

PORTABLE DEVICE, IN PARTICULAR A WATCH, INCLUDING
AN ANTENNA ASSOCIATED WITH A REMOVABLE ELECTRONIC
MODULE AND SUCH AN ELECTRONIC MODULE

The present invention concerns a portable device, in particular a timepiece, including a case within which is arranged an antenna, this antenna being intended to be coupled to an electronic module to form together a receiver and/or transmitter or a transponder. The present invention also concerns an electronic module including an electronic unit within which are stored certain data, and which is intended to be fitted to a portable device according to the invention.

10 Receivers and/or transmitters or transponders are conventionally used in various portable devices, for example for identification procedures for entry doors to closed premises. There exist numerous watches provided with an antenna for picking up electromagnetic signals and
15 means for storing data which may be of confidential nature.

By way of example, in relation to Figure 1, Swiss Patent Application No. 686 696 discloses a watch 1 including a case 2 formed of a middle part 3 and a bezel 5
20 together forming an inner housing 4. Watch 1 further includes means for picking up and/or transmitting radio signals formed by an antenna coil 6, mounted on an annular support 7 and arranged in inner housing 4, and by a communication interface including demodulating and/or
25 modulating means. The antenna is connected to an electronic module 9 permanently arranged in case 2 by electric contact means 10.

One problem encountered in watches such as that disclosed in the aforementioned Patent Document lies in
30 the fact that electronic module 9 is permanently arranged in the watch, which may be particularly inconvenient if the electronic unit of this module stores data or

information of a confidential nature, for example door opening codes or bank-related information. Portable devices are generally only temporarily carried about the person and people often have a plurality of portable
5 devices for the same function, in particular a plurality of watches. Moreover, certain portable devices have a limited lifespan and/or are no longer used after a certain period of time. Thus, there is a risk that personal data, which may be of a confidential nature, is entered in
10 various portable devices and remains therein even when they are not used or no longer used. It will also be noted that certain data or information may change over time, in particular bank-related information, and that it may be preferable for such data always to be updated at each new
15 transaction. Consequently, the use of several portable devices each having its own electronic data storage and/or control unit is not to be recommended.

An object of the present invention is to overcome the aforementioned problems and drawbacks while keeping the
20 possibility of having personal use of a plurality of portable devices having an electromagnetic signal receiver and/or transmitter function.

The present invention thus concerns a portable device including a case within which is arranged an antenna,
25 characterised in that said case includes a housing within which an electronic module may be arranged in a removable manner, said electronic module including at least two electric contact zones, the antenna having two ends or electric terminals respectively connected to two electric
30 contact means arranged at least partially at the periphery of said housing so as to assure an electric connection respectively to said two electric contact zones of said module when the latter is introduced into the housing and held therein by closing means, the electrically connected
35 antenna and electronic module together forming an electronic signal receiver and/or transmitter.

As a result of the aforementioned features of the invention, it is possible to detach the electronic module

from the portable device including an antenna. An antenna, acting as communication means with one or more external units fitted with electromagnetic communication means, is provided in each portable device according to the invention. Conversely, the electronic unit used for data or information management, in particular for storage of such data or information in a memory portion of the electronic unit forming said electronic module, may be separated from a particular portable device. Thus, the electronic module and the data contained therein are not associated in an inseparable manner with a particular portable device. Moreover, when the electronic module and the housing for which it is intended are made in accordance with a given standard, it is possible to integrate a particular electronic module in several different portable devices, in particular watches, cards or other portable objects, such as keyrings or jewellery. It will be noted that it is also possible to integrate such an electronic module in a removable manner in a computer or any medium also allowing the data contained in the module to be processed and/or simply read.

It is thus clear from the features of the present invention that the electronic module may be associated with an individual or even a legal entity and remain in the possession of such person while being integrated over time in several portable devices belonging to such person as such portable devices are temporarily used. Thus, for example, a person may possess several watches, while having a single personal electronic module integrated in turn in such watches when they are respectively worn in turn by said person.

Other particular features and advantages of the present invention will be described in more detail with reference to the following description, made with reference to the annexed drawings, given by way of non-limiting examples, in which:

- Figure 1 already cited shows schematically a cross-section of a watch able to pick up radio messages;

- Figure 2 shows schematically a watch and an electronic module illustrating the general concept of the present invention;

5 - Figure 3 is a schematic bottom view of a watch according to a first embodiment of the invention;

- Figure 4 is a schematic cross-section along the line IV-IV of Figure 3;

- Figure 5 is a partial schematic cross-section of a first alternative of the first embodiment;

10 - Figure 6 is a partial schematic cross-section of a second alternative of the first embodiment;

- Figure 7 is a schematic perspective view of a third alternative of the first embodiment, only the electronic module and the cover associated therewith
15 having been shown here;

- Figure 8 is a schematic perspective view of a fourth alternative of the first embodiment;

- Figure 9 is a partial schematic cross-section of a second embodiment of the invention; and

20 - Figures 10 and 11 are respectively two electric diagrams of two alternative embodiments of an electronic module according to the invention arranged so as to be able to be associated with two different antenna as required.

25 With the development of electronic chips for managing personal data and transponders, personal data is entered into several different devices, which can be detrimental to the confidential nature and secure management of such personal data. In response to this situation, as has
30 already been mentioned hereinbefore, the present invention proposes, as shown generally in Figure 2, to arrange an electronic module 18, containing an electronic unit for storing and possibly managing data, in a removable manner in a housing 20 of a watch case 22. In the base of housing
35 20 are arranged two electric contact pads 24 and 25 against which electric contact pins 26 and 27 of electronic module 18 respectively abut when the latter is inserted in housing 20 and held therein by cover 28 which

is provided for this purpose. Thus, module 18 which contains an electronic unit for storing and possibly managing data may be arranged in the watch to allow access to the electronic unit of module 18 by means of a communication antenna provided within case 22 (not shown), this antenna being able to be arranged within case 22 in various ways known to the man skilled in the art.

It will be noted that the present invention is not limited to particular frequency ranges for the antenna integrated in the case nor is it limited to a particular application. Moreover, although the following description concerns timepieces in particular wristwatches, the present invention is not limited to such timepieces but may easily be applied to any other portable device in which an antenna is arranged and which allows reception and/or transmission of electromagnetic signals or which allows a transponder function to be assured.

With reference to Figures 3 and 4, a first embodiment of the invention will be described hereinafter. Watch 30 includes a case 32 within which is arranged an antenna 34 on a support 7 in a similar manner to the watch of the prior art shown in Figure 1. The two ends of antenna coil 34 are electrically connected to two respective electric contact pads 36A and 36B arranged on support 7. Watch 30 also includes a movement 38 arranged in a casing ring 40. Watch 30 also includes a dial 42 and a set of hands 44, and an LCD display 46. According to the invention, a housing 48 is provided in case 32 for an electronic module 50 intended to be electrically connected to antenna coil 34 and arranged in a removable manner. In order to do this, housing 48 is closed by a cover 52 which assures that electronic module is held in housing 48 and also that housing 48 is closed in a sealed manner by means of sealing disc 54. Module 50 is fitted with two electric contact pins 56 and 57 which are held against two corresponding electric contact pads 58 and 59 when module 50 is arranged in housing 48 and cover 52 is set in the position closing housing 48.

The two electric contact pads 58 and 59 are respectively connected to the two ends of antenna coil 34 by means of electric connections 60 and 61 which end respectively on two electric connection pads 62 and 63 which are respectively electrically connected to pads 36A and 36B by means of a metallisation 64 provided on the upper face of casing ring 40. In this embodiment, electric contact pads 58 and 59, and electric connection pads 62 and 63 are arranged in movement 38. However, in other alternative embodiments, these pads may be arranged on another support and electric connection to antenna coil 34 may be achieved by other means known to the man skilled in the art. In particular, it is possible for the two ends of antenna coil 34 to be directly connected to electric contact pads 58 and 59 arranged at the periphery of housing 48.

It will be noted that cover 52 may be actuated from the exterior of case 32 by any user. Thus it is possible for a user to remove cover 52 to extract electronic module 50 which is arranged in a removable manner in housing 48. When module 50 is electrically connected to antenna coil 34, they form together an electromagnetic receiver and/or transmitter.

Module 50 includes an electronic unit (not explicitly shown here) including at least one memory portion. This electronic unit may be more or less complex and include, in particular, a microprocessor. Any arrangement for electronic module 50 known to the man skilled in the art may be used within the scope of the present invention. Likewise, any arrangement of an antenna in a portable device known to the man skilled in the art, in particular in a watch, may be used without departing from the scope of the present invention.

With reference to Figures 5 to 8, various alternatives of the first embodiment described hereinbefore will be described hereinafter, these alternatives being in no way limiting. The references

already described previously are not described again in detail in the explanation of the various alternatives.

In the alternative shown in Figure 5, electronic module 68 includes a metal envelope defining two electric poles 69 and 70. These two electric poles are connected to an electronic unit 72 and are separated from each other by an electric insulator 71 of circular shape. At the periphery of housing 48 two electric contact strips 74 and 75 are arranged, these strips being respectively in electric contact with poles 69 and 70 of module 68 when the latter is inserted into housing 48 and held in the latter by means of cover 52. Cover 52 assures closure of housing 48 in a sealed manner via a bayonet system known to the man skilled in the art, complementary recesses to the lateral ends of the cover being arranged in case 32. The arrangement of metal strips 74 and 75 is similar to an arrangement provided, in particular, for a battery supplying power to an electronic watch movement.

In the alternative of Figure 6, electronic module 78 is similar to module 68 of Figure 5, but differs in that it forms a single piece with cover 80, used to close housing 48. Cover 80 includes a thread 81 and is screwed to case 32 sealing being assured by a sealing gasket 82. This alternative has an advantage and a drawback. The advantage stems from the fact that module 78 attached to cover 80 allows better gripping and thus better manipulation of module 78. Conversely, when module 78 is removed or extracted from housing 48, it is not possible to replace cover 80 to close the housing again. In such case, an additional cover, allowing the case to be closed in a sealed manner in the absence of an electronic module, may be provided, if it is deemed necessary to keep housing 48 closed.

The alternative partially shown in Figure 7, only cover 52 and electronic module 68 being shown, differs from the alternative shown in Figure 6 solely in that cover 52 has a bayonet closure and is electrically insulated from electric poles 69 and 70 of module 68. This

configuration may be advantageous since, in the Figure 6 alternative, electric pole 70 is connected to the ground given that it is electrically connected to case 32 or to the body of the wearer by means of cover 80 which forms, with electric pole 70, a single, same metal envelope, which may be limiting. This is why, in the of Figure 7 alternative, cover 52 is separated from module 68 by an electrically insulating intermediate zone 84.

Figure 8 shows an alternative embodiment wherein electronic module 50, similar to the module shown in Figure 4, is arranged not in the base of case 32, but in a housing 48 provided in a lateral part of the case. Thus, in order to be able to extract module 50 from housing 48, it is not necessary for a user to take the watch off his wrist. In this alternative, cover 88 is made of a plastic material or rubber having sufficient elasticity to be forced into the upper part of housing 48 so as to close the housing and hold electronic module 50 in a position of electric contact with the antenna (not shown) arranged in the watch, i.e. to hold electric contact pins 56 and 57 respectively against electric contact pads 58 and 59. A recess 90 is provided in case 32 at the periphery of housing 48 to allow a user to extract cover 88 using a finger, in particular, using a fingernail. The use of a cover made of a non-metallic material may constitute an advantage.

With reference to Figure 9, a second embodiment of the invention will be described, such embodiment being characterised in that electronic module 68 is inserted into a housing 94 arranged for containing a supply battery 96 and module 68. In the alternative shown in Figure 9, battery 96 is electrically connected to two electric contact strips 97 and 98 arranged in a conventional manner at the periphery of housing 94. Module 68 has a similar external appearance to that of battery 96 and defines, in particular, two electric poles 69 and 70. Electric pole 70 is electrically connected to an antenna (not shown) provided in the watch case of the embodiment described

here by means of an electric contact strip 100 arranged at the periphery of housing 94, more particularly in the vicinity of the lateral wall of such housing 94. Pole 70 of module 68 is electrically insulated from battery 96 by means of a disc 102 made of an electrically insulating material. Disc 102 is preferably fixed to module 68. However, this disc 102 may also be fixed onto battery 96 or form a separate element from battery 96 and module 68. Electric pole 69 is electrically connected to a contact pad 104 by means of metal cover 106 whose surface 106A is applied against pole 69 when the cover is closed.

This second embodiment thus has the advantage of requiring a single housing 94 and a single cover 106 for arranging a battery and module 68 in the portable device, in particular in an electronic watch according to the invention. The man skilled in the art will obviously be able to design other alternatives of this second embodiment without departing from the scope of the present invention. For example, it is possible to design electronic module 68 with two electric poles each partially occupying the lateral surface of this module 68. In this case, the two electric contacts provided for electric connection to the antenna provided in the portable device may be made by means of two electric contact strips similar to strip 100 and both arranged in the vicinity of the lateral surface of housing 94. Thus, the cover is not used as electric contact means, which may be advantageous according to the particular application.

It is possible to provide other shapes for the electronic module and the battery, in particular, a cylindrical or rectangular shape with the two electric poles at the two ends of the module or at one end only according to the alternative selected.

With reference to Figures 10 and 11, two alternatives of a third embodiment of the invention will be described in a schematic manner. As in the first and second embodiments, an electronic module 108 is arranged in a housing provided in a device including a communication

antenna. However, in this third embodiment, module 108 is arranged so that the latter can be coupled to two different antenna 110 and 112 arranged respectively in two different devices. In order to do this, in the Figure 10
5 alternative, the electronic module includes four electric contact terminals 114, 115, 116 and 117. When module 108 is arranged in a housing provided in a device including antenna 110, the two ends of antenna 110 are electrically connected to the two terminals 115 and 116. Conversely,
10 when electronic module 108 is arranged in another device including antenna 112, the two ends of the antenna are electrically connected to the two terminals 114 and 117. Thus, module 108 can be arranged with different antenna allowing different applications, in particular as regards
15 the communication distance or the frequency range in which the data is to be exchanged between the unit formed by module 108 and antenna 110 or 112 which is associated therewith and an external communication unit provided for this purpose.

20 As has already been mentioned, the present invention includes a major advantage in that it allows the electronic unit including, in particular, personal or confidential data, to be detached or separated from the portable device including the means for communication with
25 an external unit provided for such purpose. Moreover, another significant advantage of the invention is that it allows a single same electronic module to be arranged in several portable devices provided for this purpose. Thus, according to a third embodiment, it is possible to arrange
30 the same electronic module in portable devices having antenna operating in various frequency ranges and at various transmission powers or operating with different reception sensitivities.

Figure 11 shows an alternative wherein electronic
35 module 108 includes only three electric contact terminals 114, 115 and 116, pad 116 being connected to one end of antenna 110 or antenna 112 according to whether module 108

is arranged in a first device including antenna 110 or a second device including antenna 112.



CLAIMS

1. Portable device (30) including a case (32) within which is arranged an antenna (34), characterised in that said case includes a housing (48; 94) within which an electronic module (50; 68; 78; 108) may be arranged in a removable manner, said electronic module including at least two electric contact terminals or pads (56, 57; 69, 70; 114, 115, 116, 117), the antenna having two ends respectively connected to two electric contact means (58, 59; 74, 75; 100, 106A) arranged at least partially at the periphery of said housing so as to assure an electric connection respectively to said two electric contact terminals or pads of said electronic module when the latter is inserted into said housing and held therein by closing means (52; 80; 88; 106), said electrically connected antenna and electronic module together forming an electronic signal receiver and/or transmitter.

2. Portable device according to claim 1, characterised in that said closing means may be actuated from the exterior of said case.

3. Portable device according to claim 1 or 2, characterised in that said closing means (52; 106) are formed by a cover fitted with a bayonet closing device, complementary recesses to the cover being arranged in said case (32) to allow said housing (48; 94) to be closed.

4. Portable device according to claim 1 or 2, characterised in that said closing means are formed by a cover (80) having a lateral thread (81) to allow the housing (48) to be screwed closed.

5. Portable device according to one of the preceding claims, characterised in that said electronic module (68; 78) and said closing means (52; 80) together form a single same part.

6. Portable device according to any of the preceding claims, characterised in that it forms a watch (30).



7. Portable device according to claim 6, characterised in that said housing (48; 94) is arranged in the base of said case (32) of the watch (30).

8. Portable device according to claim 6, characterised in that said housing (48) is arranged in said case (32) in an area other than the base of said case.

9. Portable device according to one of the preceding claims, characterised in that said closing means (80; 106) are electrically connected to an electric pole (70; 69) defining one of said electric contact pads of said electronic module (78; 68), said closing means being formed at least partially by an electrically conductive material.

10. Portable device according to any of the preceding claims, characterised in that said housing (94) is arranged also to accommodate an electric supply battery (96) so that said battery and said electronic module (68) are arranged in a single same housing (94).

11. Portable device according to claim 10, characterised in that electric insulating means (102) are provided between the battery (96) and the electronic module (68).

12. Portable device according to any of the preceding claims, characterised in that said electronic module (108) includes at least three electric contact pins or pads (114, 115, 116, 117), said electronic module being arranged to be able to be associated with at least two different antenna (110, 112).

13. Electronic module (18, 50, 68, 78, 108) including at least two electric contact terminals or pads (56, 57; 69; 70; 114, 115, 116, 117) in which is arranged an electronic unit (72) including at least one memory portion, said electronic unit being intended to be electrically connected to two ends of an antenna arranged in a portable device (30) including a housing (48; 94) in which said module may be arranged in a removable manner, said portable device including two electric contact means



(58, 59; 74, 75; 100, 106A) arranged at least partially at the periphery of said housing so as to allow an electric contact respectively with said two electric contact terminals or pads of said electronic module when the latter is inserted into said housing and held therein by closing means (28; 52; 80 88; 106) able to be actuated from the exterior of said case, said electrically connected antenna and module together forming an electromagnetic signal receiver and/or transmitter.

10 14. Electronic module according to claim 13, characterised in that it includes at least three electric contact terminals or pads allowing the electronic module to be associated with first and second different antenna arranged respectively in two different portable devices,
15 at least one of said electric contact terminals or pads (115) being intended to be associated with said first antenna (110) and at least one other of said electric contact terminals or pads (114) being intended to be associated with said second antenna (112).