Description

This invention relates to the field of wireless receivers for mobile communications. More particularly, it relates to a radio receiver system employing diversity switching to automatically select among the outputs of a plurality of receivers, such as twin receivers, and to improve communication quality when the strengths of the electromagnetic signal waves reaching the receiver system are subject to large scale fluctuations.

In United States patent specification No. 4,035,728, there is described a diversity receiving system in which the levels of received signals are compared and the signal having the higher level is selectively led to an output terminal of the system. It is said with reference to one embodiment that, it will be apparent that, by providing a hysteresis characteristic to a switching level, the reception of the signal is evenly shared by two receivers.

An object of the invention is to provide a diversity reception receiver that reduces unwanted switching noise in a recovered signal when both signals waves are weak or strong. A more particular object of the invention is to reduce the unnecessary "churning" of prior art diversity receivers when both signals are relatively weak and the unnecessary switching that saturates the signal-to-noise (S/N) performance when both signals are relatively strong.

In keeping with an aspect of the invention, a diversity reception radio receiver has a two-receiver system incorporating first and second receivers. A wave envelope detector is provided for each receiver to generate an output voltage corresponding to the strength of the electromagnetic signal wave which is picked up by the receiver. A hysteresis comparator compares the outputs of the two wave envelope detectors and generates a switching control signal. Responsive to the switching control signal, a switching means selects between the signals which are produced by the first and second receivers. The amount of hysteresis in the comparator is adjustable so that there is a minimum of or no hunting between the outputs of the two receivers.

The above mentioned and other features of this invention and the manner of obtaining them will become more apparent, and the invention itself will be best understood by reference to the following description of some embodiments of the invention taken in conjunction with the accompanying drawings, in which:

Figure 1 is a simplified diagrammatic block diagram of a first embodiment of my invention;

Figure 2 shows typical detector output voltages of weak signal waves from the two receivers which are used in the embodiment of Figure 1, together with a trace indicating which receiver output will be selected by automatic switching;

Figure 3 shows typical detector output voltages of strong signal waves from the two receivers which are used in the embodiment of Figure 1, together with a trace indicating which receiver output will be selected by automatic switching;

Figure 4 shows a graph of the noise level of the embodiment of Figure 1 as a function of the average signal strength of the received electromagnetic waves, together with a comparison of the noise level of a prior art receiver shown in Figure 7;

Figure 5 is a simplified diagrammatic schematic of the embodiment of Figure 1, showing details of the controller and comparator;

Figure 6 is a simplified diagrammatic block diagram of a second embodiment of my invention employing a digital controller; and

Figure 7 is a block diagram of a prior art diversity receiver employing automatic switching between two receivers.

The block diagram of Figure 7 shows a prior art diversity reception receiver for frequency modulated (FM) signals. The FM modulated signals are picked up by a separated pair of antennas 1 and 2 and are respectively input to a pair of demodulating receivers 3 and 4, which in turn recover baseband signals S1 and S2 from the picked up modulated signals.

For determining the received signal strength, each receiver includes a wave envelope detector (not shown) for detecting the wave envelope of the antenna signals which it receives. These wave envelope detectors respectively generate detector output voltages v_1 (receiver 3) and v_2 (receiver 4) which are proportional to the strengths of the electromagnetic waves picked up from their respective antennas 1, 2.

These detector output voltages v_1, v_2 are input to a comparator 5 which generates a signal for directing baseband switch 6 to select the output of the baseband receiver having the larger detector output voltage. The baseband signal selected by switch 6 is amplified by a baseband amplifier 7 and then used to drive an output speaker 8. In sum, this prior art twin receiver system automatically switches to the stronger of two recovered signals in response to a comparator circuit's indication as to which receiver has the larger wave envelope detector output voltage.

However, such a prior art diversity receiver does not perform well when the electromagnetic signals picked up by each of the two antennas are relatively weak with a high content of background noise. In such a case, the envelope detector signals are correspondingly noisy. Thus, even if the inputs to the two receivers are about the same quality, the noise can cause unnecessary automatic switching between the receivers. The noise generated by this unnecessary switching further weakens the signal-to-noise ratio (S/N) of the recovered signal.

Moreover, there are also problems when the signals picked up by both antennas are relatively strong. In such a case, even a significant drop in wave amplitude may not cause much degradation in an already good S/N. However, the prior art circuit continues to automatically search for and switch to the stronger signal, giving rise to more switching than needed. This causes additional "switching noise" that degrades the recovered signal, leading to an undesirable saturation of S/N for strong signals (see Fig. 4).

Figure 1 shows a block diagram of a first embodiment of my invention providing a diversity receiver which is suitable for FM signals. The FM modulated signals are picked up by a pair of antennas 1 and 2 which are separated from each other. The signals are respectively input to a pair of demodulating receivers 3 and 4, which in turn recover baseband signals S1 and S2 from them. The recovered baseband signals S1 and S2 are input to baseband switch 6, which selects one of them to be fed via baseband amplifier 7 to output speaker 8.

Each receiver includes a wave envelope detector WD for detecting the wave envelope of the antenna signals which it receives, and hence for detecting their signal strength. These wave envelope detectors respectively generate detector output voltages v_1 (receiver 3) and v_2 (receiver 4), which voltages are proportional to the strengths of the electromagnetic waves input from their respective antennas 1, 2.

A dotted line 70 encloses parts constituting an improved comparator portion of the invention. A comparator 5 in a comparator circuit 15 receives the envelope detector voltages v_1 and v_2 and simultaneously sends switching control signals to both baseband switch 6 and signal switch 9.

The detector output voltages v_1, v_2 of receivers 3 and 4 are also split off as alternative inputs to signal switch 9. The output selected by switch 9 goes to an integrator or low pass filter 10, which smoothes or time-averages the selected detector output voltage. The output of integrator 10 is an input to controller 11, which generates a control signal that is an additional input to comparator 5 in order to give it a predetermined amount of hysteresis or a threshold resistance to change, that is responsive to the smoothed wave envelope detector output voltage produced by integrator 10.

The first embodiment operates this way. As shown in Figure 1, the circuit is such that every time comparator 5 sends a control signal to reverse the position of baseband switch 6, it also simultaneously sends a corresponding control signal to reverse signal switch 9. For example, if comparator 5 orders baseband switch 6 to select receiver 3, as having the stronger received signal, it also simultaneously orders signal switch 9 to select the detector output voltage v_1 to be fed to integrator 10.

Conversely, if switch 6 is ordered to select receiver 4, output voltage v_2 is fed to integrator 10. Integrator 10 then produces a smoothed output signal that is a time-averaged version of which ever detector output voltage is then being received by it and feeds such smoothed signal to controller 11. This smoothed signal reflects the strength of the signal waves. Controller 11, in turn, generates a control signal for comparator 5 that causes it to make a corresponding change in the amount of its hysteresis or threshold resistance to change, depending on the strength of the received signal.

For weak signal waves, Figure 2 shows typical wave envelope detector output voltages which vary as a function of time. These output voltages are from the two receivers used in the embodiment of Figure 1, together with a trace indicating which receiver output will be selected by comparator 5.

Starting on the left of Figure 2, initially v_1 is greater than v_2, so receiver 3 is selected. However, because of the hysteresis or threshold resistance to change which is set in comparator 5, that comparator will not order a switchover to receiver 4 until after the detector voltage v_1 falls below detector voltage v_2 by some specific amount d. If the amount of hysteresis or threshold resistance to change d is larger than the typical noise voltage that appears in the detector outputs, unnecessary switching between the receivers can be virtually eliminated.

For strong signal waves, Figure 3 shows typical wave envelope detector output voltages which vary as a function of time. These two voltages are provided by the two receivers used in the embodiment of Figure 1. Figure 3 also includes a trace indicating which receiver output is selected by comparator 5. Because the threshold resistance to change d' in comparator 5 has been set much larger than it was set in Figure 2, there will be no switchover of receivers unless the difference in detector output voltages becomes unusually large. Therefore, compared with the situation for weak signals, the frequency of switching has greatly diminished.

Figure 4 shows a graph of the noise level of the embodiment of Figure 1 as a function of the average

signal strength of the received electromagnetic waves, together with a comparison of the noise level of the prior art receiver of Figure 7 (dotted line). From this graph, it is clear that the introduction of a controlled amount of hysteresis or threshold resistance to change generally reduces the noise, particularly for strong signal waves.

Figure 5 is a simplified diagrammatic schematic of the embodiment of Figure 1, showing details of the controller and comparator. FM receivers 3 and 4 recover the modulated signals picked up by antennas 1 and 2 and deliver them as baseband signals S1 and S2 that become the alternative inputs to baseband switch 6. To help determine which signal is better, the respective wave envelope detector output voltages v_1, v_2 from receivers 3 and 4 are input as alternatives to signal switch 9.

Figure 5 shows the case where receiver 3 has been selected and the detector output voltage v_1 has been input to a low pass smoothing filter 10. The output of low pass filter 10 is being input to the "+" side of comparators 21, 22, & 23.

Comparators 21 - 23 and their associated logic network are for determining when the signal waves are "weak", "mid-strength", and "strong". The "-" inputs of comparators 21 and 22 are provided with reference voltages obtained by voltage dividers respectively formed by potentiometers 41, 42 and resistors 44, 45 connected between a supply voltage V_{cc} and ground. The potentiometers are set to adjust for the characteristics of the particular wave detectors (not shown) that produce the detector output voltages. The "-" input of comparator 23 is grounded by resistor 46.

The reference voltage input to comparator 21 is set higher than the reference voltage input to comparator 22. For example, suppose comparator 21 is set for a received detector output voltage of 20 dB microvolts and comparator 22 is set for 10 dB microvolts. Further suppose the voltage input from low pass filter 10 is 20 dB microvolts or more, indicating a "strong" signal wave. Then the outputs of all three comparators 21 - 23 will become logical 1's. This will cause the outputs of Exclusive OR gates 26 and 27 to become 0's. A logic network at the inputs of a set of controllable switches 32 - 37 is arranged so that when both gates 26 and 27 output 0's, only switches 32 and 35 will be "CLOSED", the others being left "OPEN".

Suppose that the voltage input from low pass filter 10 is between 10 dB - 20 dB microvolts, indicating a "mid-strength" signal wave. The comparator 21 gives an output which is a 0, but comparators 22 and 23 continue giving outputs which are 1's. This causes Exclusive OR gate 26 to give an output which is a 1, but Exclusive OR 27 continues to output a 0. For the logic network which is shown, the outputs of the gates cause only switches 33 and 36 to be fed control input signals of 1, thus switching them "CLOSED" and leaving the others "OPEN".

When the voltage input from low pass filter 10 equals or falls below 10 dB microvolts, it indicates a "weak" signal wave. Comparators 21 and 22 then give outputs which are 0's, while only comparator 23 will continue to give an output which is a 1. Therefore, Exclusive OR 26 gives an output which is a 0 and Exclusive OR 27 gives an output which is a 1. This causes only switches 34 and 37 to be "CLOSED", the others being left "OPEN".

The responses of the logical network described above are summarized by Table I.

TABLE I - RESPONSE OF LOGIC NETWORK

	SIGNAL WAVE STRENGTH		
GATE OUTPUT	WEAK	MID-STRENGTH	STRONG
21	0	0	1
22	0	1	1
23	1	1	1
26	0	1	0
27	1	0	0
SWITCH POSITION			
32	OPEN	OPEN	CLOSED
33	OPEN	CLOSED	OPEN
34	CLOSED	OPEN	OPEN
35	OPEN	OPEN	CLOSED
36	OPEN	CLOSED	OPEN
37	CLOSED	OPEN	OPEN

In Figure 5, comparator circuit 5 is shown as including two comparators 24 and 25 having "-" inputs respectively receiving wave envelope detector output voltages v_1 and v_2. The "+" inputs of comparators 24 and 25 receive the corresponding "other" wave envelope detector output voltage v_2 or v_1, as proportionally reduced by the voltage divider networks leading to these "+" inputs. Thus, comparator circuit 5 is called a "hysteresis comparator".

One end of each of the resistors 50 and 54 is respectively connected to to the "+" input of comparators 24 and 25, and the other end of each resistor is connected to ground. Controllable switches 32 - 37 effectively switch resistors 47 - 49 and 51 - 53 into and out of the voltage divider circuits connected to the "+" inputs of comparators 24 and 25. Thus, switches 32 - 37 set the relative values of the resistors making up the voltage dividers connected to the "+" inputs, thereby adjusting the amount of hysteresis that is exhibited by comparators 24 and 25.

To enable the hysteresis operation described above, resistors 47 - 49 and 51 - 53 should preferably have the following relationships:

resistor 47 > resistor 48 > resistor 49

resistor 51 > resistor 52 > resistor 53

The output of comparators 24 and 25 is input through respective input diodes 30 and 31 to a bistable multivibrator 74. For example, suppose receiver 3 is selected by switches 6 and 9 because $v_1 > v_2$ by an amount exceeding the current hysteresis or threshold resistance to change. This means that comparator 24 is producing a "0" and comparator 25 is producing a "1". Bistable 74 then has its left transistor 28 "OFF"

and its right transistor 29 "ON", which can be interpreted as outputting a logical "0" to the control input of switch 6 which selects the recovered signal S1.

Next, suppose that wave envelope detector output voltage v_1 becomes less than detector output voltage v_2, by an amount exceeding the current hysteresis or the threshold resistance to change. Comparator 24 switches from "0" to "1", causing a positive pulse to pass through diode 30 to the base of the bistable's transistor 28, flipping bistable 74 so that left transistor 28 becomes "ON" and right transistor 29 becomes "OFF". Bistable 74 then has an output which is a logical "1" and which controls switch 6 to select recovered signal S2 from receiver 4. This output of bistable 74 also controls switch 9, via line 76, to select detector output voltage v_2 as input for integrator 10.

Figure 6 is a simplified diagrammatic block diagram of a second embodiment of the invention employing a digital controller. It has a comparator circuit 16 which includes an analog-to-digital converter 12, a digital controller 13, and a digital-to-analog converter 14. The digital controller 13 could be, for example, a microprocessor based controller.

The first embodiment of Figure 5 quantizes the strength of the signal waves into three levels: weak, mid-strength, and strong. It also quantizes the amount of hysteresis into three alternatives. The second embodiment of Figure 6 provides virtually a continuum of hysteresis adjustments, by means such as a computation or table look up by the digital controller; thus, such a continuum of adjustments is within the scope of the invention.

As will now be apparent, my invention uses a comparator that has hysteresis for providing the output signals responsive to the wave envelope detectors. The amount of hysteresis is adjusted in response to the strength of the received signal waves. This substantially reduces the frequency of switching between the alternative recovered signals, greatly reducing the noise which is introduced into the recovered signal by the switching between receivers, both when the signals are weak and when they are strong.

While the principles of the invention have been described above in connection with specific apparatus and applications, it is to be understood that this description is made only by way of example and not as a limitation on the scope of the invention, which is defined in the appended claims.

Claims

1. A diversity reception radio receiver including a two-receiver system having first and second receivers (3,4) for responding to electromagnetic signal waves, wave envelope detectors (WD) associated with each receiver (3,4) for generating an output voltage corresponding to the strength of an electromagnetic signal wave picked up by its associated receiver (3,4), hysteresis comparator means (5) for comparing the outputs of the two wave envelope detectors and for generating a switching control signal in response thereto, and switching means (6) responsive to the switching control signal for selecting between the first and the second recovered signals produced respectively by the first and second receivers (3,4), whereby switching between the first and second recovered signals occurs only after the compared outputs reach a threshold level of change, characterised in that it further includes means (11) for automatically adjusting the threshold level of change by which the amount of hysteresis is adjustable in response to the strength of the output of either one of two wave envelope detectors (WD).

2. A diversity radio receiver system including first and second reception channels extending to output means, each of the channels having at least a receiver (3,4) and an individually associated antenna, comparator means (5) for comparing the strengths of received signals in the two channels, the comparator means (5) having a threshold level of resistance to change, and first switching means (6) responsive to the compared signals reaching the threshold level for selecting the channel having the stronger signal and for applying the output of the selected channel to the output means, characterised in that there is further provided means (11) for changing the threshold level in response to the strength of either one of the received signals.

3. A diversity radio receiver system as claimed in claim 2 characterised in that there is provided wave envelope detector means (WD) associated with each of the channels for generating an output voltage which is representative of the strengths of the signals in the respective channels.

4. A system as claimed in claim 3 and characterised in that there are provided signal switching means (9) for selectively applying signals from either one of the receivers (3,4) to an input of said comparator (5), and means for simultaneously applying switching control signals from the comparator means (5) to both the first and the signal switching means (6,9).

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and its right transistor 29 "ON", which can be interpreted as outputting a logical "0" to the control input of switch 6 which selects the recovered signal S1.

Next, suppose that wave envelope detector output voltage v_1 becomes less than detector output voltage v_2, by an amount exceeding the current hysteresis or the threshold resistance to change. Comparator 24 switches from "0" to "1", causing a positive pulse to pass through diode 30 to the base of the bistable's transistor 28, flipping bistable 74 so that left transistor 28 becomes "ON" and right transistor 29 becomes "OFF". Bistable 74 then has an output which is a logical "1" and which controls switch 6 to select recovered signal S2 from receiver 4. This output of bistable 74 also controls switch 9, via line 76, to select detector output voltage v_2 as input for integrator 10.

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The first embodiment of Figure 5 quantizes the strength of the signal waves into three levels: weak, mid-strength, and strong. It also quantizes the amount of hysteresis into three alternatives. The second embodiment of Figure 6 provides virtually a continuum of hysteresis adjustments, by means such as a computation or table look up by the digital controller; thus, such a continuum of adjustments is within the scope of the invention.

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While the principles of the invention have been described above in connection with specific apparatus and applications, it is to be understood that this description is made only by way of example and not as a limitation on the scope of the invention, which is defined in the appended claims.

Claims

1. A diversity reception radio receiver including a two-receiver system having first and second receivers (3,4) for responding to electromagnetic signal waves, wave envelope detectors (WD) associated with each receiver (3,4) for generating an output voltage corresponding to the strength of an electromagnetic signal wave picked up by its associated receiver (3,4), hysteresis comparator means (5) for comparing the outputs of the two wave envelope detectors and for generating a switching control signal in response thereto, and switching means (6) responsive to the switching control signal for selecting between the first and the second recovered signals produced respectively by the first and second receivers (3,4), whereby switching between the first and second recovered signals occurs only after the compared outputs reach a threshold level of change, characterised in that it further includes means (11) for automatically adjusting the threshold level of change by which the amount of hysteresis is adjustable in response to the strength of the output of either one of two wave envelope detectors (WD).

2. A diversity radio receiver system including first and second reception channels extending to output means, each of the channels having at least a receiver (3,4) and an individually associated antenna, comparator means (5) for comparing the strengths of received signals in the two channels, the comparator means (5) having a threshold level of resistance to change, and first switching means (6) responsive to the compared signals reaching the threshold level for selecting the channel having the stronger signal and for applying the output of the selected channel to the output means, characterised in that there is further provided means (11) for changing the threshold level in response to the strength of either one of the received signals.

3. A diversity radio receiver system as claimed in claim 2 characterised in that there is provided wave envelope detector means (WD) associated with each of the channels for generating an output voltage which is representative of the strengths of the signals in the respective channels.

4. A system as claimed in claim 3 and characterised in that there are provided signal switching means (9) for selectively applying signals from either one of the receivers (3,4) to an input of said comparator (5), and means for simultaneously applying switching control signals from the comparator means (5) to both the first and the signal switching means (6,9).

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5. A system as claimed in claim 4 characterised in that there is provided integrator means (10) coupled to smooth signals passing through the signal switching means (9) to provide an average voltage which is representative of the strength of the signal.

6. A system as claimed in claim 5, characterised in that the changing means includes logic circuit means (11) responsive to the integrator means (10) for measuring the level of signals in order to generate the threshold level for the comparator means (5).

7. A system as claimed in claim 5 characterized in that the changing means includes means (11) responsive to the integrator means (10) for converting the received signals into digital signals, and in that the comparator means (5) includes means (5) responsive to the digital signals for controlling the signal switching means (9).

8. A method of selecting the stronger of two wave signals received at a diversity receiver, the method including the steps of

(a) detecting the envelope of each of the two respective wave signals,

(b) comparing the signals detected in step (a) to find the stronger of the two signals and preventing a response to said comparison for a given amount of hysteresis, and

(c) switching to the stronger of the two signals after the given hysteresis amount is exceeded following the detection of a change in the relative signal strengths of the two signals,

characterised in that the given amount of hysteresis is automatically changed in response to the strength of one of the signals detected in step (a).

Patentansprüche

1. Diversity Empfangs-Funkempfänger mit einem Zweiempfängersystem mit einem ersten und zweiten Empfänger (3, 4) zum Antworten auf elektromagnetische Signalwellen, Hüllwellendetektoren (WD), die jedem Empfänger (3,4) zugeordnet sind, zum Erzeugen einer Ausgangsspannung, die der Stärke einer durch den zugehörigen Empfänger (3, 4) aufgenommenen elektromagnetischen Signalwelle entspricht, einer Hysterese-Vergleichseinrichtung (5) zum Vergleichen der Ausgaben der zwei Hüllwellendetektoren und zum Erzeugen eines Schaltsteuersignals in Abhängigkeit davon, und einer auf das Schaltsteuersignal ansprechenden Schalteinrichtung (6) zum Wählen zwischen dem ersten und dem zweiten wiedergewonnenen Signal, das jeweils von dem ersten und zweiten Empfänger (3, 4) erzeugt wird, wobei das Umschalten zwischen dem ersten und dem zweiten wiedergewonnenen Signal nur erfolgt, nachdem die verglichenen Ausgaben einen bestimmten Änderungs-Schwellwert erreichen, **dadurch gekennzeichnet,** daß es ferner eine Einrichtung (11) aufweist zum automatischen Einstellen des Änderungs-Schwellwerts, dadurch, daß die Größe der Hysterese in Abhängigkeit von der Stärke der Ausgabe eines der zwei Hüllwellendetektoren (WD) einstellbar ist.

2. Diversity-Funkempfängersystem mit einem ersten und einem zweiten Empfangskanal, die sich zu Ausgabeeinrichtungen erstrecken, wobei jeder der Kanäle mindestens einen Empfänger (3, 4) und eine einzelne zugehörige Antenne hat, eine Vergleichseinrichtung (5) zum Vergleichen der Stärken der empfangenen Signale in den zwei Kanälen, wobei die Vergleichseinrichtung (5) einen Schwellwert als Widerstand gegen Änderungen hat, und einer ersten Schalteinrichtung (6), die darauf anspricht, wenn die verglichenen Signale den Schwellwert erreichen, zum Auswählen des Kanals mit dem stärkeren Signal und zum Anlegen der Ausgabe des ausgewählten Kanals an die Ausgabeeinrichtung, **dadurch gekennzeichnet**, daß ferner eine Einrichtung (11) vorgesehen ist zum Ändern des Schwellwerts in Abhängigkeit von der Stärke eines der empfangenen Signale.

3. Diversity-Funkempfängersystem nach Anspruch 2, **dadurch gekennzeichnet**, daß Hüllwellendetektoreinrichtungen (WD) vorgesehen sind, die jedem der Kanäle zugeordnet sind, zum Erzeugen einer Ausgangsspannung, die die Stärken der Signale in den jeweiligen Kanälen repräsentiert.

4. System nach Anspruch 3, und **dadurch gekennzeichnet**, daß eine Signalschalteinrichtung (9) zum wahlweisen Anlegen von Signalen von einem der Empfänger (3, 4) zu einem Eingang des Vergleichers (5) und eine Einrichtung zum gleichzeitigen Anlegen eines Schaltsteuersignals von der Vergleichseinrichtung (5) zu sowohl der ersten als auch der zweiten Signalschalteinrichtung (6, 9) vorgesehen sind.

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5. System nach Anspruch 4, **dadurch gekennzeichnet**, daß eine Integratoreinrichtung (10) vorgesehen ist, die so verbunden ist, daß sie Signale, die durch die Signalschalteinrichtung (9) hindurchgehen, glättet, so daß eine Mittelspannung bereitgestellt wird, die für die Stärke des Signals repräsentativ ist.

6. System nach Anspruch 5, **dadurch gekennzeichnet**, daß die Änderungseinrichtung eine Logikschaltungseinrichtung (11) aufweist, die auf die Integratoreinrichtung (10) anspricht, zum Messen des Pegels der Signale, so daß der Schwellwert für die Vergleichseinrichtung (5) erzeugt wird.

7. System nach Anspruch 5, **dadurch gekennzeichnet**, daß die Änderungseinrichtung eine Einrichtung (11) aufweist, die auf die Integratoreinrichtung (10) anspricht, zum Wandeln der empfangenen Signale in digitale Signale, und daß die Vergleichseinrichtung (5) eine Einrichtung (5) aufweist, die auf die Digitalsignale anspricht, zum Steuern der Signalschalteinrichtung (9).

8. Verfahren zum Auswählen des stärkeren von zwei Wellensignalen, die an einem Diversity-Empfänger empfangen werden, wobei das Verfahren die Schritte aufweist
   (a) Detektieren der Hülle von jeder der zwei zugehörigen Wellensignale,
   (b) Vergleichen der im Schritt (a) detektierten Signale zum Herausfinden des stärkeren der zwei Signale und Vermeiden einer Antwort auf den Vergleich für eine bestimmte Hysteresegröße, und
   (c) Umschalten auf das stärkere der zwei Signale, nachdem die vorgegebene Hysteresegröße überschritten wird als Folge der Detektion einer Änderung in den relativen Signalstärken der zwei Signale,

   dadurch gekennzeichnet, daß die vorgegebene Hysteresegröße automatisch in Abhängigkeit von der Stärke eines der im Schritt (a) detektierten Signale geändert wird.

Revendications

1. Récepteur de radio pour une réception en diversité comportant un système à deux récepteurs ayant des premier et second récepteurs (3, 4) pour répondre à des ondes de signaux électromagnétiques, des détecteurs d'enveloppe d'onde (WD) associés à chaque récepteur (3, 4) pour produire une tension de sortie correspondant à la force d'une onde de signal électromagnétique captée par son récepteur associé (3, 4), un moyen de comparateur hystérétique (5) pour comparer les sorties des deux détecteurs d'enveloppe d'onde et pour produire un signal de commande de commutation en réponse à celles-ci, et un moyen de commutation (6) répondant au signal de commande de commutation pour faire une sélection entre les premier et second signaux récupérés qui sont produits respectivement par les premier et second récepteurs (3, 4), d'où il résulte que la commutation entre les premier et second signaux récupérés ne se produit qu'après que les sorties comparées aient atteint un seuil de changement, caractérisé en ce qu'il comprend en outre un moyen (11) pour ajuster automatiquement le seuil de changement grâce auquel la quantité de l'hystérésis peut être réglée en réponse à l'intensité de la sortie de l'un ou l'autre des deux détecteurs d'enveloppe d'onde (WD).

2. Système de récepteur de radio en diversité, comprenant des premier et second canaux de réception s'étendant jusqu'à un moyen de sortie, chacun des canaux ayant au moins un récepteur (3, 4) et une antenne associée individuellement, un moyen de comparateur (5) pour comparer les intensités des signaux reçus dans les deux canaux, le moyen de comparateur (5) ayant un seuil de résistance au changement, et un premier moyen de commutation (6) répondant aux signaux comparés atteignant le seuil pour la sélection du canal ayant le signal le plus intense et pour appliquer la sortie du canal sélectionné au moyen de sortie, caractérisé en ce qu'on a en outre prévu un moyen (11) pour changer le seuil en réponse à l'intensité de l'un ou l'autre des signaux reçus.

3. Système de récepteur de radio en diversité selon la revendication 2, caractérisé en ce qu'on prévoit un moyen de détecteur d'enveloppe d'onde (WD) associé à chacun des canaux pour produire une tension de sortie qui est représentative des intensités des signaux dans les canaux respectifs.

4. Système selon la revendication 3, caractérisé en ce qu'on prévoit un moyen de commutation de signal (9) pour appliquer sélectivement des signaux à partir de l'un ou l'autre des récepteurs (3, 4) à une entrée dudit comparateur (5), et un moyen pour appliquer simultanément des signaux de commande de commutation à partir du moyen de comparateur (5) au premier ainsi qu'au moyen de commutation de signal (6, 9).

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5. Système selon la revendication 4, caractérisé en ce qu'on prévoit un moyen d'intégrateur (10) relié de façon à écrêter les signaux passant par le moyen de commutation de signal (9) pour fournir une tension moyenne qui est représentative de l'intensité du signal.

6. Système selon la revendication 5, caractérisé en ce que le moyen de changement comprend un moyen de circuit logique (11) répondant au moyen d'intégrateur (10) pour mesurer le niveau des signaux afin de produire le seuil pour le moyen de comparateur (5).

7. Système selon la revendication 5, caractérisé en ce que le moyen de changement comprend un moyen (11) répondant au moyen d'intégrateur (10) pour convertir les signaux reçus en signaux numériques, et en ce que le moyen de comparateur (5) comprend un moyen (5) répondant aux signaux numériques pour commander le moyen de commutation de signal (9).

8. Procédé pour sélectionner le plus intense de deux signaux d'onde reçus à un récepteur en diversité, le procédé comprenant les étapes consistant à:

(a) détecter l'enveloppe à chacun des deux signaux d'onde respectifs,

(b) comparer les signaux détectés dans l'étape (a) de manière à trouver le plus intense des deux signaux et éviter une réponse à ladite comparaison pour une quantité donnée de l'hystérésis, et

(c) passer au plus intense des deux signaux après dépassement de la quantité d'hystérésis donnée à la suite de la détection d'un changement dans les intensités relatives des deux signaux,

caractérisé en ce que la quantité donnée de l'hystérésis est modifiée automatiquement en réponse à l'intensité de l'un des signaux détectés dans l'étape (a).