

2 COLOR THERMAL PRINTER

FTP-602 Series

OVERVIEW

A 2-color printer is now included in our compact high-speed thermal printer FTP-602 series. The coloring of 2-color printing of the line thermal printer will be explained.

1. Market trend of thermal printers

A line thermal printer, which has such features as high-speed printing, high quality image printing, low noise, and which is maintenance free, is used for printing the receipts of distribution terminals (e.g. POS, ECR), banking terminals (e.g. ATM, CD), journal printers, various ticket issuing machines, measuring and medical equipment, and various other equipment, since thermo-sensitive paper has become cheaper and has a longer life, and quality and characteristics have been improved. The applications of respective equipment are also diversified and the functions of the printer are also increasing.

The FTP-602 series has been used for various applications, such as the standard mechanism of compact high-speed printers, compact cutters, and unit types where the control circuit and paper feed part are integrated. Unit products with a winding mechanism for journals have been included in this series to support many functions.

At this time a 2-color printing compact thermal type with maintenance free features where ink ribbons and toner are unnecessary is included in the series. Since printing remarks, the prevention of altered printing, and special printing including advertisements are possible, this printer can be used to print receipts, journals, coupons and tickets.

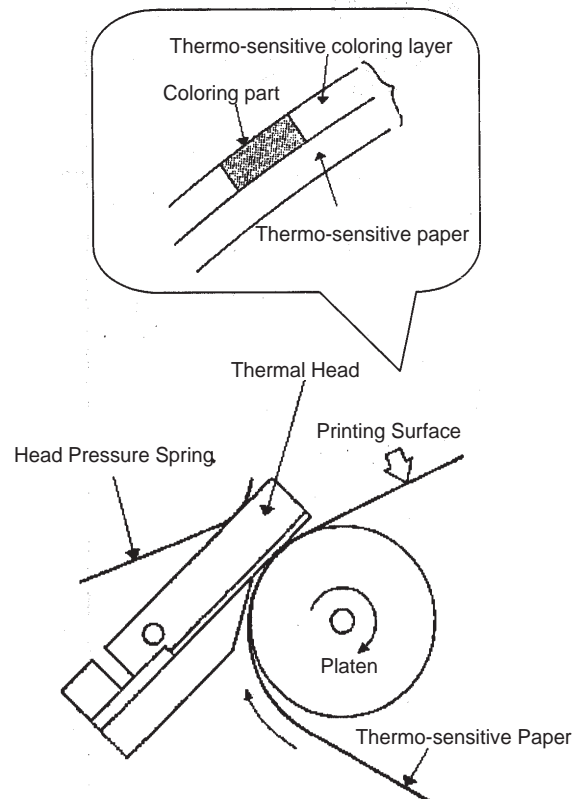


Fig. 1 Thermal System

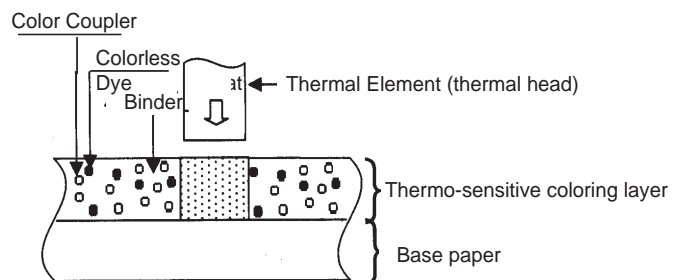


Fig. 2 Basic Structure of thermo-sensitive paper

2. Basic configuration and operation principle of thermal printers

A thermal printer is basically comprised of a thermal head which generates heat and prints data, a platen (rubber roller) which feeds paper, and a spring to pressure the head which contacts the thermal head to thermo-sensitive paper. For printing, thermo-sensitive paper is inserted into the part between the thermal head and the platen, and the thermal head is contacted to the thermo-sensitive paper by the spring which pressures the head. Then heat is generated by supplying a current to the heating resistor of the thermal head. By this heat, the thermo-sensitive coloring layer of the thermo-sensitive paper is colored and printed. This system is called a "thermal system" (direct system).

A several micron thermo-sensitive coloring layer is coated on the base paper of the thermo-sensitive paper. In the thermo-sensitive coloring layer, a color coupler and colorless dye are fixed on the base paper by a binder. When heat is applied to the thermo-sensitive coloring layer by such a thermal element as a thermal head, needle and pen (thereafter represented by thermal head), the color coupler and colorless dye cause a chemical reaction, instantaneously generating such colors as black, blue and red.

Printing density differs depending on the energy applied to the thermal head. Fig. 3 shows the relationship between printing density and applied energy. As applied energy increases printing density increases.

In order to maintain printing quality at a constant level, the voltage to be applied to the thermal head and the energizing pulse width are changed so that the applied energy can be controlled in a range where printing density is stabilized. Printing density also changes depending on the ambient temperature, so the correction of applied energy is required here as well.

3. 2-color printing

2-color printing is implemented by controlling the applied energy required to color each color to the optimum using 2-color thermo-sensitive paper.

Two types of color tones are created on 2-color thermo-sensitive paper by the difference of the applied energy. To achieve this a special layer is created on the coloring material surface as one layer, so that coloring materials with different color tones do not mix, and different coloring

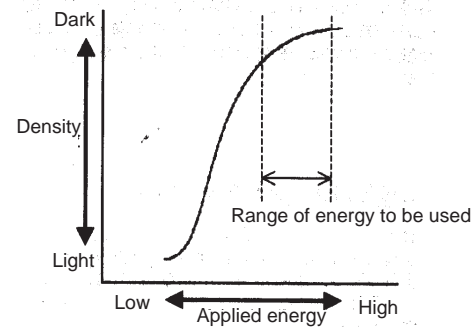


Fig. 3 Coloring characteristics of single color thermo -sensitive paper

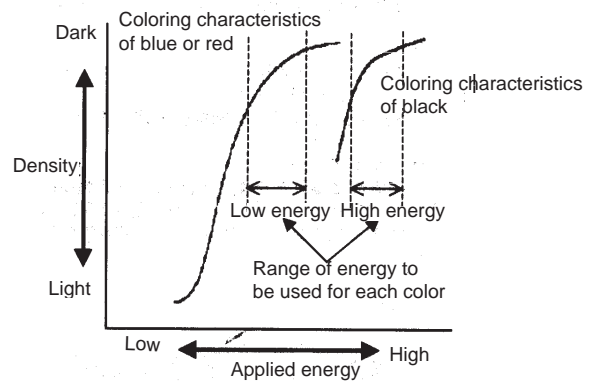


Fig. 4 Coloring characteristics of 2-color printing thermo -sensitive paper

energy can be used. Specifically, such chromatic colors as red and blue are developed at low energy, and black is developed at high energy (about double that of low energy). Actually the black image part developed at high energy is a "mixed color" with chromatic color developed at low energy.

Printing quality differs depending on the printing speed of the printer, the thermal response of the head, heat retaining characteristics and other factors. Another particular consideration is that the degree of bleeding of red or blue, developed at low energy, to be generated around black, developed at high energy, is different. Therefore to clearly print two colors, the above conditions must be considered and the applied energy must be controlled to the optimum.

Our FTP-602 series 2-color printer implemented high printing quality by using a thermal head, which has a good thermal response and which is robust in high energy applications, and by controlling the applied energy to the optimum. See the separate document for details on specifications.

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