. To return to the main service mode menu: [Yes]

4.1.14. Automatic Document Size Sensor (APS) Test (Function 11)

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



2. [2] . The display shows the current status of the original length and width sensors. Refer to section 2.1.3 for the location of these six sensors.



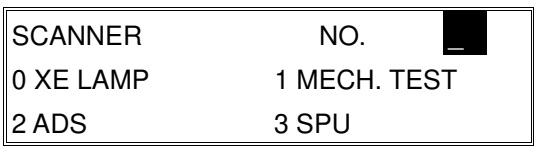
0: No paper detected
1: Paper present

3. To end the test: [Yes]
4. To return to the main service mode menu: [Yes]

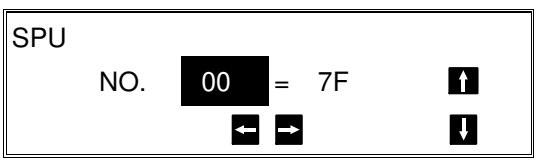
4.1.15. SP Mode Parameters (Scanner) (Function 11)

For a description of the Scanner SP Mode Parameters, see section 4-3-1.

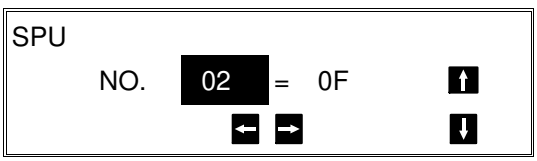
1. After entering service mode, press [1] [1]



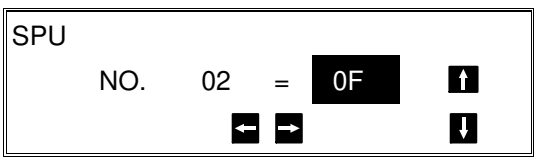
2. [3]



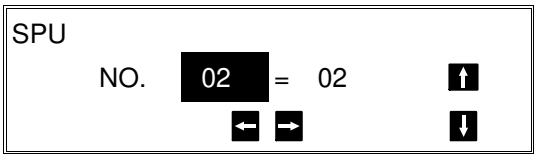
3. Either:
   - Scroll through the SP Modes on the screen using the [↑] and [↓] keys.
   - Input the required SP Mode number directly at the ten-key pad.



4. When the required SP Mode is displayed: [→]



5. Input the required value for this SP Mode, then press [←]

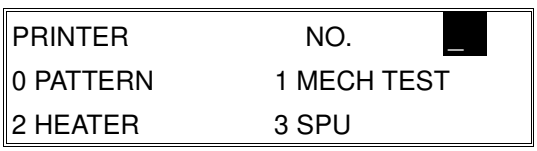


6. Either:
   - Adjust another SP Mode. Go to step 3.
   - Finish: [Yes]

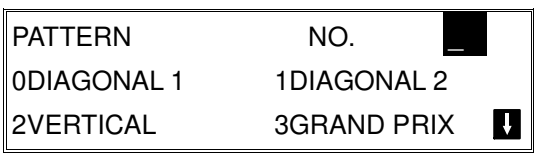
7. To return to the main service mode menu: [Yes]

4.1.16. Printer Test Patterns (Function 12)

1. After entering service mode, press [1] [2]



2. [0]



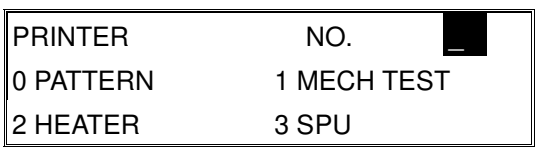
3. Press a key from 0 to 5, depending on the required pattern. Use [↑] and [↓] to see what patterns are available.

4. [Start]
   A test pattern is printed.

5. To return to the main service mode menu: [Yes] x 2

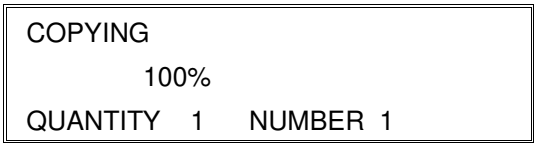
4.1.17. Scanner and Printer Mechanism Test - Free Run (Function 12)

1. After entering service mode, press [1] [2]



2. [1]

3. **Start**

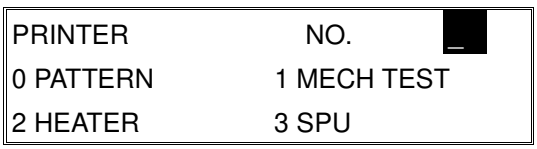


4. To end the test: **Stop**
5. To return to the main service mode menu: **Yes**

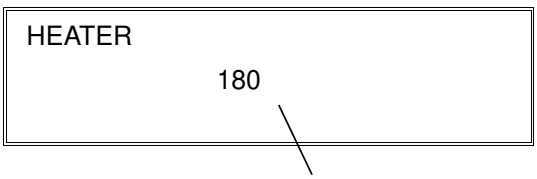
The function of this test depends on the setting of Printer SP Mode 52.
- 00 (Default): This test is a combined scanner and printer free run.
- 01: This test is a printer free run only.

4.1.18. Fusing Unit Temperature Check (Function 12)

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



2. **2**



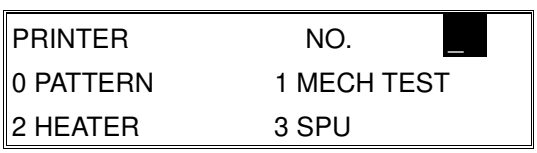
The current fusing unit temperature in °C

3. To return to the main service mode menu: **Yes** x 2.

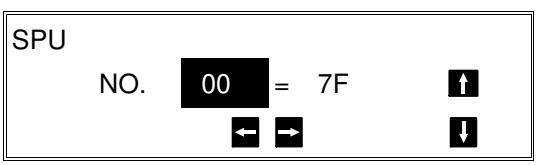
4.1.19. SP Mode Parameters (Printer) (Function 12)

For a description of the Printer SP Mode Parameters, see section 4-3-2.

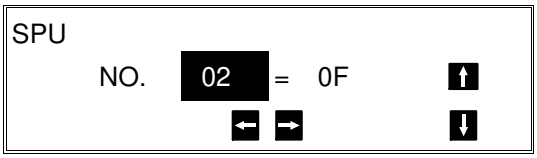
1. After entering service mode, press **1** **2**



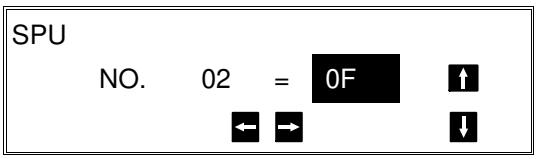
2. **3**



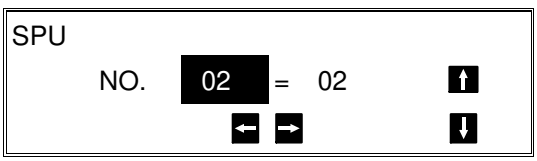
3. Either:
   - Scroll through the SP Modes on the screen using the [↑] and [↓] keys.
   - Input the required SP Mode number directly at the ten-key pad.



4. When the required SP Mode is displayed: [→]



5. Input the required value for this SP Mode, then press [←]

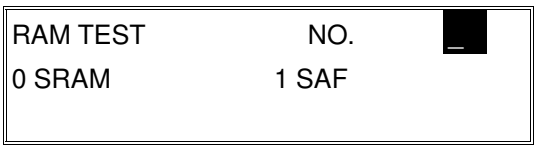


6. Either:
   - Adjust another SP Mode. Go to step 3.
   - Finish: [**Yes**]

7. To return to the main service mode menu: [**Yes**]

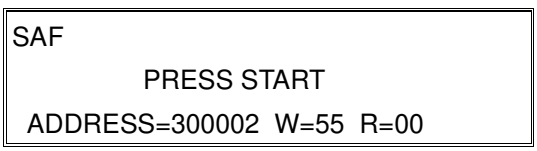
4.1.20. RAM Tests (Function 13)

1. After entering service mode, press [1] [3]



2. Either:
   - Test the SRAM: [0] [Start]
   - Test the SAF: [1] [Start]

If there is a problem, a display of the following type will occur (W indicates write data, and R indicates read data).



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

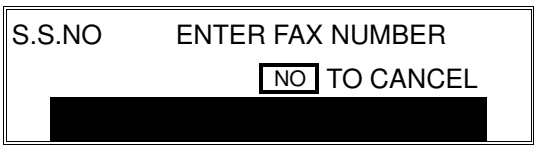
If there is a problem with the SAF, replace the SAF card or the FCU.

If there is a problem with the SRAM, replace the MBU-F board.

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

4.1.21. Service Station Telephone Number (Function 14)

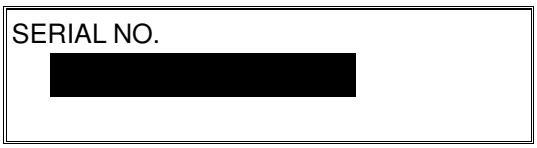
1. After entering service mode, press [1] [4]



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.

4.1.22. Serial Number (Function 15)

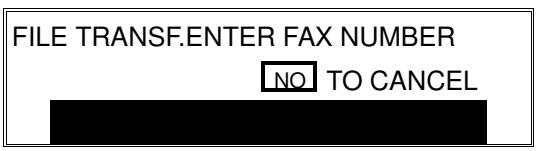
1. After entering service mode, press [1] [5]



2. Enter the machine's serial no at the keypad.
   To correct a mistake: [No]
3. If the display is correct: [Yes]

4.1.23. File Transfer (Function 16)

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

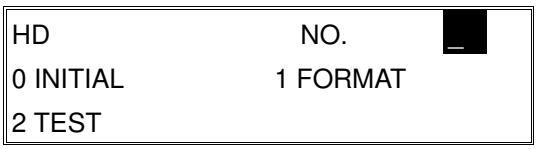


2. Input the telephone number of the fax machine to which you wish to transfer all the files. Then press [Yes] [Start] .
   If the ISDN Option kit has been installed, press the Line Selector key to select either G3 or G4 before inputting the number.

4.1.24. Hard Disk Initialization (Function 17)

Note: First, set bit 0 of Bit Switch 0D to "1," to enable the hard disk unit.

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



2. Either
   - Erase all SAF files from the hard disk: [0] [Start]
   - Format the hard disk: [1] [Start]
   - Test the hard disk: [2] [Start]

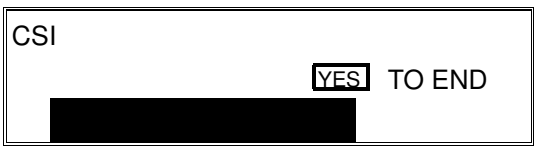
4.1.25. Group 4 Communication Parameters (Function 18)

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

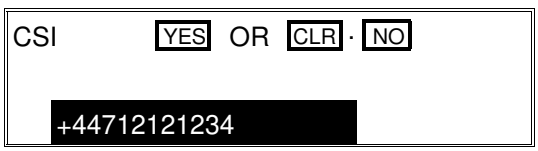
4.1.26. Programming the CSI (Function 19)

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

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



2. Input the CSI (not more than 20 digits)



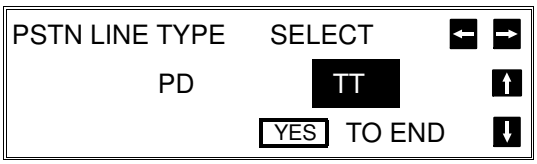
Note: If you wish to input a '+' sign to signify the international dial access code, press [31] then [1]

4. [Yes] [Function]

4.1.27. Setting the Telephone Line Type (Function 20)

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

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



2. If the setting needs changing, press ← or → until the required setting is highlighted in reverse video.
3. **Yes** **Function**

4.2. BIT SWITCHES

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

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

Bit Switch 00		
	FUNCTION	**COMMENTS**
0	Not used	Do not change the factory setting.
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. **Caution:** Before using this bit switch print the settings of all the system parameters (System Parameter List) and SP mode parameters (RAM addresses 080400 - 0805FF).
2	RAM reset level 3 **1:** Reset **Note:** RAM reset level 1 is a RAM address adjustment.	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 switches, SP mode parameters and NCU parameters settings, clock, own tel. no., CSI, RTI, TTI, Quick Dials, Speed Dials, Groups, and the TCR/Journal memory. Also, all image files in the SAF memory are erased. This bit switch is recommended for use when it is necessary to clear the SAF, as fewer RAMs will need reprogramming.
3	Not used	Do not change the factory setting.
4	Inclusion of technical data on the TCR/Journal **0:** No **1:** Yes	**1:** Instead of the personal code, the following data are listed on the TCR/Journal (G3 communications only). e.g., 14.4K A1 01 03 00 02 **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 00 for tx mode. **Fourth number:** Cable equalizer: 00 = Equalizer is Off, 01 = Low, 02 = Medium, 03 = High **Fifth number:** Total number of error lines that occurred during reception. **Sixth number:** Total number of burst errors that occurred during reception

Bit Switch 00		
	FUNCTION	**COMMENTS**
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 below). This is normally disabled because it cancels the CSI display for the user. Make sure that you reset this bit after testing.

Communication parameter display

Mode	DCS: CCITT G3	NSS: Non-standard G3
Modem rate	144S: 14,400 bps with short trainng (V.17) 144L: 14,400 bps with long trainng (V.33) 120S: 12,000 bps with short trainng (V.17) 120L: 12,000 bps with long trainng (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	
Communi-cation mode	ECM: With ECM EFC: Using EFC	SSC: Using SSC NML: With no ECM, SSC, or EFC
Compression mode	MMR: MMR compression MR: MR compression MH: MH compression	
Resolution	SF: Superfine, transmitted at 16 x 15.4 dots per mm (400 x 400 dpi) [1] SSF: Fine, transmitted at 8 x 15.4 dots per mm (200 x 400 dpi) [1] DTL: Detail STD: Standard ([1]: Optional page memory for 400 dpi reception required in rx mode.)	
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 RAM address 080049(H) (see section 4.7). 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). After finishing with this operation, 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 60,000 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 2.7.8 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 2.7.8 for details.
3 to 7	Not used	Do not change the factory settings.

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 occured in the data. Such errors are caused by a noisy line, for example.
5	Not used	Do not change the factory setting.
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 Ground Start 1 1 Flash Start	Set these bits to match the type of signal accepted by the PABX. If there is no PABX between the machine and the network, set both bits to 0.

Bit Switch 06

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

Bit Switch 07		
	FUNCTION	**COMMENTS**
0	Back to back test **0:** Disabled **1:** Enabled	Set this bit to 1 when you wish to do a back to back test. Note that the USA version of 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. Refer to Appendix B in the Group 3 Facsimile Manual for details.
2	AI short protocol (transmission and reception) **0:** Enabled **1:** Disabled	If this bit is 0, the AI Short Protocol feature is switched on. Refer to Appendix B in the Group 3 Facsimile Manual for details.
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	FTZ protocol 0: Disabled 1: Enabled	Set this bit to 1 in Germany.

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	Not used	Do not change the factory setting.
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	Not used.	Do not change the factory setting.
5	Hardware equalizer (PSTN G3 rx mode) **0:** On **1:** Off	The effects of this equalizer are similar to a cable equalizer. However, the machine may experience problems during ISDN G3 communications if this equalizer is kept on. Refer to Appendix C in the Group 3 Facsimile manual for details.
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 **5**	Not used	Do not change the factory settings.
6	Printout of the message when acting as a transfer broadcasting station **0:** No **1:** Yes	**1:** The machine prints out the messages received from transfer requesters.
7	Transmission of the Transfer Result Report to the transfer requesting station **0:** Always **1:** Only if an error occurred	**1:** The machine returns the Transfer Result Report to the requester only if an error occurred during transfer operation.

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

Bit Switch 0D		
	FUNCTION	**COMMENTS**
0	Hard disk **0:** Not installed **1:** Installed	Set this bit to 1 if you install a hard disk in the machine. Also, set this bit back to 0 manually when you take the hard disk off the machine; otherwise, the machine can not use the standard SAF memory.
1	Not used	Do not change the factory settings.
2		
3		
4		
5		
6		
7		

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

Bit Switch 0F

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

Bit Switch 10

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

Bit switch 11 is not used. Do not change the factory settings.

Bit Switch 12		
	FUNCTION	**COMMENTS**
0	Transmission report printout after transmission using an OMR sheet **0:** As selected by the user parameter setting **1:** Always printed	Set this bit to 1 if the user always wishes to have this report printed after a transmission made by an OMR sheet, regardless of whether or not it is printed for transmissions made in the usual manner.
1	Not used	Do not change the factory setting.
2	Image rotation before printing **0:** Enabled **1:** Disabled	**0:** If the paper direction of a received fax message (lengthwise or sideways) is not the same as the paper in the cassettes, the machine can rotate the image before storing it into the page memory, to fit the image on the paper currently in the printer. (See section 2.7.9 for details.)
3	Not used	Do not change the factory settings.
4		
5		
6		
7		

Bit Switches 13 to 1C are not used. Do not change the factory settings.

Bit Switch 1D		
	FUNCTION	**COMMENTS**
0	Emergency calls using 999 **0:** Enabled **1:** Disabled	This bit is only used in the UK. If this bit is at 1, the machine cannot dial 999.
1	Not used	Do not change the factory settings.
2		
3	8 minute close **0:** Disabled **1:** Enabled	This feature is only for use in Germany. In all other areas, do not change the factory setting.
4	Not used	Do not change the factory settings.
5		
6		
7		

Bit Switch 1E		
	FUNCTION	**COMMENTS**
0	Operator call if no reposne 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 from 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, and the settings must be the same in tx and rx machines.
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	Not used	Do not change the factory settings.
5	Hardware equalizer (ISDN G3 rx mode) **0:** On **1:** Off	The effects of this equalizer are similar to a cable equalizer. However, the machine may experience problems during PSTN G3 communications if this equalizer is kept on.
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.

4.3. SP MODE PARAMETERS

WARNING: Do not change the settings of any SP Modes other than those listed in the following tables.
Keep the record of the following SP mode parameters settings for each machine, as the values have been finely adjusted at the factory.
Scanner SP Mode Parameters: 03 - 1D
Printer SP Mode Parameters: 10 - 1A, and E0 - E8
To print the SP Mode values, print out the contents of RAM addresses 080400 to 0805FF.

4.3.1. Scanner

The following table shows the SP Mode Parameters for the scanner. To use a scanner SP Mode, use Function 11-3 (section 4. 1.15).

To read in the currect status data (in SP Mode Parameters 80 to 92 and A0 to A4), do the following:

1. Set the SP mode parameter 93 to 01(H).
2. Press Yes.
3. Press 3.
4. Check any of SP Modes 80 to 92 and A0 to A4.
5. After checking all that you need, return to standby mode (SP Mode 93 automatically returns to 00).

No.	Purpose	Default	Comments
03	Fax transmission mode: Magnification rate (sub-scan direction)	05(H)	A larger value causes the image to become longer. Adjust if the user complains that transmitted images seem to be reduced before arriving at the other end. Adjust this setting if the user frequently sends to areas using different standard paper sizes (A4 paper is longer than North American Letter-size paper). The magnification rate is given by the following formula: $\frac{27+RAMvalue}{32}$
10	Copy mode: Leading edge registration adjustment	19(H)	A larger value causes the image to disappear at the leading edge.
11	Copy mode: Side registration adjustment	81(H)	A larger value moves the image to the left. The unit of adjustment is 0.0635 mm.

No.	Purpose	Default	Comments
13	Copy mode: Magnification rate (sub-scan direction)	05(H)	A larger value causes the image to become longer. The magnification rate is given by the following formula: $\frac{95+RAMvalue}{100}$
14	Copy mode: Magnification rate (main scan direction)	05(H)	A larger value causes the image to become wider. The magnification rate is given by the following formula: $\frac{95+RAMvalue}{100}$
1D	Side registration when using the ADF	2F(H)	Adjust if the left or right edge is missing when making copies with the optional ADF unit. A larger value shifts the printed image to the left (unit: 0.0635 mm). Do this adjustment after installing the optional ADF unit.
2F	MTF	00(H)	01: MTF disabled If this value is changed, restart the machine with the main switch, so that the new setting can become effective.
30	Scanner lamp to shipping position	00(H)	To move the scanner lamp to the shipping position, set this to 01(H).
3F	Scan width during scanner free run	0D(H)	05: A4 lengthwise, 06: A4 sideways, 0D: A3 lengthwise
Fax “Text” Mode Contrast Threshold			
70	Normal	1B(H)	Increasing the value darkens the image. If these values are changed, restart the machine with the main switch, so that the new values can become effective.
71	Slightly Lighten	1E(H)	
72	Lighten	21(H)	
73	Slightly Darken	18(H)	
74	Darken	15(H)	
Fax “Text/Photo” Mode Contrast Threshold (Resolution - 200 x 100 dpi, 200 x 200 dpi, or 200 x 400 dpi; reduction enabled)			
75	Normal	20(H)	Increasing the value darkens the image. If these values are changed, restart the machine with the main switch, so that the new values can become effective.
76	Slightly Lighten	22(H)	
77	Lighten	24(H)	
78	Slightly Darken	1E(H)	
79	Darken	1C(H)	
Fax “Text/Photo” Mode Contrast Threshold (400 x 400 dpi or no reduction)			
7A	Normal	1C(H)	Increasing the value darkens the image. If these values are changed, restart the machine with the main switch, so that the new values can become effective.
7B	Slightly Lighten	1E(H)	
7C	Lighten	20(H)	
7D	Slightly Darken	1A(H)	
7E	Darken	18(H)	

No.	Purpose	Default	Comments
80	Sensor status: Motor lock	00(H)	Bit 0: Main motor 0: Locked Bit 1: Master unit drive motor 0: Locked Bit 2: Polygon motor 0: Locked Bit 3: Optional PFU motor 1: Locked Bits 4-7: Not used
81	Sensor status: Sensors		Bit 0: By-pass feed sensor 0: Paper present Bit 1: First relay sensor 0: Paper present Bit 2: Registration sensor 0: Paper present Bit 3: Fusing unit exit sensor 0: Paper present Bits 4-7: Not used
82	Sensor status: Toner		Bits 0-2: Not used Bit 3: Toner end sensor 0: Toner end Bits 4-5: Not used Bit 6: Toner overflow sensor 1: Used toner tank full Bit 7: Development unit 0: Installed
83	Sensor status: Optional units, etc		Bit 0: Duplex unit 0: Installed Bit 1: Paper feed unit 0: Installed Bit 2: Paper feed unit 0: Installed Bit 3: Not used Bit 4: Not used Bit 5: Expose the used car salesman 0: Indicates that someone has tampered with the total print counter Bit 6: 3-bin sorter 0: Installed Bit 7: Not used
84	Sensor status: Abnormal conditions		Bit 0: Operation switch 1: OFF Bit 1: PFU/Duplex unit fuse (IOU-F3) 0: Blown Bit 2: ADF fuse (IOU - F1) 0: Blown Bit 3: LD power failure 0: Failure Bit 4: +24V (IOU-F2) 0: Blown Bit 5: +24VS supply 0: OFF Bit 6-7: Not used
85	Sensor status: Duplex unit		Bit 0: Not used Bits 1 and 2: Duplex unit status Bit 2 1 Status 0 0 Ready 0 1 There is paper at the relay sensor. 1 0 There is paper at the turn sensor or at the relay sensor. 1 1 Ready signal to feed paper from the duplex unit Bit 3-7: Not used

No.	Purpose	Default	Comments
86	Sensor status: Optional unit sensors		Bit 0: Sorter first exit sensor 0: Paper present Bit 1: Sorter second exit sensor 0: paper present Bit 2: Sorter third exit sensor 0: Paper present Bit 3: Sorter entry sensor 0: Paper present Bit 4: Inverter entrance sensor 0: Paper present Bit 5: Second relay sensor 1: Paper present Bit 6: Third relay sensor 1: Paper present Bit 7: Duplex entrance sensor 1: Paper present
87	Sensor status: Cover open status		Bit 0: Front cover 0: Open Bit 1: Fusing exit cover 0: Open Bit 2: Right cover 0: Open Bit 3: Bypass feed table 0: Open Bit 4: PFU right cover 0: Open Bit 5: Sorter upper cover 0:Open Bits 6-7: Not used
88	Sensor status: First paper feed station		Bits 0-3: Paper size: Bit 3 2 1 0 Size 1 1 1 0 A3, 11x17" 1 1 0 1 A4 ▭, 8.5x11" 1 0 1 1 A4 ▯, 11x8.5" 0 1 1 1 A5 ▯ 1 0 0 0 B4 ▭, 8.5x14" 0 0 1 0 B5 ▯ 0 1 0 0 F ▭ Bits 4-5: Not used Bit 6: Paper end 1: End Bit 7: Not used
89	Sensor status: Second paper feed station		Same as SP Mode 88
8A	Sensor status: Third paper feed station		Bits 0-3: Paper size: Bit 3 2 1 0 Size 0 1 1 1 A3, 11x17" 1 0 1 1 A4 ▭, 8.5x11" 1 1 1 0 A4 ▯, 11x8.5" 0 0 0 1 B4 ▭, 8.5x14" 0 1 0 0 B5 ▯ 1 0 0 0 F ▭ Bits 4-5: Not used Bit 6: Paper end 1: End Bit 7: Not used
8B	Sensor status: Fourth paper feed station		Same as SP Mode 8A

No.	Purpose	Default	Comments
8C	Sensor status: Bypass feed table		Bits 0-3: Paper width Bit 3 2 1 0 Width 1 1 1 0 A3, 11" 1 1 0 0 B4, F, 8.5" 1 1 0 1 A4 1 0 0 1 B5 0 0 1 1 A5 0 1 1 1 B6 1 1 1 1 A6 Bits 4-7: Not used
8D	Sensor status: Printer I/F Option		Bit 0: Printer I/F status (CPRDYX) 0: Standby mode 1: Reset in progress Bit 1: Print start request (PRINTX) 0: Start of printing a page
8E	Not used		
8F	Sensor status: Scanner		Bit 0: Scanner home position 1: Home position Bit 1: Platen cover sensor 0: Cover closed Bits 2-7: Not used
90	Sensor status: Automatic document size sensors (APS)		APS output (Same as function 11 - 2: APS test)
93	Read in the sensor and control port status data	00(H)	To read in the current status data (in SP Modes 80 to 92 and A0 to A4): 1. Set this value to 01(H). 2. Press Yes. 3. Press 3. 4. Check any of SP Modes 80 to 92 and A0 to A4. 5. After checking all that you need, return to standby mode (SP Mode 93 automatically returns to 00).
A0	Control port 1 status		Bit 0: Fusing lamp 0: On Bit 1: Fusing lamp disabling 0: Disabled (only when fusing lamp temperature is extemely high.) Bit 2: Automatic document width sensor 0: +5V power enabled Bit 3: Laser diode 0: On Bit 4: Xenon lamp 1: On Bit 5: Junction gate #1 solenoid 0: On Bit 6: Inverter gate solenoid 0: On Bit 7: Junction gate #2 solenoid 0: On (paper goes to bin #3) 1: Off (paper goes to bin #2)

No.	Purpose	Default	Comments
A1	Control port 3 status		Bit 0: Sorter motor 0: Active Bit 1: Polygon motor 0: Active Bit 2: Printer I/F ETBSY signal 0: Receiving controller status Bit 3: Printer I/F PRRDY signal 1: Controller busy or has problem Bits 4-7: Not used
A2	Serial control port status		Bit 0: Master unit drive motor 0:Active Bit 1: Main motor 0: Active Bit 2: Development clutch 0: Active Bit 3: First relay clutch 0: Active Bit 4: Second paper feed clutch 0: Active Bit 5: Registration clutch 0: Active Bit 6: By-pass paper feed clutch 0: Active Bit 7: First paper feed clutch 0: Active
A3	Serial control port status		Bit 0: Third or fourth paper feed station selection 0: 4th station, 1: 3rd station Bit 1: Key counter 0: Counter increment in progress Bit 2: Total print counter 0: Counter increment in progress Bit 3: Not used Bit 4: Charge corona wire 0: Active Bit 5: Quenching lamp 0: Active Bit 6: Transfer corona wire 0: Active Bit 7: Development bias voltage 0: Active
A4	Serial control port status		Bit 0: Second relay roller clutch 0: Active Bit 1: PFU motor 0: Active Bit 2: 4th paper feed clutch 0: Active Bit 3: 3rd paper feed clutch 0: Active Bit 4: Duplex unit reset 1: Reset Bit 5: Duplex mode 0: Selected at operation panel Bit 6: Duplex motor 0: On Bit 7: Duplex gate solenoid 0: Active

4.3.2. Printer

The following table shows the SP Mode Parameters for the printer. To use a printer SP Mode, use Function 12-3 (section 4-1-19).

To read in the currect status data (in SP Mode Parameters 80 to 92 and A0 to A4), do the following:

1. Set the SP mode parameter 93 to 01(H).
2. Press Yes.
3. Press 3.
4. Check any of SP Modes 80 to 92 and A0 to A4.
5. After checking all that you need, return to standby mode (SP Mode 93 automatically returns to 00).

No.	Purpose	Default	Comments
10	Copy mode: leading edge registration	12(H)	Before adjusting this value, reset Printer SP Mode 13 to the default setting. Increase the stored value to move the image up in steps of 0.0635 mm. Adjust using the trim pattern generated by SP Mode 60.
11	Copy mode: side registration (first paper feed station)	4D(H)	Before adjusting this value, reset Printer SP Mode 14 to the default setting. Increase the stored value to move the image left in steps of 0.0635 mm. Adjust using the trim pattern generated by SP Mode 60.
13	Copy mode: trailing edge margin (all paper feed stations)	3A(H)	Increase the stored value to make the blank area wider in steps of 0.254 mm.
14	Copy mode: left edge margin (all paper feed stations)	40(H)	Increase the stored value to make the blank area wider in steps of 0.254 mm.

No.	Purpose	Default	Comments
16	Copy mode: side registration (2nd paper feed station)	4D(H)	Before adjusting this value, reset Printer SP Mode 14 to the default setting. Increase the stored value to move the image left in steps of 0.0635 mm. Adjust using the trim pattern generated by SP Mode 60.
17	Copy mode: side registration (3rd paper feed station)	4D(H)	
18	Copy mode: side registration (4th paper feed station)	4D(H)	
19	Copy mode: side registration (bypass feed)	4D(H)	
1A	Copy mode: side registration (duplex tray)	4D(H)	
51	Power to the fusing lamp, ozone fan, and scanner fan while standby mode key is enabled.	00(H)	00: 100% 01: 70% (Energy saving mode level) Refer to section 1.6.3 for details.
52	Printer free run	00(H)	00: Service mode 12-1 is a scanner and printer free run test. 01: Service mode 12-1 is a printer free run test only.
60	Printer test patterns	00(H)	01(H): Trim pattern (this is explained in the Removal and Adjustments section) 02(H): 16-tone grayscale pattern 03(H): 32-tone grayscale pattern To print one of these test patterns: 1. Select one of these with this parameter. 2. Exit service mode. 3. Select the required paper size. 4. Press Start without an original on the exposure glass. 5. The test pattern will be printed on the selected paper. This SP Mode value is reset to 00 when the power is switched on.
70	Development bias test (B)	00(H)	01(H): Test mode To start a test, change the value of the appropriate parameter to 01. However, the power to these devices is shut off if the covers are opened. Switch the machine off after the test. The settings are reset to 00(H) at power-on. The letters in the brackets are the same as the letters printed on the power pack.
71	Transfer corona bias test (T)	00(H)	
72	Quenching lamp test	00(H)	
73	Charge corona bias test (C)	00(H)	

No.	Purpose	Default	Comments
80 to 92	Sensor status data		Printer SP Modes 80 through 92 are the same as scanner SP modes 80 through 92.
93	Read in the sensor and control port status data	00(H)	To read in the currect status data (in SP Modes 80 to 92 and A0 to A4): 1. Set this value to 01(H) then press Yes. 2. Press 3. 3. Check any of SP Modes 80 to 92 and A0 to A4. 4. After checking all that you need, return to standby mode (SP Mode 93 automatically returns to 00).
A0	Control port 1 status		Printer SP Modes A0 through A4 are the same as scanner SP modes A0 through A4.
A1	Control port 3 status		
A2	Serial control port status		
A3	Serial control port status		
A4	Serial control port status		
E0	Printer interface output image alignment position	00(H)	00(H): Center, 01(H): Upper left corner
E5	Printer interface output mode: side registration (2nd paper feed station)	4D(H)	Increase the stored value to move the image left in steps of 0.0635 mm. .
E6	Printer interface output mode: side registration (3rd paper feed station)	4D(H)	
E7	Printer interface output mode: side registration (4th paper feed station)	4D(H)	
E8	Printer interface output mode: side registration (bypass feed)	4D(H)	

4.4. NCU PARAMETERS

The following tables give the RAM addresses and units of calculation of the parameters that the machine uses for ringing signal detection and automatic dialling. The factory settings for each country are also given. Most of these must be changed by RAM read/write (Function 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 06, add 080. For example, for address 305, input 080305

<table>
<tr><th>Address</th><th>Function</th><th>Unit</th><th>Remarks</th></tr>
<tr><td>301</td><td>Country code for NCU parameters</td><td colspan="2">Use the Hex value to program the country code directly into this address, or use the decimal value to program it using Function 09 (parameter 00).

Country — Decimal — Hex
France 00 00
Germany 01 01
UK 02 02
Italy 03 03
Austria 04 04
Belgium 05 05
Denmark 06 06
Finland 07 07
Ireland 08 08
Norway 09 09
Sweden 10 0A
Switzerland 11 0B
Portugal 12 0C
Holland 13 0D
Spain 14 0E
Israel 15 0F
USA 17 11
Asia 18 12
Japan 19 13
Hong Kong 20 14
South Africa 21 15
Australia 22 16
New Zealand 23 17
Singapore 24 18
Malaysia 25 19</td></tr>
<tr><td>305</td><td>Line current detection time</td><td rowspan="3">20 ms</td><td rowspan="3">Line current is not detected if 305 contains FF.</td></tr>
<tr><td>306</td><td>Line current wait time</td></tr>
<tr><td>307</td><td>Line current drop detect time</td></tr>
</table>

Address	Function	Unit	Remarks
308	PSTN dial tone upper frequency limit (HIGH)	Hz (BCD)	See Note 2.
309	PSTN dial tone upper frequency limit (LOW)		
30A	PSTN dial tone lower frequency limit (HIGH)		
30B	PSTN dial tone lower frequency limit (LOW)		
30C	PSTN dial tone detection time	20 ms	If 30C contains FF, the machine pauses for the pause time (address 311/312). See Note 3 (Italy).
30D	PSTN dial tone reset time (HIGH)		
30E	PSTN dial tone reset time (LOW)		
30F	PSTN dial tone continuous tone time		
310	PSTN dial tone permissible drop time		
311	PSTN wait interval (HIGH)		
312	PSTN wait interval (LOW)		
313	PSTN ringback tone detection time	20 ms	Detection is disabled if this contains FF.
314	PSTN busy tone upper frequency limit (HIGH)	Hz (BCD)	If 314 is FF, detection is disabled. See Note 2.
315	PSTN busy tone upper frequency limit (LOW)		
316	PSTN busy tone lower frequency limit (HIGH)		
317	PSTN busy tone lower frequency limit (LOW)		
318	PABX dial tone upper frequency limit (HIGH)	Hz (BCD)	See Note 2.
319	PABX dial tone upper frequency limit (LOW)		
31A	PABX dial tone lower frequency limit (HIGH)		
31B	PABX dial tone lower frequency limit (LOW)		
31C	PABX dial tone detection time	20 ms	If 31C contains FF, the machine pauses for the pause time (321/322).
31D	PABX dial tone reset time (HIGH)		
31E	PABX dial tone reset time (LOW)		
31F	PABX dial tone continuous tone time		
320	PABX dial tone permissible drop time		
321	PABX wait interval (HIGH)		
322	PABX wait interval (LOW)		
323	PABX ring back tone detection time	20 ms	Detection is disabled if this contains FF.

Address	Function	Unit	Remarks
324	PABX busy tone upper frequency limit (HIGH)	Hz (BCD)	If this is FF, detection is disabled. See Note 2.
325	PABX busy tone upper frequency limit (LOW)		See Note 2.
326	PABX busy tone lower frequency limit (HIGH)		
327	PABX busy tone lower frequency limit (LOW)		
328	Busy tone ON time: range 1	20 ms	
329	Busy tone OFF time: range 1		
32A	Busy tone ON time: range 2		
32B	Busy tone OFF time: range 2		
32C	Busy tone ON time: range 3		
32D	Busy tone OFF time: range 3		
32E	Busy tone ON time: range 4		
32F	Busy tone OFF time: range 4		
330	Busy tone continuous tone detection time		
331	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 2 and 3 must always be kept at 0. Bits 7, 6, 5, 4 - number of cycles required for detection		
332	International dial tone upper frequency limit (HIGH)	Hz (BCD)	See Note 2.
333	International dial tone upper frequency limit (LOW)		
334	International dial tone lower frequency limit (HIGH)		
335	International dial tone lower frequency limit (LOW)		

Address	Function	Unit	Remarks
336	International dial tone detection time	20 ms	If 336 contains FF, the machine pauses for the pause time (33B/33C). See Note 3 (Belgium).
337	International dial tone reset time (HIGH)		
338	International dial tone reset time (LOW)		
339	International dial tone continuous tone time		
33A	International dial tone permissible drop time		
33B	International dial wait interval (HIGH)		
33C	International dial wait interval (LOW)		
33D	Country dial tone upper frequency limit (HIGH)	Hz (BCD)	See Note 2.
33E	Country dial tone upper frequency limit (LOW)		
33F	Country dial tone lower frequency limit (HIGH)		
340	Country dial tone lower frequency limit (LOW)		
341	Country dial tone detection time	20 ms	If 341 contains FF, the machine pauses for the pause time (346/347).
342	Country dial tone reset time (HIGH)		
343	Country dial tone reset time (LOW)		
344	Country dial tone continuous tone time		
345	Country dial tone permissible drop time		
346	Country dial wait interval		
347	Not used		
348	Grounding time (ground start mode)	20 ms	The Gs relay is closed for this interval.
349	Break time (flash start mode)	1 ms	The Di relay is open for this interval.
34A	International dial access code	BCD	For a code of 100: 34A - F1 34B - 00
34B			
34C	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 361 is used.

Address	Function	Unit	Remarks
34D	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 Bits 4, 2, 0 - See Note 3.	
34E	CCITT T1 time	1 s	
34F	Max. number of dials per station (not using memory)	1	
350	Redial interval (not using memory)	1 min	
351	Interval between dialling to different stations	2 s	
352	Not used		
353	Acceptable ringing signal frequency: range 1, upper limit	1000/ N (Hz). N is the value stored using Function 09.	Function 09 (parameter 02).
354	Acceptable ringing signal frequency: range 1, lower limit		Function 09 (parameter 03).
355	Acceptable ringing signal frequency: range 2, upper limit		Function 09 (parameter 04).
356	Acceptable ringing signal frequency: range 2, lower limit		Function 09 (parameter 05).
357	Number or rings until a call is detected	1	Function 09 (parameter 06).
358	Minimum required length of the first ring	20 ms	See Note 5. Function 09 (parameter 07).
359	Minimum required length of the second and subsequent rings		Function 09 (parameter 08).
35A	Ringing signal detection reset time (HIGH)		Function 09 (parameter 09).
35B	Ringing signal detection reset time (LOW)		Function 09 (parameter 10).
35C	Time between opening or closing the Ds relay and opening the Di relay	1 ms	See Notes 4 and 7. Function 09 (parameter 11).
35D	Break time for pulse dialling		See Note 4. Function 09 (parameter 12).
35E	Make time for pulse dialling		See Note 4. Function 09 (parameter 13).
35F	Time between final Di relay closure and Ds relay opening or closing		See Notes 4 and 7. Function 09 (parameter 14).
360	Minimum pause between dialled digits (pulse dial mode)	10 ms	See Note 4. Function 09 (parameter 15).
361	Time waited when a pause is entered at the operation panel		Function 09 (parameter 16). See Note 3.
362	DTMF tone on time	1 ms	Function 09 (parameter 17).
363	DTMF tone off time		Function 09 (parameter 18).

Address	Function	Unit	Remarks
364	DTMF tone attenuation value	-dBm x 0.5	Function 09 (parameter 19). See Note 6.
365	Tx level from the modem	- dBm	Function 09 (parameter 01).
366	800 Hz tone detection level	-1 x value of 365(H) - 0.5N (dB)	N is the value stored in the RAM address.
367	1100 Hz tone detection level		
368	2100 Hz tone detection level		
369	Modem turn-on level (incoming signal detection level)	USA: -37-0.5N (dBm) Others: -38-0.5N (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.
36B	Tx level difference between high frequency tone and low frequency tone in DTMF signals	-Nx0.5 (dB)	See Note 6.
371	Acceptable CED detection range; upper frequency (HIGH)	BCD (Hz)	Factory setting: 2200 Hz
372	Acceptable CED detection range; upper frequency (LOW)		
373	Acceptable CED detection range; lower frequency (HIGH)		Factory setting: 2000 Hz
374	Acceptable CED detection range; lower frequency (LOW)		
375	CED detection time	20 ms ± 20 ms	Factory setting: 200 ms
376	Acceptable CNG detection range; upper frequency (HIGH)	BCD (Hz)	Factory setting: 1200 Hz
377	Acceptable CNG detection range; upper frequency (LOW)		
378	Acceptable CNG detection range; lower frequency (HIGH)		Factory setting: 1000 Hz
379	Acceptable CNG detection range; lower frequency (LOW)		
37A	CNG detection time	20 ms ± 20 ms	Factory setting: 200 ms
37B	CNG on time	20 ms	Factory setting: 500 ms
37C	CNG off time	20 ms	Factory setting: 200 ms
37D	Number of CNG cycles required for detection		The data is coded in the same way as address 331. Factory setting: 23(H)
37E	Detection frequency for 800 Hz AI short protocol tone (upper limit, high byte)	BCD (Hz)	Factory setting: 880 Hz
379	Detection frequency for 800 Hz AI short protocol tone (upper limit, low byte)	BCD (Hz)	

Address	Function	Unit	Remarks
380	Detection frequency for 800 Hz AI short protocol tone (lower limit, high byte)	BCD (Hz)	Factory setting: 720 Hz
381	Detection frequency for 800 Hz AI short protocol tone (lower limit, low byte)	BCD (Hz)	
382	Detection time for 800 Hz AI short protocol tone	20 ms	Factory setting: 200 ms
391	Interval between dialing the last digit and switching the Oh relay over to the external telephone when dialing from the operation panel in handset mode.	100 ms	Factory setting: 500 ms
3F2	ISDN: Modem transmission level for image data	-dBm	Factory setting: -15 dBm
3F3	ISDN: 800 Hz tone transmission level	- N_{3F2} - 0.5 N	N_{3F2} is the value stored in address 3F2. Factory settings: -15 dBm
3F4	ISDN: 1100 Hz tone transmission level		
3F5	ISDN: 2100 Hz tone transmission level		

Notes

1. If a setting is not required, store FF in the address.
2. Tone frequencies are stored in BCD in the following format.
   Examples:
   a) 380 Hz HIGH 0 3 LOW 8 0, b) 1210 Hz HIGH 1 2 LOW 1 0
3. Italy and Belgium only

   RAM address 34D: the lower four bits have the following meaning.
   Bit 4: 1: The units for the value stored at 361(H) is 20 ms (Italy)
   Bit 3 Not used
   Bit 2 1: International dial tone cadence detection enabled (Belgium)
   Bit 1 Not used
   Bit 0 1: PSTN dial tone cadence detection enabled (Italy)

   If bit 0 or bit 2 is set to 1, the functions of the following RAM addresses are changed.
   30C (if bit 0 = 1) or 336 (if bit 2 = 1): tolerance for on or off state duration (%), and number of cycles required for detection, coded as in address 331.
   30F (if bit 0 = 1) or 339 (if bit 2 = 1): on time, hex code (unit = 20 ms)
   310 (if bit 0 = 1) or 33A (if bit 2 = 1): off time, hex code (unit = 20 ms)
4. Pulse dial parameters (addresses 35C to 361) are the values for 10 pps. If 20 pps is used, the machine automatically compensates.
5. The first ring may not be detected until 1 to 2.5 wavelengths after the time specified by this parameter.
6. The calculated level must be between 0 and 15.
   The attenuation levels calculated from RAM data are:
   High frequency tone: - 0.5 x N_{364} dBm
   Low frequency tone: - 0.5 x (N_{364} + N_{36B}) dBm
   Note: N_{364}, for example, means the value stored in address 080364(H)
7. 35C: Europe - Between Ds opening and Di opening, France - Between Ds closing and Di opening
   35F: Europe - Between Ds closing and Di closing, France - Between Ds opening and Di closing

On the following pages, there are tables of factory settings for each country. To enable the factory settings for a particular nation, program the Country Code (RAM address 080301 [use hex codes] or use Function 09 [input the decimal value]) to the appropriate setting. The country code also affects the NCU signal status.

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

Country	305		306		307		308/309		
France							480 Hz	04(H)	80(H)
Germany	1.1 s	55	4.1 s	205	1.08 s	54	498 Hz	04(H)	98(H)
UK/Univ									
Italy							471 Hz	04(H)	71(H)
Austria							530 Hz	05(H)	30(H)
Belgium							520 Hz	05(H)	20(H)
Denmark							512 Hz	05(H)	12(H)
Finland							536 Hz	05(H)	36(H)
Ireland	1.1 s	55	4.1 s	205	1.08 s	54	450 Hz	04(H)	50(H)
Norway							512 Hz	05(H)	12(H)
Sweden							512 Hz	05(H)	12(H)
Switz.	1.1 s	55	4.1 s	205	5.1 s	255	608 Hz	06(H)	08(H)
Portugal							460 Hz	04(H)	60(H)
Holland							563 Hz	05(H)	63(H)
Spain							490 Hz	04(H)	90(H)
Israel	1.1 s	55	4.1 s	205	1.08 s	54	498 Hz	04(H)	98(H)
USA									
Asia									
Australia							450 Hz	04(H)	50(H)

Country	30A/30B			30C		30D/30E		30F	
France	400 Hz	04(H)	00(H)	2 s	100	12 s	600	1 s	50
Germany	370 Hz	03(H)	70(H)	2.1 s	105	20 s	1000	2.1 s	105
UK									
Italy	391 Hz	03(H)	91(H)	2,50%	21(H)	10.9 s	545	0.6 s	30
Austria	370 Hz	03(H)	70(H)	0.8 s	40	10 s	500	0.8 s	40
Belgium	300 Hz	03(H)	00(H)	0.6 s	30	3 s	150	0.6 s	30
Denmark	340 Hz	03(H)	40(H)	1.3 s	65	10 s	500	1.3 s	65
Finland	315 Hz	03(H)	15(H)	4.1 s	205	10 s	500	4.1 s	205
Ireland	200 Hz	02(H)	00(H)	2.1 s	105	10 s	500	2.1 s	105
Norway	340 Hz	03(H)	40(H)	1.1 s	55	20 s	1000	1.1 s	55
Sweden	340 Hz	03(H)	40(H)	0.8 s	40	5.12 s	256	0.8 s	40
Switz.	338 Hz	03(H)	38(H)	0.8 s	40	10.9 s	545	0.8 s	40
Portugal	290 Hz	02(H)	90(H)	2.1 s	105	10 s	500	2.1 s	105
Holland	76 Hz	00(H)	76(H)	1.1 s	55	15 s	750	1.1 s	55
Spain	310 Hz	03(H)	10(H)	1.5 s	75	12.8 s	640	0.72 s	36
Israel	340 Hz	03(H)	40(H)	2.1 s	105	20 s	1000	2.1 s	105
USA									
Asia									
Australia	130 Hz	01(H)	30(H)	3.0 s	150	6 s	300	2 s	100

Country	310		311/312		313		314/315		
France	0.04 s	2	0 s	0			488 Hz	04 (H)	88 (H)
Germany	0.08 s	4	4 s	200			510 Hz	05 (H)	10 (H)
UK/Univ			4 s	200			430 Hz	04 (H)	30 (H)
Italy	1 s	50	4 s	200			529 Hz	05 (H)	29 (H)
Austria	0.08 s	4	4 s	200			512 Hz	05 (H)	12 (H)
Belgium	0.08 s	4	4 s	200			471 Hz	04 (H)	71 (H)
Denmark	0.08 s	4	4 s	200			460 Hz	04 (H)	60 (H)
Finland	0.08 s	4	4 s	200					
Ireland	0.08 s	4	4 s	200			430 Hz	04 (H)	30 (H)
Norway	0.08 s	4	4 s	200			512 Hz	05 (H)	12 (H)
Sweden	0.06 s	3	4 s	200			512 Hz	05 (H)	12 (H)
Switz.	0.04 s	2	4 s	200	0.1 s	5	608 Hz	06 (H)	08 (H)
Portugal	0.08 s	4	4 s	200					
Holland	0.08 s	4	4 s	200			563 Hz	05 (H)	63 (H)
Spain	0.08 s	4	3 s	150			460 Hz	04 (H)	60 (H)
Israel	0.08 s	4	4 s	200			498 Hz	04 (H)	98 (H)
USA			2 s	100					
Asia			2 s	100					
Australia	0.16 s	8	3 s	150			450 Hz	04 (H)	50 (H)

Country	316/317			318/319			31A/31B		
France	396 Hz	03(H)	96(H)	900 Hz	09(H)	00(H)	300 Hz	03(H)	00(H)
Germany	350 Hz	03(H)	50(H)						
UK/Univ	360 Hz	03(H)	60(H)						
Italy	329 Hz	03(H)	29(H)	512 Hz	05(H)	12(H)	391 Hz	03(H)	91(H)
Austria	380 Hz	03(H)	80(H)						
Belgium	405 Hz	04(H)	05(H)	520 Hz	05(H)	20(H)	300 Hz	03(H)	00(H)
Denmark	390 Hz	03(H)	90(H)	512 Hz	05(H)	12(H)	340 Hz	03(H)	40(H)
Finland									
Ireland	370 Hz	03(H)	70(H)						
Norway	340 Hz	03(H)	40(H)						
Sweden	340 Hz	03(H)	40(H)	512 Hz	05(H)	12(H)	340 Hz	03(H)	40(H)
Switz.	338 Hz	03(H)	38(H)	608 Hz	06(H)	08(H)	338 Hz	03(H)	38(H)
Portugal									
Holland	320 Hz	03(H)	20(H)	563 Hz	05(H)	63(H)	76 Hz	00(H)	76(H)
Spain	380 Hz	03(H)	80(H)						
Israel	370 Hz	03(H)	70(H)	563 Hz	05(H)	63(H)	370 Hz	03(H)	70(H)
USA									
Asia									
Australia	390 Hz	03(H)	90(H)	450 Hz	04(H)	50(H)	390 Hz	03(H)	90(H)

Country	31C		31D/31E		31F		320		321/322	
France	2 s	100	12 s	600	1 s	50	40 ms	2	0 s	0
Germany									4 s	200
UK/Univ									4 s	200
Italy	2 s	100	10.1 s	505	0.18 s	9	80 ms	4	4 s	200
Austria									4 s	200
Belgium	0.6 s	30	3 s	150	0.6 s	30	80 ms	4	4 s	200
Denmark	1.3 s	65	10 s	500	1.3 s	65	80 ms	4	4 s	200
Finland									4 s	200
Ireland									4 s	200
Norway									4 s	200
Sweden	0.8 s	40	5.12s	256	0.8 s	40	60 ms	3	4 s	200
Switz.	0.8 s	40	9.9 s	495	0.8 s	40	80 ms	4	4 s	200
Portugal									4 s	200
Holland	1.1 s	55	15 s	750	1.1 s	55	80 ms	4	4 s	200
Spain									3 s	150
Israel	2.1 s	105	20 s	1000	2.1 s	105	80 ms	4	4 s	200
USA									4 s	200
Asia									4 s	200
Australia	3 s	150	6 s	300	2 s	100	20 ms	1	3 s	150

Country	323		324/325			326/327		
France								
Germany								
UK/Univ								
Italy			600 Hz	06(H)	00(H)	100 Hz	01(H)	00(H)
Austria								
Belgium								
Denmark			460 Hz	04(H)	60(H)	390 Hz	03(H)	90(H)
Finland								
Ireland								
Norway								
Sweden								
Switz.			608 Hz	06(H)	08(H)	338 Hz	03(H)	38(H)
Portugal								
Holland								
Spain								
Israel			563 Hz	05(H)	63(H)	370 Hz	03(H)	70(H)
USA								
Asia								
Australia			450 Hz	04(H)	50(H)	390 Hz	03(H)	90(H)

Country	328		329		32A		32B		32C	
France	0.5 s	25	0.5 s	25						
Germany	0.24 s	12	0.24 s	12	0.48 s	24	0.48 s	24	0.14 s	7
UK/Univ	0.38 s	19	0.38 s	19	0.4 s	20	0.34 s	17	0.22 s	11
Italy	0.3 s	15	0.3 s	15						
Austria	0.2 s	10	0.2 s	10	0.3 s	15	0.3 s	15	0.4 s	20
Belgium	0.5 s	25	0.5 s	25	0.16 s	8	0.16 s	8		
Denmark	0.24 s	12	0.24 s	12	0.16 s	8	0.46 s	23		
Finland										
Ireland	0.5 s	25	0.5 s	25	0.74 s	37	0.74 s	37	0.36 s	18
Norway	0.2 s	10	0 s	0	0.5 s	25	0 s	0		
Sweden	0.24 s	12	0.24 s	12	0.24 s	12	0.74 s	37		
Switz.	0.48 s	24	0.6 s	30	0.3 s	15	0.44 s	22	0.22 s	11
Portugal										
Holland	0.24 s	12	0.24 s	12	0.5 s	25	0.5 s	25		
Spain	0.16 s	8	0.16 s	8						
Israel	0.24 s	12	0.24 s	12	0.48 s	24	0.48 s	24		
USA										
Asia										
Australia	0.24 s	12	0.24 s	12	0.5 s	25	0.5 s	25		

Country	32D		32E		32F		330		331	
France									4, 12.5	43(H)
Germany	0.48 s	24							3, 50	31(H)
UK/Univ	0.52 s	26					2 s	100	4, 12.5	43(H)
Italy									4, 75	40(H)
Austria	0.4 s	20							4, 25	42(H)
Belgium									4, 12.5	43(H)
Denmark									4, 25	42(H)
Finland										
Ireland	0.36 s	18					0.7 s	35	4, 12.5	43(H)
Norway									4, 75	40(H)
Sweden									4, 12.5	43(H)
Switz.	0.22 s	11	0.16 s	8	0.6 s	30			5, 50	51(H)
Portugal										
Holland									4, 50	41(H)
Spain									4, 50	41(H)
Israel									4, 50	41(H)
USA										
Asia										
Australia									4, 50	41(H)

Country	332/333			334/335			336	
France	474 Hz	04(H)	74(H)	406 Hz	04(H)	06(H)	1.5 s	75
Germany								
UK/Univ								
Italy								
Austria								
Belgium	1160Hz	11(H)	60(H)	1110Hz	11(H)	10(H)	4, 50%	41(H)
Denmark								
Finland								
Ireland								
Norway								
Sweden								
Switz.								
Portugal								
Holland	563 Hz	05(H)	63(H)	76 Hz	00(H)	76(H)	1.1 s	55
Spain	620 Hz	06(H)	20(H)	580 Hz	05(H)	80(H)	1.5 s	75
Israel								
USA								
Asia								
Australia								

Country	337/338		339		33A		33B/33C		33D/33E
France	12 s	600	1.5 s	75	0.04 s	2	0	0	
Germany							0	0	
UK/Univ							0	0	
Italy							0	0	
Austria							0	0	
Belgium	20 s	1000	0.32 s	16	0.68 s	34	0	0	
Denmark							0	0	
Finland							0	0	
Ireland							0	0	
Norway							0	0	
Sweden							0	0	
Switz.							0	0	
Portugal							0	0	
Holland	15 s	750	1.1 s	55	0.08 s	4	0	0	
Spain	12.8 s	640	0.72 s	36	0.1 s	5	3 s	150	
Israel							0	0	
USA							0	0	
Asia							0	0	
Australia							0	0	

Only used by Sweden:
512 Hz
33D: 05(H)
33E: 12(H)

Country	33F/340			341		342/343		344	
France									
Germany									
UK/Univ									
Italy									
Austria									
Belgium									
Denmark									
Finland									
Ireland									
Norway									
Sweden	340 Hz	03(H)	40(H)	0.8 s	40	5.12 s	256	0.8 s	40
Switz.									
Portugal									
Holland									
Spain									
Israel									
USA									
Asia									
Australia									

Country	345		346		348		349	
France			0	0	0	0	0	0
Germany			0	0	0.3 s	15	90 ms	90
UK/Univ			0	0	0.3 s	15	90 ms	90
Italy			0	0	0.3 s	15	90 ms	90
Austria			0	0	0.3 s	15	100 ms	100
Belgium			0	0	2 s	100	90 ms	90
Denmark			0	0	0.3 s	15	90 ms	90
Finland			0	0	0.3 s	15	90 ms	90
Ireland			0	0	0.3 s	15	90 ms	90
Norway			0	0	0.5 s	25	90 ms	90
Sweden	0.06 s	3	4 s	200	0.3 s	15	90 ms	90
Switz.			0	0	0.3 s	15	90 ms	90
Portugal			0	0	0.3 s	15	90 ms	90
Holland			0	0	0.3 s	15	90 ms	90
Spain			0	0	2 s	100	90 ms	90
Israel			0	0	0.3 s	15	90 ms	90
USA			0	0	0	0	0	0
Asia			0	0	0	0	0	0
Australia			0	0	0	0	0	0

Country	34A/34B			34C		34D		34E	
France	19	FF(H)	19(H)			-32.5	40(H)	53 s	53
Germany	00	FF(H)	00(H)			-49.5	C0(H)	53 s	53
UK/Univ	010	F0(H)	10(H)	1 s	50	-49.5	C0(H)	53 s	53
Italy	00	FF(H)	00(H)			-49.5	D1(H)	53 s	53
Austria	00	FF(H)	00(H)			-49.5	C0(H)	36 s	36
Belgium	00	FF(H)	00(H)			-32.5	44(H)	59 s	59
Denmark	009	F0(H)	09(H)			-32.5	40(H)	53 s	53
Finland	990	F9(H)	90(H)	2 s	100	-32.5	40(H)	53 s	53
Ireland	16	FF(H)	16(H)			-40.5	80(H)	53 s	53
Norway	095	F0(H)	95(H)			-32.5	40(H)	53 s	53
Sweden	009	F0(H)	09(H)			-32.5	40(H)	53 s	53
Switz.	00	FF(H)	00(H)			-40.5	80(H)	92 s	92
Portugal	00	FF(H)	00(H)			-32.5	40(H)	53 s	53
Holland	09	FF(H)	09(H)			-26.5	00(H)	53 s	53
Spain	07	FF(H)	07(H)			-40.5	80(H)	79 s	79
Israel	00	FF(H)	00(H)			-49.5	C0(H)	59 s	59
USA						-49	C0(H)	53 s	53
Asia						-49.5	C0(H)	53 s	53
Australia						-49.5	C0(H)	53 s	53

Country	34F		350		351				353 (Hz)	
France	6	6	5	5	8 s	4			58.8	17
Germany	4	4	2	2	12 s	6			58.8	17
UK/Univ	3	3	2	2	12 s	6			50	20
Italy	3	3	2	2	18 s	9			55.5	18
Austria	3	3	1	1	12 s	6			76.9	13
Belgium	4	4	6	6	16 s	8			47.6	21
Denmark	3	3	1	1	12 s	6			30.3	33
Finland	3	3	2	2	12 s	6			62.5	16
Ireland	3	3	2	2	12 s	6			27.8	36
Norway	3	3	2	2	12 s	6			62.5	16
Sweden	3	3	2	2	12 s	6			58.8	17
Switz.	5	5	1	1	12 s	6			62.5	16
Portugal	3	3	1	1	12 s	6			33.3	30
Holland	3	3	2	2	12 s	6			62.5	16
Spain	3	3	1	1	48 s	24			40	25
Israel	14	14	1	1	12 s	6			62.5	16
USA	3	3	5	5	12 s	6			76.9	13
Asia	3	3	5	5	12 s	6			58.8	17
Australia	3	3	5	5	16 s	8			71.4	14

Country	354 (Hz)		355 (Hz)		356 (Hz)		357		358	
France	43.5	23					2	2	0.22 s	11
Germany	20.8	48					1	1	0.22 s	11
UK/Univ	11.9	84					1	1	0.22 s	11
Italy	13.0	77					2	2	0.22 s	11
Austria	18.5	54					1	1	0.22 s	11
Belgium	13.9	72					2	2	0.22 s	11
Denmark	20	50	62.5	16	41.7	24	1	1	0.22 s	11
Finland	17.9	56					2	2	0.5 s	25
Ireland	14.9	67					1	1	0.22 s	11
Norway	17.9	56					1	1	0.35 s	18
Sweden	19.6	51					1	1	0.3 s	15
Switz.	19.6	51					3	3	0.22s	11
Portugal	12.8	78	62.5	16	41.7	24	1	1	0.3 s	15
Holland	19.2	52					2	2	0.3 s	15
Spain	20	50					2	2	0.3 s	15
Israel	12	83					2	2	0.22 s	11
USA	12	83					1	1	0.22 s	11
Asia	12	83					1	1	0.22 s	11
Australia	12	83					3	3	0.3 s	15

Country	359		35A/35B		35C		35D		35E	
France	0.22 s	11	5.2 s	260	67 ms	67	65 ms	65	35 ms	35
Germany	0.22 s	11	8 s	400	50 ms	50	60 ms	60	41 ms	41
UK/Univ	0.22 s	11	8 s	400	252ms	252	66 ms	66	35 ms	35
Italy	0.22 s	11	8 s	400	58 ms	58	60 ms	60	40 ms	40
Austria	0.22 s	11	8 s	400	53 ms	53	62 ms	62	39 ms	39
Belgium	0.22 s	11	8 s	400	61 ms	61	67 ms	67	33 ms	33
Denmark	0.22 s	11	8 s	400	53 ms	53	67 ms	67	33 ms	33
Finland	0.5 s	25	8 s	400	61 ms	61	60 ms	60	42 ms	42
Ireland	0.22 s	11	8 s	400	255ms	255	67 ms	67	33 ms	33
Norway	0.35 s	18	8 s	400	61 ms	61	59 ms	59	41 ms	41
Sweden	0.3 s	15	8 s	400	100ms	100	60 ms	60	40 ms	40
Switz.	0.22s	11	8 s	400	60 ms	60	60 ms	60	40 ms	40
Portugal	0.3 s	15	8 s	400	61 ms	61	66 ms	66	34 ms	34
Holland	0.3 s	15	8 s	400	58 ms	58	62 ms	62	40 ms	40
Spain	0.3 s	15	6 s	300	75 ms	75	60 ms	60	33 ms	33
Israel	0.22 s	11	8 s	400	61 ms	61	61 ms	61	39 ms	39
USA	0.22 s	11	8 s	400	77 ms	77	64 ms	64	38 ms	38
Asia	0.22 s	11	8 s	400	61 ms	61	66 ms	66	34 ms	34
Australia	0.3 s	15	8 s	400	255ms	255	68 ms	68	32 ms	32

Country	35F		360		361		362		363	
France	50 ms	50	0.8 s	80	0	0	70 ms	70	70 ms	70
Germany	44 ms	44	0.92 s	92	0.92 s	92	90 ms	90	90 ms	90
UK/Univ	44 ms	44	0.54 s	54	0.66 s	66	0.1 s	100	0.1 s	100
Italy	44 ms	44	0.8 s	80	3 s	150	80 ms	80	80 ms	80
Austria	50 ms	50	0.88 s	88	0.92 s	92	80 ms	80	80 ms	80
Belgium	50 ms	50	0.86 s	86	0.52 s	52	70 ms	70	70 ms	70
Denmark	50 ms	50	0.52 s	52	0.52 s	52	90 ms	90	90 ms	90
Finland	50 ms	50	0.8 s	80	1.2 s	120	70 ms	70	75 ms	75
Ireland	50 ms	50	0.6 s	60	0.66 s	66	70 ms	70	70 ms	70
Norway	50 ms	50	0.66 s	66	0.66 s	66	70 ms	70	70 ms	70
Sweden	70 ms	70	0.36 s	36	0.52 s	52	70 ms	70	70 ms	70
Switz.	60 ms	60	0.52 s	52	0	0	70 ms	70	70 ms	70
Portugal	50 ms	50	0.66 s	66	0.66 s	66	70 ms	70	70 ms	70
Holland	42 ms	42	0.66 s	66	0.66 s	66	70 ms	70	70 ms	70
Spain	75 ms	75	0.64 s	64	2 s	200	70 ms	70	0.14 s	140
Israel	50 ms	50	0.92 s	92	2.02 s	202	90 ms	90	90 ms	90
USA	74 ms	74	0.92 s	92	2.02 s	202	0.1 s	100	0.1 s	100
Asia	50 ms	50	0.72 s	72	2.02 s	202	0.1 s	100	0.11 s	110
Australia	70 ms	70	0.72 s	72	2.02 s	202	0.1 s	100	0.11 s	110

Country	364		365		366		367		368	
France	12	6	10	10	10	0	10	0	10	0
Germany	14	7	6	6	8	4	7.5	3	7	2
UK/Univ	18	9	8	8	9	2	9	2	8	0
Italy	12	6	6	6	6	0	6	0	6	0
Austria	12	6	6	6	6	0	6	0	6	0
Belgium	12	6	6	6	6	0	6	0	6	0
Denmark	18	9	10	10	10	0	10	0	10	0
Finland	18	9	10	10	10	0	10	0	10	0
Ireland	18	9	10	10	10	0	10	0	10	0
Norway	18	9	9	9	10	2	10	2	9	0
Sweden	18	9	10	10	10	0	10	0	10	0
Switz.	12	6	5	5	6	2	5.5	1	4.5	1
Portugal	18	9	6	6	6	0	6	0	6	0
Holland	18	9	7	7	7	0	7	0	7	0
Spain	12	6	10	10	10	0	10	0	10	0
Israel	12	6	6	6	6	0	6	0	6	0
USA	15	7.5	9	9	9	0	9	0	9	0
Asia	12	6	6	6	6	0	6	0	6	0
Australia	20	10	11	11	12	2	12	2	11	0

4.5. 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.

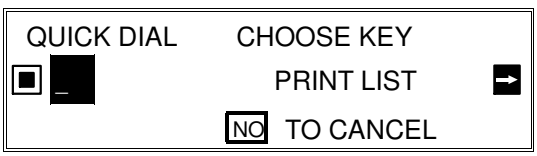
The programming procedure will be explained first. Then, the seven bytes will be described.

4.5.1. Programming Procedure

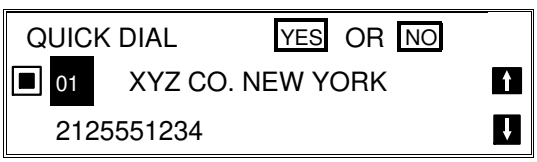
1. Set bit 5 of bit switch 01 to 1.
2. Either use Function 31 (for a Quick Dial number) or Function 32 (for a Speed Dial number).

   Example: Change the Parameters in Quick Dial 10.

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

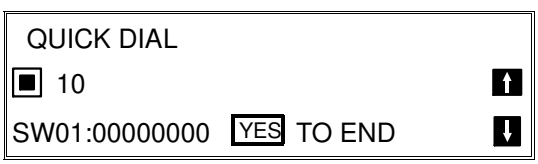


4. Press Quick Dial key **10**



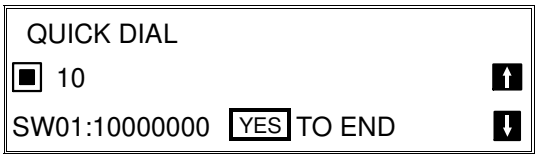
   Note: When selecting Speed Dial 10 with Function 32: **1** **0** at the ten key pad.

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.

4.5.2. 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 35 s.

Caution: If the value of byte 4 is 0, the CCITT T1 timer is 35 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 8 are only used if the ISDN kit has been installed. These bytes are explained in the service manual for the ISDN kit.

4.6. SERVICE CALLS

4.6.1. Excessive Jam Calls

Excessive jam calls automatically notify the service station (function 14) when the machine's scanner or printer frequently has jam problems. A sub code stored at 080698(H) gives you the precise location of the excessive jam.

There are excessive jam calls for eight types of jam:

- ADF jam (Sub code - 80)
- Jam in the duplex unit (Sub code - 81)
- Jam at the first paper feed station (Sub code - 82)
- Jam at the second paper feed station (Sub code - 83)
- Jam at the third paper feed station (Sub code - 84)
- Jam at the fourth paper feed station (Sub code - 85)
- Jam in the paper exit area (Sub code - 86)
- Jam in the fusing unit (Sub code - 87)

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

Each time a jam occurs: JAM is increased by 1, NO-JAM1 and NO-JAM2 are both set to 0. When JAM reaches CALL, the machine sends an Auto Service Report, a Service Monitor Report, and a System Parameter List. The Auto Service Call contains an error message, indicating which type of jam has caused the problem.

If a copy or printout is made without a jam occurring: NO-JAM1 and NO-JAM2 are both increased by 1. When NO-JAM1 reaches DEC, NO-JAM1 is set to zero, and JAM is decreased by 1. When NO-JAM2 reaches CLR, NO-JAM2 is set to zero, and JAM is also set to 0.

You can adjust the values of CALL, DEC, and CLR for each type of jam by rewriting RAM data (function 06). The values must be within the following range.

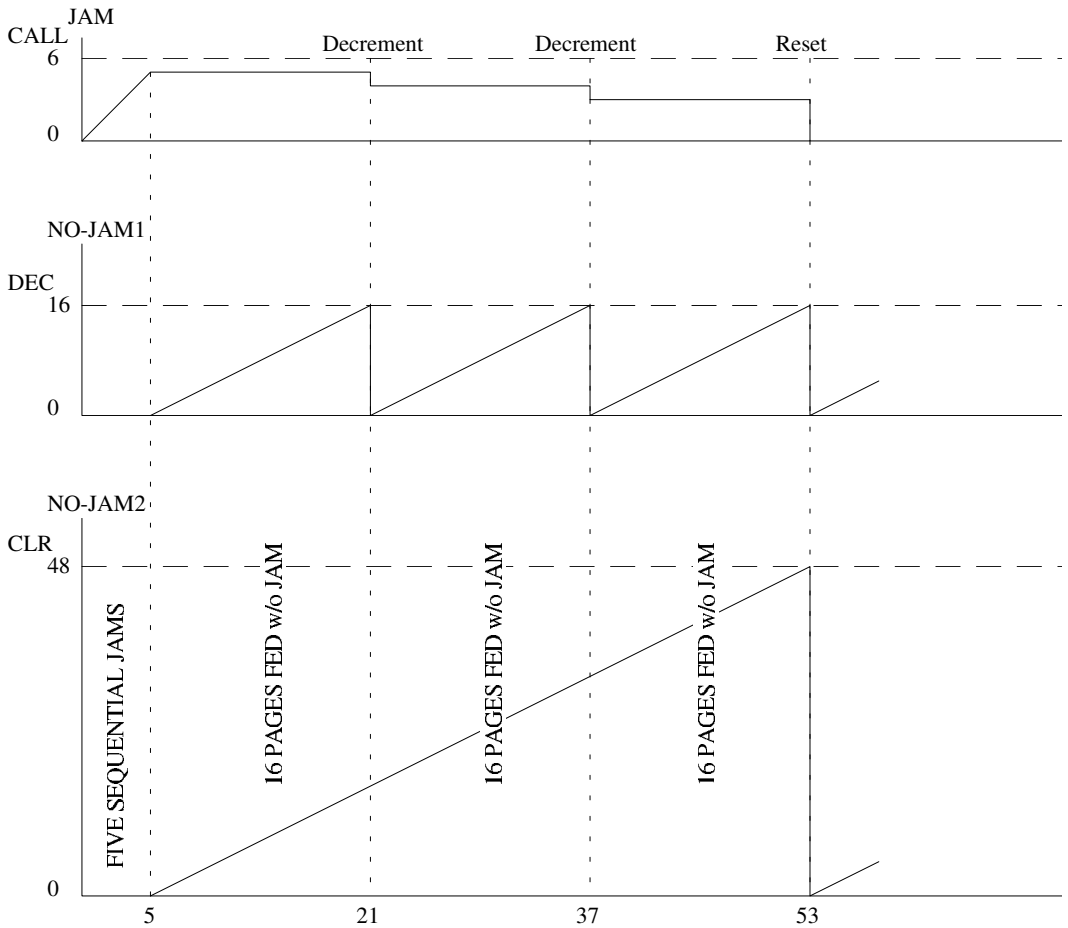
DEC: 1 through 255 (01(H) - FF(H))
CALL: 3 through 15
CLR: 1 through 65535 (0001(H) - FFFF(H))
(Normally, CLR should be three times the value of DEC.)

If either DEC or CALL is zero, the excessive jam call is disabled.
The factory settings for each type of jam are the same:

- DEC: 16 (stored as 10[H])
- CALL: 6 (stored as 06[H])
- CLR: 48 (stored as 30[H])

With these factory settings, the JAM counter is decremented when 16 pages have been fed successfully, and it is cleared when 48 pages have been fed successfully. This means that the service station will only be alerted if jams frequently occur within a short period.

The following diagram shows how the counters work. In the example shown, the machine experiences five successive jams, followed by 48 successfully fed pages.



The RAM addresses for each type of jam are listed below. (CLR and NO-JAM2 have two bytes; the byte in the upper row is the low byte).

Threshold Values

	Address								Default
	Scanr.	Duplex	1st Feed Stn.	2nd Feed Stn.	3rd Feed Stn.	4th Feed Stn.	Feed-out	Fusing Unit	
DEC	0806B0	0806B4	0806B8	0806BC	0806C0	0806C4	0806C8	0806CC	10[H]
CALL	0806B1	0806B5	0806B9	0806BD	0806C1	0806C5	0806C9	0806CD	06[H]
CLR	0806B2	0806B6	0806BA	0806BE	0806C2	0806C6	0806CA	0806CE	30[H]
	0806B3	0806B7	0806BB	0806BF	0806C3	0806C7	0806CB	0806CF	00[H]

Current Counter Values

	Address							
	Scanr.	Duplex	1st Feed Stn.	2nd Feed Stn.	3rd Feed Stn.	4th Feed Stn.	Feed-out	Fusing Unit
NOJAM1	0806D0	0806D4	0806D8	0806DC	0806E0	0806E4	0806E8	0806EC
JAM	0806D1	0806D5	0806D9	0806DD	0806E1	0806E5	0806E9	0806ED
NOJAM2	0806D2	0806D6	0806DA	0806DE	0806E2	0806E6	0806EA	0806EE
	0806D3	0806D7	0806DB	0806DF	0806E3	0806E7	0806EB	0806EF

The Call Service indicator does not light for an excessive jam call, and the machine can be operated normally after the auto service call is made. Also, the RAM addresses of the counters related to the jam location are reset to zero automatically after the call.

4.6.2. Periodic Service Call

The periodic service call notifies the condition of the machine to the service station programmed with function 14. The call is made periodically at a time interval programmed in the following RAM addresses.

Parameters		Address (H)
Call interval: 01 through 15 month(s) (BCD) 00: Periodic Service Call Disabled		08069A
Date and time of the next call		
	Year: last two digits of the year (BCD)	08069B
	Month: 01 through 12 (BCD)	08069C
	Day: 01 through 31 (BCD)	08069D
	Hour: 00 through 23 (BCD)	08069E

Caution:
Data stored in these addresses have to be within the specified range and in BCD format. Otherwise, the service call will not work correctly.

When the date and time programmed at these addresses has passed, the machine automatically places a service call to the service station and sends three reports (auto service report, service monitor report, and system parameter list). “EM manual call” is printed on the auto service report as an error message.

The default setting for this feature is off. To switch periodic service call on, just program the required call interval at address 08069A(H). Then, the date and time of the next call are automatically calculated and stored in the appropriate RAM addresses. For example, if the call interval is programmed as 03 (BCD) months and the current date and time is Dec. 24, 1993; 03:10PM, the following data are stored:

94 at 08069B(H) for 1994
03 at 08069C(H) for March
24 at 08069D(H) for 24th
15 at 08069E(H) for 3PM

To change these settings after programming, change the interval first with function 06, exit the function, then change the remaining parameters one by one if the settings are not the expected ones. The day and hour can be adjusted by altering the data in the RAM, but the year and the month cannot.

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

4.6.3. PM Call

If bit 7 of Bit Switch 01 is set to 0, the PM call will notify the service station that the time for PM has come. To switch on the call, program the counter interval at the following RAM addresses in BCD format. The initial setting is 60,000 sheets.

Address	Bits 7 - 4	Bits 3 - 0
080695	Tens	Units
080696	Thousands	Hundreds
080697	Hundred thousands	Ten thousands

When the date and time programmed at these addresses has passed, the machine automatically places a service call to the service station and sends three reports (auto service report, service monitor report, and system parameter list). “PM call” is printed on the auto service report as an error message.

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

4.6.4. Effective Term of Service Calls

A time limit for the effectiveness of service calls can be programmed at the following addresses.

	Address (H)
Year: last two digits of the year (BCD)	0806F0
Month: 01 through 12 (BCD)	0806F1
Day: 01 through 31 (BCD)	0806F2

After the date programmed in these addresses has passed, all types of service call are disabled. When all of these addresses are 00(H), there is no limit.

4.7. SERVICE RAM ADDRESSES

080000 RAM Reset Level 1
Change the data at this address to 00(H), then switch the machine off and on to reset all the system settings. (**Note:** The FAX/COPY switch must be at the FAX side before changing this RAM.)
Caution: Before using this RAM, print the settings of all the system parameters (System Parameter List) and SP mode parameters (RAM addresses 080400 - 8085FF).

080002 - 080005 FCU ROM Version

080002	Suffix (ASCII)
080003	Year (BCD)
080004	Month (BCD)
080005	Day (BCD)

080008 - 08001B Machine's Serial Number programmed by function 15.

080020 - 08003F Bit Switches (Refer to section 4.2 for details)

080040 (Service Switch 00)
TTI printing position (from the left side) BCD: 00 - 98 (mm) [Even numbers only]

080044 (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

080045 (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 080055) if forwarding is on 0: Disconnection, 1: Normal reception without forwarding

080046 (Service Switch 06)
Maximum number of dialling attempts for TRD Hex: 00 - FF

080047 (Service Switch 07): Number of page retransmission attempts (Hex code)

080048 (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 3: Polarity change detection 0: Enabled, 1: Disabled
Bit 4: Addition of TCF when AI short protocol is 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

080049 (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

08004A (Service Switch 0A)

Bit 2: inch-to-mm conversion (transmission) 0: Disabled 1: Enabled
Bit 3: inch-to-mm 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

080053 (Service Switch 13)

Bit 0: Not used
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

080054 (Service Switch 14)

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

080055 (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 = 2 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.

080058 (Service Switch 18): Number of redialling attempts, including the first dialling attempt (memory tx)
Hex : 00 - FF

080059 (Service Switch 19): Redialling interval (memory tx) Hex: 00 - FF (minutes)

08005B (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
0: Enabled (the machine adjusts the telephone number of the transfer requester before dialling it, to take account of differences in area codes and similar factors)
1: Disabled

08005C (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

08005D (Service Switch 1D): Time for which RDS is enabled after the user has switched it on BCD: 00 - 99 (hours)

08005E (Service Switch 1E)
Bit 5: Tranmission of a blank CSI (all spaces) if no CSI is programmed
0: Disabled, 1: Enabled

080061
Bit 7: Length of the DIS frame 0: 6 bytes, 1: 4 bytes

080080 - 08008F: User Parameters (see the Operator's manual for details)

0800A0 - 0800BF: G4 Internal Switches
Refer to the ISDN G4 option manual for details.

0800C0 - 0800CF: G4 Parameter Switches
Refer to the ISDN G4 option manual for details.

0800E0: SAF Memory Size ***(Read only; Do not change the setting)***
00(H): Standard (1 MB)
01(H): With 1MB memory option (2MB total)
02(H): With 2MB memory option (3MB total)
03(H): With 40MB HDD option (40MB total)

0800E1: ISDN G4 Option ***(Read only; Do not change the setting)***
01(H): Installed

0800E3: Optional Paper Feed Unit ***(Read only; Do not change the setting)***
03(H): Installed

0800E5: Duplex Unit/Sorter ***(Read only; Do not change the setting)***
00(H): Not installed
01(H): Duplex unit installed
40(H): Sorter installed
41(H): Duplex unit and sorter are both installed

0800F8: Number of RTI characters (Hex)
0800F9 - 08010D: RTI (ASCII)

08010E: Number of CSI characters (Hex)
08010F - 080123: CSI (ASCII)

080124: Number of TTI characters (Hex)
080125 - 080144: TTI (ASCII)

080146: ID Code (Hex: Lower byte)
080147: ID Code (Hex: Upper byte)

080148: Confidential ID (BCD: Lower byte)
080149: Confidential ID (BCD: Upper byte)

0801A6 - 0801A8: Master Counter

Address	Upper byte	Lower byte
0801A6	Tens digit	Units digit
0801A7	Thousands digit	Hundreds digit
0801A8	Hundred thousands digit	Ten thousands digit

0801B5 - 0801B7: ADF Jam Counter
0801B8 - 0801BA: ADF Feed Counter
0801BB - 0801BD: PM Counter
0801BE - 0801C0: Service Call Counter
0801C4 - 0801C6: Total Printer Jam Counter
0801C7 - 0801C9: Counter for Jams at Registration and Relay
0801CA - 0801CC: Jam Counter for the First Paper Feed Station
0801CD - 0801CF: Jam Counter for the Second Paper Feed Station
0801D0 - 0801D2: Jam Counter for the Third Paper Feed Station
0801D3 - 0801D5: Jam Counter for the Fourth Paper Feed Station
0801D6 - 0801D8: Jam Counter for the Duplex Unit

0801F0 - 080208: ISDN G4 TID (ASCII)
080209: Number of ISDN CSI Characters (Hex)
08020A - 08021E: ISDN CSI (ASCII)
080223 - 080226: ISDN International Dial Prefix (ASCII)
08024F - 080252: ISDN G4 Subaddress (ASCII)
080253 - 080256: ISDN G3 Subaddress (ASCII)

080261 - 080264 SPU ROM Version ***(Read only)***

080261	Suffix (ASCII)
080262	Year (BCD)
080263	Month (BCD)
080264	Day (BCD)

080265 (Copier Switch 00)
Bit 1: Automatic paper size selection enabled at power up 1: Enabled
Bit 2: Stamp position 0: Bottom of page, 1:Top of page
Bit 5: Standby mode after auto reset 1: Enabled
Bit 6, 7: Auto reset timer

Bit 6	Bit 7	Setting
0	0	1 minute
1	0	3 minutes
0	1	Auto reset disabled
Other settings		Not used

080266 (Copier Switch 01)

Bit 0: Limitless paper feed 0: Enabled

If set to 0: When a cassette becomes empty, the machine will automatically shift to a cassette with the same paper size.

Bit 1: SADF mode reset timer 0: 4 s, 1: 60 s

Bit 2: Original size detection timing

0: Only before scanning the 1st page, 1: Before scanning each page

Bit 4: Last page auto feed out after copying odd number of pages in duplex mode 0: Enabled

Bit 5: Mechanical counter increment for Double-letter/A3 size copying

0: Counts twice, 1: Counts once

Bit 6: Increment or decrement the number of copies indicated on the screen during copying

0: Increment, 1: Decrement

Bit 7: Key counter increment timing

0: At the start of paper feed, 1: After paper feed out

080267 (Copier Switch 02)

Bit 0, 1: Type of center line in double-copy mode

Bit 0	Bit 1	Setting
0	0	Broken line
1	0	Solid line
0	1	No line
1	1	No line

Bit 3: Image shift on back page of duplex copies

0: Image is shifted down by 5 mm

1: Disabled

080268 (Copier Switch 03)

Bits 0, 1, 2: ADF original length detection

Bit 0 = 0: A3, 1: Double-letter

Bit 1 = 0: B4, 1: Legal

Bit 2 = 0: A4, 1: Letter

These bits ensure that error correction for the pulse counter mechanism in the feed roller is suitable for the types of paper used.

Bits 4, 6, 7: Original size detection on the exposure glass

Bit 4 = 0: A3, 1: Double-letter

Bit 6 = 0: A4, 1: Legal

Bit 7 = 0: A5, 1: Not used

These bits determine the paper size that the machine assumes is present when the original width and length sensors are activated.

080269 (Copier Switch 04)
Bits 0 to 3 (Europe/Asia): Use of N. American standard paper sizes
To use a N. American paper size, put a paper size detector actuator for F size in the cassette, then set this RAM address to the required settings.
Example: If a customer wants to have one cassette for letter-sized paper, put an actuator for F size in that cassette, and set these bits to 1,1,1,0 or 0,0,0,1.
The setting for F size (1,0,0,1) has the same effect as the setting for "Disabled".

Bit	0	1	2	3	Setting
	0	0	0	0	Disabled
	1	1	1	0	8.5 x 11" (Letter ⊐)
	0	0	0	1	11 x 8.5" (Letter ⊏)
	1	0	0	1	F ⊏
	0	0	1	1	11 x 17" (Double Letter ⊐)
	0	1	0	1	8.5 x 14" (Legal ⊐)

08026A (Copier Switch 05)
Maximum Copy Quantity (this can be from 1 to 99, programmed in hex code)

080400 - 0804FF: Scanner SP Mode Parameters (Refer to section 4.3 for details.)
Lower two digits of an address represents a parameter number.
(e.g., 0804**1F** is for the scanner SP mode parameter 1F.)

080500 - 0805FF: Printer SP Mode Parameters (Refer to section 4.3 for details.)
Lower two digits of an address represents a parameter number.
(e.g., 0805**1F** is for the printer SP mode parameter 1F.)

080605 - 080607: Number of copy jams in location (A) [BCD]
080608 - 08060A: Number of copy jams in location (B) [BCD]
08060B - 08060D: Number of copy jams in location (C) [BCD]
08060E - 080610: Number of copy jams in location (E) [BCD]
080611 - 080613: Number of copy jams in location (Y) [BCD]
080614 - 080616: Number of copy jams in location (R) [BCD]
080617 - 080619: Number of Auto Service Calls for Main Motor Lock Failure [BCD]
08061A - 08061C: Number of Auto Service Calls for Polygonal Mirror Motor Failure [BCD]
08061D - 08061F: Number of Auto Service Calls for Fusing Unit Failure [BCD]
080620 - 080622: Number of Auto Service Calls for Laser Diode Power Control Failure [BCD]
080623 - 080625: Number of Auto Service Calls for Scanner Home Position Failure [BCD]
080626 - 080628: Number of Auto Service Calls for Fuse Failure [BCD]
080629 - 08062B: Number of Auto Service Calls for Master Unit Failure [BCD]

080698: Details of the current Auto Service Call
00(H): PM call interval (number of pages between PM calls) expired
01(H): Fusing Unit Failure - temperature exceeded 220 °C
02(H): Fusing Unit Failure - temperature did not reach 50°C within 40 seconds of switching the machine on.
11(H): Main Motor Failure - lock not achieved within 3 seconds of switching on
21(H): Polygonal Mirror Motor Failure - lock not achieved within 5 seconds of switching on
41(H): Laser Diode Power Control Failure
51(H): Master Unit Motor Failure - lock not achieved within 10 seconds of switching on
61(H): Scanner Home Position Failure - home position not achieved within 14 seconds
71(H): Fuse Failure - either the PFU Main Motor fuse, ADF, or general +24V fuse has blown
80(H): Excessive jams in the ADF
81(H): Excessive jams in the duplex unit
82(H): Excessive jams at the first paper feed station
83(H): Excessive jams at the second paper feed station
84(H): Excessive jams at the third paper feed station
85(H): Excessive jams at the fourth paper feed station
86(H): Excessive jams in the paper exit area (including jams in the sorter, if installed)
87(H): Excessive jams in the fusing unit
90(H): The used toner tank is full
A0(H): The PM interval has expired

080699: Reason for the Auto Service Call

Bit 0 - 1: Main Motor Failure	Bit 4 - 1: Laser Diode Power Control Failure
Bit 1- 1: Polygonal Mirror Motor Failure	Bit 5 - 1: Scanner Home Position Failure
Bit 2 - Not used	Bit 6 - 1: Fuse Failure
Bit 3 - 1: Fusing Unit Failure	Bit 7 - 1: Master Unit Motor

All error conditions can be cleared by switching the main power off/on, except for Fusing Unit Failure. To clear a Fusing Unit Failure, enter 00 in this address, then turn the main switch off/on.

4.8. SPECIAL TOOLS AND LUBRICANTS

- Scanner positioning pins (4 pcs.): P/N A0069104
- Test chart - OS-A3 (10 pcs): P/N 54209516
- Silicone grease G-501: P/N 52039501
- Heat resistant grease (MT-78): P/N 54479078

4.9. PM TABLE

C: Clean, R: Replace, L: Lubricate, A: Adjust, I: Inspect

Main Body

ITEM	EM	60K	120K	180K	NOTES
Scanner					
Reflector	C	C	C	C	Optics cloth
Exposure Glass	C	C	C	C	Alcohol or water with soft cloth. For units used in low humidity areas where static electricity may cause original jams, the glass should be polished periodically with silicone oil.
Mirrors and Lenses	C	C	C	C	Optics cloth
Scanner Guide Rails	C	C	C	C	Dry cloth
Xenon Lamp	I/R				Replace if necessary.
Laser Unit					
Toner Shield Glass	C	C	C	C	Alcohol or water
Paper Feed					
Paper Feed Roller	C	C	R	C	Water
Registration Roller	C	C	C	C	Water
Registration Roller Mylar	C	C	C	C	Alcohol
Paper Cassette Bottom Plate Pad	C	C	C	C	Alcohol
Printer					
Charge Corona Wire	C				Dry cloth
Charger Grid Plate	C				Dry cloth
Transfer Corona Unit	C	C	C	C	Dry cloth
Timing Belt	I/A	I/A	I/A	I/A	Adjust belt tension if necessary
Development Unit	I	R	R	R	
Ozone Filter	I	R	R	R	
Fusing					
Hot Roller				R	
Pressure Roller		C	C	R	
Pressure Roller Bushing				R	
Hot Roller Stripper				R	
Thermistor	I	I	I	I	
Fusing Entrance Guide Plates	C	C	C	C	Alcohol

Continued on the next page

ADF

ITEM	EM	60K Originals	120K Originals	180K Originals	NOTES
Transport Belt	C/I/R	C	C	C	Alcohol
Separation Belt	C	R	R	R	Water
Separation Roller	C	C	C	C	Water

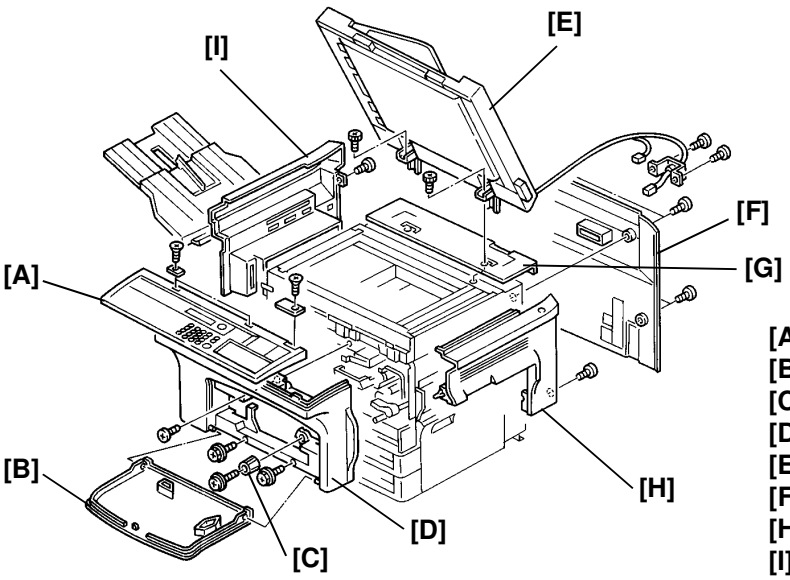
Paper Feed Unit

ITEM	EM	60K	120K	180K	NOTES
Paper Feed Roller	C	C	R	C	Water
Paper Cassette Bottom Plate Pad	C	C	C	C	Alcohol

5. REPLACEMENT AND ADJUSTMENT

5.1. COVERS

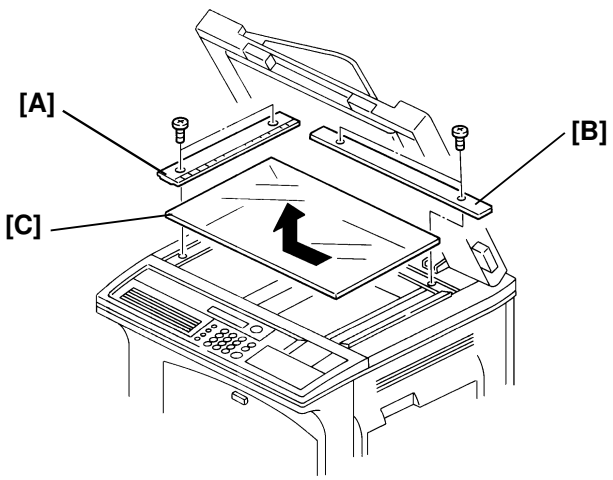
- Operation Panel Ass'y [A], Front Door [B], Front Cover [D], Optional ADF or Optional Platen Cover [E], Rear Cover [F], Rear Upper Cover [G], Right Cover [H], Left Cover [I]



[A]: 3 screws, 1 connector
[B]: 2 pins
[C]: 1 screw
[D]: 3 screws
[E]: 4 screws, 2 connectors
[F]: 4 screws
[H]: 1 screw, 1 pin
[I]: 1 screw

5.2. SCANNER

5.2.1. Exposure Glass [C]



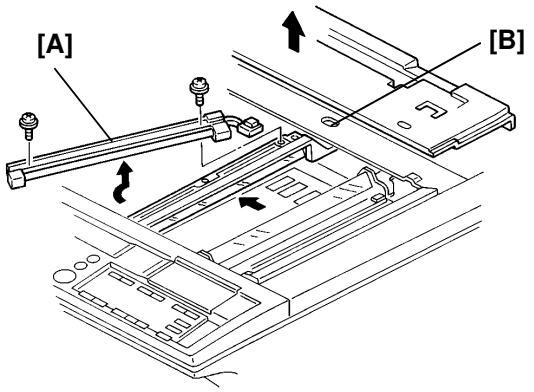
[A]: 2 screws
[B]: 2 screws

Hold the exposure glass firmly and move it to the left, then remove it.

Caution: When reinstalling the exposure glass, make sure the corner with the white mark is installed at the rear left corner.

5.2.2. Xenon Lamp [A]

- First, remove the Optional ADF or Optional Platen Cover then remove the Rear Upper Cover (see section 5.1) and Exposure Glass (see section 5.2.1). Move the First Scanner Unit to the center.
- Insert a small screwdriver through oval opening [B] to unplug the connector.

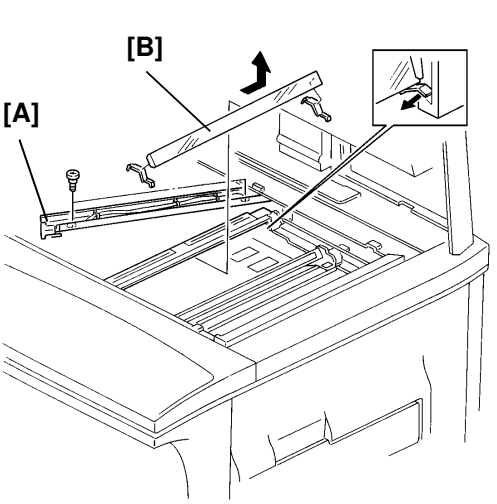


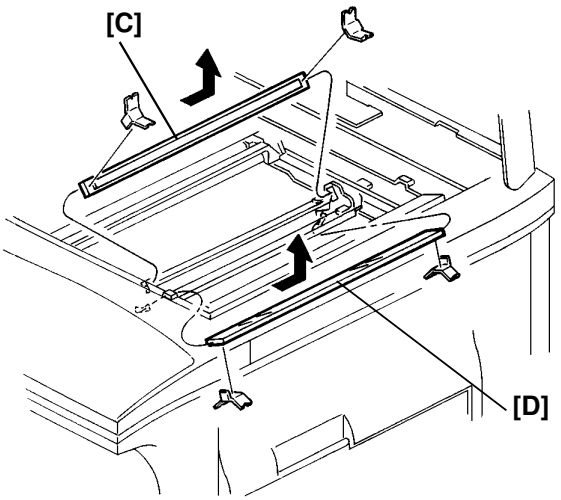
[A]: 2 screws, 1 connector

5.2.3. First Mirror [B], Second Mirror [C], Third Mirror [D]

Caution: Do not touch the mirror surface. If it is touched by mistake, use an optical cloth to clean it.

- First, remove the Xenon Lamp [A] (see section 5.2.2).



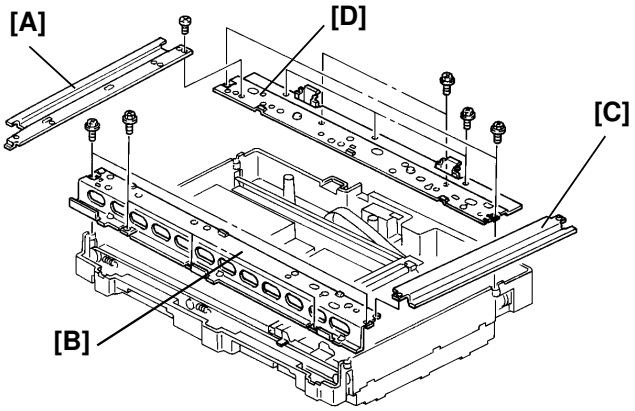


[B]: 2 spring plates
[C]: 2 spring plates
[D]: 2 spring plates

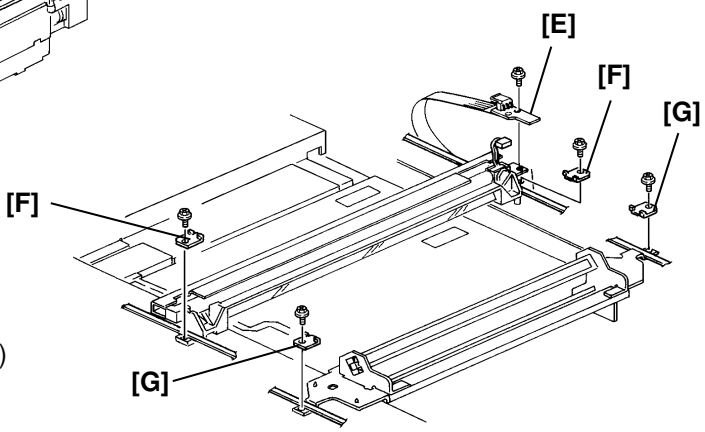
Caution: Make sure there is no play in the mirror position. If there is, replace the spring plates.

5.2.4. Scanner Belts

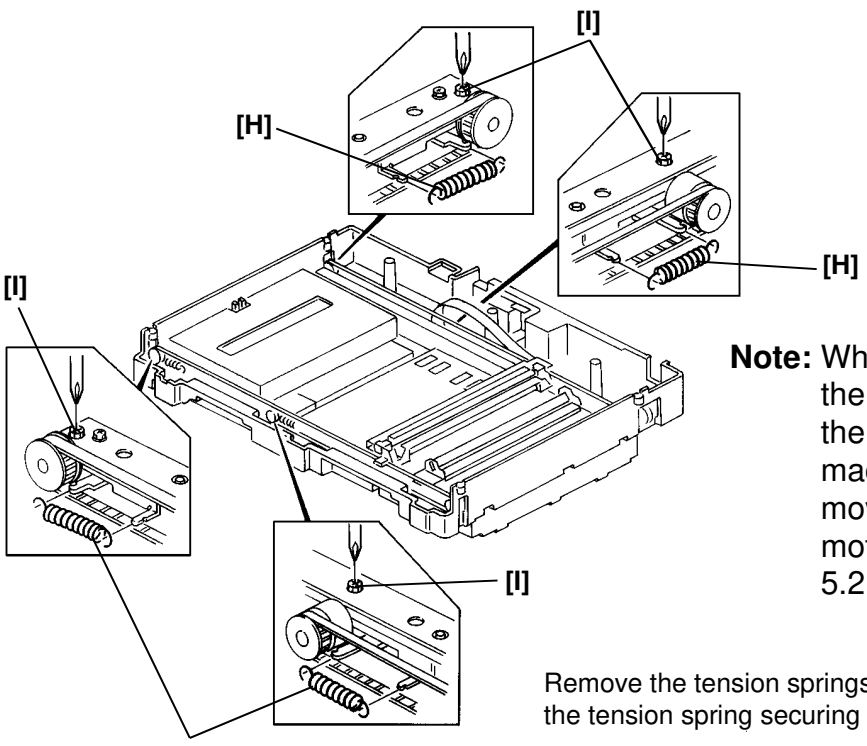
- First, remove the Exposure Glass (see section 5.2.1), Operation Panel Ass'y, Front Cover, Right Cover, Left Cover, Rear Cover, Rear Upper Cover, Copy Tray and Optional ADF or Optional Platen Cover (see section 5.1).



[A]: 1 screw
[B]: 5 screws
[D]: 7 screws



[E]: 1 screw, 1 connector
[F]: for the long belt (1 screw each)
[G]: for the short belt (1 screw each)



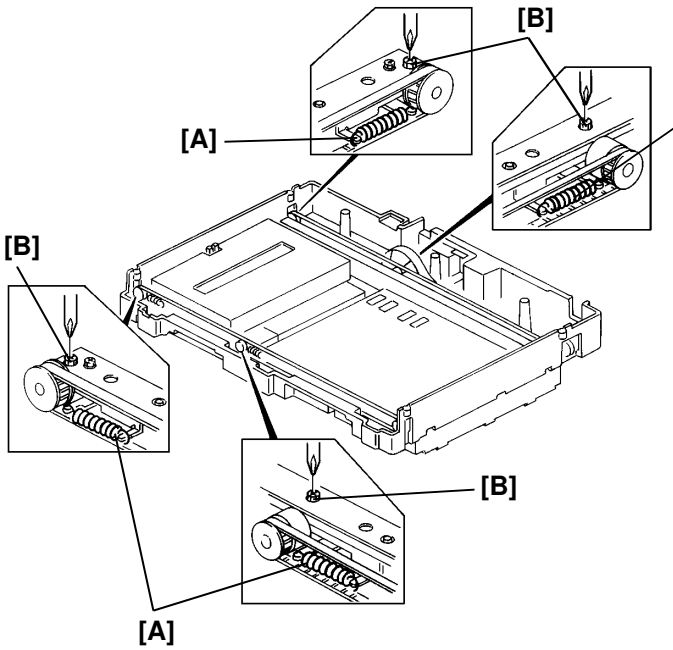
Note: When you replace the scanner belts at the rear side of the machine, first remove the scanner motor (see section 5.2.5).

Remove the tension springs [H], then loosen the tension spring securing screws [I].

Reassembly

- After replacing the belt, adjust it as shown below.

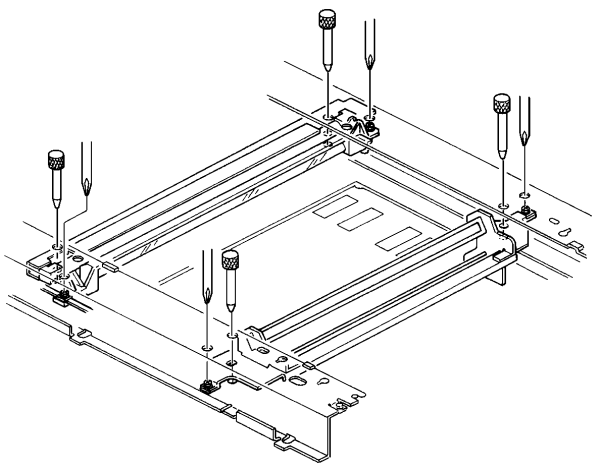
Tools Required
Scanner adjustment pin: P/N A0069104



1. Adjust the position of each tension spring [A] until the tension is satisfactory.
2. Tighten the screws [B].
3. Move the scanner slightly to ensure correct meshing of the belt teeth.
4. Loosen the screws [B].
5. Tighten the screws again.

Caution: Do not tighten the tapping screws too much, otherwise the scanner base may be broken.

Insert the adjustment pins into the positioning holes, then tighten the screws for each belt clamp.

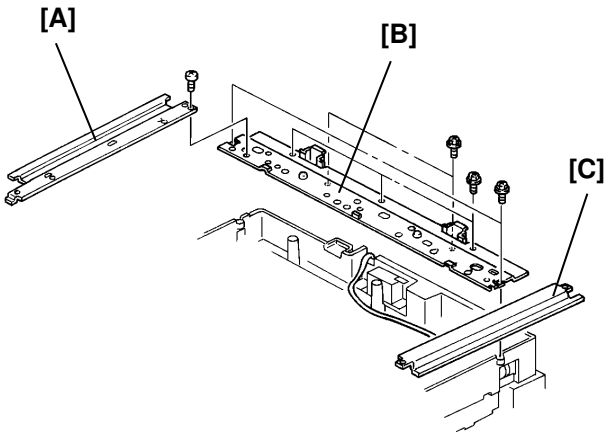


Caution: Do not tighten the screws too much, otherwise the scanner frame may be bent.

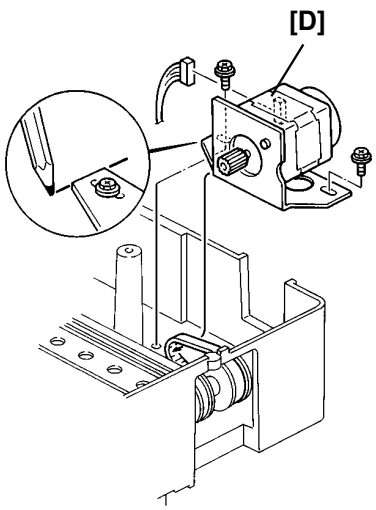
5.2.5. Scanner Motor [D]

- First, remove the Exposure Glass (see section 5.2.1), Operation Panel Ass'y, Front Cover, Right Cover, Left Cover, Rear Cover, Rear Upper Cover, Copy Tray, and Optional ADF or Optional Platen Cover (see section 5.1).

Note: Mark the position of the scanner motor before removing it, and when reinstalling the scanner motor, install it according to the mark.



[A]: 1 screw
[B]: 7 screws

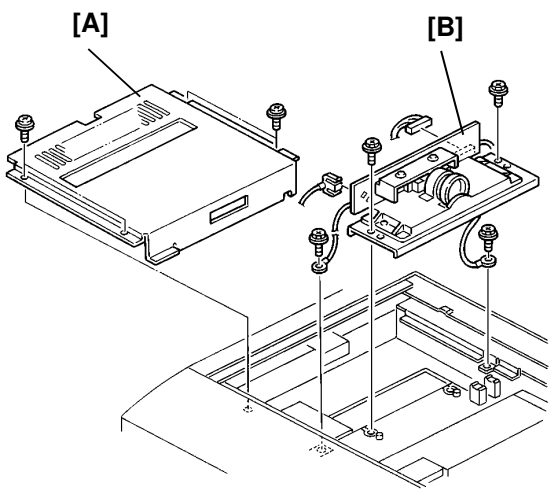


[D]: 2 screws, 1 connector

5.2.6. SBU Lens Block [B]

- First, remove the Exposure Glass (see section 5.2.1).

Caution: It is not possible to adjust the SBU in the field. Do not remove or loosen the screws which were paint locked.

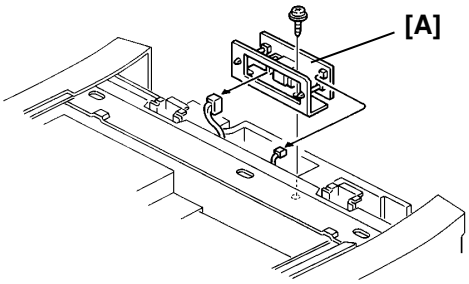


- After replacing SBU Lens Block Assembly, check the image density. Adjust, if needed, as described in section 5.9.4.

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

5.2.7. Lamp Stabilizer Ass'y [A]

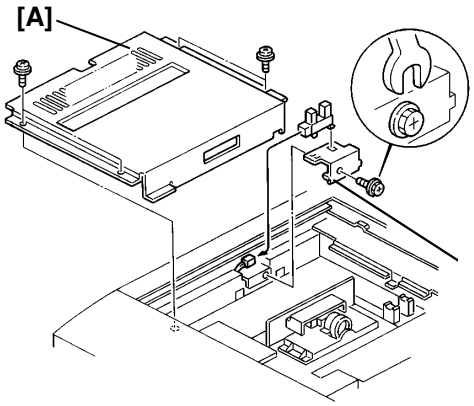
- First, remove the Exposure Glass (see section 5.2.1), Rear Cover, Rear Upper Cover and Optional ADF or Optional Platen Cover (see section 5.1).



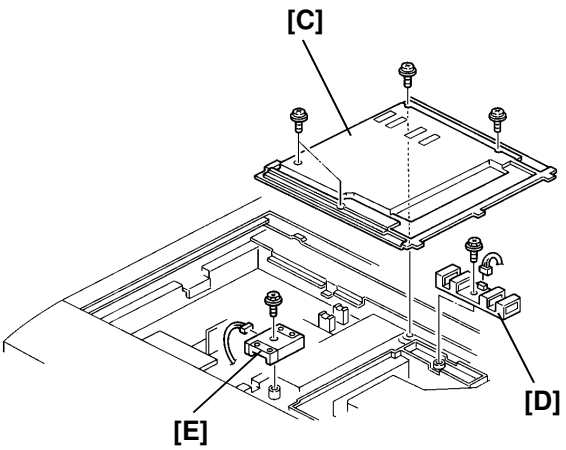
[A]: 1 screw, 2 connectors

5.2.8. Scanner H.P. [B] and Original Length/Width Sensors [D], [E]

- First, remove the Exposure Glass (see section 5.2.1).



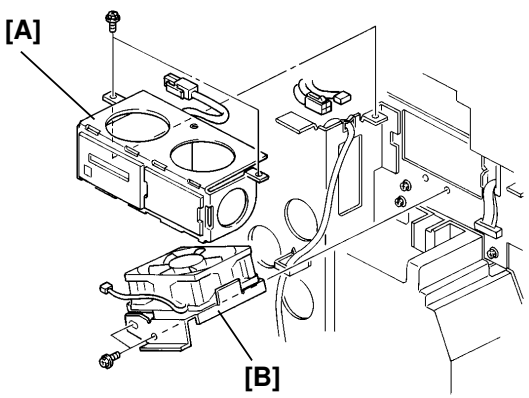
[A]: 4 screws
[B]: 1 screw



[C]: 4 screws
[D]: 1 screw, 1 connector
[E]: 1 screw, 1 connector

5.2.9. Scanner Fan [B]

- First, remove the Operation Panel Ass'y, and the Front Cover (see section 5.1).



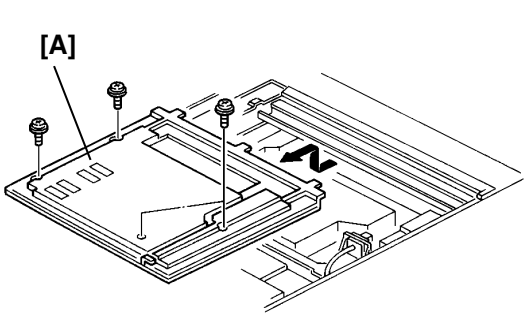
[A]: 2 screws, 1 connector
[B]: 2 screws
Then remove the fan from the bracket.
(2 screws, 1 connector)

5.3. LASER

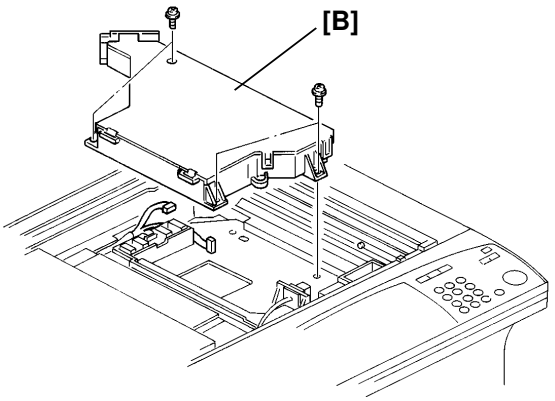
WARNING: Turn off the main switch, then unplug the main switch before attempting any of the procedures in this section. Laser beams can seriously damage your eyes.

5.3.1. Laser Unit [B]

- First, remove the Exposure Glass (see section 5.2.1), then move the scanner to the right.



[A]: 4 screws

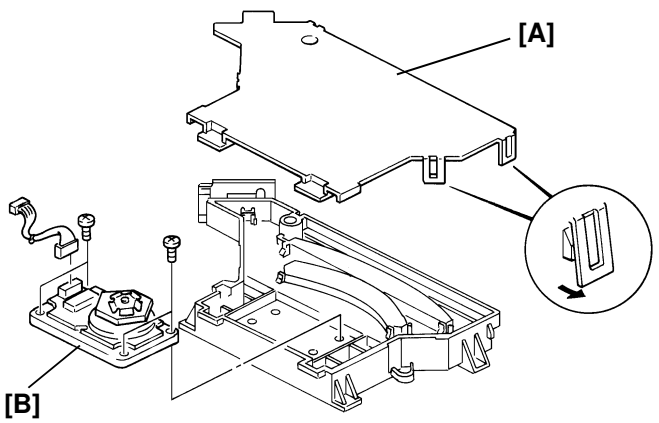


[B]: 4 screws, 2 connectors

5.3.2. Hexagonal Mirror and Motor [B]

Caution: Do not touch the faces of the mirror. If you need to clean the mirror, use an air brush or an optical cloth.

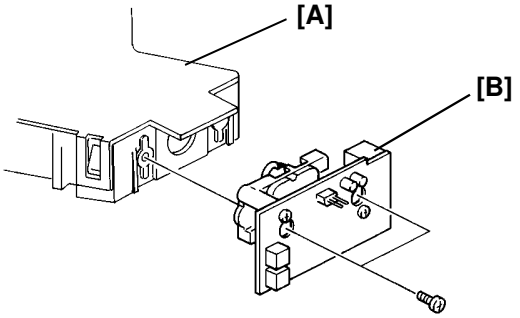
- First, remove the Laser Unit (see section 5.3.1).



[A]: 4 claws
[B]: 4 screws, 1 harness

5.3.3. Laser Diode Unit [B]

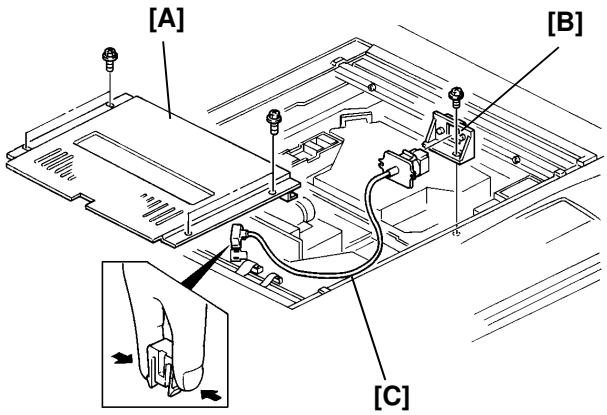
- First, remove the Laser Unit [A] (see section 5.3.1).



[B]: 2 screws

5.3.4. Main Scan Start Detector [C]

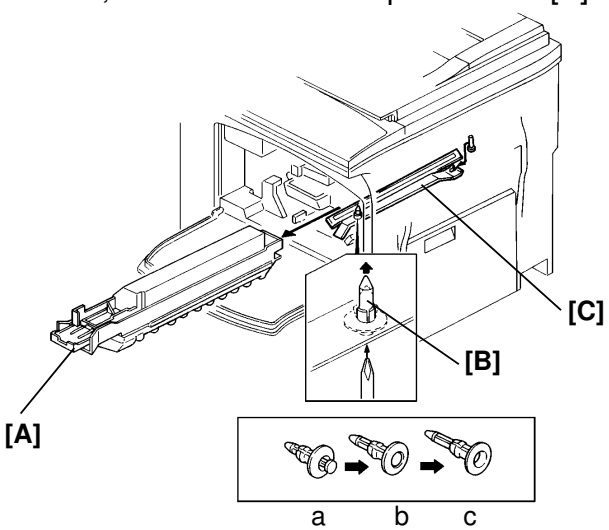
- First remove the Laser Unit Cover (see section 5.3.1), then remove the SBU Lens Block Cover [A].



[A]: 4 screws
[B]: 1 screw
[C]: 1 connector

5.3.5. Shield Glass [C]

- First, remove the Development Unit [A].



[C]: 1 lock pin [B]

Removal and replacement procedure of the pins [B]:
<To remove>
Push the center up until you hear a click, then pull out the pin.

<To replace>
Push up the center of the pin. Then insert the pin, then push up the center until you hear a click.

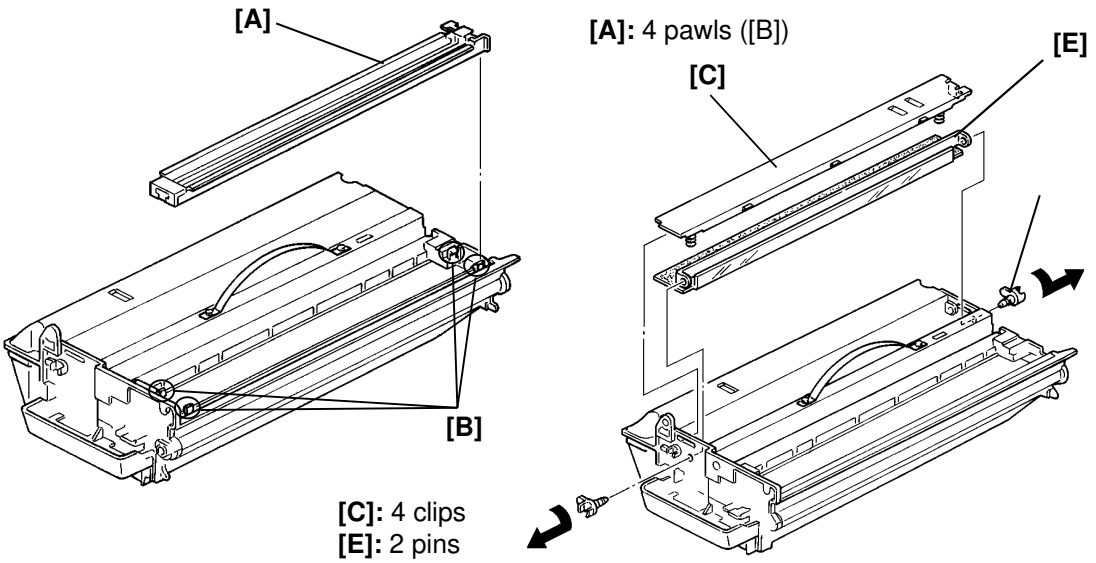
a. when inserted
b. when locked
c. when removed

5.4. MASTER/DEVELOPMENT UNIT

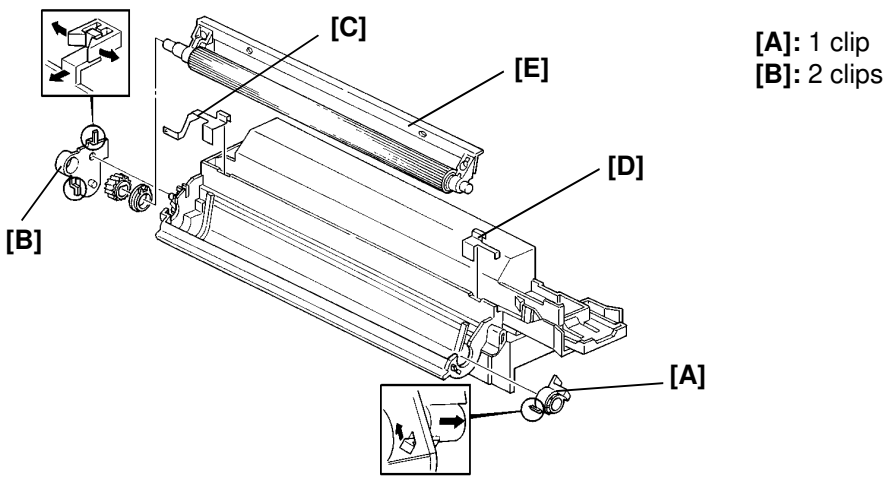
5.4.1. Charge Corona Unit [A]/Cleaning Blade [E]

- First remove the Development Unit, then remove the Master Unit.

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.



5.4.2. Development Roller and Toner Metering Blade Ass'y [E]

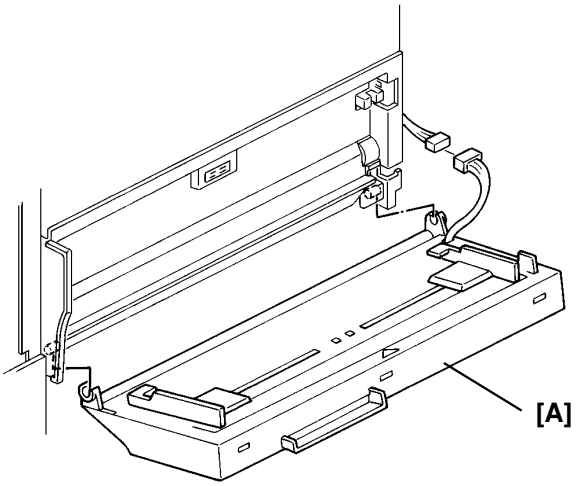


Caution:
- Be careful not to damage the pawls on components [A] and [B].
- Make sure the ground plate [D] contacts the development bias plate (made from copper). Otherwise, dirty background will appear on printouts.

5.5. PAPER FEED/REGISTRATION/TRANSFER

5.5.1. By-pass Feed Table [A]

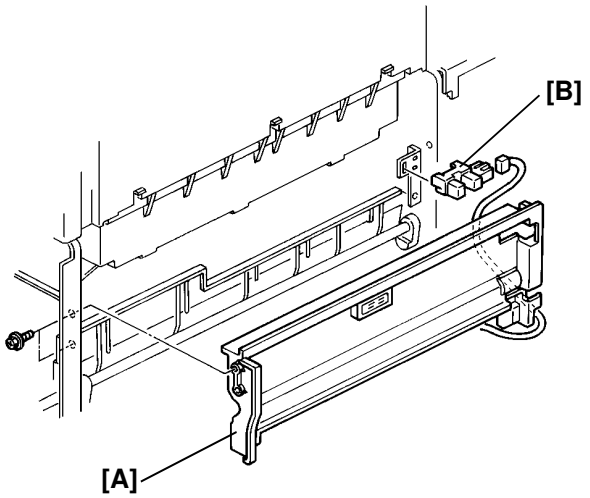
- First, remove the Platen Cover or ADF, Rear Cover and Right Cover (see section 5.1).
- Open the right cover.



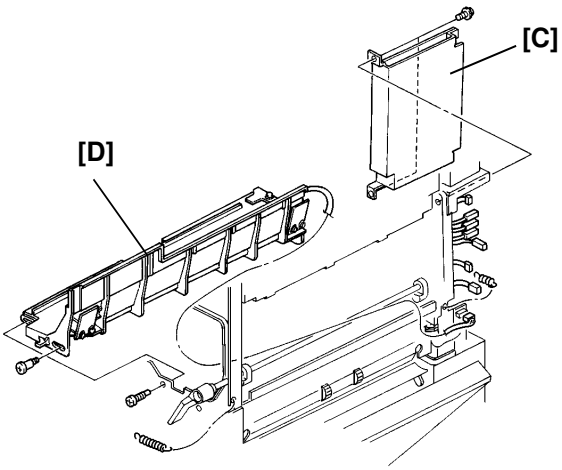
[A]: 1 connector

5.5.2. By-pass Feed Cover Sensor [B] and By-pass Feed Sensor [E] /Registration Sensor [F]

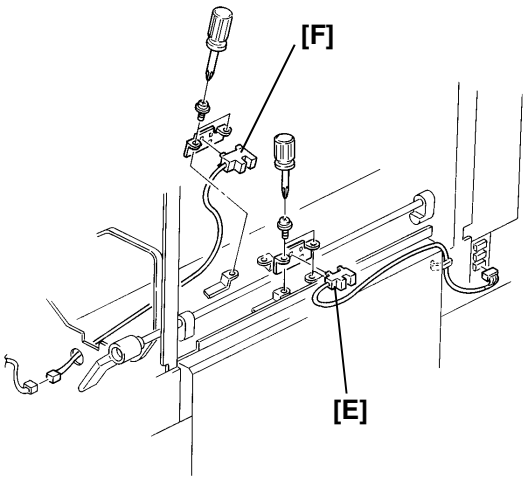
- First, remove the By-pass Feed Table, Operation Panel Ass'y, Front Cover (see section 5.1), Development Unit and Master Unit.



[A]: 2 screws
[B]: 3 clips, 1 connector



[C]: 2 screws, 7 connectors
[D]: 2 screws, 2 springs

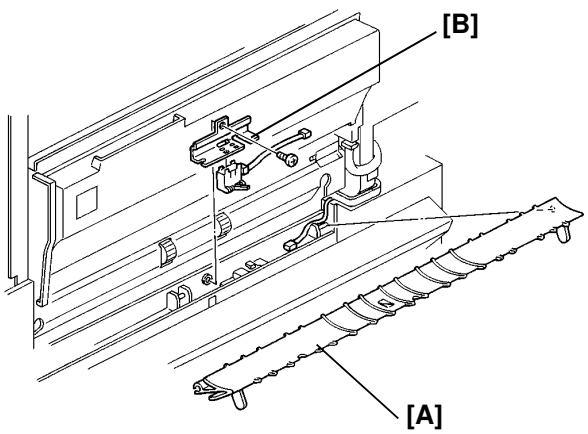


[E]: 2 screws, 1 connector
[F]: 2 screws, 1 connector

Caution: The connectors for the high voltage terminals on the power pack [C] should be as follows
Upper: White
Middle: Yellow
Bottom: Blue

5.5.3. First Relay Sensor [B]

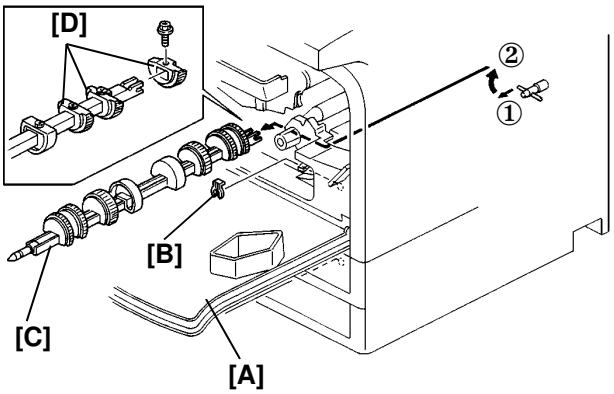
Open the upper right cover.



[B]: 1 screw, 1 connector

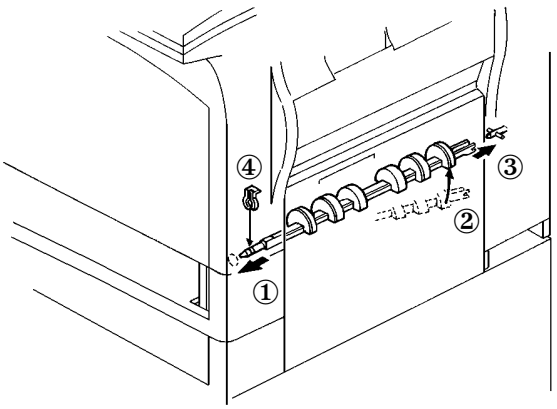
5.5.4. Paper Feed Rollers [D]

- First remove the Front Door [A] and the paper cassette.

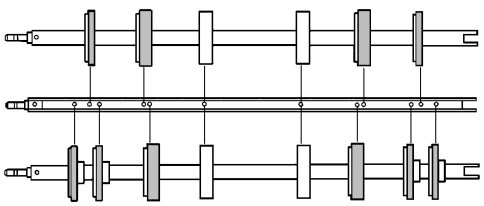


1. Remove one clip [B].
2. Move the Roller Ass'y in the direction indicated by ①.
3. Remove the Roller Ass'y [C].
4. Remove the Rollers [D] from the shaft (1 screw each).

<Replacement>



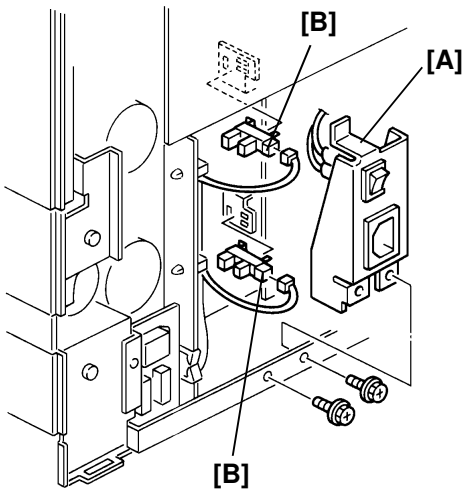
(Legal/Letter version)



(A3/A4 version)

5.5.5. Paper End Sensors [B]

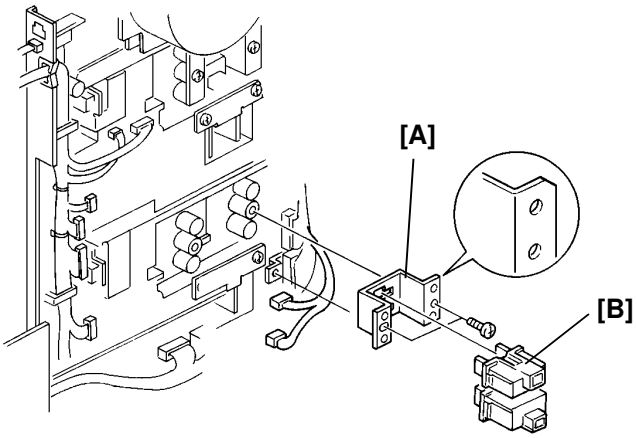
- First, remove the cassette for which you need to change the sensor, and the Rear Cover (see section 5.1).



[A]: 2 screws
[B]: 3 clips each, 1 connector each

5.5.6. Paper Size Sensor [B]

- First, remove the Rear Cover (see section 5.1), Power Inlet (see section 5.5.5), IOU Board and PSU (see section 5.7.2).

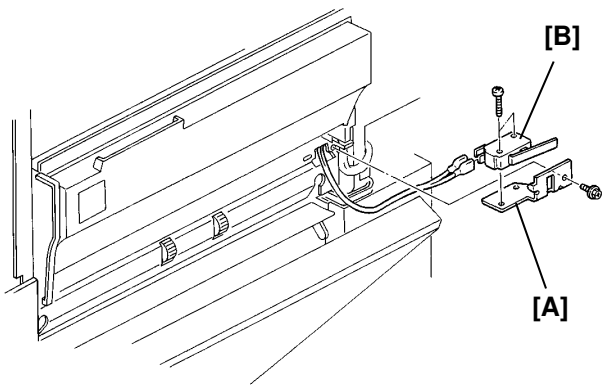


[A]: 2 screws, 2 connectors
[B]: 3 clips

Note: The connectors must be as follows
Upper ..... Blue
Lower ..... White

5.5.7. Right Cover Safety Switch [B]

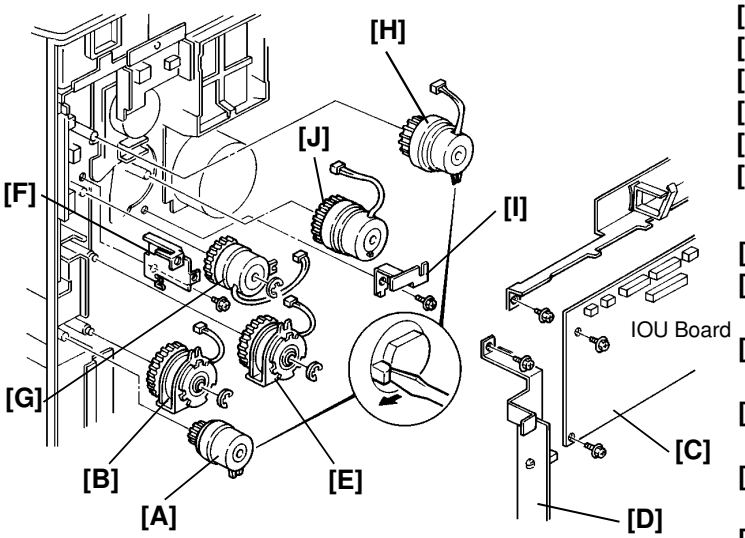
- First, remove the Right Cover (see section 5.1), then open the upper right Cover.



[A]: 1 screw
[B]: 2 screws, 2 harnesses

5.5.8. Clutches

- First, remove the Rear Cover (see section 5.1).
- Be sure to reconnect the clutches to the correct connectors.

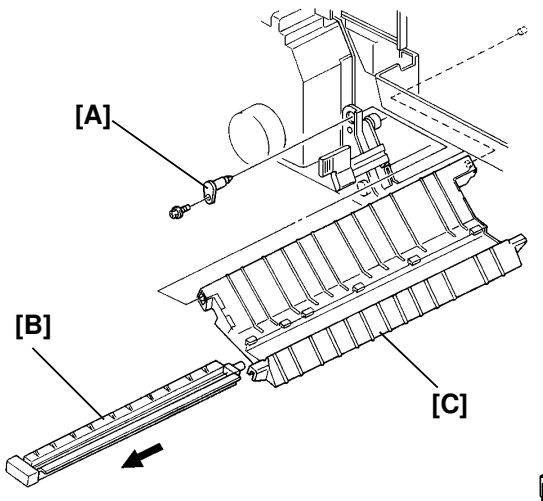


[A]: 1 clip
[B]: 1 E-ring
[E]: 1 E-ring, 1 bracket [D]
[G]: 1 E-ring, 1 bracket [F]
[H]: 1 clip, 1 bracket [F]
[J]: 1 clip, 1 bracket [I]

[A]: 1st Relay Clutch, CN233
[B]: 2nd Paper Feed Clutch, CN232
[E]: 1st Paper Feed Clutch, CN230
[G]: Bypass Feed Clutch, CN231
[H]: Development Clutch, CN229
[J]: Registration Clutch, CN219

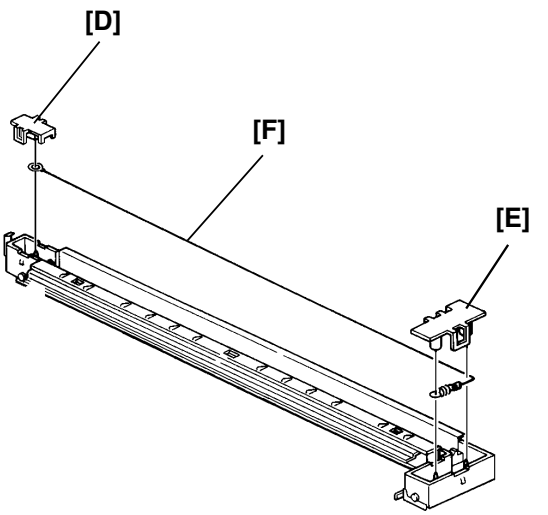
5.5.9. Transfer Unit [B]/Corona Wire [F]

- First, remove the Front Cover (see section 5.1)



[A]: 1 screw

Slide the transfer corona unit [B] out of the transfer/transport unit [C] as shown in the illustration.

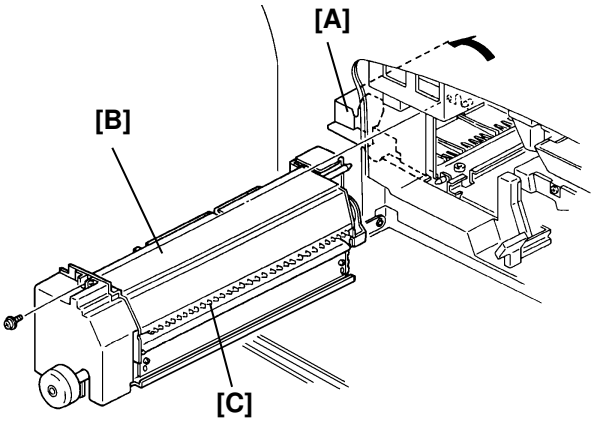


[D]: 2 clips
[E]: 2 clips

5.6. FUSING

5.6.1. Fusing Unit [B]

- First, open the Fusing Exit Cover [A] and Front Cover.

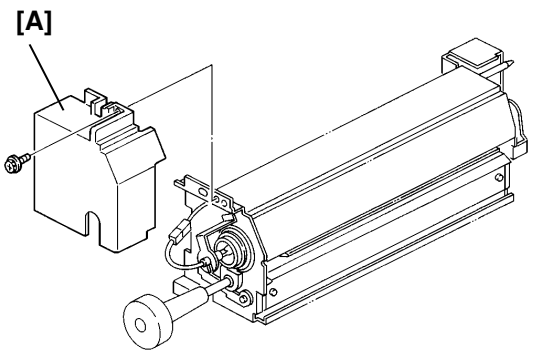


[B]: 1 screw

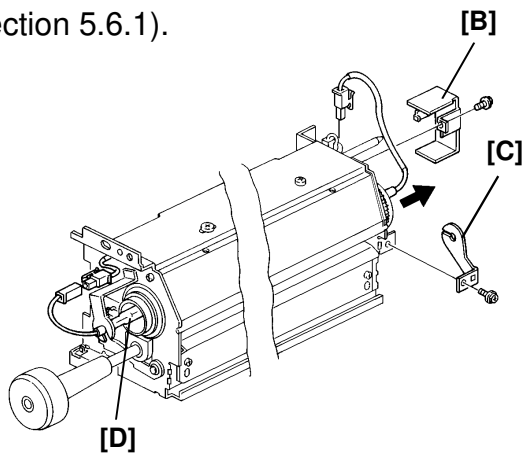
Note:
- When pulling out the fusing unit, keep one hand under it at the rear end.
- When removing the Fusing Unit, keep pushing the Fusing Unit towards the Fusing Exit Cover to prevent the Fusing Cover Rib [C] from being damaged.
- When inserting the Fusing Unit, keep holding the unit and insert it slowly to prevent the unit from being damaged.

5.6.2. Fusing Lamp [D]

- First, remove the Fusing Unit (see section 5.6.1).



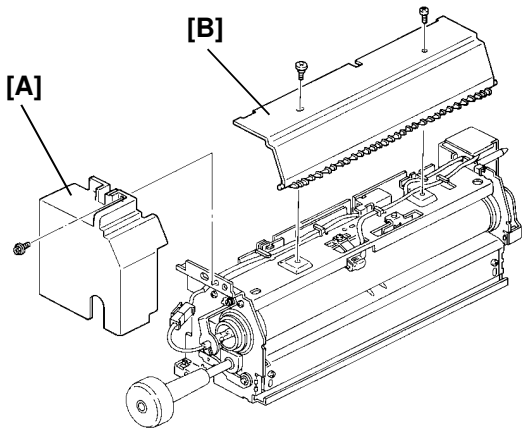
[A]: 1 screw

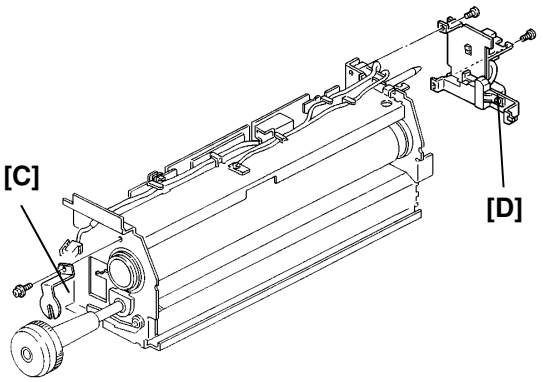


[B]: 1 screw, 1 pawl
[C]: 1 screw
[D]: 2 connectors
(1 at the rear, 1 at the front)

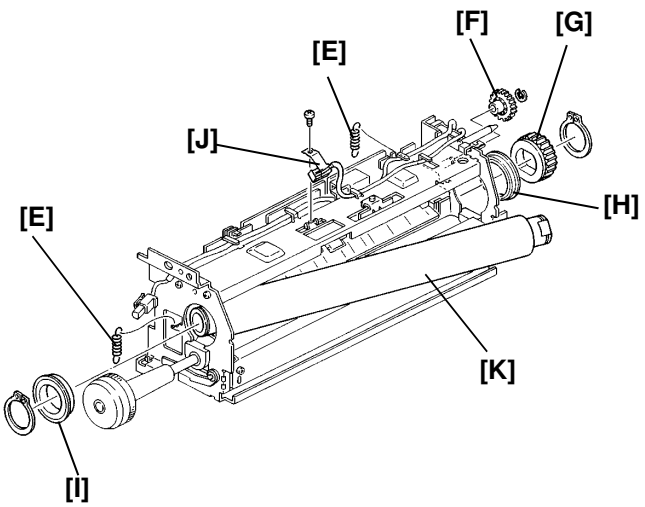
5.6.3. Hot Roller [K]

- First, remove the Fusing Unit (see section 5.6.1) and the Fusing Lamp.





[A]: 1 screw
[B]: 2 screws
(Front: Stopped Screw
Rear: M3 x 6)
[C]: 1 screw
[D]: 2 screws, 2 connectors

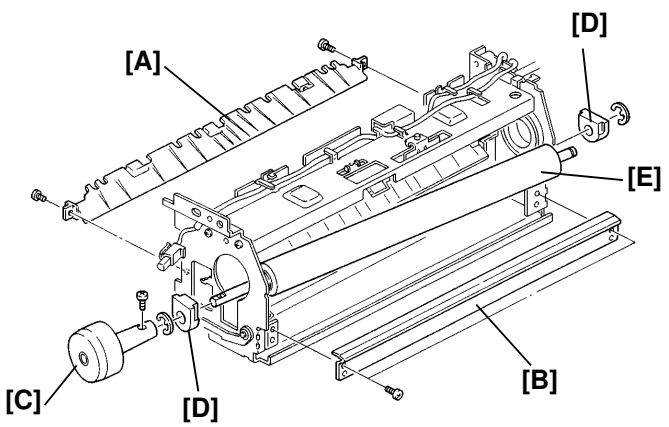


[F]: 1 E-ring
[G]: 1 C-ring
[I]: 1 C-ring
[J]: 1 screw

Note: Install the spring [C] in the middle notch on the rib.

5.6.4. Pressure Roller [E]

- First, remove the Fusing Unit, Connector Bracket and the Pressure Springs ([B] and [C] in the diagram of section 5.6.3).

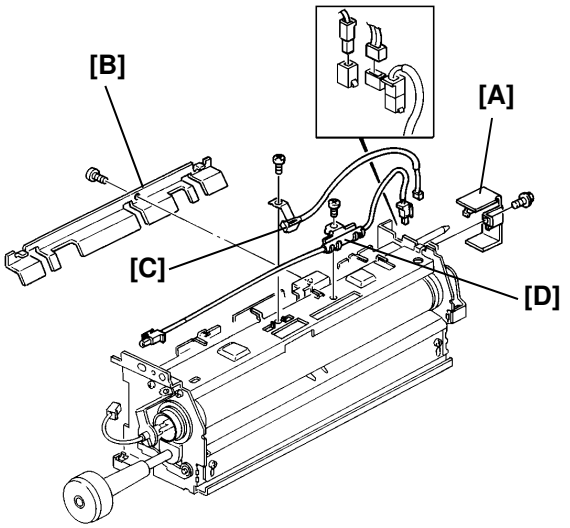


[A]: 2 screws
[B]: 2 screws
[C]: 1 screw
[D]: 1 E-ring each

Note: When installing [B], use the upper two holes for the screws.

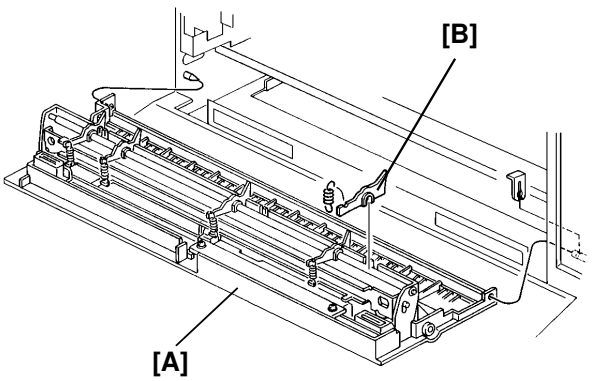
5.6.5. Thermofuse [D]/Thermistor [C]

- First, remove the Fusing Unit (see section 5.6.1) and the Fusing Upper Cover ([B] in the diagram of section 5.6.3).



[A]: 1 screw
[B]: 1 screw
[C]: 1 screw, 1 connector
[D]: 1 screw, 2 connectors

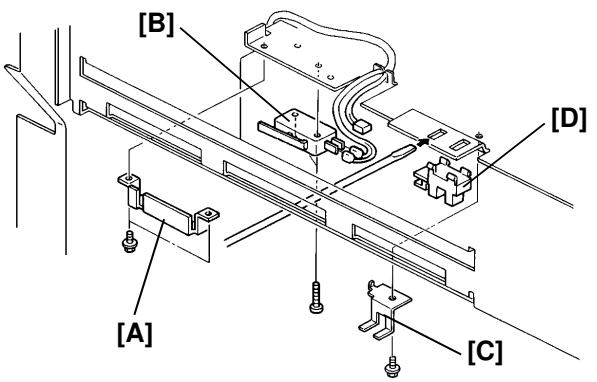
5.6.6. Hot Roller Strippers [B]



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

5.6.7. Fusing Unit Exit Sensor [D]/Fusing Exit Cover Safety Switch [B]

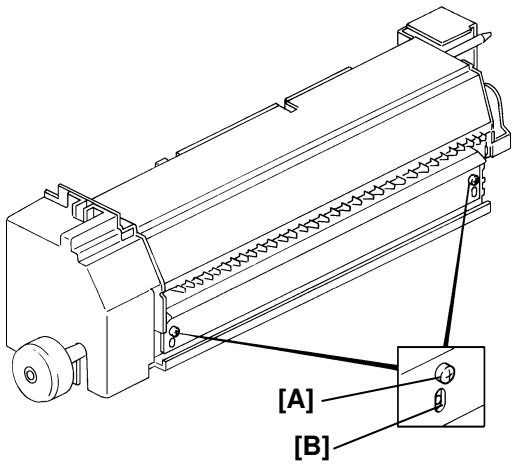
- First remove the Copy Out Cover Ass'y (see section 5.6.6).



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

Adjustments for the Fusing Unit

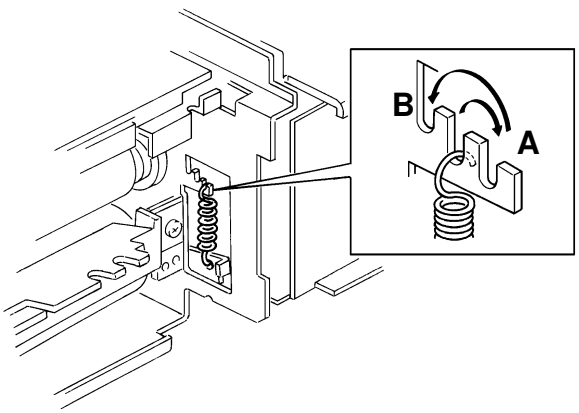
1. Fusing Entrance Guide Plate



Normally the screw should be tightened in the upper screw hole [A]. However if a fusing entrance jam occurs, it is possible to adjust the height of the Fusing Entrance Guide Plate using the lower long screw hole [B].

Jam Condition		Adjustment
Paper Feed direction	The leading edge of the copy paper is bent upwards.	The position of the guide plate should be lowered.
Paper Feed direction	The leading edge of the copy paper is bent downwards.	The position of the guide plate should be raised.

2. Pressure spring



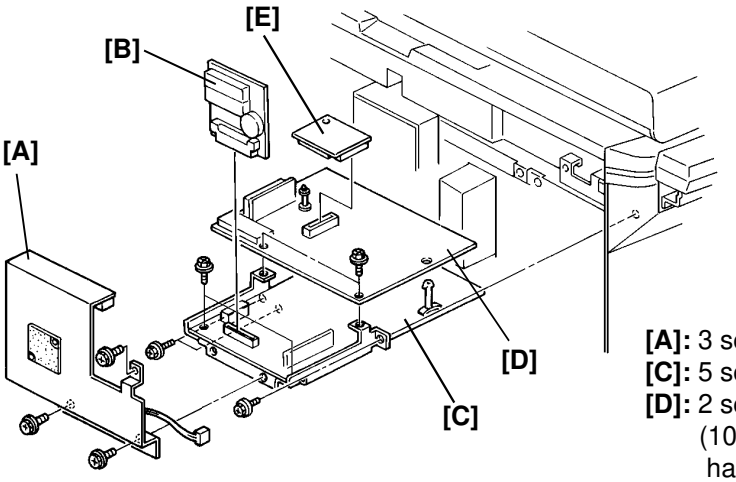
If fusing was incomplete, or if the paper gets creased, adjust the pressure of the Pressure Roller by changing the position of the spring.

A Weak
B Strong

5.7. PCBs

5.7.1. FCU [C], SPU [D], MBU-F [B], MBU-S [E]

- First, remove the Rear Cover (see section 5.1).
- Remove the Printer I/F Unit, ISDN-G4 Unit, and the Hard Disk if these units have been installed.

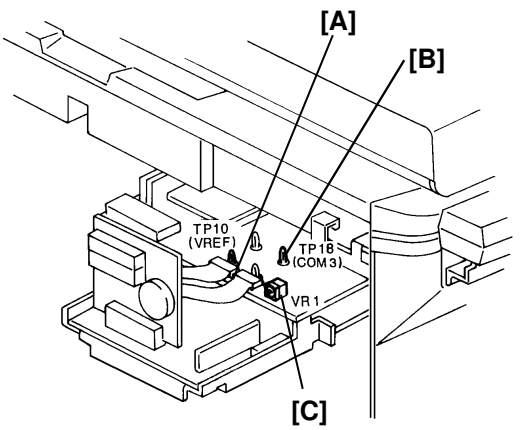


[A]: 3 screws, 1 connector
[C]: 5 screws, 3 connectors
[D]: 2 screws, 9 connectors
(10 connectors, if the sorter has been installed.)

Note: • The top of the MBU-F [B] should be in the rail of the bracket [A].

- After replacing the SPU, perform the APC adjustment.

5.7.2. APC (Auto Power Control) Adjustment

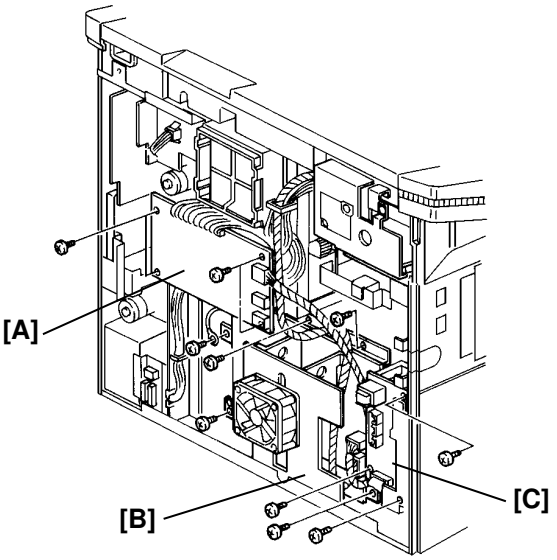


Adjust the laser diode APC whenever you replace the SPU board.

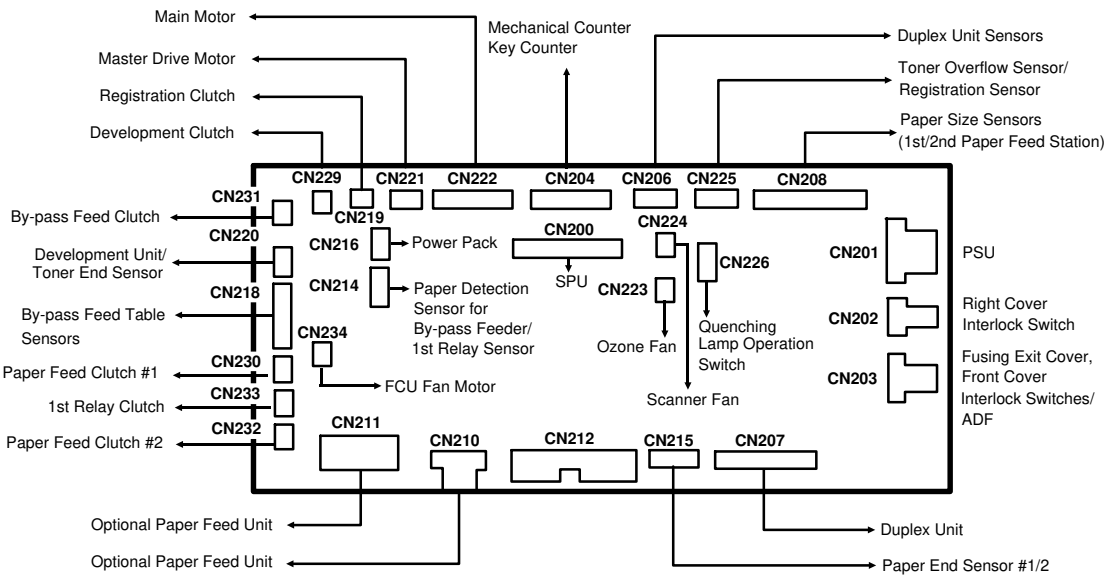
1. Measure the voltage between TP10 [A] and GND [B] on the SPU board.
2. After installing the new SPU board, adjust the voltage to the value measured in step 1, using VR1 [C].

Note: If the voltage cannot be measured in step 1, adjust the voltage to 1 volt.

5.7.3. IOU [A], PSU [B], NCU [C]



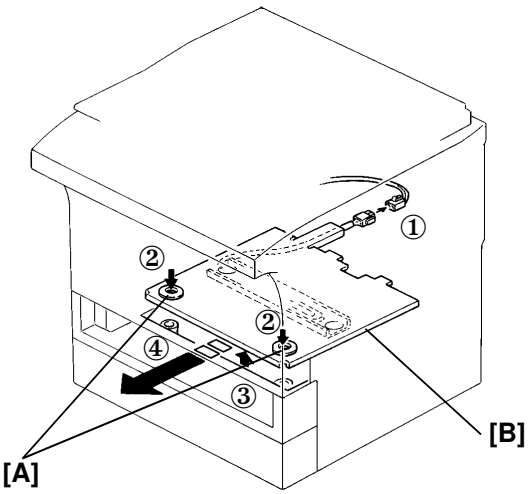
[A]: 4 screws
[B]: 5 screws
[C]: 3 screws



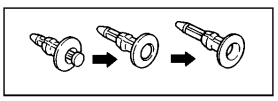
5.8. OTHERS

5.8.1. Tray Heater [B]

- First, remove the Rear Cover (see section 5.1), PSU (see section 5.7.2) and 1st cassette.



[B]: 2 lock pins **[A]**, 1 connector



a b c

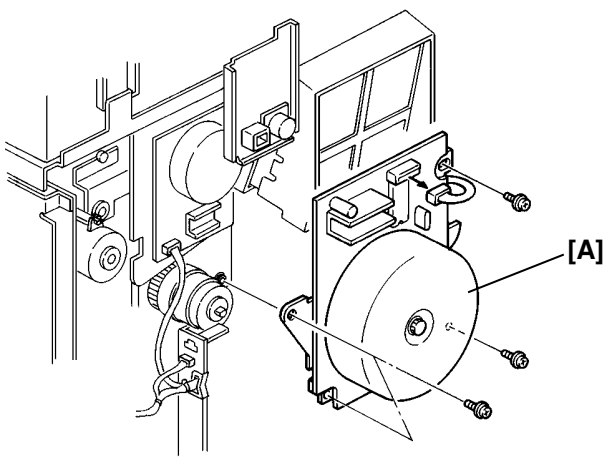
a. when inserted
b. when locked
c. when removed

Removal and replacement procedure for the pins [A]:
<To remove>
Push the center down until you hear a click, then pull out the pin.

<To replace>
Push up the center of the pin. Then insert the pin, then push down the center until you hear a click.

5.8.2. Main Motor [A]

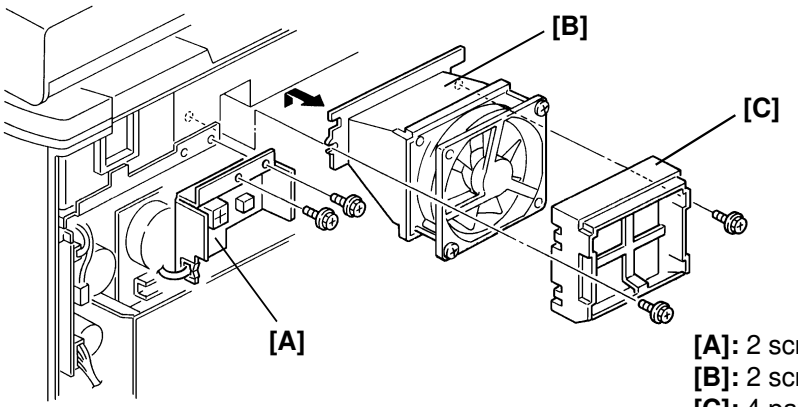
- First, remove the Rear Cover (see section 5.1) and the IOU Board (see section 5.7.2).



[A]: 4 screws, 1 connector

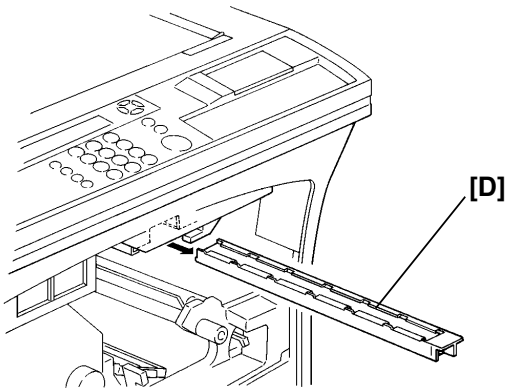
5.8.3. Ozone Fan [B] and Filters [C] and [D]

- First, remove the Rear Cover (see section 5.1).



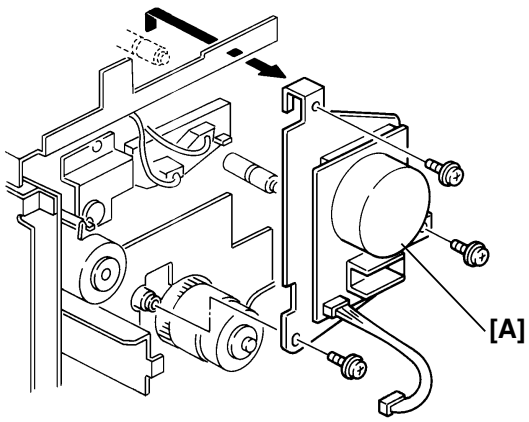
[A]: 2 screws, (2 connectors)
[B]: 2 screws
[C]: 4 pawls

- To remove filter [D], first remove the Development Unit and the Master Unit.



5.8.4. Master Motor [A]

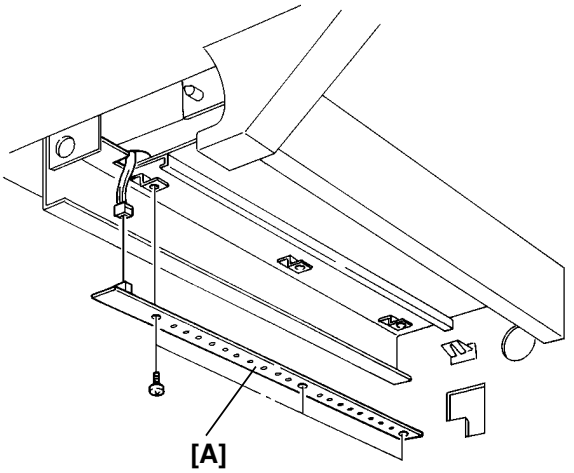
- First, remove the Rear Cover (see section 5.1) and the IOU board (see section 5.7.2) and the Ozone Fan ([B] in the diagram of section 5.8.3).



[A]: 3 screws

5.8.5. Quenching Lamp [A]

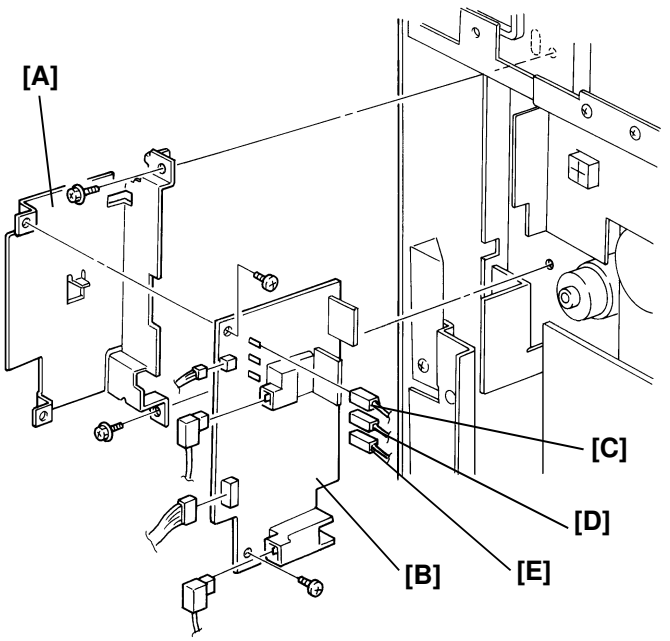
- First, remove the Master Unit Ozone Filter (see section 5.8.3).



[A]: 1 screws, 1 connector

5.8.6. Power Pack [B]

- First, remove the Rear Cover (see section 5.1).

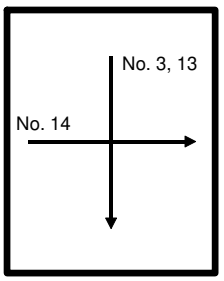


[A]: 2 screws
[B]: 2 screws, 7 connectors
[C]: White
[D]: Yellow
[E]: Blue

Note: After replacing the power pack, check the image density (see section 5.9.4).

5.9. COPY IMAGE ADJUSTMENT

5.9.1. Copy Magnification



<Copy Mode>

The magnification difference between the original and the print out should be within ±1%.

- Vertical: Function 11-3-13
- Horizontal: Function 11-3-14

<Fax Mode>

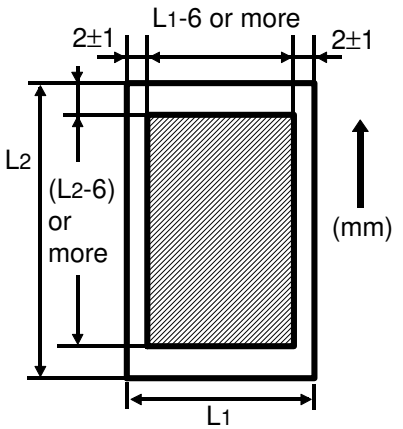
The magnification difference between the original and the transmitted image should be within ±1%.

- Vertical: Function 11-3-3

Note: When testing, it is recommended to use an original which has a 100 mm square drawn on it.

5.9.2. Printing Registration Adjustment

[Standard]



1. Blank margin

Check that the trailing edge, and the left margin are set at their default values.

- Trailing edge: Function 12-3-13 Default value: 3A H
- Left margin: Function 12-3-14 Default value: 40 H

Print out the trim pattern from one of the paper feed stations, and check whether the blank margin is out of standard or not.

- Trim pattern print out: Function 12-3-60

2. Registration adjustment (leading edge)

Adjust the leading edge registration using the trim pattern.
- Leading edge registration adjustment: Function 12-3-10

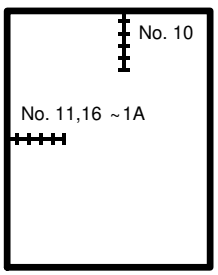
3. Registration adjustment (side-to-side)

Print out the trim pattern from each paper feed station, and check which paper feed station is out of standard.
- 1st Cassette: Function 12-3-11
- 2nd Cassette: Function 12-3-16
- 3rd Cassette (Optional PFU): Function 12-3-17
- 4th Cassette (Optional PFU): Function 12-3-18
- By-pass Feed: Function 12-3-19
- Duplex Unit (Optional): Function 12-3-1A

Caution: After performing the printing registration adjustment, reset the trim pattern print out mode (set Function 12-3-60 to 00).

5.9.3. Scanner Registration Adjustment

Note: Perform or check the printing registration (Function 12-3-10, 11, 16 ~ 1A; see section 5.9.2) before doing the following scanning leading edge and left registration adjustment.



[Standard]
- Leading Edge: 0 ± 2 mm
- Left Side: 0 ± 2 mm

1. Place a 150 mm scale perpendicular to the left scale on the exposure glass and make a copy from one of the feed stations.
2. Adjust the scanner leading edge registration using Function 11-3-10.
3. Place a 150 mm scale perpendicular to the front scale on the exposure glass and make a copy from one of the feed stations.
4. Adjust the scanner side-to-side registration using Function 11-3-11.

5.9.4. Image Density Adjustment

– Fax mode –

If dirty background or pale copy quality appears in the images sent from your machine, adjust the following SP Modes.

Function 11 - 3 (SP Modes)	No. 70	Normal (Text mode)
	No. 71	Slightly Lighten (Text mode)
	No. 72	Lighten (Text mode)
	No. 73	Slightly Darken (Text mode)
	No. 74	Darken (Text mode)
	No. 75	Normal (Text/Photo mode, without 400x400 dpi or reduction mode)
	No. 76	Slightly Lighten (Text/Photo mode, without 400x400 dpi or reduction mode)
	No. 77	Lighten (Text/Photo mode, without 400x400 dpi or reduction mode)
	No. 78	Slightly Darken (Text/Photo mode, without 400x400 dpi or reduction mode)
	No. 79	Darken (Text/Photo mode, without 400x400 dpi or reduction mode)
	No. 7A	Normal (Text/Photo mode, 400x400 dpi or Full size mode)
	No. 7B	Slightly Lighten (Text/Photo mode, 400x400 dpi or Full size mode)
	No. 7C	Lighten (Text/Photo mode, 400x400 dpi or Full size mode)
	No. 7D	Slightly Darken (Text/Photo mode, 400x400 dpi or Full size mode)
	No. 7E	Darken (Text/Photo mode, 400x400 dpi or Full size mode)

– Copy mode –

- If dirty background or pale copy quality appears in the black parts of the image, adjust the image density using VRB on the power pack.
  Counter-clockwise: The image density is made lighter.
  Clockwise: The image density is made darker.

- If the density of the light image areas is too dark or too light, adjust the image density using VR1 on the SBU.
  Clockwise: The image is made lighter.
  Counter-clockwise: The image is made darker.

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 4.1.16). Is it OK?	There may be a scanner problem; go to step 15.	Go to step 2.
2. Is the development unit 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 grounding terminal of 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. Is the transfer corona unit correctly installed?	Go to step 7.	Install it properly.
7. Does the IOU output the power and corona trigger signal to the power pack?	Clean the transfer corona unit. Go to step 8.	Change the SPU or IOU.
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 (-790 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 SPU or IOU.
11. Does the problem go away if you change the power pack?	Finished.	Go to step 12.
12. Does the development roller attract toner?	Check all LDDR - IOU - interlock switch connections. Go to step 13.	Replace the development unit.
13. Is the laser diode unit screwed in properly?	Go to step 14.	Install it properly.

Symptom: Blank copies		
Check	**Action if Yes**	**Action if No**
14. Do the interlock switches close when the cover is closed, and do they pass power to the LDDR?	Change the LD unit, SPU, or varistor.	Change them.
15. Check the SPU - SBU connection. Is there a signal from the SBU (AVIDEO)?	Go to step 16.	Replace the Lens Block Assembly.
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 4.1.16). Is it OK?	There may be a scanner problem; go to step 9.	Go to step 2.
2. Is the charge corona wire broken?	Replace the master unit.	Go to step 3.
3. Does the IOU output the power and corona trigger signal to the power pack?	Clean the charge corona unit and bias terminal. Go to step 4.	Change the SPU or IOU.
4. Does the problem go away if you change the power pack?	Finished.	Go to step 5.
5. The laser beam may be always switched on. Does the problem go away if you change the LD unit?	Finished.	Go to step 6.
6. Does the problem go away if you change the SPU?	Finished.	Go to step 7.
7. Check the connections from the IOU to the xenon lamp. Does the lamp work?	Go to step 9.	Go to step 8.
8. Does the SPU output the power and drive signals to the lamp driver?	Change the xenon lamp or the drive board.	Change the SPU or IOU.
9. Check the SPU - SBU connection. Is there a signal from the SBU (AVIDEO)?	Go to step 10.	Replace the SPU or the lens block assembly.

Symptom: Black copies		
Check	**Action if Yes**	**Action if No**
10. 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 11.
11. 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 4.1.16). Is it OK?	There may be a scanner problem; go to step 6.	Go to step 2.
2. Try the following steps (a to e) to solve the problem. If they fail, check the connections through the machine between the SPU, toner end sensor, and main 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) If the copy paper is damp, replace it. e) 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 output signal. Change the development unit if the sensor is defective.	Go to step 4.
4. Work through steps 4 to 12 of "Blank copies".		
5. Change the varistor, FCU, or LD unit.		
6. 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 4.1.16). Is it OK?	There may be a scanner problem; go to step 13.	Go to step 2.
2. Try the following steps (a to d) to solve the problem. If they fail, go to step 3. a) Clean the quenching lamp and cleaning blade. b) If the toner contains dust or paper particles, replace the toner. c) Clean the area around the bias terminal of the development unit. d) If the pattern is constant down the page, clean the laser optics with a blower brush, or clean or replace the corona wires.		

Symptom: Dirty background all over the copy

Check	Action if Yes	Action if No
3. Is the master grounded properly?	Go to step 4.	Check the grounding wire, terminals and plates. Clean or replace if necessary.
4. Does the development bias terminal give a constant correct voltage (about -790 Vdc)?	Go to step 7.	Go to step 5. Do not adjust the variable resistors on the power pack.
5. Does the IOU output constant power and bias trigger signals to the power pack?	Clean the area around the bias terminal. Go to step 6.	Change the IOU.
6. Does the problem go away if you change the power pack?	Finished.	Go to step 7.
7. Is the charge corona wire intact and correctly installed?	Check the connections between the corona wire and the power pack. Go to step 8.	Correct the problem.
8. Does the IOU output constant power and corona trigger signals to the power pack?	Clean the charge corona unit. Go to step 9.	Change the IOU.
9. Does the problem go away if you change the power pack?	Finished.	Go to step 10.
10. Does the quenching lamp operate correctly?	Go to step 12.	Check the connections between the IOU and lamp. Go to step 11.
11. Does the IOU send constant power and drive signals to the lamp?	Replace the quenching lamp.	Replace the IOU.
12. Try replacing the master unit.		
13. Clean the scanner optics, exposure glass, and white plate. Check the SBU white waveform for peaks, dropouts, or noise in the signal. Change the lens block assembly or SPU 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 development unit.		

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 IOU and lamp. Go to step 2.
2. Does the IOU send constant power and drive signals to the lamp?	Replace the quenching lamp.	Replace the IOU.

Symptom: Density changes gradually across the printout		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4.1.16). 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 development unit or develolpment clutch. Try changing the master unit or quenching lamp.		
3. Clean the exposure glass.		
4. Change the SPU or lens block assembly.		
5. The xenon lamp may need to be changed.		

Symptom: Uneven density in vertical bands		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4.1.16). Is it OK?	There may be a scanner problem; go to step 3.	Go to step 2.
2. Clean 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 development unit.		
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. Any bands in the SBU white waveform ?	Change the lens block assembly.	Change the SPU.

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 4.1.16). Is it OK?	There may be a scanner problem; go to step 5.	Go to step 2.
2. Clean the grid plate and laser optics. Clean 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 IOU 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 exposure glass, white pressure plate above the exposure glass, and scanner optics.		
6. Any peaks in the SBU white waveform ?	Change the lens block assembly.	Change the SPU.

Symptom: Fuzzy vertical white lines		
Check	**Action if Yes**	**Action if No**
Clean or replace the corona wires. Clean the laser optic and scanner optic components.		

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 assembly, 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 4.1.16). Is it OK?	There may be a scanner problem; go to step 3.	Go to step 2.
2. 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 4.1.16). 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. 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.	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 development roller assembly if the toner metering blade is damaged. Clean the laser optics carefully with a blower brush or soft dry cloth.		
5. Clean the scanner optics.		
6. Any peaks in the SBU white waveform ?	Change the lens block assembly.	Change the SPU.

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 -790 Vdc)?	Go to step 6.	Go to step 4. Do not adjust the variable resistors on the power pack.
4. Does the IOU output the power and bias trigger signal to the power pack?	Clean the area around the bias terminal. Go to step 5.	Change the IOU.
5. Does the problem go away if you change the power pack?	Finished.	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 they start and stop at the same time. If there are any problems, check the roller, master unit, and drive mechanism for any defective components, such as gears.		

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, SPU, or the SBU/lens block assembly.		

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 master unit. The laser diode may be out of control. Change the LDDR or SPU.		

Symptom: Horizontal black stripes		
Check	**Action if Yes**	**Action if No**
1. Is the Call Service indicator lit?	Replace the LD unit or SPU.	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 SPU. If the problem remains, go to step 3.		
3. Does the development bias terminal stay at a constant voltage (about -790 Vdc)?	Go to step 6.	Go to step 4. Do not adjust the variable resistors on the power pack.
4. Does the IOU output the power and bias trigger signal to the power pack?	Clean the area around the bias terminal. Go to step 5.	Change the IOU.
5. Does the problem go away if you change the power pack?	Finished.	Go to step 6.
6. Check that the development roller assembly is screwed in securely.		

Symptom: White spots in black areas		
Check	**Action if Yes**	**Action if No**
Clean the corona wires. If the problem cannot be solved, change the development roller assembly, master, or power pack.		

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/lens block assembly or SPU.		
3. Check the laser optic path. Change the SPU.		

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 IOU. 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 IOU.
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 -790 Vdc)?	Go to step 8.	Go to step 6. Do not adjust the variable resistors on the power pack.
6. Does the IOU output the power and bias trigger signal to the power pack?	Clean the area around the bias terminal. Go to step 7.	Change the IOU.
7. Does the problem go away if you change the power pack?	Finished.	Change the development roller assembly.
8. Clean the scanner optics and the xenon lamp.		

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, SPU, 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 SPU.		
3. Check the scanner drive mechanism (motors, gears, timing belts). Check the scanner motor timing belt tension. Replace the SPU or scanner motor if the motor is making abnormal noise.		

Symptom: Blank area around the edges		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4.1.16). Is it OK?	Go to step 2.	Replace the SPU.
2. Is non-standard paper being used on the bypass feed table?	Go to step 3.	Check whether the user input the correct paper size at the operation panel. If not, input the correct size and try again.
3. Does the paper size detector detect the correct paper size?	Go to step 4.	Check: a) Paper size detector plate b) Paper size detector.
4. Was the bypass feed table opened correctly when it was used?	Replace the SPU.	Open the bypass feed table correctly.

Symptom: Image skew (rotated image)		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4.1.16). Is it OK?	There may be a scanner problem. Go to step 3.	Go to step 2.
2. Are the side fences correctly positioned?	Check the paper feed mechanism.	Position them correctly.
3. Is the angle between the front and right original scales 90°?	Perform the original skew adjustment (section 7.5.8).	Adjust the angle.

Symptom: Image skew (scan line drifts with progress down the page)		
Check	**Action if Yes**	**Action if No**
1. Make a printer test (see section 4.1.16). Is it OK?	There may be a scanner problem. Go to step 2.	Poorly installed or defective polygon mirror motor/laser optics housing.
2. Is each mirror positioned correctly on its scanner assembly?	Replace the lens block assembly.	Position the mirrors correctly. If the spring plates are defective, replace them.

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. Does the Insert Original indicator on the DF turn off when an original is placed in the feeder?	Go to step 2.	Check the original set sensor. If it is defective, replace it.
2. Are the connections between the DF main board and the SPU loose?	Connect the cables properly.	Go to step 3.
3. Does the belt drive motor work?	Go to step 5.	Go to step 4.
4. Does the DF main board output power and drive signals to the belt drive motor?	Replace the belt drive motor.	Replace the DF main board (or the SPU).
5. Does the pick-up solenoid work?	Finished	Go to step 6.
6. Are the connections between the DF main board and the pick-up solenoid loose?	Replace the pick-up solenoid.	Connect the cable properly.

Symptom: Skew caused by the scanner mechanism		
Check	**Action if Yes**	**Action if No**
1. Is the white mark on the exposure glass positioned at the rear left corner?	Clean the surface of the exposure glass with alcohol or water.	Reinstall the exposure glass.

Symptom: Jam		
Check	**Action if Yes**	**Action if No**
1. Is the document feed path blocked?	Remove any debris.	Go to step 2.
2. Is the white mark on the exposure glass positioned at the rear left corner?	Clean the surface of the exposure glass with alcohol or water. If the problem remains, go to step 3.	Reinstall the exposure glass.
3. Are the connections between the DF main board and the electrical components loose?	Connect the cables properly.	Go to step 4.
4. Does the DF main board receive signals from the sensors?	Go to step 5.	Replace any sensor that is defective.
5. Does the DF main board send signals to the motors and solenoids?	Replace any defective motors and solenoids.	Replace the DF main board.

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 feed rollers, and check that the paper lift and feed mechanisms are working properly. If the problem only happens during communication, check the connections between the FCU, NCU, and telephone line.		
2. Do the paper feed clutches operate?	Go to step 5	Go to step 3.
3. Are the connections between the IOU and the paper feed motors loose?	Connect the cables properly.	Go to step 4.
4. Does the IOU output power and drive signals to the clutches?	Replace the defective clutch.	Replace the IOU.
5. If the main motor does not turn on but is 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 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. Is one of the following sensors defective: relay sensors, registration sensor, or fusing exit sensor? Check with SP Modes 80 and 86 (use Service Function 11-3).	Change the IOU or SPU.	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 outputting the correct signals for the installed actuator? The signals that should be seen are shown in the SP Mode table: see page 4-35.	If you suspect that the IOU is processing the sensor signals wrongly, change the IOU (or SPU).	Change the sensor.
7. Are the connections between the IOU 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 IOU output power and drive signals to the main motor?	Replace the main motor.	Replace the IOU.
10. Do the paper feed clutches work? See steps 2 to 4 of "Non-feed".		

Symptom: Copy jam in the paper feed entrance		
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 relay sensors (see steps 3 and 4 of "Copy jam - General").		
3. Do the paper feed clutches work? See steps 2 to 4 of "Non-feed".		

Symptom: Copy jam inside the machine		
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. Reposition the pressure springs or replace the fusing unit rollers or gears if necessary.		
2. Check the registration sensor and fusing exit sensor (see steps 3 and 4 of "Copy jam - General").		

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

Symptom: Double feed		
Check	**Action if Yes**	**Action if No**
Check the corner separator mechanism and side fences, and replace if necessary.		

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. Reposition the fusing unit pressure springs, or replace 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 components. 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), fusing exit rollers.		

Symptom: Skew caused by the printer mechanism		
Check	**Action if Yes**	**Action if No**
Check the corner separator mechanism and side fences; replace if necessary. 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 filters.	Go to step 2.
2. Does the IOU send power and drive signals to the fans?	Change any defective ozone fans.	Change the IOU.

6.3. FAX COMMUNICATION TROUBLESHOOTING

Symptom: The remote terminal disconnects the line during 16 x 15.4 mm transmission (if the remote terminal is either a FAX7000L series, FX830, or Rapicom 830 machine)	
Remote Terminal	**Action**
FAX7000L	In the remote terminal, change G3CCU Bit Switch DT10 bit 0, from 0 to 1.
FX830 or Rapicom 830	In the remote terminal, change Bit Switch SW20 bit 0, from 0 to 1

6.4. SERVICE CALL CONDITIONS

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

- Main Motor (Sub code - 11 or 51)
- Polygonal Mirror Motor Locked (Sub code - 21)
- Fusing Unit Failure (fusing lamp failure) (Sub code - 01 or 02)
- LD Power Control Failure (Sub code - 41)
- Blown Fuse Failure (IOU Fuse F1 has blown) (Sub code - 71)
- Scanner Initialization Failure (Sub code - 61)
- Master Motor Failure (Sub-code - 51)

If the Call Service indicator is not lit, one of the following conditions has occurred.

- Excessive ADF jam call - the ADF has jam problems frequently. (Sub-code: 80; see section 4.6.1)
- Excessive printer jam call - the printer has jam problems frequently. (Sub-code: 81 through 87; see section 4.6.1)
- Periodic service call (Sub-code: A0; see section 4.6.2)
- PM call interval (number of printed pages) has expired (Sub-code: 00; see section 4.6.3)

To find out which problem has occurred, either:

- See the Auto Service Report, System Parameter List, and Service Monitor Report that were sent to the service station.
- Check the error code history using function 03.
- Try to clear the service call condition: switch the power off, wait 10 seconds, then switch back on.
- Check the sub-code which is stored at RAM address 080698 (H). Note that the sub-codes do not appear on the reports that were sent to the service station, but they are stored in the above mentioned RAM.

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.

Note: A sub-code is stored in the RAM address 080698(H) when there is a service call. See section 4.7 for details.

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

This error occurs in the following condition:

- Error in the Laser Interface (LIF) chip on the SPU (sub-code 41)

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

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

This error occurs in any of the following conditions:
Standby mode: If the fusing lamp temperature exceeds 220 °C (sub-code 01)
At power on: If the printing temperature not reached within 60 s of switching the machine on. (sub-code 02)

Check	Action if Yes	Action if No
Before checking anything, do the following: Change the contents of RAM address 080699 to 00. Then switch the power off, wait for a few seconds, then switch back on. If the problem remains, check the following points. Is the fusing unit thermistor disconnected (SPU CN156)? 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 +24VIL does not return from the IOU.		

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

This error occurs in the following condition:

- If SPU CN253-4 does not go low within 10 s of the polygonal mirror motor being switched on (sub-code 21)

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

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

This error occurs in the following condition:

- If SPU CN222-4 (Main motor) does not go low within 10 s of the main motor being switched on (sub-code 11)

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 IOU, SPU or the motor.	Replace the defective switch mechanism.

Symptom: Scanner Home Position Failure (Error Code 9-11)

This error occurs in the following condition:

- If SPU CN253-7 does not goes low after 14 s of the machine's main power being switched on.

Check	Action if Yes	Action if No
1. Check that the mechanism is not obstructed.		
2. Is the scanner motor working ?	Go to step 3.	Check the +24V connection from the SPU to the scanner motor, then replace the motor or the SPU.
3. Does the +5V from the SPU reach the scanner home position sensor ?	Replace the scanner home position sensor.	Check the +5V connection from the PSU to the SPU (through the FCU), then replace the defective PCB.

Symptom: Blown Fuse Failure (Error Code 9-16)

This error occurs in either of the following conditions:

- If IOU CN203-1 (+24VADF) goes low: IOU fuse F1 may have blown.
- If IOU CN202-1 (+24V) goes low: IOU fuse F2 may have blown.

Check	Action if Yes	Action if No
1. Are either of the fuses F1 or F2 on the IOU blown ?	Replace the defective fuse or the IOU. If the problem still remains after replacement, check the ADF drive components.	Replace the SPU.

Symptom: Master Unit Motor Failure (Error Code 9-28)

This error occurs in the following condition:

- If IOU CN221-4 does not go low within 10 s of the master unit motor being switched on (sub-code 51)

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 IOU, SPU, or the master unit motor.	Replace the defective switch mechanism.

6.5. OMR SHEET

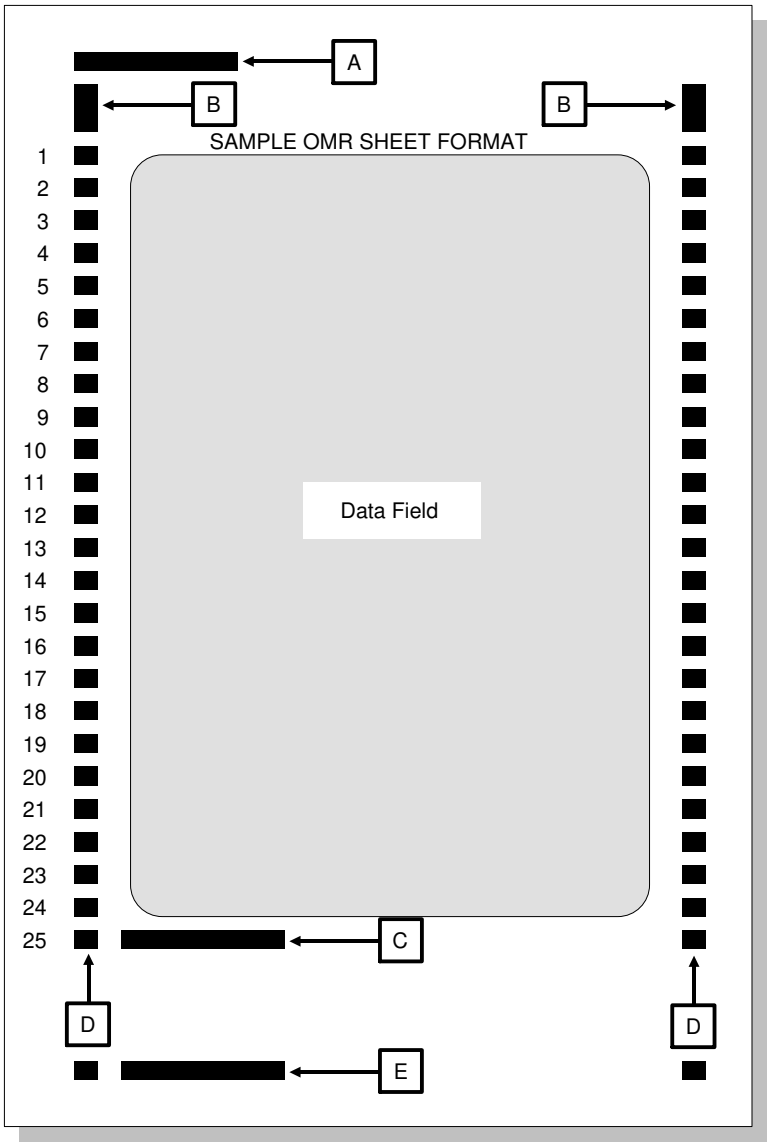
6.5.1. Possible Errors with OMR Sheets

If one of the following errors occurs while scanning an OMR sheet, the scanned data are not stored and an error code is stored in the memory.

Symptom	Action	Error Code
Start mark not detected	Check the ADF/scanner mechanisms. Check if a photocopy of the sheet was used. Check if a cut-off portion of the sheet was used. Check if the document guides are adjusted correctly. Check if the sheet is dirty. Check for any adhesive tapes on the sheet.	4-80
Skew detection mark not detected		4-82
Guide mark not detected while scanning the data field		4-84
End mark not detected after the data field		4-89
OMR sheet placed in the ADF the wrong way	Place the sheet correctly in the ADF.	4-81
Skew detected at the skew detection mark	Check the ADF mechanisms. Check if a photocopy of the sheet was used. Check for any adhesive tapes on the sheet. Check if the document guides are adjusted correctly.	4-83
Skew detected while scanning the data field		4-85
Reduction rate not acceptable	Check if a reduced photocopy was used. Adjust the scanner correctly.	4-90

6.5.2. Sample OMR Sheet Format

The following marks on the OMR sheet are used to detect errors. Refer to the following diagram for the locations of these marks.



	Name	Usage
A	Start mark	Used to detect the start of an OMR sheet.
B	Skew detection marks	Used to detect skew before scanning the data field.
C	End mark	Used to detect the end of the data field.
D	Guide marks	Used to detect lines in the data field, and to detect skew while scanning the data field.
E	Wrong way insertion detection mark	Used to detect wrong way insertion. On the transfer request program sheet, this mark is also used as the end mark.

6.6. ERROR CODES

If an error code occurs, retry the communication. If the same problem occurs, try to fix the problem as suggested below.

Code	Meaning	Suggested Cause/Action
0-00	DIS/NSF not detected within 40 s of Start being pressed	Check the line connection Check the NCU - FCU connectors. The machine at the other end may be incompatible. Replace the NCU or FCU. Check for DIS/NSF with an oscilloscope. If the rx signal is weak, there may be a bad line.
0-01	DCN received unexpectedly	The other party is out of paper or has a jammed printer. The other party pressed Stop during communication.
0-03	Incompatible modem at the other end	The other terminal is incompatible.
0-04	CFR or FTT not received after modem training	Check the line connection. Check the NCU - FCU connectors. Try changing the tx level (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, bits 6 and 7).
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 asking the user to change bit 0 of user parameter 05 to 1.
0-52	Polarity has changed during communication	Check the line connection. Retry communication.
1-00	Document jam	Improperly inserted document or unsuitable document type. Clean the document jam sensor. See "Mechanical Operation - Document Jam".
1-01	Document length exceeded the maximum	Divide the document into smaller pieces. Clean the sensors in the ADF/scanner. See "Mechanical Operation - Document Jam".
1-17	Document jam in the feed-out area	Clear debris from the sensor actuator. Clean the sensors in the ADF/scanner. Check the connections between the sensors and FCU. Replace defective sensor, operation panel board, or FCU.
1-71	Cover has been opened or cassette has been pulled out during printing.	Close the cover or put back the cassette.
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.
3-00	CIG4 reset; CIG4 did not send response to FCU.	Replace the CIG4 or FCU. Check the ISDN line.
3-10	Disconnection during ISDN G3 communication.	Check up the other terminal. Check the ISDN line. The other party dialled a wrong number.
3-11	Disconnection during ISDN G4 communication.	Check up the other terminal. Check the ISDN line.
3-20	A CSA signal was received during ISDN G4 communication.	Check up the other terminal. Check the ISDN line.
3-21	A CSA signal was sent out after pressing the Stop key,during ISDN G4 communication.	The Stop key was pressed.
3-30	Mismatched specifications (rx capability)	Check the specifications of the other terminal.

Code	Meaning	Suggested Cause/Action
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.
4-10	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.
4-80	Start mark not detected at the top of OMR sheet	See section 6.5. If the problem remains, replace the FCU.
4-81	OMR sheet placed in the ADF the wrong way	
4-82	Skew detection mark not detected	
4-83	Skew was detected before scanning the OMR data field	
4-84	Guide mark not detected while scanning an OMR sheet	
4-85	Skew was detected while scanning the OMR data field	
4-89	End mark not detected at the bottom of the OMR sheet	
4-90	Reduction rate in the main scan direction not acceptable while scanning an OMR sheet	
5-00	Data reconstruction not possible	Replace the FCU.
5-20	Storage impossible because of a lack of memory	Temporary memory shortage; otherwise, replace the FCU or memory PCB.
5-21	Memory overflow	
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	

Code	Meaning	Suggested Cause/Action
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, bits 6 and 7).
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 01 or 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.
9-11	Scanner home position failure	See section 6-4 (Scanner Home Position Failure).
9-16	Blown fuse failure	See section 6-4 (Blown Fuse Failure).
9-20	Laser diode power control failed	See section 6-4 (LD Power Control Failure). If the problem remains, replace the FCU.
9-22	Fusing lamp failure	See section 6-4 (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 6-4 (Mirror Motor Locked). If the problem remains, replace the FCU.
9-24	Main motor lock failed	See section 6-4 (Main Motor Locked). If the problem remains, replace the FCU.
9-28	Master unit motor failure	See section 6-4 (Master Unit Motor Failure). If the problem remains, replace the FCU.
9-50	Copy jam in the PFU	See section 6-2-2. If the problem remains, replace the FCU.

6.7. ELECTRICAL COMPONENT DEFECTS

6.7.1. Defective Sensor Table

Sensor	Symptoms if Defective
Book original size intialization sensor	Original size will not be changed after replacing the original with one of a different size.
Document length sensor	Wrong size is detected, or original size is not detected.
Document width sensor	Wrong size is detected, or original size is not detected.
Scanner home position sensor	Call Service indicator lights.
First paper size sensor	Wrong paper size is detected, or size is not detected.
Second paper size sensor	
First paper end sensor	Load Paper indicator lights.
Second paper end sensor	
By-pass feed sensor	Paper in the by-pass feed table is not detected.
By-pass feed cover sensor	Load Paper indicator does not light when the by-pass feed table is opened.
First relay sensor	Misfeed indicator lights and Misfeed Location indicator “A” lights.
Registration sensor	Misfeed indicator lights and Misfeed Location indicator “B” lights.
Fusing unit exit sensor	Misfeed indicator lights and Misfeed Location indicator “C” lights.
Toner end sensor	Add Toner indicator lights.
Toner overflow sensor	“USED TONER TANK FULL” is displayed.

6.7.2. Blown Fuse Table

The only service-replaceable fuses are the following.

PCB	Fuse	Symptoms if defective
PSU	FU1	No power to the machine overall
	FU2	No power to the tray heaters
	FU3	No power to the machine overall
	R12 (Fuse resistor)	No +24V output from the PSU
IOU	F1	No power to the ADF
	F2	No power to the printer components (same as if the interlock switches are open)
	F3	Paper jam in the duplex unit and optional paper feed unit (no power to the sensors in those units)
SPU	F1	No power to the optional sorter
NCU (USA)	F1	No more lightning protection available
	F2	

7. DOCUMENT FEEDER

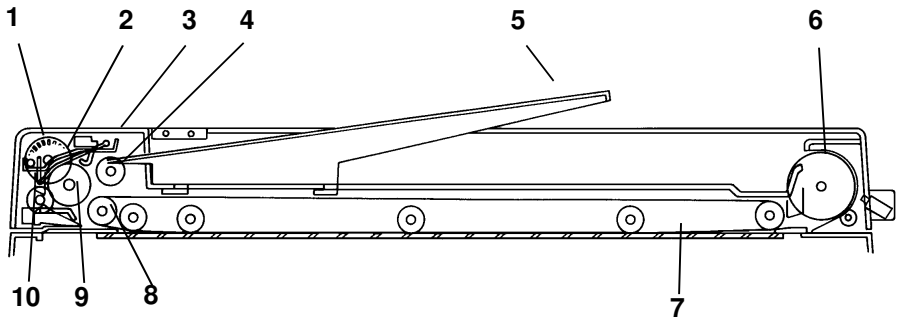
7.1. OVERALL MACHINE INFORMATION

7.1.1. Specifications

Original Size:	Maximum: A3 or 11" x 17" Minimum: A5 sideways or 5 1/2" x 8 1/2"
Original Weight:	60 to 90 g/m^2 (16 to 24 lb)
Original Feed:	Automatic Feed - ADF mode
Original Tray Capacity:	30 sheets - 80 g/m^2 (20 lb)
Original Set:	Face up - First sheet on top
Original Transport:	One flat belt
Copying Speed:	8 copies/minute (1 to 1 mode) (A4 or 11" x 8 1/2" sideways from 1st cassette)
Power Consumption:	48 W
Dimensions (W x D x H):	590 x 443 x 72 mm (23.2" x 17.4" x 2.8")
Weight:	Approximately 5.8 kg (12.8 lb)

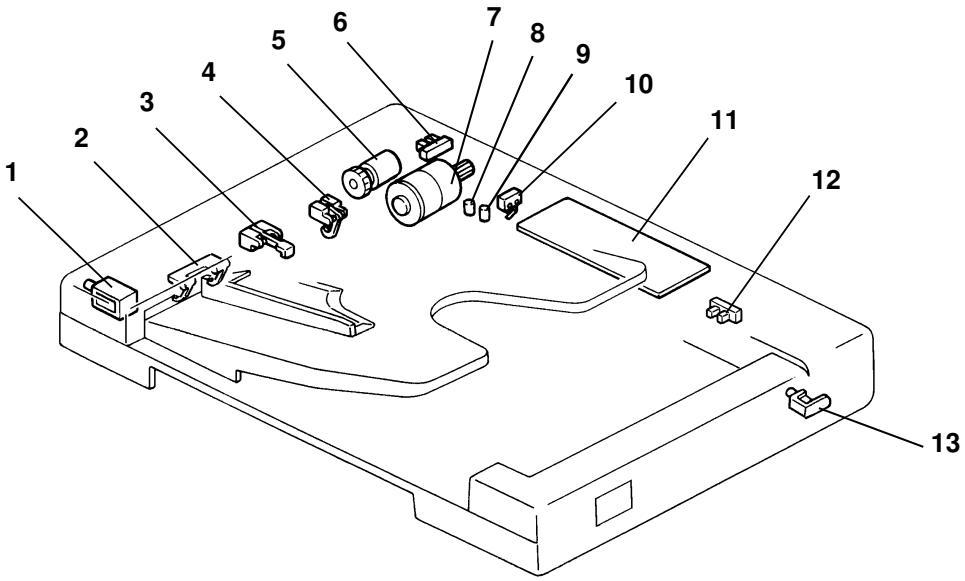
- Specifications are subject to change without notice.

7.1.2. Mechanical Components



1. Pulse Generator Disk
2. Friction Belt
3. Pick-up Lever
4. Pick-up Roller
5. Document Table
6. Exit Roller
7. Transport Belt
8. Transport Belt Roller
9. Feed Roller
10. Relay Roller

7.1.3. Electrical Component Descriptions



Name	Function	Location
Motors		
DF Motor	Drives all the document feeder components.	7
Solenoids		
Pick-up Solenoid	Energizes to press the pick-up lever against the stack of originals in preparation for original feed-in.	1
Stamper Solenoid	Energizes to stamp the originals that have been successfully transmitted (immediate transmission) or stored (memory transmission).	13
Clutches		
Feed Clutch	Turns on to transmit the main motor rotation to the feed roller.	5
Switches		
Lift Switch	Informs the cpu when the DF is lifted and also serves as the misfeed reset switch for the DF.	10
Sensors		
Pulse Generator Sensor	Supplies timing pulses to the DF main board.	6
Document Set Sensor	Informs the main cpu that originals have been placed and causes the Insert Document Indicator to go out.	4
Registration Sensor	Controls original stop timing and checks for original misfeeds.	3
Document Width Sensor	Determines the width of the originals.	2
Scanner Setup Sensor	Informs the cpu when the DF is being closed and determines the original size in the platen mode.	12
Printed Circuit Boards		
DF Main Board	Controls all DF functions.	11
LEDs		
SADF Indicator	Turns on for SADF mode.	9
Insert Document Indicator	Turns off when the originals are inserted into the document table.	8

7.2. DETAILED SECTION DESCRIPTIONS

7.2.1. Basic Operation

1. Document Feed

When the main switch is turned on, the DF cpu sends the "DF installed" signal to the cpu on the SPU. Receiving this signal, the cpu recognizes that the document feeder is installed and sends the "DF confirmed" signal to the DF cpu.

When documents are placed on the document table, the Insert Original indicator turns off and the DF cpu sends the "original set" signal to the cpu to indicate that the originals have been set.

When the Start key is pressed, the cpu on the SPU sends the "start feeding" signal to the document feeder. On receipt of this signal, the DF cpu energizes the DF motor, the pick-up solenoid, and the feed clutch to feed the bottom sheet of the document stack onto the exposure glass. The pick-up solenoid, and the feed clutch remain energized until the document's leading edge reaches the registration sensor. The DF motor turns off shortly after the document's trailing edge passes the registration sensor. Then, the DF motor pauses and reverses for a moment to align the edge of the document with the scale.

When documents are placed on the document table, the document width sensors checks the document width and while feeding the original, the DF registration sensor and the pulse generator sensor check the document size.

The scanner starts, and when it reaches the return position, as determined by the number of pulses received from the pulse generator, the cpu on the SPU sends the "feed next page" signal to the DF cpu.

2. Semi-Automatic Document Feed

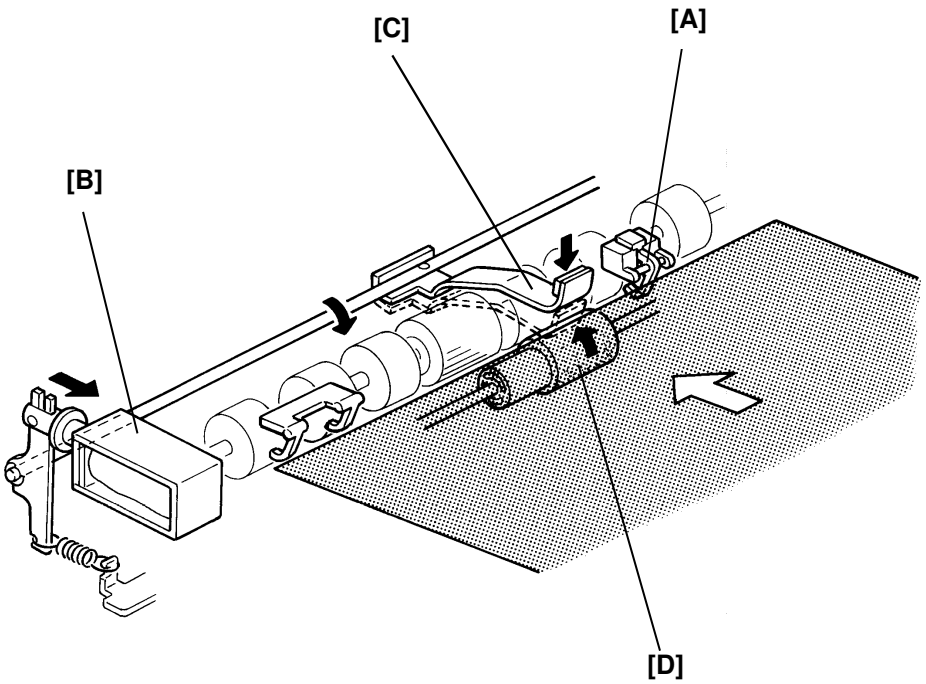
If a single document is inserted into the document table and copied, the DF shifts to the semi-automatic feed mode and lights the SADF indicator. The SADF indicator remains on for five seconds after the main motor stops. If another original is inserted within that five second period, it is automatically fed and copied.

3. Stamping

When the facsimile mode and the stamp mode are selected together, if the page was transmitted without error (immediate transmission) or stored successfully (memory transmission), the stamp marks the page with a small red dot on the front side.

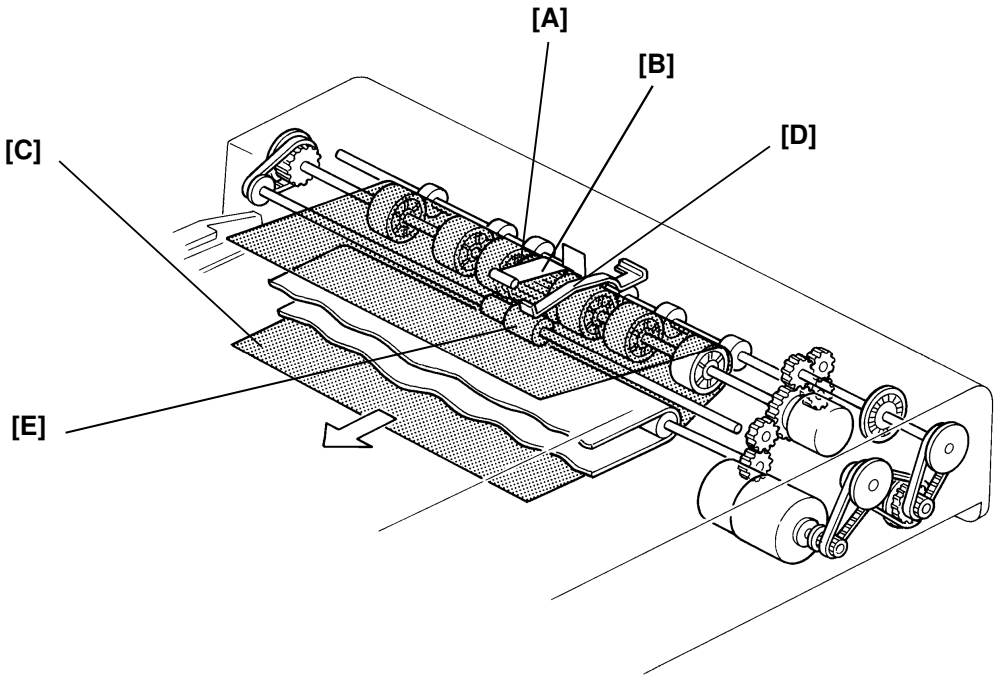
7.2.2. Document Feed

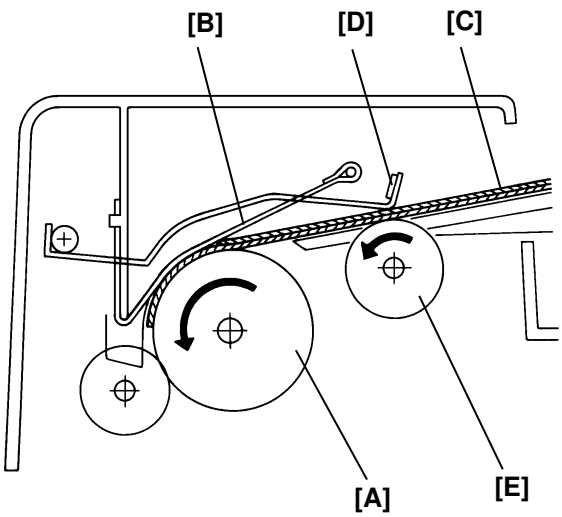
1. Document Pick-up Mechanism



After setting the document on the document table, the document contacts the actuator [A] of the document set sensor and cause the actuator to move out of the sensor. The DF cpu then sends the original set signal to the cpu to inform it that the document feeder will be used. When the Start key is pressed, the pick-up solenoid [B] is energized. The document stack is then pressed between the pick-up lever [C] and pick-up roller [D]. The rotation of the pick-up roller advances the bottom page.

2. Document Separation Mechanism

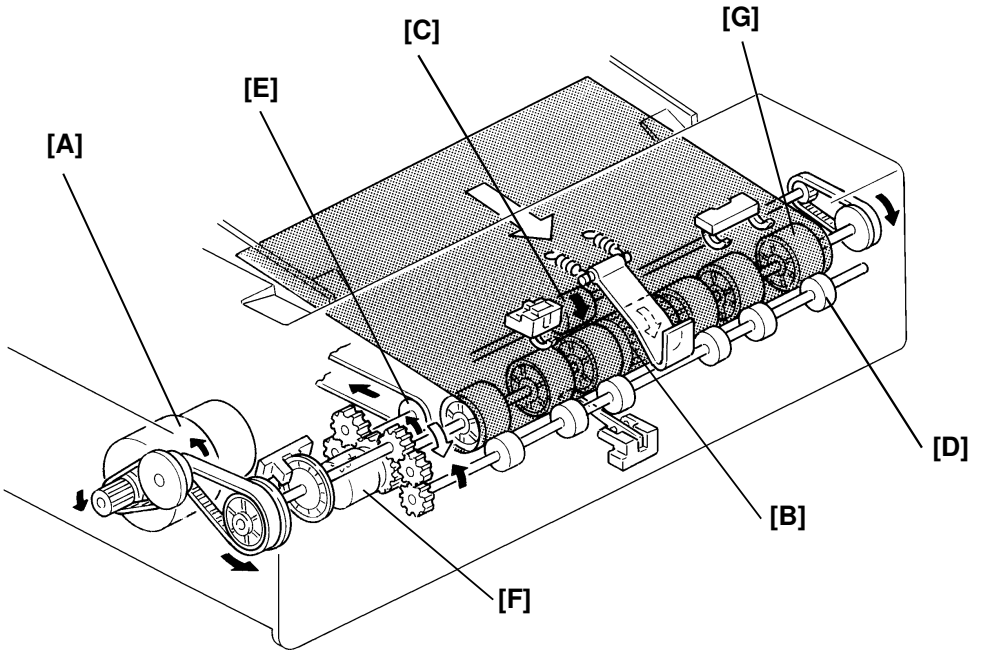




The feed roller [A] and the friction belt [B] are used to feed and separate the pages [C]. Only the bottom page is fed because the friction belt prevents any other pages from feeding.

Document feed starts when the pick-up lever [D] presses the document stack and the rotation of the pick-up roller [E] advances the bottom page of the stack. The feed roller moves the page past the friction belt because the driving force of the feed roller is greater than the resistance of the friction belt. The friction belt prevents multiple feeds because the resistance of the friction belt is greater than the friction between pages.

3. Document Feed-in Mechanism



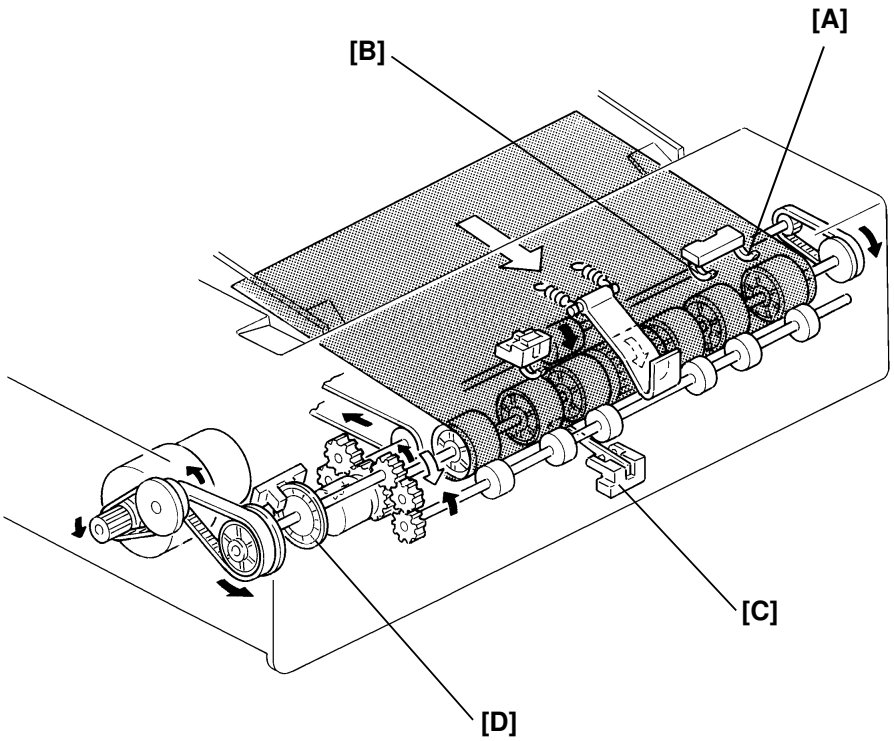
The DF motor [A] drives the feed roller [B], the pick-up roller [C], the relay rollers [D], and the transport belt roller [E] via timing belts and a gear train. The feed roller and the pick-up roller are controlled by the feed clutch [F], but the relay rollers and the transport roller are directly driven by the DF motor. The idler rollers [G] on the feed roller shaft are free from the shaft.

When the Start key is pressed, the DF motor is energized and the relay rollers and transport belt roller start turning. At 100 milliseconds after the DF motor starts turning, the pick-up solenoid and the feed clutch are energized. The pick-up and feed rollers then start turning and carry the page between the relay rollers and the idler rollers. The pick-up solenoid and the feed clutch are de-energized when the page's leading edge passes the registration sensor.

The DF motor remains energized to deliver the page to the exposure glass until a certain number of pulses (10 to 25 pulses) after the document's trailing edge passes through the registration sensor. Then, the DF motor pauses and reverses for 22 pulses to align the edge of the page with the scale.

To feed the second document, the DF motor starts rotating when the scanner reaches the return position. (The cpu on the SPU sends the feed next page signal to the DF cpu.) At this time, the transport belt starts carrying the first page on the exposure glass to the exit roller. The timing for the pick-up solenoid and the feed clutch energizing for the second page depends on the length of the first page detected by the registration sensor.

4. Document Size Detection



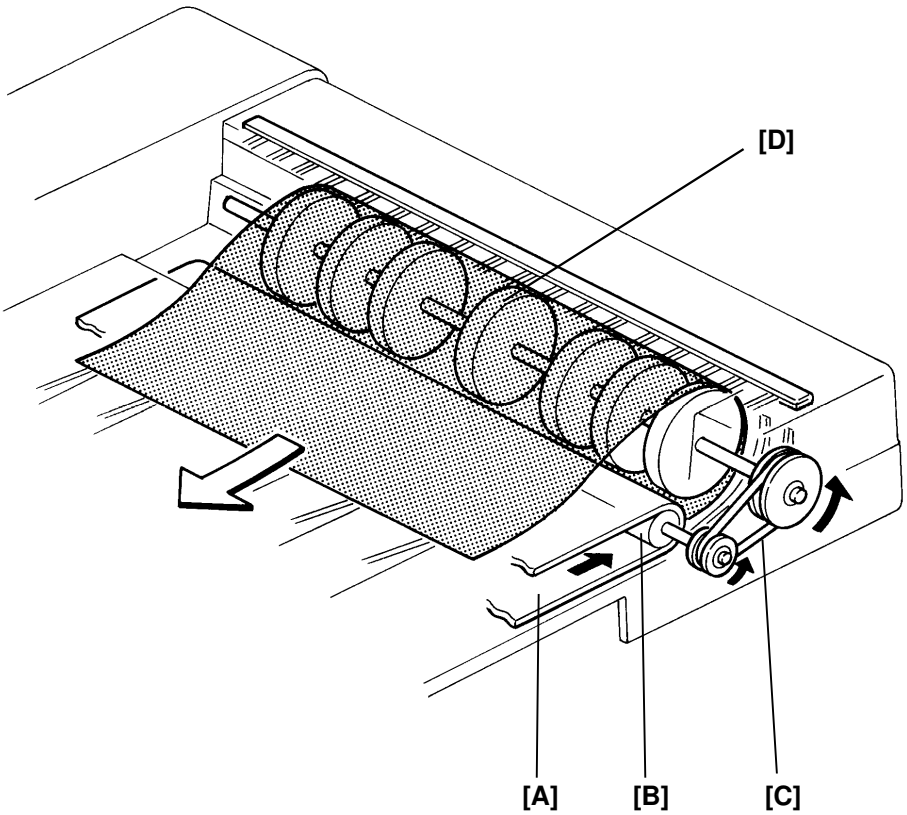
The DF determines document size (both width and length) through the use of the A3 width sensor [A], B4 width sensor [B], registration sensor, [C] and pulse generator sensor [D].

The length of the document is calculated by counting the number of pulses from the pulse generator while the registration sensor is on.

The B4 width sensor is turned on when a B4 [10.1"] width, or wider, document is placed on the document table. The A3 width sensor is turned on when an A3 [11.7"] width, or wider, document is placed.

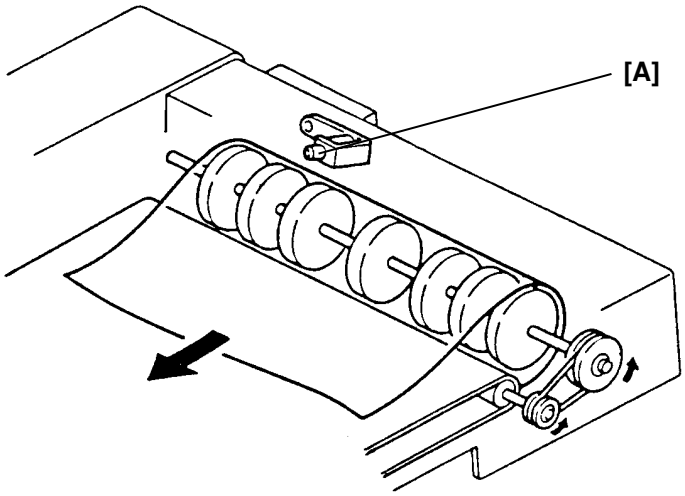
Document size detection is necessary for the feed-in/feed-out timing of the DF. Also, the detected size is used during the facsimile protocol handshake procedure.

5. Document Feed-out Mechanism



The exit rollers are driven by the DF motor through a gear train, the transport belt roller, the transport belt [A], the transport belt idler roller [B], and the exit roller drive belt [C]. When the DF cpu receives the feed next page signal from the cpu on the SPU, the DF motor starts turning. Simultaneously, the transport belt carries the document to the exit rollers [D] and the exit rollers take over the document feed-out.

6. Stamp



This function is only for fax mode.

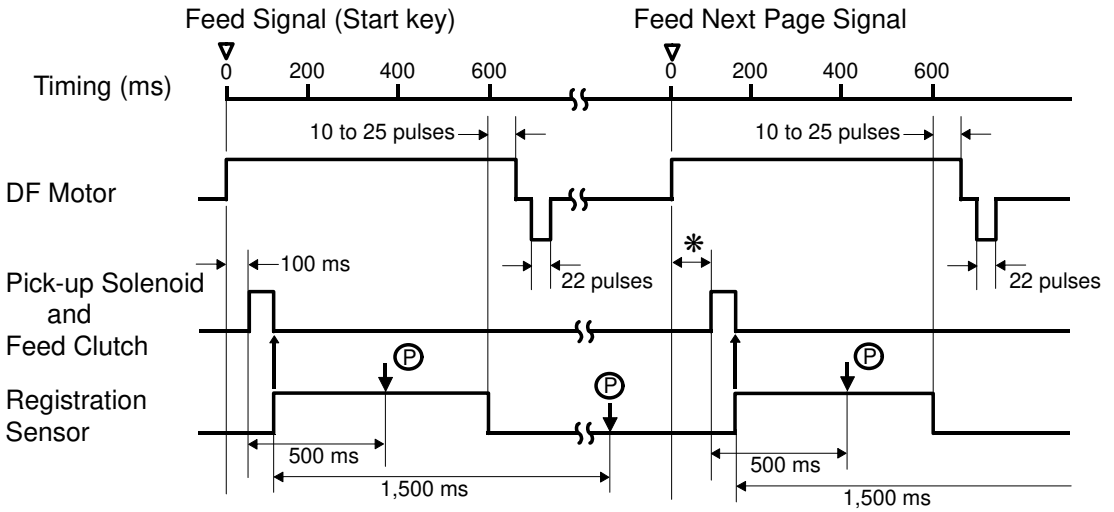
There is a stamp [A] at the document feed-out section and it is controlled by the DF cpu.

When the DF cpu receives the stamp start signal, the DF motor starts rotating to carry the document to the stamp position. When the original reaches the stamp position (this timing depends on the length of the document and the stamp position on the document) the DF motor stops. At 100 milliseconds after this, the stamp solenoid turns on if the page was sent successfully (immediate transmission) or stored successfully (memory transmission). After stamping, the DF motor starts again for feeding out the document.

The stamping position on the document can be changed from the trailing edge area to the leading edge area by adjusting RAM address 080265H.

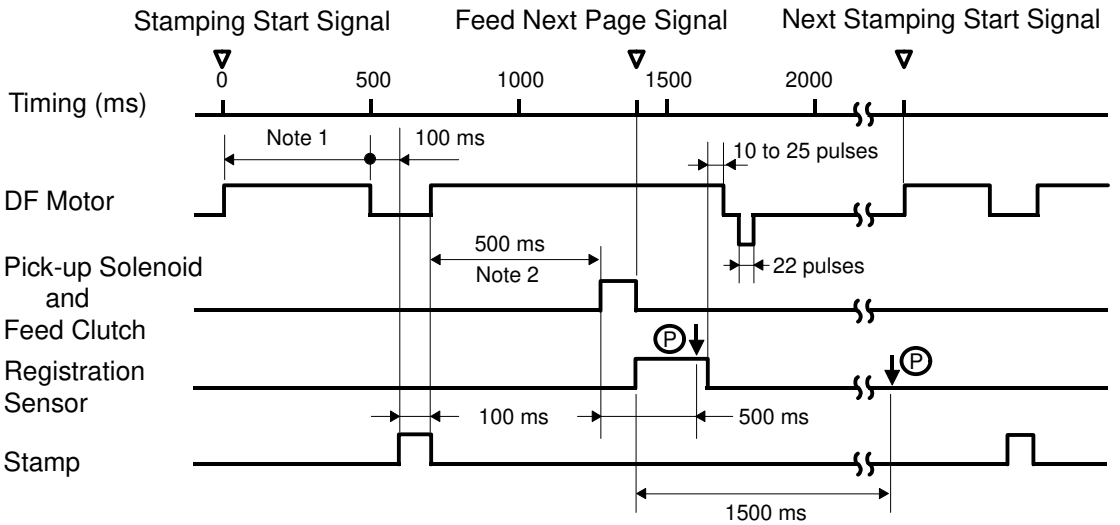
7. Original Feed and Misfeed Detection Timing

– Copy/Fax without stamp –



✻: The timing depends on the length of the first original.

– Fax with stamp –



Note 1: The timing depends on the length of the first original.
Note 2: 100 ms when the stamping position is at the trailing edge area.

The above chart shows the document feed and detection timing for document size A4 lengthwise or 8.5" x 11".

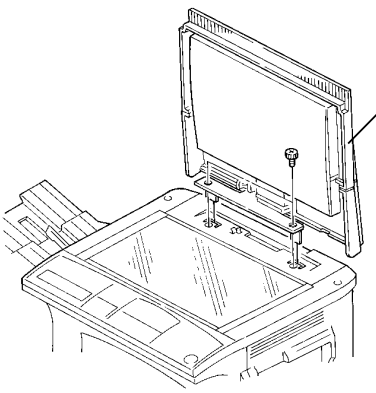
The registration sensor is used for misfeed detection. If the DF cpu detects a misfeed, the DF cpu sends the document misfeed signal to the cpu on the SPU. Then, the cpu lights the Misfeed Location indicator (P) on the operation panel. When the main switch is turned on, the DF cpu checks the registration sensor output for initial document misfeed. During document feed-in, the DF cpu detects two types of document misfeed by checking the following:

1. Whether the registration sensor is actuated within 500 milliseconds after the pick-up solenoid and the feed clutch turn on.
2. Whether the document has passed through the registration sensor 1,500 milliseconds after the registration sensor has been actuated.

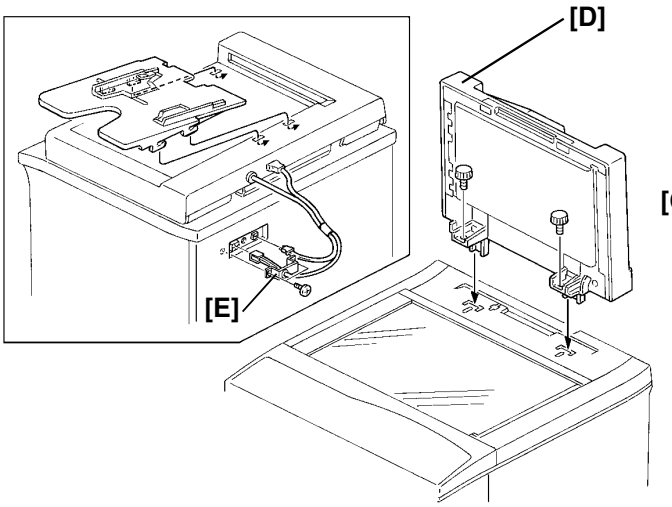
7.3. INSTALLATION

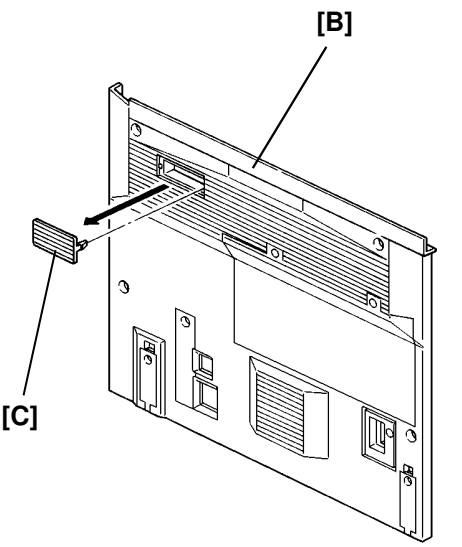
7.3.1. Installation Procedure

Caution: Check whether there are any fax messages in memory or not. If there are fax messages in memory, you have to install this unit and turn on the power within 1 hour.



Remove [A] if it has been installed (2 knob screws).





[D]: 2 knob screws
[E]: 2 screws

- Check the machine operation and copy quality.
- Check the original skew and the original side registration (see section 7.5.8 and 7.5.9).
- Check with the customer how to set up the following functions.

Function	RAM address	Bit No.	
Stamp Position	080265(H)	2	0: Bottom of page 1: Top of page
SADF Mode Reset Timer	080266(H)	1	0: 4s 1: 60s
Original Size Detection Timing	080266(H)	2	0: Only before scanning the 1st page 1: Before scanning each page

7.4. SERVICE TABLES

TEST POINTS

Number	Function
TP1	Factory Use
TP2	Not Connected
TP3	Not Connected
TP4	5 V
TP5	24 V
TP6	GND

VARIABLE RESISTOR

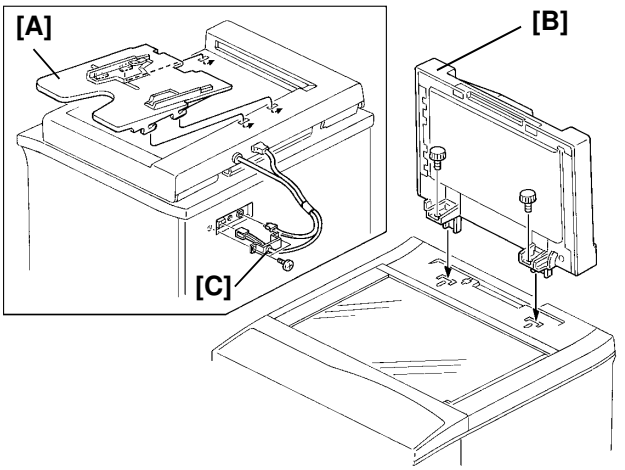
Number	Function
VR1	Adjusts the original stop position (Factory use)

DIP SWITCHES

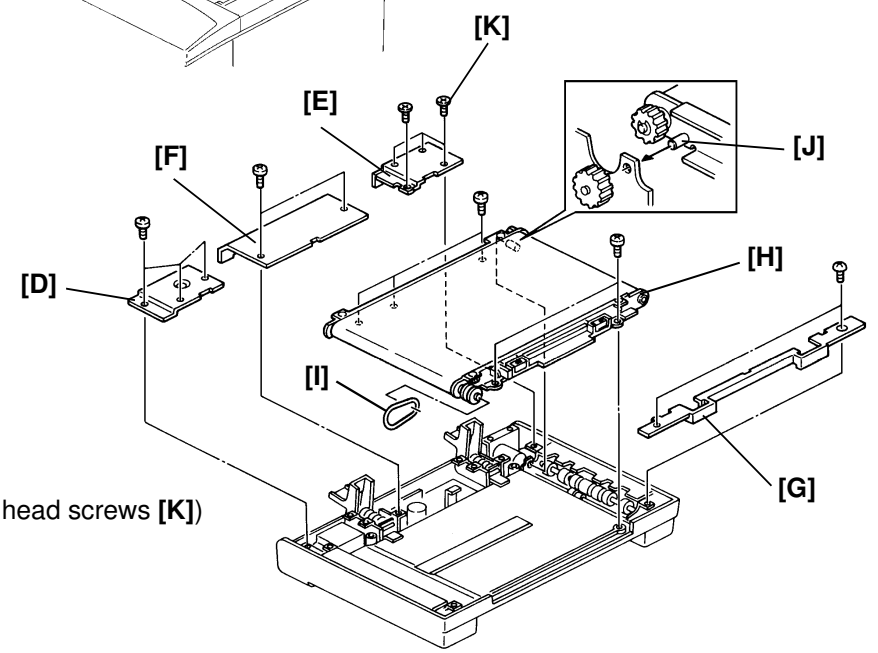
SW1				Function	
1	2	3	4		
OFF	OFF	OFF	OFF	Normal (Factory setting)	The lift switch must be ON (DF down).
ON	OFF	OFF	ON	Free Run (Insert paper)	
OFF	OFF	ON	ON	Solenoid Test	
ON	ON	OFF	ON	Motor Test	
ON	ON	ON	ON	All indicators ON	
OFF	OFF	OFF	ON	Free Run (Without paper)	

7.5. REPLACEMENT AND ADJUSTMENT

7.5.1. Transport Belt Assembly [H]

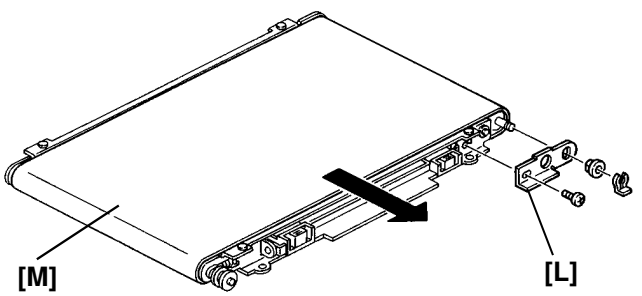


[B]: 2 knob screws
[C]: 2 screws



[D]: 3 screws
[E]: 4 screws (3 flat head screws **[K]**)
[F]: 2 screws
[G]: 2 screws
[H]: 5 screws

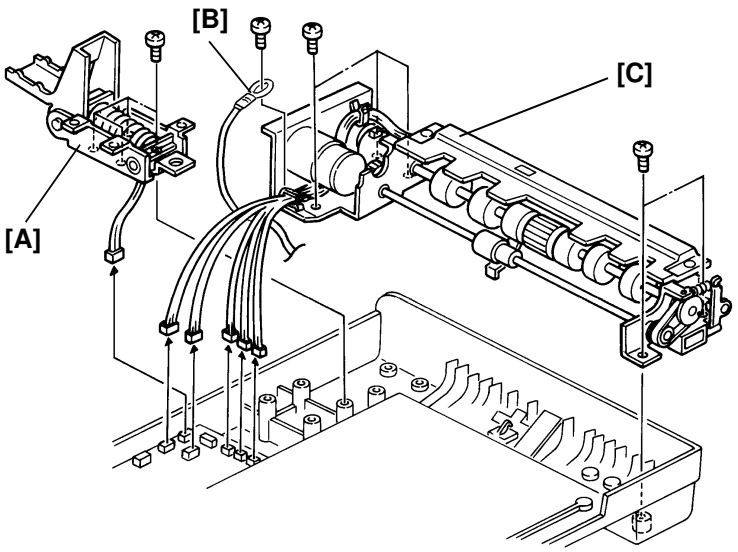
Note: When installing a transport belt assembly, make sure that the positioning pin [J] fits in the DF frame.



[L]: 1 screw, 1 bushing, and 1 clip

Note: After reinstalling the transport belt, make sure that the bushings of the transport rollers are set correctly and that the transport belt turns smoothly.

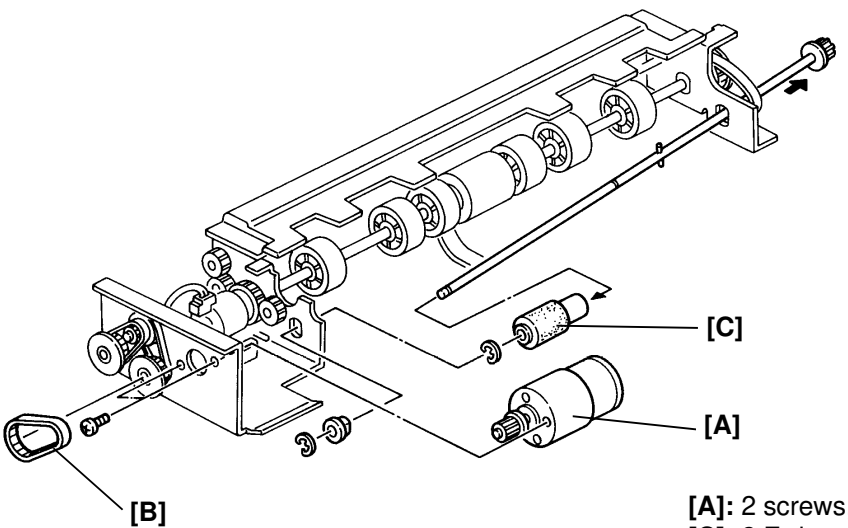
7.5.2. Feed-in Unit [C]



[A]: 4 screws, 1 connector
[B]: 1 screw
[C]: 5 screws, 5 connectors

Note:
- First, remove the transport belt assembly (see section 7.5.1., Transport Belt Replacement).
- When reinstalling the feed-in unit, the harness must be positioned underneath bracket [A].

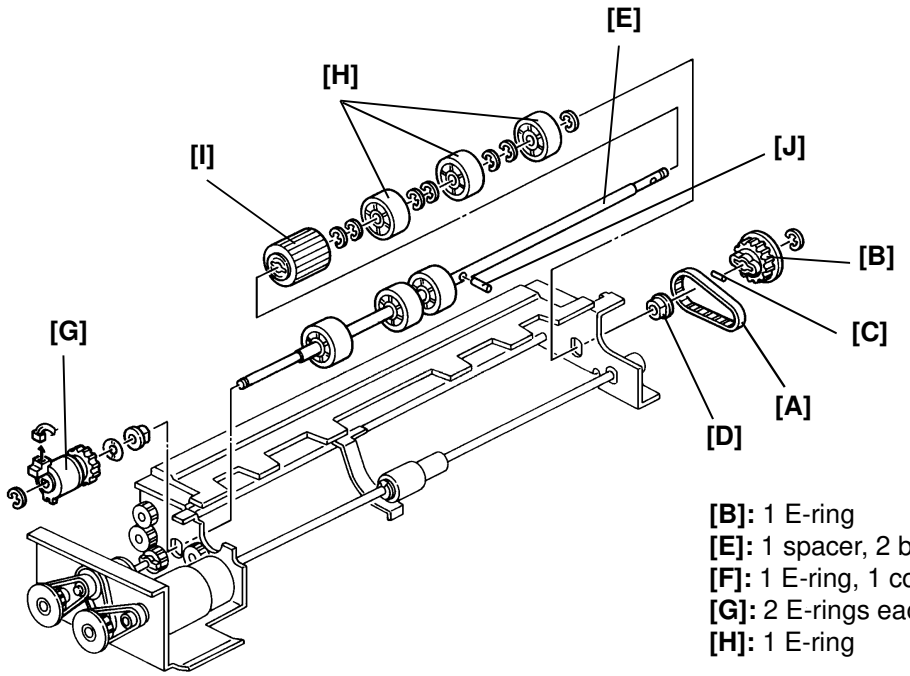
7.5.3. Pick-up Roller [C]



[A]: 2 screws, 1 timing belt **[B]**
[C]: 2 E-rings, 1 bushing

Note: First, remove the feed-in unit (see section 7.5.2, Feed-in Unit Removal).

7.5.4. Feed Roller [I]

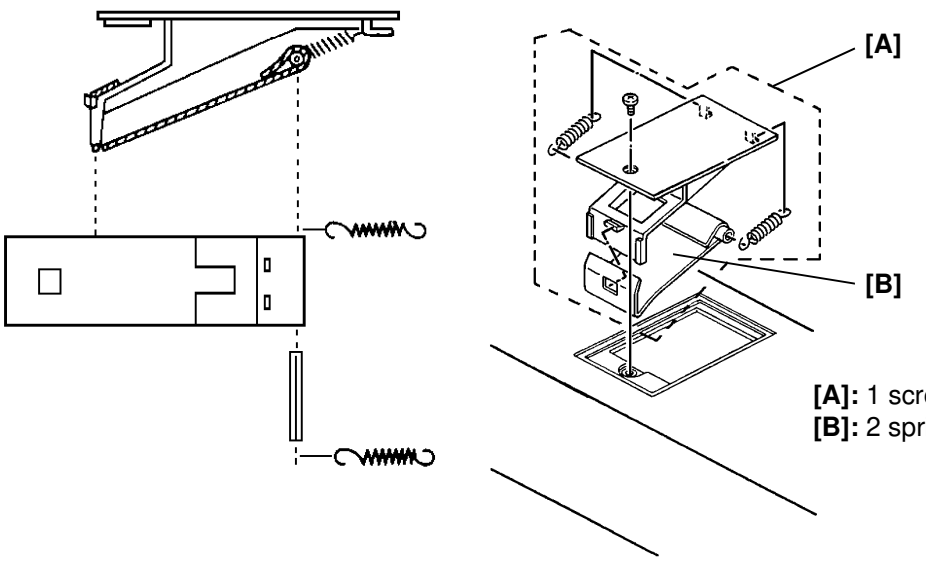


[B]: 1 E-ring
[E]: 1 spacer, 2 bushings
[F]: 1 E-ring, 1 connector
[G]: 2 E-rings each
[H]: 1 E-ring

Note: • First, remove the feed-in unit (see section 7.5.2, Feed-in Unit Removal).

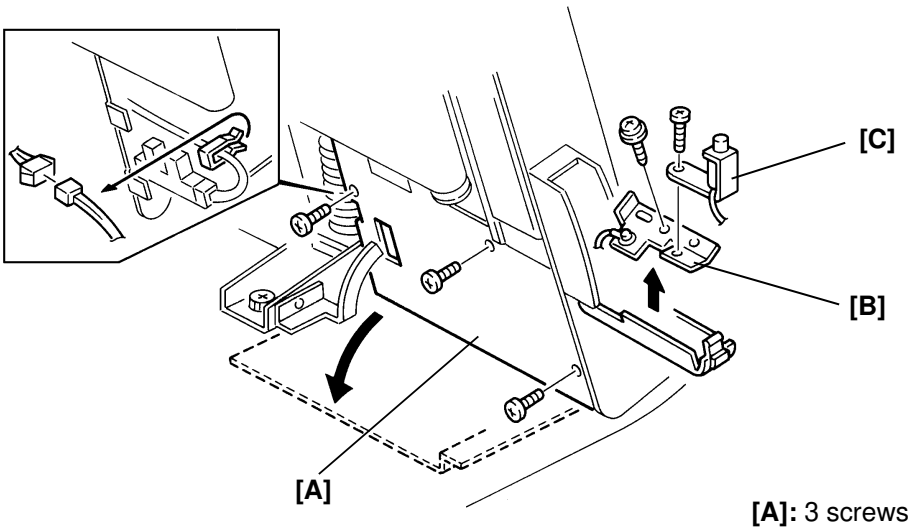
• Be careful not to lose the spring pins [C].

7.5.5. Friction Belt [B]



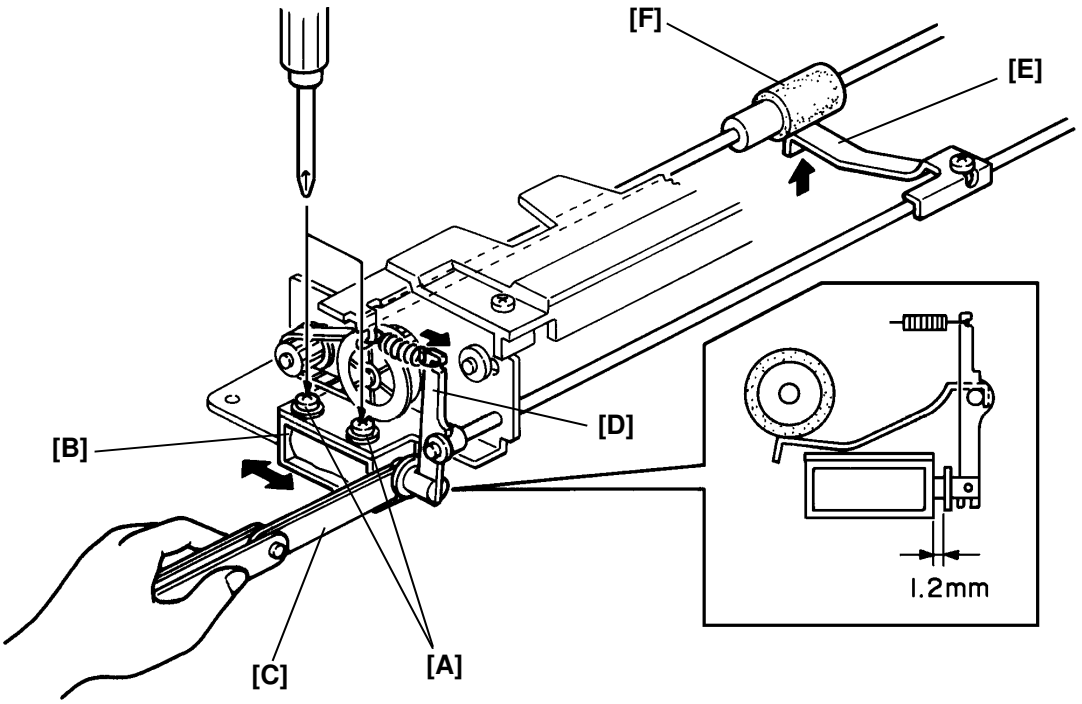
[A]: 1 screw
[B]: 2 springs, 1 pin

7.5.6. Stamp [C]



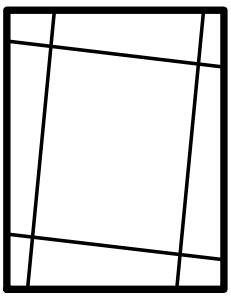
[A]: 3 screws
[B]: 1 screw
[C]: 1 screw, 1 connector

7.5.7. Pick-up Solenoid Adjustment

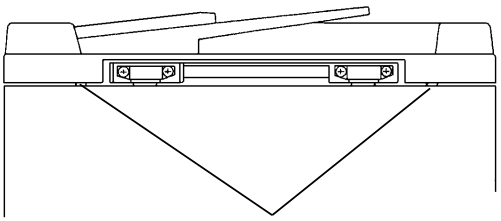


1. Turn off the main switch.
2. Remove the feed-in unit (see section 7.5.2, Feed-in Unit Removal).
3. Loosen the two screws [A] securing the pick-up solenoid [B].
4. Place a 1.2 mm thickness gauge [C] between the plunger and the solenoid.
5. Turn the solenoid lever [D] clockwise until the plunger touches the thickness gauge. Just at this point, tighten the two screws.
6. Make sure that the pick-up lever [E] is touching the pick-up roller [F] when the plunger is pushed. If not, repeat steps 3 to 5.
7. Reassemble the DF.
8. Turn on the main switch and check the document feed-in operation.

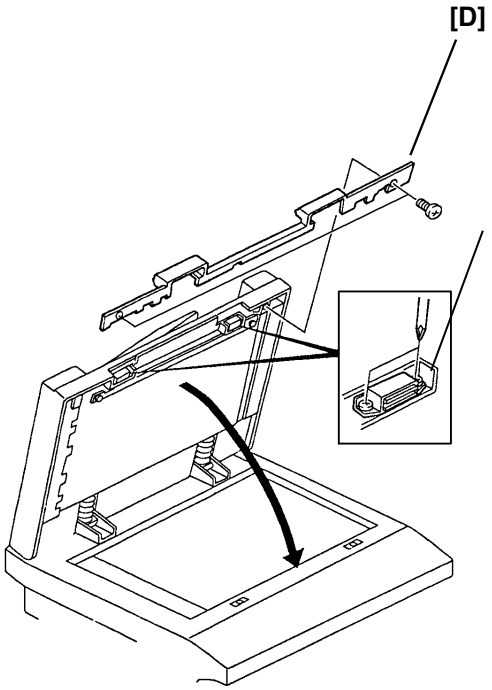
7.5.8. Original Skew Adjustment



[A]



[C]



[D]

1. Using a DF test chart, make a copy using the DF.
2. Compare the copy with the original and confirm that there is no skew.
3. If there is skew [A], close the DF, then adjust the magnet catch positions [B] so that the rubber pad [C] is in contact with the front original scale (2 screws each), after removing the DF grip [D] (2 screws).

7.5.9. Original Side Registration Adjustment

1. Using a DF test chart, make a copy using the DF.
2. Compare the side registration of the copy with that of the original, and confirm that the difference is within 0 ± 2 mm.
3. If it is not, adjust the side edge registration using Function 11-3-1D.

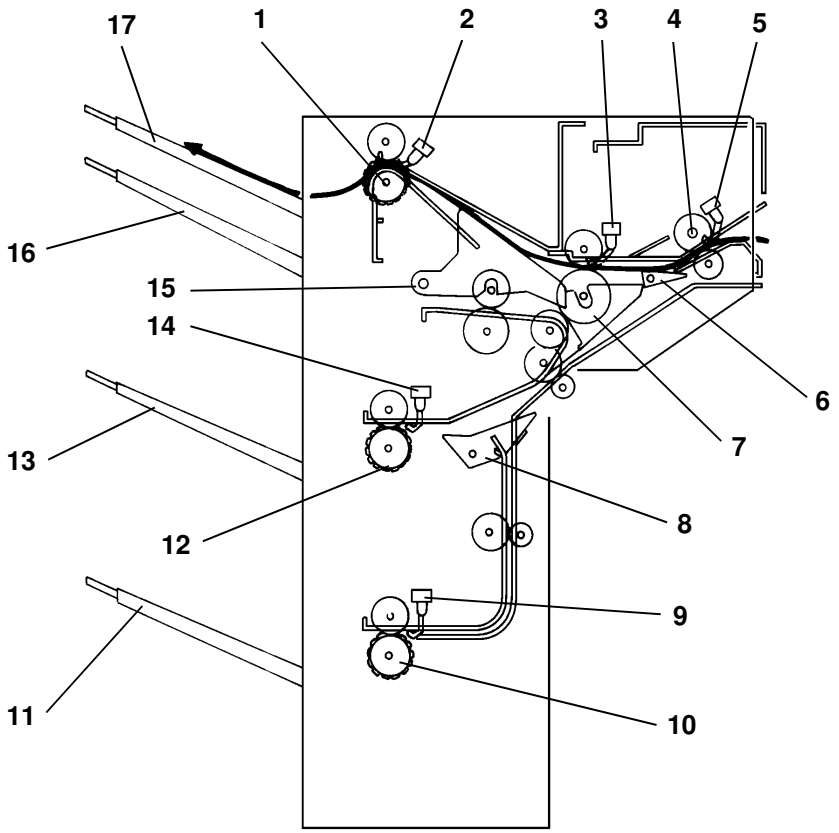
8. SORTER

8.1. OVERALL MACHINE INFORMATION

8.1.1. Specifications

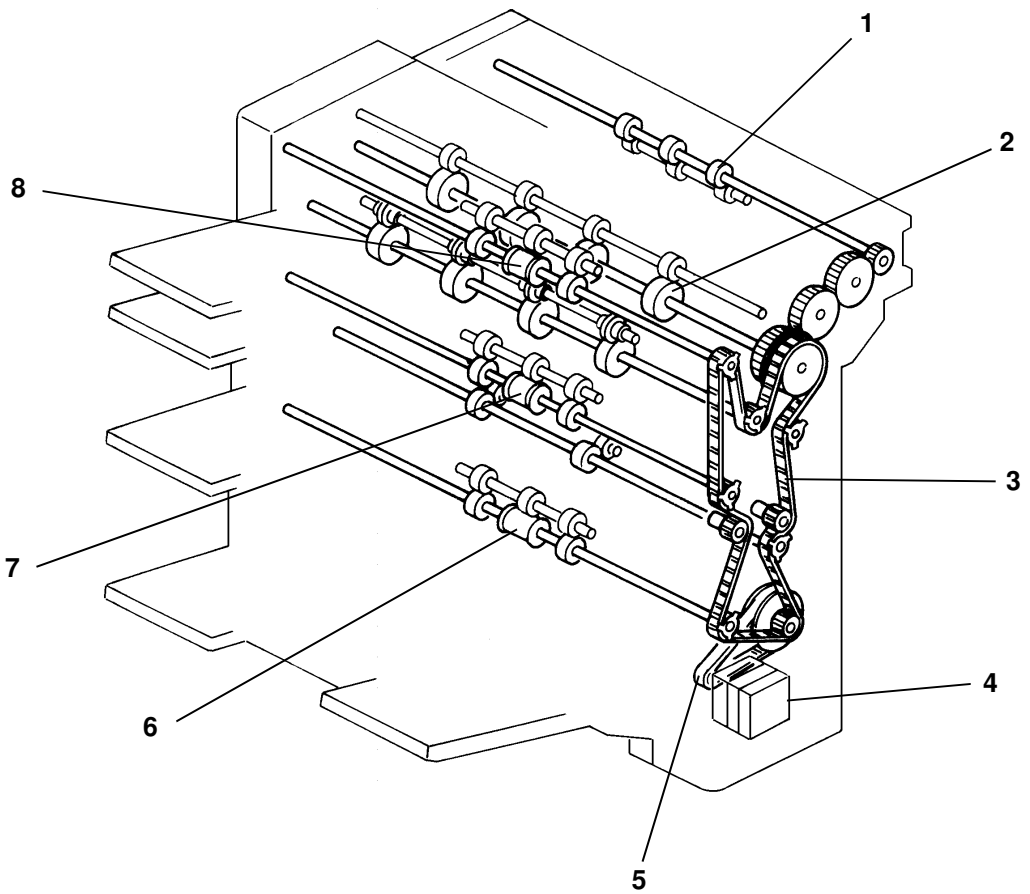
Paper Size for Bins:	Max. A3, 11" x 17" Min. A6, 5 1/2" x 8 1/2" lengthwise	
Copy Paper Weight:	53 to 157g/m^2 (14 to 42 lb) (Feed out face up) 64 to 81g/m^2 (17 to 22 lb) (Feed out face down)	
Number of Bins:	3 bins	
Bin Capacity:	Sort Stack	100 sheets/bin 100 sheets/bin
1st Bin Capacity:	130 sheets (face up)	
2nd Bin Capacity:	100 sheets (face up/down)	
3rd Bin Capacity:	100 sheets (face up/down)	
Power Source:	DC 24 V and DC 5 V from the main machine	
Power Consumption:	29 W	
Dimensions (W x D x H):	450 x 450 x 352 mm/17.7" x 17.7" x 13.9"	
Weight:	9 kg (19.8 lb)	

8.1.2. Mechanical Components



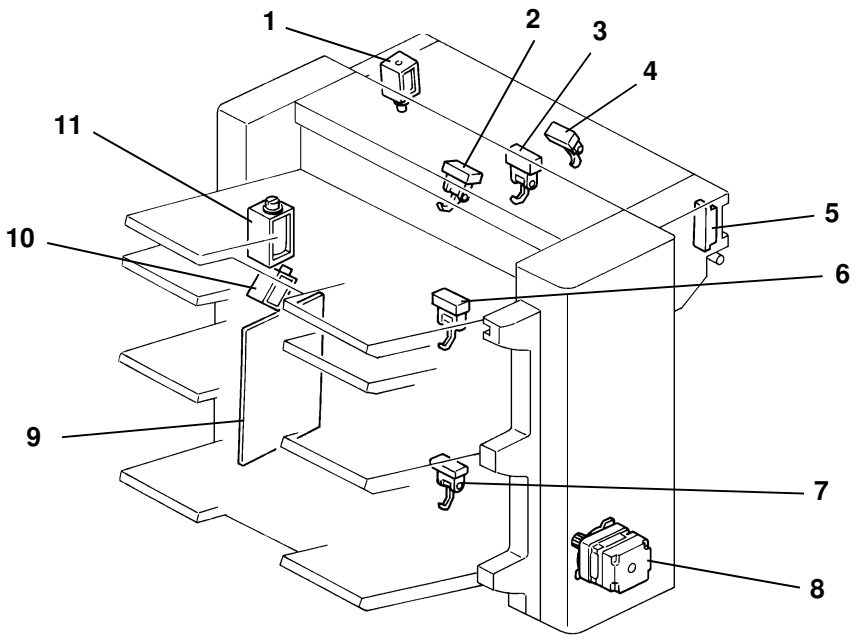
1. First Exit Roller
2. First Exit Sensor
3. Inverter Entrance Sensor
4. Entry Roller
5. Entry Sensor
6. Junction Gate 1
7. Inverter Roller
8. Junction Gate 2
9. Third Exit Sensor
10. Third Exit Roller
11. Third Bin
12. Second Exit Roller
13. Second Bin
14. Second Exit Sensor
15. Inverter Gate
16. Inverter Bin
17. First Bin

8.1.3. Drive Layout



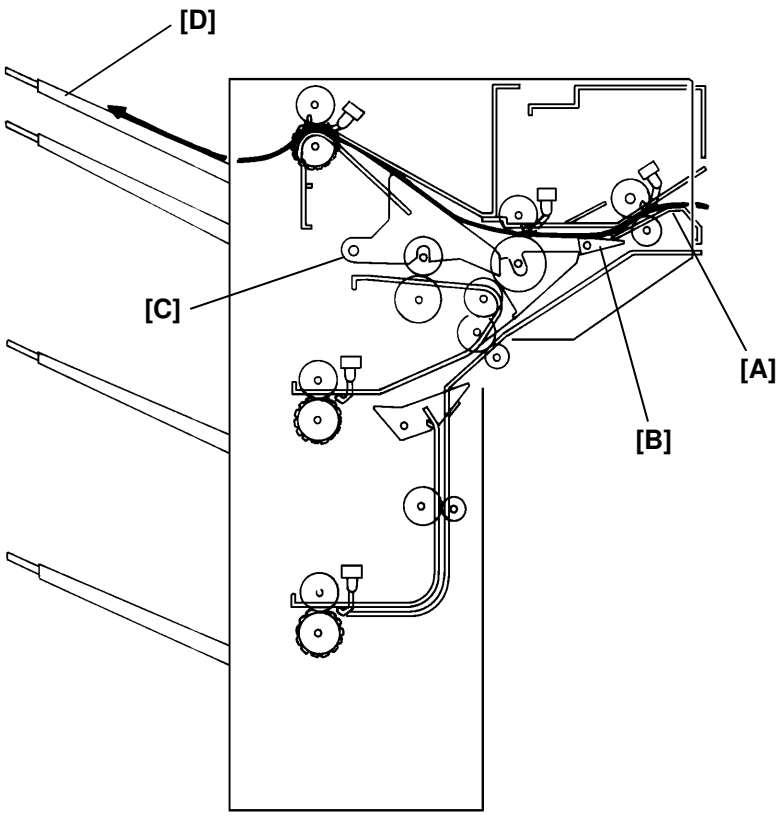
1. Entry Roller
2. Inverter Roller
3. Timing Belt
4. Sorter Motor
5. Timing Belt
6. Third Exit Roller
7. Second Exit Roller
8. First Exit Roller

8.1.4. Electrical Component Descriptions



Name	Function	Location
Motors		
Sorter	Drives all inverter and sorter components.	8
Solenoids		
Junction Gate 1	Opens and closes junction gate 1 to direct the copies into either the first bin or other bins.	1
Inverter Gate	Opens and closes the inverter gate to direct the copies into either the inverter bin, or towards the second and third bins.	11
Junction Gate 2	Opens and closes junction gate 2 to direct the copies into either the second bin or third bin.	10
Sensors		
Entry	Detects misfeeds and copy paper entry.	4
Inverter Entrance	Detects misfeeds and synchronizes the inverter gate enable timing.	3
Sensors		
First Exit	Detects paper jams at the first bin exit.	2
Second Exit	Detects paper jams at the second bin exit.	6
Third Exit	Detects paper jams at the third bin exit.	7
Unit Set	Detects when the sorter is attached to the main machine.	5
PCBs		
Inverter Main	Controls all sorter and inverter functions.	9

8.1.5. Basic Operation

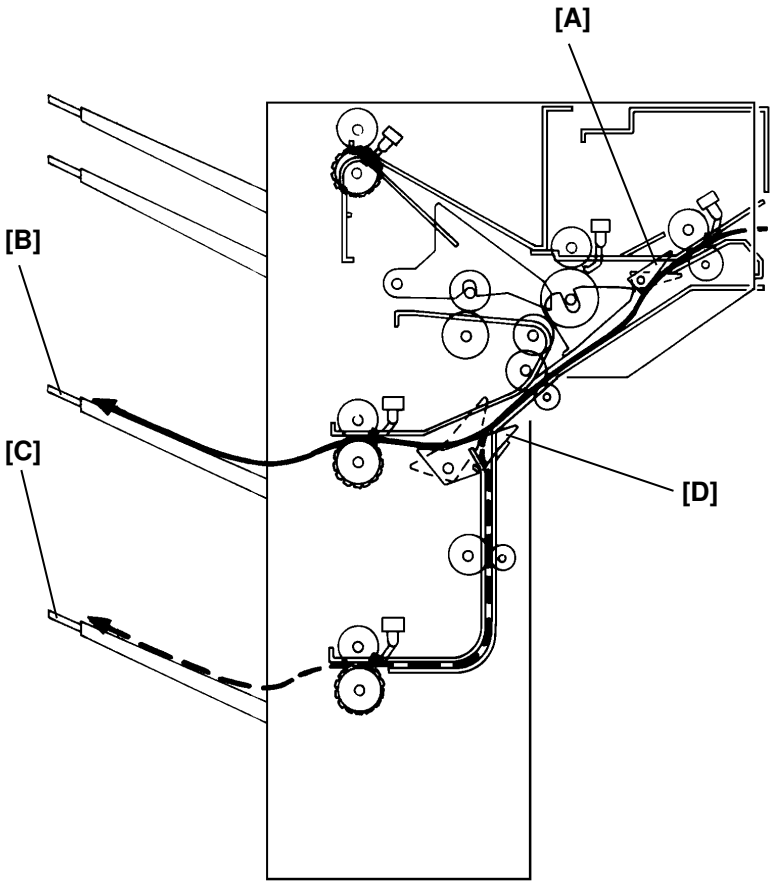


Sorter operation starts when the registration clutch turns on.

At this time, the sorter motor starts rotating. Copies exiting the main machine pass through the entrance guide plate [A] to the first junction gate section.

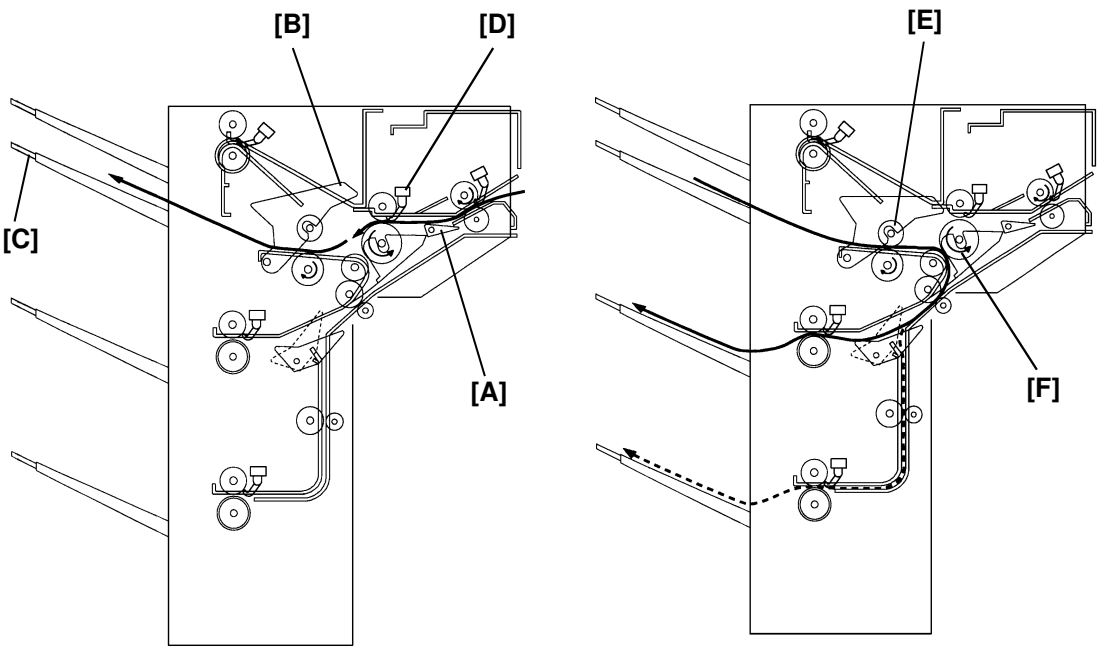
– First bin –

When junction gate 1 [B] and the inverter gate [C] are closed as shown above, the copies output to the first bin [D] pass through the upper part of junction gate 1 and the inverter gate.



– Second and third bins –

When junction gate 1 [A] is opened, the copies are directed to the second bin [B] or the third bin [C] outlet. The outlet (second or third bin) depends on junction gate 2 [D]. If junction gate 2 is closed, the copies are directed to the second bin. Otherwise, the copies are directed to the third bin.



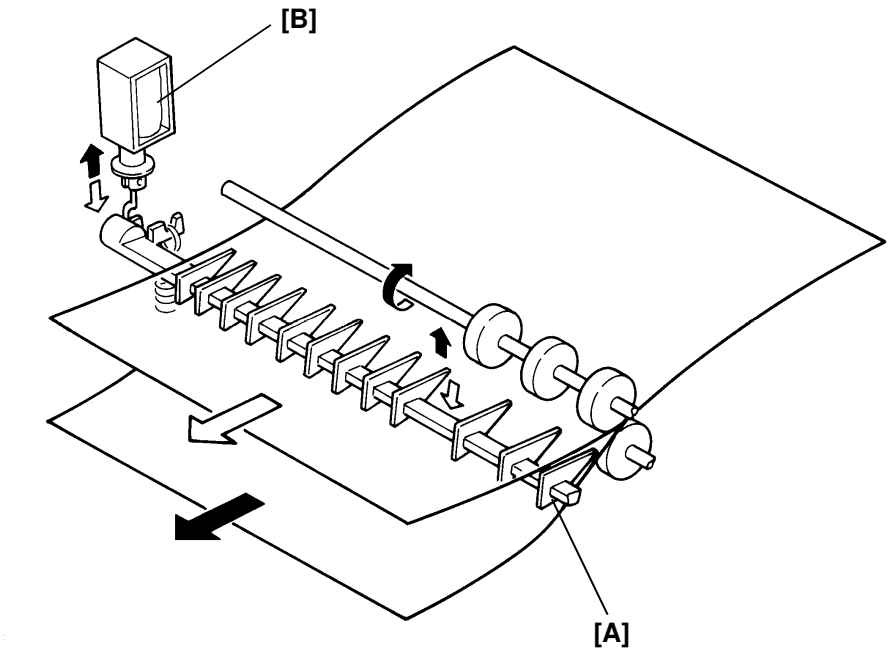
– Inverted output –

When junction gate 1 [A] is closed and the inverter gate [B] is opened, the paper goes to inverter bin [C], passes through the upper part of junction gate 1, and the lower part of the inverter gate. The inverter gate is closed when the trailing edge of the paper passes through the inverter entrance sensor [D]. The inverter gate has the pinch rollers [E]. Using these rollers and the inverter roller [F], the paper is reversed (inverted) then fed out to the second or third bin.

The inverted output can be sent either to the second bin or the third bin.

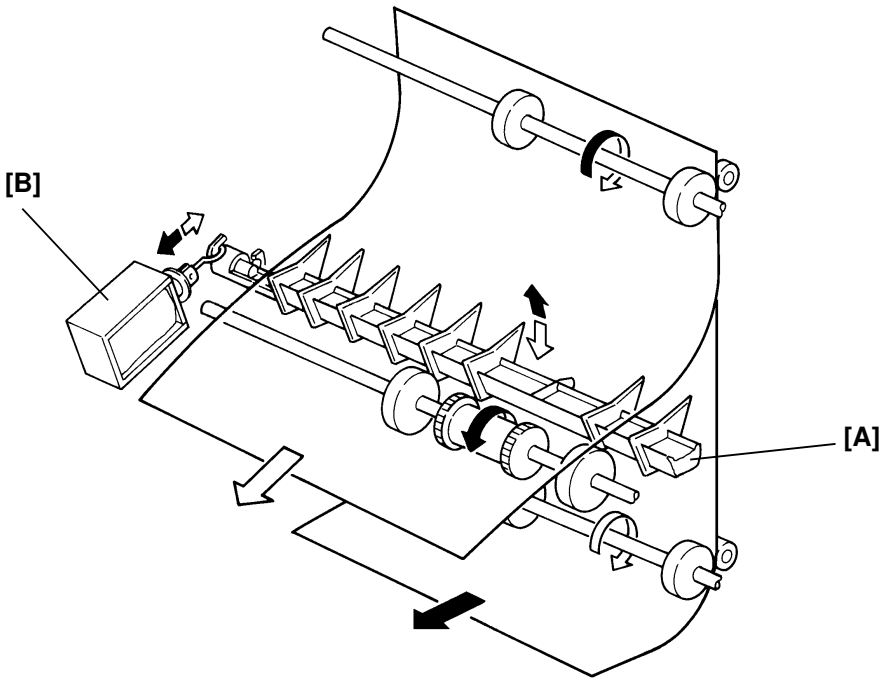
8.2. DETAILED SECTION DESCRIPTIONS

8.2.1. Paper Transport Mechanism



– Junction gate 1 –

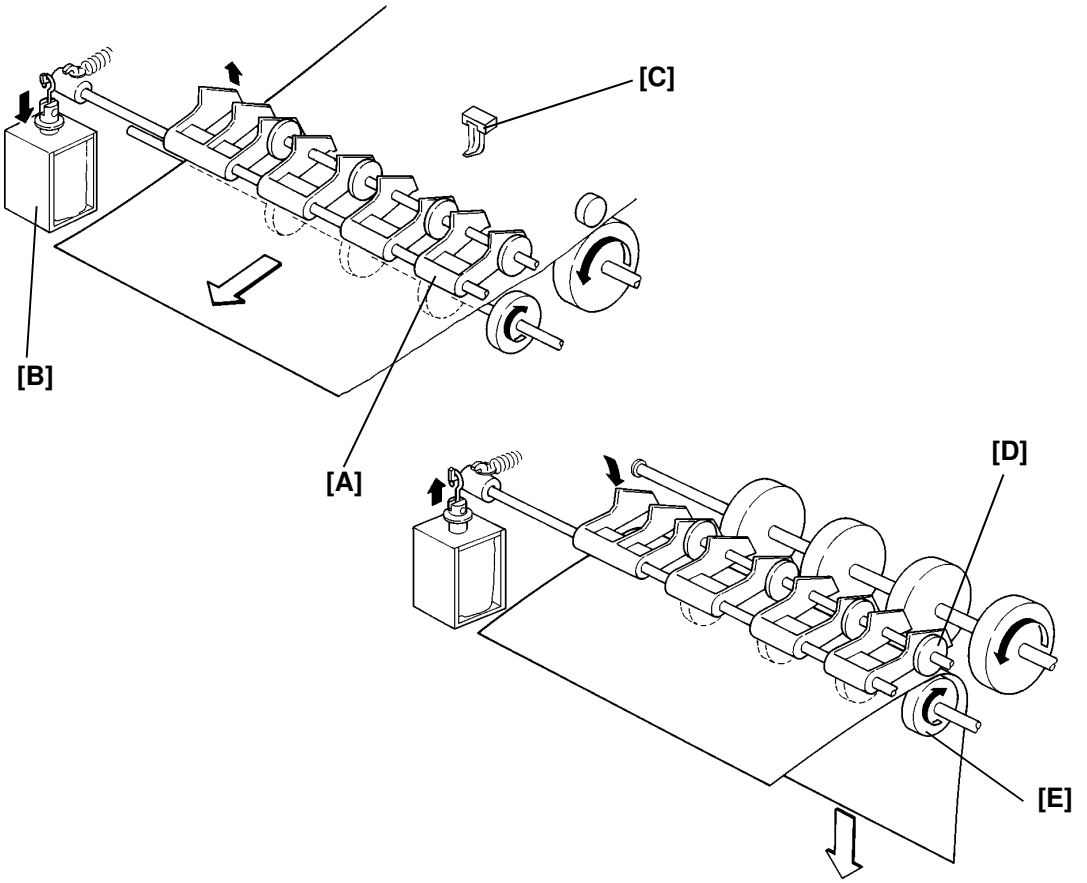
Junction gate 1 [A] is operated by the junction gate 1 solenoid [B]. For output to the first bin and in inverter modes, the junction gate 1 solenoid stays off. The paper is directed to the first bin or the inverter bin. For output to the second bin and third bin output modes, the junction gate 1 solenoid is energized 0.12 second after the fusing exit sensor has been actuated. Junction gate 1 is opened and paper is directed to the second bin or third bin.



– Junction gate 2 –

Junction gate 2 [A] is operated by the junction gate 2 solenoid [B]. In the second bin output mode, the junction gate 2 solenoid stays off. The paper is directed to the second bin.

In the third bin output mode, the junction gate 2 solenoid is energized 1.53 seconds after the fusing exit sensor has been actuated. Junction gate 2 is opened and the paper is directed to the third bin.



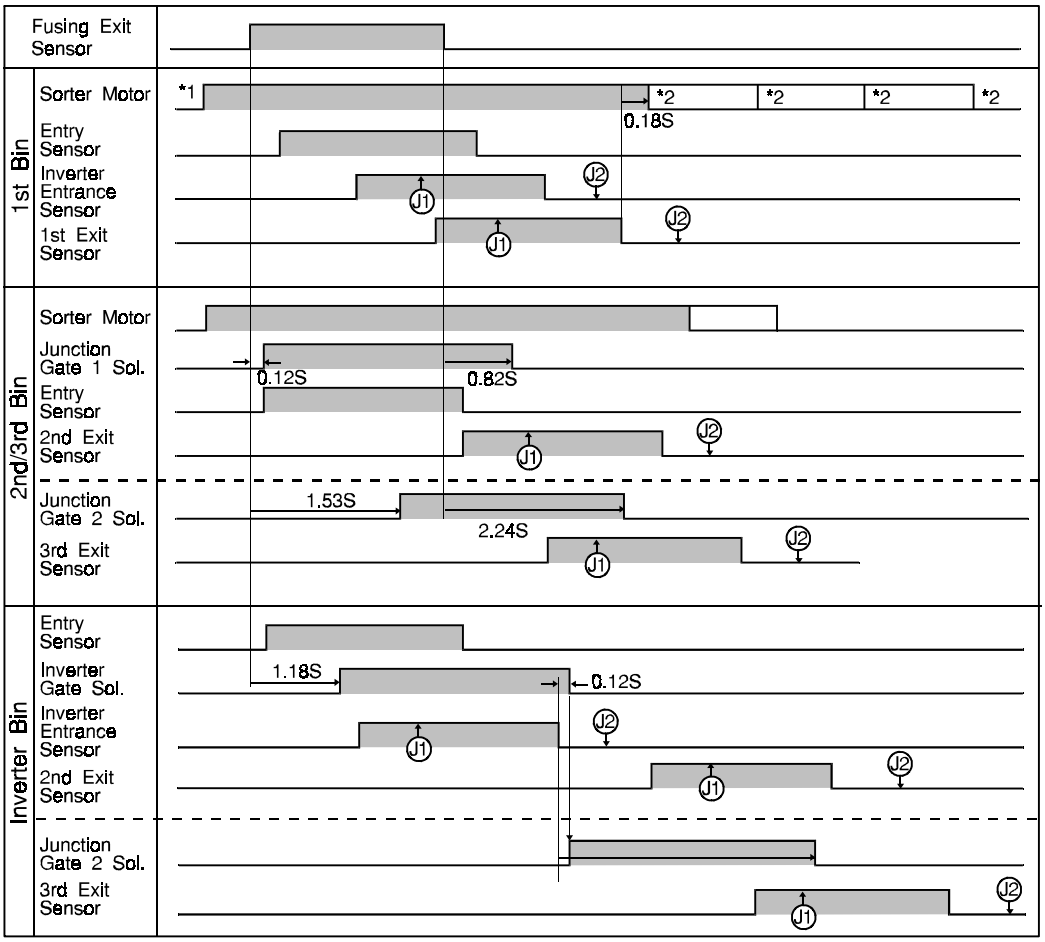
– Inverter gate –

The inverter gate [A] is operated by the inverter gate solenoid [B]. In the inverter mode, the inverter gate solenoid is energized 1.18 seconds after the fusing exit sensor has been actuated. The inverter gate is opened and the paper is directed to the inverter bin. After the trailing edge passes through the inverter entrance sensor [C], the inverter gate solenoid is de-energized. When the inverter gate is closed, the return pinch roller [D] is pressed against the return roller [E] and the paper is reversed. Then the paper is directed to the second bin or third bin.

The following table summarizes the operation of the junction gate 1, junction gate 2, and inverter gate solenoids.

Sol. / Model	Junction Gate 1 Solenoid	Junction Gate 2 Solenoid	Inverter Gate Solenoid
First bin	OFF	OFF	OFF
Second bin	ON	OFF	OFF
Third bin	ON	ON	OFF
Inverter	OFF	OFF ... 2nd bin output ON ... 3rd bin output	OFF → ON → OFF

8.2.2. Paper Feed and Misfeed Detection Timing



*1: The sorter motor starts rotating at the same time the registration clutch is energized.

*2: The sorter motor stops 0.18 second after the exit sensors have been de-actuated.

The above chart shows the paper feed and jam detection timing for a page size of A4 sideways or 11" x 8.5".

J1 ... The leading edge of the paper does not reach the sensors within 0.7 second after the expected time.

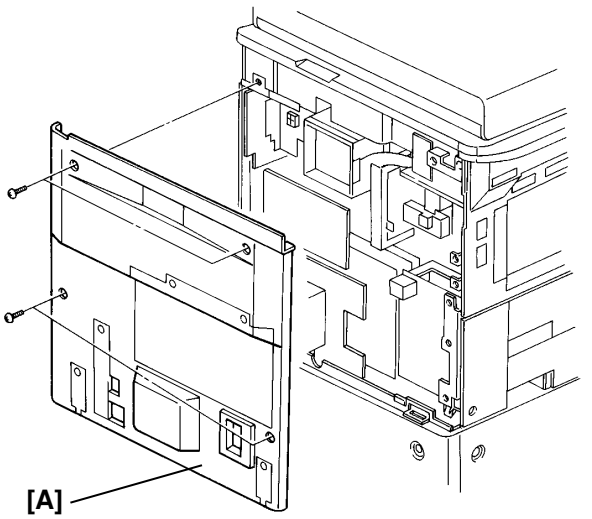
J2 ... The trailing edge of the paper has not passed the sensors within 0.7 second after the expected time.

If a copy jam is detected, the Misfeed Location indicator (R) on the operation panel will light and the Misfeed indicator on the operation panel will start blinking.

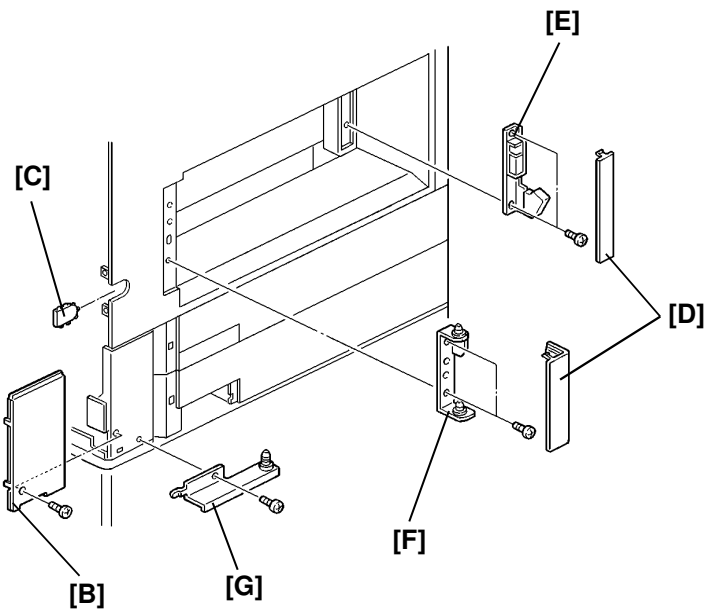
8.3. INSTALLATION

8.3.1. Installation Procedure

Caution: Check whether there are any fax messages in memory or not. If there are fax messages in memory, you have to install this unit and turn on the power within 1 hour.

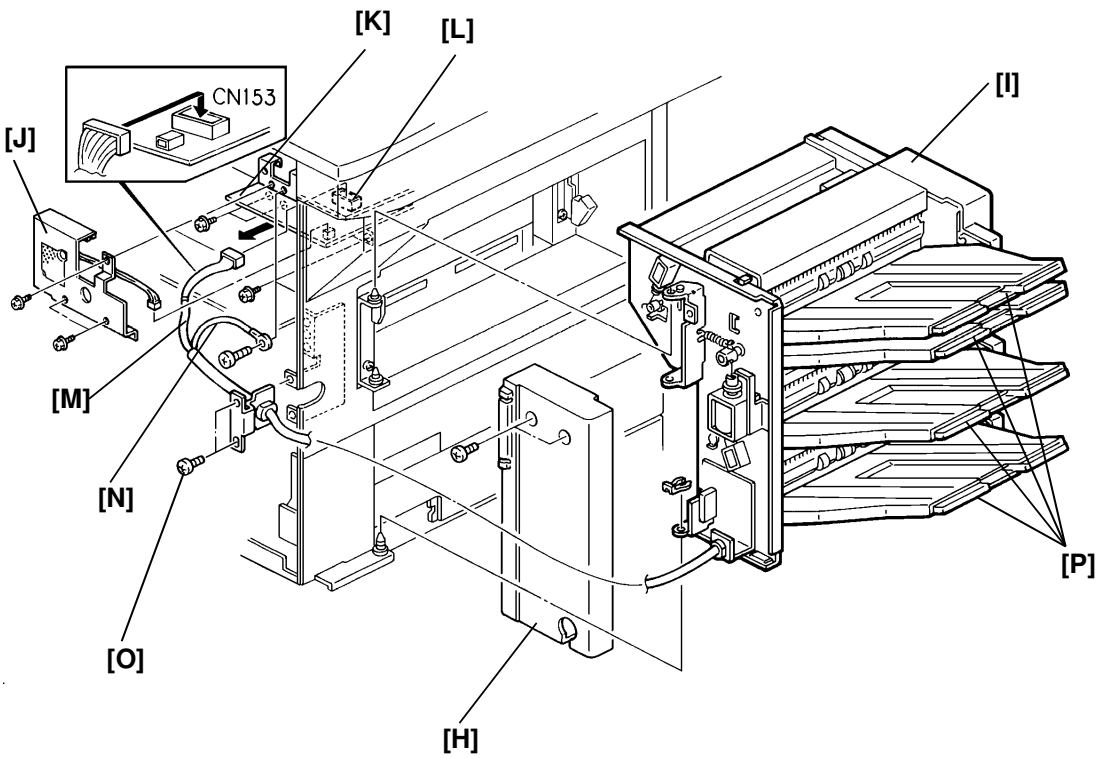


[A]: 4 screws



[B]: 1 screw
[E]: 2 screw (M3 x 6)
[F]: 2 screw (M4 x 5)
[G]: 1 screw (M4 x 5)

Note:
- Remove [B], [C], and [D]. Then install [E] and [F].
- Install [G] while pushing it up.
- Reinstall [B] after installing [G].



[H]: 2 screws
[I]: 1 clip
[J]: 3 screws
[K]: 3 screws, 1 connector [K]
[N]: 1 screw (M4 x 8 screw with toothed washer)
[O]: 2 screws (M3 x 6)

8.4. SERVICE TABLE

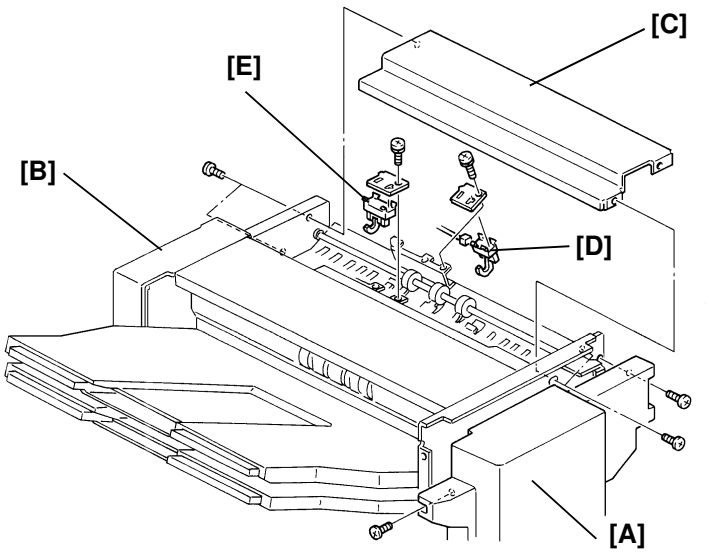
VARIABLE RESISTOR

Number	Function
VR100	Adjusts motor speed (Factory use)

8.5. REPLACEMENT AND ADJUSTMENT

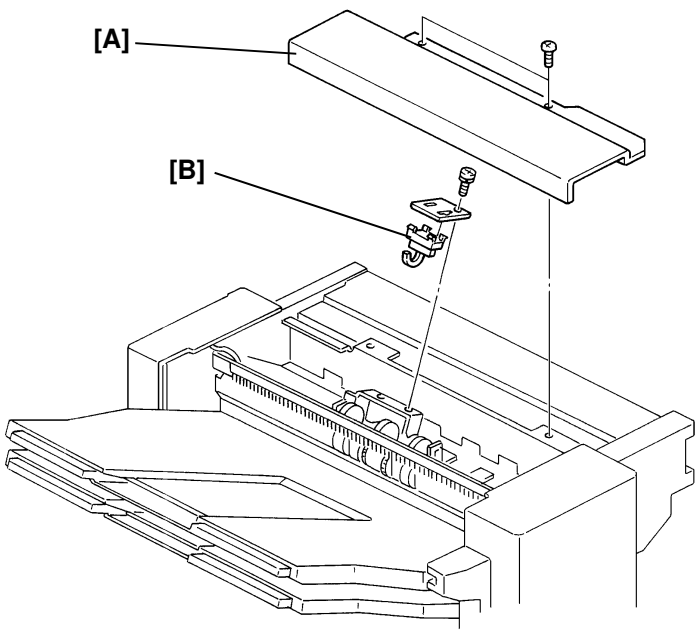
8.5.1. Entry [D] and Inverter Entrance [E] Sensors

First, remove the sorter unit.



[A]: 2 screws
[B]: 2 screws
[C]: 2 screws
[D]: 1 screw, 1 connector
[E]: 1 screw, 1 connector

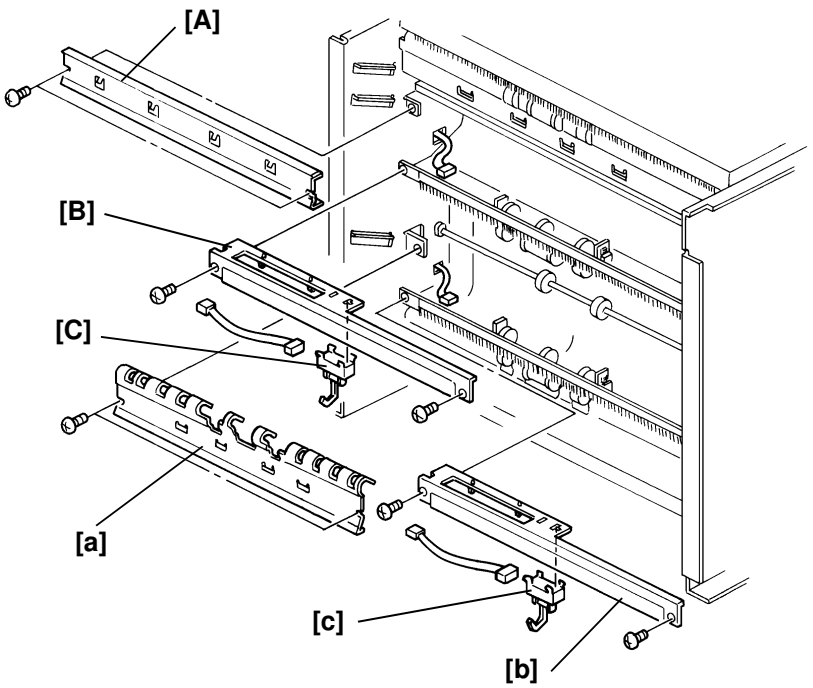
8.5.2. 1st Exit Sensor [B]



[A]: 2 screws
[B]: 1 screw, 1 connector

8.5.3. 2nd and 3rd Exit Sensors [C, c]

First, remove all trays.



2nd Exit Sensor

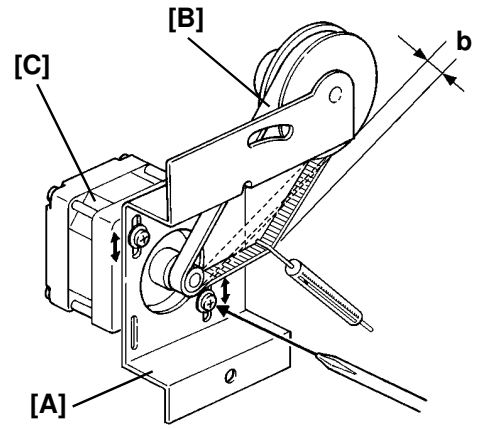
[A]: 2 screws
[B]: 2 screws
[C]: 1 connector

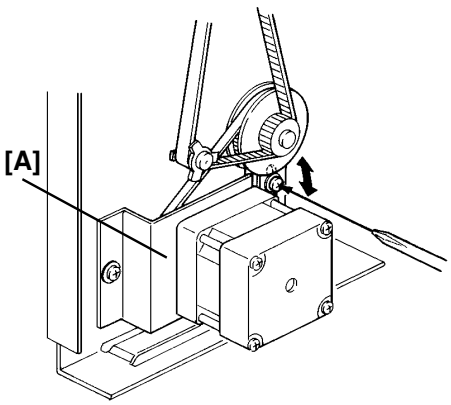
3rd Exit Sensor

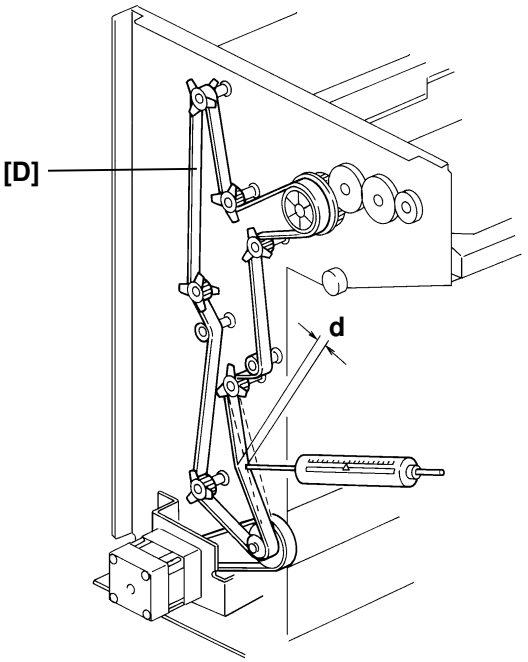
[a]: 2 screws
[b]: 2 screws
[c]: 1 connector

Note: When replacing the sensor, make sure the actuator is located under the roller shaft.

8.5.4. Belt Tension Adjustment







1. Remove the main motor assembly [A].
2. Pull the timing belt [B] with a tension gauge as shown in the diagram and adjust the tension by repositioning the sorter motor [C].
3. Press the timing belt [D] with a tension gauge as shown above and adjust the tension by repositioning the wheel of the sorter motor assembly [A].

The specifications for these timing belts are as follows.

Timing Belt	Bending	Pressure
B	[b]: 2 ± 0.5 mm	100 gf
D	[d]: 2.5 ± 0.5 mm	100 gf

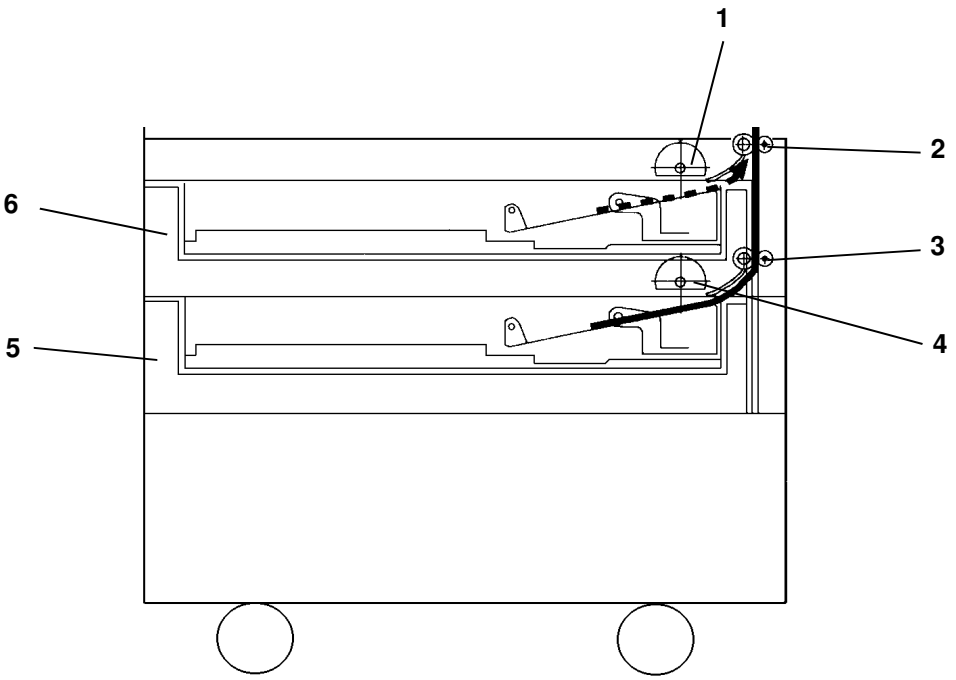
9. PAPER FEED UNIT (PFU)

9.1. OVERALL MACHINE INFORMATION

9.1.1. Specifications

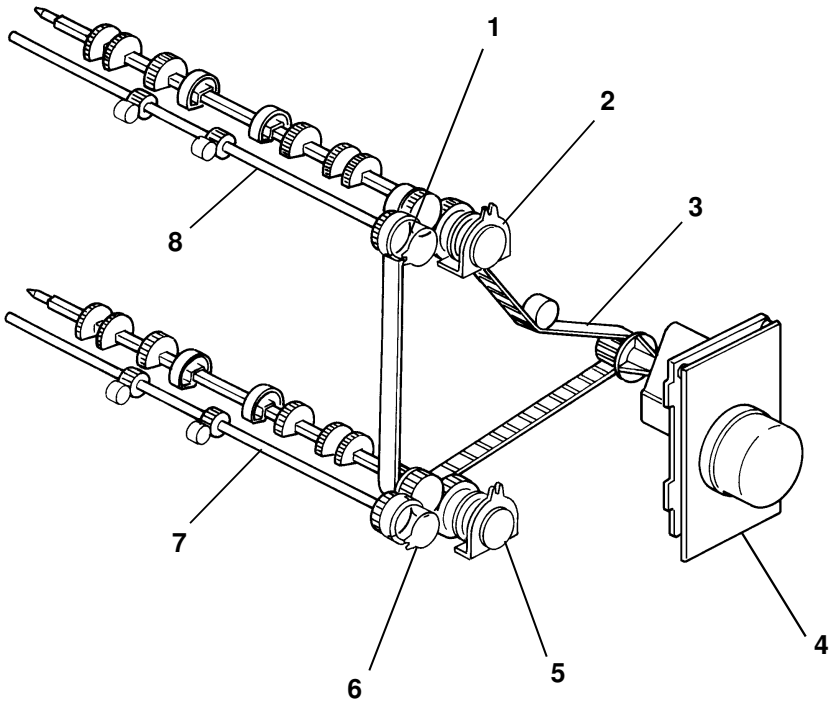
Configuration:	Two-tray table
Paper Capacity:	250 sheets x 2 paper trays
Paper Size:	Maximum: A3/11" x 17" Minimum: B5 sideways/8 1/2" x 11"
Paper Weight:	60 ~ 90 g/m^2, 16 ~ 24 lb
Power Source:	DC 24 V, 5 V and AC 115 V/220 V ~ 240 V from the main frame
Power Consumption:	24 W
Dimension (W x D x H):	542 x 565 x 441 mm/21.3" x 22.2" x 17.3"
Weight:	27 kg/59.5 lb

9.1.2. Mechanical Component Layout



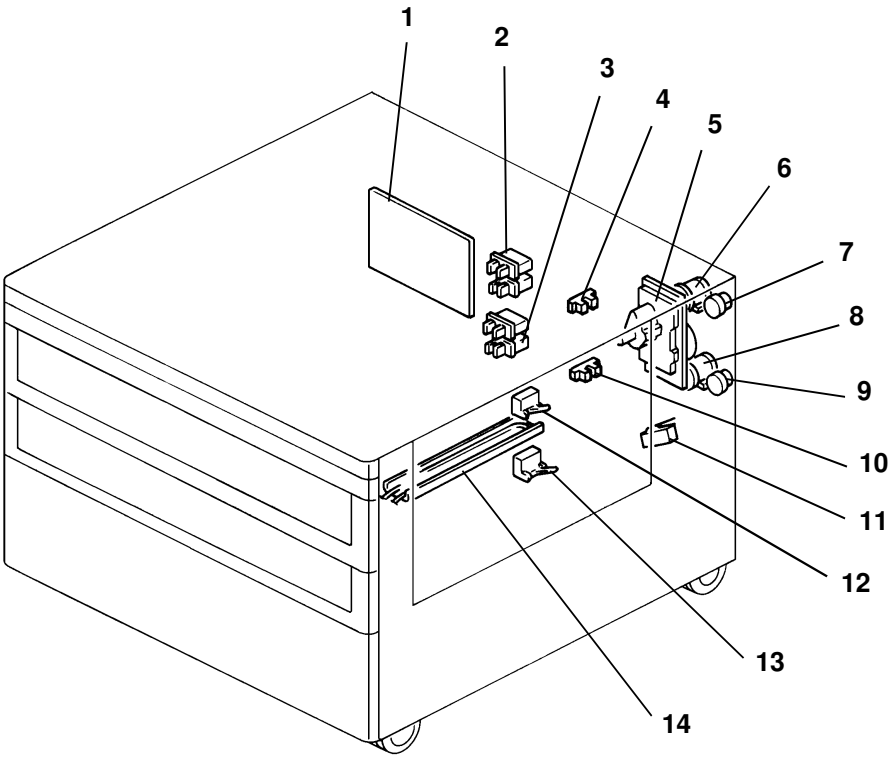
1. 3rd Paper Feed Roller
2. 2nd Relay Rollers
3. 3rd Relay Rollers
4. 4th Paper Feed Roller
5. 4th Paper Tray
6. 3rd Paper Tray

9.1.3. Drive Layout



1. 2nd Relay Roller Clutch
2. 3rd Paper Feed Clutch
3. Timing Belt
4. PFU Motor
5. 4th Paper Feed Clutch
6. 3rd Relay Roller Clutch
7. 3rd Relay Roller
8. 2nd Relay Roller

9.1.4. Electrical Component Descriptions

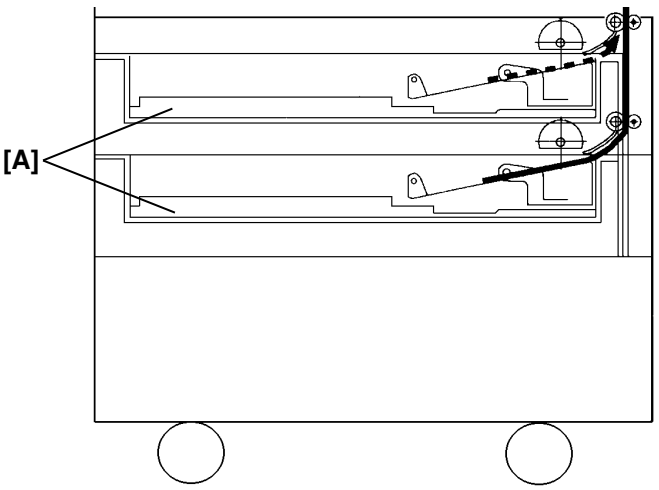


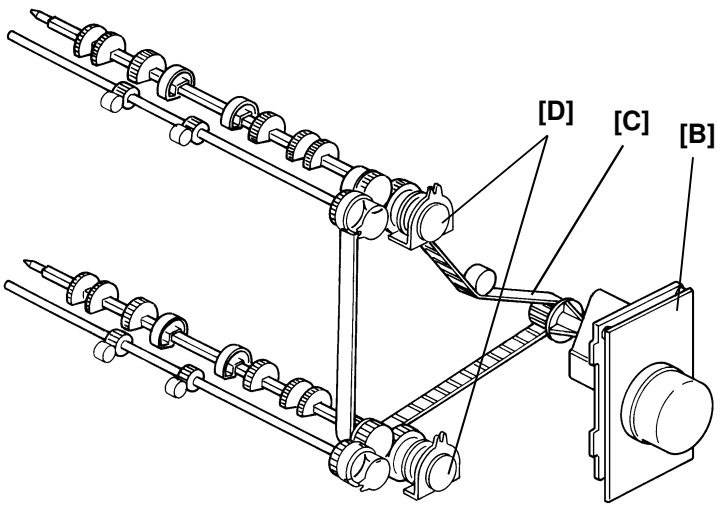
Name	Function	Location
Motor		
PFU Motor	Drives all the paper feed unit components.	5
Clutches		
3rd Paper Feed Clutch	Starts paper feed from the 3rd paper tray.	6
4th Paper Feed Clutch	Starts paper feed from the 4th paper tray.	8
2nd Relay Roller Clutch	Drives the 2nd relay rollers.	7
3rd Relay Roller Clutch	Drives the 3rd relay rollers.	9
Sensors		
3rd Paper Size Sensor	Determines what size paper is in the 3rd paper tray.	2
4th Paper Size Sensor	Determines what size paper is in the 4th paper tray.	3

Name	Function	Location
3rd Paper End Sensor	Informs the SPU's cpu when the 3rd paper tray runs out of paper.	4
4th Paper End Sensor	Informs the SPU's cpu when the 4th paper tray runs out of paper.	10
2nd Relay Sensor	Detects misfed paper.	12
3rd Relay Sensor	Detects misfed paper.	13
Switch		
Lower Right Cover Switch	Detects whether the lower right cover is open or not.	11
PCB		
PFU Control Board	Controls the PFU functions in accordance with the signal from the SPU.	1
Heater		
Tray Heater	Keeps paper dry in the 3rd and 4th paper trays.	14

9.2. DETAILED SECTION DESCRIPTIONS

9.2.1. Overview





There are two paper feed trays. Each paper tray [A] is a drawer type and their function and mechanism are exactly the same as those of the main frame.

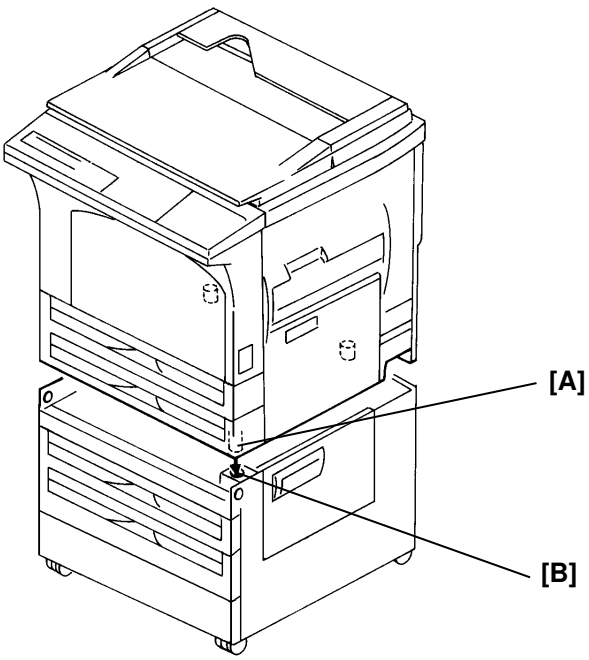
All the electrical components of the paper feed unit are controlled by the SPU in the main frame through the PFU control board.

All the PFU rollers are driven by the PFU motor [B] via the timing belt [C]. When the Start key is pressed, the PFU motor and both relay clutches (2nd and 3rd relay clutches) are energized. Then the relay rollers starts rotating. After this, the paper feed clutch [D] for the selected paper tray is energized, and paper is fed from the paper tray to the main frame through the relay rollers.

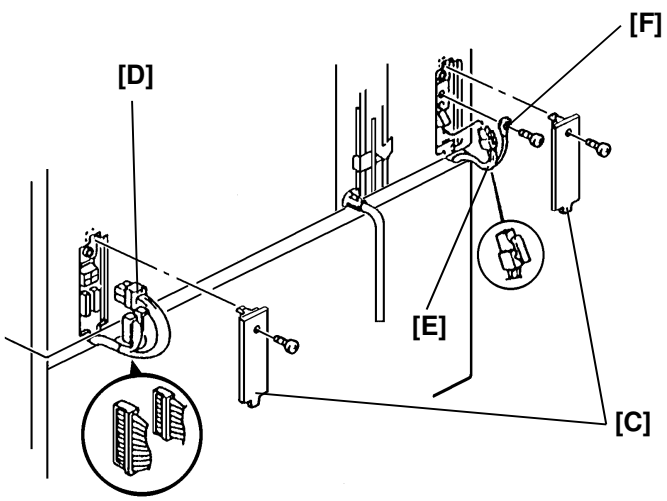
9.3. INSTALLATION

9.3.1. Installation Procedure

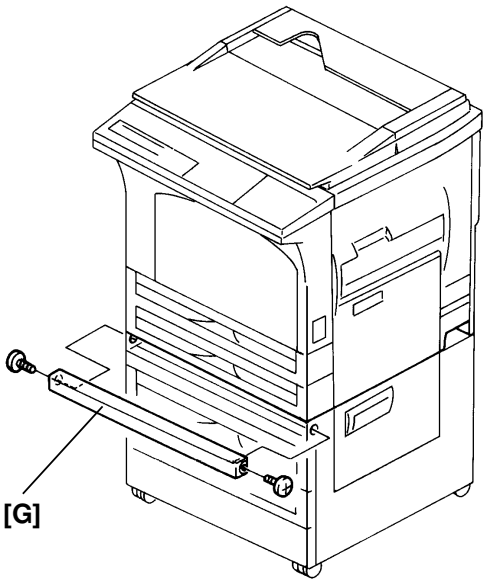
Caution: Check whether there are any fax messages in memory or not. If there are fax messages in memory, you have to install this unit and turn on the power within 1 hour.



Note: Make sure the machine's feet [A] fit into the PFU's holes [B].



[F]: 1 screw
(M4 x 8 screw with toothed washer)



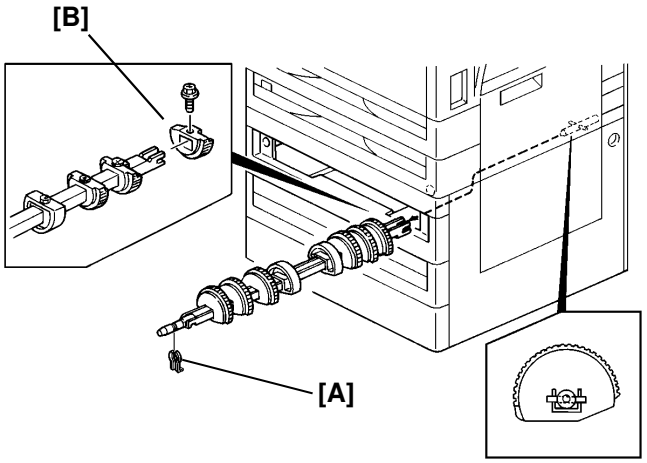
[G]: 2 screws (M3 x 6)

Check with the customer how to set up the following function.

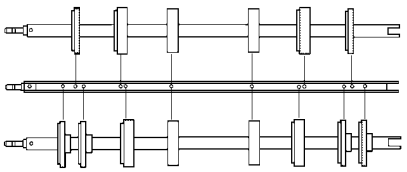
Function	RAM address	Bit No.	
Limitless paper feed	080266(H)	0	0: Enabled 1: Disabled

9.4. REPLACEMENT AND ADJUSTMENT

9.4.1. Paper Feed Roller [B]



(Legal/Letter version)



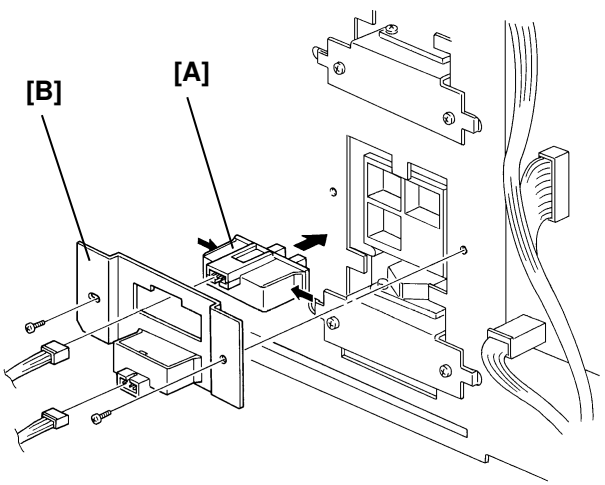
(A3/A4 version)

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

Note:
- Do not touch the rubber surface with bare hands.
- When installing the feed roller assembly, the flat side of the roller should be facing down.
- The two rollers without rubber should be at the center position of the shaft.

9.4.2. Paper Size Sensors [B]

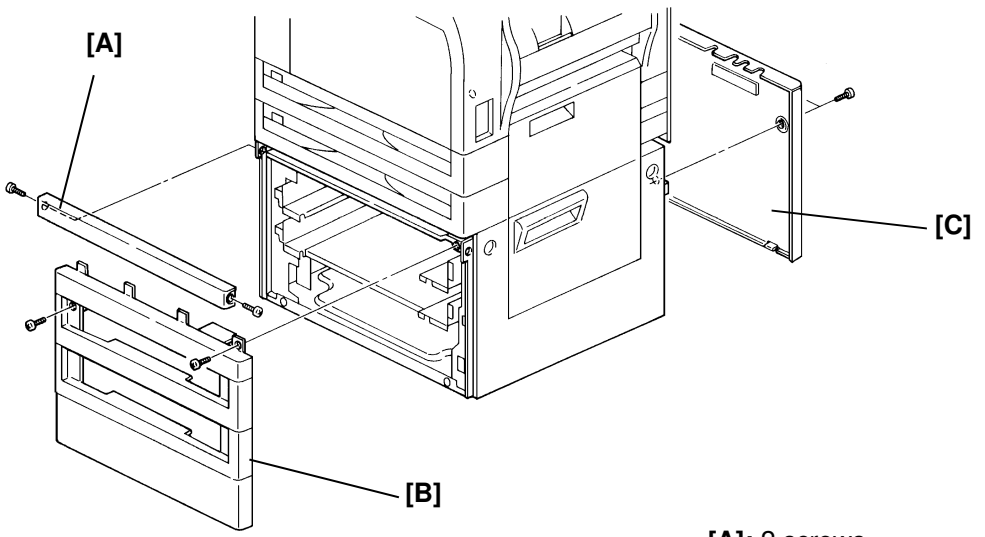
First remove the rear cover (2 screws).



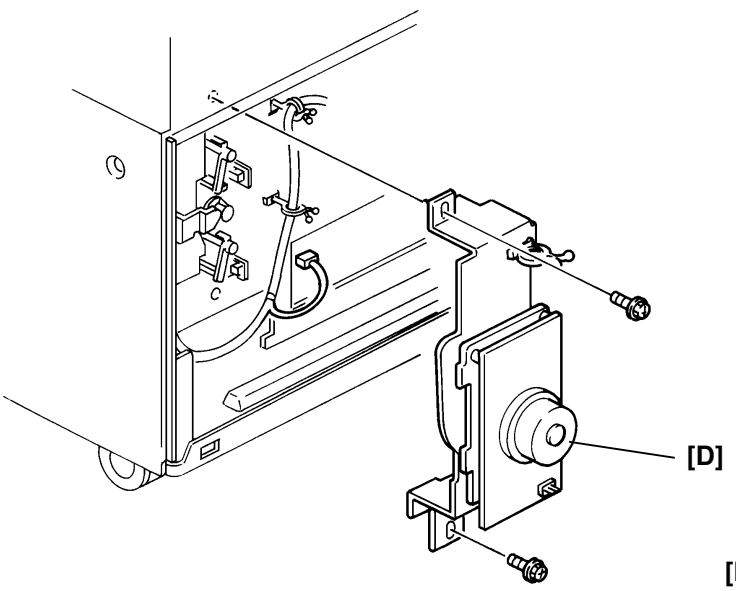
[A]: 1 connector each
[B]: 2 screws

Note: When connecting the harness, the white connector should be connected to the upper sensor, and the blue connector should be connected to the lower sensor.

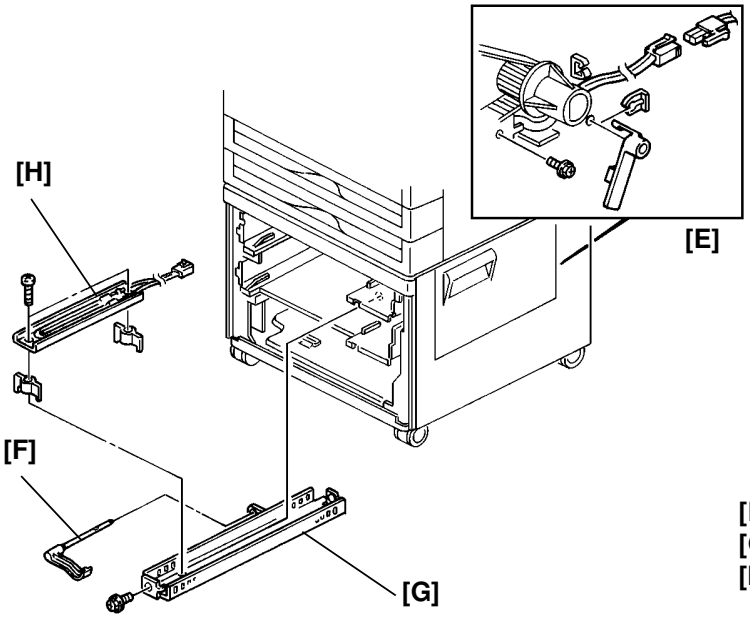
9.4.3. Tray Heater [H]



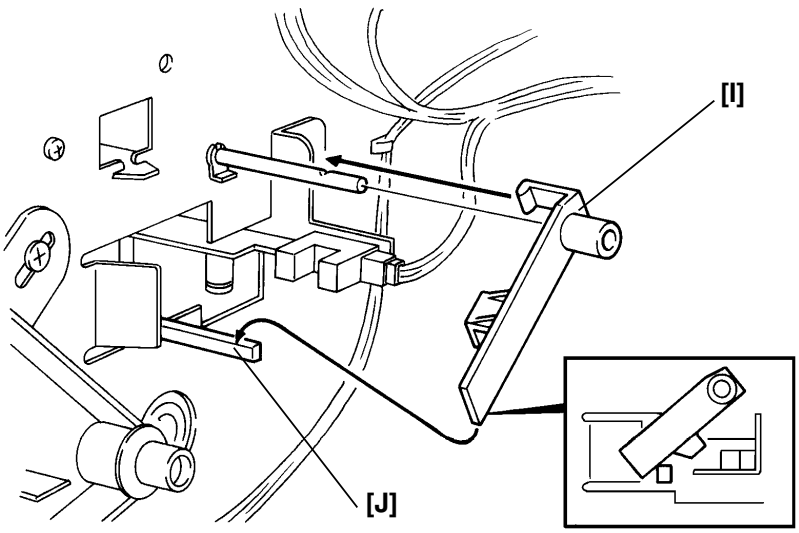
[A]: 2 screws
[B]: 2 screws
[C]: 2 screws



[D]: 2 screws, 1 connector



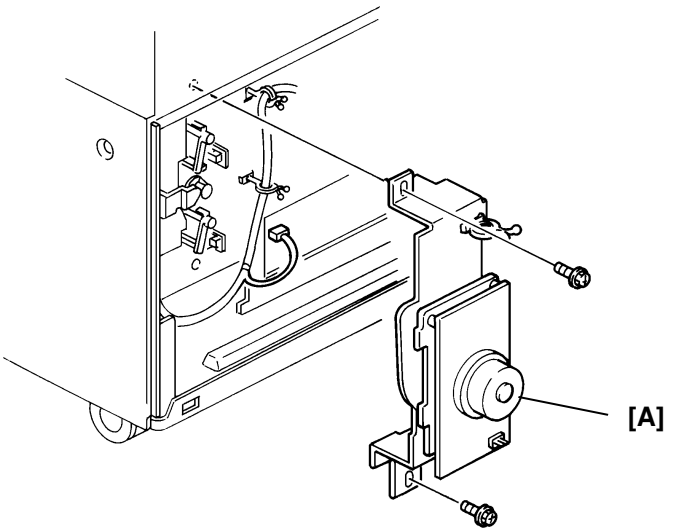
[F]: 1 clip
[G]: 2 screws, 1 connector
[H]: 2 screws



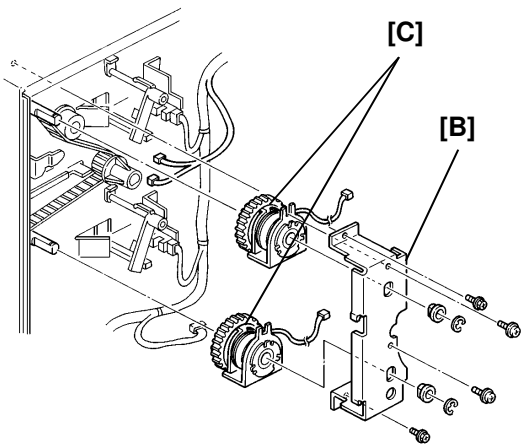
When putting back the paper end actuator [I], its position should be to the left of the feeler [J].

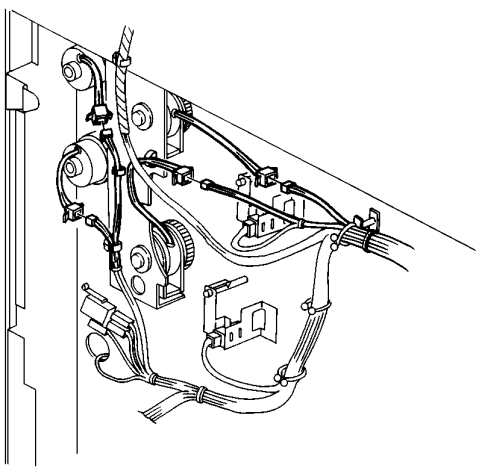
9.4.4. Timing Belt [H]

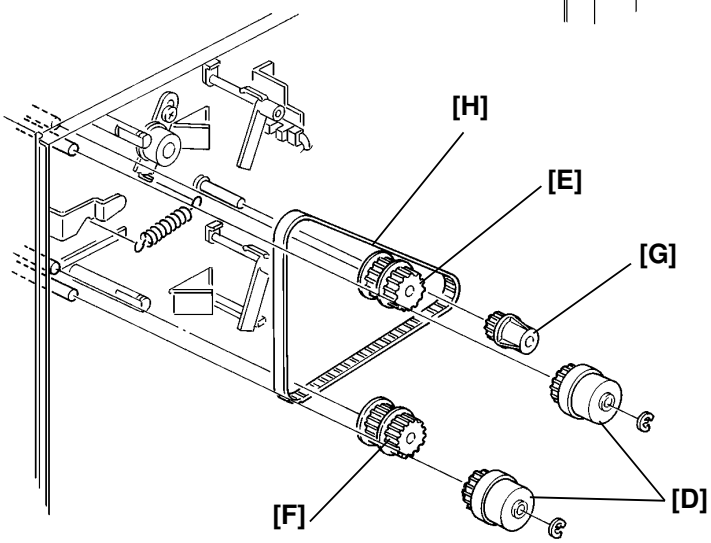
First, remove the rear cover (2 screws).



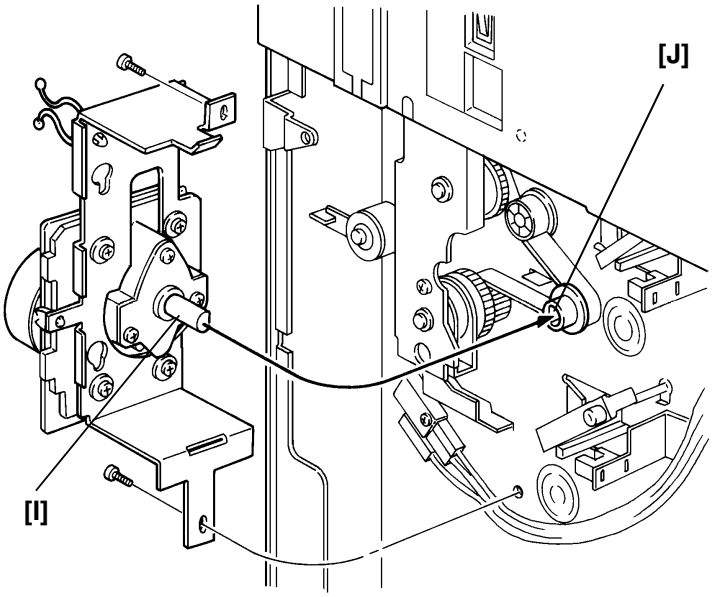
[A]: 2 screws, 1 connector
[B]: 2 screws
[C]: 2 E-rings, 2 bushings







[D]: 2 E-rings



When putting back the main motor, make sure that the motor shaft [I] fits into the hole in the pulley [J].

10. DUPLEX UNIT

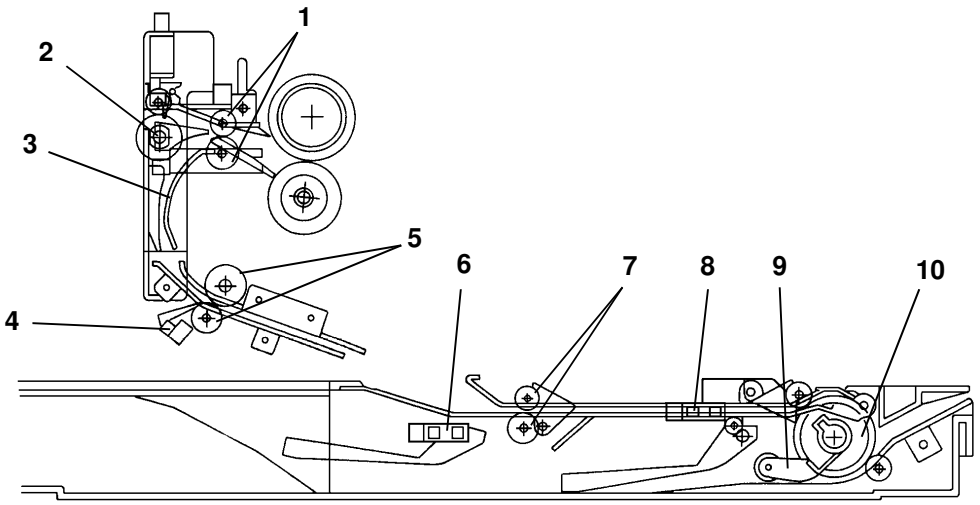
10.1. OVERALL MACHINE INFORMATION

10.1.1. Specifications

Copy paper size:	11" x 17", 8.5" x 11", 8.5" x 14", 8.5" x 13" A3, B4, A4, B5
Paper Weight:	64 to 81 g/m^2 (17 to 22 lb)
Paper Stack:	1 sheet
Dimension (W x D x H):	448 x 440 x 56 mm (17.6" x 17.3" x 2.2")
Weight:	Approximately 3.5 kg (7.5 lb)

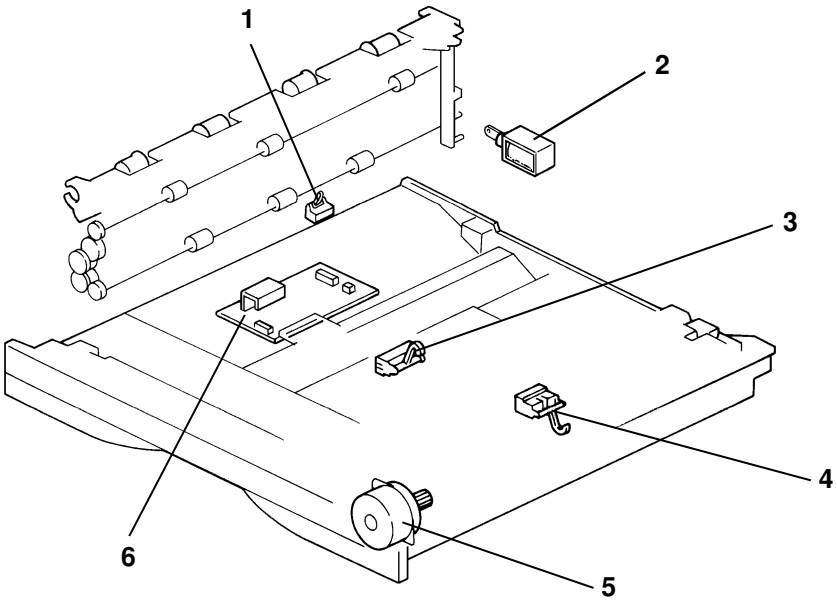
Specifications are subject to change without notice.

10.1.2. Mechanical Components



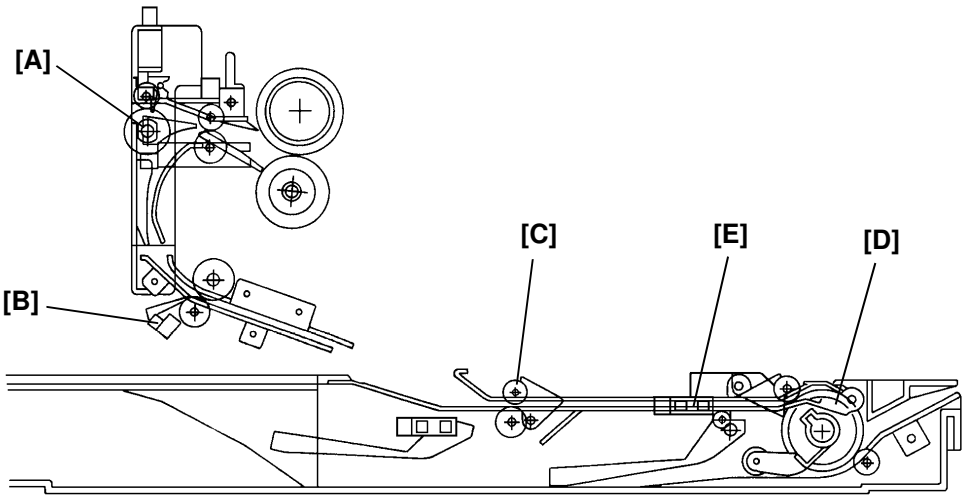
1. Duplex Gate Roller
2. Duplex Gate
3. Turn Gate Plate
4. Duplex Entrance Sensor
5. Transport Roller
6. Relay Sensor
7. Entrance Roller
8. Duplex Turn Sensor
9. Paper Flattener
10. Duplex Feed Roller

10.1.3. Electrical Component Descriptions



Name	Function	Index No.
Motor		
Duplex Feed Motor	Drives the feed roller and the transport roller.	5
Solenoid		
Duplex Gate Solenoid	Moves the duplex gate to direct copies to the duplex tray or the paper exit.	2
Sensors		
Duplex Entrance Sensor	Detects the copy at the entrance of the duplex unit.	3
Duplex Turn Sensor	Detects the copy in the turn section.	4
Relay Sensor	Detects misfeeds.	1
PCB		
Duplex Main Board	Controls all duplex unit functions.	6

10.1.4. Basic Operation



– First Side Copy –

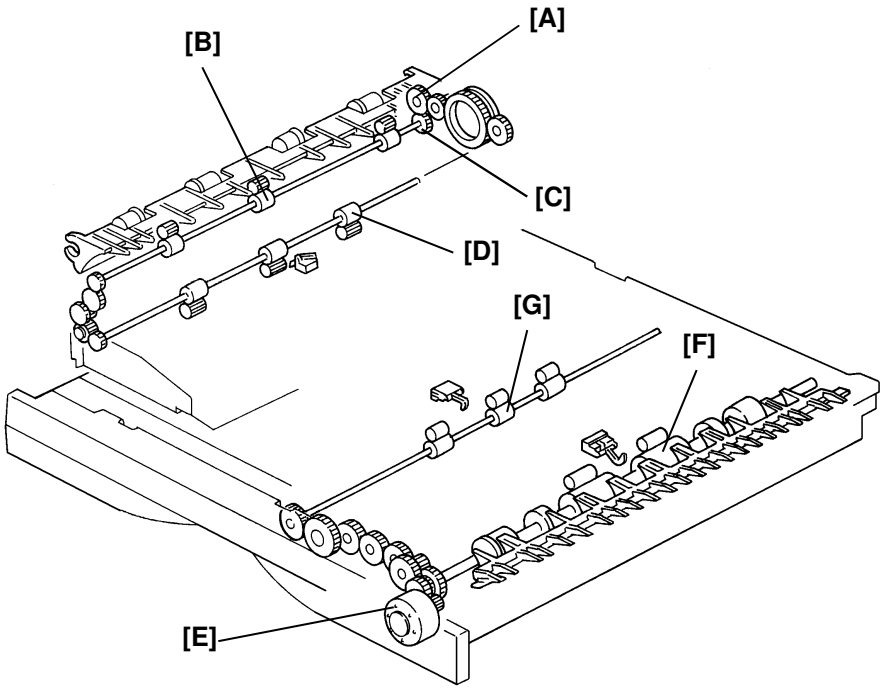
The duplex gate [A] rotates up 2.4 seconds after the registration clutch turns on. When the leading edge of the paper activates the duplex entrance sensor [B], the entrance roller [C] and duplex feed roller [D] start to rotate. The paper is fed into the duplex tray by these rollers. After the trailing edge of the paper passes through the duplex turn sensor [E], these rollers stop rotating.

– Second Side Copy –

When the duplex cpu receives the feed start signal, the cpu energizes the duplex feed motor. Then the duplex feed roller starts rotating counter-clockwise to feed the copy. The second side is then copied with the copy following the first feed station paper path.

10.2. DETAILED SECTION DESCRIPTIONS

10.2.1. Drive Mechanism

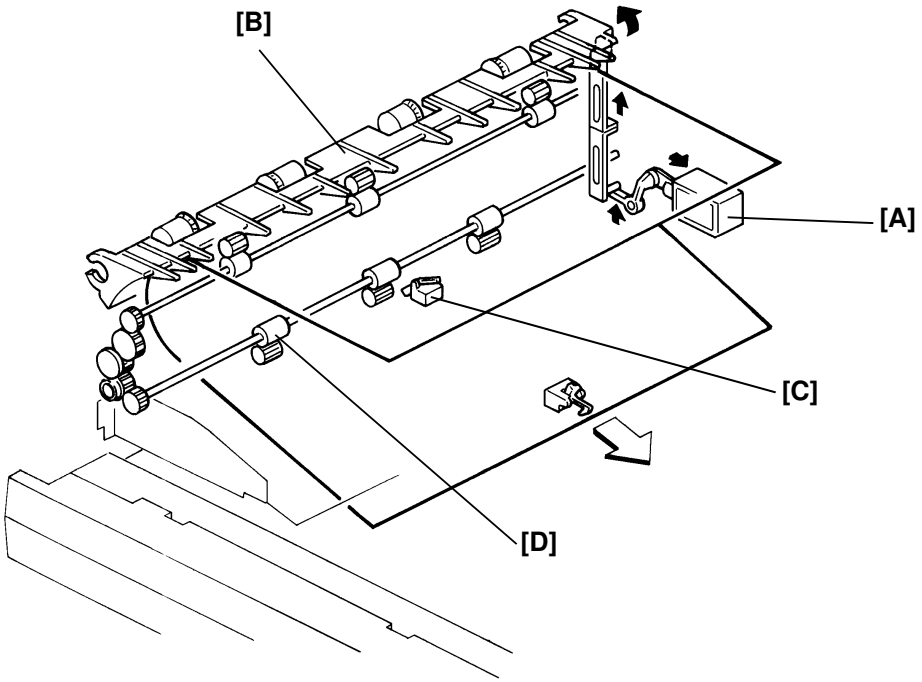


A relay gear [A] in the main frame exit section transmits drive to the duplex gate rollers [B] through the duplex transport gear [C]. At this time, the transport rollers [D] are also driven by a gear on the duplex gate roller shaft through a series of gears.

Drive is transmitted from the duplex feed motor [E] to the duplex feed rollers [F] and the relay roller [G] through a series of gears.

10.2.2. First Side Copy

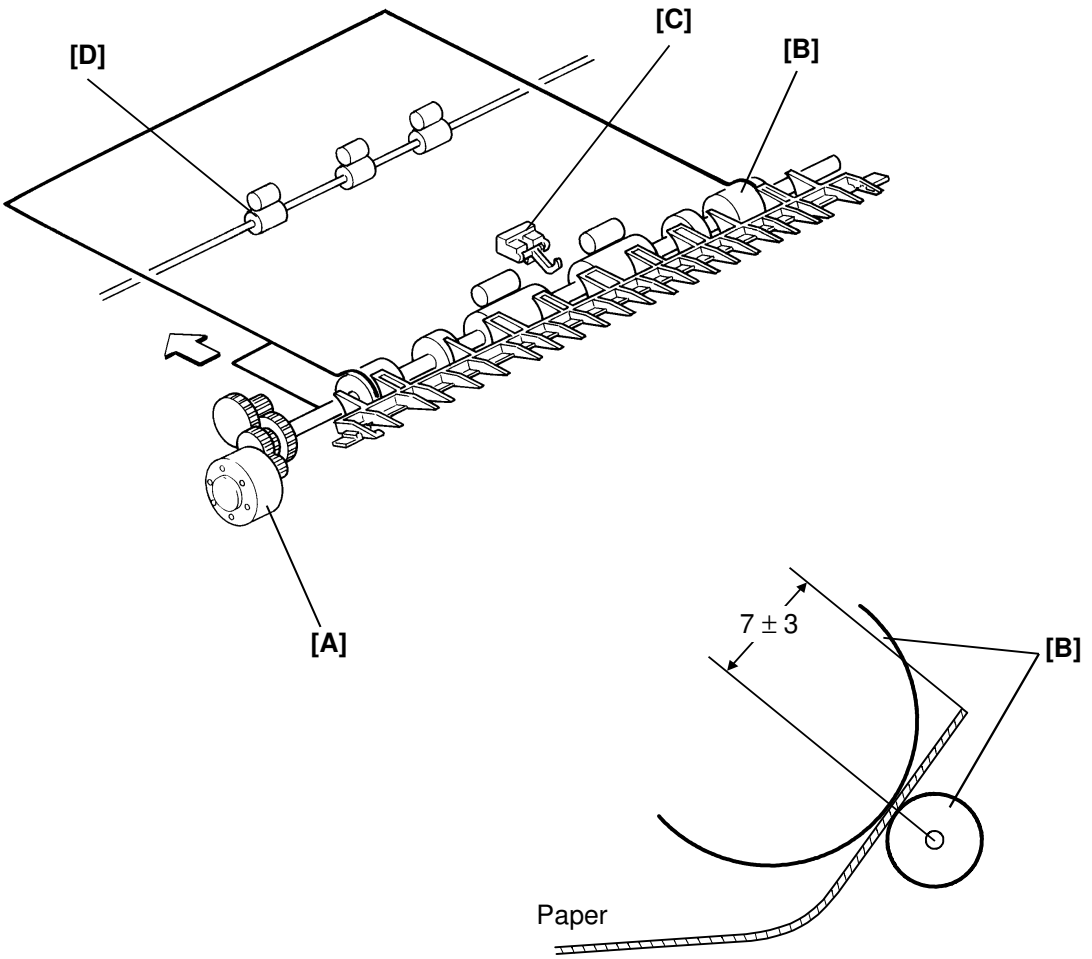
– From Main Paper Feed Section to Duplex Entrance Roller –



At 2.4 seconds after the registration clutch turns on, the duplex gate solenoid [A] energizes to raise the duplex gate [B]. The duplex gate solenoid stays on until the trailing edge of the paper passes through the duplex entrance sensor [C].

The copy is then directed to the duplex turn gate, where it is fed by the transport rollers [D] to the entrance rollers.

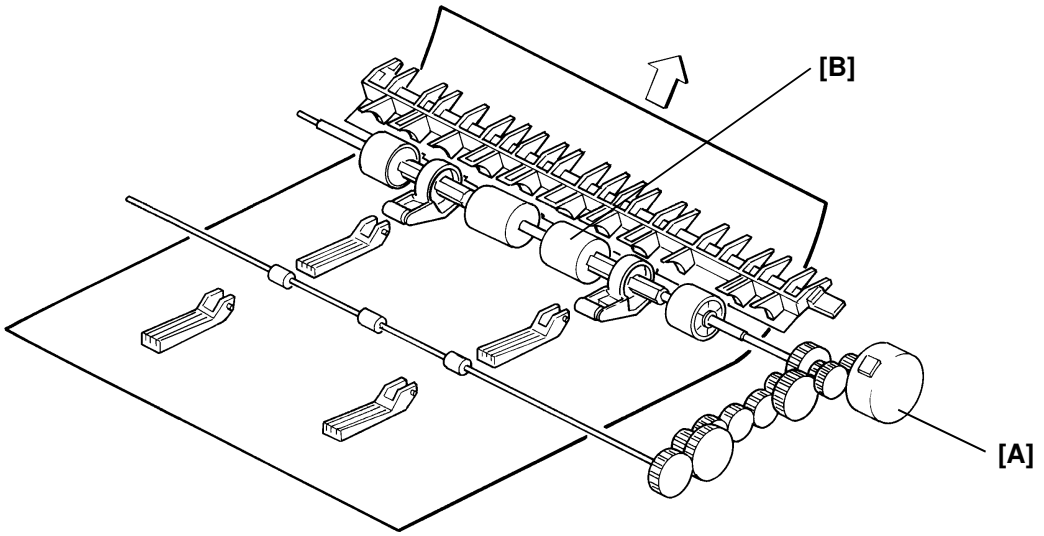
– From Duplex Entrance Roller to Duplex Tray –



When the leading edge of the paper activates the duplex entrance sensor, the duplex feed motor [A] starts rotating counterclockwise. Gears drive the duplex feed rollers [B] clockwise and the paper is transferred to the duplex tray.

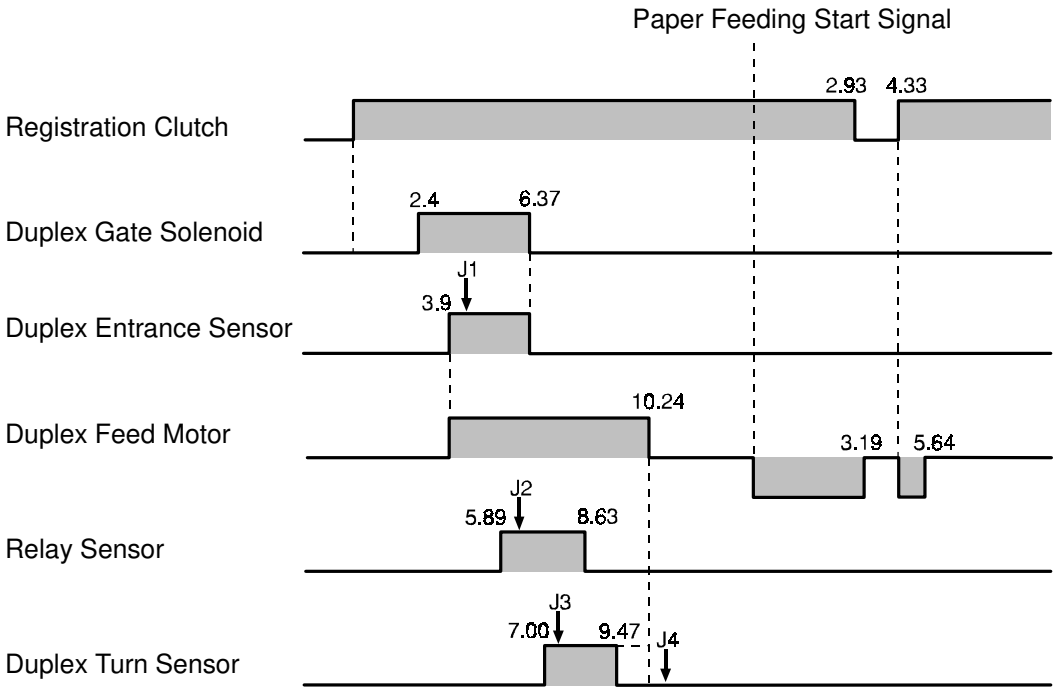
The duplex feed motor stays on until 0.77 second after the trailing edge of the paper passes through the duplex turn sensor [C]. Then the duplex feed roller and the entrance roller [D] stop rotating. At this time, the paper is held at the duplex feed rollers about 7 ± 3 mm from the trailing edge.

10.2.3. Second Side Copy



When the duplex cpu receives the paper feed start signal from the main cpu, the duplex cpu energizes the duplex feed motor [A] and it starts rotating clockwise. The feed rollers [B] rotate counterclockwise and the paper is fed to the registration section. After that, the second side copy follows the first feed station paper path.

10.2.4. Duplex Paper Feed and Misfeed Detection Timing



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

J1: The leading edge of the paper does not reach the duplex entrance sensor within 4.6 seconds after the registration clutch has been turned on.

J2: The leading edge of the paper does not reach the relay sensor within 6.59 seconds after the registration clutch has been turned on.

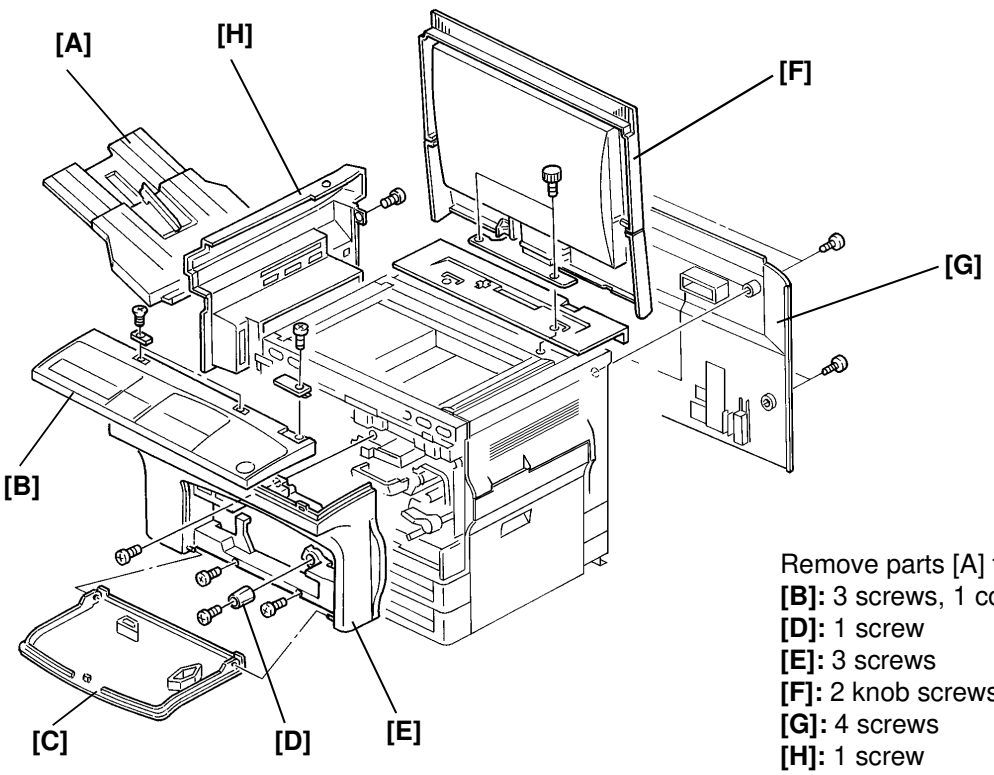
J3: The leading edge of the paper does not reach the duplex turn sensor within 7.7 seconds after the registration clutch has been turned on.

J4: The trailing edge of the paper does not passed the duplex turn sensor within 10.94 seconds after the registration clutch has been turned on.

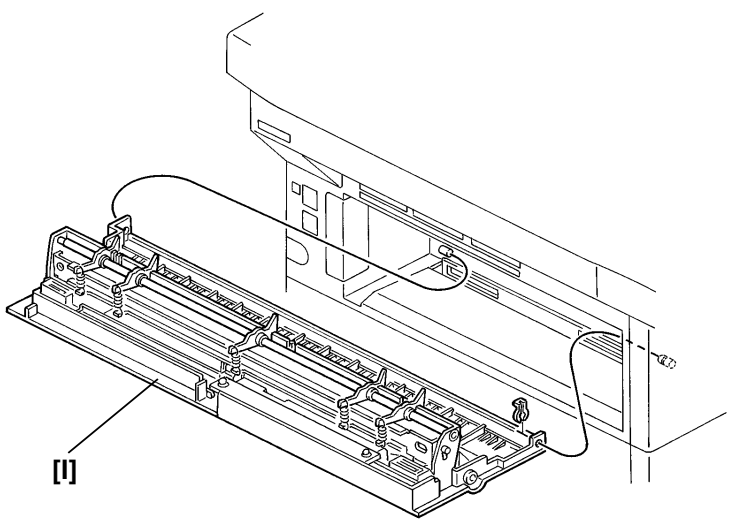
If the jam is detected, the Misfeed Location indicator (E) on the operation panel will light and the Misfeed indicator on the operation panel will start blinking.

10.3. INSTALLATION PROCEDURE

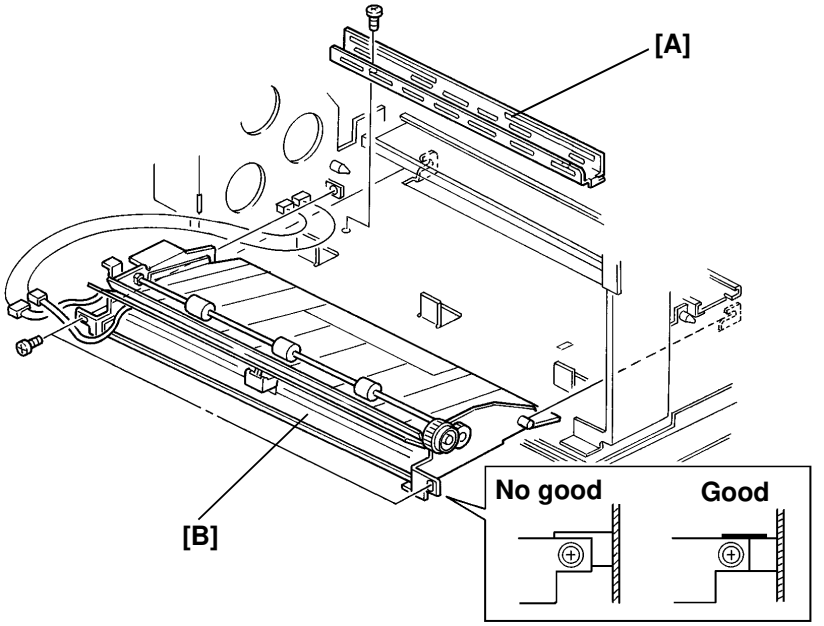
Caution: 1. Check whether there are any fax messages in memory or not. If there are fax messages in memory, you have to install this unit and turn on the power within 1 hour.
2. If the machine has been in use recently, the fusing unit may be hot.



Remove parts [A] to [I]
[B]: 3 screws, 1 connector
[D]: 1 screw
[E]: 3 screws
[F]: 2 knob screws
[G]: 4 screws
[H]: 1 screw



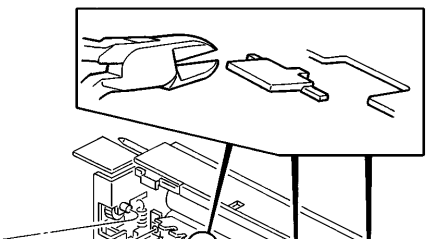
[I]: 1 clip



[A]: 1 screw
[B]: 2 M3 x 5 screws
2 connectors

Reinstall the copy tray holder [A] after installing the relay unit [B].

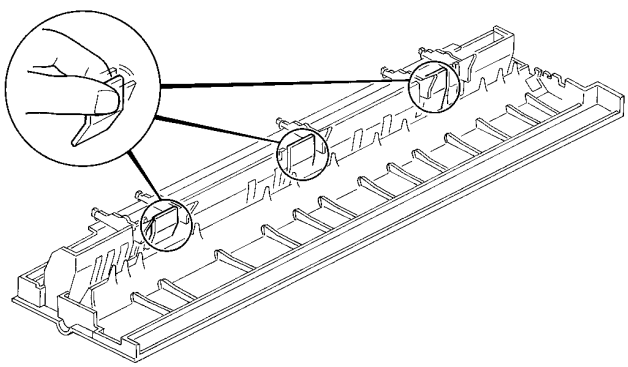
Remove the fusing unit [C] (1 screw), then remove the tabs as shown below.

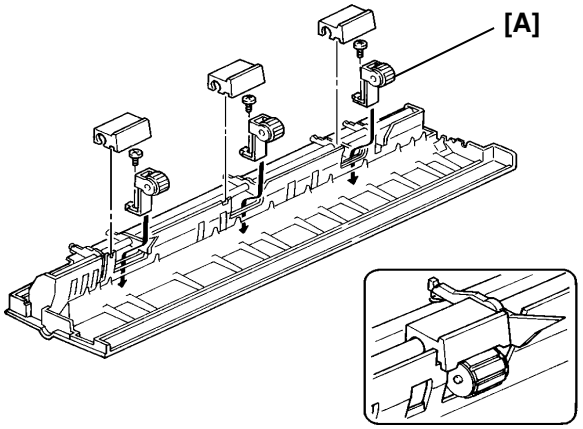


Attach **[D]:** 2 screws

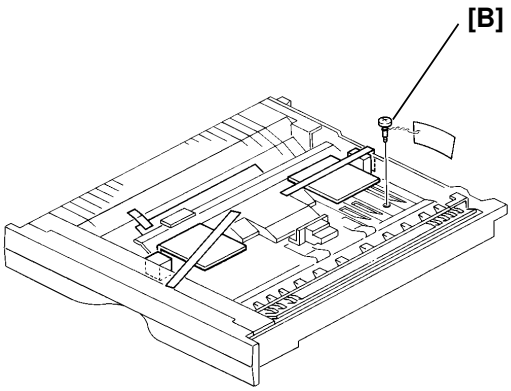
[C]

[D]



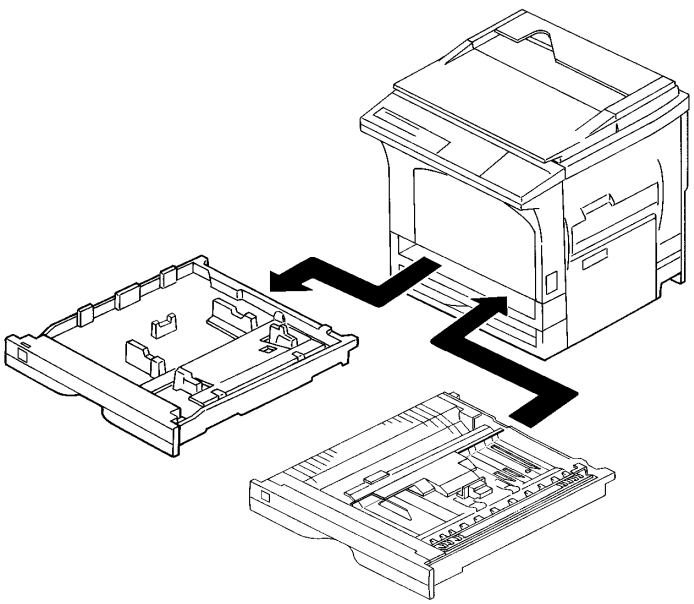


Attach **[A]:** 1 M3 x 6 tapping screweach
Remove **[B]**.



Reassemble the machine.

Note: Keep the shipping retainer [B] for future shipping.

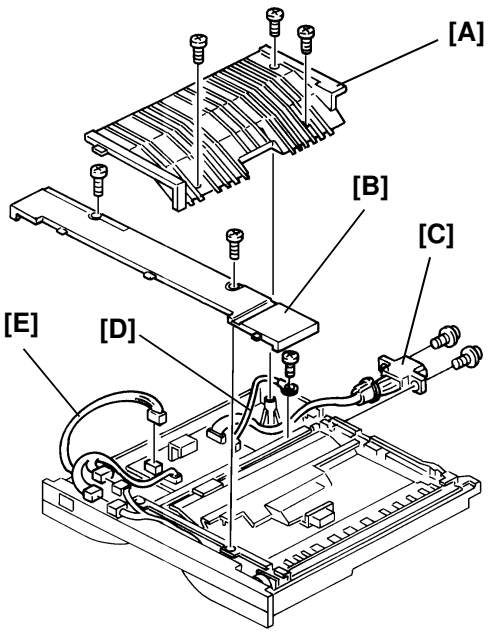


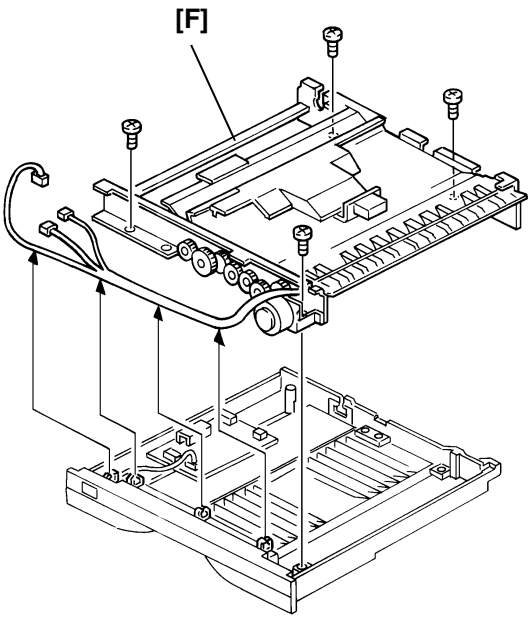
Check with the customer how to set up the following functions.

Function	RAM Address	Bit No.	
Auto feed out from the duplex tray in case of an odd number of originals in the ADF.	080266 (H)	4	0: No 1: Yes
Auto image shifting for the reverse side copy in the one-sided to two-sided copy mode.	080267 (H)	3	0: 5 mm 1: 0 mm

10.4. REPLACEMENT AND ADJUSTMENT

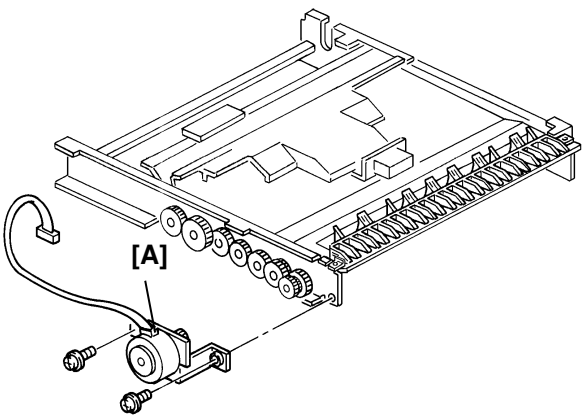
10.4.1. Duplex Tray [F]





[A]: 3 screws
[B]: 2 screws
[C]: 2 screws, 1 bushing
[D]: 1 screw
[E]: 3 connectors
[F]: 4 screws

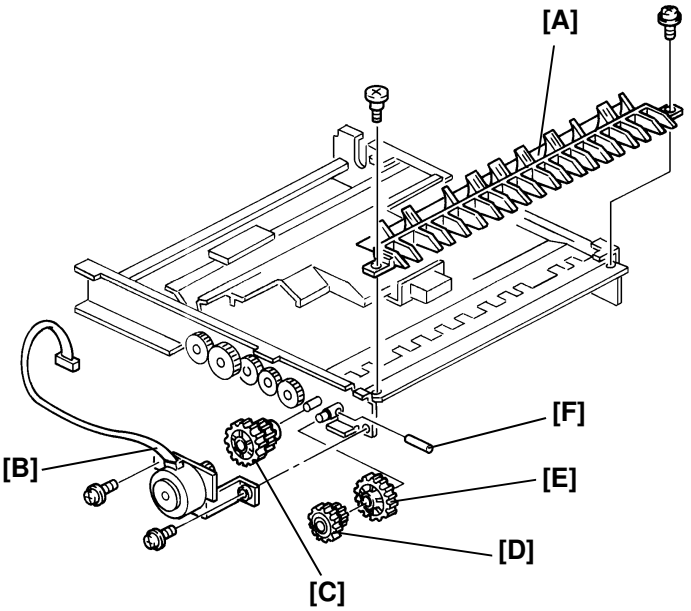
10.4.2. Duplex Feed Motor [A]



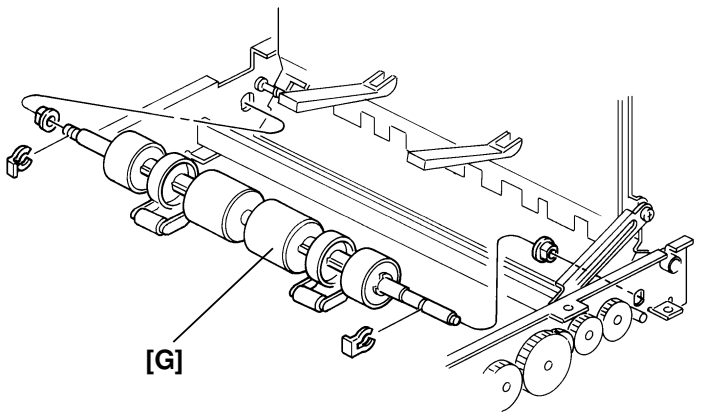
[A]: 2 screws

Note: First, remove the duplex tray unit.

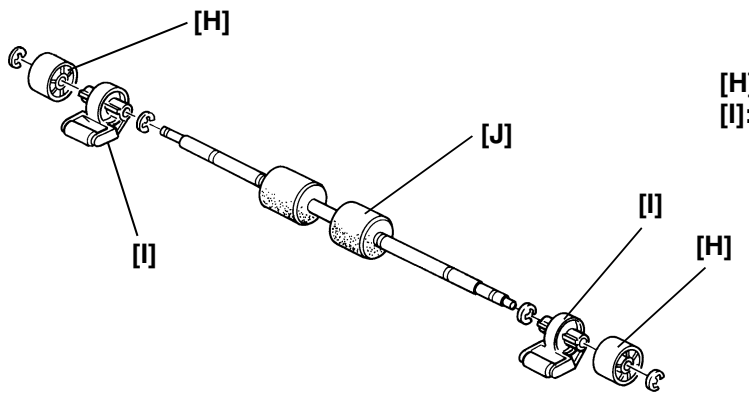
10.4.3. Duplex Feed Roller [J]



[A]: 2 screws
(stepped screw: front,
screw with flat washer: rear)
[B]: 2 screws



[G]: 2 snap rings



[H]: 2 E-rings
[I]: 2 E-rings

Note: • First, remove the duplex tray unit.

- Do not lose the pin [E].

1. APPENDIX

1.1. TRANSFER OPERATIONS

This section explains how the following transfer operations are done, how to set up the machine for international transfer operations, and some limitations.

Single step transfer operation

Multiple steps transfer operation

Specific two steps transfer operation

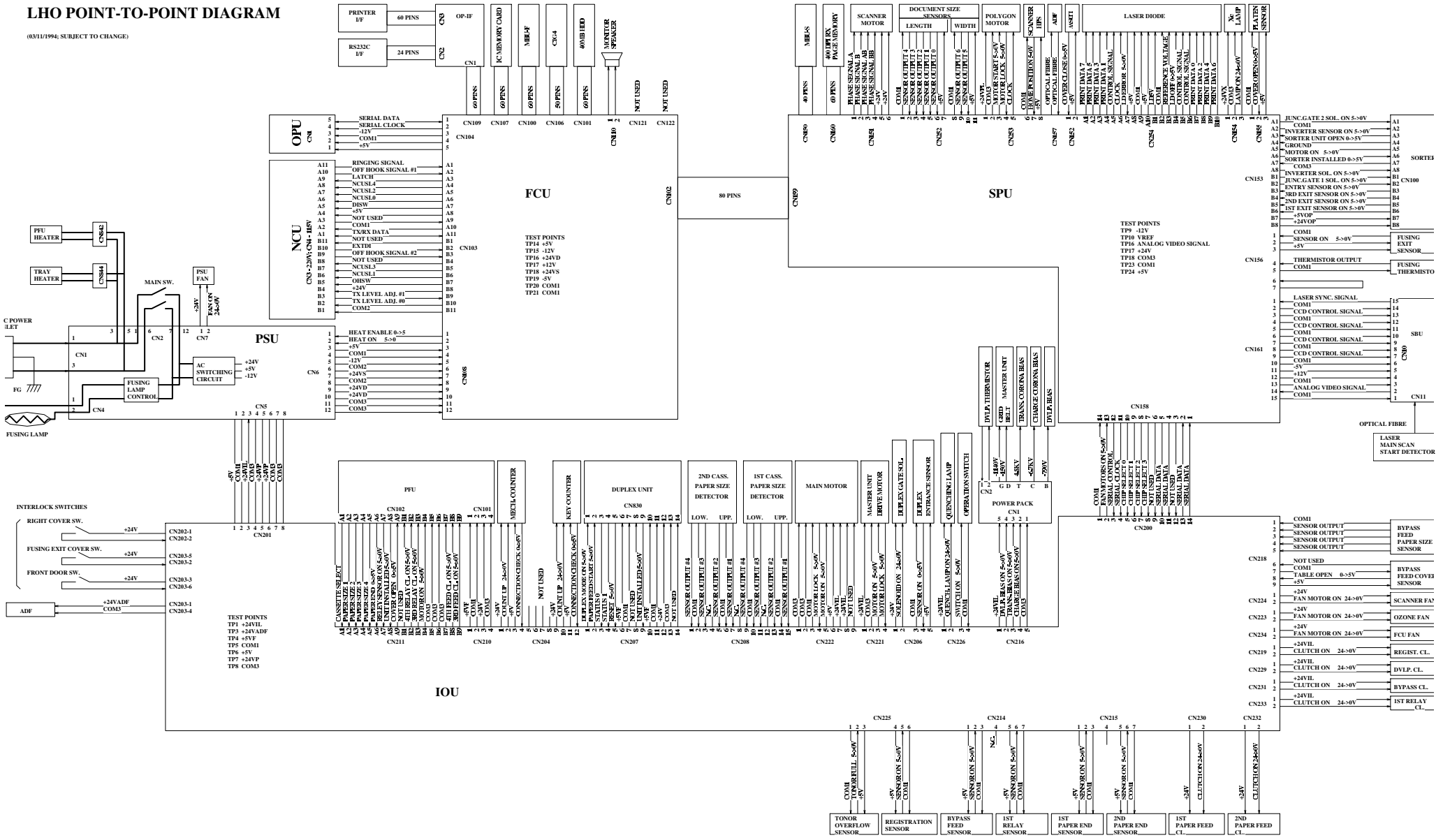
How to set-up the machine for transfer

Transfer operations can only be done between the machines capable of transfer operation(s) which are manufactured by RICOH. The following items have to be programmed in both of Transfer Requesting Terminal [referred as TRQ in the following sections] and Transfer Broadcasting Terminal(s) [referred as TBC in the following sections].

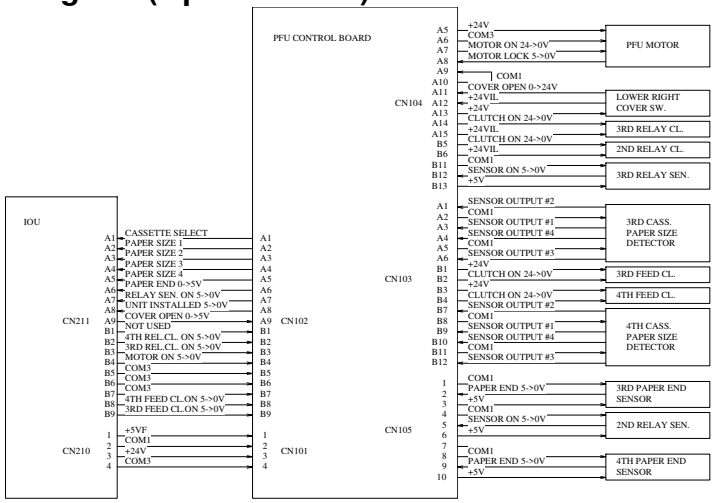
Item	Function No.	User/ Service	Remarks
ID Code	61	User	All the terminals in the Transfer network have to have the same ID code.
RTI	61	User	
Own Telephone No.	61	User	
Own ISDN G4 No.	61	User	
Own ISDN G3 No.	61	User	
Own ISDN G4 No.	18-05	Service	
Own ISDN G3 No.	18-07	Service	

Single Step Transfer Operation

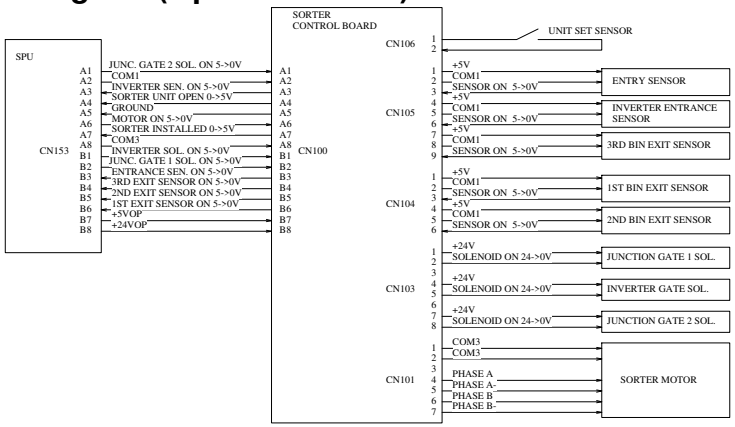
Point-to-Point Diagram (Main)



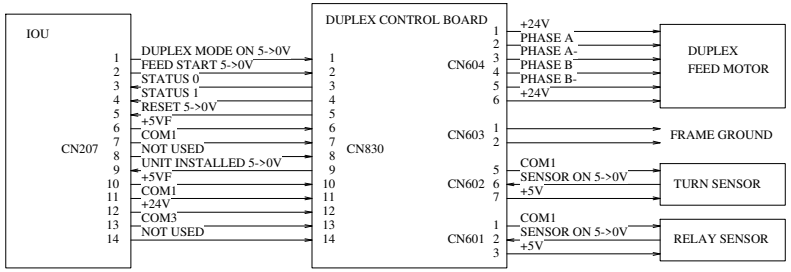
Point-to-Point Diagram (Optional PFU)



Point-to-Point Diagram (Optional Sorter)



Point-to-Point Diagram (Optional Duplex Unit)



Point-to-Point Diagram (ADF)