

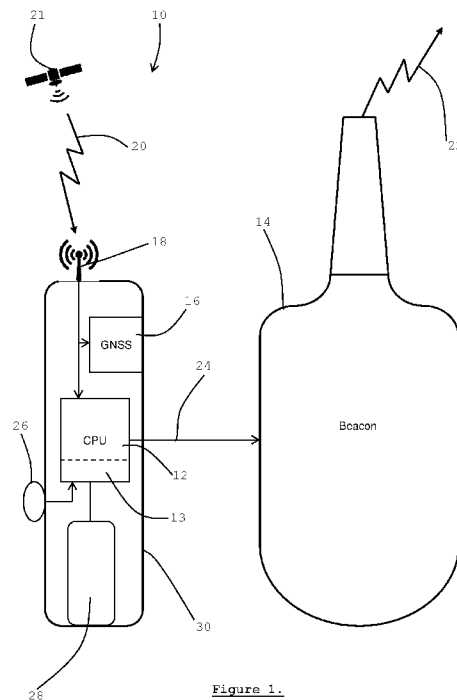


(43) International Publication Date
25 April 2019 (25.04.2019)

- (51) International Patent Classification:
G01S 1/68 (2006.01) G08B 5/00 (2006.01)
G01S 5/00 (2006.01)
- (21) International Application Number:
PCT/AU2018/051119
- (22) International Filing Date:
15 October 2018 (15.10.2018)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
2017904169 16 October 2017 (16.10.2017) AU
- (72) Inventors; and
- (71) Applicants: HARVEY, Doriette Fransien [AU/AU]; 22 Fairway Circle, Connolly, Western Australia 6027 (AU).
HARVEY, Frederick [AU/AU]; 22 Fairway Circle, Connolly, Western Australia 6027 (AU).

- (74) Agent: PATENTEUR PTY LTD; Amberley Business Centre, IBM Building, Level 3, 1060 Hay Street, West Perth, Western Australia 6005 (AU).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,

(54) Title: EMERGENCY RADIO BEACON REMOTE ACTIVATION SYSTEM



(57) Abstract: Provided is a system (10) for remote activation of an emergency radio beacon by a Search and Rescue (SAR) party, the system (10) comprising a controller (12) operatively arranged in signal communication with an emergency radio beacon (14), a positioning module (16) arranged in signal communication with the controller (12) and configured to operatively provide spatial positioning data to the controller (12), and a receiver (18) arranged in signal communication with the controller (12) and configured to operatively receive an activation signal (20). The controller (12) is configured to activate the beacon (14) upon receipt of the activation signal (20) and to provide the spatial positioning data of a potentially lost or distressed party to the beacon (14) for transmission along with an emergency signal (22).



WO 2019/075512 A1

EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

- *with international search report (Art. 21(3))*

EMERGENCY RADIO BEACON REMOTE ACTIVATION SYSTEM**TECHNICAL FIELD**

[0001] This invention relates to a system for remote activation of an emergency radio beacon by a Search and Rescue (SAR) party, and an associated remotely activatable emergency radio beacon.

BACKGROUND ART

[0002] The following discussion of the background art is intended to facilitate an understanding of the present invention only. The discussion is not an acknowledgement or admission that any of the material referred to is or was part of the common general knowledge as at the priority date of the application.

[0003] Emergency radio beacons are known in the art. An Emergency Position Indicating Radio Beacon (EPIRB) is typically used to alert search and rescue services in the event of an emergency. EPIRBs are tracking transmitters which aid in the detection and location of boats, aircraft, and people in distress. EPIRBs generally function by transmitting a coded message on the 406MHz distress frequency via satellite and earth stations to the nearest rescue co-ordination centre. In most countries, EPIRBs are mandated to be used in all commercial and private shipping.

[0004] EPIRBs generally rely on the Cospas-Sarsat polar orbiting satellite system, an international satellite system for search and rescue (SAR), which provides global coverage. The signals are monitored worldwide and the location of the distress is detected by these non-geostationary satellites using the Doppler effect for trilateration.

[0005] The coded message transmitted by an EPIRB identifies the exact vessel to which the EPIRB is registered. This information allows rescue services to eliminate false alerts and launch an appropriate rescue. Some EPIRBs also have a secondary distress transmitter which typically transmits on the 121.5MHz spectrum and is used for "homing" purposes. When the rescue services get close, this allows them to direction find on the signal. Some EPIRBs also have a high brightness LED flashing light that aids final visual location.

[0006] A Personal Locator Beacon (PLB) is a particular type of EPIRB that is typically smaller, has a shorter battery life and, unlike an EPIRB, is registered to a person rather than a vessel. PLBs work in exactly the same way as EPIRBs by sending a coded message on the 406MHz distress frequency which is relayed via the Cospas-Sarsat global satellite system.

[0007] EPIRBs and PLBs typically require manual activation, or may be automatically activated upon immersion or impact by having suitable immersion or impact activation sensors. Applicant has identified a shortcoming in the art, as such conventional activation methodologies are not always best suited to search and rescue operations by Search and rescue (SAR) teams.

[0008] The present invention seeks to propose possible solutions, at least in part, in amelioration of the known shortcomings in the art.

SUMMARY OF THE INVENTION

[0009] According to a first aspect of the invention there is provided a system for remote activation of an emergency radio beacon by a Search and Rescue (SAR) party, said system comprising:

a controller operatively arranged in signal communication with an emergency radio beacon;

a receiver arranged in signal communication with the controller and configured to operatively receive an activation signal from the SAR party; and

a positioning module arranged in signal communication with, and configured to operatively provide spatial positioning data to, the controller, wherein the controller is configured to activate the beacon upon receipt of the activation signal and to provide the spatial positioning data to the beacon for transmission as part of an emergency signal.

[0010] In one example, the controller is configurable with a predetermined geo-fence, said controller configured to activate the radio beacon should the system move outside the geo-fence, as determined by the positioning module. The skilled addressee will appreciate that a geo-fence is a virtual perimeter for a real-world geographic area.

[0011] In one example, the controller includes a transducer configured to monitor a predetermined aspect of a vessel or person to which the radio beacon is registered.

[0012] Typically, the predetermined aspect is selected from either a human physiology-related measurement or an operational characteristic of a vessel.

[0013] Typically, the radio beacon comprises an EPIRB (emergency position-indicating radio beacon), a PLB (personal locator beacon), an ELT (emergency location transmitter), a SEPIRB (submarine EPIRB), or the like.

[0014] Typically, the controller is arranged in communication with the beacon by means of a suitable electromagnetic waveguide.

[0015] Typically, the controller is configured to encode the spatial positioning data for transmission as part of the emergency signal.

[0016] In one example, the positioning module includes a global navigation satellite system (GNSS) module.

[0017] The skilled addressee will appreciate that a global navigation satellite system (GNSS) generally comprises a satellite navigation system with global coverage, e.g. the United States' Global Positioning System (GPS), Russia's GLONASS and the European Union's Galileo, or the like.

[0018] Typically, the receiver includes a radio frequency receiver.

[0019] In one example, the receiver is configured to receive the activation signal in a frequency allocated for satellite transmission systems.

[0020] Typically, the system includes energising means for operatively energising the controller, the positioning module and the receiver.

[0021] In one example, the energising means includes at least one electrochemical cell.

[0022] In one example, the energising means includes a photovoltaic arrangement for supplying at least one electrochemical cell with energy.

[0023] In one example, the controller is configured to provide an indication of a status of the energising means.

[0024] Typically, the controller is configured to perform a system diagnostic check on the beacon, controller, receiver, positioning module and/or energising means on receipt of an interrogation signal via the receiver.

[0025] In one embodiment, the controller is configured to transmit an outcome of such system diagnostic check.

[0026] Typically, the controller is configured with a low-power consumption mode wherein only reception of the activation signal from the SAR party by the receiver is monitored in order to minimise power consumption.

[0027] In one example, the system is enclosed in a sealed and impact-resistant housing to prevent the ingress of water and/or dirt.

[0028] In one example, the system includes an audible and/or visual indicator that is activated upon receipt of the activation signal.

[0029] According to a second aspect of the invention there is provided an emergency radio beacon remotely activatable by a Search and Rescue (SAR) party, said beacon comprising:

a transmitter for operatively transmitting an emergency signal;

a controller operatively arranged in signal communication with the transmitter;

a receiver arranged in signal communication with the controller and configured to operatively receive an activation signal from the SAR party; and

a positioning module arranged in signal communication with, and configured to operatively provide spatial positioning data to, the controller, wherein the controller is configured to activate and provide the spatial positioning data to the transmitter upon receipt of the activation signal so that the emergency signal is indicative of a geographic position of the beacon.

[0030] In one example, the controller includes a transducer configured to monitor a predetermined aspect of a vessel or person to which the radio beacon is registered.

[0031] Typically, the predetermined aspect is selected from either a human physiology-related measurement or an operational characteristic of a vessel.

[0032] Typically, the radio beacon comprises an EPIRB (emergency position-indicating radio beacon), a PLB (personal locator beacon), an ELT (emergency location transmitter), a SEPIRB (submarine EPIRB), or the like.

[0033] Typically, the controller is arranged in communication with the beacon by means of a suitable electromagnetic waveguide.

[0034] Typically, the controller is configured to encode the spatial positioning data for transmission as part of the emergency signal.

[0035] In one example, the positioning module includes a global navigation satellite system (GNSS) module.

[0036] Typically, the receiver includes a radio frequency receiver.

[0037] In one example, the receiver is configured to receive the activation signal in a frequency allocated for satellite transmission systems.

[0038] Typically, the controller is configured with a low-power consumption mode wherein only reception of the activation signal from the SAR party by the receiver is monitored in order to minimise power consumption of the system.

[0039] Typically, the beacon includes energising means for operatively energising the controller, the positioning module and the receiver.

[0040] In one example, the energising means includes at least one electrochemical cell.

[0041] In one example, the energising means includes a photovoltaic arrangement for supplying at least one electrochemical cell with energy.

[0042] In one example, the controller is configured to provide an indication of a status of the energising means.

[0043] Typically, the controller is configured to perform a system diagnostic check on the beacon, controller, receiver, positioning module and/or energising means on receipt of an interrogation signal via the receiver.

[0044] In one embodiment, the controller is configured to transmit an outcome of such system diagnostic check.

[0045] In one example, the controller is configurable with a user-definable expiry date, said controller configured to disable the energising means when such expiry date is reached.

[0046] In one example, the beacon is enclosed in a sealed and impact-resistant housing to prevent the ingress of moisture and/or dirt.

[0047] In one example, the beacon includes an audible and/or visual indicator that is activated upon receipt of the activation signal.

[0048] In a further example, the activation signal is generated by means of a user input to the controller, a fluid-pressure sensor of the controller, or a fluid sensor of the controller.

[0049] According to a further aspect of the invention there is provided a method for retrofitting an emergency radio beacon with a system for remote activation of said beacon by a Search and Rescue (SAR) party, said method comprising the steps of:

providing an emergency radio beacon; and

fitting a system for remote activation of an emergency radio beacon in accordance with the first aspect of the invention thereto.

BRIEF DESCRIPTION OF THE DRAWINGS

The description will be made with reference to the accompanying drawings in which:

Figure 1 is a diagrammatic representation of one example of an emergency radio beacon activation system in accordance with an aspect of the invention; and

Figure 2 is a diagrammatic representation of one example of an emergency radio beacon in accordance with an aspect of the invention.

DETAILED DESCRIPTION OF EMBODIMENTS

[0050] Further features of the present invention are more fully described in the following description of several non-limiting embodiments thereof. This description is included solely for the purposes of exemplifying the present invention to the skilled addressee. It should not be understood as a restriction on the broad summary, disclosure or description of the invention as set out above. In the figures, incorporated to illustrate features of the example embodiment or embodiments, like reference numerals are used to identify like parts throughout.

[0051] With reference now to the accompanying Figures, there is shown one embodiment of an emergency radio beacon activation system 10. System 10 is generally configured for remote activation of an emergency radio beacon 14 by a Search and Rescue (SAR) party in accordance with one aspect of the present invention. In this present example, emergency radio beacon activation system 10 broadly comprises a controller 12, a positioning module 16, and a receiver 18.

[0052] Broadly, the system 10 allows for a remote activation signal to be sent from a Search and Rescue team or party (diagrammatically represented by satellite 21) to wake-up an EPIRB or similar beacon of a potentially distressed or lost party

and interrogate that EPIRB for position information with the intention of using the position information to rescue the lost party and/or causing the EPIRB to start sending distress signals. As far as known, conventional systems require a beacon to be activated by a user, as the present invention enables remote activation of a beacon.

[0053] In general, the controller 12 is operatively arranged in signal communication with an emergency radio beacon 14, as shown. The radio beacon 14 generally comprises an EPIRB (emergency position-indicating radio beacon), a PLB (personal locator beacon), an ELT (emergency location transmitter), a SEPIRB (submarine EPIRB), or the like. The controller 12 includes a microcontroller which is configured to interpret and execute suitable processor instructions, as is known in the art of microcontrollers.

[0054] The controller 12 is generally arranged in communication with the beacon 14 by means of a suitable electromagnetic waveguide 24, which may include electrical conductors and/or a suitable electromagnetic transmission channel. Accordingly, the activation system 10 can be located proximate the beacon 14 and arranged in suitable signal communication by means of a physical connection, or the activation system 10 can be located distant from the beacon 14 and arranged in suitable signal communication by means of an electromagnetic transmission channel, e.g. a Wi-Fi channel, a Bluetooth channel, short-wave radio channel, or the like.

[0055] Importantly, the system 10 may be retrofitted to an existing emergency beacon, where the retrofitting would permit an existing emergency beacon to be operated in constant standby mode, and remote activated and deactivated from that standby

mode. Of course, other embodiments could see the system incorporated as part of a new design of emergency beacon, an example of which is provided below.

[0056] The positioning module 16 is arranged in signal communication with the controller 12 and configured to operatively provide spatial positioning data to the controller 12. In one example, the positioning module includes a global navigation satellite system (GNSS) module. The skilled addressee will appreciate that a global navigation satellite system (GNSS) generally comprises a satellite navigation system with global coverage, e.g. the United States' Global Positioning System (GPS), Russia's GLONASS and the European Union's Galileo GNSSs. Other GNSSs may be appropriate.

[0057] System 10 also includes receiver 18 which is arranged in signal communication with the controller 12 and is configured to operatively receive an activation signal 20 from a SAR party. The controller 12 is configured to activate the beacon 14 upon receipt of the activation signal 20 and to provide the spatial positioning data to the beacon 14 for transmission along with an emergency signal 22. The controller 12 is typically configured to encode the spatial positioning data for transmission as part of the emergency signal, e.g. to minimise required bandwidth, or the like.

[0058] The receiver 18 generally includes a radio frequency receiver. In one example, the receiver 18 may be configured to receive the activation signal 20 in a frequency allocated for satellite transmission systems, or the like.

[0059] The skilled addressee will appreciate that the activation signal may include any suitable signal useable to

activate an emergency beacon 14 generally over long distances. For example, the activation signal may include a radio signal transmitted via a satellite system in order to activate the beacon 14 over a large geographic area, or a long-distance radio signal, or the like. A variety of activation signals may be suitable and is within the scope of the present invention.

[0060] In one example, the controller 12 is configurable with a predetermined geo-fence, wherein the controller 12 is configured to activate the radio beacon 14 should the system 10 move outside this geo-fence, generally as determined by the positioning module 16. The skilled addressee will appreciate that a geo-fence is a virtual perimeter for a real-world geographic area typically making use of GNSS technology.

[0061] In one example, the controller 12 includes a transducer 26 which is configured to monitor a predetermined aspect of a vessel or person to which the radio beacon 14 is registered, i.e. as is known in the art, emergency radio beacons are typically registered to a particular entity to allow tracking and tracing of details, etc. Typically, the predetermined aspect is selected from either a human physiology-related measurement or an operational characteristic of a vessel.

[0062] For example, the controller 12 can use the transducer 26 to sense a variety of such predetermined aspects, including either a human physiology-related measurement or an operational characteristic of a vessel. The human physiology-related measurement may be any measurement whereby a person in distress can be identified, for example a heart rate, blood pressure, etc. Similarly, the operational characteristic of a vessel may be any characteristic whereby a vessel in distress can be identified, e.g. fuel level, equipment status, hull integrity, etc.

[0063] The system 10 typically includes energising means 28 for operatively energising the controller 12, the positioning module 16 and the receiver 18. In one example, the energising means 28 includes at least one electrochemical cell, or a plurality to form a battery. In another example, the energising means 28 may include a photovoltaic arrangement for supplying at least one electrochemical cell with energy, an alternating current (AC) generator, or the like.

[0064] The controller 12 may also be configured to perform a system diagnostic check on the beacon 14, controller 12, receiver 18, positioning module 16 and/or energising means 28 on receipt of an interrogation signal via the receiver 18. In one example, the controller 12 may be configured to provide an indication of a status of the energising means 28, such as a battery charge status, operational capability status, etc. Similarly, the controller 12 may be configured to provide a health or related operability indication of the system 10, or constituents parts of said system 10. In one embodiment, the controller 12 is configured to transmit an outcome of such system diagnostic check.

[0065] For example, the system 10 can be interrogated by a remote-monitoring centre or SAR party 21 to check on the operation of the system 10 or beacon 14, such as status of energising means 28, status of GNSS module 16, status of receiver 18, or the like. This interrogation can include a check of all of the operation cycles of the system 10, or the like. This has the advantage of providing advanced notice of imminent failure of beacon 14. The controller 12 is also generally configured with a low-power monitoring element 13, which required very little power consumption and wherein only reception of the activation signal

20 from the SAR party 21 by the receiver 18 is monitored in order to minimise power consumption of the overall system 10.

[0066] In a further embodiment, in such low-power constant standby mode, the system 10 can be remote controlled to be turned on to deliver location information, then put back into standby mode to conserve power, then later on reactivated to confirm any changes in the location of the beacon, or the like. Such remote monitoring has the effect of increasing the effective period of operation of the system 10 or beacon 14 and taking account of any changes in position of the beacon 14 that may have happened since the previous location check.

[0067] In a yet further example, the controller 12 is configurable with a user-definable expiry date, wherein the controller 12 is configured to disable the energising means 28 when such expiry date is reached. For example, it is common in emergency beacons that they have a 'use-by' date after which they are not to be used. For this purpose, the system 10 can be programmed to blow a low power fuse in its power circuits once its use-by date has been exceeded, or the like. This also reduces the risk of false alarms from unregistered out-of-date emergency beacons.

[0068] In one example, the system 10 is enclosed in a sealed and impact-resistant housing 30 to prevent the ingress of water and/or dirt. In a further example, the system 10 can be used to remote control other devices in the vicinity of the emergency beacon 14 or system 10, as well as to communicate via e.g. short text messages with the users or operators of the emergency beacon, etc. Such remote control can be achieved by the use of an open collector type output from the system 10 or by a USB port connected by a suitable interface unit provided with its own

power, so as to avoid compromising the emergency power of the system 10 or beacon 14.

[0069] Referring now to Figure 2 of the accompanying drawings, there is shown an emergency radio beacon 14 in accordance with an aspect of the present invention. The beacon 14 generally incorporates the activation system 10 described above.

[0070] Accordingly, the beacon 14 comprises a transmitter 19 for operatively transmitting the emergency signal 22, the controller 12 operatively arranged in signal communication with the transmitter 19, the positioning module 16 arranged in signal communication with the controller 12 and configured to operatively provide spatial positioning data to the controller 12, as well as the receiver 18 arranged in signal communication with the controller 12 and configured to operatively receive the activation signal 20. As above, the controller 12 is configured to activate the transmitter 19 upon receipt of the activation signal 20 and to provide the spatial positioning data to the beacon 14 for inclusion into the emergency signal 22.

[0071] Applicant believes it particularly advantageous that the present invention provides means whereby an emergency radio beacon, such as an EPIRB or PLB, can be remotely activated via a suitable activating signal. Such functionality finds particular application in locating missing people or vessels fitted with emergency beacons in circumstances where manual activation of such beacons is not possible, such as due to people being unconscious, etc.

[0072] The skilled addressee is to appreciate that variations to the system 10 an/or beacon 14 are possible. For example, the system 10 generally provides a means of remotely activating a

standard emergency beacon 14 without user input. Such remote activation typically occurs from a SAR emergency control centre 21, which could be located anywhere in the world. Unlike a conventional emergency beacon, which only gets turned ON when activated by a user or when immersed in water, and as such is not consuming any power from its batteries, the emergency radio beacon activation system 10 is drawing power from the batteries all the time the system 10 is enabled.

[0073] As such, it is envisaged that the emergency radio beacon activation system 10 is only turned ON (enabled) while the owner/user is engaged in an activity which may be hazardous or a threat to life. When not required, the emergency radio beacon activation system 10 would be turned OFF (disabled), thus preventing the battery supply being discharged and unable to provide power during an emergency.

[0074] In general, the emergency radio beacon activation system 10 (and associated emergency beacon 14) would be fully charged prior to starting a journey or similar potentially perilous activity. In this mode or when being stored (not in use) the emergency radio beacon activation system 10 would be OFF (disabled). At the commencement of the journey or activity, the emergency radio beacon activation system 10 is turned ON (enabled). In this low power standby mode, the emergency radio beacon activation system 10 is ON and only powering the receiver electronics 18 and low-power controller element 13 which is of a very low power design. The rest of the controller electronics 12, the GNSS 16 and sensor 26 and including the emergency beacon 14 are disabled (OFF).

[0075] As described, the controller 12, the GNSS 16 and the sensor 26 can be powered-up via the controller element 13 at

regular intervals to check the status of those inputs, for example, to determine if the geofencing has been breached or any of the external sensor conditions have exceeded their pre-set levels, thus requiring transmission of the emergency signal 22. This usage consumes a minimum amount of electrical power and could be provided by a solar power supply.

[0076] When the system 10 is to be remote activated, a remote activation signal 20 from the emergency operations centre 21 is sent, causing the emergency radio beacon activation system 10 to power up the remaining control electronics. Once all the data transfer has been verified, the emergency radio beacon activation system 10 powers up the emergency beacon 14. Once the beacon 14 starts transmitting there is a significant increase in power consumption. However, once the beacon 14 transmits its position location information to the control centre and that information is verified the activation system 10 can power the beacon 14 OFF and return to its standby mode of operation.

[0077] A further advantage includes potential false alarms, which are one of the single biggest issues with emergency beacons, accounting for the vast majority of all emergency signals generated (reportedly 98% of alarms are false alarms). The system 10 and beacon 14 can also include an alarm authentication feature whereby the beacon is interrogated for position information from a registration rescue service who can then communicate with one or more emergency contact people (via telephone) and/or travel plans registered to the beacon which issued the emergency signal. The use of registered travel plans could be used to automate the authentication of emergency signals generated from a registered beacon. In this way, false alarms can be reduced or even eliminated.

[0078] Similarly, since about 25% of all emergency beacons are not registered, there is usually a significant risk of false alarms being generated and no easy way to identify the owners of those beacons. Hence, the system 10 can also be programmed for receiving a deactivation signal for rendering the system inoperative where it generates repeated false alarms. The beacon is, however, able to be reactivated by re-registering it with a monitoring agency.

[0079] Optional embodiments of the present invention may also be said to broadly consist in the parts, elements and features referred to or indicated herein, individually or collectively, in any or all combinations of two or more of the parts, elements or features, and wherein specific integers are mentioned herein which have known equivalents in the art to which the invention relates, such known equivalents are deemed to be incorporated herein as if individually set forth. In the example embodiments, well-known processes, well-known device structures, and well-known technologies are not described in detail, as such will be readily understood by the skilled addressee.

[0080] The use of the terms "a", "an", "said", "the", and/or similar referents in the context of describing various embodiments (especially in the context of the claimed subject matter) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. The terms "comprising," "having," "including," and "containing" are to be construed as open-ended terms (i.e., meaning "including, but not limited to,") unless otherwise noted. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items. No language in the specification should be construed as indicating

any non-claimed subject matter as essential to the practice of the claimed subject matter.

[0081] It is to be appreciated that reference to "one example" or "an example" of the invention, or similar exemplary language (e.g., "such as") herein, is not made in an exclusive sense. Various substantially and specifically practical and useful exemplary embodiments of the claimed subject matter are described herein, textually and/or graphically, for carrying out the claimed subject matter.

[0082] Accordingly, one example may exemplify certain aspects of the invention, whilst other aspects are exemplified in a different example. These examples are not intended to limit the overall scope of the invention in any way unless the context clearly indicates otherwise. Variations (e.g. modifications and/or enhancements) of one or more embodiments described herein might become apparent to those of ordinary skill in the art upon reading this application. The inventor(s) expects skilled artisans to employ such variations as appropriate, and the inventor(s) intends for the claimed subject matter to be practiced other than as specifically described herein.

CLAIMS

1. A system for remote activation of an emergency radio beacon by a Search and Rescue (SAR) party, said system comprising:
 - a controller operatively arranged in signal communication with an emergency radio beacon;
 - a receiver arranged in signal communication with the controller and configured to operatively receive an activation signal from the SAR party; and
 - a positioning module arranged in signal communication with, and configured to operatively provide spatial positioning data to, the controller, wherein the controller is configured to activate the beacon upon receipt of the activation signal and to provide the spatial positioning data to the beacon for transmission as part of an emergency signal.
2. The system of claim 1, wherein the controller is configurable with a predetermined geo-fence, said controller configured to activate the radio beacon should the system move outside the geo-fence, as determined by the positioning module.
3. The system of either of claims 1 or 2, wherein the controller includes a transducer configured to monitor a predetermined aspect of a vessel or person.
4. The system of claim 3, wherein the predetermined aspect is selected from a human physiology-related measurement and/or an operational characteristic of a vessel.
5. The system of any of claims 1 to 4, wherein the radio beacon is selected from a group consisting of an EPIRB (emergency position-indicating radio beacon), a PLB (personal locator

beacon), an ELT (emergency location transmitter), and a SEPIRB (submarine EPIRB).

6. The system of any of claims 1 to 5, wherein the controller is arranged in communication with the beacon by means of a suitable electromagnetic waveguide.

7. The system of any of claims 1 to 6, wherein the controller is configured to encode the spatial positioning data for transmission as part of the emergency signal.

8. The system of any of claims 1 to 7, wherein the positioning module includes a global navigation satellite system (GNSS) module.

9. The system of any of claims 1 to 8, wherein the receiver includes a radio frequency receiver.

10. The system of any of claims 1 to 9, wherein the receiver is configured to receive the activation signal in a frequency allocated for satellite transmission systems.

11. The system of any of claims 1 to 10, wherein the controller is configured to perform a system diagnostic check on the beacon, controller, receiver, positioning module and/or energising means on receipt of an interrogation signal via the receiver.

12. The system of claim 11, wherein the controller is configured to transmit an outcome of such system diagnostic check.

13. The system of any of claims 1 to 12, wherein the controller is configured with a low-power consumption element

whereby only reception of the activation signal from the SAR party by the receiver is monitored in order to minimise power consumption.

14. The system of any of claims 1 to 13, which is enclosed in a sealed and impact-resistant housing to prevent the ingress of moisture and/or dirt.

15. The system of any of claims 1 to 14, which includes an audible and/or visual indicator that is activated upon receipt of the activation signal.

16. An emergency radio beacon remotely activatable by a Search and Rescue (SAR) party, said beacon comprising:

- a transmitter for operatively transmitting an emergency signal;

- a controller operatively arranged in signal communication with the transmitter;

- a receiver arranged in signal communication with the controller and configured to operatively receive an activation signal from the SAR party; and

- a positioning module arranged in signal communication with, and configured to operatively provide spatial positioning data to, the controller, wherein the controller is configured to activate and provide the spatial positioning data to the transmitter upon receipt of the activation signal so that the emergency signal is indicative of a geographic position of the beacon.

17. The beacon of claim 16, wherein the controller includes a transducer configured to monitor a predetermined aspect of a vessel or person.

18. The beacon of claim 17, wherein the predetermined aspect is selected from a human physiology-related measurement and/or an operational characteristic of a vessel.

19. The beacon of any of claims 16 to 18, wherein the controller is configured with a low-power consumption element whereby only reception of the activation signal from the SAR party by the receiver is monitored in order to minimise power consumption of the system.

20. The beacon of any of claims 16 to 19, wherein the controller is configurable with a user-definable expiry date, said controller configured to disable the beacon when such expiry date is reached.

21. The beacon of any of claims 16 to 20, wherein the controller is configured to perform a system diagnostic check on the beacon, controller, receiver, positioning module and/or energising means on receipt of an interrogation signal via the receiver.

22. The system of claim 21, wherein the controller is configured to transmit an outcome of such system diagnostic check.

23. A method for retrofitting an emergency radio beacon with a system for remote activation of said beacon by a Search and Rescue (SAR) party, said method comprising the steps of:

providing an emergency radio beacon; and

fitting a system for remote activation of an emergency radio beacon according to any one of claims 1 to 16 thereto.

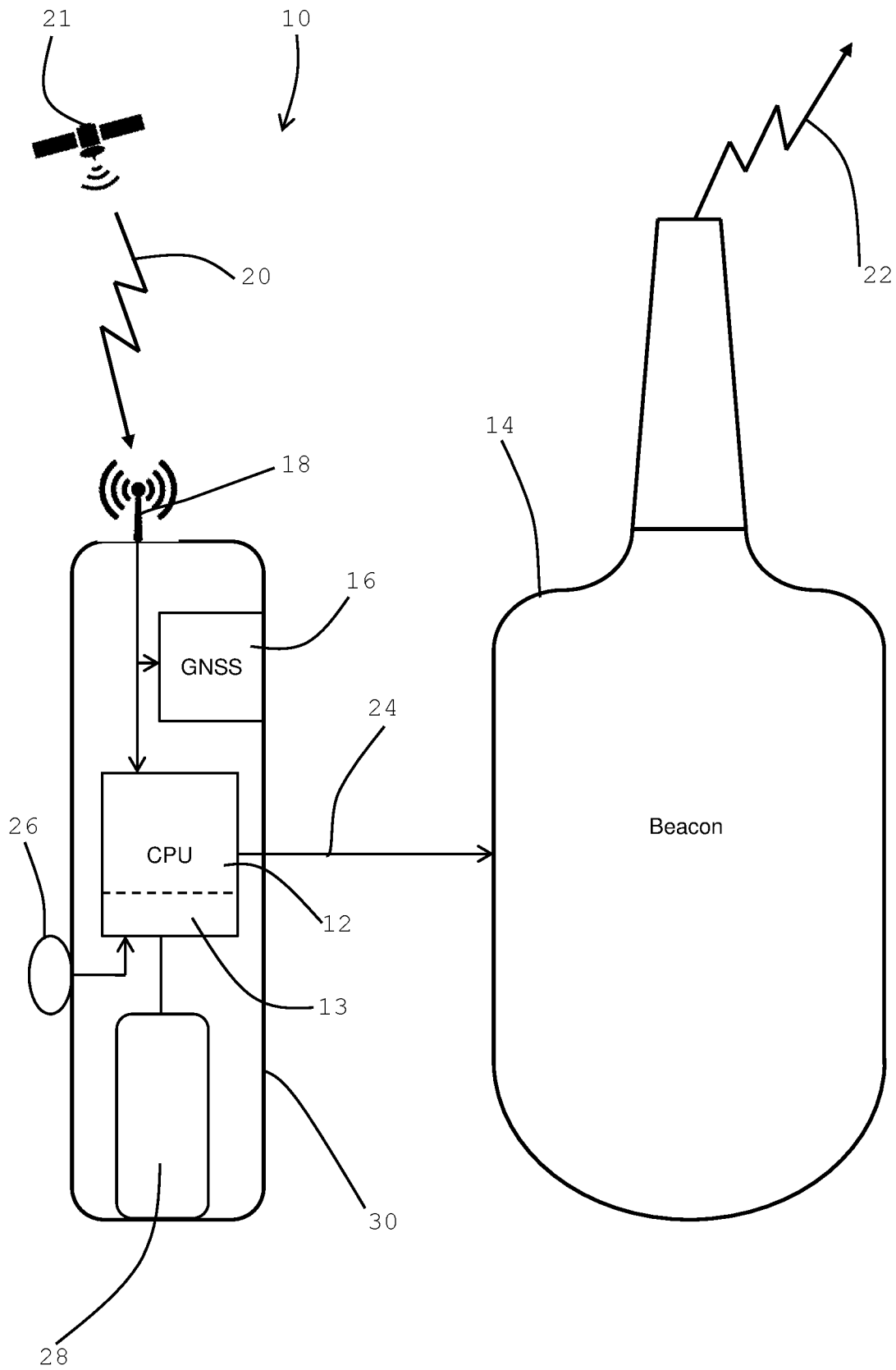


Figure 1.

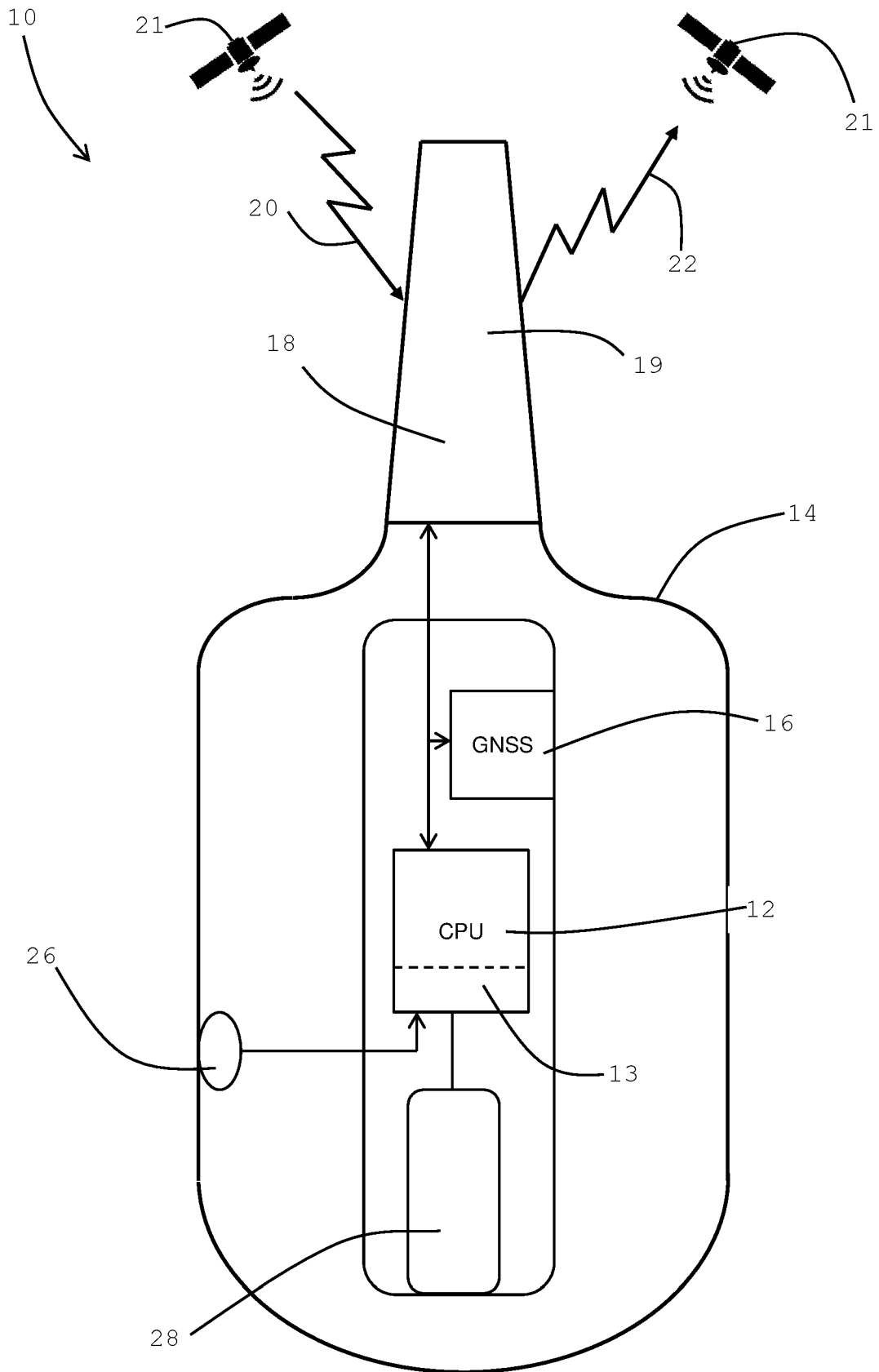


Figure 2.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2018/051119

A. CLASSIFICATION OF SUBJECT MATTER

G01S 1/68 (2006.01) G01S 5/00 (2006.01) G08B 5/00 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Databases: PATENW, Google patents, Google scholar, Google images & Esp@cenet :

CPC/IPC Codes: G01S 1/68, G01S 5/00, G08B 5/00. Keywords: emergency, beacon, GPS, receiver, geo fence and similar keywords

Google patents, Auspat, Espacenet and IP Australia's internal databases: Applicants'/Inventors' name (DORINETTE FRANSIEN HARVEY, FREDERICK HARVEY), keywords (emergency, beacon, GPS, receiver , geo fence and similar keywords)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

 Further documents are listed in the continuation of Box C See patent family annex

* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
10 December 2018Date of mailing of the international search report
10 December 2018

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
Email address: pct@ipaustralia.gov.au

Authorised officer

Riju Jacob
AUSTRALIAN PATENT OFFICE
(ISO 9001 Quality Certified Service)
Telephone No. +61262832220

INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		PCT/AU2018/051119
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2003/089953 A1 (INMARSAT LTD) 30 October 2003 Abstract, pages 2-11 and figures 1-2.	1-23
X	US 8514095 B2 (GREER et al.) 20 August 2013 Abstract, pages 2-5 and figures 1-8	1-23
X	GB 2430064 A (ROYAL NATIONAL LIFEBOAT INSTITUTION) 14 March 2007 Abstract, pages 1-27 and figures 1-16	1-23
A	US 2017/0238129 A1 (NICHOLAS M. MAIER) 17 August 2017 Paragraphs 0090-0091, 0328-0329	2
A	Hoffman. C, 'Beacon Manufacturers Workshop 2016', Radio Technical Commission for Maritime Services (RTCM), 2016, pages 1-19. [retrieved from internet on 30 November 2018] <URL: https://www.sarsat.noaa.gov/BMW%202016_files/RTCM_SC110_BMW2016_Presentation.pdf > Page 14	2

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2018/051119

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	Publication Date	Publication Number	Publication Date
WO 2003/089953 A1	30 October 2003	WO 03089953 A1	30 Oct 2003
		WO 03089953 B1	18 Dec 2003
		AU 2003222979 A1	03 Nov 2003
US 8514095 B2	20 August 2013	US 2009209227 A1	20 Aug 2009
		US 8514095 B2	20 Aug 2013
GB 2430064 A	14 March 2007	GB 2430064 A	14 Mar 2007
US 2017/0238129 A1	17 August 2017	US 2017238129 A1	17 Aug 2017
		AU 2010222708 A1	06 Oct 2011
		AU 2010222708 B2	24 Jul 2014
		AU 2014213514 A1	04 Sep 2014
		AU 2014213514 B2	14 Jul 2016
		BR PI1009819 A2	16 Nov 2016
		CA 2754945 A1	16 Sep 2010
		CN 102712686 A	03 Oct 2012
		CN 102712686 B	17 Oct 2017
		EP 2406280 A1	18 Jan 2012
		EP 2406280 B1	14 May 2014
		EP 2754668 A2	16 Jul 2014
		EP 2754668 B1	09 May 2018
		EP 3392269 A1	24 Oct 2018
		HK 1199888 A1	24 Jul 2015
		JP 2012520278 A	06 Sep 2012
		JP 5847590 B2	27 Jan 2016
		SM T201400120 B	10 Nov 2014
		US 2007270164 A1	22 Nov 2007
		US 7937067 B2	03 May 2011
		US 2010317317 A1	16 Dec 2010
US 8442481 B2	14 May 2013		
US 2011207429 A1	25 Aug 2011		
US 8442482 B2	14 May 2013		
US 2013203376 A1	08 Aug 2013		
US 8755767 B2	17 Jun 2014		
US 2014295786 A1	02 Oct 2014		
US 8918075 B2	23 Dec 2014		

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

Form PCT/ISA/210 (Family Annex) (January 2015)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2018/051119

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report**Patent Family Member/s****Publication Number****Publication Date****Publication Number****Publication Date**

US 2015140954 A1	21 May 2015
US 9094816 B2	28 Jul 2015
US 2015334545 A1	19 Nov 2015
US 9635534 B2	25 Apr 2017
US 2013045212 A1	21 Feb 2013
US 2016039919 A1	11 Feb 2016
US 2018206100 A1	19 Jul 2018
WO 2010103289 A1	16 Sep 2010

End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

Form PCT/ISA/210 (Family Annex) (January 2015)