

## 34 Information Concerning Submarines

### 1. Introduction

The Canadian Armed Forces, Royal Canadian Navy, operates four Victoria Class submarines. Mariners are warned that they may encounter these submarines anywhere off the Canadian coast, particularly in the vicinity of Halifax including the operating areas south of Halifax, and Victoria including the Juan de Fuca Strait and the Georgia Strait, especially in the vicinity of Nanoose Bay. United States Navy submarines are also frequently encountered off the east and west coasts of Canada. Submarines may be surfaced or submerged, operating independently, or with surface ships and/or aircraft

### 2. Submarine Presence Indicators

#### (a) Visual Signals Exhibited by Surface Ships Operating with Submarines

When a surface ship is operating with a submarine the surface ship will fly the International Code Group "NE Pennant 2", meaning *Submarines are exercising in this vicinity; you should proceed with great caution*. Vessels should steer so as to give a wide berth to any ship flying this signal. If, for any reason, it is necessary to approach this ship, vessels should proceed at slow speed until warning is given of the danger zone by VHF bridge-to-bridge radio, flags or signal lamp. At all times, a good lookout should be kept for submarines whose presence may only be indicated by a periscope or snorkel showing above the water.

#### (b) Pyrotechnic Signals Released by Submarines

A submarine, when operating at depth, either independently or with a surface ship or aircraft, may indicate its position by releasing a *smoke candle* or a *flare*. (See para. 8)

#### (c) Navigation Warnings

Under certain circumstances, warnings that submarines are exercising in specified areas may be issued as *CANHYDROLANT* and *CANHYDROPAC* messages on standard navigational warning broadcasts.

### 3. Navigation Lights

(a) On many occasions, the overall arrangement of submarine lights and their small silhouettes, both while underway and at anchor, have led to submarines being mistaken for much smaller vessels. For instance, submarines at anchor by night have been confused with two separate vessels of less than 50 m (164 ft.) in length. The masthead and sidelights of submarines are placed well forward and very low over the water in proportion to the length and tonnage of these vessels. In particular, the masthead steaming light may be well forward of the midpoint of the submarine's length. The stern light is placed very low and may at times be partially obscured by spray and wash, but is invariably lower than the sidelights. Some submarines may be encountered which do not carry a forward steaming light and on which the stern light may be situated on the after end of the fin. In addition, if a submarine is sighted on, or shortly after, surfacing (or shortly before diving), it may not be displaying navigation lights as these are stowed whilst a submarine is submerged. Victoria Class submarine navigation lights are normally positioned as follows:

I. Masthead Steaming Light – above the fin about 9.27 m above the surface.

II. Stern Light – at the back of the fin about 6.84 m above the surface.

III. Side Lights – below and forward of the masthead light about 3.0 m apart and 7.63 m above the surface.

IV. Forward Anchor Light – in the bows about 5.5 m above the surface; and

V. After Anchor Light – at the stern about 3.3 m above the surface.

(b) In addition to displaying the prescribed navigation lights for such vessels, some submarines may show a yellow coloured light, producing 90 flashes per minute, visible all round the horizon for a distance of at least three nautical miles. The light is located over the fin about 10.16 m above the surface.

(c) Submerged submarines at periscope depth may show an all round or quick flashing red or yellow light to indicate their presence to exercising aircraft.

**Note:** In restricted waters submarines should be passed with caution, observing their limited manoeuvrability on the surface, deep draught and their vulnerability to collision.

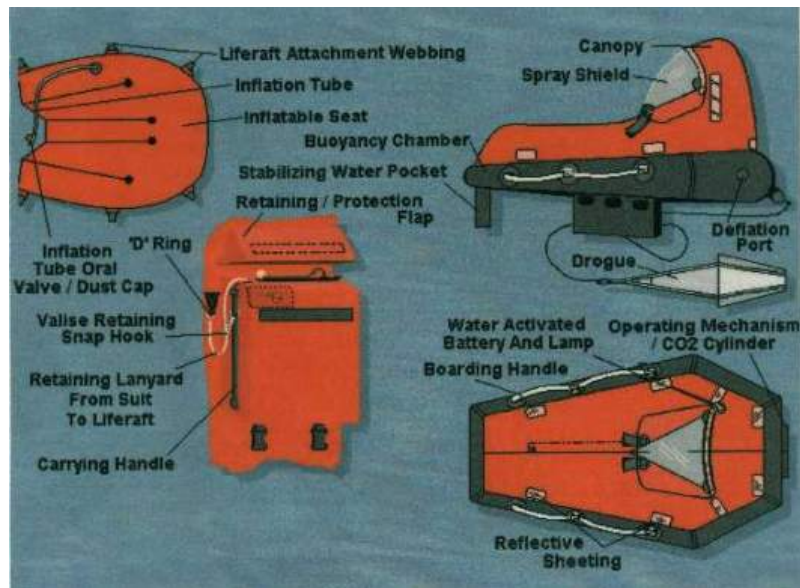
#### 4. Indications of a Submerged Submarine in Distress

A disabled submarine which is unable to surface will try to indicate its position using the following methods:

- (a) Releasing distress buoys described in para 6 of this notice as soon as the accident occurs;
- (b) Firing red pyrotechnic signals described in para 7 of this notice. While the submarine may fire these signals at any time, the signals are most likely to be released on the approach of surface vessels and in response to sound signals in para (5) (e). These are special message carrying smoke candles, which also release dye. Every effort should be made to obtain this message, which will be in a tubular container attached to the top of the smoke candle;
- (c) Pumping out fuel or lubricating oil;
- (d) Releasing air bubbles;
- (e) Personnel or debris floating on the surface. The personnel may be unconscious or incoherent due to decompression sickness (DCS) problems and unable to explain their position. They may or may not be wearing a Submarine Escape Suit or a Submarine Surface Abandonment Suit.



Mk10 Submarine Escape Suit with MK 18 One Man Life Raft



Mk 18 One Man Life Raft which comes with Submarine Escape Suit

#### 5. Submarine Surface Abandonment

- a. There are a myriad of reasons that may force a crew of a submarine to abandon their vessel. In most cases, these will include damage sustained as a result from a fire, flood, atmosphere contamination, or reactor emergency. Circumstances leading to the crew abandoning a submarine will develop rapidly and very likely result in a swift evacuation with little preparation time.
- b. Surface abandonment from a submarine is accomplished by evacuating the submarine using the main deck hatches or sail/ fin hatches. This is an extremely difficult evolution, particularly in higher sea states and, unlike surface ships, submarines offer no freeboard protection and are usually not fitted with large life rafts and/ or ready-use provisions to support and sustain the crew.
- c. Once the crew has successfully abandoned the submarine, survivors face numerous challenges and adverse conditions while waiting for rescue forces. Survivors from an abandoned submarine are unlikely to have experienced decompression sickness; however, there may be casualties or major injuries from smoke inhalation, radiation, or hypothermia.
- d. Survivors are likely to be in an Escape Suit or in some instances, a Submarine Surface Abandonment Suit and may be tethered together or in portable or fixed life rafts.

#### Submarine Surface Abandonment Suit

The Submarine Surface Abandonment Suit (SSAS) is a high-performance one-piece, one-size-fits-all immersion suit designed to provide an exceptional level of thermal protection and flotation to personnel immersed in colder waters for a period of up to 12 hours.



**Submarine Surface Abandonment Suit**

**Portable Six-Person Submarine Inflatable Life Raft**

Victoria Class submarines carry ten portable six-person submarine inflatable life rafts. These life rafts are designed for use in the event personnel are forced to abandon ship and are to be deployed in conjunction with the SSAS.



## 6. Submarine Disaster Actions

- (a) In any submarine accident, time is the most vital factor affecting the chances of rescue of survivors. At the first indication that a submarine accident has occurred – by sighting the indications noted in para 4 of this notice or actually being in collision with a submarine – *an immediate report should be made by the quickest available means to the Headquarters of Maritime Forces Atlantic in Halifax NS, Phone (902) 427-2501 or the Headquarters of Maritime Forces Pacific in Esquimalt BC, Phone (250) 363-2425 as appropriate, or to the nearest Marine Communications and Traffic Services Centre.*
- (b) The aim of a submarine rescue operation is to save lives and will have to achieve the following:
- (i) Fix the exact position of the submarine;
  - (ii) Get a ship standing by to pick up survivors, if practicable, with boats already lowered;
  - (iii) Inform the trapped personnel that help is at hand;
  - (iv) Get medical assistance to recovered survivors;
  - (v) Get a recompression chamber to the scene; and
  - (vi) Get divers, rescue equipment, etc., on the scene to assist the submarine personnel.
- (c) There are Maritime Forces Atlantic and Pacific organizations designed to respond to a submarine search and rescue event, which are kept at an immediate readiness for action. It is clear, however, that any ship may at any time find evidence of a submarine disaster, and if it takes prompt and correct action as described above may be in a position to play a vital role. There should be no reluctance to make a report of a suspected submarine accident because the observer has been unable to establish beyond any reasonable doubt that a submarine accident has occurred. Canadian Maritime Forces Atlantic and Pacific are prepared to react appropriately.
- (d) At any time after a submarine accident, survivors may start attempting to escape. Conditions inside are likely to deteriorate rapidly and postponement of escape will only be made in order to allow rescue ships time to reach the scene. Any ship finding a submarine indicator buoy should not therefore, leave the position but should remain in the area, well clear, ready to pick up survivors. The survivors will ascend nearly vertical and it is important that plenty of sea room be given to enable them to do so in safety. On arrival at the surface, personnel may be exhausted or ill, and if circumstances are favourable, the presence of a boat already lowered is very desirable. Some personnel may require recompression and it will be the aim of the Commander of either Maritime Forces Atlantic or Pacific as appropriate to get personnel to a recompression chamber without delay.
- (e) In order that those trapped in the submarine are aware that help is at hand, rescue forces may drop up to 12 small explosive charges (individually at five second intervals) into the sea. There is no objection to the use of small charges for this purpose, but it is vital that they are not dropped too close, as sailors in the process of making ascents are particularly vulnerable to underwater explosions and may easily receive fatal injuries. A distance of a quarter of a nautical mile is considered to be safe. If no small charges are available, the running of an echo sounder or tapping on the ship's hull with a hammer from a position below the waterline is likely to be heard in the submarine. These signalling methods will reassure trapped survivors and therefore should be done at regular intervals.

## 7. Canadian Submarine Distress Buoys

- (a) Canadian Victoria Class submarines are fitted with two indicator buoys which are tethered to the submarine by a mooring line. These buoys are marked as either FORWARD or AFT to indicate the end of the submarine from which they were released and are marked with the submarine's identification number. They can be released from inside the vessel in case of emergency or, if for any reason, the submarine is not able to surface. These buoys do not contain a telephone and there is, therefore, no requirement to approach it. Great care should be taken to avoid damage to the buoy and its mooring line and it should only be touched if it shows signs of sinking. In this case, a boat should endeavour to support the buoy while putting minimum possible strain on the nylon line. Attaching a life raft to the buoy may be the best means of achieving adequate support. There is a great danger of parting the mooring line and losing the location of the distressed submarine.



- (b) Victoria Class submarine indicator buoys are Type 639 model 060 buoys. These buoys, with Scotch-lite orange and silver reflective tape wrapped alternately around the upper half of the body, have a white light which flashes every two seconds. The buoy has a visual three-digit identifier in accordance with ATP 57 – NATO Submarine Search and Rescue Manual. There is a mooring bolt on the bottom from which is suspended 1000 m of 1.3 cm (circumference) nylon mooring line. The buoys float with a freeboard of about 15.2 cm. The buoy has an extending vertical whip antenna, which extends to a height of 1.77 meters above the buoy. A white light which flashes approximately twice every second for at least 40 hours is mounted in the centre of the top surface. In darkness, and during good weather, the visibility of the light without binoculars is 3.2 kilometres. For identification purposes, the following inscription is carried on each buoy around the top surface.

IN ENGLISH - S.O.S. *identification number*). *Finder inform Navy, Coastguard or Police. Do not secure to or touch.*

IN FRENCH - S.O.S. *numéro d'identification*) .*Prévenir immédiatement autorités maritimes. Défense de toucher.*

Each Canadian submarine has two buoys which are fitted with an automatic transmitting radio unit operating on 243.0 MHz, and the Global Maritime Distress and Safety System (GMDSS) frequency 406.025 MHz. The signals are transmitted automatically when the indicator buoy is released. On frequency 243 MHz, the sound is a high-pitched tone dropping to a low-pitched tone, then a break. This is repeated and these repeating tones will trigger automatic receiving SAR equipment. On the GMDSS frequency, a 15-digit code is transmitted in digitalized format. This code is received by satellite, which will correspond to the specific indicator buoy. The code is identified by the Rescue Coordination Centres. Ships hearing these signals should immediately report their position and depth of water and, if possible, an indication of signal strength. If such a buoy is sighted in depths of water greater than 1000 m, it is certain to be adrift, and this fact should also be reported as soon as possible.



**639 Indicator Buoy**

- (c) Submarine Emergency Positioning Indicating Radio Beacon (SEPIRB) is a (GMDSS) that is approved for use on submarines.

The SEPIRB has the following features:

COSPAS-SARSAT approved 406 MHz/121.5 MHz (homing)

Global Positioning System (GPS) position data supplied in (COSPAS-SARSAT) message

Capable of both submarine launch and manually by hand

Two are carried on board and can be fired from the submerged signal ejectors.

The SEPIRB is designed for launch from submarines or by hand over the side. The SEPIRB is a 3 inch diameter device with a maximum overall length of 41.285 inches and a maximum weight of 8.2 lbs.

The SEPIRB has a minimum operational life of 48 hours.

The SEPIRB is activated after the launch tab is bent back during submarine launch or manually by hand.

Once on the surface, the SEPIRB immediately begins to obtain a GPS fix and begins transmitting a 406.025 MHz digital message to the COSPAS-SARSAT system containing its initial GPS fix (default value until GPS fix is obtained), elapsed time from activation, and unique ID number. No further updates of position are performed.

Six hours after activation, the SEPIRB will begin transmission of a 121.5 MHz homing beacon signal to assist in the location of the buoy. Operation continues until deactivation or end of battery life (min. of 48 hrs).



**SEPIRB**

- (d) *Distress Radio Transmitting Buoys*

The Victoria class carries expendable communications buoys Type ECB 680. This is a silver coloured, radio rescue spar buoy approximately 10 cm in diameter by 60cm in length powered by a lithium battery. The buoys are designed for launch from the signal ejector of a submerged submarine. Upon reaching the surface, the buoy transmits a sabre tone radio distress signal 243.0 MHz for approximately 8 hours. The buoy is free-floating and not attached to the submarine.

## 8. Submarine Pyrotechnics

There is a possibility that submarine pyrotechnics may be confused with aircraft marine markers, floats, sonobuoys, etc. Therefore, when making identification, reference should also be made to paragraph 9.

- (a) *Smoke Candles* – These are fired from submarines to indicate their position. The white candles can burn for up to 15 minutes emitting smoke and flame and can thus be seen by day or night. There are also yellow, red, and rarely used green and black smoke candles. These emit smoke for a shorter period and do not have a marked flame and are difficult to see at night.

- (b) *Flares and Stars* – These may be fired from submarines to indicate their position.

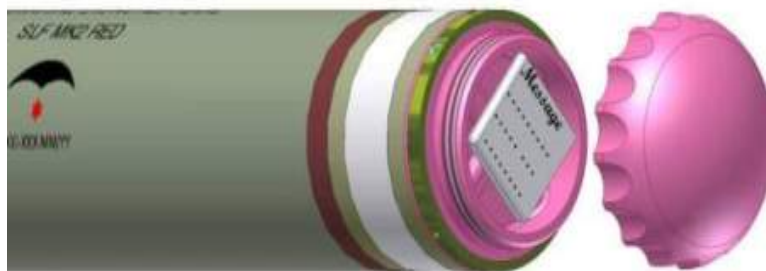
*Flares* – A canister floats to the surface and a small explosive hurls a container about 150 m (450 ft.) into the air. The container then disintegrates and a flare very similar to a *VERI flare* light is visible for about 15-45 seconds. The flares are red, green or yellow.

*Stars* operate in a manner similar to flares, except the container is hurled to a height of about 151 m (450 ft.) and when the container disintegrates, the red, green or yellow star descends suspended from a parachute. At the same time, the star canister in the water emits smoke of a colour similar to the star for about 15-45 seconds.

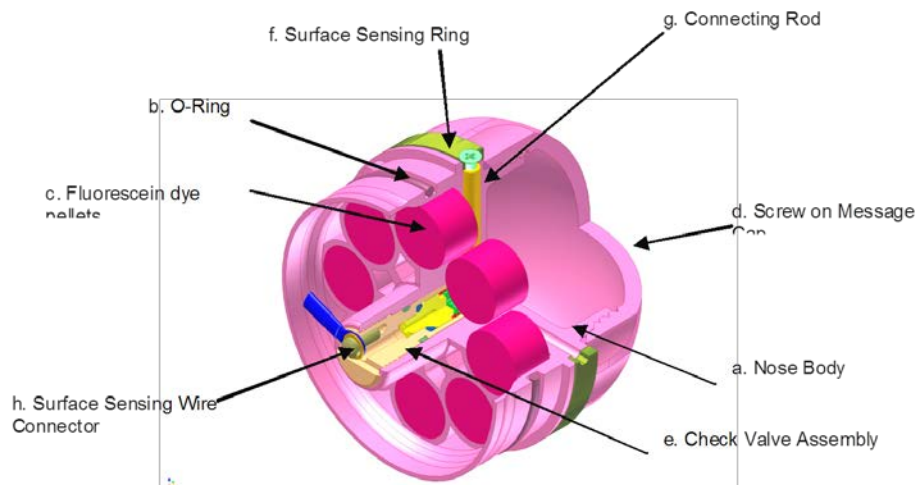
- (c) *Dye Markers* – Are attached to the top red para flare candles and when released from the submarine float to the surface and give off white smoke for up to 15 minutes. At the same time, they release green fluorescent dye in the water.
- (d) *Message Carrier* – Message carriers are curved tubular containers which may be secured to the top of a red para flare. A message carrier is normally found on the body of a candle, which also gives off fluorescent dye markings. Every effort should be made to obtain the message.



**SUBMARINE LAUNCHED FLARE (SLF) MK2**



**Message Carrier Area of Nose Assembly SLF MK2**



**SLF MK2 (R) – Nose Assembly showing Dye Package**





**Submarine Launched Red Para Flare deployed**

**9. Marine Markers**

The following may be dropped by aircraft or ships and, unless closely examined, may be mistaken for submarine pyrotechnics:

(a) Sonobuoys

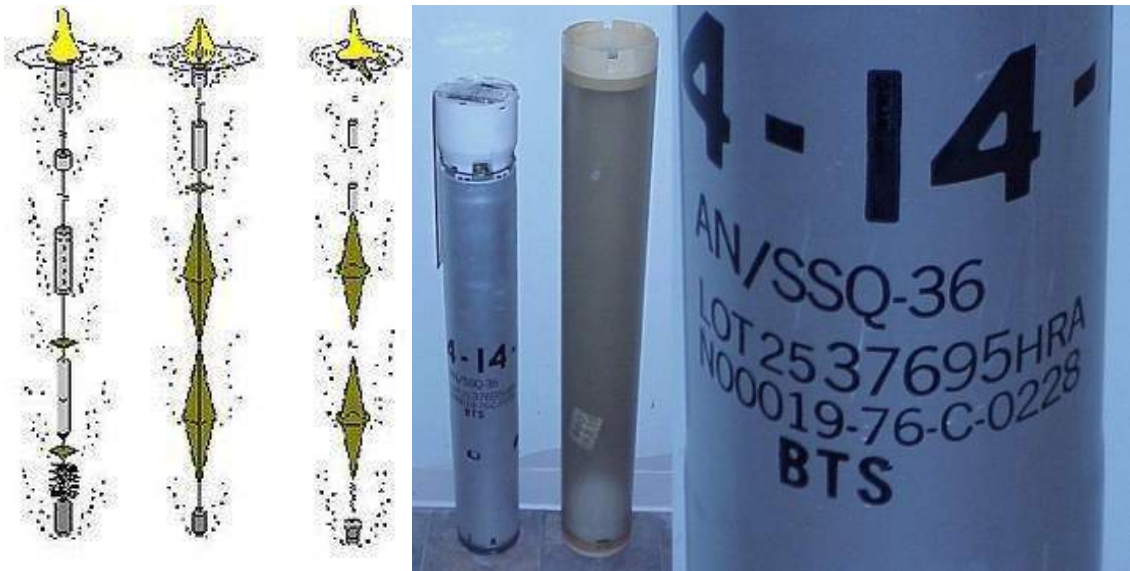
All sonobuoys currently in use by the Canadian Armed Forces are cylindrical in shape prior to deployment and have the following dimensions:

Diameter - 120.7 mm to 123.8 mm

Length - 909.6 mm to 917.6 mm

Once deployed, however, the physical characteristics of the sonobuoys vary considerably, depending on purpose and manufacturer.

Warning - Some sonobuoys contain lithium batteries, which are potentially hazardous. Improper handling of the lithium power supply could result in extreme battery temperatures, venting of toxic gases, fire and explosion. Most sonobuoys employ CO<sub>2</sub> gas bottles to inflate the surface float and may be hazardous if accidental activation occurs during handling.



- (b) Warning – Markers contain pyrotechnic composition (red phosphorous) and, if not completely burned out, are very dangerous and may cause severe burns if handled.



**Marine Location Marker C2A2**

Authority: Department of National Defence (NDHQ)