Description

The present invention relates to a portable radio communication apparatus and, more particularly, to a portable radio communication apparatus having a diversity reception function.

An example of portable radio communication apparatuses of the type described is disclosed in "No. 2455: Study on a Diversity Antenna for Portable Radio Unit" by Taga et al, National Convention (Record) of the Institute of Electronics and Communication Engineers of Japan, pp. 10-155, 1984. The communication apparatus shown and described in this paper includes two folded inverted F-type antennas which are built in a housing, so that diversity reception may be performed through those antennas. Although such a construction is suitable for portable apparatus design, it fails to achieve a required sufficient degree of antenna gain.

A portable radio communication apparatus capable of attaining a sufficient gain is disclosed in "PORTABLE RADIO", our Japanese unexamined laid-open patent application No. Shô 62-49729, namely 49729 of 1987 (with corresponding European patent application publication No. EP-A-0 214 806 published on 18 March 1987, after the priority date of the present application). As will be described in detail later, this apparatus is provided with a single sleeve or whip antenna and a single built-in antenna for effecting diversity reception. The sleeve or whip antenna is connected to a transmitter and a diversity receiver while the built-in antenna is connected to the diversity receiver. The sleeve or whip antenna may be tucked away in the housing to enhance portability. So long as the apparatus is used with the sleeve or whip antenna pulled out of the housing, sufficiently high reception and transmission gains are guaranteed due to the high antenna gain and diversity gain of the sleeve or whip antenna. However, once the sleeve or whip antenna is retracted into the housing, the transmitter becomes substantially inoperable to render bidirectional communication impracticable. A similar problem arises with a sleeve or whip antenna which is folded.

SUMMARY OF THE INVENTION

According to the invention in a first aspect there is provided a portable radio communication apparatus comprising transmitter means, diversity receiver means, transmission filter means connected to said transmitter means, first and second reception filter means connected to said diversity receiver means, first antenna means capable of being retracted into a housing of said apparatus, second antenna means mounted inside of or on the outer periphery of said housing, and switch means for connecting said second antenna means to a junction of said transmission filter means and first reception filter means and disconnecting said second antenna means from said second reception filter means, in a first condition in which said first antenna means is retracted in said housing, and for connecting said first antenna means to said junction and for connecting said second antenna means to said second reception filter means, in a second condition in which said first antenna means is pulled out of said housing, said switch means being switched from said second condition to said first condition by the retraction of said first antenna means.

According to the invention in a second aspect there is provided a method of switching a first antenna of a portable radio communication apparatus, which includes a transmitter and a diversity receiver, capable of assuming a first condition wherein said first antenna does not protrude from a housing of said apparatus and a second condition wherein said first antenna protrudes from said housing, and a second antenna supported by said housing in such a manner as not to protrude from said housing, said method comprising the steps of, in the first condition, connecting said second antenna to said transmitter and diversity receiver while disconnecting said first antenna from said transmitter and said diversity receiver; in the second condition, connecting said first antenna to said transmitter and diversity receiver while connecting said second antenna to said diversity receiver; and switching said transmitter and receiver from said first condition to said second condition by the motion of said first antenna.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be described in more detail by way of example in the following description with reference to the accompanying drawings in which:

Fig. 1 is a schematic block diagram showing a prior art portable radio communication apparatus having a diversity reception function for facilitating an understanding of the present invention;

Figs. 2A and 2B are schematic block diagrams of a portable radio communication apparatus having a diversity reception function embodying the present invention, in two different conditions;

Figs. 3A and 3B are schematic block diagrams of an essential part of a portable radio communication apparatus according to another embodiment of the present invention; and

Fig. 4 is a schematic view of a specific construction of a switch driving mechanism which is included in the apparatus as shown in Figs. 2A and 2B or 3A and 3B; and

Figs. 5 to 7 are schematic views showing specific structures for receiving and folding a sleeve and a whip antenna.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

To better understand the present invention, a brief reference will be made to a prior art radio communication apparatus, shown in Fig. 1. As shown, the apparatus includes an antenna 14 which is connected to a transmitter 12 and a diversity receiver 11 through, respectively, a transmission filter 81 and a reception filter 82 which are built in a duplexer 8. An antenna 15 is connected to the diversity receiver 11 through a reception filter 10. The antenna 14 is implemented with a sleeve antenna or a λ/2 whip antenna which has a high radiation gain and allows a minimum of high-frequency current to flow through a housing. Here, λ is representative of the wavelength of the signal used. On the other hand, the antenna 15 is implemented with an antenna which, although lower in gain than a sleeve or whip antenna, can be built in a housing like a flat antenna.

So far as gain is concerned, both of the antennas 14 and 15 should preferably comprise a sleeve antenna or a λ/2 whip antenna. However, when it comes to portability and design, mounting two such antennas on a housing is problematic. For example, a λ/2 whip antenna has an element length which is substantially 16 cm for the frequency band of 900 MHz, mounting two antennas each having such a length on a housing being impractical. On the other hand, the exclusive antenna 15 for reception preserves the diversity effect even if the gain is lowered by about several dB compared to the transmit/receive antenna 14 and, therefore, it can be implemented with a flat antenna. Further, not only the space diversity effect but also the polarization diversity effect can be expected if a flat antenna is used in combination with a vertical polarization antenna of a sleeve antenna or that of a λ/2 whip antenna.

For the above reason, applying a built-in antenna to a portable radio communication apparatus in combination with the sleeve or whip antenna of Fig. 1 is advantageous, and actually this combination is used in the present invention. However, the construction shown in Fig. 1 has a drawback that when the sleeve or whip antenna is tucked away, the apparatus becomes unable to transmit, as previously stated. Specifically, when the antenna 14 is received in the housing, the gain is lowered to a value which is even far smaller than that of the built-in antenna 15 and, in the worst case, the antenna 14 is electrically isolated to make transmission impossible. Hence, the prior art apparatus shown in Fig. 1 is not applicable to a system in which a transmission should begin automatically in response to a reception.

Referring to Fig. 2A, a portable radio communication apparatus embodying the present invention is shown in a block diagram. In the figure, a first antenna 1 is implemented with a sleeve or whip antenna which may be retracted into the housing 13 of the apparatus or folded, as described in detail later. The antenna 1 protrudes from the housing 13 unless tucked in or folded. In this particular embodiment, the antenna 1 is assumed to be bodily received in the housing 13. A second antenna 2 is implemented with a microstrip or like flat antenna which is built in the housing 13 or mounted on the outer periphery of the housing 13 so as not to protrude from the housing 13.

When the first antenna 1 is retracted into the housing 13 as shown in Fig. 2A, it is electrically disconnected from a first switch 5. By the movement of the first antenna 1 into the housing 13, the first switch 5 is automatically caused to shift an antenna terminal 9 of duplexer 8 from the first antenna 1 to the second antenna 2. In this instance, a second switch 6 which is interlocked with the first switch 5 maintains a reception filter 10 disconnected from the second antenna 2, the receive frequency band being the pass band of the filter 10. Specifically, when the first antenna 1 is received in the housing 13, the switches 5 and 6 are actuated such that the second or built-in antenna 2 becomes connected to a transmitter 12 via a transmission filter 81 and to a diversity receiver 11 via a reception filter 82.

In Fig. 2B, the apparatus of Fig. 2A is shown in a condition wherein the first antenna 1 is pulled out of the housing 13 to its outermost position. As shown, since contacts 3 and 4 are brought into connection, the first antenna 1 is connected to the switch 5. The switch 5 is operated to connect the first antenna 1 to the antenna terminal 9 of the duplexer 8 while disconnecting the second or built-in antenna 2. The second switch 6, on the other hand, is actuated to connect the built-in antenna 2 to the diversity receiver 11 via the reception filter 10. In short, when the first antenna 1 is held in the outermost position, the antenna 1 is shared by transmission and diversity reception while, at the same time, the second or built-in antenna 2 is exclusively assigned to diversity reception.

In the condition shown in Fig. 2B, a line 7 extending between the first and second switches 5 and 6 is connected to the antenna 2 and, therefore, apt to disturb high-frequency matching. Such an occurrence can be eliminated by dimensioning the line 7 sufficiently shorter than λ/4 or equal to an integral multiple of λ/2 of the receive frequency band.

Referring to Figs. 3A and 3B, an essential portion of a second embodiment of the present invention is shown. The second embodiment has the same structure as the first one of Figs. 2A and 2B except that a switch 106 having three contacts is used in the second embodiment in place of the switch 6 having two contacts. The conditions shown in Figs. 3A and 3B correspond to those of Figs. 2A and 2B, respectively. In Fig. 3A, the first antenna 1 is disconnected from the terminal 9 of duplexer 8 while the second or built-in antenna 2 is connected to the transmitter 12 and the diversity receiver 11 through the duplexer 8. On the other hand, in Fig. 3B, the first antenna 1 is connected to the transmitter 12 and the diversity receiver 11 through the duplexer 8 while the second antenna 2 is connected to the diversity receiver 11 through the reception filter 10.

Unlike the connecting line 7 of Fig. 2B, a connecting line 107 is disconnected from the second antenna 2 in the condition shown in Fig. 3B. Accordingly, the line 107 has no adverse effect on the high-frequency matching. In other words, the length of line 107 can be freely selected.

Referring to Fig. 4, there is shown an illustrative and not limitative mechanism for automatically actuating the switches 5 and 6 or 106 in response to the movement of the first antenna 1 into and out of the housing 13. As shown, while the first antenna 1 is fully or partly retracted into the housing 13, a lever 16 is urged by a spring 20 to the position shown in the figure. As the antenna 1 is pulled out to the outermost position, the conductor 3 fixed to the bottom of the antenna 1 is brought into connection with the contact 4 while rotating the lever 16 about a pin 17 against the action of the spring 20. Then, the lever 16 presses actuators 18 and 19 which are respectively associated with the switches 5 and 6 or 106, whereby the switches 5 and 6 or 106 are actuated as explained with reference to Figs. 2A and 2B or 3A and 3B.

Figs. 5 to 7 show exemplary configurations of the first antenna 1. In Fig. 5, a sleeve antenna 41 serves as the first antenna 1 and may be fully received in the housing 13. In Fig. 6, a whip antenna 51 is shown which also serves as the first antenna 1 and may be fully received in the housing 13. In Fig. 7, a whip antenna 61 plays the role of the first antenna 1 and is foldable along the outer periphery of the housing 13.

In summary, it will be seen that the illustrated system provides a portable radio communication apparatus in which, when a sleeve antenna or a whip antenna is pulled out of a housing of the apparatus, a sufficient gain is attainable due to the gain of that antenna and diversity reception by that antenna and a built-in antenna. Another advantage of the present system is that even when the sleeve or whip antenna is tucked away in the housing, or is folded, the built-in antenna is automatically switched from a receive-only condition to a transmit and receive condition to allow transmission and reception to be performed as needed. Hence, even in a system in which an answer to a reception is automatically transmitted and, then, a communication is allowed only if the answer is confirmed by the other party, a person can wait for a reception while carrying the apparatus in a bag or the like with the antenna not protruding from the housing. In addition, in a place where an electric field which allows stable connection to be set up through the built-in antenna only and, yet, without resorting to reception diversity is available, communication may be performed with the sleeve or whip antenna kept in the housing, i.e., in an easy-to-use condition wherein no long projections exist.

Claims

1. A portable radio communication apparatus comprising:
   transmitter means (12);
   diversity receiver means (11);
   transmission filter means (81) connected to said transmitter means (12);
   first and second reception filter means (82,10) connected to said diversity receiver means (11);
   first antenna means (1) capable of being retracted into a housing (13) of said apparatus;
   second antenna means (2) mounted inside of or on the outer periphery of said housing (13); and
   switch means (5,6; 106) for connecting said second antenna means (2) to a junction (9) of said transmission filter means (81) and first reception filter means (82) and disconnecting said second antenna means (2) from said second reception filter means (10), in a first condition in which said first antenna means (1) is retracted in said housing (13); and for connecting said first antenna means (1) to said junction (9) and for connecting said second antenna means (2) to said second reception filter means (10), in a second condition in which said first antenna means (1) is pulled out of said housing (13), said switch means (5,6; 106) being switched from said second condition to said first condition by the retraction of said first antenna means (1).

2. An apparatus as claimed in claim 1, wherein said switch means comprises a first (5) and a second switch (6) which are interlocked with movement of said first antenna means (1) into and out of said housing (13);

Referring to Figs. 3A and 3B, an essential portion of a second embodiment of the present invention is shown. The second embodiment has the same structure as the first one of Figs. 2A and 2B except that a switch 106 having three contacts is used in the second embodiment in place of the switch 6 having two contacts. The conditions shown in Figs. 3A and 3B correspond to those of Figs. 2A and 2B, respectively. In Fig. 3A, the first antenna 1 is disconnected from the terminal 9 of duplexer 8 while the second or built-in antenna 2 is connected to the transmitter 12 and the diversity receiver 11 through the duplexer 8. On the other hand, in Fig. 3B, the first antenna 1 is connected to the transmitter 12 and the diversity receiver 11 through the duplexer 8 while the second antenna 2 is connected to the diversity receiver 11 through the reception filter 10.

Unlike the connecting line 7 of Fig. 2B, a connecting line 107 is disconnected from the second antenna 2 in the condition shown in Fig. 3B. Accordingly, the line 107 has no adverse effect on the high-frequency matching. In other words, the length of line 107 can be freely selected.

Referring to Fig. 4, there is shown an illustrative and not limitative mechanism for automatically actuating the switches 5 and 6 or 106 in response to the movement of the first antenna 1 into and out of the housing 13. As shown, while the first antenna 1 is fully or partly retracted into the housing 13, a lever 16 is urged by a spring 20 to the position shown in the figure. As the antenna 1 is pulled out to the outermost position, the conductor 3 fixed to the bottom of the antenna 1 is brought into connection with the contact 4 while rotating the lever 16 about a pin 17 against the action of the spring 20. Then, the lever 16 presses actuators 18 and 19 which are respectively associated with the switches 5 and 6 or 106, whereby the switches 5 and 6 or 106 are actuated as explained with reference to Figs. 2A and 2B or 3A and 3B.

Figs. 5 to 7 show exemplary configurations of the first antenna 1. In Fig. 5, a sleeve antenna 41 serves as the first antenna 1 and may be fully received in the housing 13. In Fig. 6, a whip antenna 51 is shown which also serves as the first antenna 1 and may be fully received in the housing 13. In Fig. 7, a whip antenna 61 plays the role of the first antenna 1 and is foldable along the outer periphery of the housing 13.

In summary, it will be seen that the illustrated system provides a portable radio communication apparatus in which, when a sleeve antenna or a whip antenna is pulled out of a housing of the apparatus, a sufficient gain is attainable due to the gain of that antenna and diversity reception by that antenna and a built-in antenna. Another advantage of the present system is that even when the sleeve or whip antenna is tucked away in the housing, or is folded, the built-in antenna is automatically switched from a receive-only condition to a transmit and receive condition to allow transmission and reception to be performed as needed. Hence, even in a system in which an answer to a reception is automatically transmitted and, then, a communication is allowed only if the answer is confirmed by the other party, a person can wait for a reception while carrying the apparatus in a bag or the like with the antenna not protruding from the housing. In addition, in a place where an electric field which allows stable connection to be set up through the built-in antenna only and, yet, without resorting to reception diversity is available, communication may be performed with the sleeve or whip antenna kept in the housing, i.e., in an easy-to-use condition wherein no long projections exist.

Claims

1. A portable radio communication apparatus comprising:

   transmitter means (12);

   diversity receiver means (11);

   transmission filter means (81) connected to said transmitter means (12);

   first and second reception filter means (82,10) connected to said diversity receiver means (11);

   first antenna means (1) capable of being retracted into a housing (13) of said apparatus;

   second antenna means (2) mounted inside of or on the outer periphery of said housing (13); and

   switch means (5,6; 106) for connecting said second antenna means (2) to a junction (9) of said transmission filter means (81) and first reception filter means (82) and disconnecting said second antenna means (2) from said second reception filter means (10), in a first condition in which said first antenna means (1) is retracted in said housing (13); and for connecting said first antenna means (1) to said junction (9) and for connecting said second antenna means (2) to said second reception filter means (10), in a second condition in which said first antenna means (1) is pulled out of said housing (13), said switch means (5,6; 106) being switched from said second condition to said first condition by the retraction of said first antenna means (1).

2. An apparatus as claimed in claim 1, wherein said switch means comprises a first (5) and a second switch (6) which are interlocked with movement of said first antenna means (1) into and out of said housing (13);

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said first switch (5), in the first condition, disconnecting said first antenna means (1) from said junction (9) while connecting said second antenna means (2) to said junction (9) and, in the second condition, disconnecting said second antenna means (2) from said junction (9) while connecting said first antenna means (1) to said junction (9);

said second switch (6), in the first condition, disconnecting said second antenna means (2) from said second reception filter means (10) and, in the second condition, connecting said second antenna means (2) to said second reception filter means (10).

3. An apparatus as claimed in claim 2, wherein a line (7) extending between said first and second switches (5,6) has a length which is shorter than $\lambda/4$, where λ is the wavelength of a received signal.

4. An apparatus as claimed in claim 2, wherein a line (7) extending between said first and second switches (5,6) has a length which is an integral multiple of $\lambda/2$, where λ is the wavelength of a received signal.

5. An apparatus as claimed in claim 1, wherein said first antenna means (1) comprises a sleeve antenna (41).

6. An apparatus as claimed in claim 1, wherein said first antenna means (1) comprises a whip antenna (51).

7. An apparatus as claimed in claim 1, wherein said second antenna means (2) comprises a microstrip antenna.

8. A method of switching a first antenna (1) of a portable radio communication apparatus, which includes a transmitter (12) and a diversity receiver (11), capable of assuming a first condition wherein said first antenna (1) does not protrude from a housing (13) of said apparatus and a second condition wherein said first antenna (1) protrudes from said housing (13), and a second antenna (2) supported by said housing (13) in such a manner as not to protrude from said housing (13), said method comprising the steps of:

in the first condition, connecting said second antenna (2) to said transmitter (12) and diversity receiver (11) while disconnecting said first antenna (1) from said transmitter (12) and said diversity receiver (11);

in the second condition, connecting said first antenna (1) to said transmitter (12) and diversity receiver (11) while connecting said second antenna (2) to said diversity receiver (11); and

switching said transmitter (12) and receiver (11) from said first condition to said second condition by the motion of said first antenna (1).

9. A method as claimed in claim 8, wherein connection of said second antenna (2) to said transmitter (12) and diversity receiver (11) in the first condition and connection of said first antenna (1) to said transmitter (12) and diversity receiver (11) in the second condition are performed, respectively, through a transmission filter (81) and a first reception filter (82), and connection of said second antenna (2) to said diversity receiver (11) in the second condition is performed through a second reception filter (10).

10. A method as claimed in claim 8, wherein the connection of said first and second antennas (1,2) to said transmitter (12) and diversity receiver (11) occurs in response to a change of condition of said first antenna (1) from one to the other of said first and second conditions.

11. A method as claimed in claim 8, wherein said first antenna (1) is retracted into said housing (13) in the first condition and pulled out of said housing (13) in the second condition.

12. A method as claimed in claim 8, wherein said first antenna (1) comprises a sleeve antenna (41) which is retracted into said housing (13) in the first condition and pulled out of said housing (13) in the second condition.

13. A method as claimed in claim 8, wherein said first antenna (1) comprises a whip antenna (51) which is retracted into said housing (13) in the first condition and pulled out of said housing (13) in the second condition.

14. A method as claimed in claim 8, wherein said first antenna (1) comprises a whip antenna (61) which is folded along the outer periphery of said housing (13) in the first condition and unfolded in the second condition.

15. A method as claimed in claim 8, wherein said second antenna (2) comprises a microstrip antenna which is built in said housing.

Patentansprüche

1. Tragbares Funkverbindungsgerät mit:

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einer Sendeeinrichtung (12);

einer Diversity-Empfangseinrichtung (11);

einer mit der Sendeeinrichtung (12) verbundenen Übertragungsfiltereinrichtung (81);

mit der Diversity-Empfangseinrichtung (11) verbundene erste und zweite Empfangsfiltereinrichtungen (82, 10);

einer ersten Antenneneinrichtung (1), die in ein Gehäuse (13) des Geräts einfahrbar ist;

einer zweiten Antenneneinrichtung (2), die innerhalb oder an der Außenfläche des Gehäuses (13) befestigt ist; und

einer Schalteinrichtung (5, 6; 106), um in einem ersten Zustand, bei dem die erste Antenneneinrichtung (1) in das Gehäuse (13) eingefahren ist, die zweite Antenneneinrichtung (2) mit einer Verbindung (9) der Übertragungsfiltereinrichtung (81) und der ersten Empfangsfiltereinrichtung (82) zu verbinden und um die zweite Antenneneinrichtung (2) von der zweiten Empfangsfiltereinrichtung (10) zu trennen; und um in einem zweiten Zustand, bei dem die erste Antenneneinrichtung (1) aus dem Gehäuse (13) herausgefahren ist, die erste Antenneneinrichtung (1) mit der Verbindung (9) zu verbinden und um die zweite Antenneneinrichtung (2) mit der zweiten Empfangsfiltereinrichtung (10) zu verbinden, wobei die Schalteinrichtung (5, 6; 106) durch das Einfahren der ersten Antenneneinrichtung (1) vom zweiten Zustand in den ersten Zustand umgeschaltet wird.

2. Gerät nach Anspruch 1, wobei die Schalteinrichtung einen ersten (5) und einen zweiten Schalter (6) aufweist, die mit der Bewegung der ersten Antenneneinrichtung (1) in das Gehäuse (13) hinein und aus dem Gehäuse (13) heraus verriegelt werden;

der erste Schalter (5) im ersten Zustand die erste Antenneneinrichtung (1) von der Verbindung (9) trennt, während die zweite Antenneneinrichtung (2) mit der Verbindung (9) verbunden wird und im zweiten Zustand die zweite Antenneneinrichtung (2) von der Verbindung (9) trennt, während die erste Antenneneinrichtung (1) mit der Verbindung (9) verbunden wird;

der zweite Schalter (6) im ersten Zustand die zweite Antenneneinrichtung (2) von der zweiten Empfangsfiltereinrichtung (10) trennt und im zweiten Zustand die zweite Antenneneinrichtung (2) mit der zweiten Empfangsfiltereinrichtung (10) verbindet.

3. Gerät nach Anspruch 2, wobei eine sich zwischen dem ersten und zweiten Schalter (5, 6) erstreckende Leitung (7) eine Länge hat, die kürzer als $\lambda/4$ ist, wobei λ die Wellenlänge eines empfangenen Signals ist.

4. Gerät nach Anspruch 2, wobei eine sich zwischen dem ersten und zweiten Schalter (5, 6) erstreckende Leitung (7) eine Länge hat, die ein ganzzahliges Vielfaches von $\lambda/2$ ist, wobei λ die Wellenlänge eines empfangenen Signals ist.

5. Gerät nach Anspruch 1, wobei die erste Antenneneinrichtung (1) eine Teleskopantenne (41) aufweist.

6. Gerät nach Anspruch 1, wobei die erste Antenneneinrichtung (1) eine Peitschenantenne (51) aufweist.

7. Gerät nach Anspruch 1, wobei die zweite Antenneneinrichtung (2) eine Mikrostrip-Antenne aufweist.

8. Verfahren zum Schalten einer ersten Antenne (1) eines tragbaren Funkverbindungsgeräts, das einen Sender (12) und einen Diversity-Empfänger (11) aufweist, die in der Lage sind, einen ersten Zustand, bei dem die erste Antenne (1) nicht aus einem Gehäuse (13) des Geräts hinausragt, und einen zweiten Zustand, bei dem die erste Antenne (1) aus dem Gehäuse (13) hinausragt, anzunehmen, und einer zweiten Antenne (2), die von dem Gehäuse (13) so gehaltert wird, daß sie aus dem Gehäuse (13) nicht hinausragt, wobei das Verfahren die Schritte umfaßt:

im ersten Zustand Verbinden der zweiten Antenne (2) mit dem Sender (12) und dem Diversity-Empfänger (11), während die erste Antenne (1) vom Sender (12) und dem Diversity-Empfänger (11) getrennt wird;

im zweiten Zustand Verbinden der ersten Antenne (1) mit dem Sender (12) und dem Diversity-Empfänger (11), während die zweite Antenne (2) mit dem Diversity-Empfänger (11) verbunden wird; und

Schalten des Senders (12) und des Empfängers (11) vom ersten Zustand in den zweiten Zustand durch die Bewegung der ersten Antenne (1).

9. Verfahren nach Anspruch 8, wobei die Verbindung der zweiten Antenne (2) mit dem Sender (12) und dem Diversity-Empfänger (11) im ersten Zustand und die Verbindung der ersten Antenne (1) mit dem Sender (12) und dem Diversity-Empfänger (11) im zweiten Zustand jeweils durch einen Übertragungsfilter (81) und einen ersten Empfangsfilter (82) hergestellt wird, und die Verbindung der zweiten Antenne

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(2) mit dem Diversity-Empfänger (11) im zweiten Zustand durch einen zweiten Empfangsfilter (10) hergestellt wird.

10. Verfahren nach Anspruch 8, wobei die Verbindung der ersten und zweiten Antenne (1, 2) mit dem Sender (12) und dem Diversity-Empfänger (11) als Antwort auf eine Zustandsänderung der ersten Antenne (1) von einem zur anderen der ersten und zweiten Zustände auftritt.

11. Verfahren nach Anspruch 8, wobei die erste Antenne (1) im ersten Zustand in das Gehäuse (13) eingefahren und im zweiten Zustand aus dem Gehäuse (13) herausgefahren ist.

12. Verfahren nach Anspruch 8, wobei die erste Antenne (1) eine Teleskopantenne (41) aufweist, die im ersten Zustand in das Gehäuse (13) eingefahren und im zweiten Zustand aus dem Gehäuse (13) herausgefahren ist.

13. Verfahren nach Anspruch 8, wobei die erste Antenne (1) eine Peitschenantenne (51) aufweist, die im ersten Zustand in das Gehäuse (13) eingefahren und im zweiten Zustand aus dem Gehäuse (13) herausgefahren ist.

14. Verfahren nach Anspruch 8, wobei die erste Antenne (1) eine Peitschenantenne (61) aufweist, die im ersten Zustand entlang der Außenfläche des Gehäuses (13) geklappt und im zweiten Zustand herausgeklappt ist.

15. Verfahren nach Anspruch 8, wobei die zweite Antenne (2) eine Mikrostrip-Antenne aufweist, die ins Gehäuse eingebaut ist.

Revendications

1. Appareil portable de communications par radio comprenant :
   - un moyen d'émetteur (12);
   - un moyen de récepteur en diversité (11);
   - un moyen de filtre de transmission (81) relié audit moyen d'émetteur (12);
   - des premier et second moyens de filtre de réception (82, 10) reliés audit moyen de récepteur en diversité (11);
   - un premier moyen d'antenne (1) pouvant être rentré dans un logement (13) dudit appareil;
   - un second moyen d'antenne (2) monté à l'intérieur ou sur la périphérie extérieure dudit logement (13); et
   - un moyen de commutateur (5, 6; 106) pour relier ledit second moyen d'antenne (2) à une jonction (9) dudit moyen de filtre de transmission (81) et dudit premier moyen de filtre de réception (82) et déconnecter ledit second moyen d'antenne (2) dudit second moyen de filtre de réception (10), dans un premier état dans lequel ledit premier moyen d'antenne (1) est rentré dans ledit logement (13); et pour relier ledit premier moyen d'antenne (1) à ladite jonction (9) et pour relier ledit second moyen d'antenne (2) audit second moyen de filtre de réception (10), dans un second état dans lequel ledit premier moyen d'antenne (1) est extrait dudit logement (13), ledit moyen de commutateur (5, 6; 106) étant commuté pour passer dudit second état audit premier état en rentrant ledit premier moyen d'antenne (1).

2. Appareil selon la revendication 1, dans lequel ledit moyen de commutateur comprend des premier (5) et second (6) commutateurs qui sont combinés avec le mouvement dudit premier moyen d'antenne (1) dans son entrée dans ledit logement (13) et sa sortie de ce logement;
   - ledit premier commutateur (5), dans le premier état, déconnectant ledit premier moyen d'antenne (1) de ladite jonction (9) tout en reliant ledit second moyen d'antenne (2) à ladite jonction (9) et, dans le second état, débranchant ledit second moyen d'antenne (2) de ladite jonction (9) tout en reliant ledit premier moyen d'antenne (1) à ladite jonction (9);
   - ledit second commutateur (6), dans le premier état, débranchant ledit second moyen d'antenne (2) dudit second moyen de filtre de réception (10) et, dans le second état, reliant ledit second moyen d'antenne (2) audit second moyen de filtre de réception (10).

3. Appareil selon la revendication 2, dans lequel une ligne (7) s'étendant entre lesdits premier et second commutateurs (5, 6) a une longueur plus courte que $\lambda/4$, où λ est la longueur d'onde d'un signal reçu.

4. Appareil selon la revendication 2, dans lequel une ligne (7) s'étendant entre lesdits premier et second commutateurs (5, 6) a une longueur qui est un multiple entier de $\lambda/2$, où λ est la longueur d'onde d'un signal reçu.

5. Appareil selon la revendication 1, dans lequel ledit premier moyen d'antenne (1) comprend

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une antenne à radiation horizontale bloquée (41).

6. Appareil selon la revendication 1, dans lequel ledit premier moyen d'antenne (1) comprend une antenne fouet (51).

7. Appareil selon la revendication 1, dans lequel ledit second moyen d'antenne (2) comprend une antenne à microbande.

8. Procédé de commutation d'une première antenne (1) d'un appareil portable de communications par radio, qui comporte un émetteur (12) et un récepteur en diversité (11), capable de prendre un premier état dans lequel ladite première antenne (1) n'est pas en saillie sur un logement (13) dudit appareil, et un second état dans lequel ladite première antenne (1) est en saillie sur ledit logement (13), et une seconde antenne (2) supportée par ledit logement (13) de manière à ne pas être en saillie sur ledit logement (13), ledit procédé comprenant les étapes consistant à :
   - dans le premier état, relier ladite seconde antenne (2) audit émetteur (12) et audit récepteur en diversité (11) tout en déconnectant ladite première antenne (1) dudit émetteur (12) et dudit récepteur en diversité (11);
   - dans le second état, relier ladite première antenne (1) audit émetteur (12) et audit récepteur en diversité (11) tout en reliant ladite seconde antenne (1) audit récepteur en diversité (11); et
   - commuter ledit émetteur (12) et ledit récepteur (11) pour les faire passer du premier état au second état par le mouvement de ladite première antenne (1).

9. Procédé selon la revendication 8, dans lequel la liaison de ladite seconde antenne (2) audit émetteur (12) et audit récepteur en diversité (11) dans le premier état et la liaison de ladite première antenne (1) audit émetteur (12) et audit récepteur en diversité (11) dans le second état sont exécutées, respectivement, par l'intermédiaire d'un filtre de transmission (81) et d'un premier filtre de réception (82), et la liaison de ladite seconde antenne (2) audit récepteur en diversité (11) dans le second état est effectuée par l'intermédiaire d'un second filtre de réception (10).

10. Procédé selon la revendication 8, dans lequel la liaison desdites première et seconde antennes (1, 2) audit émetteur (12) et audit récepteur en diversité (11) s'effectue en réponse à un changement d'état de ladite première antenne (1) pour passer de l'un à l'autre desdits premier et second états.

11. Procédé selon la revendication 8, dans lequel ladite première antenne (1) est rentrée dans ledit logement (13) dans le premier état et extraite dudit logement (13) dans le second état.

12. Procédé selon la revendication 8, dans lequel ladite première antenne (1) comprend une antenne à radiation horizontale bloquée qui est rentrée dans ledit logement (13) dans le premier état et extraite dudit logement (13) dans le second état.

13. Procédé selon la revendication 8, dans lequel ladite première antenne (1) comprend une antenne fouet (51) qui est rentrée dans ledit logement (13) dans le premier état et extraite dudit logement (13) dans le second état.

14. Procédé selon la revendication 8, dans lequel ladite première antenne (1) comprend une antenne fouet (61) qui est pliée le long de la périphérie extérieure dudit logement (13) dans le premier état et dépliée dans le second état.

15. Procédé selon la revendication 8, dans lequel ladite seconde antenne (2) comprend une antenne à microbande qui est construite dans ledit logement.

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