

[0014] In the coordinate input device according to the present invention, the coordinate detector is configured by sandwiching the second insulating layer with the two electrode layers and providing the first insulating layer and the third insulating layer on each of the electrode layers respectively. Also, by forming each of the layers by using a transparent material, the transparent coordinate input device is realized. In the configuration of the coordinate input device in the known art shown in FIG. 7, each layer is laminated in the following order: the ground layer 109, the insulating layer, the Y-electrodes 106b, the insulating layer, the X-electrodes 106a, and the touch board 101, from the side of the circuit board 107. On the other hand, the coordinate detector of the coordinate input device according to the present invention does not have a layer corresponding to the ground layer 109 shown in FIG. 7. The light transmittance of the coordinate detector is high because the coordinate detector does not include the ground layer. In the coordinate input device 100 shown in FIG. 7, the ground layer 109 is provided so that a noise, which is caused when the control circuit chip is driven, does not disturb the electrostatic capacitance generated between the electrodes 106a and 106b. Thus, when the ground layer 109 is not provided, a method for preventing the disturbance of the noise is necessary. The coordinate input device of the present invention operates stably without the ground layer, because the control circuit includes a correction unit for removing noise. Accordingly, the coordinate input device of the present invention has a transparent coordinate detector whose light transmittance is high, and can operate stably.

[0015] That is, in the coordinate input device of the present invention, at least the coordinate detector is transparent. Thus, the object placed on the back side of the coordinate detector can be seen from the side of the coordinate detector surface. Also, another function can be added to the portion occupied by the coordinate input device and the space can be effectively used. For example, by displaying the method for operating the coordinate input device so that the method is transmitted through the coordinate detector, the coordinate input device can be easily operated by even a person who is not accustomed to operate the coordinate input device. Accordingly, the usability of the device can be significantly improved.

[0016] Also, the coordinate input device of the present invention comprises: a coordinate detector including a first insulating layer which has transparency and which is formed at the top; a first electrode layer having a plurality of linear transparent electrodes formed in parallel on the lower surface of the first insulating layer; a second insulating layer which has transparency and which is formed on the lower surface of the first electrode layer; a second electrode layer having a plurality of linear transparent electrodes which are aligned in parallel and which extend in the direction orthogonal to the transparent electrodes of the first electrode layer, the second electrode layer being formed on the lower surface of the second insulating layer; and a third insulating layer which has transparency and which is formed on the lower surface of the second electrode layer, and a display device placed on the back side of the coordinate detector. A scanning frequency for scanning the electrodes of the coordinate input device is different from a driving frequency of the display device.

[0017] That is, in the coordinate input device of the present invention, since the display device is placed on the back side of the transparent coordinate detector, information displayed on the display device is transmitted through the coordinate detector so that an operator can see the information. With this configuration, by displaying necessary information such as hints for operation on the display device as required, a person who is not accustomed to operate the device can easily operate the coordinate input device or electronic equipment including the same. Alternatively, the display device can display an image, a calendar, time, and so on.

[0018] In the coordinate input device of the present invention, a scanning frequency for scanning the electrodes of the coordinate detector in a predetermined direction is different from a driving frequency for driving the display device. With this arrangement, the coordinate detector and the display device do not mutually disturb. Accordingly, deterioration in the detecting accuracy and malfunction of the coordinate input device and distortion of the display of the display device can be effectively prevented, and thus a stable operation can be realized.

[0019] Preferably, the coordinate input device further comprises a controller which is electrically connected to the two electrode layers of the coordinate detector so as to drive and control the electrode layers and which has a correction unit for removing electrostatic capacitance noise that disturbs the coordinate detector. With this configuration, disturbance from the display device provided on the back side of the coordinate detector and electronic equipment including the coordinate input device can be canceled. Accordingly, a malfunction of the coordinate input device can be prevented.

[0020] The display device may be a liquid crystal display device or an EL display device in which electroluminescent elements are aligned.

[0021] The advantage of the coordinate input device of the present invention can be achieved by using either of the above-mentioned display devices. Also, a thin and low-power-consumption coordinate input device can be realized by using either of the display devices.

[0022] For a liquid crystal display device as the display device according to the present invention, any type can be adopted without problems. Specifically, any of a transmissive-type, a reflective-type, and a transreflective-type can be used. Furthermore, the driving method may be any of a passive matrix and an active matrix.

[0023] In addition, an arbitrary type of EL display device, such as a display device in which a gray scale is displayed by a variation in the luminance of EL elements or a display device using light of EL elements as lighting and including a liquid crystal device as an optical modulation element, can be used. Also, the EL element may be selected from an inorganic EL element, a polymer organic EL element, and a low-molecular organic EL element.

[0024] Also, a ground layer comprising a conductor may be provided on the back side of the display device. With this configuration, the coordinate detector and the display device can be electrically operated stably and an electrical disturbance from electronic equipment including the coordinate input device can be prevented. The ground layer comprising