**PORTABLE GRAPHIC DISPLAY HAVING INTEGRAL DISPLAY MOVEMENT TRACKING**

An apparatus comprises a display device (10) for displaying information and a movement tracking device (21, 22) for aligning the information on the display means (15) in response to the movement of the display means.
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PORTABLE GRAPHIC DISPLAY HAVING INTEGRAL DISPLAY MOVEMENT TRACKING

Field of the Invention

This invention relates in general to display devices, and more specifically to a portable display device wherein a portion of displayable information may be selected and aligned on the display in response to movement of the display device.

Background of the Invention

Displays which are capable of forming images of characters or patterns conventionally may be broadly broken down into two different categories, active, such as light emitting diode (LED) displays, and passive, such as liquid crystal displays (LCD). Since active displays are typically characterized by high power consumption, the choice for low power applications, such as portable calculators, watches, portable radios, and pocket pagers, is typically the passive display.

However, both of these conventional displays occupy a substantial amount of area on the housing of the electronic device in which the displayed information is processed. As technology progresses, the trend has been to reduce the size of such electronic devices. This reduction is severely limited by the size requirements of the visual display, e.g., the ability to display a telephone number or a series of words. Furthermore, there is also a recognized desire in the industry to be able to display larger (longer) messages or even graphic information on a portable display. It is obvious that graphic information displayed on a small portable display such as a watch sized display would make it difficult to interpret the details of the information.

Thus, what is needed is a portable display device wherein the displayable information may be readily seen and understood by the user.

Summary of the Invention

Accordingly, it is an object of the present invention to provide an improved portable display device.
In carrying out the above and other objects of the invention in one form, there is provided an apparatus comprising a display device for displaying information and a movement tracking device for aligning the information on the display means in response to the movement of the display means.

Brief Description of the Drawing

FIGURE 1 is a block diagram of a selective call receiver in accordance with the present invention.

FIGURE 2 is a perspective view of a selective call receiver having two movement tracking devices in accordance with the present invention.

FIGURE 3 is an example of a graphic message.

FIGURE 4 is a top plan view of the selective call receiver displaying the graphic message.

FIGURE 5 is a top plan view of the selective call receiver displaying a portion of the graphic message.

FIGURE 6 is a top plan view of the selective call receiver displaying a smaller portion of the graphic message.

FIGURES 7 (a), (b), and (c) are top plan views of the selective call receiver displaying different portions of the graphic message.

Detailed Description of the Invention

Referring to FIGURE 1, a selective call radio receiver 10, e.g., a pager, comprises an antenna 11 that provides an RF carrier signal that is demodulated by the receiver module 12 to provide a signal suitable for processing by the decoder 13 in a manner well known to one skilled in the art. The decoder 13 processes the recovered signal to decode the address and message data contained therein. For selective call receivers with message storage, the recovered message or voice output is stored in the memory 14 for subsequent "playback" by the display 15. In operation, the microcomputer 16 compares information contained in the recovered signal with predetermined addresses contained in the memory 14, and when substantially similar, alerts the user that a signal has been received by alert mechanism 17. The display 15 will automatically, or when
manually selected by the controls 18, present the message. Although a
selective call receiver is shown, the invention described herein would
work equally well with any type of device having a visual display.

For a more detailed description of the structure and operation of a
selective call radio paging receiver of the type shown in FIG. 1, reference
is made to U. S. Patent Number 4,644,352, the teachings of which are
hereby incorporated by reference. Means for moving graphic
information having an area greater than the area of a display are known
in computer art. A typical example of such a means is incorporated into
a MacPaint software package manufactured by Claris Inc. operating on a
Macintosh computer manufactured by Apple Inc.

In accordance with the present invention, a display movement
tracking device 19 is coupled between the microprocessor 16 and the
display 15 for aligning the information (moving the message) on the
screen in a manner described more thoroughly hereinafter.

Referring to FIGURE 2, the selective call receiver 10 includes a
housing 20, a first movement tracking device 21, conventionally referred
to as a mouse, and an optional second movement tracking device 22.
The movement tracking devices 21 and 22 are illustrated as knobs on the
side of the selective call receiver 10; however, they may assume other
forms such as a ball located on the bottom of the selective call receiver 10
in a manner similar to a "mouse" movement tracking means used
commonly on modern desk top computers. The knobs 21 and 22 extend
below the bottom of the selective call receiver 10 and would move in
response to the selective call receiver 10 moving across a surface. Balls
located on the bottom of the selective call receiver 10 would move in the
same manner. The movement tracking devices 21 and 22 may also be
placed so that direct input (e.g., twirling by the fingers) from the user of
the selective call receiver 10 would provide a similar response response.

Referring to FIGURE 3, an example of a graphic message that may be
sent to and displayed by the selective call receiver 10 is shown. The
message may alternatively be numeric, alphanumeric, or other form, or
any combination thereof.

Referring to FIGURE 4, the message is shown displayed on the
selective call receiver 10. The display 15 includes a selection, or zoom,
window 23 identifying a portion of the message. Upon activation of a
"zoom in" button 24 (one of the controls 18), the portion of the message
in the selection window 23 occupies the entire display 15 as shown in FIGURE 5. Activation of the "zoom in" button 24 a second time would present the portion of the message enclosed within the selection window 23 of FIGURE 5 on the entire display as shown in FIGURE 6. This magnification of the message allows the user to view the smaller details that may be difficult to distinguish without the zoom feature. Activation of a "zoom out" button 25 returns the message to the next largest size (FIGURE 5). Additional controls 18 may include other buttons 26 for functions such as on/off and read.

Referring to FIGURES 7 (a), (b), and (c), different portions of the message are shown. This is accomplished by moving the movement tracking device 21 as discussed above (e.g., twirling by the finger or moving across a surface). The movement tracking device 21 would provide alignment of the message in the x coordinate and the movement tracking device 22 would provide alignment of the message in the y coordinate. Alternatively, the x-y movement could be provided by a single ball 21 on the selective call receiver 10. A second ball 22 may selectively provide a rotational movement of the message. This rotational movement may be selected by activation of one of the controls 18. For convenience of use, the movement tracking devices 21 and 22 may be located, either together or separately, on the front, back, or any side of the selective call receiver 10.

In summary, a portable display device is shown wherein a portion of displayable information may be selected and aligned on the display in response to movement of the display device.
CLAIMS

1. An apparatus comprising:
   display means for displaying information; and
   movement tracking means for aligning the information on the
   display means in response to the movement of the display means.

2. The apparatus according to claim 1 wherein the movement
   tracking means comprises coordinate tracking means for moving the
   information in a planar fashion.

3. The apparatus according to claim 2 wherein the movement
   tracking means further comprises rotational tracking means for rotating
   the information.

4. The apparatus according to claim 1 wherein the movement
   tracking means further comprises zoom means for magnifyingly
   displaying a portion of the information.

5. The apparatus according to claim 1 wherein the movement
   tracking means further comprises zoom means for displaying a portion
   of the information, the size of the portion of the information displayed
   being selected by the zoom means.

6. A method comprising the step of aligning information on a
   display by moving the display.

7. The method according to claim 6 wherein the aligning step
   comprises rotating the information.

8. The method according to claim 6 further comprising
   magnifyingly displaying a portion of the information.
9. A receiver comprising:
receiver means for receiving and displaying an electronic
message; and
movement tracking means for aligning the message on the
display means in response to the movement of the receiver means.

10. The receiver according to claim 9 wherein the receiver means
comprises a selective call receiver.

11. The receiver according to claim 9 wherein the movement
tracking means comprises a mouse coupled to the receiver means, the
mouse moving as the receiver means is moved.

12. The receiver according to claim 9 wherein the movement
tracking means further comprises zoom means for magnifyingly
displaying a portion of the information.

13. The apparatus according to claim 9 wherein the movement
tracking means further comprises zoom means for displaying a portion
of the information, the size of the portion of the information displayed
being selected by the zoom means.

14. The apparatus according to claim 9 wherein the movement
tracking means comprises coordinate tracking means for moving the
information in a planar fashion.

15. The apparatus according to claim 14 wherein the movement
tracking means further comprises rotational tracking means for rotating
the information.
### I. CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC) or to both National Classification and IPC

**U.S. Cl.** 340/825.440

### II. FIELDS SEARCHED

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Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched:

### III. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>Y</td>
<td>US, A, IBM Technical Disclosure, &quot;Mouse/Keyboard Concept incorporating devices for controlling CRT display cursors, Vol. 27, No. 10B, March 1985</td>
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<td>US, A, 4,661,810 (Himelstein et al.), 28 April 1987. See Fig. 1</td>
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* Special categories of cited documents:
  - "A" document defining the general state of the art which is not considered to be of particular relevance
  - "E" earlier document but published on or after the international filing date
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  - "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step
  - "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
  - "Z" document member of the same patent family

### IV. CERTIFICATION

- **Date of the Actual Completion of the International Search:** 12 March 1991
- **Date of Mailing of this International Search Report:** 19 APR 1991

**International Searching Authority:** ISA/US