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Research On The Operation Panel And Switch Of A Business Machine

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***Abstract*—With the rapid development of electronic technology, the traditional button panel has been insufficient and gradually eliminated. As the button is replaced by the touch panel, these functions of the touch panel are becoming more and more powerful and extensive. This phenomenon is similar to the development of the computer technology. With the rapid advancement of the integrated circuit (IC) and foundry, functions of computer chips and computers themselves have become more and more powerful. In the same way, functions of the touch panel of the business machine are beyond the user's vision. For example; Copying, scanning and faxing are three main function keys of the business machine. There are 10~20 sub-function keys under a main function key. There are 3~5 three- function keys below each sub-function keys. If it is a traditional button operation panel that requires 90~300 keys, then the key operation panel becomes very large and heavy. On the contrary, the computer touch operation panel only needs a 12cmX9cm computer operation screen which is enough and the volume and weight become small and light.**

Keywords—touch computer screen, integrated circuit (IC), foundry, main function key, sub-function key, three- function key

I. Introduction:

The main components of the operation panel and switch of a business machine are as follows: ①Power switch ②Interlock switch ③Multifunction LCD panel and text-to-speech service(HVP-TTS) ④control board ⑤ Hard disk drive ⑥ Paper transport input output buffer(IOB) ⑦Power supply unit(AC controller board) ⑧Power supply unit(DC power)⑨Bandwidth control unit ⑩ Cooling fan of controller box ⑪ Image processing unit (IPU)⑫Sub-image processing unit (IPU sub)(i.e. Space physics data facility).

II. Literature review:

Research on the operation panel and switch of a business machine, here are some papers as examples. 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], Wu Tinghui graduate student published "Automatic system for detecting surface flaw of notebook touch pads". This paper explains in detail how to detect the defects of the touch panel in the fastest and simplest way. In literature [3], Miao Huakai graduate student published "Displacement analysis of notebook computer touchpad support plate". This paper is to test whether the bracket in the touch panel is really performing its due function or not? In literature [4], Zheng Dayang graduate student published "Flick board: enabling track pad interaction with automatic mode switching on a capacitive-sensing keyboard". This paper is used to

study the conversion interface between the keyboard and the command which are built in the touchpad.

III. Explanation of principle:

Fig.1 The appearance of a business machine [1]

A. The fine construction of the operation panel and switch:

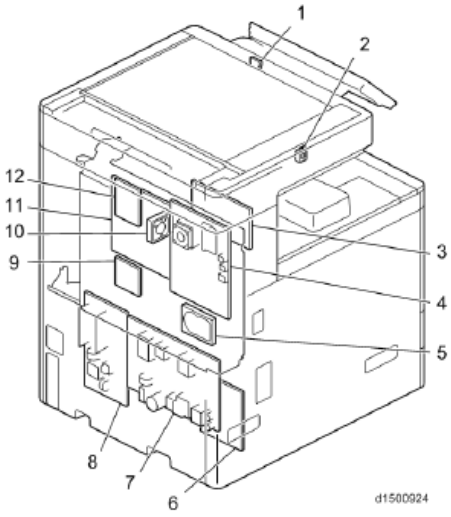

Fig.2 The detailed diagram of the operation panel and switch [1]

1.power switch 2.Interlock switch: front cover 3.multifunction LCD panel and text-to-speech service(HVP-TTS) 4.control board 5.hard disk drive (HDD) 6.paper transport input output buffer(IOB) 7.power supply unit(AC controller board) 8.power supply unit(DC power) 9.bandwidth control unit (BCU) 10.cooling fan of controller box 11.Image processing unit (IPU) 12. sub-image processing unit (IPU sub)(i.e. Space physics data facility(SPDF)).

IV. Practical operation of the operation panel and switch of a business machine:

Fig.3 The inspection of the operation panel and switch

Fig.4 The testing of the operation panel and switch

Fig.5 The troubleshooting of the operation panel

Fig.6 The troubleshooting of the switch

V.The result of experiments of the operation panel and switch:

Fig.7 The operation panel that has been inspected

Fig.8 The switch that has been inspected

VI. The interpretation of important proper nouns:

A. Electrically-Erasable

programmable ready-only memory (EEPROM):

EEPROM is a semiconductor storage device that can be rewritten multiple times electronically. Compared with other EPROMs (Erasable programmable ready -only memory), EEPROM has the following advantages. It does not need to be irradiated with ultraviolet light or removed, and it can erase the information on the chip with a specific voltage to implant new data. EEPROM has four working modes ①reading mode ②writing mode ③ wiping mode ④calibrating mode.

B. Flexible Flat Cable (FFC):

The flexible flat cable (FFC) is a kind of PET (polyethylene terephthalate) insulation material and very thin tinned flat copper wire laminate by high-technology automatic equipment production line. For this material, the general manufacturer has semi-finished products that can be cut according to the length and the number of pins that is required by the customer.

VII. Conclusion:

For the operation panel and switch of the business machine, the new machine has the following improvements that are compared with the old machine.

(1) The new machine uses two LCD

screens. Compared with the traditional machine that only uses one liquid crystal screen, the new machine is a combination of multiple brands.

(2) For image innovation and paper

transfer functions, the new machine adopts two input and output boards (IOB). Compared with the traditional machine that only uses one input and output board (IBO), the new machine is an optimized layout (deployment).

(3) For the electrically-erasable

programmable read-only memory (EEPROM) that is built in the touch panel, the new machine is

increased to two groups. Compared with the old machine that only one set of EEPROM is used, the new machine can increased the processing speed.

(4) For the flexible flat cable (FFC) that

is built into the touch panel, the new machine is used for the main single-line diagram to complete the three-phase power system and the FFC itself has a fixed clip socket. Compared with the wire of the old machine which has high hardness and FFC does not have a clip, the new machine can reduce the weight and improve the signal processing ability.

(5) For the main switch that is built in

the operation panel, the new machine adopts the DC switch as long as it is pressed and held to achieve the purpose of forced shutdown. Compared with the old machine using the locker switch, the plug must be pulled out to force the shutdown. The new machine is more advance and convenient.

(6) For the fax machine that is built in

the business machine, the new machine adds a bracket to the replaced small fan coil unit (FCU). Compared with the old machine without a fixed bracket in the fan coil unit (FCU), the new machine makes the operation more flexible

VIII. Reference:

[1](2015),"*Service manual of Ricoh*

university: learning, knowledge, performance", page 1-1~1-44, Ricoh Americas corporation, 1st edition.

[2]Wu T.H., (2018), "*Automatic system for detecting flaw of notebook touch pads*", master's dissertation, Taipei, Taiwan, national Taipei university of technology, department of industrial engineering and management.

[3]Miao H.K., (2016), "*Displacement analysis of notebook computer touchpad*

support plate", master's dissertation, Taipei, Taiwan, national Taipei university of technology, Manufacturing technology research institute.

[4]Zheng D.Y., (2014), "*Flick board: enabling track pad interaction with automatic mode switching on a capacitive-sensing keyboard*", master's dissertation, Taipei, Taiwan, national Taiwan university, department of information engineering.