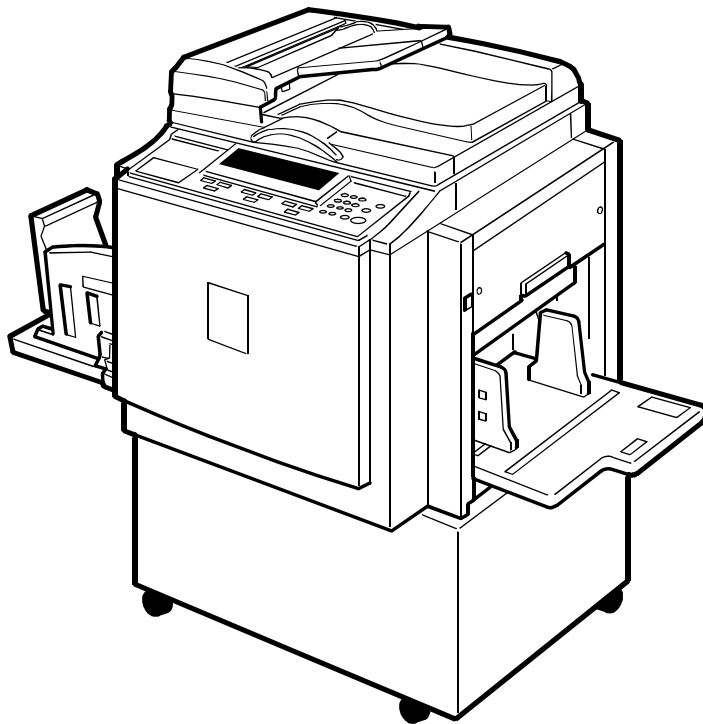


# **SERVICE MANUAL**

## **(Machine code: C238)**



# IMPORTANT SAFETY NOTICES

## PREVENTION OF PHYSICAL INJURY

1. Before disassembling or assembling parts of the printer and peripherals, make sure that the power cord is unplugged.
2. The wall outlet should be near the printer and easily accessible.
3. If any adjustment or operation check has to be made with exterior covers off or open while the main switch is turned on, keep hands away from electrified or mechanically driven components.

## HEALTH SAFETY CONDITIONS

1. If you get ink in your eyes by accident, try to remove it with eye drops or flush with water as first aid. If unsuccessful, get medical attention.
2. If you ingest ink by accident, induce vomiting by sticking a finger down your throat or by giving soapy or strong salty water to drink.

## OBSERVANCE OF ELECTRICAL SAFETY STANDARDS

1. The printer and its peripherals must be installed and maintained by a customer service representative who has completed the training course on those models.

### CAUTION

**The RAM has a lithium battery which can explode if handled incorrectly. Replace only with the same type of RAM. Do not recharge or burn this battery. Used RAM's must be handled in accordance with local regulations.**

### ATTENTION







**La carte RAM comporte une pile au lithium qui présente un risque d'explosion en cas de mauvaise manipulation. Remplacer la pile uniquement par une carte RAM identique. Ne pas recharger ni brûler cette pile. Les cartes RAM usagées doivent être éliminées conformément aux réglementations locales.**

## SAFETY AND ECOLOGICAL NOTES FOR DISPOSAL

1. Dispose of replaced parts in accordance with local regulations.
2. Used ink and masters should be disposed of in an environmentally safe manner and in accordance with local regulations.
3. When keeping used lithium batteries (from the main processing units) in order to dispose of them later, do not store more than 100 batteries (from the main processing units) per sealed box. Storing larger numbers or not sealing them apart may lead to chemical reactions and heat build-up.

## Symbols

This manual uses several symbols. The meaning of those symbols are as follows:

	See or Refer to
	Core tech manual
	Clip ring
	E-ring
	Screw
	Connector

# TABLE OF CONTENTS

<b>1. INSTALLATION .....</b>	<b>1-1</b>
1.1 INSTALLATION REQUIREMENTS .....	1-1
1.1.1 OPTIMUM ENVIRONMENTAL CONDITION .....	1-1
1.1.2 ENVIRONMENTS TO AVOID .....	1-1
1.1.3 POWER CONNECTION .....	1-1
1.1.4 ACCESS TO THE MACHINE .....	1-2
1.2 INSTALLATION PROCEDURE .....	1-3
1.2.1 MAIN BODY .....	1-3
Accessory Check .....	1-3
Installation Procedure .....	1-4
1.2.2 PLATEN COVER INSTALLATION (OPTION) .....	1-9
Accessory Check .....	1-9
Installation Procedure .....	1-9
1.2.3 ADF INSTALLATION (OPTION) .....	1-10
Accessory Check .....	1-10
Installation Procedure .....	1-11
ADF stabilizer installation .....	1-14
1.2.4 TAPE MARKER (OPTION) .....	1-15
Accessory Check .....	1-15
Installation Procedure .....	1-16
- For C238 - .....	1-16
- For C231 and C237- .....	1-17
- For C226 - .....	1-18
- For C210, C218, C219, C222, and C223 - .....	1-19
- For C217 and C225 - .....	1-20
- Common Steps - .....	1-21
1.2.5 ADDITIONAL DRUMS (OPTION) .....	1-22
1.2.6 INTERFACE BOARD (OPTION) .....	1-23
Accessory Check .....	1-23
Installation Procedure .....	1-23
<b>2. PREVENTIVE MAINTENANCE .....</b>	<b>2-1</b>
2.1 MAINTENANCE TABLE .....	2-1
<b>3. REPLACEMENT AND ADJUSTMENT .....</b>	<b>3-1</b>
3.1 GENERAL CAUTION .....	3-1
3.2 COVERS / BOARDS .....	3-1
3.2.1 FRONT COVER / PANEL .....	3-1
3.2.2 REAR COVERS .....	3-2
3.2.3 MPU .....	3-2
3.2.4 PSU .....	3-3

3.3	SCANNER.....	3-4
3.3.1	EXPOSURE GLASS / SCALES.....	3-4
3.3.2	SBU AND LAMP STABILIZER / SCANNER MOTOR.....	3-4
3.3.3	SCANNER H.P. SENSOR / PLATEN COVER SENSOR .....	3-5
3.3.4	EXPOSURE LAMP (XENON LAMP) .....	3-6
3.3.5	SCANNER WIRES .....	3-7
	Installation.....	3-7
3.3.6	IMAGE ADJUSTMENT .....	3-9
3.4	MASTER EJECT .....	3-10
3.4.1	MASTER EJECT UNIT .....	3-10
3.5	MASTER FEED .....	3-11
3.5.1	MASTER MAKING UNIT .....	3-11
3.5.2	THERMAL HEAD.....	3-11
	Installation.....	3-12
3.5.3	THERMAL HEAD VOLTAGE ADJUSTMENT .....	3-13
3.5.4	MASTER END SENSOR ADJUSTMENT .....	3-14
3.6	PAPER FEED.....	3-15
3.6.1	PICK-UP ROLLER / PAPER FEED ROLLER / FRICTION PAD.....	3-15
3.6.2	PAPER SEPARATION PRESSURE ADJUSTMENT .....	3-15
3.6.3	PAPER WIDTH DETECTION BOARD .....	3-16
3.7	PRINTING .....	3-17
3.7.1	PRESS ROLLER .....	3-17
3.7.2	PRESS ROLLER RELEASE LEVER ADJUSTMENT .....	3-18
3.7.3	PRINTING PRESSURE ADJUSTMENT .....	3-19
3.8	DRUM.....	3-20
3.8.1	PREPARATION .....	3-20
3.8.2	CLOTH SCREEN.....	3-20
	Installation.....	3-21
3.8.3	CLAMPER / METAL SCREEN .....	3-22
	Installation.....	3-23
3.8.4	INK PUMP ADJUSTMENT .....	3-24
3.8.5	INK ROLLER UNIT / INK ROLLER ONE-WAY CLUTCH .....	3-26
3.8.6	DOCTOR ROLLER GAP ADJUSTMENT .....	3-27
3.8.7	INK DETECTION ADJUSTMENT .....	3-28
3.8.8	MAIN MOTOR PULLEY POSITION.....	3-28
3.8.9	MAIN DRIVE TIMING BELT ADJUSTMENT .....	3-28
3.9	PAPER DELIVERY.....	3-29
3.9.1	PAPER DELIVERY UNIT .....	3-29
3.9.2	DELIVERY BELT / PAPER EXIT SENSOR.....	3-29
3.9.3	EXIT PAWL ADJUSTMENT .....	3-30
	Clearance adjustment .....	3-30
	Timing adjustment .....	3-31
3.9.4	AIR PUMP ADJUSTMENT .....	3-32
3.10	SPECIAL TOOLS .....	3-33

<b>4. TROUBLESHOOTING .....</b>	<b>4-1</b>
4.1 ERROR CODES.....	4-1
4.2 ELECTRICAL COMPONENT DEFECTS .....	4-3
4.2.1 SENSORS.....	4-3
4.2.2 SWITCHES.....	4-4
4.2.3 LINES .....	4-5
4.3 FUSE, LED, VR, DIP-SW, AND TP TABLES .....	4-6
4.3.1 BLOWN FUSE CONDITIONS .....	4-6
4.3.2 LED'S.....	4-6
4.3.3 VR'S.....	4-6
4.3.4 DIP SWITCHES.....	4-7
4.3.5 TEST POINTS.....	4-7
 <b>5. .SERVICE TABLES.....</b>	 <b>5-1</b>
5.1 USING SERVICE PROGRAM MODES.....	5-1
5.1.1 ACCESSING SP MODES.....	5-1
Entering SP Mode.....	5-1
Leaving SP Mode .....	5-1
5.1.2 HOW TO SELECT A PROGRAM NUMBER.....	5-2
5.2 MAIN MENU NO.1: COPY DATA.....	5-3
5.2.1 SP TABLE .....	5-3
5.2.2 SP1-70, 71: FIRMWARE/ROM SUFFIX INFORMATION .....	5-4
5.2.3 SP1-80: ERROR CODE INFORMATION .....	5-4
5.3 MAIN MENU NO.2: BASIC SETTINGS .....	5-5
5.3.1 SP TABLE .....	5-5
5.3.2 SP2-41, 2-42: THERMAL HEAD ENERGY CONTROL.....	5-5
5.4 MAIN MENU NO.3: SYSTEM SETTINGS .....	5-6
5.4.1 SP TABLE .....	5-6
5.4.2 SP3-1: INPUT THE PRESENT TIME .....	5-6
5.5 MAIN MENU NO.4: INPUT MODE .....	5-7
5.5.1 SP TABLE .....	5-7
5.6 MAIN MENU NO.5: OUTPUT MODE .....	5-8
5.6.1 SP TABLE .....	5-8
5.7 MAIN MENU NO.6: ADJUSTMENT.....	5-9
5.7.1 SP TABLE .....	5-9
5.7.2 SP6-40: INK DETECTION ADJUSTMENT.....	5-9
5.7.3 IMAGE ADJUSTMENT (SP6-10, -21, -5, -3, AND -1).....	5-10
SP6-10: Master writing speed.....	5-10
SP6-21: Paper registration position .....	5-10
SP6-05: Scanning speed - platen .....	5-11
SP6-06: Scanning speed - ADF.....	5-11
SP6-03: Scanning start position - platen.....	5-11
SP6-04: Scanning start position - ADF .....	5-11
SP6-01: Main scan position - platen .....	5-11
SP6-02: Main scan position - ADF.....	5-11
5.7.4 SP6-31: SBU CALIBRATION .....	5-12
5.7.5 SP6-20: REGISTRATION BUCKLE (NOT USED).....	5-12

5.8	MAIN MENU NO.7: MEMORY CLEAR.....	5-13
5.8.1	SP TABLE .....	5-13
5.8.2	SP7: HOW TO CLEAR .....	5-13
5.8.3	SP7-1: FACTORY SETTINGS CLEAR.....	5-13
5.9	MAIN MENU NO.8: SYSTEM TEST .....	5-14
5.9.1	SP TABLE .....	5-14
5.9.2	SP8-1: DOWNLOAD MAIN FIRMWARE .....	5-14
5.9.3	SP8-2: UPLOAD MAIN FIRMWARE.....	5-15
5.9.4	SP8-10: TEST PATTERNS .....	5-15
5.9.5	SP8-21: PAPER FEED TEST (15 RPM).....	5-15
5.9.6	SP8-22: FREE RUN PAPER FEED (15 RPM) .....	5-15

## **6. DETAILED SECTION DESCRIPTIONS ..... 6-1**

6.1	MECHANISM OVERVIEW .....	6-1
6.1.1	MAJOR PARTS .....	6-1
6.1.2	ELECTRICAL COMPONENT LAYOUT .....	6-2
	Boards .....	6-3
	Motors.....	6-3
	Switches .....	6-4
	Sensors.....	6-4
	Solenoids.....	6-5
	Counters .....	6-5
	Others .....	6-5
6.1.3	DRIVE LAYOUT .....	6-6
6.2	MASTER EJECT UNIT .....	6-7
6.2.1	OVERVIEW .....	6-7
	Overview.....	6-7
	Procedure .....	6-7
6.2.2	MASTER CLAMPER OPENING MECHANISM .....	6-8
	Clamper Mechanism .....	6-8
	Notes .....	6-8
6.2.3	MASTER EJECT ROLLER MECHANISM .....	6-9
	Mechanism .....	6-9
	Procedure .....	6-9
6.2.4	PRESSURE PLATE MECHANISM.....	6-10
	Mechanism .....	6-10
	Procedure .....	6-10
6.3	SCANNER UNIT.....	6-11
6.3.1	OVERVIEW .....	6-11
6.3.2	SCANNER DRIVE .....	6-12
	Full size mode.....	6-12
	Reduction/enlargement modes .....	6-12
6.4	IMAGE PROCESSING .....	6-13
6.4.1	OVERVIEW .....	6-13
6.4.2	AUTO BACKGROUND CORRECTION .....	6-14
6.4.3	AUTO SHADING .....	6-14
6.4.4	MTF FILTER.....	6-14
6.4.5	MAIN SCAN ENLARGEMENT/REDUCTION .....	6-14
6.4.6	BINARY PROCESSING .....	6-15

6.4.7	FINE MODE.....	6-15
6.4.8	THERMAL HEAD.....	6-16
	Specifications.....	6-16
	Thermal head control.....	6-16
	Thermal head protection.....	6-16
	Remarks for Handling the Thermal Head.....	6-17
6.5	MASTER FEED.....	6-18
6.5.1	OVERVIEW.....	6-18
	Procedure.....	6-18
6.5.2	MASTER FEED MECHANISM.....	6-19
	Mechanism.....	6-19
	Procedure.....	6-19
	Notes.....	6-19
6.5.3	CLAMPER AND TENSION ROLLER MECHANISM.....	6-20
	Mechanism.....	6-20
	Notes.....	6-20
6.5.4	CUTTER MECHANISM.....	6-21
6.5.5	MASTER SET COVER SENSOR.....	6-21
6.6	DRUM.....	6-22
6.6.1	OVERVIEW.....	6-22
	Procedure.....	6-22
	Notes.....	6-22
6.6.2	DRUM DRIVE MECHANISM.....	6-23
	Mechanism.....	6-23
	Notes.....	6-23
6.6.3	INK SUPPLY MECHANISM.....	6-24
	Mechanism.....	6-24
	Notes.....	6-24
6.6.4	INK ROLLER MECHANISM.....	6-25
	Mechanism.....	6-25
	Notes.....	6-25
6.6.5	INK SUPPLY CONTROL.....	6-26
	Mechanism.....	6-26
	Notes.....	6-26
6.6.6	DETECTION OF MASTERS ON THE DRUM.....	6-27
6.7	PAPER FEED.....	6-28
6.7.1	OVERVIEW.....	6-28
6.7.2	PAPER FEED MECHANISM.....	6-29
	Mechanism.....	6-29
	Notes.....	6-29
6.7.3	PAPER FEED / SEPARATION PRESSURE MECHANISM.....	6-30
6.7.4	REGISTRATION ROLLER MECHANISM.....	6-31
	Registration Roller Drive.....	6-31
	Registration Roller Up/Down Mechanism.....	6-31
6.7.5	PRINTING PRESSURE MECHANISM.....	6-32
6.7.6	RE-FEEDING MECHANISM.....	6-32



6.7.7 PAPER TABLE MECHANISM .....	6-33
Table lifting/lowering .....	6-33
Mechanism .....	6-33
Notes .....	6-33
Paper end detection.....	6-33
Paper size detection .....	6-33
Table side fences and side-to-side shift.....	6-34
Side fence friction pads.....	6-34
6.8 PAPER DELIVERY.....	6-35
6.8.1 OVERVIEW .....	6-35
6.8.2 PAPER DELIVERY UNIT DRIVE MECHANISM.....	6-35
Mechanism .....	6-35
Notes .....	6-35
6.8.3 PAPER SEPARATION FROM THE DRUM .....	6-36
Air knife.....	6-36
Exit pawl air pump .....	6-36
6.8.4 EXIT PAWL DRIVE MECHANISM.....	6-37
6.9 TIMING CHART.....	6-38
6.9.1 MASTER EJECT / MASTER FEED.....	6-38
6.9.2 MASTER WRAPPING .....	6-40
6.9.3 PRINTING .....	6-42
6.10 JAM DETECTION.....	6-44
6.10.1 MASTER EJECT JAM (E JAM LOCATION INDICATOR) .....	6-44
Picking up the used master from the drum .....	6-44
Compressing the used master .....	6-44
Just after turning on the main switch.....	6-44
6.10.2 DF JAM (P JAM LOCATION INDICATOR).....	6-45
Feeding in the original.....	6-45
Feeding out the original .....	6-45
Turning on the main switch/closing the DF cover .....	6-45
6.10.3 MASTER FEED JAM (D JAM LOCATION INDICATOR) .....	6-46
Cutting the master (master not cut) .....	6-46
Cutting the master (cutter unit problem).....	6-46
Clamping the master.....	6-47
6.10.4 DRUM JAM (B JAM LOCATION INDICATOR).....	6-47
Wrapping jam.....	6-47
6.10.5 PAPER FEED JAM (A JAM LOCATION INDICATOR) .....	6-48
Paper feed .....	6-48
Turning on the main switch/end of paper feed.....	6-48
6.10.6 PAPER DELIVERY JAM (C JAM LOCATION INDICATOR).....	6-48
Paper delivery .....	6-48

## **7. POINT TO POINT DIAGRAM..... 7-1**

<b>SPECIFICATIONS.....</b>	<b>SPEC-1</b>
1. GENERAL SPECIFICATIONS.....	SPEC-1

## **DOCUMENT FEEDER (C600)**

<b>1. OVERALL INFORMATION .....</b>	<b>C600-1</b>
1.1 SPECIFICATIONS.....	C600-1
1.2 MECHANICAL COMPONENT LAYOUT .....	C600-2
1.3 ELECTRICAL COMPONENT LAYOUT .....	C600-3
1.4 ELECTRICAL COMPONENT DESCRIPTION.....	C600-4
1.5 DRIVE LAYOUT .....	C600-5
<b>2. DETAILED SECTION DESCRIPTIONS .....</b>	<b>C600-6</b>
2.1 ORIGINAL SIZE DETECTION.....	C600-6
2.2 PICK-UP AND SEPARATION .....	C600-8
2.3 ORIGINAL TRANSPORT AND EXIT MECHANISM.....	C600-9
2.4 OVERALL ELECTRICAL CIRCUIT .....	C600-10
<b>3. REPLACEMENT AND ADJUSTMENT.....</b>	<b>C600-11</b>
3.1 FEED UNIT REMOVAL .....	C600-11
3.2 SEPARATION ROLLER REPLACEMENT .....	C600-11
3.3 PICK-UP ROLLER REPLACEMENT .....	C600-12
3.4 FEED BELT REPLACEMENT .....	C600-12
3.5 ORIGINAL SET SENSOR REPLACEMENT .....	C600-13
3.6 ORIGINAL SIZE SENSORS REPLACEMENT .....	C600-14
3.7 ORIGINAL EXIT TRAY/FRONT COVER/REAR COVER REMOVAL.....	C600-15
3.8 FEED COVER OPEN SENSOR/DF OPEN SENSOR REPLACEMENT.....	C600-15
3.9 FEED CLUTCH/PICK-UP SOL/TRANSPORT MOTOR REPLACEMENT.....	C600-16
3.10 DF FEED COVER REMOVAL .....	C600-17
3.11 REGISTRATION SENSOR REPLACEMENT .....	C600-17

# **1. INSTALLATION**

## **1.1 INSTALLATION REQUIREMENTS**

Carefully select the installation location because environmental conditions greatly affect machine performance.

### **1.1.1 OPTIMUM ENVIRONMENTAL CONDITION**

1. Temperature —10 to 30 °C (50 to 86 °F)
2. Humidity —20 to 90 % RH
3. Install the machine on a strong and level base. The machine must be level within 5 mm (0.2") both front to rear and left to right.

### **1.1.2 ENVIRONMENTS TO AVOID**

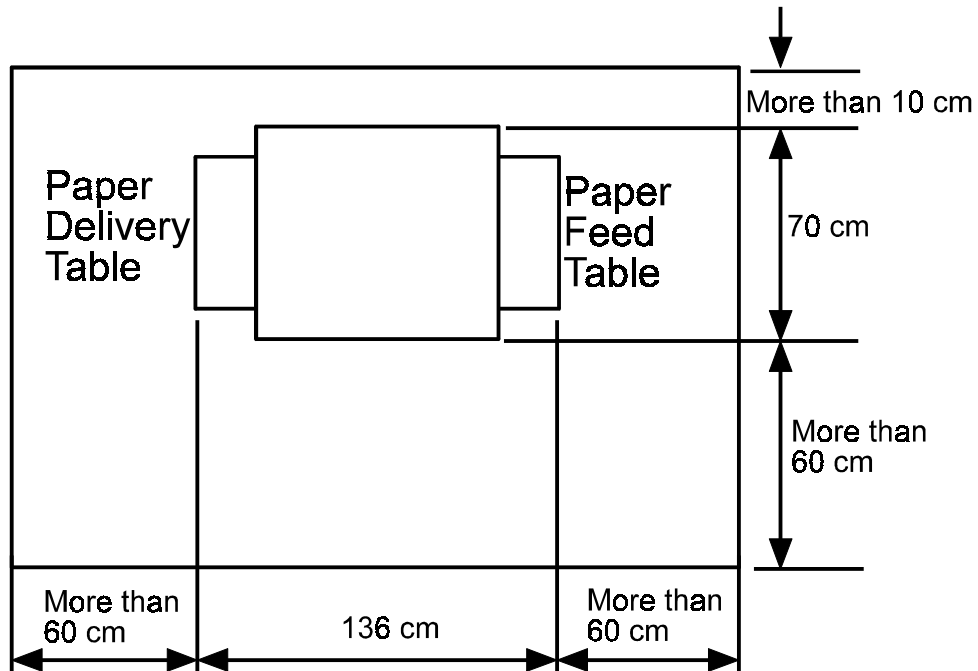
1. Locations exposed to direct sunlight or strong light (more than 1,500 lux).
2. Dusty areas.
3. Areas containing corrosive gases.
4. Locations directly exposed to cool air from an air conditioner or reflected heat from a space heater. (Sudden temperature changes from low to high or vice versa may cause condensation within the machine.)

### **1.1.3 POWER CONNECTION**

1. Securely connect the power cord to a power source.
2. Make sure that the wall outlet is near the machine and easily accessible.
3. Make sure the plug is firmly inserted in the outlet.
4. Avoid multi-wiring.
5. Do not pinch the power cord.

### 1.1.4 ACCESS TO THE MACHINE

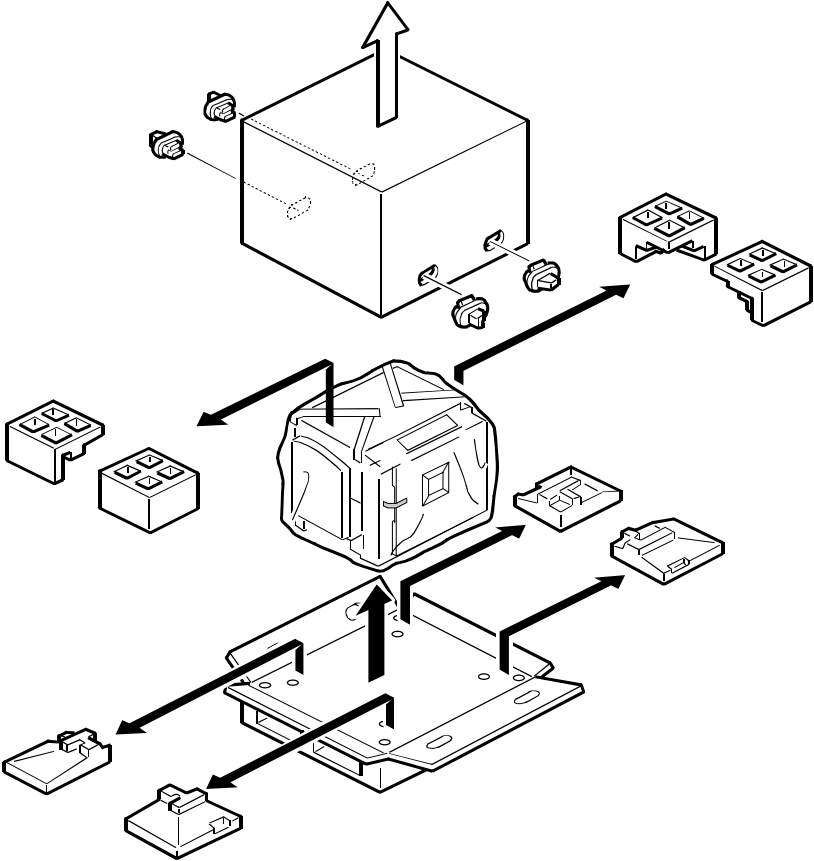
Place the machine near a power source, providing clearance as shown below.



1.2 INSTALLATION PROCEDURE

1.2.1 MAIN BODY

Accessory Check

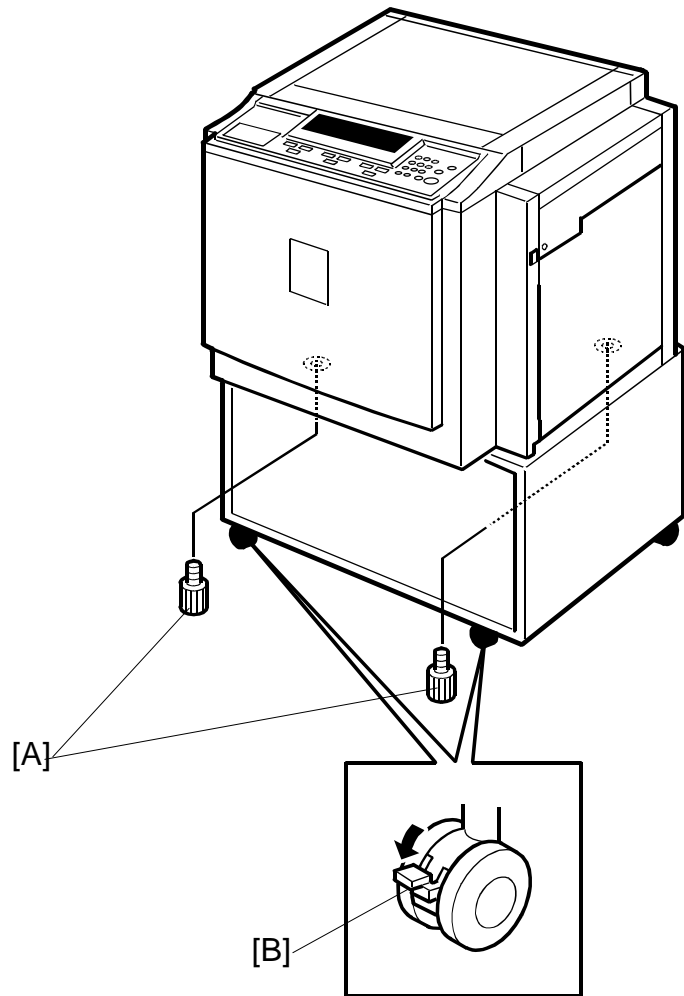


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Make sure that you have all the accessories listed below:

Description	Quantity
1. Master Spool.....	2
2. Paper Feed Side Pad .....	2
3. Operating Instructions.....	1
4. NECR (Ricoh version only) .....	1
5. Model Name Plates (C238-22, -52 and -54 only).....	1 set

**Installation Procedure**



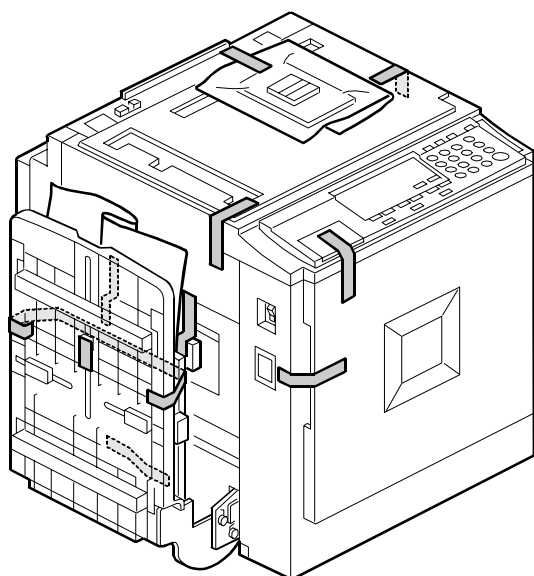
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1. Unpack the box. When installing the optional table, mount the machine as shown (there are 2 screws [A] packed with the table).

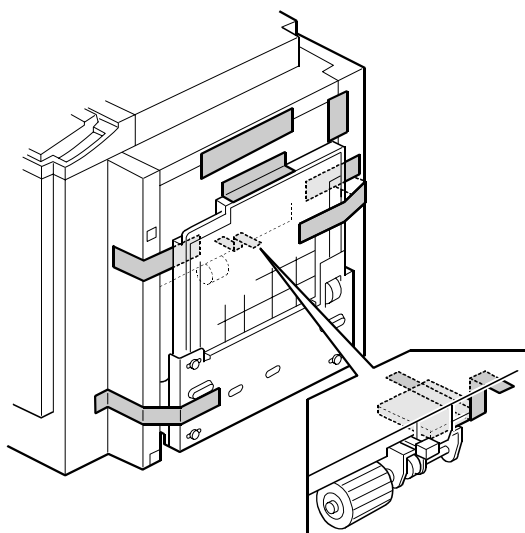
**⚠ CAUTION**

**Only lift with the carrying handles on the bottom corners of the machine. Secure the machine on the table with the 2 screws [A] provided. This prevents the machine from falling from the table when the platen cover is open.**

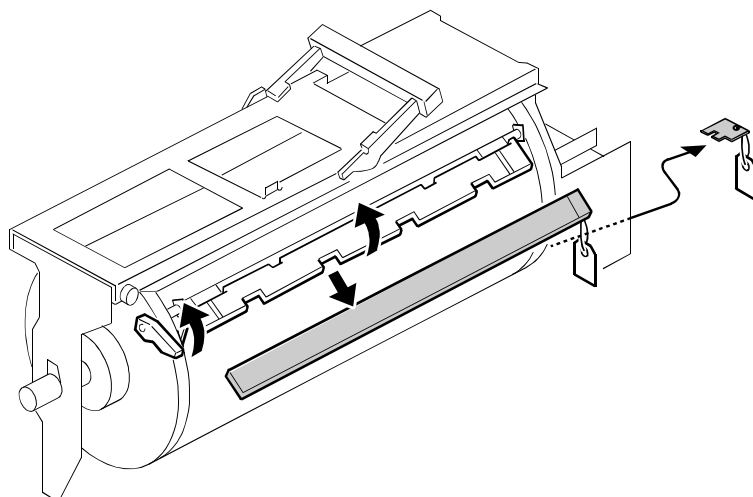
**Lock the casters of the table as shown [B], to prevent the machine from moving (e.g. when the drum is set).**



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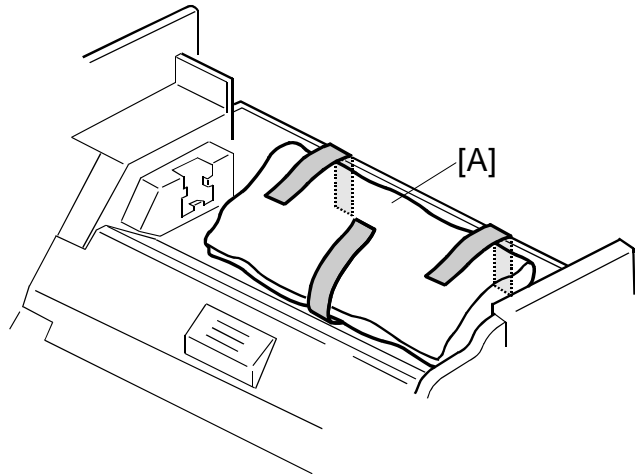
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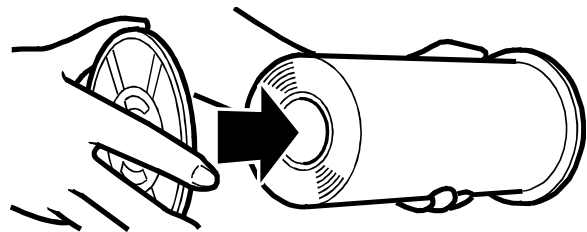
2. Remove the filament tape and string securing the covers and units as shown above.

3. Pull out the master making unit, and take out the accessory bag [A].



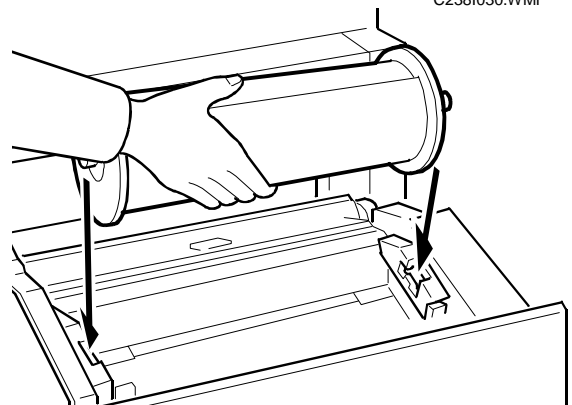
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4. Insert both spools into a new master roll.



C238I030.WMF

5. Install the master roll as shown to the right.



C238I032.WMF

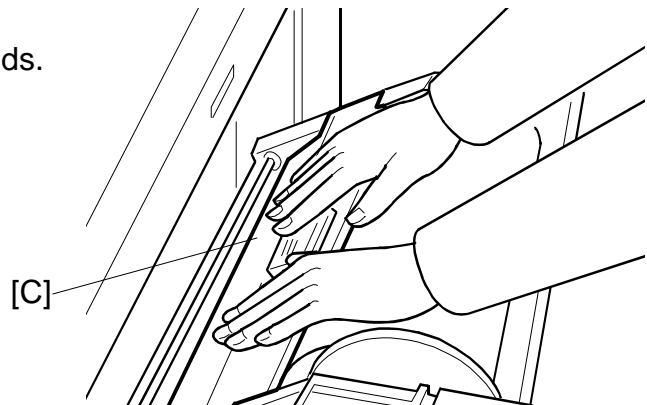
6. Insert the leading edge of the master roll under the platen roller. The arrows [B] indicate the correct position of the master leading edge.



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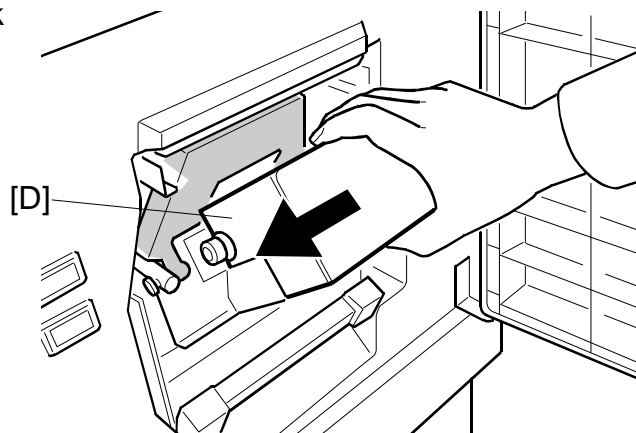


7. Close the cover [C] using both hands.
8. Set the master making unit.



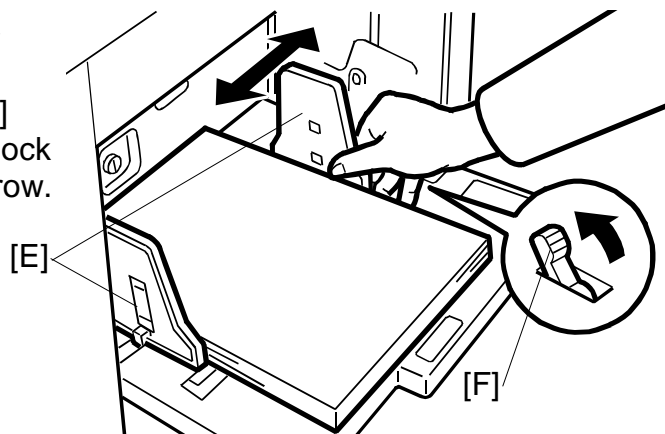
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9. Open the door, and insert a new ink cartridge [D].



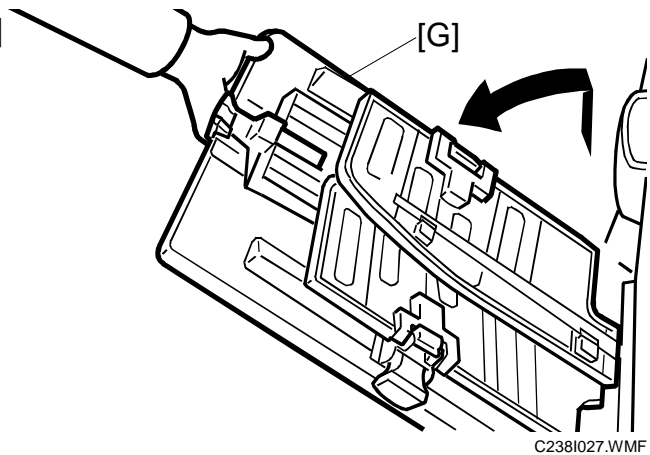
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10. Open the paper table, and load a stack of paper .
11. Make sure that the side plates [E] touch the paper gently. Shift the lock lever [F] in the direction of the arrow.

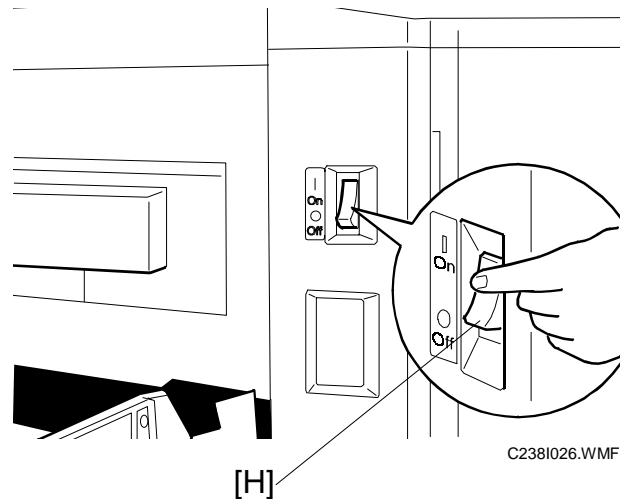


C238I028.WMF

12. Raise the paper delivery table [G] slightly, then gently lower it.
13. Lift the side plates and the end plate, and adjust them to the paper size.



14. Firmly insert the power plug in the outlet.
15. Make sure that the wall outlet is near the machine and easily accessible.
16. Turn on the main switch [H].
17. Press the “Economy mode” key while holding down the “0” key, to supply ink inside the drum.
18. Make some test copies.



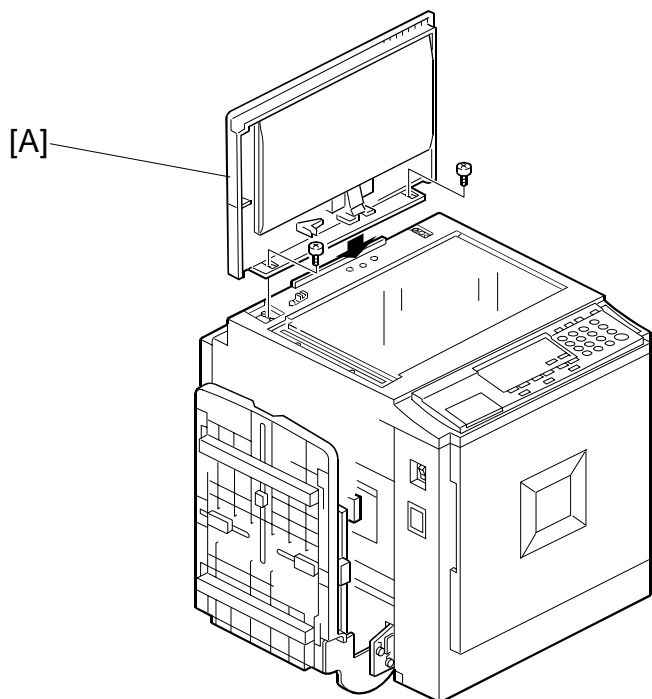
## 1.2.2 PLATEN COVER INSTALLATION (OPTION)

### **Accessory Check**

Check the quantity and condition of the accessories in the box against the following list:

Description	Quantity
1. Stepped Screw.....	2

### **Installation Procedure**



C238I001.WMF

1. Install the platen cover [A] (2 screws).

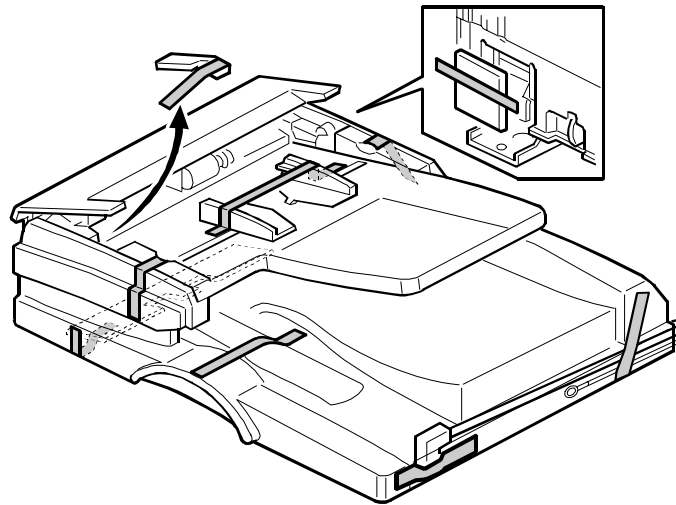
### 1.2.3 ADF INSTALLATION (OPTION)

#### ***Accessory Check***

Check the quantity and condition of the accessories in the box against the following list:

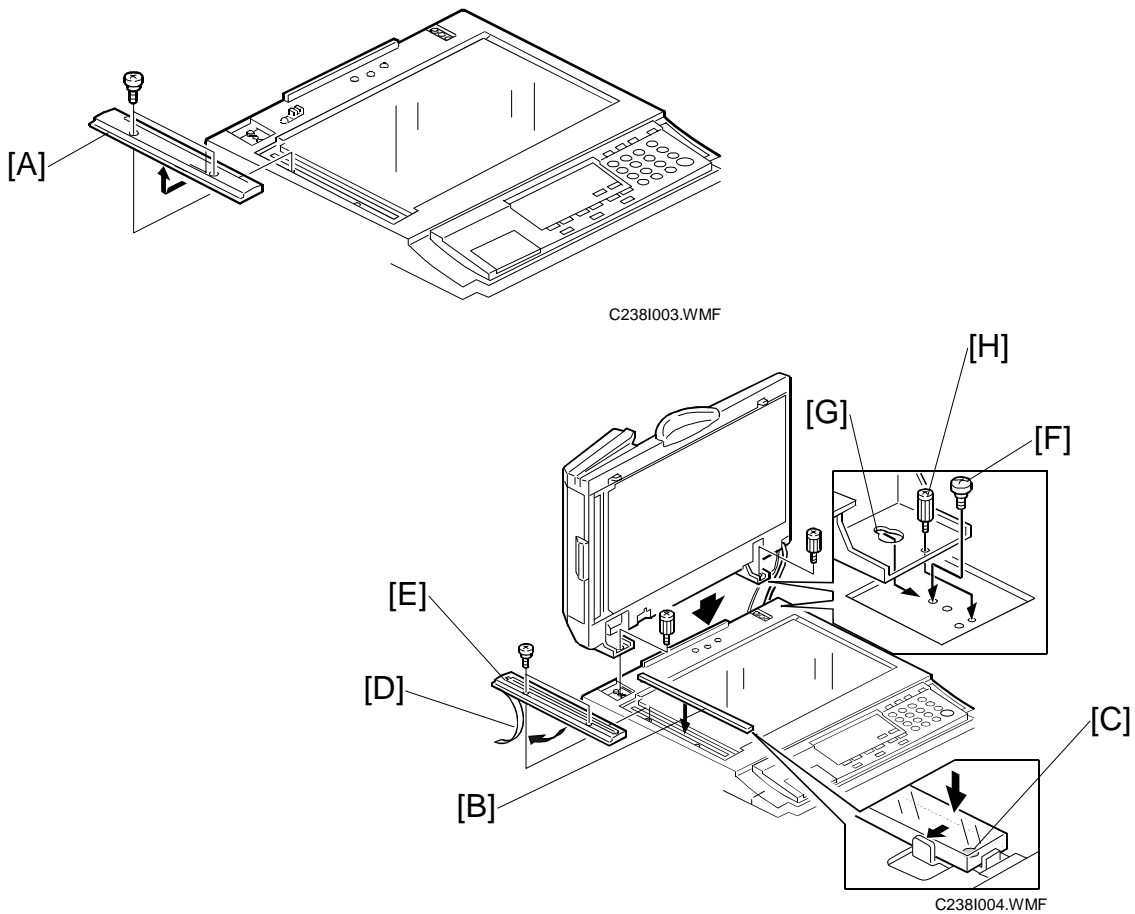
Description	Quantity
1. Stepped Screw .....	2
2. Screws .....	3
3. Screwdriver .....	1
4. DF Exposure Glass .....	1
5. Decal - Exposure Glass .....	1
6. Decal - Scale - mm .....	1
7. Decal - Scale - inch .....	1
8. Scale Guide .....	1
9. Stabilizer Bracket .....	2
10. Thumbscrew .....	4
11. Caution Label .....	1

***Installation Procedure***

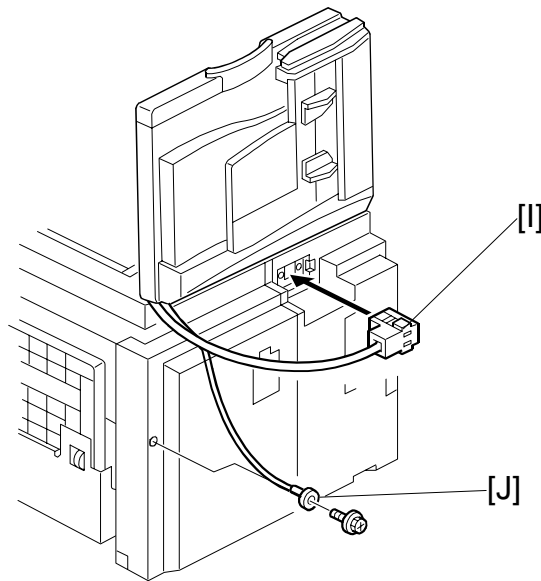


C2381002.WMF

1. Remove the strips of tape.

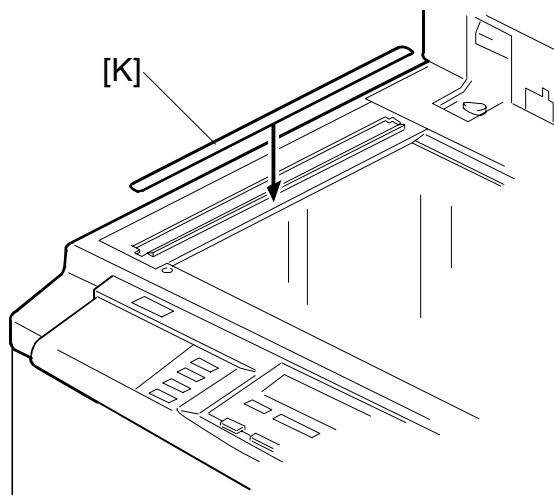


2. Remove the left scale [A] (2 screws).
3. Place the DF exposure glass [B] on the glass holder.  
**NOTE:** When installing the DF exposure glass, make sure that the white point [C] is positioned at the lower front side, as shown.
4. Peel off the backing [D] of the double-sided tape attached to the rear side of the scale guide [E], then install the scale guide (2 screws removed in step 2).
5. Install the two stud screws [F].
6. Mount the DF by aligning the holes [G] in the DF with the stud screws, then slide the DF to the front as shown.
7. Secure the DF unit with two screws [H].



C238I018.WMF

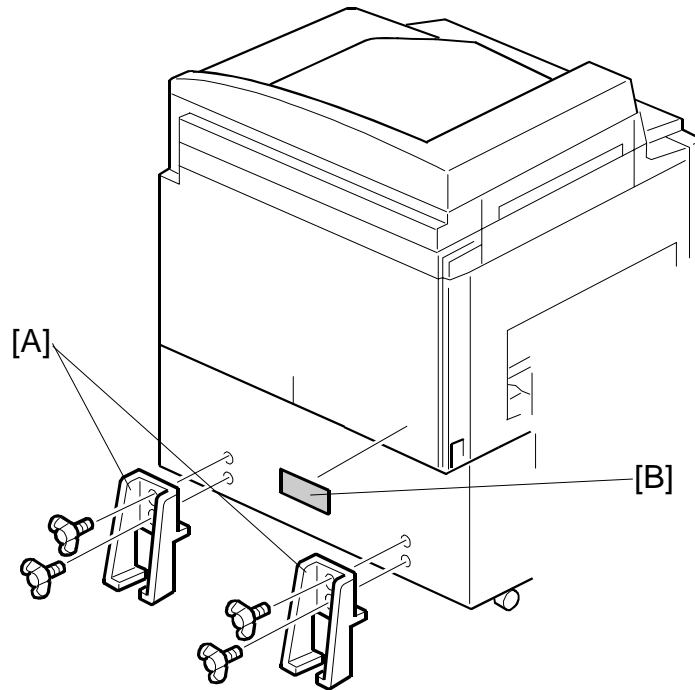
8. Connect the cables [I] and [J] to the main body.



C238I500.WMF

9. Attach the scale decal [K] as shown.
10. Plug in the power cord, then turn the main switch on.
11. Make a full size copy using the ADF. Then check to make sure the side-to-side and leading edge registrations are correct. If they are not, adjust their values (do the adjustment procedures in section 5.7.3).

***ADF stabilizer installation***



C238I040.WMF

1. Attach the two stabilizer brackets [A] to the back of the table using the thumbscrews (4 screws).
2. Attach the caution label [B], as shown.

**⚠ CAUTION**

**This procedure must be done to prevent the machine from falling backwards when the ADF is open.**



1.2.4 TAPE MARKER (OPTION)

**Accessory Check**

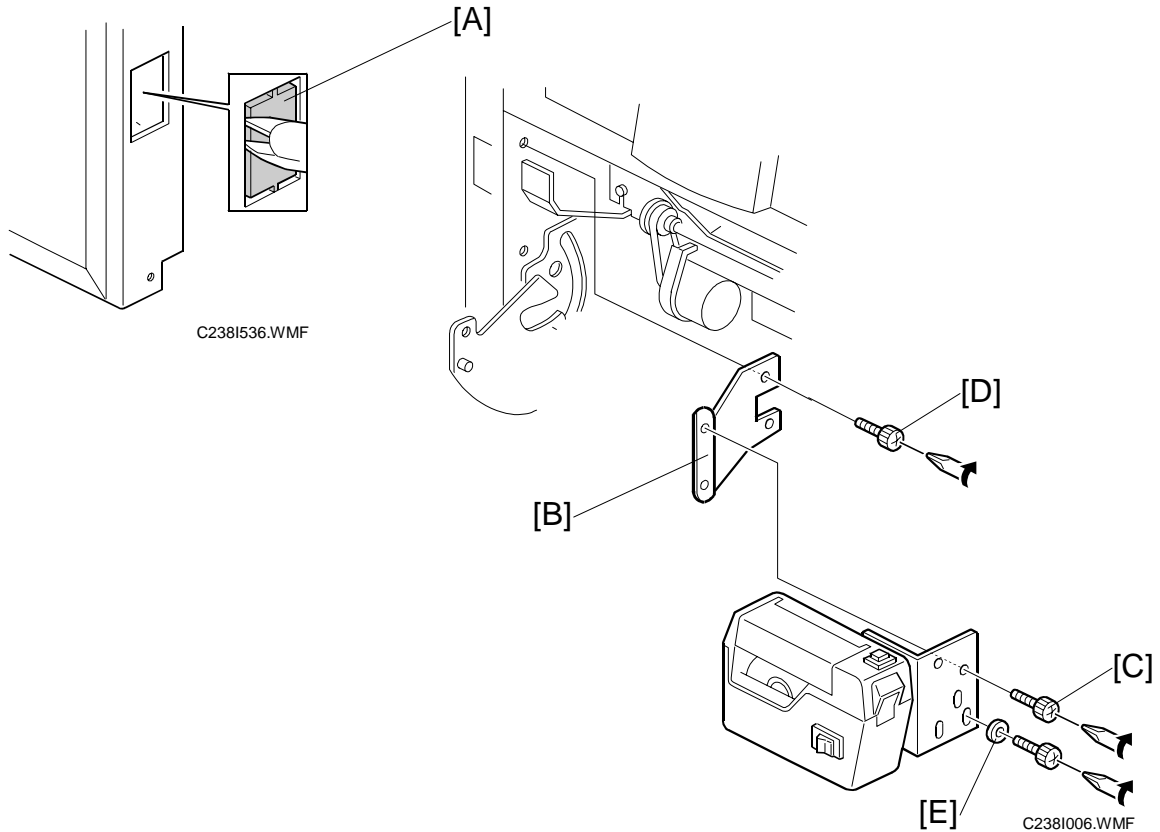
Check the quantity and condition of the accessories in the box against the following list:



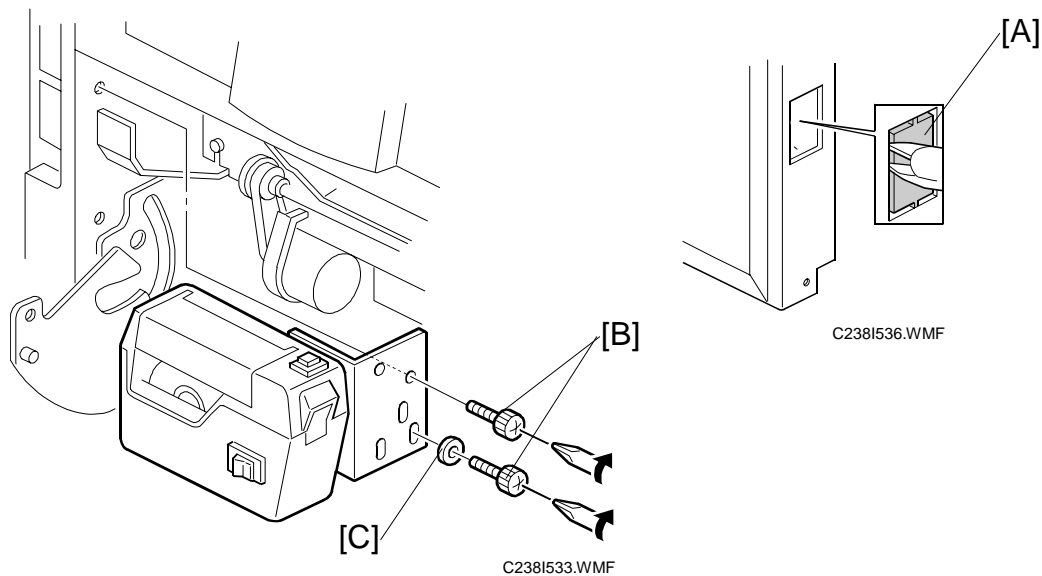
Description	Quantity
1. Knob Screw (C210, C217, C218, C219, C222, C223, C225, C228, C238, C237, and C238 only).....	2
2. Screw M4 x 25 (C211, C212, C213, C214, C216, C224, and C226 only) .....	2
3. Hexagon Nut M4 (C211, C212, C213, C214, C216, C224, and C226 only) .....	2
4. Auxiliary Bracket (C226 only).....	1
5. Auxiliary Bracket (C238 only).....	1
6. Screw M4 x 8 (C226 and C238 only) .....	2
7. Lock Washer (C226 only) .....	1
8. Lock Washer.....	1
9. Tape .....	1

**Installation Procedure**

**- For C238 -**

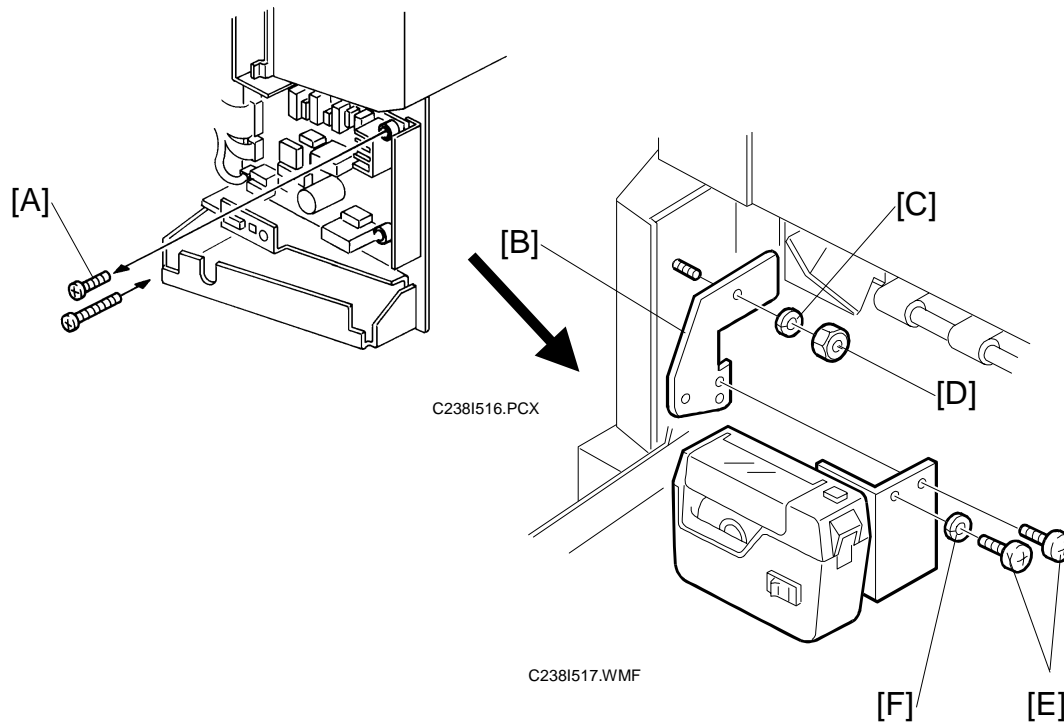


1. Turn off the main switch and unplug the power cord.
2. Remove the paper delivery plate (4 screws).
3. Cut the cap [A] off the rear cover of the main body with pliers, then connect the tape marker cable to the main body.
4. Install the auxiliary bracket [B] on the tape marker with M4 x 8 screws (accessories) [C].
5. Install the tape marker on the main body with two knob screws [D] (accessories) in the two outer holes in the tape marker bracket.  
**NOTE:** 1) Tighten the knob screws with a screwdriver to prevent them from coming loose.  
 2) Install the lock washer [E] (accessories) with the lower of the two knob screws.
6. Reinstall the paper delivery plate.
7. Refer to "Common Steps".

**- For C231 and C237-**

1. Turn off the main switch and unplug the power cord.
2. Remove the paper delivery table (2 screws).
3. Remove the paper delivery plate (4 screws).
4. Cut the cap [A] off the rear cover with pliers, then connect the tape marker cable to the main body.
5. Install the tape marker on the main body with two knob screws [B] (accessories) in the two outer holes in the tape marker bracket.  
**NOTE:** 1) Tighten the knob screws with a screwdriver to prevent them from coming loose.  
2) Install the lock washer [C] (accessories) with the lower of the two knob screws.
6. Reinstall the paper delivery plate and paper delivery table.
7. Refer to "Common Steps".

**- For C226 -**

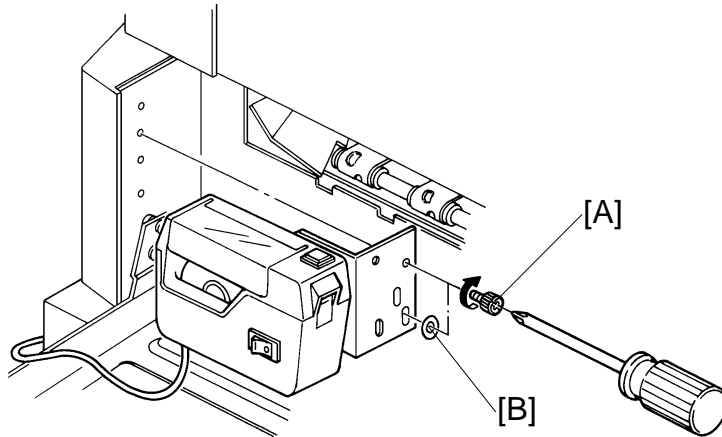


**Main Body:**

1. Turn off the main switch and unplug the power cord.
2. Remove the rear cover (6 screws).
3. Replace the screw [A], to secure the AC drive board with M4 x 25 screws (accessories).
4. Reinstall the rear cover.
5. Install the auxiliary bracket [B] on the main body with the hexagon nut [D] (accessories) as shown.  
**NOTE:** Install the lock washer [C] (accessories) with the nut.

**Tape Marker:**

6. Install the tape marker on the auxiliary bracket with two M4 x 8 screws [E] (accessories).
7. Install the lock washer [F] (accessories) with one of the two screws.
8. Refer to "Common Steps".

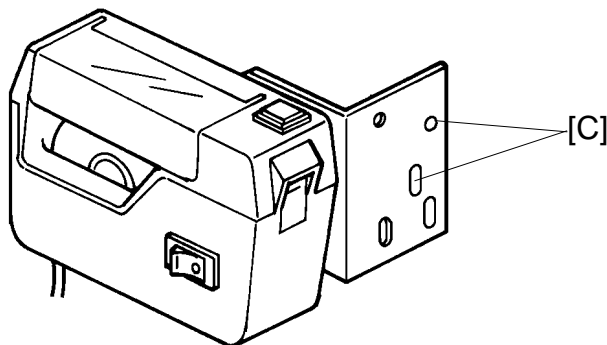
**- For C210, C218, C219, C222, and C223 -**

C238I502.PCX

1. Turn off the main switch and unplug the power cord.
2. Install the tape marker on the main body with two knob screws [A] (accessories) in the two outer holes in the tape marker bracket.  
**NOTE:** 1) Tighten the knob screws with a screwdriver to prevent them from coming loose.  
2) Install the lock washer [B] (accessories) with the lower of the two knob screws.
3. Refer to "Common Steps".

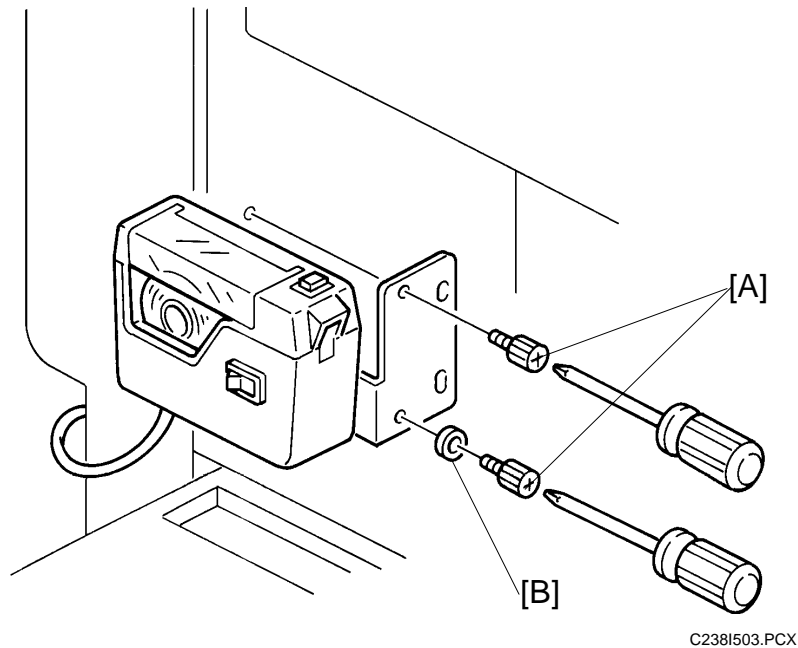
**— For Model C228 and the models on which the New Paper Delivery Table is installed —**

Use the two holes in the tape marker bracket [C] as shown below.



C238I504.PCX

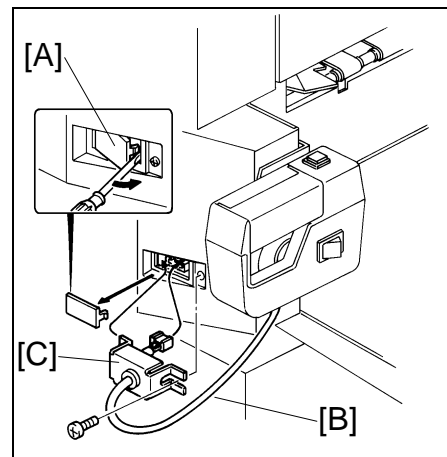
**- For C217 and C225 -**



1. Turn off the main switch and unplug the power cord.
2. Install the tape marker on the main body with two knob screws [A] (accessories) in the two inner holes of the tape marker bracket.  
**NOTE:** 1) Tighten the knob screws with a screwdriver to prevent them from coming loose.  
 2) Install the lock washer [B] (accessory) with the lower of the two knob screws.
3. Refer to "Common Steps".

**- Common Steps -**

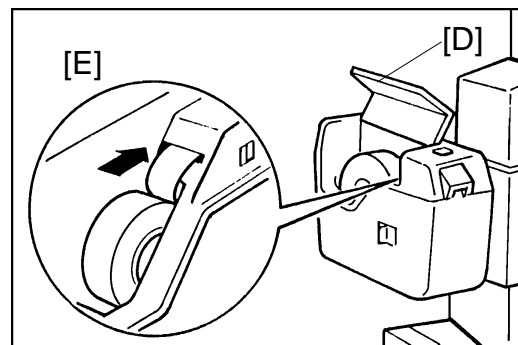
1. Remove the small cap in the rear cover of the main body [A]. Then, connect the tape marker cable [B] to the main body, and install the connector cover [C] using one of the rear cover securing screws. (For C238 and C238, this has already been done.)



C238I518.PCX

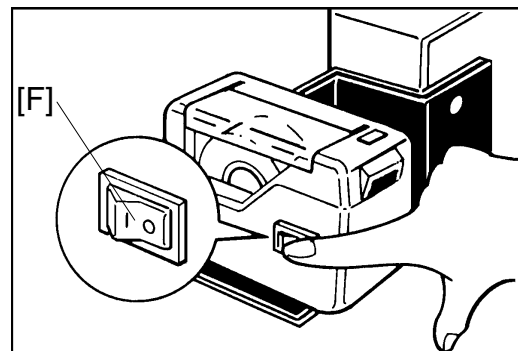
2. Open the tape marker cover [D]. Then, insert the leading edge of the tape into the tape entrance until it stops as shown in the illustration [E].

**NOTE:** Be sure that the tape is installed in the proper direction. If it is not, the tape marker will not work correctly.



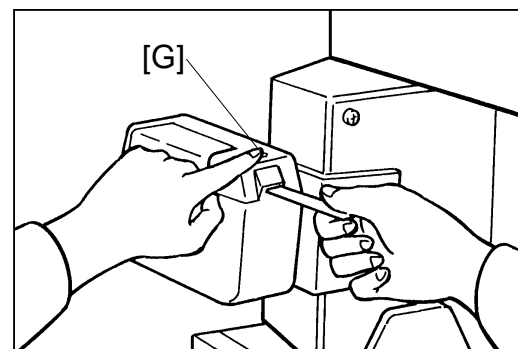
C238I519.PCX

3. Turn on the main switch of the main body and set the SP mode to activate the tape marker. (Refer to the service program table.)
4. Turn on the tape marker switch [F].



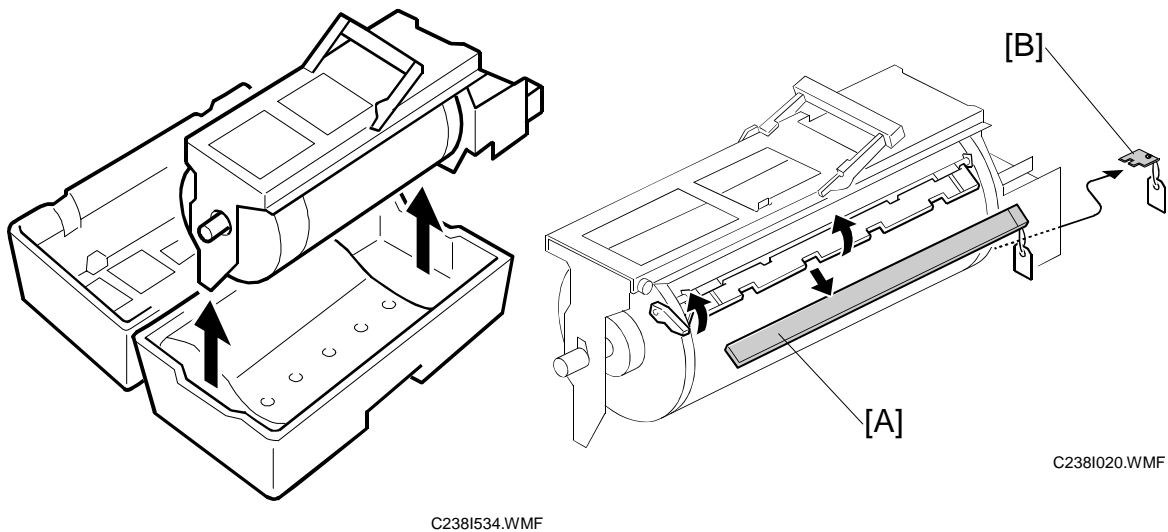
C238I520.PCX

5. Press the tape cut button [G] to cut off the leading edge of the tape.
6. Check the tape marker operation using the Memory/Class modes of the main body.



C238I521.PCX

### 1.2.5 ADDITIONAL DRUMS (OPTION)



There are two types of drum units:

A3 Size: Color drum

A4 Size: Black drum (Black ink only)

1. Remove the protective sheet [A] and the lock [B] from the drum unit.
2. Remove the tape securing the ink holder.
3. Attach a color indicator decal to the drum case. The decal must be the same color as the ink in use.
4. Remove the drum unit.
5. Leave the master wrapped around the removed drum to protect the drum from dust and from drying.
6. Keep the removed drum unit in the drum case.
7. Install the drum unit.  
**NOTE:** The color drum indicator (or A4 drum indicator) on the operation panel stays lit when a drum is mounted in the machine.
8. Remove the ink cartridge cap.
9. Insert the ink cartridge in the ink holder.



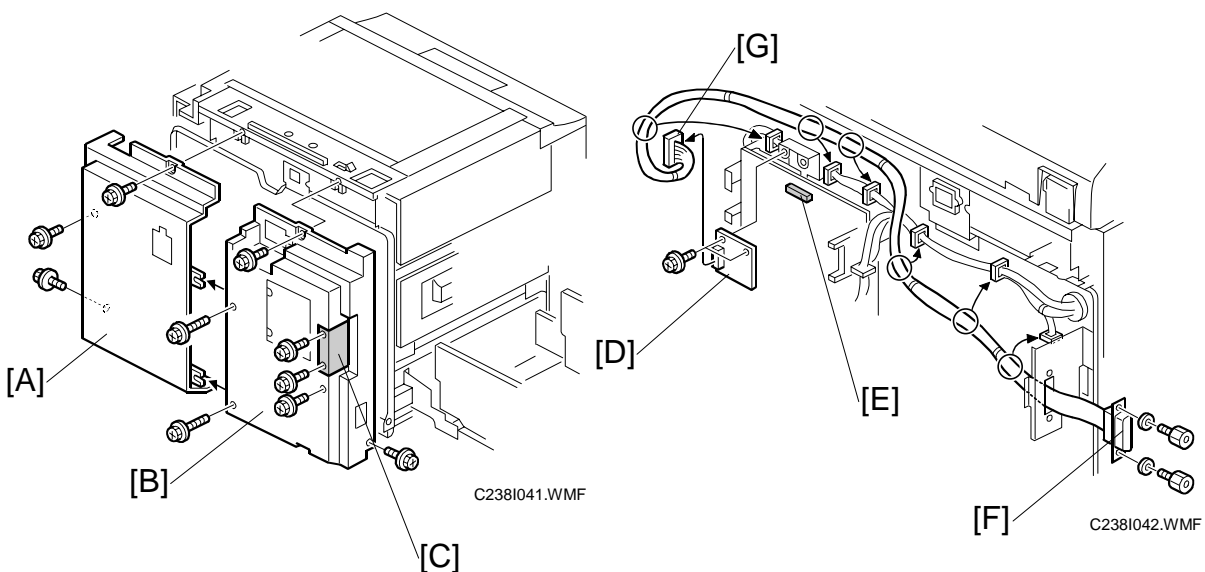
## 1.2.6 INTERFACE BOARD (OPTION)

### Accessory Check

Check the quantity and condition of the accessories in the box against the following list:

Description	Quantity
1. Interface Board .....	1
2. Interface Cable .....	1
3. Screw M3 x 6 .....	2
4. Lock Screw .....	2
5. Washer .....	2

### Installation Procedure



1. Remove the rear covers [A] [B] (8 screws).
2. Remove the I/F connector cover [C] (2 screws).
3. Install the I/F board [D] (accessories) in CN117 [E] on the MPU (2 screws).
4. Attach the cable [F] (accessories) to the connector bracket (2 screws) and clamp the cable (6 clamps).
5. Connect the connector [G] at the opposite end to the I/F board.
6. Re-install the rear covers.

## 2. PREVENTIVE MAINTENANCE

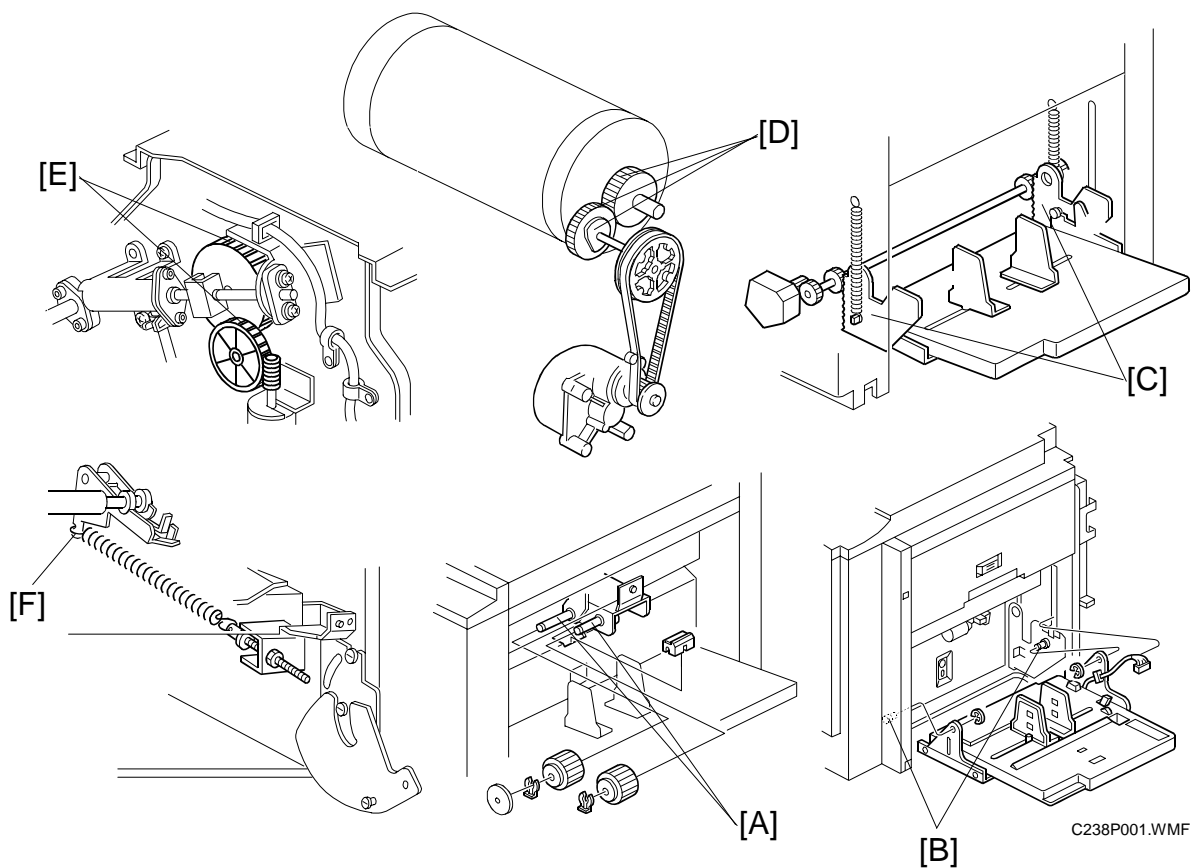
### 2.1 MAINTENANCE TABLE

The following items should be maintained periodically. There are two sets of intervals - one based on time and the other based on print count. For maintenance items with entries in both of them, use whichever comes first.

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

Interval Item	Time				Print Counter					EM	NOTE
	6M	1Y	2Y	3Y	1M	1.2M	2M	2.4M	3M		
Scanner/Optics											
Exposure Lamp	C	C	C	C							Dry Cloth
Mirror/Reflector	C	C	C	C							Soft Cloth
Scanner Guide Rail	C	C	C	C							Dry Cloth
Platen Cover / White Plate	C	C	C	C							Damp Cloth
Exposure Glass	C	C	C	C							Dry Cloth
Master Feed											
Thermal Head										C	Alcohol
Platen Roller	C	C	C	C							Damp cloth and water
Master Eject Rollers	C	C	C	C							Alcohol
Drum Master Sensor										C	Dry Cloth
Paper Feed											
Paper Pick-up Roller	C	C	R	C		R		R			Damp Cloth
Paper Feed Roller	C	C	R	C		R		R			Damp Cloth
Pick-up Roller/Feed Roller Shafts [A]		L	L	L							Motor Oil (SAE #20)
Friction Pad	C	C	R	C		R		R			Damp Cloth
Press Roller	C	C	R	C		R		R			Alcohol
Table Fulcrum Shafts [B]		L	L	L							Motor Oil (SAE #20)
Table Racks [C]		L	L	L							Grease (Alvania #2)
Paper Delivery Transport Belts			R			R		R			
Paper End Sensor	C	C	C	C							Dry Cloth
Registration/Exit Sensors	C	C	C	C							Dry Cloth
Registration Roller	C	C	C	C							Dry Cloth

Item	Interval	Time				Print Counter					EM	NOTE
		6M	1Y	2Y	3Y	1M	1.2M	2M	2.4M	3M		
Drum and Ink Supply												
Cloth Screen			R			R		R				
Ink Roller One-way Clutch									R		☛ 3.8.5	
Drum Drive Gears and Cam [D]		L	L	L							Grease (Alvania #2)	
Ink Pump Gears [E]		L	L	L							Motor Oil (SAE #20)	
In/Outside of Drum	C	C	C	C							Alcohol	
Ink Nozzle	C	C	C	C							Alcohol	
Others												
Main Drive Timing Belt Tension			A								☛ 3.8.9	
Printing Pressure Spring Hooks [F]		L	L	L							Grease (Alvania #2)	
Press Roller Release Lever Position			A									
ADF (Option)												
DF Feed Rollers	C	C	C	C							Dry Cloth	



## 3. REPLACEMENT AND ADJUSTMENT

### 3.1 GENERAL CAUTION

#### ⚠ CAUTION

Turn off the main power switch and unplug the machine before attempting any of the procedures in this section.

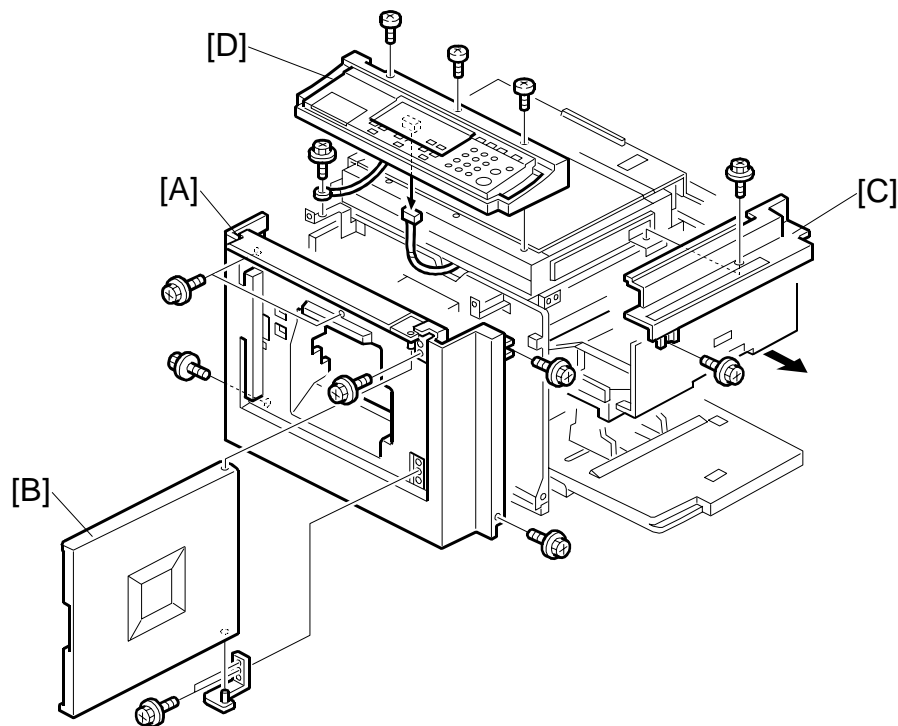
**NOTE:** This manual uses several symbols. The meaning of those symbols are as follows:

☛ : See or Refer to    🔩 : screw    📡 : connector    Ⓢ : E-ring    📌 : Clip

Replacement  
Adjustment

### 3.2 COVERS / BOARDS

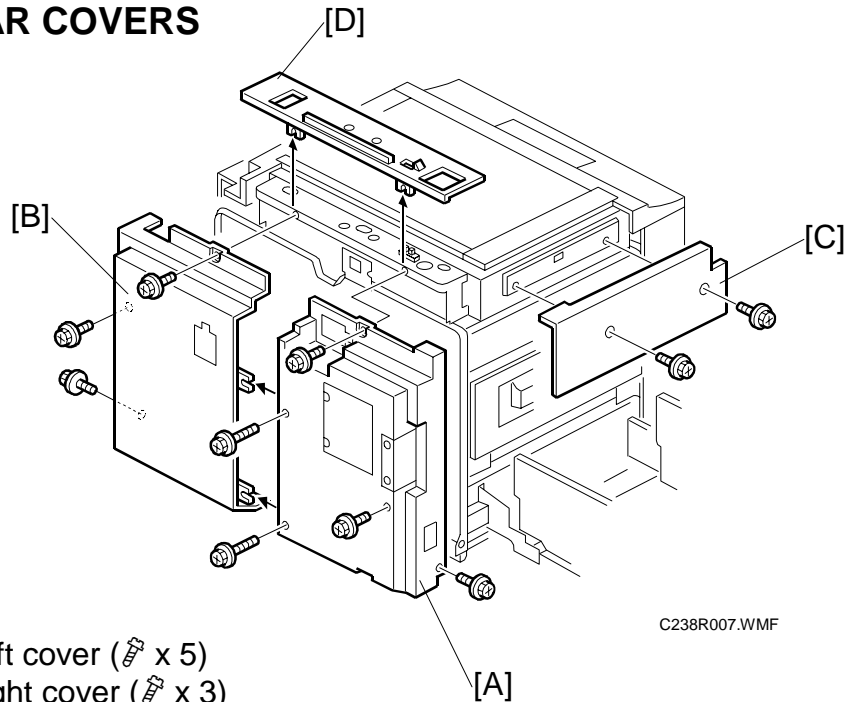
#### 3.2.1 FRONT COVER / PANEL



C238R006.WMF

- [A]: Front cover (🔩 x 6)
- [B]: Front door (🔩 x 4)
- [C]: Upper right cover (🔩 x 2)
- [D]: Operation panel (🔩 x 4, 📡 x 1)

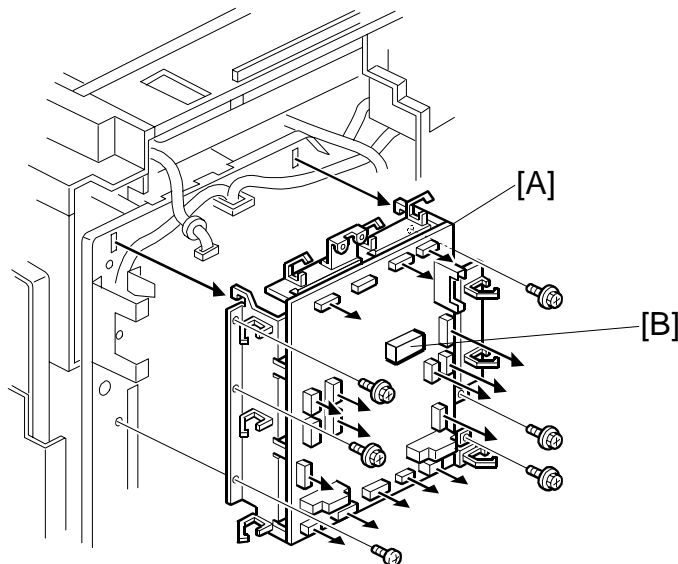
### 3.2.2 REAR COVERS



C238R007.WMF

- [A]: Rear left cover (⚙ x 5)
- [B]: Rear right cover (⚙ x 3)
- [C]: Upper left cover (⚙ x 2)
- [D]: Rear upper cover

### 3.2.3 MPU

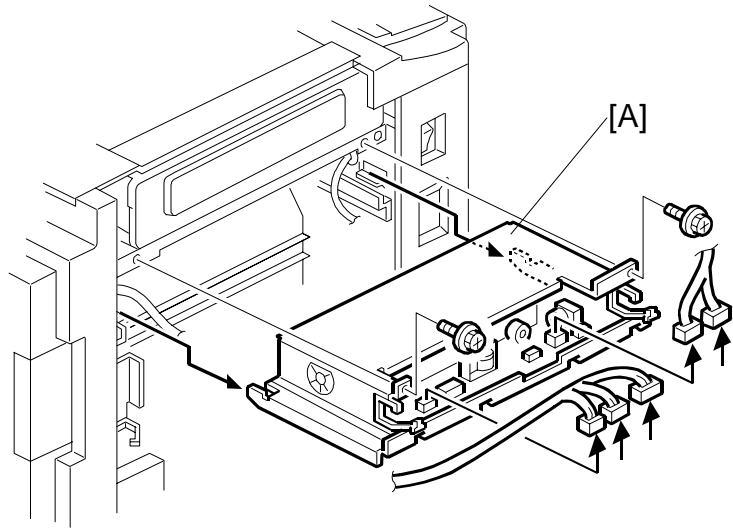


C238R008.WMF

- Rear left cover, Rear right cover (☛ 3.2.2)
- [A]: MPU (⚙ x 17, ⚙ x 6, 9 clamps)

**CAUTION:** Move the RAM [B] from the old board to the new one, so that the SP mode settings will be transferred to the new board. Adjust the master end sensor (☛ 3.5.4) after installing the new MPU.

### 3.2.4 PSU



C238R009.WMF

- Upper left cover (☛ 3.2.2)
  - Master eject unit (☛ 3.4.1)
- [A]: PSU (☛ x 5, ☛ x 2, 2 clamps)

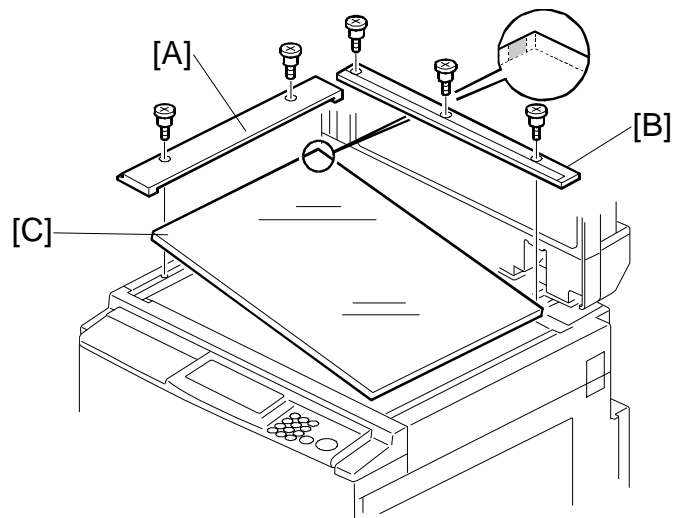
**CAUTION:** When the PSU is replaced, the thermal head voltage returns to the default. Adjust the thermal head voltage (☛ 3.5.3) after installing the new board.

Replacement  
Adjustment

### 3.3 SCANNER

#### 3.3.1 EXPOSURE GLASS / SCALES

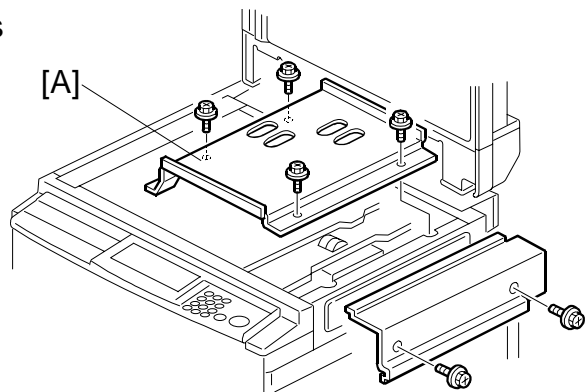
- [A]: Left scale (⚙ x 2)  
 [B]: Upper scale (⚙ x 3)  
 [C]: Exposure glass



C238R038.WMF

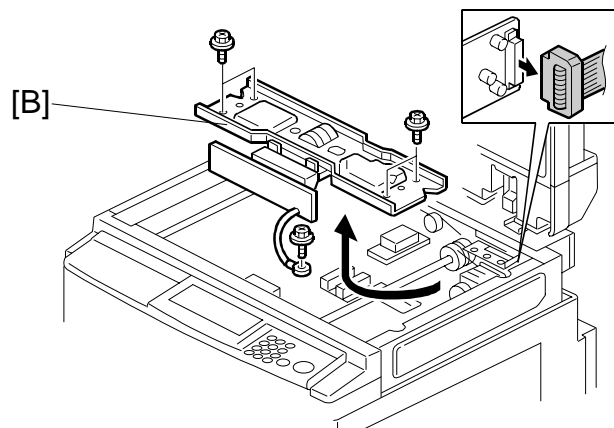
#### 3.3.2 SBU AND LAMP STABILIZER / SCANNER MOTOR

- Left scale, Upper scale, Exposure glass  
 (☛ 3.3.1)
  - Upper right cover (☛ 3.2.1)
- [A]: SBU cover (⚙ x 4)



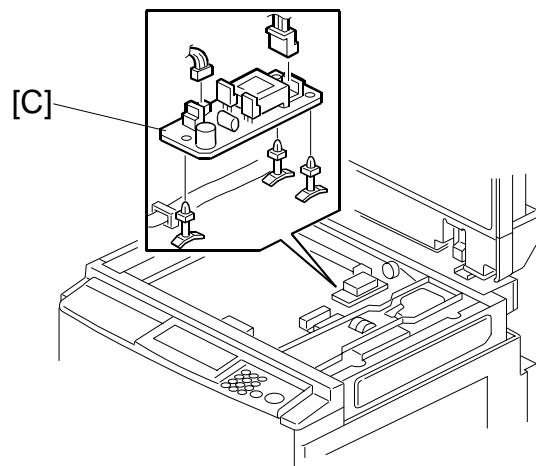
C238R039.WMF

- [B]: SBU (⚙ x 1, ⚙ x 5)



C238R040.WMF

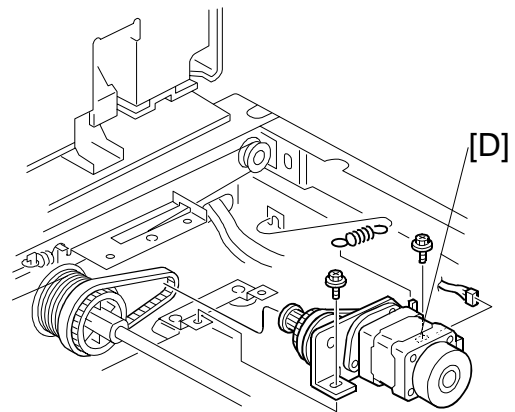
[C]: Lamp stabilizer (⌘ x 2, ⌘ x 5)



C238R041.WMF

 Replacement  
Adjustment

[D]: Scanner motor (⌘ x 2, 1 spring)



C238R042.WMF

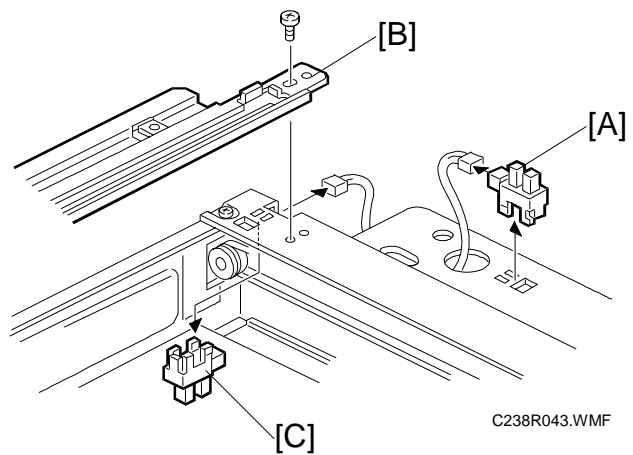
### 3.3.3 SCANNER H.P. SENSOR / PLATEN COVER SENSOR

- Left scale, Upper scale, Exposure glass (☛ 3.3.1)
- Operation panel (☛ 3.2.1)
- Rear upper cover (☛ 3.2.2)

[A]: Platen cover sensor (⌘ x 1)

[B]: Left stay (⌘ x 1)

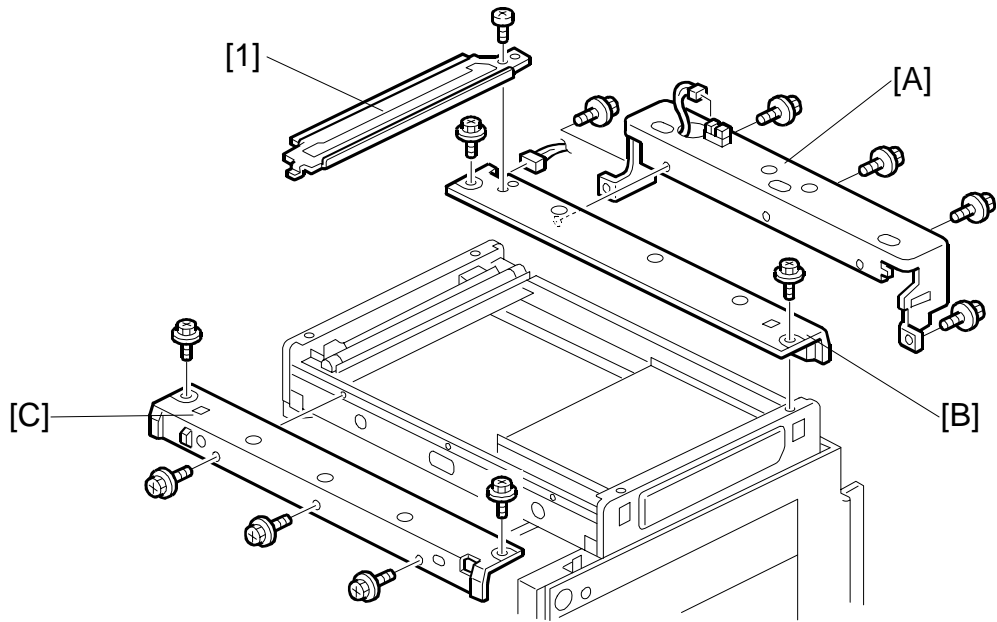
[C]: Scanner H.P. sensor (⌘ x 1)



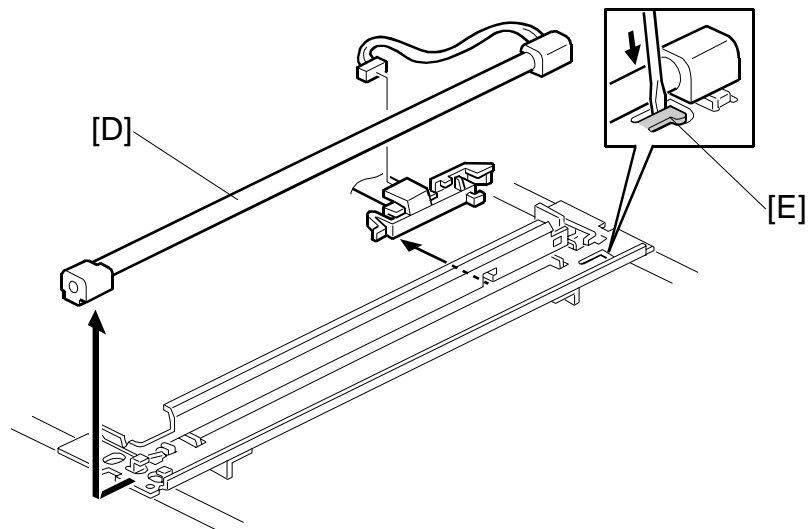
C238R043.WMF



### 3.3.4 EXPOSURE LAMP (XENON LAMP)



- Move the first scanner next to the opening in the frame.
- Exposure glass (☛ 3.3.1)
- [1]: Left stay (☛ 3.3.3)
- [A]: Platen base (☛ x 1, ⚙ x 5)
- [B]: Rear frame (☛ x 1, ⚙ x 2)
- [C]: Front frame (⚙ x 5)

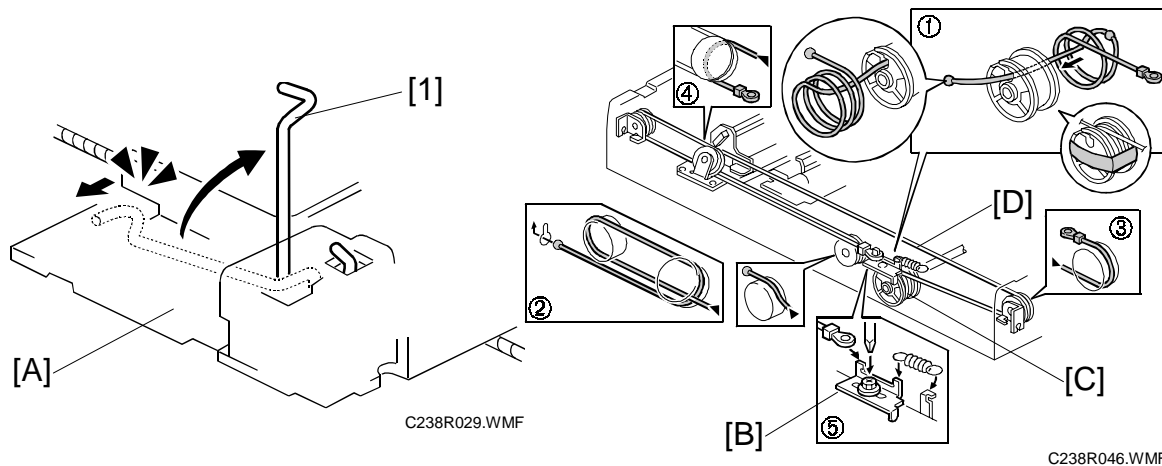


- [D]: Exposure lamp (☛ x 1)

**NOTE:** After installing the lamp, press the lamp holder [E] up to the original position so that it can hold the lamp properly.

### 3.3.5 SCANNER WIRES

- Move the first scanner next to the opening in the frame.
- Exposure glass (☛ 3.3.1)
- SBU cover (☛ 3.3.2)
- Left stay (☛ 3.3.3)
- Rear and front frames (☛ 3.3.4)



1. First scanner ([1]: 2 pins)

**NOTE:** The drawings show only the front side. Repeat to remove components on the other side.

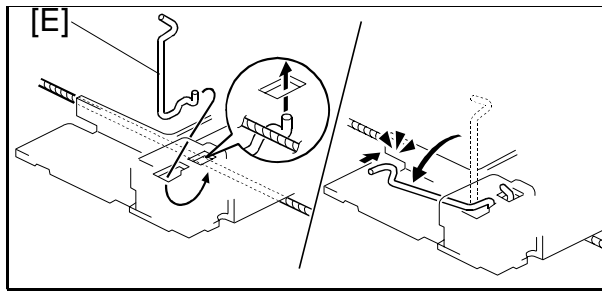
[A]: Wire tension brackets (2 springs, 1 x 2)

[B]: Scanner drive pulleys (2 Allen screws)

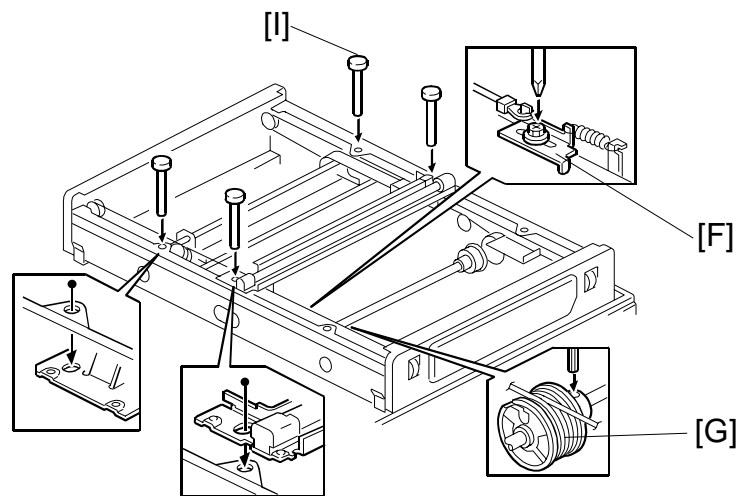
[C]: Scanner wires

### Installation

1. Wrap the new scanner wire around the pulley as shown ①, then temporarily secure the pulley with tape.
2. Re-install the first scanner. Then secure the first and second scanner with the scanner positioning pins (P/N A0069104), as shown in the illustration on the next page.
3. Wind the new scanner wire around the scanner drive pulley in the correct way, as shown.
4. Wind the end of the new wire with the ball as shown (②).
5. Wind the end of the new wire with the ring as shown (③, ④, and ⑤).
6. Connect the tension spring to the wire tension bracket (⑤).
7. Wind the new scanner wire for the other side as well.



C238R047.WMF



C238R048.WMF

8. Secure the first scanner with the pins [E].
9. Tighten the screw securing the tension bracket [F].
10. Secure the scanner drive pulley [G] (1 Allen screw).
11. Remove the scanner positioning pins [I] (P/N: #A0069104).
12. Slide the scanner to the left and right several times, then set the scanner positioning pins to check the clamp position and wire tension bracket position again.

### 3.3.6 IMAGE ADJUSTMENT

Purpose: To adjust the image position on prints by changing the SP settings.

Adjust the following in the order given below.

SP6-10: Master writing speed (☛ 5.7.3)



SP6-21: Paper registration position (☛ 5.7.3)



SP6-05: Scanning speed - platen (☛ 5.7.3)

SP6-06: Scanning speed - ADF



SP6-03: Scanning start position - platen (☛ 5.7.3)

SP6-04: Scanning start position - ADF



SP6-01: Main scan position - platen (☛ 5.7.3)

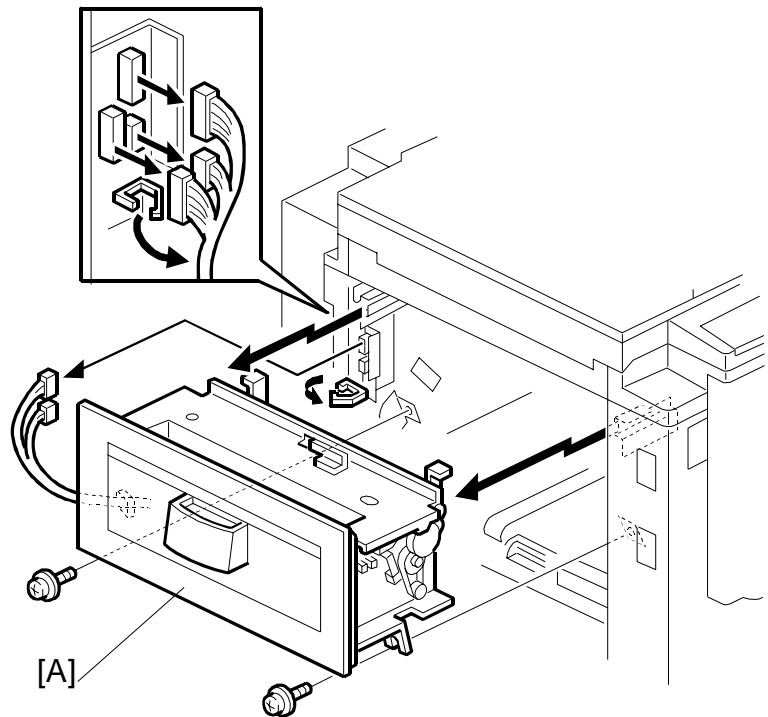
SP6-02: Main scan position - ADF





SP6-31: SBU calibration (☛ 5.7.4)

## 3.4 MASTER EJECT

### 3.4.1 MASTER EJECT UNIT

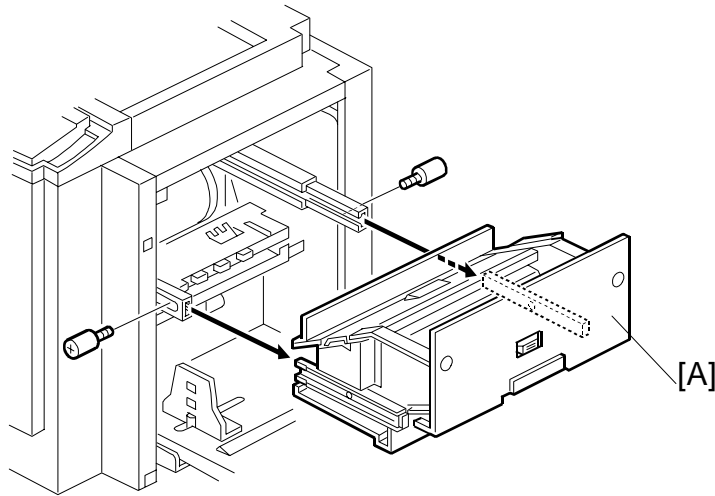


C238R025.WMF

[A]: Master eject unit (  x 3,  x 2, 1 clamp)

## 3.5 MASTER FEED

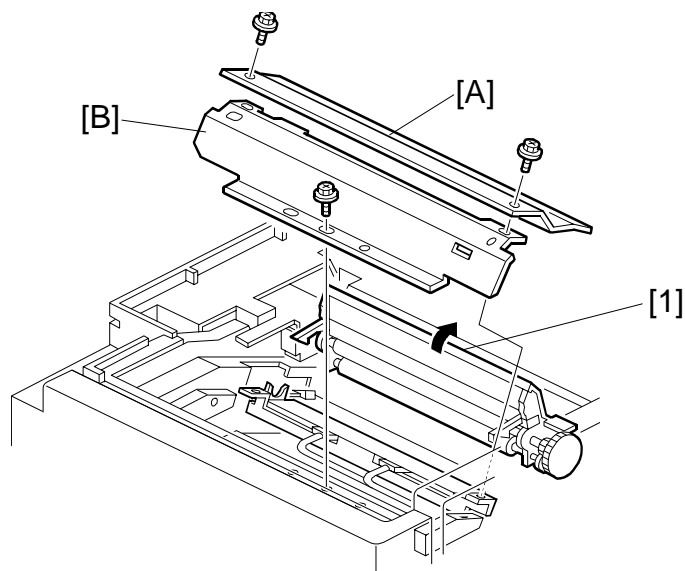
### 3.5.1 MASTER MAKING UNIT



C238R010.WMF

[A]: Master making unit (🔩 x 2)

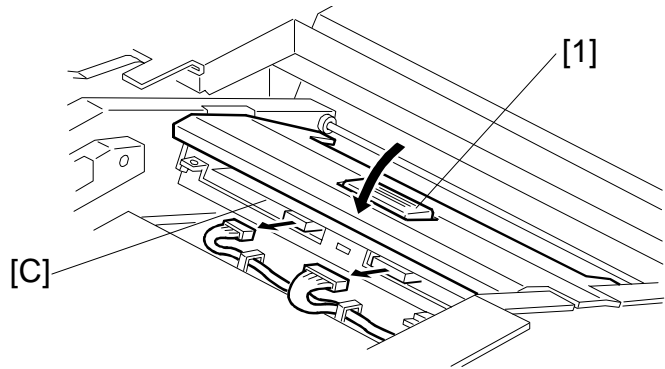
### 3.5.2 THERMAL HEAD



C238R049.WMF

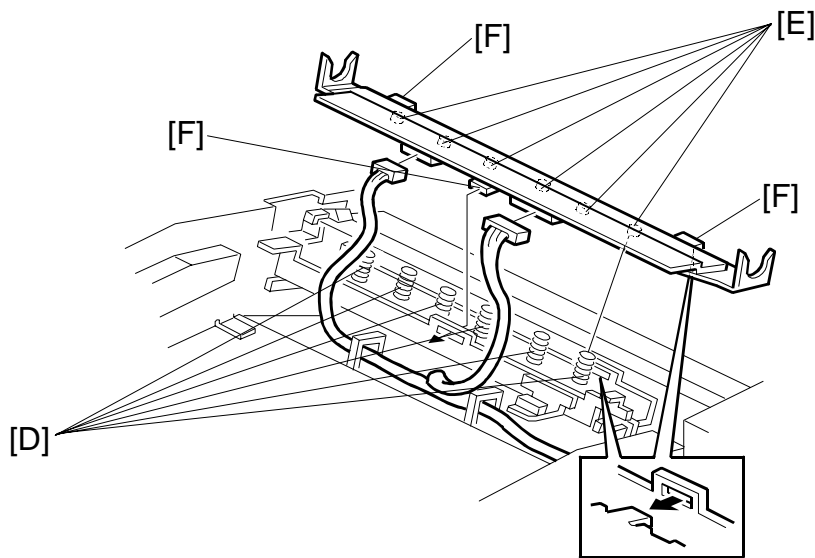
- Master making unit (👉 3.5.1)
- Open the platen roller unit [1].
- [A]: T/H upper cover (🔩 x 2)
- [B]: T/H side cover (🔩 x 1)

- Close the platen roller unit [1].
- [C]: Thermal head (☞ x 2)



C238R050.WMF

### Installation



C238R030.WMF

If the following remarks are not followed, the thermal head will be installed incorrectly.

- 1) Fit the base's springs [D] over the protrusions [E] on the underside of the thermal head (6 points).
- 2) While fitting the tops of the springs [D] over the protrusions on the underside of the thermal head, hook the lock pawls [F] of the thermal head onto the base (3 lock pawls). Make sure to set the front side (the paper table side) first.
- 3) Make sure that all protrusions are properly fitted into the springs.

**CAUTION:** Adjust the thermal head voltage (☞ 3.5.3) after installing the new thermal head.

### 3.5.3 THERMAL HEAD VOLTAGE ADJUSTMENT

#### ⚠ CAUTION

This adjustment is always required when the thermal head or PSU has been replaced.

Purpose: To maintain master making quality and extend the lifetime of the thermal head.

Standard: Refer to the voltage value (X) printed on the thermal head. The value varies from one thermal head to another.

The adjustment voltage should be between X and X - 0.1 V.

Replacement  
Adjustment

Tools: Circuit tester

- Upper left cover (☞ 3.2.2)
- Read the voltage value on the decal on the thermal head.

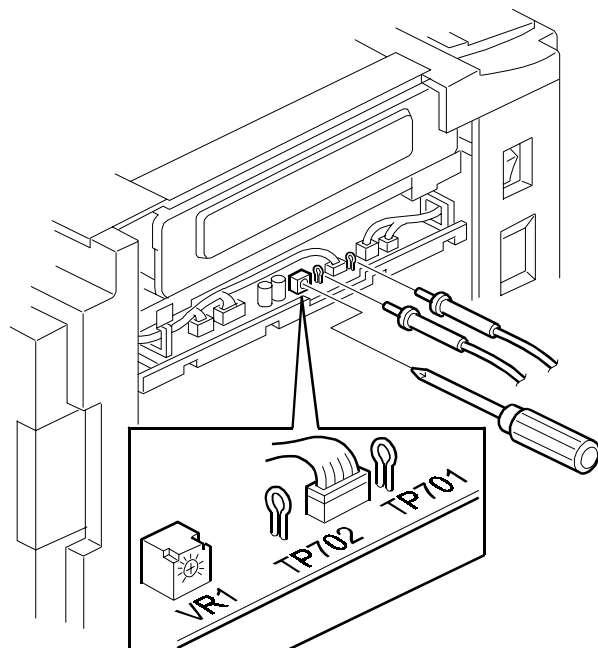
1. Slide out the master making unit.

**CAUTION:** Never turn VR1 clockwise rapidly while the master making unit is connected. The T/H will be damaged if too much voltage is supplied suddenly.

2. Connect the positive terminal of a circuit tester to TP701 and the negative terminal to TP702 .

**CAUTION:** If the output and ground terminals touch each other, the board will be damaged.

3. Connect the power plug, and turn on the main switch to access SP mode.
4. Select SP5-12 (Thermal head signal output).
5. Press the Start key. Power is continuously supplied to the thermal head, so press the Stop key if you cannot finish the adjustment quickly. A beeper sounds while the power is being supplied.
6. Measure the voltage, and turn VR1 so that the value becomes between "+0" and "-0.1" volts from the value on the thermal head decal.



C238R012.WMF

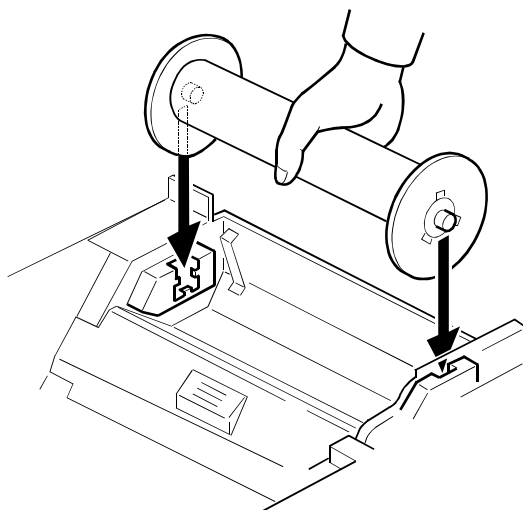


### 3.5.4 MASTER END SENSOR ADJUSTMENT

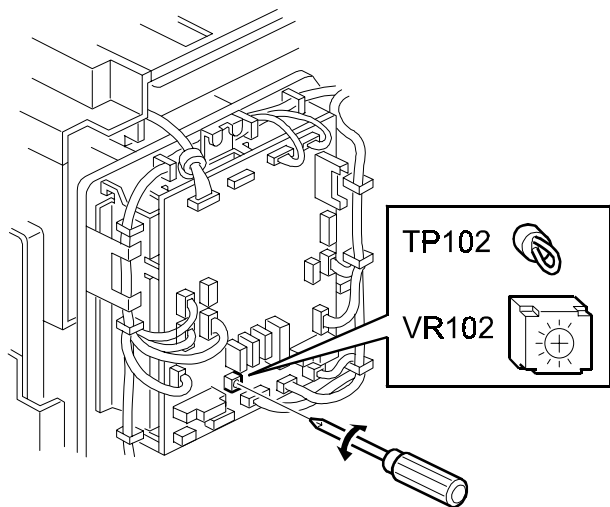
**Purpose:** To ensure that the sensor detects the end mark (a solid black area) on the master roll.

**Standard:** 1.6 volts (within “+0.1” and “-0” volts)

**Tools:** Circuit tester, the core of a used master roll (the core has no master)



C238R021.WMF



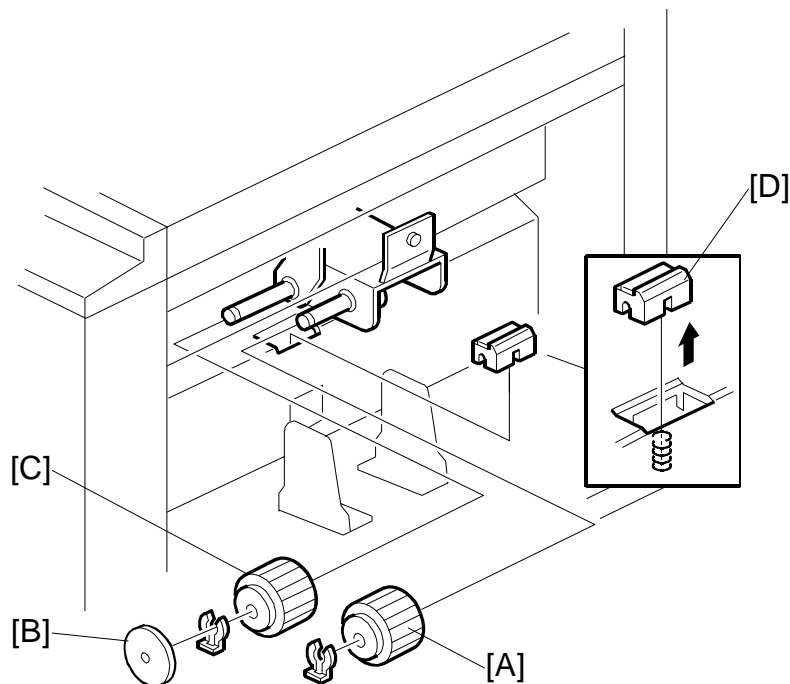
C238R011.WMF

- Rear covers (➡ 3.2.2)

1. Connect the terminals of a circuit tester to TP102 and to a grounded place (e.g. iron base).
2. Place the core of the used master roll inside the master making unit, and close the master making unit.
3. Connect the power plug, and turn on the main switch.
4. Measure the voltage, and turn VR102 so that the value becomes between “-0” and “+0.1” volts from the standard value (1.6 volts).

## 3.6 PAPER FEED

### 3.6.1 PICK-UP ROLLER / PAPER FEED ROLLER / FRICTION PAD



C238R024.WMF

- Lower the paper table.

[A]: Pick-up roller (☺ x 1)

[B]: Paper guide

[C]: Feed roller (☺ x 1)

[D]: Friction pad

Replacement  
Adjustment

### 3.6.2 PAPER SEPARATION PRESSURE ADJUSTMENT

Purpose: To ensure that the friction pad exerts sufficient pressure for smooth printing paper separation.

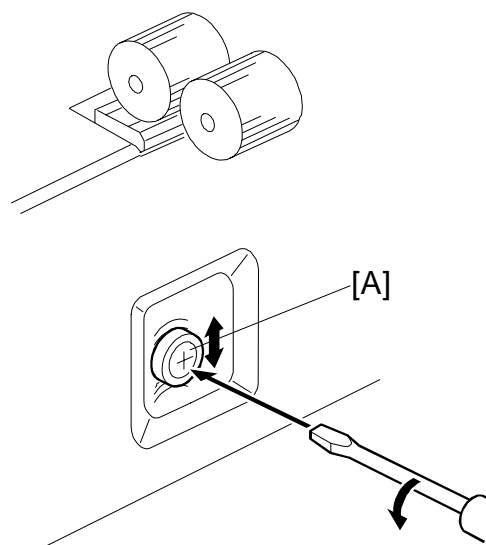
Default: The next position to the top.

Adjust the paper separation pressure by loosening and moving the adjusting screw [A] up or down.

Moving up the screw ⇒ Increases the paper separation pressure

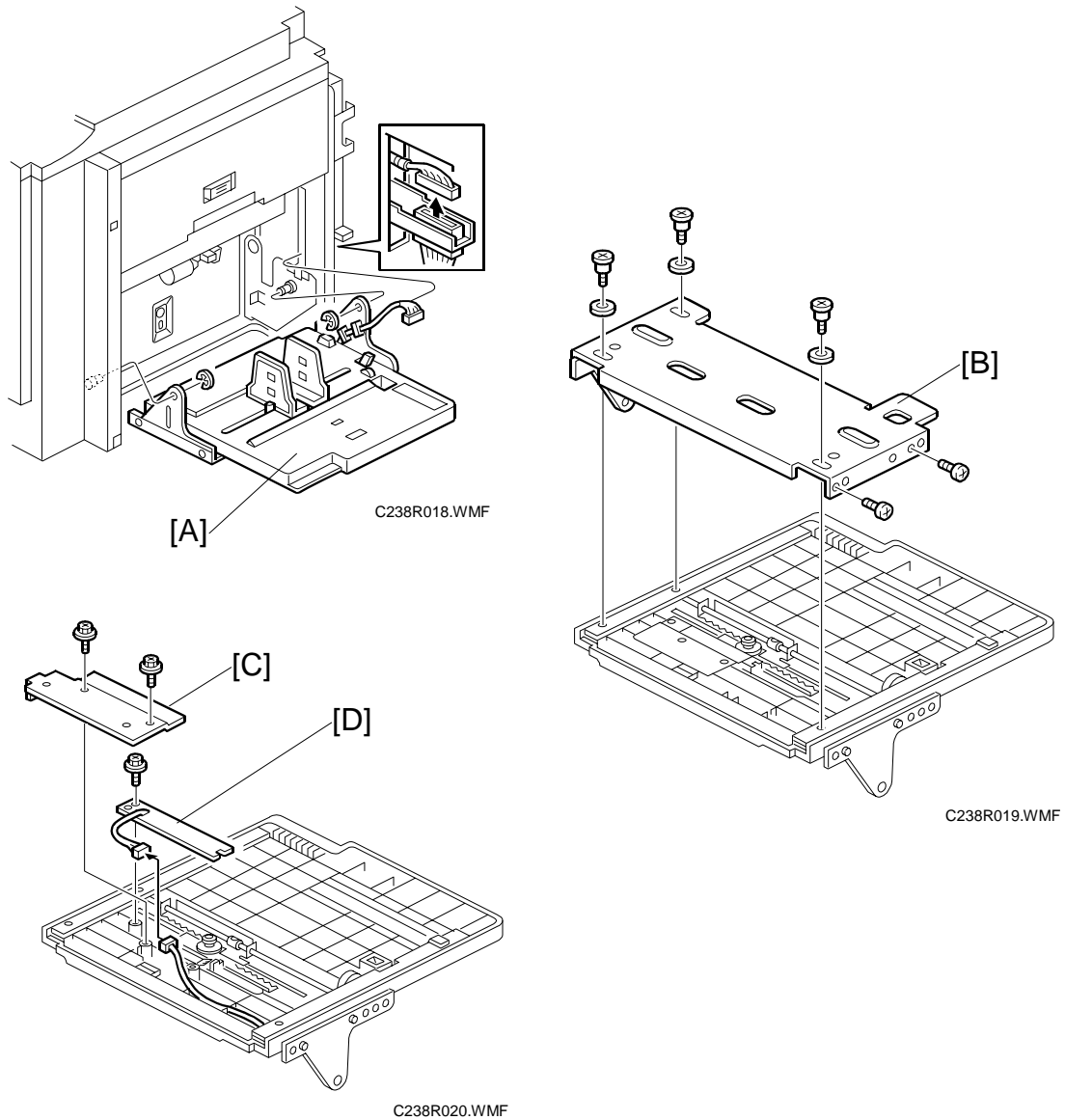
Moving down the screw ⇒ Decreases the paper separation pressure

Tighten the screw after the adjustment.



C238R031.WMF

### 3.6.3 PAPER WIDTH DETECTION BOARD



- Lower the paper table.

[A]: Paper table (⌘ x 1, Ⓢ x 2)

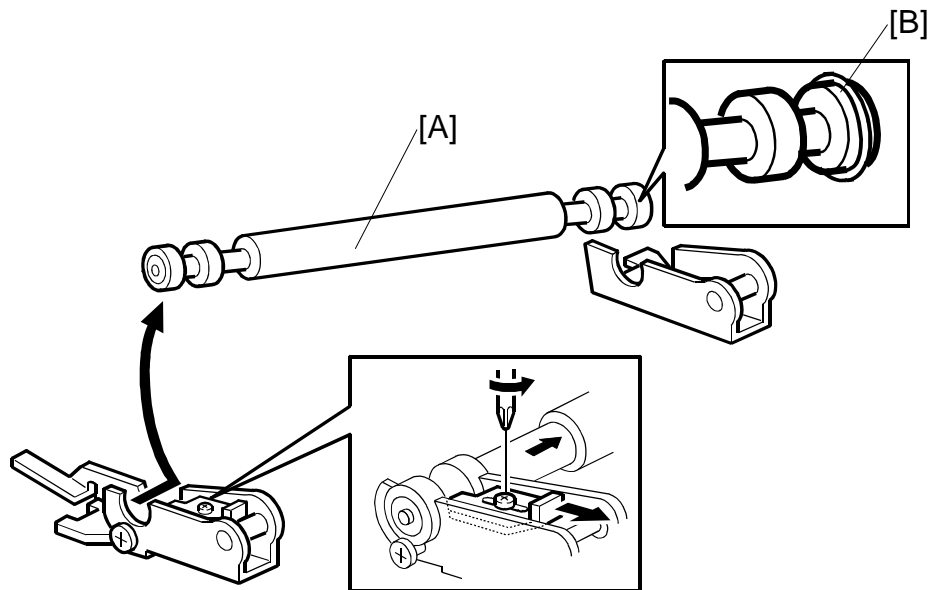
[B]: Table cover (⌘ x 5, 3 washers)

[C]: Sensor cover (⌘ x 2)

[D]: Paper width detection board (⌘ x 1, ⌘ x 1)

## 3.7 PRINTING

### 3.7.1 PRESS ROLLER



C238R037.WMF

Replacement  
Adjustment

#### **⚠ CAUTION**

**Take care to avoid possible injury. If the printing pressure release arms disengage, the press roller will be pulled upwards suddenly.**

- Remove the drum.
- [A]: Press roller (🔧 x 1)

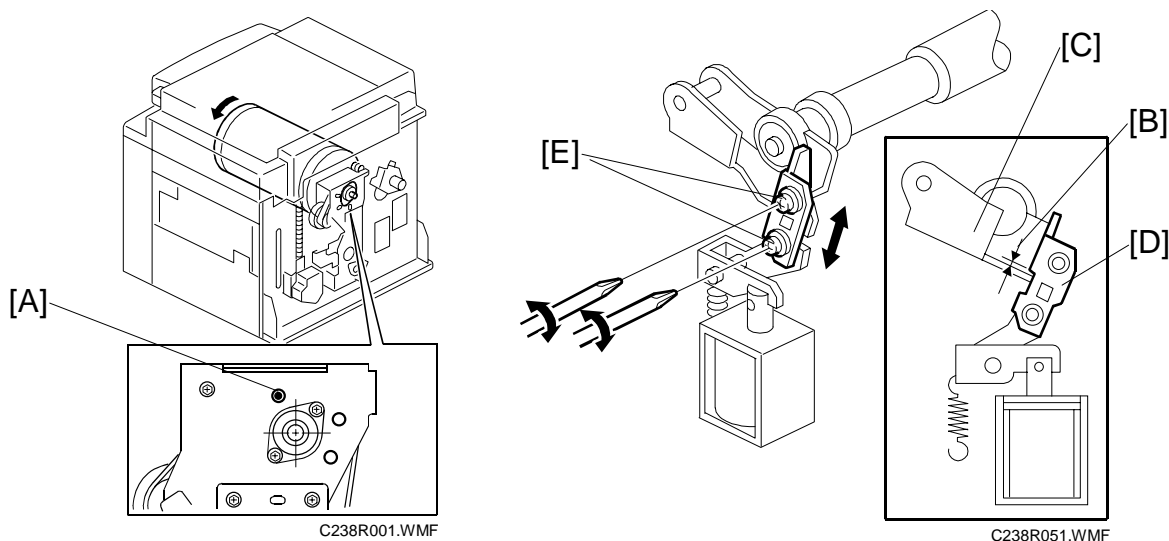
The bearings on the rear and front differ. During installation, ensure that the bearing with the stopper [B] is positioned towards the rear of the machine.

### 3.7.2 PRESS ROLLER RELEASE LEVER ADJUSTMENT

**Purpose:** To maintain the correct clearance between the press roller arms and press roller lock levers. This ensures that the press roller is correctly released and pressed against the drum when the press roller release solenoid is energized.

**Standard:** 0.7 to 1.2 mm

**Tools:** A thickness gauge

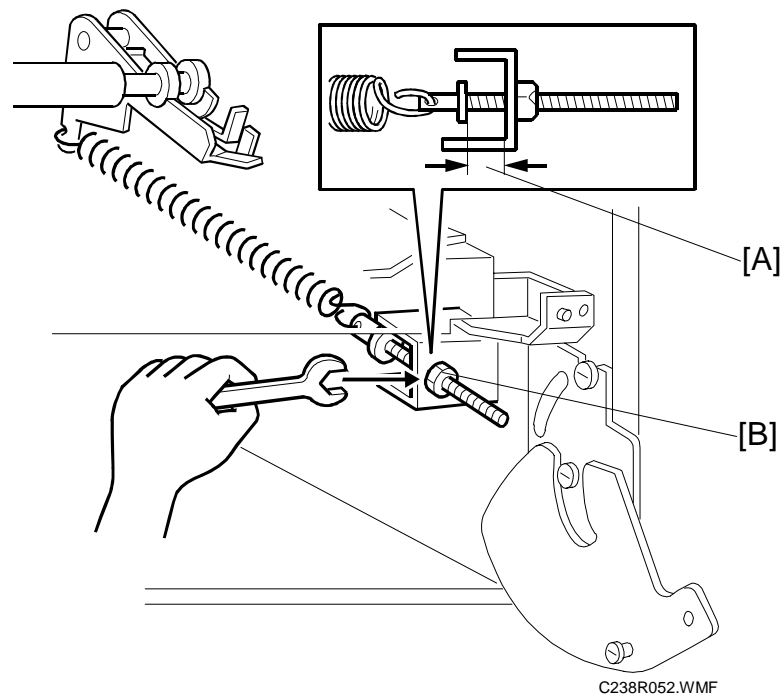


- Front cover (➡ 3.2.1)
  - Rear covers (➡ 3.2.2)
1. Turn the drum manually until the drum master clamber on the drum moves into the lowest position. (This is when the high points of the cams on the drum flanges meet with the cam followers on both ends of the press roller.)
    - To find out the correct position of the drum for the adjustment, look at the rear end of the drum shaft. The recess on the drum drive gear meets the hole [A] in the bracket when the drum is in the correct position.
  2. Using a thickness gauge, measure the clearance [B] between the press roller arm [C] and the press roller lock lever [D] (rear side). It should be between 0.7 and 1.2 mm.
  3. If it is not correct, adjust the position of the press roller lock lever after loosening the two screws [E].
  4. Repeat steps 2 and 3 for the front side.

### 3.7.3 PRINTING PRESSURE ADJUSTMENT

Purpose: To make better print results without decreasing the run length.

Standard: Within  $10 \pm 0.2$  mm



Replacement  
Adjustment

- Paper delivery unit (☛ 3.9.1)

1. Adjust the distance [A] to  $10 \pm 0.2$  mm by turning the adjusting bolt [B].
2. Repeat the same procedure for the printing pressure spring at the non-operation side.

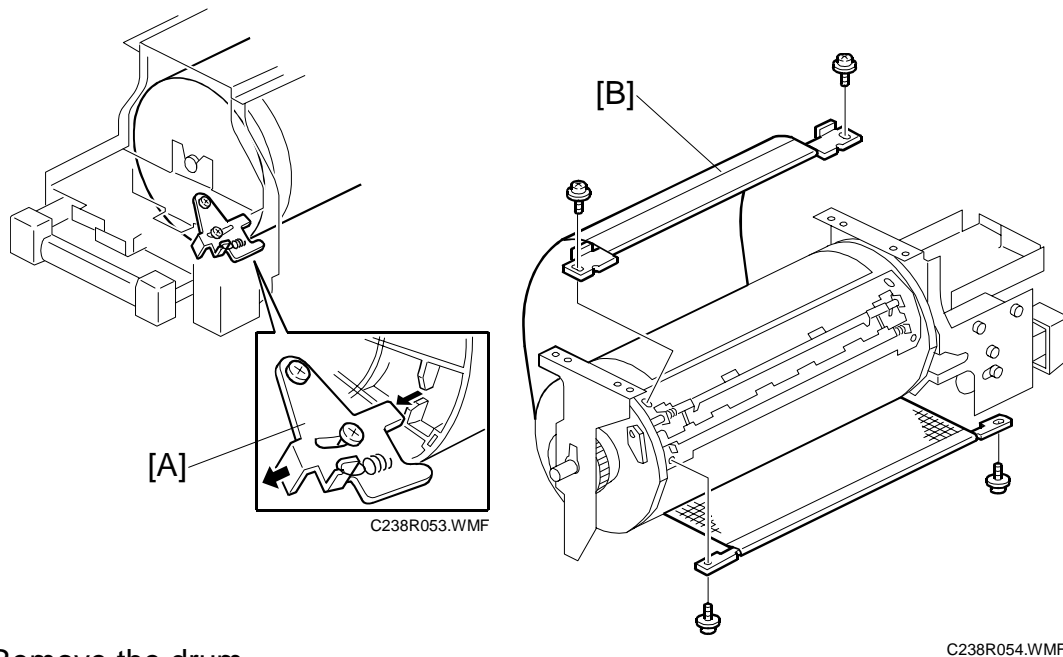
## 3.8 DRUM

### 3.8.1 PREPARATION

Before attempting any of the procedures in this section, wipe off the ink around the ink roller. To do this, set SP2-10 (ink detection) to OFF, and feed paper until ink ends.

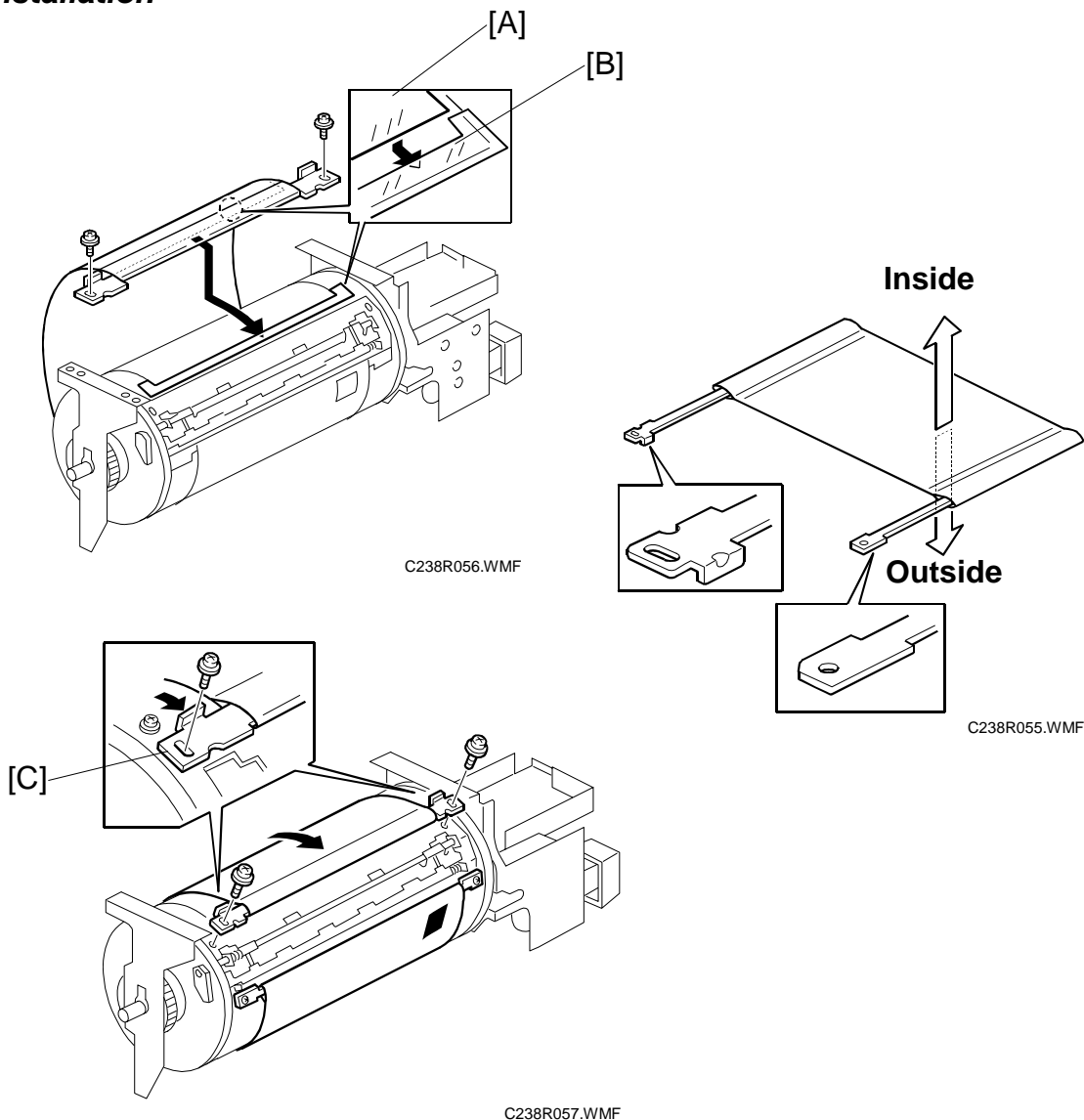
After finishing the required procedures in this section, do not forget to return SP2-10 to the default (ink detection on).

### 3.8.2 CLOTH SCREEN



- Remove the drum

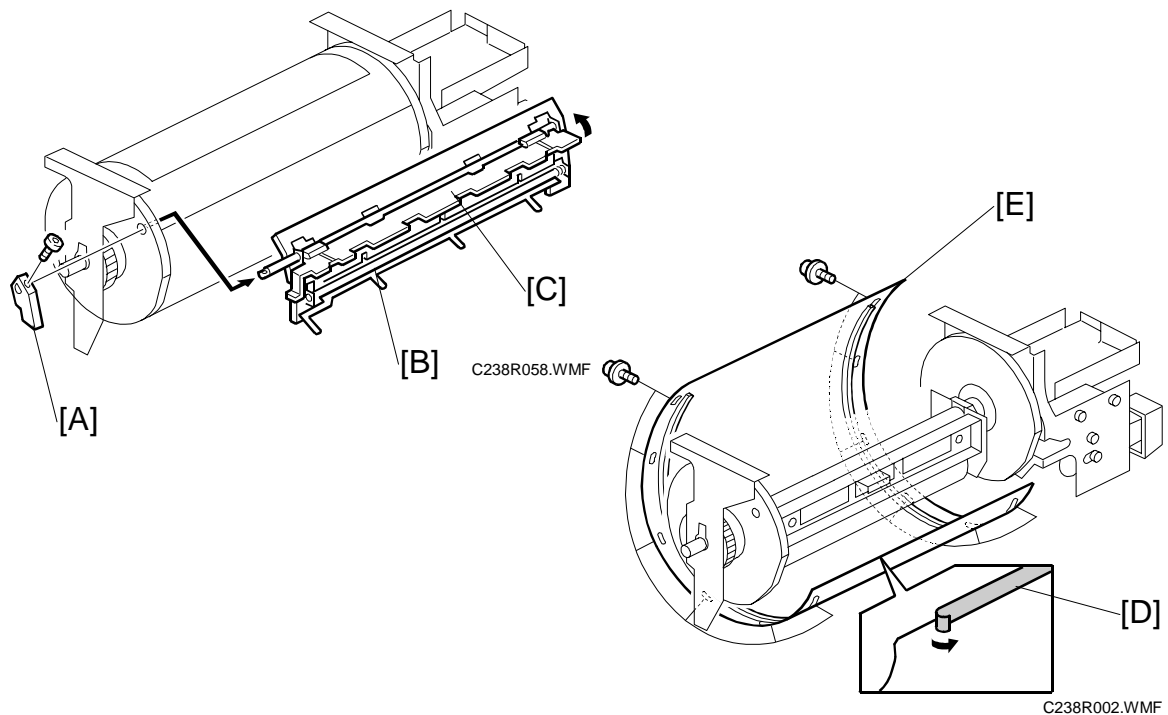
1. Remove the drum upper bracket (⌘ x 4).
2. Release the stopper [A], then rotate the drum until the master clamber faces top.
3. Remove the cloth screen [B] (⌘ x 4).

**Installation**

- Do not scratch the cloth screen or metal screen.
- Properly insert the edge of the mylar [A] on the cloth screen under the mylar [B] on the metal screen, as shown above.  
Otherwise, ink will leak from the trailing edge of the master on the drum during a long printing run.
- Make sure that the correct side of the screen is facing up. In addition, make sure that the stays for securing the cloth screen are positioned correctly. (Refer to the upper right illustration.)
- When replacing the cloth screen, spread the screen around the metal screen while strongly pulling the stay [C]. Adjust the stay so that it is parallel to the master clamber, then tighten the screws.
- Make sure that the cloth screen is not wrinkled while spreading it around the drum.



### 3.8.3 CLAMPER / METAL SCREEN



- Remove the drum
- Cloth screen (☞ 3.8.2)

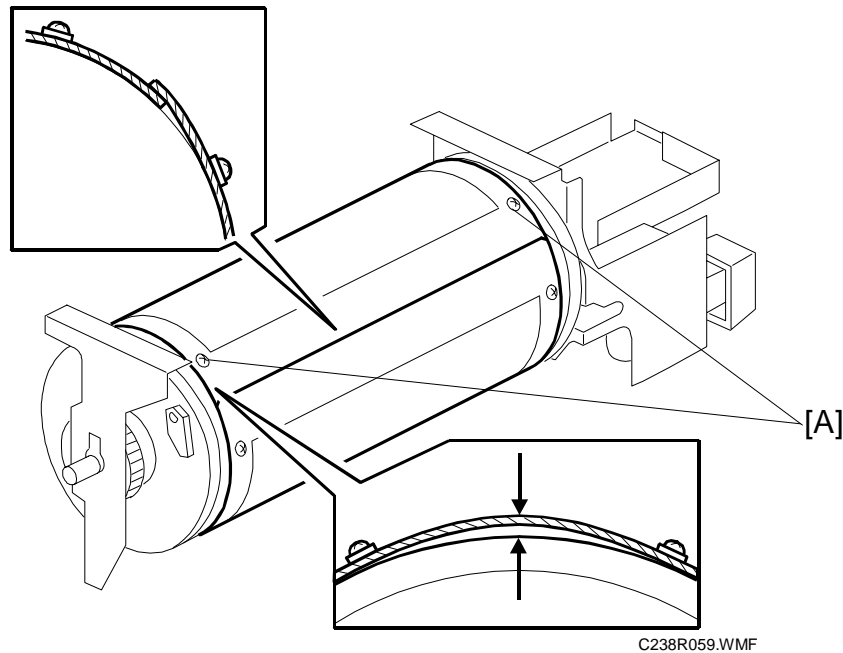
[A]: Clamper lever (1 hexagon screw)

[B]: Clamper - open the clamping plate [C], then remove the clamper.

- NOTE:** 1) Do not allow ink to get on the inside of the clamping plate [C]. If it is dirty with ink, the master may slip off and the image position on the prints will move toward the trailing edge of the prints during a printing run.
- 2) Use a cloth dampened with water to clean the inside of the clamping plate [C]. Never use alcohol or other solvents. The clamping force of the magnet will be weakened.

[D]: Tape (do not lose it)

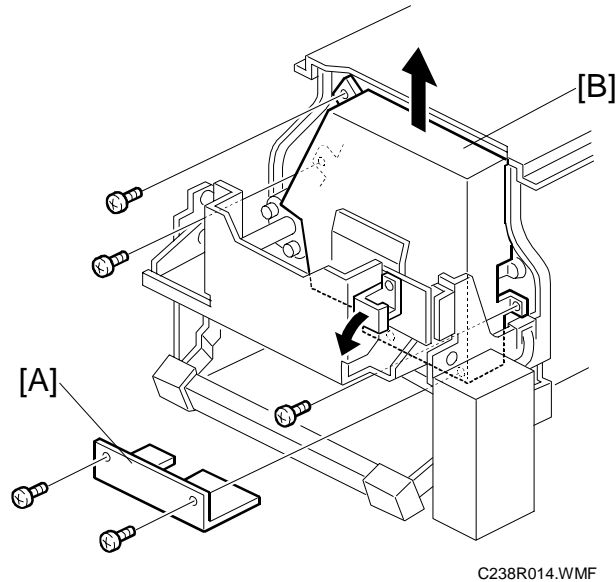
[E]: Metal screen (☞ x 12)

**Installation****Replacement  
Adjustment**

- Make sure that the correct end of the metal screen is overlapping. (The right side overlaps, as viewed from the non-operation side, as shown above.)
- The 4 screws holding the drum master clamper are longer than the 12 screws holding the metal screen, although they are similar in appearance. Be careful not to mix them up or use the wrong screws.
- When installing the metal screen, secure the trailing edge first with the 2 screws. Then, tighten the other screws while removing the slack from the screen. Make sure that the gap between the drum flanges and the screen is 0.3 mm or less, as shown above. (The two holes [A] on the trailing side are round holes and the other holes are long holes, to allow for the removal of the slack.)
- Do not scratch the cloth screen or metal screen.

### 3.8.4 INK PUMP ADJUSTMENT

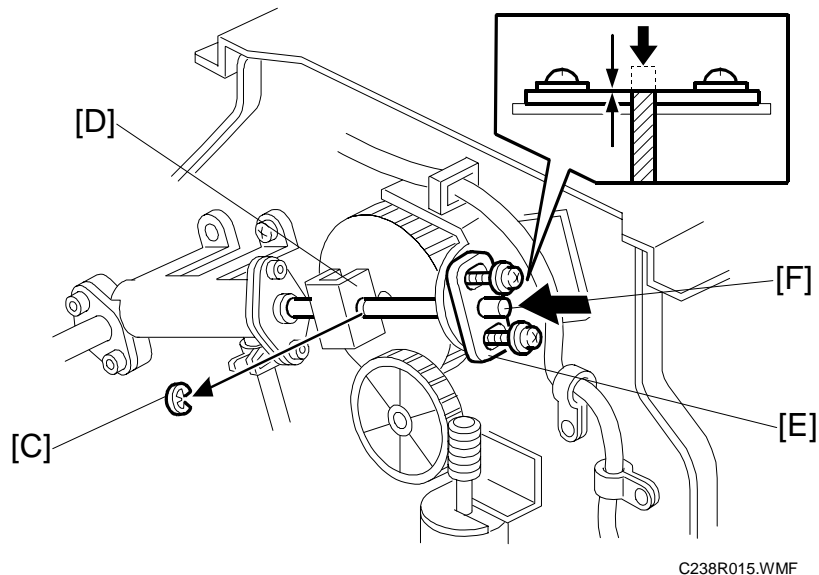
Purpose: To ensure the smooth operation of the ink pump plunger by properly positioning its holder.



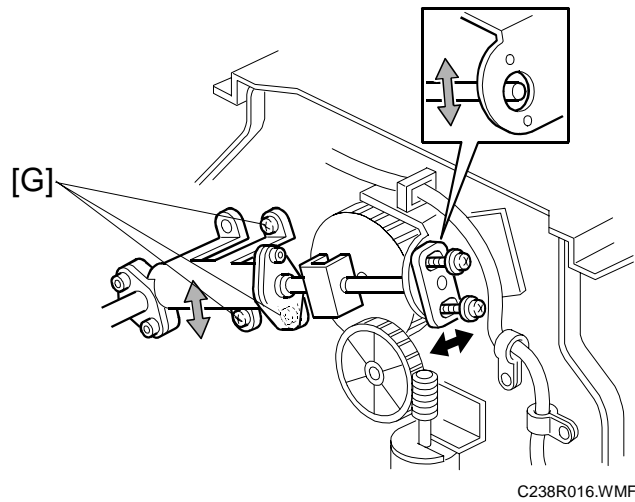
- Remove the drum

[A]: Lower pump cover (⌘ x 2)

[B]: Upper pump cover (⌘ x 3)

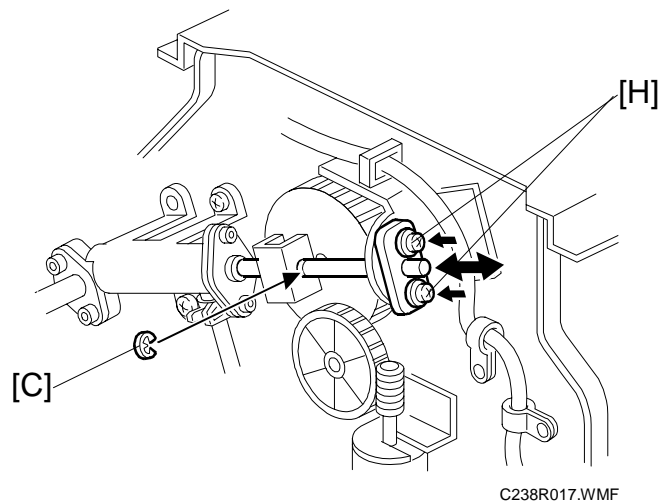


1. Remove the E-ring [C] to free the plunger from the pump drive slider [D].
2. Loosen the two screws securing the holder [E]. (Do not remove the holder.)
3. Push the plunger [F] until it reaches the bottom.  
**NOTE:** The end of the plunger [F] must not stick out from the holder [E].



Replacement  
Adjustment

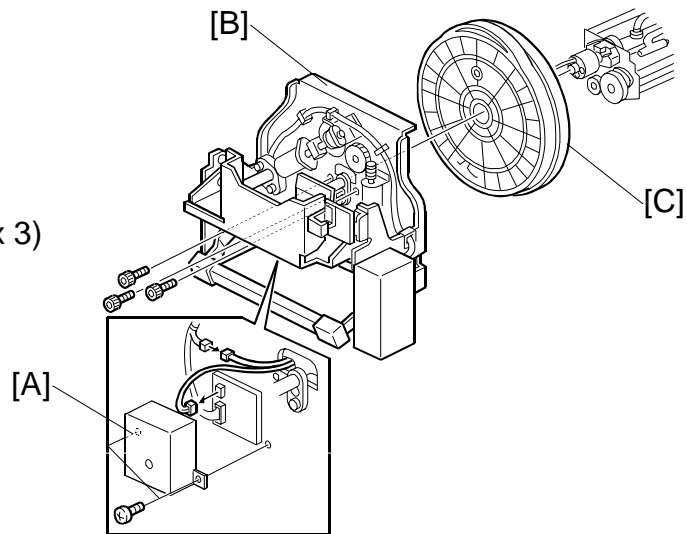
4. Check that the piston motion is smooth.
5. If the motion is stiff, loosen the pump screws [G] and adjust the pump position.
6. After tightening, repeat step 4 and step 3.



7. Re-tighten the two screws [H].
8. Check that the piston motion is smooth.
9. Reinstall the E-ring [C].

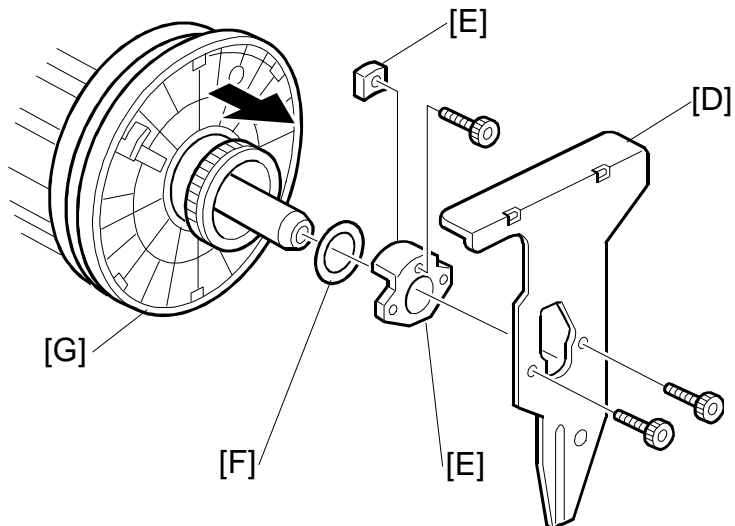
### 3.8.5 INK ROLLER UNIT / INK ROLLER ONE-WAY CLUTCH

- Metal screen (☛ 3.8.3)
- Pump covers (☛ 3.8.4)
- [A]: Board cover (☛ x 2)
- [B]: Front stay (☛ x 2, ☛ x 3)
- [C]: Front flange



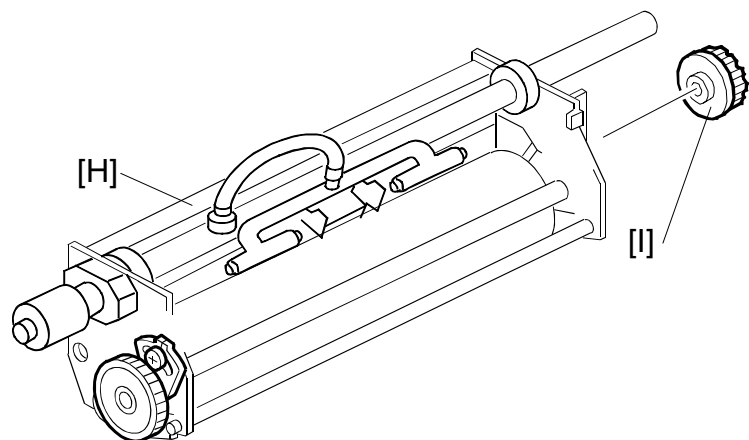
C238R023.WMF

- [D]: Rear stay (☛ x 2)
- [E]: Rear stoppers (☛ x 1)
- [F]: Ring
- [G]: Rear flange



C238R060.WMF

- [H]: Ink roller unit
- [I]: Ink roller one-way clutch



C238R033.WMF

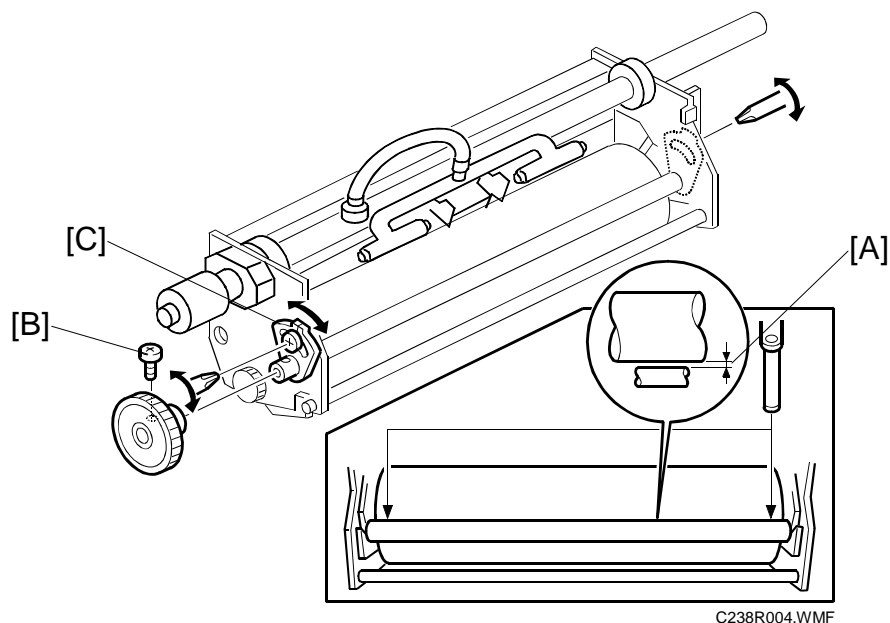
### 3.8.6 DOCTOR ROLLER GAP ADJUSTMENT

Purpose: To control the ink thickness around the ink roller.

Standard: 0.08 mm gauge passes, 0.10 mm gauge does not.

Tools: Thickness gauge

**CAUTION:** Normally the doctor roller gap is not adjusted or changed. It tends to be difficult to change in the field. If the gap is too narrow, an uneven image may appear on the prints. If it is too wide, too much ink will be applied to the drum screens, resulting in ink leakage from the drum.



C238R004.WMF

- Ink roller unit (☛ 3.8.5)

1. Make sure that a 0.08 mm gap gauge goes through the gap [A] between the ink and doctor rollers, and that a 0.10 mm gap gauge does not.

**NOTE:** 1) The gap should be checked at both ends of the doctor roller. Insert a gap gauge at each end of the roller. The gap tends to be larger for the center.

2) While the gap gauge is inserted, hold the doctor and ink rollers with your fingers in order to stop the rollers from rotating.

3) While the gap gauge is inserted, hold the end of the gap gauge.

2. If the gap is out of the standard, loosen the screw [B] and adjust the gap by turning the cam bushing [C] for the front and for the rear.

**NOTE:** Make sure to repeat the adjustment for both ends of the rollers.

### 3.8.7 INK DETECTION ADJUSTMENT

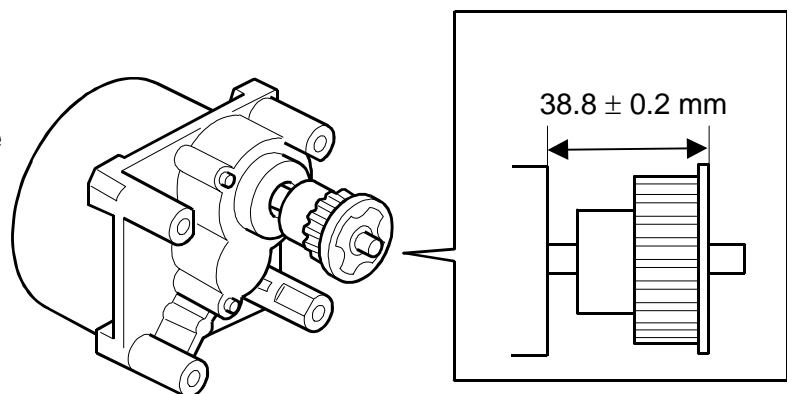
Purpose: To ensure that the CPU detects a no-ink condition.

**CAUTION:** Before attempting this procedure, wipe off the ink around the ink roller. To do this, set SP2-10 (ink detection) to OFF, and feed paper until ink ends.  
After finishing this procedure, do not forget to return SP2-10 to the default (ink detection on).

- SP6-40 Ink detection adjustment (☛ 5.7.2)

### 3.8.8 MAIN MOTOR PULLEY POSITION

After putting the pulley back on the main motor shaft, refer to the above illustration for the correct position of the pulley.

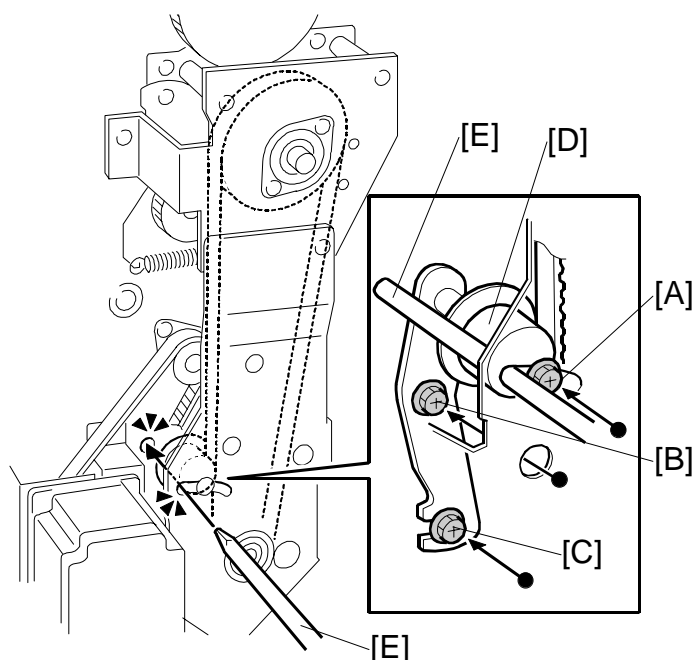


C238R061.WMF

### 3.8.9 MAIN DRIVE TIMING BELT ADJUSTMENT

Purpose: After the timing belt is replaced, correct belt tension must be applied.

- Rear covers (☛ 3.2.2)
  - MPU (☛ 3.2.3)
1. Loosen the screws [A], [B], and [C].
  2. Move the tension roller [D] to the right with a screwdriver [E] as shown.
  3. Tighten the screws [A], [B], and [C].
  4. Remove the screwdriver.



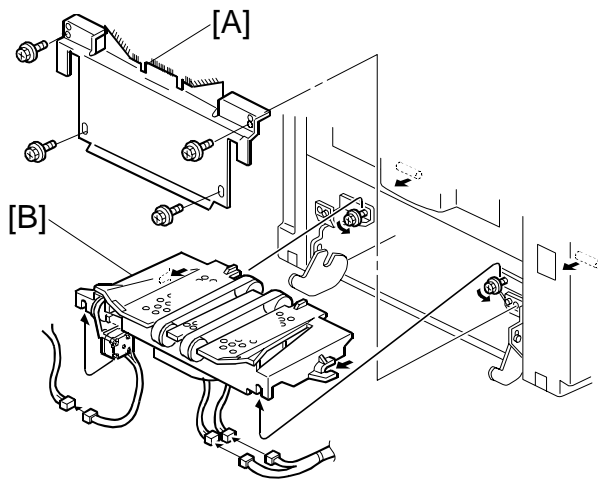
C238R032.WMF

## 3.9 PAPER DELIVERY

### 3.9.1 PAPER DELIVERY UNIT

[A]: Paper delivery cover (⚙ x 4)

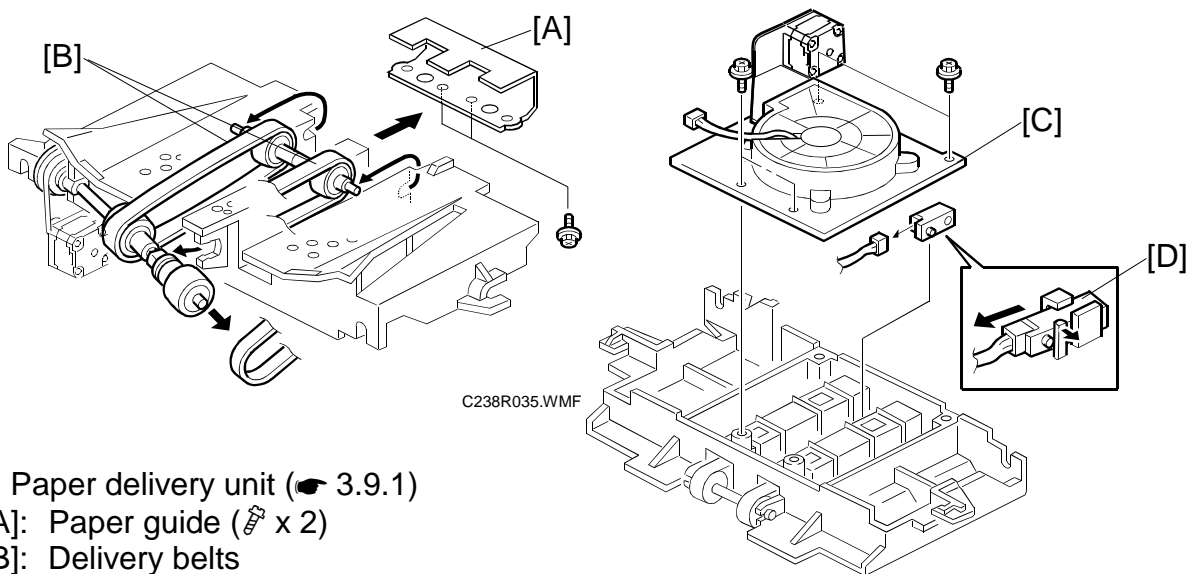
[B]: Paper delivery unit (⚙ x 3, ⚙ x 2)



C238R027.WMF

Replacement  
Adjustment

### 3.9.2 DELIVERY BELT / PAPER EXIT SENSOR



C238R035.WMF

C238R036.WMF

• Paper delivery unit (➡ 3.9.1)

[A]: Paper guide (⚙ x 2)

[B]: Delivery belts

[C]: Vacuum fan motor (⚙ x 1, ⚙ x 4)

[D]: Paper exit sensor (⚙ x 1)

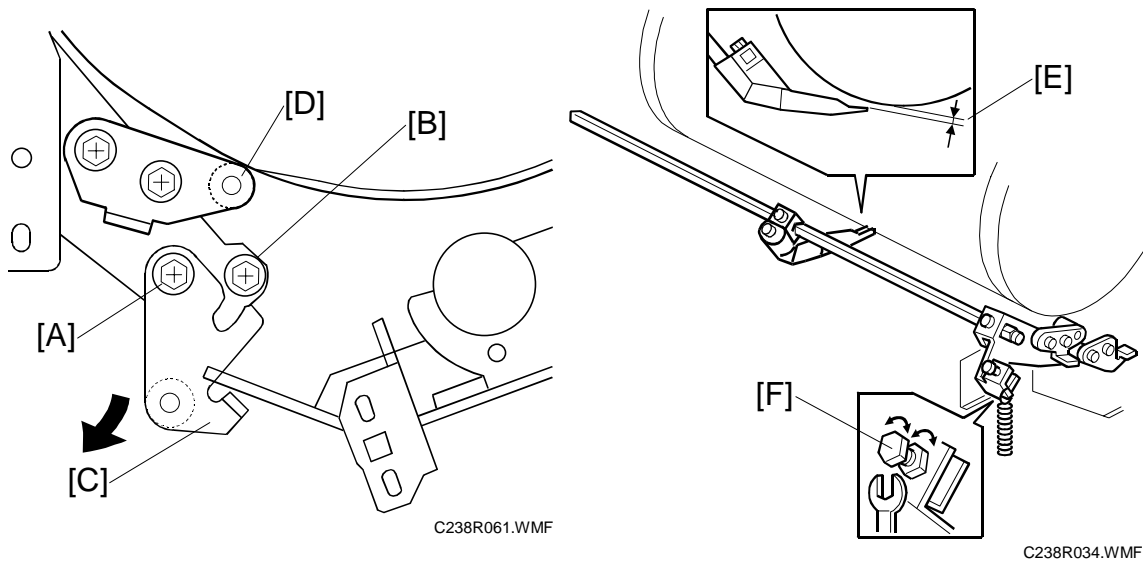


### 3.9.3 EXIT PAWL ADJUSTMENT

Purpose: To ensure that the exit pawls can move out of the way of the drum master clamber while the drum is rotating.

#### *Clearance adjustment*

Standard: Within  $1.15 \pm 0.15$  mm

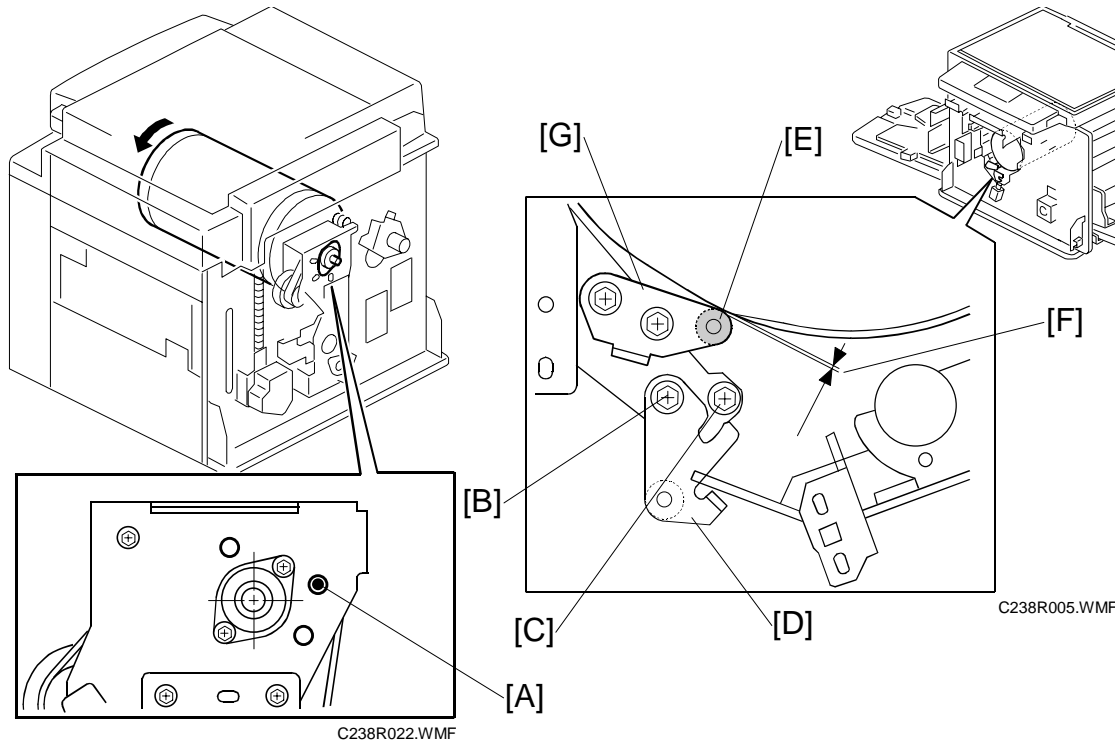


#### • Front cover (☛ 3.2.1)

1. Loosen screw [A] then screw [B] in this order (do not remove them). Make sure that the bracket [C] becomes free from engagement and the cam follower [D] contacts the drum flange.
2. Using a gap gauge, measure the clearance [E] between the drum surface and the exit pawls. It should be  $1.15 \pm 0.15$  mm.
3. If the clearance is not correct, adjust the clearance by turning the bolt [F].
4. Reposition the bracket [C] and tighten the screws [A] and [B].
5. Do the timing adjustment (see the next page).

**Timing adjustment**

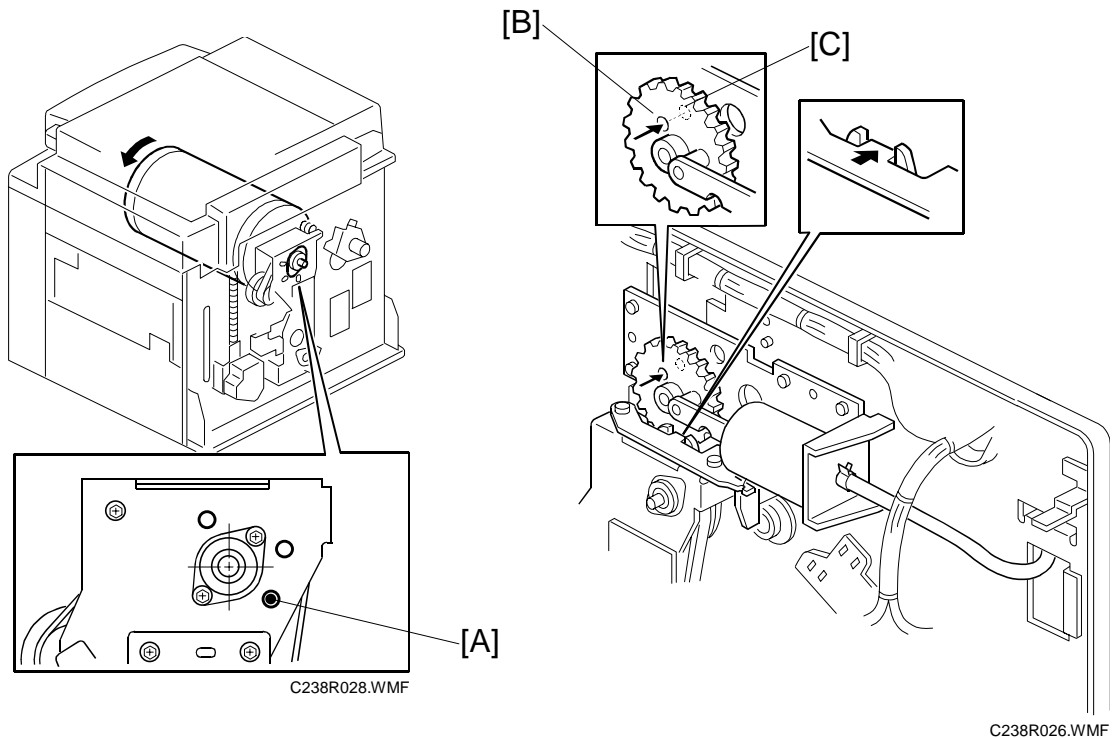
Standard: 0 or less than 0.5 mm



- Front cover (➡ 3.2.1)
  - Rear covers (➡ 3.2.2)
  - Do this after the clearance adjustment.
1. Turn the drum manually until the recess in the drum drive gear meets the positioning hole [A] in the bracket, as shown.
  2. Loosen screw [B] then screw [C] in that order (do not remove them). Make sure that the bracket [D] becomes free from engagement and the cam follower [E] contacts the drum flange.
  3. Measure the gap [F] between the cam follower and cam face (front drum flange). It should be 0 to 0.5 mm.
  4. If the gap is not correct, loosen the two screws securing the cam follower bracket [G].
  5. Re-tighten the two screws while pushing the cam follower against the cam face. Make sure that the gap [F] is 0 or less than 0.5 mm.  
**NOTE:** Do not push the cam followers too strongly against the cam.
  6. Re-position the bracket [D] and tighten the screws [B] and [C].

### 3.9.4 AIR PUMP ADJUSTMENT

Purpose: To ensure that the exit pawl produces a jet of air at the proper time.



- Rear covers (➡ 3.2.2)

1. Check the recess in the drum drive gear meets the positioning hole [A] in the bracket, as shown.
2. Check whether the hole [B] in the pump drive gear is aligned with the hole [C] in the air pump unit bracket.
3. If the alignment is incorrect, remove the air pump unit and re-position the gear.

### 3.10 SPECIAL TOOLS

The following are the special tools used for service.

Description	Part number	Note
Scanner positioning pins (4 pins as a set)	A006 9104	☛ 3.3.5
Flash memory card	A230 9352	☛ 5.9.2 ☛ 5.9.3





## 4. TROUBLESHOOTING

### 4.1 ERROR CODES

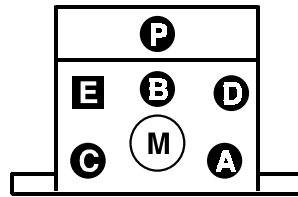


No.	Symptom	Possible cause
E-00	<u>Clamper error</u> The MPU cannot detect the clamper position sensor signal (open or closed) within 3.0 seconds after the clamper motor turns on.	Clamper drive Clamper sensors Clamper motor
E-01	<u>Cutter error</u> The cutter HP sensor does not turn on within 3.0 seconds after the cutter motor turns on.	Cutter drive Cutter switch Cutter motor
E-02	<u>Paper Table Drive error</u> The paper height sensor or the table lower limit sensor does not turn on within 7.5 seconds after the table motor turns on.	Table drive Table motor Table height sensor Table lower sensor
E-04	<u>Thermal Head Overheat</u> The temperature of the thermal head is greater than 54°C when the Start key is pressed.	Overheat (wait for the thermal head to cool down) Thermal head
E-06	<u>Main Motor error</u> The CPU cannot detect the master eject position sensor (drum HP) signal within 5.0 seconds after the main motor turns on.	Main motor drive Main motor Motor drive board Master eject position SN
E-09	<u>Thermal Head Thermistor Open</u> The thermistor output voltage is over 4.9 volts.	Thermal head thermistor Thermal head connector
E-12	<u>Pressure Plate error</u> The pressure plate home position sensor signal is not detected within 15.0 seconds after the pressure plate motor turns on.	Pressure plate drive Pressure plate motor Plate position sensors
E-13	<u>Scanner error</u> The scanner HP sensor does not turn on after the scanner motor has moved for more than 7.0 seconds back to home position after scanning. The scanner cannot leave the home position within 2.0 seconds of power on. Just after switching the power on, the scanner cannot return to the home position within 2.0 seconds of leaving.	Scanner drive Scanner HP sensor Scanner motor
E-15	<u>Operation Panel error</u> Signal transmission error (from the operation panel board) occurred in the MPU.	Operation panel MPU
E-16	<u>Paper Feed Control error</u> Signal transmission error (from the paper feed control section) occurred in the MPU.	MPU
E-17	<u>Drum Thermistor Open</u> The thermistor output voltage is over 4.9 volts.	Thermistor connector Thermistor
E-18	<u>Drum Overheat</u> The temperature of the drum is greater than 54°C when the Start key is pressed.	Drum overheat Thermistor

Trouble-  
shooting

No.	Symptom	Possible cause
 E-21	<u>Paper Exit Timing Sensor error</u> The paper exit timing sensor does not activate before the master eject position sensor activates.	Drum sensors Feeler
 E-22	<u>2nd Feed Timing Sensor error</u> The 2nd feed timing sensor does not activate before the paper exit timing sensor activates.	Drum sensors Feeler
 E-23	<u>Master Eject Position Sensor (Drum HP) error</u> The master eject position sensor does not activate before the feed start timing sensor activates.	Drum sensors Feeler
 E-24	<u>Feed Start Timing Sensor error</u> The feed start timing sensor does not activate before the 2nd feed timing sensor activates.	Drum sensors Feeler

## 4.2 ELECTRICAL COMPONENT DEFECTS



C238T001.WMF

### 4.2.1 SENSORS

Component	Condition	Symptom
Master Eject Position (HP) Sensor	Open	E-23 is displayed whenever the drum rotates.
	Shorted	
Paper Exit Timing Sensor	Open	E-21 is displayed whenever the drum rotates.
	Shorted	
Feed Start Timing Sensor	Open	E-24 is displayed whenever the drum rotates.
	Shorted	
2nd Feed Timing Sensor	Open	E-22 is displayed whenever the drum rotates.
	Shorted	
Pressure Plate Limit Sensor	Open	The "master eject" indicator is lit.
	Shorted	E-12 is displayed.
Pressure Plate HP Sensor	Open	The "master eject" indicator is lit.
	Shorted	E-12 is displayed.
Drum Master Sensor	Open	The "D" jam indicator is lit whenever a master is made.
	Shorted	
Paper Exit Sensor	Open	The "C" jam indicator is lit.
	Shorted	The "B" jam indicator is lit whenever a copy is made.
Master Eject Sensor	Open	The "E" jam indicator is lit.
	Shorted	The "E" jam indicator is lit whenever a used master is ejected.
Clamper Open Sensor	Open	E-00 is displayed.
	Shorted	E-00 is displayed whenever the clamper operates.
Clamper Close Sensor	Open	E-00 is displayed whenever the clamper operates.
	Shorted	E-00 is displayed.
Table Lower Sensor	Open	The paper table doesn't go down.
	Shorted	The paper table goes down below the sensor, and E-02 is displayed.
Platen Cover Sensor	Open	The master is made normally, even if the platen cover is open.
	Shorted	The image is treated using center/edge erase mode.
Scanner HP Sensor	Open	E-13 is displayed.
	Shorted	

Trouble-shooting

Component	Condition	Symptom
Master Set Cover Sensor	Open	The "D" jam indicator is lit or E-01 is displayed whenever the cover isn't placed correctly.
	Shorted	The "the open cover" and "D" indicators are lit.
Master End Sensor	White	Master making can start even if there is no master roll, but the "D" jam indicator will be lit.
	Black	The "load new master roll" indicator is lit.
Paper Height Sensor	Open	The "A" jam indicator is lit whenever a copy is made.
	Shorted	The paper table goes up over the sensor, and E-02 is displayed
Registration Sensor	Open	The "A" jam indicator is lit.
	Shorted	The "A" jam indicator is lit whenever a copy is made.
Paper End Sensor	Open	Printing can begin even if there is no paper, but the "A" jam indicator will be lit.
	Shorted	The "load more paper" indicator is lit.
Cutter HP Sensor	Open	The cutter cuts the master only half way, and the "D" jam indicator is lit.
	Shorted	E-01 is displayed.
Paper Length Sensor	Open	The press roller becomes dirty whenever the paper is shorter than the image.
	Shorted	Long images will be cut because the machine does not detect the presence of long paper sizes on the table.

## 4.2.2 SWITCHES

Component	Condition	Symptom
Door Safety Switch	Open	The "the open cover" indicator is lit.
	Shorted	The "the open cover" indicator is not lit even if the door is opened.
Main Switch	Open	The machine does not turn on.
	Shorted	The machine does not turn off.
Master Making Unit Set Switch	Open	E-09 is displayed whenever the master making unit is not installed.
	Shorted	The "the open cover" and "E" indicators are lit.
Eject Box Set Switch	Open	The master is fed to the eject box, even if there is no eject box.
	Shorted	The "the open cover" and "E" indicators are lit.



**4.2.3 LINES**

Component	Condition	Symptom
+5v (CN102-4)	Wire (or PSU) broken	The machine does not turn on.
+5v (CN102-2, 3)		The machine does not turn on, but LED104 on the MPU blinks.
+12v (CN102-9)		The thermal head does not burn the master.
-12v (CN102-8)		The thermal head does not burn the master.
+24v (CN111-3, 4, 5)		E-13 is displayed, and the output mode in SP mode does not turn anything on except the main motor.
+24v (CN111-1)		E-13 is displayed, and SP5-14, 15 (pressure plate motor output mode) does not turn the motor on.

## 4.3 FUSE, LED, VR, DIP-SW, AND TP TABLES

### 4.3.1 BLOWN FUSE CONDITIONS

#### *Main motor board*

No.	Rate	Symptom
Fuse	10.0 A	The “close the covers” indicator is lit.

#### *PSU*

No.	Rate	Symptom
FU700	6.3 A	The machine does not turn on.
FU701, 702	5.0 A	E-13 is displayed, and the output mode in SP mode does not turn anything on except the main motor.
FU703, 704	5.0 A	The “close the covers” indicator is lit.

### 4.3.2 LED'S

#### *MPU*

No.	Function
LED101	Not used.
LED102	Monitors the master end sensor. When the sensor detects a master, this LED is lit. (☛3.5.4)
LED103	Monitors the paper feed circuit in the MPU. Usually, this LED is blinking at intervals of 2 seconds.
LED104	Monitors the CPU operation. Usually, this LED is blinking at intervals of 1 second.

### 4.3.3 VR'S

#### *MPU*

No.	Function
VR101	Not used.
VR102	Adjusts the master end sensor (☛3.5.4)

#### *PSU*

No.	Function
VR1	Adjusts the thermal head voltage. (☛3.5.3)
VR2	Not used.

***Ink detection board***

No.	Function
VR1	Adjusts the ink detection. (●5.7.2)

**4.3.4 DIP SWITCHES*****Ink detection board***

No.	Normal drum	Color drum	A4 black drum
SW1	OFF	OFF	ON
SW2	OFF	ON	OFF
SW3	OFF	OFF	OFF
SW4	OFF	OFF	OFF

**4.3.5 TEST POINTS*****MPU***

No.	Function
TP102	Measures the master end sensor voltage. (●3.5.4)

***PSU***

No.	Function
TP701	Measures the thermal head voltage. (●3.5.3)
TP702	

---

## 5. .SERVICE TABLES

### 5.1 USING SERVICE PROGRAM MODES


Use the service program modes (SP modes) to check electrical data, change operating modes, and adjust values.

#### 5.1.1 ACCESSING SP MODES

##### *Entering SP Mode*

1. Key in the following sequence.

Method 1:

 → (1) → (0) → (7) → (C/⊗)


- Hold the (C/⊗) key down for longer than 3 seconds.

Method 2:

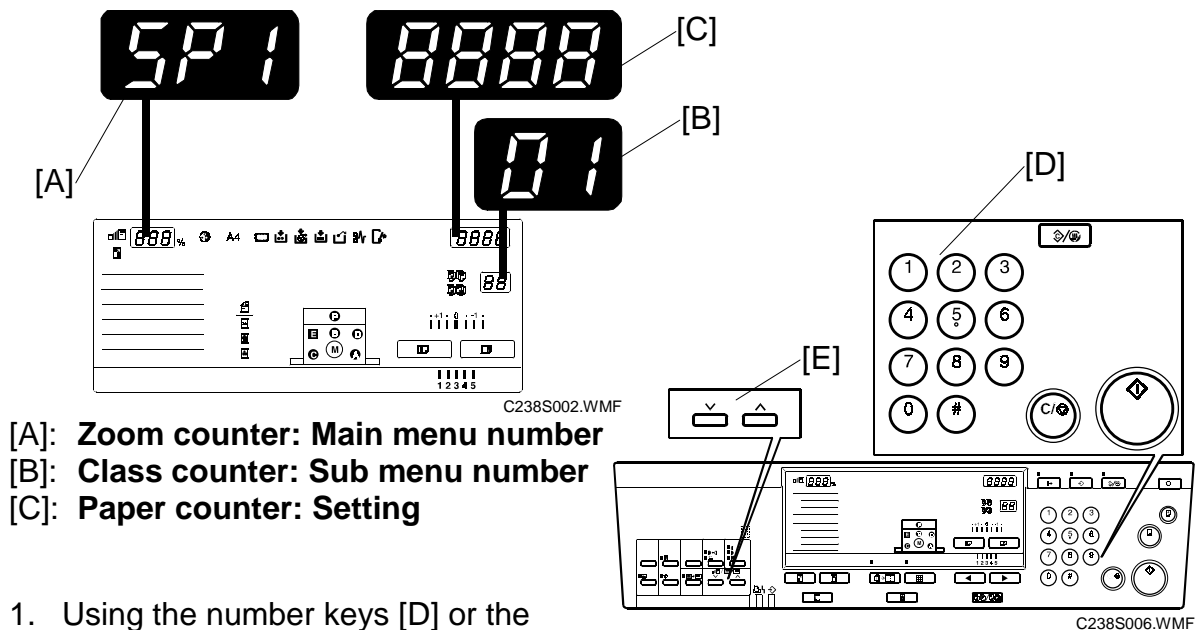
 → (C/⊗) → Combine key → (#)

2. The zoom counter displays "SP1".
3. Go to section 5.1.2.

##### *Leaving SP Mode*

Press the  key one or more times.

## 5.1.2 HOW TO SELECT A PROGRAM NUMBER



1. Using the number keys [D] or the scroll keys [E], enter the desired main menu number (listed below), then press the Enter key. (The zoom counter [A] shows the main menu number.)

### Main menu number list:

1. Copy data, 2. Basic settings, 3. System settings, 4. Input mode  
5. Output mode, 6. Adjustment, 7. Memory clear, 8. System test
2. Using the number keys or the scroll keys, enter the desired sub-menu number, then press the Enter key. (The class counter [B] shows the sub menu number.)
3. Enter the desired value or mode using the number keys (SP modes are listed in the service program tables). (The paper counter [C] shows the current setting.)  
**NOTE:** 1) Use the Memory/Class key to toggle between "+" and "-".  
 2) To enter a decimal place, you do not have to enter a decimal point.  
 For example, to enter "1.5" just press "1" and "5" keys.
4. Press the Enter key to store the displayed setting.

### When the setting has more than four digits:



First, the last four digits of the number are displayed. Keep pressing the Enter key to display the rest of the number.

Example: When the value is 32055, the paper counter display changes as shown.

### Change ON/OFF:

Use the "1" key and "0" key to switch an SP "ON" and "OFF".

1: ON      0: OFF

## 5.2 MAIN MENU NO.1: COPY DATA

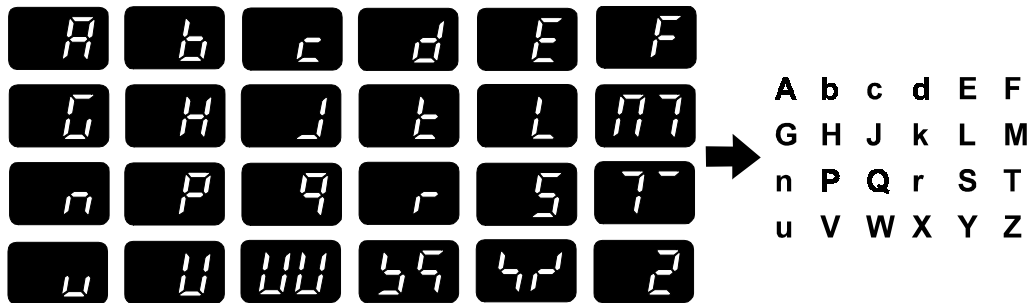
### 5.2.1 SP TABLE

No.	Menu Items	Function
1-1	Total master counter	
1-2	Master counter - ADF	
1-3	Master counter - Letter mode	
1-4	Master counter - Letter/Photo mode	
1-5	Master counter - Photo mode	
1-6	Master counter - Tint mode	
1-7	Master counter - Economy mode	
1-8	Master counter - Combine mode	
1-9	Master counter - Enlargement	
1-10	Master counter - Reduction	
1-11	Master counter - Zoom mode	
1-12	Master counter - Margin erase mode	
1-13	Master counter - Fine mode	
1-14	Master counter - Online mode	
1-15	Master counter - Online overlay	
1-16	Master counter - Color drum	
1-20	Total print counter	
1-21	Print counter - over A3/DLT	
1-22	Print counter - A3/DLT	
1-23	Print counter - B4/LG	
1-24	Print counter - A4-L/LT-L	"-L": Lengthwise feeds
1-25	Print counter - A4/LT	
1-26	Print counter - B5-L	
1-27	Print counter - B5	
1-28	Print counter - A6-L	
1-29	Print counter - under A6-L	
1-30	Print counter - other sizes	
1-40	Copies per original counters - 1,000 and under 1,000 prints	
1-41	Copies per original counters - over 1,000 prints	
1-50	D jam location counter (when clamping the master)	☛ 6.10.3
1-51	E jam location counter (picking up a used master from drum)	☛ 6.10.1
1-52	E jam location counter (compressing the used master)	☛ 6.10.1
1-53	A jam location counter (paper feed)	☛ 6.10.5
1-54	A jam location counter (after turning on the main switch)	☛ 6.10.5
1-55	B jam location counter (wrapping jam)	☛ 6.10.4
1-56	C jam location counter (paper delivery)	☛ 6.10.6
1-57	P jam location counter (original feed-in)	☛ 6.10.2
1-58	P jam location counter (original feed-out)	☛ 6.10.2
1-70	Main firmware suffix information	☛ 5.2.2
1-71	Feed ROM suffix information	☛ 5.2.2
1-80	Error code information	☛ 5.2.3



### 5.2.2 SP1-70, 71: FIRMWARE/ROM SUFFIX INFORMATION

This model has no LCD, so the suffix is displayed as shown below instead of in English letters.



C238S012.WMF

**NOTE:** The letters “i” and “o” are always skipped.

### 5.2.3 SP1-80: ERROR CODE INFORMATION

Purpose: To display the error codes and the date.

By pressing the Enter key, the display changes between the year, the month / date, and the time, as shown below.

#### Latest error code

↓#

#### The year

↓#

#### The month / the date

↓#

#### The time

↓#

#### Error code previous to that

↓#

Example: E-01, 2002/January/2nd/13:00

E-01

↓#

2002

↓#

0102

↓#

1300

## 5.3 MAIN MENU NO.2: BASIC SETTINGS

### 5.3.1 SP TABLE

No.	Menu Items	Default	Settings
2-1	Default print speed	3	1 to 5
2-2	Default image position	4	1 to 7 1: -15mm, 2: -10mm, 3: -5mm, <b>4: 0.0mm</b> , 5: +5mm, 6: +10mm, 7: +15mm
2-10	Ink detection board	On	Off/On (Off is used for tests, and for removing ink from the drum – section 3.8.)
2-11	Paper end sensor	On	Off/On (Off is used for tests.)
2-12	Drum master sensor	On	Off/On (Off is used for tests.)
2-13	Platen cover sensor	On	Off/On (Off is used for tests.)
2-14	ADF cover sensor	On	Off/On (Off is used for tests.)
2-20	Destination setting	-	0: Japan, 1: NA, 2: EU
2-21	Swap start key for print key	Off	Off/On
2-22	Double count-up for A3 masters	0	0: Not used, 1: Master counter only, 2: Master counter and print counter
2-40	T/H energy control by ink temperature	On	Off/On
2-41	Thermal head energy control	7	0 to 50%
2-42	Thermal head energy control - economy	10	0 to 43% (☛ 5.3.2)

### 5.3.2 SP2-41, 2-42: THERMAL HEAD ENERGY CONTROL

2-41: The default is 7%. This means that during normal printing mode, the thermal head energy is 93% of the maximum possible (100 – 7).

2-42: The default is 10%. This means that in economy printing mode, the thermal head energy is reduced by another 10%. With the default settings, this means that the thermal head energy is 83% of maximum power (100-7-10).



## 5.4 MAIN MENU NO.3: SYSTEM SETTINGS

### 5.4.1 SP TABLE



No.	Menu Items	Default	Settings
3-1	Input the present time	-	5.4.2
3-10	Optional key counter setting	Off	Off/On

### 5.4.2 SP3-1: INPUT THE PRESENT TIME

Input the year, the month / date, and the time in that order. Press the Enter key between each one.

**Input the last two digits of the present year (two-digit number).**

↓#

**Input the present month and the date (four-digit number).**

↓#

**Input the present time (four-digit number).**

↓#

Example: 2002/January/2nd/13:00

02

↓#

0102

↓#

1300

↓#

## 5.5 MAIN MENU NO.4: INPUT MODE

### 5.5.1 SP TABLE

No.	Menu Items
4-1	Scanner HP sensor
4-2	Platen cover sensor
4-10	Master making unit set switch
4-11	Master set cover sensor
4-12	Cutter HP sensor
4-13	Master end sensor
4-14	Eject box set switch
4-15	Master eject sensor
4-16	Pressure plate HP sensor
4-17	Pressure plate limit sensor
4-18	Ink detection signal
4-19	Color drum signal
4-20	Drum size signal
4-21	Drum set signal
4-22	Clamper open sensor
4-23	Clamper closed sensor
4-24	Drum master sensor
4-25	Master eject position (drum HP) sensor
4-26	Paper exit timing sensor
4-30	Table lowering switch
4-31	Table lower sensor
4-32	Paper height sensor
4-33	Paper end sensor
4-34	Paper length sensor
4-35	Paper width signal 0
4-36	Paper width signal 1
4-37	Paper width signal 2
4-38	Paper width signal 3
4-39	Paper width signal 4
4-40	Paper width signal 5

No.	Menu Items
4-41	Registration sensor
4-42	Feed start timing sensor
4-43	2nd feed timing sensor
4-44	Paper exit sensor
4-50	Door safety switch
4-60	ADF connecting signal
4-61	ADF cover sensor
4-62	ADF registration sensor
4-63	ADF original trailing edge sensor
4-64	ADF original set sensor
4-65	ADF original length sensor 1
4-66	ADF original length sensor 2
4-67	ADF original width sensor 1
4-68	ADF original width sensor 2
4-69	ADF open sensor
4-70	Optional key counter signal



## 5.6 MAIN MENU NO.5: OUTPUT MODE

### 5.6.1 SP TABLE

No.	Menu Items
5-1	Exposure lamp (xenon lamp)
5-2	Scanner motor
5-10	Master feed motor
5-11	Cutter motor
5-12	VHD signal (● 3.5.3)
5-13	Master eject motor
5-14	Pressure plate motor: to limit
5-15	Pressure plate motor: to HP
5-16	Main motor: 15 rpm
5-17	Main motor: 30 rpm
5-18	Main motor: 60 rpm
5-19	Main motor: 75 rpm
5-20	Main motor: 90 rpm
5-21	Main motor: 105 rpm
5-22	Main motor: 120 rpm
5-23	Clamper motor: to open
5-24	Clamper motor: to close
5-25	Ink pump motor
5-26	Pressure release solenoids

No.	Menu Items
5-30	Table motor - up
5-31	Table motor - down
5-32	Paper feed motor: 15 rpm
5-33	Paper feed motor: 30 rpm
5-34	Paper feed motor: 60 rpm
5-35	Paper feed motor: 75 rpm
5-36	Paper feed motor: 90 rpm
5-37	Paper feed motor: 105 rpm
5-38	Paper feed motor: 120 rpm
5-39	Registration motor: 15 rpm
5-40	Registration motor: 30 rpm
5-41	Registration motor: 60 rpm
5-42	Registration motor: 75 rpm
5-43	Registration motor: 90 rpm
5-44	Registration motor: 105 rpm
5-45	Registration motor: 120 rpm
5-46	Air knife fan motor 1
5-47	Air knife fan motor 2
5-48	Vacuum fan motor
5-49	Paper delivery motor
5-50	Paper counter
5-51	Master counter
5-60	ADF motor
5-61	ADF feed clutch
5-62	ADF pick-up solenoid
5-63	Optional key counter signal

## 5.7 MAIN MENU NO.6: ADJUSTMENT

### 5.7.1 SP TABLE

No.	Menu Items	Default	Settings
6-1	Main-scan position – platen mode	–	-5.0 to 5.0 mm (☛ 5.7.3)
6-2	Main-scan position - ADF mode	0	-5.0 to 5.0 mm (☛ 5.7.3)
6-3	Scanning start position - platen mode	–	-5.0 to 5.0 mm (☛ 5.7.3)
6-4	Scanning start position - ADF mode	0	-5.0 to 5.0 mm (☛ 5.7.3)
6-5	Scanning speed - platen mode	–	-5.0 to 5.0 % (☛ 5.7.3)
6-6	Scanning speed - ADF mode	0	-5.0 to 5.0 % (☛ 5.7.3)
6-10	Master writing speed	–	-5.0 to 5.0 % (☛ 5.7.3)
6-20	Registration buckle (Not used)	18	0 to 100 pluses (☛ 5.7.5)
6-21	Paper registration position	–	-5.0 to 5.0 mm (☛ 5.7.3)
6-30	Master making density	1	0: Pale, 1: Normal, 2: Dark
6-31	SBU calibration	Off	On/Off (☛ 5.7.4)
6-40	Ink detection adjustment	–	(☛ 5.7.2)

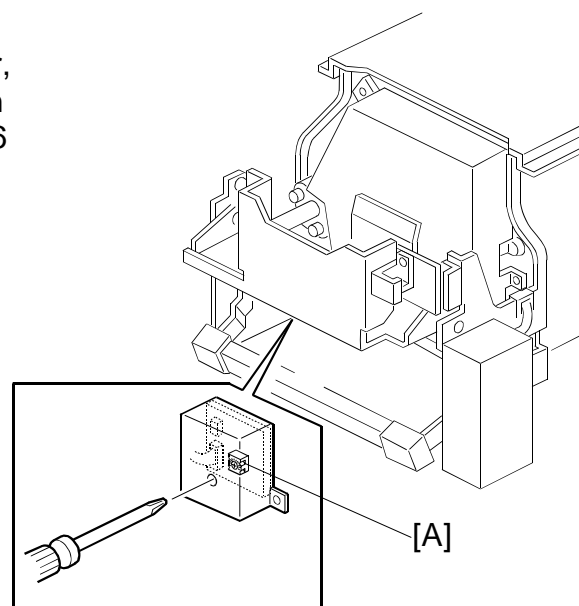
### 5.7.2 SP6-40: INK DETECTION ADJUSTMENT

Purpose: To ensure that the CPU detects a no ink condition.

**CAUTION:** Before attempting this procedure, wipe off the ink around the ink roller. To do this, set SP2-10 (ink detection) to OFF, and feed paper until ink ends. After finishing the procedure, do not forget to return SP2-10 to the default (ink detection on).

Access SP6-40, and open the door cover, then turn the VR1 [A] on the ink detection board until the display becomes “6.0 u” (6  $\mu$ s).

**NOTE:** When the drum has ink inside, the machine displays “----”.



### 5.7.3 IMAGE ADJUSTMENT (SP6-10, -21, -5, -3, AND -1)

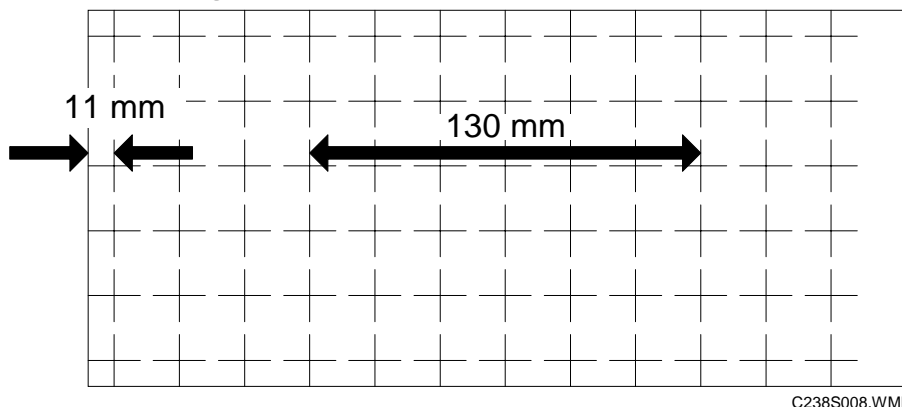
Purpose: To adjust the image position on prints by changing the SP settings.

Adjust the following in the given order.

When correcting errors made when printing with the controller, use only the first two procedures. When correcting errors made when printing with scanned originals, do all six adjustments in the given order.

This adjustment is required every time the RAM on the MPU has been replaced.

#### ***SP6-10: Master writing speed***



C238S008.WMF

1. Input SP8-10 (Test patterns) and enter "6", then press the Start key.
2. Exit the SP mode, print 10 copies at 90 rpm (speed 3). Use the 10th print for the adjustment.
3. The length of the 6 squares in the feed direction should be 130 mm, as shown above.
4. If it is not, calculate the reproduction ratio using the following formula.  

$$\{(130 - \text{Value}) / 130\} \times 100 = \pm \text{X.X \% (Round off to one decimal place)}$$
 Example: If the value is 133,  $\{(130 - 133) / 130\} \times 100 = -2.3 \%$
5. Access SP6-10, input the calculated ratio, and press the Enter key.
6. Repeat the procedure to make sure that the ratio is correct.

#### ***SP6-21: Paper registration position***

1. Input SP8-10 (Test patterns) and enter "6", then press the Start key.
2. Exit the SP mode, print 10 copies at 90 rpm (speed 3). Use the 10th print for the adjustment.
3. The space between the leading edge and the next line should be 11 mm, as shown above.
4. If it is not, access SP6-21, input the difference and press the Enter key.  
 Example: If the value is 16 mm,  $16 - 11 = +5.0$
5. Repeat the procedure to make sure that the gap is correct.

**SP6-05: Scanning speed - platen****SP6-06: Scanning speed - ADF**

1. Make copies of the test pattern printed during the previous adjustments (☛ previous page), in platen mode at 90 rpm (speed 3). Use the 10th print for the adjustment.
2. The length of the 6 squares in the feed direction should be 130 mm.
3. If it is not, calculate the reproduction ratio using the following formula.  

$$\{(130 - \text{Value}) / 130\} \times 100 = \pm \text{X.X \% (Round off to one decimal place)}$$
 Example: If the value is 133,  $\{(130 - 133) / 130\} \times 100 = - 2.3 \%$
4. Access SP6-05, input the calculated ratio, and press the Enter key.
5. Check again to make sure that the ratio is correct.
6. Make copies of the test pattern in ADF mode and repeat the process using SP6-06.

**SP6-03: Scanning start position - platen****SP6-04: Scanning start position - ADF**

1. Make copies of the test pattern printed during the previous adjustments (☛ previous page), in platen mode at 90 rpm (speed 3). Use the 10th print for the adjustment.
2. The space between the leading edge and the next line should be 11 mm.
3. If it is not, access SP6-03, input the gap value and press the Enter key.  
 Example: If the value is 16 mm,  $16 - 11 = +5.0$
4. Repeat the procedure to make sure that the gap is correct.
5. Make copies of the test pattern in ADF mode and repeat the process using SP6-04.

**SP6-01: Main scan position - platen****SP6-02: Main scan position - ADF**

1. Make a copy in platen mode at 90 rpm (speed 3).
2. Measure the difference between the center of the main-scan on the original and on the print.
3. Access SP6-01, input the gap value and press the Enter key. (If you input a positive value, the image moves towards the operation side.)
4. Repeat the procedure to make sure that there is no difference.
5. Make a copy in ADF mode and repeat the process using SP6-02.

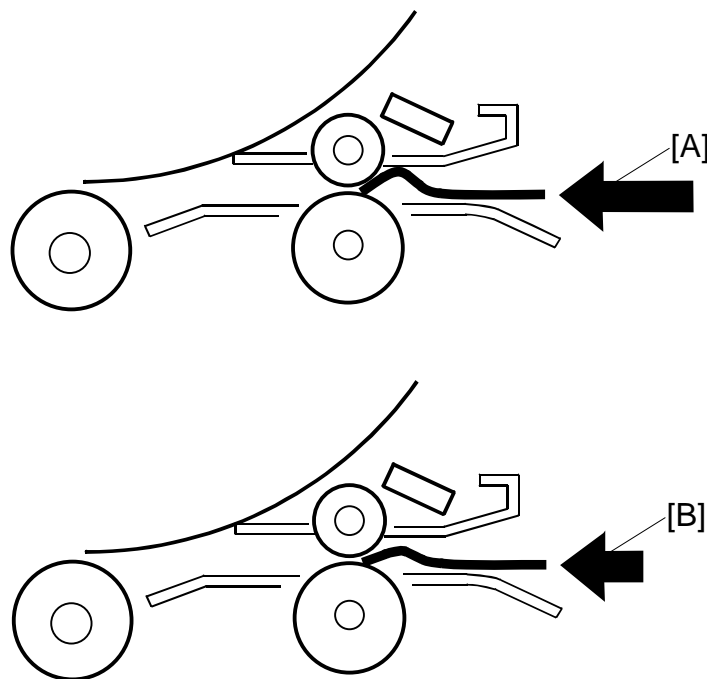
### 5.7.4 SP6-31: SBU CALIBRATION

Purpose: To adjust the SBU after the MPU or the white plate located behind the original scale is replaced.

1. Place a stack of 10 sheets of paper on the exposure glass.
2. Access SP6-31 and enter "1", then press the Enter key to start the auto calibration.

### 5.7.5 SP6-20: REGISTRATION BUCKLE (NOT USED)

Purpose: To adjust the paper skew and the paper registration slippage.



C238S011.WMF

**[A]: Increase the value**

The occurrence of paper skew will be reduced, but the paper is more likely to slip and the registration position may be incorrect.

**[B]: Decrease the value**

The paper registration position will be correct.

## 5.8 MAIN MENU NO.7: MEMORY CLEAR

### 5.8.1 SP TABLE

No.	Menu Items	Default	Settings
7-1	Factory settings clear	No	No / Clr (☛ 5.8.3)
7-2	All settings clear	No	No / Clr
7-3	Total counter clear	No	No / Clr
7-4	Jam/Error data clear	No	No / Clr

### 5.8.2 SP7: HOW TO CLEAR

1. Using the number “1” key or the scroll keys, select “Clr”.
2. Press the Enter key.
3. When the clear is completed, ring the beeper.

### 5.8.3 SP7-1: FACTORY SETTINGS CLEAR

This resets all SP settings except for the following SP numbers.

- SP2-20: Destination settings
- SP3-01: Present time
- SP6-All: Adjustments



## 5.9 MAIN MENU NO.8: SYSTEM TEST

### 5.9.1 SP TABLE

No.	Menu Items	Default	Settings
8-1	Download main firmware	No	No/Ld (☛ 5.9.2)
8-2	Upload main firmware	No	No/Ld (☛ 5.9.3)
8-10	Test patterns	6	1 to 9 (☛ 5.9.4)
8-20	Free run - scanner	Off	Off/On
8-21	Paper feed (15 rpm)	0	(☛ 5.9.5)
8-22	Free run - paper feed (15 rpm)	0	(☛ 5.9.6)
8-30	All indicators on the panel	-	Press # key

### 5.9.2 SP8-1: DOWNLOAD MAIN FIRMWARE

Purpose: This upgrades the main firmware using a flash memory card.

1. Before downloading new firmware, check the current version with SP1-70 (☛ 5.2.2).
2. Prepare a flash memory card with the latest firmware.
3. Turn off the main switch and disconnect the power cord.
4. Remove the rear card cover.
5. Plug the flash memory card into the connector on the MPU.
6. Connect the power cord, then turn on the main switch.
7. Access SP8-1. Using the “1” key, select “Ld”.
8. Press the Enter key. (It takes about 2.0 minutes to complete.)
9. Check that the “End” is displayed.
10. Turn off the main switch, and remove the flash memory card.

### 5.9.3 SP8-2: UPLOAD MAIN FIRMWARE

Purpose: This writes firmware to a flash memory card (P/N' #A2309352) from the machine.

1. Refer to steps 3 to 5 of section 5.9.2.
2. Connect the power cord, then turn on the main switch while holding the Clear modes key.
3. Access SP8-2. Using the "1" key, select "Ld".
4. Refer to steps 8 and 10 in section 5.9.2.

### 5.9.4 SP8-10: TEST PATTERNS

Purpose: To make prints without using the scanner.

Access SP8-10 and select the number "6", then press the Start key.

Other numbers are as shown below, but do not use them except the number "6".

1: Grid, 2: Vertical, 3: Horizontal gray, 4: Vertical gray, 5: 16 grays,  
**6: Cross**, 7: Diagonal grid, 8: 256 grays, 9: 64 grays

### 5.9.5 SP8-21: PAPER FEED TEST (15 RPM)

Purpose: To feed paper at the lowest speed (15 rpm).

1. Set a stack of paper on the paper feed table.
2. Access SP8-21 and enter the number of sheets that you want to feed.
3. Press the Print key.
4. To exit this mode, press the Stop key.

### 5.9.6 SP8-22: FREE RUN PAPER FEED (15 RPM)

Purpose: To drive the paper feed mechanism at the lowest speed (15 rpm) without paper.

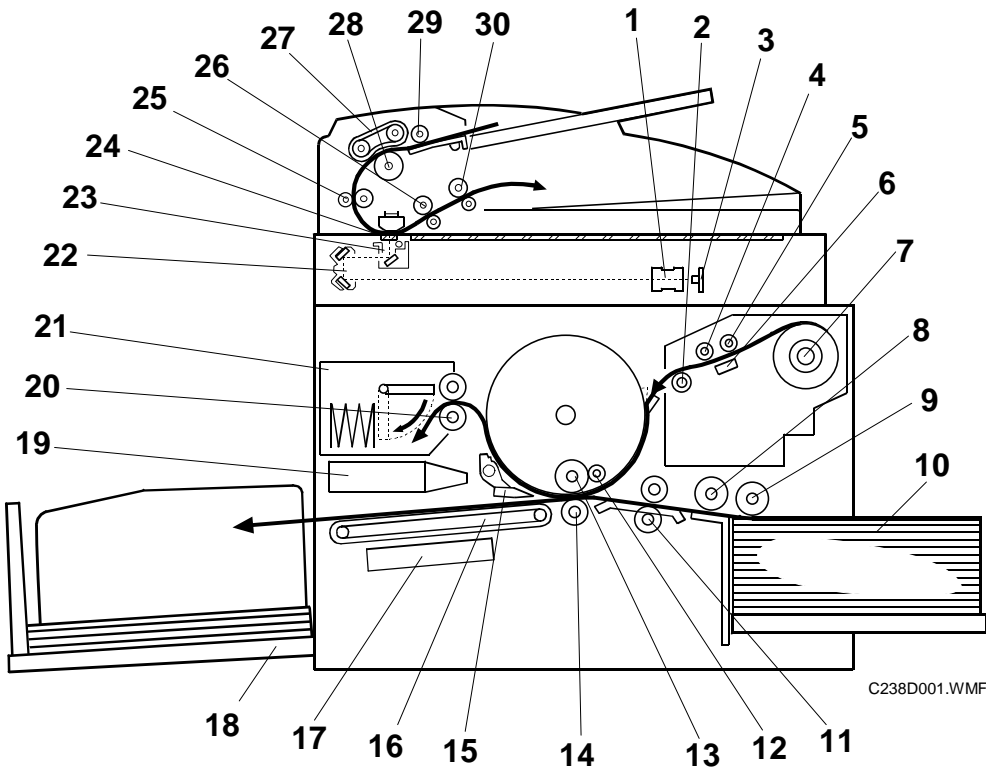
1. Access SP8-22 and enter the number of times that you want to repeat the paper feed cycle.
2. Press the Print key.
3. To exit this mode, press the Stop key.

## 6. DETAILED SECTION DESCRIPTIONS

The scanning and image processing sections are almost the same as Sapphire (C235). The other sections are almost the same as Silver/Silver-V (C231/C237).

### 6.1 MECHANISM OVERVIEW

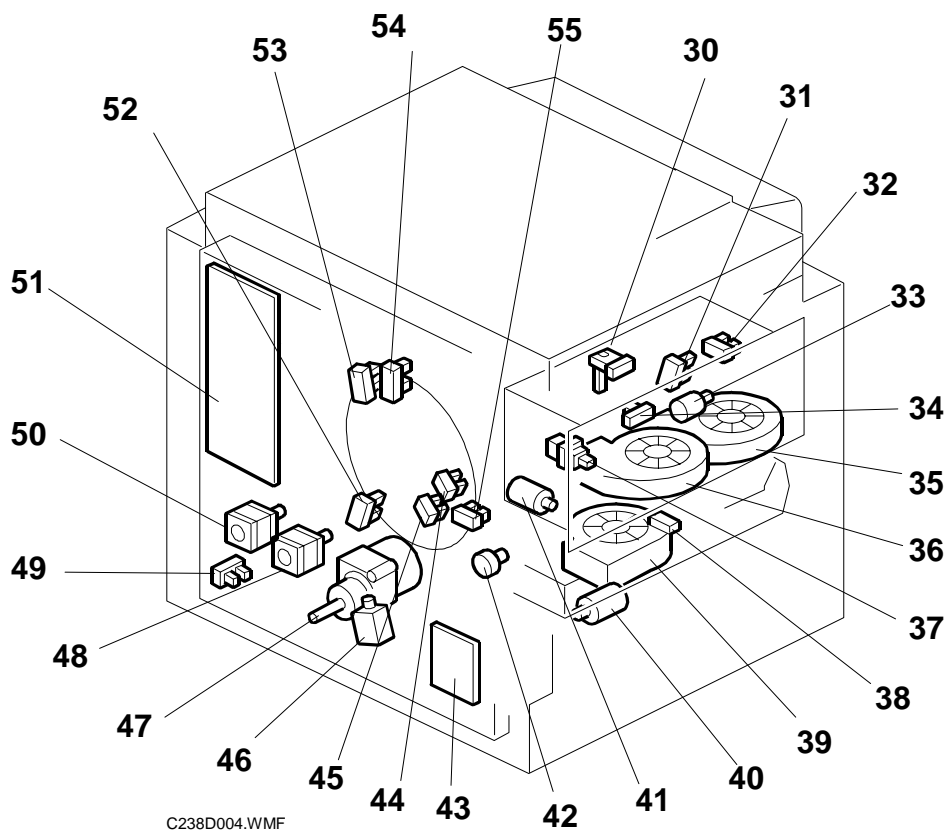
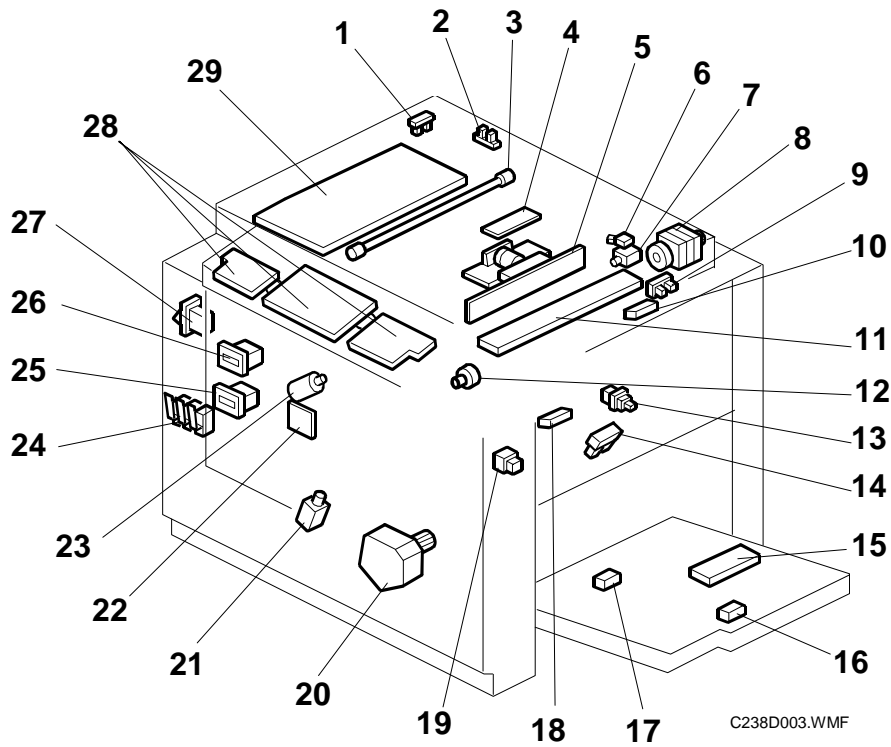
#### 6.1.1 MAJOR PARTS



C238D001.WMF

- |                          |                          |
|--------------------------|--------------------------|
| 1. Lens                  | 16. Transport belts      |
| 2. Tension roller        | 17. Vacuum fan motor     |
| 3. CCD and SBU           | 18. Paper delivery table |
| 4. Master feed roller    | 19. Air knife fan motors |
| 5. Platen roller         | 20. Master eject rollers |
| 6. Thermal head          | 21. Master eject box     |
| 7. Master roll           | 22. 2nd scanner          |
| 8. Paper feed roller     | 23. 1st scanner          |
| 9. Paper pick-up roller  | 24. DF exposure glass    |
| 10. Paper table          | 25. 1st transport roller |
| 11. Registration rollers | 26. 2nd transport roller |
| 12. Doctor roller        | 27. Original feed belt   |
| 13. Ink roller           | 28. Separation roller    |
| 14. Press roller         | 29. Pick-up roller       |
| 15. Exit pawl            | 30. Original exit roller |

## 6.1.2 ELECTRICAL COMPONENT LAYOUT



**Boards**

No.	Component	Function
51	Main Processing Unit (MPU)	Controls all machine functions, both directly and through other boards.
4	Lamp Stabilizer	This supplies power to the exposure lamp.
29	Power Supply Unit (PSU)	Provides dc power to the machine.
28	Operation Panel Boards	These boards control the operation panel.
5	CCD and SBU	Outputs a video signal to the MPU.
43	Main Motor Board	Controls the main motor speed.
22	Ink Detection Board	Checks if there is ink in the drum.
15	Paper Width Detection Board	Sends data about the paper width on the paper table to the MPU.

**Motors**

No.	Component	Function
12	Master Feed Motor	Feeds the master to the drum.
7	Cutter Motor	Cuts the master.
48	Registration Motor	Feeds the paper to align it with the master on the drum.
50	Paper Feed Motor	Feeds the paper from the paper table.
8	Scanner Motor	Drives the scanner.
33	Master Eject Motor	Sends used masters into the master eject box.
35	Air Knife Fan Motor 1	Rotates the fan to provide air to separate the leading edge of the paper from the drum.
36	Air Knife Fan Motor 2	
41	Pressure Plate Motor	Raises and lowers the pressure plate.
39	Vacuum Fan Motor	Provides suction so that paper is held firmly on the transport belt.
40	Paper Delivery Motor	Feeds out the printed paper.
42	Clamper Motor	Opens or closes the master clamper on the drum.
47	Main Motor	Rotates the drum.
20	Table Motor	Raises and lowers the paper table.
23	Ink Pump Motor	Drives the ink pump.

**Switches**

No.	Component	Function
19	Table Lowering Switch	Lowest the paper table.
24	Door Safety Switch	Checks whether the front door is properly closed.
27	Main Switch	Turns the power on or off.
13	Master Making Unit Set Switch	Checks if the master making unit is installed.
37	Eject Box Set Switch	Checks if the master eject box is installed.

**Sensors**

No.	Component	Function
53	Master Eject Position (Drum HP) Sensor	Detects when the drum is at the master eject position.
54	Paper Exit Timing Sensor	Determines the paper exit misfeed check timing.
52	Feed Start Timing Sensor	Determines the paper feed start timing.
30	Master Eject Sensor	Detects used master misfeeds.
32	Pressure Plate Limit Sensor	Detects when the pressure plate is in the lowest position.
31	Pressure Plate HP Sensor	Detects when the pressure plate is at the home position.
34	Drum Master Sensor	Detects if there is a master on the drum.
38	Paper Exit Sensor	Detects paper misfeeds at the exit.
55	2nd Feed Timing Sensor	Determines the paper misfeed check timing at the paper registration area.
44	Clamper Open Sensor	Detects if the clamper is in the open position.
45	Clamper Closed Sensor	Detects if the clamper is in the closed position.
49	Table Lower Sensor	Detects when the paper table is at its lower limit position.
2	Platen Cover Sensor	Detects whether the platen cover is open or closed.
1	Scanner HP Sensor	Detects when the image sensor is at home position.
9	Master Set Cover Sensor	Checks if the master set cover is properly set.
10	Master End Sensor	Detects when the master making unit runs out of master roll.
14	Paper Height Sensor	Detects when the paper table reaches the paper feed position.
18	Registration Sensor	Detects paper approaching the registration roller.
17	Paper End Sensor	Detects when the paper table runs out of paper.
6	Cutter HP Sensor	Detects when the cutter is at the home position.
16	Paper Length Sensor	Detects when long paper is on the paper table.

**Solenoids**

<b>No.</b>	<b>Component</b>	<b>Function</b>
46	Rear Pressure Release Solenoid	Releases the press roller to apply printing pressure.
21	Front Pressure Release Solenoid	Releases the press roller to apply printing pressure.

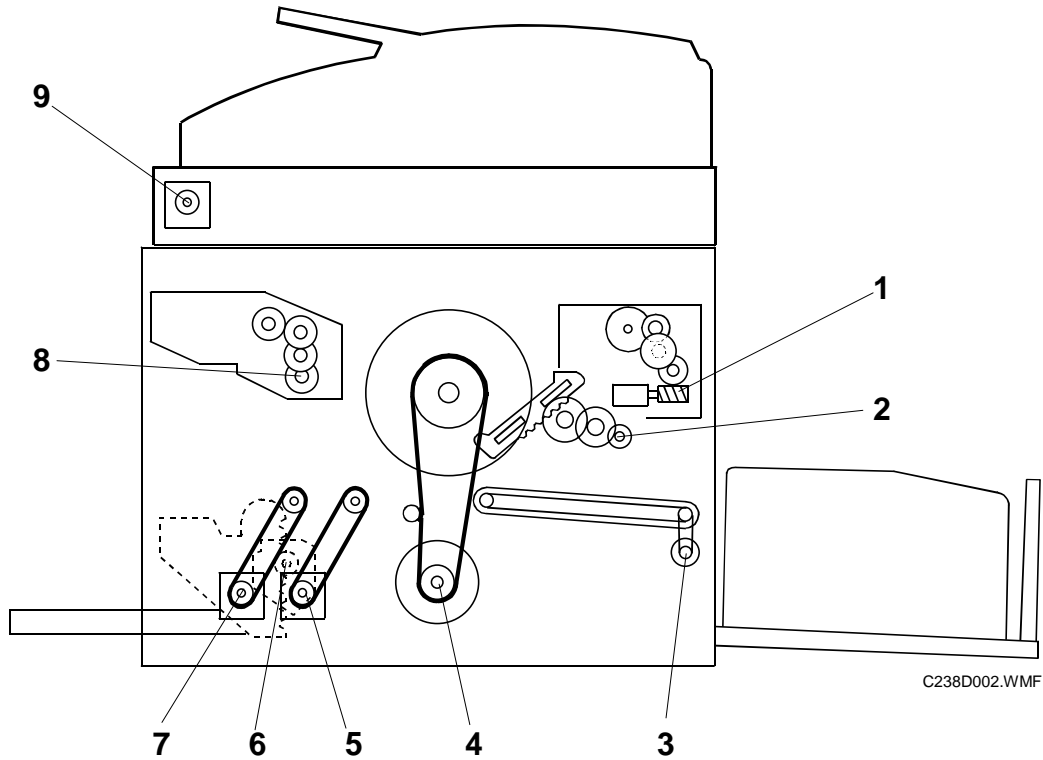
**Counters**

<b>No.</b>	<b>Component</b>	<b>Function</b>
25	Paper Counter	Keeps track of the total number of copies.
26	Master Counter	Keeps track of the total number of masters made.

**Others**

<b>No.</b>	<b>Component</b>	<b>Function</b>
11	Thermal Head	Burns the image onto the master.
3	Exposure Lamp (Xenon Lamp)	Applies light to the original for exposure.

### 6.1.3 DRIVE LAYOUT

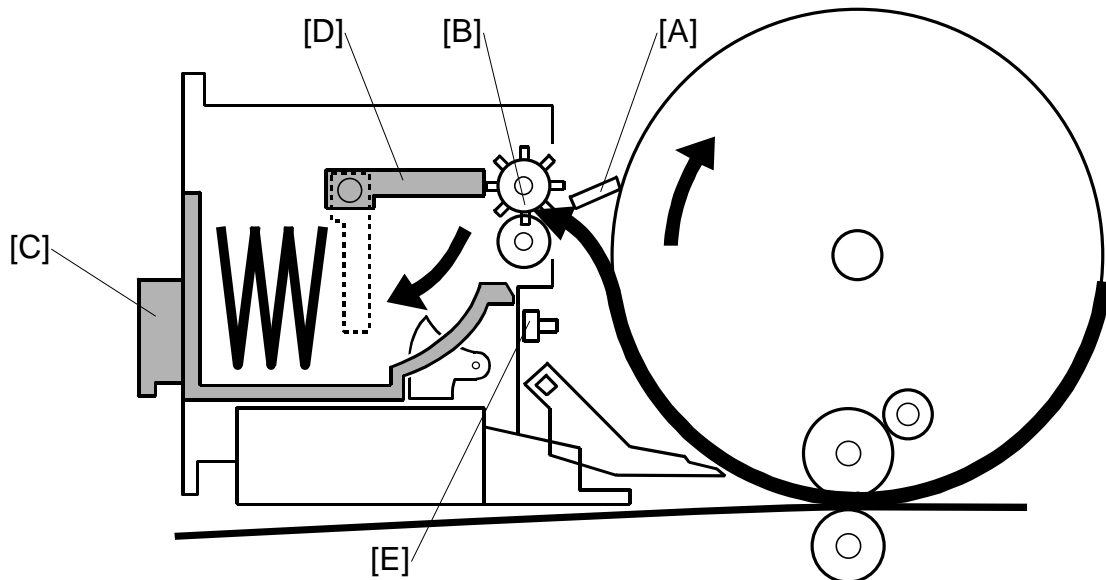


- |                         |                      |
|-------------------------|----------------------|
| 1. Pressure plate motor | 6. Table motor       |
| 2. Clamper motor        | 7. Paper feed motor  |
| 3. Paper delivery motor | 8. Master feed motor |
| 4. Main motor           | 9. Scanner motor     |
| 5. Registration motor   |                      |



## 6.2 MASTER EJECT UNIT

### 6.2.1 OVERVIEW



C238D022.WMF

#### Overview

The master eject unit removes the used master from the drum. (👉 **CT**: Digital Duplicators – Duplicating Process – Master Ejecting)

#### Procedure

The drum turns to the master eject position. Then the clamper [A] opens.



Master eject rollers [B] pick-up the master's leading edge and feed the master for 1.0 s into the master eject box [C].



The clamper then closes.



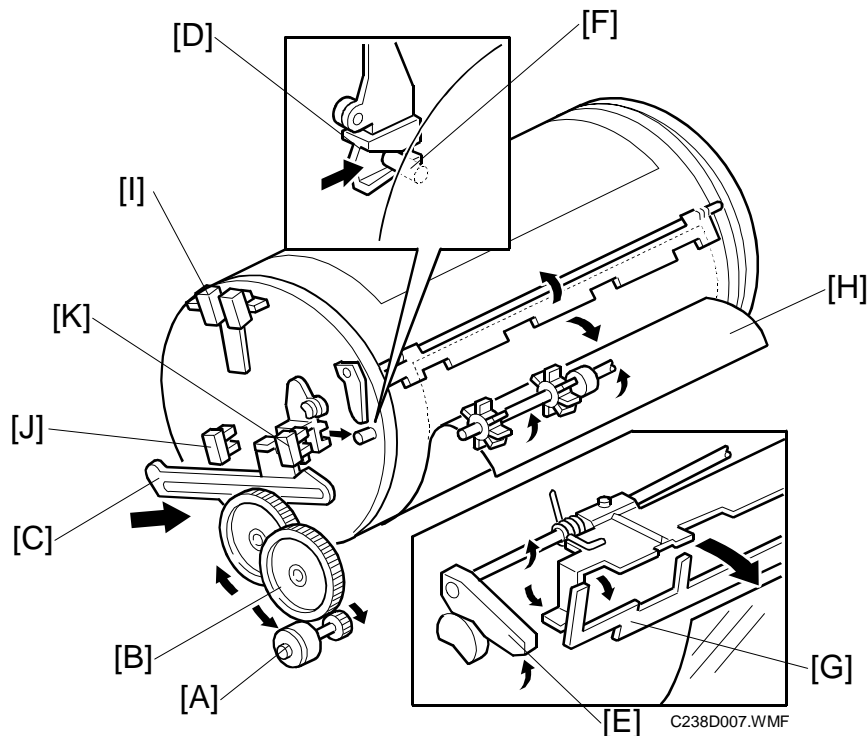
The drum then turns at 30 rpm while the master eject rollers continue to feed the used master into the eject box.



The drum stops after making about 1.5 turns. The master eject motor also stops. The pressure plate [D] then compresses the used masters in the eject box.

- The capacity is 50 used masters (under normal conditions)
- The master eject process is skipped when the drum master sensor [E] detects no master on the drum.

## 6.2.2 MASTER CLAMPER OPENING MECHANISM



### **Clamper Mechanism**

Clamper motor [A] - opens the clamper at the master eject position

↓  
Gears [B]

↓  
Link [C]

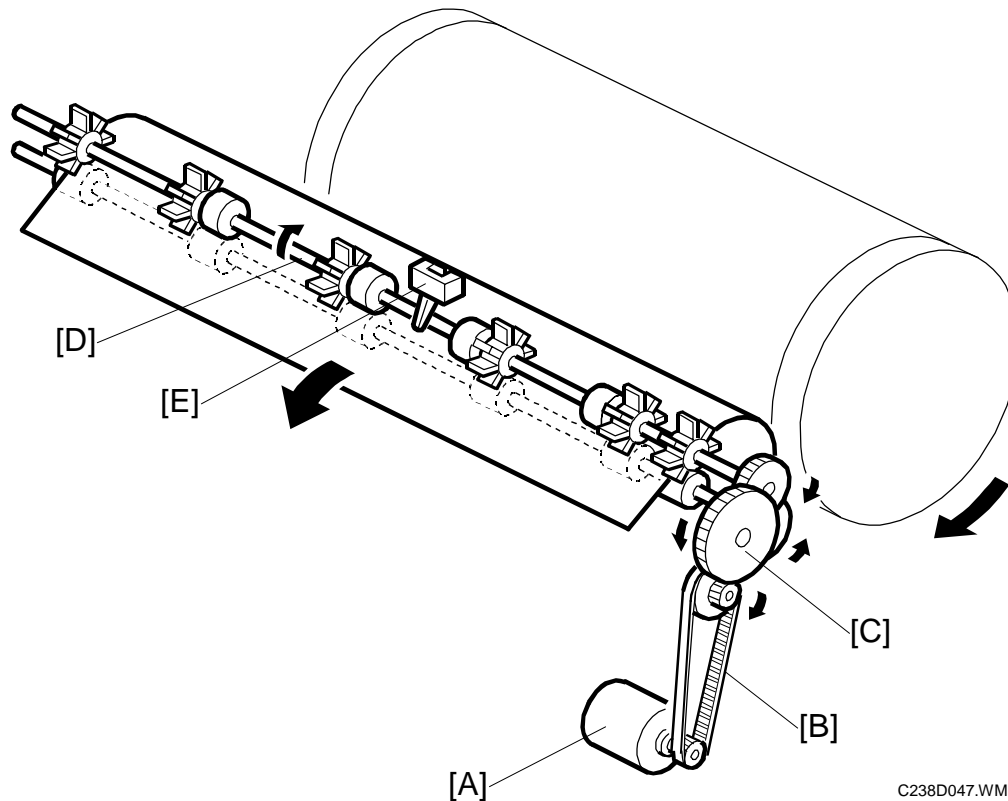
↓  
Drum guide [D] - moves and engages the pin on the rear flange of the drum

↓  
Lifts the clamper lever [E], and engages the drum pin [F]

↓  
The lever [E] lifts the master eject arm [G] to release the master's leading edge [H] from the clamper.

- NOTE:**
- 1) After the Start key is pressed and before the clamper motor starts, the master eject position sensor [I] is checked (the drum must be at the master eject pos.).
  - 2) The sensor actuators on the link [C], the clamper open sensor [J], and the clamper close sensor [K] determine the clamper open and close positions.
  - 3) The master clamper uses a magnetic plate to clamp the master's leading edge.
  - 4) The drum guide catches the drum at the master eject position while the master clamper is being opened. When the clamper motor turns on in reverse to close the clamper, the drum guide also disengages the pin and the drum can turn.

### 6.2.3 MASTER EJECT ROLLER MECHANISM



#### **Mechanism**

Master eject motor [A]



Belt [B]



Gears [C]



Master eject rollers [D] – the upper roller has paddles

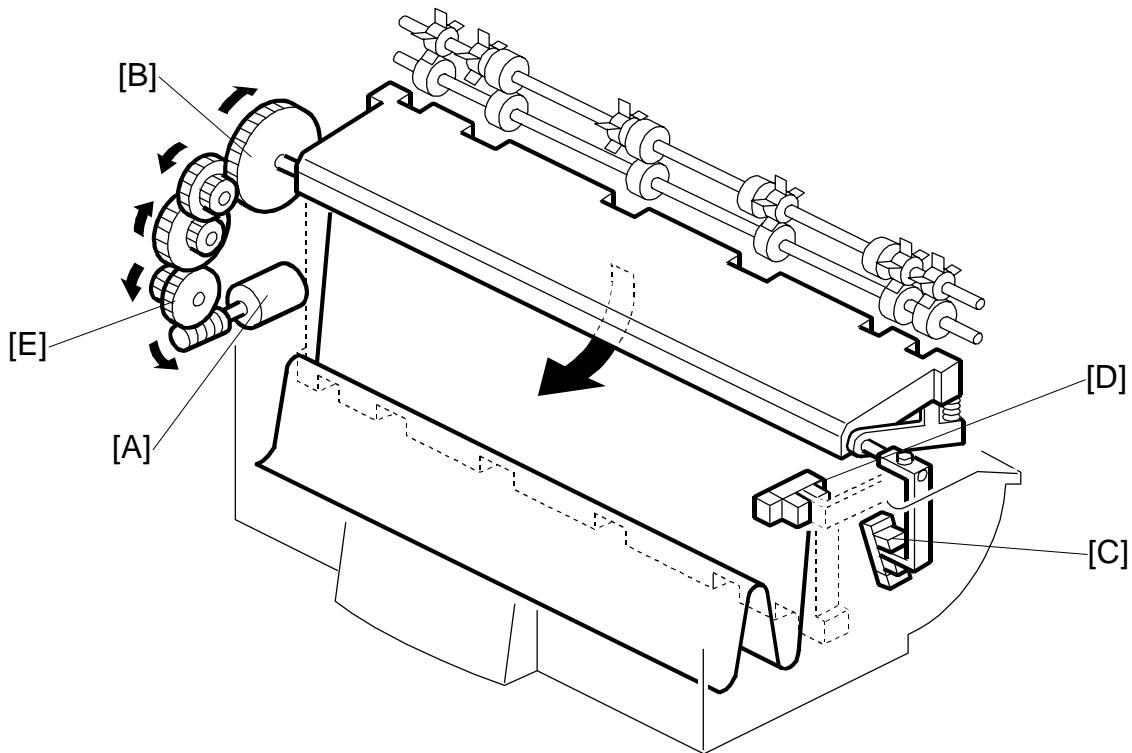


Pick up the master and feed it into the master eject box

#### **Procedure**

1. When the clamber is open and the master's leading edge is released from the clamber, the master eject motor turns on for 1.0 s to pick up the leading edge.
2. Then, the clamber motor reverses to close the clamber
3. The drum then starts turning at the slower speed (30 rpm). At the same time, the master eject rollers turn again to feed the master into the master eject box.
4. When the drum reaches the master feed position, the master eject and drum motors stop. The master feed position is 121 encoder pulses (43 degrees) after the feed start timing sensor is actuated.
5. During this process, the master eject sensor [E] detects master eject jams. (6.10.1)

## 6.2.4 PRESSURE PLATE MECHANISM



C238D017.WMF

### ***Mechanism***

Pressure plate motor [A]



Gears [B]



Pressure plate rotates



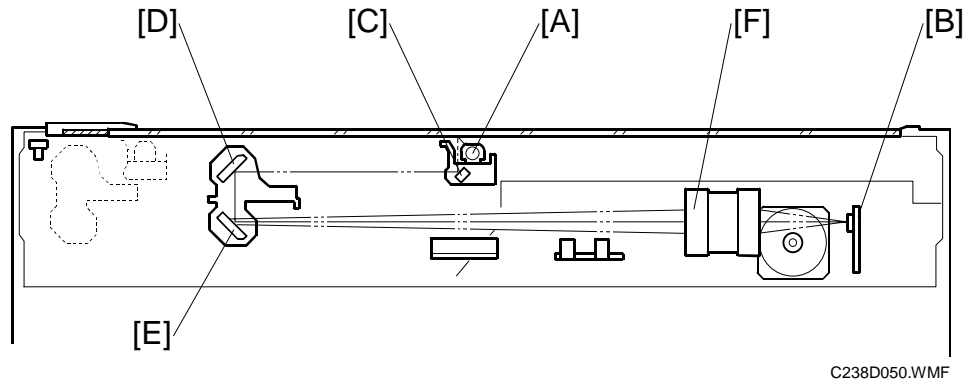
Compresses the masters

### ***Procedure***

1. After the master has been ejected and the drum is stopped at the master feed position, the pressure plate motor turns until the actuator on the pressure plate actuates the limit sensor [D].
2. After master making and cutting, the motor reverses until the pressure plate home position sensor [C] is actuated, then it stops.
3. If the pressure plate limit sensor is not actuated within 4.5 seconds after the pressure plate motor rotates, the Full Master Eject Box indicator lights.
4. The idle gear has a clutch [E] to prevent motor overload.

## 6.3 SCANNER UNIT

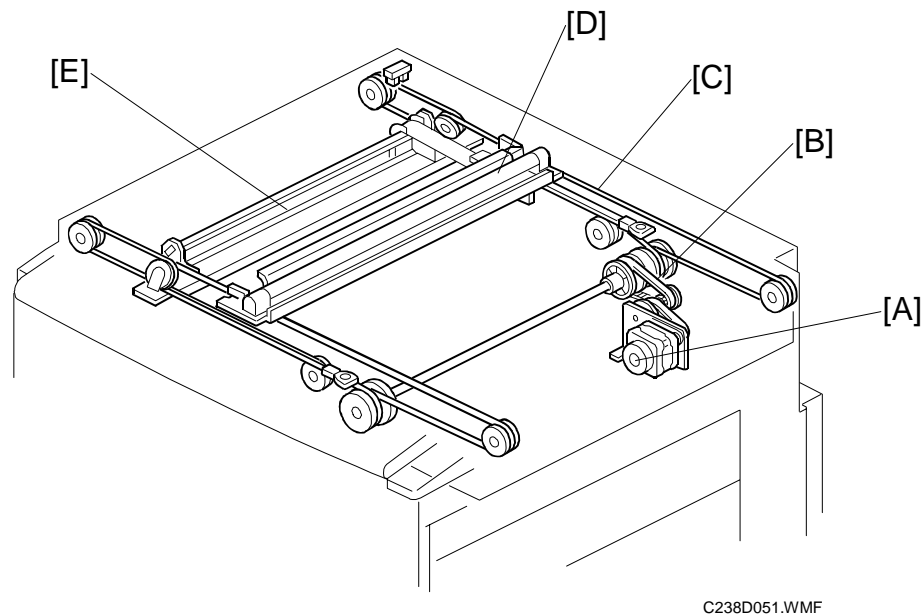
### 6.3.1 OVERVIEW



- [A]: Exposure lamp
- [B]: Charge coupled device (CCD)
- [C]: First mirror
- [D]: Second mirror
- [E]: Third mirror
- [F]: Lens

- The exposure lamp is a xenon lamp (DC 24V).
- Light reflected off the original is directed onto a CCD via the mirrors and the lens.
- The main-scan resolution is 600 dpi, because the CCD is 600 dpi. This model always reduces the amount of scanned data to 300 dpi. (➡ 6.4.5)
- The sub-scan resolution is 300 dpi.

### 6.3.2 SCANNER DRIVE



A: Scanner motor



B: Timing belt



C: Scanner wire



D: First scanner, E: Second scanner

#### **Full size mode**

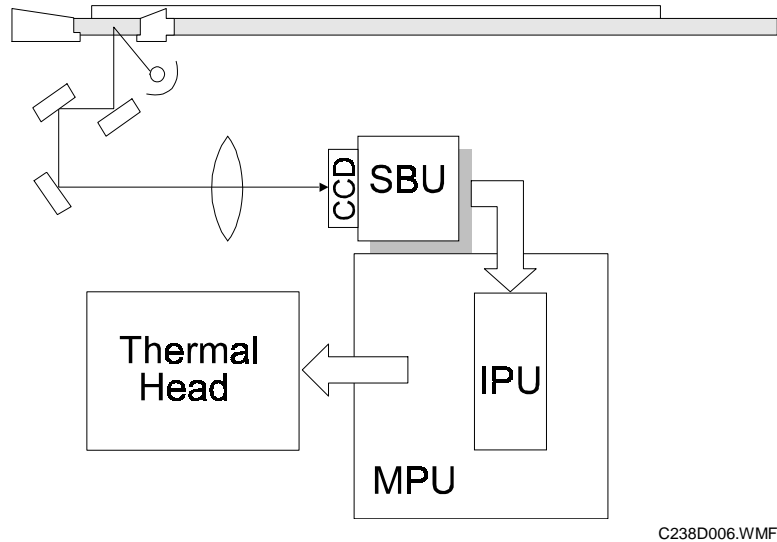
- During scanning, the first scanner speed is 20.32 mm/s.
- The second scanner's speed is half the first scanner's speed.
- Speed increases when the scanner returns.

#### **Reduction/enlargement modes**

- First scanner speed equals the drum rotation speed divided by the magnification ratio (0.5 to 2.0).
- Varying the scanner speed changes the sub-scan image size. Image processing on the MPU changes the main scan image size.
- The return speed is the same as in full size mode.

## 6.4 IMAGE PROCESSING

### 6.4.1 OVERVIEW



- The CCD line has 7,450 pixels and the resolution is 600 dpi (23.6 lines/mm).
- The A/D converter in the SBU transforms the analog signals into 8-bit digital signals.

The MPU carries out the following processes on the image data:

Auto shading



Filtering (MTF)

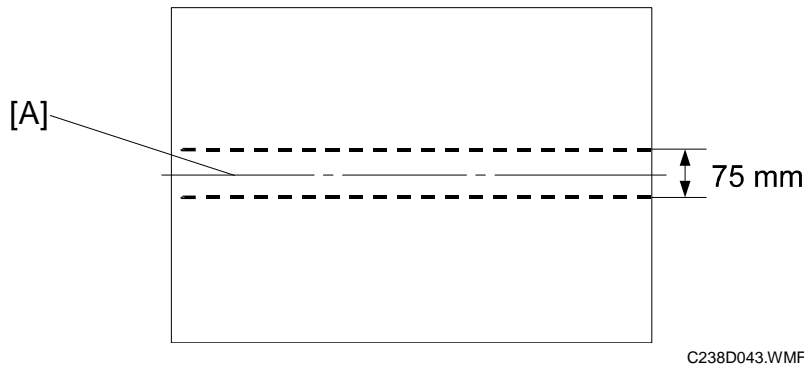


Magnification



Binary processing

### 6.4.2 AUTO BACKGROUND CORRECTION



- Auto background correction prevents the background of an original from appearing on copies.
- The density of the area [A] (the central 75 mm of the main scan) is the peak white level density.
- This correction can be used in Photo/Letter, Photo, and Tint modes.

### 6.4.3 AUTO SHADING

- Auto shading corrects errors in the signal level for each pixel using the white plate.

### 6.4.4 MTF FILTER

- The MTF filter enhances the desired image qualities.
- The MTF filter is used in all modes (Letter, Letter/Photo, Photo, and Tint).
- This model has no SP mode adjustments.

### 6.4.5 MAIN SCAN ENLARGEMENT/REDUCTION

- Changing the scanner speed enables reduction and enlargement in the sub-scan direction.
- The processing for main-scan enlargement/reduction is the same as in the previous digital machines
- The thermal head is 300 dpi, but the CCD is 600 dpi. Therefore, this model always reduces the amount of scanned data by half before printing.



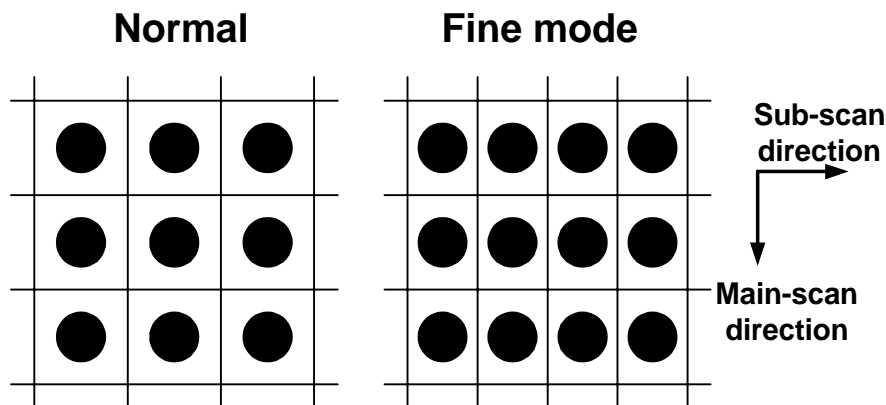
## 6.4.6 BINARY PROCESSING

This process converts the video signal from 8-bit to 1-bit (black and white) in accordance with a threshold value.

The threshold value depends on a compensation curve (gamma curve) which corresponds to selected image processing settings. For example, if a darker image is selected, a compensation curve that converts each pixel value to a higher number is selected. This ensures accurate generation of the 256 gray scales from black to white.

## 6.4.7 FINE MODE

Purpose: Use this function to make clear prints.



C238D049.WMF

This machine's specification is 300 dpi.

With this function, the scanner scans at 400 dpi in the sub-scan direction by reducing the scanner motor speed, then the master making unit writes at 400 dpi in the master feed direction by reducing the master feed motor speed. Therefore, the resolution in the paper feed direction is 400 dpi.

## 6.4.8 THERMAL HEAD

### *Specifications*

Length: 292.032 mm

Number of thermal head elements: 3456 dots

Density of thermal head elements: 300 dpi

### *Thermal head control*

The thermal head contains heating elements at a density of 300 dpi. The thermal heating elements melt the over-coating and polyester film layers of the master, in accordance with the image signal for each pixel.

The PSU applies power (VHD) to the thermal heating elements. The power source varies from one head to another because the average resistance of each element varies. Therefore, when replacing the thermal head or power supply unit, it is necessary to readjust the applied voltage to the specific value for the thermal head.

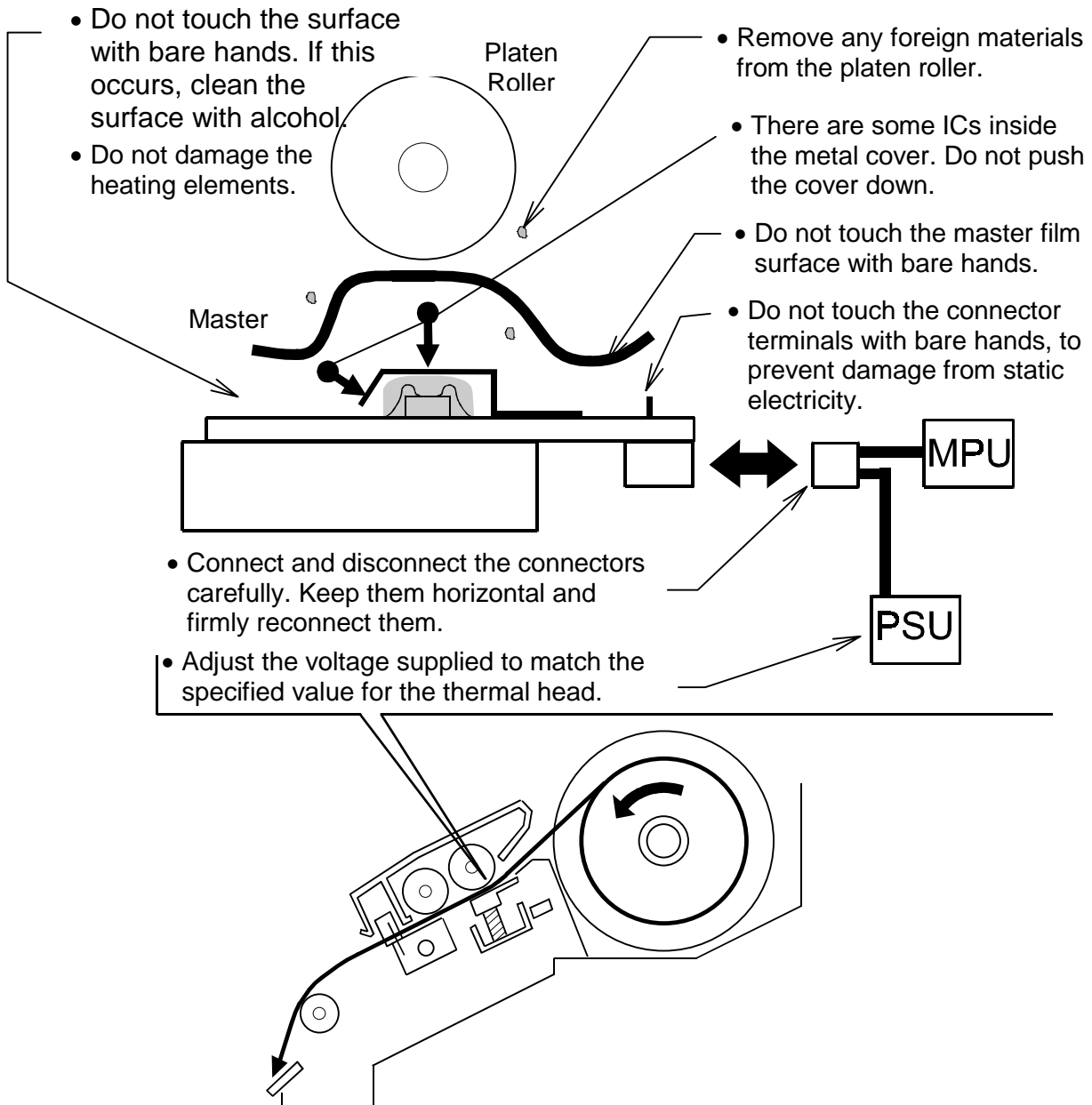
### *Thermal head protection*

The thermistor on the thermal head provides thermal head protection, preventing the thermal head from overheating when processing a solid image. The CPU checks for any abnormal condition when the Start key is pressed; it displays an error code on the operation panel as follows:

No.	Symptom	Possible cause
E-04	<u>Thermal Head Overheat</u> The temperature of the thermal head is greater than 54°C when the Start key is pressed.	Overheat (wait for the thermal head to cool down) Thermal head
E-09	<u>Thermal Head Thermistor Open</u> The thermistor output voltage is over 4.9 volts.	Thermal head thermistor Thermal head connector

### Remarks for Handling the Thermal Head

Pay careful attention to the following remarks when servicing:

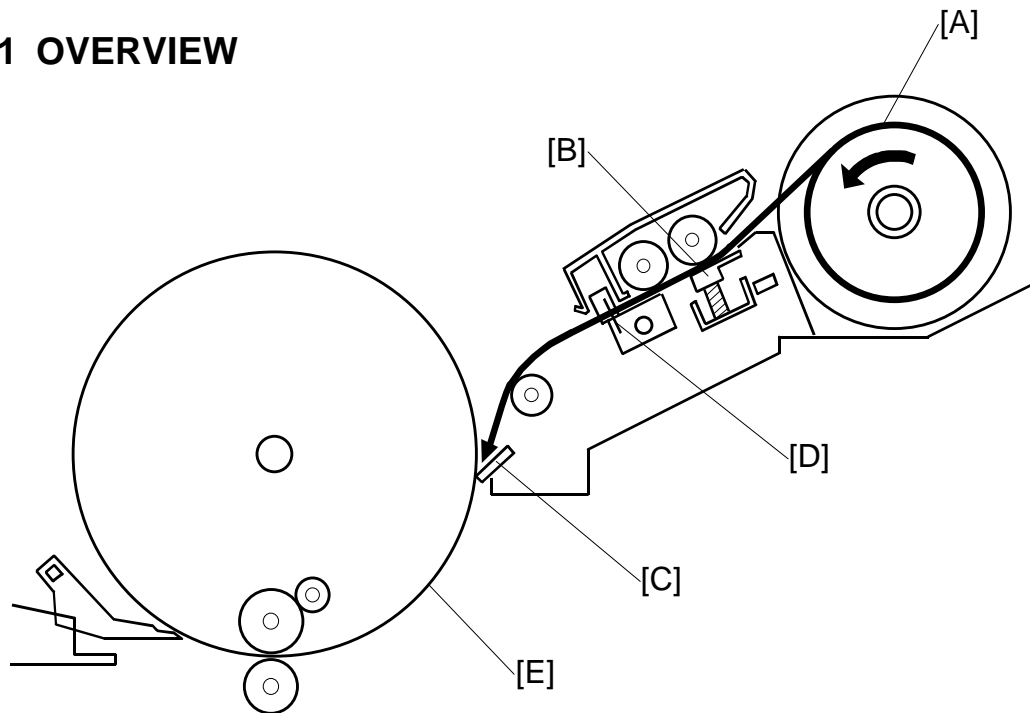


Detailed  
Descriptions

C238D021.WMF

## 6.5 MASTER FEED

### 6.5.1 OVERVIEW



C238D052.WMF

The master feed unit makes an image on the master and feeds the master to the drum. (🖨️📖: Digital Duplicators – Duplicating Process – Master Feeding)

#### ***Procedure***

The machine feeds the master from the master roll [A].



The thermal head [B] makes an image on the master.



Clamber [C] opens. (The drum is at the master feed position.)

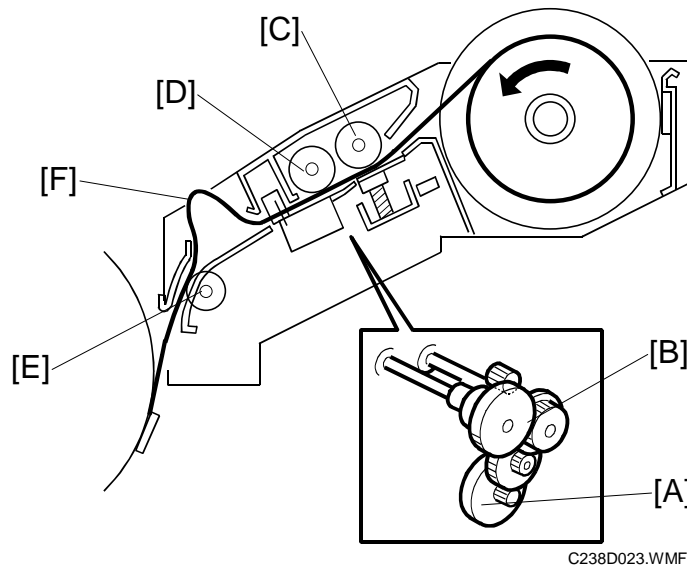


The clamber clamps the master. At this time, the cutter [D] cuts the master.



The master is wrapped around the drum [E].

## 6.5.2 MASTER FEED MECHANISM



### ***Mechanism***

Master feed motor [A] (stepper motor)



Gears [B]



Platen roller [C], master feed roller [D]



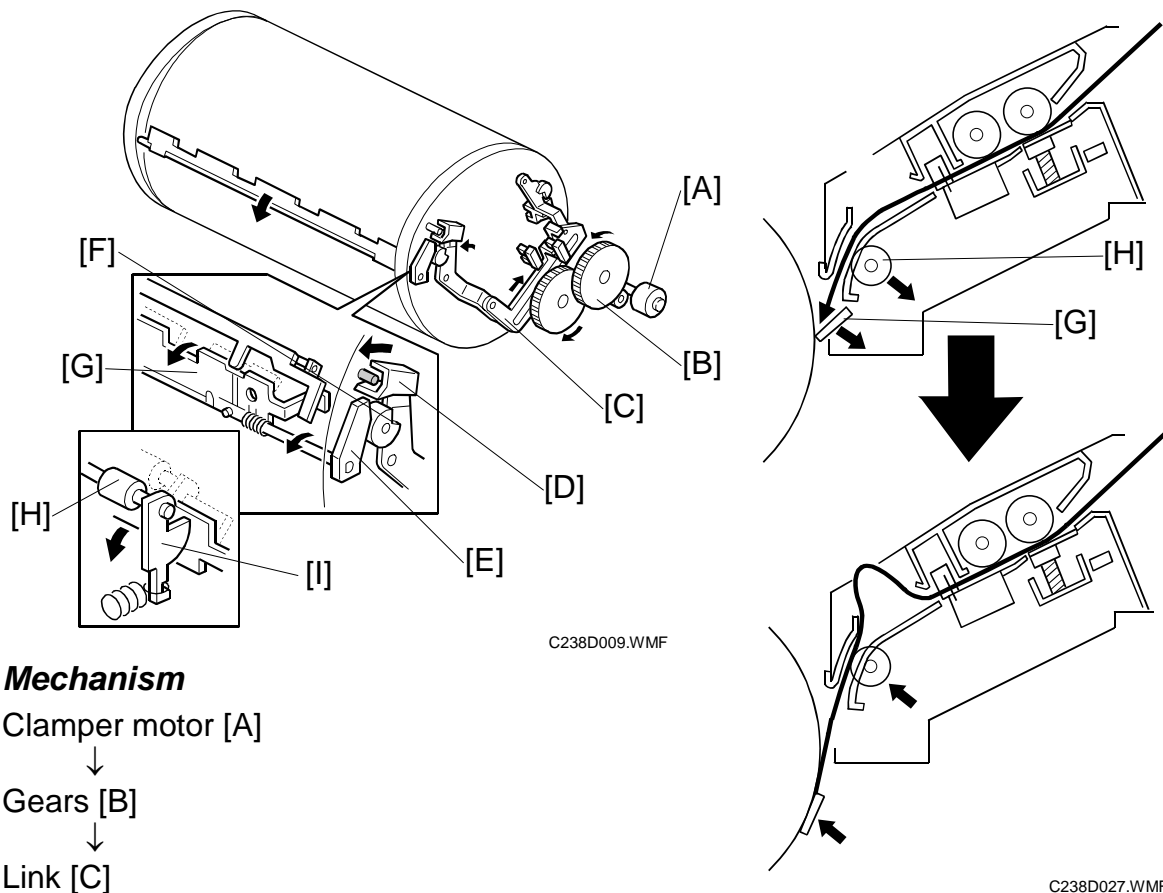
Feeds the master (The thermal head makes an image on the master.)

### ***Procedure***

1. After the old master has been ejected, the drum stops at the master feed position and the master clamber opens, ready to clamp the new master.
2. When the clamber is open, the tension roller releases and the master is fed to the clamber on the drum. For details of the tension roller, see the next section.
3. After the clamber closes, the master feed motor feeds the master while the drum rotates intermittently at 30 rpm. The intermittent rotation keeps a buckle [F] in the master above the master feed guide to absorb shocks from the wrapping operation.
4. The tension roller [E] keeps the master under tension. Without this roller, the master would crease when the drum turns continuously during wrapping around the drum, so it reduces the master making time.
5. The main motor turns off when the drum is at the master eject position. The master feed motor continues to feed the master until master making completed. Then the master feed motor turns off, and cutting is done.

**NOTE:** Springs press the thermal head against the platen roller. The pressure is applied when the master set cover, which includes the platen roller, is closed.

### 6.5.3 CLAMPER AND TENSION ROLLER MECHANISM



#### **Mechanism**

Clamber motor [A]

↓  
Gears [B]

↓  
Link [C]

↓  
Drum guide [D]

↓  
Lifts the lever [E], engages and locks the drum pin [F], and opens the clamber plate [G].

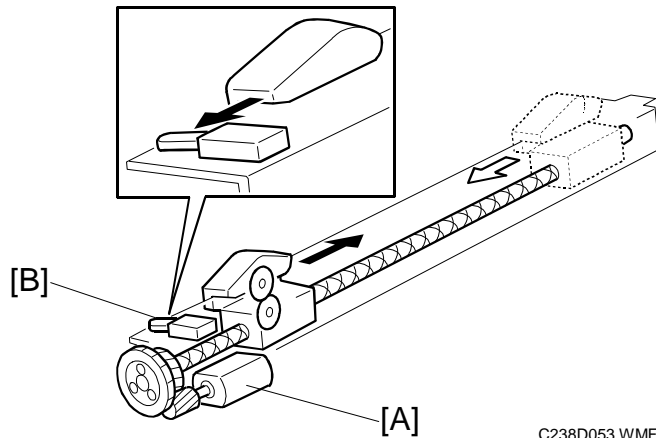
↓  
Releases the tension roller [H].

↓  
Feeds the master into the clamber.

#### **Procedure**

- When the old master has been ejected, the drum is stopped at the master feed position. The master clamber clamps the leading edge of the new master before the drum starts to turn again.
- The tension roller [H] normally presses against the master feed guide plate to apply tension to the master during master wrapping. When the clamber opens, it pushes the tension roller arms [I] and moves the tension roller away from the guide plate to allow the master to be fed into the master clamber.
- Clamber mechanism: See the Master Eject section

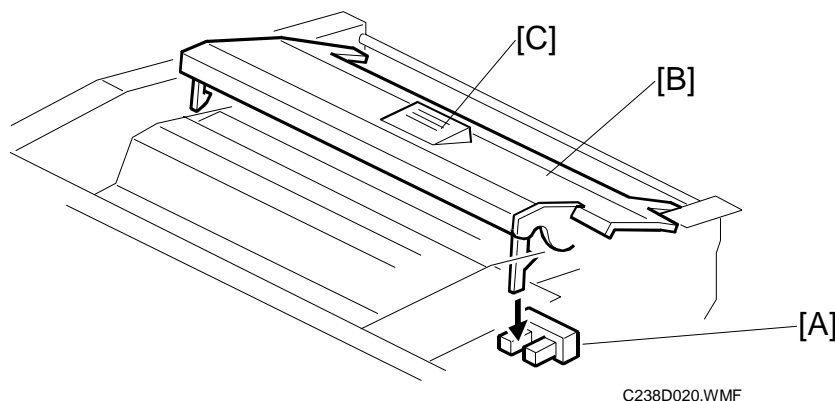
### 6.5.4 CUTTER MECHANISM



[A]: Cutter motor  
[B]: Cutter HP sensor

- When the cutter starts, the drum is stopped at the master eject position (drum HP).
- The cutter moves backwards and forwards. While the cutter travels towards the rear (non-operation side), it cuts the master. The motor turns in one direction. The cutter returns to the home position when it reaches the rear because of the two different spiral threads on the screw shaft.
- The cutter usually cuts a master of about 550 mm in length. The cutter cuts a master of about 340 mm in length when an optional A4 black drum is used.
- After cutting, the drum starts turning again to wrap the remaining part of the master around the drum. The leading edge of the master that was cut remains at the cutting position, ready to make the next master.

### 6.5.5 MASTER SET COVER SENSOR

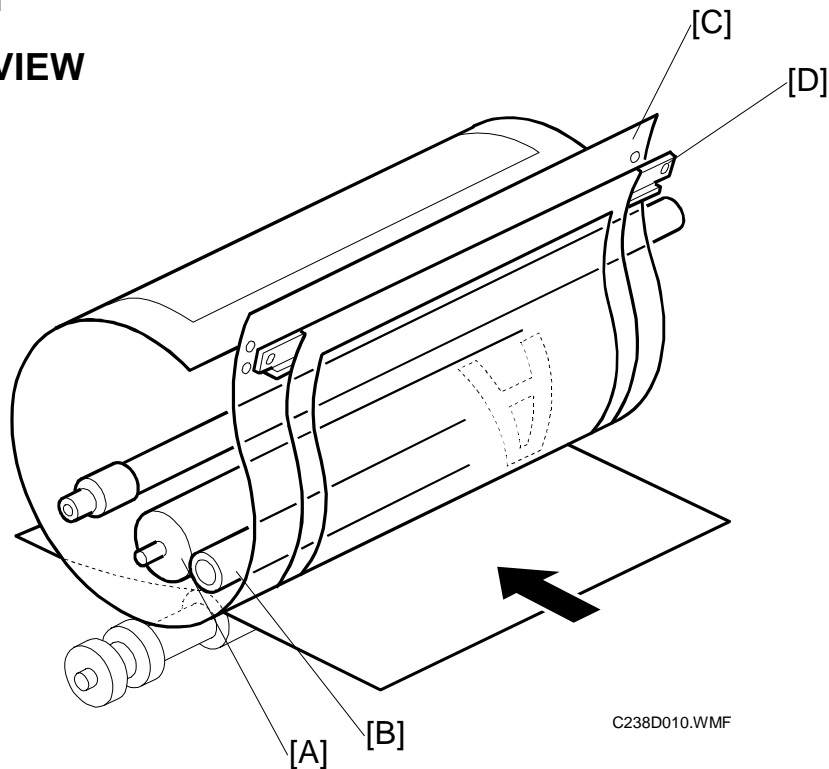


[A]: Master set cover sensor  
[B]: Master set cover

- If the cover is closed properly, the release button [C] rises.

## 6.6 DRUM

### 6.6.1 OVERVIEW



#### **Procedure**

Ink is supplied inside the drum, through the drum shaft.



The ink roller [A] and the doctor roller [B] spread the ink evenly on the screens.



Ink passes through the metal screen [C].



Ink passes through the cloth screen [D].



Ink passes through the holes in the master that were made by the thermal head.



Ink reaches the paper.

- NOTE:**
- 1) The drum is driven by the main motor and turns only clockwise.
  - 2) The main motor speed and the drum stop positions are controlled by monitoring the motor encoder.
  - 3) The ink pump, which is outside the drum, supplies ink from the ink cartridge into the drum through the drum shaft.



## 6.6.2 DRUM DRIVE MECHANISM

### **Mechanism**

Main motor [A] (dc motor)



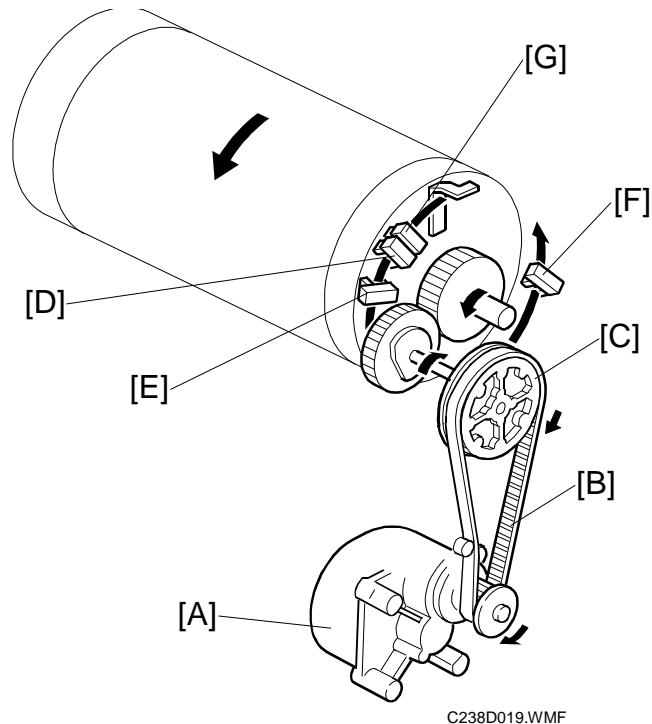
Belt [B]



Gears [C]

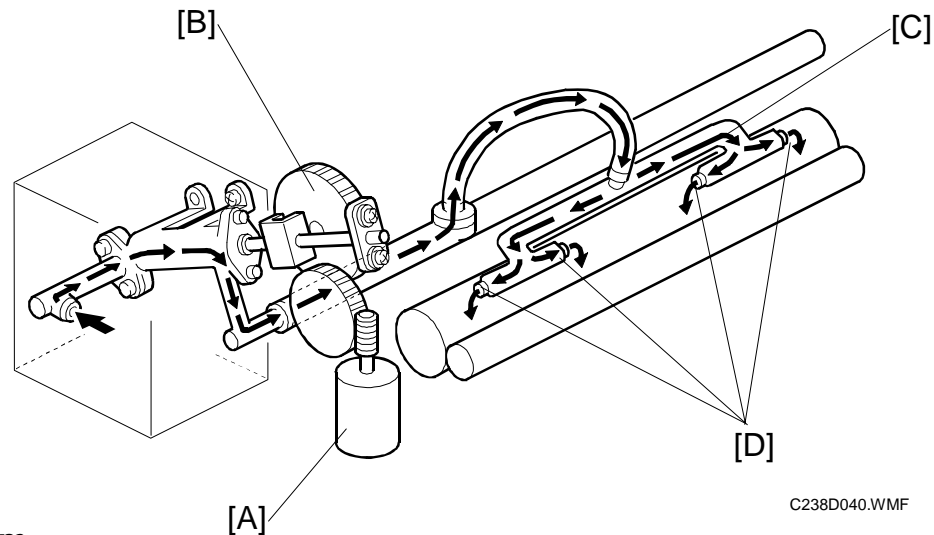


The drum rotates.



- NOTE:**
- 1) The main motor encoder sends pulses to the main motor control board (1020 pulses = 360 degrees).
  - 2) The CPU on the board monitors the pulses and controls the drum speed and stop positions.
  - 3) The drum has four sensors.
    - Master eject position sensor [D] (master eject position and HP)
    - Feed start sensor [E] (feed start timing)
    - Second feed timing sensor [F] (jam detection)
    - Paper exit timing sensor [G] (jam detection)
  - 4) The drum has two stop positions:
    - Master eject (home) position
    - Master feed position (feed start timing sensor + 121 pulses (43 degrees))

### 6.6.3 INK SUPPLY MECHANISM



#### ***Mechanism***

Ink pump motor [A]



Gears [B]



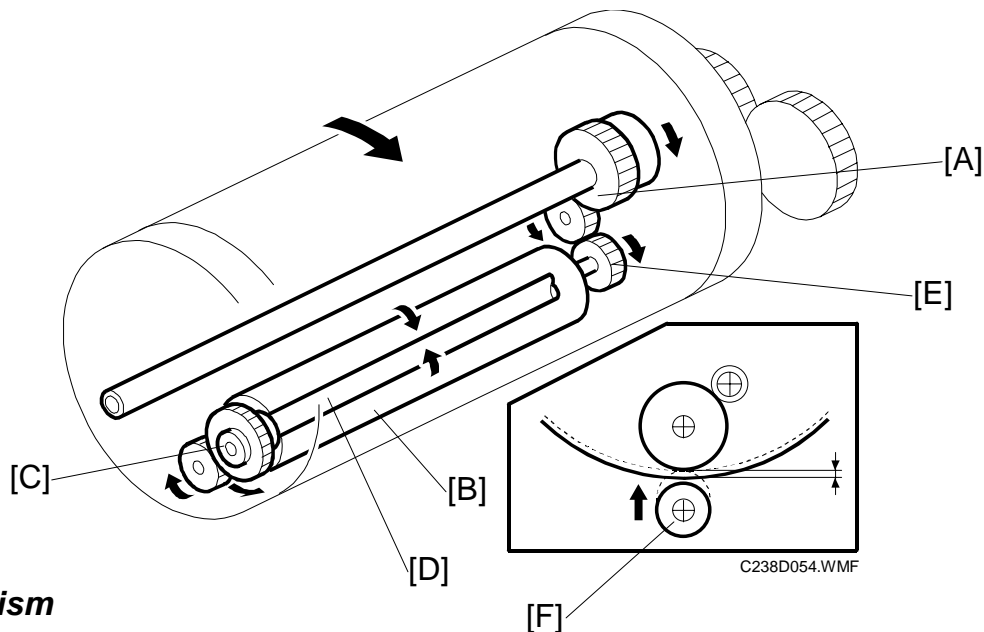
Gear rotation converted into piston motion.



Supplies ink from the ink cartridge to the ink roller via the pump, the shaft, the tube, and the ink distributor pipes [C]. Ink drops through 4 openings [D] in the ink distributor onto the ink roller.

**NOTE:** The ink pump is outside the drum in this model.

### 6.6.4 INK ROLLER MECHANISM



#### **Mechanism**

Main motor



Gears [A]



Ink roller [B] rotates



Gears [C]



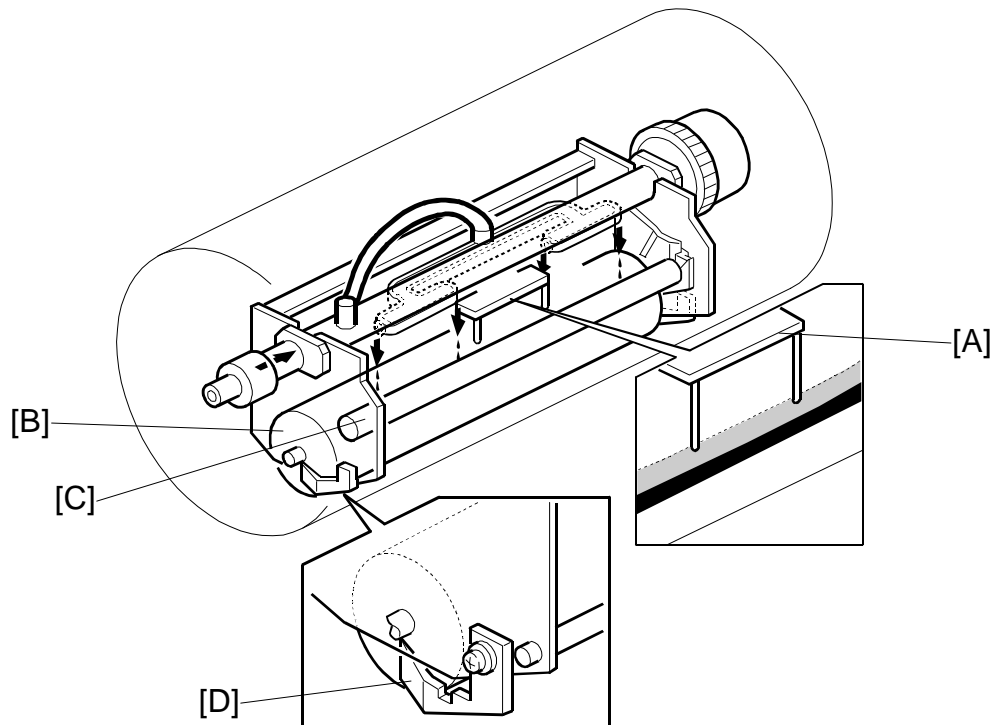
Doctor roller [D] rotates



The doctor roller squeezes the ink on the ink roller to produce an even thickness of ink on the ink roller.

- NOTE:** 1) The ink roller drive gear [E] has a one-way clutch to prevent the ink roller from being turned in reverse if the drum is manually turned in reverse.
- 2) The ink roller does not touch the metal screen when the machine is not printing.
- 3) During printing, the ink on the ink roller is applied to the paper through the holes in the screens and the master. This happens when the press roller [F] under the drum moves up to press the drum screen and the master against the ink roller. (🖨️📖: Digital Duplicators – Ink Supply Control)

## 6.6.5 INK SUPPLY CONTROL



C238D018.WMF

### ***Mechanism***

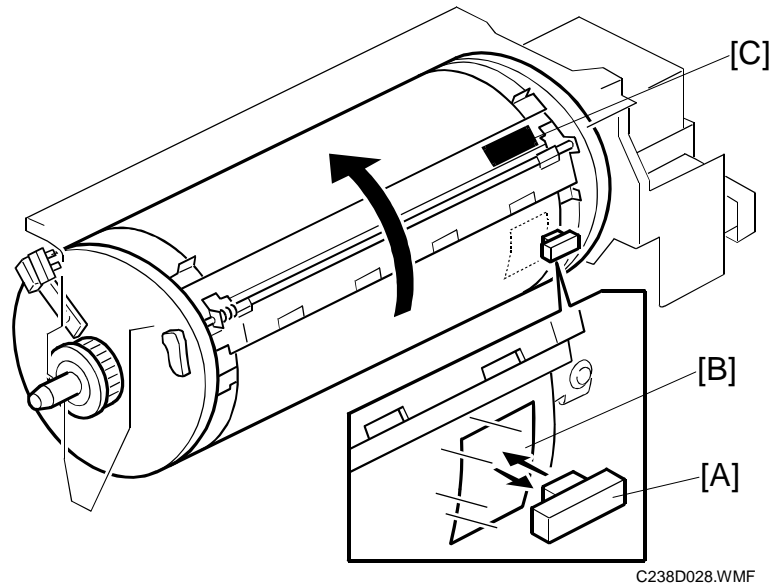
When the ink level is low, the pins [A] do not touch the ink.



The ink pump motor (●6.6.3) keeps the ink level normal by supplying ink when the level is low.

- NOTE:**
- 1) The ink detection pins [A] detect the capacitance between the ink roller [B] and doctor roller [C].
  - 2) If the pins detect an insufficient amount of ink after activating the ink pump motor for 30 seconds, a "no ink condition" is detected. The add ink indicator on the operation panel will light.
  - 3) There is an ink supply mode, which is useful when installing a new drum. When the "Economy Mode" key is pressed while holding down the "0" key, the drum turns for 60 seconds to supply ink inside the drum.
  - 4) The ink roller blades [D] on both ends of the ink roller scrape off the built-up ink on the ends of the ink roller.

### 6.6.6 DETECTION OF MASTERS ON THE DRUM

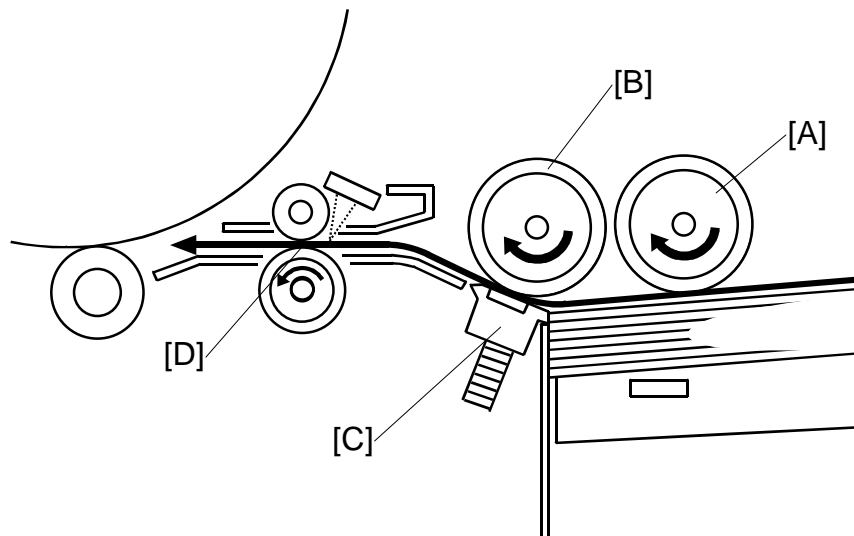


- [A]: Drum master sensor  
[B]: Black patch on the screen  
[C]: Black patch on the clamber

- The drum master sensor [A] detects whether there is a master on the drum.
- When there is a master on the drum, the black patch [B] is covered and the sensor detects the light reflected from the master. When there is no master on the drum, the black patch [B] is exposed. The black patch does not reflect light back to the sensor. Because of this, the master eject process can be skipped when a new master is being made, if no master is detected on the drum.
- The drum master sensor uses the black patch [C] on the clamber for jam detection. (●6.10.3)

## 6.7 PAPER FEED

### 6.7.1 OVERVIEW



C238D024.WMF

This mechanism feeds blank copy paper into the printer. (🖨️📖: Handling Paper – Paper Feed – Paper Feed Methods – Friction Pad)

#### ***Mechanism***

The paper table is lifted.



The pick-up roller [A] picks up a sheet of paper.



The feed roller [B] and the separation pad [C] only allow one sheet to pass.



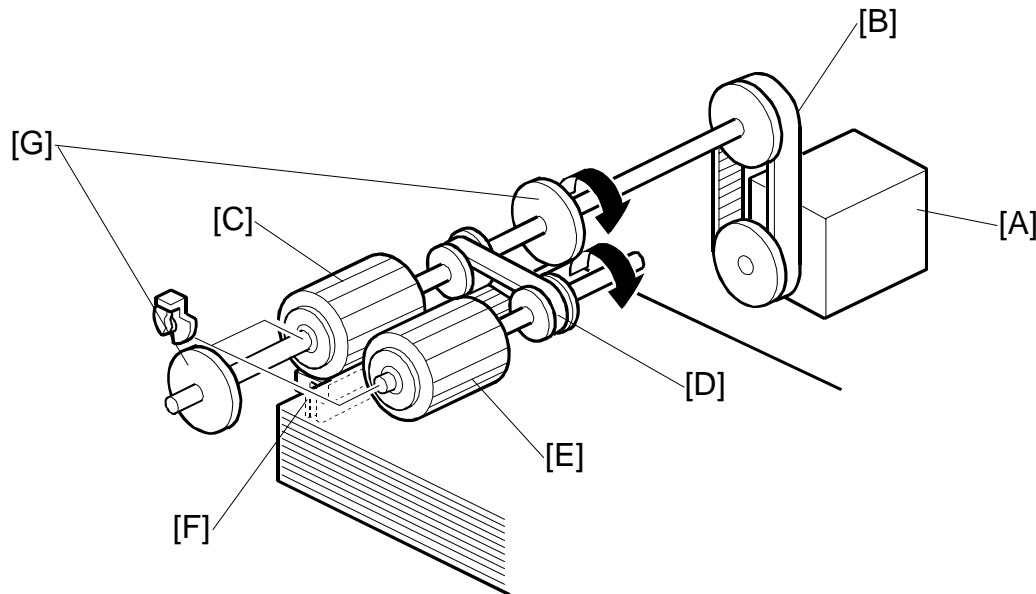
The registration rollers [D] feed the paper.



The print is made.

**NOTE:** 1) A dedicated stepper motor (paper feed motor) controls the feed roller and the pick-up roller.  
2) A dedicated stepper motor (registration motor) controls the registration roller.

## 6.7.2 PAPER FEED MECHANISM



C238D026.WMF

### **Mechanism**

Paper feed motor [A]



Belt [B]



Turns the feed roller [C]



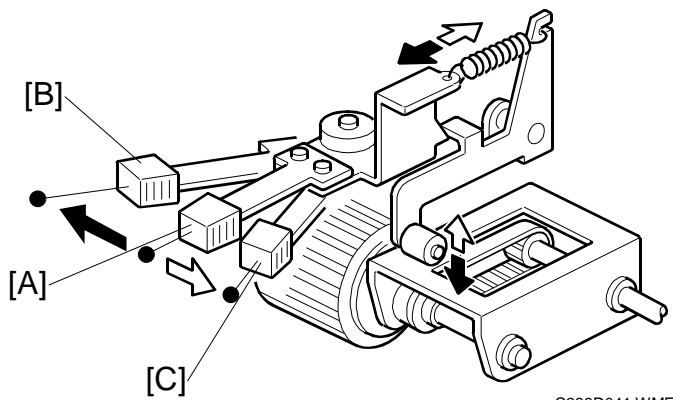
Belt [D]



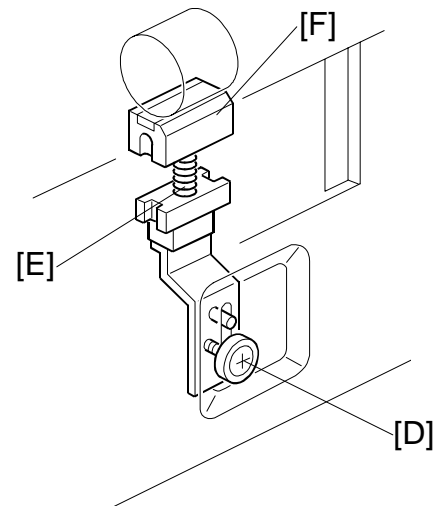
Turns the pick up roller [E]

- NOTE:** 1) The machine uses a friction pad [F] and feed roller system. (🖨️ **CT**): Handling Paper – Paper Feed – Paper Feed Methods – Friction Pad)
- 2) When the rollers stop and paper is fed by the registration rollers, the one-way clutches in the pick-up and feed rollers ensure that these rollers do not resist paper feed.
- 3) The guides [G] help to feed paper that is not perfectly flat.
- 4) Paper feed start timing depends on the selected printing speed: see the Timing Charts.

### 6.7.3 PAPER FEED / SEPARATION PRESSURE MECHANISM



C238D041.WMF



C238D055.WMF

- [A]: Normal position  
 [B]: Thick paper position  
 [C]: Thin paper position

- The user can change the pick-up roller pressure by changing the position of the pressure adjustment lever.
- If paper feed jams frequently occur, the lever should be moved to the left or the right to adjust the pressure.
- If non-feed or multi-sheet feed problems still occur, the paper separation pressure can also be adjusted. (This should be done by a technician; see 3.6.2)
- By loosening then moving the screw [D] up or down, the spring [E], which applies pressure to the friction pad block [F], moves up or down.
- The default position of the screw [D] is at the next to highest position.



## 6.7.4 REGISTRATION ROLLER MECHANISM

### *Registration Roller Drive*

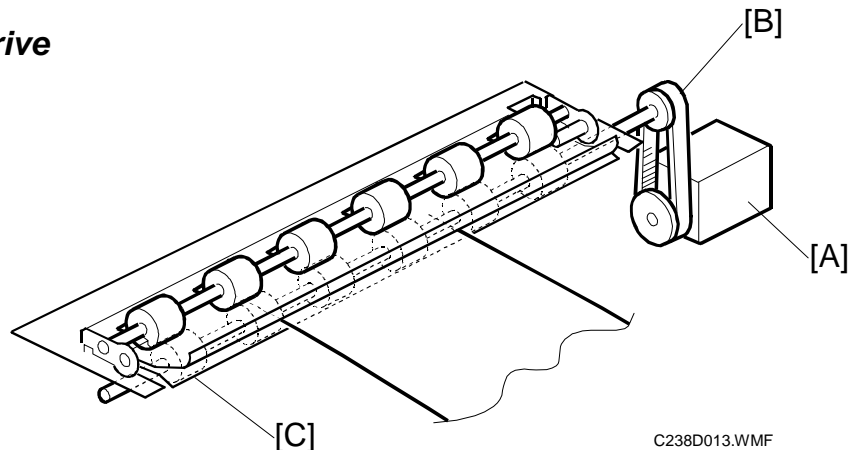
Registration motor [A]



Belt [B]



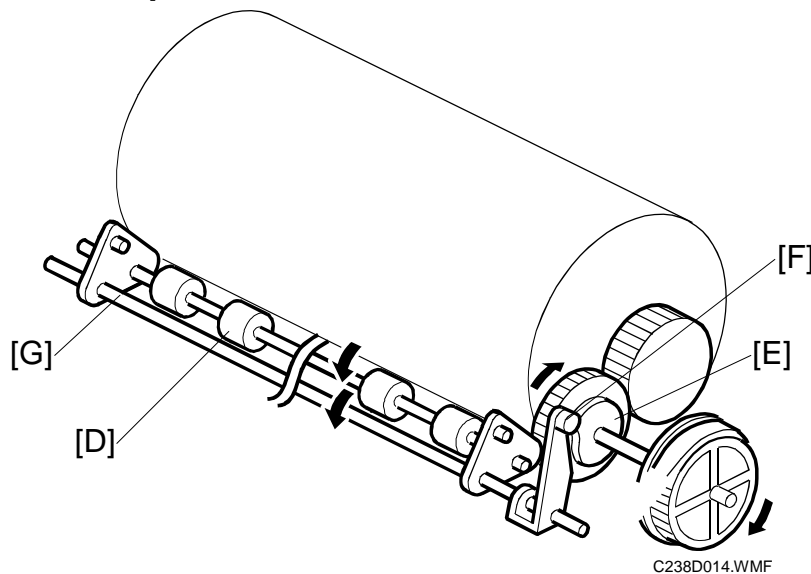
Turns the lower  
registration roller [C]



C238D013.WMF

**NOTE:** 1) The CPU controls the registration roller start timing to synchronize the printer paper with the image on the master on the drum.  
2) The motor speed depends on the selected printing speed.  
3) By pressing the image position keys on the operation panel, the registration motor start timing is changed.

### *Registration Roller Up/Down Mechanism*

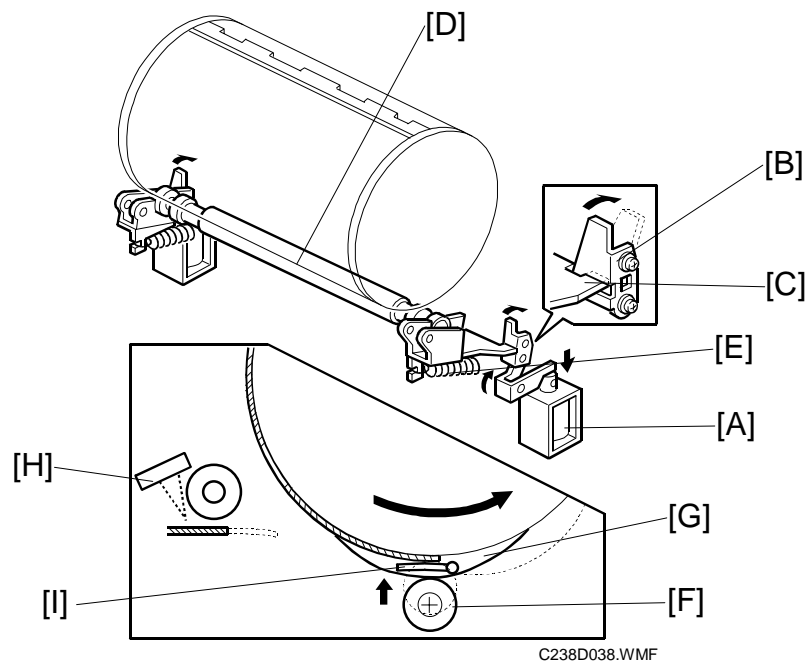


C238D014.WMF

Detailed  
Descriptions

- After the printing paper is caught between the drum and the press roller, the registration motor stops and the upper registration roller [D] is released from the lower registration roller. This is to prevent interference from the registration rollers while the drum and press roller transport the paper.
- When the high point of the cam [E] on the drum drive gear reaches the cam follower [F], the shaft [G] rotates clockwise (as seen from the operation side) to release the upper registration roller [D] from the lower registration roller.

### 6.7.5 PRINTING PRESSURE MECHANISM



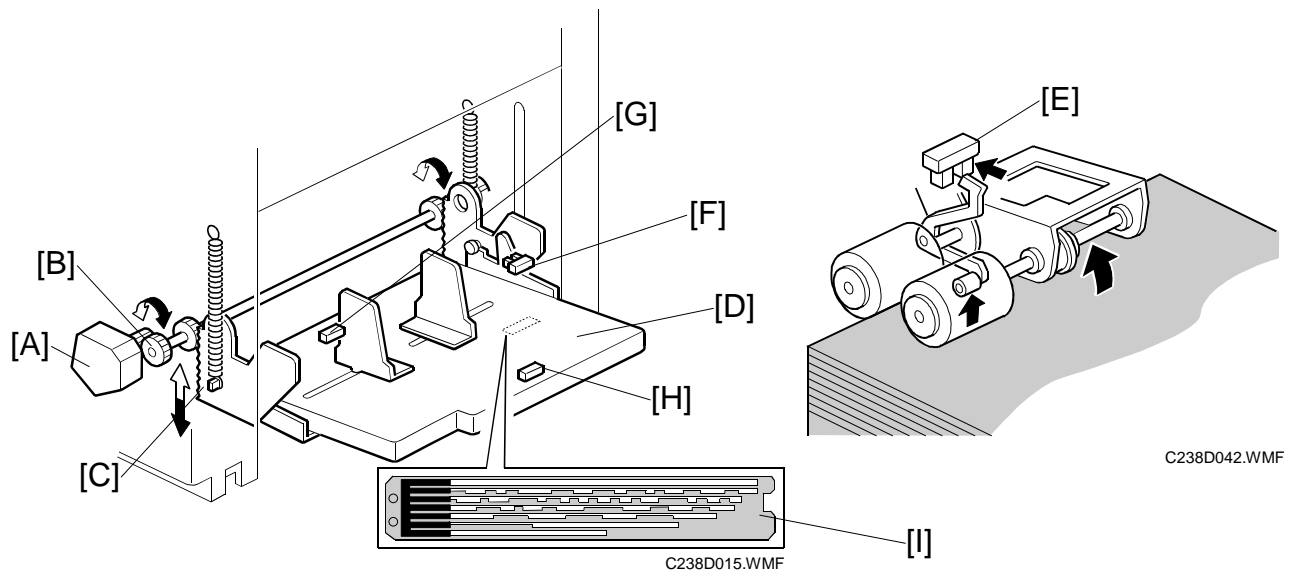
- When not in the printing cycle, the two solenoids [A] stay off and the stoppers [B] lock the brackets [C] to keep the press roller [D] away from the drum.
- When the 1st sheet of paper is fed, the solenoid is energized but the brackets are still locked by the stoppers due to strong tension from the springs [E]. When the high points of the cams [G] on the front and rear drum flanges reach the cam followers [F] on both sides of the press roller shaft, a small clearance is made between the stoppers and the brackets.
- The two solenoid plungers are pulled down at the same time, releasing the stoppers from the brackets. Printing pressure is applied by tension from the springs [E] when the cam followers [F] come off the high points of the cams [G].
- During the printing cycle, the solenoids stay on. However, if paper does not reach the registration sensor [H] at the proper time (when the cam follower is on the high point of the cam), the solenoids are de-energized to lock the brackets.
- The printing pressure is released when the cams push down the cam followers so that the press roller does not contact the master clasper [I].
- After printing is finished, the solenoids de-energize and the springs push the stoppers back. Before the drum returns to the home position, the stoppers lock the brackets again when the cams push down the cam followers.

### 6.7.6 RE-FEEDING MECHANISM

- If the registration sensor detects a non-feed, the machine tries again. However, if the machine detects a non-feed the second time, the jam indicator lights.

## 6.7.7 PAPER TABLE MECHANISM

### *Table lifting/lowering*



### **Mechanism**

Table motor [A] (dc motor)



Gear [B]



Racks [C]



Lifting or lowering the paper table [D].

- NOTE:** 1) When the paper height sensor [E] is actuated, the top of the paper stack contacts the pick-up roller [D], lifting it up. Then, when the paper height sensor [E] is actuated, the table motor stops.
- 2) When the table lower sensor [F] is actuated, the tray has been lowered to its lower limit, and the motor stops.
- 3) During a printing run, sheets are fed from the stack, lowering the pick-up roller. When the paper height sensor [E] is de-actuated, the paper table motor raises the paper table until the sensor is actuated again.

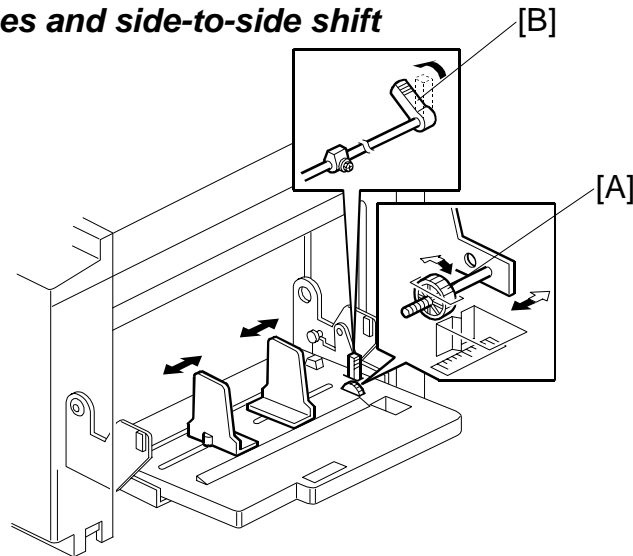
### **Paper end detection**

- The paper end sensor [G] under the paper table detects when the paper on the table runs out.

### **Paper size detection**

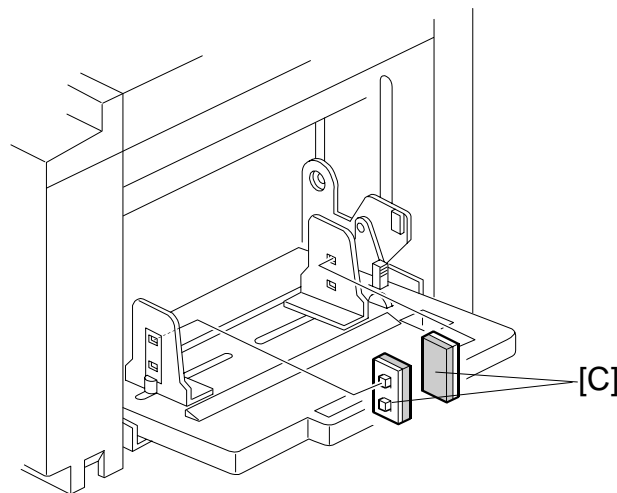
[H]: Paper length sensor

[I]: Paper width detection board

**Table side fences and side-to-side shift**

C238D056.WMF

- The paper table shift dial [A] shifts the image across the page. If the dial is turned, the whole paper table moves towards one side or the other.
- The side fences move together due to a rack and pinion mechanism. There is a lock lever [B] to hold the side fences in position.

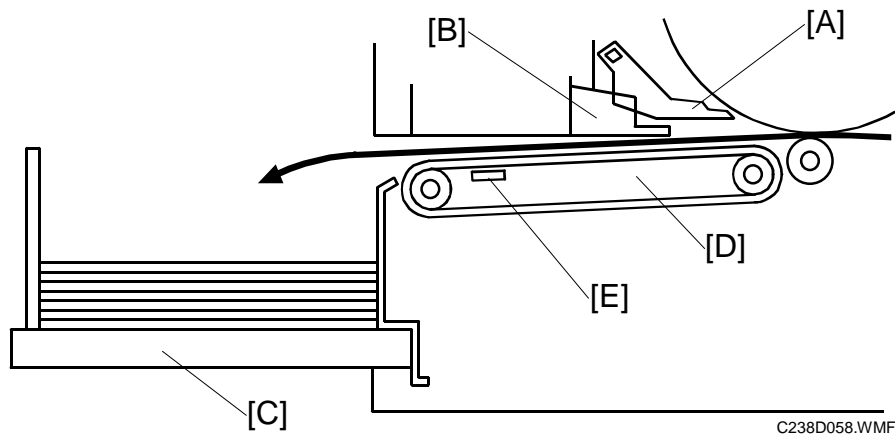
**Side fence friction pads**

C238D057.WMF

- The two side fence friction pads [C] are included as accessories. These are not used normally, but if paper multi-feed frequently occurs, the friction pads can be installed to apply stopping pressure to the paper. These are especially useful when thin paper is used.
- The user can install the friction pads if they are using thin paper.

## 6.8 PAPER DELIVERY

### 6.8.1 OVERVIEW



#### **Procedure**

The exit pawl [A] and the air knife [B] separate the paper from the drum.



The paper is fed to the exit table [C] by the paper delivery unit [D].

The paper exit sensor [E] is used for jam detection. (➡ 6.10.6)

### 6.8.2 PAPER DELIVERY UNIT DRIVE MECHANISM

#### **Mechanism**

Paper delivery motor [A]



Belt [B]

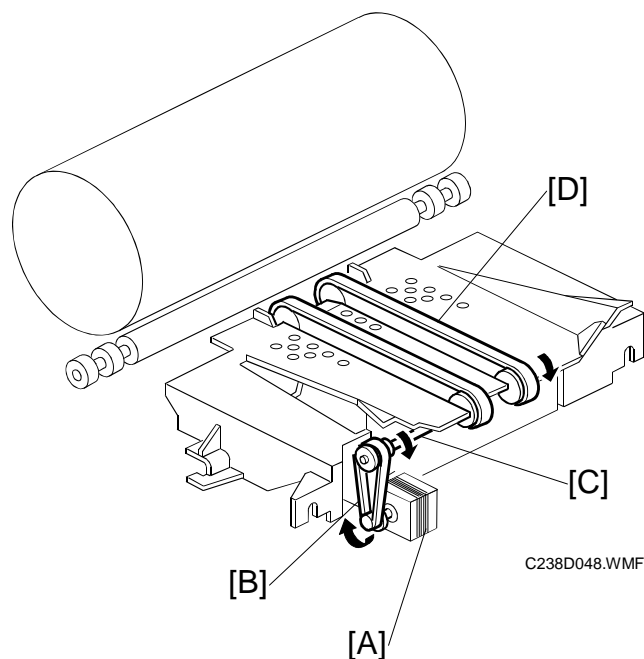


Shaft [C]



Rotates the transport belts [D].

- NOTE:** 1) The vacuum fan motor inside the unit holds the paper against the belts [D] to deliver the paper to the exit table.
- 2) The motor rotation speed depends on the selected print speed.

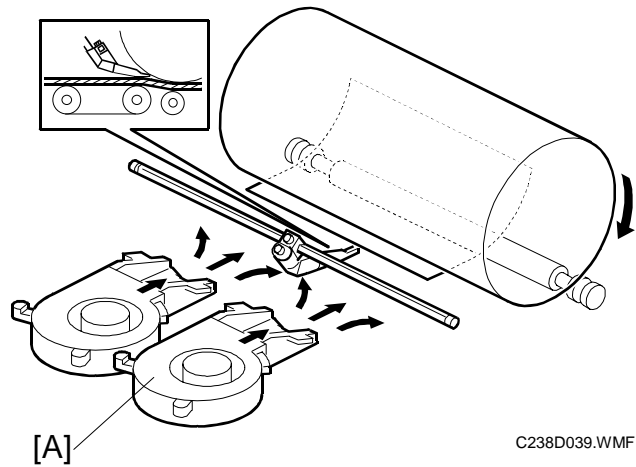


Detailed  
Descriptions

### 6.8.3 PAPER SEPARATION FROM THE DRUM

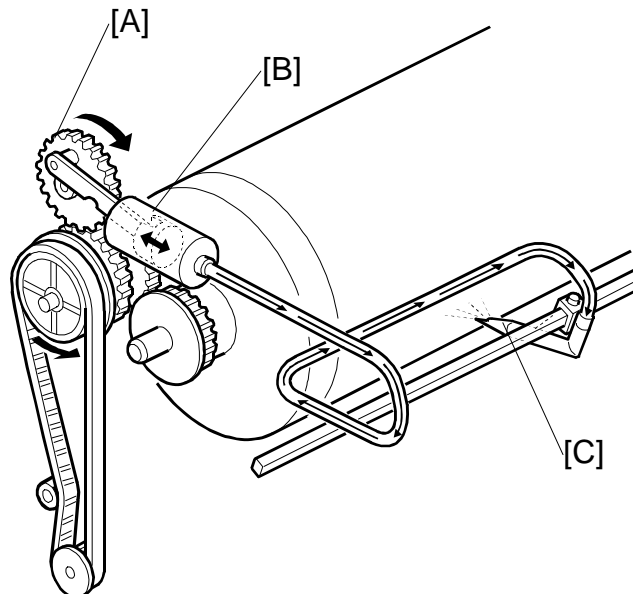
#### ***Air knife***

- The air from the air knife fan motors [A] separates the paper from the drum.
- The air knife fan motors start blowing air when the print start key is pressed or when master cutting is finished. The paper passes under the exit pawl and is delivered to the delivery table.



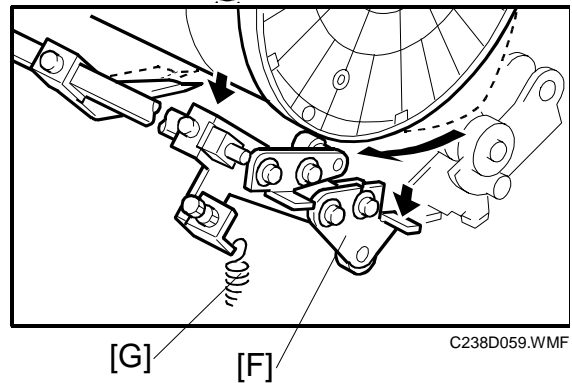
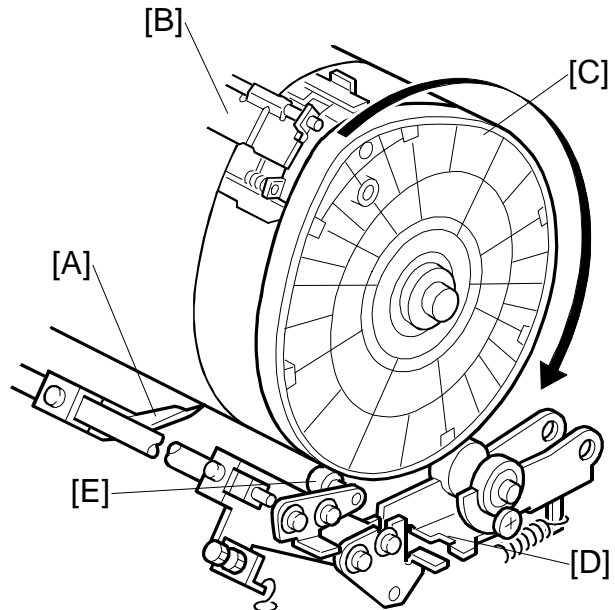
#### ***Exit pawl air pump***

- Drive from the main motor is transmitted to the pump gear [A]. When the gear [A] rotates, it drives the piston [B] back and forth.
- The piston moves forward and pushes a jet of air out through the nozzle [C]. This jet of air helps to separate the paper from the drum.

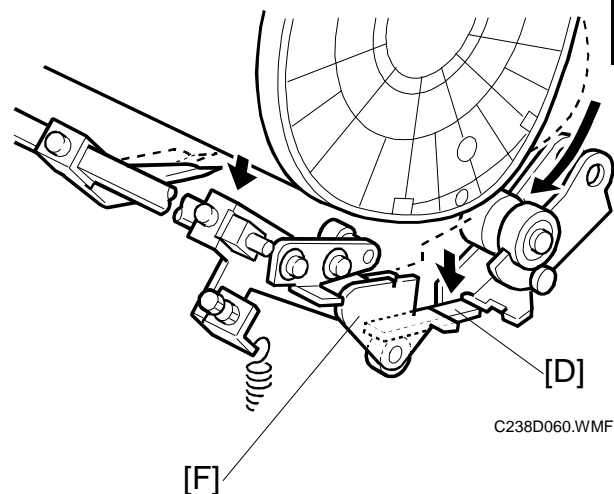


## 6.8.4 EXIT PAWL DRIVE MECHANISM

- During printing, the distance between the exit pawl [A] and the drum is very small, to prevent paper wrap jams. However, when the master clamper [B] approaches the exit pawl (as the drum turns), the pawl has to be moved away from the drum to prevent it from being damaged by the master clamper. This is controlled by the front drum flange [C], which is cam-shaped, and the cam follower [E] on the exit pawl shaft.
- When the cam follower is not pushed out by the drum flange, the exit pawl closely approaches the drum surface, due to the tension from a spring [G].
- As the master clamper approaches the exit pawl, the high point of the drum flange cam [C] moves into contact with the cam follower [E] pushing it down. This moves the cam follower arm [F] downwards. The pawl shaft turns clockwise to move the pawl away from the drum.
- When printing finishes and the printing pressure is released, the cam follower arm [F] is engaged by the printing pressure release arm [D] and held in the lower position. Therefore, after printing finishes, the cam follower is out of contact with the cam, and the exit pawl moves away from the drum to its normal position.



C238D059.WMF

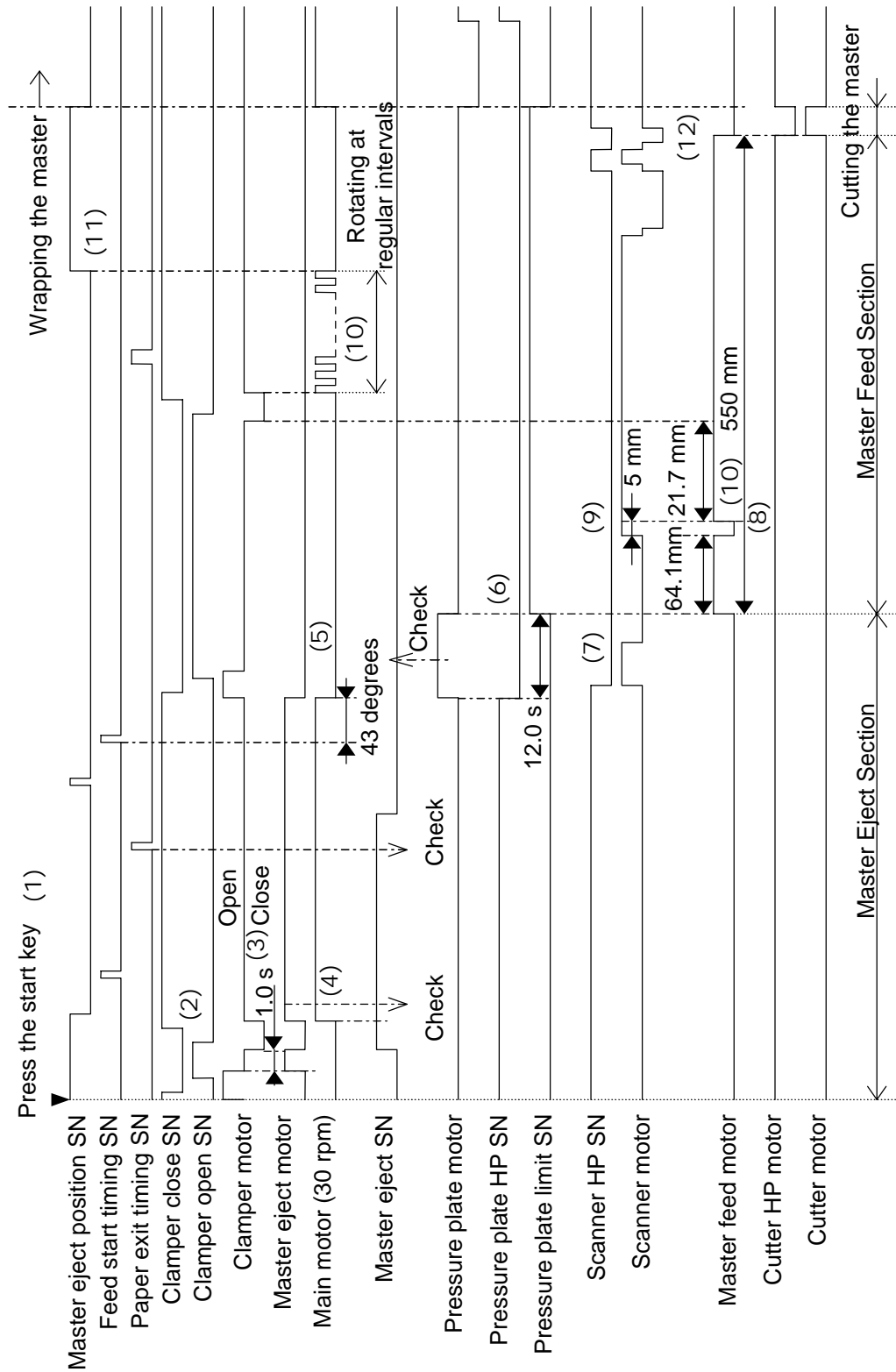


C238D060.WMF

Detailed  
Descriptions

6.9 TIMING CHART

6.9.1 MASTER EJECT / MASTER FEED

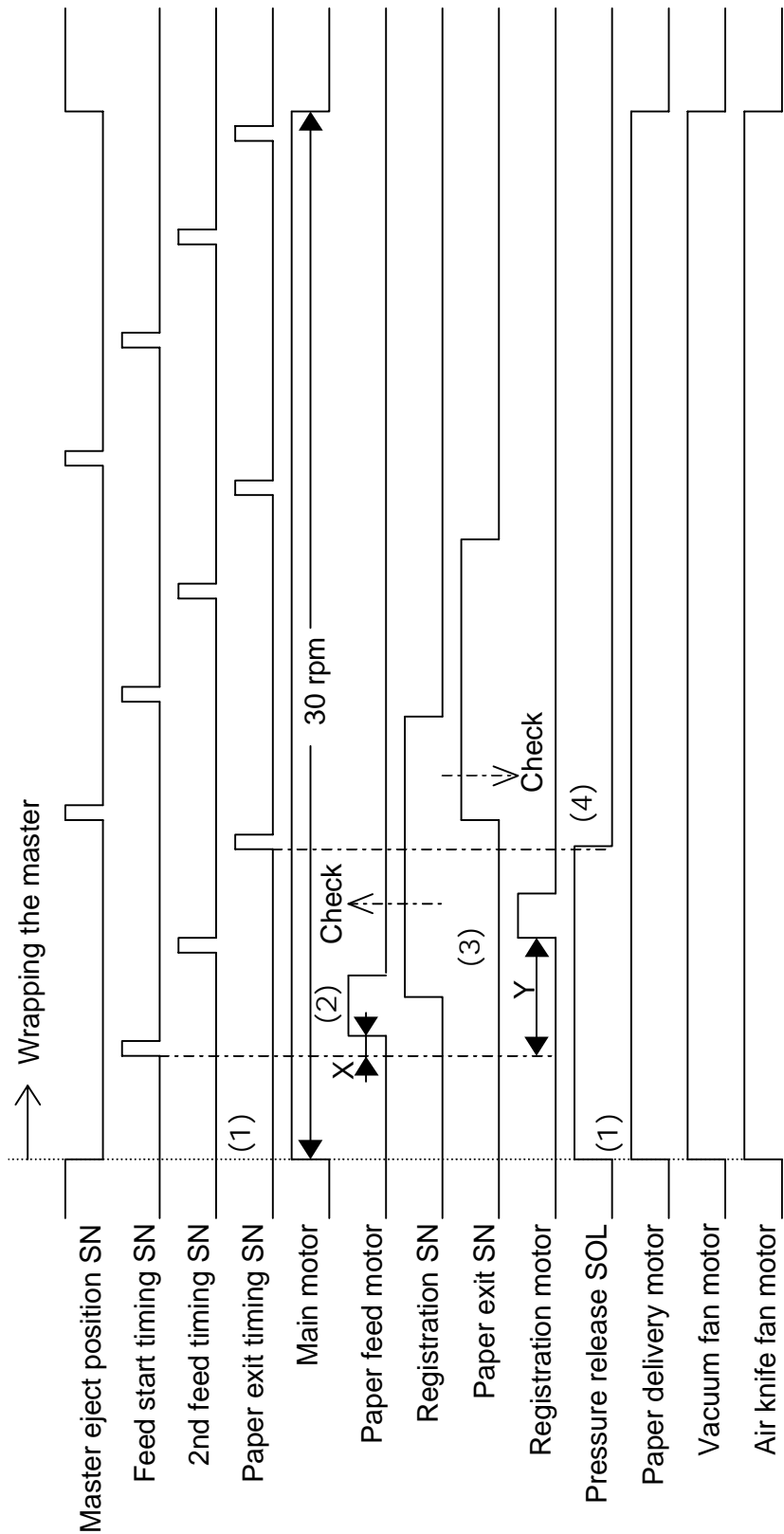




<div>(1) Press the Start key</div> <div>(2) The clamper motor turns to open the clamper.</div> <div>(3) When the clamper is open, the master eject motor turns on for 1.0 second, then the clamper closes.</div> <div>(4) When the clamper is closed, the master eject motor and the main motor turn on.</div> <div>(5) When the drum is at the feed start timing sensor position plus 43 degrees, the master eject motor and the main motor turn off, the pressure plate presses turning the pressure plate motor, and the clamper opens.</div> <div>(6) After 12.0 seconds, the pressure plate motor turns off.</div> <div>(7) The machine initializes the scanner.</div> <div>(8) When the master feed motor has fed the master 64.1 mm, the motor stops and the scanner starts to scan.</div> <div>(9) After scanning 5 mm, the master feed motor turns on.</div> <div>(10) When the master feed motor has fed the master 21.7 mm, the clamper closes, and then the drum rotates at regular intervals.</div> <div>(11) The drum stops at the master eject position sensor.</div> <div>(12) When the master feed motor has fed the master 550 mm in all, the master feed motor stops, and the cutter cuts the master.</div>	
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Detailed  
Descriptions

6.9.2 MASTER WRAPPING

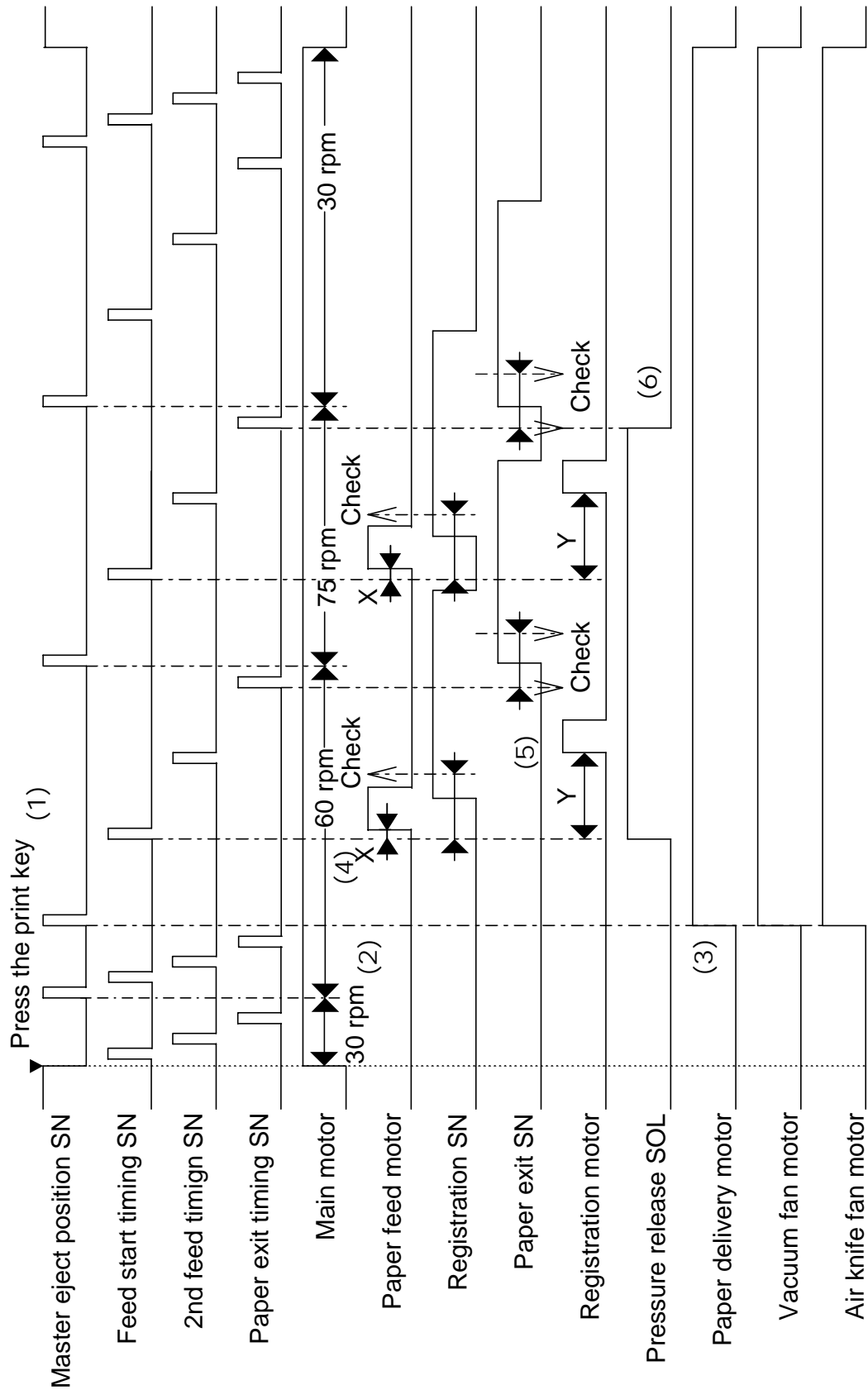


C238D045.WMF

<div>(1) When the cutter has cut the master, the pressure plate goes to the home position, the drum rotates, and the pressure release solenoid, paper delivery motor, vacuum fan motor and air knife fan motor all turn on.</div> <div>(2) When the drum is at the feed start timing sensor plus a feed delay time (X), the paper feed motor turns on. X depends on the selected printing speed.</div> <div>(3) After a certain time (Y), the registration motor turns on.</div> <div>(4) When the drum is at the paper exit timing sensor, the solenoid turns off.</div>
---

Detailed  
Descriptions

6.9.3 PRINTING



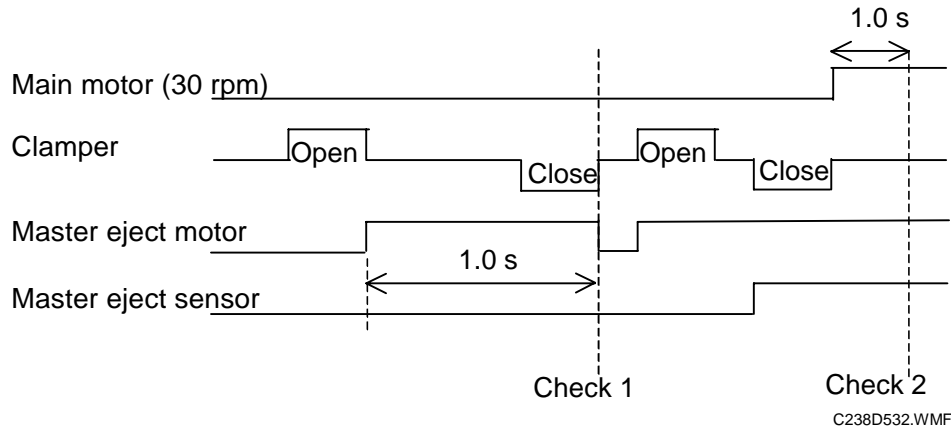
<div>(1) Press the print key.</div> <div>(2) The drum rotates at 30 rpm, then the speed goes to 60 rpm.</div> <div>(3) When the drum is at the master eject position sensor, the paper delivery motor' vacuum fan motor, and air knife fan motor all turn on.</div> <div>(4) When the drum is at the feed start timing sensor plus a feed delay time (X), the paper feed motor and the pressure release solenoid turn on. X depends on the selected printing speed.</div> <div>(5) After a certain time (Y), the registration motor turns on.</div> <div>(6) When the drum is at the paper exit timing sensor, the solenoid turns off.</div>
--

Detailed  
Descriptions

## 6.10 JAM DETECTION

### 6.10.1 MASTER EJECT JAM (E JAM LOCATION INDICATOR)

#### *Picking up the used master from the drum*

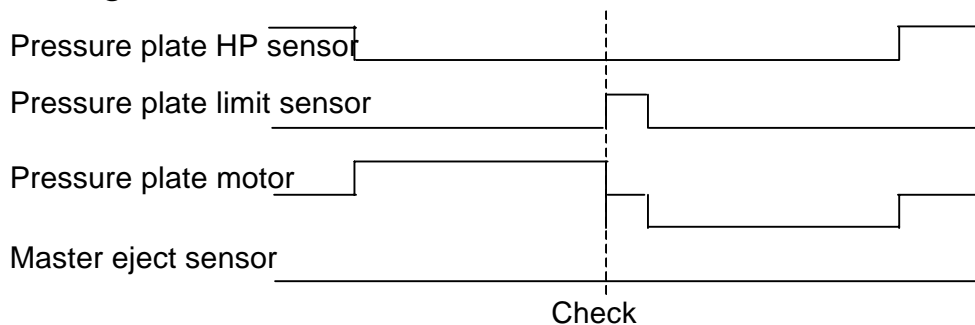


**Jam check timing:** When the clamper open sensor is on (clamper open).

**Check 1:** If the master eject motor is still on after 1.0 second, and the master eject sensor doesn't detect the master, the machine goes on to check 2.

**Check 2:** When the clamper opens and closes again, and the drum has rotated 1.0 s, if the master eject sensor doesn't detect the master, the E jam indicator will light.

#### *Compressing the used master*



**Jam check timing:** When moving the pressure plate.

**Check:** If the master eject sensor detects a master when the pressure plate limit sensor turns on (pressure plate at lower limit), the E jam indicator lights.

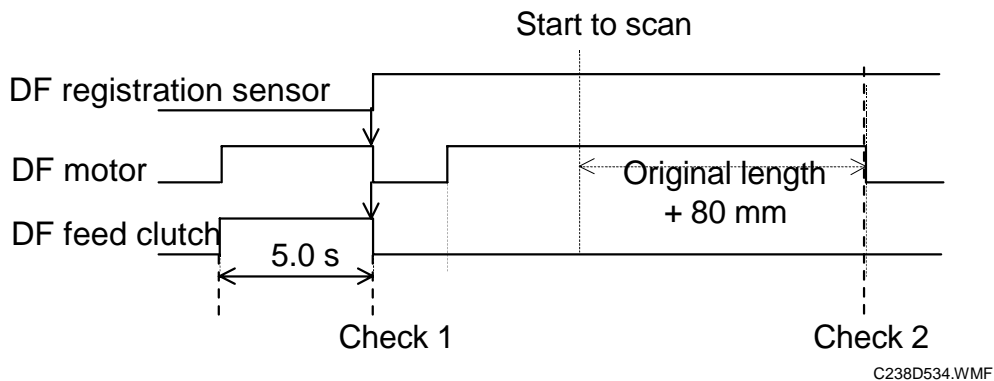
#### *Just after turning on the main switch*

**Jam check timing:** Just after the main switch has been turned on.

**Check:** If the master eject sensor is on (master detected), the E jam indicator lights.

### 6.10.2 DF JAM (P JAM LOCATION INDICATOR)

#### *Feeding in the original*



**Jam check timing:** When an original is placed in the DF.

**Check 1:** If the DF motor has operated for 5.0 seconds since the start key was pressed, and the DF registration sensor still doesn't detect the original, the P jam indicator lights.

#### *Feeding out the original*

**Jam check timing:** During original feed-out.

**Check 2:** When the DF has fed the original length plus 80 mm, the DF registration sensor still detects the original, the P jam indicator lights.

#### *Turning on the main switch/closing the DF cover*

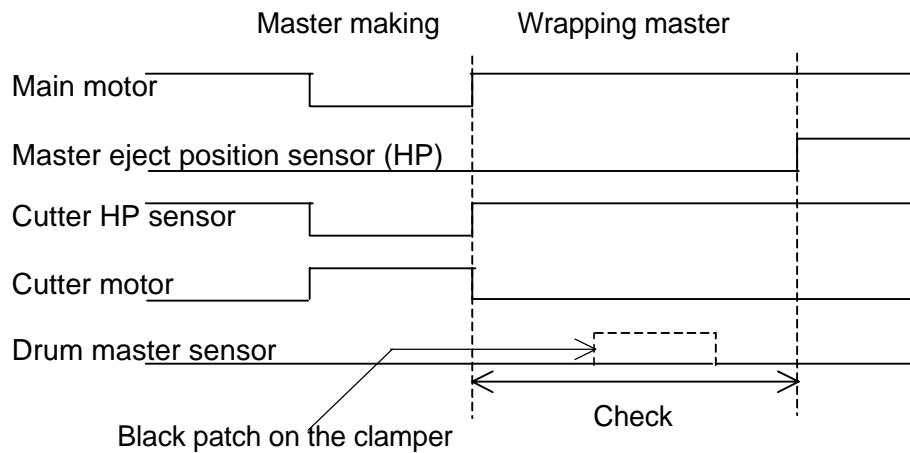
**Jam check timing:** Just after turning the main switch on, and when the DF cover is closed.

**Check:** If the DF registration sensor detects an original, the P jam indicator lights.



### 6.10.3 MASTER FEED JAM (D JAM LOCATION INDICATOR)

#### *Cutting the master (master not cut)*

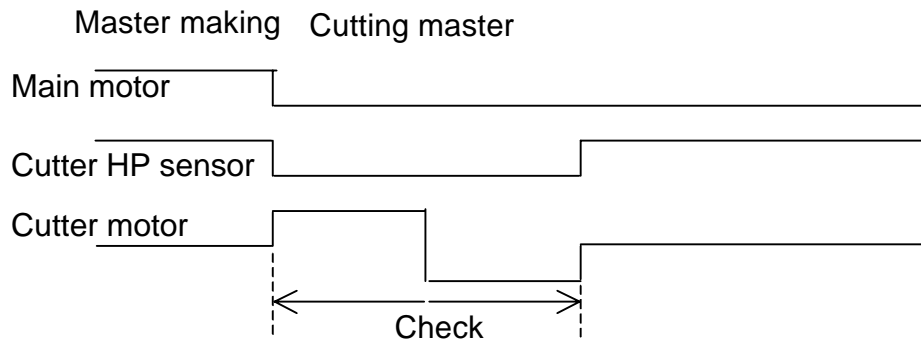


C238D529.WMF

**Jam check timing:** When the master is clamped in the clamber and cutting is taking place.

**Check:** While the drum is rotating from when the cutter home position sensor turns on (cutter at home position) until the master eject position sensor turns on (drum at master eject position), if the drum master sensor detects a master on the black patch on the clamber, then the D jam indicator lights.

#### *Cutting the master (cutter unit problem)*

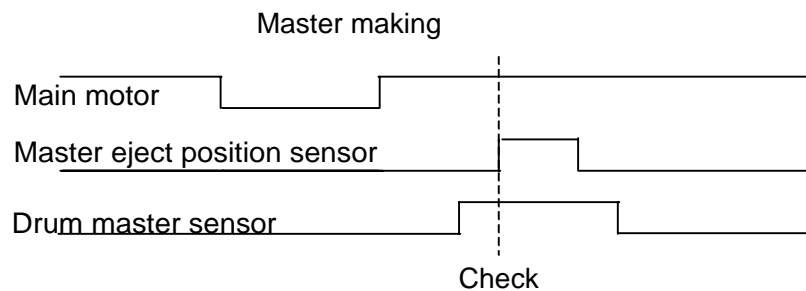


C238D530.WMF

**Jam check timing:** When the master is clamped in the clamber and cutting is taking place.

**Check:** During master cutting, if the cutter HP sensor does not turn on (cutter does not reach home position) at the desired time, then the D jam indicator lights.

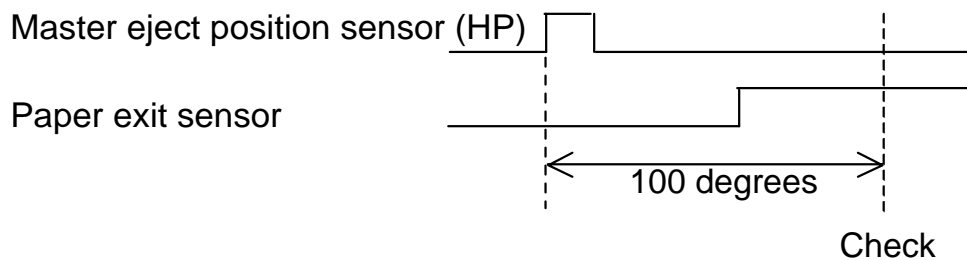


***Clamping the master***

C238D531.WMF

**Jam check timing:** When the master is wrapping around the drum.

**Check:** When the master eject position sensor turns on (drum at master eject position), if the drum master sensor doesn't detect a master, then the D jam indicator lights.

**6.10.4 DRUM JAM (B JAM LOCATION INDICATOR)*****Wrapping jam***

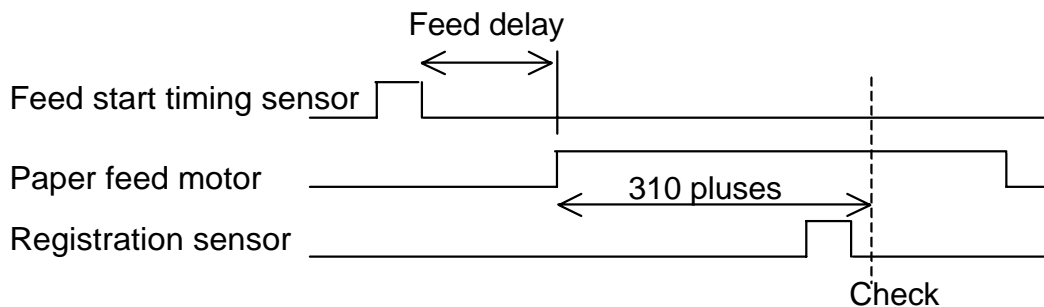
C238D536.WMF

**Jam check timing:** When printing.

**Check:** When the drum has turned 100 degrees since the master eject position sensor turned on (drum reached master eject position), and the paper exit sensor still doesn't detect the paper, then the B jam indicator lights.

### 6.10.5 PAPER FEED JAM (A JAM LOCATION INDICATOR)

#### *Paper feed*



C238D535.WMF

**Jam check timing:** When the machine starts to feed. (When the feed delay time has passed since the feed start timing sensor turned on [drum at feed start position].)

**Check:** If after the paper feed motor has fed 310 pulses, the re-feeding function starts. The paper feed motor re-starts, and if the registration sensor doesn't detect paper again after 310 pulses, the A jam location indicator lights.

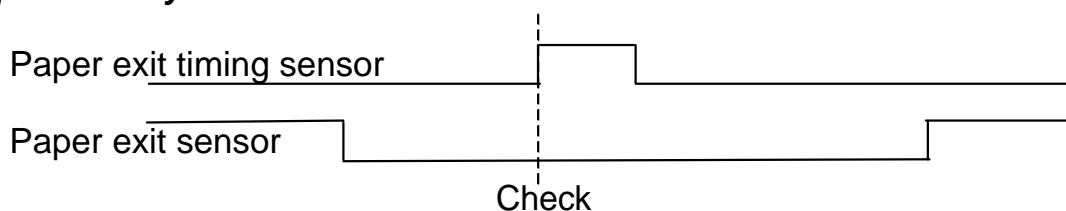
#### *Turning on the main switch/end of paper feed*

**Jam check timing:** Just after the main switch is turned on, or when paper feed has finished.

**Check:** If the registration sensor detects paper, the A jam location indicator lights.

### 6.10.6 PAPER DELIVERY JAM (C JAM LOCATION INDICATOR)

#### *Paper delivery*



C238D537.WMF

**Jam check timing:** When printing.

**Check:** When the paper exit timing sensor turns on (drum at paper exit timing position), if the paper exit sensor detects paper, the C jam location indicator lights.

Drum: 360 degrees = 1020 pulses


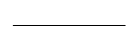






## 7. POINT TO POINT DIAGRAM

- Location Map
- Section A
- Section B
- Section C
- Section D
- Section E
- Section F
- Section G
- Section H

**NOTE:** The symbols used in the diagrams are as follows:

### - SYMBOL TABLE -

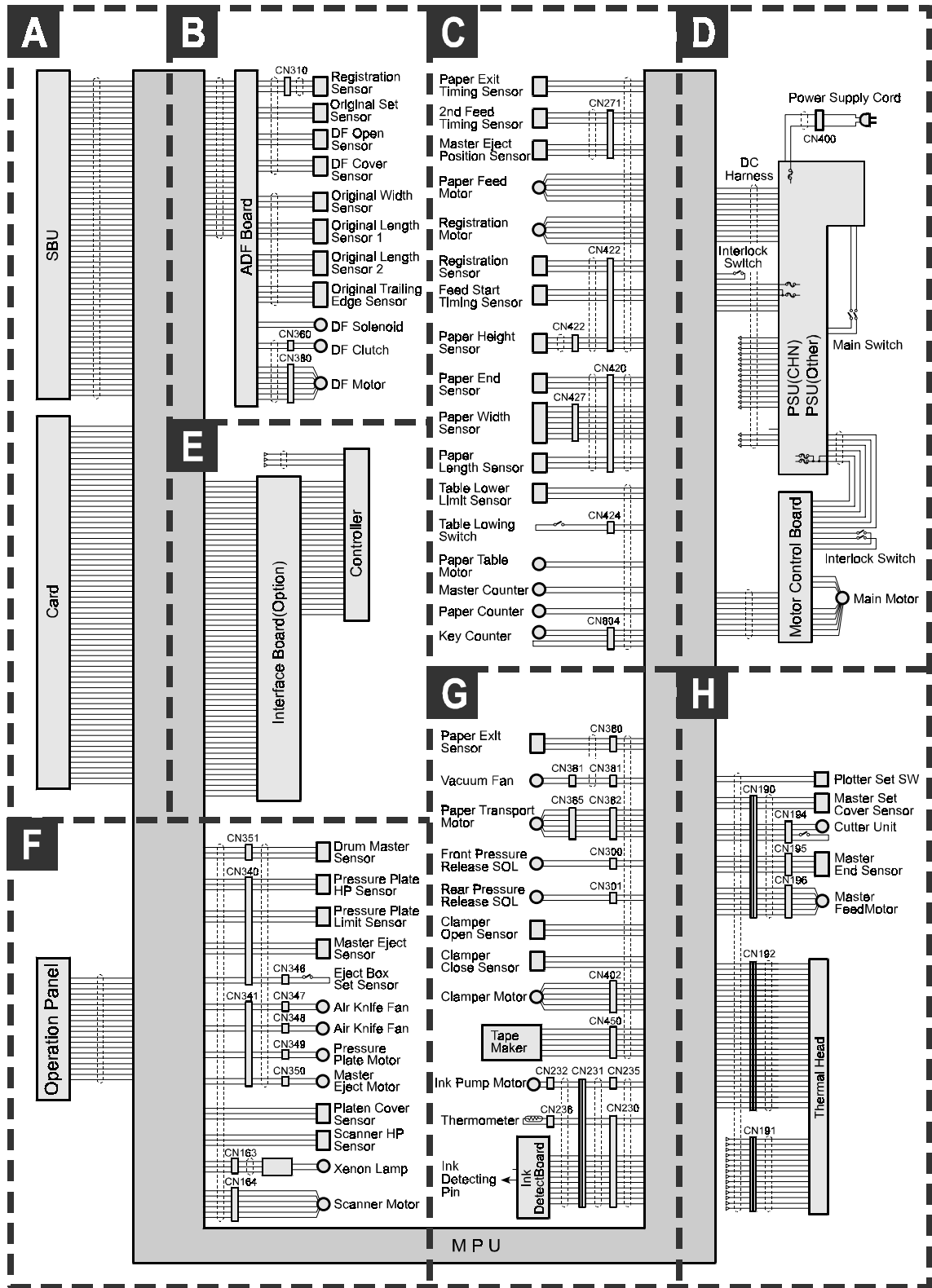
	AC Line
	DC Line
	Pulse Signal Line
	Signal Direction
	Active High Signal
	Active Low Signal

PP2.WMF

P to P

## Location Map

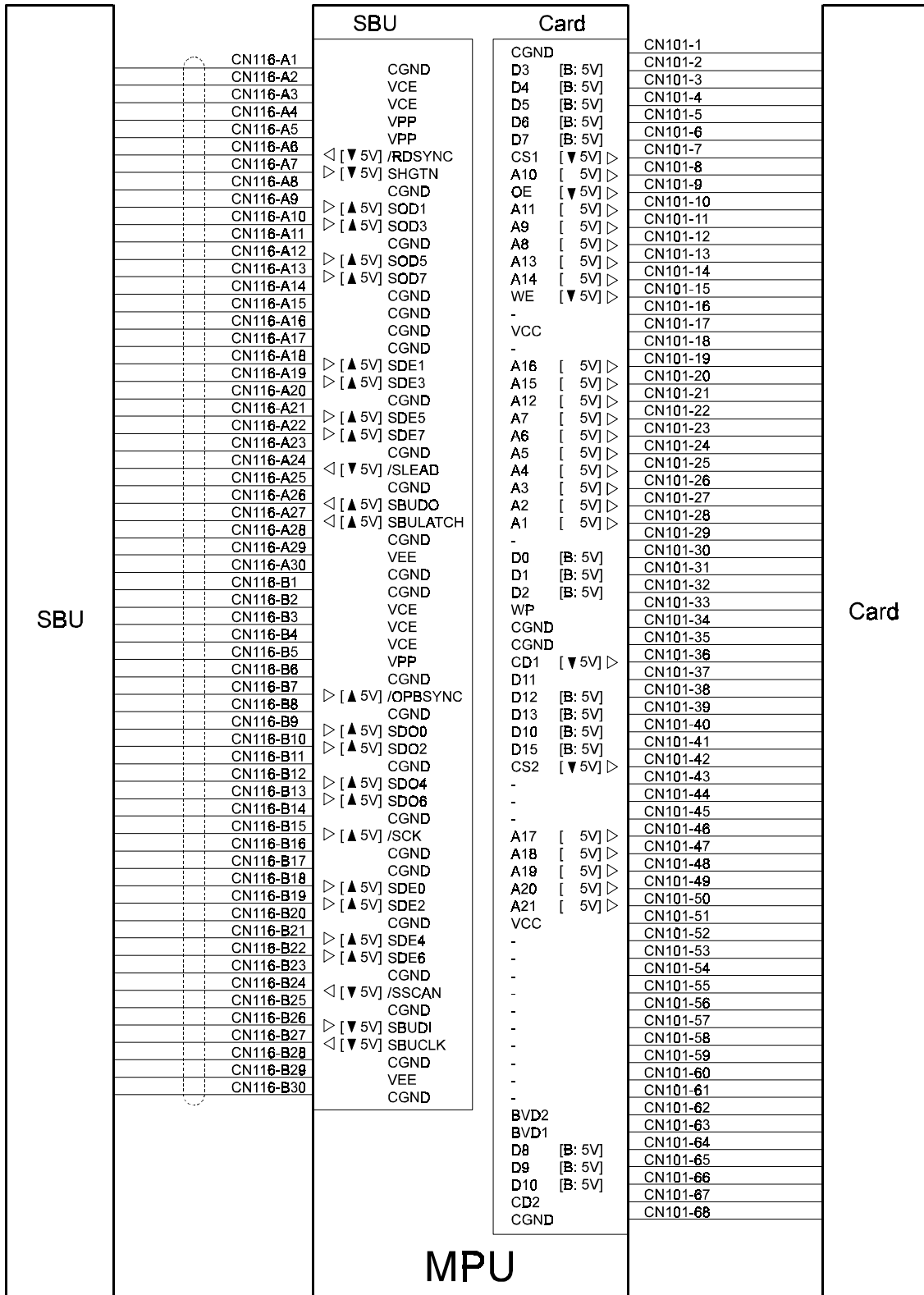
## Location Map



C238S500.WMF

## Section A

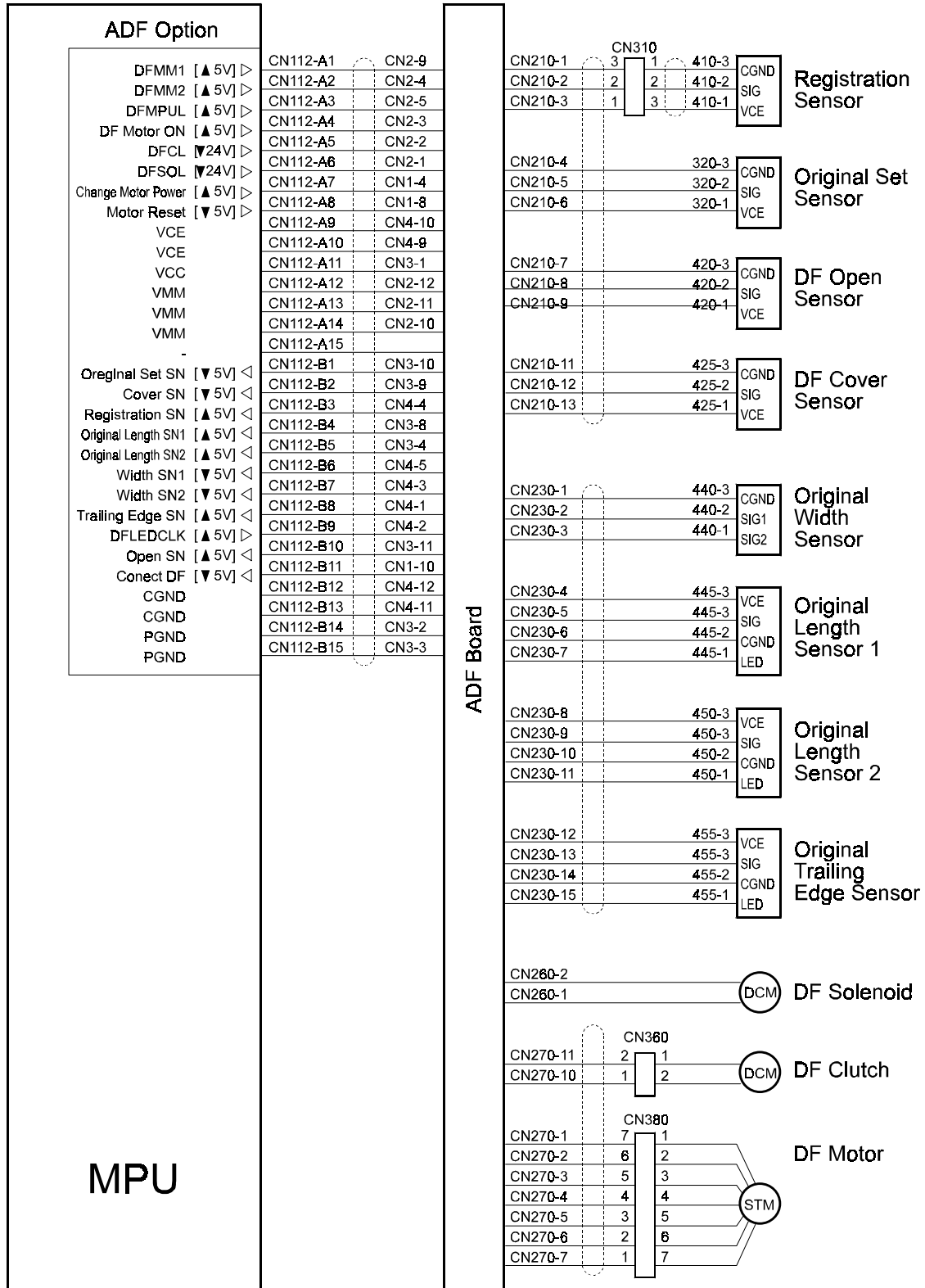
## Section A



C238S501.WMF

## Section B

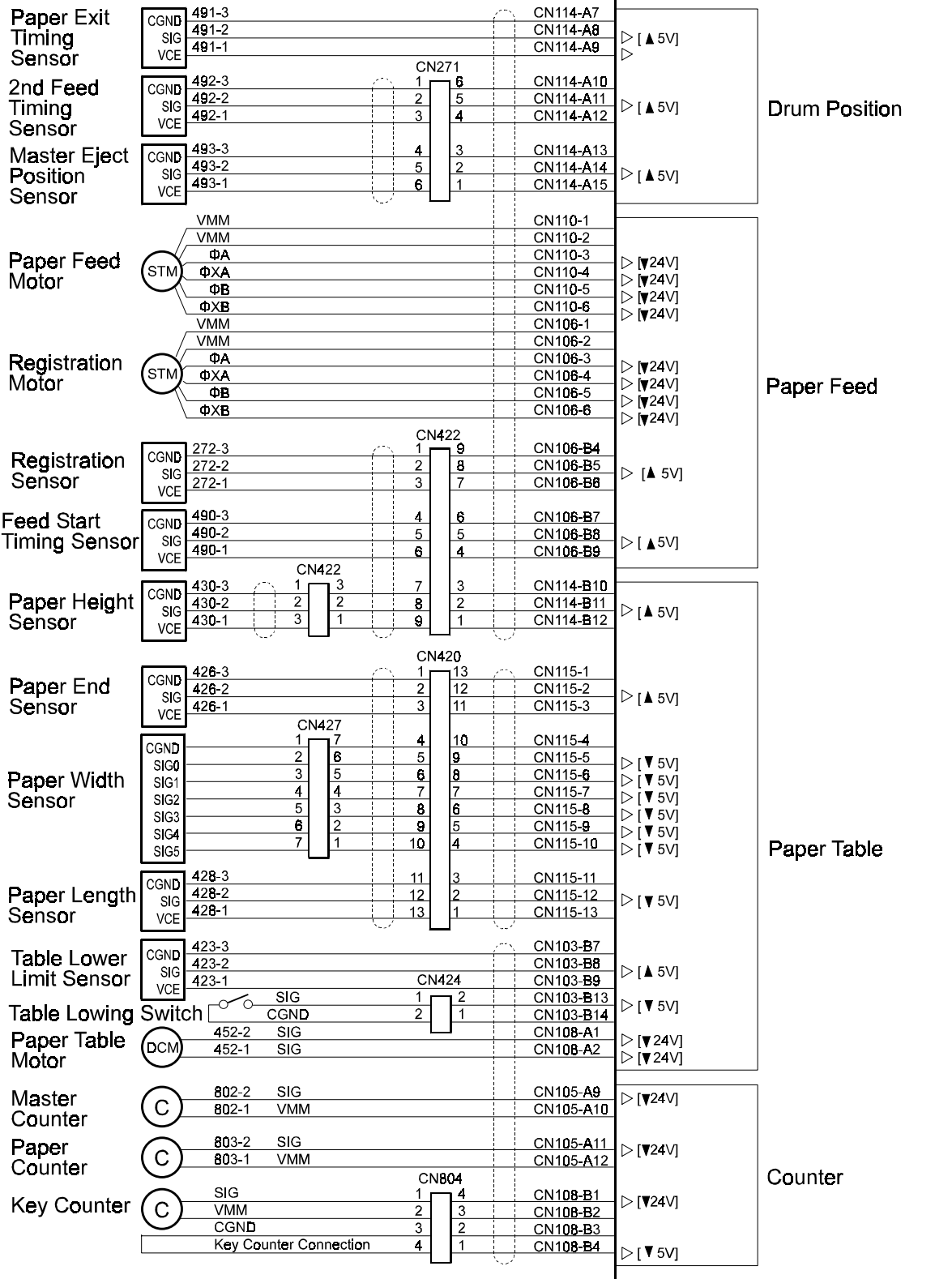
## Section B



C238S502.WMF

## Section C

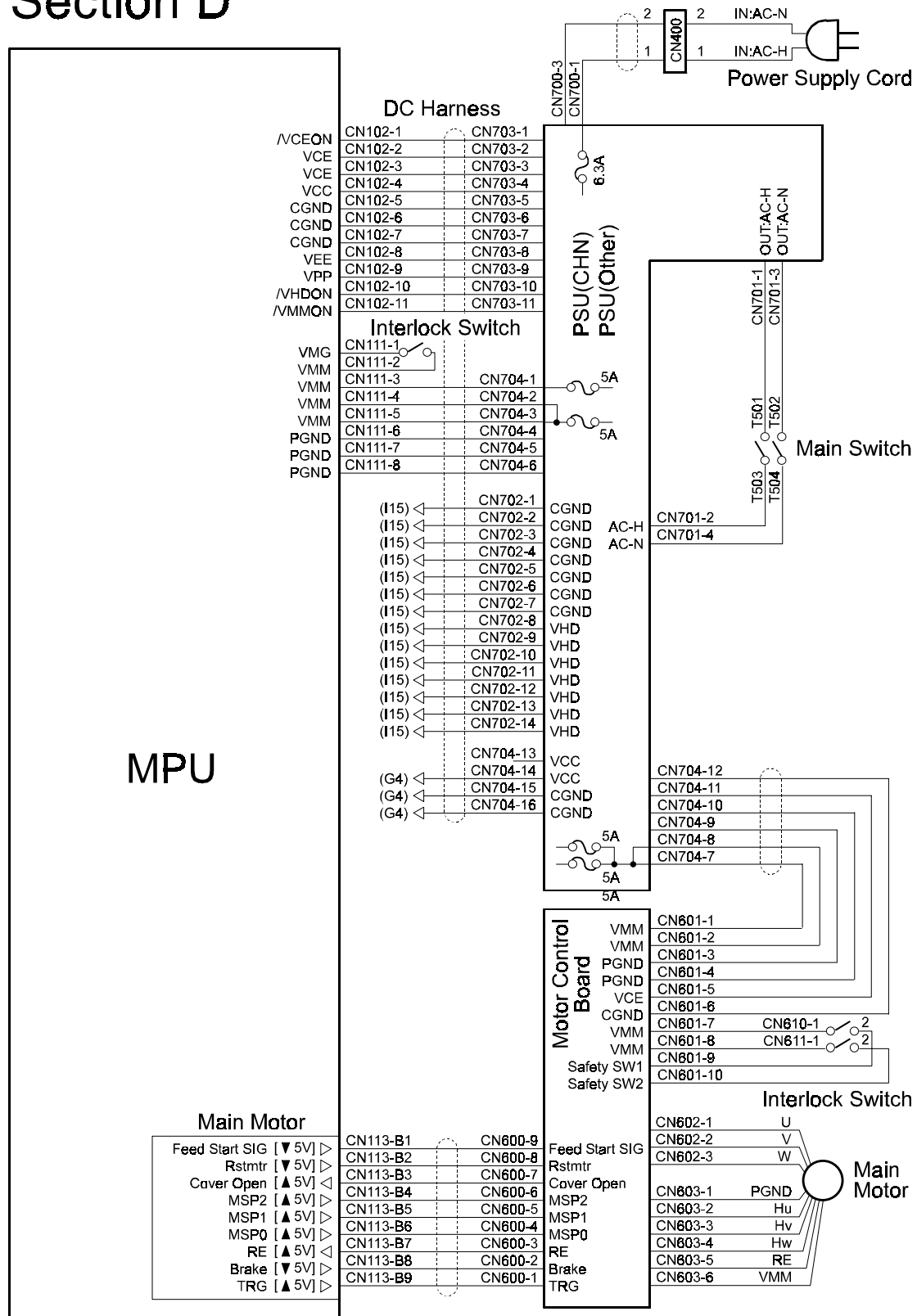
## Section C



C238S503.WMF

## Section D

## Section D

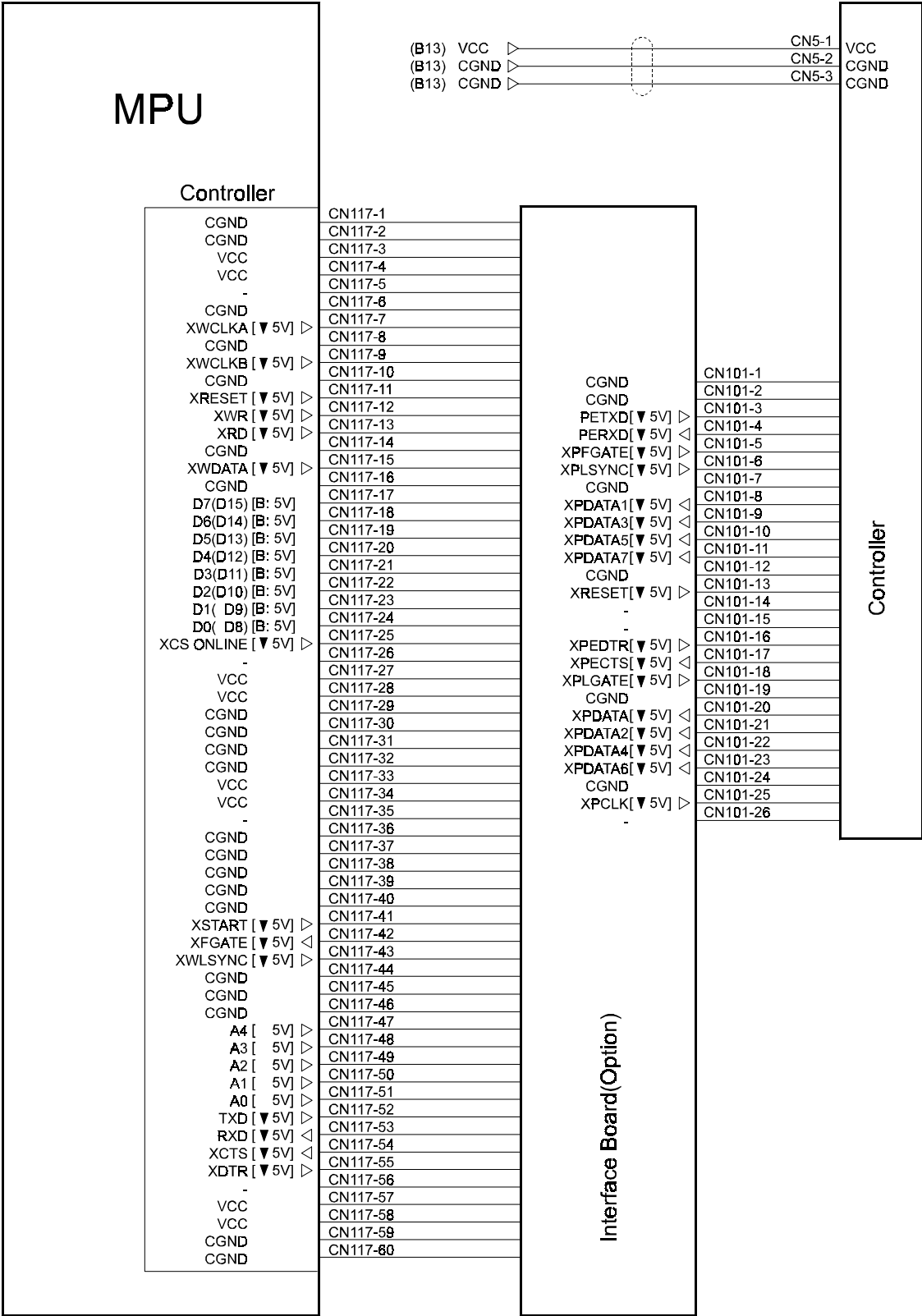


C238S504.WMF



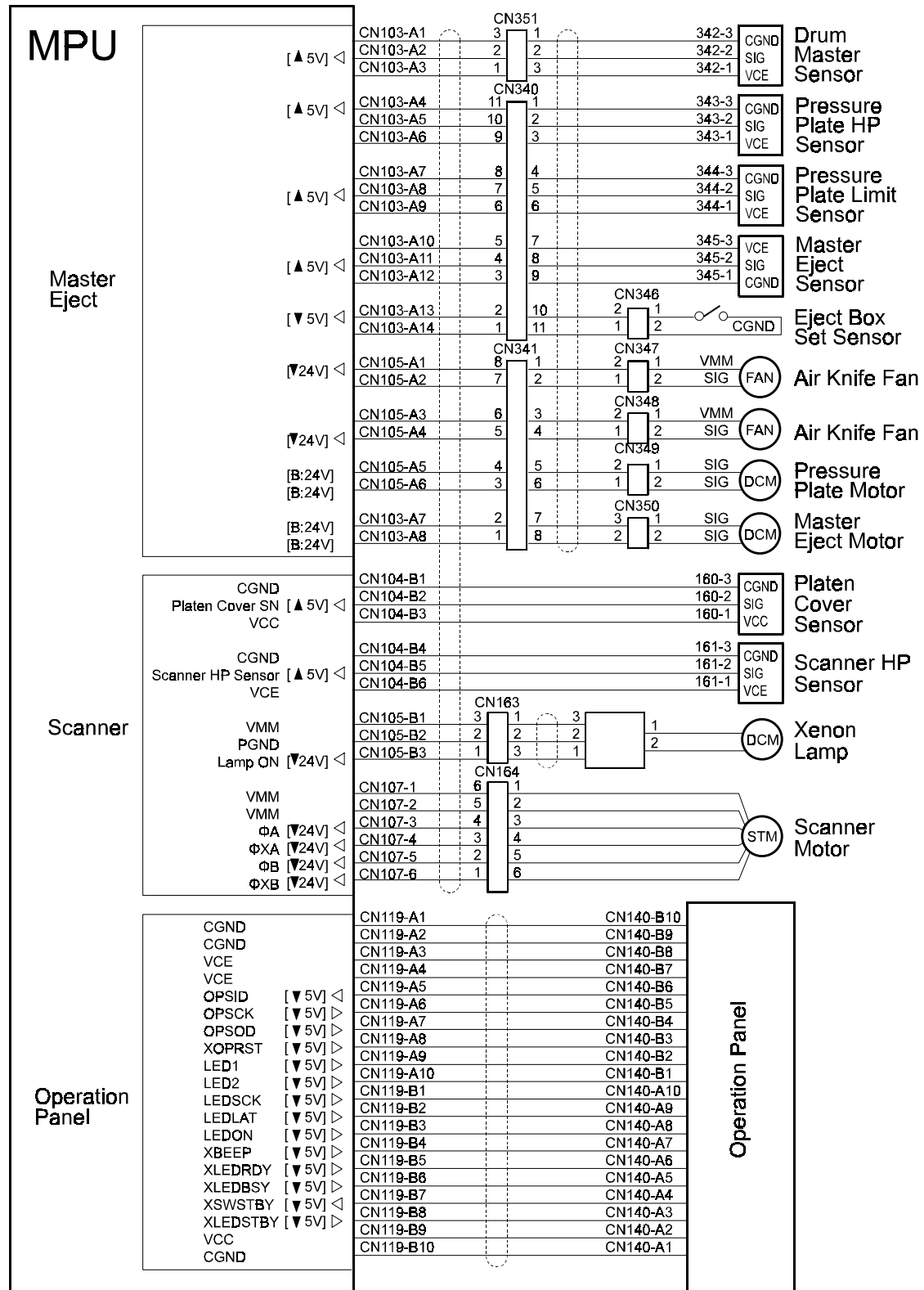
Section E

Section E



## Section F

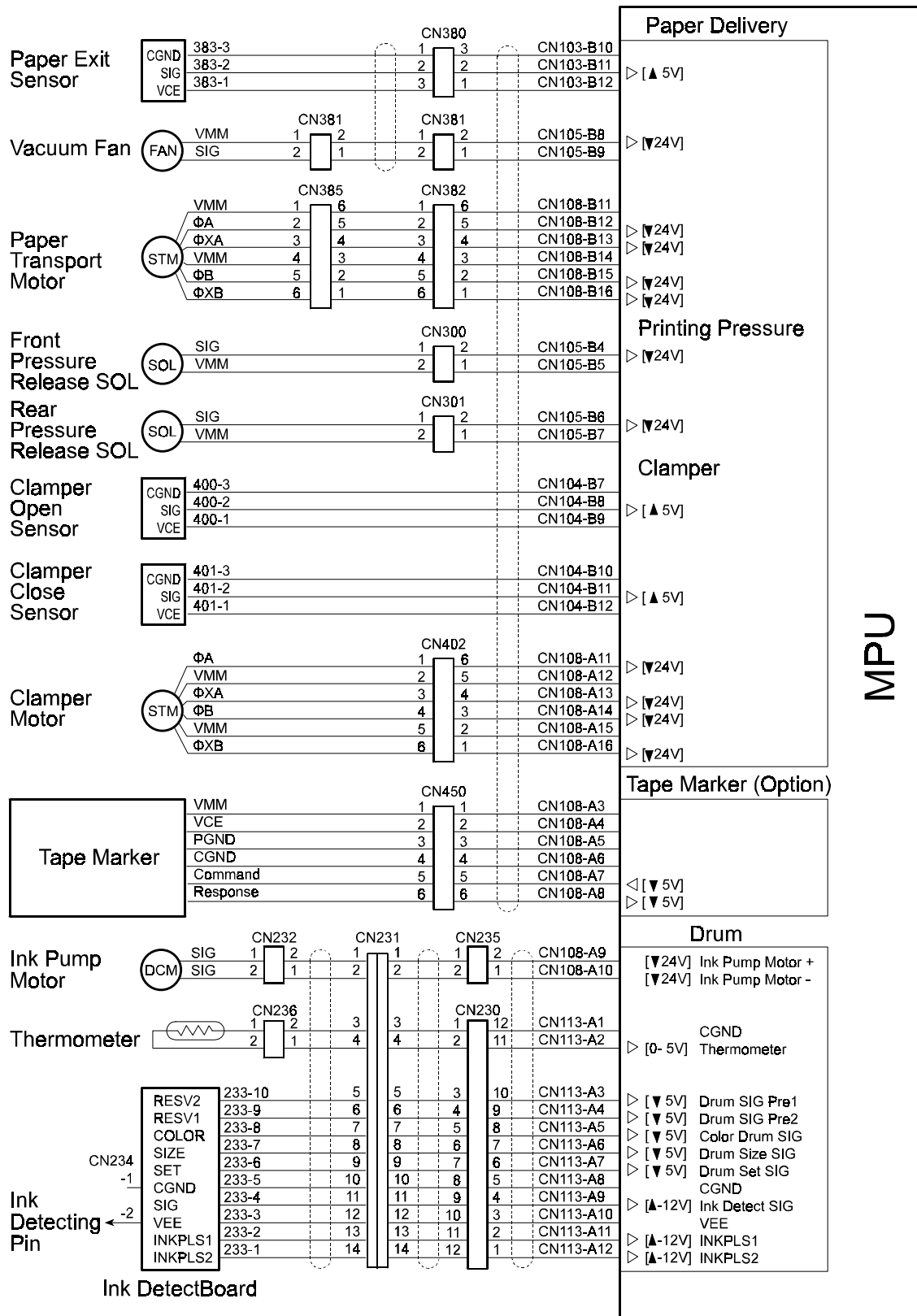
## Section F



C238S506.WMF

## Section G

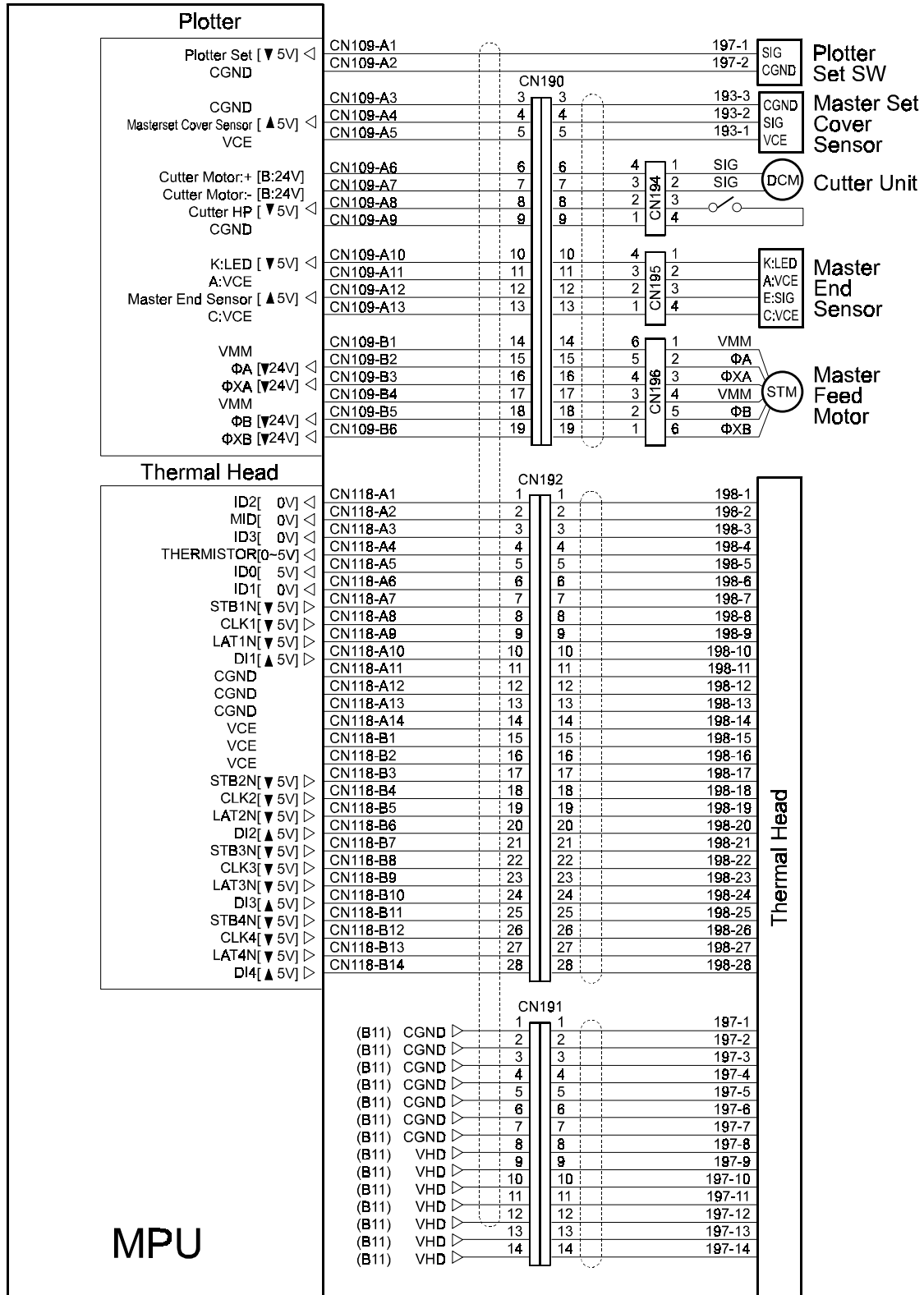
## Section G



C238S507.WMF

## Section H

## Section H



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# SPECIFICATIONS

## 1. GENERAL SPECIFICATIONS

Configuration:	Floor standing
Master Process:	Digital with 300 dpi thermal head
Scanning (Pixel Density):	300 dpi (in Fine mode 400 dpi)
Originals:	Sheet/Book
Printing process:	Fully automatic one-drum stencil system
Original Size:	Maximum 304.8 x 432 mm / 12.0" x 17.0"
Copy Paper Size:	Maximum 297 x 432 mm / 11.6" x 17.0" Minimum 70 x 148 mm / 2.8" x 5.9"
Copy Paper Weight:	47.1 – 209.3 g/m <sup>2</sup> , 12.5 – 55.6 lb.
Printing Area:	A3 drum 290 x 410 mm / 11.4" x 16.1" A4 black drum 200 x 290 mm / 7.8" x 11.4"
Printing Speed:	60, 75, 90, 105, 120 sheets/minute (5 steps)
Master Eject Box Capacity:	50 masters (Normal conditions)
Reproduction Ratios:	3 enlargement and 4 reduction

	A3 version	DLT version
Enlargement	141%	155%
	122%	129%
	115%	121%
Full Size	100%	100%
Reduction	93%	93%
	87%	77%
	82%	74%
	71%	65%

Zoom:	50% to 200%, in 1% steps
Power Source:	America, Taiwan 110 / 120 V, 50/60 Hz 5.0 A Europe, Asia 220 – 240 V, 50/60 Hz 3.0 A

## Power Consumption:

	<b>Mainframe Only</b>	
	<b>120 V</b>	<b>220 ~ 240 V</b>
Copying 60 rpm	Not above 170 W	Not above 170 W
Copying 90 rpm	Not above 190 W	Not above 190 W
Copying 120 rpm	Not above 220 W	Not above 215 W
Master making	Not above 160 W	Not above 160 W
Standby (Energy saver mode)	Not above 5 W	Not above 8 W

## Noise Emission

	<b>Sound Power Level</b>	<b>Operating Position Sound Power Level</b>
Standby:	Not above 48 dB(A)	Not above 35 dB(A)
Copying 60 rpm:	Not above 74 dB(A)	Not above 60 dB(A)
Copying 90 rpm:	Not above 78 dB(A)	Not above 63 dB(A)
Copying 120 rpm:	Not above 81 dB(A)	Not above 66 dB(A)

**NOTE:** The above measurement made in accordance with ISO 7779 are actual value.

## Dimensions (W x D x H)

Tables closed: 790 x 700 x 640 mm (31.1" x 27.6" x 25.2")

Tables opened: 1360 x 700 x 600 mm (53.6" x 27.6" x 25.2")

**NOTE:** Measurement Conditions

- 1) Without the ADF
- 2) Without the table

## Weight

80 kg (176.6 lb)

(Excluding ADF, platen cover, ink, and master)

Master Process Time:	Not more than 23 seconds (A4 copying) Not more than 26 seconds (A3 copying) <b>NOTE:</b> Measurement Conditions 1) 100%size 2) Not using fine mode
Paper Table Capacity:	1,000 sheets (80 g/m <sup>2</sup> , 20 lb)
Paper Delivery Table Capacity:	1,000 sheets (80 g/m <sup>2</sup> , 20 lb)
Leading Edge Margin:	5 ± 3 mm
Trailing Edge Margin:	2 mm
Side Registration Adjustable Range:	± 10 mm
Vertical Registration Adjustable Range:	± 15 mm
Master Type:	Thermal master roll type: 320 mm width, 125 m/roll  Yield: 220 masters/roll  Maximum run length per master: 2,000 prints
Master Storage Conditions:	Temperature: 0 °C to 40 °C  Humidity: 10% to 95% RH  Recommended maximum storage period: One year after production date  Note: Avoid locations exposed to direct sunlight.
Ink Type:	600 ml cartridge type  Available colors: Black, Red, Blue, Green, Brown, Purple, Yellow, Navy, Maroon, Orange, Teal, and Gray
Ink Storage Conditions:	Temperature: -5 °C to 40 °C (Optimum conditions: 15 °C to 25 °C)  Humidity: 10% to 95% RH (Optimum conditions: 20% to 70% RH)



Recommended maximum storage period:  
18 months after production date

Note: Avoid locations exposed to direct sunlight.

Optional Equipment:

- Platen cover
- Auto document feeder
- Color drum
- A4 black drum
- Tape marker (dispenser)
- Interface board