The portable electronic device of the present invention comprises a touch input apparatus including a touch panel installed on a surface of a display. The touch panel has a lead part projecting at the end of a detecting section. The detecting section includes a matrix area A where X value detection lines and Y value detection lines are arranged in matrix, and a lead area B where a plurality of lead lines extending from the matrix area A in the same direction as the X value detection lines to reach the lead part are arranged. A first touch input section is formed by the matrix area A of the touch panel, and a second touch input section is formed by the lead area B.
TOUCH INPUT APPARATUS AND PORTABLE ELECTRONIC DEVICE INCLUDING SAME

TECHNICAL FIELD

[0001] The present invention relates to a touch input apparatus installed in a portable electronic device such as a portable telephone, a digital camera or the like.

BACKGROUND ART

[0002] Generally, a portable telephone includes a small portable housing in which a thin display such as a liquid crystal display or the like and a plurality of operation keys such as a numerical keypad or the like are arranged. A wide range of information can be displayed by the display, and a wide range of information can be inputted by operating the operation keys.

[0003] Also, in a portable telephone, in order to improve its operability, a touch panel is placed so as to cover a screen of the display, so that, for example, by performing a touch operation of a key image displayed on the display, a function corresponding to the key image can be activated (e.g., Japan Patent Laid-Open 2000-78252).

[0004] As shown in FIG. 3, a touch panel 6 comprises a detecting part 61 on an end part of which a lead part 62 projects. The detecting part 61 includes a transparent matrix area A where X value detection lines 63 extending in a Y-axis direction and Y value detection lines 64 extending in an X-axis direction are arranged in matrix, and a non-transparent lead area B comprising a plurality of lead lines 65 extending from the matrix area A in the Y-axis direction to reach the lead part 62. The matrix area A functions as a two-dimensional input apparatus.

[0005] In a case where the touch panel 6 is installed in a portable telephone, as shown in FIG. 3, the touch panel 6 is placed so that the matrix area A is superposed on an image display area 41 of a display 4. When the portable telephone is in operation, a plurality of key images are displayed on a screen of the display 4. By performing a touch operation at a position where a certain key image is displayed, obtained are an X value output and a Y value output according to a touch position.

[0006] In the touch panel 6 shown in FIG. 3, the lead area B comprising the plurality of lead lines 65 does not function as a two-dimensional touch input apparatus, and therefore, in a case where the touch panel 6 is installed in a portable telephone, the lead area B of the touch panel 6 is covered by a cover panel to expose on a front face only the matrix area A where a two-dimensional output is obtained.

DISCLOSURE OF THE INVENTION

Problems to be Solved by the Invention

[0007] However, in small electronic devices such as a portable telephone or the like, the display has a larger screen with recent increase in quantity of information to be displayed, and the number of operation keys increases with multi-functionalization. Therefore, further downsizing of the device is difficult.

[0008] Therefore, the present invention is, in a portable electronic device with a touch input apparatus including a touch panel placed on a surface of a display, to provide a touch input apparatus which can decrease a size of the device compared to conventional ones, and a portable electronic device comprising said touch input apparatus while realizing both increasing the size of the display and increasing the number of operation keys.

Means for Solving the Problem

[0009] A touch input apparatus according to the present invention comprises a display 4 on a surface of which a touch panel 6 is installed.

[0010] The touch panel 6 comprises a detecting part 61 on an end part of which a lead part 62 projects. The detecting part 61 includes a matrix area A where an X value detection line 63 and a Y value detection line 64 are arranged in matrix, and a lead area B where a plurality of lead lines 65 extending from the matrix area A in the same direction as the X-axis detection line 63 to reach the lead part 62 are arranged. A first touch input section is formed by the matrix area A of the touch panel 6, and a second touch input section is formed by the lead area B.

[0011] With the above described touch input apparatus, by performing a touch operation on the matrix area A of the touch panel 6, a two-dimensional output (X value output and Y value output) according to a touch position is obtained. Therefore, by displaying on the display a plurality of key images arranged in a two dimensional direction, formed is a first operation key part where information is inputted by performing a touch operation of the key image.

[0012] Also, with the above described touch input apparatus, by performing a touch operation on the lead area B of the touch panel 6, obtained is a one-dimensional output (X value output) according to the touch position in a direction crossing the lead line 65. Therefore, by providing one or more key display sections 35 in a one-dimensional direction crossing the lead line 65 so as to cover the lead area of the touch panel 6, formed is a second operation key part where information is inputted by performing a touch operation on the operation part. Here, in the case where there are more than one key display sections 35, by arranging key display sections in an X-axis direction, the touch position can be recognized only by the X value output.

[0013] In a particular configuration, a cover panel 33 is placed so as to cover the touch panel 6. On the cover panel 33, a light-transmitting panel section 34 is formed in an area covering the first touch input section of the touch panel 6, and one or more key display sections 35 are provided on a line extending in a direction crossing the X-axis detection line 63 in an area covering the second touch input section.

[0014] According to this particular configuration, a plurality of key images displayed on the display 4 can be viewed through the light-transmitting panel section 34 of the cover panel 33. By performing a touch operation of any one key image, a two-dimensional output (X value output and Y value output) according to the position of the key image is obtained. Also, by performing a touch operation of any one key display section 35 of the one or more key display sections 35 provided on the cover panel 33, a one-dimensional output (X value output) according to the position of the key display section 35 is obtained. Here, since the plurality of key display sections 35 are arranged in a direction crossing the X-axis detection line 63, the touch position can be recognized only by the X value output.

[0015] A portable electronic device according to the present invention includes a touch input apparatus according to the present invention described above, and by the touch
operation of the second touch input section of the touch panel 6, a screen displayed on the display 4 is changed.

[0016] Alternatively, an image regarding device operation is displayed on the display 4, and by a touch operation of the second touch input section of the touch panel 6, an operation signal regarding the image displayed on the display 4 is generated.

Effect of the Invention

[0017] With the touch input apparatus and the portable electronic device according to the present invention, since the lead area of the touch panel which was not used conventionally is utilized as a second operation key part, a space occupied by the lead area is utilized effectively, and the size of the device can be decreased compared to conventional ones.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. 1 is a perspective view of a portable telephone according to the present invention;
[0019] FIG. 2 is an exploded perspective view of a display side body of the portable telephone;
[0020] FIG. 3 is a plan view of a touch panel;
[0021] FIG. 4 is a plan view showing an image display example on a sub-display; and
[0022] FIG. 5 is a plan view showing another image display example on the sub-display.

EXPLANATION OF REFERENCE NUMERALS

[0023] 2 operation side body
[0024] 3 display side body
[0025] 33 cover panel
[0026] 34 light-transmitting panel section
[0027] 35 key display section
[0028] 4 sub-display
[0029] 6 touch panel
[0030] 61 detecting part
[0031] 62 lead part
[0032] 63 X value detection line
[0033] 64 Y value detection line
[0034] 65 lead line

BEST MODE FOR CARRYING OUT THE INVENTION

[0035] An embodiment in which the present invention is implemented in a portable telephone is to be described in detail below with reference to the drawings.

[0036] As shown in FIG. 1, a portable telephone according to the present invention comprises an operation side body 2 and a display side body 3 foldably connected to each other. A plurality of operation keys (not shown) such as a numerical keypad or the like are arranged inside the operation side body 2, and a main display (not shown) including a large screen is arranged inside the display side body 3.

[0037] Also, a transmission part 5 is arranged in a lower end part of the operation side body 2, and a receiver part 51 is arranged in an upper end part of the display side body 3.

[0038] As shown in FIG. 2, the display side body 3 comprises an inner case half body 30 on which a sub-display 4 is mounted, a rear case half body 31 provided with an aperture 32 corresponding to a screen of the sub-display 4, a touch panel 6 placed on the rear case half body 31 so as to cover the screen of the sub-display 4, and a cover panel 33 made of resin placed on the rear case half body 31 so as to cover the touch panel 6.

[0039] As shown in FIG. 3, the touch panel 6 comprises a detecting part 61 and a lead part 62 projecting on an end part of the detecting part 61. A tip end part of the lead part 62 is connected to a circuit board (not shown) on the inner case half body 30.

[0040] The detecting part 61 of the touch panel 6 includes a matrix area A where an X value detection line 63 extending in a Y-axis direction and a Y value detection line 64 extending in an X-axis direction are arranged in matrix, and a non-transparent lead area B where a plurality of lead lines 65 extending from the matrix area A in the Y-axis direction to the lead part 62 are arranged.

[0041] The touch panel 6 is placed so that the matrix area A is superposed on an image display area 41 of the display 4.

[0042] In the above described touch panel 6, by touching with a finger-tip an intersection point of the X value detection line 63 and the Y value detection line 64 or a point adjacent thereto, an X value output and a Y value output according to the touch position are obtained, and a Z value output according to the touch operation force is obtained.

[0043] When a touch operation is performed on the matrix area A of the touch panel 6, the X value output and the Y value output are stable, and the Z value output has a certain size, too. Therefore, the touch position can be detected from the X value output and the Y value output.

[0044] In contrast, when a touch operation is performed on the lead area B of the touch panel 6, the X value output is stable, but the Y value output is unstable. Also, the Z value output is greater than the Z value output when the touch operation is performed on the matrix area A. Therefore, it is recognized that it is a touch operation of the lead area B by an increase of the Z value output, and the touch position in the X-axis direction can be detected from the X value output.

[0045] As shown in FIG. 2, a light-transmitting panel section 34 is formed on the cover panel 33 in an area opposed to the matrix area A of the touch panel 6, and a plurality of key display sections 35 aligned in the X-axis direction are provided in an area opposed to the lead area B of the touch panel 6.

[0046] When the portable telephone is in operation, a plurality of key images are displayed on a screen of the display 4 (see FIGS. 1 and 2). If a touch operation is performed on the light-transmitting panel section 34 of the cover panel 33 at a position where a certain key image is displayed, an X value output and a Y value output according to the touch position, and a Z value output of a certain size are obtained. Therefore, an operation signal according to the key image on which the touch operation was performed is generated based on the X value output and the Y value output.

[0047] Also, if a touch operation is performed on any one key display section 35 of the plurality of key display sections 35 of the cover panel 33, an X value output according to the touch position and a great Z value output are obtained. Therefore, it is determined which key display section 35 has been operated based on the X value output, and an operation signal according to the operated key display section 35 is generated.

[0048] For example, as shown in FIG. 4, in the case of scroll-displaying a plurality of operation key images on the image display area 41 of the sub-display 4, by performing a touch operation on one key display section 35 of the plurality of key display sections 35, it is possible to switch the image of
a group of operation keys displayed on the image display area 41 to an image of a group of operation keys in which the operation key designated by the key display section 35 on which the touch operation was performed is the first key.

[0049] Also, as shown in FIG. 5, in the case where a title of and a reproduction time for a music album are displayed on the image display area 41 of the sub-display 4, the operation key regarding the reproduction operation (e.g., start reproduction, forwarding, backward feed, and the like) is shown by the plurality of key display sections 35. By performing a touch operation of any one of the key display sections 35, it is possible to order one reproduction operation designated by the operated key display section 35.

[0050] With the portable telephone of the present invention described above, since the lead area B of the touch panel 6 which was not used conventionally is utilized as a second operation part, a space occupied by the lead area B is utilized effectively, and as a result, the size of the portable telephone can be decreased compared to conventional ones.

[0051] The present invention is not limited to the foregoing embodiment in construction but can be modified variously within the technical range set forth in the appended claims. In the embodiment described above, the present invention is implemented with respect to the sub display section which is exposed when a foldable telephone is folded. However, as long as a touch panel is included in a main display section which is covered when folded, the present invention can also be implemented with respect to the main display section.

[0052] The second operation key part provided in the embodiment described above supplements operation of the indication in the image display area and the operation of the main key operation part. However, in some cases it may be controlled to become unusable in a mode, an application or the like. Thereby it is possible to prevent erroneous operation, and it is not necessary to control to prevent an extra input process from being received to be processed.

[0053] Also, in the present invention, it is also possible to use the second operation key part as a main operation part to operate contents displayed in the image display area, so that the first operation key part in the image display area is not used. For example, when simply reproducing music as shown in FIG. 5, it is not necessary to operate in the image display area. Therefore, it is also possible to display information regarding the music (including movie clip, music information, photograph (jacket) or the like) in this display area, and handle simple functions (reproduction, forwarding, backward feed) in this second operation key part, so that the screen is specialized in indication and a touch input to a large screen is disabled.

[0054] The present invention can also be implemented in a sliding portable telephone or a straight type portable telephone as well as a foldable portable telephone, and further, can be implemented in various portable terminal devices such as a digital camera, a game machine or the like as well as a portable telephone.

1. A touch input apparatus comprising a display on a surface of which a touch panel is installed, the touch panel comprising a detecting part on an end part of which a lead part projects, the detecting part including a matrix area A where an X value detection line and a Y value detection line are arranged in matrix, and a lead area B where a plurality of lead lines extending from the matrix area A in the same direction as the X value detection line to reach the lead part are arranged, wherein a first touch input section is formed by the matrix area A of the touch panel, and a second touch input section is formed by the lead area B.

2. The touch input apparatus according to claim 1, wherein a cover panel is placed so as to cover the touch panel, on the cover panel, a light-transmitting panel section is formed in an area covering the first touch input section of the touch panel, and one or more key display sections are provided on a line extending in a direction crossing the X value detection line in an area covering the second touch input section.

3. A portable electronic device comprising a display on a surface of which a touch panel is installed, the touch panel comprising a detecting part on an end part of which a lead part projects, the detecting part including a matrix area A where an X value detection line and a Y value detection line are arranged in matrix, and a lead area B where a plurality of lead lines extending from the matrix area A in the same direction as the X value detection line to reach the lead part are arranged, wherein a first touch input section is formed by the matrix area A of the touch panel, and a second touch input section is formed by the lead area B.

4. The portable electronic device according to claim 3, wherein a cover panel is placed so as to cover the touch panel, on the cover panel, a light-transmitting panel section is formed in an area covering the first touch input section of the touch panel, and one or more key display sections are provided on a line extending in a direction crossing the X value detection line in an area covering the second touch input section.

5. The portable electronic device according to claim 3, wherein by a touch operation of the second touch input section of the touch panel, a screen displayed on the display is changed.

6. (canceled)

7. The portable electronic device according to claim 4, wherein by a touch operation of the second touch input section of the touch panel, a screen displayed on the display is changed.

8. The portable electronic device according to claim 3, wherein an image regarding device operation is displayed on the display, and by a touch operation of the second touch input section of the touch panel, an operation signal regarding the image displayed on the display is generated.

9. The portable electronic device according to claim 4, wherein an image regarding device operation is displayed on the display, and by a touch operation of the second touch input section of the touch panel, an operation signal regarding the image displayed on the display is generated.