AIR-SEA-RESCUE DRIFT BUOY

Fig. 1a

Fig. 7a

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Fig. 7

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[Signature]
Fig. 8

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CRISTAL OSCILLATOR

KEYING MOTOR AND SWITCH

BATTERY SUPPLY

DOUBLER

TONES OSCILLATOR

MODULATOR

FINAL AMPLIFIER
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Fig. 13

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This invention relates to air-sea-rescue devices and more particularly to new and improved droppable equipment designed to facilitate the locating of survivors of aircraft abandoned at sea.

It is well known that it is very difficult to locate survivors of aircraft disasters at sea particularly when the weather is inclement and the sea is rough. The tracking of life rafts or boats is greatly complicated by the action of wind and varying sea currents. For these reasons it is desirable that some means should be provided which will ride out the worst sea conditions and which will function automatically upon release.

Means previously used to indicate the location at sea of airplane disasters have included both aural devices, such as radio transceivers, and visual signalling aids, such as colored dye markers, flashing lights, or reflecting surfaces. However, prior rescue aids were not completely successful for several reasons, among which can be listed (1) failure to function properly, (2) failure to operate properly under varying sea conditions, (3) failure to drift in the sea at the same rate as the survivors' craft, and (4) failure to operate for an extended period of time.

It is therefore an object of the present invention to provide a new and improved air-sea-rescue buoy or device which is actuated upon ejection from an aircraft.

It is a further object of the present invention to provide an air-sea-rescue buoy which is positive in operation.

It is a further object of the present invention to provide an air-sea-rescue buoy which may be manually or mechanically launched.

Another object of the present invention is to provide an air-sea-rescue buoy which will operate under varying sea conditions.

Still another object of the present invention is to provide an air-sea-rescue buoy which will have the same rate and direction of drift as aircraft rafts when normally loaded and retarded by sea anchor.

An additional object of the present invention is to provide an air-sea-rescue buoy containing a plurality of signal means.

Yet another object of the present invention is to provide an air-sea-rescue buoy which will function upon impact with the sea.

Still another object is to provide improved release and acting means for an air-sea-rescue device whereby the device is automatically actuated upon launching.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a view of the drift buoy prior to launching;
FIG. 1A is a view showing selected upper and lower portions of the drift buoy during its descent;
FIG. 2 is a view of the drift buoy in operating condition;
FIG. 3 is a view of the upper case and the drift float sections;
FIG. 4 is a view of the drift float section retaining means;
FIG. 5 is a section taken on line V-V of FIG. 4;
FIG. 6 is a sectional view of the rotor release assembly;
FIG. 7 is a sectional view of one type of gas generator;
FIG. 7A is a sectional view of part of the lower casing illustrating the base release feature;
FIG. 8 is a sectional view of an alternative type of gas generator;
FIG. 9 is a sectional view of the thrust plunger used in the modification of FIG. 8;
FIG. 10 is a section view of transmitter switches and acting means before operation;
FIG. 11 is a section view of transmitter switches and acting means after operation;
FIG. 12 shows details of a toggle arm; and
FIG. 13 is a block diagram of the transmitter.

Despite the lightweight radio transceivers and visual signalling aids which have been provided for survivors of aircraft and surface vessels disasters at sea, the tracking of these men as their emergency craft are borne from the accident site by wind and currents usually presents great difficulties. To increase the chances of successful ocean search, experience has shown that more and better information is needed on the locally existing conditions which cause the drift of survivors' rafts or boats. Since in many ocean areas such information is not readily available, and cannot be closely predicted, it was deemed advisable to develop a small, droppable, buoyant, radio beacon which could be regularly carried and at a time of distress could be readily launched. One prerequisite was that this apparatus could ride out the worst of sea conditions and function automatically as soon as it was seaworn.

The apparatus developed is equipped to send out alerting and identifying signals to serve for prompt notification of a distress and the locating of the buoy by the air craft, ship, or shore stations using radio direction-finding equipment. Also included are one or more kinds of visual signals for short-range recognition of the buoy on the sea surface. Another distinctive feature of the buoy, of particular value where survivors are incapable of immediately retrieving and securing the buoy to their emergency craft, is the designing of the buoy in such a way that when it is freely drifting its rate and direction of drift is almost exactly the same as that of the survivors' craft when it is retarded by a sea anchor. Thus, even after a much delayed or interrupted search, a locating of the buoy by search craft will bring the searchers within a few miles of the survivors and permit the latter to use other signals or radio equipment effectively.

To insure that the air-sea-rescue buoy can be launched with existing equipment and that signals could be readily received, the equipment developed includes the following limitations:

(1) Dimensions identical with those of Sonobuoy AN/SSQ-2;
(2) Incorporate a UHF transmitter designed to operate on 243 megacycles and to be received and homed on by such airborne equipment as AN/ARC-27 and AN/ARA-25; and
(3) Have maximum signal range, with operating life a lesser consideration.

From a functional standpoint the basic components of the air-sea-rescue drift buoy hereinbelow described are:

(a) The case and auxiliary mechanisms which limit the terminal air speed and set the buoy into operating condition after impact with the sea;
(b) The drift float; and
(c) The UHF transmitter.

These components are incorporated in a structural design which permits the use of existing stowing and launching equipment.

In general the buoy consists of an upper and lower case joined with gasketed flanges. The smaller upper case
contains a shock-mounted transmitter chassis, switches, release mechanism, and gas manifold. The drift float is mounted surrounding the upper case and when collapsed, is contained in the annular space between the upper case and a three piece cylindrical shield formed by jetstreamable float covers. Mounted on the upper case is the "mechanical parachute" cap and rotor assembly including the release mechanism. Located in the lower case are batteries, gas generator, and the impact plate and dye-marker assembly. From the impact plate a rod extends to the transmitter switch mounted in the lower end of the upper casing. Another rod extends similarly from the transmitter switch to the rotor-release mechanism at the upper end of the buoy. An upward displacement of the impact plate, through the resulting action of these rods, actuates the switch and the rotor release mechanism.

Referring now to FIG. 1, there is shown the air-sea-rescue buoy 10 prior to launching. The buoy 10 consists of a lower case 11, impact plate and dye-marker assembly 12, drift float covers 13, and the "mechanical parachute" cap and rotor cap assembly 14. Both the impact plate and dye marker assembly 12 and the "mechanical parachute" 14 are those used in the AN/SQS-2 Sonobuoy. Prior to launching, the arms of the parachute, which are spring loaded, are held in an inoperative position by means of tape 15. Since the external dimensions of the air-sea-rescue drift buoy are the same as those of the Sonobuoy its characteristics during storage, launching, air drop, and impact are similar. FIG. 1A shows the retarding propellers and also exposes to view one of the coil springs which ejects cap assembly 14 when locking hook 28 is displaced upwardly in response to the impact of the buoy on the sea surface. The only modification to this part of the conventional Sonobuoy required to accommodate it to the present invention is the addition of a depending tab 27 to the retaining ring 26. This tab, as will be seen hereinafter, holds band 24 in place, and this band keeps shields 13 together during the descent stage so that no damage is done to the inflatable float 25, better shown in FIG. 2. The lower portion of FIG. 1A illustrates the general details of the dye marker and the crash plate and, as will be discussed hereinafter reveals how the crash plate dye capsules and dye marker plate separate from the rest of the buoy assembly upon impact.

Upon impact of the buoy the assembly 14, the float cover sections 13, and the impact and dye-marker plates are jettisoned in a manner hereinbelow set forth, while the transmitter switches are closed and float inflation is started enabling the buoy to perform its basic functions.

The buoy-case consists of lower and upper cylindrical sections 11 and 19 respectively which may be constructed of linen-reinforced phenolic resin tubing. The upper section is fitted with a Bakelite sleeve 21 upon which is mounted an aluminum collar having lugs 22 thereon for attachment of the rotor-cap assembly. The Bakelite sleeve supports the top end plate 18 of the transmitter and the spring plunger assembly of the rotor release mechanism. To the lower end of case section 19 is pressed-fitted the sleeve of an aluminum flanged coupling 20. This mates with a sleeve fitted into the lower case section 11 which extends slightly above the assembled coupling flanges to furnish a retaining ring for the bottom edges of the drift-float covers 13. Also mounted on flange 20 is switch and transmitter assembly and the gas tube for inflating the drift float 25.

The float covers 13, of which there are three, are used primarily as a protection for the float against physical damage prior to and during launching. When in place the bottoms of the covers plate fit inside the extended rim of the top case section 11. The plates are held down by a small angle 23 which fits under the top case sleeve 21 and are held in position by means of a retaining or clamping band 24 positioned near the top of the cover plates. When the clamping band is released upon impact of the buoy the top of the plates are free to move outward to clear the angle 23 and the plates can lift out of the lower case ring.

The band 24 is of phosphor bronze or the like and has a slot near each end into which fits the locking lug 29 when the band is positioned about the plates so that the slots are aligned. The band 24 is held retained by means of the tab 27 brazed to the standard Sonobuoy retaining ring 26. In assembling the air-sea-rescue drift buoy the float covers 13 are temporarily clamped by means of a hose clamp or the like, the rotor assembly 14 is placed in position and held by the retaining ring 26 which is held in position by the lugs 22. The ends of the ring 26 are then brought together and the locking hook 28 is forced through aligned holes in both bands. The float cover retaining band 24 with its locking lug 29 is then installed and positioned so that the free end is under the tab 27 of the retaining ring 26. Upon impact the hook 28 is driven out of the rotor retaining spring ring 26, in a manner hereinafter set forth, allowing the ring 26 to be released. This removes the tab 27 from the clamping band 24 and due to the coaction of the locking lug 29 and the slots in the band 24 the clamping band 24 is released permitting the cover plates to fall free.

The rotor release assembly, FIG. 6, is a modification that has been made in adapting the Sonobuoy rotor release system to the air-sea-rescue drifting buoy. The assembly consists of a spring biased plunger 30 normally held in a retracted position by latch 31 pivoted on rod 33. The latch 31 is actuated by rod 32 to release the plunger 30 upon impact of the buoy. The plunger 30 forces the locking hook 28 from the holes in the ends of the retaining ring 26 allowing the rotor assembly to be jettisoned. The lower end of rod 32 can be best seen in the bottom part of FIG. 1A which is drawn with a portion of tube 11 removed to disclose the rest of the rod on plate 63. It will be recalled from what has been said hereinbefore that when an upward force acts against this crash plate, clamp 92, as seen in this figure and as waved in FIG. 7A, moves out from a locking relationship with the lower edge of one of the openings 66 in the base ring 67. When this clamp clears this edge, a U-shaped spring 93, held under tension by a pair of spaced posts 90 and 91, causes it to move to the right, as waved in FIG. 7A, sufficiently far so that its depending projection clears the inner wall of the base ring. This allows the crash plate to fall free, along with dye marker plate 51 and dye markers 62. With the latter plate no longer present, spring 46 cannot maintain the input water valve closed, and water now commences to flow up the tube into reservoir pan 43 in a manner which will be hereinafter set forth in greater detail. It is sufficient at this point to note that valve 50 lifts at this time because of the static pressure acting on it and that the reservoir insures the availability of a sufficient volume of water to completely the chemical reaction that produces the gas for inflating the float.

The drift float 25 in inflated condition surrounds the upper case section and controls the rate of drift of the buoy. In construction it consists of two separate gas cells joined on one side of the buoy from fabric strips at both the inner and outer diameters and on the other side by linings. Two inflation fittings lead through holes in the case to two matching fittings of the gas manifold. The float material is a neoprene coated nylon fabric which has adequate strength and still is sufficiently thin and flexible to be folded and packed in the restricted space between the case tube section 19 and the float covers 13 as shown in FIG. 3.

Reference is now made to FIG. 7 wherein is illustrated one modification of a gas generator for inflating the float. This modification comprises an acetylene generator mounted in a recess in the bottom of lower case section 11. Permanently attached to the case section 11 is
the gas outlet fitting through which the drift float 25 is inflated. All other components of the acetylene generator are mounted on base plate 35 and are removable for adjustment or repair. The principal components of this generator are a partition 36, sealed by an O-ring 37 which divides the case into two compartments, a collapsible water reservoir 43, a water inlet tube 39 with a check valve 50, a water feed tube 40 with metering stem, and seals for water and gas openings into the lower compartment. Space 41 below the partition enclosed by an aluminum screen 42 is the container for the calcium carbide which reacts with the sea water to form the gas necessary to inflate float 25. Partition 36 apertures situated above the base plate 35 by two hollow posts, the water inlet tube 39 which leads from the outside through the partition 36 to the water reservoir pan 43, and the water feed tube 40 which leads from the water reservoir pan 43 through the partition 36 and base plate 35 to the bellows 44 which is mounted below the generator base plate. From the bellows holes through the base plate lead to distribution ducts (not shown) at the bottom of the calcium carbide container 41. In its normal position the end-plate of bellows 44 clears the end of the water feed tube 40 but when the bellows is compressed by an external spring, the bellows rests on the area of the end of the bellows is held against the water feed tube and seals it. Adjacent the water feed tube 40 and parallel to it is a rod 45 the lower end of which rests on the end-plate of the bellows. The upper end of rod 45 is biased by spring 47 and causes said rod to follow the movement of the bellows. Rod 45 therefore controls the stub gas outlet tube 48 which leads from the gas ducts located at the top of the calcium carbide 41 to the reservoir chamber 49. The hole size of the gas passage is the major factor controlling rate of reaction when the buoy is floating at the surface. When the bellows 44 is compressed by the presence of the dye-marker plate 51, the rod 45 rests against the end of the outlet tube 48 and seals it.

The water reservoir 43 is a pan, preferably of aluminum, which is covered with a cup-shaped diaphragm 38 of neoprene or similar material. As seen in FIG. 7 the diaphragm is normally collapsed into the pan. When water is introduced the diaphragm shape is reversed so that it extends above the pan. It's size is such that the filled diaphragm occupies nearly all the space above the reservoir pan without stretching. This expedites filling of the reservoir under conditions of minimum water head, before increasing gas pressure from the elimination of the pressure differential. The function of the reservoir is to supply sufficient water to complete the reaction after gas pressure equals external water pressure, at the generator position. The inlet check valve 50 covering the opening of the inlet tube 39 into the reservoir pan 43 serves to prevent discharge of water or gas when the generator pressures exceed external water pressure.

The initial rate of flow of water into the calcium chamber is modified by the specially grooved metering rod 52 fitted into the water feed tube 40. The amount of restriction thereby provided is so controlled that it results in the maximum rate of reaction that can be attained without foaming or overflowing to the point where some of the water is vaporized. Further control of the reaction rate is provided by cooling fins 53 which are four in number and which extend through slots in the base plate 35 and are brazed in position.

A slight modification of float inflating means is disclosed in FIG. 8. The acetylene generator of FIG. 7 is replaced by a carbon dioxide flask 54 which is normally sealed and is adapted to be punctured by pin 55 upon impact of the drift buoy. Pin 55 which is mounted on sleeve cap 56 is actuated by upward displacement of crash plate 53 by means of a spring and a mechanism. Rod 60 in its operative position rests upon crash plate 63 and is adapted to reciprocate upon movement of plate 63. The upper end of rod 60 extends into sleeve 59 upon which is mounted cap 56. Sleeve 59 is adapted to reciprocate in guide 58 and is provided intermediate its ends with oppositely disposed apertures in which are carried balls 64 of lesser diameter than said apertures. The balls 64 cooperate with a reduced section of rod 60 whereby sleeve 59 is carried along with rod 60 so that rod 60 as long as the inside diameter of guide 58 is the same as the outer diameter of sleeve 59. However when the inside diameter of guide 58 exceeds the outside diameter of sleeve 59 at the position of the apertures the balls 64 are forced outwardly through said apertures by the compression of rod 60. Rod 60 is then enabled to move freely with respect to sleeve 59. This thrust plunger assembly insures that pin 55 is immediately actuated to puncture the flask 54 upon upward displacement of the crash plate 63. The thrust plunger assembly is mounted on dye marker plate 61, which also carries the dye markers 62, by means of threaded guide nut 57 and guide 58.

The prime mover of the activating system is the Sonobuoy crash plate 63 which is retained by three lugs 65 extending into openings 66 in the base ring 67. These openings are about ½ inch high to allow vertical displacement and the lugs are held against the edges of the openings by downward thrust of a relatively heavy U spring 68 acting between the crash plate 63 and the dye marker plate 51. One lug is spring retracted and is provided with a turned-down lip which latches over the lower edge of the opening. The spacing of the lugs such that, once an upward displacement of the crash plate has cleared the lip of the retractible lug from the base ring and the lug has been withdrawn, the crash plate can fall free of the base ring. The crash plate 63, dye-marker plate 61 and base ring assembly mentioned above are standard An/SSQ-2 Sonobuoy parts unmodified except for a hole in the dye-marker plate through which the rod of the trigger-foot passes. The trigger foot rod 72 is an unmodified Sonobuoy part having its lower end resting on the crash plate 63 and extending vertically through a hole in the dye-marker plate 51 into a tube (not shown). This tube, which is constructed in two sections joined at the transmitter switch mechanism, extends vertically through the lugs from the crash plate to the rotor release trigger. The trigger rod is made of two sections the lower rod 72 extending to the under side of the trip-lever of the switch actuator toggle and the upper rod 32 extending from the upper side of the toggle to the rotor release mechanism.

The transmitter switch mechanism is a toggle arrangement which holds switches 69 of the normally closed type in open position until triggered by impact. One arm of the toggle linkage is a bar 74 provided with two positions for mounting additional members. The end position receives a pin 75 mounted at the free end of cantilever spring 76. The second position is a round end slot which receives the right of a U-shaped wire 77 which is the second toggle arm. Thin link plates 78 with holes at either end receive both hinge pins and are located on both sides of the bar 74 to hold the linkage together. The ends of these lugs of the second toggle arm 77 are knife-edged and are pivoted in a groove 80 machined in the housing 79 which is mounted in the lower end of the upper case section 19. The bar 74 is offset upward and extends to the midpoint hinge. Prior to impact the toggle arms are in the position of FIG. 10 with the midpoint hinge below the centerline joining the pivot pin 75 and the pivot groove 80. Upward displacement of the lower arm rod 73 moves the midpoint hinge across the centerline and reverses the direction of the thrust of cantilever spring 76. When the cantilever spring has reached its limiting position against the case 79, further upward displacement of rod 72 will tilt toggle.
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7 bar 74 upward until it swings clear of the rod (FIG. 11) permitting it to enter the upper tube. The mechanism may be set to switch off position by first returning the lower rod 72 to its initial position. This allows the hinged toggle bar to fall back until the knife edges of bar 77 contact the groove 80. The upper rod 52 is then depressed to force the toggle linkage back across the centerline to preimpact condition.

In order to make the mechanism watertight a flexible gasket or diaphragm 71 is clamped over the housing opening. The unsupported portion of this diaphragm lies between the toggle-actuated cantilever spring 76 inside the housing 79 and the switch actuating spring 70 outside the housing. The hydraulic pressure on the diaphragm is not sufficient to hold the switches open when the buoy is floating at its lowest position with a deflated drift float.

The transmitter of the air-sea-rescue drift buoy is designed to provide a reliable and distinctive modulated radio signal capable of being received and homed upon by search craft using the guard channel of UHF receiving and homing apparatus. Equipment suitable for this purpose are aircraft receiver AN/ARC-27 and direction-finding adapter AN/ARA-25.

The transmitter consists of an overtone crystal oscillator 81, a frequency doubler stage 82, a parallel doubler final stage 83, a modulator 84, and a tone oscillator 85. The output frequency is 243 megacycles, amplitude modulated by a tone of approximately 700 cycles. All stages may use sub miniature tubes such as a Raytheon CK-6147, with the exception of the tone oscillator which uses a Raytheon CK-722 transistor.

The overtone oscillator 81 is designed to provide an output at 60.75 megacycles using an overtone type crystal. The doubler stage 82 operates class C and provides an output at 121.50 megacycles. The final amplifier consists of two tubes connected in parallel and is designed to provide a modulated output at 243 megacycles. Separate grid coupling condensers and bias resistors are used to allow each tube to find its own operating point.

The modulator 84 operates class A and provides 130 volts R.M.S. modulating voltage which is sufficient to modulate the final amplifier 83, 100 percent. Tone oscillator 85 uses a junction transistor such as a Raytheon CK-722 which operates satisfactorily over the range of temperatures which may be encountered. The oscillator is a grounded emitter type which provides sufficient driving voltage to the modulator at the proper impedance level. The output from oscillator 85 is 4.2 volts R.M.S. at a frequency of 700 cycles.

The modulator and switch 86 keys the transmission of signals by switching the negative B lead. A keying cycle that has been found desirable is one of five seconds, the transmitter on for two seconds and off for three, with the signal light 17 (FIG. 2) being switched on during the inoperative time of the transmitter. To expedite rescue operations it is advantageous to transmit sufficiently long bearing dashes to obtain the correct bearing to the buoy as soon as possible after contact.

Impact rod 72 upon striking the water closes switches 69 in a manner hereinafter described to energize the transmitter filaments, the tone oscillator, and the keying motor and also provide the negative 150 volts to the transmitter through the keying switch.

The battery supply 87 preferably consists of mercury cells packaged to conform to the space limitations of the lower case section 11 wherein the batteries are stored. The battery cells are placed in the space between the gas generator and the buoy case and their weight is carried by a collar on the inside of the lower case.

Thus it will be seen that the structural design of the air-sea-rescue drift buoy is such that in prelaunched condition, as shown in FIG. 1, it has the same external dimensions as a Sonobuoy and utilizes the same "mechanical parachute" impact plate assembly, and dye-markers. This similarity to the Sonobuoy is retained during launching, air drop and impact. The operations which are initiated by impact jettison the "mechanical parachute" cap and rotating the float-cover sections, and the impact and dye-marker plates. The transmitter and light switches are also closed and the float inflation is begun rendering the buoy and its associated equipment operative.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. An air-sea-rescue drift buoy comprising, in combination, a watertight cylindrical housing, an acetylene gas generator mounted within said housing, said generator having as its gas producing component a calcium carbide charge, a flexible watertight container secured to the upper portion of said housing, means for normally maintaining said container in a collapsed condition, and means responsive to the impact of the lower end of said cylindrical housing upon a fluid medium for permitting a volume of said fluid to enter said housing thereby to activate said gas generator, and means also responsive to said impact for permitting said container to be inflated by said gas generator.

2. An air-sea-rescue drift buoy comprising, in combination, a watertight tubular casing, said casing being divided into an upper and a lower compartment, a radio signal transmitter mounted in said upper compartment, a seawater activated gas generator mounted in said lower compartment, a deflated flexible cylindrical float secured around the upper portion of said casing, a normally closed passageway between said gas generator and said float, means for retaining said float in a collapsed condition during the descent of said casing from an aircraft to the sea, and means responsive to the impact of the lower end of said casing upon the sea for permitting a portion of said sea to enter said lower compartment and thereby activate said gas generator and means also responsive to said impact for concurrently releasing said retaining means and for opening said passageway whereby said float may be inflated from said gas generator and for activating said radio signal transmitter.

3. An air-sea-rescue drift buoy adapted to be launched from an aircraft comprising, in combination, a watertight tubular housing, said housing having an upper and a lower compartment, a gas generator mounted within said lower compartment and adapted to be activated upon the introduction of said lower compartment of seawater, a flexible watertight member wrapped about the upper compartment of said housing, said member forming a cylindrical float concentrically disposed about said upper compartment when inflated, a gas passageway interconnecting said gas generator and the internal part of said flexible, watertight member, a group of arcuate restraining shields surrounding said member and maintaining it in place during the descent of said housing, and means responsive to the impact of the lower end of said cylindrical housing upon the sea for permitting a volume thereof to enter said lower compartment thereby to activate said gas generator, said last-mentioned group of arcuate restraining shields surrounding said member being made of a flexible material and assuming a cylindrical shape when inflated, a group of arcuate shields surrounding and keeping it collapsed during the descent of said housing from said aircraft, and means
responsive to the impact of the lower end of said cylindrical housing upon the sea for puncturing said gas cylinder, the puncturing of said cylinder permitting the flow of gas to said member, means also responsive to said impact for releasing said shields from about said float whereby said float may be inflated.

5. An air-sea-rescue drift buoy comprising, in combination, a watertight cylindrical housing, said housing being divided into an upper and a lower compartment, gas storage means mounted within said lower compartment, a deflated flexible float secured around the upper portion of said housing, a group of restraining shields surrounding said float and maintaining it in place in a collapsed condition during the descent of said housing from an aircraft, and means responsive to the impact of the lower end of said housing upon the sea for permitting said gas storage means to supply gas to said float, and means also responsive to the impact of the lower end of said housing for releasing said shields from about said float thereby to allow its inflation, and radio signalling apparatus mounted in said upper compartment, said radio signalling apparatus being activated simultaneously with the inflation of said float.

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