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KEYPAD ARRANGEMENT FOR AN ELECTRONIC DEVICE

Field of the Invention

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The present invention relates generally to watch radiotelephones, and more particularly to a keypad arrangement for a watch radiotelephone.

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Background of the Invention

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Recent progress in microelectronics has promoted the miniaturization of portable radiotelephone components such as transmitters and receivers. This miniaturization has permitted the integration of these components into wrist carried portable radiotelephones.

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Telephone number entry is fundamental function needed for a portable radiotelephone. Typically, telephone numbers are manually entered into the portable radiotelephone by actuating keys of a keypad. The keys of a portable radiotelephone generally include: 1, 2, 3, 4, 5, 6, 7, 8, 9, *, 0 and #. The keys are traditionally arranged in a twelve key matrix pattern represented by three columns by four rows. Because the twelve key matrix pattern is a standard in the telephone industry, users

have become familiar with the location of each of the individual keys in the twelve key matrix pattern. On a hand held portable radiotelephone there is usually enough space to place the twelve key matrix using adequately sized keys. However, on a wrist carried
5 portable radiotelephone, there is very little space to place the twelve key matrix using twelve adequately sized keys. Presently, the twelve key matrix is shrunk to a very small size to fit on a face surface of a wrist carried portable radiotelephone. However, the lettering on such small keys are difficult to read and the small keys are difficult to actuate
10 with fingers. Further, the small twelve key matrix has a calculator type appearance which is sometimes not considered aesthetically pleasing or fashionable.

Alternatively, telephone numbers are also entered using voice recognition. However, there are situations where voice recognition is
15 not effective. For example voice recognition is not effective in noisy environments or when a person's voice is not easily recognized by the voice recognition program. Therefore, although voice recognition may be available, a need remains for some type of manual telephone number entry.

20 Accordingly, there is a need for a keypad arrangement suitable for a watch radiotelephone which provides for manual telephone number entry, is familiar to a user, is easy to actuate using fingers and is aesthetically pleasing.

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Brief Description of the Drawings

FIG. 1 illustrates a perspective view of a watch radiotelephone.

FIG. 2 illustrates a block diagram of the watch radiotelephone.

Detailed Description of the Preferred Embodiments

FIG. 1 illustrates a perspective view of a watch radiotelephone 10. A watch is a portable timepiece. A radiotelephone is a device which communicates information using electromagnetic waves in the radio frequency range. Therefore, the watch radiotelephone 10 combines the functions of a portable timepiece and a radiotelephone into a single unit.

The watch radiotelephone 10 is preferably carried on a user's wrist. Alternatively, the watch radiotelephone 10 may be carried in a pocket like a pocket watch, hung by a cord as a pendant or attached to an article using a clip.

The watch radiotelephone 10 comprises a watch face 12 and a keypad 14. The watch face 12 includes a plurality of areas 16 - 27 located around a perimeter 30 of the watch face 12 corresponding to locations of a plurality of indicia 32 - 43 representing a time a day in an analog format. The keypad 14 includes a plurality of keys 46 - 57. Individual keys 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57 of the plurality of keys 46 - 57 are positioned to correspond with individual areas 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27 of the plurality of areas 16 - 27. A user of the watch radiotelephone 10 is permitted actuate a predetermined number of the plurality of keys 46 - 57 of the keypad 14 in a predetermined sequence to enter a telephone number in accordance with a user's familiarity of the plurality of areas 16 - 28 located around the perimeter 30 of the watch face 12.

Therefore, the keypad 14 provides a suitable arrangement for the watch radiotelephone 10. The keypad 14 provides for manual telephone number entry. To manually enter a telephone number into

the watch radiotelephone 10, a user individually actuates a predetermined number of the plurality of keys 46 - 57 of the keypad 14 in a predetermined sequence.

The location of the keys are familiar to a user, since the
5 individual keys 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57 of the keypad 14 are positioned to correspond with individual areas 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27 of the plurality of areas 16 - 27 of the analog format for indicating the time of day. Users of the watch radiotelephone 10 typically already know how to tell the time of day by looking at a watch
10 or a clock displaying the time of day in an analog format using an hour hand and a minute hand. Therefore, users of the watch radiotelephone 10 are already familiar with the twelve areas on the watch face 12 indicating the twelve hours of the day. By positioning the twelve individual keys 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57 of
15 the keypad 14 at locations corresponding to the twelve individual areas 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27 of the analog format, a user can easily navigate around the keypad 14 without relearning key locations a new keypad arrangement. Thus, the present invention advantageously translates a user's knowledge and familiarity of the
20 analog format for presenting the time of day to a familiar keypad arrangement for entering a telephone number in the watch phone 10.

The plurality of keys 46 - 57 are easy to actuate using fingers, because the individual keys 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57 of the keypad 14 are located around the perimeter 30 of the watch face 12.
25 Any individual key of the plurality of keys 46 - 57 is bordered by only two opposing adjacent keys. Whereas, an individual key of a conventional twelve key matrix arrangement may be bordered by three, five or eight keys. Thus, the arrangement of the plurality of keys

46 - 57 of the keypad 14 have less chance of falsing adjacent keys in the present invention.

The arrangement of the plurality of keys 46 - 57 is aesthetically pleasing and fashionable because the plurality of keys 46 - 57 of the keypad 14 are located around the perimeter 30 of the watch face 12 and are positioned to correspond with individual areas 16 - 27 of the plurality of areas 16 - 27 of the analog format for indicating the time of day. With a conventional watch or clock a person expects some sort of indicia to be located at the perimeter of a watch or clock to present the time of day in the analog format. Therefore, by positioning the plurality of keys 46 - 57 near the plurality of areas 16 - 27, the plurality of keys 46 - 57 effectively blend into the analog format of the watch face in an unassuming and natural way. The plurality of keys 16 - 27, although functional, can be designed with a distinctive shape, color, texture and material to provide attractive ornamentation for the watch phone 10. The watch face 12 is preferably round, but may be any other shape such as oval, rectangular, square, triangular, or the like.

The plurality of areas 16 - 27 preferably number twelve areas. The twelve areas 16 - 27 represent the twelve hours of the day of the analog format for presenting the time of day. The plurality of keys 46 - 57 preferably number twelve keys to correspond to the twelve hours of the day of the analog format for presenting the time of day.

Alternatively, if the watch phone 10 is large enough, the number of the plurality of areas 16 - 27 and the plurality of keys 46 - 57 can be increased, such as by placing additional keys between individual ones of the plurality of keys 46 - 57.

The plurality of indicia 32 -43 are preferably located on the watch face 12. Alternatively, the plurality of indicia 32 -43 may be located on

the plurality of keys 46 - 58 themselves instead of being located on the watch face 12 or in addition to being located on the watch face 12.

Locating the plurality of indicia 32 - 43 in only one of the two locations reduces clutter on the watch radiotelephone 10 without sacrificing

5 functionality.

The plurality of indicia 32 - 43 are preferably represented as Arabic numerals. Alternatively, the plurality of indicia 32 - 43 may be represented as Roman numerals or any other marking, as is well known in the art. The plurality of indicia 32 - 43 may even be the
10 plurality of keys 46 - 58 themselves, since they provide twelve identifying marks around the perimeter 30 of the watch face 12.

The plurality of indicia 32 - 44 are preferably located on the watch face 12. The individual keys 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57 of the plurality of keys 46 - 57 are preferably positioned adjacent to
15 corresponding individual indicia 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43 of the plurality of indicia 32 - 43. With this arrangement, a user can see the individual indicia corresponding to the individual key being actuated while the individual key is being actuated.

The watch radiotelephone 10 further comprises a bezel 60
20 disposed outside of and around the perimeter 30 of the watch face 12. The plurality of keys 46 - 58 are preferably disposed on the bezel 60. The bezel 60 is preferably part of a top housing of the watch radiotelephone 10. Alternatively, the bezel 60 may be a removable ornamental feature or a functional feature which permits a user to change the appearance
25 of the watch radiotelephone 10 by exchanging the bezel 60 and the plurality of keys 46 - 57.

The plurality of indicia 32 - 43 are located on the watch face 12. The individual keys 46', 47', 48', 49', 50', 51', 52', 53', 54', 55', 56', 57' of

the plurality of keys 46' - 57' are alternatively positioned above corresponding individual indicia 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43 of the twelve indicia 32 - 43. The watch radiotelephone 10 further comprises a lens 62 and a touch screen keypad 64. The lens 62 covers
5 the watch face 12. The touch screen keypad 64, forming the individual keys 46', 47', 48', 49', 50', 51', 52', 53', 54', 55', 56', 57' of the plurality of keys 46' - 57', is disposed on the lens 62. The alternative location of the plurality of keys 46' - 57' using a touch screen keypad 64 is shown in FIG. 1 by the light shading on the lens 62 above each of the twelve
10 indicia 32 - 43.

The watch face 12 further comprises an hour hand 66 and a minute hand 68. A first end 70 of the hour hand 66 and a first end 72 of the minute hand 68 are disposed at a center 74 of the watch face 12. A second end 76 of the hour hand 66 and a second end 78 of the minute
15 hand 68 radially extend from the center 74 of the watch face 12. The second end 76 of the hour hand 66 and the second end 78 of the minute hand 68 move in a clockwise circular pattern relative to the center 74 of the watch face 12 in accordance with time passing. A position of the second end 76 of the hour hand 66 relative to the plurality of indicia 32
20 - 43 and a position of the second end 78 of the minute hand 68 relative to the plurality of indicia 32 - 43 provide an indication of the time of day in the analog format. Thus, the watch radiotelephone 10 provides a user with the time of day in an analog format in combination with providing radiotelephone functions.

25 Preferably, at least one of the second end 76 of the hour hand 66 and the second end 78 of the minute hand 68 temporarily points to one key 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57 of the plurality of keys 46 - 57 when actuated to provide confirmation to the user which one key 46,

47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57 of the plurality of keys 46 - 57 was actuated. This is implemented by having the timekeeping circuit or mechanism respond to key signals generated by the keypad 14 and sent to the controller 96 (see FIG. 2) when the plurality of keys 46 - 57 are
5 actuated. In operation, the minute hand, for example, points to the key actuated until the next key is actuated. After a predetermined time delay without a key actuation, the minute hand returns to its timekeeping position. This feature provides a user with valuable feedback as to which key is being depressed when the key is depressed
10 so that a mistaken telephone number is not entered. With this feature, an auxiliary digital display is not necessary to provide such feedback.

Further, preferably at least one of the second end 76 of the hour hand 66 and the second end 78 of the minute hand 68 temporarily points to each one of the predetermined number of the plurality of
15 keys 46 - 57 of the keypad in the predetermined sequence representing the telephone number to provide confirmation to the user of the telephone number entered. In operation, the minute hand, for example, points to each of the keys actuated for approximately one second to give the user time to recognize or record the telephone
20 number entered. This feature is activated by a user via control or function keys on the keypad 14 or using other auxiliary keys. The minute hand, for example, preferably moves in either a clockwise or a counterclockwise direction to point to the next key. In a similar manner as described hereinabove, this feature provides a user with
25 feedback of the entire telephone number entered after all the keys were depressed. With this feature, an auxiliary digital display is also not necessary to provide such feedback.

Alternatively, the watch face 12 indicates the time of day in a digital format. This is accomplished using an auxiliary digital display 102 (see FIG. 2) located on the watch face. Note the significance of this alternative. The watch radiotelephone 10 does not necessarily have to
5 provide the time of day in the analog format. An advantage of the present invention is provided by placing the plurality of keys 46 - 57 at locations of the analog format which a user is already familiar with. Therefore, although there may be twelve keys disposed at the perimeter 30 of the watch face 12 corresponding to the twelve hours in
10 the day according to the analog format for providing time, the watch phone 10 does not need to actually provide the time of day in the analog format. The analog format is advantageously used, in this case, to provide a user with a familiar keypad arrangement which is easy to use and aesthetically pleasing to look at. The auxiliary digital display
15 102 provides the time of day in the digital format. Alternatively, both the analog format and the digital format may be provided together on the watch radiotelephone 10, if so desired.

Particularly, the plurality of indicia 32 -43 further comprise: a first indicia 32 representative of a first hour of the day; a second indicia
20 33 representative of a second hour of the day; a third indicia 34 representative of a third hour of the day; a fourth indicia 35 representative of a fourth hour of the day; a fifth indicia 36 representative of a fifth hour of the day; a sixth indicia 37 representative of a sixth hour of the day; a seventh indicia 38
25 representative of a seventh hour of the day; an eighth indicia 39 representative of an eighth hour of the day; a ninth indicia 40 representative of a ninth hour of the day; a tenth indicia 41 representative of a tenth hour of the day; an eleventh indicia 42

representative of an eleventh hour of the day; and a twelfth indicia 43 representative of a twelfth hour of the day.

Particularly, the plurality of keys 46 - 57 further comprise: a first key 46 representative of telephone key number one; a second key 47
5 representative of telephone key number two; a third key 48 representative of telephone key number three; a fourth key 49 representative of telephone key number four; a fifth key 50 representative of telephone key number five; a sixth key 51 representative of telephone key number six; a seventh key 52
10 representative of telephone key number seven; a eighth key 53 representative of telephone key number eight; a ninth key 54 representative of telephone key number nine; a tenth key 55 representative of telephone key number zero; an eleventh key 56 representative of a first telephone key function; and a twelfth key 57
15 representative of a second telephone key function.

Preferably, the first key 46, the second key 47, the third key 48, the fourth key 49, the fifth key 50, the sixth key 51, the seventh key 52, the eighth key 53, the ninth key 54, the tenth key 55, the eleventh key 56 and the twelfth key 57 are positioned to correspond to the first indicia
20 32, the second indicia 33, the third indicia 34, the fourth indicia 35, the fifth indicia 36, the sixth indicia 37, the seventh indicia 38, the eighth indicia 39, the ninth indicia 40, the tenth indicia 41, the eleventh indicia 42, and the twelfth indicia 43, respectively.

The first telephone key function, representing the eleventh key
25 56, is a SEND function of a cellular radiotelephone. The second telephone key function, representing the twelfth key 57, is an END function of the cellular radiotelephone. The SEND function and the END function may also be reversed on the keys, if so desired.

Alternatively, the first telephone key function, representing the eleventh key 56, is a star (*) function of a conventional telephone. The second telephone key function, representing the twelfth key 57, is a pound (#) function of a conventional telephone. The star (*) and the pound (#) may also be reversed on the keys, if so desired. Further, any other function may be assigned to the eleventh key 56 and the twelfth key 57.

FIG. 2 illustrates a block diagram of the watch radiotelephone 10. A radiotelephone portion 90 of the watch radiotelephone 10 is preferably a cellular radiotelephone, but may also be a cordless radiotelephone or a personal communication service (PCS) radiotelephone. The radiotelephone portion 90 may be constructed in accordance with an analog communication standard or digital communication standard. The radiotelephone portion 90 generally includes a radio frequency (RF) transmitter 92, a RF receiver 94, a controller 96, an antenna 98, a battery 100, a duplex filter 112, a frequency synthesizer 104, and a user interface 106 including a keypad 14, control switches 110, a digital display 112, an earpiece 114 and a microphone 116. The radiotelephone portion 90 may also include a paging receiver 119. The watch portion 116 of the watch radiotelephone 10 includes a timekeeping circuit 118 or a timekeeping mechanical mechanism.

In operation, the controller 96 receives signals from the keypad 108 indicative of a telephone number entered by the user. The controller 96 sends signals to the transmitter 92 for transmitting the telephone number.

What is claimed is:

Claims



1. An electronic device (10) comprising:
a watch face (12) including a plurality of areas (16-27) located
5 around a perimeter (30) of the watch face (12) corresponding to expected
locations of a plurality of indicia (32-43) representing a time of day in
an analog format; and
a plurality of keys (46-57) , wherein individual keys of the
plurality of keys (46-57) are positioned to correspond with individual
10 areas of the plurality of areas (16-27),
whereby a user of the electronic device is permitted to actuate a
predetermined number of the plurality of keys (46-57) in accordance
with a user's familiarity with the plurality of areas (16-27) located
around the perimeter (30) of the watch face (12).
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2. An electronic device (10) according to claim 1:
wherein the plurality of areas (16-27) number twelve areas, and
wherein the plurality of keys (46-57) number twelve keys.
- 20 3. An electronic device (10) according to claim 1 wherein the
plurality of indicia (32-43) are located on at least one of the watch face
(12) and the plurality of keys (46-57).
4. An electronic device (10) according to claim 1:
25 wherein the plurality of indicia (32-43) are located on the watch
face (12), and wherein the individual keys of the plurality of keys (46-
57) are positioned adjacent to corresponding individual indicia (32-43)
of the plurality of indicia (32-43).

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5. An electronic device (10) according to claim 4 further comprising:
a bezel (60) disposed outside of and around the perimeter (30) of the watch face (12),
wherein the plurality of keys (46-57) are disposed on the bezel (60).
6. An electronic device (10) according to claim 1:
wherein the plurality of indicia (32-43) are located on the watch face (12), and wherein the individual keys of the plurality of keys (46-57) are positioned above corresponding individual indicia (32-43) of the plurality of indicia (32-43).
7. An electronic device (10) according to claim 6 further comprising:
a lens (62) covering the watch face (12); and
a touch screen keypad (64), forming the individual keys of the plurality of keys (46-57), disposed on the lens (62).
8. An electronic device (10) according to claim 1 wherein the watch face (12) further comprises:
an hour hand (66) and a minute hand (68), wherein a first end (70) of the hour hand (66) and a first end (72) of the minute hand (68) are disposed at a center (74) of the watch face (12), wherein a second end (76) of the hour hand (66) and a second end (78) of the minute hand (68) radially extend from the center (74) of the watch face (12), wherein the second end (76) of the hour hand (66) and the second end (78) of the





minute hand (68) move in a clockwise circular pattern relative to the center (74) of the watch face (12) in accordance with time passing, and wherein a position of the second end (76) of the hour hand (66) relative to the plurality of indicia (32-43) and a position of the second end (78) of the minute hand (68) relative to the plurality of indicia (32-43) provide an indication of the time of day in the analog format.

9. An electronic device (10) according to claim 8 wherein at least one of the second end (76) of the hour hand (66) and the second end (78) of the minute hand (68) temporarily points to one key of the plurality of keys (46-57) when actuated to provide confirmation to the user that the one key of the plurality of keys (46-57) was actuated.

10. An electronic device (10) according to claim 8 wherein at least one of the second end (76) of the hour hand (66) and the second end (78) of the minute hand (68) temporarily points to each one of the predetermined number of the plurality of keys (46-57) after all of the predetermined number of the plurality of keys (46-57) were actuated to provide confirmation to the user that the predetermined number of the plurality of keys (46-57) were actuated.

11. An electronic device (10) according to claim 1 wherein the watch face (12) indicates the time of day in a digital format.

12. An electronic device (10) according to claim 1 wherein the plurality of indicia (32-43) further comprise:
a first indicia (32) representative of a first hour of the day;
a second indicia (33) representative of a second hour of the day;





a third indicia (34) representative of a third hour of the day;
a fourth indicia (35) representative of a fourth hour of the day;
a fifth indicia (36) representative of a fifth hour of the day;
a sixth indicia (37) representative of a sixth hour of the day;
5 a seventh indicia (38) representative of a seventh hour of the
day;
an eighth indicia (39) representative of an eighth hour of the
day;
a ninth indicia (40) representative of a ninth hour of the day;
10 a tenth indicia (41) representative of a tenth hour of the day;
an eleventh indicia (42) representative of an eleventh hour of
the day; and
a twelfth indicia (43) representative of a twelfth hour of the day.

- 15 13. An electronic device (10) according to claim 1:
wherein the plurality of keys (46-57) further comprise:
a first key (46) representative of key number one;
a second key (47) representative of key number two;
a third key (48) representative of key number three;
20 a fourth key (49) representative of key number four;
a fifth key (50) representative of key number five;
a sixth key (51) representative of key number six;
a seventh key (52) representative of key number seven;
a eighth key (53) representative of key number eight;
25 a ninth key (54) representative of key number nine;
a tenth key (55) representative of key number zero;
an eleventh key (56) representative of a first key function; and
a twelfth key (57) representative of a second key function;





wherein the predetermined number of the plurality of keys (46-57) actuated in a predetermined sequence are representative of a telephone number; and

wherein the electronic device (10) further comprises:

5 a radio frequency transmitter (92) for transmitting a radio frequency signal, representative of the telephone number, responsive to receiving key signals from the predetermined number of the plurality of keys 46-57 when the predetermined number of the plurality of keys 46-57 are actuated.

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14. An electronic device (10) according to claim 13:

 wherein the first key function, representing the eleventh key (56), is a SEND function of a radiotelephone; and

 wherein the second key function, representing the twelfth key
15 (57), is an END function of the radiotelephone.

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