

TPNL is pushed with the pen or the like, the control circuit TCON detects the positional information, and, after a lapse of equal to or more than 0.1 seconds from the detection, the control circuit TCON transmits the data for erasing to the liquid crystal display panel LPNL.

[0229] FIG. 18 is a flow chart showing one embodiment of an operation performed by the control circuit TCON.

[0230] In the drawing, first of all, in step SP1, a touch address is detected based on the information PD from the touch panel TPNL. Thereafter, in step SP2, address data is stored in a memory indicated by SP3.

[0231] Then, in step SP4, the stored address and the input data are compared. That is, the address stored in the memory SP3 and the inputted address data are compared, and it is determined whether the stored address data and the inputted address data coincide with each other or not. Then these data do not coincide, the counter CM is reset to "0" in step SP5 and the count number is added along with inputting of data at step SP6.

[0232] When the count number assumes a value which corresponds to 0.1 seconds in step SP7, the video signal data of the region corresponding to the address stored in the memory SP3 is replaced with the data for erasing in step SP8.

[0233] When the stored address data is inputted in step SP4, the processing returns to the step SP1, and the processing is repeated until the stored address data is no more inputted.

[0234] Since the touching operation of the touch panel TPNL is performed by a human, the time during which the pressure is applied to the touch panel TPNL by the touching operation is not a moment, but is a continuous time having a finite value.

[0235] Even when the screen is erased during touching, the memory function is generated, and, hence, it is not so effective. Accordingly, to add the data for erasing after completion of touching, it is desirable to perform the setting of data for erasing after a time equal to or more than 0.1 second lapses. Accordingly, it is possible to surely erase the region from the screen immediately after the completion of touching.

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[0236] FIGS. 19A to 19D are diagrams relating to another embodiment of the liquid crystal display device according to the present invention.

[0237] This embodiment is different from the embodiment shown in FIG. 17 in that, first of all, when the touch panel TPNL is traced with a pen or the like, as shown in FIG. 19A, a locus drawn by the pen or the like appears as it is as a display, as shown in FIG. 19B. Although this display constitutes the above-mentioned "dark spot", this embodiment is characterized by effectively using the dark spot as the display.

[0238] Then, this display is erased in response to an instruction from a manipulator. That is, the locus drawn by a pen or the like can be used for some purpose; and, when the locus becomes no longer necessary, the erasing signal is

applied in response to an instruction from the user, as shown in FIG. 19C, and the display of the locus is released, as shown in FIG. 19D.

[0239] FIG. 20 is a flow chart showing one embodiment of an operation performed by the control circuit TCON.

[0240] In the drawing, in step SP1, the touch address from the touch panel TPNL is detected. Then, the address data is stored in step SP2. Here, the address data is stored in a memory indicated by SP3. In this case, the locus drawn by a pen or the like appears on the display and the control circuit TCON waits for an erasing request CO of the display.

[0241] When the control circuit TCON receives the erasing request CO in step SP4, the video signal data of a region corresponding to the stored address is replaced with the data for erasing in step SP5. Thereafter, the address data of the memory is reset in step SP6.

[0242] Here, in this case, the erasing signal may be produced only with respect to the vicinity of the touching region. Due to such a constitution, it is possible to constitute the liquid crystal display device without affecting images other than that of the touched portion.

[0243] FIG. 21 is a flow chart showing one embodiment of an operation performed by the control circuit TCON and is shown by extracting a portion of FIG. 20.

[0244] As shown in the drawing, when the control circuit TCON receives the erasing request in step SP4, in step SP7, the whole screen is erased without performing the replacement of the video signal as shown in FIG. 12 or FIG. 14, for example. In this case, it is possible to obtain an advantageous effect that the memory is no longer necessary.

[0245] In this embodiment, the memory property, which has been considered to give ill effects to the display, is positively utilized in the display. In describing characters or images using the touch panel, when a trace which is formed by touching of the pen is observed, it is easier for the user to describe the character or the image so that the availability of the user is enhanced.

[0246] Accordingly, in this embodiment, erasing is performed in accordance with the instruction of the user such that an erasing signal is inputted upon receiving the instruction from the user.

[0247] Here, it is desirable to execute the erasing request using software. By setting some address as an address which issues a display signal, when a user merely touches the region, an erasing signal is issued and erasing of the memory image can be realized.

[0248] It is needless to say that to the above-mentioned liquid crystal display device having the touch panel TPNL, techniques which are described in respective embodiments of the liquid crystal display device having no touch panel TPNL are applicable.

[0249] As can be clearly understood from the foregoing explanation, according to the liquid crystal display device of the present invention, the above-mentioned dark spot can be obviated. Further, it is possible to effectively utilize the above-mentioned dark spot.