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B63C 9/00 (2006.01) ***B60K 28/04*** (2006.01)

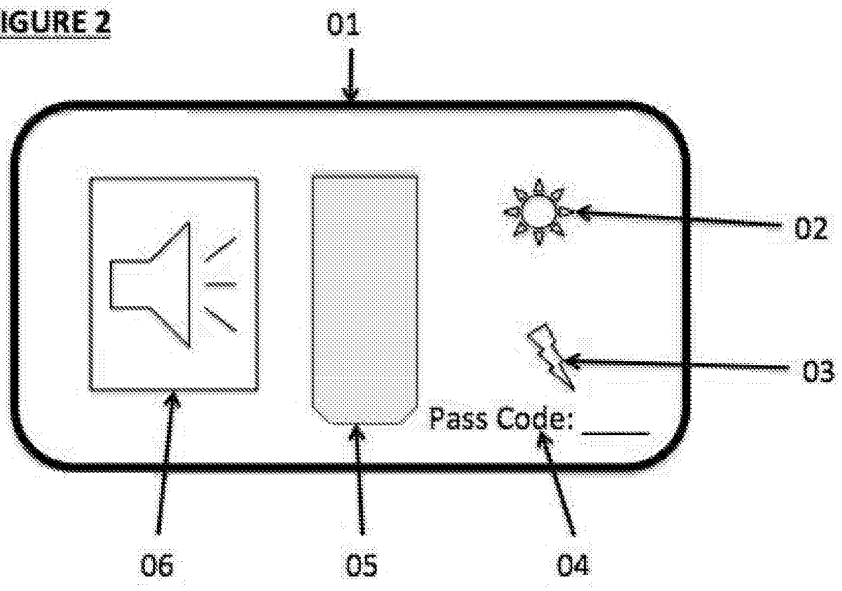
(56) Documents Cited:
GB 2444967 A
WO 2005/125108 A1
WO 1997/039924 A1
WO 2007/064834 A3
WO 2004/007276 A1
US 20040222891 A1

(58) Field of Search:
INT CL **B60K, B60L, B63C**
Other: **WPI, EPODOC, Internet**

(54) Title of the Invention: **Automatic Bluetooth controlled marine engine kill switch with distress activation**
Abstract Title: **A wireless marine engine kill switch**

(57) An engine immobiliser for a marine engine where the engines kill switch circuitry is controlled by a unit that is activated wirelessly by a Bluetooth (RTM) enabled mobile device that is paired with the control unit, when the control unit fails to detect the presence of the mobile device which is carried/worn by a user, the engine is immobilised by the kill switch circuitry. After a predetermined time period, to prevent false emergencies, one or more distressed signals are activated. The mobile device is preferably a mobile phone with Bluetooth (RTM) capabilities. The distress signal may be an audible or visible alarm e.g. the vessels horn sounding, lights flashing, and / or the sending of a radio message or activation of a search and rescue transponder. The device preferably has an override switch that allows the device to be started without the presence of the paired device.

FIGURE 2



GB 2523842 A

FIGURE 1

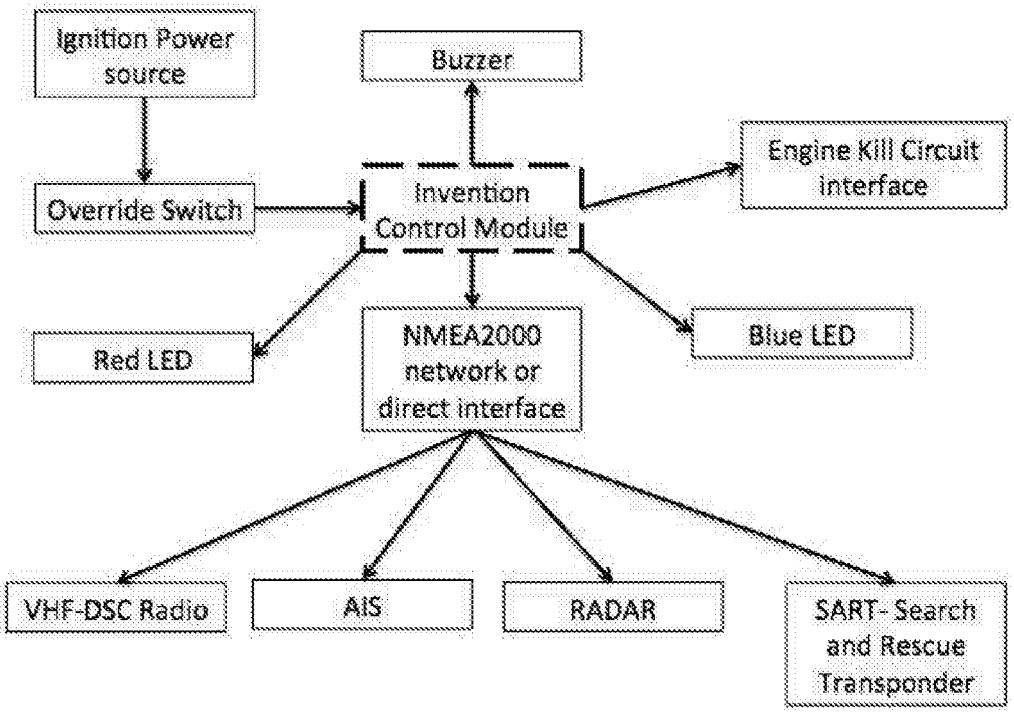
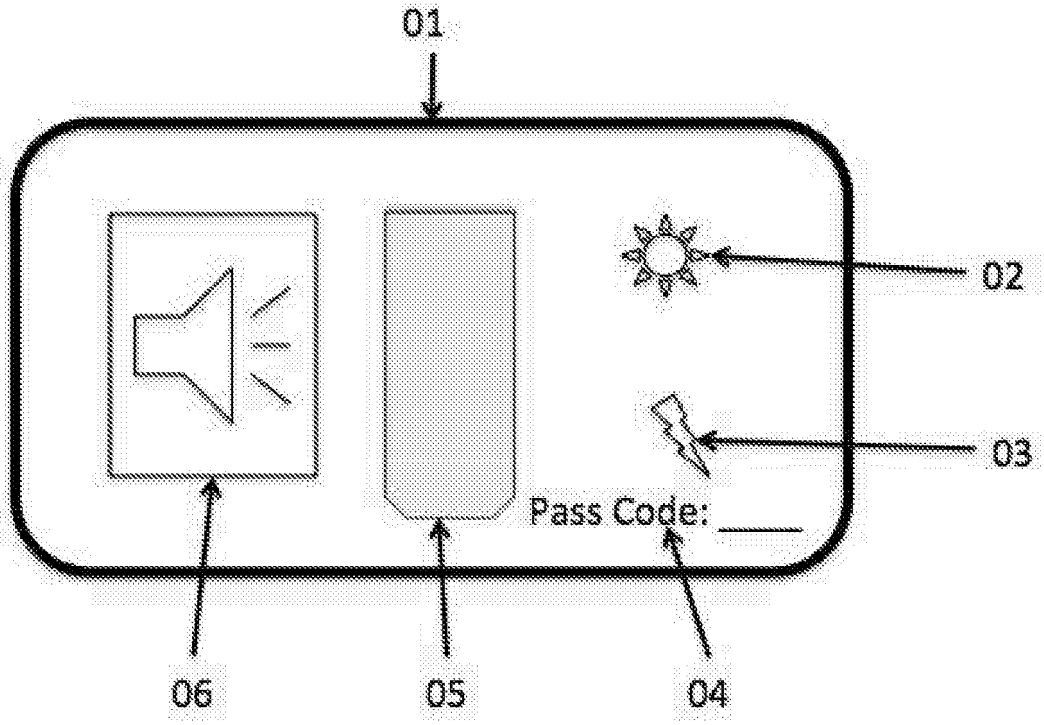


FIGURE 2



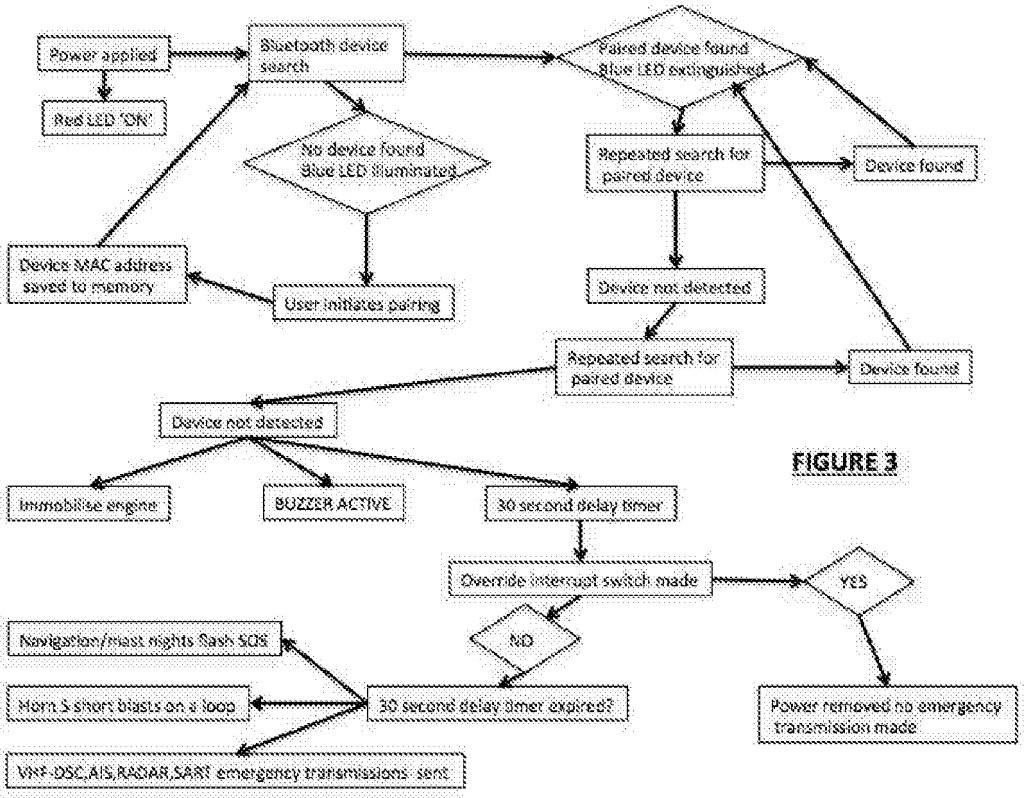

Power applied
Bluetooth device search
Paired device found Blue LED extinguished
Red LED 'ON'
No device found Blue LED illuminated
Repeated search for paired device
Device found
Device MAC address saved to memory
User initiates pairing
Device not detected
Repeated search for paired device
Device found
Device not detected
Immobilise engine
BUZZER ACTIVE
30 second delay timer
Override interrupt switch made
YES
NO
Navigation/mast nights flash SOS
Horn 5 short blasts on a loop
30 second delay timer expired?
Power removed no emergency transmission made
VHF-DSC,AIS,RADAR,SART emergency transmissions sent

FIGURE 3

The following terms are registered trade marks and should be read as such wherever they occur in this document:

Bluetooth

Automatic Bluetooth Controlled Marine Engine Kill Switch with Distress Activation

1. Field of Invention

[001] The present invention relates Bluetooth enabled mobile phone devices and the compatibility with marine engine control apparatus, immobilising the engine when the Bluetooth connection to the mobile device has been lost. The engine control apparatus provides a signal drive to facilitate output to vessel lighting, horn, SART, VHF DSC subsystems by either direct interface or NMEA2000 network.

2. Description of the related art

[002] Boats are fitted with a Kill Cord, often refereed to as a '*Dead Mans Switch'*. It's a simple device that physically connects the boats helmsman to an engine switch. If the driver falls overboard the switch is made and the engine is immobilised stopping the boat in the water. However these cords are often forgotten about or more so, ignored. This has led to many cases of people being thrown overboard from their vessels and being left to drown with no distress alert being raised.

[003] Mobile phones are Bluetooth enabled devices and are commonplace in everyday life and are inherently carried on ones person. Bluetooth systems are capable of auto detecting the presence of a mobile device and providing an action once a connection has been established.

3. Summary of the invention

[004] The presented invention provides an automatic wireless engine kill switch for marine engines.

[005] The user is required to have their mobile phone on their person and have the Bluetooth facility turned on.

[006] The invention utilises the Bluetooth signal transmitted by the users mobile phone to enable the invention control module

[007] The invention consist of a control unit which interfaces, via direct connection or NMEA2000 network, with the vessels; marine engine, VHF DSC Radio, Radar, Horn, Lighting and electrical supply systems.

[008] The control unit has direct connection to the marine engines existing 'Kill Circuit' and electrical power is sourced from the engines ignition power supplies.

[009] The control unit is Bluetooth enabled with a small Bluetooth transmitter/receiver device. The Bluetooth device is pre-coded with a unique passcode that is embedded at manufacture.

[010] The invention is initialised when the ignition is turn on. With power available a Red LED indicates that the invention is 'ON' and Blue LED illuminates to indicate no mobile device is connected.

[011] The user then searches for Bluetooth devices with their mobile phone. The engine control switch name shall be displayed in the list.

[012] The user then pairs the device from their phone using the unique password associated with the control unit [009] printed to the external body of the invention.

[013] The control unit recognises the paired device and the devices MAC address is saved to memory. The Blue LED on the control device extinguishes, as there is now a connected device.

[014] Now whenever power (ignition turned on) is applied to the invention it will auto connect to the paired device. Making the invention no longer require user input when stepping aboard their vessel.

[015] To pair a new device the old mobile device must have its Bluetooth turned off. The invention will fail to auto connect to the device MAC address in its memory and the Blue LED will illuminate. A new device can now be paired by steps [010] to [012].

[016] Once pairing has been established the invention arms its self and continually monitors for the presence of the mobile device once every 2 seconds, 2 seconds as to save the mobile devices battery utilising Bluetooth Sniff Subrating techniques.

[017] If the invention no longer detects the paired mobile device the control unit will search again for the paired device.

[018] If the control unit is still unsuccessful in its search it will assume the user has fallen overboard, thus being out of range for the Bluetooth signal and immobilise the engine utilising the engines existing kill circuit- stopping the vessel.

[019] A timer circuit initialises with a tone sounder. The user has 30 seconds to either; restart the engine, operate the override control on the invention or remove power from the engine to prevent false emergency message transmissions [020 below].

[020] If [019] is not carried out within 30 seconds the control module will initiate a state of distress and requirement for aid by sending an output drive signal to; flash the vessels navigation/mast lights at a Morse Code SOS rate. The vessels horn sounds 5 short blasts in a loop. The invention also provides an output drive to the vessels VHF DSC radio, Radar SART system for transmission of a distress signal.

[021] A guarded override switch connected to the invention allows for the engine to start/run without the presence of a paired device and to cancel all distress signals prior to their messages being sent.

[022] The override switch removes the power source to the control module thus preventing it from operating the engine kill circuits and providing output drives to sub systems.

3. Detailed Description of the Preferred Embodiments

[023] Figure. 1 shows the integration of components connected to and controlled by the central control module.

[024] Figure.2 is an example of the control unit (1) and how it could be laid out for user interface. The control could also become an integral part of the marine engine control unit. LED indication of power being applied (3) and LED indication (2) of a paired device. Audible buzzer (6) and a location for the pass code (4) used in pairing. The override switch (5) is central as to allow immediate access.

[025] Figure. 3 is a flow diagram of the system response.

4. What is Claimed

1. A marine engine immobilising device comprising:
   A control module powered by the vessels power supply. With Bluetooth capability such that pairing can be made with a mobile phone device;
   A Blue LED illuminates when there is no Bluetooth connection(pairing) and extinguishes when a connection is established. Once pairing with a device has been established, with a unique pass code, the control module constantly monitors the presence of the paired device.
   Said control module has an interface with the vessels marine engine 'Kill Circuit' to allow the engine to be turned off (immobilised).
   When said device can no longer detect the Bluetooth paired mobile phone then the control module will immobilise the connected engine and the vessel shall stop in the water.
   When the engine is immobilised a horn/buzzer shall sound for 30 seconds prior to a command signal been given from said control module to a NMEA2000 network to associated subsystem and direct output to VHF-DSC Radio, SART, Radar, AIS systems.
2. The system of claim (1) wherein said power supply is sourced from the vessels ignition system, which becomes live when power is applied to the vessel.
3. The system of claim (1) wherein said Bluetooth capability a Bluetooth device of which range can be set to a default value.
4. The system of claim (1) wherein said pairing is with a mobile phone with Bluetooth capability.
5. The system of claim (4) wherein said pairing is only required to be manually established on first connection to the invention.
6. The system of claim (5) wherein said first connection as the MAC Address of said paired device is stored to memory.
7. The system of claim (6) wherein said memory with the MAC address held in memory the next time the invention is powered on the device will automatically connect to the stored device in memory if it is within range of the invention.

8. The system of claim (7) wherein said range can be specified dependant on class of Bluetooth device utilised in manufacture.
9. The system of claim (1) wherein said monitors for paired device continuous searches for the paired device are carried out on loss of the mobile phone connection a repeat search is carried out.
10. The system of claim (9) wherein said repeat search to confirm loss of connection in case loss of connection was a false alarm
11. The system of claim (1) wherein said will immobilise the connected engine this is by utilising the engines existing Kill Circuit which in most cases is to ground the charge capacitors within the ignition system.
12. The system of claim (11) wherein said ignition system for diesel engines may require activation of a fuel stop solenoid.
13. The system of claim (1) wherein said a horn/buzzer shall sound is for 30 seconds so that accidental activation of the invention can be prevented from generating a emergency message send.
14. The system of claim (1) wherein said pass code is utilised for pairing mobile devices such that cross connections can not be made with similar devices within Bluetooth range.
15. The system of claim (1) wherein said command signal comprises of a output electrical signal via either NMEA2000 databus to connected subsystems or by hardwire link to sub systems.
16. The system of claim (15) wherein said subsystems is to linked VHF-DSC Radio, SART, Radar, AIS systems.
17. The system of claim (1) wherein said VHF-DSC Radio, SART, Radar, AIS systems is to facilitated the devices means of sending a emergency transmission.
18. The system of claim (17) wherein said emergency transmission this defines the requirement for aid or rescue by the subsystems programmed modes of operation.
19. The system of claim (1) wherein said marine engine being either petrol or diesel fuelled.
20. The system of claim (6) wherein said within range if not in range a new device can be paired.

21. The system of claim (20) wherein said new device can be paired, only one device may be paired at any one time.
22. The system of claim (2) wherein said power is applied once applied a Red LED illuminated to identify the module is operating.

Application No: GB1404110.7 **Examiner:** Sally Vaughan

Claims searched: 1 - 22 **Date of search:** 13 May 2014

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1 at least	WO2004/007276 A1 (AQUALIV AB) see whole document
X	1 at least	WO2005/125108 A1 (AQUALIV AB) see whole document
X	1 at least	WO2007/064834 A3 (VIGGIANO et al) see whole document
X	1 at least	GB2444967 A (VISION ENGINEERING LIMITED) see whole document
X	1 at least	WO97/39924 A1 (MURRAY) see whole document
X	1 at least	US2004/0222891 A1 (EHLERS) see whole document

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

B60K; B60L; B63C

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, Internet

International Classification:

Subclass	Subgroup	Valid From
B63C	0009/00	01/01/2006
B60K	0028/04	01/01/2006