# Gestetner RICOM SaVIn 



## C223/C228 <br> SERVICE MANUAL

## Gestetner <br> RTCOM <br> 5．VII

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# Gestetner Rロ®OM SEVII 

C223/C228 SERVICE MANUAL

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## LEGEND

| PRODUCT CODE | COMPANY |  |  |
| :---: | :---: | :---: | :---: |
|  | GESTETNER | RICOH | SAVIN |
| C223 | 5385 | (VT3800) | 3300DNP |
| C 228 | 5390 | (VT6000) | 3400 DNP |
|  |  |  |  |

## DOCUMENTATION HISTORY

| REV. NO. | DATE | COMMENTS |
| :---: | :---: | :--- |
| ${ }^{*}$ | $3 / 96$ | Original Printing |
| 1 | $7 / 97$ | Updated Pages |
| 2 | $4 / 98$ | C228 Addition |
|  |  |  |

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## 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 copier 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.

| $\uparrow$ CAUTION |
| :--- |
| The RAM board has a lithium battery which can explode if handled |
| incorrectly. Replace only with the same type of RAM board. Do not |
| recharge or burn this battery. Used RAM boards must be handled in |
| accordance with local regulations. |

> | $\boxed{\text { ATTENTION }}$ |
| :--- |
| 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 envionmentally safe manner and in accordance with local regulations.
3. When keeping used lithium batteries (from the main control boards) in order to dispose of them later, do not store more than 100 batteries (from the main control boards) per sealed box. Storing larger numbers or not sealing them apart may lead to chemical reactions and heat build-up.


## OVERALL MACHINE INFORMATION

## 1. SPECIFICATIONS

| Configuration: | Table-top |
| :---: | :---: |
| Master Processing: | Digital |
| Printing Process: | Fully automatic one-drum stencil system |
| Original Type: | Sheet/Book |
| Original Size: | Maximum $307 \mathrm{~mm} \times 432 \mathrm{~mm}$ (12.0" $\times 17.0{ }^{\prime \prime}$ ) |
| Reduction Ratios: | Inch version: <br> 93\%, 77\%, 74\%, 65\% <br> Metric version: $93 \%, 87 \%, 82 \%, 71 \%$ |
| Enlargement Ratios: | Inch version: 155\%, 129\%, 121\% Metric Version: $141 \%, 122 \%, 115 \%$ |
| Zoom: | From $50 \%$ to $200 \%$ in 1\% steps |
| Directional Magnification: | Vertical: From $50 \%$ to $200 \%$ in $1 \%$ steps Horizontal: From $50 \%$ to $200 \%$ in $1 \%$ steps |
| Image Mode: | Line, Photo, Line/Photo |
| Color Printing: | Drum unit replacement system (Red, Blue, Green, Brown, Yellow, Purple, Navy, and Maroon) |
| Master Feed/Eject: | Roll master, automatic feed/eject |
| Leading Edge Margin: | 5 mm (0.2") |
| Trailing Edge Margin: | 3 mm (0.12") |
| Printer Paper Size: | $\begin{array}{ll}\text { Maximum } & 297 \mathrm{~mm} \times 432 \mathrm{~mm}\left(11.6^{\prime \prime} \times 17.0^{\prime \prime}\right) \\ \text { Minimum } & 90 \mathrm{~mm} \times 148 \mathrm{~mm}\left(3.6^{\prime \prime} \times 5.8^{\prime \prime}\right)\end{array}$ |
| Printing Area: | A3 drum <br> When using A3 paper: <br> More than $290 \mathrm{~mm} \times 410 \mathrm{~mm}, 11.4 \mathrm{x}$ <br> 16.1" <br> When using 81/2" x 11 " paper: <br> More than $290 \mathrm{~mm} \times 415 \mathrm{~mm}, 11.4 \mathrm{x}$ <br> 16.3" <br> A4 drum <br> More than $290 \mathrm{~mm} \times 204 \mathrm{~mm}, 11.4^{\prime \prime} \times 8.0^{\prime \prime}$ |
| Print Paper Weight: | $47.1 \mathrm{~g} / \mathrm{m}^{2}$ to $209.3 \mathrm{~g} / \mathrm{m}^{2}$ ( 12.5 lb to 55.6 lb ) |
| Printing Speed: | 60, 75, 90, 105, 120 sheets/minute (5 steps) |
| First Copy Time (Master Process Time): | Less than 23.5 seconds (A3, 11" x 17") Less than 19.0 seconds (A4, $81 / 2^{\prime \prime} \times 11^{\prime \prime}$ ) |

## SPECIFICATIONS

Second Copy time
(First Print Time):
Paper Feed Table Capacity: 1,000 sheets $\left(80 \mathrm{~g} / \mathrm{m}^{2}, 20 \mathrm{lb}\right)$
Paper Delivery Table Capacity:
Power Source:

Power Consumption:

Weight:

Less than 26.5 seconds (A3, 11" $\times 17^{\prime \prime}$ )
Less than 21.5 seconds (A4, 81/2" $\times 11^{\prime \prime}$ )

1,000 sheets ( $66.3 \mathrm{~g} / \mathrm{m}^{2}, 17.6 \mathrm{lb}$ )
1,000 sheets ( $80 \mathrm{~g} / \mathrm{m}^{2}, 20 \mathrm{lb}$ )
$120 \mathrm{~V}, 50 / 60 \mathrm{~Hz}, 3.6 \mathrm{~A}$ (for N. America)
220/240 V, 50/60 Hz, 2.0 A (for Europe, Asia)
$120 \mathrm{~V}, 50 / 60 \mathrm{~Hz}, 400 \mathrm{~W}$ (for N. America)

120 V version: $\quad 125 \mathrm{~kg}(275.5 \mathrm{lb})$
$220 / 240 \mathrm{~V}, 50 / 60 \mathrm{~Hz}, 400 \mathrm{~W}$ (for Europe, Asia)

220/240 V version: 125 kg (275.5 lb)
Cabinet: $\quad 23.5 \mathrm{~kg}(51.8 \mathrm{lb})$
Dimensions ( $\mathrm{W} \times \mathrm{D} \times \mathrm{H}$ ):

|  | Width | Depth | Height |
| :--- | :--- | :--- | :--- |
| Stored | $719 \mathrm{~mm}, 28.4^{\prime \prime}$ | $698 \mathrm{~mm}, 27.5^{\prime \prime}$ | $646 \mathrm{~mm}, 25.5^{\prime \prime}$ |
| Stored with <br> document feeder | $719 \mathrm{~mm}, 28.4^{\prime \prime}$ | $698 \mathrm{~mm}, 27.5^{\prime \prime}$ | $676 \mathrm{~mm}, 26.7^{\prime \prime}$ |
| Set up | $719 \mathrm{~mm}, 28.4^{\prime \prime}$ | $698 \mathrm{~mm}, 27.5^{\prime \prime}$ | $644 \mathrm{~mm}, 25.4^{\prime \prime}$ |
| Set up with cabinet | $719 \mathrm{~mm}, 28.4^{\prime \prime}$ | $698 \mathrm{~mm}, 27.5^{\prime \prime}$ | $1,072 \mathrm{~mm}, 42.3^{\prime \prime}$ |
| Set up with <br> document feeder | $1,331 \mathrm{~mm}, 52.5^{\prime \prime}$ | $698 \mathrm{~mm}, 27.5^{\prime \prime}$ | $666 \mathrm{~mm}, 26.3^{\prime \prime}$ |
| Set up with cabinet <br> and document feeder | $1,331 \mathrm{~mm}, 52.5^{\prime \prime}$ | $698 \mathrm{~mm}, 27.5^{\prime \prime}$ | $1,092 \mathrm{~mm}, 43.0^{\prime \prime}$ |

Original Scanning Time: $2.5 \mathrm{~ms} / \mathrm{line}$
Pixel Density: $\quad 400 \mathrm{dpi}$
Master Eject Box Capacity:
More than 50 masters under low temperature
More than 60 masters at $23^{\circ} \mathrm{C}, 73^{\circ} \mathrm{F}$
More than 60 masters under high temperature
Paper Separation: Friction roller/center separation system
Feed Table Side Plate
88 mm to 336 mm (3.46" to 13.2")
Movement:
Side Registration:
Vertical Registration:
Ink Supply:
$\pm 10 \mathrm{~mm}$
More than $+15 \mathrm{~mm},-20 \mathrm{~mm},+0.59$ ", $-0.79{ }^{\prime \prime}$
Automatic ink supply system
Air knife/vacuum delivery

Print Counter:
Supplies:

Optional Equipment

7 digits
Master Thermal master 320 mm width 370 masters/roll (with A4 drum) 226 masters/roll (with A3 drum) (VT-II L master)

Max. run length 2000 prints
Ink 1000 cc ink pack (black) 600 cc ink pack (Red, Blue, Green, Brown, Yellow, Purple, Navy, Maroon)

Large Capacity Tray (LCT-4000) Master Counter (6 digits)
Make Up Function, Type 40
Automatic Document Feeder, Type 20
Automatic Document Feeder, Type 50
Tape Marker, Type 20
PCRIP-10 Priport Controller

## 2. GUIDE TO COMPONENTS



1. Platen Cover

Lower this cover over an original before printing.

## 2. Original Holder

A convenient place for holding originals while operating the machine.

## 3. Original Table Release Lever

Use to open the original table unit when installing the master.
4. Feed Roller Pressure Lever

Use to adjust the contact pressure of the paper feed roller according to paper thickness.

## 5. Separation Roller Pressure Levers

Use to adjust the separation roller pressure to prevent double feed.
6. Paper Feed Table

Set blank paper on this table for printing.
7. Paper Feed Side Plates Use to prevent paper skew.
8. Side Plate Fine Adjustment Dial Use to shift the paper feed table sideways
9. Paper Feed Table Down Key Press to lower the paper feed table.

## 10. Front Door

Open for access to the inside of the machine.


## 1. Master Eject Unit Open Button

Press to remove misfed paper or a misfed master.
2. Master Cut Button

Press this button to cut the master paper leading edge after installing a new master roll.
3. Pressure Release Lever

Use to install the master roll.
4. Operation Panel

Operator controls and indicators are located here.

## 5. Drum Rotation Button

Press to return the drum to the home position.
6. Drum Unit Lock Lever

Lift to unlock and pull out the drum unit.
7. Drum Unit

The master is wrapped around this unit.

## 8. Ink Holder

Set the ink cartridge in this holder.
9. Paper Delivery Table

Completed prints are delivered here.
10. Small Size Paper Delivery End Plate
Use to align the leading edges of prints that are A4, 81/2" $\times 11^{\prime \prime}$ or smaller.
11. Paper Delivery End Plate

Use to align the leading edges of prints larger than A4, 81/2" $\times 11$ ".
12. Paper Delivery Side Plates

Use to align the prints on the paper delivery table.
13. Master Eject Container Cover

Open when removing the master eject box.
14. Main Switch

Use to turn the power on or off.

## 3. MECHANICAL COMPONENT LAYOUT



1. Drum Unit
2. Lens
3. $C C D$
4. Reverse Roller
5. Master Feed Roller
6. Platen Roller
7. Thermal Head
8. Master Roll
9. Master Making Unit
10. Upper Separation Roller
11. Paper Feed Roller
12. Paper Table
13. Separation Plate
14. Lower Separation Roller
15. 2nd Feed Roller
16. Doctor Roller
17. Press Roller
18. Ink Roller
19. Paper Exit Pawl
20. Transport Unit
21. Paper Delivery Table
22. Master Eject Box
23. 1st Eject Roller
24. 2nd Eject Roller
25. Master Eject Unit
26. Exposure Lamps
27. Original Exit Tray

## 4. DRIVE LAYOUT



1. Scanner Belt
2. Scanner Motor
3. Image Position Motor
4. Master Eject Motor
5. Drum Drive Gear
6. Drum Unit Gear
7. Drum Drive Pulley
8. Main Drive Belt
9. Transport Belt
10. Printing Pressure Pulley
11. Printing Pressure Gear
12. Idle Gear
13. Idle Pulley
14. Main Motor
15. Paper Table Drive Motor
16. Paper Feed Cam Gear
17. Master Feed Motor
18. Timing Belt
19. Platen Roller Gear
20. Master Transport Roller Gear
21. Reverse Roller Gear

22. Scanner Unit Safety Switch
23. Paper Table Down Button
24. Paper End Sensor
25. Paper Width Sensors (4)
26. Paper Table Open Switch
27. Paper Length Sensor
28. Paper Table Safety Switch
29. Paper Table Height Sensor
30. Image Processing PCB
31. Transformer
32. Paper Table Lower Limit Sensor
33. Front Door Safety Switch
34. Printing Pressure Sensor
35. 1st Paper Exit Sensor
36. Vacuum Fan Motor
37. Power Supply Unit
38. 2nd Paper Exit Sensor
39. Test Switch
40. Circuit Breaker
41. Delivery Table Open Switch
42. Main Switch
43. Air Knife Motor Safety Switch
44. Master Counter
45. Total Counter
46. Operation Panel
47. Drum Rotation LED
48. Drum Rotation Button
49. Drum Unit Safety Switch
50. Main Control PCB

51. Master Eject Unit Safety Switch
52. Ink Supply Solenoid
53. Master Press Sheet Solenoid
54. 2nd Drum Position Sensor
55. Noise Filter
56. 1st Drum Position Sensor
57. Printing Pressure Solenoid
58. Main Motor
59. Drum Rotation Sensor
60. Paper Feed Solenoid
61. Paper Table Drive Motor
62. Detection Pin Release Solenoid
63. AC Drive PCB
64. Ink Detection PCB
65. Master Cut Button
66. Image Positioning Motor
67. Master Feed Clamper Solenoid
68. Drum Lock Solenoid
69. Master Eject Clamper Solenoid
70. Drum Master Sensor

71. Master Buckle Sensor
72. Master Feed Motor
73. Left Cutter Switch
74. Master Buckle Fan Motor
75. Pressure Plate Motor
76. Lower Pressure Plate Sensor
77. Upper Pressure Plate Sensor
78. Full Master Box Sensor
79. Master Eject Sensor
80. Master Eject Solenoid
81. Air Knife Motor
82. Master Eject Box Switch
83. Master Eject Motor
84. Reverse Roller Clutch
85. Cutter Motor
86. Master End Sensor
87. Right Cutter Switch
88. Thermal Head

89. Scanner Home Position Sensor
90. Xenon Lamps (2)
91. Scanner Motor
92. CCD PCB
93. Platen Cover Position Sensor
94. Xenon Lamp Stabilizer
95. A/D Conversion PCB
96. Original Sensor
97. ADF Set Switch

## 5. ELECTRICAL COMPONENT DESCRIPTIONS

| P to P Location | INDEX No. | NAME | FUNCTION | SERVICE PROGRAM |
| :---: | :---: | :---: | :---: | :---: |
| Motors |  |  |  |  |
| N-16 | 15 | Vacuum Fan Motor | Provides suction to ensure that the paper is held firmly on the transport belt. | OUT-6 |
| E-4 | 37 | Main Motor | Drives paper feed, drum printing, and paper delivery unit components. | $\begin{aligned} & \text { OUT-26 \& } \\ & 32 \end{aligned}$ |
| E-4 | 40 | Paper Table Drive Motor | Raises and lowers the paper feed table. | $\begin{aligned} & \text { OUT-18 } \\ & \text { \&19 } \end{aligned}$ |
| K-16 | 45 | Image Positioning Motor | Changing the relative timing of the paper feed roller and the drum to adjust the vertical image position. | $\begin{aligned} & \text { OUT-24 \& } \\ & 25 \end{aligned}$ |
| E-10 | 51 | Master Feed Motor | Feeds the master to the drum. | OUT-34 |
| M-13 | 53 | Master Buckle Fan Motor | Provides suction to ensure that the master is stored in the master box during the master eject operation. | OUT-40 |
| L-16 | 54 | Pressure Plate Motor | Raises and lowers the pressure plate in the master eject mechanism. | OUT-4 |
| L-16 | 60 | Air Knife Motor | Drives the fans to separate the leading edge of the paper from the drum. | OUT-7 |
| L-16 | 62 | Master Eject Motor | Sends the used master into the master eject box. | OUT-3 |
| M-13 | 64 | Cutter Motor | Drives the mechanism to cut the master. | $\begin{aligned} & \text { OUT-22 \& } \\ & 23 \end{aligned}$ |
| E-13 | 70 | Scanner Motor | Drives the 1st and 2nd scanners. | OUT-37 |
| Solenoids |  |  |  |  |
| 1-14 | 31 | Ink Supply Solenoid | Releases the spring clutch to activate the ink supply pump. | OUT-12 |
| L-18 | 32 | Master Press Sheet Solenoid | Inserts the mylar sheet between the press roller and the drum during a quality start operation. | OUT-38 |
| K-16 | 36 | Printing Pressure Solenoid | Engages the pressure on/off lever when a paper misfeed occurs. | OUT-14 |
| K-16 | 39 | Paper Feed Solenoid | Releases the sector gears to feed the paper. | OUT-14 |
| L-16 | 41 | Detection Pin Release Solenoid | Releases the detection pin arm to apply printing pressure during a quality start operation. |  |
| M-16 | 46 | Master Feed Clamper Solenoid | Opens the master clamper to capture the leading edge of the master during master feed. | OUT-15 |
| L-16 | 47 | Drum Lock Solenoid | Prevents the drum unit from being removed during a printing run, or when the drum is not in the home position. | OUT-13 |

ELECTRICAL COMPONENT DESCRIPTIONS

| P to P Location | $\begin{gathered} \text { INDEX } \\ \text { No. } \\ \hline \end{gathered}$ | NAME | FUNCTION | SERVICE PROGRAM |
| :---: | :---: | :---: | :---: | :---: |
| M-16 | 48 | Master Eject Clamper Solenoid | Opens the master clamper to eject the master. | OUT-16 |
| M-16 | 59 | Master Eject Solenoid | Presses the lower master eject roller against the drum surface to capture the used master | OUT-17 |
| Switches |  |  |  |  |
| E-6 | 1 | Scanner Unit Safety Switch | Cuts off the power line of the main and paper table drive motor when the scanner unit is open. |  |
| J-16 | 2 | Paper Table Down Button | Instructs the CPU to turn on the paper table drive motor to lower the paper table. | IN-22 |
| J-16 | 5 | Paper Table Open Switch | Checks if the paper table is opened. | IN-19 |
| J-16 | 7 | Paper Table Safety Switch | Stops the lowering of the paper feed table to prevent users from catching their fingers under it, by cutting the ac power. It is also closed when the paper feed table is closed. |  |
| E-4 | 12 | Front Door Safety Switch | Informs the CPU when the front door is open, and cuts off the power line to the paper table drive motor. |  |
| E-5 | 18 | Test Switch | Disables the front door, paper table, master eject unit, and scanner unit safety switches. |  |
| N-16 | 20 | Delivery Table Open Switch | Checks if the delivery table is open. | IN-50 |
| F-3 | 21 | Main Switch | Turns the power on or off. |  |
| L-16 | 22 | Air Knife Motor Safety Switch | Cuts off the power line of the air knife motor when the master eject unit is open. |  |
| J-14 | 27 | Drum Rotation Button | Instructs the CPU to rotate the drum at 10 rpm . |  |
| J-14 | 28 | Drum Unit Safety Switch | Checks if the drum unit is set correctly. |  |
| F-5 | 30 | Master Eject Unit Safety Switch | Cuts off the power line when the master eject unit is open. |  |
| K-14 | 44 | Master Cut Button | Instructs the CPU to feed a short strip of master paper and cut the master paper. | IN-38 |
| M-14 | 52 | Left Cutter Switch | Detects when the cutter is at the left side (operation side). | IN-24 |
| I-16 | 61 | Master Eject Box Switch | Checks if the master eject box is set properly. | IN-33 |
| M-14 | 66 | Right Cutter Switch | Detects when the cutter is at the right side (non-operation side). | IN-23 |
| E-3 | 76 | ADF Set Switch | Detects if the optional document feeder cover is closed. | IN-47 |
|  |  |  |  |  |
| Sensors |  |  |  |  |
| K-16 | 3 | Paper End Sensor | Informs the CPU if there is paper on the paper table. | IN-18 |
| J-16 | 4 | Paper Width Sensors (4) | Informs the CPU of the printer paper width. | $\begin{aligned} & \mathrm{IN}-13 \sim \\ & 16 \end{aligned}$ |

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| P to P Location | $\begin{gathered} \text { INDEX } \\ \text { No. } \end{gathered}$ | NAME | FUNCTION | SERVICE PROGRAM |
| :---: | :---: | :---: | :---: | :---: |
| K-16 | 6 | Paper Length Sensor | Informs the CPU of the printer paper length. | IN-17 |
| K-14 | 8 | Paper Table Height Sensor | Informs the CPU when the paper table is at the paper feed position. | IN-21 |
| J-16 | 11 | Paper Table Lower Limit Sensor | Informs the CPU when the paper table is at the lowest position. | IN-20 |
| H-14 | 13 | Printing Pressure Sensor | Informs the CPU when printing pressure is applied. Also, detects paper misfeeds. | IN-35 |
| H-16 | 14 | 1st Paper Exit Sensor | Detects paper misfeeds. | IN-41 |
| H-16 | 17 | 2nd Paper Exit Sensor | Detects paper misfeeds. | IN-42 |
| L-13 | 33 | 2nd Drum Position Sensor | Checks the position of the drum. | IN-37 |
| K-13 | 35 | 1st Drum Position Sensor | Checks the position of the drum (home position). | IN-36 |
| J-14 | 38 | Drum Rotation Sensor | Supplies timing pulses to the CPU based on the rotation of the main motor. |  |
| H-16 | 49 | Drum Master Sensor | Informs the CPU if there is a master on the drum. | IN-44 |
| L-13 | 50 | Master Buckle Sensor | Informs the CPU when the master is buckling. | IN-25 |
| J-16 | 55 | Pressure Plate Lower Position Sensor | Informs the CPU when the pressure plate in the master eject mechanism is at the lower limit position. | IN-32 |
| J-16 | 56 | Pressure Plate Upper Position Sensor | Informs the CPU when the pressure plate in the master eject mechanism is at the upper limit position. | IN-31 |
| J-16 | 57 | Full Master Box Sensor | Informs the CPU when the master eject box is full of masters. | IN-34 |
| J-16 | 58 | Master Eject Sensor | Detects used master misfeeds. | IN-43 |
| L-13 | 65 | Master End Sensor | Informs the CPU when the master roll in the master making unit has run out. | IN-26 |
| D-3 | 68 | Scanner Home Position Sensor | Informs the CPU when the 1st scanner is at home position. | IN-45 |
| E-3 | 72 | Platen Cover Position Sensor | Detects when the platen cover or the optional document feeder is opened more than 25 degrees above the exposure glass. | IN-46 |
| E-3 | 75 | Original Sensor | Detects when an original is placed on the exposure glass. | IN-48 |
|  |  |  |  |  |
| Printed Circuit Boards |  |  |  |  |
| A-6 | 9 | Image Processing PCB | Control the image processing performance. |  |
| E-6 | 29 | Main Control PCB | Controls all machine functions both directly and indirectly through other boards. |  |
| E-5 | 42 | AC Drive PCB | Controls the ac components using relays. |  |
| 1-13 | 43 | Ink Detection PCB | Informs the CPU when ink is present in the drum. |  |

ELECTRICAL COMPONENT DESCRIPTIONS

| P to P <br> Location | INDEX <br> No. | NAME | FUNCTION | SERVICE <br> PROGRAM |
| :--- | :---: | :--- | :--- | :--- |
| A-2 | 71 | CCD PCB | Converts the reflected light intensity <br> into an analog signal. |  |
| C-4 | 74 | A/D Conversion PCB | Converts the CCD analog signal into <br> a digital signal. |  |
|  |  |  | Counters |  |
| M-16 | 23 | Master Counter | Keeps track of the total number of <br> masters made. | OUT-9 |
| M-16 | 24 | Total Counter | Keeps track of the total number of <br> prints made. | OUT-10 |
| F-4 | 10 | Transformer | Others |  |
| F-8 | 16 | Power Supply Unit | Steps down the wall voltage. <br> Provides power for all dc <br> components. |  |
| F-3 | 19 | Circuit Breaker | Cuts the ac line off. |  |
| O-14 | 25 | Operation Panel | Interfaces the CPU and the operator. |  |
| K-14 | 26 | Drum Rotation LED | Lights the LED green when the <br> drums stops at the home position. <br> Lights the LED red when the drum <br> is not in the home position |  |
| F-2 | 34 | Noise Filter | Filters out electrical noise from the <br> ac power input line. |  |
| M-13 | 63 | Reverse Roller Clutch | Transfers drive to the reverse roller. | OUT-5 |
| D-10 | 67 | Thermal Head | Creates the master using heat. |  |
| B-1 | 69 | Xenon Lamps (2) | Illuminates the original. | OUT-21 |
| B-2 | 73 | Xenon Lamp Stabilizer | Stabilizes the power supplied to the <br> xenon lamps. |  |

## 6. PRINTING PROCESS



2. Master Feed:

3. Paper Feed:
4. Printing:
5. Paper Delivery:

At the start of the master making cycle, the machine will eject the used master that is wrapped around the drum into the master eject box.

At the same time, the machine will scan the original on the exposure glass (reflected light to the CCD via the mirrors and the lens. The scanned image is transferred onto the master using a thermal head.

While the old master is being ejected, the new master is stored in a box.

After the old master has been ejected, the new master is fed to the drum and wrapped around it. At the same time, the new master is cut.

Individual sheets of paper are fed to the drum.

The paper fed from the paper feed mechanism is pressed against the surface of the drum. This will transfer the ink onto the printer paper through the drum screen and the master.

The exit pawl and air knife are used to peel the printed paper off the drum, and eject the paper onto the paper delivery table.

## 7. MAJOR DIFFERENCES BETWEEN THE VT3600 AND THE VT3800

The VT3800 was developed based on the VT3600.
The following table lists the major differences between the VT3800 and the VT3600.

| No. | Item | Remarks |
| :---: | :---: | :---: |
| 1 | Exposure Lamp | The exposure lamp has been changed from a fluorescent lamp to two xenon lamps. |
| 2 | Master Buckle Mechanism | The master process time has been reduced as a result of the new master buckle mechanism. The master making process will start at the same time as the master eject operation. |
| 3 | Quality Start | A quality start mechanism has been added to minimize wasted prints after a long idle interval. |
| 4 | Platen Roller Holding Method | To ensure the correct platen roller positioning, the platen roller is held by two screws instead of two levers. |
| 5 | Leading Edge Margin | The leading edge margin has been reduced from 8 mm to 5 mm . The drum screens and printing pressure cam have been changed. |
| 6 | Separation Roller Shaft | The diameter of the separation roller shaft has been increased. Due to this modification, the paper feed vibration noise has been reduced. |
| 7 | Noise Reduction Cover | The noise reduction cover has been added to reduce paper feed noise. |
| 8 | Paper Size Sensors | The paper size detection board has been eliminated. The paper size sensors send the signals directly to the main control board. |
| 9 | Optional Equipment | Large Capacity Tray LT4000 ADF (50 Sheets) |
| 10 | Line/Photo Mode | To allow clear prints of originals having line and photo areas, Line/Photo mode has been added. Photo mode is processed using Error Diffusion, which is similar to the CAPIX method used in the VT3600. |
| 11 | Economy Mode | If "Economy" mode is selected on the operation panel, a lower thermal head energy is applied when a master is made. As a result, the image will be lighter than normal and ink consumption will be reduced. |
| 12 | CS Mode | Customers can register three of seven frequently used user SP modes in the CS mode. The setting can be recalled using the new CS mode key. |
| 13 | Scanner Lock Lever | To facilitate operation, the shape of the scanner lock lever has been changed. |
| 14 | Paper Return Mechanism | The paper return mechanism (a solenoid and a dc motor) has been eliminated. |
| 15 | Cassette Size Detection | The cassette size detection board (reed switch) has been eliminated. |
| 16 | Paper Feed Motor | The paper feed motor has been changed from an ac motor to a dc motor. |


| No. | Item | Remarks |
| :---: | :--- | :--- |
| 17 | Original Tray Cover | To prevent the originals from dropping when the ADF is <br> opened, a cover has been added on the original tray. |
| 18 | Base Pads | The shape of the base pads has been changed so that they <br> can be used for both the normal table and the table for the <br> LCT (Large Capacity Tray). |

# DETAILED SECTION DESCRIPTIONS 

## 1. MASTER EJECT

### 1.1 OVERALL

At the end of the printing cycle, the used master will remain wrapped around the drum to prevent the ink on the drum surface from drying. When the Master Making key is pressed to make a new master, the used master will then be ejected from the drum.

The master is pulled off the drum, and is fed through the eject rollers and into the master eject box. A pressure plate will then compact the used master.


- The drum $[B]$ rotates in reverse (opposite to the printing direction).
- The master eject rollers [A] rotate.
- The lower eject roller [C] is moved forward and is pressed against the surface of the drum.

[G]

[H]
- The pressure plate $[\mathrm{H}]$ will compact the ejected master [I].


### 1.2 MASTER EJECT ROLLER ROTATION MECHANISM



When an original is in place and the Master Making key is pressed, the main motor will start turning at 22 rpm in the reverse direction. As a result, the drum will also turn in reverse direction (compared with the rotation direction during printing).

At this moment, if the drum master sensor detects that there is a master on the drum, the master eject motor [A] starts rotating. Drive is transmitted to gear [E] and to the upper first eject rollers [G] through the timing belt [B] and gears [C] and [D]. Gear [F] will drive the lower first eject rollers [H]. The belts [I] will transmit the drive from the first eject rollers to the upper and lower second eject rollers [J].
(If the drum master sensor had detected that no master was wrapped around the drum when the Master Making key is pressed, the machine will skip the master eject process and will go directly to the master making process.)

After the master eject process is completed, the drum will return to its home position. The master eject rollers then stop rotating.

There are five rollers on each eject roller shaft. (only four illustrated)

### 1.3 MASTER EJECT ROLLER DRIVE MECHANISM


[E]


The drum position is detected by the first [G] and second [H] drum position sensors. When the drum reaches its home position, the first drum position sensor [G] is actuated by the interrupter [F] located on the rear side of the drum.

To eject the master, the drum will turn in reverse direction (opposite to the printing direction). When the drum is $70^{\circ}$ past the 1 st drum position sensor, the master eject solenoid [A] is energized and the supporter [C] on the upper eject roller shaft [D] will pivot away from the drum. This will force the lower first eject roller, [E] to be pressed against the surface of the drum.

The drum will momentarily stop rotating for 150 milliseconds when the trailing edge of the master is about 5 mm from the master eject rollers to ensure the capture of the used master

As the drum rotates, the curled trailing edge of the master [B] will pass between the upper and lower first eject rollers. The first eject rollers will then peel the used master off the drum.


When the drum is 109 degree past the 1st drum position sensor, the master eject solenoid [A] is turned off, moving the lower first eject rollers [C] away from the drum.

Shortly after the leading edge of the ejected master has passed between the upper and lower first eject rollers, the master eject sensor [B] is activated. The used master will then be dumped into the master eject box [D].


## [Master Eject Misfeed Detection]

The misfeed indicator for the master eject section will blink during the following conditions:

1: The master eject sensor is not activated and the drum has rotated an additional 50 degrees (still in reverse direction and after the de-activation of the master eject solenoid). The machine will know that the eject rollers have failed to capture the master. The drum will return 68 degrees (in the printing direction) to repeat the master eject process again. The master eject solenoid will again be energized while the drum rotates another 18 degrees to try to capture the trailing edge of the master.

If the master eject sensor again fails to detect the master, the drum will return to its home position and the misfeed indicator will blink.

2: $\quad$ The drum finishes its rotation for the master ejecting process and returns to the home position, but the master eject sensor does not turn off. This means that the master is still positioned between the master eject rollers, the misfeed indicator will blink.

### 1.4 MASTER EJECT CLAMPER MECHANISM



When the drum has rotated $306^{\circ}$ (in the reverse direction) past the 1 st drum position sensor, the master eject clamper solenoid [A] will energize and lever [B] will move counterclockwise a short distance as shown. This will move the cam [D] inwards towards the drum. The drum rotation will bring the clamper sector gear [E] against the cam [D]. Gear [F] will turn counterclockwise as it engages the clamper sector gear, thus opening the master clamper [G]. This will release the leading edge of the master from the drum.

The drum will continue rotating until the interrupter at the rear of the drum has traveled 13 degrees past the first drum position sensor. Then, the main motor will turn off. A half a second later, the master eject clamper solenoid [A] will turn off and the spring [C] will pull the cam [D] back to its initial position. The drum will then rotate forward to its home position.

### 1.5 PRESSURE PLATE UP/DOWN MECHANISM



## Pressure Plate Down

When the interrupter located at the rear of the drum interrupts the first drum position sensor (this will occur at the completion of the master eject process), the pressure plate motor [B] will rotate. This will drive the gear $[\mathrm{H}]$ clockwise by means of gears [C], [D], [E], and [F].

Pin [I] on gear [H] will move the link [G] downward until the link interrupter [L] interrupts the lower pressure plate sensor [J]. The spring [M] will pull down on the pressure plate and the ejected master in the master eject box is compressed by the pressure plate $[A]$.

If the master box full sensor $[\mathrm{K}]$ does not turn on when the pressure plate travels downward, this will indicate that the master eject box is filled with ejected masters. In this case, the master eject box full indicator will blink, and the machine will stop after a new master is wrapped around the drum.

The indicator will go off after the master eject box switch has been turned off and on. Then the master box full sensor will be checked again after one master has been fed. This is to prevent the indicator from being reset without removing the ejected masters from the box. When the indicator is blinking, the Master Making key will not work, but the Print Start key and Proof key will operate correctly and the master that is currently wrapped around the drum can be used for printing.


## Pressure Plate Up

After the new master has been wrapped around the drum in the master making process, the master cutter will leave the home position to cut the master, the pressure plate motor $[\mathrm{B}]$ will start rotating to raise the pressure plate.

When the pressure plate motor $[\mathrm{B}]$ rotates, the gear $[\mathrm{C}]$ is driven through the relay gears. The pin [F] on the gear inserted into the link [D] will rise and lift the left end of the link, thus raising the pressure plate.

The gear [C] will continue to turn until the interrupter [G] at the front end of the pressure plate blocks the upper pressure plate sensor [A]. At this time, the master eject motor [B] will stop and the pressure plate is held in the upper position.

## Pressure Plate Motor Lock Detection

To prevent the pressure plate motor from locking, the error code, "E-12" will light on the operation display panel under the following conditions:

1. When the lower pressure plate sensor [E] is not activated within 8 seconds after the pressure plate motor starts to lower the pressure plate.
2. When the upper pressure plate sensor $[A]$ is not activated within 4 seconds after the pressure plate motor starts to raise the pressure plate.

### 1.6 ELECTRICAL TIMING



T1: When the Master Making key is pressed, the main motor and master eject motor will start turning. At the same time, the paper table drive motor will start turning to lift the paper table upward to the paper feed position.

T2: When the drum rotates X 1 degrees past the first drum position sensor actuation position (drum home position), the master eject solenoid is energized. This will press the lower eject rollers against the surface of the drum. The master eject solenoid is de-energized when the drum rotates an additional X2 degrees.

The drum rotation angles X 1 and X2 are depended on the drum type. There are two types of drums: the A3/DLT drum (standard), and the
 A4/LT drum (optional). X1 and X2
 degrees for each drum are as follows

| Drum Type | A3/DLT | A4/LT |
| :---: | :---: | :---: |
| X1 (degree) | 70 | 174 |
| X2 (degree) | 39 | 55 |

## MASTER EJECT

T3: When the drum has rotated 306 degrees past the home position, the master eject clamper solenoid is energized.

T4: When the drum has rotated 13 degrees past the drum home position, the drum will stop.

The drum will stop for 500 milliseconds and the master eject clamper solenoid will be de-energized. The drum will then rotate in the opposite direction to return the drum to the home position. The master eject process is completed.

After the master eject cycle, the machine will start feeding the new master and the drum will rotate in the print direction to begin the master making process.

## 2. SCANNER

### 2.1 OVERALL

There are two modes for scanning originals.
Platen Cover Mode: The original is placed on the exposure glass, and the scanner motor moves the scanner under the exposure glass to scan the original.
ADF Mode: When an optional Document Feeder is installed, the original is fed onto the exposure glass. The scanner will then move 22 mm away from the CCD and will then remain stationary as it scans the moving original. The scanner is returned to the home position when the scanning is completed.


The light from the xenon lamps $[A]$ are reflected from the original by the first $[B]$, second $[F]$, and third $[E]$ mirrors through the lens [D] to the CCD [C].

In the Platen cover mode, the CCD will measure the reflected light of the white plate [G] on the back side of the original scale [I] each time before scanning the document to obtain the standard white level. The standard white level is used to correct distortion such as bright or dull spots in the light path (lamp, reflectors., exposure glass, mirrors, lens and CCD). The scanner is the home position when it measures the white level

In the ADF mode, as the scanner will move 22 mm , the CCD will then measure the white level off the white plate installed on the ADF Unit.

[Lens]
The lens assembly [B] consists of 6 lenses to transfer the image to the photoelectric elements of the CCD. It is possible to adjust the focus by moving the lens assembly.

## [Shading Plate]

Compared with the ends, the middle of the lamp is too bright. To correct this, a shading plate $[A]$ is placed in front of the lens. The shading plate will block some of the light in the center to distribute it more uniformly, across the CCD.

## [CCD (Charge Coupled Device)]

The CCD [C] is a solid-state device similar to a photodiode array, but unlike a photodiode array, a CCD can read one complete scan line at a time. The CCD produces an analog signal which is converted into a digital signal in the A/D conversion PCB.

### 2.2 SCANNER MECHANISM



The scanner motor [ A ] (a stepper motor) is used to drive the scanners. The first scanner $[B]$, which consists of the exposure lamps and the first mirror, is driven by the first scanner belt [F]. The second scanner [C], which consists of the second and third mirrors, is driven by the second scanner belt [D]. Both scanners move along the guide rails.

The timing belt [G] moves the second scanner at half the speed of the first scanner. This is to maintain the focal distance between the original and the lens during scanning.

The scanner home position is detected by the scanner home position sensor [E]. In the Platen Cover Mode, the scanner will scan the original on the exposure glass, then will return until the scanner home position sensor is activated. In the ADF Mode, the scanner will move 22 mm backwards (away from the CCD), to scan the original which is fed by the ADF. When the master making process is finished and the ADF motor has stopped, the scanner will return to the home position.

### 2.3 PLATEN COVER POSITION DETECTION



When the platen cover is opened about 25 degrees, the Platen Cover Position Sensor $[A]$ is deactivated. When this sensor is deactivated, the Original Sensor $[B]$ is able to detect the original on the exposure glass.

When the Platen Cover Position Sensor is deactivated and the Original Sensor will detect that there is no original on the exposure glass, the machine will indicate the message "SET THE ORIGINALS" on the operation display. This will prevent wasting a blank master that would occur when the Master Making key was pressed without an original being placed on the exposure glass.

When the original is placed on the exposure glass and the Master Making key is pressed with the platen cover opened more than 25 degrees ( the Platen Cover Position Sensor is deactivated), the shadow (margin) erase function is enabled.

The margin erase function will erase the shadows around the original. This function is useful when printing from a thick book or similar originals. The margin erase function is also enabled when the margin erase key is pressed. When the key is pressed, the machine will erase the margin that is shown on the operation display regardless of how much the platen cover is opened.

## Notes regarding the shadow erase function

- Margins of 1 mm [0.02"] on all four sides of the original will be erased. The width of the margins will change depending on the reproduction ratios.
- Shadows near the edge of a book might not be erased completely.
- If the shape of the original is as shown below, shadows might appear on the prints. In this case, make the master with the platen cover closed.

Shadow


Scanning direction

- If there is a line or solid image on the margin at the center or at the edges being erased, parts of the image might be erased as shown below.


Scanning direction

### 2.4 ELECTRICAL TIMING

### 2.4.1 Platen Mode



## Master Feed Lengths

a: 18.7 mm
b: 0.7 mm
c: 10.7 mm
d: 13.7 mm
e: 420 mm
f: 62.5 mm ( $211 \mathrm{~mm}:$ A4/LT drum)
$\mathrm{g}: 40 \mathrm{~mm}$ (61 mm: A4/LT drum)
The machine will scan and plot (burn) the new master during the master eject cycle. The new master will be stored until the completion of the master eject cycle.

T1: When the master making key is depressed, the main motor will rotate in the reverse direction at 22 rpm . At the same time, the master feed motor and the reverse roller clutch will turn on to feed the leading edge of the master 18.7 mm , then both the master feed motor and the reverse clutch will turn off. The scanner motor will turn on moving the scanner unit in the forward direction.

T2: After the scanner unit has moved 20 mm pass the home position, the master feed motor, the master buckle fan motor and the reverse roller clutch will turn on

T3: The scanning process and the master making process will begin simultaneously after the master has been advanced 1 mm . The new master will be stored until the used master has been ejected from the drum.

T4: After the scanner has traveled the length of the paper on the paper table (maximum length 420 mm ), the scanner motor will rotate in the reverse direction to return the scanner back to the home position.

T5: After the scanner home position sensor is actuated, the scanner motor will rotate in the forward direction then the reverse direction to ensure that the scanner unit had stopped at the correct home position.

### 2.4.2 ADF Mode (Type 50)



The timing chart above shows the scanner timing when an optional ADF is used.

T 1 : When the originals are inserted in the ADF unit, the original set sensor is activated.

T2: When the Master Making key is pressed, the ADF motor will rotate in the forward direction to drive the pickup roller and the feed roller to feed the top original into the ADF.

T3: The ADF motor will stop rotating when the original has been fed 14.5 millimeters after the original registration sensor was activated. After a 50 milliseconds delay, the ADF motor will start rotating in the reverse direction to drive the 1st original transport roller.

T4: The ADF motor will stop again when the original has been fed 22 millimeters after the scan line sensor was activated.


T5: When the ADF motor stops, the scanner motor will rotate in the reverse direction to move the scanner unit to the ADF scanning position.

## 3. MASTER FEED

### 3.1 OVERALL



The thermal head $[B]$ will burn the image (scanned by the CCD) onto the master [A] which will be later be wrapped around the drum [C]. At the same time that the used master is being ejected, the new master will be printed and stored in the master box [D]. After the old master has been completely ejected, the new master will then be clamped to and wrapped around the drum.

The master box mechanism will reduce the amount of time that is needed to make a new master, because the new master can be made at the same time that the old one is ejected.

### 3.2 MASTER FEED CLAMPER OPENING MECHANISM



After the master eject process is completed and the interrupter [A] is positioned in the first drum position sensor [B], the main motor will turn on and the drum starts rotating ( 22 rpm ) in reverse direction (opposite to the printing direction).

When the drum has rotated 160 degrees past the actuation position of the second drum position sensor [C], the master feed clamper solenoid [D] will energize, and the cam $[\mathrm{H}]$ will move inside the drum.

When the drum has rotated an additional 58.5 degrees, the sector gear [F] will rotate upwards as it contacts the cam $[\mathrm{H}]$. This will engage the sector gear with the gear [E], which will turn counterclockwise to open the clamper [G]. At the same time, the drum will stop and the clamper will remain open to capture and clamp the leading edge of the new master.

### 3.3 MASTER FEED MECHANISM



To minimize the first print time, the master making process will start just after the master making key is pressed.

When the master making key is pressed, the drum will start rotating in reverse direction to eject the used master that is wrapped around the drum. At the same time, the master feed motor [A] will start turning and the reverse roller clutch $[B]$ is energized.

When the master has been transported 18.7 mm , the master feed roller and the reverse roller clutch will stop. They will start again just after the scanning process of the original is initiated.

When the master has been transported an additional 10.7 mm (when the leading edge is 6 mm past the reverse roller [C]), the reverse roller clutch is turned off but the master feed motor will continue to rotate. As a result, the leading edge of the master will stay at 6 mm past the reverse roller, and the master will buckle upward behind the reverse roller. Until the drum is in to the master feed position, the new master will be fed by the master feed motor and stored in the master box [D]. The suction provided by the master buckle fan motor [E], will assist to bring the master into the box.

The main results of this mechanism are:

- A much greater length of new master can be made before it starts to be wrapped around the drum.
- The new master can be made much earlier during the machine's operation cycle, reducing the time of the first print.

The master buckle fan motor will turn on when master making is initiated, and will remain on until the reverse roller rotates again to feed the master to the master clamp on the drum.

### 3.4 MASTER WRAPPING MECHANISM



When the drum stops at the master feed position (at this time, the master clamper is open), the reverse roller clutch [A] will turn on again. When the master has been transported 18.7 mm and the master leading edge has reached the master clamper, the reverse roller clutch and the master feed clamper solenoid will turn off. The leading edge of the master is clamped by the master clamper.

After the master clamper catches the leading edge of the master, the drum will rotate at 22 rpm while the master buckle sensor $[B]$ is on. The master feed motor will continue to feed the master at this stage. The drum will pull the master faster than the master feed motor feeds it, so that the master buckle sensor will eventually deactivate. When this occurs, the main motor will stop until the sensor is activated by a buckle in the master again. The master is wrapped around the drum while keeping a buckle between the reverse roller [C] and the master feed roller [D]. The buckle will prevent the master that is still located under the thermal head from being pulled; if a long master is being made, this will adversely affect copy quality.

When the new master making process is completed, the master feed speed will increase (to 4 times the master making speed) and the master cutter will cut the master when the appropriate length of master has been transported.

## MASTER FEED

Even if a master eject jam occurs, the master making operation will continue. When a master eject jam is detected, the machine will stop after master making and cutting is completed (during this period, the new master is stored in the master box [E]). When the reset key is pressed after the jammed master is removed, the reverse roller clutch will turn on to transport the new master to the master clamper. The master clamper will then clamp onto the leading edge of the master. The drum will rotate at 22 rpm in the print direction to wrap the master around the surface of the drum.

### 3.5 CUTTER MECHANISM


[B]

After the master making process is completed, the master feed motor will turn off and the cutter motor [A] will start turning.

The cutter motor $[\mathrm{A}]$ will start turning in the reverse direction (see the arrows) when the cutter holder [ B ] is pressed against the left cutter switch at the front end (operation side) of the cutter rail; (this is the cutter holder home position). This will drive the cutter holder [B] toward the rear (non-operation side) by means of the gear/pulley [C] and the wire [D] on which the cutter holder [ B ] is fixed. The master will be cut.

When the cutter holder reaches the rear end of the cutter rail and is pressed against the right cutter switch, the cutter motor [ A ] will change its rotation direction, and the cutter holder $[B]$ will move toward the front. The cutter motor $[A]$ will stop turning when the cutter holder $[B]$ is back at its home position (pressed against the left cutter switch). The master cutting process is now finished.

While the cutter holder $[B]$ is traveling towards the rear of the machine, the roller [ E$]$ in the cutter holder is turning clockwise because it touches the cutter rail. The roller [ $E$ ] will rotate the cutter blade [F] as indicated by the arrow. The master is between the blade and blade plate [G] and as the cutter moves rearward, it will cut the master. The blade plate also serves as a lower guide plate for the master.

After the master cutting process is completed, the master is fed an additional 40 millimeters and the master feed process is completed.

## MASTER FEED

### 3.6 ELECTRICAL TIMING


a: 18.7 mm
b: 0.7 mm
c: 10.7 mm
d: 13.7 mm
e: 420 mm
f: 60 mm (211 mm: A4/LT drum)
$\mathrm{g}: 40 \mathrm{~mm}$ ( 61 mm : A4/LT drum)

## - Master Feed -

T1: When the master making key is depressed, the main motor will rotate in the reverse direction at 22 rpm . At the same time, the master feed motor and the reverse roller clutch will turn on to feed the leading edge of the master 18.7 mm , then both the master feed motor and the reverse clutch will turn off. The scanner motor will turn on moving the scanner unit in the forward direction.

T2: After the scanner unit has moved 20 mm pass the home position, the master feed motor, the master buckle fan motor and the reverse roller clutch will turn on.

T3: The scanning process and the master making process will begin simultaneously after the master has been advanced 1 mm . The new master will be stored until the used master has been ejected from the drum.

T4: After the scanner has traveled the length of the paper placed on the paper table (maximum length 420 mm ), the scanner motor will rotate in the reverse direction to return the scanner back to the home position.

T5: After the scanner home position sensor is actuated, the scanner motor will rotate in the forward direction then the reverse direction to ensure that the scanner unit had stopped at the correct home position.

## - Master Wrapping -

T6: After the master eject process is completed, the main motor will rotate in reverse direction at 22 rpm . The main motor will stop when the drum has rotated 220 degrees.

T7: When the drum has rotated 160 degrees past the 2nd drum position sensor, the master feed clamper solenoid will energize.

T8: When the drum stopped at the master feed position, the master buckle fan motor will turn off. At the same time the reverse roller clutch is de-energized. When the master has been transported 13.7 mm , the reverse roller clutch and the master feed clamper solenoid are turned off.

T9: When the master has been clamped, the main motor will start rotating in print direction to wrap the master around the surface of the drum. The motor will rotate at 22 rpm only when the master buckle sensor is activated.

## 4. PAPER FEED

### 4.1 OVERALL



This mechanism uses a center separation system, which consists of the separation plate [F], upper separation roller [B], and lower separation roller [E]. If a few sheets of paper are picked up from the paper stack (on the paper table) by the paper feed roller [A], only one sheet of paper is transported to the second upper feed roller [C] and second lower feed roller [D].

### 4.2 PAPER TABLE UP/DOWN MECHANISM

The paper table is raised and lowered by the paper table drive motor.
The paper end sensor [E] (a reflective photosensor) is actuated when the paper is placed on the paper table. When the Print Start key is pressed, the paper table drive motor $[\mathrm{H}]$ will start rotating in the clockwise direction and the worm gear [G] will turn. The gear [F] will turn clockwise and both gears $[F]$ and $[D]$ will turn to raise the racks [C].

As the paper table rises, the paper will push against the paper feed roller [I]. This raises the lever [J] which is mounted on the paper feed bracket. This will activate the paper table height sensor $[\mathrm{K}]$ (the phototransistor detects the light from the photocoupler, which up to now blocked by the lever), and will cause the paper table motor $[\mathrm{H}]$ to turn off stopping the raising of the paper table.

As printing proceeds and the level of paper on the table decreases, the lever [J] will block the light path in the photocoupler and the motor [H] will rotate clockwise until the phototransistor is reactivated. As a result, the top of the paper stack is constantly kept at the correct height.

When no paper is present, the paper end sensor [E] is not activated and the motor $[\mathrm{H}]$ will turn counterclockwise to lower the paper table. The paper table is lowered until the actuator [A] (fixed to the front rack) interrupts the lower limit sensor [B].

When a misfeed occurs or printing is finished, the paper table motor $[\mathrm{H}]$ will rotate counterclockwise for 500 milliseconds, to slightly lower the paper table.


### 4.3 FEED ROLLER PRESSURE MECHANISM



The weight of the feed roller assembly [C], will press the paper feed roller onto the paper that is stacked on the paper table. This is because the feed roller assembly rotates freely around its shaft [D].

The spring [A] applies tension to the feed roller assembly in the direction in which the paper feed roller is pulled up. When the feed pressure lever $[B]$ is moved up, the spring $[\mathrm{A}]$ is stretched. Thus, the tension of the spring is increased, weakening the feed roller pressure.

Originally, the feed pressure lever is in the up position (standard paper). When thick paper ( 132.5 to $215 \mathrm{~g} / \mathrm{m}^{2}$, or 35.2 to 57 lb ) is used and frequently the paper is not fed correctly, push the feed pressure lever down. The feed roller pressure will increase.

### 4.4 PAPER SEPARATION MECHANISM



Pressure from spring [F] holds the separation plate [G] against the upper separation roller. A rubber pad located on the top of the separation plate allows only a few sheets of paper to reach the lower separation roller. If too many sheets of paper are fed to the lower separation roller at the same time, the lower separation roller may not be able to separate the sheets; it can separate only two or three sheets of paper.

Springs pull lever [A] push up the lower separation roller [E] upward. This roller presses the sheets to be fed against the upper separation roller [B]. The lower separation roller does not turn in the paper feeding direction. (It turns in the opposite direction due to the one-way clutch bearings [D] located on both right and left separation levers [A].) When two or more sheets of paper are fed, brake force is applied to the lower sheets of paper by the friction between the paper and the lower separation roller. Then, the sheets are separated and only a single sheet of paper is fed to the second feed rollers.

The pressure between the upper and lower separation rollers can be adjusted by changing the right and left separation pressure adjusting levers [C] as follows (this is a user-level adjustment):

Levers Up: Separation pressure decreases.
Levers Down: Standard position.
When dog-eared or wrinkled prints are delivered, the separation pressure should be decreased.
Fig. 2
Fig. 1


View from "E"


The lower separation roller [C] will turn slightly (see the arrow in Fig. 2) due to the one-way clutch bearings when paper passes through the roller. The lower separation roller [C] and its shaft [D] are slightly pushed downward by the paper $[B]$ when the upper separation roller $[A]$ is feeding the paper (Fig.1). Just when the paper is fed out from the rollers, the lower separation roller [C] and its shaft [D] will spring back against roller [A] (Fig. 2). This will rotate the lower separation roller and ensures that it will wear evenly.

There are four paper guide rollers [G] to reduce curl in the leading edge of the paper, and to feed the paper smoothly to the guide plates. There are four marks (slots) on the bracket [F] that corresponds to the roller positions as shown in the lower diagram.

### 4.5 PAPER FEED ROLLER/UPPER SEPARATION ROLLER MECHANISM



The main motor drives the paper feed roller cam [C], which moves the sector gear back and forth. The sector gear [J] will rotate the paper feed roller [M] and the upper separation roller [A]. A one-way clutch inside gear [H] will prevent the rollers from rotating in reverse during the return half of the sector gear movement. The cam will rotate once per sheet of paper.

When the paper feed solenoid [G] is energized, it will pull the link [F] away from the sector gear to allow it to rotate. When the cam roller [D] is at the widest part of the paper feed roller cam [C], the sector stopper [E] will drop away in a counterclockwise direction as a clearance is formed between the stopper and pin [I]. Then, the cam roller [D] on the sector gear will move along the surface of the cam [C]. The solenoid [G] will remain energized during the print cycle.

When the narrowest part of the paper feed roller cam [C] is rotating away from the cam roller [D] and the widest part is approaching, the sector gear [J] will move forward (paper feed direction) and the gear $[\mathrm{H}]$ will rotate counterclockwise. The rotation of the gear $[\mathrm{H}]$ is transmitted to the upper separation roller shaft $[B]$ and the upper separation roller $[A]$ will rotate counterclockwise. At the same time, the pulley $[\mathrm{K}]$ on the upper separation roller shaft $[B]$ will turn, and the belt [L] will rotate the paper feed roller [M] counterclockwise to feed the printing paper.

When the narrowest part of the paper feed roller cam [C] approaches the cam roller [D] again, the sector gear [J] will move rearward and the gear [H] is turned clockwise. However, a one-way clutch inside the gear $[\mathrm{H}]$ to prevent the upper separation $[A]$ and paper feed rollers $[\mathrm{M}]$ from turning.

### 4.6 SECOND FEED ROLLER MECHANISM



## Drive Mechanism

The main motor drives the lower second feed roller cam [A], which moves the sector gear [C] back and forth. The sector gear [C] will rotate the lower second feed roller [I]. A one-way clutch inside the feed roller gear [E] prevents the roller from rotating in reverse during the return half cycle of the sector gear movement. The cam will rotate once per sheet of paper.

When the paper feed solenoid [G] is energized, it will pull the link [F], the 1st paper feed roller sector gear stopper [H], and the 2nd feed roller sector gear stopper [K].

The bearing [J] on the sector gear rotates along the cam surface. When the widest part of the cam comes to the bearing [J], the stopper [B] is released from the sector gear as a clearance is formed between the pin of the sector gear [D] and the stopper [K].

When the feed roller gear rotates counterclockwise, its rotation is not transmitted to the lower second feed roller due to the one-way clutch bearing in the gear.

When the narrowest part of the second feed roller cam moves away from the bearing [J], the sector gear moves rearward (paper feed direction) and the feed roller gear will rotate clockwise. As the rotation of the feed roller gear is transmitted to the lower second feed roller, the lower second feed roller turns clockwise to feed the paper to the drum.


## Release Mechanism

This mechanism will release the upper second feed rollers [B] from the lower one [G] after the press roller and the drum had captured the leading edge of the paper.

The mechanism is made up of several parts. First, a cam which transmits motion to a sector gear [F]; then another cam will [E] that is part of the sector gear. This cam will push the bearing [D], which will cause the lever $[\mathrm{H}]$ attached to the bearing to turn the upper feed roller shaft [C] so that the upper rollers contact with the lower rollers.

At the beginning of each cycle the upper and lower rollers are away from each other. They come together halfway through the cycle and at the end of the cycle they will move apart.

Initially, the rollers are separate, and the sector gear [F] is ready to start moving clockwise. The bearing [D] on the lever $[\mathrm{H}]$ is in contact with the cam [E] on the sector gear. As the gear turns clockwise, it will cause the cam to turn the lever in the same direction (clockwise).

The lever will lower the upper roller [B]. It does this by turning the roller's eccentric shaft [C]. Eccentric means that the shaft is not located in the center of the roller, actually it is a little off center, so when the shaft turns the roller, the roller will move up or down.

## PAPER FEED

When the cycle is halfway through, the sector gear has reached its maximum rearward position (paper feed direction). The upper roller will touch the lower one and a pair of springs [A] will apply tension at each end of the upper roller. Until this moment the lower roller had not turned.

At this point, the paper will arrive from the first paper feed rollers. The leading edge will hit the two rollers and the paper will buckle slightly. This will ensure that the paper will go into the rollers straight.

The lower roller will now begin to turn and will feed the paper to the drum section. The sector gear is now moving in the forward direction, raising the upper roller. The gear will return to its original position and the paper feed cycle is now completed.

## Service Note

The paper will buckle slightly as the leading edge of the paper arrives from the first paper feed rollers before the second paper feed rollers start to turn. The second feed roller start timing can be adjusted to change the leading edge margin. See Refer to section 5.6.10; Second Feed Roller Start Timing.

### 4.7 PAPER SIZE DETECTION

The machine will determine the printing area of the master based on the detected paper size and the original length (which is detected during the original scanning process). If the original size is different from the paper size, the machine will compare the lengths of the original and the paper. The lenght of the master will be the shorter of the two. The printing width of the master is determined by the paper width.
Note: The determined master printing area is not changed if the paper on the paper table is replaced with another size of paper during the master making process.
The printing area of the master for each detected paper size is as follows:

| Paper Size | Printing Area of the Master |  |
| :---: | :---: | :---: |
|  | Width (mm) | Length (mm) |
| A3 | 292 | 412 |
| B4 | 256 | 356 |
| A4 | 208 | 289 |
| A4-S | 292 | 202 |
| B5 | 180 | 249 |
| B5-S | 256 | 174 |
| A5 | 146 | 202 |
| DLT | 278 | 412 |
| LG | 214 | 348 |
| LT | 214 | 271 |
| LT-S | 278 | 208 |
| HLT | 138 | 208 |

## S: Sideways feed

The machine can only distinguish standard sizes. If a non-standard paper size or original size is used, the machine will determine a standard size. If the actual paper size is larger than the determined paper size, the excess area will not be transferred to the master. In such a case, the paper size detection can be canceled using SP mode (no. 142-1) in order to obtain the entire image of the original. However, the press roller may become contaminated with ink if the paper is smaller than the image on the master. The ink will be transferred to the back side of the prints when the next printing is done with larger paper.

## Paper Size Detection for the Paper Table



The paper width detection plate $[A]$ located behind the front paper side guide [B] have four (4) width sensors.

The front and rear paper side guides are adjusted to the paper width. Depending on the paper width sensors ([C] [D] [E] [F]; 4 photointerrupters) can be interrupted and whether the paper length sensor [G] (a reflective photosensor) is activated, the machine will determine the size of the paper table as shown in the chart below.

| Paper Size | A4-S | LT-S | B5-S | LT | A4 |  | B5 | A5 | HLT |  | A3 | DLT | B4 | LG |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Paper Width Sensor-0 [C] | 0 | X | 0 | x | x | x | 0 | X | x | 0 | 0 | x | 0 | X |
| Paper Width Sensor-1 [D] | X | 0 | 0 | X | X | x | 0 | 0 | 0 | 0 | X | 0 | 0 | x |
| Paper Width Sensor-2 [E] | x | X | 0 | 0 | 0 | 0 | 0 | x | X | x | X | X | 0 | 0 |
| Paper Width Sensor-3 [F] | x | x | X | X | X | 0 | 0 | 0 | 0 | 0 | x | X | X | x |
| Paper Length Sensor [G] | X | x | X | X | X | X | X | X | X | x | 0 | 0 | 0 | 0 |

x : Not blocked or Not activated, o: Blocked or Activated
S: Sideways feed


The side pads $[A]$ in the front and the rear paper side guides prevent multiple feed. These are especially useful when thin paper is used. After adjusting the paper side plates to the proper paper width (so that they touch the paper lightly), move the front and rear side pad levers to the right (as viewed from the operation side of the machine). Normally, the pressure from the side pads should be released by moving the levers to the left.

The separation plate pressure can be adjusted to match the type of paper being used. The plate which supports the pressure plate spring $[B]$ can be moved up or down by turning the eccentric cam shaft [C] (this is a service-level adjustment only).

If multiple paper feed frequently occurs, the plate should be moved upward. If the paper misfeeds frequently, the plate should be moved downward.

### 4.8 SEPARATION ROLLER PRESSURE RELEASE MECHANISM



When printing is finished or a misfeed occurs, the paper table drive motor will rotate for 500 milliseconds to lower the paper table. The paper on the paper table will move down from the paper feed roller [D] and the paper feed bracket $[A]$ is pulled down by its own weight.

At this time, the shaft [B] will push down the left separation lever [C] and this will move the lower separation roller [E] slightly downward.

This mechanism will make it easier to remove paper that is caught between the upper and lower separation rollers.

### 4.9 PAPER TABLE SIDE ADJUSTMENT MECHANISM



The shaft [D] of the fine adjustment dial [F] is threaded. The inside of the sleeve [E] is also threaded. The sleeve is fixed to the paper table stay $[B]$ through a bracket [A].

The paper table bracket [C] mounted under the table is fixed to both ends of the adjustment dial shaft. When the adjustment dial is turned clockwise, the feed table bracket [C] and the paper table move to the right.

The indicator [G] fixed to the bracket [A] will show how much the paper table has moved.

### 4.10 NOISE REDUCTION COVER





The noise reduction cover [A] will reduce the paper feed noise. When the paper feed table $[B]$ is in the paper feed position, there is a small clearance between the paper stack and the noise reduction cover.

The noise reduction cover can be folded back when a user puts paper on the table. The magnet [C] catches the cover to keep it in the upper position.

By loosening the screw [D], the bracket [E] can be slid in the direction of the arrow and the noise reduction cover can be removed from the machine.

### 4.11 ELECTRICAL TIMING



T1: When paper is placed on the paper table and the Print key is pressed, the paper table will move upward until the paper table height sensor is activated. 15 milliseconds after the height sensor is activated, the paper table brake signal will turn on for 50 milliseconds to apply the braking force to the paper table drive motor to prevent the paper table from overrunning.

T2: When the height sensor is activated, the vacuum fan motor and air knife motor will turn on. At the same time, the drum (main motor) will start rotating in the forward direction (this is the printing direction).

T3: The paper feed solenoid is energized when the interrupter at the rear side of the drum activates the second drum position sensor.

T4: After the paper is fed, the top of the paper stack is a little lower and the height sensor is de-activated. When the second drum position sensor is activated, the paper table drive motor will start rotating. This will lift the paper table until the height sensor is re-activated (approximately 30 milliseconds after the motor starts). When the height sensor is re-activated, the motor will stop rotating.

T5: After the Stop key is pressed, the paper feed solenoid is de-energized the next time that the second drum position sensor is activated. The counter on the operation panel will be reset at this time.

T6: When the second drum position sensor is again activated after one more additional drum rotation, the vacuum fan motor and air knife motor will turn off. Then, the drum will rotate one more time and will stop at the first drum position actuation position (the drum home position).

## 5. PRINTING

5.1 OVERALL
[C]


In the standby mode, the printing pressure roller is held away from the drum by two devices, a solenoid (the printing pressure solenoid), and a mechanical arm (activated by the paper detection feeler $[A]$ ).

At the start of the print cycle, the printing pressure solenoid is energized to release its hold on the printing mechanism at point [C], and the paper feed solenoid is energized to transfer drive from the main motor to the paper feed mechanism.

Soon after the paper has reached the second paper feed roller, the paper detection feeler [A] is pushed downward by the paper, which completely releases the printing mechanism.

Printing pressure is then applied (the press roller [B] touches the drum) to transfer the ink from the master to the paper.

If the machine is not used for more than 6 hours, a drum stroke operation is performed before the old master wrapped around the drum is removed. This operation will minimize the number of wasted prints before the image is stabilized.

### 5.2 PAPER DETECTION AND PRINTING PRESSURE ON/OFF MECHANISM



Front View


During the printing process, the main motor will turn the gear $[\mathrm{A}]$ and pressure cam [B] clockwise.

When the widest part of the pressure cam $[B]$ reaches the bearing on the pressure on/off lever [C], the paper detection arm [D] will separate from the pressure on/off lever [C]. At this moment, if paper is being fed, the paper will press down the paper detection feeler [E]. Then, the paper detection arm [D] will turn clockwise to release the pressure on/off lever. As a result, the pressure on/off bearing will continue moving along the pressure cam and the press roller $[F]$ will move against the drum to apply printing pressure.
The printing pressure can be adjusted by the pressure spring [G].
The printing pressure sensor feeler $[\mathrm{H}]$ is away from the sensor while printing pressure is applied.

### 5.3 PRINTING PRESSURE RELEASE MECHANISM


[F]

During the normal print operation, the printing pressure solenoid [G] is energized to release the pressure on/off lever [D] at the same time as the paper feed solenoid is energized.

If a jammed sheet of paper in the printing section presses down on the paper detection feeler [A], the pressure on/off lever [D] will remain disengaged from the paper detection arm [C]. Printing pressure will keep on being applied to the drum. If this printing pressure is still applied when an operator slides out the drum unit to remove the jammed sheet, the drum surface and the press roller can be damaged.

To prevent this, printing pressure is released from the drum if a paper misfeed is detected. When a misfeed is detected, the printing pressure solenoid [G] is de-energized. Then, the drum will rotate to the home position. While the drum is being returned to the home position, the widest part of the pressure cam $[F]$ approach the bearing $[\mathrm{E}]$. This will move the pressure on/off lever [D] clockwise, then the stopper [H] will engage the lever [D] (because the stopper $[\mathrm{H}]$ is pressed down by spring tension from the solenoid). Thus, printing pressure is released since the lever [D] is connected to the press roller [B].

### 5.4 QUALITY START OPERATION



If the main motor has been kept off for more than 6 hours, a drum stroke operation will be performed before the old master wrapped around the drum is removed. This operation will remove the dried ink with the ejected master to minimize the number of waste prints before the print image is stabilized.

When the master making key is pressed, the master press sheet solenoid [A] is energized. The master press sheet mylar $[B]$ is inserted between the drum and the press roller [C]. At the same time, the detection arm release solenoid $[D]$ is energized to release the paper detection arm [E]. Then, the main motor will turn on and the press roller will press the mylar sheet to stroke the drum surface. The drum will rotate twice (three times if the machine is kept off for more than 32 hours) to stroke the old master that is around the drum. Then the master press sheet solenoid and the detection pin release solenoid are de-energized and the master eject operation starts.

Because there is no paper in the paper path at this time to release the paper detection arm [E] so that printing pressure can be applied to the master press sheet mylar [B], the detection arm release solenoid [D] was added to the mechanism.

### 5.5 PRINTING PRESSURE ON/OFF MECHANISM FOR A4/LT DRUM



When the A3/DLT drum is used, printing pressure is applied while the bearing [D] of the pressure ON/OFF lever [E] is on the bottom of the pressure cam [C]. Pressure is released while the bearing is on top of the cam.

However, when the A4/LT drum is used, printing pressure should be released sooner because the master on the A4/LT drum is shorter than the master on the A3/DLT drum. This is to prevent the press roller from getting dirty.

Before the bearing [D] comes to the top of the pressure cam, the bearing [A] of the arm $[B]$ (fixed with the pressure ON/OFF lever) rides up the A4/LT cam [F] and the arm moves (arrow).

As a result, the pressure ON/OFF lever turns clockwise and printing pressure is released.

### 5.6 ELECTRICAL TIMING



T1: The main motor rotates. At the same time, the printing pressure solenoid and the detection arm release solenoid are energized.

T2: When the drum has rotated 198 degrees from the home position, the master press sheet solenoid is energized. The solenoid will be turned off when the drum has rotated an additional 40 degrees.

T3: When the printing pressure sensor is actuated after the master press sheet solenoid has been energized ( $n-1$ ) times, the printing pressure solenoid and the detection arm release solenoid will turn off.

The value of " n " depends on the values set in the service program mode, SP79 and 80.

## 6. DRUM

### 6.1 OVERALL



[A]: Doctor Roller<br>[B]: Ink<br>[C]: Ink Roller<br>[D]: Press Roller<br>[E]: Paper<br>[F]: Drum

Ink is supplied from the ink cartridge and is applied to the ink roller uniformly. The ink is then transferred to the printing paper through the holes in the master.

### 6.2 DRUM ROTATION MECHANISM



The main motor (a DC motor) [J], located under the rear side plate, will rotate the drum either clockwise or counterclockwise through belt [G], then through gears $[F]$ and $[E]$, then belt [D], and pulley [C]. The drive mechanism uses helical gears because they can turn more quietly.

Notice gear [A], the last gear of the drive, and gear [B] at the rear end of the drum: each have a part cut out of the flange $[\mathrm{K}]$. When the drum is in the home position, the cutout parts, will mate, and the drum unit can be removed.

Pulse disk [l] and sensor $[\mathrm{H}]$ on the main motor shaft are used to monitor the drum rotation speed.

### 6.3 DRUM LOCK MECHANISM 1



Fig. 1 [D]
Fig. 2

When the drum unit is set in the machine, the arm $[B]$ is pushed by the lock pin [D] until the top of the arm [B] is locked by the stopper [C]. This will completely lock the drum unit in the machine (Fig. 1). At the same time, the top of the right stopper [C] will press against the drum detection switch [E]. The closed switch will [E] inform the machine that the drum unit is in place (Fig. 3).

Pulling the lever [A] to the operation side will turn the stopper [C] clockwise and will disengage the arm [B]. Therefore, the lock pin [D] of the main body will also be released from the arm [B] due to spring tension (Fig. 2).

### 6.4 DRUM LOCK MECHANISM 2



To prevent the drum from rotating when the drum unit is slid out, the drum stopper $[A]$ will drop into the drum lock $[B]$. This will secure the drum [D].

When the drum unit is re-installed, the front side plate of the main body [C] will hold the drum stopper [A] out of the drum lock.

DRUM

### 6.5 DRUM LOCK MECHANISM 3



When the drum is removed, the drum stopper [B] will drop into the hole (see the diagram above). This will stop the drum unit from being pulled out any further. At this moment, if the operator pulls the handle [A], the drum unit will not fall out.

When the operator pulls the stopper release [D] in the direction of the arrow, the drum stopper $[B]$ is pushed up to the level of the drum rail cover [C]. This will allow the drum to be completely removed.

### 6.6 DRUM CONNECTION MECHANISM/DRUM LOCK MECHANISM 4



When the drum release lever [ $A$ ] in front of the machine is raised, the connector $[\mathrm{B}]$ is pushed away and is disconnected from the drum by the bracket [C] through the link [D], . The bracket [C] will also push the drum lock lever [F] to release the drum lock allowing the drum to be removed. While the drum is away from its home position, the drum lock solenoid [G] is energized and the stopper $[\mathrm{H}]$ will lock the link [D] to prevent the drum from being removed during a print cycle. The solenoid is de-energized when the drum stops at the home position (when the 1st drum position sensor is actuated).

### 6.7 INK SUPPLY MECHANISM



Ink is supplied from the ink cartridge $[\mathrm{H}]$ to the ink roller [ M ] by the ink pump [I] and then through the 8 holes in the ink distributor [A].

Drum rotation is transmitted from gear [K] to gear [L], then to the gear of the spring clutch [G]. However, the rotation is not transmitted to gear [D] because of the spring clutch [G].

When the ink detector detects less ink on the ink roller [M], the ink supply solenoid [E] will energize, and the ink supply stopper [F] will release the clutch [G] allowing the gear [D] to turn.

The pin [C] will move the pump shaft up and down as the gear [D] rotates. (One stroke of the ink pump will occur for every 2 rotations of the drum.) Therefore, the ink in the ink cartridge is sucked into the pump [I]. The pump will then send the ink into the drum shaft [J]. Then, the ink will go from the ink distributor $[A]$ onto the ink roller $[M]$ through the tube $[B]$.

### 6.8 INK KNEADING MECHANISM



The ink kneading mechanism consists of the ink roller [C] and the doctor roller $[B]$. The ink roller [ $C$ ] rotates with the drum and the doctor roller $[B]$ to ensure that the ink applied evenly accross the ink roller.

The ink roller [C] rotates with the drum this way: the drum will turn a gear [A], the gear [A] turns an idle gear [E], and the idle gear [E] turns the roller gear [D]. The gear [D] is mounted on the ink roller.

The doctor roller is adjusted to give a distance of 0.08 millimeter between itself and the ink roller. The doctor roller will rotate to create an even thickness of ink.

The ink roller does not touch the screen [F] when the machine is not printing. However, during the printing process, the ink on the ink roller will go to the paper through holes in the screen and the master. This happens while the drum screen is held against the master by the pressure roller which is located under the drum.

During the master eject process, the drum rotates in the reverse direction but the ink roller will not rotate. The gear [D] has a one-way clutch to prevent the ink roller from rotating in the opposite direction.

### 6.9 DRUM MASTER DETECTION



The drum master sensor [A] is mounted on the drum rail and it will detect if there is a master on the drum.

When there is a master on the drum, the black patch $[B]$ is covered and the sensor will detect the light reflected from the master [C]. Printing starts when the Print Start key is pressed.

When there is no master on the drum, the black seal is exposed. The black seal does not reflect light back to the sensor. The " M " indicator on the display panel will blink and printing will not start when the Print Start key or the Proof key is pressed.
If there is no master on the drum, the master making key can be pressed after an original is set in the machine. With no master on the drum, the machine will bypass the master eject cycle and will proceed directly to the master making process.


The machine can identify the installed drum type electrically. Depending on which terminals of the drum unit connector [A] are connected, the corresponding indicator will light up on the operation panel as follows:

| Drum Type | Indicator | Terminal Number |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  |  | 2 | 3 | 4 | 5 |
| A3/DLT (Original) | A3 or DLT Indicator | 1 | 0 | 1 | 0 |
| A3/DLT (Option) | A3 or DLT and Color Indicators | 1 | 1 | 1 | 0 |
| A4/LT (Option) | A4 or LT Indicator | 1 | 0 | 1 | 1 |

1: Connected, 0: Not connected
To use the A4/LT drum with color ink, terminals no. 2 and no. 3 should be linked using a short connector [B]. This will turn on the color indicator. The short connector is an accessory of the unit, and is included with the drum.
NOTE: * To use the A4/LT drum with black ink, it is not necessary to use short connector [B].

* To use a 1000 cc black ink cartridge with the drum, the ink holder spacer [C] must be removed. The ink holder spacer is originally installed in the optional A3/DLT and A4/LT drums and is necessary only for the 600 cc color ink cartridges.


### 6.10 INK DETECTION



## Ink Detection Circuit

The detecting pin $[B]$ works like the electrode of a capacitor. The capacitance between this pin and the ink roller [C] depends on the presence or absence of ink, and it will affect the duty cycle of the detection pulse that is generated by the ink detection PCB. The detection pulse is compared to a standard pulse to determine if there is ink in the drum or not.
(1) The standard pulse is output from OUTPUT 1. The pulse length (T0) can be adjusted by adjusting VR901.
(2) OUTPUT 2 is the detection pulse. The duty cycle is determined by C908 and the electrostatic capacity between the detection pin and the ink roller [C] or doctor roller [A] (ground). The detection pulse is triggered by the falling edge of the standard pulse that is input from TRIGGER 2.
When ink is present, the electrostatic capacity increases and the pulse length ( $\mathrm{T}_{1}$ ) becomes longer. When ink is not present, the pulse length ( T 2 ) will become shorter as the electrostatic capacity decreases.
(3) The pulse length ( $\mathrm{T}_{1}$ or T 2 ) is compared with the standard pulse (T0). When the pulse length is shorter than the standard pulse (To), the output of CN902-2 goes low, indicating that there is no ink.


## Ink Detection Timing

T1: When there is no ink on the ink roller and the no ink signal (output of CN902-2) is low (indicating that there is no ink), the ink supply solenoid will energize at the next rising edge of the second drum position sensor signal. The ink supply solenoid will turn off when CN902-2 goes back high.

T2: If the no ink signal remains low after the drum has made 20 rotations since the ink supply solenoid was energized, the No Ink indicator will blink.

When this occurs and when the "Reset" key is pressed, the drum will rotate 20 cycles to supply ink; this is the user's procedure for supplying new ink. With the "0" key held down, and the "Reset" key is pressed, the drum will rotate 20 times even when the No Ink indicator is not blinking: this is a technician's test procedure.

When the No Ink Signal goes high during the 20 drum rotations, the indicator will go off and the ink supply solenoid will be de-energized.

## 7. DELIVERY

### 7.1 OVERALL


[D]: Belt
[F]: Vacuum Fan
[G]: Press Roller
[H]: Paper
The exit pawl $[C]$ and the air knife $[B]$ will separate the paper from the drum $[A]$ and the vacuum fan $[F]$ in the transport unit [E] will pull the paper downward against the belt [D] as the belt moves the paper to the delivery table.

### 7.2 EXIT PAWL DRIVE MECHANISM



The exit pawl [B], located in the center of the drum, will provide a jet stream of air to separate the paper from the drum. As the master clamper [A] approaches the exit pawl, the exit pawl will be moved away from the drum.

When printing pressure is applied to the drum, the narrowest part of the pressure cam [G] is at the bearing on the pressure on/off lever [H], and the lever $[\mathrm{H}]$ will turn counterclockwise. The exit pawl drive cam [F] is connected to the pressure on/off lever $[\mathrm{H}]$ and the cam $[\mathrm{F}]$ moves upward. The exit pawl lever [E] then turns clockwise as it moves along the surface of the exit pawl drive cam [F]. Therefore, the exit pawl will also come near the drum until the stopper [D] contacts the adjusting screw [C]. This will maintain a small clearance between the exit pawl and the drum surface to ensure that the printed paper can be fed to the vacuum unit.

As the press roller moves away from the drum (the widest part of the cam [G] is at the bearing on the pressure on/off lever $[\mathrm{H}]$ ), the exit pawl drive cam [F] moves downward and the exit pawl lever [E] will turn counterclockwise. This will cause the exit pawl [B] to separate from the drum.

The exit pawl $[B]$ is held away from the drum when printing pressure is not applied.


The vacuum fan (below the transport belts) will hold the paper against the transport belts [ D ]. The transport belts will move the paper to the delivery table.

Wing guides [C] at each end of the vacuum unit are used to help keep the back side of the printing paper clean.

When the main motor turns on, the gear [F] mounted on the main motor shaft will drive a drive shaft [E] through gears and belts. This drive shaft will turn the transport belts.

The first and second paper exit sensors $[\mathrm{A}]$ and $[\mathrm{B}]$ will check for paper jams.
The paper exit jam check is performed when the printing pressure is applied and the printing pressure sensor is interrupted.

| Jam Condition | Sensor Status |
| :--- | :--- |
| Delivery Misfeed | The 2nd paper exit sensor is still on when the 2nd drum position <br> sensor turns on. |
| Paper Wrap | The 1st paper exit sensor fails to turn on even though the drum has <br> rotated $20^{\circ}$ after activating the 2nd drum position sensor. |
| Paper Wrap | The 2nd paper exit sensor fails to turn on even though the drum has <br> rotated $25^{\circ}$ after activating the 1st drum position sensor. |

### 7.4 EXIT PAWL AIR PUMP MECHANISM



The main motor $[A]$ turns gear $[B]$ through idle gears, a belt and a shaft. The gear [B] will rotate and drive the piston [C] back and forth in the air pump.

The piston will move forward and push a jet of air out through the nozzle [D]. This jet of air will help push the paper downward and separate it from the drum.

### 7.5 WING GUIDE MECHANISM



The wing guide [ A ] are used to lift up the sides of the paper as it exits the machine.

This will stiffen the paper so that the leading edge of thin paper will not sag and brush against the sheets of paper on the delivery table. This will prevent the ink on freshly printed sheets from being smeared.

The angle of the wing guide can be changed by moving the guide release lever [B]. Usually, the wing guide release lever is set to the lower position to raise the wings. If printed pages do not stack evenly or if the pages pass over the end fence, raise the lever to the upper position to lower the wings.

### 7.6 PAPER DELIVERY TABLE

### 7.6.1 Master Eject Unit Lock Mechanism



The master eject open button [A] is locked when the paper delivery table is closed. This will prevent the paper delivery table from opening suddenly when the user presses the master eject open button.

The lock mechanism functions are as follows:

- As the paper delivery table is closed, the pin [B] located on the front of the paper delivery table will push downward on lever [C] which will raise arm [D]. When arm [D] is in the upper position, lever [E] cannot be moved forward.
- When the delivery table is opened, arm [D] is pulled down by the tension spring [F] and lever [E] can be moved forward.
- The projection [G] on arm [D] contacts the delivery table open switch [H], which will send a signal to inform the main PCB that the delivery table is open.


### 7.6.2 Paper Delivery Table Angle



Fig. 1: Closed


Fig. 2: $10^{\circ}$ slant


Fig. 3: Level

There are two paper delivery table open positions, level and $10^{\circ}$ slant.
As the paper delivery table is lowered from the closed position (fig. 1), the pin [A] fixed to the table side frame moves forward and push the stopper [B] forward. This will disengage the lever [C] from the stopper (fig. 2) with a audible click and the table will stop at a $10^{\circ}$ downward slant when the pin reaches the end of the slot cut in the side frame.

When the delivery table is slightly raised up from the $10^{\circ}$ downward slant position, spring tension will pull the lever downward and the pin will engage the lever. This will stop the table at the level position.

Normally, the table should be at a $10^{\circ}$ downward slant. This will prevent the leading edge of each sheet from rubbing against the other sheets on the table as each sheet is fed out, and will ensure that the leading edge of the sheet being fed out will not smear the ink on the top printout that is on the paper delivery table. However, small paper sheets may pass over the end fence if the table is at the $10^{\circ}$ downward slant position. If this occurs, the user should raise the table to the level position.

### 7.7 ELECTRICAL TIMING



T1: The cutter motor, vacuum fan motor, air knife motor, and main motor are turned on.

T2: The vacuum fan motor and the air knife motor will turn off the next time the 2 nd drum position sensor is deactivated after the printing pressure sensor is turned off.

T3: When the Print Start key is pressed, the vacuum fan motor and the air knife motor will turn on when the paper table height sensor is activated.

T4: When the counter indicates " 0 " and the 2 nd drum position sensor is activated, the vacuum fan motor and air knife motor will turn off.

T5: When the 1st exit sensor and the printing pressure sensor turn off, the main motor speed increases to 60 rpm to ensure that the paper is delivered to the exit table.

## 8. IMAGE POSITIONING

### 8.1 OVERALL

In the image positioning mode, the image can be shifted 15 mm ( 5 mm steps) up or -20 mm down on the page by pressing the forward or backward Image Position key on the operation panel. This will rotate the first and second paper feed roller cam a small distance to change the paper feed timing in relation to the drum rotation timing.

### 8.2 IMAGE POSITIONING MECHANISM



Continued on the next page


When the forward Image Position key on the operation panel is pressed, the image positioning motor $[\mathrm{A}]$ will rotate and drive cam gear $[\mathrm{B}]$ clockwise a short distance through the gears.

The cam gear has a spiral track along which the lever [C] moves. When the cam gear turns clockwise a short distance, the pin on the lever [C] will move towards the outside of the cam gear and the lever will turn clockwise a short distance.

The lever [C] drives gear [E] clockwise a short distance through gear [D] and the first paper feed roller and the second paper feed roller cams [F] mounted of the shaft on gear [G] turn clockwise a short distance.
As a result, the paper feed start timing is delayed in relation to the drum rotation timing and the image position is moved in the forward direction. (Refer to the Paper Feed section for details on the cam mechanism.)

The image position is detected by the image position sensor $[\mathrm{H}]$ which is located behind the cam gear [B].

### 8.3 CIRCUIT



When the forward Image Position key is pressed, CN103-2 will go to 22 V and CN103-1 will go to 0 V , and the image positioning motor will turn to advance the paper feed timing.

When the backward Image Position key is pressed, CN103-1 will go to 22 V and CN103-2 will go to 0 V , and the image positioning motor will turn in the opposite direction to move back the paper feed timing.

The main PCB will detect the image position by means of a four-bit signal received from the image position sensor. The image positioning motor will turn off when the image is at the selected position.

Nine different image position settings can be selected by pressing the Image Position key.


## 9. IMAGE PROCESSING

### 9.1 OVERVIEW



The light reflected from the original will go to the CCD, which will convert the light signal into an analog electrical signal. The analog signal is sent to the A/D conversion PCB, where it is changed to 6-bit digital data. The 6-bit data is changed to 1 -bit data in the image processing PCB and the image processing PCB will drive the thermal head through the thermal head drive PCB to burn the image onto the master with the 1-bit data.

The 6-bit to 1-bit conversion procedure is depended on the image settings on the operation panel.

### 9.2 CCD (CHARGE COUPLED DEVICE)

The light that is reflected from the original will expose the pixels (Picture Elements) in the CCD (Charged Coupled Device). The CCD is a solid state device which contains a single row of pixels. Each pixel within the CCD is similar to a photodiode array. The CCD can read a complete line of scanned data at a time.

The basic circuit of each pixel (Picture Element) within the CCD is shown below. The reflected light from the original will be sensed by the photodiode $[A]$ and the capacitor $[B]$ will store the resulting electrical charge as an analog signal. There are 5416 sets of photo diodes and capacitors (pixels) in the CCD that is used in this machine. The electrical charges of each pixel is outputted in a serial format as an analog signal, called the OS signal. To increase the scanning speed of the machine, the image data in the odd and even numbered pixels are handled separately.

There are a total of 5416 pixels within the CCD, the first 64 pixels are dummy pixels and are not used as image data. The following 5340 pixels are used for the image data and the last 12 pixels are also dummy pixels which are not used for the image data.


### 9.3 A/D CONVERSION



The analog signal generated from the CCD is inverted and amplified in the A/D conversion PCB. The analog signal is converted into 6 -bit digital data which is sent to the image processing PCB. The original background and the distortion of the light path are monitored to obtain accurate image data.

### 9.3.1 Inversion and Amplification



CCD Output
Inverted and Amplified CCD Output

The analog signal (OS) from the CCD is outputted to the A/D conversion PCB. It is sent as a negative signal in relation to the dc bias voltage (which is approximately 4.8 V ). In the A/D conversion PCB, the negative signal will be inverted and amplified before being converted to a digital signal.

The amplification ratio can be changed by using VR601 on the A/D conversion PCB.

### 9.3.2 A/D Converter

The inverted and amplified CCD output is sent to the A/D converter. The A/D converter can produce 64 gray scale steps. To make the 64 steps, the difference in voltage between the high reference voltage (+REF) and the low reference voltage (-REF) is divided into 64 steps. The amplified CCD output voltage is digitized based on these steps. If the amplified CCD output voltage is higher (the image pixel is lighter), a higher value is the result.

The digitized image data are sent to the main control PCB in a serial format.


### 9.3.3 Shading Distortion Correction

The received image data from one main scan line from the CCD does not exactly represent the date line from the original image, because of the following reasons:

1) Loss of brightness towards the ends of the exposure lamp and the edges of the lens.
2) Variations in the sensitivity of the pixels within the CCD
3) Distortions of the light path

Such distortions in the image data are corrected when they are converted into the digital data.

Before scanning the document, the scanner will read the white plate on the back of the original scale. The output of each CCD element (pixel) will be changed to a 6-bit digital value stored in the shading distortion memory.

To change the analog shading distortion signals to digital data, a scale of 64 steps is made between the whitest level when the white plate is scanned and $50 \%$ of the whitest level. Using this scale, the analog signal is changed to 6-bit digital data.

While an original is scanned, the stored 6-bit shading distortion value of each pixel is serially fed from memory to the D/A converter, synchronizing with the image signal that is being sent to the $A / D$ converter. The D/A converter will change the distortion value to electrical current. The current is converted to the voltage to be used as the high reference data for A/D conversion. In this way, the high reference voltage for A/D conversion is changed serially for each pixel depending on the stored shading distortion data for that pixel.


Ideal CCD output when the white plate is scanned


Actual CCD output when the white plate is scanned

IMAGE PROCESSING

### 9.3.4 Original Background Correction

When an original is scanned, the whitest level of the original background is stored, and is used as the white peak level for A/D conversion. The gray scale is made based on the white peak level of the original. As a result, a dark or dirty background will not appear on the printout.

In the normal setting, the original background correction is performed for Line mode only. In Photo mode or Line/Photo mode, the whitest level when the white plate was scanned is used as the high reference voltage. If "Yes" is selected in SP29, the background correction is also performed in the Photo and Line/Photo modes.


### 9.3.5 Peak Hold

The peak hold circuit holds the voltage for the white peak level. Before scanning an original, it will hold the white peak voltage from the white plate to make the shading distortion data. When the original is scanned, it will store the white peak level of the original for the original background correction.

### 9.3.6 Black Level

The black level circuit will always output a constant voltage which is used as the low reference value for A/D conversion. The black level is adjustable, and should be the same as the output from the CCD dummy elements (optical black level).

### 9.3.7 White Peak Limit Circuit

There is a protection circuit which will limit the white peak voltage to 3.7 V . This will prevent dark printouts resulting from an abnormally high reference voltage caused by strong light that has intruded into the scanner.

### 9.4 BINARY PROCESSING

The 6-bit digital image data is sent from the A/D conversion PCB to the image processing PCB. The digital data is inverted to match the binary processing circuit of the image processing PCB. Therefore, the white peak level will become 0 , and the black level will become 63 . Then the 6 -bit data is converted into a 1-bit data (black or white pixels) in the binary processing circuit. The binary process for the line mode is different then the process that is used in the photo mode.

1) Line Mode: MTF (Modulation Transfer Function) Correction
2) Photo Mode: Error Diffusion or Dither Processing


### 9.4.1 MTF Correction

Image

Ideal Signal


Actual Signal


When the original image is converted to electrical analog signals by the CCD, the signal will deteriorate and contrast is reduced. This is because neighboring black and white parts of the image may influence each other. The characteristics of the lens is the main cause. This symptom is typical whenever the width and spacing of the black and white areas are narrow. The ratio of the difference between the black and white levels of the electrical signal (the actual difference) and that of the original (the ideal difference) is called the Modulation Transfer Function (MTF).

If the MTF is too low, the edges on the image tend to be lost. In this model, MTF correction is used to emphasize 6-bit image data in the line mode. This will help to reproduce sharper characters.

A target pixel value is compared with the values of the surrounding pixels and is compensated. If the surrounding pixels are very different (compared with the target pixel) then the target value will be more influenced by them. This step is repeated for all pixels of the original.

(a) Section of document

| 0 | 0 | 0 | 0 |
| :--- | :--- | :--- | :--- |
| 0 | 12 | 4 | 0 |
| 0 | 30 | 12 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |

(c) Image data after A/D conversion

(b) Enlarged view of dot

(d) Print without MTF correction (threshold level: 32)

Consider a small black point on a original as shown in the illustration (a) and (b). The 6 -bit image data (range 0 to 63) for this section of the original is shown in (c). If the threshold level is 32 , all the pixels in this area will become a single-bit white data and the image will not be reproduced (d).

The MTF correction will prevent this image loss as follows:


The value of the target pixel is multiplied by 3 . Then, $3 / 8$ of the values of the pixels to the left and right, $1 / 8$ of the values of the pixels two steps to the left and right, and $1 / 2$ of the values of the pixels above and below are subtracted from the new value of the target pixel. (If the result is less than zero, then the pixel value is set to zero.)

| 0 | 0 | 0 | 0 |
| :---: | :---: | :---: | :---: | :---: |
| 0 | 19.5 | 1.5 | 0 |
| 0 | 63 | 22.7 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |

(e) Image data after MTF correction

(f) Print after MTF correction

After the MTF correction is applied, the image data of the example is as shown in (e) and (f) above. The small black point is reproduced on the print.

The correction values in the sub-scanning direction can be changed by using SP mode no. 31. The correction values for each setting of SP no. 31 are as follows:

SP31-0: Low


SP31-1: Standard


SP31-2: High


SP31-3: Maximum


The SP mode is normally set at 0 (factory setting). Setting it at 1,2 or 3 will help to reproduce better quality prints from low contrast originals.
NOTE: If SP31 is set to a higher level (2 or 3), stains, scratches etc. in the light path will appear on prints more easily.

### 9.4.2 Main Scan Magnification And Image Shift Processing



## - Main Scan Magnification -

Reduction and enlargement in the sub-scanning direction is done by changing the original transport motor speed (see the diagram). Reduction and enlargement in the main scanning direction is handled by the magnification and image shift processing.

Pixels for scanning and master making are generated at fixed intervals (the CCD and thermal head element intervals). The image is scanned at the CCD element interval. If the pixels on the master are plotted at the same interval (by the thermal head elements) then the master image is the same size as the original.

## 80 \% Reduction

For example, data for 10 pixels in a main scan line are scanned by the CCD. Those data are compressed into data for 8 pixels by the magnification processor. As a result, the image is reduced to $80 \%$.

## 140 \% Enlargement

Data for 10 pixels of a main scan line are expanded into data for 14 pixels. As a result, the image is enlarged to a $140 \%$ magnification ratio.

When actual pixels are divided in accordance with a magnification ratio, the values of the imaginary points that would correspond to new pixels are calculated by the magnification processor. The proper value for each imaginary point is calculated based on the image data of the surrounding pixel values.


## - Image Shift -

This model can reposition the image of the original by using the image shifting mode. The image position change in the sub-scanning direction is done by changing the timing of the original scanning or of the master making process. In the main scanning direction, it is done by the magnification and image shift processor, simultaneously with the magnification process.

Data for one main scan line is stored in a line memory. This memory has enough room to hold one main scan line, and has a little extra capacity. When the data is output from memory, the output timing can be adjusted by entering the desired value in the image shifting mode.

### 9.4.3 Binary Processing



The binary processor converts the 6-bit image data to a single-bit white or black data to send it to the thermal head. This processor is only used when in the line mode. (The binary processing for the photo mode is done by the half-tone processor.)

In this process, all of the pixel image data are compared with a single threshold level. A pixel datum is set to black if it is above the threshold level, or it is set to white if it is equal to or below the threshold level. (See the above figure.)

The threshold level varies depending on the image density setting. The threshold level is selected by the Image Density key (Lighter, Normal, Darker 1, and Darker 2). The image can also be darkened or lightened by SP mode No. 32 as shown below:


A: Lighter
B: Normal
C: Darker 1
D: Darker 2

### 9.4.4 Photo Data Compensation Processing



The photo data compensation process is used only when the photo mode is selected.

In this process, the 6-bit image data is compensated based on the selected image density. The user selects the density with the Image Density key (Lighter, Normal, Darker 1, or Darker 2). When the photo mode is selected with the make-up mode, the contrast of the Normal, Light Tone, and Dark Tone settings can also be changed by changing the compensation ratio. The compensated image data is outputted as an 8-bit signal to obtain more graduation steps. Therefore, this will increase the resolving power for half-tone images. The above graph shows one of the compensation ratios for input and output.


The compensation ratio will vary depending on which image density and contrast are selected. For example, when Darker 1 is selected, the output value of the image data is increased slightly (i.e. it is slightly higher than the output obtained when Normal density is selected).

When Light Tone is selected, the 8-bit output concentrates on the light tone part of the image (the low input value). This will help to reproduce the lighter parts of the image and the whole image will darken a bit. On the other hand, when Darker Tone is selected, the 8-bit output concentrates on the dark tone parts of the image. This will help to reproduce the darker parts of the image and the whole image will be lighten a bit.

The above graphs show the compensation ratios for each contrast and image density setting.

### 9.4.5 Half-tone Processing

In photo mode, the 8 -bit image data from the photo data compensation processor is converted into single-bit white or black pixels in the half-tone processor. This will help reproduce half-tone images (such as photographs). For half-tone images, this process works better than the binary process.

When the photo mode is selected, three types of half-tone processing can be selected with the Screen key (Normal, Fine, and Coarse). The normal type (non-screen) is selected first, when the photo mode key is is pressed.

- Error Diffusion Processing -

Error Diffusion Processing is used when a screen mode is not selected (i.e., when Normal is selected).

When an image signal is converted into a single-bit (white or black) signal based on a threshold level, a difference is yielded between the image signal value and the complete white value ( 255 in 8 -bit signal) or black value (0). With Error Diffusion Processing, the difference is distributed among the surrounding pixels. (The binary process simply erases these differences.)

For example, when considering a one dimensional Error Diffusion Processing, the image data shown in the diagram (see the next page) produces white and black data outputs as follows.


The errors are distributed in three dimensions. The error is preferentially distributed to darker pixels in higher ratio and to lighter pixels in lower ratio. CAPIX has the following advantages:

1. Moire patterns are not produced (as in the binary process of the line mode) since the difference of the binary process is scattered.
2. With CAPIX, both half-tone and solid images are well produced. But with dithering, solid images do not produce well. This is because dithering uses more gradation steps than a solid image (such as a simple diagram or a character) will need.
3. Because of CAPIX's high resolving power the texture pattern will appear. The texture pattern will not appear with dithering.


## - Moire -

When the CCD scans an image that is made up of regular lines such as a resolution chart, the output image may have another pattern over the regular lines. This is called "moire".

The above illustration shows one of the moire mechanisms. In this case, the pixel density of the CCD is the same as the density of the regular lines on the original. However, the regular lines are slightly out of step with the CCD pixels due to some magnification error when they were scanned. As a result, each CCD pixel has a different value (as shown in the above figure). Since the length of a CCD pixel is very short, the waveform from the CCD output looks like the cross lines in the figure. The moire pattern appears when prints are made from this signal. The moire pattern typically appears when the CCD pixel density is a multiple of the density of the regular lines on the original.


## - Dithering -

Dithering is used when the screen mode is selected in Photo mode. Two kinds of dither matrices are used for the fine and coarse screen level.

Dithering converts the 8-bit image data into a single-bit white or black data.
A dither matrix contains various threshold levels (Vthn) for the locations which correspond to some pixels of an original image. Each pixel datum of the scanned image (En) is compared with the corresponding fixed threshold level (Vthn) in the dither matrix. Then, each pixel datum is converted to either black or white depending on whether the image data is greater or less than the threshold level. This procedure is repeated for the whole area of the original. The thresholds of the dither matrix are determined so that half-tone graduations are introduced on prints using only black and white pixels. This is done by changing the ratio of black pixels to white pixels.

The figures above show an example of a $4 \times 4$ (16 pixels) dither matrix and dithering for 4 -bit data scanned from an imagined gray image. The result of dithering (image reappearance) shows the pattern of white and black dots, which appears as gray to the human eye.


In this model, a $12 \times 12$ dither matrix is used to convert 8-bit image data into single-bit data. There are two kinds of dither matrices to allow for the fine and coarse screen modes.

A uniform gray area of an original is scanned, and the pixel datum is set at 55. It then goes through the dithering process and the results (both for coarse screen and fine screen) are shown above.

IMAGE PROCESSING

### 9.4.6 Line/Photo Separation

In the Line/Photo mode, the machine will check each pixel of the original to see if the pixel is in a line area or a photo area. To recognize a line area in a photo original, the CPU will perform the following calculation on the 6 -bit pixel data.


$$
\begin{aligned}
& \mathrm{X}=|\mathrm{E}-\mathrm{F}|+|\mathrm{E}-\mathrm{D}| \\
& \mathrm{Y}=|\mathrm{E}-\mathrm{H}|+|\mathrm{E}-\mathrm{B}|
\end{aligned}
$$

In the following conditions, the machine will recognize that pixel $E$ is in a line area of the image, and will replace it with the value of the same pixel calculated with the MTF process.
( $\mathrm{F}=0$ or $\mathrm{D}=0$ ) and ( $\mathrm{x}>$ threshold level)
or
( $\mathrm{H}=0$ or $\mathrm{B}=0$ ) and ( $\mathrm{y}>$ threshold level)
The threshold level changes are depended on the image density, contrast, and the SP34 setting.

| Contrast | Image Density | Threshold |
| :---: | :---: | :---: |
| Standard | Lighter | 18 |
|  | Normal | 16 |
|  | Darker 1 | 22 |
|  | Light | Darker 2 |
|  | Lighter | 22 |
|  | Normal | 16 |
|  | Darker 1 | 14 |
|  | Darker 2 | 14 |
| Dark | Lighter | 14 |
|  | Normal | 8 |
|  | Darker 1 | 10 |
|  | Darker 2 | 14 |

(When "0" is selected with SP34)

### 9.4.7 Multi-copy Circuit

If Quadruple copy mode is selected, one main scan line from the original is output twice to make one line of the printed image as shown below.


The original scan width is calculated with the following formula:
Scan Width (a) $=\frac{\text { Paper Width (b) }}{2 \times \text { MagnificationRatio }}$

IMAGE PROCESSING

### 9.4.8 Shadow Detection in Platen Mode

In platen mode, to detect which part of the scanned area is the original, and which parts are shadows, the machine compares each 6-bit pixel value of scanned area with a threshold level. This is done before the MTF correction. If the data within a certain area are greater than the threshold level, and the area is not surrounded by white areas, the machine recognizes that the area is not part of the original and the area is erased.

1) Shadow Erase Threshold in Line Mode

| Image Density Setting | Threshold Level |
| :---: | :---: |
| Lighter | 27 |
| Normal | 19 |
| Darker 1 | 14 |
| Darker 2 | 10 |

2) Shadow Erase Threshold in Photo Mode

| Contrast | Image Density | Threshold Level |
| :---: | :---: | :---: |
| Normal | Lighter | 23 |
|  | Normal | 17 |
|  | Darker 1 | 11 |
|  | Light Tone | Darker 2 |
|  | Lighter | 6 |
|  | Normal | 31 |
|  | Darker 1 | 27 |
|  | Dark Tone | Lighter |
|  | Normal | 20 |
|  | Darker 1 | 12 |
|  | Darker 2 | 12 |
|  |  | 9 |
|  |  | 6 |

## Exceptions

If the shape of the originals are as shown below, the black areas cannot be recognized as shadows.


### 9.4.9 Make-up Processing

If an optional Make-up Function Board is installed, Image Make-up mode is available.

## - Overall Operation -

The user can make command sheets to specify how various areas of the original should be processed. The command sheets must be scanned before the original. The command sheet is scanned twice as fast as the original. The image data for the command sheet are digitized and converted to a single-bit white or black data. They also go through normal image processing in the line mode. The image data for a command sheet are reduced to $1 / 80$ and are stored in the corresponding memory area.

The command sheet data is picked out of memory through the area selector when image data from an original are sent to the selection circuit. When the areas designated by two or more command sheets overlap, the data from the last command sheet are picked from the corresponding memory by the area selector.

The image data from the original and the command sheet data are combined and edited in the selection circuit. When a pattern mode is selected, the pattern generator will send the selected background pattern(s) to the selection circuit. The image data from the original, the command sheet data, and the pattern data are combined and edited in the selection circuit as ordered.


Diagonal Line Method


## - Make-up Mode -

A variety of editing functions can be selected in the make-up mode as follows:
Step 1 Make the command sheet(s) to designate the areas to be edited. Either the diagonal line method or the closed area method can be used on a command sheet to designate areas. Up to four command sheets can be used at a time to designate areas for an original. If designated areas on two or more command sheets overlap, the data from the last command sheet will apply for the overlapped portion.

Step 2 Select the appropriate command number for the designated areas using the number keys. Only one command can be selected for each command sheet (up to four sheets) from seven modes. (See the following table of modes that can be selected areas.) When two or more command sheets are used, select an appropriate mode for each command sheet.

When a pattern mode is selected, also select an appropriate background pattern using the Number keys. There are 40 patterns from 1 to 40 . (See the following list of background patterns.) Patterns 51 to 90 are the same as patterns 1 to 40 but the pattern elements are twice as large. By adding 100 to the pattern numbers of 1 to 40 and 51 to 90 , the patterns rotate $90^{\circ}$. Therefore, there are 160 different patterns.

Step 3 Select an appropriate command number for the outside of the designated areas using the number keys. Even if two or more command sheets are used at a time, only one command can be selected for all command sheets from four modes. (See the following table of modes that can be selected, for outside designated areas.)

Step 4 Set the command sheets and original in the ADF so that the command sheets are scanned prior to the original.

IMAGE PROCESSING

- Modes for Designated Areas -

The following commands are for the designated area(s).


- Modes for Outside Designated Areas -

The following commands are for the area outside the designated area(s).


IMAGE PROCESSING

## - Recognition of Designated Areas -

How you enter the designated area will affect the final result. Therefore, refer to the following table when you make the command sheet.

| No. | Item | Typical Problems |  | Preferred Designated Area |
| :---: | :---: | :---: | :---: | :---: |
|  |  | $\begin{gathered} \text { Designated } \\ \text { Area } \\ \hline \end{gathered}$ | Area <br> Recognized |  |
| 1 | Form of the designated area | Serial pattern | The designated area is recognized as follows: | Separation the area to be designated as follows: <br> Make a space more than 2 mm . <br> Make a space more than 2 mm . <br> Designate the area with a closed line. |
|  |  | Double circle pattern. | Only the outer circle will be recognized as follows: | Either. <br> 1) Make a small gap (more than 2 mm ) in the pattern. <br> Or. <br> 2) Use one command sheet for the one circle pattern. The smaller circle must be read as the designated area after the larger circle is read. |
| 2 | Non-closed line | The designated area is not a closed loop. | The designated area is not recognized. | Designate the area with a closed loop. |


| No. | Item | Typical Problems |  | Preferred designated area |
| :---: | :---: | :---: | :---: | :---: |
|  |  | Designated area | Area recognized |  |
| 3 | Thickness of the designating line | The thickness of the line must be as follows: <br> $X \leq 1 \mathrm{~mm}$ $\mathrm{Y} \leq 0.6 \mathrm{~mm}$ (In Full Size Mode) | If the line of the designated area is too thin, no designated area is recognized. | Mark with a line more than 1 mm in width. <br> (More than 2 mm for 50\% reduction mode.) |
| 4 | Density of the designated line | A pencil or a color pen was used. (The line has low image density.) | If the designating line is too light, no designated area is recognized. | Mark using a black pen. |
| 5 | Type of command sheet | 1) Rough paper is used as a command sheet. <br> 2) If the command sheet has a different friction coefficient from the original. | 1) Any fibrous black spots will be read as a designated area. <br> 2) Due to different registration of the original and the command sheet, the designated areas will be different from the imagined positions. | 1) Use white paper $\left(65 \mathrm{~g} / \mathrm{m}^{2}\right)$. <br> 2) Use the same paper as the original. |


| No. | Item | Typical Problems |  | Preferred designated area |
| :---: | :---: | :---: | :---: | :---: |
|  |  | Designated area | Area recognized |  |
| 6 | Gap between the designated area and neighboring image, or gap between two designated areas. | When the gap between the designated area and the neighboring image is too small. | Depending on the original feed condition (registration and skewing) or neatness when outlining the designated area, the neighboring image may or may not be recognized as a designated area. | 1) There should be more than 2 mm clearance between the line and the image. <br> 2) Mark the line more than 2 mm away from the image in the designated area so that the image is recognized completely. <br> 3) For best results, approximately 5 mm is needed between the neighboring image and the image to be designated. |

### 9.5 MASTER MAKING

### 9.5.1 Thermal Head

A thin-film type thermal heating element is used in the thermal head. The thermal heating elements will melt the over-coating and polyester film layer of the master in response to image signals for each pixel. The specifications are as follows:

Maximum Master Making Width:292.6 mm
Number of Thermal 4608 dots
Heating Elements
Density of Thermal 400 dpi
Heating Elements
The power supply PCB applies power (VHD) to the thermal heating elements through the thermal head drive PCB. The power source (VHD) will vary from one thermal head to another since the average resistance of the elements in the head will vary. Therefore, whenever the thermal head or the power supply PCB is replaced, it is necessary to readjust the applied voltage to the particular value indicated on the thermal head (see Replacement and Adjustment: Thermal Head Voltage Adjustment).


IMAGE PROCESSING

### 9.5.2 Thermal Head Control

The energy that is applied to the thermal heating elements is determined by the length of time ( t ) that the power is applied.

The duration of time is depended on the thermal head temperature which is detected by the thermistor located on the thermal head. If the temperature is higher, the time ( t ) that the energy is applied will be shorter.


The time ( t ) is determined when the Master Making key is pressed, and it is kept constant until the current master is finished.

Each thermal element receives the data twice to make one pixel.


1) The 1st datum depends on whether the previous pixel was black or white. If the previous pixel was black, the 1st output for the next pixel is white. If the previous pixel was white, the 1st output for the next pixel is black. This is to counterbalance the effect of the previous heating element's condition on the next pixel.
2) The 2nd datum is the actual image datum for that pixel.

### 9.5.3 Thermal Head Protection



The thermistor located on the thermal head and a thermal guard (a thermostat) located on the PSU (not shown) are used for thermal head protection. This will prevent the thermal head and power supply unit from becoming overheated when continuously processing a solid image.

The CPU will detect an abnormal condition when the Master Making key is pressed, and will indicate an SC code on the operation panel under the following conditions:

| Detecting Component | Conditions | SC Code |
| :--- | :--- | :--- |
| Thermistor | Over $54^{\circ} \mathrm{C}(\mathrm{CN} 111-\mathrm{A} 1$ is <br> under 1.17 V$)$ | $\mathrm{E}-04$ |
|  | Under $-20^{\circ} \mathrm{C}$ <br> (Thermistor Open) | $\mathrm{E}-09$ |

## 10. OTHERS

### 10.1 TEST SWITCH



Push in the actuator $[A]$ of the test switch $[B]$ located inside of the inner cover to disable the front door, paper table, master eject unit, and scanner unit safety switches. The safety switches will remain deactivated as long as the actuator is pushed in.

NOTE: During troubleshooting, the ADF cover detection safety switch can be disabled by using SP mode \#146. On completion, ensure that SP mode \#146 is returned to its original setting ("i").

### 10.2 MASTER MAKING AND PRINTING AREAS





| Items | Standard | Note |
| :---: | :---: | :---: |
| - Master Mak <br> Original <br> Master | gth in Relation to Paper Size - <br> Master Making Length $\begin{aligned} & \text { LM }=(\text { Lo }-5-2) \times \frac{\alpha}{100} \\ & \left(\begin{array}{ll} \text { A3/DLT } & \text { LM } \leq 420 \\ \text { A4/LT } & \text { LM } \leq 211 \end{array}\right. \end{aligned}$ <br> $\alpha$ : Magnification Ratio (\%) | The machine will not print the last 2 mm of the original on the master. |

### 10.3 PAPER MISFEED DETECTION


[a] When the 2nd drum position sensor is turned on, if the printing pressure sensor is still OFF, the main PCB will detect a paper misfeed.
[b] When the 2nd drum position sensor is turned on, if the 2nd paper exit sensor remains ON, the main PCB will detect a paper misfeed.

[c] When the drum has rotated $20^{\circ}(\theta 1)$ after activating the 2 nd drum position sensor, if the 1st paper exit sensor is still OFF, the main PCB will detect a paper misfeed.
[d] When the drum has rotated $25^{\circ}(\theta 2)$ after activating the 1 st drum position sensor, if the 2nd paper exit sensor is still OFF, the main PCB will detect a paper misfeed.

## 11. COMBINATION CHART

This combination chart indicates which modes that can be used together.
O: the modes can be used together.
$x$ : the modes cannot be used together.
$\star$ : some functions within the modes cannot be used together.

|  |  | $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ | $\mathbf{4}$ | $\mathbf{5}$ | $\mathbf{6}$ | $\mathbf{7}$ | $\mathbf{8}$ | $\mathbf{9}$ | $\mathbf{1 0}$ | $\mathbf{1 1}$ | $\mathbf{1 2}$ | $\mathbf{1 3}$ | $\mathbf{1 4}$ | $\mathbf{1 5}$ | $\mathbf{1 6}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | Reduction |  | $\boldsymbol{x}$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{2}$ | Enlargement | $\boldsymbol{x}$ |  | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{3}$ | Zoom | $\boldsymbol{x}$ | $\boldsymbol{x}$ |  | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{4}$ | Auto Cycle | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |  | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\star$ | $\star$ | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{5}$ | Memory/Class | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |  | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{\star}$ | $\bigcirc$ |
| $\mathbf{6}$ | Multi Copy | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |  | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{x}$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{7}$ | Directional Mag. | $\boldsymbol{x}$ | $\boldsymbol{x}$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |  | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{8}$ | Margin Erase | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |  | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{9}$ | Make-up | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |  | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{1 0}$ | Line/Photo | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{x}$ |  | $\boldsymbol{x}$ | $\bigcirc$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{1 1}$ | Line or Photo | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{x}$ |  | $\bigcirc$ | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{1 2}$ | Image Density | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |  | $\boldsymbol{x}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{1 3}$ | On-Line | $\boldsymbol{x}$ | $\boldsymbol{x}$ | $\boldsymbol{x}$ | $\bigcirc$ | $\boldsymbol{\star}$ | $\boldsymbol{x}$ | $\boldsymbol{x}$ | $\boldsymbol{x}$ | $\boldsymbol{x}$ | $\boldsymbol{x}$ | $\boldsymbol{x}$ | $\boldsymbol{x}$ |  | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{1 4}$ | Overlay | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{\star}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |  | $\bigcirc$ | $\bigcirc$ |
| $\mathbf{1 5}$ | Sort | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{\star}$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |  | $\bigcirc$ |
| $\mathbf{1 6}$ | Economy | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |  |

## INSTALLATION PROCEDURE

## 1. INSTALLATION REQUIREMENTS

The installation location should be carefully chosen because the environmental conditions greatly affect the performance of the machine.

### 1.1 OPTIMUM ENVIRONMENTAL CONDITIONS



Temperature -
10 to $30^{\circ} \mathrm{C}$ ( 50 to $86^{\circ} \mathrm{F}$ )
Humidity -



On a strong and level base.
The machine must be level within 5 mm (13/64") both front to rear and left to right.

### 1.2 ENVIRONMENTS TO AVOID



Locations exposed to direct sunlight or strong light (more than 1,500 lux).


Areas with corrosive gases.


Dusty areas.


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.)

### 1.3 POWER CONNECTION



Securely connect the power cord to a power source.

Ensure that the wall outlet is near the machine and easily accessible.

Ensure that the plug is firmly inserted in the outlet.


Avoid multiwiring.


Voltage must not fluctuate more than 10\%.


Do not pinch the power cord.

### 1.4 ACCESS TO THE MACHINE

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


## 2. ACCESSORY CHECK

Ensure that you have the following accessories.

1. Operating Instructions
2. End Plate Prop
3. Decal - Mode


## ⒸAUTION

Do not hold the scanner unit when pushing the machine or the scanner unit safety switch may be damaged.

1. Place the machine on the table.

NOTE: The screw holes in the bottom plate of the machine must line up with the screw holes in the table.
2. Remove the strips of tape $[A]$ securing the covers and units shown above.

3. Open the front door and slide out the drum unit [B].
4. Open the master clamper and remove the clamp [C].
5. Open the paper feed table and remove the cardboard cover [D] protecting the paper feed roller.
6. Slide the scanner unit to the left (as seen from the operator side) and remove the two strips of tape securing the master box.

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7. Open the paper delivery table and remove the strip of tape $[E]$ protecting the end fence.
8. Remove the cardboard [F] under the scanner unit.
9. Slide the scanner unit to the left (as seen from the operator side) and change the position of screws [G] from the transport position to the operating position.
10. Open the doors (2 strips of tape $[\mathrm{H}]$ ) of the optional table and take out the plastic bag containing 2 screws.

11. Raise the front side of the machine and position the base pad $[A]$ under the machine. Then raise the rear side of the machine and position the other base pad $[B]$ under the machine.
12. Secure the machine to the table with the two screws [C] packed with the table.
13. Open the paper feed table [A] and neatly stack some printing paper on the table.
14. Slide the paper feed side plates [B] gently up against the paper stack.
15. Open the paper delivery table[C] and adjust the position of the end plate [D] and the side plates [E] to match the printing paper size. Refer to the paper size scale on the table.
16. Install the ink cartridge [F].


a. Open the front door and lower the ink holder [G].
b. Remove the ink cartridge cap.
c. Insert the ink cartridge in the ink holder and raise the ink holder to the original position.
d. Close the front door.

[G]
17. Slide the scanner unit all the way to the left, and take the master spools [H] out.
18. Install the master roll.
a. Attach a spool $[A]$ to each end of the master roll [B].
b. Push the pressure release lever [ $C$ ] to the left.
c. Set the master roll in the machine as shown in the illustration.
d. Insert the leading edge of the master roll under the platen roller.
e. Return the pressure release lever to the original position.
f. Plug in the power cord and turn on the main switch.
g. Press the master cut button.

h. Open the master box cover and remove the cut strip of master paper.
NOTE: Confirm that the paper on the master roll is not bent or creased.
i. Close the scanner unit.

19. Idle the machine to distribute ink on the drum.
a. Press the Reset key while holding down the "0" key on the operation panel.
b. If $\stackrel{\downarrow}{\text { b }}$ blinks on the operation panel when the machine stops, repeat step a.
20. Make some test prints to check the machine.
a. Raise the platen cover and place an original face down on the exposure glass [A]. Ensure that the original is flush with the left scale and aligned with the proper paper size marks. Close the platen cover.
b. Press the Master Making key.
c. Select the lowest print speed (1) with the Speed key and press the Print Start key. Make prints at this speed until the print image density stabilizes.
NOTE: 1. Usually, about 30 prints are needed before the image fully stabilizes.
2. Check the image quality after the print image density is stabilized.
21. If necessary, change the language for the LCD guidance as follows:
a. Turn the main switch off and unplug the machine.
b. Remove the right front cover ( 4 screws).
c. Change the DIP-SW 102-1, 2,3 settings. The following table shows the setting for each language.

| DPS102 |  |  | LCD Display |
| :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ |  |
| ON | ON | OFF | English (Default) |
| OFF | OFF | ON | German |
| ON | OFF | ON | French |
| OFF | ON | ON | Spanish |
| ON | ON | ON | Italian |

d. Reinstall the right front cover (4 screws).

## 4. MAKE-UP FUNCTION BOARD INSTALLATION PROCEDURE (OPTION)

1. Turn off the main switch and unplug the power cord.
2. Remove the right front cover (4 screws [A]).
3. Disconnect all the connectors on the main PCB.
4. Remove the main PCB (5 screws [B]) and Main Board Spacers.
5. Replace the Image Processing PCB with the optional Make-up Function board (4 screws [C]).
6. Reinstall the Main PCB and right front cover.
7. Plug in the power cord and turn on the machine. Make some test prints using the Image Make-up function.


Installation


## SERVICE TABLES

## 1. SERVICE REMARKS

1. If a circuit breaker or a fuse opens, correct the cause of the overcurrent before resetting the breaker or replacing the fuse.
2. If the thermal head or the power supply unit is replaced, the thermal head voltage adjustment is required to match the installed thermal head unit.
3. Do not touch the edge of the cutter blade with bare hands.
4. Be careful not to drop the master eject unit when removing the eject unit guide shaft.
5. If the paper feed guide plate is removed, ensure that the guide plates do not touch the lower second feed roller when reinstalling the guide.
6. When installing the lower separation roller, ensure that the front and rear separation levers move smoothly.
7. If the slowest print speed is faster than 60 rpm , the sorter cannot keep up with the machine and a TS sorter jam might occur.
8. Do not energize the master feed and master eject clamper solenoids for longer than 10 seconds.
9. When adjusting the ink roller gap, check the gap at the right, center, and left positions.
10. The ink detection adjustment should be made under normal temperature conditions ( $20 \mathrm{C} / 65 \% \mathrm{RH}$ ).
11. When removing the pressure cam drive gear, do not loosen the two deeply recessed bolts.
12. If the main drive belt has been removed, check the relationships between the drum drive gear, printing pressure cam, and the paper feed cams after replacing the belt. Adjust if necessary.
13. Do not keep on pressing the Image Position key if the image position sensor is broken or removed. The plastic gears between the metal gears may break.

## 2. SERVICE TABLES

### 2.1 MAINTENANCE TABLES

### 2.1.1 Lubrication Points

Lubricate after removing adhering ink and paper dust at yearly intervals.

| Section | Lubrication Point | Type | Location |
| :---: | :---: | :---: | :---: |
| Drive | Speed Reduction Gears of the Main Motor | Grease <br> (Shell Albania No. <br> 2) | (Fig.1-E) |
|  | Gears of the Drum Drive Shaft |  | On the inside and outside of the frame (Fig.1-B) |
| Image Positioning | Spiral Track of the Cam Gear |  | (Fig.1-K) |
| Paper Feed | Paper Feed Sector Gear |  | (Fig.1-J) |
|  | Second Feed Sector Gear |  | (Fig.1-F) |
|  | Gear of the Paper Feed Cam Shaft |  | (Fig.1-A) |
|  | Paper Table Slide Groove |  | Both front and rear (Fig.1-H) |
|  | Paper Table Drive Gear |  | (Fig.1-G) |
|  | Bearings for the Upper Separation Roller Shaft | Motor oil (SAE No. 20) | (Fig.1-I) |
|  | Bearings for the Paper Feed Roller Shaft |  | (Fig.2-L) |
| Drum | Drum Drive Gear | Grease (Shell Albania No. 2) | (Fig.3-N) |
|  | Master Clamper Sector Gear |  | (Fig.3- O) |
|  | Master Clamper Pinion Gear |  | (Fig.3- P) |
|  | Ink Pump Drive Gear |  | (Fig.3-M) |
| Printing Pressure | Between Printing Pressure Arm [Q] and Printing Pressure Stay [Q'] |  | Both front and rear (Fig.4- Q) |
|  | Pressure Spring Link |  | (Fig.1-C) |
| Master Eject | Master Pressure Plate Grooves | Grease (Shell Albania No. 2) | Both front and rear (Fig.5-S) |
|  | Rounded Ends of the Master Pressure Plate Drive Arms |  | (Fig.5-R) |
| Paper Exit | Air Pump Drive Gears |  | (Fig. 6-T) |
|  | Inside of the Air Pump Piston | Grease <br> (Mobil Ep-1) | (Fig. 6-U) |
| ADF | Bearings for the Feed Roller Shaft | Motor oil (SAE No. 20) | Both front and rear (Fig. 7-V) |
| Others | Edge of Each Cam | Grease (Shell Albania No. 2) | (Fig.1-D) |



[S]

[Fig 6]

[Fig 7]


### 2.1.2 User's Maintenance

Advise the customer to clean each item regularly. Clean the following items at every EM call if necessary.

| Section | Cleaning Point | Cleaner |
| :--- | :--- | :--- |
| Interval |  |  |
| Optics | Original Platen Cover | Cloth and water |
|  | At every EM <br> call |  |
|  |  | Cloth and glass cleaner |
| Paper Feed |  | Cloth and soap and water |
|  | Paper End Sensor | Dry cloth |

### 2.1.3 Periodic Inspection (every 6 months)

| Section | Item | Standard Procedure |
| :--- | :--- | :--- |
| Optics | Original Platen Cover | Wipe off stains using a soft cloth moistened <br> with ethyl alcohol. |
|  | Exposure Glass | Wipe with a dry cloth. |
|  | Paper Feed Roller | Wipe off ink and paper powder using a cloth <br> moistened with ethyl alcohol. |
|  | Upper and Lower Second <br> Feed Rollers | Upper and Lower <br> Separation Rollers |
| Printing | Press Roller | Wipe off paper powder using a cloth <br> moistened with water. |
| ADF | Pick-up Roller <br> Feed Roller <br> Separation Roller |  |

### 2.1.4 Periodic Inspection (every 12 months)

| Section | Item | Standard Procedure |
| :--- | :--- | :--- |
| Optics | Back side of the <br> Exposure Glass | Wipe with a dry cloth. |
|  | Mirrors | Use a blower brush. |
|  | Xenon Lamps | Wipe with a dry cloth. |
| Master Eject | Upper and Lower Master <br> Eject Rollers | Wipe off ink and paper powder using a cloth <br> moistened with ethyl alcohol. |
|  | Master Eject Box | Wipe off ink using a cloth moistened with <br> ethyl alcohol. |
| Drum | Inside and outside of the <br> Drum | Wipe off built-up ink and paper powder <br> using a cloth moistened with ethyl alcohol. |
|  | Ink Holder | Wipe off paper powder using a cloth <br> moistened with water. |
|  | First and Second Paper <br> Exit Sensors <br> Master Eject Sensor <br> Drum Master Sensor | Check the performance of all the sensors. <br> Remove stains from the sensors using a dry <br> cloth. |

### 2.2 SERVICE CALL CODES

| Code | Problem | Possible Causes |
| :---: | :---: | :---: |
| Main Body |  |  |
| E-01 | Either the right or the left cutter switch turned off within 3 seconds of the cutter motor starting. | 1) Drive wire cut <br> 2) Drive section malfunction <br> 3) Defective cutter switch |
| E-02 | Malfunction in the paper table drive section. <br> 1. The paper table lower limit sensor or paper table height sensor did not turn on within 7 seconds. <br> 2. The LCT tray drive motor did not stop within 25 seconds. <br> 3. The upper limit sensor did not turn on within 8 seconds after the LCT cassette bottom plate drive motor starts. | 1) Drive worm gear broken <br> 2) Mounting screw of the worm gear broken <br> 3) No power supply |
| E-04 | The temperature of the thermal head is greater than $54^{\circ} \mathrm{C}$ when the Master Making key is pressed. | 1) Excessive thermal head temperature <br> 2) Thermistor short |
| E-05 | Malfunction in the image shifting section. | 1) Image position sensor connector disconnected <br> 2) Defective image position sensor |
| E-06 | The drum rotation sensor detects an incorrect motor speed. | 1) Drum lock <br> 2) No power supply |
| E-09 | The signal level between CN104-A1 and GND is over 4.9 volts. | 1) The thermistor is open. |
| E-10 | The CPU detects an abnormality in the pulse signals from the thermal head drive PCB. These pulses determine the energy to be applied to the thermal heating elements. | 1) Defective thermistor <br> 2) Related connectors are not connected (Thermal head drive PCB CN705 or CN701). |
| E-11 | Encoder output does not change within 3 seconds of the main switch being turned on or the Clear Mode key being pressed. | 1) Defective image position motor <br> 2) No power supply |
| E-12 | 1. The upper or lower pressure plate sensor remains activated for more than 4 seconds after the pressure plate motor starts turning. <br> 2. The lower pressure plate sensor is not activated within 8 seconds of the pressure plate motor starting to turn even though the upper pressure plate sensor is de-activated. <br> 3. The upper pressure plate sensor is not activated for more than 8 seconds after the pressure plate motor starts to turn even though the lower pressure plate sensor is de-activated. | Pressure plate drive mechanism malfunction. |

SERVICE TABLES


Shaded area - Sorter not available in the USA

| Code | Problem | Possible Causes |
| :--- | :--- | :--- |
| E-38 | The 2nd sorter staple position sensor or <br> staple unit movement sensor status <br> does not change even if the staple unit <br> shift motor drive signal is applied. | 1)Defective staple unit shift <br> motor |
| Defective jogger bar H.P. <br> sensor |  |  |
| sensertive staple unit |  |  |

Shaded areas - Sorter not available in the USA

### 2.3 DIP SWITCHES, LEDs, VRs, TPs (ON THE MAIN CONTROL PCB)

### 2.3.1 DIP Switches

| DIP Switch | Function | Remarks |
| :---: | :--- | :--- |
| DIP SW101 | Do not use. | Must be off at all times. |


| DPS 102 |  |  | LCD Display |  |
| :---: | :---: | :---: | :--- | :---: |
| $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ |  |  |
| ON | ON | OFF | English |  |
| OFF | OFF | ON | German |  |
| ON | OFF | ON | French |  |
| OFF | ON | ON | Spanish |  |
| ON | ON | ON | Italian |  |
| OFF | OFF | OFF | For Japanese Machines |  |
| ON | OFF | OFF |  |  |
| OFF | ON | OFF |  |  |


| DPS 102 | ON | OFF |
| :---: | :--- | :--- |
| 4 | DFII (Type 50) Also see SP8. | DFI |
| 5 | Print and master counters <br> increment by two counts when <br> the A3 drum is used (NRG <br> setting). Also, see SP86. | Print and master counters <br> increment by one regardless of <br> the drum size. |
| 6 | Inch version | A4 version |

NOTE: The DF setting can be changed using SP8. When the memory clear (SP60) is performed, the SP8 setting depends on the DPS102-4 setting. Later, if the SP mode is changed but not the DPS, the SP mode setting takes priority. This note also applies to DPS 102-5.

### 2.3.2 Photodiodes

| LED | Component | Remarks |
| :---: | :--- | :--- |
| LED101 | 1st Paper Exit Sensor | When paper is detected, the LED lights. |
| LED102 | Drum Master Sensor | When a master is on the drum, the LED <br> lights. |
| LED103 | 2nd Paper Exit Sensor | When paper is detected, the LED lights. |
| LED104 | Master Eject Sensor | When a master is under the master <br> eject sensor, the LED lights. |
| LED105 | Ink Detection | When ink is present, the LED lights. |
| LED106 | Main Motor | When the main motor turns on, the LED <br> lights. |

### 2.3.3 VRs

| VR | Function |
| :---: | :--- |
| VR101 | 1st Paper Exit Sensor Adjustment |
| VR102 | Drum Master Sensor Adjustment |
| VR103 | 2nd Paper Exit Sensor Adjustment |
| VR104 | Master Eject Sensor Adjustment |
| VR105 | Adjustment for Drum Speed 5 (120 rpm) |
| VR106 | Adjustment for Drum Speed 1 60 rpm$)$ |

### 2.3.4 TPs

| TP | Function |
| :---: | :--- |
| TP101 | 1st Paper Exit Sensor Voltage |
| TP102 | Drum Master Sensor Voltage |
| TP103 | 2nd Paper Exit Sensor Voltage |
| TP104 | Master Eject Sensor Voltage |
| TP105 | Ink Detection Voltage |
| TP106 | Drum Rotation Sensor Voltage |
| TP107 | GND |

### 2.4 EXPECTED LIFE OF PARTS

| Section | Part Description | Expected Life |
| :--- | :--- | :--- |
| Scanner | Xenon Lamps | 15,000 originals |
| Master Feed/Master | Thermal Head | 30,000 masters |
| Making | Reverse Roller | 30,000 masters |
|  | Platen Roller | 30,000 masters |
|  | Upper Master Feed Roller | 1 year or 30,000 masters |
| Drum | Drum Cloth Screen | 2 years or $1,200,000$ prints |
| Paper Feed | Paper Feed Rubber Side Plate | 2 years or $1,200,000$ prints |
|  | Paper Feed Roller | 6 months or 300,000 prints |
|  | Upper Separation Roller | 1 year or 600,000 prints |
|  | Lower Separation Roller | $2,000,000$ prints |
|  | 2nd Feed Roller Brake Belt | $1,000,000$ prints |
|  | 2nd Feed Roller Gear | $1,000,000$ prints |
|  | Separation Plate | 1 year or 600,000 prints |
|  | Press Roller | 2 years or $1,200,000$ prints |
| Printing | Transport Belt | 2 years or $1,200,000$ prints |
| Delivery |  |  |

### 2.5 SPECIAL TOOLS

| Description | Part Number |
| :--- | :--- |
| Test Chart R-21 | 99992131 |
| Resolution Chart | A0129110 |
| Drum Gauge | C2009001 |
| Image Shifting Gauge | C2009002 |

## 3. SERVICE PROGRAM MODE

### 3.1 SERVICE PROGRAM MODE OPERATION

The service program (SP) mode is used to check electrical data, change modes, or change adjustment values.

### 3.1.1 Service Program Mode Access Procedure (for technicians)

All service program modes can be accessed with this procedure.

1. Press the following keys on the operation panel in the following order:

## Case 1:

a) Clear Modes key
b) Clear key
c) Multi Copy Key
d) Enter key

To exit the SP mode, press the Clear Mode Key.

Case 2:
a) Turn off the power switch
b) Press and hold down the Enter key, Stop key, and Clear key simultaneously
c) Turn on the power

To exit the SP mode, turn the power switch off and back on.
2. The following is displayed on the LCD when the SP mode is accessed.

```
SP-MODE
    PROGRAM No. 0
```

3. Using the number keys, enter the desired SP mode number (listed in the service program table.)
NOTE: The SP mode number can be shifted up or down by pressing the Zoom key ("+" or "-").

### 3.1.2 Service Program Mode Access Procedure (for users)

This procedure allow the users to access only the service program modes that are marked with an asterisk in the service program table.

1. Press the following keys on the operation panel in the following order:
a) Clear Modes key
b) Clear key
c) Enter key
2. The following is displayed on the LCD when the SP mode is accessed.

SP-MODE
PROGRAM No. 0
3. Using the number keys, enter the desired SP mode number (listed in the service program table).
4. To exit the SP mode, press the Clear Modes key.

### 3.1.3 Change Adjustment Values or Modes

1. After entering the desired SP mode number, press the Enter key. The current value or mode will be displayed on the LCD (at the end of the second line).
2. Enter the desired value or mode using the number keys (listed in the service program table).
Use the Memory/Class key to toggle between + and - values.
3. Press the Enter key to store the desired value or mode.
4. To exit the SP mode, press the Clear Modes key.

### 3.2 SERVICE PROGRAM TABLE

*: Accessible by a customer **: Can be registered in CS mode
๒: A4 version * : LT version

| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | On line | Enables On Line key operation. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 2 | FDC Type 10 | Used only in Japan | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | Keep at 0. |
| 3 | Key Counter | Enables key counter operation. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 4 | Key Card | Used only in Japan. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 5 | EMF Sorter | Selects the number of sorters. | 0 : No sorters $1,2,3,4$, or 5 : Sorters present | 0 | Input 1 to 5 to indicate the number of sorters. |
| 7-1 | DS/TS Sorter | Enables TS20A/B operation. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | If " 1 " is selected in $7-1$, the machine goes to Auto Reset Time setting mode. |
| 7-2 | Auto Reset Time | Specifies the auto reset time. | $\begin{aligned} & \text { 0: No } \\ & \text { 1-5: min. } \end{aligned}$ | 0 |  |
| 8 | ADF Select | Informs the machine if DF Unit Type 50 is installed. | $\begin{aligned} & \text { 0: DF1 (or no DF) } \\ & \text { 1: DF2 (type 50) } \end{aligned}$ | 0 |  |
| ${ }^{*} 10$. | Min. Print | Limits the minimum print quantity that can be entered. | 0 to 9999 | 0 |  |
| *11 | Max. Print | Limits the maximum print quantity that can be entered. | 0 to 9999 | 9999 |  |
| *12 | v : A4 $\rightarrow$ A3 Mag. Ratio <br> - : HLT $\rightarrow$ LG Mag. Ratio | Adjusts the fixed magnification ratio. <br> v: From A4 to A3 <br> - From 51/2" x 81/2" to $81 / 2^{\prime \prime} \times 14$ " | 50 to 200\% | - : $155 \%$ <br> - : 141\% |  |
| *13 | $\vee: A 4 \rightarrow B 4$ Mag. Ratio <br> - : LT $\rightarrow$ DLT Mag. Ratio | Adjusts the fixed magnification ratio. <br> v: From A4 to B4 <br> - : From 51/2" x 81/2" to 11 " x 17" | 50 to 200\% | v: $129 \%$ <br> - 122\% |  |
| *14 | $\vee: B 4 \rightarrow A 3$ Mag. Ratio <br> - : LG $\rightarrow$ DLT Mag. Ratio | Adjusts the fixed magnification ratio. <br> v: From B4 to A3 <br> - From 81/2" x 14 " to 11 " x 17" | 50 to 200\% | v: $121 \%$ <br> - : 115\% |  |
| *15 | Full Size | Adjusts the full size magnification ratio. | 50 to 200\% | 100\% |  |
| *16 | Page Margin | Adjusts the create margin magnification ratio. | 50 to 200\% | 93\% |  |

Shaded area - Sorter not available in the USA

SERVICE PROGRAM MODE

| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| *17 | v: A3 $\rightarrow$ B4 Mag. Ratio <br> $\bullet: L G \rightarrow$ LT <br> Mag. Ratio | Adjusts the fixed magnification ratio. <br> v : From A3 to B4 <br> - : From 81/2" x 14 " to 81/2" x 11" | 50 to 200\% | $\begin{aligned} & \text { •: 77\% } \\ & \text { • : 87\% } \end{aligned}$ |  |
| *18 | $\vee: B 4 \rightarrow$ A4 <br> Mag. Ratio <br> - : ** $\rightarrow$ LT <br> Mag. Ratio | Adjusts the fixed magnification ratio. <br> v : From B4 to A4 <br> - : From $11^{\prime \prime} \times 15$ " to 81/2" x 11" | 50 to 200\% | v: 74\% <br> - : 82\% |  |
| *19 | $\vee: A 3 \rightarrow A 4$ Mag. Ratio <br> $\bullet$ : DLT $\rightarrow$ LT Mag. Ratio | Adjusts the fixed magnification ratio. <br> v: From A3 to A4 <br> - : From $11^{\prime \prime} \times 17^{\prime \prime}$ to 81/2" x 11" | 50 to 200\% | $\begin{aligned} & \text { •:65\% } \\ & \bullet: 71 \% \end{aligned}$ |  |
| *20 | Buzzer On | Turns the beeper ON or OFF | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| *21 | Prints/Master Cost | Adjusts the cost ratio of masters to prints for accounting purposes. | 0 to 50 | 0 | The set number (0 to 50) is automatically added to the key counter each time a master is used. |
| 22 | Read Image Area | Not used | - | 0 | Not used |
| *23 | Online Paper Size | Used only in Japan | $\begin{aligned} & \text { 0: A6 } \\ & \text { 1: A5 } \end{aligned}$ | 0 | Not used |
| 25 | Sorter Feed Speed | Determines the transport belt speed in the TS sorter. | $0:-20 \%$ $6:+15 \%$ <br> $1:-15 \%$ $7:+20 \%$ <br> $2:-10 \%$ $8:+25 \%$ <br> $3:-5 \%$ $9:+30 \%$ <br> $4:+5 \%$ $10: 0 \%$ <br> $5:+10 \%$  | 10 |  |
| 26-1 | Sorter Priority | Determines the sorter priority. | 0 : Normal <br> 1: Others | 0 |  |
| 26-2 | $0: 1 \mathrm{st} / 2 \mathrm{nd}$ <br> 1: $2 \mathrm{nd} / 1 \mathrm{st}$ <br> 2. 1 st <br> 3. 2nd | Determines the sorter priority when "1" is selected in SP26-1. | 0 : 1st sorter first <br> 1: 2nd sorter first <br> 2: 1st sorter only <br> 3: 2nd sorter only | 0 | If " 2 " or " 3 " is selected, only one sorter is used. |
| 27 | Auto Staple Off | Specifies whether the staple unit is disabled. | 0 : Staple mode enabled. <br> 1: Staple mode disabled. | 0 |  |
| 28 | Max. Print/Bin | Specifies the sort/stack number limit. | 1 to 50 sheets | 50 |  |
| **29 | Pht Bckgrnd Correct | Determines whether the original background correction is done in Photo mode. | 0 : Correction is not done. <br> 1: Correction is done. | 0 |  |

Shaded area - Sorter not available in the USA

SERVICE PROGRAM MODE

| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 30 | Sub Scan Mag. Adjust | Adjusts the sub-scan magnification. | -1.9 to +1.9\% | (0) | The factory setting depends on the machine. |
| 31 | MTF Level | Adjusts the MTF level. | 0: Low <br> 1: Standard <br> 2: High <br> 3: Maximum | 1 |  |
| 32 | Image Density Rank | In line mode, adjusts the image density level. | 0: Light <br> 1: Standard <br> 2: Dark | 1 |  |
| 33 | Lead Edge Margin | Adjusts the lead edge margin. | 4 to 10 mm | 5 mm |  |
| 34 | Line/Pht Mode Level | Use to adjust the threshold level for separating line areas and photo areas in the Line/Photo mode. | 0 : Change the threshold setting 1: Returns the setting to default | * | If " 0 " is selected in this mode, the machine goes to 34-1. |
| 34-1 | Contrast | Select the contrast setting for changing the threshold for line and photo. | 0: Standard <br> 1: Light <br> 2: Dark |  | Depending on the number selected in this mode, the machine goes to 34-1-0, 34-1-2, or 34-1-3. |
| $\begin{array}{\|l\|} \hline 34-1 \\ -0 \end{array}$ | Std (setting for the Standard tone) | Adjust the threshold level to distinguish line and photo areas for the Standard tone setting in the Line/Photo mode. There are four numbers and each represents the threshold value for an image density. Input the required value for the one that is blinking, then press Enter to move the next one. | Lt: 0 to 63 <br> Std: 0 to 63 <br> Dk: 0 to 63 <br> Dkr: 0 to 63 | Lt: 18 <br> Std: 16 <br> Dk: 22 <br> Dkr: 22 | If " 0 " is selected in 34-1, the machine goes to this mode. |
| $\begin{array}{\|l\|} \hline 34-1 \\ -1 \end{array}$ | Lt (setting for the Light tone) | Adjust the threshold level to distinguish line and photo areas for the Light tone setting in the Line/Photo mode. | Lt: 0 to 63 <br> Std: 0 to 63 <br> Dk: 0 to 63 <br> Dkr: 0 to 63 | Lt: 16 <br> Std: 14 <br> Dk: 14 <br> Dkr: 14 |  |
| $\begin{array}{\|l\|} \hline 34-1 \\ -2 \end{array}$ | Dk (setting for the Dark tone) | Adjust the threshold level to distinguish line and photo areas for the Dark tone setting in the Line/Photo mode. | Lt: 0 to 63 <br> Std: 0 to 63 <br> Dk: 0 to 63 <br> Dkr: 0 to 63 | Lt: 8 <br> Std: 10 <br> Dk: 14 <br> Dkr: 14 |  |

SERVICE PROGRAM MODE

| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 35 | Head Energy Adjust | Selects normal mode or Economy mode for changing the thermal head energy. | 0: Normal mode <br> 1: Economy mode |  | Depending on the number selected in this mode, the machine goes to 35-1 or 35-2. |
| 35-1 | Head Energy Adjust <br> (Normal) | Adjusts the thermal head energy for the normal mode. | 0 to -99 (\%) | 7 |  |
| 35-2 | Head Energy Adjust (Economy) | Adjusts the thermal head energy for the Economy mode. | 0 to -99 (\%) | 35 |  |
| 36 | Sub Scan Mag. Adjust (ADF) | Adjusts the ADF sub-scan magnification. | -1.9 to 1.9 \% | 0 | 0.1 \% steps |
| 37 | Shadow Erase Level | Selects the image mode for adjusting the threshold level for shadow erase. | 0: Line <br> 1: Photo <br> 2: Returns the settings to the defaults |  | If " 0 " or " 1 " is selected in this mode, the machine will go to 37-0 or 37-1. |
| 37-0 | Line | Adjusts the shadow erase threshold level for Line mode. There are four numbers and each represents the threshold value for an image density. Input the required value for the one that is blinking, then press Enter to move the next one. | Lt: 0 to 63 <br> Std: 0 to 63 <br> Dk: 0 to 63 <br> Dkr: 0 to 63 | Lt: 27 <br> Std: 19 <br> Dk: 15 <br> Dkr: 10 |  |
| 37-1 | Contrast (Photo) | Selects the contrast setting for adjusting the threshold level for shadow erase in Photo mode. | $\begin{aligned} & \text { 0: Standard } \\ & \text { 1: Light } \\ & \text { 2:Dark } \end{aligned}$ |  | Depending on the number selected in this mode, the machine will go to 37-1-0, 37-1-1 or 37-1-2. |
| $\left\lvert\, \begin{aligned} & 37-1 \\ & -0 \end{aligned}\right.$ | Std (setting for the normal tone) | Adjusts the shadow erase threshold for the Normal contrast setting in Photo mode. There are four numbers and each represents the threshold value for an image density. Input the required value for the one that is blinking, then press Enter to move the next one. | Lt: 0 to 63 <br> Std: 0 to 63 <br> Dk: 0 to 63 <br> Dkr: 0 to 63 | Lt: 24 <br> Std: 15 <br> Dk: 11 <br> Dkr: 4 |  |


| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{array}{\|l\|} \hline 37-1 \\ -1 \end{array}$ | Lt (setting for the light tone) | Adjusts the shadow erase threshold for the Light Tone contrast setting in Photo mode. | Lt: 0 to 63 <br> Std: 0 to 63 <br> Dk: 0 to 63 <br> Dkr: 0 to 63 | Lt: 31 <br> Std: 24 <br> Dk: 15 <br> Dkr: 9 |  |
| $\begin{array}{\|l\|} \hline 37-1 \\ -2 \end{array}$ | Dk (setting for the dark tone) | Adjusts the threshold value for shadow erase of the Dark tone contrast in Photo mode. | Lt: 0 to 63 <br> Std: 0 to 63 <br> Dk: 0 to 63 <br> Dkr: 0 to 63 | Lt: 12 <br> Std: 7 <br> Dk: 5 <br> Dkr: 2 |  |
| 38 | ADF Scan Line Adjust | Adjusts the ADF scanning start position. | -4.9 to 4.9 mm | 0 | 0.1 mm steps See remarks (1). |
| 39 | Image Center Adjustment | Adjusts the center position of copies in the ADF and platen modes. | 0 : Scanner <br> 1: ADF | 0 | See remarks (2). |
| 39-0 | Image Center Adjustment: Scanner | Adjusts the center position of copies in platen mode. | -4.9 to 4.9 mm | 0 | 0.1 mm steps |
| 39-1 | Image <br> Center Adjustment: ADF | Adjusts the center position of copies in ADF mode. | -4.9 to 4.9 mm | 0 | 0.1 mm steps |
| *40 | Original | Specifies the image mode at power-up. | 0 : Photo <br> 1: Line <br> 2: Line/Photo | 0 |  |
| *41 | Image Density | Specifies the image density at power-up. | 0: Light <br> 1: Standard <br> 2: Dark <br> 3: Darker | 1 |  |
| 42 | Print Speed | Specifies the printing speed at power-up. | 0: 60 rpm <br> 1: 75 rpm <br> 2: 90 rpm <br> 3: 105 rpm <br> 4: 120 rpm | 2 |  |
| *43 | Auto Cycle Mode | Specifies whether Auto Cycle mode is selected at power-up. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| *44 | Memory/Class Mode | Specifies the initial job memory feature (Memory or Class mode) at power-up. | 0: Class <br> 1: Memory | 1 |  |
| 45 | Std. Image Position | Specifies the image position at power-up | 1: +15 mm <br> 2: +10 mm <br> 3: +5 mm <br> 4: 0 mm <br> 5: -5 mm <br> 6: -10 mm <br> 7: -15 mm <br> 8: -20 mm | 4 |  |
| *46 | Make Up | Specifies the initial make-up background pattern when the Image Make-up mode is selected. | $\begin{aligned} & 1 \text { to } 40 \\ & 51 \text { to } 90 \\ & 101 \text { to } 140 \\ & 151 \text { to } 190 \end{aligned}$ | 0 | 0 : No background pattern is selected. |

SERVICE PROGRAM MODE

| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 47 | Contrast | Specifies the initial contrast when the Photo mode is selected. | 0: Standard <br> 1: Light <br> 2: Dark | 0 |  |
| 48 | Photo | Specifies the initial screen when the Photo mode is selected. | 0: Standard <br> 1: Fine <br> 2: Coarse | 0 |  |
| *50 | Directional Mag. Mode | Selects which is used to input directional magnifications: reproduction ratios or vertical and horizontal lengths. | 0 : Reproduction ratios <br> 1: Vertical and horizontal lengths | 0 |  |
| 60 | Clear All Memory | Returns all SP modes to the default settings. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 61 | Clear <br> Memory / <br> Except SP <br> 30, 36, 38, 39 | Returns all SP modes to the default settings except for SP No. 30, 36, 38 and 39 | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 70 | Original Feed Jam (A) | Displays the total number of original jams. |  | 0 |  |
| 71 | Paper Feed Jam (B) | Displays the total number of paper feed jams. |  | 0 |  |
| 72 | Paper Wrap Jam <br> (E)/(B)(E) | Displays the total number of times that paper has accidentally wrapped around the drum. |  | 0 |  |
| 73 | Paper Delivery Jam (G) | Displays the total number of paper delivery jams. |  | 0 |  |
| 74 | Master Feed Jam (C) | Displays the total number of master feed jams. |  | 0 |  |
| 75 | Master Delivery Jam (F) | Displays the total number of master delivery jams. |  | 0 |  |
| 76 | Clear Jam Counters | Clears all jam counters. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 77 | Last Sorter Jam | Displays the jam code for the last sorter jam. |  |  |  |
| **79 | Eco/Quality Start | Specifies if Quality Start operation is done for every master making. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | If " 1 " is selected in 79, the machine goes to 79-1. |
| 79-1 | Idling Number | Specifies the number of drum rotations for Quality Start. | 0 to 10 | 2 | If " 0 " is selected in SP79, the number of rotations is determined by SP80. |

Shaded area - Sorter not available in the USA

| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| *80 | Auto Eco/Q Start | Specifies whether Quality Start is done or not. If "Yes" is selected, the machine goes to "Idling No." mode. The idling number can be selected separately corresponding to the machine off time; 0 to 6 hours, 6 to 32 hours, and more than 32 hours. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 1 | If " 1 " is selected in 80, the machine goes to 80-1. |
| $\begin{array}{\|l\|} \hline 80-1 \\ -1 \end{array}$ | Idling Number (after a 0 to 6 hour interval) | Specifies the drum rotation number for the machine off time 0 to 6 hours. | 0 to 10 | 1 | If Enter key is pressed in this mode, the machine goes to 80-1-2. |
| $\left\lvert\, \begin{aligned} & 80-1 \\ & -2 \end{aligned}\right.$ | Idling Number (after a 6 to 32 hour interval) | Specifies the drum rotation number for when the machine was off from 6 to 32 hours. | 0 to 10 | 2 | If Enter key is pressed in this mode, the machine goes to 80-1-3. |
| $\left\lvert\, \begin{aligned} & 80-1 \\ & -3 \end{aligned}\right.$ | Idling Number (after an intermal of more than 32 hours) | Specifies the drum rotation number for when the machine was off from more than 32 to 72 hours. | 0 to 10 | 3 |  |
| 81 | Trial Print No. | Specifies how many trial prints are made after making the master. | 0 to 2 sheets | 1 |  |
| $\begin{array}{\|l\|} \hline * 82 \\ -1 \end{array}$ | Skip Feed No. | Selects the feed interval. | 1 to 9 | 2 | 1: Normal operation 2 to 9: One sheet fed every two to nine drum rotations |
| -2 | Long Sheet? | Specifies whether a long sheet is used. (If "Yes" is selected, paper exit jam detection is not done.) | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | Displays only when no. 2 to 9 are selected in 82-1. |
| *83 | Auto Reset Time | Specifies the auto reset time. | $\begin{aligned} & 0 \text { : No } \\ & 1 \text { to } 5 \text { min. } \end{aligned}$ | 0 |  |
| **84 | Auto Multi-copy | Specifies the initial mode for Multi copy. | 0 : Normal 1: Auto (Two or four identical images are made if the Master Making key is pressed once.) | 0 |  |

SERVICE PROGRAM MODE

| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 85 | Initial Compression | Specifies whether full master box detection is made at power-up. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 86 | A3 Drum 2 Count Up | Specifies whether the counter increments by two counts per print when the A3 drum is used. | 0: No <br> 1: Only the master counter <br> 2: Both the master and the copy counter | 0 <br> Ricoh, AB Dick $\begin{gathered} 2 \\ \mathrm{NRG} \end{gathered}$ | See <br> Remarks (3) |
| **87 | Memory Print | Specifies the printing operation when in Memory mode. | 0: Memory <br> 1: Stack | 0 | See Remarks (4). |
| **88 | Auto Memory/ Class | Specifies whether Auto Memory/Class mode is used. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | See Remarks (5). |
| **89 | Gray/Tint Mode | Select "Yes" to make a "Tint" image. (If "Tint" mode is selected, the Screen, Contrast, and Image Density keys are not available.) | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Ye } \end{aligned}$ | 0 |  |
| 90 | Thermal Head Test | Selects the background pattern for the copy made in the thermal head test; performs the test. | $\begin{aligned} & 1 \text { to } 40 \\ & 51 \text { to } 90 \\ & 101 \text { to } 140 \\ & 151 \text { to } 190 \end{aligned}$ | 7 | See the Thermal Head Test section. |
| 91 | Command Sheet Check | Prints the command sheet image (designated area) together with the original image. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | See the Command Sheet Check section. |
| 92 | Thermal Paper Mode | Use this mode to test the thermal head. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | See <br> Remarks (6) |
| 93 | Erase Area Check | Checks the erase area. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | See Remarks (7) |
| $\begin{array}{\|l\|} \hline 95 \\ -1 \end{array}$ | Scanner Free Run | Selects the type of scanner free run. | 0 : With the lamp off <br> 1: With the lamp on | 0 | See <br> Remarks (8) |
| -2 | Scanner Free Run | Carries out the scanner free run. <br> (The speed can be changed: see Remarks (8).) | Start with the Print Start key. Stop with the Stop key. |  | Displays when pressing \# after selecting 0 or 1 in 95-1. |
| 96 | ADF Original Feed Check | Carries out the ADF original feed check. (The speed can be changed; see Remarks (9).) | Start with the Print Start key. Stop with the Stop key. |  | See <br> Remarks (9) |
| 98 | Economy Count | Displays the total number of masters made in Economy mode. |  | 0 |  |


| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 99 | Staple Count | Displays the total number of stapling operations done. |  | 0 |  |
| 100 | Multi-copy Count | Displays the total number of masters made in Multi-copy mode. |  | 0 |  |
| 101 | Make Up Count | Displays the total number of masters made in Make-up mode. |  | 0 |  |
| 102 | Make Up Photo Count | Displays the total number of masters made in Make-up Photo mode. |  | 0 |  |
| 103 | Margin Erase Count | Displays the total number of masters made with the Margin Erase key. |  | 0 |  |
| 104 | On line Count | Displays the total number of masters made in On Line mode. |  | 0 |  |
| 105 | Overlay Count | Displays the total number of masters made in Overlay mode. |  | 0 |  |
| 106 | Enlarge Count | Displays the total number of masters made in Fixed Enlargement mode |  | 0 |  |
| 107 | Reduction Count | Displays the total number of masters made in Fixed Reduction mode. |  | 0 |  |
| 108 | Zoom Count | Displays the total number of masters made in Zoom mode. |  | 0 |  |
| 109 | Directional Mag. Count | Displays the total number of masters made in Directional Magnification mode. |  | 0 |  |
| 110 | Power On Time | Displays the total amount of time the machine has been turned on. |  | 0 | xxxxx Hour xx Minutes xx Seconds |
| 111 | Total Count | Displays the total number of masters and prints. |  | 0 | M: Master count <br> P: Print count |
|  | Resettable Count | Used by the customer to display the total number of masters and prints. |  | 0 | M: Master count <br> P: Print count |
| ${ }^{*} 114$ | CLR Resettable Count | Clears the resettable total master/print counters. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 115 | ADF Mode Count | Displays the total number of sheets fed in the ADF mode. |  | 0 |  |

Shaded Area - Sorter not available in the USA.

SERVICE PROGRAM MODE

| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 116 | Scanner <br> Mode Count | Displays the total number of originals set in platen mode. |  | 0 |  |
| 117 | Color Drum Count | Displays the total number of prints when using the color drum. |  | 0 |  |
| 118 | Paper Size Count | Displays the total number of prints made in each paper size. |  | 0 | Display counters for each paper size by pressing the \# key. See remarks (10). |
| 119 | CLR All Total Count | Clears the following counters: <br> SP Nos. 111, 115, 116, 117, and 118. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| $\begin{array}{\|l\|} \hline{ }^{*} 120 \\ -1 \end{array}$ | User Code Mode | Selects user code mode, and displays the total number of prints made in the User Code mode. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | See the user code mode section. |
| -2 | Auto Reset Time | Selects the auto reset time. | 0: Unlimited <br> 1: 3 min . <br> 2: 5 min . | 0 | Displays only when "Yes" is selected in 120-1. |
| ${ }^{*} 121$ | UC Count | Displays the total number of masters and prints made by each user code. |  | 0 | Press the \# key to shift to another user code. |
| *122 | Clear UC <br> Count | Clears every user code counter. | $\begin{array}{\|l\|} \hline 0: \text { No } \\ \text { 1: Yes } \\ \hline \end{array}$ | 0 | Same as above. |
| *123 | Total UC Count | Displays the total number of masters and prints for up to 20 user codes. |  | 0 |  |
| *124 | Clear Total UC Count | Clears the total user code counter. | $\begin{aligned} & \hline \text { 0: No } \\ & \text { 1: Yes } \\ & \hline \end{aligned}$ | 0 |  |
| 130 | Input Check Mode | Displays the inputs from sensors and switches. |  |  | See the input check table. |
| 131 | Output <br> Check Mode | Turns on the electrical components. |  |  | See the output check table. |
| 132 | All Indicators ON | Turns on all the indicators on the operation panel. |  |  | Press the \# key to light all the indicators. |


| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 133 | Sorter Cleaning Mode | In this mode, one bin shift is carried out when the Print Start key is pressed. First, select the 1st sorter or 2nd sorter. | 1: 1st Sorter <br> 2: 2nd Sorter | 1 | Depending on the number selected in this mode, the machine goes to 133-1 or 133-2. |
| $133-$ | Sorter <br> Cleaning Mode <br> (1st Sorter) | 1. When the Print Start key is pressed once, the bin returns to the home position. <br> 2. Each time the Print Start key is pressed after this, one bin shift is carried out. When the 20th bin shift is done, the bins return to the home position. |  |  |  |
| $\begin{aligned} & 133- \\ & 2 \end{aligned}$ | Sorter <br> Cleaning <br> Mode <br> (2nd Sorter) | 1. When the Print Start key is pressed once, the bin returns to the home position. <br> 2. Each time the Print Start key is pressed after this, one bin shift is carried out. When the 20th bin shift is done, the bins return to the home position. |  |  |  |
| 135 | SN: 1st Paper Exit | Displays the 1st paper exit sensor voltage. |  |  | Unit: Volts |
| 136 | SN: 2nd Paper Exit | Displays the 2nd paper exit sensor voltage. |  |  | Unit: Volts |
| 137 | SN: Master Eject | Displays the master eject sensor voltage. |  |  | Unit: Volts |
| 138 | SN: Drum Master | Displays the drum master sensor voltage. |  |  | Unit: Volts |
| 140 | Ink Detection | Specifies whether ink detection is done. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \\ & \hline \end{aligned}$ | 1 |  |
| 141 | Paper Detection | Specifies whether paper end detection is done. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 1 |  |
| $141-$ | Size <br> Detection | Specifies whether paper size detection is done or not. | 0 : Yes <br> 1: No size detection | 0 | If " 0 " is selected in this mode, the machine goes to 142-2. |
| $141-$ | Size Detection OFF? | Specifies whether the paper size indication on the operation panel is erased. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |

SERVICE PROGRAM MODE

| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| *143 | Orig. Size Detection | Specifies whether original size detection is done. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 1 |  |
| 145 | Drum Mast. Detection | Specifies whether drum master detection is done. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 1 |  |
| 146 | ADF Cover Detection | This mode disables the ADF Cover Sensor. | 0: Disabled <br> 1: Enabled | 1 |  |
| 147 | ADF Set Detection | This mode disables the ADF Set Sensor. | 0: Disabled (the ADF is always set) <br> 1: Enabled | 1 |  |
| 150 | Control ROM No. | Displays the ROM part number and the ROM manufacturing date. |  | P/No. | $\begin{aligned} & 1994 / 10 / 07= \\ & \text { YYYY/MM/DD } \end{aligned}$ |
| 151 | Machine No. | Displays the machine serial number and the installation date. |  | 0 | Input the serial number and the installation date. |
| 152 | Service Tel. No. | Input the service representative's telephone number, which is displayed with the service call code. |  | 0 | Use the number keys to input the telephone number at installation. Press the Memory/ Class key if you wish to add a space between the digits. |
| 153 | Last Service Code | Displays the last service call. |  | 0 |  |
| *160 | v: Margin Ers. A3 $\bullet$ : Margin Ers. $11 \times 17 \square$ | Adjust the margin erase area. <br> -: A3 <br> - : 11" x 17" | $(50 \text { to } 307) \times(50$ to 432) mm | $\begin{gathered} v: 289 \\ x \\ 416 \mathrm{~mm} \\ \bullet: 271 \\ x \\ 428 \mathrm{~mm} \end{gathered}$ |  |
| *161 | v: Margin <br> Ers. B4 - <br> $\bullet$ : Margin <br> Ers. $8.5 \times 14$ | Adjust the margin erase area. <br> $\downarrow$ : B4 <br> - : 81/2" x $14^{\prime \prime}$ | $(50 \text { to } 307) \times(50$ to 432) mm | $\begin{gathered} v: 249 \\ x \\ 360 \mathrm{~mm} \\ \star: 208 \\ x 352 \\ \mathrm{~mm} \\ \hline \end{gathered}$ |  |
| *162 | v: Margin Ers. A4 $\bullet$ : Margin Ers. $8.5 \times 11 \square$ | Adjust the margin erase area. <br> - : A4 Landscape <br> - : 81/2" x 11" <br> Landscape | $(50 \text { to } 307) \times(50$ to 432) mm | $\begin{gathered} \hline \vee: 202 \\ x 293 \\ \mathrm{~mm} \\ \bullet: 208 \\ \times 275 \\ \mathrm{~mm} \\ \hline \end{gathered}$ |  |


| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| *163 | v: Margin Ers. A4 - : Margin Ers. $8.5 \times 11$ $\square$ | Adjust the margin erase area. <br> v : A4 Portrait <br> - : 81/2" x 11" Portrait | (50 to 307) $\times(50$ to 432) mm | $\begin{gathered} \mathrm{v}: 289 \\ \mathrm{x} 206 \\ \mathrm{~mm} \\ \bullet: 271 \\ \mathrm{x} 212 \\ \mathrm{~mm} \\ \hline \end{gathered}$ |  |
| *164 | v: Margin Ers. B5 -- : Margin Ers. $5.5 \times 8.5$ $\square$ | Adjust the margin erase area. <br> $\downarrow$ : B5 Landscape <br> - : 51/2" x 81/2" <br> Landscape | $(50 \text { to } 307) \times(50$ to 432) mm | $\begin{gathered} \vee: 174 \\ x 253 \\ \mathrm{~mm} \\ \star: 132 \\ \mathrm{x} 212 \\ \mathrm{~mm} \end{gathered}$ |  |
| *165 | v: Margin Ers. B5 $\bullet$ : Margin Ers. $5.5 \times 8.5$ $\square$ | Adjust the margin erase area. <br> - B5 Portrait <br> - : 51/2" x 81/2" <br> Portrait | $(50 \text { to } 307) \times(50$ to 432) mm | $\begin{gathered} \mathrm{v}: 249 \\ \mathrm{x} 178 \\ \mathrm{~mm} \\ \bullet: 208 \\ \mathrm{x} 136 \\ \mathrm{~mm} \\ \hline \end{gathered}$ |  |
| *166 | v : Margin Ers. A5 -- : Margin Ers. **1 | Adjust the margin erase area. <br> $\bullet$ : A5 Landscape <br> - : 2" x 2" | (50 to 307) $\times(50$ to 432) mm | $\begin{gathered} \vee: 140 \\ x 206 \\ \mathrm{~mm} \\ \bullet: 50 \mathrm{x} \\ 50 \mathrm{~mm} \end{gathered}$ |  |
| *167 | v: Margin Ers. A5 -- : Margin Ers. **2 | Adjust the margin erase area. <br> - : A5 Portrait <br> - : 2" x 2" | (50 to 307) $\times(50$ to 432) mm | $\begin{gathered} \vee: 202 \\ x 144 \\ \mathrm{~mm} \\ \bullet: 50 \mathrm{x} \\ 50 \mathrm{~mm} \\ \hline \end{gathered}$ |  |
| *168 | $\vee$ : Margin Ers. A6 -- : Margin Ers. **3 | Adjust the margin erase area. <br> -: A6 Landscape <br> - : 2" x 2" | $(50 \text { to } 307) \times(50$ to 432) mm | $\begin{gathered} \bullet: 97 x \\ 144 \mathrm{~mm} \\ \bullet: 50 \mathrm{x} \\ 50 \mathrm{~mm} \end{gathered}$ |  |
|  | - : Margin Ers. A6 -- : Margin Ers. ${ }^{* *} 4 \mathrm{a}$ | Adjust the margin erase area. <br> v : A6 Portrait <br> - : 2" x 2" | $\begin{aligned} & (50 \text { to } 307) \times(50 \\ & \text { to } 432) \mathrm{mm} \end{aligned}$ | $\begin{gathered} \bullet: 140 \\ x 101 \\ \mathrm{~mm} \\ \star: 50 \mathrm{x} \\ 50 \mathrm{~mm} \\ \hline \end{gathered}$ |  |
| *170 | v: Margin Ers. ** $\square$ - : Margin Ers. ${ }^{* *} 5 \square$ | Adjust the margin erase area. <br> $\vee$ : Others <br> - : 2" x 2" | $\begin{aligned} & (50 \text { to } 307) \times(50 \\ & \text { to } 432) \mathrm{mm} \end{aligned}$ | $\begin{gathered} \bullet: 92 x \\ 144 \mathrm{~mm} \\ \bullet: 50 \mathrm{x} \\ 50 \mathrm{~mm} \end{gathered}$ |  |

1) SP Mode No. 38 - ADF Scan Line Position

The printing position will move as shown below.
$\leftarrow$ Direction


Original Position
+X : Moves X mm to the left


Printing Position
-X: Moves X mm to the right

2) SP Mode No. 39 - Image Center Position

The printing position will move as shown below.

+X: Moves X mm


Printing Position
-X: Moves down X mm


Note: When adjusting the scanner image position input " 0 " first:
Example) $\quad X=0.9 \mathrm{~mm} \rightarrow$ " 0 ", " 9 ", and then press the \# key.
3) SP Mode No. 86 - A3 Drum 2 Count Up

The counter will increment by 2 if an A3 drum is installed, regardless of the size of paper.
The default setting is changed with DIP switch 102-5. See Sub-section 2.3.1. of section 4.

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4) SP Mode No. 87 - Memory Print

Normally, in platen mode (with no originals in the ADF), the machine will stop when the 1st print job is finished even if the tape marker is installed, so that the next original can be placed. The next printing job will start when the Print Start key is pressed.
If "1" is selected in this mode, after the 1st print job is finished, the tape marker will feed a strip of tape and the next print job will start immediately afterwards.

## 5) SP Mode No. 88 - Auto Memory/ Class

In Memory/Class mode, the machine will normally stop when the first print job is finished if the tape marker is not installed.
If " 1 " is selected in this mode, the machine will stop for a while (this interval is the same as when the tape marker is operating). Then it will continue with the next print (or master making) job.
6) SP Mode 92 - Thermal Paper Mode

You can use this mode to test the thermal head.
Install the master roll and change this SP Mode to 1. Place an original on the exposure glass and press the Master Making key. The machine will start printing (plotting) the thermal paper without performing the master clamp process.

You can also enable SP Mode 90 and press the Master Making key to test the thermal head without placing an original on the exposure glass.
7) SP Mode 93 - Erase Area Check

This will check the erased area for shadow erase (Center and Edge Margin Erasing). If you make a master and print an image with this mode, the machine will make a background pattern on the area to be erased.
8) SP Mode No. 95 - Scanner Free Run

- It is possible to change the first scanner speed by changing the magnification ratio:

25 to $200 \%$ (Maximum speed = $25 \%$ )

- To start the scanner free run, press the Print Start key after selecting "Lamp On/Off" using the \# key. Input a magnification ratio if you wish to change the first scanner speed, before you press the Start key. (Factory setting = $25 \%$ )
- To stop the scanner free run, press the Stop key. The scanner will return to the home position, and then stop.
- The machine will not exit the SP mode until the scanner is returned to home position correctly.

9) SP Mode No. 96 - ADF Original Feed Check

- It is possible to change the original feed speed by changing the magnification ratio:

25 to $\mathbf{2 0 0} \%$ (Maximum speed = $\mathbf{2 5 \%}$ )

- To start original feed, press the Print Start key after placing originals in the ADF.
Input a magnification ratio if you wish to change the original feed speed, before you press the Start key. The ADF will start feeding until all of the inserted originals are fed.
- To stop feeding, press the Stop key. The original will stop feeding at this moment.
- If the original feed fails, or if the Stop key is pressed, the "A + Jam" indicator will turn on.
If the jammed originals are removed from the ADF, the jam indicator will turn off and the failure is reset.
- The machine will not exit SP mode during feeding.

10) SP Mode No. 118 - Print Size Count

- The print size counter indicates the following paper sizes:

A4 version

- A3
- B4
- A4 Landscape
- A4 Portrait
- B5 Landscape
- B5 Portrait
-     * (Others)

LT version

- DLT
- LG
- LT Landscape
- LT Portrait
- HLT
-     * (Others)


### 3.3 THERMAL HEAD TEST

This function is used to determine which printer component is causing an image problem on the master.

In this mode, the background pattern that is printed will cover the entire sheet of paper.

## Procedure

1. Place paper on the paper table.

NOTE: To reduce thermal head load, use the smallest paper size possible, i.e. the smallest paper width on which the part with the image problem can be printed.
2. Access SP mode.
3. Input No. 90 and press the Enter key.

NOTE: The factory setting is pattern No. 7. If necessary, input another background pattern using the Number keys.
4. Press the Master Making key (an original is not necessary).
5. Make some prints and check the image.

## Assessment

If the printout is normal, a Part A component is defective.
If the printout is abnormal, a Part B component is defective.


- This mode can be used in combination with SP mode No. 92, Thermal Paper Mode.


### 3.4 COMMAND SHEET CHECK

Normally, Fn 9 or Fn 19 cannot be input in the Make-up mode.
By changing the data of SP mode \#91 from "0" to "1", Fn 9 or Fn 19 can be input.

| Command No. | Display | Function |
| :---: | :---: | :--- |
| Fn 9 | OVERLAY | Prints both the original image and <br> designated area of the command <br> sheet on the paper. |
| Fn 19 | OVERLAY | Shet |

This function is used to check the position of the designated area on the command sheet. It is checked in relation to the original image to ensure that the command sheet is being read correctly.

Procedure

1. Access SP mode.
2. Input 91 and press the Enter key.
3. Input 1 with the number keys and press the Enter key.
4. Press the Clear Modes key to leave SP mode.
5. Place the command sheet and the original on the ADF.
6. Press the Make-up key and input Fn 9 or Fn 19 (the commands have the same function).
7. Input 1 for the undesignated area.
8. Press the Master Making key and then check the print to make sure that the area designated by the command sheet is in the correct position on the original image.

NOTE: 1. Only one command sheet can be stored in memory. If two or more command sheets are read, only the last command sheet is outputted.
2. Ensure to return the SP mode to its original setting after checking the designated area position.

### 3.5 INPUT/OUTPUT CHECK MODE

This program checks the electrical components. The procedure for accessing the program is as follows:

### 3.5.1 Input Check Mode Access Procedure

1. Access SP mode. (See the SP mode access procedure.)
2. Enter 130 (SP mode number) using the number keys.
3. Press the Enter key.
4. Enter the desired input number. (See the input check table.)

NOTE: The input number can be shifted up or down by pressing the Zoom keys (+ or -).
5. Press the Enter key.

NOTE: In the input check mode, all image position LEDs and printing speed LEDs will turn on when a sensor or switch that is being tested is actuated. A beep will also be heard.
6. Press the Enter key to return the display to the initial input check menu.
7. Press the Clear Modes key to leave SP mode.

### 3.5.2 Output Check Mode Access Procedure

1. Access SP mode. (See the SP mode access procedure.)
2. Enter 131 (SP mode number) using the number keys.
3. Press the Enter key.
4. Enter the desired output number. (See the output check table.)

NOTE: The output number can be shifted up or down by pressing the Zoom key ("+" or "-").
5. Press the Enter key.
6. Press the Print Start key to turn on the component.
7. Press the Enter key to return the display to the initial output check menu.
8. Press the Clear Modes key to leave the SP mode.

### 3.5.3 Input Check Table

| Code | LCD Display | Component Checked |
| :---: | :---: | :---: |
| 1. | SN: ADF Cover ${ }_{\text {In- }} 1$ | ADF Cover Sensor |
| 2. | $\begin{array}{\|l\|l} \begin{array}{l} \text { SN: 1st Original } \\ \text { (ADF) } \end{array} \\ \hline \end{array}$ | Original Set Sensor |
| 3. | $\begin{aligned} & \text { SN: 2nd Original } \\ & \text { (ADF) } \quad \text { In- } 3 \end{aligned}$ | Original Registration Sensor |
| 4. | $\begin{aligned} & \text { SN: 3rd Original } \\ & \text { (ADF) } \quad \text { In- } 4 \end{aligned}$ | Scan Line Sensor |
| 5. | SN: Original Size 0 (ADF) $\begin{aligned} & \text { In- } 5\end{aligned}$ | Original Width Sensor - 0 |
| 6. | SN: Original Size 1 (ADF) $\quad$ In- 6 | Original Width Sensor - 1 |
| 7. | $\begin{aligned} & \text { SN: Original Size } 2 \\ & \text { (ADF) } \\ & \text { In- } \end{aligned}$ | Original Width Sensor - 2 |
| 8. | SN: Original Size 3 <br> (ADF) In- 8 | Original Width Sensor - 3 |
| 13. |  | Paper Width Sensor - 0 |
| 14. | $\text { SN: Paper Size } \begin{aligned} & 1 \\ & \\ & \\ & \\ & I n-14 \\ & \hline \end{aligned}$ | Paper Width Sensor - 1 |
| 15. | SN: Paper Size ${ }_{\text {In-15 }}^{2}$ | Paper Width Sensor - 2 |
| 16. | SN: Paper Size ${ }_{\text {In-16 }}$ | Paper Width Sensor - 3 |
| 17. | SN: Paper Size 4 | Paper Length Sensor |
| 18. | SN: Paper End ${ }_{\text {In-18 }}$ | Paper End Sensor |
| 19. | SW: Paper Table Open | Paper Table Open Switch |
| 20. | SN: Paper Table Low <br> Limit In-20 | Paper Table Lower Limit Sensor |
| 21. | SN: Paper Table <br> Height In-21 | Paper Table Height Sensor |
| 22. | KEY: Lower Paper Feed Table $1 \mathrm{In}-22$ | Paper Table Down key (Button) |
| 23. | SW: Right Cutter In-23 | Right Cutter Switch |
| 24. | SW: Left Cutter In-24 | Left Cutter Switch |
| 25. | SN: Master Buckle $\ln -25$ | Master Buckle Sensor |
| 26. | SN: Master End ${ }_{\text {In-26 }}$ | Master End Sensor |
| 27. | SIG: Ink In-27 | When the Ink Detecting Pin detects ink |
| 28. | SIG: Color Drum In-28 | When a color drum is installed |
| 29. | SIG: Drum Size $\underset{\text { In-29 }}{0}$ | When an A3/DLT or A4/LG drum is installed |
| 30. | SIG: Drum Size$1 \mathrm{In}-30$ <br>  | When an A4/LT drum is installed |
| 31. | SN: Pressure Plate High Position In-31 | Upper Pressure Plate Sensor |

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| Code | LCD Display | Component Checked |
| :---: | :---: | :---: |
| 32. | SN: Pressure Plate Low Position In-32 | Lower Pressure Plate Sensor |
| 33. | SW: Master Eject Box | Master Eject Box Switch |
| 34. | SN: Full Master In-34 | Full Master Box Sensor |
| 35. | SN: Printing Pressure | Printing Pressure Sensor |
| 36. | SN: 1st Drum Position In-36 | First Drum Position Sensor |
| 37. | SN: 2nd Drum Position In-37 | Second Drum Position Sensor |
| 38. | SW: Manual Master Cut In-38 | Master Cut Switch |
| 39. | SIG: Key Counter In-39 | When a key counter is installed |
| 41. | SN: 1st Paper Exit In-41 | First Paper Exit Sensor |
| 42. | SN: 2nd Paper Exit In-42 | Second Paper Exit Sensor |
| 43. | SN: Master Eject In-43 | Master Eject Sensor |
| 44. | SN: Drum Master In-44 | Drum Master Sensor |
| 45 | SN: Scanner Home Position In-45 | Scanner Home Position Sensor |
| 46 | SN: Platen Angle (Scanner) In-46 | Platen Cover Position Sensor |
| 47 | SN: Platen Set (Scanner) $\quad$ In-47 | ADF Set Sensor |
| 48 | SN: Platen Original (Scanner) In-48 | Original Sensor |
| 49 | SN: 4th Original (ADF) $\quad$ In-49 | Original Exit Sensor |
| 50 | SW: Delivery Table Open In-50 | Delivery Table Open Switch |
| 60 | SN: Feed Unit Low (1st Sorter) In-60 | 1st Transport Non-Sort Mode Position Sensor (Sorter) |
| 61 | $\begin{array}{ll}\text { SN: Feed Unit High } \\ \text { (1st Sorter) } & \text { In-60 }\end{array}$ | 1st Transport Sort Mode Position Sensor (Sorter) |
| 62 | SN: Feed Unit Cover (1st Sorter) In-62 | 1st Transport Cover Open Switch (Sorter) |
| 63 | SN: Safety Switch (1st Sorter) In-63 | Staple Cover Open Switch (1st Sorter) |
| 64 | SN: Staple Cover (1st Sorter) In-64 | Staple Cover Open Switch (1st Sorter) |
| 65 | SN: Paper Edge (1st Sorter) In-65 | Trailing Edge Sensor (Sorter) |
| 66 | SN: Sort Paper <br> (1st Sorter) In-66 | 1st Transport Sensor (Sorter) |
| 67 | SN:Stapler Position (1st Sorter) In-67 | Staple Position Switch (1st Sorter) |
| 68 | SN: Stapler Unit Move (1st Sorter) In-68 | Staple Unit Movement Switch (1st Sorter) |
| 69 | SN: Stapler H.P. (1st Sorter) In-69 | Staple Home Position Sensor (1st Sorter) |

Shaded area - Sorter not available in the USA

| Code | LCD Display | Component Checked |
| :---: | :---: | :---: |
| 70 | $\begin{aligned} & \text { SN;Staple End } \\ & \text { (1st Sorter) } \quad \text { In-70 } \end{aligned}$ | Staple End Sensor (1st Sorter) |
| 71 | $\begin{array}{ll}\text { SN: Jogger Bar H.P. } \\ \text { (1st Sorter) } & \text { In-71 }\end{array}$ | Jogger Bar Home Position Sensor (1st Sorter) |
| 72 | $\begin{array}{l}\text { SN: Lead Cam H.P. } \\ \text { (1st Sorter) } \\ \text { In-72 }\end{array}$ | Helical Wheel Position Sensor (1st Sorter) |
| 73 | SN: Bin Home Position (1st Sorter) In-73 | Bin Unit Home Position Sensor (1st Sorter) |
| 74 | $\begin{array}{lll}\text { SN: Bin Paper } \\ \text { (1st Sorter) } & \text { In-74 }\end{array}$ | Bin/Jam Sensor (1st Sorter) |
| 75 | $\begin{array}{ll} \begin{array}{l} \text { KEY: Stapler } \\ \text { (1st Sorter) } \end{array} & \\ \hline \end{array}$ | Manual Staple Key (1st Sorter) |
| 76 | $\begin{array}{ll} \hline \text { SN: Staple Paper } \\ \text { (1st Sorter) } & \text { In-76 } \\ \hline \end{array}$ | Paper Sensor-Stapler (1st Sorter) |
| 77 | $\begin{array}{ll}\text { SN: Bin Shift MT CLK } \\ \text { (1st Sorter) } & \text { In-77 }\end{array}$ | Bin Shift Motor Rotation Sensor (1st Sorter) |
| 78 | $\begin{array}{\|lr} \hline \text { SN: Feed Motor CLK1 } \\ \text { (1st Sorter) } & \text { In-78 } \end{array}$ | 1st Transport Motor Rotation Sensor (1st Sorter) |
| 79 | $\begin{array}{ll}\text { SN: Feed Motor CLK2 } \\ \text { (1st Sorter) } & \text { In-79 }\end{array}$ | 2nd Transport Motor Rotation Sensor (Sorter) |
| 80 | SN: Staple Cover (2nd Sorter) In-80 | Staple Cover Open Switch (2nd Sorter) |
| 81 | SN: Paper Edge (2nd Sorter) In-81 | Trailing Edge Sensor (2nd Sorter) |
| 82 | $\begin{aligned} & \text { SN: Sort Paper } \\ & \text { (2nd Sorter) } \quad \text { In-82 } \end{aligned}$ | 2nd Transport Sensor (Sorter) |
| 83 | SN: Stapler Position (2nd Sorter) In-83 | Staple Position Switch (2nd Sorter) |
| 84 | SN: Stapler Unit Move (2nd Sorter) IN-84 | Staple Home Position Sensor (2nd Sorter) |
| 85 | $\begin{aligned} & \text { SN: Stapler H.P. } \\ & \text { (2nd Sorter) } \quad \text { iN-85 } \end{aligned}$ | Staple End Sensor (2nd Sorter) |
| 86 | SN: Staple End (2nd Sorter) In-86 | Staple End Sensor (2nd Sorter) |
| 87 | SN: Jogger Bar H.P. (2nd Sorter) In-87 | Jogger Bar Home Position Sensor (2nd Sorter) |
| 88 | SN: Lead Cam H.P. (2nd Sorter) In-88 | Helical Wheel Home Position Sensor (2nd Sorter) |
| 89 | SN: Bin Home Position (2nd sorter) In-89 | Bin Unit Home Position Sensor (2nd Sorter) |
| 90 | SN: Bin Paper (2nd Sorter) In-90 | Bin/Jam Sensor (2nd Sorter) |
| 91 | KEY: Stapler <br> (2nd Sorter) In-91 | Manual Staple Key (2nd Sorter) |
| 92 | SN: Stapler Paper (2nd Sorter) In-92 | Paper Sensor-Stapler (2nd Sorter) |
| 93 | SN: Bin Shift MT .LK (2nd Sorter) In-93 | Bin Shift Motor Rotation Sensor (2nd Sorter) |
| 100 | SN: Cassette Paper | Cassette Paper End Sensor (LCT) |
| 101 | SN: Paper End LCT | Tray Paper End Sensor (LCT) |
| 102 | SN: Paper Position | Tray Paper Position Sensor (LCT) |
| 103 | SIG: LCT | CN110 Connection (Should be ON when connected) |
| 104 | SN: Low Limit | Tray Lower Limit Sensor (LCT) |
| 105 | SN: Paper MAX. Limit | Maximum Paper Load Sensor (LCT) |
| 106 | KEY: Lower LCT | Tray Down Switch (LCT) |


| Code | LCD Display | Component Checked |
| :---: | :--- | :--- |
| 107 | SN: Paper Size 0 | Paper Size Sensor 0 (LCT) |
| 108 | SN: Paper Size 1 | Paper Size Sensor 1 (LCT) |
| 109 | SN: Paper Size 2 | Paper Size Sensor 2 (LCT) |
| 110 | SN: Paper Size 3 | Paper Size Sensor 3 (LCT) |
| 111 | SN: Paper Size 4 | Paper Length Sensor 4 (LCT) |
| 112 | SN: LCT Cover | Cover Open Switch (LCT) |
| 113 | SIG: Cassette | Cassette Switch (LCT) |

### 3.5.4 Output Check Table

| Code | LCD Display | Description |
| :---: | :---: | :---: |
| 2 | MOTOR: ADF Drive Out- 2 | Turns on the ADF drive motor. |
| 3 | MOTOR: Master Eject Out- 3 | Turns on the master eject motor. |
| 4 | MOTOR: Pressure Plate Up/Down Out- 4 | Turns on the pressure plate up/down motor. |
| 5 | MC: Master Reverse Roller Out- 5 | Turns on the master reverse roller magnetic clutch. |
| 6 | MOTOR: Vacuum Out- 6 | Turns on the vacuum fan motor. |
| 7 | MOTOR: Air Knife Out- 7 | Turns on the air knife motor. |
| 8 | SIG: Key Counter Out- 8 | Increments the key counter. |
| 9 | COUNTER: Master $\begin{gathered}\text { Out- } 9\end{gathered}$ | Increments the master counter. |
| 10 | COUNTER: $\begin{gathered}\text { Paper } \\ \text { Out-10 }\end{gathered}$ | Increments the total counter. |
| 12 | SOL: Ink Supply $\begin{gathered}\text { Out-12 }\end{gathered}$ | Turns on the ink supply solenoid. |
| 13 | SOL: Drum Lock Out-13 | Turns on the drum lock solenoid. |
| 14 | SOL: Paper Feed/Print Pressure Out-14 | Turns on the paper feed solenoid and the printing pressure solenoid. |
| 15 | SOL: Master Feed <br> Clamper Out-15 | Turns on the master feed clamper solenoid. |
| 16 | SOL: Master Eject Clamper Out-16 | Turns on the master eject clamper solenoid. |
| 17 | SOL: Master Eject Out-17 | Turns on the master eject solenoid. |
| 18 | RELAY: Paper Table Down Out-18 | Turns on the paper table drive motor (down). |
| 19 | RELAY: Paper Table Up $\left.\begin{array}{l}\text { Out-19 }\end{array}\right)$ | Turns on the paper table drive motor (up). |
| 20 | RELAY: Main Motor | Turns the drum in the direction opposite to the printing direction. |
| 21 | SIG: Lamp (xenon lamps) Out-21 | Turns on the exposure lamps when the Print key is pressed. Turns off the lamps when the Print key is pressed again. |
| 22 | MOTOR: Cutter <br> + Direction Out-22 | Turns on the cutter motor (moves it to the front of the machine). |
| 23 | MOTOR: Cutter <br> - Direction Out-23 | Turns on the cutter motor (moves it to the rear of the machine). |
| 24 | MOTOR: Image Shift <br> + Direction Out-24 | Turns the image position motor in the "-" direction. |
| 25 | MOTOR: Image Shift <br> - Direction Out-25 | Turns the image position motor in the "+" direction. |
| 26 | MOTOR: Main (10 rpm) Out-26 | Turns on the main motor (10 rpm). |
| 27 | MOTOR: Main (30 rpm) | Turns on the main motor (30 rpm). |
| 28 | MOTOR: Main (1st Speed) Out-28 | Turns on the main motor (1st speed). |

SERVICE PROGRAM MODE

| Code | LCD Display | Description |
| :---: | :---: | :---: |
| 29 | MOTOR: Main (2nd Speed) Out-29 | Turns on the main motor (2nd speed). |
| 30 | MOTOR: Main <br> (3rd Speed) Out-30 | Turns on the main motor (3rd speed). |
| 31 | MOTOR: Main <br> (4th Speed) Out-31 | Turns on the main motor (4th speed). |
| 32 | MOTOR: Main <br> (5th Speed) Out-32 | Turns on the main motor (5th speed). |
| 33 | MOTOR: Original Feed Out-33 | Turns on the original transport motor. |
| 34 | MOTOR: Master Feed Out-34 | Turns on the master feed motor. |
| 36 | Turn on drum, feed/ pressure SOLs Out-36 | Turns on the main motor (10 rpm), the paper feed solenoid, and the printing pressure solenoid. |
| 37 | MOTOR: Scanner | Turns on the scanner motor. <br> Start by pressing the Print Start key. Stop by pressing the Print Start key again. The scanner (carriage) will return to home position when the Print Start key is pressed the second time. |
| 38 | SOL: Sheet Insert Out-38 | Turns on the master press sheet solenoid. |
| 39 | SOL: Sheet Pressure Out-39 | Turns on the detection arm release solenoid. |
| 40 | MOTOR: Master Buckle Fan Out-40 | Turns on the master buckle fan motor. |
| 41 | SIG: VHD on Out-41 | Applies thermal head voltage. |
| 50 | EMF Sorter Mode 1 Out-50 | Available only when the EMF Sorter is installed. |
| 51 | EMF Sorter Mode 2 Out-51 | Available only when the EMF Sorter is installed. |
| 52 | EMF Sorter Mode 3 Out-53 | Available only when the EMF Sorter is installed. |
| 53 | EMF Sorter Mode 4 Out-53 | Available only when the EMF Sorter is installed. |
| 60 | MODE: Feed Unit U/D <br> (1st Sorter) Out-60 | Turns on the paper delivery table motor. |
| 61 | MOTOR: Paper Feed <br> (1st Sorter) Out-61 | Turns on the 1st transport motor. |
| 62 | MOTOR: Paper Feed (2nd Sorter) Out-62 | Turns on the 2nd transport motor. |
| 63 | MODE: Bin Shift <br> (1st Sorter) Out-63 | Turns on the bin shift motor (1st Sorter) |
| 64 | MODE: Jogger <br> (1st Sorter) Out-64 | Turns on the jogger bar motor. (1st Sorter) |
| 65 | MODE: Staple <br> (1st Sorter) Out-65 | Turns on the staple motor. (1st Sorter) |
| 66 | MODE: Bin Home <br> (1st Sort) Out-66 | Moves the bins to the home position. (1st Sorter) |
| 67 | MODE: Bin Shift <br> (2nd Sorter) Out-67 | Turns on the bin shift motor. (2nd Sorter) |
| 68 | MODE: Jogger <br> (2nd Sorter) Out-68 | Turns on the jogger bar motor. (2nd Sorter) |
| 69 | MODE: Staple (2nd Sorter) Out-69 | Turns on the staple motor (2nd Sorter) |

Shaded area - Sorter not available in the USA

SERVICE PROGRAM MODE

| Code | LCD Display | Description |
| :---: | :--- | :--- |
| 70 | MODE: Bin Home <br> (2nd Sorter) Out-70 | Moves the bins to the home position. (2nd Sorter) |
| 71 | MODE: Free Running <br> (Sorter) Out-71 | The machine simulates sort separation. |
| 100 | MOTOR: Table Down <br> (LCT) Out-100 | The LCT tray drive motor moves the tray down. |
| 101 | Motor:Table Up <br> (LCT) Out-101 | The LCT tray drive motor moves the tray up. |
| 102 | MOTOR: Cassette <br> Down $\quad$ Out-102 | The LCT cassette bottom plate drive motor moves the <br> plate down. |
| 103 | MOTOR: Cassette Up <br> (LCT) Out-103 |  |$\quad$| The LCT cassette bottom plate drive motor moves the |
| :--- |
| plate up. |

Shaded area - Sorter not available in the USA

### 3.6 USER CODE MODE

### 3.6.1 User Codes

With the user code function, operators must input an authorized code before the machine will operate. The machine will keep track of the number of prints made under each code.

There are 20 user codes as follows:

| No. | User Code No. |
| ---: | :---: |
| 1 | 382 |
| 2 | 191 |
| 3 | 182 |
| 4 | 173 |
| 5 | 164 |
| 6 | 155 |
| 7 | 146 |
| 8 | 137 |
| 9 | 128 |
| 10 | 119 |
| 11 | 482 |
| 12 | 291 |
| 13 | 282 |
| 14 | 273 |
| 15 | 264 |
| 16 | 255 |
| 17 | 246 |
| 18 | 237 |
| 19 | 228 |
| 20 | 219 |

### 3.6.2 How To Use a User Code

1. Enter the user code (3 digits) with using the number keys.
2. Press the Enter key.
3. Press the Master Making key to start printing.

NOTE: The user code mode is reset if the Clear Modes key and the Stop key are pressed together.

## 4. DRUM INTERCHANGEABILITY

O: Standard combination
$\Delta$ : Usable under certain conditions

| Color Drum |  |  |  |  |  |  |  | VT3000-L <br> (C533) | $\Delta$ (NOTE 1, 2, 3) | $\Delta$ (NOTE 1, 2, 3) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | VT3000-S <br> (C535) | $\Delta$ (NOTE 1, 2) | $\Delta$ (NOTE 1, 2, 3) |  |  |  |  |  |  |  |
|  | VT3000II-L (C556) | O | O (NOTE 3) |  |  |  |  |  |  |  |
|  | VT3000II-S (C559) | O | O (NOTE 3) |  |  |  |  |  |  |  |

NOTES: 1. The modified clamper and the cloth screen must be installed.
2. For the U.S. version machine, the modified Drum Unit Rail End must be installed (for safety standard reasons).
3. A leading margin longer than the machine specification is required for originals (VT3000-L/S: 10 mm , VT3000II-L/S: 8 mm ).

## REPLACEMENT AND ADJUSTMENT

## 1. EXTERIOR

### 1.1 EXTERIOR COVERS



When adjusting or disassembling each section, refer to the following procedures on how to remove exterior covers.
[A] Right Cover (5 screws)
[B] Right Front Cover: Open the front door, loosen the 2 screws [G], remove the 2 screws [H].
[C] Operation Panel: Open the front door, slide the scanner unit to the left and remove the 4 screws.
[D] Master Eject Cover: Open the master eject unit and remove the 2 screws.
[E] Upper Rear Cover: Remove the 3 screws.
[F] Rear Cover: Remove the 7 screws.
[K] Upper Cover
1: Remove the exposure glass [I] (2 screws).
2: Remove the right upper cover [J] (Front: 1 screw /Rear: 1 stepped screw, 1 washer)
3: Remove the upper cover $[\mathrm{K}]$ ( 5 screws)
[L] Left Upper Cover (Front: 1 screw /Rear: 1 stepped screw, 1 washer).

## 2. SCANNER

### 2.1 SCANNER POSITION ADJUSTMENT



Purpose: To position of the first and second scanners parallel with the scan line position, and to ensure that the scanners stop at the correct home position.

1. Restart the machine with the main switch, so that the scanners move to the home position. Then, enter the scanner home position check mode (Input check mode: SP130-45).
2. Remove two positioning pins $[A]$ that are located in the right side of the scanner.

3. Insert the positioning pins into the front and rear openings [B] of the first scanner. Ensure that the positioning pins can be inserted into the holes smoothly.
4. If the pins do not insert smoothly, adjust the position of the first scanner with the screws [C].
5. Check and adjust the position of the second scanner using the same procedure as in steps 3 and 4.
6. Slide the scanner unit and remove the sensor cover [D] (2 screws).
7. Connect the probes of a multimeter to the sensor's connector.

CN1: +5V
CN2: GND
CN3: Scanner H.P (Signal)
8. Slide the sensor bracket [E] and tighten the bracket when the sensor output goes to low ( 5 V to 0 V ).
9. Check the optics adjustments and adjust if necessary (see Removal and Adjustment: Optics).

### 2.2 EXPOSURE LAMP REPLACEMENT



1. Remove the exposure glass [A] (2 screws [B]).
2. Remove the front and rear xenon lamp terminals [C] (screw each).
3. Remove the plate [D] that holds the cable protection sheet [E].
4. Remove the cable protection sheet.
5. Remove the lens block cover [G] (7 screws).
6. Remove the clamper ( 1 screw) holding the lamp harness. (not shown)
7. Disconnect the lamp cable connectors from the lamp stabilizer. (not shown)
8. Slide the xenon lamp $[F]$ to the rear side and remove.

### 2.3 SCANNER TIMING BELTS



1. Remove the exposure glass (see Exterior Cover Removal).
2. Remove the upper cover (see Exterior Cover Removal).
3. Remove the exit guide [A] (2 screws).
4. Remove the upper rear cover (see Exterior Cover Removal).
5. Remove the grounding wire $[B]$ (1 screw).
6. Remove the spring [C].
7. Remove the scanner motor assembly [D] (2 screws, 1 connector, 1 timing belt).
8. Loosen the screws $[E]$ securing both the 1st scanner $[F]$ and 2nd scanner [G], then remove the scanners.
9. Loosen the screws securing the belt tension brackets [H].
10. Remove the timing belts [I].

NOTE: After replacing the scanners, the scanner position adjustment must be performed (see section 2-1).

## 3. OPTICS

### 3.1 OVERVIEW

Double-check all optical component adjustments, because the adjustments can influence each other.

The following table shows the reciprocal relationship between adjustment procedures. A "O" indicates items that must be checked (check items) after an item in the left column (adjustment item) is adjusted.


Necessary Tools

1) Facsimile Test Chart R-21 (P/N 99992131)
2) Resolution Chart (P/N A0129110)
3) Oscilloscope

| Oscillo-scope | Test Pin |
| :---: | :--- |
| CH 1 | TP603 (SIGNAL) |
| CH 2 | TP604 (OFFSET) |
|  | TP602 (TRIG) |
| GND | TP601 (GND-A) |

CH 2 should be connected to TP604 when the black level is adjusted. For all other adjustments, CH 2 should be connected to TP602.


### 3.2 PREPARATION FOR ADJUSTMENT

1. Remove the upper cover.
2. Remove the lens block cover.
3. Connect CH 1 of the oscilloscope to TP603, and CH2 to TP602 (A/D conversion board). Connect both ground terminals to TP601.
4. Remove the screws [A] then remove the exposure glass. Rotate the exposure glass 90 degrees, and position it across the top of the machine as shown above.
5. Turn the main switch on and access SP mode. Select Output check mode (SP131) No. 21.

## OPTICS

### 3.3 REDUCTION RATIO ADJUSTMENT (MOIRE ADJUSTMENT)




Purpose: To adjust the magnification ratio in the main scan direction (to set the distance between the lens and the original).
Adjustment Standard: There must be 30 crosspoints [A] or fewer.

1. Position the resolution chart so that the area containing the 200 dpi pattern on the test chart can be read.
2. Press the Print Start key to turn on the xenon lamps.
3. At the same time, ensure the waveform looks like the one in the illustration above.
4. If it does not, loosen the mounting screws [B] and adjust the position of the lens block [C] as indicated by the arrows.
5. After the adjustment, retighten the mounting screws [B].

### 3.4 FOCUS ADJUSTMENT (MTF ADJUSTMENT)



Purpose: To adjust the focus distance between the CCD and the lens.

## Adjustment Standard: a-b/a+b x $100 \geq 60 \%$

1. Position the resolution chart so that the 200 dpi area on the test chart can be read.
2. Press the Print Start key to turn on the xenon lamps.
3. Ensure that the waveform looks like the one you see in the illustration above.
4. Loosen the screw $[A]$ and adjust the position of the lens $[B]$ until the length (a-b) reaches its maximum by moving the lens as shown by the arrow.
5. After the adjustment, retighten the screw $[A]$.

### 3.5 READING START POSITION IN THE MAIN SCAN DIRECTION ADJUSTMENT



Purpose: To align the center of the original with the center of the CCD. This will center the image on the master.
Adjustment Standard: The difference between L1 and L2 is less than $6 \mu \mathrm{~s}$.

1. Position the R-21 test chart so that the center line, located at the leading edge of the test chart, is positioned at the center mark [ A ] on the exit guide.
2. Press the Print Start key to turn on the xenon lamps.
3. Ensure that the waveform looks like the one you see in the illustration.
4. If it does not, adjust the CCD position by turning the screws [B] until waveform is as shown in the diagram.

### 3.6 SCAN LINE POSITION ADJUSTMENT



R21 Test Chart



Purpose: To ensure that the CCD alignment is perpendicular to the original feed direction.
Adjustment Standard: See the above illustration.

1. Position the exposure glass so that the edge of the glass is placed across the center of the holes [A] and place the black line of the test chart just at the edge of the glass as shown in the above diagram.
2. Press the Print Start key to turn on the xenon lamps and confirm that the waveform looks like the one in the above illustration.
3. If it does not, adjust the CCD board position by turning the screws [B] until the shape of the wave is similar to that shown in the above diagram.

### 3.7 SHADING PLATE ADJUSTMENT



- The middle of the waveform should be higher than the ends.

Purpose: To correct light intensity distortion properly.
Adjustment Standard: See the above illustration.

1. Position the resolution chart so that the white area can be read.
2. Press the Print Start key to turn on the xenon lamps.
3. Confirm that the above white level waveform is displayed.
4. If it is not, move the shading plate [A] vertically (up or down) until the waveform matches the one in the above diagram.

### 3.8 WHITE LEVEL AND BLACK LEVEL ADJUSTMENT



Purpose: To reproduce the correct original image density.

1. Position the resolution chart so that the white area can be read.
2. Press the Print Start key to turn the xenon lamps on.
3. Adjust VR601 on the A/D conversion board so that the maximum level is $3.4 \pm 0.1 \mathrm{~V}$ (see Fig. 1).
4. Connect CH2 of the oscilloscope to TP604.
5. Check the standard black level at TP604. It should be the same as the optical black level of the CCD output. If it is not, adjust the standard black level by turning VR602 (see Fig. 2).

NOTE: 1. When adjusting the standard black level, the GND level of CH 1 and CH 2 should be the same.
2. If the standard black level is changed, the white level will also change. Readjust the white level after adjusting the black level.

### 3.9 MAIN-SCAN IMAGE POSITION ADJUSTMENT (PLATEN MODE)

Purpose: Adjust the master making start position to match the original center to the print image center.

1. Access the SP mode and select " 0 " in SP39.
2. Enter the desired value for the image position in the main-scan direction using the number keys. It can be changed to any value from -4.9 mm to +4.9 mm in 0.1 mm steps.
3. Press the Enter key to store the setting. Exit the SP mode.
4. Make a new master and check the image position in the main scan direction.

### 3.10 SUB-SCAN IMAGE MAGNIFICATION ADJUSTMENT (PLATEN MODE)

Purpose: Adjust the scanner motor speed to fix the original image length to the print image length.
Adjustment Standard: $100 \pm 0.5 \%$

1. Access the SP mode and select SP No. 30.
2. Change the magnification in the sub-scan direction using the number keys. It can be changed to any value from $-1.9 \%$ to $+1.9 \%$ in $0.1 \%$ steps.
3. Press the Enter key to store the setting. Exit the SP mode.
4. Make a new master and check the image magnification.

## 4. MASTER FEED

### 4.1 THERMAL HEAD VOLTAGE ADJUSTMENT



Purpose: To maintain quality when making masters and to extend the lifetime of the thermal head.

## Adjustment Standard:

Refer to the voltage value ( X ) on the thermal head decal. The adjustment voltage should be between "X-0.1" and "X".
NOTE: This adjustment is always required when the thermal head or power supply unit is replaced.

1. Turn off the main switch and remove the paper exit cover plate (4 screws).
2. Check the voltage on the thermal head decal. (The voltage is different for each thermal head.)
3. Turn on the main switch.
4. Access the SP mode and select output check mode (SP131) No. 41.
5. Press the Print Start key to apply thermal head voltage continuously (do not apply the voltage for more than 60 seconds).
6. Check the voltage between CN503-15 and CN503-12. If the voltage is out of standard, turn VR1 on the power supply board to adjust the voltage.

### 4.2 BELT TENSION ADJUSTMENT



Purpose: To ensure that proper rotation for the master feed is transmitted to each roller.

Adjustment Standard: 1.2 to 1.8 mm

1. Lower the paper table [A].
2. Remove the master making unit cover (5 screws).
3. Remove the master making unit [B] (2 screws [C] and 4 connectors [D]).
4. Using a tension gauge, apply a 110-gram load to the center of the belt [E]. Ensure that the belt deflects 1.2 to 1.8 mm .
5. If not, adjust the master feed motor position (2 screws [F]).

### 4.3 RIGHT AND LEFT CUTTER SWITCHES ADJUSTMENT



Purpose: To ensure that the cutter slider stops properly.
Adjustment Standard: Confirm that the cutter holder activates the switches.

1. Remove the cutter unit. (See Cutter Unit Removal.)
2. After moving the cutter holder [A] fully to the left, ensure that the left cutter switch $[B]$ is turned on. Ensure that the right cutter switch $[C]$ is also turned on when the cutter is moved fully to the right.
3. If not, loosen the mounting screws [D] and adjust the switch position.

### 4.4 THERMAL HEAD ALIGNMENT ADJUSTMENT



(a)


Purpose: To ensure that the original image is correctly reproduced without skew.

1. Remove the master box, thermal head cover [A] (2 screws), platen roller gear cover (1 screw), platen roller [B], and the thermal head [C] (2 screws).
2. Loosen the Allen screws securing the front and rear thermal head positioning pins [D].
3. Turn the front or rear thermal head positioning pin. Then turn the other position pin in the opposite direction in the same amount.
NOTE: If the front and rear thermal head pins are turned through one unit on the scale printed above the pin, the image skew amount (a) is corrected by 0.3 mm .
4. Tighten the Allen screws and reassemble the machine.
5. Make a new master and check if the image skew is corrected.

### 4.5 CUTTER UNIT REMOVAL



NOTE: Be careful not to damage the thermal head.

1. Lower the paper table.
2. Remove the master making unit. (See Belt Tension Adjustment.)
3. Remove the master box [A] (4 screws).
4. Remove the left bracket ( 1 screw).
5. Remove the cutter unit [D] (2 screws).
6. Remove the holder plate [E] (1 screw) and remove the cutter blade [F].

Do not touch the edge of the cutter blade with bare hands.

### 4.6 THERMAL HEAD REMOVAL



1. Slide the scanner unit to the left.
2. Remove the master box [A] (4 screws).
3. Remove the platen roller and remove the master roll.
4. Remove the thermal head cover [B] (2 screws).
5. Disconnect the two thermal head connectors [C].
6. Remove the thermal head [D] (2 screws).

NOTE: 1. When replacing the thermal head, ensure the thermal head guide plate $[\mathrm{E}]$ is positioned above the lower cutter unit guide plate [F].
2. Ensure that neither of the connectors are loose before reassembling the machine.

### 4.7 THERMAL HEAD DRIVE PCB REMOVAL



1. Remove the master making unit.
2. Open the bottom plate $[A]$ of the master making unit (2 screws).
3. Disconnect the 5 connectors (a to e).
4. Remove the thermal head drive PCB [B] (6 locking supports).

## 5. MASTER EJECT

### 5.1 MASTER EJECT SENSOR ADJUSTMENT



Purpose: To ensure that the sensor $[A]$ detects the ejected master.
Adjustment Standard: 0.8 to 0.9 V when no master is detected.

1. Make a master that has a solid black area as follows. The solid black area should be about A7 size ( $74 \times 105 \mathrm{~mm} / 3^{\prime \prime} \times 4$ "). Using a solid black test master ensures that the sensor is tested under the worst case condition.
a. Put the original with the solid black area on the original table.
b. Make some prints.
c. Stop printing when the image density of the solid black area on the print stabilizes.
d. Take out the drum unit and master eject box, and remove the master from the drum.
NOTE: To prevent the thermal head from overheating, do not use a large solid black original.
2. Reinstall the drum unit and the master eject box.
3. Access SP mode and select SP No.137. Then press the Print Start key. The master eject sensor voltage is displayed.
NOTE: The voltage can also be checked using TP104 (master eject sensor output) and TP107 (GND).
4. Confirm that the voltage is 0.8 to 0.9 V when the master is not under the master eject sensor.
5. If it is not, adjust it by turning VR104 on the main PCB.
6. After adjusting, insert the master [A] between the upper and the lower eject rollers with the master film side up and position the solid black area $[B]$ under the sensor [C]. Then confirm that LED104 turns on.
If the sensor does not respond, the sensor or the main PCB is defective, or the two components may be disconnected.

### 5.2 MASTER EJECT SOLENOID POSITION ADJUSTMENT



Purpose: To ensure that the master is ejected.

1. Open the master eject unit and remove its upper cover (4 screws).
2. Ensure that the lower rollers [B] touch the drum surface when the solenoid $[A]$ is on, and that they do not touch when the solenoid is off. To energize the solenoid, use output check mode (SP131) No.17.
3. If the rollers are not adjusted correctly, loosen the screws [C] and adjust the mounting position of the master eject solenoid [A].
4. After adjusting, retighten the screws [C].

NOTE: To check if the lower roller touches the drum surface, wrap the drum with blank paper. Then check the paper for roller marks.

### 5.3 AIR KNIFE MOTOR SAFETY SWITCH ADJUSTMENT



Purpose: To ensure that the safety switch turns on and stops the air knife motor when the master eject unit is opened.
Adjustment Standard: 0.1 to 0.7 mm

1. Open the front door, then remove the right front cover and inner cover.
2. Confirm that the safety switch [A] turns off when you open the master eject unit.
3. Confirm that the distance between the safety switch and the actuator is $0.1 \sim 0.7 \mathrm{~mm}$ when the master eject unit is closed.
4. If it is not, loosen the screw $[B]$ and adjust the position of the switch $[A]$.
5. After adjusting, tighten the screw $[B]$ and check the function of the safety switch again.

### 5.4 MASTER EJECT UNIT REMOVAL



1. Remove the rear cover (7 screws).
2. Remove the master eject unit cover [A] (2 screws).
3. Disconnect the 4 connectors [B].
4. Remove the guide shaft stopper [C] (1 Allen screw).
5. While supporting the master eject unit, slide out the guide shaft [D]. NOTE: Be careful not to drop the master eject unit.

### 5.5 MASTER EJECT SENSOR REMOVAL



1. Remove the master eject unit.
2. Remove the upper master eject unit cover.
3. Remove the 2 screws $[A]$.
4. Disconnect the connector [C] and remove the master eject sensor [B].

### 5.6 MASTER EJECT BELTS/ROLLERS REMOVAL


[J]


1. Remove the master eject unit.

2. Remove the unit cover [A] (6 screws).
3. Remove the 2 E -rings $[\mathrm{B}]$ and remove the upper pulley shaft [C].
4. Remove the 2 E-rings [D], take out the shaft [E], and remove the roller unit from the master eject unit.
5. Remove the 4 E -rings [F] and 3 gears [G].
6. Remove the supporter [H].
7. Remove the 8 belts [I].
8. Remove the rubber rollers [J].

## 6. PAPER FEED

### 6.1 PAPER TABLE OPEN SWITCH ADJUSTMENT



Purpose: To ensure that the paper table open switch turns on to prevent the paper table from going upward when the paper table is closed.

Adjustment Standard: 0.3 to 0.8 mm

1. Ensure that the switch $[A]$ turns off when the paper table is opened and that it turns on when the paper table is closed.
2. If this is not the case, loosen the screw $[\mathrm{B}]$ and adjust the switch bracket position.
3. After adjustment, repeat step 1.


Purpose: To ensure smooth paper feed.
$\Rightarrow$ Adjustment Standard: $54 \pm 0.5 \mathrm{~mm}$

1. Set the paper feed pressure adjusting lever $[A]$ to the upper position.
2. Remove the right cover of the machine ( 5 screws).
3. Turn on the main switch and access the service program mode.
4. Select output check mode (SP131) No. 19, and press the Print Start key to raise the table.
5. After the paper table stops, ensure that the distance between Paper Table and the top of the Feed Roller Holder is $54 \pm 0.5 \mathrm{~mm}$.
6. If it is not, loosen the screw [C] and adjust the position of the actuator [D].
7. After adjusting, repeat step 5 by lowering the paper table (use output No. 18) and raising the paper table (use output No. 19) several times, checking the height each time.
NOTE: When mounting the actuator, ensure that the actuator [D] does not touch the paper table height sensor [E].

### 6.3 PAPER FEED ROLLER PRESSURE ADJUSTMENT



Purpose: To ensure that the paper feed roller exerts sufficient pressure for a smooth paper feed (for a printing paper weight range of 50 $\mathrm{g} / \mathrm{m}^{2}$ to $215 \mathrm{~g} / \mathrm{m}^{2}$ ).
NOTE: 1. If paper isn't feeding properly or not at all, perform procedure 1. If procedure 1 fails to correctly adjust the feed roller pressure, perform procedure 2 (next page).
2. After replacing the paper feed pressure spring [C], perform procedure 2 to adjust the roller pressure.

## — Procedure 1 -

1. Loosen the screw $[A]$ securing the lower adjustment plate $[B]$.

NOTE: When loosening the screw [A], hold the lower adjustment plate $[B]$ in the original position for a fine adjustment.
2. Adjust the paper feed roller pressure by moving the lower adjustment plate $[B]$ up or down.

Up to increase the pressure
Down to reduce the pressure


## — Procedure 2 -

This procedure should only be used when the proper pressure cannot be achieved with procedure 1.

1. Remove the master making unit.
2. Move the lever for adjusting the paper feed roller pressure to the upper position.
3. Remove the right front cover, main PCB, and image processing PCB.
4. Manually rotate the paper table drive gear to raise the paper table to the paper feed position. (The paper table height sensor is interrupted.)
5. Align the lower adjustment plate notch with the center notch of the link $[C]$ and tighten the screw $[B]$.
6. Hook a tension gauge (500-gram range) to the paper feed roller shaft [E]. Insert a strip of paper [D] between the paper feed roller and the sheets of paper. Then hook a tension gauge (100-gram range) to the paper strip and apply a 100-gram load. Now gradually pull up the tension gauge hooked to the shaft and ensure that the paper strip can be pulled out when the tension gauge shows $250 \pm 5$ grams.
7. If this is not the case, adjust the pressure by moving the mounting position of the shaft [A].

### 6.4 LOWER GUIDE PLATE ADJUSTMENT



Purpose: To ensure smooth paper feed, and to prevent paper jams, folding, and wrinkling.
Adjustment Standard: 0 to 0.1 mm

1. Ensure that the distance between the lower guide plate $[A]$ and lower second feed roller $[B]$ is between 0 and 0.1 mm as shown.
2. If it is not, remove both the front and rear covers and loosen the screw [C] (front and rear, one each). Then, adjust the position of the guide plate [A].
3. After adjustment, retighten the screw [C].

### 6.5 SEPARATION PLATE PRESSURE ADJUSTMENT


[A]: Strong
[B]: Factory Setting
[C]: Weak

Purpose: To adjust the separation plate pressure to suit the type of paper being used by the customer.
Adjustment Standard: See the above illustration.

1. Adjust the separation plate pressure by turning the adjustment screw [D].

NOTE: Position the groove on the screw head vertically $\mathbb{D}$ or horizontally $\qquad$ . Otherwise, vibrations may cause the screw to turn.
2. After adjusting, make some copies to ensure that the paper feeds smoothly without jamming, folding, or wrinkling. Test all the types of paper that the customer uses.

### 6.6 FEED LENGTH OF THE PAPER FEED ROLLER ADJUSTMENT

[B]


Purpose: To ensure paper feed to the second paper feed roller.
Adjustment Standard: 93 to 97 mm

1. Stack about 100 sheets of paper on the paper table.
2. Set the lever for adjusting the paper feed roller pressure to the up position.
3. Remove the rear cover.
4. Turn on the paper feed solenoid $[A]$ manually. Then, turn the rollers counterclockwise by rotating the shaft [B] with a 10 mm spanner.
5. Measure the length of paper fed. Measure from the time the paper feed roller starts rotating until it stops rotating. This feed length should be between 93 and 97 mm .
6. If it is not, adjust the feed length by loosening the hexagon nut [C] mounted on the sector gear. Then shift the bearing [D] up or down.
7. After adjusting, repeat steps 5 and 6.

### 6.7 PAPER FEED SECTOR GEAR STOPPER CLEARANCE ADJUSTMENT



Purpose: To ensure that the paper feed roller starts rotating when the paper feed solenoid is turned on and stops rotating when the paper feed solenoid is turned off.
Adjustment Standard: See the above illustrations.

1. Remove the rear cover.
2. With a 10 mm spanner, gradually turn the shaft [A] counterclockwise.
3. When the sector gear $[B]$ fully turns clockwise, ensure that the clearance between the pin [C] and sector gear stopper [D] is between 0.1 and 0.3 mm .
4. If it is not, loosen the hexagon bolt [E] and adjust the clearance by shifting the sector gear stopper [D].
5. Push the plunger of the paper feed solenoid [F] down by hand. Ensure that the clearance between pin [C] and stopper [D] is between 0.1 and 0.5 mm .
6. If it is not, loosen the screw [G] and adjust it by shifting the bracket for the solenoid [F] up or down.

### 6.8 SECOND FEED ROLLER SECTOR GEAR STOPPER CLEARANCE ADJUSTMENT



[A]

Purpose: To ensure that the second feed roller starts rotating when the paper feed solenoid is turned on and stops rotating when the paper feed solenoid is turned off.
Adjustment Standard: 0.1 to 0.3 mm

1. Remove the rear cover of the machine.
2. Gradually turn the drum rotation shaft [A] counterclockwise with a 10 mm spanner.
3. Turn the sector gear $[B]$ counterclockwise until it stops. Ensure that the clearance between the pin [C] and the sector gear stopper [D] is between 0.1 and 0.3 mm .
4. If it is not, loosen the Allen screws [E] and adjust the clearance between the pin and the sector stopper.
5. Retighten the screws [E].

### 6.9 FEED LENGTH OF THE SECOND FEED ROLLER ADJUSTMENT


[B]


Purpose: To ensure proper paper feed by the second feed rollers.
Adjustment Standard: 80 to 85 mm

1. Stack about 100 sheets of paper on the paper table.
2. Set the paper table in the paper feed position. (Use output check mode (SP131) No. 19.) Then, turn the main switch off and unplug the machine.
3. Remove the drum unit and the rear cover from the machine.
4. Turn on the paper feed solenoid manually. Then, gradually turn the drum rotation shaft [A] with a 10 mm spanner.
5. Measure the paper feed length from the time the second feed roller [B] starts rotating until it stops rotating. This feed length should be between 80 and 85 mm .
6. If it is not, adjust the feed length by loosening the screw [C] and by shifting the cam [D] up or down.
7. Check the adjustment by repeating steps 4 and 5 .

### 6.10 SECOND FEED ROLLER START TIMING



Purpose: To ensure correct paper feed by calibrating the second feed roller start timing, and to adjust the leading edge margin.
Adjustment Standard: $177^{\circ}$

1. Set the Image Position indicator to the "0" position and return the drum to the home position by turning the main switch off and on. Then, turn the main switch off and unplug the machine.
2. Remove the rear cover of the machine.
3. Position a protractor $[B]$ on the end of the image shift shaft $[A]$.

NOTE: Align the origin of the protractor with the edge of the solenoid bracket [C].

4. Turn on the paper feed solenoid [F] manually and, using a 10 mm spanner, gradually turn the drum rotation shaft counterclockwise.
5. Measure the degrees turned when the second feed roller sector gear [C] starts returning counterclockwise (when the second feed rollers start rotating). This should be $177^{\circ}$.
6. If it is not, loosen the 2 bolts [D] and adjust the second feed roller rotation timing by turning the cam [E].

### 6.11 PAPER FEED ROLLER REMOVAL



1. Remove the left clamper [A].
2. Remove the left bushing $[B]$.
3. Remove the paper feed roller shaft [C].
4. Remove the 2 paper feed rollers [D].

### 6.12 PAPER FEED ROLLER UNIT REMOVAL



1. Remove the master making unit.
2. Remove 2 hexagon screws $[A]$.
3. Remove the clamper [B].
4. Remove the paper feed roller unit from the machine by sliding the shaft to the rear.

### 6.13 UPPER SEPARATION ROLLER REMOVAL


[E]

1. Remove the paper feed roller unit.
2. Remove the clamps [A] from both sides of the upper separation roller.
3. Slide the shaft $[B]$ in the direction of the arrow.
4. Remove the guide disks [C] and remove the upper separation roller [D].

NOTE: When reassembling the paper feed roller unit, position the guide disks [C] under the cuts in the feed roller holder [E].

### 6.14 SEPARATION PLATE/LOWER SEPARATION ROLLER REMOVAL



1. Remove the separation plate $[A]$ with the spring $[B]$ (1 screw).

## Lower Separation Roller

1. Remove the master making unit, paper feed roller unit, and drum unit.
2. Remove the 2 springs [C] and slide the upper second feed roller [D] in the direction of the arrow.
NOTE: Use a spring hook. That way the spring will not drop into the machine.
3. Remove the upper and lower guide plates [ $E$ ] (2 screws).

NOTE: When reinstalling the guide plates, ensure that the guide plates do not touch the lower second feed roller.
4. Remove the spring [F] hooked on the front separation lever [G].
5. Remove the front separation lever [G] (1 screw).

6 . Remove the lower separation roller shaft $[\mathrm{H}]$.
7. Remove the lower separation roller [I] from the shaft (one Allen screw).

NOTE: When reassembling the lower separation roller, confirm that the front and rear separation levers [G] move smoothly.

### 6.15 PAPER FEED TABLE REMOVAL



1. Lower the paper table and disconnect the power cord.
2. Remove the right front cover, rear cover, and right cover.
3. Remove the noise reduction cover [A] (1 screw) and two brackets [B] (1 screw each).
4. Remove the plate [C] (1 screw).
5. Remove the paper table drive gear [D] (1 E-ring).
6. Disconnect the two connectors [E] and remove the two screws [F] securing the front and rear grounding wires.
7. Remove the sensor actuator bracket [G] (2 screws) and two studs [H].
8. Remove the paper feed table [I].

NOTE: When reassembling the machine, ensure that the paper table is level.

## 7. PRINTING

### 7.1 PAPER DETECTION ARM CLEARANCE ADJUSTMENT



Purpose: To ensure that printing pressure is applied during paper feed, and is released correctly afterwards.
Adjustment Standard: 0.2 to 0.6 mm

1. Remove the rear cover of the machine.
2. Using a 10 mm spanner, gradually turn the drum rotation shaft counterclockwise to position the bearing of the pressure release arm $[B]$ at the widest part of the pressure cam $[A]$.
3. Ensure that the clearance between the paper detection arm [C] and the pressure release arm $[\mathrm{B}]$ is 0.2 to 0.6 mm .
4. If it is not, loosen the screws [D] and adjust the clearance by shifting the paper detection bracket [E] up or down.
5. After adjusting, confirm that the printing pressure on/off mechanism is working properly. To do this, monitor a print run.

### 7.2 PRESS ROLLER POSITION ADJUSTMENT 1



Purpose: To ensure that the press roller does not touch the clamper section of the drum.
Adjustment Standard: 0.6 to 1.0 mm

1. Remove the rear cover of the machine.
2. Using a 10 mm spanner, turn the drum rotation shaft counterclockwise and position the bearing of the pressure release arm $[A]$ at the widest part of the pressure cam $[B]$.
3. While the arm is at the widest part of the cam, ensure that the distance between the press roller [C] and the tip of the clamper [D] is 0.6 to 1.0 mm .
4. If it is not, loosen the hexagon nut [E] and adjust the clearance by turning the bolt [F].

### 7.3 PRESS ROLLER POSITION ADJUSTMENT 2 (FOR THE A4/LT DRUM)



Purpose: To keep the distance between the press roller and the drum constant while the printing pressure is released.
NOTE: Perform this adjustment after adjusting the press roller position 1.

1. Remove the master eject unit.
2. Using a 10 mm spanner, turn the drum rotation shaft counterclockwise and position the bearing $[A]$ of the pressure ON/OFF lever [B] on top of the pressure cam [C].
3. Loosen the bolt [D] fixing the arm [E].
4. Adjust the position of the bolt [F] using a 7 mm spanner so that the bearing [G] of the arm just touches the top of the A4 cam [H].
5. Rotate the bearing [G] manually. If there is no friction between the bearing and the cam, turn the bolt [F] clockwise.
6. Retighten the bolt [D].

### 7.4 PRESSURE TIMING ADJUSTMENT



Purpose: To ensure that the maximum printing area is within specifications, and that the ink does not stain the trailing edge.
Adjustment Standard: $218 \pm 2^{\circ}$

1. Stack about 100 sheets of paper on the table.
2. Set the Image Shifting indicator to the "0" position and return the drum to the home position by turning the main switch off and on.
3. Set up the paper table in the paper feed position. (Use output check mode (SP131) No. 19.) Turn the main switch off and unplug the machine.
4. Remove the rear cover of the machine.
5. Position a protractor [D] on the end of the image shift shaft [A]. Align the origin of the protractor with the edge of the solenoid bracket [E].
6. Using a 10 mm spanner, turn the drum rotation shaft counterclockwise while pressing in the plungers of the paper feed and printing pressure solenoids by hand.
7. Turn the drum rotation shaft a little further, and stop when the press roller begins to touch the drum surface.
8. In the above condition, measure the degrees turned; this should be 218 $\pm 2^{\circ}$.
9. If it is not, loosen the screw [B] of the pressure cam [C] and adjust the pressure timing by turning the cam [C].

### 7.5 PRINTING PRESSURE ADJUSTMENT



Purpose: To apply the proper printing pressure to the press roller.

## Adjustment Standard: $4 \pm 0.5 \mathrm{~mm}$

1. Remove the rear cover of the machine.
2. Adjust the clearance $[A]$ to $4 \pm 0.5 \mathrm{~mm}$ by turning the adjustment bolt [B].

### 7.6 PRINTING PRESSURE SOLENOID CLEARANCE ADJUSTMENT



Purpose: To ensure that the printing pressure stopper is released when paper feed starts, and that the stopper is locked within one drum rotation when a paper jam occurs.
Adjustment Standard: 1 to 2 mm

1. Manually press in the plunger of the printing pressure solenoid [A]. At this time rotate the drum rotation shaft counterclockwise with a 10 mm spanner until the bearing [B] rides at the widest part of the printing pressure cam.
2. Confirm that the clearance [C] is between 1 and 2 mm .
3. If it is not, loosen the hexagon head screws [D] and adjust the clearance by moving the printing pressure solenoid.

### 7.7 MASTER PRESS SHEET SOLENOID POSITION ADJUSTMENT



Purpose: To ensure that the master press sheet covers the press roller when the solenoid is energized, and that the sheet does not interfere with paper feeding when the solenoid is off.

Adjustment Standard: $4 \pm 0.2 \mathrm{~mm}$

1. Remove the transport unit (see section 9-6, Transport Unit Removal).
2. Manually press in the plunger $[A]$ of the master press sheet solenoid $[B]$. Check the gap between the tip of the solenoid plunger and the inside of the solenoid bracket [C].
3. If the gap is out of standard, loosen the two screws that hold the solenoid and adjust the solenoid position.

### 7.8 PRESS ROLLER REMOVAL



1. Remove the screw [A].
2. Slide the holding plate $[B]$ to the front side of the machine.
3. Remove the press roller.
4. Remove both right and left bearings [C] (2 E-rings).

## 8. DRUM

### 8.1 MAIN DRIVE BELT TENSION ADJUSTMENT



Purpose: To ensure that the main motor rotation is correctly transmitted to the drum.

Adjustment Standard: $4 \pm 0.2$ mm

1. Remove the rear cover of the machine.
2. Apply a 1000-gram load (using a tension gauge) to the center of the main drive belt [A]. Ensure that the belt deflects 1.5 mm .
3. If it does not, remove the drum unit and adjust the belt tension by moving the tensioner shaft [B] after loosening the nut [C].
4. After adjusting, tighten the nut [C] very securely.

### 8.2 DRUM MASTER SENSOR


[B]

Purpose: To ensure that the drum master sensor correctly detects the master on the drum.

Adjustment Standard: 0.9 to 1.0 V when the sensor is activated, and 2.0 V or higher when it is not activated.

1. Slide out the drum unit and remove the master $[A]$ from the drum.
2. Reinstall the drum unit. Press and hold down the Drum Rotation button until the drum reaches the home position.
3. Access SP mode and select No. 138. Then press the Print Start key. The drum master sensor voltage is displayed.
NOTE: The voltage can also be checked using TP102 (drum master sensor output) and TP107 (GND).
4. If the voltage is outside the specified range, adjust VR102 on the main PCB [B].
5. Make a master with an all-white original.

NOTE: Ensure the master's leading edge is held by the drum clamper and that the master $[A]$ is wrapped correctly on the drum.
6. Ensure that the drum master sensor voltage is 2.0 V or higher. At this time, LED102 will light.

### 8.3 PRINTING SPEED ADJUSTMENT


[B] [A]

Purpose: To ensure the correct main motor speed.

## Adjustment Standard:

$120{ }_{-0}^{+10}$ rotations/minute when the fastest printing speed (speed 5 ) is selected. $60{ }_{-2}^{+0}$ rotations/minute when the slowest speed (speed 1 ) is selected.

1. Press the Speed Change key to set the speed at the maximum level.
2. Make some prints. After the first print, the machine should produce $120{ }_{-0}^{+10}$ prints every minute.
3. If it does not, adjust the speed of the main motor by turning VR105 [A].
4. Press the Speed Change key to select the slowest speed (speed 1).
5. Make some prints. After the first print, the machine should produce $60{ }_{-2}^{+0}$ prints.
6. If it does not, adjust the speed of the main motor by turning VR106 [B].

NOTE: The fastest speed adjustment and the slowest speed adjustment do not affect each other. But both adjustments affect speeds 2, 3, and 4.

If the slowest speed (speed setting for the TS20 sorter) is faster than 60 cpm , the sorter speed cannot catch up with the machine speed and sorter jams might occur.
*Sorter not available in the USA.

### 8.4 DRUM STOPPER ADJUSTMENT



Purpose: To ensure that the drum is securely locked when the drum unit is pulled out.
Adjustment Standard: Less than 1 mm

1. Remove the drum unit from the machine.
2. Ensure that the distance between the center of the drum lock $[A]$ and the center of the drum stopper $[B]$ is less than 1 mm .
3. If it is more than 1 mm , loosen the screws [C] and adjust the distance by moving the drum lock $[A]$.

### 8.5 MASTER FEED CLAMPER CAM ADJUSTMENT



Purpose: To ensure that the master feed clamper is open during the master feed process and is closed during other processes.

## Adjustment Standard:

$29 \pm 0.5 \mathrm{~mm}$ when the solenoid is energized, and less than 25 mm when it is de-energized.

1. Remove the drum unit and open the master eject unit.
2. Using output check mode (SP131) No. 15, turn on the master feed clamper solenoid [A].
3. Confirm that the distance [E] between the bushing [D] and the edge of the cam [B] is $29 \pm 0.5 \mathrm{~mm}$ when the solenoid is turned on.
4. If it is not, loosen the mounting screws [C] and adjust the solenoid position.

## ©CAUTION:

Do not leave the solenoid on longer than 10 seconds.
5. After adjusting, retighten the mounting screws [C].

### 8.6 MASTER EJECT CLAMPER CAM ADJUSTMENT



Purpose: To position the master eject clamper cam $[B]$ so that the master clamper opens correctly during the master eject process and closes correctly for all other processes.

## Adjustment Standard:

$29 \pm 0.5 \mathrm{~mm}$ when the solenoid is energized, and less than 25 mm when it is de-energized.

1. Remove the drum unit and open the master eject unit.
2. Using output check mode (SP131) No. 16, turn on the master eject clamper solenoid [A].
3. Confirm that the distance [E] between the bushing [D] and the edge of the opening cam $[B]$ is $29 \pm 0.5 \mathrm{~mm}$ when the solenoid is turned.
4. If not, loosen the mounting screws [C] and adjust the solenoid position.

## ⒸAUTION:

Do not leave the solenoid on longer than 10 seconds.
5. After adjusting, retighten the mounting screws [C].

### 8.7 INK DETECTION PIN ADJUSTMENT



Purpose: To ensure detection of ink build-up between the ink roller and the doctor roller.
Adjustment Standard: $5 \pm 1 \mathrm{~mm}$

1. Remove the drum unit.
2. Remove the clamper.
3. Remove the cloth screen and the metal screen from the drum unit.
4. Remove the ink distributor (2 screws).
5. Wipe off the ink around the ink roller [A] and the doctor roller [B].
6. Ensure that the distance between the end of the ink detection pin [C] and the doctor roller [B] surface is $5 \pm 1 \mathrm{~mm}$.
7. If it is not, loosen the screw [D] and adjust the distance by moving the ink detection pin [C].
8. After adjusting, retighten the screw [D].

### 8.8 INK ROLLER GAP ADJUSTMENT



Purpose: To equalize the ink thickness around the ink roller and prevent an uneven image.
Adjustment Standard: 0.08 mm

1. Remove the drum unit.
2. Remove the clamper.
3. Remove the cloth screen and the metal screen from the drum unit.
4. Remove the ink distributor (2 screws).
5. Wipe off the ink around the ink roller and the doctor roller.
6. Insert a $0.08-\mathrm{mm}$ gap gauge between the doctor roller and the ink roller. Then ensure that a $0.1-\mathrm{mm}$ gauge can not penetrate the gap.
NOTE: Check the gap at the right, center, and left positions.
7. If the gap is not within specifications, loosen the screw $[\mathrm{A}]$ and adjust the gap by turning the eccentric bushing [B].
NOTE: Before adjusting, remove the drive gear located on the operation side of the doctor roller because the drive gear will restrict the adjustment.

### 8.9 INK ROLLER POSITION ADJUSTMENT



Purpose: To ensure that the pressure of the press roller is applied evenly to the ink roller.
Adjustment Standard: The drum gauge must be inserted.

1. Remove the drum unit from the machine.
2. Remove the clamper.
3. Remove the cloth screen and the metal screen from the drum unit.
4. Loosen the bolts $[A]$ and $[B]$ that secure the ink roller unit to the drum shaft.
5. Insert the drum gauge [C] (P/N C2009001) in the holes in both side plates of the drum unit and in both side plates of the ink roller unit.
6. With the gauge in the holes, tighten the bolts $[A]$ and $[B]$ so that the rotational thrust play of the flange [D] is between 0.05 and 0.2 mm .

### 8.10 INK SUPPLY SOLENOID ADJUSTMENT



Purpose: To ensure total clutch-sleeve release by the stopper when the ink supply solenoid $[A]$ is turned on and complete clutch-sleeve locking by the stopper when the ink supply solenoid is turned off.

## Adjustment Standard: 0.5 to 1 mm

1. Remove the drum unit from the machine.
2. Remove the upper ink supply solenoid cover and remove the front cover of the drum unit.
3. Press in the solenoid plunger by hand and ensure that the distance between the stopper $[B]$ and the clutch sleeve $[C]$ is between 0.5 mm and 1.0 mm as shown.
4. If it is not, loosen the screw [D] and adjust the distance by moving the solenoid bracket [E].
5. After adjusting, retighten the screw [D].

### 8.11 INK DETECTION ADJUSTMENT



Purpose: To ensure that the ink detection PCB detects a no ink condition when the ink is running out.
Adjustment Standard: See the above illustration.

1. Remove the rear cover of the machine.
2. Connect the CH 1 probe of an oscilloscope to TP1, the CH 2 probe to TP2 and the GND lead to TP-12 V. Select the 5 microsecond range.
3. Turn on the main switch and install a drum with no ink. Or instead, remove the ink bottle and make prints until the Add Ink indicator lights.
4. Ensure that the waveform is as shown.

NOTE: 1. This adjustment should be made under normal conditions $\left(20^{\circ} \mathrm{C} / 65 \% \mathrm{RH}\right)$.
2. The duration of the waveform varies inversely with temperature. (High temp. $\rightarrow$ reduced period, Low temp. $\rightarrow$ increased period)
5. If it is not, adjust the ON timing of the detection signal using VR901 on the ink detection PCB.

### 8.12 INK ROLLER BLADE ADJUSTMENT



Purpose: To prevent ink leakage from both edges of the ink roller.
Adjustment Standard: 0.2 to 0.5 mm

1. Remove the drum unit from the machine.
2. Remove the clamper.
3. Remove the cloth screen and the metal screen.
4. Check that the distance between the edge of the ink roller [A] and the edge of the ink roller blade $[\mathrm{B}]$ is 0.2 to 0.5 mm .
5. If the distance is out of standard, loosen the screw [C] and adjust the ink roller blade position.
6. Retighten the screw [C].

### 8.13 DRUM SCREEN REMOVAL



1. Remove the drum unit from the machine.
2. Remove the front stay $[A]$ of the screen $[B]$ (2 screws).
3. Remove the 2 springs [C].
4. Remove the clamper
5. Remove the screen [B].

NOTE: 1. Ensure that the black seal [ D$]$ is on the front side (outside) of the screen when reinstalling it.
2. Ensure that the front stay $[A]$ comes under the clamper plate $[E]$ when reinstalling it.
3. Ensure that the mylar [F] attached to the screen is correctly inserted into the pocket [G] on the drum.

### 8.14 DRUM DRIVE BELT REPLACEMENT



## Removal:

1. Set the image position to "0" by turning the main switch off and on.
2. Turn off the main switch and unplug the power supply cord.
3. Remove the drum unit.
4. Remove the rear cover.
5. Remove the center support plate [A] (5 screws).
6. Remove the lower support plate [B] (3 screws).
7. Remove the upper support plate [C] (4 screws).

8. Remove the relay gear assembly [A].
9. Remove the timing gear assembly $[B]$.
10. Remove two belt tension bearings [C].
11. Remove the pressure cam drive gear [D] (2 hexagon bolts [E] and 1 E-ring).
NOTE: Four hexagon bolts secure the gear [D]. Do not loosen the two deeply recessed bolts [F].
12. Remove the drum drive belt [G].


## Re-assembly:

1. Install a new drum drive belt [A].
2. Adjust the drum drive belt position.
1) The alignment hole $[B]$ in the drum drive gear [C] should be aligned with the hole in the rear side plate. At this time, the notch [D] in the plate lines up with the center of the drum drive gear cutout [E].
2) The alignment hole [F] in the pressure cam [G] should be right over the pressure cam shaft $[\mathrm{H}]$.
3. Install two belt tension bearings [I] (1 E-ring).

NOTE: Ensure that the drum drive gear and the pressure cam are in the proper position as explained above.
If the relation between the printing pressure cam [G] position and the drum drive gear [C] position is wrong, printing pressure will be applied too late or too early. For each misaligned tooth between the cam and the gear, the print will appear 23 mm too far up or too far down.
4. Install the white spacer [J] and the pressure cam drive gear [K] (2 hexagon bolts).
NOTE: Take care to install the white spacer [J] with the correct face towards the gear. (See the above diagram.)
5. Install the relay gear assembly [L] and the relay belt.
6. Install the lower support plate (3 screws).

7. Adjust the position of the second feed cam [A] so that the center of the slot $[B]$ in the second feed cam is aligned with the bearing shaft [C].
8. Install the timing gear assembly [D] with the two bearings [E].

NOTE: Ensure that the pin on the timing gear assembly is in the spiral groove [F] in the cam gear [G].
Ensure that the drum drive gear $[\mathrm{H}]$ is at the home position (see step 2, sub-step 1).
9. Install the upper support plate [I] (4 screws).
10. Push down lightly on the second feed cam [A] to hold it firmly in place. While still holding it, ensure that the hole [J] in the second feed cam is aligned with the small hole in the upper support plate [I]. If it is not, repeat steps 7 to 10.
11. Make some prints to check the leading edge registration.
12. If the registration is off by more than 12 mm , repeat steps 7 to 11 . If the registration is less than 12 mm , adjust the relation between the feed rollers and the gear as explained in the "Second Feed Roller Start Timing" section.

NOTE: For each misaligned tooth of the feed cam gear, the registration is changed by approximately 12 mm .
13. Install the center support side plate (5 screws).

## 9. DELIVERY

### 9.1 FIRST PAPER EXIT SENSOR ADJUSTMENT



[B]

Purpose: To ensure that the sensor detect the correct paper delivery, and to ensure that the jam indicator blinks properly after an exit misfeed or a paper wrap occurs.
Adjustment Standard: 0.8 to 0.9 V

1. Remove the right front cover of the machine.
2. Wrap a sheet of paper [A] around the drum.
3. Access SP mode and select No. 135. Then press the Print Start key. The 1st exit sensor voltage is displayed. It should be between 0.8 and 0.9 volts.

NOTE: The 1st exit sensor voltage can also be checked using TP101 (1st exit sensor output) and TP107 (GND).
4. If it is not, adjust the sensor sensitivity by turning VR101 on the main PCB [B].
5. To confirm that LED 101 turns ON and OFF, activate the first paper exit sensor [C]. Use a sheet of paper to activate the sensor.

### 9.2 SECOND PAPER EXIT SENSOR ADJUSTMENT

 ensure that the jam indicator blinks and the machine stops when a paper wrap or an exit misfeed occurs.
Purpose: To ensure the sensor detects the correct paper delivery, and to
$\stackrel{\vdots}{0}$
$\frac{0}{3}$
$\frac{0}{2}$
$\frac{2}{2}$

Adjustment Standard: VR103 is set at the on/off threshold of LED103 [D].

1. Remove the right front cover of the machine.
2. Place a sheet of paper $[A] 15 \mathrm{~mm}$ away from the second paper exit sensor [B]. Ensure that VR103 is set at the on/off threshold of LED103.
3. If it is not, adjust the sensor sensitivity by turning VR103 on the main PCB.

### 9.3 EXIT PAWL CLEARANCE ADJUSTMENT



Purpose: To ensure that the printing paper is delivered without a paper wrap problem or damage to the screen.
Adjustment Standard: 0.6 to 0.9 mm

1. Remove the rear cover of the machine and open the master eject unit.
2. Put a few sheets of paper on the paper table. Then, set up the paper table in the paper feed position. (Use output check mode No. 19.)
3. To feed a sheet of paper, turn on the paper feed solenoid by hand, and using a 10 mm spanner, gradually rotate the drum rotation shaft counterclockwise and at the same time manually turn on the printing pressure solenoid to move the exit pawl $[A]$ to the drum.
4. Ensure that the clearance between the drum and the exit pawl is between 0.6 and 0.9 mm when the exit pawl is closest to the drum.
5. If it is not, loosen the hexagon nut [ $B$ ] of the exit pawl drive arm. Then adjust the clearance by turning the screw [C].

6 . Check the adjustment by repeating steps 3 and 4 .

### 9.4 EXIT PAWL TIMING ADJUSTMENT



Purpose: To ensure that the exit pawl does not touch the master clamper.
Adjustment Standard: $230 \pm 2^{\circ}$

1. Remove the rear cover of the machine.
2. Press and hold down the Drum Rotation button until the drum reaches the home position.
3. Position a protractor on the end of the image shift shaft. Position the origin of the protractor at the bracket of the master feed clamper solenoid.
4. Manually press in the plunger of the printing pressure solenoid. Release the paper detection arm manually by rotating the drum rotation shaft counterclockwise with a spanner ( 10 mm ).
5. Measure the degrees turned when the exit pawl $[A]$ comes closest to the drum. This must be $230 \pm 2^{\circ}$.
6. If it is not, loosen the hexagon nut [B] and screw [C] , then adjust the exit pawl position by turning the hexagon bolt [D].
7. Check the adjustment by repeating steps 4 to 6 .

### 9.5 PAPER EXIT PAWL AIR PUMP ADJUSTMENT



Purpose: To ensure that the paper exit pawl air pump produces a jet of air when the paper exit pawl is in the upper position (near the drum surface).

## Adjustment Standard:

When the drum has rotated 341 degrees, the pump piston position is at the upper dead point.

1. Open the front door and remove the inner cover.
2. Press and hold down the Drum Rotate button until the drum reaches the home position.
3. Confirm that the 13 mm diameter hole in the gear and the 8 mm diameter hole in the side plate are lined up at the 6:00 o'clock position.
4. If the holes are not lined up, remove the E-rings and reposition the gear.
5. Rotate the drum to the home position and do step 3 again.

### 9.6 TRANSPORT UNIT REMOVAL



1. Remove the right front cover and remove the inner cover.
2. Remove the exit side plate $[A]$ (4 screws).
3. Remove the harness clamp and disconnect the two connectors [B].
4. Remove the two screws [C].
5. Take off the belt [D] from the pulley and remove the transport unit [E].

## 10. IMAGE POSIITONING

### 10.1 IMAGE POSITION ADJUSTMENT



Purpose: To ensure that the image is well centered when the Image Position key is set to "0".
Adjustment Standard: The gauge [A] must be inserted.

1. Remove the rear cover.
2. Turn on the main switch. This way, the image position is returned exactly to its initial position. (The image position indicator shows "0".)
3. Ensure that it is possible to insert the gauge [A] (P/N C2009002).
4. If the gauge $[A]$ cannot be inserted into the hole in the gear $[B]$, move the gear [B] to enable the gauge to be inserted into the hole as follows:
a) Disconnect the image positioning motor connector [C].
b) Loosen the Allen screw [D] so that the gear at the end of the image position sensor shaft [E] rotates freely.
c) Turn the gear $[B]$. To do this, turn the worm gear $[F]$ manually until the gauge $[A]$ can be inserted into the hole in gear [B].
NOTE: Do not turn the image position sensor shaft [E]. If the shaft is turned, the image position indicator will be affected. If the indicator is affected, turn off the main switch, then turn it on again. This returns the indicator to " 0 ".
5. Make some prints to check the image position.

ⒸAUTION:
Do not keep on pressing the Image Position key if the image position sensor is broken or removed. The plastic gears between the worm gear [F] and gear [B] may break if the pin which moves along the spiral track of the gear [B] hits the end of the track.

## TROUBLESHOOTING

## 1. ELECTRICAL COMPONENT PROBLEMS

| Component | Condition | Symptom |
| :---: | :---: | :---: |
| FU1 <br> (Power Supply Unit) | Open | The machine will not work. (No indicators on the operation panel turn on.) |
| FU2 <br> (Power Supply Unit) | Open | When the main switch is turned on, "E-11" is displayed. |
| $\begin{array}{\|l\|} \hline \text { FU3 } \\ \text { (Power Supply Unit) } \end{array}$ | Open | When the main switch is turned on, " $E-13$ " is displayed. |
| $\begin{array}{\|l} \hline \text { FU4 } \\ \text { (Power Supply Unit) } \end{array}$ | Open | The door open condition cannot be released. |
| FU101 (Main PCB) | Open | When the Print Start key is pressed, paper is not fed and jam indicators " B " and of will blink. When the Master Making key is pressed, the master is not ejected and jam indicators "F" and of will blink. |
| FU102 <br> (Main PCB) | Open | If the master is wrapped around the drum, when the Master Making key is pressed, the master is not ejected and jam indicators "F" and of will blink. <br> If the master is not wrapped around the drum, when the Master Making key is pressed, the master is not wrapped around the drum and jam indicators " C " and of will blink. |
| FU301 (AC drive board) | Open | The door open condition cannot be released. |
| Master Eject Sensor | ON condition (Activated) | When the main switch is turned on, jam indicators "F" and of will blink. |
|  | OFF condition (Not activated) | When the master is being ejected, the jam indicators "F" and of will blink. |
| Full Master Box Sensor | ON condition (Not interrupted) | When the master eject box is full, the $\downarrow$ indicator will not blink. |
|  | OFF condition (Interrupted) | After master ejecting is finished, the indicator will blink. |
| Paper Table Lower Limit Sensor | ON condition (Interrupted) | The paper table will not go down. |
|  | OFF condition (Not interrupted) | When the paper feed table goes down and stops, the cover open indicator will blink. |
| Paper Table Safety Switch | ON condition (Feeler is actuated) | When the main switch is turned on, the cover open indicator will blink. |
|  | OFF condition (Feeler is not actuated) | The paper feed safety bar will not work. If the paper table lower limit sensor is faulty, the paper table will move all the way down and will lock. |
| Paper Table Height Sensor | ON condition (Interrupted) | When the paper feed table goes up, it will not stop at the proper position and E -02 will light. |
|  | OFF condition (Not interrupted) | The paper feed table will not go up. Jam indicators " B " and of will blink when the Print key is pressed. |

ELECTRICAL COMPONENT PROBLEMS

| Component | Condition | Symptom |
| :---: | :---: | :---: |
| Paper End Sensor | ON condition (Activated) | When there is no paper on the paper feed table, the Print Start key can be used, but jam indicators "B" and of will blink. |
|  | OFF condition (Not activated) | Though there is paper on the paper table, the paper end indicator will blink. |
| Printing Pressure Sensor | ON condition (Interrupted) | Jam indicators "B" and of will blink after a trial print and the paper will stop on the transport unit. |
|  | OFF condition (Not interrupted) | Jam indicators "E" and of will blink when the main switch is turned on. Drum rotation will not stop after the Reset key is pressed. |
| First Paper Exit Sensor | ON condition (Activated) | When the main switch is turned on, jam indicators "G" and of will blink. |
|  | OFF condition (Not activated) | Jam indicators "B", "E", and of will blink after one sheet of paper has been fed out. |
| Second Paper Exit Sensor | ON condition (Activated) | When the main switch is turned on, jam indicators "G" and of will blink. |
|  | OFF condition (Not activated) | Jam indicators "E" and of will blink after one sheet of paper has been fed out. |
| Drum Rotation Sensor | ON condition (Interrupted) | When the Print Start key or the Master Making key is pressed, E-06 will light. |
|  | OFF condition (Not interrupted) | Same as the above symptom. |
| Master End Sensor | ON condition (Activated) | Normal operation when master paper is present. Master end is not detected: Master End indicators "C" and ${ }^{\dagger}$ will not blink and jam indicators "C" and of will blink. |
|  | OFF condition (Not activated) | Even if master paper is present, the Master End indicators " C " and $\downarrow$ will blink. |
| Right Cutter Switch (Rear) | ON condition (Feeler is actuated) | The master is not cut. (The cutter unit will not move at all.) |
|  | OFF condition (Feeler is not actuated) | When the master is cut, E-01 will light. At that time, the cutter will not return to the front (home position). |
| Left Cutter Switch (Front) | ON condition (Feeler is actuated) | The master is not cut. (The cutter unit will not return from the rear.) |
|  | OFF condition (Feeler is not actuated) | When the main switch is turned on, E-01 will light. |
| First Drum Position Sensor | OFF condition (Not interrupted) | When the main switch is turned on, the drum will start rotating and will not stop. |
|  | ON condition (Interrupted) | 1) Jam indicators "B" and of will blink when the Print key is pressed. The drum cannot be removed. <br> 2) Jam indicator C of will blink after the Master Making key is pressed. The drum cannot be removed. |

ELECTRICAL COMPONENT PROBLEMS

| Component | Condition | Symptom |
| :---: | :---: | :---: |
| Second Drum Position Sensor | OFF condition (Not interrupted) | 1) When the Print key is pressed, paper is not fed but the drum will rotate and not stop. <br> 2) Master Eject jam is detected after the Master Making key is pressed. |
|  | ON condition (Interrupted) | 1) When the Print key is pressed, paper is not fed but the drum will rotate and not stop. <br> 2) Master Eject jam is detected after the Master Making key is pressed. |
| Master Buckle Sensor | ON condition (Activated) | When the main switch is turned on, jam indicators " C " and of will blink and cannot be reset. |
|  | OFF condition (Not activated) | When the Master Making key is pressed, the original will stop halfway, and jam indicators "A", "C", and of will blink. |
| Upper Pressure Plate Sensor | ON condition (Not interrupted) | When the main switch is turned on, the pressure plate will keep moving up and down. <br> Then "E-12" is displayed. |
|  | OFF condition (Interrupted) | After master making is finished and one sheet of paper has been delivered, $\uparrow$ will light. The pressure plate will stop at the lower position. |
| Lower Pressure Plate Sensor | ON condition (Interrupted) | After master making is finished and one sheet of paper has been delivered, $\downarrow$ will light. |
|  | OFF condition (Not interrupted) | During the master eject process, the machine will stop and E-12 is displayed. |
| Paper Width Sensor 0 | ON <br> (Activated) | The machine cannot detect the correct paper size. |
|  | OFF <br> (Not activated) |  |
| Paper Width Sensor 1 | ON <br> (Activated) | The machine cannot detect the correct paper size. |
|  | OFF <br> (Not activated) |  |
| Paper Width Sensor 2 | ON <br> (Activated) | The machine cannot detect the correct paper size. |
|  | OFF <br> (Not activated) |  |
| Paper Width Sensor 3 | ON <br> (Activated) | The machine cannot detect the correct paper size. |
|  | OFF <br> (Not activated) |  |
| Paper Length Sensor | ON <br> (Activated) | A3 paper is detected even though A4 sideways paper is on the paper table. |
|  | OFF <br> (Not activated) | A4 sideways paper is detected even though A3 paper is on the paper table. |

ELECTRICAL COMPONENT PROBLEMS

| Component | Condition | Symptom |
| :---: | :---: | :---: |
| Drum Master Sensor | Always ON (Sensor always detects white) | If a master is on the drum: The machine will work correctly. <br> If no master is on the drum: Indicators "F" and of will blink during the master eject process. Printing will start when the Print Start key is pressed, but indicators " $E$ ", "B", and of soon turn on and the machine will stop. |
|  | OFF (Sensor always detects black) | If a master is on the drum: Two masters are wrapped on the drum. <br> If no master is on the drum: The master is wrapped correctly on the drum, but the " M " indicator will blink when the Print Start key is pressed. |
| Platen Cover Position Sensor | ON condition (Interrupted) | The shadow erase function will not work even if the platen cover is opened more than 25 degrees. |
|  | OFF condition (Not interrupted) | The shadow erase function works regardless of whether the platen cover is opened or not. |
| Scanner Home Position Sensor | ON condition (Not interrupted) | " $\mathrm{E}-13$ " is displayed when the main switch is turned on. |
|  | OFF condition (Interrupted) | " $\mathrm{E}-13$ " is displayed when the main switch is turned on. |
| Original Sensor | On condition (Activated) | The Master Making key is accepted even if an original has not been placed on the exposure glass. |
|  | ON condition (Not activated) | "SET THE ORIGINALS" is displayed when the Master Making key is pressed even if an original has been placed on the exposure glass. |

## 2. IMAGE AND PAPER FEED PROBLEMS

### 2.1 IMAGE QUALITY PROBLEMS

## 1. No image, white lines, uneven image on copies

Does the image created on the master match the original?
No


Are the drum screens clogged with dried ink? (If so, the machine has not been used for a long time.)

No
Yes
Clean or replace the drum screens.

Has the ink inside the drum separated out? (If so, the ink was in storage for a long time.)

No
Yes
Clean inside the drum and install a new ink cartridge.

Insufficient printing pressure applied to the drum?
Yes
Check the printing pressure mechanism.

Has the platen roller been mounted correctly on the thermal head?

| Yes $\xrightarrow{\text { No Mount the platen roller correctly. }}$ |
| :--- |
| Make a print using the Thermal Head Pattern Test, and check the <br> printout (see Section 3.3; Thermal Head Test) |

Does the same problem still occur with the test pattern?
Yes \(\left.\xrightarrow{No} \begin{array}{l}The A/D conversion PCB, CCD PCB, or <br>

image processing PCB is defective.\end{array}\right\}\)| The thermal head, thermal head drive PCB, |
| :--- |
| or image processing PCB is defective. |

## 2. The printed image is enlarged or reduced in the paper feed direction



Is the printed image larger than the original in the paper feed direction?
No $\quad$ Yes


Are the drive belts in the original feed section adjusted to the correct tension?

Yes $\quad$ No Adjust the belt tension by loosening and tightening the belt tension bracket screws (see section 5.2.2.3 Replacement \& Adjustment; Scanner Timing Belts).

Are any of the pulleys and/or gears in the original feed section loose?

Yes
Tighten the screws securing the pulleys and/or gears.

Is the printed image smaller than the original in the paper feed direction?


Is the master feed motor functioning normally?


Are the drive belts in the master feed section adjusted to the correct tension?
Yes $\quad$ No

Adjust the belt tension (see section 5.4.4.2; Replacement \& Adjustment; Master Feed).

Are any of the pulleys and/or gears in the master feed section loose?

Yes
Tighten the screws securing the pulleys and/or the gears.

### 2.2 PAPER FEED PROBLEMS

## 1. No paper is fed from the paper table

Are the paper feed rollers turning normally?


Does the paper feed table rise when the Print Start key is pressed?


Check the paper table height sensor.

Has the surface of the paper feed roller been damaged?
Yes
Replace the roller.

Has the timing belt slipped off the paper feed roller pulley?


Reinstall the belt.

Has the plunger of the paper feed solenoid been pulled out?


Is there enough clearance between the paper feed sector gear stopper and the stopper pin?


Adjust the clearance (see section 5.6.6.7;
Replacement \& Adjustment; Paper Feed).
Does the paper feed solenoid energize?
$\rightarrow$ Check the paper feed solenoid in the I/O mode and the main PCB.

Is the paper feed sector gear turning normally?

## Yes <br> No

Check the sector gear mechanism.

Is the one-way clutch on the paper feed roller shaft slipping? (Paper is often not fed forward at high printing speeds.)

Yes
Lightly sand the roller shaft surface with fine sandpaper (this increases the coefficient of friction) or replace the clutch.

## 2. The paper's leading edge jams under the second feed roller

Does the upper second feed roller contact the lower second feed roller and are both rollers turning normally?


Is the paper detection pin moving normally?


Check the paper detection arm mechanism.

Is any paper stuck between the guide plates?


Remove the paper.

Are the guide plates at the correct height?
No
Adjust the height of the plates (see section 5.6.6.4;
Replacement \& Adjustment; Lower Guide Plate Adjustment).

## 3. The paper's leading edge jams under the drum

Is printing pressure correctly applied to the drum?
Yes ${ }^{\text {No }}$
Does the printing pressure solenoid turn on?


Check the solenoid in I/O check mode and the main board.

Is the clearance between the printing pressure stopper and the printing pressure arm correct?

No Adjust the clearance (see section 5.7.7.6;
Replacement \& Adjustment; Printing Pressure Solenoid Clearance Adjustment).

Is the printing pressure timing correct?
Yes $\quad$ No
Adjust the timing (see section 5.7.7.4; Replacement \&
Adjustment; Pressure Timing Adjustment).
Is the paper detection pin moving smoothly?
Yes No
Check the paper detection arm mechanism.

Is the upper second feed roller moving normally? (The upper second feed roller should move up when the pressure roller contacts the drum.)

No
Adjust the roller up/down timing (see section 5.6.6.9;
Replacement \& Adjustment; Adjusting the Feed Length of the Second Feed Roller).

## 4. Paper frequently jams or is not fed during high speed printing (but not at low printing speeds)

Is the surface of the paper feed roller damaged or defective?


Is the timing belt of the paper feed roller slipping?

| No | $\begin{array}{l}\text { Yes } \\ \longrightarrow\end{array}$ Adjust the belt tension. |
| :--- | :--- |

Is the one-way clutch on the paper feed roller shaft slipping?


Is there enough clearance between the paper detection arm and the pressure release arm?


Is the printing pressure cam timing correct? (If not, the maximum printing area cannot be created.)

No
Adjust the cam timing (see Replacement \& Adjustment; Pressure Timing Adjustment).

## 5. Paper frequently jams at the sorter

Is the paper table shifted more than 3 mm ?
No $\quad$ Yes
Install the paper table movement eliminators, or change the positions of the paper table movement limit switch brackets. (Refer to the sorter and LCT installation procedures.)

Is the print speed higher than 60 rpm ?
No $\quad$ Yes
Reduce the print speed using VR 106 on the main PCB. (If the print speed is higher than 60 rpm , the bin movement cannot keep up with the printing speed.)

Is paper properly held on the transport belt?


Check the transport vacuum fan motor.

Is the paper trailing edge caught by the bin entrance?
Yes
Increase the transport belt speed using SP mode No. 20. (If the belt speed is too fast, the paper will be arranged in the bins poorly.)

## DOCUMENT FEEDER C562

## 1. OVERALL MACHINE INFORMATION

### 1.1 SPECIFICATIONS

Original Type:
Original Paper Size:

Original Weight:
ADF Original Capacity:

Sheet-feed
Maximum $307 \mathrm{~mm} \times 432 \mathrm{~mm}$ (12.0" x 17.0") Minimum $90 \mathrm{~mm} \times 140 \mathrm{~mm}$ (3.6" x 5.5")
$40.7 \mathrm{~g} / \mathrm{m}^{2}$ to $127.9 \mathrm{~g} / \mathrm{m}^{2}, 10.8 \mathrm{lb}$ to 34 lb
50 sheets ( $66 \mathrm{~g} / \mathrm{m}^{2}, 17.6 \mathrm{lb}$ )
42 sheets ( $80 \mathrm{~g} / \mathrm{m}^{2}, 20 \mathrm{lb}$ ) or $4.2 \mathrm{~mm}, 0.15^{\prime \prime}$ height

### 1.2 MECHANICAL COMPONENT LAYOUT



1. Original Exit Tray
2. 2nd Original Transport Roller
3. 1st Original Transport Roller
4. Feed Roller
5. Separation Roller
6. Pickup Roller

### 1.3 ELECTRICAL COMPONENT LAYOUT



| 1. Original Exit Sensor | 5. ADF Motor |
| :--- | :--- |
| 2. Scan Line Sensor | 6. ADF Interface Board |
| 3. Original Registration Sensor | 7. Original Width Sensor |
| 4. ADF Cover Sensor | 8. Original Set Sensor |

COMPONENT DESCRIPTION

| Index No. | Name | Function |
| :---: | :--- | :--- |
| 1 | Original Exit Sensor | Informs the CPU when the original exits the <br> ADF. Also used to detect original misfeeds. |
| 2 | Scan Line Sensor | Determines the timing for scanning. Also used <br> to detect original misfeeds. |
| 3 | Original Registration <br> Sensor | Determines the timing for the ADF motor. Also <br> used to detect original misfeeds. |
| 4 | ADF Cover Sensor | Informs the CPU when the ADF cover is <br> opened. |
| 5 | ADF Motor | Drives the mechanisms in the ADF. |
| 6 | ADF Interface Board | Controls the ADF in response to signals from <br> the main body. |
| 7 | Original Width Sensor | Informs the CPU of the original width. |
| 8 | Original Set Sensor | Informs the CPU when an original is placed in <br> the ADF. |

## 2. SECTIONAL DESCRIPTIONS

### 2.1 DRIVE MECHANISM


[G]: Original Set Sensor
[H]: 1st Original Transport Roller

In the service program mode, the ADF motor [A] is listed under two (2) different names. The ADF Drive motor and the original feed motor. When the ADF rotates in the clockwise (cw) direction, to drive the pick-up roller it is listed as the ADF drive motor (output - 2). When the ADF motor rotates in the counter clockwise (ccw) direction to drive the original transport roller it is listed as the original feed motor (output - 33).

The ADF motor [A] is a stepper motor. The ADF motor rotates clockwise and then counterclockwise to feed the original. When the Master Making key is pressed, the ADF motor will rotate clockwise to drive the pick up roller [B] and the feed roller [C] turns clockwise to feed the top page of the original. When the original has been fed 14.5 mm after the original registration sensor [D] was activated, the ADF motor will start to rotate counterclockwise. This will drive the lower 1st original transport roller [E] and the lower original exit roller [F] counterclockwise, feeding the original.

[I]: Original Set Sensor
[J]: Feed Roller
[K]: 1st Original Transport Roller
[L]: Exposure Glass
[M]: 2nd Original Transport Roller
[N]: Original Exit Sensor
[O]: Scan Line Sensor
[P]: Original Registration Sensor
[Q]: Separation Roller
[R]: Original Paper Path

### 2.2 PAPER FEED AND SEPARATION



When the originals are placed on the ADF and the Master Making key is pressed, the pickup roller [A] will start to rotate as it is lowered by the spring clutch $[B]$ to touch the top page of the document. The original shutter [C] is lowered by the spring clutch and the lever [D] when the ADF motor rotates in the clockwise (cw) direction. The separation roller [E] and the feed roller [F] will allow only one page into the scanner. The one-way clutch on the feed roller will prevent its backward rotation when the ADF motor [G] rotates in the counterclockwise (ccw) direction.
The pick-up and the shutter torque are adjustable by the length of the spring. See Pick-up Torque Adjustment and Shutter Torque Adjustment for details.

### 2.3 ORIGINAL SIZE DETECTION



There are 4 sensors (photointerrupters) for detecting the width of the original. When the front original guide [E] is shifted to match the original width, the plate $[\mathrm{F}]$ moves with the guide. Eight actuators are located on the plate, and depending on the side guide position, the sensor status will be changed.
The following table shows the relationship between the paper size and the sensor status.

| Original Size | A3 | DLT | B4 | LT/LG | A4 | B5 | A5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Original Size Sensor-0 | O | X | O | X | X | O | X |
| Original Size Sensor-1 | X | O | O | X | X | O | O |
| Original Size Sensor-2 | X | X | O | O | O | O | X |
| Original Size Sensor-3 | X | X | X | X | O | O | O |

X= Non-blocked, O= Blocked

* : All of the above original sizes are for lengthwise feed.


### 2.4 ORIGINAL MISFEED DETECTION

The machine will indicate an original misfeed during the following conditions.

- When the original registration sensor does not go ON within 3 seconds after the ADF motor starts rotating (clockwise).
- When the scan line sensor does not go ON within 2.5 seconds after the original registration sensor is turned on.
- When the original exit sensor does not go ON after the scan line sensor is turned on and the original has been fed 60 millimeters.


### 2.5 ADF OPEN/CLOSE DETECTION



The ADF set sensor detects whether the ADF unit is opened or closed. The sensor is a reed switch. A magnet mounted on the ADF [A] cover will activate the reed switch $[B]$. When an original is placed in the ADF, if this reed switch is not activated, the Master Making key is disabled. The machine will display the message "CLOSE PLATEN COVER", the machine will indicate this condition when the optional ADF unit is installed.

### 2.6 ADF POSITION DETECTION



When the ADF cover $[A]$ is opened, the platen cover position sensor $[B]$ is deactivated. When this sensor is deactivated, the Master Making key is disabled. The machine will display the message "CLOSE ADF COVER".

## 3. INSTALLATION PROCEDURE

### 3.1 ACCESSORY CHECK



Make sure that you have all the accessories listed below.
(1) Document Feeder Unit
(2) Bracket (2 pcs.)
(3) Screw and a Toothed Washer
(4) Thumb Screws (4 pcs.)
(5) Test Chart
(6) Installation Procedure
(7) Decal Kit

### 3.2 INSTALLATION PROCEDURE



1. Turn off the main switch and unplug the power cord.
2. Open the Platen Cover, remove 4 screws $[A]$ and remove the Platen Cover.
3. Remove 3 screws $[B]$ and remove the Upper Rear Cover.
4. Remove 2 screws [C] and remove the cover plate.
5. Feed the DF connector through the opening and mount the DF Unit as shown in the diagram [D].
6. Secure the DF Unit with the 4 screws that were removed in step 2.

7. Close the DF and connect the connector to the scanner connector [A].
8. Secure the wire $[\mathrm{B}]$ by the screw and the washer in the accessory.
9. Secure the DF Harness Bracket by 2 screws [C].
10. Replace the Upper Rear Cover by 3 screws.
11. Secure the machine by placing 2 brackets [D] on the back of the table using 4 thumb screws in the accessory.

## $\triangle$ CAUTION

The brackets must be attached to the back of the table. This is to prevent the machine from falling over when the ADF is opened. Also, ensure that the machine is secured to the table.

After the ADF unit is installed model, change the SP mode setting as follows:
12. Press the Clear modes, Clear, Multi Copy and Enter(\#) keys to access SP mode.
13. Change the setting of SP8 from 0 to 1 . Then press the Enter key to store the setting.
14. Press the clear mode key to exit the SP modes.
15. Ensure that Dip switch DPS102 - BIT 4 is set to the on position. Refer to section 4.2.3.1.

After installing the optional ADF, verify the following adjustments.

- ADF height adjustment. Refer to section 7.5.18.
- Image scan magnification adjustment. Refer to section 7.5.20.
- Image center adjustment (side to side). Refer to section 7.5.21.


## 4. SERVICE TABLES

### 4.1 USER'S MAINTENANCE

Advise the customer to clean each item regularly. Clean the following items at every EM call if necessary.

| Cleaning Point | Cleaner |
| :---: | :---: |
| Original Feed Rollers | Cloth, soap, and water |

### 4.2 PERIODIC INSPECTION

Inspect the following every 6 months.

| Item | Standard Procedure |
| :--- | :--- |
| Pick-up Roller <br> Feed Roller <br> Separation Roller | Wipe off paper powder using a cloth moistened with water. |

## 5. REPLACEMENT AND ADJUSTMENT

### 5.1 ADF UNIT REMOVAL



1. Remove the upper rear cover [A] of the main frame (3 screws).
2. Disconnect the connector $[B]$, and remove the screw [C] that holds the ground wire.
3. Remove the DF harness bracket [D] (2 screws).
4. Open the ADF unit and remove the four screws [E] that hold the ADF unit hinge.
5. Slide the unit to the right and remove the ADF unit from the machine.

NOTE: When reinstalling the ADF unit, perform the following adjustments:
ADF Height Adjustment, refer to section 7.5.18.
Image Center Adjustment, refer to section 7.5.20
Image Scan Magnification Adjustment, refer to section 7.5.2.

### 5.2 ADF COVER REMOVAL



1. Remove the screws $[A]$ securing the ADF cover (8 screws).
2. Disconnect the original size detector harness [B].
3. Remove the harness protector [C] (2 screws).

### 5.3 ADF UPPER UNIT REMOVAL



1. Remove the ADF cover (see section 7.5.2).
2. Open the ADF unit $[A]$ and remove two stopper screws $[B]$.
3. Remove the ground wire [C] ( 1 screw, 1 toothed washer).
4. Disconnect the connector [D].
5. Remove the collar [E] (1 Allen screw).
6. Remove the ADF upper unit [A] (2 bushings, 1 E-ring).

### 5.4 SEPARATION ROLLER REMOVAL



1. Remove the ADF cover (see section 7.5.2).
2. Remove the two stopper screws [A] and fully open the ADF upper unit.
3. Remove the lower guide plate [B] (2 screws).
4. Remove the screw [C] that holds the separation roller [D], and remove the separation roller.

NOTE: When replacing the separation roller, perform the separation torque adjustment (see section 7.5.15).

### 5.5 ORIGINAL SET SENSOR REMOVAL



1. Remove the ADF cover (see section 7.5.2).
2. Remove the two stopper screws [A] and fully open the ADF upper unit.
3. Remove the lower guide plate [B] (2 screws).
4. Remove the sensor bracket [C] (2 screws) and remove the original set sensor [D].

### 5.6 ORIGINAL REGISTRATION SENSOR REMOVAL



1. Remove the ADF cover (see section 7.5.2).
2. Remove the two stopper screws and fully open the ADF upper unit (see the previous page).
3. Remove the sensor bracket [A] (2 screws) and remove the original registration sensor [B].

### 5.7 PICK-UP ROLLER AND FEED ROLLER REMOVAL



1. Remove the ADF cover (see section 7.5.2).
2. Remove the two stopper screws and fully open the ADF upper unit (see section 7.5.5).
3. Remove the E-ring [A] and remove the pick-up roller drive gear [B].
4. Remove the upper guide plate [C].
5. Remove the pick-up roller [D].
6. Remove the clip and remove the feed roller [E].

### 5.8 SCAN LINE SENSOR REMOVAL



1. Remove the ADF upper unit (see section 7.5.3).
2. Remove the sensor bracket [A] (1 screw).
3. Remove the scan line sensor [B] (1 connector).

### 5.9 ORIGINAL EXIT SENSOR REMOVAL

## [B]



1. Remove the ADF unit (see section 7.5.1).
2. Remove the sensor bracket [A] (1 screw).
3. Remove the original exit sensor $[B]$ (1 connector).

### 5.10 ADF COVER SENSOR REMOVAL



1. Remove the ADF cover (see section 7.5.2).
2. Remove the ADF upper unit (see section 7.5.3).
3. Remove the lower guide plate (2 screws). Not shown
4. Remove the transport guide plate [A] (4 screws).
5. Open the ADF unit and peel away the platen sheet $[B]$ to access the ADF cover sensor [C].
6. Remove the ADF cover sensor.

### 5.11 TRANSPORT ROLLER REMOVAL



1. Remove the ADF cover (see section 7.5.2).
2. Remove the ADF upper unit (see section 7.5.3).
3. Loosen the screws [A] that hold the front and rear belt tension brackets.
4. Remove the transport guide plate $[B]$ (4 screws).
5. Remove the front pulley [C] (1 screw).
6. Remove the rear pulley [D] (1 clip).
7. Remove the transport roller [E] (2 bushings).

NOTE: A one-way clutch is installed in the rear pulley [D]. Install the pulley in the proper direction.

### 5.12 ADF MOTOR REMOVAL



1. Remove the ADF cover (see section 7.5.2).
2. Loosen the screw $[\mathrm{A}]$ securing the belt tension bracket.
3. Disconnect the motor harness $[B]$.
4. Remove the motor bracket [C] (2 screws, 1 timing belt).
5. Remove the ground wire [D] (1 screw).
6. Remove the ADF motor [E] (2 screws).

NOTE: 1. When reinstalling the motor bracket, push down the bracket as shown, then tighten the four screws.
2. After reinstalling the timing belt, ensure that the screw $[A]$ is tighten.

### 5.13 PICK-UP TORQUE ADJUSTMENT



Purpose: To ensure that the originals are picked-up properly.
Adjustment Standard: $25.0 \pm 0.3 \mathrm{~mm}$

1. Remove the ADF cover (see section 7.5.2).
2. Remove the two stopper screws $[A]$ and fully open the ADF upper unit.
3. Remove the gear $[\mathrm{B}]$ (1 E-ring) and remove the upper guide plate [C] (4 screws).
4. Confirm that the length of the spring on the separation roller shaft is 25.0 $\pm 0.3 \mathrm{~mm}$.
5. If it is not within the specified range, loosen the Allen screw [D] and adjust the collar position.
NOTE: After this adjustment, ensure that if the separation roller shaft rotates smoothly.

### 5.14 SHUTTER TORQUE ADJUSTMENT



Purpose: To ensure that the original shutter functions properly.
Adjustment Standard: $20.5 \pm 0.3 \mathrm{~mm}$

1. Remove the ADF cover (see section 7.5.2).
2. Remove the two stopper screws [A] and fully open the ADF upper unit.
3. Remove the lower guide plate [B] (2 screws).
4. Confirm that the spring length is $20.5 \pm 0.3 \mathrm{~mm}$.
5. If the value is not within the specified range, loosen the screw [C] and adjust the spring length by sliding the collar.
If the original is not transported after moving the stopper, extend the spring length.
If original multi-feed occurs, shorten the spring length.

### 5.15 SEPARATION ROLLER TORQUE ADJUSTMENT



Purpose: To ensure that the top original is properly separated from the original stack.
Adjustment Standard: $19.0 \pm 0.3 \mathrm{~mm}$

1. Remove the ADF cover (see section 7.5.2).
2. Remove the two stopper screws [A] and fully open the ADF upper unit.
3. Remove the lower guide plate [B] (2 screws).
4. Check the separation torque spring length.
5. If the length is not within the specified range, turn the hexagon bolts [C] to adjust the separation roller torque.

### 5.16 ORIGINAL SKEW ADJUSTMENT



Purpose: To correct original skew.

1. Open the ADF unit.
2. Loosen the screw $[\mathrm{A}]$ and move the adjustment plates to correct the skew.
3. After adjusting the skew, tighten the plate properly.

### 5.17 ORIGINAL SEPARATION PRESSURE ADJUSTMENT



Purpose: To ensure that the top original is properly separated from the original stack.

1. Remove the ADF cover (see section7.5.2).
2. Remove the two stopper screws $[A]$ and fully open the ADF upper unit.
3. Remove the lower guide plate [B] (2 screws).
4. Loosen the screw [C] securing the pressure adjusting lever [D] then move the lever to change the pressure.
Original non-feed: Move the lever towards "A" (to decease the pressure).
Original multi-feed: Move the lever towards " B " (to increase the pressure).
After adjusting the pressure, tighten the screw [C].

### 5.18 ADF HEIGHT ADJUSTMENT



Purpose: To ensure that the image can be properly scanned.
Adjustment Standard: Less than 0.5 mm

1. Slide the scanner unit to the left $[A]$.
2. Remove two positioning pins (white) [B] located under the scanner unit. Then, attach them to the ADF as shown in the diagram.
3. Close the ADF and ensure that the gap [C] between the positioning pins and the scanner upper cover is less than 0.5 mm , use a thickness gauge.
4. If not, adjust the ADF height as follows.
$4-1$. Remove the upper rear cover (see section 5.1 of the main frame's manual).
4-2. Loosen the nut [D] and adjust the height by turning the knob screw [E]. Then, tighten the nut.
5. After adjusting the ADF height position, return the positioning pins back in their previous position (under the scanner unit).

### 5.19 IMAGE SCAN MAGNIFICATION ADJUSTMENT

Purpose: To correct the sub-scan magnification.
Adjustment Standard: $100 \pm 0.5 \%$ in full size mode.

1. Using a test chart, make a print in ADF mode.
2. Check if the sub-scan magnification is within the specified range.
3. If it is out of the specified range, adjust the sub-scan magnification using SP36.

### 5.20 IMAGE CENTER ADJUSTMENT (SIDE-TO-SIDE)

Purpose: To correct the center position of the printed image.
Adjustment Standard: Less than 1 mm
NOTE: Before adjusting the image center position in ADF mode, adjust the image center for platen mode.

1. Using a test chart, make a print using both ADF mode and platen mode.
2. Compare both copies and check that the difference between the two copies is within 1 mm .
3. If the difference is not within the specified range, adjust the image center using SP39-1.

### 5.21 SCANNER LEADING EDGE REGISTRATION ADJUSTMENT

Purpose: To adjust the vertical image position of the prints with that of the original.
Adjustment Standard: The scanning starts at 5 mm after the leading edge.
NOTE: When performing this adjustment, set the print speed and image position to the standard position.

1. Using a test chart, make a print in ADF mode.
2. Check the scanner start position and adjust the scanner leading edge registration using SP38.

## DOCUMENT FEEDER C550

## 1. OVERALL MACHINE INFORMATION

### 1.1 SPECIFICATIONS

Original Type:
Original Paper Size:

Original Weight:
ADF Original Capacity:

Sheet-feed
Maximum $307 \mathrm{~mm} \times 432 \mathrm{~mm}$ (12.0" x 17.0") Minimum $90 \mathrm{~mm} \times 140 \mathrm{~mm}\left(3.6 \mathrm{x} \times 5.5^{\prime \prime}\right)$
$40.7 \mathrm{~g} / \mathrm{m}^{2}$ to $127.9 \mathrm{~g} / \mathrm{m}^{2}, 10.8 \mathrm{lb}$ to 34 lb 20 sheets ( $66 \mathrm{~g} / \mathrm{m}^{2}, 17.6 \mathrm{lb}$ ) or 1.8 mm height

### 1.2 MECHANICAL COMPONENT LAYOUT



1. Original Exit Tray
2. 2nd Original Transport Roller
3. 1st Original Transport Roller
4. Separation Roller
5. Feed Roller
6. Pick-up Roller

### 1.3 ELECTRICAL COMPONENT LAYOUT



1. Original Exit Sensor
2. ADF Motor
3. Scan Line Sensor
4. ADF Interface Board
5. Original Registration Sensor
6. Original Width Sensor
7. ADF Cover Sensor
8. Original Set Sensor

## COMPONENT DESCRIPTION

| Index No. | Name | Function |
| :---: | :--- | :--- |
| 1 | Original Exit Sensor | Informs the CPU when the original exits the <br> ADF. Also used to detect original misfeeds. |
| 2 | Scan Line Sensor | Determines the timing for scanning. Also used <br> to detect original misfeeds. |
| 3 | Original Registration <br> Sensor | Determines the timing for the ADF motor to <br> start. Also used to detect original misfeeds. |
| 4 | ADF Cover Sensor | Informs the CPU when the ADF cover is <br> opened. |
| 5 | ADF Motor | Drives the ADF mechanisms. |
| 6 | ADF Interface Board | Controls the ADF in response to signals from <br> the main body. |
| 7 | Original Width Sensor | Informs the CPU of the original width. |
| 8 | Original Set Sensor | Informs the CPU when an original is placed in <br> the ADF. |

## 2. SECTIONAL DESCRIPTIONS

### 2.1 DRIVE MECHANISM



In the Service Program Mode, the ADF motor is listed under two (2) different names, the ADF drive motor and the original feed motor. When the motor rotates in the clockwise (cw) direction to drive the pickup roller, it is listed as the ADF drive motor (output - 2). When the motor rotates in the counterclockwise (ccw) direction to drive the original transport roller, it is listed as the original feed motor (output - 33).

The ADF motor [A] is a stepper motor. The ADF motor rotates clockwise and then counterclockwise to feed the original. When the Master Making key is pressed, the ADF motor rotates clockwise to drive the pick-up roller $[\mathrm{B}]$ and the feed roller [C] turns counterclockwise to feed the bottom page of the original. When the original has been fed 14.5 mm after the original registration sensor $[F]$ was activated, the ADF motor starts to rotate counterclockwise. This drives the lower 1st original transport roller [H] and the lower original exit roller [E] counterclockwise, feeding the original.

[I]: Original Set Sensor
[J]: Feed Roller
[K]: 1st Original Transport Roller
[L]: Exposure Glass
[M]: 2nd Original Transport Roller
[N]: Original Exit Sensor
[O]: Scan Line Sensor
[P]: Original Registration Sensor
[Q]: Separation Roller
[R]: Original Paper Path

### 2.2 PAPER FEED AND SEPARATION



When the originals are placed on the ADF and the Master Making key is pressed, the pick-up roller [A] will start to rotate as it is lifted by the spring clutch $[\mathrm{H}]$ to touch the bottom page of the document. The original shutter [C] is lifted by the spring clutch and the lever [G] when the ADF motor rotates in the clockwise (cw) direction. The separation roller [D] and the feed roller [B] allow only one page into the scanner. The one-way clutch on the feed roller [E] will prevent its backward rotation when the ADF motor [F] rotates in the counterclockwise (ccw) direction.

The pick-up and the shutter torque are adjustable by the length of the spring. See Pick-up Torque and Shutter Torque Adjustment for details.

### 2.3 ORIGINAL SIZE DETECTION



There are 4 sensors (photointerrupters) for detecting the width of the original. When the front original guide [E] is shifted to match the original width, the plate [F] moves with the guide. Eight actuators are installed on the plate, and depending on the side guide position, the sensor status will be changed.

The following table shows the relationship between the paper size and the sensor status.

| Original Size | A3 | DLT | B4 | LT/LG | A4 | B5 | A5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Original Size Sensor-0 | O | X | O | X | X | O | X |
| Original Size Sensor-1 | X | O | O | X | X | O | O |
| Original Size Sensor-2 | X | X | O | O | O | O | X |
| Original Size Sensor-3 | X | X | X | X | O | O | O |

$\mathrm{X}=$ Non-blocked, $\mathrm{O}=$ Blocked
*: All of the above original sizes are for lengthwise feed.

### 2.4 ORIGINAL MISFEED DETECTION

The machine will indicate an original misfeed during the following conditions.

- When the original registration sensor does not go ON within 3 seconds after the ADF motor starts rotating (clockwise).
- When the scan line sensor does not go ON within 2.5 seconds after the original registration sensor is turned on.
- When the original exit sensor does not go ON after the scan line sensor is turned on and the original has been fed 60 millimeters.


### 2.5 ADF OPEN/CLOSE DETECTION



The ADF set sensor detects whether the ADF unit is opened or closed. This sensor is a reed switch. A magnet mounted on the ADF cover will [A] activate the reed switch $[B]$. When an original is placed in the ADF and the Master Making key is pressed while this sensor detects that the ADF is not closed, the machine will indicate "CLOSE PLATEN COVER" on the operation display. The machine will indicate this condition only when the optional ADF unit is installed.

### 2.6 ADF POSITION DETECTION



When the ADF cover [ $A$ ] is opened, the platen cover position sensor $[B]$ is deactivated. When this sensor is deactivated, the master making key is disabled. The machine will display the message "CLOSE ADF COVER" on the operation display.

## 3. INSTALLATION PROCEDURE

### 3.1 ACCESSORY CHECK



Make sure that you have all the accessories listed below.
(1) Document Feeder Unit
(2) Bracket (2 pcs.)
(3) Screw and a Toothed Washer
(4) Thumb Screws (4 pcs.)
(5) Test Chart
(6) Installation Procedure
(7) Decal Kit


1. Turn off the main switch and unplug the power cord.
2. Open the Platen Cover, remove 4 screws $[A]$ and remove the Platen Cover.
3. Remove 3 screws $[B]$ and remove the Upper Rear Cover.
4. Remove 2 screws [C] and remove the cover plate.
5. Feed the DF connector through the opening and mount the DF Unit as shown in the diagram [D].
6. Secure the DF Unit with the 4 screws that were removed in step 2.

7. Close the DF and connect the connector to the scanner connector [A].
8. Secure the wire $[B]$ by the screw and the washer in the accessory.
9. Secure the DF Harness Bracket by 2 screws [C].
10. Replace the Upper Rear Cover by 3 screws.
11. Secure the machine by placing 2 brackets [D] on the back of the table using 4 thumb screws in the accessory.

## $\triangle$ CAUTION

The brackets must be attached to the back of the table. This is to prevent the machine from falling over when the ADF is opened. Also, ensure that the machine is secured to the table.

INSTALLATION PROCEDURE
After the ADF unit is installed, perform the following adjustments.

- ADF height adjustment. Refer to section 8.5.16
- Image center adjustment. Refer to section 8.5.18
- Image scan magnification adjustment. Refer to section 8.5.17
- Ensure that service program mode, SP8 is set to "0".
- Ensure that DIP switch DPS102. BIT 4 is set to the OFF position. Refer to section 4.2.3.1.


## 4. SERVICE TABLES

### 4.1 USER'S MAINTENANCE

Advise the customer to clean each item regularly. Clean the following items at every EM call if necessary.

| Cleaning Point | Cleaner |
| :---: | :---: |
| Original Feed Rollers | Cloth, soap, and water |

### 4.2 PERIODIC INSPECTION

Inspect the following every 6 months.

| Item | Standard Procedure |
| :--- | :--- |
| Pick-up Roller <br> Feed Roller <br> Separation Roller | Wipe off paper powder using a cloth moistened with water. |

## 5. REPLACEMENT AND ADJUSTMENT

### 5.1 ADF COVER REMOVAL



1. Remove the screws $[A]$ securing the ADF cover (8 screws).
2. Disconnect the original size detector harness [B].
3. Remove the harness protector [C] (2 screws).

### 5.2 ADF UNIT REMOVAL



1. Remove the ADF cover (see section 8.4.1).
2. Open the ADF unit $[A]$ and remove two stopper screws $[B]$.
3. Remove the grounding wire [C] ( 1 screw, 1 toothed washer).
4. Disconnect the connector [D].
5. Remove the collar [E].
6. Remove the ADF unit [A] (2 bushings, 1 E-ring).

### 5.3 SEPARATION ROLLER REMOVAL



1. Open the ADF unit [A].
2. Remove the separation guide plate $[B]$ (4 screws).
3. Remove the separation roller assembly [C] (1 screw).
4. Remove the separation roller [D].

NOTE: After replacing the separation roller, perform the separation torque adjustment (see section 8.5.14).

### 5.4 PICK-UP ROLLER AND FEED ROLLER REMOVAL



1. Remove the ADF cover (see section 8.4.1).
2. Remove two stopper set screws $[A]$ and open the ADF unit $[B]$.
3. Remove the guide plate [C] (4 screws).
4. Remove the sensor bracket [D] (2 screws).
5. Remove the pick-up roller [E] (1 clip).
6. Remove the bracket [F] (1 screw, 1 clip).
7. Remove the feed roller [G] (1 clip).

### 5.5 TRANSPORT ROLLER REMOVAL



## [E]



1. Remove the ADF cover (see section 8.4.1).
2. Remove the grip cover [A] (2 screws).
3. Remove two stopper set screws and open the ADF unit (see section 8.4.4).
4. Remove the guide plate (see section 8.4.4).
5. Remove the transport guide plate [B] (4 screws).
6. Loosen the screws [C] securing the belt tension bracket.
7. Remove the pulleys [D] (1 screw at the front, 1 clip at the rear).
8. Remove the transport roller [E] (2 bushings).

NOTE: When you reinstall the transport guide plate [B], ensure that the guide plate is positioned under the white plate [F].

### 5.6 ORIGINAL REGISTRATION SENSOR REMOVAL



1. Remove the ADF cover (see section 8.5.1).
2. Remove two stopper set screws $[A]$ and open the ADF unit.
3. Remove the separation guide plate [B] (4 screws).
4. Remove the sensor bracket [C] (2 screws).
5. Remove the original registration sensor [D] (1 connector).

### 5.7 ADF POSITION SENSOR REMOVAL



1. Remove the ADF cover (see section 8.5.1).
2. Remove two stopper set screws and open the ADF unit (see section 8.5.4).
3. Remove the guide plate (see section 8.5.4).
4. Remove the transport guide plate $[A]$ (4 screws).
5. Remove the ADF position sensor [B] (1 connector).

### 5.8 ORIGINAL SET SENSOR REMOVAL



1. Remove the ADF cover (see section 8.5.1).
2. Remove two stopper set screws $[A]$ then open the ADF unit [B].
3. Remove the guide plate [C] (4 screws).
4. Remove the harness clamp [D] (1 screw).
5. Remove the sensor bracket [E] and the bracket [F] (2 screws).
6. Remove the original set sensor [G] (1 connector).

### 5.9 SCAN LINE SENSOR REMOVAL



1. Remove the ADF unit (see section 8.5.2).
2. Remove the sensor bracket $[A]$ (1 screw).
3. Remove the scan line sensor [B] (1 connector).

### 5.10 ORIGINAL EXIT SENSOR REMOVAL



1. Remove the ADF unit (see section 8.5.2).
2. Remove the sensor bracket $[A]$ (1 screw).
3. Remove the original exit sensor (1 connector).

### 5.11 ADF MOTOR REMOVAL

## [A]



1. Remove the ADF cover (see section 8.5.1).
2. Loosen the screw $[A]$ securing the belt tension bracket.
3. Disconnect the motor harness $[B]$.
4. Remove the motor bracket [C] (2 screws, 1 timing belt).
5. Remove the ground wire [D] (1 screw).
6. Remove the ADF motor [E] (2 screws).

NOTE: - When reinstalling the motor bracket, slide the bracket slightly to the right as viewed when standing at the rear of the machine.

- After reinstalling the timing belt, ensure that the screw $[A]$ is tighten.


### 5.12 PICK-UP TORQUE AND SHUTTER TORQUE ADJUSTMENT

Purpose: To ensure that the originals are picked-up properly.
Adjustment Standard: The length of the spring for:
Pick-up: $23 \pm 0.5 \mathrm{~mm}$
Shutter: $26.5 \pm 0.5 \mathrm{~mm}$


1. Remove the ADF cover (see section 8.5.1).
2. Remove two stopper screws $[A]$ and open the ADF unit $[B]$.
3. Remove the guide plate [C] (4 screws).

4. Check that the length of the pick-up and shutter torque springs are within the following specifications.

Length of the pick-up spring [D]: $23 \pm 0.5 \mathrm{~mm}$
Length of the shutter spring [E]: $26.5 \pm 0.5 \mathrm{~mm}$
5. If they are out of the specified range, adjust the spring lengths by sliding the collar [F].
Original double feed: These springs should be shorter than the specification.
Original non-feed: These springs should be longer than the specification.

### 5.13 SEPARATION ROLLER PRESSURE ADJUSTMENT

Purpose: To ensure that the originals are fed properly.


1. Open the ADF unit [A].
2. Remove the separation guide plate [B] (4 screws).
3. Loosen the screw [C] securing the pressure adjustment lever [D] then move the lever to change the pressure.
Original non-feed: Move the lever towards [a] (decrease the pressure). Original double feed: Move the lever towards [b] (increase the pressure).
4. After adjusting the pressure, tighten the screw [C].

### 5.14 SEPARATION TORQUE ADJUSTMENT

Purpose: To ensure that the originals are fed properly.
Adjustment Standard: 450 gf (use a torque gauge)


1. Open the ADF unit and remove the separation guide plate $[A]$.
2. Adjust the separation torque by turning the bushing [B].

Original double feed: Turn the bushing in the direction [a] (increase the torque).
Original non-feed: Turn the bushing in the direction [b] (decrease the torque).

### 5.15 ORIGINAL SKEW ADJUSTMENT

Purpose: To correct original skew.


1. Open the ADF unit [A].
2. Move the adjustment plates $[B]$ to correct the skew.
3. After adjusting the skew, tighten the plate properly.

### 5.16 ADF HEIGHT ADJUSTMENT

Purpose: To ensure that the image can be properly scanned.
Adjustment Standard: Less than 0.5 mm


1. Slide the scanner unit to the left [A].
2. Remove two positioning pins (white) $[B]$ located under the scanner unit. Then, attach them to the ADF as shown in the diagram.
3. Close the ADF and ensure that the gap [C] between the positioning pins and the scanner upper cover is less than 0.5 mm , use a thickness gauge.
4. If not, adjust the ADF height as follows.
$4-1$. Remove the upper rear cover (see section 8.5 .1 of the main frame's manual.).
4-2. Loosen the nut [D] and adjust the height by turning the knob screw [E]. Then, tighten the nut.
5. After adjusting the ADF height, return the positioning pins back in their previous position (under the scanner unit).

### 5.17 IMAGE SCAN MAGNIFICATION ADJUSTMENT

Purpose: To correct the sub scan magnification.
Adjustment Standard: $100 \pm 0.5 \%$ in full size mode.

1. Using a test chart, make a print in ADF mode.
2. Check that the sub scan

3. If it is out of specification, adjust the sub scan
magnification using SP No. 36.

### 5.18 IMAGE CENTER ADJUSTMENT (SIDE-TO-SIDE)

Purpose: To correct the center position of the printed image.
Adjustment Standard: Less than 1 mm
NOTE: Before adjusting the image center position in ADF mode, adjust it in platen mode.

1. Using a test chart, make a print using both ADF mode and platen mode.
2. Compare both copies and check that the difference between the two copies is within 1 mm .
3. If the difference is too great, adjust the image center using SP No. 39-1.

### 5.19 SCANNER LEADING EDGE REGISTRATION ADJUSTMENT

Purpose: To adjust the scanner start position in accordance with the customer's request, or to adjust the vertical image position of the prints to match the original.
Standard Position: The scanning starts 5 mm after the leading edge.
NOTE: When performing this adjustment, set the print speed and the image position to the standard positions.

1. Using a test chart, make a print using ADF mode.
2. Check the scanner start position and adjust the scanner leading edge registration using SP No. 38.


## LARGE CAPACITY TRAY C563

## 1. OVERALL MACHINE INFORMATION

### 1.1 SPECIFICATIONS

Paper Size:

Paper Capacity:

Copy Paper Weight
Power Source:
Power Consumption:
Weight:
Dimensions:
(W x D x H)
Image Shifting:
(DC) $24 \mathrm{~V}, 5 \mathrm{~V}$

Less than 100W
Less than $37 \mathrm{~kg}, 82 \mathrm{lb}$
$550 \times 500 \times 688 \mathrm{~mm}, 21.7^{\prime \prime} \times 19.7^{\prime \prime} \times 27.1^{\prime \prime}$
The following paper sizes can be placed in the large capacity tray and the LCT cassette.
A3 $\square, B 4 \square, A 4 \square \square, B 5 \square \square, A 5 \square$,
11" x 17" $\square, 81 / 2 \times 14 " \square, 81 / 2^{\prime \prime} \times 11 " \square \square$ In addition, the following size can be placed in the LCT cassette.
A6 $\square$.
LCT: 4,000 sheets $\left(64 \mathrm{~g} / \mathrm{m}^{2}, 17 \mathrm{lb}\right)$ 3,000 sheets $\left(80 \mathrm{~g} / \mathrm{m}^{2}, 20 \mathrm{lb}\right)$
Cassette: 500 sheets ( $64 \mathrm{~g} / \mathrm{m}^{2}, 17 \mathrm{lb}$ ) 400 sheets ( $80 \mathrm{~g} / \mathrm{m}^{2}, 20 \mathrm{lb}$ )
$47.1 \mathrm{~g} / \mathrm{m}^{2}$ to $209.3 \mathrm{~g} / \mathrm{m}^{2}, 12.5 \mathrm{lb}$ to 55.6 lb
$\pm 10 \mathrm{~mm}( \pm 3 \mathrm{~mm}$ if the optional sorter is installed)
*Sorter is not available in the USA.

### 1.2 MECHANICAL COMPONENT LAYOUT



1. Bottom Plate
2. Tray Drive Belt
3. Tray Drive Motor
4. Tray Shift Motor
5. Feed Unit Base

### 1.3 ELECTRICAL COMPONENT DESCRIPTION

| Index. No. | Description | Note |
| :---: | :---: | :---: |
| Sensors |  |  |
| 1 | Cassette Size | Determines the size paper in the cassette. |
| 3 | Paper Length | Detects the paper length. |
| 5 | Maximum Paper Load | Informs the printer CPU when the LCT bottom plate is at the lowest position for loading paper, and that no more paper can be loaded. |
| 10 | Paper Size 0 | Determines the paper size is in the tray. |
| 11 | Paper Size 1 | Determines the paper size is in the tray. |
| 12 | Paper Size 2 | Determines the paper size is in the tray. |
| 13 | Paper Size 3 | Determines the paper size is in the tray. |
| 9 | Tray Lower limit | Turns off the tray drive motor when the tray has reached the lowest possible position (for loading the cassette). |
| 20 | LCT Paper End | Detects the presence of paper in the LCT. |
| 21 | Cassette Paper End | Detects the presence of paper in the cassette. |
| 17 | Tray Paper Position | Detects the top of the LCT tray or the paper stack when adding paper. |
|  |  |  |
| Switches |  |  |
| 2 | Cassette | Informs the printer CPU when the cassette is installed. |
| 4 | Cover Open | Detects if the LCT cover is open. |
| 8 | Rear Shift Limit | Turns off the tray shift motor when the feed unit base reaches the rear end. |
| 14 | Front Shift limit | Turns off line to the tray shift motor when the feed unit base reaches the front end. |
| 16 | Tray Down | Lowers the LCT bottom plate when pressed by the user. |
| 19 | Image Position | The tray shift motor moves forward or in reverse when pressed by the user. |
|  |  |  |
| Motors |  |  |
| 6 | Tray Drive | Lifts the LCT bottom plate to bring paper to the feed position and lowers the plate to allow paper to be loaded. |
| 7 | Tray Shift | Moves the feed unit base from front to rear to shift the LCT bottom plate, in order to shift the image position. |
| 18 | Cassette Bottom Plate Drive | Lifts the cassette bottom plate. |
|  |  |  |
| PCBs |  |  |
| 15 | I/O Control | Controls all the LCT operations. |

### 1.4 BASIC OPERATION



- Overview -

The LCT bottom plate $[\mathrm{A}]$ is moved up and down by the tray drive motor (a reversible motor) [B]. Drive from the tray drive motor is transmitted through the worm gear [C], worm wheel, drive pulley [D] to the drive belts [E]. The drive belts are connected the ends of the LCT bottom plate.

The bottom plate is controlled so that the top of the paper stack is in one of two basic positions: the paper feed position or the standby position. The paper feed position is used during printing, and at all other times, the standby position is used. When in the standby position, the top of the paper stack is lowered until the tray paper position sensor is activated. When in the standby position the user can add about 1,000 sheets of paper.

## - Power-up -

When the main switch is turned on, the tray drive motor will lift the LCT bottom plate until the top of the paper stack on the plate is at the standby position. This is the initialization procedure for the bottom plate position.

The bottom plate is lifted until the top sheet pushes up the feed roller and the paper table height sensor in the main body is de-actuated (this is the paper feed position; refer to "Printing" for more details). Then, the tray drive motor will lower the bottom plate until the top of the paper stack or the plate is just below the tray paper position sensor [F] (a photocoupler), which is turned off at this time. This is the standby position.

If there is no paper or only a small amount of paper on the bottom plate, the tray paper position sensor will turn on then off soon after (because the bottom plate will pass the sensor), before the top sheet is pushed up to the feed roller. When this happens, the bottom plate will stop rising immediately and will be lowered until the top of the paper stack returns to the standby position (the tray paper position sensor turns on then back off again). This process allows the initialization to be completed more quickly.

## - Printing -

When the Print Start key is pressed, the bottom will plate start rising from the standby position. It will stop when the top sheet pushes the paper feed roller and the paper table height sensor in the main body is deactuated (this is the paper feed position). The machine can now start to feed.

As pages are printed, the top sheet position becomes lower, and eventually the main body's paper table height sensor is actuated. When this occurs, the tray drive motor will raise the bottom plate until the paper height sensor is de-actuated again; this will keep the top sheet of paper at the paper feed position.

When a printing job is completed or a paper misfeed occurs, the tray drive motor will slightly lower the bottom plate (for 500 ms ). If the tray paper position sensor is turned off (this is possible when there is only a small amount of paper on the bottom plate and the paper stack is in between the sensor and the paper feed roller), the bottom plate will move down until the tray paper position sensor is just activated by the bottom plate. This is to allow the user to add paper. It is not possible to add paper by pressing the tray down switch if the tray paper position sensor remains off (refer to the Adding Paper section below).

Unlike after a normal printing job, after a proof printing made, (one sheet is fed each time the Proof Printing key is pressed), the bottom plate is not lowered. This is to save time for the top sheet to reach the paper feed position when the print key is pressed.

If paper runs out during printing, the paper end condition is detected by the LCT paper end sensor (a photocoupler). The bottom plate will move down until the tray paper position sensor is turned on then off (it will stop in the standby position). Then, the user can add paper.

## - Adding Paper -

The bottom plate can be lowered by pressing the tray down switch only when the tray paper position sensor is turned on. This is because if the sensor stays off, the top of the paper stack (or the bottom plate if there is no paper) is in the standby position. The user can add paper without lowering the bottom plate in this case.

When the top of the paper stack is above the tray paper position sensor (the sensor is On) and the tray down switch is pressed, the tray drive motor will lower the bottom plate until the top sheet of the remaining paper stack has just passed the tray paper position sensor (the sensor turns off). This will provide enough space for the user to add about 1,000 sheets of paper.

If the tray down switch is then pressed again after adding paper (the tray paper position sensor is turned on), the bottom plate will move down and again will stop once the top sheet was just passed the tray paper position sensor. This operation can be repeated until the maximum paper load sensor [G] is actuated by the actuator [H] on the bottom plate. Then, the bottom plate cannot be lowered any further and no more paper can be added.

## - Installing the Cassette -

With the LCT cover raised, press the tray down switch for 2 seconds. When the bottom plate starts to lower, release the switch. The bottom plate will continue to move downward until the tray lower limit sensor [i] detects the actuator on the bottom plate.

## 2. DETAILED SECTION DESCRIPTIONS

### 2.1 TRAY SHIFT MECHANISM


[D]

Image shifting is carried out by shifting the LCT unit to the front or to the rear. When the forward image position switch [A] is pressed, the tray shift motor (a reversible motor) $[B]$ will rotate in the counterclockwise (ccw) direction to rotate the shift shaft [C] clockwise. The shaft will move the feed unit base [D] of the LCT unit towards the rear of the machine. Thus, the image is shifted in the forward direction.

When the rearward image position switch $[\mathrm{A}]$ is pressed, the tray shift motor $[B]$ will rotate in the clockwise(cw) direction to rotate the shift shaft [C] counterclockwise. The shaft will move the feed unit base [D] of the LCT unit towards the fromt of the machine. Thus, the image is shifted in the rearward direction.

### 2.2 PAPER SIZE DETECTION



The rear side fence $[A]$ and front side fence $[B]$ can be slid to change the paper size. This is accomplished by loosening a knob screw and sliding the rear end fence to the paper size. The rear side fence has an actuator plate [C] mounted on its underside. There are four sensors photo-interrupters: paper size sensor 0 [D], 1 [E], 2 [F], and 3 [G] on the bottom shaft for detecting paper width and one the paper length sensor on the bottom plate (not shown) for detecting the paper length. The printer CPU will determine the paper size by reading the combination of signals from the sensors.

### 2.3 CASSETTE LOADING MECHANISM

### 2.3.1 BOTTOM PLATE DOWN



When the tray down switch is held down for longer than 2 seconds, the bottom plate [A] will lower until the tray lower limit sensor detects the actuator on the bottom plate (refer to "Basic Operation"). When the bottom plate passes the position of the maximum paper load sensor [B], the side fences $[C]$ will be lowered with the bottom plate until the tray lower limit sensor detects the bottom plate. The openings [D] in the side fences will allow the bottom plate to be lowered to the maximum paper load sensor position and the side fences to be lowered with the bottom plate.

### 2.3.2 CASSETTE LOADING



The printer CPU will detect that the cassette is loaded in the printer when the cassette switch $[A]$ is pressed. When the cassette is loaded and the LCT cover $[B]$ is closed, the cassette bottom plate drive motor [C] will raise the bottom plate [D] by lifting the bottom plate lever [E] until the top sheet pushes the feed roller upward and the main body's paper table height sensor is de-actuated. Then, the cassette bottom plate drive motor will stop.

When the LCT cover is opened, the cassette bottom plate drive motor will rotate in the reverse direction for 5 seconds to lower the bottom plate. The cassette size sensor (composed of 5 photointerrupters) [F] are used to detect the cassette tray paper size. The cassette size sensor is actuated by a plate located on one corner of the cassette. Each paper size has its own unique combination of notches in the actuator plate. The CPU will read which photointerrupters have been activated and deactivated by the actuator plate to determine the paper size that has been loaded in the cassette.

## 3. INSTALLATION PROCEDURE

NOTE: The original table (unit code C564) is necessary to install this LCT.

### 3.1 ACCESSORY CHECK

Check the accessories in the box against the following list.

1. Installation Procedure
1
2. Decal - Operation ........................................................ 1
3. Decal - Paper Change.

1
4. Right Paper Guide Plate .............................................. 1
5. Left Paper Guide Plate.................................................. 1
6. Paper Feed Small Cover.............................................. 1
7. Positioning Bracket ...................................................... 1
8. Short Connector ............................................................ 1
9. Knob Screw................................................................. 2
10. Nylon Clamp................................................................ 1
11. Flange Head Screw - M4 x 8 ....................................... 1
12. Philips Screw with Flat Washer - M4 x 6...................... 3
13. Cassette ....................................................................... 1

### 3.2 INSTALLATION PROCEDURE



During the installation of the large capacity tray unit, the following assemblies and associated hardward will be removed from the VT3800.

1. Noise reduction cover (step 5)
2. Guide plate (step 6)
3. Paper table gear (step 8)
4. Paper table holder (step 11)
5. Rack shafts and rollers (step12)
6. Paper table (step 13)
7. Support Bracket, (paper table safety switch) (step 15)
8. Paper feed bottom plate (step 16)
9. Remove the strips of tape [A].
10. Place the base pad [B] on the table [C].
11. Place the VT3800 [D] on the table.
12. Remove the following covers from the printer: right front cover, left cover, paper feed cover, and rear cover. Do not remove the right cover. Refer to section 5.1.1.
13. Loosen the screw $[E]$ and slide it in the direction of the arrow. Then remove the noise reduction cover [F].
14. Remove the guide plate [G] (one screw each).


15. Remove the Image Processing PCB [A] and main control PCB [B]. The boards are removed to gain access to the side frame components.
16. Remove the gear [D] (1 E-ring) to enable free movement of the paper table [E].
17. Raise the paper table and disconnect the two connectors [J] at the front side.
[C] [D]


[A]
[I]

18. Remove the two screws holding the grounding wires [A]. Remove the harness clamper securing the grounding wires. (Keep the screws and washers for installing the grounding wire in step 22.)
19. Remove the paper table holder [B] (1 screw).
20. Remove the rack shafts [C] and rollers [D]. (can use a \#10 spanner.) Remove the paper table securing bracket [E].
21. Remove the paper table [F].
22. Disconnect the connector $[\mathrm{H}]$ of the paper table safety switch and install the short connector [I] packed with the LCT.
23. Remove the support bracket [D] (4 screws). (This is not necessary after installing the LCT.)
24. Remove the paper feed bottom plate [G] (4 screws).
25. Reinstall the three screws that were removed in step 9, to secure the paper table drive motor bracket [J]. Reinstall the image processing PCB and the main control PCB.

26. Install the positioning bracket [A] (2 screws with washer).
27. Position the main body so that the two pins [B] on the bracket fit into the two openings in the table. Then fix the main body to the table with the two knob screws [C].
28. Remove the two screws [E] installed on the stay at the back side of the LCT.
29. Set the left and right guide plates [F and G] on the LCT, and fix them with the 2 screws [E].
30. Remove the paper feed cover. [H].


NOTE: Take care not to damage the connector of the harness where the front upper cover is connected.
23. a) Remove the upper, front lower, rear upper, rear lower, and right covers of the LCT.
b) Change the positions of both the switch brackets $[A]$ inward.
c) Reassemble all the LCT covers except for the front upper cover.
24. Pass the connector harness $[\mathrm{B}]$ through the bracket cutout as shown. Connect the 6 pin connector [C] from the LCT to the harness connector from the printer. Connect the 22 pin connector [D] to the main board [E]. Fix the grounding wire [F] as shown ( 1 screw and toothed washer).
25. Secure the LCT harness with the harness clamper [G] (flange head screw - M4 x 8).
26. Push the LCT against the printer to connect the units. Turn the LCT legs $[\mathrm{H}]$ until each leg just contacts the floor.

28. Secure the LCT position indicator arm [A] to the inside of the printer side plate (Philips screw with flat washer M4 x 6 [B]).
NOTE: If the screw cannot be fixed, readjust the LCT leg height. Ensure that the indicator arm and the edge [C] of the printer side plate are parallel.
29. Fix the LCT to the table with the two knob screws [D].

NOTE: Ensure that the positioning pin projects from the center opening [ $E]$ between the two knob screws.
30. Remove the magnet [F] ( 2 screws). Then install the paper feed small cover [G] instead with two Philips screws with flat washer M4 x $6[H]$.
NOTE: Push the paper feed small cover [G] to the uppermost position, then secure it

[E]

30. Adhere the Decal-Paper Change [A] onto the Lower Paper Table Decal [B].
31. Adhere the decal [C] under the illustration decal on the paper feed small cover. Open the LCT cover [D] and adhere the lever position decals [E] as shown.
32. Install the left and right front covers by loosing the screws of the left cover.
33. Reinstall the front upper cover [F] of the LCT and rear cover of the printer.
34. Check the LCT operation.

## 4. SERVICE TABLES

### 4.1 SERVICE REMARKS

1. When the printer and LCT are moved to another place to comply with a customer request, first remove the LCT from the printer.
2. If any adjustment or operation check have to be made with exterior covers off or open, note that the LCT bottom plate may move down and up while the main switch is turned on. Keep hands away from mechanically driven components, especially under the LCT bottom plate and the space between the right cover and LCT bottom plate.
3. Do not raise the LCT bottom plate while the LCT is removed from the printer and the LCT harness is connected to the printer. Otherwise, the bottom plate will continue to be lifted upward and mechanical damage may occur.

### 4.2 PM TABLE (Every 6 months)

I: Inspect L: Lubricate C: Clean

| Section | $\mathbf{6}$ Months | Notes |
| :---: | :---: | :--- |
|  <br> Switches | I,C | Clean with a blower brush. |
| bottom Plate | C | Clean with a dry cloth and blower brush. |
| Tray Drive Worm <br> Gear, Wheel | I, L | Grease (Shell Albania No. 2): Lubricate after <br> cleaning. <br> Ensure that the bottom plate can be lifted up and <br> down smoothly without abnormal noise. |
| Tray Shift Shaft | I, L | Oil: Lubricate after cleaning. <br> Ensure that the LCT can be shifted front to rear <br> smoothly without abnormal noise. |
| Bushings | L | Oil: Lubricate after cleaning. |
| Gears | L | Grease (Shell Albania No. 2): Lubricate after <br> cleaning. |

## 5. REPLACEMENT AND ADJUSTMENT

### 5.1 TRAY DRIVE BELT TENSION ADJUSTMENT



1. Remove the LCT from the printer.
2. Loosen the tension plate screws $[A]$.
3. Push the tension plate up, until the tension shaft $[B]$ contacts the bottom of the opening [C] then secure the screws.

### 5.2 HORIZONTAL ADJUSTMENT OF THE BOTTOM PLATE



1. Remove the paper from the LCT bottom plate.
2. Raise the bottom plate until the tray paper position sensor detects the bottom plate, then turn off the printer main switch.
3. Remove the LCT from the printer.
4. Confirm that the heights $[A]$ at the three indicated positions are within 1.5 mm .
5. If not, loosen the screws $[B]$ on the joints $[C]$ and adjust the joint positions until the heights $[\mathrm{A}]$ at the three positions are within 1.5 mm .

### 5.3 IMAGE POSITION INDICATOR ADJUSTMENT



NOTE: Take care not to damage the harness in step 1.

1. Using the Image Position switch [A], position the paper tray at the center. (The paper tray is at the center when the distance between the base and the front shift limit switch equals the distance between the base and the rear shift limit switch.)
2. Remove the indicator cover ( 2 screws and 1 connector).
3. Loosen the screw [B].
4. Adjust the indicator [C] to the center.
5. Re-tighten the screw.
6. Reassemble the machine.
7. Perform the image center adjustment in the platen mode (SP39-0) and image center adjustment in the ADF mode (SP39-1).

### 5.4 COVER OPEN SWITCH BRACKET POSITION ADJUSTMENT



1. Lift up the LCT cover [A] 20 mm as shown. Verify that the cover open switch has turned off.
2. If not, move the bracket $[B]$ by loosening the screw [C].

## PCRIP-10

## Priport Controller

## Installation Guide

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## 1. INTRODUCTION

The Priport Controller is an external PostScript® and PCL-5® compatible processor designed to add a computer interface to Priport Digital Duplicators. Since it is separate from the Priport, the designers were able to use high-speed techniques making it one of the fastest add-on processors available.

The Controller uses a high-speed 25 megahertz Intel 960-CF RISC microprocessor chip to achieve its high speed processing. In addition the Controller contains 4 Megabytes (Mb) of RAM which can be upgraded to 16 Mb.

This product features Pipeline Associates' PowerPage ${ }^{\mathrm{TM}}$ interpreter, a widely recognized LaserWriter® compatible implementation of Adobe's® PostScript interpreter. The PowerPage interpreter offers users excellent quality and performance in handling the thirty-five industry standard Type 1 compatible fonts built into the Controller. Pipeline Associates' PCL-5 compatible interpreter is also built into the Controller providing the eight standard Intellifont ${ }^{\text {TM }}$ PCL-5 fonts.

The Controller supports several models of Priport Digital Duplicators with print resolutions of 300 dots per inch (dpi). The U.S. page sizes supported by the Priport Controller are US Letter, US Legal and US $11 \times 17$. Supported international page sizes are A3, A4, B4 and B5.

We reserve the right to make amendments to the technical specifications and/or the external appearance of the equipment without prior notice.

### 1.1 SYSTEM REQUIREMENTS

## Supported Priports:

- Models VT1730, VT2105, VT3600 and VT3800


## Compatible computers:

- IBM 286, 386, 486 and compatible PC's
- Apple Macintosh

Memory requirements:

- The Priport Controller places no requirements on the RAM in the PC or Macintosh.


### 1.2 INSTALLATION PROCEDURE:

1. Ensure that the Priport is turned off and disconnected from the power source.
2. Prior to installation, set the dip switch DPS101 on the new Video Interface Board to the correct setting for the Model VT3800 Priport.

Number 1, 2, 3: ON (up)
Number 4: OFF (down)
3. Remove the Front Cover Panel from the Priport.
4. Mount the Interface Board Bracket onto the chassis at the right side of the Image Processing PCB using the Phillips M4x6 screw with flat washer. The bracket is used to support the upper right corner of the Video Interface PCB. Refer to figure 1.


FIGURE 1 - Front View of frame with Mounting Hardware
5. Mount the Short Stud (Gray) onto the chassis at the lower left corner of the Image Processing PCB. The stud is used to support the lower left corner of the Video Interface PCB.
6. Attach one end of the short I/O Ribbon Cable to the connector labeled, CN405 on the Image Processing PCB.
7. Attach the upper right corner of the Video Interface PCB to the bracket installed in step 4, using a Phillips M3x6 screw with flat washer. Refer to figure 2.


FIGURE 2 - Front View of frame with Video Interface PCB
8. Remove the lower right corner screw on the Image Processing PCB. Thread the Phillips M3x5 screw with flat washer through the mounting hole in the lower right corner of the Video Interface PCB, through the Board Spacer (White Nylon) and into the mounting hole in the lower right corner of the Image Processing PCB (where the screw was previously removed). Tighten the screw.
9. Attach the lower left corner of the Video Interface PCB to the stud installed in step 5, using a Phillips M3x6 screw with flat washer. Note that the upper left corner of the Video Interface PCB is not secured.
10. Attach the other end of the short I/O Ribbon cable to the connector along the right edge of the Video Interface PCB labeled, CN102.
11. Remove the screws securing the Main Power Cable Harness to the Cable Channel to allow the cable channel to drop downward.
12. Remove the Rear Cover Panel from the Priport.
13. Working from the rear of the machine, thread the small connector, labeled "AMP" of the Interface Harness with Bracket through the cable channel to the front of the machine.
14. Attach the connector labeled, "AMP" of the Interface Harness to the port labeled, CN101 on the Video Interface PCB.
15. Reposition the cable channel and reinstalled the screws removed in step 11.
16. On the rear side of the Priport, install the two (2) Long Studs (Black) into the chassis above the cable channel. Refer to figure 3.


FIGURE 3 - Rear View of Frame
17. Attach the bracket end of the Interface Harness to the Long Studs installed in step 16 using two (2) Phillips M4x8 screws.
18. Remove the Communication Port Cover from the lower center of the Rear Cover Panel.
19. Reinstall the Front and Rear Cover Panels.
20. Refer to section 9.5 for the proper cabling configuration.
21. Refer to "Priport Controller User's Guide" (located after section 9.8) for theproper set-up and operation procedures.

### 1.3 PARTS LISTING:

INTERFACE UNIT - 10 TYPE 3 KIT
DESCRIPTION
QUANITY
Interface Harness with Bracket ..... 1
Video Interface PCB ..... 1
Phillips screw with flat washer - M3x25 ..... 1
Phillips Screw with flat washer - M3x6 ..... 2
Phillips Screw with flat washer - M4x6 ..... 1
Phillips Screw - M4x8 ..... 2
Long Stud (Black) Interface Bracket ..... 2
Short Stud (Gray) ..... 1
Board Spacer (White Nylon) ..... 1
Interface Board Bracket ..... 1
I/O Ribbon Cable ..... 1

### 1.4 CABLING BETWEEN PCRIP-10 AND COMPUTER

The cable to be installed now is one that the customer has purchased to match his specific computer and communication port choice. The correct cable for each computer and communication port is described generally below. (For more detailed technical information on cables, see page 10-12).

## A. IBM and compatibles - Parallel

1. Make sure that the customer's computer is turned off.
2. Attach the DB-25 Male end of a standard PC parallel printer cable to the customer designated parallel output port on the rear of the computer. Record the choice of LPT1 or LPT2 because this port name will be required during the configuration process.
3. Attach the other end (36-pin Centronics Male) of a standard PC parallel printer cable to the input port on the rear of the PCRIP-10 labeled "Parallel In".


Figure A - Parallel Connection

## B. IBM and compatibles - Serial

1. Make sure that the customer's computer is turned off.
2. Attach the DB-25 Female end of a standard PC serial printer cable to the customer designated serial output port on the rear of the computer. Record the choice of COM1 or COM2 because this port name will be required during the configuration process.
3. Attach the other end (DB-25 Male) of a standard PC serial printer cable to the input port on the rear of the PCRIP-10 labeled "Serial In".


## C. Macintosh computers - AppleTalk Standard

1. Make sure that the customer's computer is turned off.
2. Attach one 8-pin mini DIN Male end of a standard Macintosh printer cable to the printer output port on the rear of the computer.
3. Attach the other end (8-pin mini DIN Male) of a standard Macintosh printer cable to the input port on the rear of the PCRIP-10 labeled "AppleTalk".


Figure C - AppleTalk Connection

### 1.5 SYSTEM VERIFICATION AND DEFAULT CONFIGURATION

## Now that the physical installation is complete, you are ready to start the system verification.

1. Plug in all components of the system and turn them on in this order:
2. Computer
3. Priport
4. PCRIP-10
5. Look at the two lights located in the lower left corner below the product label. The left hand light indicates "Power-on". It will stay on as long as the PCRIP-10 is receiving power.
6. The right hand light indicates "Ready". It will come on for a few seconds at Power-on and then go off for up to 60 seconds while the PCRIP-10 runs its internal diagnostics. If the Ready light comes back on and stays on, the PCRIP-10 has passed its startup diagnostics and verified communication with the Priport.
7. If the Ready light flashes quickly, the PCRIP-10 has not been able to verify communication with the Priport.
A. First, check to see if the Priport is plugged in and turned on.
B. Next, check to see that the cable from the PCRIP-10 to the Priport is securely seated in the ports at each end.
C. If the Ready light does not come on after these steps, turn off the PCRIP-10 and then the Priport.

- Check to see that the small "AMP" connector of the Interface Harness is securely fastened to the connector on the Video Interface PCB.
- Check to see that the I/O Ribbon Cable which connects the Video Interface PCB to the image processing board inside the Priport is securely fastened as well. Then, turn on the Priport and the PCRIP-10. Watch the Ready light again to see if it comes on briefly, goes off for approximately 30-60 seconds and then comes back on. If so, you are ready to proceed. If not, contact your local service organization for help.

5. If the Ready light fails to come on at all, the PCRIP-10 has been damaged, contact your local service organization for help.
6. Push the On Line button on the Priport Control Panel. The Priport must be On Line for the Priport to accept input from the computer through the PCRIP-10. (If the Priport is not On Line, the scanner in the Priport will be enabled instead.) If the green On Line light comes on, skip to Step 8.
7. If the On Line light does not come on, check to see that the new ROM was installed as described in Step 5 of the Installation Procedure and is seated firmly in its socket. Try the On Line key again. If the On Line light comes on, skip to Step 8. If not, contact your local service organization for help.
8. Turn the PCRIP-10 off. Install the Diagnostic Plug P/N DP000001 (optional test tool) in the port labeled Diagnostic on the rear of the PCRIP-10 and turn it back on again. The PCRIP-10 will send an internal PostScript file to the Priport which will output a Diagnostic Status page. This page includes PostScript font samples as well as configuration status from the PCRIP-10. (An example of this page can be found on page 10-37 of the Priport Controller User's Guide.)
9. The configuration status information found in the lower left corner of the page should match the following factory default settings:

Selected Page Size: US Letter (in US and Canada) or A4 (International)Controller RAM size: 4 Megabytes Mode: Postscript Compatibility
(The number which follows "Controller Firmware Rev:" will vary according to when the PCRIP-10 was manufactured. This firmware revision number will be needed only if you must contact your local service organization about technical problems with this PCRIP-10 unit.)

## Now that you have verified that the PCRIP-10 can successfully send files to the Priport, you are ready to proceed with configuring the PCRIP-10. Turn to page 10-23 of the User's Guide to continue.

### 1.6 CABLE PIN-OUT DIAGRAMS

A. PARALLEL INTERFACE CABLE (CENTRONICS) PIN-OUT CONNECTIONS:
DB-25 Pin Male Centronics

1. ..... 1
2. ..... 2
3 ..... 3
4 ..... 4
3. ..... 5
6 ..... 6
4. ..... 7
5. ..... 8
6. ..... 9
10 ..... 10
11 ..... 11
12 ..... 12
13 ..... 13
15 ..... 32
18-25 ..... 19-30
B. PARALLEL INTERFACE CABLE (CENTRONICS) PIN ASSIGNMENTS:

| Signal | Pin | Signal | Pin |
| :---: | :---: | :---: | :---: |
| -Strobe (Input) | .. 1 | GND | 19 |
| Data 1 (Input) | .... 2 | GND | 20 |
| Data 2 (Input) | .. 3 | GND | 21 |
| Data 3 (Input) | ... 4 | GND | 22 |
| Data 4 (Input) | .. 5 | GND. | 23 |
| Data 5 (Input) | .... 6 | GND. | 24 |
| Data 6 (Input) | .... 7 | GND. | 25 |
| Data 7 (Input) | .... 8 | GND. | 26 |
| Data 8 (Input) |  | GND. | 27 |
| -Acknlg (Output) .... | .. 10 | GND. | 28 |
| Busy (Output) ........ | . 11 | GND. | 29 |
| Paper Error (Output). | .. 12 | GND | 30 |
| Select (Output) ....... | . 13 | NC.. | 31 |
| NC. | .. 14 | -Error. | 32 |
| NC | .. 15 | +5 VDC (Output) |  |
| 0 VDC. | .. 16 | NC.................... | 34 |
| GND | .. 17 | +5 VDC (Output) |  |
| +5 VDC (Output) ... | .. 18 | NC... | .. 36 |

The dash (-) before some signals indicates that the signal is negative true (active LOW). GND means the connection is a ground. NC indicates that the pin has no connection.

## C. SERIAL INTERFACE CABLE PIN-OUT CONNECTIONS:

Controller ..... PC
DB-25 Pin Male DB-25 Pin Female
1 ..... 1
2 ..... 3
3 ..... 2
5, 6 ..... 20
7 ..... 5
8 ..... 7
20 ..... 5, 6
ControllerPC
DB-25 Pin Male ..... DB-9 Pin Female
2 2
3. ..... 3
4. ..... 1
5, 6 ..... 4
7. ..... 5
8. ..... 7
20 ..... 6, 8
NOTE: The cable pin-outs shown above are recommended; however, any standard serial printer cable should work.
D. SERIAL INTERFACE CABLE PIN ASSIGNMENTS FOR CONTROLLER:
Signal ..... Pin
Protective ground shield ..... 1
Transmitted data from the Controller (Output) ..... 2
Received data by the Controller (Input) ..... 3
Request to send (Output) ..... 4
Clear to send (Input) ..... 5
Data set ready (Input) ..... 6
Signal ground ..... 7
(Not Used) ..... 8
Data terminal ready (Output) ..... 20

### 1.7 RAM UPGRADE PROCEDURE

The RAM in the PCRIP-10 consists of four (4) - 1 Megabyte by 8 (or 9 ) Single-Inline-Memory-Modules (SIMMs) running at 70 nanoseconds. A SIMM consists of a very small (appr. 3/4" inch by $31 / 2^{\prime \prime}$ inches) printed ciruit board (PCB) with 30 contact fingers which plug into sockets on the main board of the PCRIP-10. Dynamic RAM memory chips which are soldered on to this small PCB can communicate with each other through the wiring in the board and with the main board through the 30 contact fingers. The actual physical number of DRAM chips installed on the SIMM can be either 2 or 8 for $1 \mathrm{Mb} \times 8$ (3 or 9 for $1 \mathrm{Mb} \times 9$ ) depending on the density of the chips. (See Figure 1.)


Figure 1 - SIMM
"1 Megabyte X 8" (or 9 ) describes a SIMM with 1 Megabyte usable storage which sends data out 8 bits (or 9 bits) at a time.
"70 nanoseconds" describes how fast the memory can respond in billionths of a second to commands from the Intel CF processor chip on the main board of the PCRIP-10.

## HOW TO UPGRADE RAM TO 16 MEGABYTES

To upgrade the PCRIP-10 to 16 Megabytes of RAM from the factory standard, contact either a local computer dealer or an electronic component distributor about purchasing parts with the following description:

Four (4) - 4 Megabyte $X 8$ (or 9) SIMMs with 30 contact fingers running at 70 nanoseconds (ns) While SIMMs of this variety are available in both 70 and 80 ns speeds, BE CERTAIN TO PURCHASE ONLY SIMMS WHICH RUN AT 70 NS! Due to the high speed of the Intel CF processor chip, SIMMs running at 80 nanoseconds will not work in the PCRIP-10.
NOTE: Please take appropriate precautions for preventing static discharge throughout this procedure.

1. Turn off and disconnect all cables to the PCRIP-10.
2. Slide the metal chassis of the controller from its plastic housing.
3. Remove the 3 screws from each side and 2 screws from the backpanel which hold the chassis lid in place.
4. Remove the chassis lid and set it aside.
5. With the chassis oriented with the 2 LED's facing you, the 4 SIMMs to be replaced are located directly to your right. (See Figure 2.) Main PCB


## NOTE: BE VERY CAREFUL NOT TO BREAK ANY PORTION OF THE SIMM SOCKET OR SOCKET CLIP WHEN REMOVING OR INSTALLING SIMMS. THIS IS AN ITEM WHICH CAN BE REPAIRED ONLY BY REPLACING THE MAIN BOARD AT THE FACTORY!

6. Starting with the SIMM in the socket closest to you, gently move the clip on one end of the socket to release the edge of the SIMM.
7. Gently move the clip on the other end of the socket to release the other edge. When both edges are released the SIMM will rotate forward (toward you) at a 45 degree angle.
8. Carefully remove the existing SIMM by pulling it towards you and set it aside.
9. Repeat Steps 6 through 8 for each of the remaining SIMMs, each time moving to the next socket away from yourself.
10. Starting with the SIMM socket farthest away from you, with the notched edge of the SIMM pc board on your right, insert one of the new 4 Megabyte X 8 (or 9) SIMMs in the socket at a 45 angle (toward you). The insertion angle for the new SIMMs is the same angle you used when removing the previous SIMMs.
11. Gently rotate the top of the SIMM away from you until you see the clips on each end of the socket engage. Check to see if the prongs of the clips are inserted in both of the small holes at each end of the SIMM. When correctly inserted, the SIMM should be firmly seated in the socket.
12. Repeat Steps 10 and 11 for each on the remaining SIMMs, each time moving to the next socket closer to you.
13. To verify that the SIMM installation was successful, reattach the chassis lid to the chassis and reconnect all cables including the power cable to the PCRIP-10.
14. Install the Diagnostic Plug in the Diagnostic Port on the backpanel of the PCRIP-10.
15. Power on the PCRIP-10. A Diagnostic Status Page should be output to the Priport which confirms the "Controller RAM size" as 16 Megabytes. If the Diagnostic Status Page is correct, you may skip to Step 18. If the Diagnostic Status Page does not reflect the upgrade to 16 Megabytes of RAM, go to Step 16. If the Diagnostic Status Page does not output at all and the PCRIP-10 Ready light is off, go to Step 17.
16. If the Diagnostic Status Page still shows only 4 Megabytes as the "Controller RAM size", you need to recheck that each of the 4 SIMMs you just installed match the specification of "4 Megabytes X 8" or "4 Megabytes X 9" as given above. The PCRIP-10 startup diagnostic routine has checked the RAM and only found 4 Megabytes. BE SURE TO TURN OFF AND UNPLUG THE CONTROLLER BEFORE MAKING ANY FURTHER CHANGES TO THE SIMMS. When the changes are completed, repeat Steps 13 through 15 to verify successful installation before continuing to Step 18 for reassembly.
17. If a Diagnostic Status Page was not output to the Priport at all, the PCRIP-10 startup diagnostics routine has checked the RAM in the PCRIP-10 and found an error that prevented any further operation. BE SURE TO TURN OFF AND UNPLUG THE CONTROLLER BEFORE MAKING ANY FURTHER CHANGES TO THE SIMMS. When the changes are completed, repeat Steps 13 through 15 to verify successful installation before continuing to Step 18.

- First, check to see if all the SIMMs are properly seated in their sockets. There should be no movement from side to side and very little movement up and down if the SIMMs are properly seated.
- Next, verify that the newly installed SIMMs are, in fact, 70 ns in speed. As mentioned in the purchase specification above, 80 ns SIMMs do not respond quickly enough to work with the Intel CF processor in the PCRIP-10 and can not be used!
- Check that all the newly installed SIMMs are 4 Megabyte X 8 (or 9) and that you have not accidently reinstalled one of the 1 Megabyte X 9 SIMMs you removed.
- If none of the steps above have solved the problem, it is possible, though highly unlikely, that one of the new SIMMs is defective. If the SIMMs were purchased from reputable dealer or distributor, these components should have been tested and should also be replaceable under warranty.

18. Make sure the PCRIP-10 is turned off and that the Diagnostic Plug and all cables are removed.
19. Make sure that the chassis lid is reattached with 8 screws--3 on each side and 2 on the backpanel.
20. Slide the metal chassis back into the plastic housing. Be careful to line up the two LED's on the front of the chassis with the holes cut in the front panel of the plastic housing for them.

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# Priport Controller 

## User's Guide

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### 1.8 REGULATORY NOTICES

## FCC REGULATIONS

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded interconnect cables must be employed with this equipment to insure compliance with the pertinent RF emission limits governing this device.

Changes or modifications not expressly approved by Elesys, Inc. could void the user's authority to operate the equipment.

### 1.9 TRADEMARKS

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### 1.10 HARDWARE INSTALLATION

1. The Controller is connected by cables between both the computer and the Priport. (The computer and Priport are not directly connected to each other.) The inputs to the Priport Controller replicate those of a standard printer, including Parallel, RS-232 Serial and AppleTalk® inputs. Simply remove the cable from the printer and insert it into the appropriately labeled connector on the backpanel of the Controller. DO NOT CONNECT A SERIAL CABLE TO THE DIAGNOSTIC PORT.
2. The Controller is connected from the Priport port on its backpanel to the input port on the back of the Priport. The required cable is a standard IBM-PC parallel printer cable which is included with the Controller.
3. Cabling Diagrams:

## Parallel Connection



Serial Connection


AppleTalk Connection


### 1.11 PRIPORT CONTROLLER CONFIGURATION

1. Factory Settings:

The Controller comes preset with the following factory defaults:

| - Input Buffers: | Parallel Inputs -256 Kb |
| :--- | :--- |
|  | Serial Inputs -4 Kb |
|  | AppleTalk - Not applicable |
| - Page Size: | US Letter $\left(8-1 / 2^{\prime \prime} \times 111^{\prime \prime}\right)$ for U.S. and Canada |
|  | A4 (210mm $\times 297 \mathrm{~mm})$ for International |
| - Mode: | PostScript compatible |

2. Controller Configuration Programs:

Three diskettes have been provided with the Controller: one $51 / 4$ " and one $31 / 2^{\prime \prime}$ for IBM and compatible computers and one 3 1/2" for Apple Macintosh computers. Each of these configuration programs allows you to change the factory settings of the Controller (including the ones listed above) until the next power down of the Controller or permanently if desired.

NOTE: See Step 9 on page 10-26 on how to save configuration changes you have made with an IBM and compatible computers. See Step 5 on page 10-29 on how to save configuration changes made with an Apple Macintosh.

### 1.12 CONFIGURATION OF IBM PC AND COMPATIBLES

The configuration program is menu-driven and has been designed to be very simple to use. (If you will be changing output page size regularly, you should copy these files to your hard disk.) When the initial configuration is completed and saved, you should rarely need to use this program disk.

- If you have the Controller connected to your IBM PC or compatible output port labeled LPT1 and you wish to output in PostScript mode with the default page size listed above, you will not need to use this program to make any configuration changes from the factory settings.
- If you have the Controller connected to your IBM PC or compatible to an output port labeled LPT2, COM1, or COM2, or wish to change to PCL-5 mode, or wish to change to any page size other than the default page size listed above, you will need to use this program.
- If you have more than one computer (IBM compatibles and/or a Macintosh) connected to the Controller, you should be cautious about switching modes between PostScript and PCL-5 compatibility. To achieve the best output results, both IBM compatibles should output files in the same mode. Also, if the Controller is set in PCL-5 mode for the IBM's, the Macintosh will be locked out because it can only send PostScript compatible files.

Step 1. Insert the Utility Disk in drive A. (If you are copying these files to your hard disk, first create a subdirectory named PCRIP. At the DOS prompt type md PCRIP <ENTER> Next, type cd PCRIP <ENTER> At the C:\PCRIP prompt, type COPY A:*.* <ENTER> and skip to Step 3.)

Step 2. Type A: <ENTER>
Step 3. Type PCRIP <ENTER> (The Main Menu Bar will appear across the top of the screen.)

## File Page Install PC Port Input Bufrs Special Help Quit

The "Help" Menu item explains the general function of each item in the menu bar. The first item on each of the pull-down menus is context-sensitive help. This item describes the functions of all the other items available on whatever pull-down menu you have open.

Step 4. Use the right arrow key to move the highlight over the "PC Port" pull-down menu and <ENTER> The selections available are: Printer Port LPT1, Printer Port LPT2, Printer Port COM1, Printer Port COM2, Printer Port to LOG file, and Printer Port to NULL.

Step 5. Use the up or down arrow keys to highlight the correct PC output port and <ENTER>. This port selection should match the name of the physical port on the back of your computer that is connected by cable to the Controller. Any selection from any menu will move you back up to the main menu bar.

If you selected COM1 or COM2, you must select the "PC Port" pull-down menu again to specify a baud rate. The selections available are: Com Port Baud Rate 1200, Com Port Baud Rate 2400, Com Port Baud Rate 4800, Com Port Baud Rate 9600 and Com Port Baud Rate 19.2K. This selection will tell the Controller what speed to expect data from your computer. Most serial port users should select "Com Port Baud Rate 19.2K".

Step 6. Use the left arrow key to move the highlight back to the "Install" pull-down menu and <ENTER>. The selections available are:
Set PostScript compatible input, Set PCL-5 compatible input, Enable AppleTalk, Disable AppleTalk, Reset to Factory Config, Print Test File, Print Diagnostic Status Page, Save
Configuration Changes. You must use this menu to select PCL-5 mode or to re-select PostScript mode if you have previously selected PCL-5 mode. You may also use items from this menu to permanently save the configuration settings you have made during this session, turn AppleTalk on or off, print a test page, print the diagnostic status page or reset the Controller back to the original factory settings. Just use the up or down arrow keys to highlight your choice and <ENTER>.

Step 7. Use the left arrow key to move the highlight back to the "Page" pull-down menu and <ENTER>. The selections available are: Page Size A4, Page Size B4, Page Size B5, US Letter, US Legal. You must use this menu to select an output page size other than the factory default. Just use the up or down arrow to highlight your new output page size and <ENTER>.

Step 8. If your computer is connected to the Controller through COM1 or COM2, OR if it is the only computer connected, you may also want to change the input buffers. The larger the input buffer, the faster your print job will be processed, however there is a limited amount of memory to be allocated to input buffers. Use the right arrow key to move the highlight to "InputBufrs" pull-down menu and <ENTER> . The selections available are: Parallel Input Buffer Size = OK, Parallel Input Buffer Size = 256K, Parallel Input Buffer Size $=256$ K, Serial Input Buffer Size $=0 \mathrm{~K}$ and Serial Input Buffer Size = 64K. If you are the only computer user hooked to the Controller, you should select the maximum available. For a single computer connected to COM1 or COM2, use the down arrow key to select "Serial..$=\mathbf{6 4 K}$ ". For a single computer connected to LPT1 or LPT2, use the down arrow to choose "Parallel...$=512 \mathrm{~K}$ ", though the factory default of 256 K should be adequate.

Step 9. When all the configuration changes are completed, you must decide if you want to make them permanent. If you do not complete this step, any changes you have made this session will be lost the next time the Controller is turned off. If you do complete this step, the Controller will remember any changes you have made through all power cycles. Use the right or left arrow to highlight the "Install" pull-down menu and <ENTER>. Use the down arrow key to select "Save Configuration Changes" and <ENTER>. You can change
and save the configuration settings of the Controller as often as you wish.

The two remaining Main Menu items, "File" and "Special", provide functions which may be useful during setup or reconfiguration of the Controller.

The following selections are available in the "File" menu: Print a File, Eject Page, Info About this Program and Quit (Exit) this Program. To print an output file from the hard disk or a diskette as a test of the configuration before saving or exiting the program, you would use the "Print a File" command. To clear the Input Buffer of the Controller or to create a master for a blank page, you would use the "Eject Page" command. To check the revision number of the PCRIP program which you are using, you would choose "Info About this Program". You may also exit the program from this menu.

The following selections are available in the "Special" menu: Set Inter-Job Timeout Value, Disable Formfeed between Jobs, Enable Formfeed between Jobs and Enter Executive Mode. The factory default setting for Inter-Job Timeout Value is 20 seconds. In other words, if the Controller does not receive any data from the computer for more than 20 seconds, the Controller will assume that the print job is complete and signal the start of master making in the Priport. Some software applications, specifically Windows-based programs which generate graphic-intensive output, may require a longer timeout value. If you use the "Set Inter-Job Timeout Value" to change this setting, we recommend that you increase the timeout value in 10 second increments until you achieve the desired output results. The factory default setting also has Formfeed Enabled. If the PCL-5 output file does not include a formfeed, the Controller will automatically generate one. You may turn this feature off with "Disable Formfeed between Jobs" and turn it back on with "Enable Formfeed between Jobs". This menu also provides an advanced PostScript feature called "Executive Mode" which allows direct entry of PostScript programming commands from the keyboard of the computer.

### 1.13 CONFIGURATION OF MACINTOSH COMPUTERS

The utility disk contains a program called "FontDownLoader" and 13 small PostScript format files. These files contain the instructions for changing the output page size, printing the diagnostic status page, saving configuration changes permanently and numbering multiple Controllers if more than one Controller is connected to the same AppleTalk network. (If you will be changing the output page size regularly, you should copy the entire PCRIP Utility folder onto your desktop or hard disk.)

- The files which will be used most frequently are the output page size selection files. They are "A4", "B4", "B5", "US Letter" and "US Legal".
- If you wish to verify that the page size selection is correct, you can select "Diagnostic Status Page." This file will generate a one page print-out of PostScript font samples as well as a listing of the current Controller settings at the bottom of the page. See Appendix A for an example of this Diagnostic Status Page output.
- If you have more than one Controller installed on an AppleTalk network, you will need to add a number to its name so that Appletalk can distinguish between the Controller units. The file names are "Priport \#1", "Priport \#2", "Priport \#3", etc. If you only have one Controller installed on the AppleTalk network, you will not need to use these files at all.
- If you have changed the output page size or the name/number of the Controller and wish to retain that change as the Controller's power on default, you will also need to use "Save Config Changes."

Step 1. Insert the Priport Controller Disk in the drive and double click on the floppy icon to open it.

Step 2. Double click on the Priport Controller folder to open it and then double click on "DownLoader 5.0.1". (A new window will NOT appear on the screen but a new smaller menu bar with only three pull-down menus--File Edit Special--will appear.)
Step 3. Under the File Menu, the selections available are: Download Font and Download PostScript File and Quit. Double click on Download PostScript File. (A dialog box listing the 13 possible file choices will appear on the screen.)

Step 4. Point and click to select the file which will make the desired configuration change and click on Open. (While the file is being sent, AppleTalk will display a printer status report. When the file
has been successfully received by the Controller, the following message will be displayed "The download was successful".)
Step 5. Click OK. If you wish to make any other changes, start again at Step. 3. If you are finished making or saving the configuration changes, select Quit under the File menu.

### 1.14 APPLICATION SOFTWARE SET-UP

1. Printer Drivers:

Each desktop publishing or word processing application provides printer drivers for PostScript and PCL-5 compatible printers. Please follow the instructions supplied with your application software to select the appropriate printer for the page size you wish to send to the Priport. We have supplied examples for MS Windows 3.1 and WordPerfect.
2. Printer Selection:
A. PostScript-Compatible Printing - DOS:

- Windows 3.1 applications (Pagemaker, Corel Draw, MS Word for Windows, etc.) should select "Postscript Printer" for the following page sizes: Letter, Legal, A4 and B5.
- WordPerfect 5.1 users should select a "TI Microlaser" for the following page sizes: Letter, Legal and A4.
- WordPerfect 5.1 users needing B4 or B5 page sizes should install the WPPSE1.ALL file (supplied on the 3 1/2" Priport Configuration Disk for IBM and compatibles) and select "Priport Controller".
B. PostScript-Compatible Printing - Macintosh:
- Using the pull-down menu from the Apple icon, point and click on Chooser.
- Within the Chooser left-hand dialog box, point and click on LaserWriter. (The Macintosh will then poll the AppleTalk network and return the Priport name in the right-hand dialog box.)
- If it is not already selected, you should point and click on Priport now.

When you close the Chooser, the Macintosh is ready to send files to the Controller from any Macintosh software program. This driver supports the printing of all possible output page sizes through the Controller; however, you may be limited by the page size choices within the specific Macintosh application itself.
C. PCL-5 Compatible Printing - (only applicable for DOS applications):

All users should select an "HP LaserJet III" printer within their software application for letter, legal or A-4 page sizes. (Other page sizes are not available.)

### 1.15 PRIPORT CONTROLLER OPERATION

1. Power-On/Power-Off Sequence:

Please follow the steps listed below to turn on and off your system:

- Power-On:

1. Computer
2. Priport
3. Controller

- Power-Off: 1. Controller

2. Priport
3. Computer
4. Controller - Front Panel Indicator Lights:

- Power-On Light (left hand light): When light is on, power is on.
- Ready Light (right hand light)

3. Ready Light:
A. The Controller is ready for operation after the following sequence occurs:

- At power on, the ready light remains off for a short time.
- When ready light turns on, the Controller is ready for use.
B. Ready Light--Slow Flash:
- When a slow flash occurs, the Controller is processing the document.
C. Ready Light--Quick Flash:
- When a quick flash occurs, the Controller has encountered an error condition in processing the document. (See the Troubleshooting section for possible error conditions and solutions.)
D. Ready Light--One Long + Two Short Flashes:
- When one long and two short flashes occur, either the Priport is off-line or the Priport is still waiting to print copies off a new master which is currently on the drum.


### 1.16 COMMONLY ASKED QUESTIONS

## 1. How far can I have the Controller from the computer?

- The official specification for parallel cables recommends a length not greater than 10 feet (appr. 3 meters), however you can probably use a cable up to 25 feet (appr. 8 meters) without encountering any line communication problems.
- The official specification for serial cables recommends a length not greater than 50 feet (appr. 16 meters), however you can probably use a cable up to 100 feet (appr. 30 meters).
- The AppleTalk specification recommends a cable length of not greater than 1000 feet (appr. 300 meters) which should not be exceeded.

2. How far can I have the Controller from the Priport?

- The official specification allows for a 10 foot (appr. 3 meter) cable. A 6 foot (appr. 2 meter) cable was supplied with the Controller, but you can probably use a cable up to 20 feet (appr. 6 meters) if necessary. The potential for line communication problems are greater the farther the Priport is from the computer.


## 3. Which is faster--the serial port or the parallel port?

- The parallel port connection on the back panel of the Controller will receive data from the computer as much as eight times faster than the serial connection. However, because of the higher data transmission rate, you are limited to a maximum parallel cable length of 25 feet (appr. 8 meters).


## 4. How many computers can you run from the Controller?

- Three. One IBM or compatible connected to the parallel port, one IBM or compatible connected to the serial port, and one Apple Macintosh or Macintosh network connected to the AppleTalk port.

5. Will the Controller work with a laptop or notebook computer?

- Yes, all computers connect to the Controller as if it were a standard computer printer.

6. Is any special wiring required for the Controller?

- No, it will work on 110 or 220 volt systems by using the appropriate power cord.


## 7. How much RAM memory does the Controller have?

- It comes standard with 4 megabytes of RAM.

8. What if my file size is over 4 megabytes? Will the Controller be
able to process the file?

- Under most circumstances, the answer is yes, due to a process built into the Controller called "power banding". If your files are very large, you might want to consider upgrading to 16 megabytes of RAM. Please contact your local Sales Representative for more information.


## 9. Can you add additional memory?

- Yes, the Controller can be upgraded from 4 megabytes to 16 megabytes of RAM. Please contact your local Sales Representative for more details on this upgrade.

10. Must you configure all software when you install the Controller?

- Yes and no. The Configuration Program supplied with the Controller must be installed on your computer in order for you to change any of the factory settings. For example, the Controller comes preset in PostScript mode with a US Letter ( $81 / 2^{\prime \prime}$ X 11 ") or A4 page size. If you wish to switch to PCL-5 mode or to a different page size, you must use the Configuration Program to make those changes. In order to output to the Priport through the Controller, you need to select the appropriate printer driver in your software application for the mode (PostScript or PCL-5) and page size you wish to print.

11. Will the Controller work with Windows 3.1?

- Yes, as long as you select the appropriate printer driver for the page size you need.


## 12. Will the Controller work with all application software programs?

- As there are no international software standards which apply to the over 10,000 software applications worldwide, it is impossible to give a definitive answer for each and every program in the DOS, Windows and Macintosh environments. We have tested and know that the most popular software applications, MS Windows 3.1, WordPerfect, MS Word, etc. work extremely well. The Controller is designed to emulate (act as if it were in fact) a large variety of PostScript printers or a HP LaserJet III for PCL-5 output. Therefore, if your software application allows you to select either a PostScript printer or a HP LaserJet III, you should be able to send files to the Priport through the Controller to produce documents.


## 13. Will the Controller work on a network?

- Yes, if the Controller is connected to a host computer. The computer used as a host for the Controller can be the file server, a printer server or any one of the network nodes. Other than the AppleTalk port for Macintosh networks, there is no port on the Controller, at this time, which allows for a connection directly to the network.

14. What fonts are built into the Controller?

- The 35 standard PostScript fonts plus the 8 standard Intellifont PCL-5 fonts.

15. Can you use other downloaded soft fonts with the Controller?

- Yes, you can use downloaded soft fonts in both PostScript and PCL-5 compatibility modes. You should be aware that the amount of RAM the soft fonts occupy may impact the processing speed.

16. Can you reverse scan with the Controller and the Priport?

- No, but you could buy a scanner and hook it directly to your computer. While this process is simpler in the Macintosh environment, it is still a very complex project in either the PC or Macintosh environment and should be undertaken only by an expert computer user. When scanned images are saved as graphic files, they can be included in documents you create in various software applications.


## 17. Can you set the number of copies to print from the computer?

- No, the number of copies to be printed must be set from the Priport control panel. This was done intentionally so that you can check that the correct paper and ink are in the Priport before printing.

18. How important is the "Auto Cycle" key in the printing of a job?

- It is important that the Priport print a minimum of one copy in addition to the proof copy for each new master. Until at least one copy has been printed, the Priport will not allow a new master to be created. Therefore, we recommend that when using the Controller that you also use the "Auto Cycle" mode to enable the system to clear itself and be ready for the next print job.

19. What does the Diagnostic Port do?

- When the diagnostic plug used by the Customer Engineer is installed in the Diagnostic Port and the Controller is turned on, the Priport will output a Diagnostic Status page which includes Postscript font samples and configuration information for the Controller. (See Appendix A.)

20. If I have a software or hardware question, who do I call?

- Your local sales/service organization should be contacted first.


### 1.17 TROUBLESHOOTING

The following are symptoms you might encounter and the appropriate solution for each:

## 1. There is a quick flash of the ready light.

- An error condition has been detected in the Priport. First, check for a loose or missing cable between the Controller and the Priport.
- Next, check the control panel of the Priport for a flashing master jam indicator. Clear the jam and, if possible, print one proof copy from the newly created master. If the image on the proof copy is complete, you can print more copies. If the image is not complete, pust the reset button on the Priport control panel and the Controller will resend the document to the Priport to create a new master.
- If you are unable to print a proof copy, you will need to toggle the On Line button off and back on again to clear the error and the Controller will resend the document to create a new master.


## 2. There is no master making at all.

The Customer Engineer who installed the Controller should have tested both the connection between the Controller and the Priport, the connection between your computer and the Controller and the system as a whole.

- If the Controller ready light is producing a quick flash, follow the steps listed above to clear the error.
- If the Controller ready light is producing one long and two short flashes, check to see if the Priport may be off-line. Put the Priport back on-line and verify that the PCRIP-10 ready light has stopped flashing.
- If the Priport is not off-line, then the Priport is waiting to print from a new master. You may either print one copy from the master currently on the drum, or push the Priport's on-line button off and then on again to clear this condition.
- If you are sending PostScript files to the Controller, make sure that you have the correct PostScript compatible printer selected as the output printer within in your application software and the Controller has been configured for PostScript mode.
- If none of the steps above have produced any master making, it is possible that the PostScript file you are trying to print may be corrupted. You can test for actual Postscript output by printing the Diagnostic Status Page through the Configuration Program. If you can not successfully print this page (which is a special PostScript compatible file), you should contact your local service organization for help.


## 3. A new master is made, but only blank pages print out.

- Verify that the page size selected in the application software, the Controller configuration and the Priport all match.
- Make sure that you have the correct printer selected in the application software for either PostScript or PCL-5 mode.
- Check that the document being sent to the Controller is not blank.
- If you have followed all of the steps listed above and still get blank pages as output, contact your local service organization.


## 4. My document prints out as unrecognizable text.

- This symptom is usually the result of sending a PostScript file to a Controller that is still configured in PCL-5 compatibility mode. Check to make sure that you have the correct printer selected in the application as well as that the Controller is in PostScript compatibility mode.


## 5. Part of the document image I can see on my monitor is missing when it prints.

- Verify that the page size and the page orientation (portrait or landscape) selected in the application software, the Controller configuration and the Priport all match.


## 6. My Macintosh gives an error message which says "Priport is not available on AppleTalk".

- Make sure that the Controller is powered on.
- If both an IBM or compatible and a Macintosh are connected to the Controller, check to see if the Controller has been switched to PCL-5 mode for the IBM PC. If so, the Macintosh will be locked out until the Controller is switched back to PostScript compatibility mode.
- If only one Macintosh is connected to the Controller, contact your local sales/service organization for additional help.


### 1.18 APPENDIX A - DIAGNOSTIC STATUS PAGE

## Controller Status Page

1 Helvetica
2 Helvetica-Oblique
3 Helvetica-Bold
4 Helvetica-BoldOblique
5 Helvetica-Narrow
6 Helvetica-Narrow-Oblique
7 Helvetica-Narrow-Bold
8 Helvetica-Narrow-BoldOblique
9 AvantGarde-Book
10 AvantGarde-BookOblique
11 AvantGarde-Demi
12 AvantGarde-DemiOblique
13 NewCenturySchlbk-Roman
14 NewCenturySchlbk-Italic
15 NewCenturySchlbk-Bold
16 NewCenturySchlbk-BoldItalic
17 ZapfChancery-MediumItalic

19 Symbol ABX $\triangle$ ЕФГНІ $\vartheta \mathrm{K} \Lambda \mathrm{MNOП} \mathrm{\Theta P} \mathrm{\Sigma TY} \mathrm{\varsigma} \mathrm{\Omega} \mathrm{\Xi} \mathrm{\Psi Z} \alpha \beta \chi \delta \varepsilon \phi \gamma \eta\llcorner\varphi \kappa \lambda \mu \nu о \pi \theta \rho$

| Controller Firmware Rev: 123456 | 0 | xxxx | 6 | xxxx | C | XXXX |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Selected Page Size: US Letter | 1 | xxxx | 7 | xxxx | d | xxxx |
| Controller RAM size: 4 Megabytes | 2 | xxxx | 8 | xxxx | e | $x \times x \times$ |
| Mode: Postscript Compatiblity | 3 | xxxx | 9 | xxxx |  | x ${ }^{\text {d }}$ |
|  | 4 | xxxx | a | xxxx |  | $x x x x x x x x$ |
|  | 5 | xxxx | b | x $x$ XX |  |  |

## TAPEMARKER C532

## 1. SPECIFICATIONS

| Tape Feed Length: | ```250 mm (9.8") or 150 mm (5.9"), 200 mm (7.9")``` |
| :---: | :---: |
| Tape Feed Speed: | $100 \mathrm{~mm} / \mathrm{s}$ (3.9"/s) |
| Tape Size: | Outside Diameter 80 mm (3.1") or smaller Inside Diameter 20 mm (0.8") or larger Width 17 mm to 18 mm ( 0.67 " to 0.71") |
| Dimensions (W x D x H): | $155 \mathrm{~mm} \times 105 \mathrm{~mm} \times 60 \mathrm{~mm}$ (6.1" $\times 4.1{ }^{\text {" }}$ x $2.4{ }^{\text {" }}$ ) |
| Weight: | 700 g (1.5 lb) |
| Power Source: | +24 VDC and +5 VDC from main body |
| Power Consumption: | 15 W |

## 2. BASIC OPERATION

### 2.1 OVERVIEW



After the tape dispenser receives the start signal from the main body, the drive motor $[A]$ rotates counterclockwise to feed out the tape. The pinch roller [B] presses the center of the tape against the feed roller [C] flexing the tape into a V shape. This will keep the tape stiff as it is fed out. After the tape has fed out to the proper length, the drive motor will rotate in the opposite direction (clockwise) and the cutter [D] will move downward to cut the tape. After the cutter home position sensor [E] detects the cutter actuator [F], the drive motor will stop and will send the task completion signal to the main body. The main body will start the next job after receiving this signal.

### 2.2 DRIVE AND CUTTING MECHANISM



Start Signal

Timer
Drive Motor
Home Position
Sensor
Task Completion
Signal

The tape dispenser uses a stepping motor, which is driven at 460 pulses per second, as the drive motor.

When the print counter of the main body becomes 0 , the start (low) signal from the main body changes from high ( +5 VDC ) to low ( 0 VDC ) to start the timer on the tape dispenser PCB. When the start signal changes back to a high signal 10 milliseconds later, the drive motor $[A]$ will start to rotate counterclockwise to feed tape. However, since a one-way bearing is mounted in the cam drive gear [B], the cutter cam [C] does not rotate.

The drive motor will start to rotate in the opposite direction 2,500 milliseconds after the initial timer signal. To feed the tape out 250 mm (9.8") from the tape dispenser. The drive motor will rotate the cam drive gear clockwise and the eccentric shaped cutter cam will press the cutter arm down [D]. The cutter [E] will cut the tape. The cutter spring [F] returns the cutter to its original position. After the cutter home position sensor [G] detects the cutter actuator [H], the drive motor will stop and the tape dispenser PCB will send the task completion signal to the main body.

### 2.3 MANUAL CUT



When the manual cut switch $[A]$ is pressed, the timer starts counting and the drive motor will feed the tape. 2,500 milliseconds later, the drive motor will reverse its direction to cut the tape.

If the manual switch is pressed longer than 2,500 milliseconds, the tape will continue to be fed out until the manual switch is released. Afterward, the motor will reverse direction to cut the tape.

## 3. INSTALLATION

### 3.1 ACCESSORY CHECK

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

1. Knob Screw ..... 2
2. Screw M4 ..... 2
3. Hexagon Nut M4 ..... 2
4. Tape ..... 1

### 3.2 INSTALLATION PROCEDURE



1. Install the tape marker on the main body with two knob screws [A] (accessory) using the outside two holes of the tape marker bracket.

NOTE: * Tighten the knob screws with a screwdriver to prevent them from coming loose.

* Fix the grounding wire $[B]$ with the lower of the two knob screws.

2. Remove the small cap in the rear cover of the main body [A] using a minus screw driver. Then, connect the tape marker harness $[B]$ to the main body, and install the connector cover [C] using of the rear cover fixing screw.
3. Open the tape marker cover [D]. Then, insert the leading edge of
[A]
[B]
 the tape into the tape entrance until it stops as shown in the illustration [E].

NOTE: Ensure that the tape is installed in the proper direction. If it is not correct, the tape marker will not work correctly.
4. Turn the main switch and the tape
 marker switch [F] on.
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.


## 4. REPLACEMENT AND ADJUSTMENT

### 4.1 CUTTER REPLACEMENT




1. Remove the tape dispenser from the main body ( 1 connector, 2 nuts or screws).
2. Remove the support bracket $[A]$ ( 3 screws).
3. Remove the tape dispenser cover [B] and the upper housing [C] (1 screw, 1 connector).
4. Remove the tape dispensing assembly [D] (2 connectors).
5. Replace the cutter assembly [E] (2 screws).

NOTE: Ensure that the cutter moves smoothly by manually rotating the cam drive gear [F] clockwise after the replacement cutter had been installed.
6. Reassemble the tape dispenser.

NOTE: Ensure that the tape dispenser PCB [G] and the tape dispensing bracket [H] are in lower housing slots [I].

### 4.2 CUTTER HOME POSITION SENSOR REPLACEMENT



1. Remove the tape dispensing assembly. (See steps \#1 to \#4 of " 4.1 CUTTER REPLACEMENT".)
2. Unhook the cutter spring $[A]$.
3. Remove the cam drive gear [B] (1 E-ring).
4. Remove the pinch roller support bracket [C] (4 screws).
5. Remove the cutter home position sensor assembly [D] and replace the sensor (1 screw, 1 connector).
6. Reassemble the tape dispenser.

NOTE: Ensure that the tape dispenser PCB [E] and the tape dispensing bracket [F] are in the lower housing slots [G].

### 4.3 TAPE CUT LENGTH ADJUSTMENT



Adjustment standard: $250 \mathrm{~mm} \pm 15 \mathrm{~mm}$

1. Press the manual cut switch [A].

NOTE: Do not press the switch longer than 2.5 seconds.
2. Measure the tape length.

If the tape is longer than 250 mm , turn VR2 [B] counterclockwise.
If the tape is shorter than 250 mm , turn VR2 clockwise.
CAUTION: Do not turn VR1. It is for factory adjustment only.

## C228 SERVICE MANUAL

## OVERALL MACHINE INFORMATION

## 1. OVERALL MACHINE INFORMATION <br> 1.1 SPECIFICATIONS

| Configuration: | Table-top |
| :---: | :---: |
| Master Processing: | Digital |
| Printing Process: | Fully automatic one-drum stencil system |
| Original Type: | Sheet/Book |
| Original Size: | Maximum $307 \mathrm{~mm} \times 432 \mathrm{~mm}$ (12.0" x 17.0") |
| Reduction Ratios: | Inch version: <br> 93\%, 77\%, 74\%, 65\% <br> Metric version: $93 \%, 87 \%, 82 \%, 71 \%$ |
| Enlargement Ratios: | Inch version: <br> 155\%, 129\%, 121\% <br> Metric Version: <br> 141\%, 122\%, 115\% |
| Zoom: | From 50\% to 200\% in 1\% steps |
| Directional Magnification: | Vertical: From $50 \%$ to $200 \%$ in $1 \%$ steps <br> Horizontal: From $50 \%$ to $200 \%$ in $1 \%$ steps |
| Image Mode: | Letter, Photo, Letter/Photo |
| Color Printing: | Drum unit replacement system (Red, Blue, Green, Brown, Yellow, Purple, Navy, and Maroon) |
| Master Feed/Eject: | Roll master, automatic feed/eject |
| Leading Edge Margin: | 5 mm (0.2") |
| Trailing Edge Margin: | 3 mm (0.12") |
| Print Paper Size: | Maximum $297 \mathrm{~mm} \times 432 \mathrm{~mm}$ <br>  $\left(11.6^{\prime \prime} \times 17.0^{\prime \prime}\right)$ <br> Minimum $90 \mathrm{~mm} \times 148 \mathrm{~mm}\left(3.6^{\prime \prime} \times 5.8^{\prime \prime}\right)$ |
| Printing Area: | A3 drum (original drum) More than $290 \mathrm{~mm} \times 412 \mathrm{~mm}$ |
|  | Optional A3 drum <br> More than $290 \mathrm{~mm} \times 407 \mathrm{~mm}$ Optional A4 drum <br> More than $290 \mathrm{~mm} \times 204 \mathrm{~mm}$ |
| Print Paper Weight: | $47.1 \mathrm{~g} / \mathrm{m}^{2}$ to $209.3 \mathrm{~g} / \mathrm{m}^{2}$ ( 12.5 lb to 55.6 lb ) |


| Printing Speed: | 60, $75,90,105,120$ sheets/minute (5 steps) |
| :---: | :---: |
| First Copy Time (Master Process Time): | Less than 46.0 seconds (A3) Less than 37.0 seconds (A4) |
| Second Copy time (First Print Time): | Less than 48.0 seconds (A3) Less than 39.5 seconds (A4) |
| Paper Feed Table Capacity: | 1,000 sheets ( $80 \mathrm{~g} / \mathrm{m}^{2}, 20 \mathrm{lb}$ ) |
| Paper Delivery Table Capacity: | 1,000 sheets ( $80 \mathrm{~g} / \mathrm{m}^{2}, 20 \mathrm{lb}$ ) |
| Power Source: | $120 \mathrm{~V}, 50 / 60 \mathrm{~Hz}$ : 3.6 A (for N. America) 220/240 V, $50 / 60 \mathrm{~Hz}$ : 2.0 A (for Europe, Asia) |
| Power Consumption: | 120 V, 50/60 Hz: 360 W (for N. America) $220 / 240 \mathrm{~V}, 50 / 60 \mathrm{~Hz}$ : 350 W (for Europe, Asia) |
| Weight: | 120 V version: 127 kg <br> 220/240 V version: 127 kg <br> Cabinet: 23.5 kg |

Dimensions (W x D x H):

|  | Width | Depth | Height |
| :--- | :--- | :--- | :--- |
| Stored | $719 \mathrm{~mm}, 28.4^{\prime \prime}$ | $698 \mathrm{~mm}, 27.5^{\prime \prime}$ | $644 \mathrm{~mm}, 25.4^{\prime \prime}$ |
| Stored with document <br> feeder | $719 \mathrm{~mm}, 28.4^{\prime \prime}$ | $698 \mathrm{~mm}, 27.5^{\prime \prime}$ | $666 \mathrm{~mm}, 26.3^{\prime \prime}$ |
| Set up | $719 \mathrm{~mm}, 28.4^{\prime \prime}$ | $698 \mathrm{~mm}, 27.5^{\prime \prime}$ | $644 \mathrm{~mm}, 25.4^{\prime \prime}$ |
| Set up with cabinet | $719 \mathrm{~mm}, 28.4^{\prime \prime}$ | $698 \mathrm{~mm}, 27.5^{\prime \prime}$ | $1,070 \mathrm{~mm}, 42.2^{\prime \prime}$ |
| Set up with document <br> feeder | $1,331 \mathrm{~mm}, 52.5^{\prime \prime}$ | $698 \mathrm{~mm}, 27.5^{\prime \prime}$ | $666 \mathrm{~mm}, 26.3^{"}$ |
| Set up with cabinet and <br> document feeder | $1,331 \mathrm{~mm}, 52.5^{\prime \prime}$ | $698 \mathrm{~mm}, 27.5^{\prime \prime}$ | $1,092 \mathrm{~mm}, 43.0^{" \prime}$ |


| Original Scanning Time: | $3.07 \mathrm{~ms} /$ line <br> Master Making Density: |
| :--- | :--- |
| $600 \mathrm{dpi}(C C D: 400 \mathrm{dpi})$ <br> Master Eject Box Capacity: | More than 70 masters under low temperature <br> More than 100 masters at $23^{\circ} \mathrm{C}, 73^{\circ} \mathrm{F}$ and <br> over |
| Paper Separation: | Friction roller/center separation system |
| Feed Table Side Plate | 88 mm to $336 \mathrm{~mm}\left(3.46 "\right.$ to $\left.13.2^{\prime \prime}\right)$ |
| Movement: | $\pm 10 \mathrm{~mm}$ |
| Side Registration: | More than $+10 \mathrm{~mm},-20 \mathrm{~mm}$ |
| Vertical Registration: |  |



### 1.2 MAJOR DIFFERENCES BETWEEN THE C223 AND THE C228

| No. | Item | Details |
| :---: | :---: | :---: |
| 1 | Thermal Head | A new 600 dpi thermal head is used. |
| 2 | Thermal Head Pressure Release Mechanism | The thermal head is pressed against the platen roller only during the master making process. A unique dc motor is used for this mechanism. For details, refer to 'Master Feed' in the Detailed Section Descriptions section. |
| 3 | Improvements for Better Master Feeding in the Master Feed Unit | The new master is thinner and has a smoother surface. Some improvements have been made to improve master feed. For details, refer to 'Master Feed' in the Detailed Section Descriptions section. |
| 4 | Paper Feed Roller | The core of the paper feed roller has been changed to improve paper feed. For details, refer to 'Paper Feed' in the Detailed Section Descriptions section. |
| 5 | Paper Separation Plate | The shape of the separation plate has been changed for better paper feeding. For details, refer to 'Paper Feed' in the Detailed Section Descriptions section. |
| 6 | Paper Feed Cam and Printing Pressure Cam | For better printing quality, the shape of the printing pressure cam (the cam profile) has been changed. Also, the shapes of the two paper feed rollers have been changed in order to make the paper registration more accurate. For details, refer to 'Paper Feed' and 'Printing' in the Detailed Section Descriptions section. |
| 7 | Paper Detection System for Start Applying the Printing Pressure | For better printing, the printing pressure application timing has been changed. Because of the strictly controlled timing, a photocoupler (the paper registration sensor) is used to detect when to start applying the printing pressure. (The paper detection feeler used in the C223 has been removed.) For details, refer to 'Printing' in the Detailed Section Descriptions section. |
| 8 | Master Eject Roller | Grooves have been made in the lower master feed rollers to improve master feed. For details, refer to 'Master Eject' in the Detailed Section Descriptions section. |
| 9 | Paper Delivery Table | The C228 uses a new paper delivery table. (This table is also used for the recent C223 because of a |


| No. | Item | Details |
| :--- | :--- | :--- |
|  |  | modification.) This new table has small guide plates <br> [A] on the front and rear side fences. The guide <br> plates stack the prints more evenly. The small <br> guide plates [B], on the bottom of each side fence, <br> keep the prints aligned in the center of the table <br> while the prints are being stacked. |
| 12 |  |  |


| No. | Item | Details |
| :---: | :---: | :---: |
|  |  | processing board. |
| 13 | New Replacement and Adjustment Procedures | - The thermal head voltage adjustment procedure has been changed. <br> - The adjustment standard for the second feed roller start timing has been changed from $177^{\circ}$ to $144^{\circ}$. <br> - A remark has been added to the paper feed roller removal procedure. <br> - The adjustment standard for the exit pawl timing has been changed from $230 \pm 2^{\circ}$ to $228 \pm 2^{\circ}$. <br> For details, refer to the Replacement and Adjustment section. |
| 14 | New Master | A new more heat-sensitive master is used to improve the printing quality. <br> Due to the new master material, the capacity of the master eject box has been increased. <br> Because the new master surface is slippery, the new master roll is tightened with tape $[A]$ as shown below to prevent the roll from becoming loose. The master roll installation method has been changed. (For details, refer to 'Installation Procedure' in the Installation section.) |
| 15 | New SP Modes | The default setting for the thermal head energy for the economy mode (SP35-2) has been changed from $-35 \%$ to $-30 \%$. (In other words, the energy used in economy mode has been increased.) |


| No. | Item | Details |
| :---: | :---: | :---: |
|  |  | The following SP modes are new for the C228: <br> SP51: Clear Multi Copy <br> SP52: Compress W Start Key <br> SP78-1: Letter/Pht Mode [CS] <br> SP78-2: Clear/Original <br> Note: SP51 and SP78 are accessible to users. SP78 also can be registered in CS mode. <br> - Functions - <br> SP51: Resets the Combine 2 Originals or Combined Print function (if it has been set) after the master making process. There are two options: 0: No, 1: Yes. " 0 " is the default. <br> SP52: The masters in the master eject box can be compressed every time the Master Making key is pressed. There are two options: 0 : No, 1: Yes. " 0 " is the default. <br> Note: If this mode is enabled, it reduces the possibility of the master eject belts slipping off, which tends to occur when the master box is full. <br> SP78-1: Select whether the reproduction of letter mode areas is emphasized when Letter/Photo mode is used. There are two options: 0: Standard, 1: Emphasized. " 0 " is the default. <br> SP78-2: Select whether the image mode (letter, photo, or letter/photo) is to be returned to the default setting when master making is finished. There are two options: 0 : No, 1: Yes. " 0 " is the default. |
| 16 | New Input/Output Check Mode | The following are the new items for theInput/Output Check Mode:Input: 51SN: Paper Registration <br> (Paper Registration Sensor)Input: $52 \quad$SN: T. Head Position <br> (Thermal Head Pressure ReleaseSensor)Output: 42MOTOR: T. Head Up/Down (Turnson |

## ctions

Combined Print function (if it has been set) after the master making process. There are two options: 0: No, 1 : Yes. " 0 " is the default.

SP52: The masters in the master eject box can be compressed every time the Master Making key is pressed. There are two options: 0 : No, 1: Yes. " 0 " is the default.

Note: If this mode is enabled, it reduces the possibility of the master eject belts slipping off, which tends to occur when the master box is full.

SP78-1: Select whether the reproduction of letter mode areas is emphasized when Letter/Photo mode is used. There are two options: 0: Standard, 1: Emphasized. " 0 " is the default.

SP78-2: Select whether the image mode (letter, photo, or letter/photo) is to be returned to the default setting when master making is finished. There are two options: 0 : No, 1: Yes. "0" is the default.
The following are the new items for the Input/Output Check Mode:
Input: 51 SN: Paper Registration (Paper Registration Sensor)
Input: 52 SN: T. Head Position
(Thermal Head Pressure Release Sensor)
Output: 42
the thermal head pressure release motor.)

## DETAILED SECTION DESCRIPTIONS

## 2. DETAILED SECTION DESCRIPTIONS

### 2.1 MASTER EJECT

Grooves have been added on the lower master eject rollers for better master feeding.

| $\triangle$ CAUTION |
| :--- |
| The lower master eject roller must be installed in the correct direction. The <br> groove $[A]$ on the shaft (see the illustration) must be on the operation side. |



### 2.2 MASTER FEED

### 2.2.1 MASTER FEED MECHANISMS

A 600 dpi thermal head and a new more heat-sensitive master is used to improve the printing quality. The new master is thinner and has a smoother surface. The following improvements are implemented to improve master feed.

1. Three master buffer fan motors [A] are used instead of the one fan motor used in the C223. This generates stronger suction to guide the master into the master box [B].

2. To ensure correct master feed, the material of the upper master feed roller [C] has been changed to an anti-static rubber. (A sponge-like material was used for the C223.)

The new master feed roller [C] rotates slightly faster than the platen roller [D]. This stretches the master on the thermal head (under the platen roller) and makes sure that the master is made accurately. A torque limiter built into the upper master feed roller gear can release the master feed force to prevent the master from being damaged in this area.

Also, the counter roller [E] has been added to prevent the master from wrapping around the upper master feed roller.

3. A metal master guide plate was used between the master feed roller and reverse roller for the C223. This was good for grounding static electricity. However, when static electricity is grounded, the master tends to stick to the guide plate. As a thinner master is used for the C228, the guide plate [A] is made of a plastic material. This prevents the master from being stuck on the guide plate surface even if static electricity is generated. Also, ribs have been added to the new guide plate to feed the master more smoothly.
4. Four strips of mylar $[B]$ have been added to the surface of the master guide plates. This will prevent the master from catching on the rollers under the master feed and reverse rollers. Additional strips of mylar are used in front of the master feed roller [C] and after the platen roller [D].

NOTE: These mylar strips must be carefully repositioned when the rollers are reinstalled.

### 2.2.2 THERMAL HEAD PRESSURE RELEASE MECHANISM



The thermal head $[A]$ is pressed against the platen roller $[B]$ only during the master making process. The thermal head position is moved up and down by changing the position of the cam [C].

The cam position is changed by the thermal head pressure release motor [D] via gears. The thermal head pressure release sensor [E] monitors the cam position. The sensor, which is a photointerrupter, is interrupted by the shutter mounted on the gear $[\mathrm{F}]$ as the pressure release motor turns to maintain the cam position.

### 2.3 PAPER FEED

To improve paper feed, especially for thin paper, the paper feed roller and the separation plate have been changed.
In addition, the shapes of the two paper feed cams (the cam profiles) have been changed in order to make the paper registration more accurate.
With the new cams, the leading edge of the paper reaches the second feed roller faster than before. Then, the second feed roller can start feeding the paper earlier.
The second feed roller can start feeding the paper at a lower transportation speed. (The time that the paper reaches the press roller position is still the same, but the acceleration from the second feed roller has become more moderate.) As a result, the paper registration has become more accurate.

With the timing for the second feed roller advanced to start feeding the paper, the paper detection feeler used in the C223 could not be used. A photocoupler is used instead. For more details, refer to the Printing section.

NOTE: 1) Due to the new cams, the adjustment values for second feed roller operation are changed. For details, refer to 'Feed Length of the Second Feed Roller Adjustment' and 'Second Feed Roller Start Timing Adjustment' in the 'Replacement and Adjustment' section. (The 'Feed Length of the Paper Feed Roller Adjustment' procedure is still the same.)
2) The new paper feed cams cannot be used on the older models since those models use the paper detection feeler.

### 2.3.1 PAPER FEED ROLLER


[A]

In this model, the two rubber rollers $[\mathrm{A}]$ on the core roller are separated. This helps to prevent creasing of paper that can be caused by the narrower roller assembly of the C223. (This was likely to occur with very thin paper.)
The material of the core roller [B] was changed from plastic to metal for better stiffness. As a result, to balance the weight of the whole paper feed roller unit, the number of balancing weight plates on the feed roller bracket was reduced from three to two.

With the weight of the paper feed roller itself increased, the roller tends to overrun (it keeps on feeding paper) after the roller driving force stops. To prevent this, a spring [C] which works as a brake has been added at the end of the shaft.

NOTE: When servicing, make sure that the core roller is between 35.5 mm and 36.5 mm from the end of the shaft.

### 2.3.2 PAPER SEPARATION PLATE



If the leading edge of paper stacked on the paper table curls downwards, it tends to be caught by the separation plate and this causes a jam. The shape of the separation plate $[A]$ has been changed (see the diagram) to improve paper feed.

For the same purpose, the shape of the upper edge of the entrance plate [B] (which holds the separation plate) has been changed as shown.
The rubber part of the separation plate [C] has been lengthened to improve paper feed, especially for thick paper. The lengthened rubber can guide the paper leading edge to the upper separation roller [D] surface more precisely. Because of this, the paper edge hits the upper separation roller more gently. This prevents the paper leading edge from being damaged at the area where the separation plate (the rubber part) contacts the upper separation roller surface. (This was likely to occur with thick paper.)

### 2.4 PRINTING

### 2.4.1 OVERVIEW

## Printing Pressure Cam

For better printing quality, the shape of the printing pressure cam (the cam profile) has been changed.

The new cam applies printing pressure to the drum faster than before. The press roller is pressed against the ink roller (the master and the drum screens are in between) before the leading edge of the paper reaches this section.

In the C223, the press roller is pressed against the ink roller just when the paper leading edge reaches this point. In this case, the paper leading edge is strongly pressed against the master surface on the drum. Since the new master is thinner and delicate, the paper leading edge tends to damage the master surface if the same printing pressure cam was used, especially during a long printing run. (If the master surface is damaged, ink will leak and transfer onto the paper.) The new printing pressure cam will avoid this situation.
NOTE: 1) Because of the new printing pressure cam, the adjustment values (angles) for printing pressure application timing and exit pawl operation timing are changed. Refer to 'Exit Pawl Timing Adjustment' in the 'Replacement and Adjustment' section.
2) The new printing pressure cam cannot be used in the older models. Because of the new cam profile, the shift range in the backward direction in image shifting mode has been changed from 15 mm to 10 mm . In the forward direction, it is 20 mm as before.

## Paper Detection and Printing

In the C223, the paper detection feeler was used in order to prevent the press roller from contacting the drum (without paper) and getting ink on it when a paper misfeed occurred before the paper reached the press roller.

The paper detection feeler could be pressed downwards by paper since a gap between the paper detection arm and the pressure on/off lever was created when the widest part of the pressure cam reached the bearing on the pressure on/off lever. With the earlier second feed roller start timing, this gap cannot be created. Therefore, the same mechanism is not used. (The timing was changed to make paper registration more accurate; see the Paper Feed section for details.)
NOTE: For the details of the paper detection feeler operation, refer to the C223 Service Manual. (Section 5.2, 'Paper Detection And Printing Pressure On/Off Mechanism' in the 'Detailed Section Descriptions' section.)
Instead of the paper detection feeler, the registration sensor (a photocoupler) is used. When the sensor detects the paper, the printing pressure solenoid energizes to start applying the printing pressure. (In the C223, the printing pressure solenoid was energized as soon as paper feed started.) The sensor is also used as a paper jam detector.

For more details about this mechanism, refer to the following 'Paper Detection and Printing Pressure On/Off Mechanism' section.

## Quality Start

The detection arm release solenoid which was used in the C223 has been removed. Since the paper detection feeler has been removed, the detection arm release solenoid is not necessary to start the drum stroke operation in the quality start mode.

When the drum stroke operation starts, the printing pressure solenoid turns on. This disengages the pressure on/off lever and starts applying the printing pressure.

NOTE: For the details of the quality start mode operation, refer to the C223 Service Manual. (Section 5.4 'Quality Start Operation' in the 'Detailed Section Descriptions' section.)

### 2.4.2 PAPER DETECTION AND PRINTING PRESSURE ON/OFF MECHANISM



When the paper is detected by the paper registration sensor [A], the printing pressure solenoid $[B]$ is energized. The stopper arm [C] then disengages the pressure on/off lever [D]. The pressure on/off lever, which is connected to the end of the press roller arm [E], starts moving when the printing pressure cam [F] starts moving; the cam moves bearing [G], which is on the lever. The press roller is pressed against the ink roller.

The printing pressure solenoid is de-energized when the printing pressure sensor is activated; this is soon after it is energized. The stopper arm [C] returns and is pressed against the pressure on/off lever, due to tension from a spring. (The stopper arm just rides on the edge of the pressure on/off lever at this time.) To finish applying the printing pressure, the bearing [G] on the pressure on/off lever is pushed by the printing pressure cam and the lever turns clockwise, until it is engaged by the stopper arm.
If the next sheet of paper is detected by the paper registration sensor within a certain period, the printing pressure solenoid is again energized to disengage the pressure on/off lever. The printing pressure for the next sheet of paper starts being applied.

If the paper registration sensor is not activated, the machine detects a paper misfeed condition (Location B Misfeed). In this case, the printing pressure solenoid stays de-energized and the printing pressure is not applied. This can prevent the press roller contacting the drum (without paper) and getting ink on it because of the paper misfeed.
NOTE: In the C223, Location B Misfeed was detected when the printing pressure sensor was not activated within a certain period.

### 2.5 IMAGE PROCESSING

### 2.5.1 OVERVIEW



The light reflected from the original goes to the CCD, which converts the light signal into an analog electrical signal. The analog signal is sent to the A/D conversion PCB, where it is changed to 6-bit digital data. The 6-bit data is changed to 1 -bit data in the image processing PCB and it goes to the thermal head. The thermal head drive circuit is built into the image processing PCB.
The 6-bit to 1-bit conversion procedure depends on the image settings on the operation panel.

### 2.5.2 MASTER MAKING

The operation of the thermal head is just like that of the C223, except that the thermal head drive circuit has been built into the image processing board.

The new 600 dpi thermal head is used with the new more heat-sensitive master. The specifications of the thermal head are as follows:

- Density of Thermal Heating Elements: 600 dpi
- Number of Thermal Heating Elements: 7168 dots
- Maximum Master Making Width: 303.45 mm


### 2.5.3 THERMAL HEAD PROTECTION



The thermistor on the thermal heat prevents it from overheating when continuously processing a solid image.
The CPU checks for abnormal conditions when the Master Making key is pressed, and indicates an SC code on the operation panel under the following conditions:

| SC Code | Conditions |
| :---: | :--- |
| $\mathrm{E}-04$ | The thermistor on the thermal head detected a temperature of over <br> $54^{\circ} \mathrm{C} .(\mathrm{CN111-A1}$ is below 1.17 volts.) |
| $\mathrm{E}-09$ | The thermistor is open, or related connectors are not connected. <br> (The signal level between CN111-A1 and GND is over 4.9 volts.) |



### 2.6 PAPER MISFEED DETECTION

[a] When the drum has rotated $175^{\circ}$ after activating the 1st drum position sensor, if the paper registration sensor is still OFF, a paper misfeed (Location B jam) is detected.
[b] When the 2nd drum position sensor turns on, if the 2nd paper exit sensor remains ON, a paper misfeed (Location G jam) is detected.

[c] When the drum has rotated $20^{\circ}$ after activating the 2nd drum position sensor, if the 1st paper exit sensor is still OFF, a paper misfeed (Location BE jam) is detected.
[d] When the drum has rotated $25^{\circ}$ after activating the 1 st drum position sensor, if the 2nd paper exit sensor is still OFF, a paper misfeed (Location E jam) is detected.

## INSTALLATION PROCEDURE

## 3. INSTALLATION

### 3.1 INSTALLATION REQUIREMENTS

### 3.1.1 OPTIMUM ENVIRONMENTAL CONDITIONS



Temperature -

Humidity -

10 to $30^{\circ} \mathrm{C}$ ( 50 to $86^{\circ} \mathrm{F}$ )
20 to $90 \%$ RH

On a strong and level base.

The machine must be level within 5 mm (13/64") both front to rear and left to right.

### 3.1.2 ENVIRONMENTS TO AVOID



Locations exposed to direct
Dusty areas.
sunlight or strong light (more than 1,500 lux).


Areas with corrosive gases.

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.)

### 3.1.3 POWER CONNECTION



Securely connect the power cord to a power source.

Make sure that the wall outlet is near the machine and easily accessible.

Make sure the plug is firmly inserted in the outlet.


Avoid multiwiring.


Voltage must not fluctuate more than 10\%.

### 3.1.4 ACCESS TO THE MACHINE

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


### 3.2 ACCESSORY CHECK

Make sure that you have the following accessories.

1. Operating Instructions (except for -27 models)
2. NECR (-17, -27 models only)
3. End Plate Prop
4. Decal - Mode
5. Decal - Key Top Cover (OEM machines only)
6. Model Name Plate (OEM machines only)
7. Decal - Master Set (-27 models only)

### 3.3 INSTALLATION PROCEDURE



## ①CAUTION

Do not hold the scanner unit when pushing the machine or the scanner unit safety switch may be damaged.

1. Place the machine on the table.

NOTE: The screw holes in the bottom plate of the machine must line up with the screw holes in the table.
2. Remove the strips of tape $[A]$ securing the covers and units shown above.

3. Open the front door and slide out the drum unit $[B]$.
4. Open the master clamper and remove the clamp [C].
5. Open the paper feed table and remove the cardboard cover [D] protecting the paper feed roller.
6. Slide the scanner unit to the left (as seen from the operation side) and remove the two strips of tape securing the master box.

7. Open the paper delivery table and remove the strip of tape [E] protecting the end fence.
8. Remove the cardboard [F] under the scanner unit.
9. Open the scanner unit and change the position of screws [G] from the transport position to the operating position.
10. Open the doors ( 2 strips of tape $[\mathrm{H}]$ ) of the optional table and take out the plastic bag containing 2 screws.

11. Raise the front side of the machine and position the base pad $[A]$ under the machine. Then raise the rear side of the machine and position the other base pad $[B]$ under the machine.
12. Secure the machine to the table with the two screws [C] packed with the table.
13. Open the paper feed table [A] and neatly stack some printing paper on the table.
14. Slide the paper feed side plates [B] gently up against the paper stack.

15. Open the paper delivery table [C] and adjust the position of the end plate [D] and the side plates [E] to match the printing paper size. Refer to the paper size scale on the table.

16. Install the ink cartridge [F].

1) Open the front door and lower the ink holder [G].
2) Remove the ink cartridge cap.
3) Insert the ink cartridge in the ink holder and raise the ink holder to the original position.
4) Close the front door.

17. Slide the scanner unit all the way to the left, and take the master spools $[\mathrm{H}]$ out.
18. Install the master roll.
1) Take out the master roll from the plastic bag.

NOTE: • Firmly grasp the master roll since it is very slippery.

- Do not remove the strip of the tape holding the master roll till step 5 below.

2) Attach a spool $[A]$ to each end of the master roll [B].

3) Push the pressure release lever [C] to the left.
4) Set the master roll in the machine as shown in the illustration.
5) Remove the tape holding the master roll as shown to the right.


NOTE: - Hold the spools by hand to remove the tape easier.

- It is better to remove the tape completely, but leave any parts that remain on the spools or in the core.

6) Insert the leading edge of the master roll under the platen roller.
7) Return the pressure release lever to the original position.
8) Plug in the power cord and turn on the main switch.
9) Press the master cut button.
10) Open the master box cover and remove the cut strip of master paper.


NOTE: Check that the paper on the master roll is not bent or creased.
11) Close the scanner unit.

19. Idle the machine to distribute ink on the drum.

1) Press the Reset key while holding down the " 0 " key on the operation panel.
2) If $\dot{\omega}$ blinks on the operation panel when the machine stops, press the Reset key again.
20. Make some test prints to check the machine.
1) Raise the platen cover and place an original face down on the exposure glass [A]. Make sure the original is flush with the left scale and aligned with the proper paper size marks.
2) Press the Master Making key.
3) Select the lowest print speed (1) with the Speed key and press the Print Start key. Make prints at this speed until the print image density stabilizes.

NOTE: 1) Usually, about 30 prints need to be made before the image fully stabilizes.
2) Check the image quality after the print image density is stabilized.
21. If necessary, change the language for the LCD guidance as follows:

1) Turn the main switch off and unplug the machine.
2) Remove the right front cover ( 4 screws).
3) Change the DIPSW 102-1, 2, 3 settings. The following table shows the setting for each language.

| DPS102 |  |  | LCD Display |
| :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ |  |
| ON | ON | OFF | English (Default) |
| OFF | OFF | ON | German |
| ON | OFF | ON | French |
| OFF | ON | ON | Spanish |
| ON | ON | ON | Italian |

4) Reinstall the right front cover (4 screws).

## SERVICE TABLES

## 4. SERVICE TABLES

### 4.1 SERVICE REMARKS

1. If a circuit breaker or a fuse opens, check and remove the cause of the overcurrent before resetting the breaker or replacing the fuse.
2. If the thermal head or the power supply unit is replaced, thermal head voltage adjustment is required.
3. Do not touch the edge of the cutter blade with bare hands.
4. Be careful not to drop the master eject unit when removing the eject unit guide shaft.
5. If the paper feed guide plate is removed, make sure that the guide plates do not touch the lower second feed roller when putting back the guide.
6. When putting back the lower separation roller, make sure that the front and rear separation levers move smoothly.
7. If the slowest speed is faster than 60 rpm , the sorter cannot keep up with the machine and a TS sorter jam might occur. (Sorter is not available in the USA.)
8. Do not energize the master feed and master eject clamper solenoids for longer than 10 seconds.
9. When adjusting the ink roller gap, check the gap at the right, center, and left positions.
10. The ink detection adjustment should be made under normal conditions (20 C/65\%RH).
11. When removing the pressure cam drive gear, do not loosen the two deeply recessed bolts.
12. If the main drive belt has been removed, check the relationships between the drum drive gear, printing pressure cam, and the paper feed cams after replacing the belt. Adjust if necessary.
13. Do not keep on pressing the Image Position key if the image position sensor is broken or removed. The plastic gears between the metal gears may break.

### 4.2 SERVICE TABLES

### 4.2.1 MAINTENANCE TABLES

## Lubrication Points

Lubricate after removing adhering ink and paper dust at yearly intervals.

| Section | Lubrication Point | Type | Location |
| :---: | :---: | :---: | :---: |
| Drive | Speed Reduction Gears of the Main Motor | Grease (Shell Albania No.2) | (Fig.1-E) |
|  | Gears of the Drum Drive Shaft |  | On the inside and outside of the frame (Fig.1-B) |
| Image Positioning | Spiral Track of the Cam Gear |  | (Fig.1-K) |
| Paper Feed | Paper Feed Sector Gear |  | (Fig.1-J) |
|  | Second Feed Sector Gear |  | (Fig.1-F) |
|  | Gear of the Paper Feed Cam Shaft |  | (Fig.1-A) |
|  | Paper Table Slide Groove |  | Both front and rear (Fig.1-H) |
|  | Paper Table Drive Gear |  | (Fig.1-G) |
|  | Bearings for the Upper Separation Roller Shaft | Motor oil (SAE No.20) | (Fig.1-I) |
|  | Bearings for the Paper Feed Roller Shaft |  | (Fig.2- L) |
| Drum | Drum Drive Gear | Grease (Shell Albania No. 2) | (Fig.3-N) |
|  | Master Clamper Sector Gear |  | (Fig.3- O) |
|  | Master Clamper Pinion Gear |  | (Fig.3-P) |
|  | Ink Pump Drive Gear |  | (Fig.3-M) |
| Printing Pressure | Between Printing Pressure Arm [Q] and Printing Pressure Stay [Q'] |  | Both front and rear (Fig.4- Q) |
|  | Pressure Spring Link |  | (Fig.1-C) |
| Master Eject | Master Pressure Plate Grooves | Grease (Shell Albania No. 2) | Both front and rear (Fig.5-S) |
|  | Rounded Ends of the Master Pressure Plate Drive Arms |  | (Fig.5-R) |
| Paper Exit | Air Pump Drive Gears |  | (Fig. 6-T) |
|  | Inside of the Air Pump Piston | Grease <br> (Mobil Ep-1) | (Fig. 6-U) |
| ADF | Bearings for the Feed Roller Shaft | Motor oil (SAE No. 20) | Both front and rear (Fig. 7-V) |
| Others | Edge of Each Cam | Grease (Shell Albania No. 2) | (Fig.1-D) |

[Fig1]




[Fig 7]


## User's Maintenance

Advise the customer to clean each item regularly. Clean the following items at every EM call if necessary.

| Section | Cleaning Point | Cleaner | Interval |
| :--- | :--- | :--- | :--- |
| Optics | Original Platen Cover | Cloth and water |  |
|  | Exposure Glass | Cloth and glass cleaner |  |
| Paper Feed | Paper Feed Roller | Cloth and soap and <br> water |  |
|  | Paper End Sensor | Dry cloth |  |
|  | Paper Length Sensor |  |  |
| Printing | Press Roller | Cloth and soap and <br> water |  |
| ADF | Original Feed Rollers |  |  |

## Periodic Inspection (every 6 months)

| Section | Item | Standard Procedure |
| :--- | :--- | :--- |
| Optics | Original Platen Cover | Wipe off stains using a soft cloth <br> moistened with ethyl alcohol. |
|  | Exposure Glass | Wipe with a dry cloth. |
| Paper Feed | Paper Feed Roller | Wipe off ink and paper powder using a <br> cloth moistened with ethyl alcohol. |
|  | Upper and Lower <br> Second Feed Rollers |  |
|  | Upper and Lower <br> Separation Rollers |  |
| Printing | Press Roller | Wipe off paper powder using a cloth |
| ADF | Pick-up Roller <br> Feed Roller <br> Separation Roller | moistened with water. |

## Periodic Inspection (every 12 months)

| Section | Item | Standard Procedure |
| :--- | :--- | :--- |
| Optics | Back side of the <br> Exposure Glass | Wipe with a dry cloth. |
|  | Mirrors | Use a blower brush. |
|  | Xenon Lamps | Wipe with a dry cloth. |
| Master Eject | Upper and Lower Master <br> Eject Rollers | Wipe off ink and paper powder using a <br> cloth moistened with ethyl alcohol. |
| Drum | Inside and outside of the <br> Drum | Wipe off built-up ink and paper powder <br> using a cloth moistened with ethyl <br> alcohol. |
|  | Ink Holder | Wipe off paper powder using a cloth <br> moistened with water. |
|  | Platen Roller | Check the performance of all the <br> sensors. Remove stains from the <br> sensors using a dry cloth. |
| Others | First and Second Paper <br> Exit Sensors <br> Master Eject Sensor <br> Drum Master Sensor |  |

### 4.2.2 SERVICE CALL CODES

| Code | Problem | Possible Causes |
| :---: | :---: | :---: |
| Main Body |  |  |
| E-01 | Either the right or the left cutter switch turns off within 3 seconds of the cutter motor starting. | 1) Drive wire cut <br> 2) Drive section malfunction <br> 3) Defective cutter switch |
| E-02 | Malfunction in the paper table drive section. <br> 1. The paper table lower limit sensor or paper table height sensor does not turn on within 7 seconds. <br> 2. The LCT tray drive motor does not stop within 25 seconds. <br> 3. The upper limit sensor does not turn on within 8 seconds after the LCT cassette bottom plate drive motor starts. | 1) Drive worm gear broken <br> 2) Mounting screw of the worm gear broken <br> 3) No power supply |
| E-04 | The temperature of the thermal head is greater than $54^{\circ} \mathrm{C}$ when the Master Making key is pressed | 1) Excessive thermal head temperature <br> 2) Thermistor short |
| E-05 | Malfunction in the image shifting section. | 1) Image position sensor connector disconnected <br> 2) Defective image position sensor |
| E-06 | The drum rotation sensor detects an incorrect motor speed. | 1) Drum lock <br> 2) No power supply |
| E-09 | The signal level between CN104-A1 and GND is over 4.9 volts. | 1) The thermistor is open. |
| E-10 | The CPU detects an abnormality in the pulse signals from the image processing PCB. These pulses determine the energy to be applied to the thermal heating elements. | 1) Defective thermistor <br> 2) Related connectors are disconnected. |
| E-11 | Encoder output does not change within 3 seconds of the main switch being turned on or the Clear Mode key being pressed. | 1) Defective image position motor <br> 2) No power supply |


| Code | Problem | Possible Causes |
| :---: | :---: | :---: |
| E-12 | 1. The upper or lower pressure plate sensor remains activated for more than 4 seconds after the pressure plate motor starts turning. <br> 2. The lower pressure plate sensor is not activated within 8 seconds of the pressure plate motor starting to turn even though the upper pressure plate sensor is de-activated. <br> 3. The upper pressure plate sensor is not activated for more than 8 seconds after the pressure plate motor starts to turn even though the lower pressure plate sensor is deactivated. | Pressure plate drive mechanism malfunction. |
| E-13 | 1. During scanner initialization: <br> - The home position sensor remains activated for more than 4 seconds. <br> - The home position sensor is not activated within 2 seconds. <br> 2. The home position sensor is not activated within 7 seconds when the scanner returns after finishing making the master or scanning. | 1) Defective home position sensor <br> 2) Scanner motor lock |
| E-14 | EMF sorter communication error. |  |
| Sorters |  |  |
| E-21 | The 1st transport motor speed is abnormal. | 1) Defective 1st transport motor <br> 2) Defective 1st transport motor rotation sensor. |
| E-26 | The 1st sorter helical wheel H.P. sensor status does not change even if the bin shift motor drive signal is applied. <br> The bin shift motor rotation sensor status does not change even if the bin shift motor drive signal is applied. | 1) Defective bin shift motor <br> 2) Defective helical wheel H.P. sensor <br> 3) Defective bin shift motor rotation sensor |
| E-27 | The 1st sorter jogger bar H.P. sensor status does not change even if the jogger bar motor drive signal is applied | 1) Defective jogger bar motor <br> 2) Defective jogger bar H.P. sensor |

Shaded area - sorter in not available in the USA

| Code | Problem | Possible Causes |
| :---: | :---: | :---: |
| E-28 | The 1st sorter staple position switch or staple unit movement switch status does not change even if the staple unit shift motor drive signal is applied. | 1) Defective staple unit shift motor <br> 2) Defective jogger bar H.P. sensor <br> 3) Defective staple unit movement switch |
| E-29 | The 1st transport sort mode position sensor or the 1st transport non-sort mode position sensor status does not change even if the delivery table motor drive signal is applied. | 1) Defective 1st transport sort mode position sensor <br> 2) Defective 1st transport non-sort position sensor <br> 3) Defective delivery table motor |
| E-34 | The 2nd transport motor rotation sensor speed is abnormal. | 1) Defective 2nd transport motor <br> 2) Defective 2nd transport motor rotation sensor |
| E-36 | The 2nd sorter helical wheel H.P. sensor status does not change even if the bin shift motor drive signal is applied. <br> The bin shift motor rotation sensor status does not change even if the bin shift motor drive signal is applied. | 1) Defective bin shift motor <br> 2) Defective helical wheel H.P. sensor <br> 3) Defective bin shift motor rotation sensor |
| E-37 | The 2nd sorter jogger bar H.P. sensor status does not change even if the jogger bar motor drive signal is applied. | 1) Defective jogger bar motor <br> 2) Defective jogger bar H.P. sensor |
| E-38 | The 2nd sorter staple position sensor or staple unit movement sensor status does not change even if the staple unit shift motor drive signal is applied. | 1) Defective staple unit shift motor <br> 2) Defective jogger bar H.P. sensor <br> 3) Defective staple unit movement switch |

Shaded Area - Sorter is not available in the USA.

### 4.2.3 DIP SWITCHES, LEDS, VRS, TPS (ON THE MAIN CONTROL PCB)

DIP Switches

| DIP Switch | Function | Remarks |
| :---: | :--- | :--- |
| DIP SW101 | Do not use. | Must be off at all times. |


| DPS 102 |  |  | LCD Display |  |
| :---: | :---: | :---: | :--- | :---: |
| $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ |  |  |
| ON | ON | OFF | English |  |
| OFF | OFF | ON | German |  |
| ON | OFF | ON | French |  |
| OFF | ON | ON | Spanish |  |
| ON | ON | ON | Italian |  |
| OFF | OFF | OFF | For Japanese Machines |  |
| ON | OFF | OFF |  |  |
| OFF | ON | OFF |  |  |


| DPS 102 | ON | OFF |
| :---: | :--- | :--- |
| 4 | DFII (Type 50) Also see SP8. | DFI |
| 5 | Print and master counters <br> increment by two counts when <br> the A3 drum is used (NRG <br> setting). Also, see SP86. | Print and master counters <br> increment by one regardless of <br> the drum size. |
| 6 | Inch version | A4 version |

NOTE: The DF setting can be changed using SP8. When the memory clear (SP60) is performed, the SP8 setting depends on the DPS102-4 setting. Later, if the SP mode is changed but not the DPS, the SP mode setting takes priority. This note also applies to DPS 102-5.

## Photodiodes

| LED | Component | Remarks |
| :---: | :--- | :--- |
| LED101 | 1st Paper Exit Sensor | When paper is detected, the LED lights. |
| LED102 | Drum Master Sensor | When a master is on the drum, the LED <br> lights. |
| LED103 | 2nd Paper Exit <br> Sensor | When paper is detected, the LED lights. |
| LED104 | Master Eject Sensor | When a master is under the master eject <br> sensor, the LED lights. |
| LED105 | Ink Detection | When ink is present, the LED lights. |
| LED106 | Main Motor | When the main motor turns on, the LED <br> lights. |

## VRs

| VR | Function |
| :---: | :--- |
| VR101 | 1st Paper Exit Sensor Adjustment |
| VR102 | Drum Master Sensor Adjustment |
| VR103 | 2nd Paper Exit Sensor Adjustment |
| VR104 | Master Eject Sensor Adjustment |
| VR105 | Adjustment for Drum Speed 5 (120 rpm) |
| VR106 | Adjustment for Drum Speed 1 60 rpm$)$ |

## TPs

| TP | Function |
| :---: | :--- |
| TP101 | 1st Paper Exit Sensor Voltage |
| TP102 | Drum Master Sensor Voltage |
| TP103 | 2nd Paper Exit Sensor Voltage |
| TP104 | Master Eject Sensor Voltage |
| TP105 | Ink Detection Voltage |
| TP106 | Drum Rotation Sensor Voltage |
| TP107 | GND |

### 4.2.4 EXPECTED LIFE OF PARTS

| Section | Part Description | Expected Life |
| :---: | :---: | :---: |
| Scanner | Xenon Lamp | 15,000 originals |
| Master Feed/Master Making | Thermal Head | 30,000 masters |
|  | Reverse Roller | 30,000 masters |
|  | Platen Roller | 30,000 masters |
|  | Upper Master Feed Roller | 1 year or 30,000 masters |
| Drum | Drum Cloth Screen | 2 years or 1,200,000 prints |
| Paper Feed | Paper Feed Rubber Side Plate | 2 years or 1,200,000 prints |
|  | Paper Feed Roller | 6 months or 300,000 prints |
|  | Upper Separation Roller | 1 year or 600,000 prints |
|  | Lower Separation Roller | 2,000,000 prints |
|  | 2nd Feed Roller Brake Belt | 1,000,000 prints |
|  | 2nd Feed Roller Gear | 1,000,000 prints |
|  | Separation Plate | 1 year or 600,000 prints |
| Printing | Press Roller | 2 years or 1,200,000 prints |
| Delivery | Transport Belt | 2 years or 1,200,000 prints |

## SERVICE TABLES

### 4.2.5 SPECIAL TOOLS

| Description | Part Number |
| :--- | :---: |
| Test Chart R-21 | 99992131 |
| Resolution Chart | A0129110 |
| Drum Gauge | C2009001 |
| Image Shifting Gauge | C2009002 |

### 4.3 SERVICE PROGRAM MODE

### 4.3.1 SERVICE PROGRAM MODE OPERATION

The service program (SP) mode is used to check electrical data, change modes, or change adjustment values.

## Service Program Mode Access Procedure (for technicians)

All service program modes can be accessed with this procedure.

1. Press the following keys on the operation panel in the following order:

Case 1:
a) Clear Modes key
b) Clear key
c) Combine 2 Originals key
d) Enter key

To exit the SP mode, press the Clear Modes key.
Case 2:
a) Turn off the power switch
b) Press the Enter key, Stop key, and Clear key simultaneously
c) Turn on the power

To exit the SP mode, turn the power switch off and back on.
2. The following is displayed on the LCD when the SP mode is accessed.

| SP-MODE |  |
| :--- | :--- |
| PROGRAM No. $\quad 0$ |  |

3. Using the number keys, enter the desired SP mode number (listed in the service program table.)
NOTE: The SP mode number can be shifted up or down by pressing the Zoom key ("+" or "-").

## Service Program Mode Access Procedure (for users)

This procedure allows users to access only the service program modes that are marked with an asterisk in the service program table.

1. Press the following keys on the operation panel in the following order:
a) Clear Modes key
b) Clear key
c) Enter key
2. The following is displayed on the LCD when the SP mode is accessed.

| SP—MODE |  |
| :--- | :--- |
| PROGRAM No. | 0 |

3. Using the number keys, enter the desired SP mode number (listed in the service program table).
4. To cancel the SP mode, press the Clear Modes key.

## Change Adjustment Values or Modes

1. After entering the desired SP mode number, press the Enter key. The current value or mode will be displayed on the LCD (at the end of the second line).
2. Enter the desired value or mode using the number keys (listed in the service program table).
Use the Memory/Class key to toggle between + and -.
3. Press the Enter key to store the desired value or mode.
4. To cancel the SP mode, press the Clear Modes key.

### 4.3.2 SERVICE PROGRAM TABLE

*: Accessible by a customer<_>**: Can be registered in CS mode
$\bullet$ : A4 version $\bullet$ : LT version

| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | On line | Enables On Line key operation. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 2 | FDC Type 10 | Used only in Japan | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | Keep at 0. |
| 3 | Key Counter | Enables key counter operation. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 4 | Key Card | Used only in Japan. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 5 | EMF Sorter | Selects the number of sorters. | $\begin{aligned} & 0: \text { No sorters } \\ & 1,2,3,4, \text { or } 5 \text { : } \\ & \text { Sorters present } \end{aligned}$ | 0 | Input 1 to 5 to indicate the number of sorters. |
| 6 | Tape Marker | Enables the Tape Marker | $\begin{aligned} & \text { 0: On } \\ & \text { 1: Off } \end{aligned}$ | 0 |  |
| 7-1 | DS/TS Sorter | Enables TS20A/B operation. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | If "1" is selected in 7-1, the machine goes to Auto Reset Time setting mode. |
| 7-2 | Auto Reset Time | Specifies the auto reset time. | $\begin{aligned} & \text { 0: No } \\ & \text { 1-5: min. } \end{aligned}$ | 0 |  |
| 8 | ADF Select | Informs the machine if DF Unit Type 50 is installed. | $\begin{aligned} & \text { 0: DF1 (or no DF) } \\ & \text { 1: DF2 (type 50) } \end{aligned}$ | 0 |  |
| *10. | Min. Print | Limits the minimum print quantity that can be entered. | 0 to 9999 | 0 |  |
| *11 | Max. Print | Limits the maximum print quantity that can be entered. | 0 to 9999 | 9999 |  |
| *12 | v: A4 $\rightarrow$ A3 Mag. Ratio <br> - HLT $\rightarrow$ LG Mag. Ratio | Adjusts the fixed magnification ratio. <br> - : From A4 to A3 <br> - : From 51/2" x 81/2" to $81 / 2^{\prime \prime} \times 14$ " | 50 to 200\% | $\begin{aligned} & \mathrm{v}: 141 \% \\ & \bullet: 155 \% \end{aligned}$ |  |
| *13 | v: A4 $\rightarrow$ B4 Mag. Ratio $\bullet$ LT $\rightarrow$ DLT Mag. Ratio | Adjusts the fixed magnification ratio. <br> - : From A4 to B4 <br> - : From 51/2" x 81/2" to 11 " x 17 " | 50 to 200\% | $\begin{aligned} & \vee: 122 \% \\ & \bullet: 129 \% \end{aligned}$ |  |
| *14 | v: B4 $\rightarrow$ A3 Mag. Ratio $\bullet$ LG $\rightarrow$ DLT Mag. Ratio | Adjusts the fixed magnification ratio. <br> - : From B4 to A3 <br> - : From 81/2" x 14" to 11" x 17" | 50 to 200\% | $\begin{aligned} & \vee: 115 \% \\ & \bullet: 121 \% \end{aligned}$ |  |
| *15 | Full Size | Adjusts the full size magnification ratio. | 50 to 200\% | 100\% |  |

Shaded Area - Sorter is not available in the USA.

| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| *16 | Page Margin | Adjusts the create margin magnification ratio. | 50 to 200\% | 93\% |  |
| *17 | v: A3 $\rightarrow$ B4 Mag. Ratio $\bullet:$ LG $\rightarrow$ LT Mag. Ratio | Adjusts the fixed magnification ratio. <br> v: From A3 to B4 <br> - : From 81/2" x 14" to 81/2" x 11" | 50 to 200\% | $\begin{aligned} & \text { •: 87\% } \\ & \text { • : } 77 \% \end{aligned}$ |  |
| *18 | ๒: B4 $\rightarrow$ A4 <br> Mag. Ratio <br> - : ** $\rightarrow$ LT <br> Mag. Ratio | Adjusts the fixed magnification ratio. <br> - : From B4 to A4 <br> $\bullet$ : From 11 " x 15 " to 81/2" x 11" | 50 to 200\% | $\begin{aligned} & \bullet: 82 \% \\ & \bullet: 74 \% \end{aligned}$ |  |
| *19 | $\vee: A 3 \rightarrow A 4$ Mag. Ratio $\bullet$ DLT $\rightarrow$ LT Mag. Ratio | Adjusts the fixed magnification ratio. <br> - : From A3 to A4 <br> - : From 11" x 17" to 81/2" x 11" | 50 to 200\% | $\begin{aligned} & \hline \vee: 71 \% \\ & \bullet: 65 \% \end{aligned}$ |  |
| *20 | Buzzer On | Turns the beeper ON or OFF | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| *21 | Prints/Master Cost | Adjusts the cost ratio of masters to prints for accounting purposes. | 0 to 50 | 0 | The set number ( 0 to 50 ) is automatically added to the key counter each time a master is used. |
| 22 | Read Image Area | Not used | - | 0 | Not used |
|  |  |  |  |  |  |
| 24 | Clear CS modes | Returns all CS modes to the default settings | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ |  |  |
| 25 | Sorter Feed Speed | Determines the transport belt speed in the TS sorter. | $\begin{aligned} & 0:-20 \% \\ & 1:-15 \% \\ & 2:-10 \% \\ & 3:-5 \% \\ & 4:+5 \% \\ & 5:+10 \% \\ & 6:+15 \% \\ & 7:+20 \% \\ & 8:+25 \% \\ & 9:+30 \% \\ & 10: 0 \% \end{aligned}$ | 10 |  |
| 26-1 | Sorter Priority | Determines the sorter priority. | $\begin{aligned} & \text { 0: Normal } \\ & \text { 1: Others } \end{aligned}$ | 0 |  |
| 26-2 | $\begin{aligned} & \text { 0: 1st/2nd } \\ & 1: 2 \mathrm{nd} / 1 \mathrm{st} \\ & \text { 2. 1st } \\ & \text { 3. 2nd } \end{aligned}$ | Determines the sorter priority when " 1 " is selected in SP26-1. | 0 : 1st sorter first <br> 1: 2nd sorter first <br> 2: 1st sorter only <br> 3: 2nd sorter only | 0 | If "2" or "3" is selected, only one sorter is used. |

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| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 27 | Auto Staple Off | Specifies whether the staple unit is disabled. | 0: Staple mode enabled. <br> 1: Staple mode disabled. | 0 |  |
| 28 | Max. Print/Bin | Specifies the sort/stack number limit. | 1 to 50 sheets | 50 |  |
| **29 | Pht Bckgrnd Correct | Determines whether the original background correction is done in Photo mode. | 0: Correction is not done. <br> 1: Correction is done. | 0 |  |
| 30 | Sub Scan Mag. Adjust | Adjusts the sub-scan magnification. | -1.9 to +1.9\% | (0) | The factory setting depends on the machine. |
| 31 | MTF Level | Adjusts the MTF level. | 0: Low <br> 1: Standard <br> 2: High <br> 3: Maximum | 1 |  |
| 32 | Image Density Rank | In line mode, adjusts the image density level. | 0: Light 1: Standard 2: Dark | 1 |  |
| 33 | Registration Adjust | Adjusts the registration | -1 to +5 | 0 mm |  |
| 34 | Letter/Photo | Use to adjust the threshold level for separating line areas and photo areas in the Line/Photo mode. | 0 : Modify the threshold setting 1: Returns the setting to default | 0 | If "0" is selected in this mode, the machine goes to 34-1. |
| 34-1 | Contrast | Select the contrast setting for changing the threshold for line and photo. | 0: Standard <br> 1: Light <br> 2: Dark |  | Depending on the number selected in this mode, the machine goes to 34-1-0, 34-1-2, or 34-1-3. |
| 34-1-0 | Std (setting for the Standard tone) | Adjust the threshold level to distinguish line and photo areas for the Standard tone setting in the Line/Photo mode. There are four numbers and each represents the threshold value for an image density. Input the required value for the one that is blinking, then press Enter to move the next one. | $\begin{aligned} & \text { Lt: } 0 \text { to } 63 \\ & \text { Std: } 0 \text { to } 63 \\ & \text { Dk: } 0 \text { to } 63 \\ & \text { Dkr: } 0 \text { to } 63 \end{aligned}$ | Lt: 12 Std: 16 Dk: 20 Dkr: 24 | If " 0 " is selected in 34-1, the machine goes to this mode. |

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| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 34-1-1 | Lt <br> (setting for the Light tone) | Adjust the threshold level to distinguish line and photo areas for the Light tone setting in the Line/Photo mode. | Lt: 0 to 63 Std: 0 to 63 Dk: 0 to 63 Dkr: 0 to 63 | Lt: 10 Std: 10 Dk: 12 Dkr: 16 |  |
| 34-1-2 | Dk (setting for the Dark tone) | Adjust the threshold level to distinguish line and photo areas for the Dark tone setting in the Line/Photo mode. | Lt: 0 to 63 Std: 0 to 63 Dk: 0 to 63 Dkr: 0 to 63 | Lt: 10 Std: 12 Dk: 18 Dkr: 20 |  |
| 35 | Head Energy Adjust | Selects normal mode or Economy mode for changing the thermal head energy. | 0: Normal mode <br> 1: Economy <br> mode |  | Depending on the number selected in this mode, the machine goes to 35-1 or 35-2. |
| 35-1 | Head Energy Adjust (Normal) | Adjusts the thermal head energy for the normal mode. | 0 to -99 (\%) | -7\% |  |
| 35-2 | Head Energy Adjust (Economy) | Adjusts the thermal head energy for the Economy mode. | 0 to -99 (\%) | -30\% |  |
| 36 | Sub Scan Mag. Adjust (ADF) | Adjusts the ADF subscan magnification. | -1.9 to 1.9 \% | 0 | 0.1 \% steps |
| 37 | Shadow Erase Level | Selects the image mode for adjusting the threshold level for shadow erase. | 0: Letter <br> 1: Photo <br> 2: Returns the settings to the defaults |  | If " 0 " or " 1 " is selected in this mode, the machine goes to 37-0 or 37-1. |
| 37-0 | Letter | Adjusts the shadow erase threshold level for Letter mode. There are four numbers and each represents the threshold value for an image density. Input the required value for the one that is blinking, then press Enter to move the next one. | Lt: 0 to 63 Std: 0 to 63 Dk: 0 to 63 Dkr: 0 to 63 | Lt: 27 <br> Std: 19 <br> Dk: 15 <br> Dkr: 10 |  |
| 37-1 | Contrast (Photo) | Selects the contrast setting for adjusting the threshold level for shadow erase in Photo mode. | $\begin{aligned} & \text { 0: Standard } \\ & \text { 1: Light } \\ & \text { 2:Dark } \end{aligned}$ |  | Depending on the number selected in this mode, the machine goes to 37-1-0, 37-1-1 or 37-1-2. |


| No. | Display | Function | Data | Factory <br> Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 37-1-0 | Std (setting for the normal tone) | Adjusts the shadow erase threshold for the Normal contrast setting in Photo mode. There are four numbers and each represents the threshold value for an image density. Input the required value for the one that is blinking, then press Enter to move the next one. | Lt: 0 to 63 <br> Std: 0 to 63 <br> Dk: 0 to 63 <br> Dkr: 0 to 63 | Lt: 24 <br> Std: 15 <br> Dk: 11 <br> Dkr: 4 |  |
| 37-1-1 | Lt (setting for the light tone) | Adjusts the shadow erase threshold for the Light Tone contrast setting in Photo mode. | Lt: 0 to 63 <br> Std: 0 to 63 <br> Dk: 0 to 63 <br> Dkr: 0 to 63 | Lt: 31 <br> Std: 24 <br> Dk: 15 <br> Dkr: 9 |  |
| 37-1-2 | Dk (setting for the dark tone) | Adjusts the threshold value for shadow erase of the Dark tone contrast in Photo mode. | $\begin{aligned} & \text { Lt: } 0 \text { to } 63 \\ & \text { Std: } 0 \text { to } 63 \\ & \text { Dk: } 0 \text { to } 63 \\ & \text { Dkr: } 0 \text { to } 63 \end{aligned}$ | Lt: 12 <br> Std: 7 <br> Dk: 5 <br> Dkr: 2 |  |
| 38 | ADF Scan Line Adjust | Adjusts the ADF scanning start position. | -4.9 to 4.9 mm | 0 | 0.1 mm steps See remarks (1). |
| 39 | Image Center Adjustment | Adjusts the center position of copies in the ADF and platen modes. | $\begin{aligned} & \text { 0: Scanner } \\ & \text { 1: ADF } \end{aligned}$ | 0 | See remarks (2). |
| 39-0 | Image Center Adjustment: Scanner | Adjusts the center position of copies in platen mode. | -4.9 to 4.9 mm | 0 | 0.1 mm steps |
| 39-1 | Image Center Adjustment: ADF | Adjusts the center position of copies in ADF mode. | -4.9 to 4.9 mm | 0 | 0.1 mm steps |
| *40 | Original | Specifies the image mode at power-up. | $\begin{aligned} & \text { 0: Letter } \\ & \text { 1: LT Photo } \\ & \text { 2: Photo } \end{aligned}$ | 1 |  |
| *41 | Image Density | Specifies the image density at power-up. | 0: Light <br> 1: Standard <br> 2: Dark <br> 3: Darker | 1 |  |
| 42 | Print Speed | Specifies the printing speed at power-up. | 0: 60 rpm 1: 75 rpm 2: 90 rpm 3: 105 rpm 4: 120 rpm | 2 |  |
| *43 | Auto Cycle Mode | Specifies whether Auto Cycle mode is selected at power-up. | $\begin{aligned} & \text { 0: No } \\ & 1: Y e s \end{aligned}$ | 0 |  |
| *44 | Memory/Class Mode | Specifies the initial job memory feature (Memory or Class mode) at power-up. | $\begin{aligned} & \text { 0: Class } \\ & \text { 1: Memory } \end{aligned}$ | 1 |  |


| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 45 | Std. Image Position | Specifies the image position at power-up | $\begin{aligned} & \text { 2: }+10 \mathrm{~mm} \\ & 3:+5 \mathrm{~mm} \\ & 4: 0 \mathrm{~mm} \\ & 5:-5 \mathrm{~mm} \\ & \text { 6: }-10 \mathrm{~mm} \\ & 7:-15 \mathrm{~mm} \\ & 8:-20 \mathrm{~mm} \\ & \hline \end{aligned}$ | 4 |  |
| *46 | Make Up | Specifies the initial make-up background pattern when the Image Make-up mode is selected. | $\begin{array}{\|l\|} \hline 1 \text { to } 40 \\ 51 \text { to } 90 \\ 101 \text { to } 140 \\ 151 \text { to } 190 \end{array}$ | 0 | 0: No background pattern is selected. |
| 47 | Contrast | Specifies the initial contrast when the Photo mode is selected. | $\begin{aligned} & \text { 0: Standard } \\ & \text { 1: Light } \\ & \text { 2: Dark } \end{aligned}$ | 0 |  |
| 48 | Photo | Specifies the initial screen when the Photo mode is selected. | $\begin{aligned} & \text { 0: Standard } \\ & \text { 1: Fine } \\ & \text { 2: Coarse } \end{aligned}$ | 0 |  |
| 49 | Lead Edge Margin | Adjusts the Lead Edge margin | 5-10 | 5 mm |  |
| *50 | Directional Mag. Mode | Selects which is used to input directional magnifications: reproduction ratios or vertical and horizontal lengths. | $\begin{aligned} & \text { 0: Reproduction } \\ & \text { ratios } \\ & \text { 1: Vertical and } \\ & \text { horizontal lengths } \end{aligned}$ | 0 |  |
| *51 | Clear Multi Copy | Resets the Combine 2 originals or Combined Print function (if it has been set) after the master making process. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 52 | Compress W Start Key | The master compression for the master eject box is carried out always when the Master Making key is pressed. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | This mode is to reduce the possibility of slipping off the eject belts. |
| 60 | Clear All Memory | Returns all SP modes to the default settings. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 61 | Clear Memory / <br> Except SP 30, 36, <br> 38, 39 | Returns all SP modes to the default settings except for SP No. 30, 36,38 and 39 | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 70 | Original Feed Jam (A) | Displays the total number of original jams. |  | 0 |  |
| 71 | Paper Feed Jam <br> (B) | Displays the total number of paper feed jams. |  | 0 |  |


| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 72 | Paper Wrap Jam $(\mathrm{E}) /(\mathrm{B})(\mathrm{E})$ | Displays the total number of times that paper has accidentally wrapped around the drum. |  | 0 |  |
| 73 | Paper Delivery Jam (G) | Displays the total number of paper delivery jams. |  | 0 |  |
| 74 | Master Feed Jam (C) | Displays the total number of master feed jams. |  | 0 |  |
| 75 | Master Delivery Jam (F) | Displays the total number of master delivery jams. |  | 0 |  |
| 76 | Clear Jam Counters | Clears all jam counters. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 77 | Last Sorter Jam | Displays the jam code for the last sorter jam. |  |  |  |
| **78-1 | Letter/Pht Mode [CS] | Select if letter images is to be emphasized in Letter/Photo mode. | 0: Standard 1:Emphasize | 0 |  |
| 78-2 | Clear/Original | Select if the image mode (letter, photo, or letter/photo) is to be returned to the default setting when finishing the master making. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| **79 | Eco/Quality Start | Specifies if Quality Start operation is done for every master making. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | If "1" is selected in 79 , the machine goes to 79-1. |
| 79-1 | Idling Number | Specifies the number of drum rotations for Quality Start. | 0 to 10 | 2 | $\begin{aligned} & \text { If " } 0 \text { " is selected } \\ & \text { in SP79, the } \\ & \text { number of } \\ & \text { rotations is } \\ & \text { determined by } \\ & \text { SP80. } \end{aligned}$ |
| *80 | Auto Eco/Q Start | Specifies whether Quality Start is done or not. If "Yes" is selected, the machine goes to "Idling No." mode. The idling number can be selected separately corresponding to the machine off time; 0 to 6 hours, 6 to 32 hours, and more than 32 hours. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 1 | $\begin{aligned} & \text { If "1" is selected } \\ & \text { in } 80 \text {, the } \\ & \text { machine goes to } \\ & 80-1 \text {. } \end{aligned}$ |

[^0]| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 80-1-1 | Idling Number (after a 0 to 6 hour interval) | Specifies the drum rotation number for the machine off time 0 to 6 hours. | 0 to 10 | 0 | If Enter key is pressed in this mode, the machine goes to 80-1-2. |
| 80-1-2 | Idling Number (after a 6 to 32 hour interval) | Specifies the drum rotation number for when the machine was off from 6 to 32 hours. | 0 to 10 | 2 | $\begin{array}{\|l\|\|} \text { If Enter key is } \\ \text { pressed in this } \\ \text { mode, the } \\ \text { machine goes to } \\ 80-1-3 . \end{array}$ |
| 80-1-3 | Idling Number (after an intermal of more than 32 hours) | Specifies the drum rotation number for when the machine was off from more than 32 to 72 hours. | 0 to 10 | 3 |  |
| 81 | Trial Print No. | Specifies how many trial prints are made after making the master. | 0 to 2 sheets | 1 |  |
| *82-1 | Skip Feed No. | Selects the feed interval. | 1 to 9 | 2 | 1: Normal operation 2 to 9: One sheet fed every two to nine drum rotations |
| 82-2 | Long Sheet ? | Specifies whether a long sheet is used. (If "Yes" is selected, paper exit jam detection is not done.) | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | Displays only when no. 2 to 9 are selected in 82-1. |
| *83 | Auto Reset Time | Specifies the auto reset time. | $\begin{aligned} & \text { 0: No } \\ & 1 \text { to } 5 \mathrm{~min} . \end{aligned}$ | 0 |  |
| **84 | Auto Multi-copy | Specifies the initial mode for Multi copy. | 0: No <br> 1: Yes (Two or four identical images are made if the Master Making key is pressed once.) | 0 |  |
| 85 | Initial Compression | Specifies whether full master box detection is made at power-up. | $\begin{aligned} & 0: \text { No } \\ & 1: \text { Yes } \end{aligned}$ | 0 |  |
| 86 | A3 Drum 2 Count Up | Specifies whether the counter increments by two counts per print when the A3 drum is used. | 0: No <br> 1: Only the master counter 2: Both the master and the copy counter | 0 <br> Ricoh, AB Dick $\begin{gathered} 2 \\ \text { NRG } \end{gathered}$ | See Remarks (3) |
| **87 | Memory Print | Specifies the printing operation when in Memory mode. | $\begin{aligned} & \text { 0: Memory } \\ & \text { 1: Stack } \end{aligned}$ | 0 | See Remarks (4). |
| **88 | Auto Memory/ Class | Specifies whether Auto Memory/Class mode is used. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | See Remarks (5). |


| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| **89 | Tint Mode | Select "Yes" to make a "Tint" image. (If "Tint" mode is selected, the Screen, Contrast, and Image Density keys are not available.) | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 90 | Thermal Head Test | Selects the background pattern for the copy made in the thermal head test; performs the test. | 1 to 40 <br> 51 to 90 <br> 101 to 140 <br> 151 to 190 | 7 | See the Thermal Head Test section. |
| 91 | Command Sheet Check | Prints the command sheet image (designated area) together with the original image. | $\begin{aligned} & \hline \begin{array}{l} \text { 0: No } \\ \text { 1: Yes } \end{array} \\ & \hline \end{aligned}$ | 0 | See the Command Sheet Check section. |
| 92 | Thermal Paper Mode | Use this mode to test the thermal head. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | See Remarks <br> (6) |
| 93 | Erase Area Check | Checks the erase area. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | See Remarks (7) |
| 95-1 | Scanner Free Run | Selects the type of scanner free run. | 0: With the lamp off 1: With the lamp on | 0 | See Remarks <br> (8) |
| 95-2 | Scanner Free Run | Carries out the scanner free run. (The speed can be changed: see Remarks (8).) | Start with the Print Start key. Stop with the Stop key. |  | Displays when pressing \# after selecting 0 or 1 in 95-1. |
| 96 | ADF Original Feed Check | Carries out the ADF original feed check. (The speed can be changed; see Remarks (9).) | Start with the Print Start key. Stop with the Stop key. |  | See Remarks (9) |
| 98 | Economy Count | Displays the total number of masters made in Economy mode. |  | 0 |  |
| 99 | Staple Count | Displays the total number of stapling operations done so far. |  | 0 |  |
| 100 | Multi-copy Count | Displays the total number of masters made in Multi-copy mode. |  | 0 |  |
| 101 | Make Up Count | Displays the total number of masters made in Make-up mode. |  | 0 |  |
| 102 | Make Up Photo Count | Displays the total number of masters made in Make-up Photo mode. |  | 0 |  |

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| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 103 | Margin Erase Count | Displays the total number of masters made with the Margin Erase key. |  | 0 |  |
| 104 | On line Count | Displays the total number of masters made in On Line mode. |  | 0 |  |
| 105 | Overlay Count | Displays the total number of masters made in Overlay mode. |  | 0 |  |
| 106 | Enlarge Count | $\begin{aligned} & \text { Displays the total } \\ & \text { number of masters } \\ & \text { made in Fixed } \\ & \text { Enlargement mode. } \end{aligned}$ |  | 0 |  |
| 107 | Reduction Count | $\begin{aligned} & \text { Displays the total } \\ & \text { number of masters } \\ & \text { made in Fixed } \\ & \text { Reduction mode. } \end{aligned}$ |  | 0 |  |
| 108 | Zoom Count | Displays the total number of masters made in Zoom mode. |  | 0 |  |
| 109 | Directional Mag. | Displays the total number of masters made in Directional Magnification mode. |  | 0 |  |
| 110 | Power On Time | Displays the total amount of time the machine has been turned on. |  | 0 | xxxxx Hour <br> xx Minutes <br> xx Seconds |
| 111 | Total Count | Displays the total number of masters and prints. |  | 0 | M: Master count P: Print count |
| *113 | Resettable Count | Used by the customer to display the total number of masters and prints. |  | 0 | M: Master count P: Print count |
| *114 | CLR Reset- table Count | Clears the resettable total master/print counters. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 115 | ADF Mode Count | Displays the total number of sheets fed in the ADF mode. |  | 0 |  |
| 116 | Scanner Mode Count | Displays the total number of originals set in platen mode. |  | 0 |  |
| 117 | Color Drum Count | Displays the total number of prints when using the color drum. |  | 0 |  |
| 118 | Paper Size Count | Displays the total number of prints made in each paper size. See Remarks (10). |  | 0 | Display counters for each paper size by pressing the \# key. |


| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 119 | CLR All Total Count | Clears the following counters: <br> SP Nos. 111, 115, 116, 117, and 118. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| *120-1 | User Code Mode | Selects user code mode, and displays the total number of prints made in the User Code mode. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 | See the user code mode section. |
| 120-2 | Auto Reset Time | Selects the auto reset time. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: } 1 \text { to } 5 \text { min. } \end{aligned}$ | 0 | Displays only when "Yes" is selected in 1201. |
| *121. | UC Count | Displays the total number of masters and prints made by each user code. |  | 0 | Press the \# key to shift to another user code. |
| *122 | Clear UC Count | Clears every user code counter. | $\begin{aligned} & 0: \text { No } \\ & 1: \text { Yes } \end{aligned}$ | 0 | Same as above. |
| *123 | Total UC Count | Displays the total number of masters and prints for up to 20 user codes. |  | 0 |  |
| *124 | Clear Total UC Count | Clears the total user code counter. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| 130 | Input Check Mode | Displays the inputs from sensors and switches. |  |  | See the input check table. |
| 131 | Output Check Mode | Turns on the electrical components. |  |  | See the output check table. |
| 132 | All Indicators ON | Turns on all the indicators on the operation panel. |  |  | Press the \# key to light all the indicators. |
| 133 | Sorter Cleaning Mode | In this mode, one bin shift is carried out when the Print Start key is pressed. First, select the 1st sorter or 2nd sorter. | 1: 1st Sorter 2: 2nd Sorter | 1 | Depending on the number selected in this mode, the machine goes to 133-1 or 133-2. |
| 133-1 | Sorter Cleaning Mode (1st Sorter) | 1. When the Print Start key is pressed once, the bin returns to the home position. <br> 2. Each time the Print Start key is pressed after this, one bin shift is carried out. When the 20th bin shift is done, the bins return to the home position. |  |  |  |

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| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 133-2 | Sorter Cleaning Mode (2nd Sorter) | 1.When the Print Start key is pressed once, the bin returns to the home position. <br> 2. Each time the Print Start key is pressed after this, one bin shift is carried out. <br> When the 20th bin shift is done, the bins return to the home position. |  |  |  |
| 135 | SN: 1st Paper Exit | Displays the 1st paper exit sensor voltage. |  |  | Unit: Volts |
| 136 | $\begin{aligned} & \text { SN: 2nd Paper } \\ & \text { Exit } \\ & \hline \end{aligned}$ | Displays the 2nd paper exit sensor voltage. |  |  | Unit: Volts |
| 137 | SN: Master Eject | Displays the master eject sensor voltage. |  |  | Unit: Volts |
| 138 | SN: Drum Master | Displays the drum master sensor voltage. |  |  | Unit: Volts |
| 140 | Ink Detection | Specifies whether ink detection is done. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 1 |  |
| 141 | Paper Detection | Specifies whether paper end detection is done. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 1 |  |
| 142-1 | Size Detection | Specifies whether paper size detection is done or not. | $\begin{aligned} & \text { 0: Yes } \\ & \text { 1: No size } \\ & \text { detection } \end{aligned}$ | 0 | If "0" is selected in this mode, the machine goes to 142-2. |
| 142-2 | $\begin{aligned} & \text { Size Detection } \\ & \text { OFF? } \end{aligned}$ | Specifies whether the paper size indication on the operation panel is erased. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 0 |  |
| *143 | Orig. Size Detection | Specifies whether original size detection is done. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 1 |  |
| 145 | Drum Mast. Detection | Specifies whether drum master detection is done. | $\begin{aligned} & \text { 0: No } \\ & \text { 1: Yes } \end{aligned}$ | 1 |  |
| 146 | ADF Cover Detection | This mode disables the ADF Cover Sensor. | 0: Disabled <br> 1: Enabled | 1 |  |
| 147 | ADF Set Detection | This mode disables the ADF Set Sensor. | 0: Disabled (the ADF is always set) <br> 1: Enabled | 1 |  |
| 150 | Control ROM No. | Displays the ROM part number and the ROM manufacturing date. |  | P/No. | 1994/10/07 = |
| 151 | Machine No. | Displays the machine serial number and the installation date. |  | 0 | Input the serial number and the installation date. |

Shade Area - Sorter is not available in the USA.

| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 152 | Service Tel. No. | Input the service representative's telephone number, which is displayed with the service call code. |  | 0 | Use the number keys to input the telephone number at installation. Press the Memory/ Class key if you wish to add a space between the digits. |
| 153 | Last Service Code | Displays the last service call. |  | 0 |  |
| *160 | v: Margin Ers. A3 $\square$ <br> $\bullet$ : Margin Ers. $11 \times 17 \square$ | Adjust the margin erase area. <br> $\downarrow$ : A3 <br> -: 11" x 17" | $\begin{aligned} & (50 \text { to } 307) \times(50 \\ & \text { to } 432) \mathrm{mm} \end{aligned}$ | $\begin{aligned} & \hline \mathbf{v}: 289 x \\ & 416 \mathrm{~mm} \\ & \bullet: 271 \mathrm{x} \\ & 428 \mathrm{~mm} \end{aligned}$ |  |
| *161 | $\bullet$ : Margin <br> Ers. B4 <br> $\bullet$ : Margin Ers. $8.5 \times 14$ | Adjust the margin erase area. <br> v : B4 <br> - : 81/2" x 14" | $\begin{aligned} & (50 \text { to } 307) \times(50 \\ & \text { to } 432) \mathrm{mm} \end{aligned}$ | $\begin{aligned} & \hline \vee: 249 x \\ & 360 \mathrm{~mm} \\ & \text { : }: 208 \mathrm{x} \\ & 352 \mathrm{~mm} \end{aligned}$ |  |
| *162 | v: Margin Ers. A4 $\square$ <br> $\bullet$ : Margin Ers. $8.5 \times 11 \square$ | Adjust the margin erase area. <br> v: A4 Landscape <br> - : 81/2" x 11" <br> Landscape | $\begin{aligned} & (50 \text { to } 307) \times(50 \\ & \text { to } 432) \mathrm{mm} \end{aligned}$ | $\begin{aligned} & \mathrm{v}: 202 \mathrm{x} \\ & 293 \mathrm{~mm} \\ & \bullet: 208 \mathrm{x} \\ & 275 \mathrm{~mm} \end{aligned}$ |  |
| *163 | v: Margin Ers. A4 $\square$ <br> - : Margin Ers. $8.5 \times 11$ $\square$ | Adjust the margin erase area. <br> v: A4 Portrait <br> - : 81/2" x 11" Portrait | $\begin{aligned} & (50 \text { to } 307) \times(50 \\ & \text { to } 432) \mathrm{mm} \end{aligned}$ | $\begin{gathered} \bullet 289 x \\ 206 \mathrm{~mm} \\ \text { • } 271 \mathrm{x} \\ 212 \mathrm{~mm} \end{gathered}$ |  |
| *164 | $\vee$ : Margin Ers. B5 $\square$ <br> - : Margin Ers. $5.5 \times 8.5 \square$ | Adjust the margin erase area. <br> v: B5 Landscape <br> - : 51/2" x 81/2" Landscape | $\begin{aligned} & (50 \text { to } 307) \times(50 \\ & \text { to } 432) \mathrm{mm} \end{aligned}$ | $\begin{aligned} & \mathrm{v}: 174 \mathrm{x} \\ & 253 \mathrm{~mm} \\ & \bullet: 132 \mathrm{x} \\ & 212 \mathrm{~mm} \end{aligned}$ |  |
| *165 | v: Margin Ers. B5 $\square$ <br> - : Margin Ers. $5.5 \times 8.5$ | Adjust the margin erase area. <br> - B5 Portrait <br> - : 51/2" x 81/2" Portrait | $\begin{aligned} & (50 \text { to } 307) \times(50 \\ & \text { to } 432) \mathrm{mm} \end{aligned}$ | $\begin{aligned} & \hline \mathbf{v}: 249 \mathrm{x} \\ & 178 \mathrm{~mm} \\ & \bullet: 208 \mathrm{x} \\ & 136 \mathrm{~mm} \end{aligned}$ |  |
| *166 | - : Margin Ers. A5 $\square$ <br> $\bullet$ : Margin <br> Ers. **1 $\square$ | Adjust the margin erase area. <br> $\vee$ : A5 Landscape <br> - : 2" x 2" | $\begin{aligned} & (50 \text { to } 307) \times(50 \\ & \text { to } 432) \mathrm{mm} \end{aligned}$ | $\begin{gathered} \hline \vee: 140 x \\ 206 \mathrm{~mm} \\ \bullet: 50 \times 50 \\ \mathrm{~mm} \end{gathered}$ |  |
| *167 | $\bullet$ : Margin Ers. A5 $\square$ <br> - : Margin <br> Ers. **2 $\qquad$ | Adjust the margin erase area. <br> v: A5 Portrait <br> - : 2" x 2" | $\begin{aligned} & (50 \text { to } 307) \times(50 \\ & \text { to } 432) \mathrm{mm} \end{aligned}$ | -: 202 x <br> 144 mm <br> - : 50x 50 mm |  |
| *168 | $\vee$ : Margin Ers. A6 $\square$ <br> - : Margin <br> Ers. ${ }^{* *} 3 \square$ | Adjust the margin erase area. <br> -: A6 Landscape <br> - : 2" x 2 " | $\begin{aligned} & (50 \text { to } 307) \times(50 \\ & \text { to } 432) \mathrm{mm} \end{aligned}$ | $\begin{gathered} \hline \vee: 97 x \\ 144 \mathrm{~mm} \\ \bullet: 50 x 50 \\ \mathrm{~mm} \end{gathered}$ |  |

## SERVICE PROGRAM MODE

| No. | Display | Function | Data | Factory Setting | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
| *169 | v: Margin Ers. A6 $\square$ <br> - : Margin <br> Ers. **4 $\qquad$ | Adjust the margin erase area. <br> v: A6 Portrait <br> - : 2" x 2" | $\begin{aligned} & (50 \text { to } 307) \times(50 \\ & \text { to } 432) \mathrm{mm} \end{aligned}$ | $\begin{gathered} \hline \vee: 140 x \\ 101 \mathrm{~mm} \\ \bullet: 50 \times 50 \\ \mathrm{~mm} \end{gathered}$ |  |
| *170 | v: Margin Ers. ** $\square$ <br> $\bullet$ : Margin <br> Ers. **5 $\square$ | Adjust the margin erase area. <br> $v$ : Others <br> - : 2" x 2 " | $\begin{aligned} & (50 \text { to } 307) \times(50 \\ & \text { to } 432) \mathrm{mm} \end{aligned}$ | $\begin{gathered} \hline \boldsymbol{v}: 92 x \\ 144 \mathrm{~mm} \\ \bullet: 50 \times 50 \\ \mathrm{~mm} \end{gathered}$ |  |

## Remarks

1) SP Mode No. 38 - ADF Scan Line Position

The printing position moves as shown below.
$\leftarrow$ Direction

+X : Moves X mm to the left


## SERVICE PROGRAM MODE

2) SP Mode No. 39 - Image Center Position

The printing position moves as shown below.

+X : Moves X mm

-X: Moves down X mm


Note: When adjusting the scanner image position input " 0 " first:
Example) $\mathrm{X}=0.9 \mathrm{~mm} \rightarrow$ " 0 ", " 9 ", and then press the \# key.
3) SP Mode No. 86 - A3 Drum 2 Count Up

The counter will increment by 2 if an A3 drum is installed, regardless of the size of paper.
The default setting is changed with DIP switch 102-5. See Sub-section 2.3.1. of section 4.
4) SP Mode No. 87 - Memory Print

Normally, in platen mode (when no originals are placed in the ADF), the machine will stop when the 1st print job is finished even if the tape marker is installed, so that the next original can be placed. The next printing job will start when the Print Start key is pressed.
If "1" is selected in this mode, after the 1st print job is finished, the tape marker will feed a strip of tape and the next print job will start immediately afterwards.
5) SP Mode No. 88 - Auto Memory/ Class

In Memory/Class mode, the machine will normally stop when the first print job is finished if the tape marker is not installed.
If "1" is selected in this mode, the machine will stop for a while (this interval is the same as when the tape marker is operating). Then it will continue with the next print (or master making) job.

## 6) SP Mode 92 - Thermal Paper Mode

You can use this mode to test the thermal head.
Install the master roll and change this SP Mode to 1. Place an original on the exposure glass and press the Master Making key. The machine will start printing (plotting) on the thermal paper without performing the master clamp process.
You can also enable SP Mode 90 and press the Master Making key to test the thermal head without placing an original on the exposure glass.
7) SP Mode 93 - Erase Area Check

This will check the erased area for shadow erase (Center and Edge Margin Erasing). If you make a master and print an image with this mode, the machine will make a background pattern on the area to be erased.
8) SP Mode No. 95 - Scanner Free Run

- It is possible to change the first scanner speed by changing the magnification ratio:

25 to 200 \% (Maximum speed = 25 \%)

- To start the scanner free run, press the Print Start key after selecting "Lamp On/Off" using the \# key.
Input a magnification ratio if you wish to change the first scanner speed, before you press the Start key. (Factory setting = 25 \%)
- To stop the scanner free run, press the Stop key. The scanner returns to home position, then stops.
- The machine will not exit the SP mode until the scanner returns to home position correctly.

9) SP Mode No. 96 - ADF Original Feed Check

- It is possible to change the original feed speed by changing the magnification ratio:

25 to $\mathbf{2 0 0} \%$ (Maximum speed = $\mathbf{2 5}$ \%)

- To start original feed, press the Print Start key after placing originals in the ADF.
Input a magnification ratio if you wish to change the original feed speed, before you press the Start key. The ADF starts feeding until all originals are fed.
- To stop feeding, press the Stop key. The original stops at this moment.
- If the original feed fails, or if the Stop key is pressed, the "A + Jam" indicator turns on.
If the jammed originals are removed from the ADF, the jam indicator turns off and the failure is reset.
- The machine will not exit the SP mode during feeding.

10) SP Mode No. 118 - Print Size Count

- The print size counter indicates the following paper sizes:

A4 version

- A3
- B4
- A4 Landscape
- A4 Portrait
- B5 Landscape
- B5 Portrait
-     * (Others)


## LT version

- DLT
- LT
- LT Landscape
- LT Portrait
- HLT
-     * (Others)


### 4.3.3 THERMAL HEAD TEST

This function is used to determine which printer component is causing an image problem on the master.

In this mode, the background pattern that is printed covers the entire sheet of paper.

Procedure

1. Place paper on the paper table.

NOTE: To reduce thermal head load, use the smallest paper size possible, i.e. the smallest paper width on which the part with the image problem can be printed.
2. Access SP mode.
3. Input No. 90 and press the Enter key.

NOTE: The factory setting is pattern No. 7. If necessary, input another background pattern with the Number keys.
4. Press the Master Making key (an original is not necessary).
5. Make some prints and check the image.

## Assessment

If the printout is normal, a Part A component is defective.
If the printout is abnormal, a Part B component is defective.


- This mode can be used in combination with SP mode No. 92, Thermal Paper Mode.


### 4.3.4 COMMAND SHEET CHECK

Normally, Fn 9 or Fn 19 cannot be used as an input in Make-up mode.
By changing the data of SP mode \#91 from 0 to 1, Fn 9 or Fn 19 can be used as an input.

| Command No. | Display | Function |
| :--- | :--- | :--- |
| Fn 9 | OVERLAY | Prints both the original image and designated <br> area of the command sheet on the paper. |
| Fn 19 | OVERLAY |  |

This function is used to check the position of the designated area on the command sheet. It is checked in relation to the original image to make sure that the command sheet is being read correctly.

## Procedure

1. Access SP mode.
2. Input 91 and press the Enter key.
3. Input 1 with the number keys and press the Enter key.
4. Press the Clear Modes key to leave SP mode.
5. Place the command sheet and the original on the ADF.
6. Press the Make-up key and input Fn 9 or Fn 19 (these commands have the same function).
7. Input 1 for the undesignated area.
8. Press the Master Making key and then check the print to make sure that the area designated by the command sheet is in the correct position on the original image.

NOTE: 1) Only one command sheet can be stored in memory. If two or more command sheets are read, only the last command sheet is output.
2) Make sure to return the SP mode to its original setting after checking the designated area position.

### 4.3.5 INPUT/OUTPUT CHECK MODE

This program checks the electrical components. The procedure for accessing the program is as follows:

## Input Check Mode Access Procedure

1. Access SP mode. (See the SP mode access procedure.)
2. Enter 130 (SP mode number) with the number keys.
3. Press the Enter key.
4. Enter the desired input number. (See the input check table.)

NOTE: The input number can be shifted up or down by pressing the Zoom key. ("+" or "-").
5. Press the Enter key.

NOTE: In the input check mode, all image position LEDs and printing speed LEDs turn on when a sensor or switch that is being tested is actuated. A beep will also be heard.
6. Press the Enter key to return the display to the initial input check menu.
7. Press the Clear Modes key to leave SP mode.

## Output Check Mode Access Procedure

1. Access SP mode. (See the SP mode access procedure.)
2. Enter 131 (SP mode number) with the number keys.
3. Press the Enter key.
4. Enter the desired output number. (See the output check table.)

NOTE: The output number can be shifted up or down by pressing the Zoom key ("+" or "-").
5. Press the Enter key.
6. Press the Print Start key to turn on the component.
7. Press the Enter key to return the display to the initial output check menu.
8. Press the Clear Modes key to leave the SP mode.

## Input Check Table

| Code | LCD Display | Component Checked |
| :---: | :---: | :---: |
| 1. | SN: ADF Cover In-1 | ADF Cover Sensor |
| 2. |  | Original Set Sensor |
| 3. | $\begin{array}{ll} \hline \text { SN: 2nd Original } \\ \text { (ADF) } & \text { In- } 3 \\ \hline \end{array}$ | Original Registration Sensor |
| 4. |  | Scan Line Sensor |
| 5. | $\begin{array}{ll} \begin{array}{l} \text { SN: Original Size } 0 \\ \text { (ADF) } \end{array} & \\ \hline \end{array}$ | Original Width Sensor - 0 |
| 6. | $\begin{array}{ll} \hline \text { SN: Original Size } 1 & \\ \text { (ADF) } & \text { In- } 6 \\ \hline \end{array}$ | Original Width Sensor-1 |
| 7. | $\begin{array}{ll} \hline \text { SN: Original Size } 2 & \\ \text { (ADF) } & \text { In- } 7 \\ \hline \end{array}$ | Original Width Sensor - 2 |
| 8. | $\begin{array}{ll} \hline \text { SN: Original Size } 3 \\ \text { (ADF) } & \text { In- } 8 \\ \hline \end{array}$ | Original Width Sensor - 3 |
| 13. | SN: Paper Size $0 \quad$ In-13 | Paper Width Sensor - 0 |
| 14. | SN: Paper Size $1 \quad$ In-14 | Paper Width Sensor - 1 |
| 15. | SN: Paper Size $2 \quad$ In-15 | Paper Width Sensor - 2 |
| 16. | SN: Paper Size $3 \quad \ln -16$ | Paper Width Sensor - 3 |
| 17. | SN: Paper Size $4 \quad$ In-17 | Paper Length Sensor |
| 18. | SN: Paper End In-18 | Paper End Sensor |
| 19. | SW: Paper Table Open In-19 | Paper Table Open Switch |
| 20. | SN: Paper Table Low Limit In-20 | Paper Table Lower Limit Sensor |
| 21. | SN: Paper Table Height $\quad$ In-21 | Paper Table Height Sensor |
| 22. | $\begin{aligned} & \hline \text { KEY: Lower Paper Feed } \\ & \text { Table } \\ & \hline \end{aligned}$ | Paper Table Down key |
| 23. | SW: Right Cutter In-23 | Right Cutter Switch |
| 24. | SW: Left Cutter In-24 | Left Cutter Switch |
| 25. | SN: Master Buckle In-25 | Master Buckle Sensor |
| 26. | SN: Master End In-26 | Master End Sensor |
| 27. | SIG: Ink In-27 | When the Ink Detecting Pin detects ink |


| Code | LCD Display | Component Checked |
| :---: | :---: | :---: |
| 28. | SIG: Color Drum In-28 | When a color drum is installed |
| 29. | SIG: Drum Size $0 \quad 1 n-29$ | When an A3/DLT or A4/LG drum is installed |
| 30. | SIG: Drum Size $1 \quad \ln -30$ | When an A4/LT drum is installed |
| 30. | SIG: Drum Set $\quad$ In-30 | When an A4/LT drum is installed |
| 31. | SN: Pressure Plate  <br> High Position In-31 | Upper Pressure Plate Sensor |
| 32. | SN: Pressure Plate   <br> Low Position   <br>    <br> In-32   | Lower Pressure Plate Sensor |
| 33. | SW: Master Eject Box ${ }_{\text {In-33 }}$ | Master Eject Box Switch |
| 34. | SN: Full Master $\ln -34$ | Full Master Box Sensor |
| 35. | SN: Printing Pressure In-35 | Printing Pressure Sensor |
| 36. | SN: 1st Drum Position $\ln -36$ | First Drum Position Sensor |
| 37. | SN: 2nd Drum Position In-37 | Second Drum Position Sensor |
| 38. | SW: Manual Master Cut | Master Cut Switch |
| 39. | $\text { SIG: Key Counter } \quad \text { In-39 }$ | When a key counter is installed |
| 41. | SN: 1st Paper Exit In-41 | First Paper Exit Sensor |
| 42. | SN: 2nd Paper Exit $\ln -42$ | Second Paper Exit Sensor |
| 43. | SN: Master Eject In-43 | Master Eject Sensor |
| 44. | SN: Drum Master In-44 | Drum Master Sensor |
| 45 | SN: Scanner  <br> Home Position In-45 | Scanner Home Position Sensor |
| 46 | SN: Platen Angle (Scanner) | Platen Cover Position Sensor |
| 47 | SN: Platen Set <br> (Scanner)$\quad$ In-47 | ADF Set Sensor |
| 48 | SN: Platen Original  <br> (Scanner)  <br>  In-48 | Original Sensor |
| 49 | SN: 4th Original In-49 (ADF) | Original Exit Sensor |
| 50 | SW: Delivery Table  <br> Open  <br> In-50  | Delivery Table Open Switch |
| 51 | SN: Paper Registration In -51 | Paper Registration Sensor |


| Code | LCD Display | Component Checked |
| :---: | :---: | :---: |
| 52 | SN: T. Head Position In-52 | Thermal Head Pressure Release Sensor |
| 60 | SN: Feed Unit Low  <br> (1st Sorter) In-60 | 1st Transport Non-Sort Mode Position Sensor (Sorter) |
| 61 | $\begin{array}{\|ll} \hline \text { SN: Feed Unit High } \\ \text { (1st Sorter) } & \text { In-60 } \\ \hline \end{array}$ | 1st Transport Sort Mode Position Sensor (Sorter) |
| 62 | SN: Feed Unit Cover (1st Sorter) | 1st Transport Cover Open Switch (Sorter) |
| 63 | SN: Safety Switch In-63 (1st Sorter) | Staple Cover Open Switch (1st Sorter) |
| 64 | SN: Staple Cover  <br> (1st Sorter)  <br> In-64  | Staple Cover Open Switch (1st Sorter) |
| 65 | SN: Paper Edge (1st Sorter) In-65 | Trailing Edge Sensor (Sorter) |
| 66 | SN: Sort Paper  <br> (1st Sorter) In-66 | 1st Transport Sensor (Sorter) |
| 67 | $\begin{array}{ll}\text { SN:Stapler Position } \\ \text { (1st Sorter) } & \\ \text { In-67 }\end{array}$ | Staple Position Switch (1st Sorter) |
| 68 | SN: Stapler Unit Move (1st Sorter) In-68 | Staple Unit Movement Switch (1st Sorter) |
| 69 | SN: Stapler H.P. In-69 (1st Sorter) | Staple Home Position Sensor (1st Sorter) |
| 70 | SN;Staple End (1st Sorter) | Staple End Sensor (1st Sorter) |
| 71 | $\begin{array}{ll} \hline \text { SN: Jogger Bar H.P. } \\ \text { (1st Sorter) } & \text { In-71 } \\ \hline \end{array}$ | Jogger Bar Home Position Sensor (1st Sorter) |
| 72 | $\begin{array}{ll} \hline \begin{array}{l} \text { SN: Lead Cam H.P. } \\ \text { (1st Sorter) } \end{array} & \\ \hline \end{array}$ | Helical Wheel Position Sensor (1st Sorter) |
| 73 | SN: Bin Home Position (1st Sorter) In-73 | Bin Unit Home Position Sensor (1st Sorter) |
| 74 | SN: Bin Paper  <br> (1st Sorter) In-74 | Bin/Jam Sensor (1st Sorter) |
| 75 | KEY: Stapler  <br> (1st Sorter) In-75 | Manual Staple Key (1st Sorter) |
| 76 | SN: Staple Paper  <br> (1st Sorter) In-76 | Paper Sensor-Stapler (1st Sorter) |
| 77 | SN: Bin Shift MT CLK (1st Sorter) | Bin Shift Motor Rotation Sensor (1st Sorter) |
| 78 | SN: Feed Motor CLK1 (1st Sorter) | 1st Transport Motor Rotation Sensor (1st Sorter) |
| 79 | $\begin{aligned} & \hline \text { SN: Feed Motor CLK2 } \\ & \text { (1st Sorter) } \quad \text { In-79 } \end{aligned}$ | 2nd Transport Motor Rotation Sensor (Sorter) |
| 80 | SN: Staple Cover In-80 (2nd Sorter) | Staple Cover Open Switch (2nd Sorter) |

Shaded Area - Sorter is not available in the USA

| Code | LCD Display | Component Checked |
| :---: | :---: | :---: |
| 81 | SN: Paper Edge (2nd Sorter) | Trailing Edge Sensor (2nd Sorter) |
| 82 | SN: Sort Paper (2nd Sorter) In-82 | 2nd Transport Sensor (Sorter) |
| 83 | SN: Stapler Position (2nd Sorter) | Staple Position Switch (2nd Sorter) |
| 84 | SN: Stapler Unit Move (2nd Sorter) IN-84 | Staple Home Position Sensor (2nd Sorter) |
| 85 | SN: Stapler H.P. (2nd Sorter) | Staple End Sensor (2nd Sorter) |
| 86 | SN: Staple End (2nd Sorter) In-86 | Staple End Sensor (2nd Sorter) |
| 87 | $\begin{array}{ll} \hline \text { SN: Jogger Bar H.P. } \\ \text { (2nd Sorter) } & \text { In-87 } \\ \hline \end{array}$ | Jogger Bar Home Position Sensor (2nd Sorter) |
| 88 | SN: Lead Cam H.P. In-88 (2nd Sorter) | Helical Wheel Home Position Sensor (2nd Sorter) |
| 89 | SN: Bin Home Position (2nd sorter) In-89 | Bin Unit Home Position Sensor (2nd Sorter) |
| 90 | SN: Bin Paper (2nd Sorter) | Bin/Jam Sensor (2nd Sorter) |
| 91 | KEY: Stapler (2nd Sorter) | Manual Staple Key (2nd Sorter) |
| 92 | SN: Stapler Paper  <br> (2nd Sorter) In-92 | Paper Sensor-Stapler (2nd Sorter) |
| 93 | SN: Bin Shift MT .LK (2nd Sorter) | Bin Shift Motor Rotation Sensor (2nd Sorter) |
| 100 | SN: Cassette Paper (LCT) | Cassette Paper End Sensor (LCT) |
| 101 | SN: Paper End (LCT) | Tray Paper Position Sensor (LCT) |
| 102 | SN: Paper Position (LCT) | Tray Paper Position Sensor (LCT) |
| 103 | SIG: LCT | CN110 Connection (Should be ON when connected) |
| 104 | SN: Low Limit (LCT) | Tray Lower Limit Sensor (LCT) |
| 105 | SN: Paper MAX. Limit (LCT) | Maximum Paper Load Sensor (LCT) |
| 106 | KEY: Lower LCT | Tray Down Switch (LCT) |
| 107 | SN: Paper Size 0 (LCT) | Paper Size Sensor 0 (LCT) |
| 108 | SN: Paper Size 1 (LCT) | Paper Size Sensor 1 (LCT) |
| 109 | SN: Paper Size 2 (LCT) | Paper Size Sensor 2 (LCT) |
| 110 | SN: Paper Size 3 (LCT) | Paper Size Sensor 3 (LCT) |
| 111 | SN: Paper Size 4 (LCT) | Paper Size Sensor 4 (LCT) |
| 112 | SN: LCT Cover | Cover Open Switch (LCT) |
| 113 | SIG: Cassette (LCT) | Cassette Switch (LCT) |

Output Check Table

| Code | LCD Display | Description |
| :---: | :---: | :---: |
| 2 | MOTOR: ADF Drive Out- 2 | Turns on the ADF drive motor. |
| 3 | MOTOR: Master Eject Out- 3 | Turns on the master eject motor. |
| 4 | $\begin{aligned} & \hline \text { MOTOR: Pressure Plate } \\ & \text { Up/Down } \quad \text { Out- } 4 \end{aligned}$ | Turns on the pressure plate up/down motor. |
| 5 | MC: Master Reverse Roller Out- 5 | Turns on the master reverse roller magnetic clutch. |
| 6 | MOTOR: Vacuum Out- 6 | Turns on the vacuum fan motor. |
| 7 | MOTOR: Air Knife Out- 7 | Turns on the air knife motor. |
| 8 | SIG: Key Counter Out- 8 | Increments the key counter. |
| 9 | COUNTER: Master Out- 9 | Increments the master counter. |
| 10 | COUNTER: Paper Out-10 | Increments the total counter. |
| 12 | SOL: Ink Supply Out-12 | Turns on the ink supply solenoid. |
| 13 | SOL: Drum Lock Out-13 | Turns on the drum lock solenoid. |
| 14 | $\begin{array}{ll}\text { SOL: Paper Feed/Print } \\ \text { Pressure } & \text { Out-14 }\end{array}$ | Turns on the paper feed solenoid and the printing pressure solenoid. |
| 15 | SOL: Master Feed Clamper Out-15 | Turns on the master feed clamper solenoid. |
| 16 | SOL: Master Eject Clamper Out-16 | Turns on the master eject clamper solenoid. |
| 17 | SOL: Master Eject Out-17 | Turns on the master eject solenoid. |
| 18 | RELAY: Paper Table Down | Turns on the paper table drive motor (down). |
| 19 | RELAY: Paper Table Up | Turns on the paper table drive motor (up). |
| 20 | RELAY: Main Motor Reverse $\quad$ Out-20 | Turns the drum in the direction opposite to the printing direction. |
| 21 | SIG: Fluorescent Lamp (Xenon Lamp) Out-21 | Turns on the exposure lamp if the Print key is pressed. Turns off the lamp if the Print key is pressed again. |
| 22 | MOTOR: Cutter <br> + Direction Out-22 | Turns on the cutter motor (moves it to the rear of the machine). |
| 23 | $\begin{array}{ll}\text { MOTOR: Cutter } & \\ \text { — Direction } & \text { Out-23 }\end{array}$ | Turns on the cutter motor (moves it to the front of the machine). |
| 24 | $\begin{array}{ll} \hline \text { MOTOR: Image Shift } \\ \text { + Direction } & \text { Out-24 } \\ \hline \end{array}$ | Turns the image position motor in the " + " direction. |
| 25 | $\begin{array}{ll}\text { MOTOR: Image Shift } & \\ \text { - Direction Out-25 }\end{array}$ | Turns the image position motor in the "-" direction. |


| Code | LCD Display | Description |
| :---: | :---: | :---: |
| 26 | MOTOR: Main (10 rpm) Out-26 | Turns on the main motor (10 rpm). |
| 27 | MOTOR: Main (20 rpm) Out-27 | Turns on the main motor (20 rpm). |
| 28 | MOTOR: Main <br> (1st Speed) Out-28 | Turns on the main motor (1st speed). |
| 29 | MOTOR: Main (2nd Speed) $\quad$ Out-29 | Turns on the main motor (2nd speed). |
| 30 | MOTOR: Main <br> (3rd Speed) Out-30 | Turns on the main motor (3rd speed). |
| 31 | MOTOR: Main <br> (4th Speed) Out-31 | Turns on the main motor (4th speed). |
| 32 | MOTOR: Main <br> (5th Speed) Out-32 | Turns on the main motor (5th speed). |
| 33 | MOTOR: Original Feed Out-33 | Turns on the original transport motor. |
| 34 | MOTOR: Master Feed Out-34 | Turns on the master feed motor. |
| 36 | Turn on drum, feed/ pressure SOLs <br> Out-36 | Turns on the main motor ( 10 rpm ), the paper feed solenoid, and the printing pressure solenoid. |
| 37 | MOTOR: Scanner $\quad$ l | Turns on the scanner motor. Start by pressing the Print Start key. Stop by pressing the Print Start key again. Then the scanner (carriage) returns to home position when the Print Start key is pressed. |
| 38 | SOL: Sheet Insert | Turns on the master press sheet solenoid. |
| 40 | MOTOR: Master Buckle Out-40 | Turns on the master buffer fan motors. (3). |
| 41 | SIG: VHD on Out-41 | Applies thermal head voltage. |
| 42 | MOTOR: T. Head Up/Down Out-42 | Turns on the thermal head pressure release motor. |
| 50 | EMF Sorter Mode 1 Out-50 | Available only when the EMF Sorter is installed. |
| 51 | EMF Sorter Mode 2 Out-51 | Available only when the EMF Sorter is installed. |
| 52 | EMF Sorter Mode 3 Out-53 | Available only when the EMF Sorter is installed. |
| 53 | EMF Sorter Mode 4 Out-53 | Available only when the EMF Sorter is installed. |
| 60 | $\begin{aligned} & \hline \text { MODE: Feed Unit U/D } \\ & \text { (1st Sorter) Out-60 } \end{aligned}$ | Turns on the paper delivery table motor. |

Shaded Area - Sorter is not available in the USA

| Code | LCD Display | Description |
| :---: | :---: | :---: |
| 61 | $\begin{array}{ll} \hline \text { MOTOR: Paper Feed } \\ \text { (1st Sorter) } & \text { Out-61 } \\ \hline \end{array}$ | Turns on the 1st transport motor. |
| 62 | MOTOR: Paper Feed Out-62 (2nd Sorter) | Turns on the 2nd transport motor. |
| 63 | MODE: Bin Shift (1st Sorter) Out-63 | Turns on the bin shift motor (1st Sorter) |
| 64 | MODE: Jogger <br> (1st Sorter) Out-64 | Turns on the jogger bar motor. (1st Sorter) |
| 65 | MODE: Staple <br> (1st Sorter) Out-65 | Turns on the staple motor. (1st Sorter) |
| 66 | MODE: Bin Home (1st Sort) Out-66 | Moves the bins to the home position. (1st Sorter) |
| 67 | MODE: Bin Shift (2nd Sorter) | Turns on the bin shift motor. (2nd Sorter) |
| 68 | MODE: Jogger (2nd Sorter) $\quad$ Out-68 | Turns on the jogger bar motor. (2nd Sorter) |
| 69 | MODE: Staple (2nd Sorter) Out-69 | Turns on the staple motor (2nd Sorter) |
| 70 | MODE: Bin Home (2nd Sorter) Out-70 | Moves the bins to the home position. (2nd Sorter) |
| 71 | MODE: Free Running Out-71 (Sorter) | The machine simulates sort speration. |
| 100 | MOTOR: Table Down (LCT) | The LCT tray drive motor moves the tray down. |
| 101 | Motor:Table Up (LCT) $\quad$ Out-101 | The LCT tray drive motor moves the tray up. |
| 102 | MOTOR: Cassette Down Out-102 | The LCT cassette bottom plate drive motor moves the plate down. |
| 103 | MOTOR: Cassette Up (LCT) | The LCT cassette bottom plate drive motor moves the plate up. |

Shaded Area - Sorter is not available in the USA.

### 4.3.6 USER CODE MODE

## User Codes

With the user code function, operators must input an authorized code before the machine will operate. The machine keeps track of the number of prints made under each code.

There are 20 user codes as follows:

| No. | User Code No. |
| :---: | :---: |
| 1 | 382 |
| 2 | 191 |
| 3 | 182 |
| 4 | 173 |
| 5 | 164 |
| 6 | 155 |
| 7 | 146 |
| 8 | 137 |
| 9 | 128 |
| 10 | 119 |
| 11 | 482 |
| 12 | 291 |
| 13 | 282 |
| 14 | 273 |
| 15 | 264 |
| 16 | 255 |
| 17 | 246 |
| 18 | 237 |
| 19 | 228 |
| 20 | 219 |

## How To Use a User Code

1. Enter the user code (3 digits) with the number keys.
2. Press the Enter key.
3. Press the Master Making key to start printing.

NOTE: The user code mode is reset if the Clear Modes key and the Stop key are pressed together.

## REPLACEMENT AND ADJUSTMENT

## 5. REPLACEMENT AND ADJUSTMENT

### 5.1 MASTER FEED

### 5.1.1 THERMAL HEAD VOLTAGE ADJUSTMENT



Purpose: To maintain the quality of masters and to extend the life of the thermal head.

## Adjustment Standard:

There are two steps.

1) The output voltage for the thermal head from the power supply unit must be 22.5 volts ( $\pm 0.5$ ).
2) The output from the DC/DC converter board is different from one thermal head to another. Refer to the voltage value $(\mathrm{X})$ on the thermal head decal. The output should be between "X-0.1" and "X" volts.

NOTE: This adjustment is always required when the thermal head or power supply unit is replaced.

1. Turn off the main switch and remove the paper exit cover plate (4 screws).
2. Turn on the main switch.
3. Access SP mode and select output check mode (SP131) No. 41.
4. Press the Print Start key to apply thermal head voltage continuously

CAUTION: Do not apply the Voltage for more than $\mathbf{6 0}$ seconds.
5. Check the voltage between CN503-15 and CN503-12. If the voltage is not 22.5 volts ( $\pm 0.5$ ), turn VR1 on the power supply board to adjust the voltage.
6. Leave the SP mode and turn off the main switch. Then, connect CN503 of the power supply unit.

7. Open the scanner unit, and remove the thermal head cover [A].
8. Disconnect connector CN751 on the DC/DC converter board [B].
9. Check the voltage on the thermal head decal. (The value is different from one thermal head to another.)
10. Turn on the main switch.
11. Access the SP mode and select output check mode (SP131) No. 41.
12. Press the Print Start key to apply thermal head voltage continuously.

CAUTION: Do not apply the voltage for more than $\mathbf{6 0}$ seconds.
13. Check the voltage between TP1 and TP2 on the DC/DC converter board. If the voltage is out of the standard range (the value on the thermal head decal $+0 /-$ 0.1 volt), turn VR1 on the DC/DC converter board to adjust the voltage.
14. Leave the SP mode and turn off the main switch. Reinstall the removed parts.

### 5.2 PAPER FEED

### 5.2.1 SECOND FEED ROLLER START TIMING



Purpose: To ensure correct paper feed by calibrating the second feed roller start timing, and to adjust the leading edge margin.
Adjustment Standard: $144^{\circ}$

1. Set the Image Position indicator to the " 0 " position and return the drum to the home position by turning the main switch off and on. Then, turn the main switch off and unplug the machine.
2. Remove the rear cover of the machine.
3. Position a protractor $[B]$ on the end of the image shift shaft $[A]$.

NOTE: Align the origin of the protractor with the edge of the solenoid bracket [C].

4. Turn on the paper feed solenoid [F] manually and, using a 10 mm spanner, gradually turn the drum rotation shaft.
5. Measure the degrees turned when the second feed roller sector gear [C] starts returning counterclockwise (when the second feed rollers start rotating). This should be $144^{\circ}$.
6. If it is not, loosen the 2 bolts [D] and adjust the second feed roller rotation timing by turning the cam [E].

### 5.2.2 PAPER FEED ROLLER REMOVAL



1. Remove the left clip $[A]$.

2. Remove the left bushing $[B]$.
3. Remove the paper feed roller shaft [C].
4. Remove the 2 paper feed rollers [D].

NOTE: When reassembling, make sure that the position of the core roller [E] on the shaft is between 35.5 mm and 36.5 mm from the end of the shaft as shown.

### 5.3 DELIVERY

### 5.3.1 EXIT PAWL TIMING ADJUSTMENT



Purpose: To ensure that the exit pawl does not touch the master clamper.
Adjustment Standard: $228 \pm 2^{\circ}$

1. Remove the rear cover of the machine.
2. Press and hold down the Drum Rotation button until the drum reaches the home position.
3. Position a protractor on the end of the image shift shaft. Position the origin of the protractor at the bracket of the master feed clamper solenoid.
4. Manually press in the plunger of the printing pressure solenoid. Release the paper detection arm manually by rotating the drum rotation shaft with a spanner ( 10 mm ).
5. Measure the degrees turned when the exit pawl $[\mathrm{A}]$ comes closest to the drum. This must be $228 \pm 2^{\circ}$.
6. If it is not, loosen the hexagon nut [B] and screw [C], then adjust the exit pawl position by turning the hexagon bolt [D].
7. Check the adjustment by repeating steps 4 to 6 .

### 5.4 PAPER FEED

### 5.4.1 FEED LENGTH OF THE SECOND FEED ROLLER ADJUSTMENT



Operation side

Purpose: To ensure proper paper feed by the second feed rollers.
Adjustment Standard: 55 to 60 mm

1. Stack about 100 sheets of paper on the paper table.
2. Set the paper table in the paper feed position (Use output check mode SP131, No. 19). Then, turn the main switch off and unplug the machine.
3. Remove the rear cover and the drum unit from the machine.
4. Turn on the paper feed solenoid manually, then gradually turn the drum rotation shaft with a 10 mm spanner.
5. Measure the paper feed length from the time the second feed roller starts rotating until it stops rotating. This feed length should be between 55 and 60 mm .
6. If it is not, adjust the feed length by loosening the screw and shifting the cam up or down.
7. Check the adjustment by repeating steps 4 and 5 .

SECTION 6 POINT TO POINT DIAGRAM

## 6. POINT TO POINT DIAGRAM (C228)

## Location Map 1/2 (Main Diagram)

- Section A
- Section B
- Section C
- Section D
- Section E
- Section F


## Location Map 2/2 (Main Control PCB Details)

- Section G
- Section H
- Section I
- Section J
- Section K
- Section L

NOTE: The symbols and wire color codes used in the diagrams are as follows:

- SYMBOL TABLE -

- WIRE COLOR CODE -
(B) - Black
(C) - Blue
(G)- Green
(H) - Gray
(M)-Purple
(P) - Pink
(R)-Red
(S) - Sky blue
(T) - Brown
(W)- White
(Y) - Yellow
(Z) - Orange


## Location Map 1/2 (Main Diagram)

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Section A

## Xenon Lamps



## Section B

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## Section C



## Section D

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## Section E



## Section F

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## Section G



## Section H

|  |  |  |  |  | Main Control PCB |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 0 <br> 0 <br> 0 <br> 0 <br> 1 | $\begin{aligned} & \mathrm{VCC(+5V)} \\ & \mathrm{vcC}(+5 \mathrm{~V}) \\ & \mathrm{VCC}(+5 \mathrm{~V}) \\ & \mathrm{vcc}(+5 \mathrm{~V}) \end{aligned}$ | CN201-1 | (w) | CN106-1 | $\mathrm{vcC}(+5 \mathrm{~V})$ |
|  |  | CN201-2 CN201-3 | (w) | CN106-2 | $\mathrm{vc}(+5 \mathrm{~V})$ $\mathrm{vc}(+5 \mathrm{~V})$ |
|  |  | CN201-4 | (w) | CN106-4 | vcc( + +5V) |
|  |  | CN201-5 | (w) | CN106-5 | GND-A |
|  | VCC( +5 V ) GND-A GND-A | CN201-6 | (W) | CN106-6 | GND-A |
|  | GND-A | CN201-7 | (W) | ${ }_{\text {CN106-8 }}$ | GND-A |
|  | GND-A | CN201-9 | (w) | CN106-9 | - ${ }_{\text {GND-A }}$ |
|  |  | CN201-10 | (w) | CN106-10 | P KEYYRL SEYRL1 |
|  | KEY:RL1 $D$ | CN201-11 | (w) | CN106-11 | $\square$ KEY:RL2 |
|  | KEEYRLL $\quad$ ¢ | CN201-12 | (w) | CN106-12 | $\square$ KEY:RL3 |
|  | KEY:RL4 KEY:RLS KEY:RL6 | ${ }^{\text {CN201-13 }}$ | (w) | CN106-13 CN106-14 | $\triangleright$ KEY:RL4 |
|  |  | CN201-14 $\mathrm{CN} 201-15$ | (w) | CN106-14 CN106-15 | $\triangleright$ KEY:RL5 |
|  |  | CN201-15 | (w) | CN106-15 | $\triangleright$ KEY:RL6 |
|  | KEY:RLT | ${ }^{\text {CN202-1 }}$ | (W) | CN106-16 | $\square$ KEY:RL7 |
|  | SCO:LED SC1:LED ¢ | CN202-2 | (w) | CN106-17 CN106-18 | $\triangle$ Sco:LED |
|  | SC2:LED $\triangleleft$ | CN202-4 | (w) | CN106-19 | \SC1:LED |
|  |  | CN202-5 | (w) | CN106-20 | $\triangle$ Sc3:LED |
|  | $\begin{aligned} & \text { SC3:LED } \\ & \text { SC4:LED } \end{aligned}$ | CN202-6 | (w) | CN106-21 | $\triangle$ SCA:LED |
|  | Scc:Led | CN202-7 | (w) | CN106-22 | $\checkmark$ scs:LED |
|  |  | CN202-8 | (w) | CN106-23 | $\checkmark$ Sc6:LED |
|  | SCG:LED SC7:LED \& | CN202-10 | (w) | CN106-25 | $\triangle$ SC7:LED |
|  | SEG:abled | CN202-11 | (w) | CN106-26 | \SEG:a:LED |
|  |  | CN202-12 | (w) | CN106-27 | $\triangle$ SEG:C:LED |
|  |  | ${ }^{\text {CN202-13 }}$ | (w) | CN106-28 | $\checkmark$ SEG:d:LED |
|  |  | CN202-14 CN20-15 | (w) | CN106-29 CN106-30 | $\triangle$ SEG:e:LED |
|  |  | CN202-15 | (w) | CN106-30 | $\checkmark$ SEG:f:LED |
|  | SEG:g:LED $\triangleleft$ | CN203-1 | (w) | CN107-1 |  |
|  |  | CN203-2 | (w) | CN107-2 | ¢SEG:M:LED |
|  |  | CN203-3 CN203-4 | (w) | CN107-3 | $\triangle$ Do:LED |
|  |  | CN203-4 | (w) | CN107-4 CN107-5 | $\triangle$ D1:LED |
|  |  | CN203-6 | (w) | CN107-6. | $\triangle$ D2:LED $\triangle$ D3:LED |
|  |  | CN203-7 | (w) | CN107-7 | $\triangle$ D4:LED |
|  |  | CN203-8 CN203-9 | (w) | CN107-8 | $\triangle$ CKS:LED |
|  |  | CN203-10 | (w) | CN107-9 CN107-10 | CKL:LED <br> $\triangle \mathrm{OE}$ |
|  |  | CN204-1 | (W) | CN107-11 |  |
|  |  | CN204-2 | (w) | CN107-12 | $\xrightarrow{\text { DB4.LCD }}$ |
|  | DB5:LCD DB6:LCD | CN204-3 | (w) | CN107-13 | $\triangleleft$ DB6:LCD |
|  | DB7:LCD ${ }_{\text {E }}$ | CN204-4 | (w) | CN107-14 | $\triangleleft \mathrm{DB7} 7 \mathrm{LCD}$ |
|  |  | CN204-5 CN204-6 | (w) | CN107-15 |  |
|  | RW $\begin{gathered}\text { RS } \\ \text { R }\end{gathered}$ | CN204-7 | (w) | CN107-17 | $\triangle \mathrm{RW}$ |
|  | BeeperGND-A GND-A | CN204-8 | (w) | CN107-18 | $\triangleleft$ Beeper |
|  |  | CN204-9 CN204-10 |  | CN107-19 CN107-20 | GND-A |
|  |  |  |  | CN107-20 | GND-A |

Section I


## Section J

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## Section K



## Section L

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## TECHNICAL SERVICE BULLETINS

ISSUED ON: July 23, '96


ISSUED ON: July 23, '96

| Draw No. | Old Parts No. |  | New Parts No. | Description | Rank | Q'ty Used Old $\rightarrow$ New | Inter- | Note | Parts Catalog |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  | ability |  | No. | Page |
|  | C209 6145 |  | C227 6145 | Guide Fence Bracket |  | $2 \rightarrow 2$ | X/O |  | 29 | 45 |
|  | C209 6184 |  | C227 6184 | End Fence |  | $1 \rightarrow 1$ | X/O |  | 1 | 45 |
|  | C209 6156 | $\square$ |  | Sponge Seal $-4.5 \times 65 \times 175$ |  | $2 \rightarrow 0$ |  |  |  |  |
|  |  | L | C227 6196 | End Fence Cushion |  | $0 \rightarrow 1$ | X/X |  | 2 | 45 |
|  |  |  | C227 6166 | Lower Guide - Rear Fence (A4) |  | $0 \rightarrow 1$ |  |  | *38 | 45 |
|  |  |  | C222 6166 | Lower Guide - Rear Fence (LT) |  | $0 \rightarrow 1$ |  |  | *38 | 45 |
|  |  |  | C227 6166 | Lower Guide - Front Fence (A4) |  | $0 \rightarrow 1$ |  |  | *39 | 45 |
|  |  |  | C222 6167 | Lower Guide - Rear Fence (LT) |  | $0 \rightarrow 1$ |  |  | *39 | 45 |
|  |  |  | C227 6155 | Lower Guide Shaft |  | $0 \rightarrow 4$ |  |  | *40 | 45 |
|  |  |  | C227 6156 | Upper Guide Shaft |  | $0 \rightarrow 4$ |  |  | *41 | 45 |
|  |  |  | C227 6158 | Guide Stopper |  | $0 \rightarrow 4$ |  |  | *42 | 45 |
|  |  |  | C227 6160 | Upper Guide Spring Plate |  | $0 \rightarrow 2$ |  |  | *43 | 45 |
|  |  |  | C227 6162 | Upper Guide Link |  | $0 \rightarrow 2$ |  |  | *44 | 45 |
|  |  |  | C227 6172 | Upper Guide - Front Fence |  | $0 \rightarrow 1$ |  |  | *45 | 45 |
|  |  |  | C227 6173 | Upper Guide - Rear Fence |  | $0 \rightarrow 1$ |  |  | *46 | 45 |
|  |  |  | 04504008W | Philips Tapping Screw - M4x8 |  | $0 \rightarrow 4$ |  |  | *107 | 45 |
|  |  |  | 04503008W | Philips Tapping Screw - M3x8 |  | $0 \rightarrow 4$ |  |  | *108 | 45 |

*: New Index

## DETAILS OF MODIFICATION

To stack the copies more evenly on the paper delivery table, some component parts of the table have been changed as described on the previous pages. (For details, refer to FEB\# 3300-001) The below shows the new illustration.


* : New Index


## Field Engineering Bulletin Digital Duplicator Series

## TECHNICAL OPERATIONS

BULLETIN NO. 3300-001 DATE 7/23/96

## Subject: NEW PAPER DELIVERY TABLE

| $\square$ Copy Quality |  |
| :--- | :--- |
| $\square$ Electrical |  |
| $\square$ | Mechanical |
| $\square$ | Modification |
| $\square$ | Safety Information |
| $\square$ | Technical Information |
| $\square$ | General Information |


| Model - Product / Serial Numbers Affected | Modification Schedule. |
| :---: | :---: |
|  |  |

This bulletin is to inform you that the new paper delivery table has been used from the June 1996 production.

## The features of the new table are as follows:



1. Thanks to the newly added small guide plates on the upper edge of each front and rear side fences, the copies are more evenly stacked on the table. Both edges of the copy are guided by the small guide plates as the copy is fed out. Then, the copy is correctly directed to the end plate for stacking.

The end plate is also new. The material and configuration of the cushion have been changed. The new end plate better receives the copies for stacking. (The 2nd end plate, which is for the smaller sized paper, remains the same.)

The other small guide plates, which are also provided on the bottom of each side fence, can hold the copies in the center of the table while the copies are stacked on the bottom.

This feature is more beneficial when thinner paper is used.
2. To prevent the side fences and end fence of the paper delivery table from being pushed and spread outwards while the copies are stacked, the springs that hold those fences straight-up have been strengthened. This also helps the copies to stack evenly.

## REMARKS to use the new paper delivery table

1. It is recommended to use the upper small guide plates when thin or normal paper ( 20 lbs and thinner paper) is used. For thicker paper, close the guide plates. If paper is too thick, the paper tends to be caught by the upper guide plates. (Thick paper can be stacked evenly even without using the upper guide plates.)
2. The paper stack capacity of the table is reduced to around 750 sheets (this varies depending on paper types) when the upper small guide plates are used. Close the guide plates to achieve the maximum paper stack capacity.
3. When you store the paper delivery table, you must first close the upper small guide plates.
4. The optional TAPE MARKER can be used for up to 500 sheets (this varies depending on paper types). When the old paper delivery table is used, TAPE MARKER's capacity was around 750 sheets. This is because the position of the TAPE MARKER has been slightly lowered to prevent the dispensed tape from touching the added guide plate.

5. Because of the new paper delivery table, the position of the TAPE MARKER has been slightly lowered (as mentioned above). The tape marker bracket has been changed from the June 1996 production of the TAPE MARKER as follows:

| Old P/N | New PIN | Description | Q'ty <br> Used | Inter- <br> change- <br> ability | Location on <br> Parts Catalog <br> (Index-Page) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| C532 2004 C532 2111 Tape Marker Bracket | $1 \rightarrow 1$ | X/O | $31-3$ |  |  |

To use the old type TAPE MARKER with the new paper delivery table, a new bracket is necessary. The new bracket has an additional screw hole. Install the TAPE MARKER using the holes $[A]$ as shown below:

[A]
6. Since freshly printed sheets are stacked on the bottom of the delivery table, the ink on the top copy of the stack tends to be transferred to the reverse side of the next fed-out copy (this is called "ink set-off'). Especially with the new paper delivery table, this is likely on the middle part (the reverse side) of copy.

When the added small guide plates are used, both edges of the copy are guided by the guide plates, as mentioned before. Due to this, the copy tends to buckle downward and the middle part of the copy first reaches and smears the bottom of the delivery table. (The ink set-off is not so visible when there is not a large solid-fill image in the middle of the copy.)

In June 1996 production, the new paper delivery table has been implemented. At the same time, the software of each model has been changed to reduce ink set-off, as follows:

| Applicable Models | Old P/N of the ROM | New P/N of the ROM | Notes |
| :---: | :---: | :---: | :---: |
| 3300 | C223 8045D | $\begin{gathered} \text { C223 } 8059 \\ \text { (Check Sum:423H) } \end{gathered}$ | The suffix has been advanced for the main control board. (C2238042G $\rightarrow \mathrm{H}$ ) |
|  | C223 8047 | C223 8061 (Check Sum:EFDH) | There are two ROM's on the main control board, and the old and new ones are interchangeable as a set only. |

For the NA33, the default of the SP mode setting (SP35-1: Head Energy Adjust for Normal Mode) has been changed from $-7 \%$ to $-17 \%$.

For the field units, carry out the following actions if the ink set-off is not acceptable level for the user.


Required Actions

| 3300 | Reduce the thermal head energy using SP35. Set it at $-17 \%$. |
| :--- | :--- |

## TECHNICAL OPERATIONS

BULLETIN NO. 3300-002
DATE 1 1/15/96

## Subject: PAPER TABLE DRIVE ERROR

| $\square$ Copy Quality | Model - Product / Serial Numbers Affected |
| :--- | :---: |
| Electrical <br> Mechanical | 3200DNP |
| $\square$ Modification |  |
| Safety Information | 3300DNP |
| Technical Information |  |
| $\square$ General Information |  |

Modification Schedule: Mandatory<br>Scheduled Visit<br>Next Call<br>Next PM<br>As Necessary<br>Install Time

## SYMPTOM:

The Paper Feed Table is not driven. Service code E-02: (Paper Table Drive Error) is displayed.

## CAUSE:

The DC motor that drives the table occasionally generates electrical noise when it starts rotating. This electrical noise is input into the AC Drive Board and damages IC301 on the board.

The electrical noise tends to be generated when the motor is still new
Since a DC motor of this type is used on the 3200 and 3300 models only, this problem does not occur on any other models

## FIELD COUNTERMEASURE:

For the field units, the Motor Relay Harness Kit has been registered as a service part (C2238131). Install the kit as shown below.

Note: The Motor Relay Harness Kit: (C2238131) includes.
-One Relay Harness (includes the capacitors)
-One Ty- wrap
-One Grounding Screw (M4×6)
Note: To prevent the relay harness from being caught by the gears, firmly secure it with the $T y$-wrap as shown in the illustration.


Additionally, IC 301 on the AC Drive Board may be ordered under Part Number 14080827.

## PRODUCTION COUNTERMEASURE:

To prevent the electrical noise from being generated, a harness which contains two capacitors will be installed between the AC Drive Board and DC motor from the August 1996 production.

Field Engineering Bulletin Digital Series

## TECHNICAL OPERATIONS

BULLETIN NO. C330-001 DATE 5/28/96

| Subject: TROUBLESHOOTING DIGITAL DUPLICATOR PRINT CONTROLLER PROBLEMS |  |  |
| :---: | :---: | :---: |
| $\square$ Copy Quality | Model - Product / Serial Numbers Affected | Modification Schedule:MandatoryScheduled VisitNext CallNext PMAs Necessary Install Time |
| $\square$ Electrical | Controller Type 330 |  |
| Modification | 3100DNP 3200DNP 3300DNP |  |
| Cl Safety Information Technical Information |  |  |
| $\square$ General Information |  |  |

When requesting technical assistance for the above subject, please have the following data available before contacting the Savin Technical Support Hotline.

If the controller is not working at all, please complete Part A.
If the controller prints, but the output is not as expected, please complete both Part A and B.

## PART A

1. What is the Serial Number of the Controller?
2. What Duplicator and Serial Number is it connected to?
3. What version number is on the EPROM label in the upper right corner of the Duplicator Video Interface PCB?
4. What are the dip switch settings on the Video Interface PCB?
5. Does the Controller power light (left side) come on?
6. What is the blink patter (fast, slow, etc...) of the Controller ready light (right side)?
7. Can you print a Diagnostic Status Page with the Diagnostic Plug or button? If so please have the printout available when you call.

## PART B

1. What king of computer is being used to output the Controller?
2. What output port on the computer is connected to the Controller?
3. Can you print a Diagnostic Status Page through the configuration program? If so, please have the printout available when you call.
4. Is the Controller set to Post Script compatiable or PCL-5 compatible mode?
5. What page size is selected in the Controller?
6. Does the Duplicator have the Auto-Cycle features turned on?
7. What operating system(s) and software program(s) are being used to send files to the Controller?
8. What print driver has been selected within the software program?
9. What paper size has been selected in the software program?
10. List in sequence the steps take which produced the problem.
11. Be prepared to describe how the output page does not match what is expected, i.e. margins too small or too large, image too small or too large, etc... If possible, be prepared to provide a copy (via fax) of both incorrect and correct printed output. Field Engineering Bulletin Digital Series

## TECHNICAL OPERATIONS

BULLETIN NO. C330-002 DATE 6/21/96

| PRINTING FROM THE SERIAL PORT |  |  |
| :---: | :---: | :---: |
| $\square$ Copy Quality | Model - Product / Serial Numbers Affected | Modification Schedule:MandatoryScheduled VisitNext CallNext PMAs Necessary Install Time |
| Electrical Mechanical | Controller Type 330 |  |
| Modification | 3100DNP 3200DNP 3300DNP |  |
| $\square$ General Information |  |  |

When using the Type 330 printer controller for the digital duplicators, it is possible to print from the parallel port which produces by far, the fastest results. If for some reason, printing from a serial port is required, the controller must be reconfigured. The most current version of the controller has a nine pin serial connector. With this version either the Appletalk or serial port may be used but not both. The controller comes out of the box set for Appletalk, so the serial port is disabled. To disable Appletalk and enable the serial port do the following:

1. Make the connection between the computer and the controller with a Serial Printer cable, not a Serial Modem cable. Additionally, ensure that all components are turned on (Computer, Controller and Duplicator).
2. Run the Controller configuration program (Comes on a disk with the Controller)
3. Under the Install menu select Disable Appletalk and press Enter.
4. Wait for both LED indicators on the controller to come back on.
5. Under the Install menu select Save Configuration.
6. Reboot the controller.
7. Return to the Configuration program.
8. Go to PC Port and select Printer Port COM1/ COM2

9 The computer should now show "Successful Connection".

## TECHNICAL SERVICE BULLETINS

## TECHNICAL SERVICE BULLETIN

BULLETIN NUMBER:
C218/C223/C228-001
06/25/98
APPLICABLE MODEL:
GESTETNER - 5390
RICOH - VT6000
SAVIN - 3400DNP

## SUBJECT: MASTER FEED JAMMING

| The chart listed below shows the Last Bulletin |  |
| :--- | :--- |
| Number issued for the C218/C223/C228 series. |  |
| Bulletin Cross Reference  <br> Ricoh Group Companies Last Bulletin No. <br> Gestetner GCP \#68 <br> Ricoh 012 <br> Savin 002 |  |

## SYMPTOMS:

1. The master jams during feed at location C .
2. The length of the master that wraps around the Drum is shorter than normal. This causes a Master Eject Jam " F " when ejecting during the making of the next master. The jam occurs because the Master Eject Rollers cannot catch the trailing edge of the master on the drum.

## CAUSE:

There is a Torque Limiter [A] which is built into the gear on the Upper Master Feed Roller. If the Wire Harness [B] from the Cutter Unit is routed improperly when the Gear Cover [C] is installed, the Gear Cover may catch and press the Wire Harness against the sleeve of the Torque Limiter. If this occurs, the rotation of the Upper Master Feed Roller is interfered with and the above symptoms may occur.


NOTE: The Torque Limiter is used on the C228 only, and this symptom does not occur on the C218 or C223.

## TECHNICAL SERVICE BULLETIN

BULLETIN NUMBER: C210/C218/C223/C228-002

GESTETNER - 5375/5380/5385
RICOH - VT3500/3600/3800
SAVIN - 3300DNP

## SUBJECT: PAPER DELIVERY ROLLER

## GENERAL:

Due to parts standardization, the Idler Roller used in the Paper Delivery Vacuum Unit has been modified. Both ends of the Idler Roller shaft have been threaded to accept Hexagon Nuts - M6 instead of Retainer Rings - M4. The new style Idler Roller removes any thrust play between the Roller Shaft and the Bearings. The new style Idler Roller will also improve durability. The following parts updates are being issued for all C210, C218 and C223 Parts Catalogs.


[^1]Continued...

Tech Service Bulletin No. C210/C218/C223/C228- 002
Page 2 of 2

## UNITS AFFECTED:

All units manufactured after the Serial Numbers listed below will have the new style Idler Rollers installed during production.

| MODEL NAME | SERIAL NUMBER |
| :--- | :--- |
| Gestetner 5375 | Service Parts Only |
| Gestetner 5380 | Service Parts Only |
| Gestetner 5385 | A147070001 |
| Ricoh VT3500 | Service Parts Only |
| Ricoh VT3600 | Service Parts Only |
| Ricoh VT3800 | C3437070001 |
| Savin 3300DNP | S2238010001 |

## INTERCHANGEABILITY CHART:

| 0 | OLD and NEW parts can be used in both OLD and <br> NEW machines. | 2 | NEW parts CAN NOT be used in OLD machines. <br> OLD parts can be used in OLD and NEW machines. |
| :---: | :--- | :--- | :--- |
| 1 | NEW parts can be used in OLD and NEW machines. <br> OLD parts CAN NOT be used in NEW machines. | 3 | OLD parts CAN NOT be used in NEW machines. <br> NEW parts CAN NOT be used in OLD machines. |
| $3 / S$ | Must be installed as a set on units manufactured prior to the S/N cut-in. On units manufactured after the S/N cut-in or <br> previously modified, use the new part numbers individually. |  |  |

## SOLUTION:

When you reinstall the Gear Cover, be sure to install the Wire Harness from the Cutter Unit as shown below.
NOTE: The Gear Cover is removed when you remove the Thermal Head or Platen Roller.


## GENERAL:

This area has been inspected starting from the February 1998 production.
From the April 1998 production, a Wire Clamp has been installed on the Plotter Unit Frame to position the wire, as shown to the right. (The part number of the Frame remains the same although the cutout for the Clamp has been added.)

## UNITS AFFECTED:

C228 Serial Number cut-in not available at time of publication.


## BULLETIN NUMBER

GESTETNER - 5375/5380/5385/5390
RICOH - VT3500/3600/3800/6000
SAVIN - 3300DNP/3400DNP

## SUBJECT: ENVELOPE FEEDING ENHANCEMENT

## GENERAL:

The C228 has an advantage over the C223 because of its ability to feed envelopes. This bulletin supplies information for the C223 improvement of envelope feeding using parts from the C228.

## Feeding Envelopes On The Copy Printer/Digital Duplicator/Priport Product Line:

Significant differences in materials and manufacturing processes are used in the production of envelopes. Different sizes, paper weights, surface texture, glues and equipment are used in their construction.
Packaging, shipping and storage conditions also combine to further increase the variables. In addition, the paper in an envelope is folded over itself 2 or 3 times, small variances in materials and construction are magnified. It is for these reasons envelopes from one manufacturer may differ greatly from another manufacturer, although they have the same published specifications. Differences may also exist between similar envelopes from the same manufacturer, or even in different lot numbers of the same envelope. Due to the large amount of variables, Ricoh/Savin/Gestetner has determined that the dependability of feeding envelopes can not be guaranteed.
As with other imaging applications, orientation and feed settings must be predetermined in order to provide optimal performance. We recommend no more then 100 envelopes be stacked in the feed tray at one time. Due to the stiffness of envelopes, we recommend checking the master for nicks after 100 impressions. An indication of a nicked master is ink marks on the lead edge of the envelope.

## Enhancement and Limitations Details:

The C228 uses the registration sensor (photocoupler) to strictly control paper feed timing. Consequently, the C228 uses paper feed cams that are different from those of the C223 (The paper feed timing and speed are slightly different from each other).
This enhancement contains parts from the C228 paper feed system, however it does not contain the paper feed cams used in the C228. Therefore, the paper feed performance of the enhanced C223 does not exactly match the C228.
By following the procedure recommended in this bulletin, an enhanced C223 should have an advantage in performance when feeding envelopes,compared with the original paper feed system.
The enhanced paper feed system may have a little more fluctuation in the paper registration depending on the type of paper. However, this will not occur with most types of paper, and differs only slightly from the original system.

Tech Service Bulletin No. C210/C218/C223/C228-003
Page 2 of 6

## Details of Feed System Differences:

## 1. Separation Plate and Front Side Plate:



The shape of the Separation Plate and front side plate is different. The C228 type can prevent the leading edge of the paper (envelopes) from hitting against the corner of the plates and guides the paper more smoothly.
2. Right and Left Separation Arms:


The C228 (in combination of the right and left arms) moves The Lower Separation Roller to the paper table side. Thus, the paper (envelopes) can enter between the (upper) feed roller and Lower Separation Roller.

## 3. Lower Guide Plate:

Since the position of the lower separation roller changes, this part must be replaced.

## 4. Paper Feed Roller Core:

The C228 is longer, in order to enable the two rubber Feed Rollers on the shaft to be positioned at a distance. (For the C223, the rollers are closely positioned, side by side.)

## 5. Torque Limiter and Pick-up Roller Shaft:

Since the C228 paper feed roller core is heavier, the torque limiter (a coil spring) requires a stronger tension. The pick-up roller shaft must be modified to use the torque limiter.

## 6. Paper Feed Balancing Weight:

Since the C228 paper feed roller core is heavier, the paper feed pressure (the pressure from the pick-up roller against the paper stack) increases. This can cause multiple sheets feeding.
To improve the paper feed pressure, remove one sheet of the balancing weight (C2015073) on the top of the bracket holding the Pick-Up Roller. (There are originally three sheets of the balancing weights are used in the C223.)

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Page 3 of 6

## Parts Required for the Enhancement Procedure:

Description
Part Number

1. Front Side Plate.......................................................... C228 5016
2. Separation Plate ........................................................ C228 5018
3. Paper Feed Roller Core.............................................. C228 5033
4. Right Separation Arm ................................................. C228 5061
5. Left Separation Arm.................................................... C228 5062
6. Pick-up Roller Shaft..................................................... C203 5043
7. Torque Limiter - Paper Feed Roller............................. 55076038
8. Lower Guide Plate ........................................................ C228 5215
9. Balancing Weight (Remove one of three) .................. C201 5073

For the locations of each part, see diagrams below:

## View From The Operator Side -



View From The Paper Feed Table Side


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Page 4 of 6

## INSTALLATION PROCEDURE:



1. Remove one of the three Balancing Weights (C2015073). Only two Balancing Weights are needed.
2. Replace the Paper Feed Roller Core (C2285033). Reinstall the two rubber rollers on the new shaft.
3. Replace the Pick-Up Roller Shaft (C2035043) and Torque Limiter (55076038).

NOTE: Refer to 6.11 PAPER FEED ROLLER REMOVAL (page 5-40) in the C223 Service Manual.

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Page 5 of 6

4. Replace the Lower Guide Plate (C2285215).

NOTE: Refer to 6.14 SEPARATION PLATE/LOWER SEPARATION ROLLER REMOVAL (page 5-43) in the C223 Service Manual.

5. Replace the right and left Separation Arm (C2285061 and C2285062).

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Page 6 of 6

6. Replace the Front Side Plate (C2285016) and Separation Plate (C2285018).

BULLETIN NUMBER：C210／C218／C223／C228－003 REISSUE $\star$
APPLICABLE MODEL：
GESTETNER－5385
RICOH－VT3800
SAVIN－3300DNP

## SUBJECT：ENVELOPE FEEDING ENHANCEMENT

## GENERAL：

The C228 has an advantage over the C223 because of its ability to feed envelopes．This bulletin supplies information for the C223 improvement of envelope feeding using parts from the C228．

## Feeding Envelopes On The Copy Printer／Digital Duplicator／Priport Product Line：

Significant differences in materials and manufacturing processes are used in the production of envelopes． Different sizes，paper weights，surface texture，glues and equipment are used in their construction． Packaging，shipping and storage conditions also combine to further increase the variables．In addition，the paper in an envelope is folded over itself 2 or 3 times，small variances in materials and construction are magnified．It is for these reasons envelopes from one manufacturer may differ greatly from another manufacturer，although they have the same published specifications．Differences may also exist between similar envelopes from the same manufacturer，or even in different lot numbers of the same envelope． Due to the large amount of variables，Ricoh／Savin／Gestetner has determined that the dependability of feeding envelopes can not be guaranteed．
As with other imaging applications，orientation and feed settings must be predetermined in order to provide optimal performance．We recommend no more then 100 envelopes be stacked in the feed tray at one time． Due to the stiffness of envelopes，we recommend checking the master for nicks after 100 impressions．An indication of a nicked master is ink marks on the lead edge of the envelope．

## Enhancement and Limitations Details：

The C228 uses the registration sensor（photocoupler）to strictly control paper feed timing．Consequently，the C228 uses paper feed cams that are different from those of the C223（The paper feed timing and speed are slightly different from each other）．
This enhancement contains parts from the C228 paper feed system，however it does not contain the paper feed cams used in the C228．Therefore，the paper feed performance of the enhanced C223 does not exactly match the C228．
By following the procedure recommended in this bulletin，an enhanced C223 should have an advantage in performance when feeding envelopes，compared with the original paper feed system．
The enhanced paper feed system may have a little more fluctuation in the paper registration depending on the type of paper．However，this will not occur with most types of paper，and differs only slightly from the original system．

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Page 2 of 6

## Details of Feed System Differences:

## 1. Separation Plate and Front Side Plate:



The shape of the Separation Plate and front side plate is different. The C228 type can prevent the leading edge of the paper (envelopes) from hitting against the corner of the plates and guides the paper more smoothly.
2. Right and Left Separation Arms:


The C228 (in combination of the right and left arms) moves The Lower Separation Roller to the paper table side. Thus, the paper (envelopes) can enter between the (upper) feed roller and Lower Separation Roller.

## 3. Lower Guide Plate:

Since the position of the lower separation roller changes, this part must be replaced.

## 4. Paper Feed Roller Core:

The C228 is longer, in order to enable the two rubber Feed Rollers on the shaft to be positioned at a distance. (For the C223, the rollers are closely positioned, side by side.)

## 5. Torque Limiter and Pick-up Roller Shaft:

Since the C228 paper feed roller core is heavier, the torque limiter (a coil spring) requires a stronger tension. The pick-up roller shaft must be modified to use the torque limiter.

## 6. Paper Feed Balancing Weight:

Since the C228 paper feed roller core is heavier, the paper feed pressure (the pressure from the pick-up roller against the paper stack) increases. This can cause multiple sheets feeding.
To improve the paper feed pressure, remove one sheet of the balancing weight (C2015073) on the top of the bracket holding the Pick-Up Roller. (There are originally three sheets of the balancing weights are used in the C223.)

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## Parts Required for the Enhancement Procedure:

## Description <br> Part Number

1. Front Side Plate......................................................... C228 5016
2. Separation Plate ........................................................ C228 5018
3. Paper Feed Roller Core............................................... C228 5033
4. Right Separation Arm .................................................. C228 5061
5. Left Separation Arm.................................................... C228 5062
6. Pick-up Roller Shaft..................................................... C203 5043
7. Torque Limiter - Paper Feed Roller............................. 55076038
8. Lower Guide Plate....................................................... C228 5215
9. Balancing Weight (Remove one of three) .................. C201 5073

For the locations of each part, see diagrams below:

## View From The Operator Side -



View From The Paper Feed Table Side


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Page 4 of 6

## INSTALLATION PROCEDURE:



1. Remove one of the three Balancing Weights (C2015073). Only two Balancing Weights are needed.
2. Replace the Paper Feed Roller Core (C2285033). Reinstall the two rubber rollers on the new shaft.
3. Replace the Pick-Up Roller Shaft (C2035043) and Torque Limiter (55076038).

NOTE: Refer to 6.11 PAPER FEED ROLLER REMOVAL (page 5-40) in the C223 Service Manual.

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4. Replace the Lower Guide Plate (C2285215).

NOTE: Refer to 6.14 SEPARATION PLATE/LOWER SEPARATION ROLLER REMOVAL (page 5-43) in the C223 Service Manual.

5. Replace the right and left Separation Arm (C2285061 and C2285062).

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Page 6 of 6

6. Replace the Front Side Plate (C2285016) and Separation Plate (C2285018).

## APPLICABLE MODEL:

GESTETNER - 5380/5385/5390
RICOH - VT3600/3800/6000
SAVIN - 3300DNP/3400DNP

## SUBJECT: PARTS CATALOG UPDATES

- UPDATE 1: C228 RELAY CONNECTORS - The following parts updates are being issued for all C228 Parts Catalogs. Please update your Parts Catalogs with the following information.


| C228 |  |  |  | REFERENCE |  |
| :---: | :--- | :---: | :---: | :---: | :---: |
| PART NUMBER | DESCRIPTION | QTY | PAGE | ITEM |  |
| 11025828 | Connector 15 P | 1 | 73 | $29^{*}$ |  |
| 11025193 | Connector 10 P | 1 | 73 | $30^{*}$ |  |

[^2]Tech Service Bulletin No. C210/C218/C223/C228-004
Page 2 of 2

- UPDATE 2: C223 RELAY CONNECTORS - The following parts updates are being issued for all C223 Parts Catalogs. Please update your Parts Catalogs with the following information.


| C223 | REFERENCE |  |  |  |
| :---: | :--- | :---: | :---: | :---: | :---: |
| PART NUMBER | DESCRIPTION | QTY | PAGE | ITEM |
| 11026621 | Connector 13 P | 1 | 73 | $27^{*}$ |
| 11024559 | Connector 3 P | 1 | 73 | $28^{*}$ |

* Denotes new item.
- UPDATE 3: C218 RELAY CONNECTORS - The following parts updates are being issued for all C218 Parts Catalogs. Please update your Parts Catalogs with the following information.


| C218 | REFERENCE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| PART NUMBER | DESCRIPTION | QTY | PAGE | ITEM |
| 11024560 | Connector 6 P | 1 | 71 | $19^{*}$ |
| 11024431 | Connector 8 P | 1 | 71 | $20^{*}$ |

* Denotes new item.

TECHNICAL SERVICE BULLETIN

BULLETIN NUMBER:
C210/C218/C223/C228-005
1/07/2000
APPLICABLE MODEL:
GESTETNER - 5375/5380/5385/5390
RICOH - VT3500/3600/3800/6000
SAVIN - 3300DNP/3400DNP

## SUBJECT: PRESSURE ON/OFF LEVER

## GENERAL:

When the Pressure On / Off Lever breaks, damage may occur to other parts of the machine. In an effort to reduce down time and possible additional damage, we recommend that on the next service call the Pressure On/Off Lever be inspected. If deformation of the tab that supports the Pressure Roller Positioning Screw (See diagram below) is found, replace the Pressure On/Off Lever using the accompanying procedure.


NOTE 1 Part number C2285566 has not changed.
NOTE 2 An improved Pressure On / Off Lever was installed in production October 1998.
NOTE 3 Any Pressure On / Off Lever currently ordered from our stock will be the new style part.

Continued...

## Pressure On / Off Lever Replacement Procedure:

1. Ensure Drum is in home position.
2. Lock Paper Feed Cam in home position by inserting screwdriver into hole [A].

3. Remove Wiring Harness Bracket (1 Screw).

Note: This will allow easier release of the spring tension in the following step.
4. Release Pressure Roller pressure by turning screw $[B]$ counterclockwise.

5. Remove Printing Pressure Spring.
6. Remove Main Motor Drive Belt Support Plate (3 screws).
7. Remove Drive Pulley Assembly [C].
8. Remove E-clip securing Drum Drive Belt Tension Bearings and remove Bearings [D].

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## Page 3 of 5

9. Remove non-recessed Hex Nuts [E].
10. Remove E-clip [F].
11. Remove Drive Gear [G].
12. Tuck belt out of way.
13. Remove Pressure Timing Cam [H].
14. To avoid damage remove Pulse Generator Sensor [I] and Disk (two setscrews).


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Page 4 of 5
15. Remove Pressure On/Off Lever [J] and Print Pressure Arm [K].


NOTE: To remove these two levers, the slot for the drive pin must be aligned with the cutouts in the lever. You may also need to manually release the Pressure Release Solenoid.

## DO NOT PRY THE LEVERS WITH A SCREWDRIVER FOR REMOVAL. GRASP THE LEVERS FROM THE FRONT USING A PAIR OF PLIERS.

16. Remove Bearing and Adjusting Screw (note position of screw for reassembly) from old Lever and install on new Lever.

## dO NOT tighten screw at this time

17. Reinstall Lever assembly.
18. Adjust the position of screw the same amount as noted in step 16.
19. Reinstall E-clip on Lever Assembly.
20. Apply tension to Pressure Lever Adjustment listed on Page 5-49 (see below).


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21 Reinstall Pulse Generator Disk and Sensor.
Ensure that Pulse Generator Disk does not contact the Sensor (moves freely through sensor) and the teeth are not bent.
Reinstall Pressure Timing Cam (ensure that washers are installed).
Install Drive Belt.
Install Pressure Timing Cam Page 5-68 FSM. See diagram below. Hole [L] should be above shaft [ M ] when belt tension is applied.

26. Install Drum Drive Belt Tension Bearings and retaining E-clip.
27. Install Pressure Timing Drive Gear (2 cap screws) in center of adjustment range.
28. Install Main Motor Drive and Belt.
29. Install Main Motor Drive Belt Support Plate (3 screws).
30. Caution! Remove locking screwdriver installed in step 2.

## END OF PROCEDURE

 TECHNICAL SERVCE BULLEIINGESTETNER－ 5390
RICOH－VT6000
SAMN－3400DNP

SUBJECT：RE－INSTALLATION OF PAPER TRAY FOLLOWING LCT REMOVAL

## GENERAL：

If the LCT is being permanently removed from the machine the following parts are required to replace the Paper Tray after the LCT has been removed．Please refer to the Parts Table below and the following Illustrations for the required parts and their location．

|  |  |  |  | REFERENCE |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | PART NO． | DESCRIPTION | QTY | PAGE | ITEM |
|  | C2232085 | Paper Table Lower Cover | 1 | 14 | 31 |
|  | 03140080Z | Philips Screw－4×8 | 8 | 14 | 101 |
|  | 03140080Z | Philips Screw－4×8 | 1 | 16 | 107 |
|  | C2192428 | Switch Plate－Paper Feed Table | 1 | 16 | 24 |
|  | 54032048 | Bushing－4mm | 1 | 16 | 25 |
|  | C2198295 | Safety Switch Relay Harness | 1 | 16 | 26 |
|  | C2198294 | Safety Switch | 1 | 16 | 27 |
|  | AA063016 | Pressure Spring | 1 | 16 | 28 |
|  | C2222429 | Support Cover－Paper Feed Cover | 1 | 16 | 29 |
|  | C2102091 | Harness Cover | 1 | 16 | 41 |
|  | 03140060Z | Philips Pan Head Screw－4×6 | 2 | 16 | 108 |
|  | 03130120Z | Philips Screw－3×12 | 1 | 16 | 110 |
|  | 05940080E | Bolt－M4×8 | 1 | 16 | 112 |
|  | C2231059 | Paper Feed Tray Assy（Assembled unit） | 1 |  |  |
|  | C2235073 | Paper Table Fixing Bracket | 1 | 24 | 1 |
|  | C2035142 | Rack Shaft | 1 | 24 | 12 |
|  | 56062310 | Roller | 2 | 24 | 13 |
|  | C2095235 | Paper Table Holder | 1 | 24 | 35 |
|  | C2195081 | Sensor Bracket | 1 | 24 | 36 |
|  | AW020021 | Photointerruptor－175487－3 | 1 | 24 | 37 |
|  | C2223175 | Scanner Slider | 1 | 24 | 38 |
|  | 03140120Z | Philips Screw－4×12 | 1 | 24 | 100 |
|  | 05850161B | Hexagon Bolt－M5×16 | 1 | 24 | 104 |
|  | $09513008 Z$ | Philips Screw With Flat Washer－M3×8 | 1 | 24 | 111 |

＊＝This indicates a whole assembly part number that is not currently in the Parts Catalog．This number can be used to order the whole Paper Feed Tray Assembly．

Tech Service Bulletin No. C228-006

## Page 2 of 4

Remove/replace the circled items.
)


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Page 3 of 4

Remove/replace the circled items.


Tech Service Bulletin No. C228-006

## Page 4 of 4


8. PAPER TABLE 2 (C228)


## TECHNICAL SERVICE BULLETIN

BULLETIN NUMBER: C210/C218/C223/C228-007
09/15/2000

## APPLICABLE MODEL:

GESTETNER - 5375/5380/5385/5390
RICOH - VT3500/3600/3800/6000
SAVIN - NA/NA/3300DNP/3400DNP

## SUBJECT: 2ND FEED ROLLER DAMAGE

## SYMPTOM:

A worn 2nd Sector Gear and/or 2nd Feed Roller Gear causes paper feed jams. This also causes the 2nd Feed Roller lifting mechanism to not work properly. When this occurs, printed images will be distorted.
These images are not transferred to paper properly because of the lifting mechanism failure.

## CAUSE 1:

The Sector Gear [A] and the Feed Roller Gear [B] insufficiently lubricated. This causes the Sector Gear [A] to not oscillate back and forth correctly.


There is too much thrust play and the Sector Gear is oscillating on the shaft. This causes the Sector Gear to not oscillate back and forth correctly. As a result, the Sector Gear does not move correctly on the 2nd Feed Roller Gear and damages the teeth of the Gear.

Sector Gear

## SOLUTION 1:

Make sure to lubricate between the Sector Gear and the Feed

## CAUSE 2:

Roller Gear periodically.

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Page 2 of 2

## SOLUTION 2:

Add some Spacers to remove the play. The part numbers of the added Spacers are shown in the table below:

| Production Name | Using Spacer \# | Description |
| :--- | :---: | :--- |
| (C228) only | 08077013 | Spacer - 10.2X14X0.2 mm |
| Other models | 08077018 | Washer - M10 |

Add 1 or 2 additional Spacers [C] on the front side, as shown in the illustration to the right.

## UNITS AFFECTED:

The above procedure was applied from the March 2000 production, so the thrust play was 0.2 mm or less.


RTEOM TECHNICAL SERVICE BULLETIN

## BULLETIN NUMBER: C210/C218/C223/C228-008

12/11/2000

## APPLICABLE MODEL: <br> GESTETNER - 5385/5390 <br> RICOH - VT3800/6000 <br> SAVIN - 3300DNP/3400DNP

## SUBJECT: SERVICE MANUAL - INSERT

## GENERAL:

The Service Manual pages listed below must be replaced with the pages supplied. Each bulletin package contains 1 set of replacement pages.

## PAGES:

The revised areas have been highlighted by an arrow $\Rightarrow$.

- xiv
- 5-74 (C223)
- 2-8 (C228)
- 5-1 (C228)
- 5-7 (C228)

Updated Information (Table of Contents)
Updated Information (Paper Exit Pawl Air Pump Adjustment)
Updated Information (Printing)
Updated Information (Thermal Head Voltage Adjustment)
New Information (Feed Length of the Second Feed Roller Adj.)
4.3.2 SERVICE PROGRAM TABLE ..... 4-15
4.3.3 THERMAL HEAD TEST ..... 4-32
4.3.4 COMMAND SHEET CHECK ..... 4-33
4.3.5 INPUT/OUTPUT CHECK MODE ..... 4-34
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### 9.5 PAPER EXIT PAWL AIR PUMP ADJUSTMENT



Purpose: To ensure that the paper exit pawl air pump produces a jet of air when the paper exit pawl is in the upper position (near the drum surface).

## Adjustment Standard:

When the drum has rotated 341 degrees, the pump piston position is at the upper dead point.

1. Open the front door and remove the inner cover.
2. Press and hold down the Drum Rotate button until the drum reaches the home position.
3. Confirm that the 13 mm diameter hole in the gear and the 8 mm diameter hole in the side plate are lined up at the 6:00 o'clock position.
4. If the holes are not lined up, remove the E-rings and reposition the gear.
5. Rotate the drum to the home position and do step 3 again.

### 2.4 PRINTING

### 2.4.1 OVERVIEW

## Printing Pressure Cam

For better printing quality, the shape of the printing pressure cam (the cam profile) has been changed.

The new cam applies printing pressure to the drum faster than before. The press roller is pressed against the ink roller (the master and the drum screens are in between) before the leading edge of the paper reaches this section.

In the C223, the press roller is pressed against the ink roller just when the paper leading edge reaches this point. In this case, the paper leading edge is strongly pressed against the master surface on the drum. Since the new master is thinner and delicate, the paper leading edge tends to damage the master surface if the same printing pressure cam was used, especially during a long printing run. (If the master surface is damaged, ink will leak and transfer onto the paper.) The new printing pressure cam will avoid this situation.
NOTE: 1) Because of the new printing pressure cam, the adjustment values (angles) for printing pressure application timing and exit pawl operation timing are changed. Refer to 'Exit Pawl Timing Adjustment' in the 'Replacement and Adjustment' section.
2) The new printing pressure cam cannot be used in the older models. Because of the new cam profile, the shift range in the backward direction in image shifting mode has been changed from 15 mm to 10 mm . In the forward direction, it is 20 mm as before.

## Paper Detection and Printing

In the C223, the paper detection feeler was used in order to prevent the press roller from contacting the drum (without paper) and getting ink on it when a paper misfeed occurred before the paper reached the press roller.

The paper detection feeler could be pressed downwards by paper since a gap between the paper detection arm and the pressure on/off lever was created when the widest part of the pressure cam reached the bearing on the pressure on/off lever. With the earlier second feed roller start timing, this gap cannot be created. Therefore, the same mechanism is not used. (The timing was changed to make paper registration more accurate; see the Paper Feed section for details.)
NOTE: For the details of the paper detection feeler operation, refer to the C223 Service Manual. (Section 5.2, 'Paper Detection And Printing Pressure On/Off Mechanism' in the 'Detailed Section Descriptions' section.)
Instead of the paper detection feeler, the registration sensor (a photocoupler) is used. When the sensor detects the paper, the printing pressure solenoid energizes to start applying the printing pressure. (In the C223, the printing pressure solenoid was energized as soon as paper feed started.) The sensor is also used as a paper jam detector.

## 5. REPLACEMENT AND ADJUSTMENT

### 5.1 MASTER FEED

### 5.1.1 THERMAL HEAD VOLTAGE ADJUSTMENT



Purpose: To maintain the quality of masters and to extend the life of the thermal head.

## Adjustment Standard:

There are two steps.

1) The output voltage for the thermal head from the power supply unit must be 22.5 volts ( $\pm 0.5$ ).
2) The output from the DC/DC converter board is different from one thermal head to another. Refer to the voltage value $(\mathrm{X})$ on the thermal head decal. The output should be between "X-0.1" and "X" volts.

NOTE: This adjustment is always required when the thermal head or power supply unit is replaced.

1. Turn off the main switch and remove the paper exit cover plate (4 screws).
2. Turn on the main switch.
3. Access SP mode and select output check mode (SP131) No. 41.
4. Press the Print Start key to apply thermal head voltage continuously

CAUTION: Do not apply the Voltage for more than $\mathbf{6 0}$ seconds.
5. Check the voltage between CN503-15 and CN503-12. If the voltage is not 22.5 volts ( $\pm 0.5$ ), turn VR1 on the power supply board to adjust the voltage.
6. Leave the SP mode and turn off the main switch. Then, connect CN503 of the power supply unit.

### 5.4 PAPER FEED

### 5.4.1 FEED LENGTH OF THE SECOND FEED ROLLER ADJUSTMENT



Operation side

Purpose: To ensure proper paper feed by the second feed rollers.
Adjustment Standard: 55 to 60 mm

1. Stack about 100 sheets of paper on the paper table.
2. Set the paper table in the paper feed position (Use output check mode SP131, No. 19). Then, turn the main switch off and unplug the machine.
3. Remove the rear cover and the drum unit from the machine.
4. Turn on the paper feed solenoid manually, then gradually turn the drum rotation shaft with a 10 mm spanner.
5. Measure the paper feed length from the time the second feed roller starts rotating until it stops rotating. This feed length should be between 55 and 60 mm .
6. If it is not, adjust the feed length by loosening the screw and shifting the cam up or down.
7. Check the adjustment by repeating steps 4 and 5 .

[^0]:    Shaded Area - Sorter is not available in the USA.

[^1]:    * Denotes new item.

[^2]:    * Denotes new item.

