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Research on the Power Control and Distribution Unit System of a Business Machine

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Abstract—The major performance of the power control and distribution unit system (PCDU) is used to control and distribution the power system of a business machine, just like the compression and relaxation of the human heart and the running flow of the blood. This system mainly focuses on the voltage and the current. The voltage part is mainly on the voltage quarantine range of the power channel, the exchange each other between the alternative current (AC) and the direct current (DC) converters and the setting and adjustment of the threshold voltage of the hardware equipment. The emphasis in the current protection is on warning devices and isolation measures for the overcurrent of electromechanical equipment. In particular, internal electronic components of the computer operation panel can't endure large currents. Especially logic IC chips inside the operation panel can only endure the micro current of 0.05 mA.

Keywords—power channel, threshold voltage, electromechanical equipment, computer operation panel, logic IC chips.

I. Introduction

Main frames of the power control

and distribution unit (PDCU) of a business machine is as following: (1) the power control and distribution unit of the yellow toner's roller (2) the power control and distribution unit of the magenta toner's roller (3) the power control and distribution unit of the cyanic toner's roller (4) the power control and distribution unit of the black toner's roller. Commercially, the most representative products for making power control and distribution systems are desktop power supply, all in line power supply, switching power supply, industrial power supply, display power supply, servo power supply, Netcom equipment power supply, and so on. These equipments can meet requirements of the environmental protection, quiet, dust-free, low carbon emissions. In the response to the rapid development of information system structure, the main structure of power distribution has also a huge variation. The power distribution has 3 transformations: (1) the intermediate bus architecture (2) the technology of digital control (3) the point of load power management technology. These 3 kinds transformation can be said to be a new revolution in power distribution technology. They can greatly lift the service lift and the mechanical performance of the power distribution system.

II. Noun explanation.

(1) The intermediate bus architecture:

The power management technology

entered into a new frame since 2000 year. Cooling methods of traditional fan can't satisfy new equipment requirements of electronic communication and data communication. So the DC/DC power converter (direct current to direct current) came into being. It is one kind voltage transformer of direct current to direct current. It

can provide the secondary side voltage of 25V to support gate driver IC.

(2) The technology of digital control:

Different from traditional analog

electronic components, digital logic ICs expand the powerful performances that analog ICs can't achieve, making microcomputers more powerful and the electronic technology more advanced, especially the microcomputer operation panel used in the business machine. It can be used in programmable logic ICs.

(3) The point of load power management technology:

The point of load power management

supply is a complex compensation circuit that is composed of conductances, MOSFETs, electronic capacitors, resistors, diodes and micro controllers. It can provide the output current within 10A and can provide also the good excellent transient response for the fast changing load current.

III. Literature review:

Regarding the technology of the power control and distribution unit of the business machine, we have listed several journals here as examples. In the literature [1], Taiwan Ricoh company made the operation method of a business machine that is produced by himself into a manual. The content is very detailed. In the literature [2], Huang Zhezheng and Ye Jiajing jointly published "Power control distribution unit protection circuit-design of Formosat-5 satellite". In this literature, the author explains in detail the control and distribution circuit and principle of the satellite power system. The author divides the protection circuit into two parts, one is voltage protection and the other is current protection. It gives an abnormal alarm through the voltage testing circuit and the current testing circuit.

IV. Principle explanation

A.The introduction of the overall

business machine

Fig.1 The appearance of a business machine

B.The position of the power control and

distribution unit (PDCU) system on a business machine.

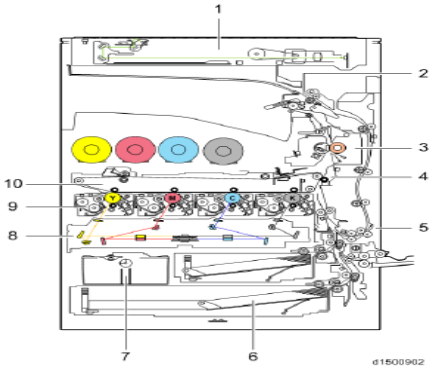

Fig.2 The position of the power control and distribution unit (PDCU) system on a business machine

9. The power control and distribution unit (PDCU) system

C. The detail diagram of the power

control and distribution unit (PDCU) system

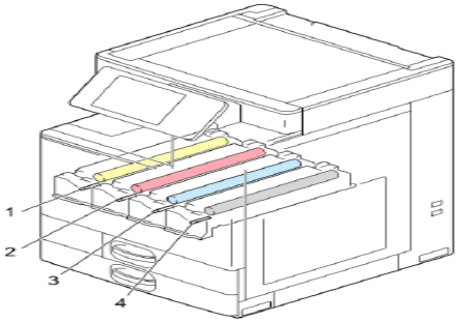

Fig.3 The fine construction diagram of the PDCU system

1.the power control and distribution unit

of the yellow toner's roller 2.the power control and distribution unit of the magenta toner's roller 3.the power control and distribution unit of the cyanic toner's roller 4.the power control and distribution unit of the black toner's roller

V.The practical operation of the

PDCU system of a business machine

Fig.4 The checked bus structure

Fig.5 The detection of completed DC/DC power converters

Fig.6 The detected driver IC

VI. Conclusion

For the power control unit that is built in the business machine: Compared with the old business machine, the improvement of the new business machine is as follows.

6.1 In the system conversion of the

new machine, each mode has spring release processes but the old machine has no spring release process. The new machine optimizes throughput and compatibility units for each type of product marketing (PM).

6.2 New machines are heat-sealed

during the installation and unit replacement. Old machines only require heat-sealed during the unit replacement. New machines can simplify the unit layout.

6.3 The new machine has the tracing

performance of operation records which is not available in the old machine. The new machine can enhance the modified performance for the controller and the engine motor.

Reference

[1] (2015), "Service manual of Ricoh university: learning, knowledge, performance", page 1-3~1-40, Ricoh Americas corporation, 1st edition.

[2] Huang Z.Z. and Ye J.J., (February 2012), "Power control distribution unit protection circuit-design of FORMOSA-5 satellite", Science news journal, Issue 186, Taiwan instrument research institute, National experiment research institute.