

Research On The Maintenance Technology Of A Business Machine

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Abstract—In today's development of industry and commerce, the business machine (photocopying machine) is the most intensively used machine in the office of all related companies and its functions are very wide and practical. For example; copying, continuous scanning, segment scanning, archiving, automatic paging, automatic paper clip switching, single-side copying, double-side copying, scaling up and down, original count display, color mode priority, copy ratio, preset reduction/enlargement priority, double-side borders, rotating paging, auto-continue, etc.

Keywords—segmented scanning, rotating page, original count display, continuous scanning

I. Introduction

The configuration and composition of the business machine can be divided into several parts in total 1 scanner unit 2 laser exposure unit 3 image transfer unit 4 power control and distribution unit 5 toner supply and waste toner bottle unit 6 paper feed unit 7 duplex unit 8 by-pass unit 9 fusing unit 10 paper transfer and paper exit 11 air flow unit 12 drive unit 13 board and switch unit. Every composition has its performance and importance. Support and connection between each component are even more important.

II. Literature review

Research on business machine, here are some example. In literature [1], Ricoh Taiwan company has

finished a complete operation manual of the company's business machine, which is very detailed. In literature [2], Hou Juanjuan graduate student published "Research on the USB controller of copiers", This paper allowed the data in the photocopier to enter and exit the photocopier along with USB drive, which increases the flexible use of the business machine and the data can be carried around. In literature [3], Shen Yijing graduate student published "Exploring the problems, turning points, and management implication of firm business process: The case of a business machine company". This paper is to introduce how a leasing company of business machines can stand out in many highly competitive industries and gain the trust of customers. The content of this paper covers the service of software and hardware of transaction machine. Hardware services include machine maintenance, parts quality and warranty period. Software service includes the speed of service personnel on-site repair and customer service attitude after customer response. The above factors are the basis for determining whether the customer wants to renew the lease or not.

III. Explanation of principle



Fig.1 The appearance of a business machine

A. The overall architecture of the business machine

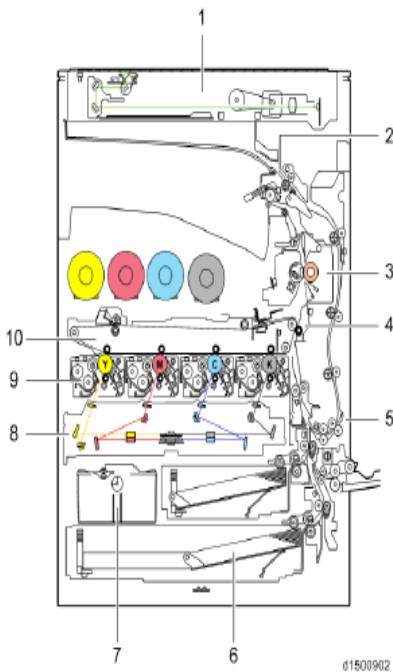


Fig. 2 The main structure of a business machine

1. Scanner unit: The scanner is located inside the top cover of the machine to scan the manuscript.

2. Paper exit unit: It is used to sense the demand of paper and supply paper.

3. Fusing unit: It can feedback the sensor signal to drive the motor to rotate.

4. Paper transfer unit: It converts the type of paper according to the result of the signal and supplies the paper.

5. Duplex unit: It is used to control the coordination between various motors and determine the order of rotation.

6. Paper feed unit: It selects the required paper according to the feedback signal of the tray position.

7. Waste toner unit: It includes toner supply sensor as well as waste toner recycling and cleaning.

8. Laser exposure unit: It includes the functions of forward driving board and backward driving board of light-emitting diode, polygonal reflective motor, asymmetric motor (skew motor), etc.

9. Power control and distribution unit (PCDU): It simultaneously supplies and distributes the power required by various motors.

10. Image transfer unit: It judges the position of paper and the condition of the solenoid type according to the signals returned by the temperature sensors at various positions.

B. Scanner unit:

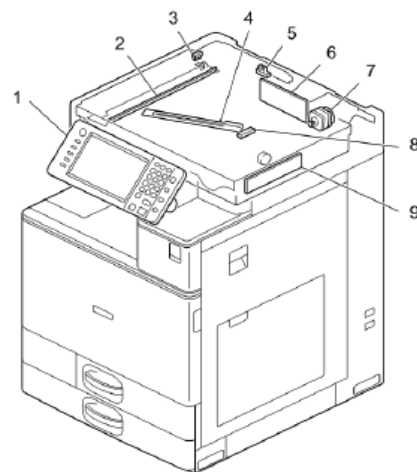


Fig.3 The detail diagram of a scanner

1. operation panel 2.scanner lamp unit (LED)
 3.scanner home position sensor 4.anti-condensation heater (scanner heater)

5.direction finder position sensor 6.scanner input/output board
 7.scanner motor 8.automatic paper size detection sensor 9.sensor board unit

C. Laser exposure unit:

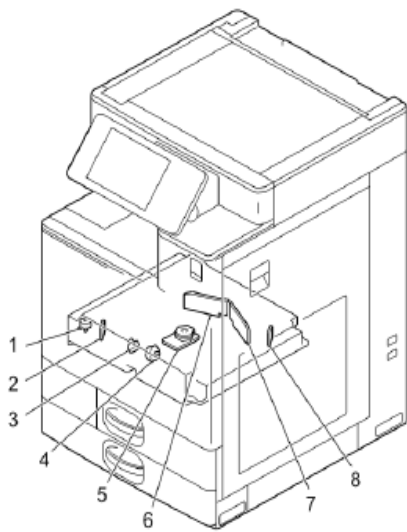


Fig.4 The detailed diagram of laser exposure

1.skew motor 2.synchronizing detector board(forward) 3.skew motor 4.skew motor 5.polygon mirror motor 6.LED drive board (forward) 7. LED drive board (backward) 8.synchronizing detector board (backward)

D. Image transfer unit:

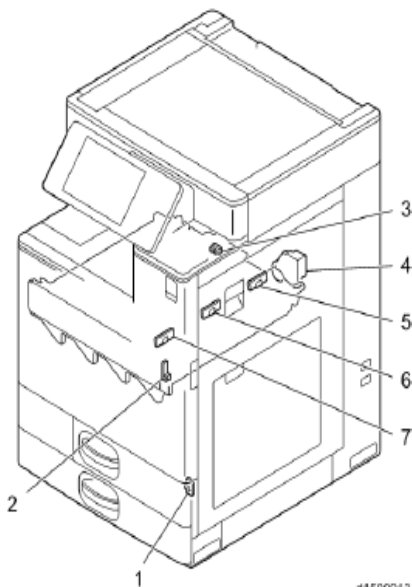


Fig.5 The detail diagram of image transfer unit

1.interlock switch: front cover (LED safety switch) 2. interlock switch: duplex unit (LED safety switch) 3.image temperature sensor (thermistor) 4.

temperature sensor shutter solenoid 5. temperature sensor(rear) 6. temperature sensor(center) 7. temperature sensor (front)

E.Power control and distribution unit:

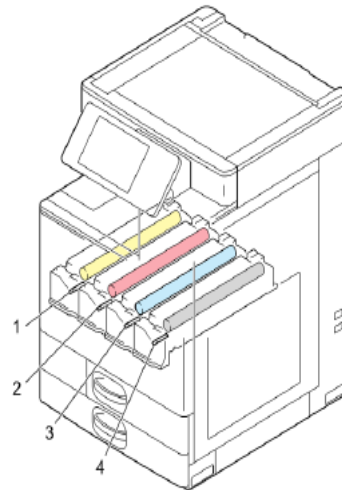


Fig.6 The detailed diagram of power control and distribution

1.control power supply of yellow color 2. control power supply of magenta color 3. control power supply of cyanic color 4. control power supply of black color

F.Toner supply/Waste toner bottle:

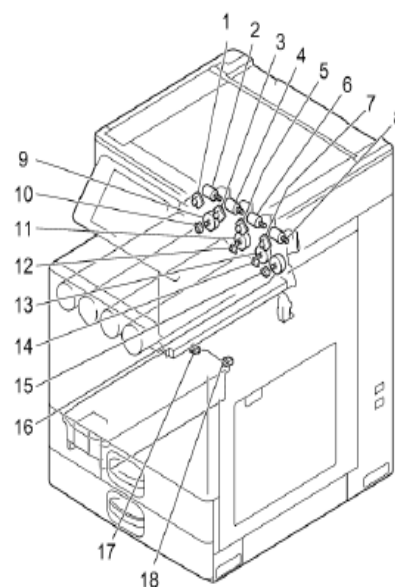


Fig.7 The detailed diagram of toner supply and waste toner recycling system

- 1.ID chip(yellow) 2.toner bottle drive motor(yellow)
- 3.ID chip(magenta) 4. toner bottle drive motor(magenta)
- 5.ID chip(cyanic) 6. toner bottle drive motor (cyanic)
- 7.ID chip(black) 8. toner bottle drive motor(black)
- 9.toner transport motor(yellow) 10.toner end sensor(yellow)
- 11.toner transport motor (magenta) 12.toner end sensor (magenta)
- 13.toner transport motor (cyanic) 14.toner end sensor (cyanic)
- 15.toner end sensor (black) 16.toner transport motor (black)
- 17.waste toner capacity sensor 18.waste toner bottle set switch

G. Paper feed unit:

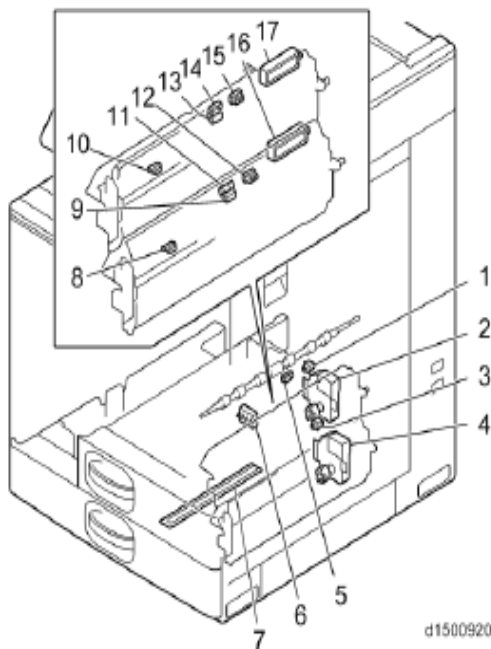


Fig.8 The detailed diagram of paper feed system

- 1.tray set switch (1st feed tray) 2.lift motor (1st feed tray)
- 3.tray set switch (2nd feed tray) 4.lift motor (2nd feed tray)
5. registration sensor 6.size switch (2nd feed tray)
- 7.anti-condensation heater 8.paper feed sensor (2nd feed tray)
9. transport sensor (2nd feed tray) 10.paper feed sensor (1st feed tray)
- 11.paper end sensor (2nd feed tray) 12.limit sensor (2nd feed tray)
- 13.transport sensor (1st feed tray) 14.paper end sensor (1st feed tray)
- 15.limit sensor (1st feed tray) 16.pick-up solenoid (2nd feed tray)
17. pick-up solenoid (1st feed tray)

H. Duplex unit:

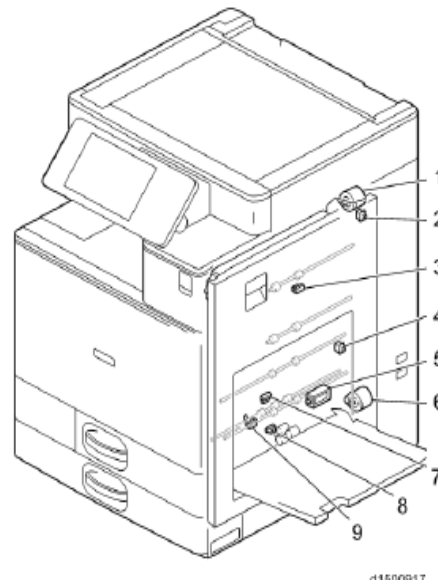


Fig.9 The detailed diagram of duplex unit

- 1.duplex entrance motor 2.duplex unit open/close sensor
- 3.duplex entrance sensor 4.by-pass unit open/close sensor
- 5.by-pass pick-up solenoid 6.by-pass /duplex motor
- 7.double feed sensor 8.by-pass paper end sensor
- 9.duplex exit sensor

I. Fusing unit:

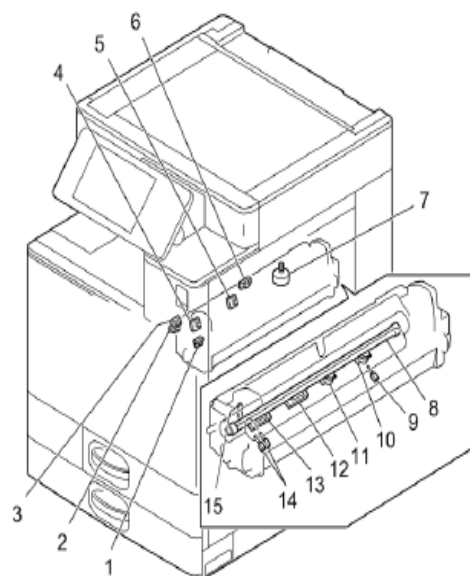


Fig.10

The detailed diagram of fusing unit

- 1.fusing pressure release sensor 2. shield position sensor (lower)
- 3.shield position sensor (upper) 4.thermopile (edge)
5. thermopile (center) 6. Fusing

exit sensor 7.shield drive motor 8.fusing heater
 9.thermistor (center) 10. thermistor (edge) 11.
 thermostate (center) 12.numerical control sensor
 (center) 13.numerical control sensor (edge)
 14.thermistor (edge) 15. shield sensor 1/2

J. Paper transfer/paper exit:

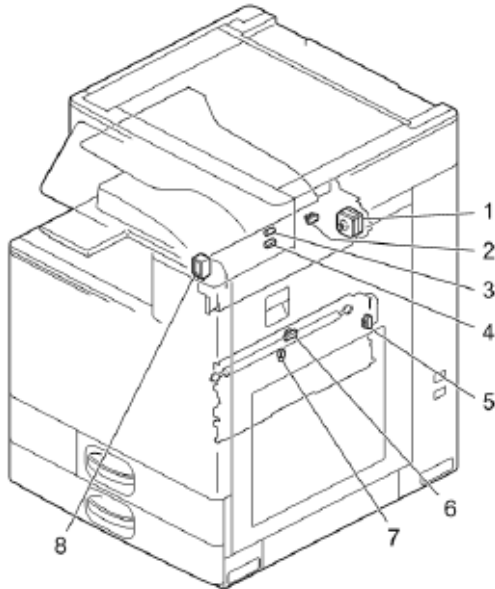


Fig.11 The detailed diagram of paper transfer / paper exit

- 1.inversion motor 2.paper exit full sensor
- 3. inversion sensor 4.paper exit sensor
- 5.paper transfer roller home position sensor 6.fusing entrance sensor
- 7.fusing jam sensor 8.paper exit Solenoid

IV. Practical operation of maintenance technology (experiment)



Fig.12 The detection of a business machine



Fig.13 The troubleshooting of the paper supply group

V.The results of maintenance:



Fig.14 The toner cartridge, power distribution board, paper feed tray, paper output tray have been repaired and tested

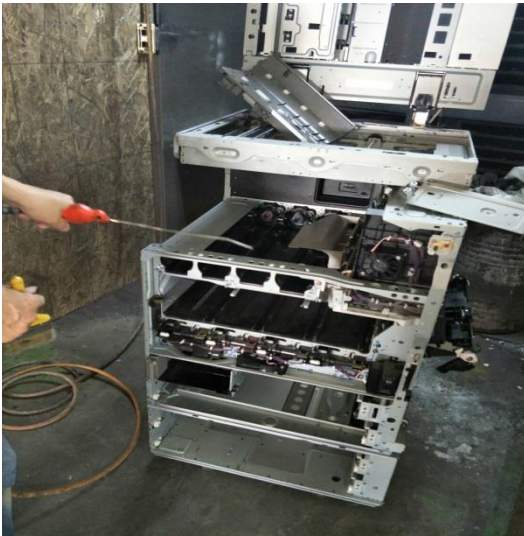


Fig.15 The fusing pressure release sensor, outer edge electric heating cone, housing drive motor have been repaired and tested

VI. Conclusion:

Comparing the new business machine with the old business machine, the new business machine has been improved a lot.

(1) Scanner: All light source use light-emitting diodes (LEDs) to replace the traditional halogen element luminous body, which can save energy and improve the trouble of black line variation.

(2) Paper feed system: Using the radio frequency system (RF system) to replace the traditional online communication system to improve the efficiency. It is more convenient to replace the traditional locking tray with a draw system tray.

(3) Duplex system: Using the internal paper tray reverse switch back system to replace the traditional internal reverse system to increase the flexibility of the new machine, a brand new real blocking animation is used to let the operator knew where the blocking is. Both of these two new devices can greatly improve the performance of the business machine.

(4) Drive layout: It uses individual motors for paper supply and transmission instead of the traditional single motor to increase the flexibility of the machine.

(5) Main frame: It uses a paper cooling system to replace the traditional atmospheric cooling to improve the cooling efficiency.

(6) Power control and distribution unit: When the machine is installed and the unit is replaced the heat sealing is required. The traditional model only needs heat sealing when the unit is replaced. This way, the layout of the unit can be simplified and the product marketing and production volume of each model can be taken into account.

VII. Reference

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