

## EMERGENCY REPORTING FOR MARINE AND AIRBORNE VESSELS

### BACKGROUND OF THE INVENTION

#### 1. Technical Field

This invention relates to reporting of emergency events and the locations of such events for marine or airborne vessels and their occupants by electronic reporting means, using global positioning information received from satellites.

#### 2. Background Art of the Invention

A marine or airborne vessel (referred to simply as a "vessel" herein) and its occupants can experience an emergency event, such as vessel disablement, vessel sinking or capsizing, vessel crash, fire on board, position loss, radio failure or person overboard, on any navigable waterway or air flight path. If an emergency event occurs out of sight of a Coast Guard station or other emergency response facility, it is important to report the event, including its location, time of occurrence and type of event, to an emergency response facility or another marine or airborne vessel so that assistance can be received, if needed. Many of the reporting procedures available today for emergency events rely upon visually perceptible signals, such as semaphore signals, light signals and the like, and do not report much more than the fact that an emergency event has occurred.

U.S. Pat. No. 3,866,206, issued to DeGiorgio et al, discloses an emergency signalling system having a manually operated generator to provide supplemental power. The system communicates with a home station, which identifies the communicator and automatically transmits a signal-received return message upon receipt. This system requires maintenance of a home station and does not provide determination of position, type of emergency or time of occurrence. Use of global positioning techniques or any equivalent system for position identification is not mentioned.

Muncheryan, in U.S. Pat. No. 3,911,425, discloses an alarm system, for signalling for emergency help, using both visual means (a sign or flashing light) and audible means such as a microwave transmitter. The alarm may be turned on at a predetermined time, presumably with reference to the time the emergency event has occurred. This system is apparently intended for communication at short distances, such as sight distance of a few hundred feet and does not broadcast position, type of emergency or time of occurrence. Use of global positioning techniques or any equivalent system for position identification is not mentioned.

McDonald discloses a marine signalling system for indicating the position of a boat or person in the water in U.S. Pat. No. 3,952,694. The system uses a buoyant means attached to the boat or person and adapted to be reeled out as a distress signal that can be more easily seen by a search aircraft or search boat. The signalling means is purely visual (a marker with one or two colors that contrast with the surrounding sea) and uses no electronic communications.

U.S. Pat. No. 4,468,656, issued to Clifford et al, discloses a signalling device for rescuing workers endangered by occurrence of an emergency event. The device is worn by each worker, transmits on a different frequency for each worker, and provides an audio signal as well. An emergency signal may be transmitted by voluntary action by the worker, by sensing the worker's physical condition, or by sensing the condition of an

environmental protection system (such as a self-contained breathing apparatus) carded by the worker. The system does not provide determination of position or time of occurrence of the emergency event. The system may provide information on the type of emergency, through its sensing of the physical condition of the worker or of the environmental condition of the worker's equipment.

Gantz, in U.S. Pat. No. 4,466,698, discloses an emergency signalling device that displays a visually perceptible, coded signal, such as SOS, when activated in response to occurrence of an emergency event. The signalling means is purely visual, and communication would be limited to a few hundred feet. No electronic communications is used.

A system for signalling occurrence of an emergency event within a vehicle is disclosed in U.S. Pat. No. 4,550,304, issued to Saitta. The signalling means is purely visual (a flashing or rotating light mounted outside the vehicle), and the signal is activated voluntarily by an occupant of the vehicle. The emergency events contemplated for use of this device include robbery of a taxicab driver, sudden heart attack, and the like). The signalling means is arranged so that the light is not reflected back into the vehicle from any nearby object. No electronic communications is used.

Ray et al disclose a system, attached to a telephone in a home or business, that detects tone dialing of a 911 number in U.S. Pat. No. 4,878,236. The system responds to this detection by activating a strobe light or other visual means, positioned outside the structure where the emergency event occurs, that helps an emergency response team to easily locate the structure from which the emergency call originated. The signalling means is purely visual, although the device is activated by initial use of the telephone.

Turner, in U.S. Pat. No. 4,903,243, discloses a marine transponder system that is selectively activated to produce a predetermined light, audio or radio transmission signal pattern for navigation or for use with EPIRBs. An EPIRB is an emergency signalling device, mounted on a marine vessel or a nearby buoy or other fixed or floating object, that is activated in response to occurrence of an emergency event nearby. The emergency event might be sinking of a vessel, person overboard, heart attack on board, or similar occurrence. The EPIRB system then emits a predetermined signal indicating the EPIRB position and occurrence of an unspecified emergency. This system does not transmit position of the vessel or person in trouble, the nature of the emergency event or the time the event occurred. The Turner system uses intermittent signalling to reduce power consumption, and the signal emitted may be visual, audio or radio wave. The receiver or "home station" receives the transmission, in coded form if desired, and determines the position of the EPIRB transmitter, based on the frequency used or the decoded message and a list of such positions incorporated at the receiver. The receiver then transmits certain information for receipt and response by the Coast Guard or other emergency response unit. If an EPIRB transmitter position is changed, the new location would have to be manually re-entered at the receiver. No provision is made for accurately tracking the continuously changing position of the vessel or person.

U.S. Pat. No. 3,860,900, issued to Scudder, discloses a method of determination of the position of a towed