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AL LT LV RO SI(30) Priority: **14.06.1996 IT RM960421**(71) Applicant: **SIP - Societa' Italiana per L'esercizio delle Telecomunicazioni P.A. also trading as Telecom Italia S.p.A. 00196 Roma (IT)**(72) Inventor: **Giorgi, Gianmauro 17019 Varazze (SV) (IT)**

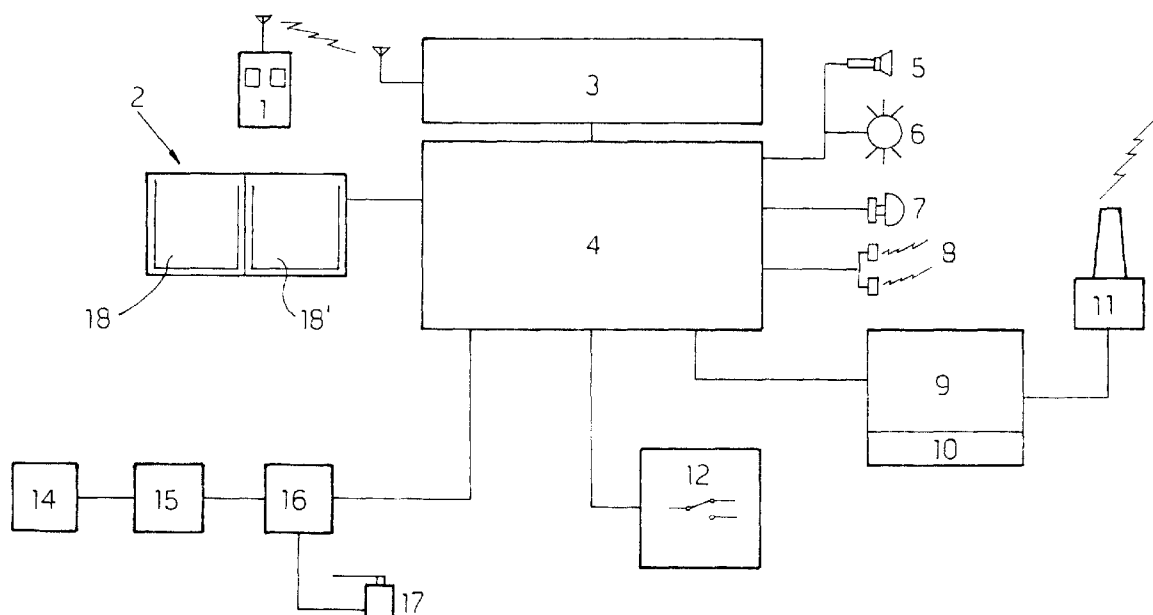
(74) Representative:

Fiammenghi-Domenighetti, Delfina et al Fiammenghi-Fiammenghi Via Quattro Fontane 31 00184 Roma (IT)**(54) Electronic safety system for sailors on sailing boats**

(57) An electronic safety system comprising a central processor (4) receiving through the radio receiver (3) the signals transmitted by a miniaturized portable radio transmitter (1).

In case of a transmission of an alarm signal, optical and

acoustic alarm devices (5, 6) are activated, and the position of the rudder (17) is modified by the rudder actuator (16), according to the boom position, which is detected by at least one sensor (12) linked with the central processor (4), so as to stop the sailing boat.

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Description

The present invention relates to an electronic safety system for boats, and more particularly for sailing boats with a single person on board, able to automatically stop the boat if, the sailor is suddenly taken ill or accidentally falls overboard, and transmitting, via satellite the boat position to succouring units.

Electronic systems for determining the position of a boat (electronic compass) and for transmitting by means of a satellite terminal the current boat position, if necessary, have been known for a long time.

However, if the sailing boat is controlled by a single sailor, and in the extreme case in which the sailor intends to cross the ocean, it is obvious that it will be necessary to provide for a system which automatically activates the satellite terminal in case of danger.

An object of the present invention is to provide an electronic safety system for sailors of sailing boats, which uninterruptedly checks if the person is on board or is fallen overboard, and reads in the latter case the boat position, activates alarm devices, possibly stops the boat and communicates via satellite to the succouring units the position where the accident has occurred. Another object of the present invention is to provide an electronic system of the above type, comprising a portable miniaturized transmitter, and activating (triggering) immediately the above sequence of operations, even when the sailor leaves the deckhouse without carrying the transmitter, or without having turned it on.

A third object of the invention is that of including in the electronic safety system, reset means which stop the above mentioned sequence of actions when the dangerous situation has ceased to exist, or which only temporarily postpone this sequence, in case the sailor comes out of the deckhouse for an emergency.

The above objects and advantages of the invention will be put in evidence by the following description of a preferred embodiment, which is schematically shown in the annexed drawing, wherein:

Fig. 1 is a block diagram for explaining the various components of the electronic system and the way they interact.

As shown in Fig. 1 the system comprises at least one miniaturized portable radio transmitter 1 which transmits the signals to the radio receiver 3 of the central processor 4. Two photoelectric cells 8, arranged one after the other, allow to inform the central processor 4 if the sailor is entering the deckhouse or is coming out of it. The numerals 5 and 6 indicate optical and acoustic alarm devices.

The central processor 4 is also connected to systems known in the art and which have already been used for a long time in this field of nautical science, namely the gyrocompass 14, the automatic pilot 15, the actuator 16 for the rudder position, and, on the other hand, the - also known - system comprising the transceiver apparatus INMARSAT-C 9 enabling communication via satellite

and the GPS board 10 for position determination, together with its antenna 11. A detector 12 of the boom position is also linked with the central processor 4, and this detector can be embodied by a rheostat, a potentiometer or any kind of microswitches, or even any kind of position sensor whatever, magnetic, etc. The device 12 cooperating with the known components 14, 15, 16, 17, as described below, is one of the fundamental elements included in the electronic safety system, according to the present invention.

A mushroom-head push button 7 for the manual resetting of the system is also connected to the central processor 4. This mushroom-head push button 7 is located at the entry of the deckhouse. A further reset push button (not shown) is on the portable radio transmitter 1.

The reset push buttons restore the initial conditions of the electronic safety system and have various functions, since they can be actuated in several situations, as follows from the following description of the system operation.

A last component of the system schematically illustrated in Fig. 1, is the battery loader 2 with two spaces for lodging the miniaturized portable radio transmitter 1.

Usually, a transmitter 1 is constantly placed into one of the spaces 18, 18' of the battery loader 2. When the sailor is inside the boat, he puts also the other transmitter into the second space 18'. In this manner a transmitter 1 is always loaded and can be used, if necessary.

The operation of the present invention will be described now, and the utility of the single components together with their interaction will be consequently appreciated. Before coming out of the deckhouse, the sailor takes from the battery loader 2, one of the miniaturized radio transmitters 1 located in the respective spaces 18, 18', turns it on and wears it. When the sailor comes out of the deckhouse, the photoelectric cells 8 transmit this information to the central processor 4.

If during the presence of the sailor in the external part of the boat, he accidentally falls in the sea water, the transmitter sends an alarm signal, which will be received by the radio receiver 3 and processed by the control unit 4, starting the execution of the following actions:

- a) readout and recording of the boat position, with the GPS board located inside the transceiver apparatus INMARSAT-C for communication via satellite;
- b) activation of the optical and acoustic alarm devices 5, 6.

At this point it is important to notice that the transmitter 1 emits signals in an intermittent manner, therefore, even if the transmitter 1 did not transmit the signal "man fallen overboard", the central processor 4, which could not receive the intermittent signal too, would anyway start the sequence of actions a) and b).

Moreover, the transmitter 1 also has a push button, operable by the sailor in an emergency case, for instance if he is struck by an illness, leading, also in this case, to the actions a) and b). In any case, after the action b) has taken place, if the sailor has not pushed one of the pre-

viously mentioned reset buttons within a predetermined time period, of for instance 10 seconds, the program of the central processor 4 will start the operations c) and d), according to which:

c) the tiller of the rudder 17 is driven, by controlling the actuator 16 of the rudder position, in the end of stroke position, in the direction opposite to the wind direction - detected through the detector 12 of the boom position -, so as to stop the boat;

d) after 10 minutes (the time available to the sailor to go on board again), an alarm will be sent to the responsible authorities, through the satellite terminal INMARSAT-C or through the B station, communicating the position where the accident has occurred. The period of 10 minutes in the above phase d), may be increased or reduced.

As stated above, the absence of the signal received from the portable transmitter, for instance for a period of more than 10 seconds, activates in any case the alarm procedure a)-d).

If the sailor comes out of the deckhouse without wearing the transmitter 1, the sequence of alarm actions a)-d) is started automatically in any case.

The same occurs if he comes out of the deckhouse forgetting to turn on the portable transmitter 1. Indeed, in both circumstances, the photoelectric cells 8 will inform the central processor 4 that the sailor left the deckhouse, but the radio receiver 3 will not receive any signal. In order to allow the sailor to come out of the deckhouse in emergency situations without activating the alarm procedure, it is provided that the pressing of the mush-room-head push button 7 (located at the entry of the deckhouse) will delay, for instance for 5 minutes, the sequence of alarm actions.

At any time it is possible to restore the initial conditions of the electronic safety system; by pressing the reset push button on the portable transmitter 1, or the mush-room-head push button 7 at the deckhouse entry. If the conditions that caused the alarm lasted for a longer period, the procedure a)-d) would be repeated automatically.

The system returns in the stand-by conditions, i.e. in the fundamental state, when the sailor enters again the deckhouse and puts again the portable transmitter in the battery loader.

The invention can be applied also to the case of several persons present on board and to the case of a motor boat.

Claims

1. An electronic safety system for sailors on sailing boats, characterized in that it comprises a central processor (4) connected to a radio receiver (3) receiving signals transmitted by a miniaturized portable transmitter (1), a detector (12) of the boom position which is also connected to the central proc-

essor (4), photoelectric cells (8) which inform the central processor (4) that the sailor is entering the deckhouse or coming out of it, a gyrocompass (14), an automatic pilot (15) and an actuator (16) of the rudder position modifying the rudder position according to signals from the detector (12) and according to the control action of the central processor (4), and lastly, optical and/or acoustical alarm devices (5,6).

2. An electronic safety system according to claim 1, characterized in that after a predetermined time period, after rotation of the rudder (17) tiller, in particular till the stroke end, in a direction opposite to the wind direction detected by said detector (12) of the boom position, an alarm is sent from a transceiver apparatus (9) for communication via satellite or from the B station, communicating the position where the accident has occurred and which was read and recorded by a GPS board or any kind of apparatus (10) for the position determination, said apparatus being linked, like the transceiver apparatus (9), with the central processor (4).

3. An electronic safety system according to claim 1, characterized in that reset means are provided, that is means for restoring the initial conditions of the system, comprising a mush-room-head push button (7), located at the entry of the deckhouse, and a push button on the miniaturized portable radio transmitter (1); pressing of said mush-room-head push button (7) allowing to postpone the sequence of alarm actions in case of an emergency, when the sailor has to come out of the deckhouse.

4. An electronic safety system according to claim 1, characterized in that said portable transmitter (1) is introduced into a space (18 or 18') of a battery loader (2), when it is not utilized, whereas a second portable transmitter (1) which is identical with the first one, is constantly lodged inside the second space (18 or 18') of said battery loader (2) when the first transmitter (1) is worn by the sailor.

5. A method for carrying out a sequence of alarm actions, which uses the safety electronic system of claim 1 to 4, characterized in that it comprises the following operations:

- a) readout and recording of the boat position by a board (10) inside the transceiver (9);
- b) activation of the optical and acoustic alarm devices (5,6);
- c) positioning of the tiller of the rudder (17) at the end of stroke, in a direction opposite to the wind direction, detected by said detector (12), so as to cause the boat to stop, after a predetermined period of time from the action b), and

provided that no resetting has occurred;

d) transmission of an alarm signal by means of the terminal (9) for communication via satellite, informing about the previously detected position of the accident, said transmission occurring

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after a further period of time from the action c),

provided that no resetting has been performed;

e) automatic repetition of the operations a) to

d), if the conditions which have caused the alarm last for a longer time.

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6. A method according to claim 5, characterized in that the monitoring starts from the very instant in which the sailor comes out of the deckhouse, wearing the portable transmitter (1) in the "on" condition, and in that said actions a) to d) are carried out from the very instant in which the radio receiver (3) of the central processor (4) no more receives the signal from the portable transmitter (1) or receives an alarm signal from the latter.

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