



**SURVIVAL AT SEA**

**INSTRUCTION MANUAL**

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# **1. BUILD-UP CONFIDENCE, UNITE AND STRUGGLE TO WIN VICTORY**

## **1.1. Face up to reality, built-up confidence**

Though you have met with great difficulty owing to the unfortunate accident, you shouldn't give up your hope of surviving. With the development of maritime transportation, with the daily improvement of the lifesaving appliances, there are many favorable conditions in the rescue operations at the present time. In answering to the distress signals already sent by the distress vessel, the passing vessels nearby and the personnel on land are now trying their best to locate you and are ready to give assistance. The GMDSS is now in full swing to call for search and rescue. The lifeboat or liferaft -you are now embarked- is of the best performance and is provided with a variety of useful equipment such as means for communication, fresh water, food rations and other repairing tools and material. Besides, you can make every effort to overcome the difficulties and you can try to communicate with the passing vessels or aircraft or land. The drifting position of your lifeboat or liferaft is just in the vicinity of the original course of the distress ship, so it is very easy to be discovered and rescued.

Therefore, you must keep up your spirits, foster your firm confidence, and remember that the final victory belongs to the people who wage an unswerving struggle for such victory.

## **1.2. Get organized, appoint a leader and arrange watch-keeping**

In order to better accomplish self-rescue and awaiting rescue, you must get well organized, strengthen leadership, help each other, define clearly the duties and carry out the work and life in an efficient way.

### **1.2.1. Fix the leader of a survival raft**

Every survival craft should have a leader, who may be an officer of the distress ship or a certified person; however, persons practiced in the handling and operation of liferafts may be permitted to be in charge of a liferaft. The leader should have a good nautical knowledge, good organizational skills and to be willing to dedicate himself to the work of overcoming the difficulties and struggle for surviving.

The duties of the leader are as follows:

1. Arrange for watch-keeping. It is advisable to have two persons on each watch of 24 hours duration.
2. Allocate food rations and fresh water.
3. Keep and register a survival craft log book which contains: the name of the abandoned ship, the position, time and date and weather condition of the accident; the names of the occupants and their physical conditions; the distribution of food and fresh water; and the collection of fresh water etc;
4. Inform the occupants about the construction and equipment of the survival craft so as to make the best use of them.
5. Help the occupants familiarize with the use of various signaling devices, and to use such signals in proper time to attract the attention of any passing ship or aircraft.
6. Take measures to maintain morale.

7. Make sanitary arrangements to keep the liferaft habitable.

### **1.2.2. Duties of the persons on watch**

1. Keep constant lookout, and watch carefully for any passing ship and aircraft and report in time to the leader.
2. Inspect the condition and equipment of the survival craft. Especially watch the inflation of the buoyancy chambers for any leakage. Should there be any, report to the leader immediately and effect repairs.
3. Collect and store rainwater.
4. Look after the sick or injured persons.
5. Carry out all duties detailed by the leader.

## **2. INFLATABLE LIFERAFTS**

### **2.1. Brief Introduction of Liferafts**

#### **2.1.1. Types of liferafts**

At present, the liferafts may be classified into throw over board type (OCEANO), davit launched type (OCEANO DL) and open reversible type (OCEANO OR).

The throw-overboard inflatable liferafts may be thrown overboard by man power or may be dropped into the sea by gravity, or may float free by means of the hydrostatic release when the ship sinks and then inflate on the sea surface. The survivors are to board by climbing down the shipside embarkation ladder or by other means.

The davit-launched liferafts are hoisted by a special davit and slewed outboard, and the raft is inflated at the outboard position by pulling the painter line, then the survivors can board the liferaft from the deck side. When the davit launched liferaft is loaded, then it is lower away onto the sea surface. The davit launched liferafts may also be used as a throw-over board liferaft.

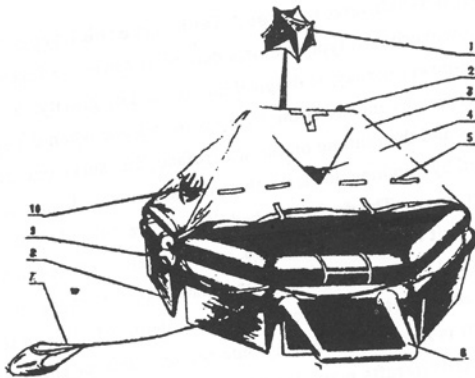
The open reversible inflatable liferafts are used as a thrown overboard liferaft (see above). The main difference is that the floor of the liferaft is between the buoyancy tubes and after the inflation, the occupants can board immediately, whichever side of the liferaft is above the sea level.

The inflatable liferafts may also be classified according to the navigation area. For the throw over board inflatable liferafts & for the davit launched inflatable liferaft, the ship operates into A-type liferaft for ship engaged in unrestricted navigation area and the B-type liferaft for ship engaged in coastal or near-coastal navigation areas. The open reversible inflatable liferafts are applicable for high-speed crafts engaged in warm sea area in China and in the international voyages only.

#### **2.1.2. Construction of Inflatable Liferafts**

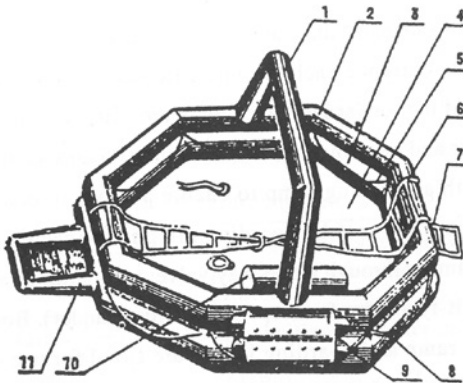
Throw over board (OCEANO) & the davit launched (OCEANO DL) liferafts:

These inflatable liferafts are mainly composed of four parts: the upper and lower buoyancy chambers, the canopy and arches, and the floor (Figure 1 & Figure 2).



**Figure 1**

1. Radar reflector
2. Identification light
3. Canopy
4. Rain catchment
5. Retro-reflective material
6. Boarding ramp
7. Sea anchor
8. Water stabilizing pocket
9. CO2 Cylinders
10. Viewing port



**Figure 2**

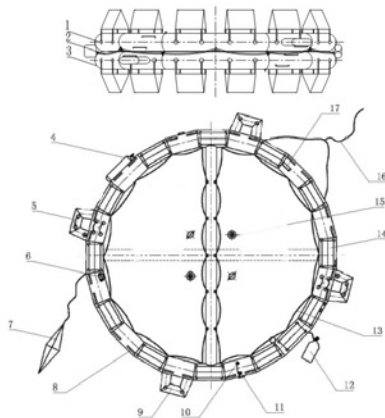
1. Canopy arches
2. Upper buoyancy chamber
3. Lower buoyancy chamber
4. Floor
5. Inside lifelines
6. Haul-in ladder
7. Boarding ladder
8. Outside lines
9. CO2 cylinders
10. Emergency pack
11. Boarding ramp

The lower buoyancy chamber and the boarding ramp form a separate air cell, and the upper buoyancy chamber and the canopy arches are connected by one way valves to form one air cell. These air cells are inflated into shape by the CO2 gas stored in the bottles. The floor is also a separate air cell and this is inflated by hand bellows after boarding. Several stabilizing pockets are attached to the underside of the floor along the periphery of the lower chamber, to increase the stability of raft at sea.

Two entrances fitted at both ends of the liferaft. At the front entrance a boarding ladder and a towing device are fitted, and at the back entrance a boarding ramp is fitted to enable persons to board the liferaft from the sea (the boarding ramp is connected to the lower chamber through an one-way valve; no boarding ramp is fitted to B-type liferaft except for the boarding ladder). Both the boarding ramp and boarding ladder are fitted for use by the persons in water. Lifelines are bucketed around both outside and inside the liferaft as a hand hold for persons.

## Open Reversible (OCEANO OR) inflatable liferaft:

This inflatable liferaft is composed of upper and lower buoyancy tubes, floor and so on (Figure 3).



**Figure 3**

1. Upper buoyancy chamber
2. Outer grab line
3. Lower buoyancy chamber
4. Inflation system
5. Boarding handle
6. Rescue quoit
7. Sea anchor
8. Reflective tape
9. Boarding ramp
10. Interior light
11. Indication light
12. Emergency bag
13. Inner grab line
14. Water pocket
15. Draining hole
16. Painter line
17. Safety Knife

The section of the upper and lower buoyancy tubes is round-shaped; the appearance of the body is round or polygon when it is looked from above.

The upper and lower buoyancy tubes and its connected inflation tubes are two separate gas chambers. These chambers have their own inflation system and can be inflated automatically by steel cylinders with mixed gas of CO<sub>2</sub> & N<sub>2</sub> at the same time.

The floor is made of single-layer antiskid fabric, which is between the two buoyancy tubes. Both the upper and lower sides have one or two discharge systems. The buoyancy tubes are equipped with lighting or indication lights and reflective materials.

The upper and lower buoyancy tubes are each equipped with a safety valve and an inflation/deflation valve. The upper and lower buoyancy tubes are each equipped with 1-2 semi-rigid boarding ramps. The upper and lower buoyancy tubes are each equipped with certain quantities of water-pockets on their tops.

### 2.1.3. Inflatable liferaft equipment

The inflatable liferaft equipment is provided in accordance with the provisions as indicated in the LSA Code, as lastly amended. The equipment of every liferaft carried by ships engaged on international voyages is as listed in the following table:

No.	Name	Unit	Amount			Notes
			A Pack	B Pack	HSC Pack	
1	First-aid kit	Pack	1	1	1	
2	Rocket parachute signal	Pc	4	2	/	

No.	Name	Unit	Amount			Notes
			A Pack	B Pack	HSC Pack	
3	Hand red flares	Pc	6	3	2	
4	Orange Smoke Signals	Pc	2	1	/	
5	Food ration	Pack	1 pack/p	/	/	
6	Fresh water	Bag	3 packs/p	/	/	
7	Waterproof electric torch	Pc	1	1	1	Transmit Morse Code, two spare batteries and bulbs
8	Buoyant Bailer	Pc	1~2	1~2	1	If the rated occupants are less than twelve, one buoyant bailer shall be equipped; otherwise, two shall be equipped.
9	Paddle	Pc	2	2	2	Buoyant
10	Sea-anchor	Pc	2	2	1	One sea anchor shall be fastened to the liferaft.
11	Sponge	Block	2	2	2	
12	Tin opener	Pc	3	/	/	
13	Whistle	Pc	1	1	1	
14	Fishing tackle	Set	1	1	/	
15	Radar reflector	Pc	1	1	/	
16	Daylight signaling mirror	Pc	1	1	/	
17	Thermal protective aids	Pc	2	/	/	Two or 10 % of rated occupants
18	Drinking cup	Pc	1	/	/	
19	Seasickness bag	Pc	1 pc/p	1 pc/p	/	
20	Instructions for life-saving signals	Book	1	1	1	Including a guiding picture
21	Pump	Pc	1	1	1~2	1 pump for liferaft less than 50prs. Otherwise, it shall be equipped with 2 pumps.
22	Buoyant rescue quoit	Pc	1	1	2	The floating rope diameter of $\phi$ 4mm, length of 30m
23	Safety Knife	Pc	1~2	1~2	2	
24	Spare rope	Pc	1	1	/	30m
25	Log Book	Book	1	1	1	
26	Instructions for immediate action card	Pc	1	1	1	
27	Anti-seasickness medicine	Pc	1 pill/p	1 pill/p	/	
28	Operating manual	Book	1	1	1	
29	Inventory of Repair	Pc	1	1	1	

Note: The items and quantity of equipment will be different depending on the naviga-



tion area in which the ship is engaged. The throw over board type (OCEANO) & davit launched type (OCEANO DL) inflatable liferafts have 2 types of equipment packs: Pack A and Pack B, according to the navigation area in which the ship is engaged. The open reversible type (OCEANO OR) inflatable liferafts have standard emergency equipment pack (HSC Pack) according to HSC Code regulations.

## 2.2. Immediate actions to be taken after boarding the liferaft

### 2.2.1. Righting a capsized liferaft

Should the liferaft be accidentally capsized, one person wearing a lifejacket should jump into the water and climb up the bottom side of the liferaft, standing on the bottom side of the chamber nearing the CO<sub>2</sub> bottles, and then pull the righting strap steadily while leaning as far backwards as possible. A steady pull is better than a jerk, and it is easier to right the raft with the wind (see Figure 4).

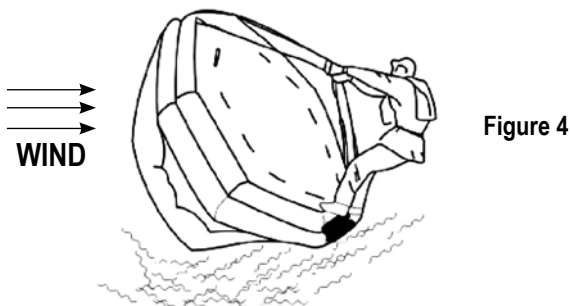


Figure 4

### 2.2.2. Clearing the distress ship as quick as possible

When all the survivors are on board, cut the line connecting the liferaft to the distress ship with the knife stowed near one of the entrances, and paddle a safe distance away from the sinking ship immediately to avoid being sucked in by the draught (see Figure 5).



Figure 5

### 2.2.3. Rescue of survivors in water

Persons in the liferaft should search carefully for survivors in water. Blow a whistle and use also the electric torch to attract attention during the night. If any survivor is located, make every effort to approach him and throw him a rescue quoit, draw in the line attached to the quoit and help him into the liferaft.

### 2.2.4. Examination of the liferaft body for leaks

After clearing the abandoned ship, examine the buoyancy chambers for any possible leakage. If small holes are found on the body of the liferaft, the leakage may be stopped temporarily by plugs which are stowed in the equipment bag (see Figure 6). When using a plug stopper, care is to be taken not to screw it in too hard, as this will enlarge the hole and make the leak worse. A tear or a big hole can be temporarily repaired by the repair clamp (see Figure 6). Permanent repairs for large holed areas are described in Paragraph 2.3 (6). Remember that even when one of the buoyancy chambers becomes damaged and deflated, the other one can still support the full complement of persons, for which the liferaft has been certified. Ventilate if CO<sub>2</sub> is leaking into the liferaft.

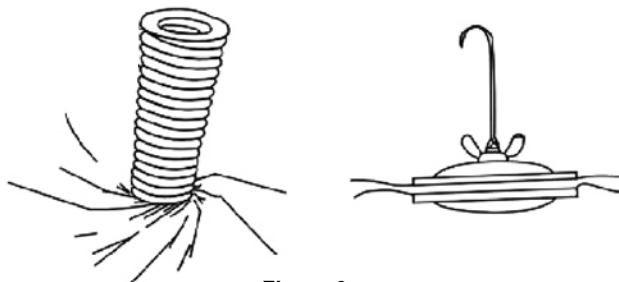


Figure 6

### 2.2.5. Keep the liferaft in position and stream the sea anchor

In order to obtain quick rescue, the liferaft should be kept in the vicinity of the abandoned ship so as to facilitate discovery by the rescue ships or aircrafts. When the liferaft drifts fast with the wind, the sea anchor may be streamed to reduce the drifting speed, keep the liferaft in position and increase its stability.

For the convenience of mutual support and assistance, and for facilitating discovery, it is advisable to keep all the liferafts together by joining them with the lines and distribute survivors and equipment between survival crafts. In case of rough sea, they should be kept apart from each other at a distance not less than 20-30 meters.

### 2.2.6. Examination of the raft equipment

Liferaft equipment is very precious. After boarding the liferaft, inspect the equipment in time to see whether it is properly stored and check the actual quantity of its

parts. Read carefully the instructions for use, and be careful not to let them be carried away by sea or moistened. What is more, you can gather up any useful floating objects.

## 2.3. Measures to be taken while awaiting Rescue at Sea

### 1) Protection of occupants

In order to avoid being affected by the weather after boarding, the weather aprons over the front and back entrances are to be lowered and fastened; thence a lookout should be maintained through the viewing port (or window). If there is water accumulation on the floor, use the bailer or sponge to dry out.

In cold weather, take out the hand bellows from the equipment bag and connect it to the floor inflation valve and work the handles as shown in Figure 7 to inflate the floor for insulation against cold. In case of hot weather, open the deflation valve and deflate the floor to provide a cooling effect.

### 2) Frequent inspection of the air pressure in the buoyancy chamber

The buoyancy chambers and the canopy support tubes are to be maintained with sufficient air pressure. In case of any leakage, the cause is to be ascertained and the leakage corrected. It is normal that the gas in the chambers expands due to heat from sunshine and escapes through the safety topping-up valves with a hissing noise.



Figure 7

1. Canopy arches
2. Safety topping-up valve
3. Upper buoyancy chamber
4. Lower buoyancy chamber
5. Hand bellows
6. Bellows pipe connection
7. Floor inflation valve

Where the buoyancy chambers soften due to falling temperature, they can be topped-up through the safety topping-up valves by means of hand bellows. If the canopy arches become soft, they can be topped-up through the upper chamber. During topping-up, remove the rubber plug first (if fitted), and replace the rubber plug after topping-up to prevent possible leakage.

### 3) Rational use of the power supply cells

Inflatable liferafts are provided with 2 canopy lights. One light is fitted inside the canopy for use of reading the survival manual and instructions on how to use the equipment; the other light is fitted outside and on top of the canopy which is visible on a dark night with a clean atmosphere at a distance of at least 2 miles, for use of the survivors in the water and to assist other survivor crafts or rescue ships to search for the raft. These two lights are powered by a sea activated cell or a dry chemical cell, and are to light automatically when the liferaft inflates on the water surface. They can both operate for a period of at least 12 hours.

In order to prolong the life of the cell, disconnect the lights from the socket and then re-plug in the night time. Be careful not to break the connecting wire or cause short circuit.

### 4) Prevention against piercing the buoyancy chambers

Articles having sharp edges and corners are strictly forbidden to be taken into the liferaft so as to prevent piercing the buoyancy chambers. Empty this with ragged lids and fishing hooks to be well stowed.

### 5) Collecting rain water

Before the rain water collection, clean the salt from the part of the canopy above the rain catchment, pour out firstly the water with salt, and then collect rain water with as much containers as available.

### 6) Repairing of piercing of the buoyancy chambers

For repairing a large piercing, dry the damaged area first and then clean the area surrounding the hole with a piece of emery paper from the repair kit. Cut a patch at least 25mm larger in circumference than the damaged area and also clean it with emery paper. Apply a layer of the repair gum on the surfaces of the patch and the damaged area. Wait a few minutes for the solution to dry and then place the patch on the damaged area and press by means of a small roller to expel any air bubbles (see Figure 8). After the repair, it is advisable to wait 5 minutes before re-inflation.

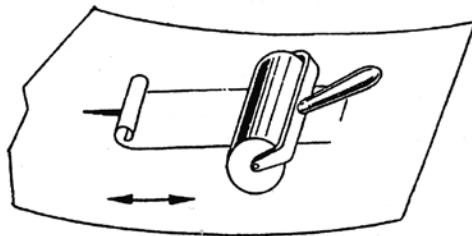


Figure 8

## **3. HYPOTHERMIA PROTECTION, FIRST-AID AND TREATMENT OF ORDINARY SICKNESS**

### **3.1. Hypothermia Protection**

A prolonged immersion in cold sea water will result in heat-loss and low body-core temperature, and finally drop into drowsy, unconsciousness, vascular sclerosis, till death. Therefore attention should be paid to hypothermic protection.

The victim of cold is to be warmed up by wrapping with the thermal protective aid in the raft, or to wear an immersion suit, or covered with a blanket or other extra clothing or coverings.

### **3.2. First-aid**

#### **3.2.1. The apparently drowned**

The life of the apparently drowned can only be saved if immediate action is taken. Firstly lay him face down with the belly on the upper buoyancy chamber of the liferaft or the gunwale of the boat so that he may vomit out the water he swallowed. While doing this, care is to be taken that he will not fall into the sea. Wipe his mouth and nose clean, loosen his belt and buttons and apply artificial respiration. He must be kept warm. After natural respiration is resumed, massage his limbs to stimulate blood circulation.

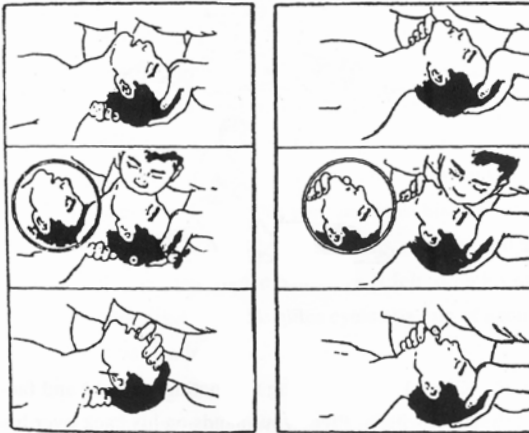
#### **3.2.2. Artificial respiration**

There are several methods of artificial respiration, namely: mouth to mouth or mouth to nose breathing; laying the victim face down or laying the victim face up. Attention is to be paid to the following points during artificial respiration.

First of all, the victim's belt and buttons are to be loosened and he is to be kept warm. Inspect for and take out any artificial denture or any blood or other object of his mouth which may hinder natural breathing. The action of the artificial respiration should be gentle so as not to injure the victim's ribs. It should be rhythmic and continuous till the victim resumes natural respiration and becomes conscious, or till death is established and further action is useless. After the victim resumes respiration, let him rest quietly.

##### **(1) Mouth to mouth or mouth to nose breathing.**

Lay the victim face up with his hands at his sides. Open his mouth with a spoon handle or by other means. A handkerchief or 2-3 layers of gauze are laid on his mouth. Hold his nose with one hand and blow forcefully through his mouth to expand his lungs. Then rest a while and the air will escape due to the elasticity of the lungs and chest. Repeat this cycle about 12-16 times a minute. (See Figure 9 (a)).



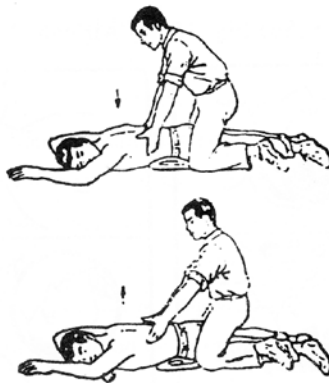
**Figure 9**

(a) Mouth to mouth breathing    (b) Mouth to nose breathing

Air can also be breathed into the victim's lungs through his nose (See Figure 9 (b)). This is a method of choice for children and victims with broken ribs.

(2) Laying the victim face down.

Lay the victim face down with one arm bent under his head and keep his face to one side so that his mouth and nose are free. Put a pillow or a small roll of clothes under his belly (See Figure 10).



**Figure 10**

Kneel down straddling the victim's thighs and facing his head. Place your hands on his back over his lungs with the thumbs close to his spine and fingers spread over his ribs. Press down, then forward gradually to expel the air from his lungs. Next, relax both hands to let the lungs expand and take in air. Repeat this cycle about 12-16 times a minute. This is a better method for victims with no back or rib injury.

Another way of performing this kind of artificial respiration is to lay the victim face down with both arms bent. Rest his head on his arm and preferably turn his to left and let one cheek rest on one hand to allow free passage of air through his nose and mouth. Get down on one knee at victim's head and put the other foot near his elbow. Put your thumbs over the points of the victim's shoulder blades and spread the fingers of both hands. Rock slowly forward with stiff elbows until your arms are vertical, then apply steady pressure to his chest. Now rock slowly backwards and slide your hands to his arms above the elbows. Grasp the victim's arms, raise and pull them towards you. When resistance is felt, drop his arms (See Figure 11). Repeat this cycle at a rate of about 12 times a minute.

(3) Laying the victim's face up.

Lay the victim's face up and put a roll of clothes under his waist. Kneel down straddling the victim's thighs and facing his head.

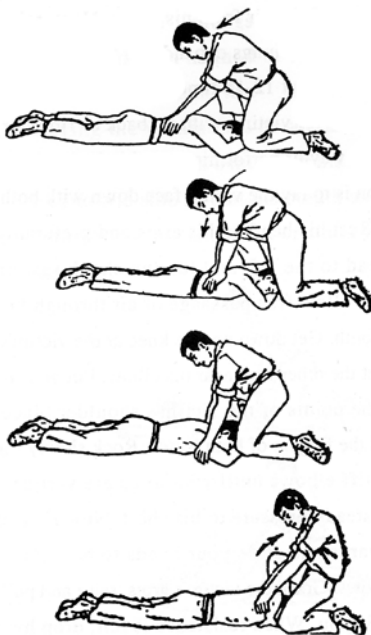
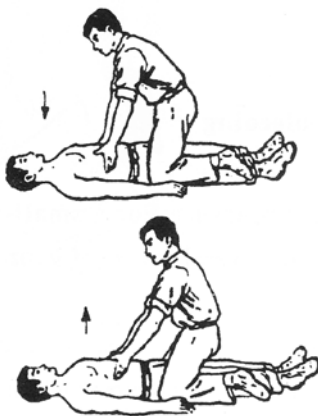


Figure 11

Put both hands on the lower part of his chest and press downward steadily to expel the air from his lungs, and then release both hands to let air into his lungs due to the elasticity of his chest (See Figure 12). Repeat this cycle about 12-16 times a minute. This method is not suitable for victims with rib injury or apparently drowned.



**Figure 12**

### **3.2.3 Treatment of shock**

Shock is caused by severe injury, excessive loss of blood, over-fatigue, starvation, heat or cold. If proper measures are not taken in time, death will result. If bleeding, stop it at once. See also paragraph 3.2.4. If severe pain is the cause, sedative may give relief. In case of fractured limbs, the fractures should be secured before moving the patient. Movement should be very smooth and keep the victim warm.

The causes of shock are numerous and different cases of shock require different treatments. Ammonia inhalation may help the patient regain consciousness. Water may be given, but alcoholic drinks should be avoided.

### **3.2.4. To stop bleeding**

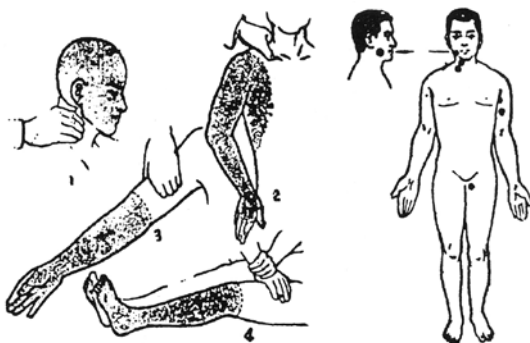
Apply direct pressure for a small wound; apply mercurochrome with several layers of gauze securely bandaged.

Press the hemostat points to stop bleeding. Where bleeding is considerable, apply the mercurochrome and haemostatic powder, and press the haemostatic points with fingers or roll of bandage to stop the bleeding. For haemostat points see Figure 13.

Use of the tourniquet: the tourniquet is applied at the artery above the wound to stop the bleeding on limbs. Where no tourniquet is available, a triangular bandage or strips of cloth may be used instead. A towel or gauze should be placed under the tourniquet to protect the skin from chafing. The tourniquet must be loosened every 15-30



minutes to prevent necrosis of the limbs due to the interruption of blood circulation for too long time.

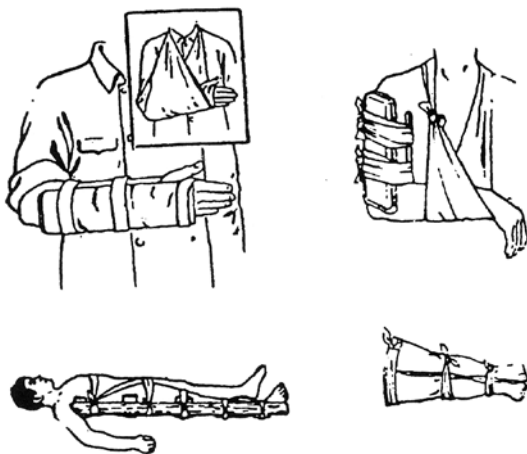


1. Neck artery    2. Artery below clavicle    3. Arm artery    4. Thigh artery

**Figure 13**

### 3.2.5. Treatment of bone fractures

Limbs with broken bones should be put in correct position to ease the pain, and then fixed to prevent aggravating the break, or bone splinters from piercing the flesh. If an upper limb is broken, use a triangular bandage to sling the arm in front of the chest. If it is a leg, fix it with a splint, or secure the broken leg to the sound one (See Figure 14). During stormy weather, wedge the victim between two healthy persons.



**Figure 14**

### **3.2.6. Treatment of burns and scalds**

Ointment for burns and scalds should be applied liberally and the area should be covered with 2-3 layers of gauze to absorb the fluid seepage. Care should be taken not to burst the blisters, but let the fluid absorb by itself. Sedative and antibiotics may be given.

## **3.3 Treatment and Prevention of Common Illnesses in Liferaft**

### **3.3.1. Controlling sea-sickness**

Seasick persons lose large quantity of fluid through vomiting, and survivors should immediately protect themselves against seasickness once they have boarded a liferaft by taking anti-seasick tablets, except when the sea is calm. The tablets should be taken according to the instructions on the bottle. Drowsiness is normal after taking the tablets. Sufferers from seasickness should breathe fresh air and have their faces wiped with a moisture towel. The liferaft should be cleared of vomit.

### **3.3.2. Prevention of frostbite**

Hands, feet, face and ears in particular are prone to frostbite in cold weather, ulceration may occur if neglected. The affected area should be kept warm and lightly massaged to stimulate circulation. Prevention is important. All normally exposed portions of the body should be protected from the cold or to be kept warm by frequent rubbing with hands. Shoes, socks and clothing should be kept dry. The limbs should be moved slightly after long sitting.

### **3.3.3. Prevention of sunburn**

When exposed to strong sunshine, large areas of skin can soon blister and may become septic. Ointment for burns and scalds may be applied. Long exposure to strong sunshine should be avoided.

### **3.3.4. Prevention of bed sore**

Bed sore may form on the buttocks after a long time in the liferaft. It may be prevented by keeping clothing dry and changing the sitting position frequently. If bed sore occurs, apply tertacycling ointment.

## **4. WATER AND FOOD**

### **4.1. Fresh Water**

Water is far more important for survival than food. In tropics, lack of fresh water is the main cause of death. Healthy persons may not drink any water for the first 24 hours

after boarding the raft as the body has sufficient water content, and drinking before that time will only cause the excess fluid to be passed quickly as urine. The injured or sick, depending on circumstances, may drink some water if thirsty.

In no case should anyone drink any sea water or sea water mixed with fresh water. Drinking sea water even over a short period of time is fatal. Passing stool or urine, breathing, vomiting and sweating all lose considerable amounts of water. For this reason, sweating is to be reduced as much as possible. There are several ways of doing this. When atmospheric temperature is high, wetting the canopy with sea water, opening both entrances for ventilation will help to reduce the temperature in the liferaft. Soaking the clothes with water will keep your body cool, but the clothes must be dried before sunset, as nights in the tropics are usually cool. Reduce your physical activity to a minimum. Do not bathe in the tropic seas, as apart from being attacked by sharks, you may swallow sea water.

Issue of the water ration is at the discretion of the leader, considering the amount of water in store, the expected time before rescue, and the possibility of rain, as well as the condition of the survivors. The liferaft is supplied with 1.5 liters of water for each person of the rated complement. It is advisable that after 24 hours 500ml per person per day can be issued. If the water in possession is less, the ration may be reduced.

Each person's daily water ration should be divided into many small portions, one portion being drunk each time. When drinking, the lips are to be wetted and the inside of the mouth and the throat moistened by gargling before the water is swallowed.

Do not throw the empty tins away. Hang them in the raft to increase the chances of detection by radar. They can also be used to stow rain water for drinking.

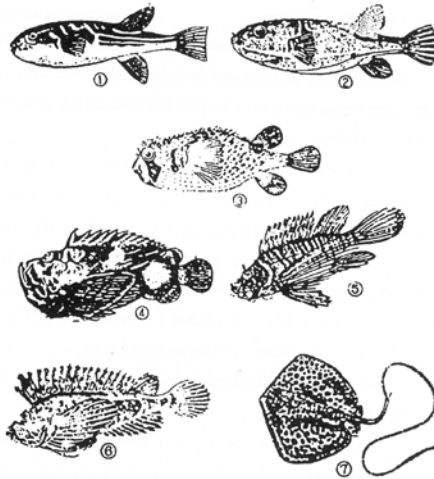
## **4.2. Food**

Human beings can survive for a relatively long time without food as long as there is fresh water to drink and no food is to be issued for the first 24 hours after boarding the survival craft. Thereafter, a daily ration of food is to be issued to each person every day. The daily ration of food is also to be divided into small portions and chewing it thoroughly before swallowing.

Most seaweeds are edible, but they must be firm and smooth to the touch, fresh with no marked odor. Before eating seaweed, inspect for small organisms, which should be removed.

Fishes are edible except some tropic shallow-water fish and those with bristles or spines instead of normal scales, which may be poisonous. Poisonous fishes are shown in Figure 15. Remember however, that seaweed, fish and sea birds may be eaten to supplement the food ration on condition that double quantity of the water ration is needed.

The residue of the fish or birds should be thrown overboard at night in areas where sharks appear. Sharks, whales or dolphins will not attack the liferaft deliberately but sometimes they may swim close to. The occupants must take care not to stretch their limbs into the water.



1. Striped puffer, 2. Puffer, 3. Pocupine fish, 4. Stone fish,  
5. Turkey fish, 6. Devil stinger, 7. Ringtailed ray

**Figure 15 Poisonous Fish**

### 4.3. Fishing and Bird Catching

There are fish hooks and lines available in the survival craft carried by ships engaged on international voyages for fishing and bird catching.

In survival craft carried by ships engaged in hometrade, there are no fishing hooks and lines available, however, safety pins or hair pins may be used as the buoyant lines of rescue quoit may be used as the angling lines.

#### 4.3.1 Fishing

In using the dummy fish as bait, jerk the line frequently to make the dummy look like real. Fish skin and intestines may be used as bait. If no other bait is available, hair or strips of cloth may be used.

Gloves must be worn for grasping the fish, as injuries from fish fins may become infected.

Edible fish can be dried for future use.

#### 4.3.2. Bird catching

Sea birds are edible, and may be caught by a piece of triangular wood about 5cm in length on each side with sharp corners and covered the whole with fish skin, or may be caught by a fish hook embedded in a small fish or fish intestine as bait and floating on the water with the aid of a piece of wood. Sea birds are difficult to catch but an attempt is worthwhile.

Care must be taken not to pierce the buoyancy chambers with fish hooks.

## 5. SOME NAUTICAL KNOWLEDGE

### 5.1. Remain in the Vicinity of the Distress Ship

After boarding the survival craft, it is of vital importance to remain in the vicinity of the area where the accident has taken place. This will facilitate search and rescue by other ships or the aircrafts.

Erect the radar reflector and use the pyrotechnic signals or heliograph to increase the possibility of being detected. Use pyrotechnic signals only when you are sure a ship is within the range of visibility or when aircraft flies over your vicinity. The range of visibility of heliograph varies with the brightness of the sunshine and particularly with the condition of the atmosphere.

### 5.2. Ascertaining Direction

In ascertaining the approximate position of the survival craft, it is necessary to know the direction of drift. The methods for ascertaining the direction of drift are as follows.

#### 5.2.1. Ascertaining direction by the sun

The approximate direction may be ascertained by the sun. If the survival craft is in a position north of latitude  $23.5^{\circ}$  N, the sun passes to the south of you at noon. If the survival craft is in a position south of latitude  $23.5^{\circ}$  S, the sun passes to the north of you at noon. Between these latitudes, the passing of the sun to the north or south of you at noon depends on the time of year.

Sunrise and sunset are useful in ascertaining direction. The approximate direction of sunrise and sunset is given in the Table 1 below:

Table 1

Latitude	$60^{\circ}$ N	$30^{\circ}$ N	$0^{\circ}$	$30^{\circ}$ S
Feb.5	$122^{\circ}/238^{\circ}$	$108^{\circ}/252^{\circ}$	$106^{\circ}/234^{\circ}$	$109^{\circ}/251^{\circ}$
Mar. 21	$89^{\circ}/271^{\circ}$	$90^{\circ}/270^{\circ}$	$90^{\circ}/270^{\circ}$	$90^{\circ}/270^{\circ}$
May 5	$55^{\circ}/305^{\circ}$	$71^{\circ}/289^{\circ}$	$74^{\circ}/286^{\circ}$	$72^{\circ}/288^{\circ}$
June 22	$37^{\circ}/323^{\circ}$	$63^{\circ}/297^{\circ}$	$67^{\circ}/293^{\circ}$	$64^{\circ}/296^{\circ}$
Aug.6	$55^{\circ}/305^{\circ}$	$71^{\circ}/289^{\circ}$	$74^{\circ}/286^{\circ}$	$72^{\circ}/288^{\circ}$
Sept. 23	$89^{\circ}/271^{\circ}$	$90^{\circ}/270^{\circ}$	$90^{\circ}/270^{\circ}$	$90^{\circ}/270^{\circ}$
Nov. 7	$122^{\circ}/238^{\circ}$	$108^{\circ}/252^{\circ}$	$106^{\circ}/254^{\circ}$	$104^{\circ}/256^{\circ}$
Dec. 22	$140^{\circ}/220^{\circ}$	$116^{\circ}/244$	$143^{\circ}/247^{\circ}$	$117^{\circ}/245^{\circ}$

Sunrise means that the upper rim of the sun just shows above the horizon, and sunset means that its upper rim just sinks below the horizon. The figures to the left of the slanted line indicate the direction of sunrise; while those to the right of the slanted line indicate the direction of sunset.

The directions of sunrise or sunset at latitudes and dates other than those listed in the table can be worked out by interpolation. For example, at latitude  $40^{\circ}$ N the direction of sunrise on June 22 is about  $54^{\circ}$ .

### 5.2.2. Ascertaining direction by a wrist watch

When the survival craft is situated in a position north latitude  $23.5^{\circ}\text{N}$ , point the hour hand of the watch exactly towards the sun, and the line by setting the angle subtended between the hour hand and 12 O'clock will point South. (See Figure 16).

When the craft is situated in a position south of latitude  $23.5^{\circ}\text{S}$ , point the 12 O'clock towards the sun, and the line by setting the angle subtended between 12 O'clock and the hour hand will point North.

The directions thus obtained are approximate.

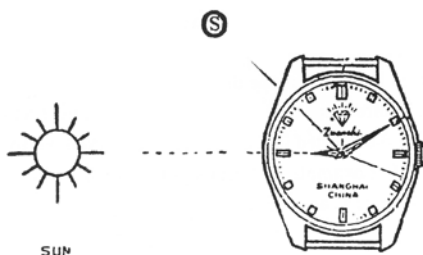


Figure 16

### 5.2.3. Ascertaining directions by stars

At night, stars can be utilized for ascertaining direction. In northern hemisphere, the Pole Star indicates true north. This star can easily be identified through the Great Bear constellation. The 7 bright stars of this constellation is in a form of a long handle of a scoop. The Pole Star is situated on the line extending from the 2 stars at the mouth of the bowl, at a distance about 5 times the distance between them (See Figure 17).

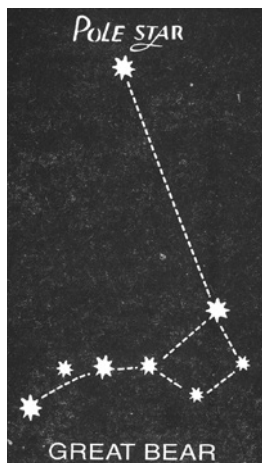
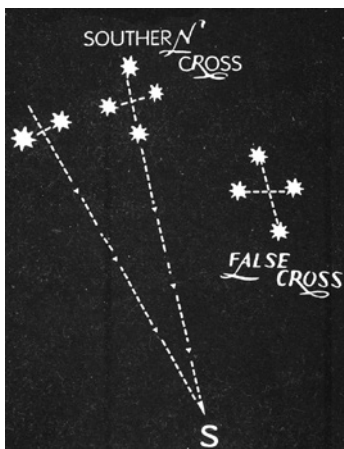


Figure 17  
The Pole Star &  
the Great Bear  
constellation

In the southern hemisphere, the Southern Cross constellation may be used to determine true south. The four bright stars of the constellation form a cross, the vertical line of which points to the South Pole (See Figure 18).



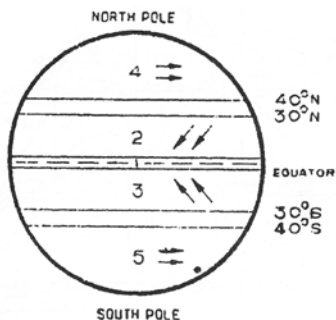
**Figure 18**  
The Southern Cross constellation

### 5.3. Direction of Wind and Ocean Currents

The survival craft drifts as the direction of wind or ocean current varies.

#### 5.3.1. The direction of wind

There is a calm belt known as doldrums in the vicinity of the equator with light and variable winds. In a belt between  $30^{\circ}\text{N}$  and doldrums a NE trade wind prevails, while in a belt between  $30^{\circ}\text{S}$  and doldrums a SE trade wind prevails. From  $40^{\circ}\text{N}$  and  $40^{\circ}\text{S}$  towards the Poles the prevailing wind is westerly (see Figure 19).



**Figure 19**

1. Doldrums
2. NE trade wind
3. SE trade wind
4. Westerly wind
5. Westerly wind

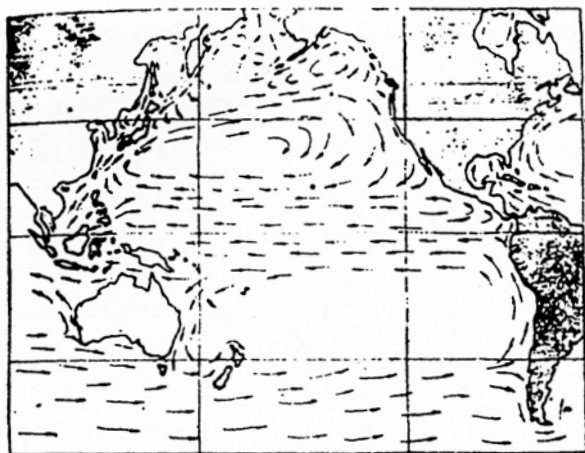


Figure 20 Pacific Ocean Currents

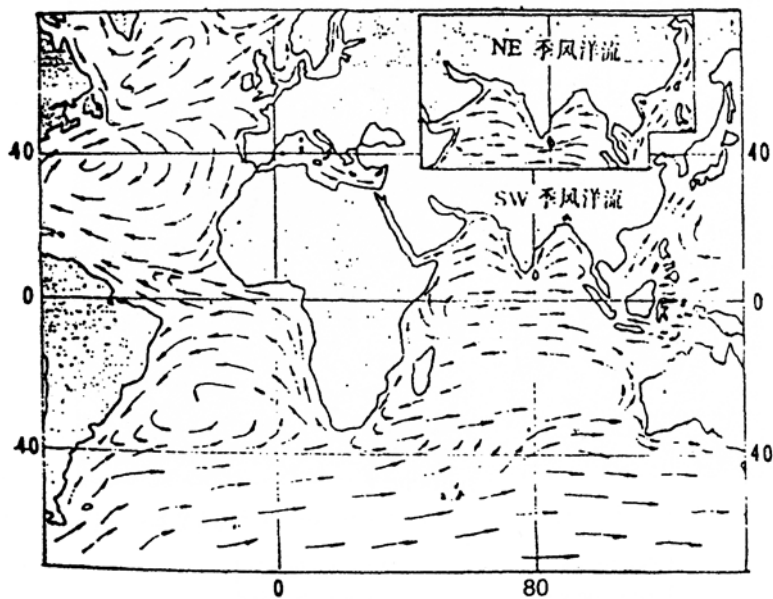


Figure 21 Atlantic and Indian Ocean Currents



### 5.3.2 The direction of ocean currents

In the oceans, currents flow along a certain direction. The major current systems on earth are the Pacific Ocean currents, and the Atlantic and Indian Ocean currents (see Figure 20 and Figure 21).

### 5.4. Signs of Land

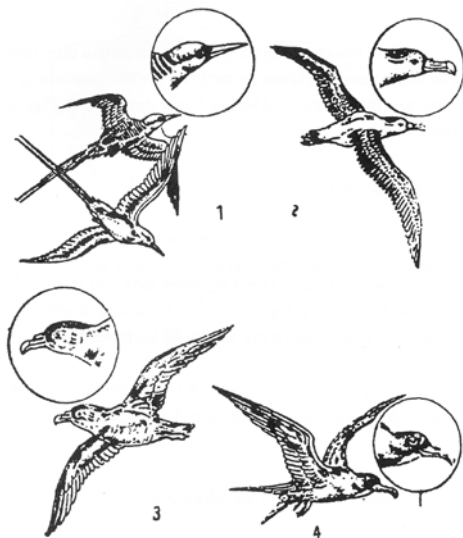
In a clear sky if large, white and fleecy cumulus clouds occur (that are usually observed over land), indicate that the land is near.

Sea birds are grouped into two kinds-coastal and oceanic. Coastal sea birds do not fly more than 100 miles from land. Birds shown in Figure 22 live on the ocean. Sight of birds other than those shown in Figure 22 indicates that land is near.

In tropical waters, greenish tint in the sky or on the underside of a cloud may indicate water such as coral reef.

### 5.5. Means for Attracting Attention

There are several signaling devices in the survival craft for the purpose of attracting the attention of a ship or aircraft passing by as well as communicating with them. According to the signaling method, the signals may be grouped into: light and sound signals and pyrotechnic distress signals.



**Figure 22**  
**Birds that live on the ocean**

1. Tropic bird
2. Albatross
3. Shearwater
4. Frigate bird

Light and sound signals are made by means of whistle, the heliograph or the electric torch. Morse code is used for communication. Messages in Morse code should be sent

at moderate speed, with the dots and dashes clearly separated so as to be easily distinguished. Suitable spacing should be given to each letter of the alphabet, and also between each word.

The Morse code symbols are listed in the table below:

### The Morse code Symbols

Alphabet	Morse code	Alphabet	Morse code
A	• —	N	— •
B	— • • •	O	— — —
C	— • — •	P	• — — •
D	— • •	Q	— — • —
E	•	R	• — •
F	• • — •	S	• • •
G	— — •	T	—
H	• • • •	U	• • —
I	• •	V	• • • —
J	• — — —	W	• — —
K	— • —	X	— • • —
L	• — • •	Y	— • — —
M	— —	Z	— — • •

Numeral	Morse code	Numeral	Morse code
1	• — — — —	6	— • • • •
2	• • — — —	7	— — • • •
3	• • • — —	8	— — — • •
4	• • • • —	9	— — — — •
5	• • • • •	0	— — — — —

The distress signal in Morse code is represented by SOS “• • • — — — • • •”  
**Signaling devices available in the survival craft are as follows:**

## 5.5.1. Light and sound signals

### a) HELIOGRAPH.

Heliograph is a highly polished metal mirror which reflects the sunlight so as to attract the attention of a passing ship or aircraft. The heliograph has an observation hole in one corner around which concentric circles and cross lines are cut, and is used in conjunction with the bearing finder (see Figure 23).

When using the heliograph, hold it in one hand with the polished surface facing the passing ship or aircraft. Hold the bearing finder in the other hand and look for the passing ship or aircraft through the holes of both the mirror and the bearing finder.

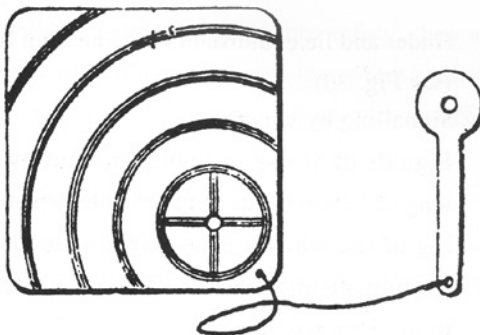


Figure 23 Heliograph

Meanwhile, adjust the mirror so that the images of the cross lines and the inner circle appear on the back of the bearing finder and lie equidistant to the bearing finder hole (see Figure 24).



Figure 24 How to use the heliograph

#### b) Signaling by whistle

Signals in Morse code may be sent by means of long and short blasts of the whistle. Irregular sounding of the whistle is an effective method for attracting attention. Sound carries a greater distance to the leeward side.

#### c) Signaling by electric torch

At night, the electric torch can be used to make signals in Morse code by giving long and short flashes. Irregular flashes of the torch are also an effective method for attracting attention.

### **5.5.2. Pyrotechnic Distress signals**

There are 3 kinds of pyrotechnic distress signals provided in a survival craft: rocket parachute distress signals, hand flares and smoke signals. The rocket parachute signal may be used both at day and night, sending a red flare of not less than 30.000 cd to a height of about 300 meters. It lasts about 40 seconds. The hand flare gives at night a red flare of not less than 15.000 cd lasting for about one minute. The smoke signal is used only in daytime; it emits smoke in orange color for a period 3 minutes. When using these signals, the instructions on the container are to be followed strictly. To ensure safety, they are to be fired on the leeside of the survival craft to prevent sparks from dropping onto the liferaft and injuring to persons.

### **5.5.3. Radio signals**

Some survival craft is equipped with radar reflector; this should be erected on the socket of the craft to facilitate searching by the rescue ship or aircraft. When portable radiotelegraph installation i.e. two-way radiotelephone apparatus, EPIRB or Satellite EPIRB, or radio transponder has been brought into the survival craft, they may be used according to the instructions.

### **5.5.4. Life-saving Signals**

The illustration of life-saving signals is provided in a survival craft in accordance with the provision of SOLAS, which is used by the survivors in the craft to communicate with the rescue ship or aircraft.

## **6. ADVICE ON FINAL RESCUE**

Final rescue is almost certain once your survival craft has been discovered. Attention must be paid to the following points in the process of rescue.

### **6.1. Rescue by a Surface Craft**

When surface craft comes to the rescue, it should approach and leave the survival craft on the leeward side. While the rescue ship comes near, the drogue is to be drawn in to prevent fouling the ship's propellers. The line thrown down from the rescue ship must be securely tied to the tow line of the survival craft.

## 6.2. Rescue by an Aircraft

Although an aircraft may not be able to render direct assistance when it sees a survival craft, it can lead a rescue ship to the spot.

Some search planes may carry with them emergency supply equipment stowed in buoyant containers, which may be dropped across the path of the drift of the survival craft.

The survivors may approach the containers by paddling or by hauling in or throwing out the drogue alternately and take the emergency supply to wait for final rescue.

When a seaplane comes to your rescue, it is very difficult for it to maneuver alongside the survival craft while keeping the engines running and you must, therefore, make efforts to get to the seaplane by yourselves. Care is to be taken that your survival craft is not damaged by the revolving propellers.

## 6.3. Rescue by a Helicopter

Rescue is more easily accomplished by the helicopter, which may be effected in two ways:

### 6.3.1. From the water

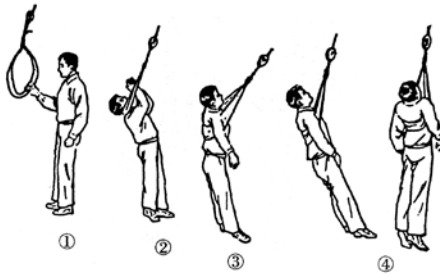
This method applies to survivors in the water, who may be rescued by means of a rescue net. The net is lowered and towed and the survivor is scooped up in the net (see Figure 25).

### 6.3.2. From a survival craft

Rescue from a survival craft is carried out by means of a rescue sling lowered from the helicopter. Survivors pull the sling over their back until it rests securely under the armpits, then each is lifted into the helicopter one by one (see Figure 25 and Figure 26).



Figure 25  
Rescue by Helicopter



**Figure 26 Using a rescue sling**

The use of a rescue sling is shown in Figure 26.

- a) The rescue sling
- b) Put head and arms through sling, raise arms and stretch through the loop.
- c) Pull rescue sling down over the back until it rests under the armpits, then pull the safety runner down to the body.
- d) Adjust the position of the rescue sling before lifting, and keep the arms down during lifting to prevent slipping.

In case the survivors are not able to help themselves, one of the helicopter crew is lowered by means of a special harness and the survivors are placed in the rescue sling with the help of the helicopter crew (see Figure 26 and Figure 27)



**Figure 27**

## **7. SURVIVAL ON A BARREN ISLAND**

It is always possible that survivors may drift to a barren coast or island before being detected, particularly if abandonment takes place in coastal waters or near the islands. During this time, the survivors should make use of all the available facilities, tools and equipment to live temporarily on the barred island till the chance of eventual rescue.

## 7.1. Making a Safe Landing

There might be reefs or rocks around the island; it is essential for survivors not to land close to the reefs in order to save the life of persons and to avoid damage to the survival craft. It is advisable to select a soft bottom beach and land at high water so that the craft may be hauled ashore.

The liferaft with canopy may be used as a warm and cozy shelter, see Figure 28.



Figure 28

In case that the liferaft is lost or entirely damaged during landing, try to find a cave facing the sunshine or other sheltered place for dwelling.

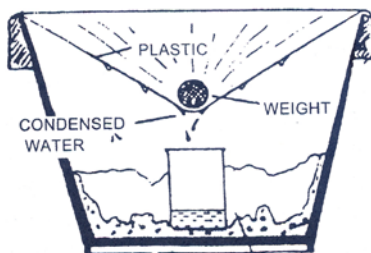
## 7.2. To Find Drinking Water

Water is more important than the food to preserve life, so that if the island is uninhabited, the first thing to do is to find the drinkable water. Water discovered on the island should be carefully tested before drinking. It may be tasted with the tongue, and should be discarded if found brackish and bitter. Care should also be taken in using it even if the water is drinkable; firstly, drink a small amount, and after 7 to 8 hours if nothing abnormal happens then drink it regularly.

If rivers, streams or springs cannot be found it may be necessary to dig for water. Water fit to drink can often be obtained by digging a hole at least 50-100 meters inshore. It will be sufficient to go 30m deeper after water is first sighted, and then test the water as mentioned before. If possible, hold the line with stones to prevent falling.

Besides, drinking water may be collected from the natural water, such as rainwater, snow or dew. It may also be possible to gather water by squeezing the flesh of animals, such as birds or fishes, and further more from the short sections of roots, stems and leaves of plants as well as from the fruits or seeds.

Another possibility is the use of an improvised solar still as shown in Figure 29.



ABSORBENT MATERIAL AND SEA WATER  
**Figure 29**

### 7.3. To Find Food

All the living things in the nature should be utilized as your food. The living resources of the sea such as seaweeds, fishes, shrimps and shellfishes, and the animals such as birds, four-footed animals and their eggs, and the fruits, roots and leaves of the plant are all edible. However, foods which are not certain to be non-poisonous are to be tested first by taking a small quantity, and then eat regularly if nothing abnormal happens after 7 to 8 hours.

The contents of Chapter 4 "Water and Food" of this Manual may be used as reference.

### 7.4. Life and Actions

The barren islands are isolated without any habitants, except some birds or animals. It is important that collective movements should be taken. Do not walk out alone, if it is necessary to do so, the leader is to be informed and the routes well marked to prevent go astray. When taking a walk in the forest, self defense appliances such as knife or club should be available. In the night time, bring a torch light with you. In winter season, care should be taken not to drop into the ice crevices, when walking on the snow ground; put on sun glasses to protect your eyes. In tropics, protect against exposure to strong sunshine and high temperature; hats and thick sole shoes are necessary.

In order to meet the need for living on a barren island, the equipment of the survival craft is very precious. The Jack knife may be used for cutting and peeling, or even as a hook; far-sighted lens or camera lens may be used to kindle a light; the motor fuel can be used to burn or boil food; hooks or safety pins may be used to angle; rope nets may be used to catch birds, etc. It all depends on how to give full play to your wits.

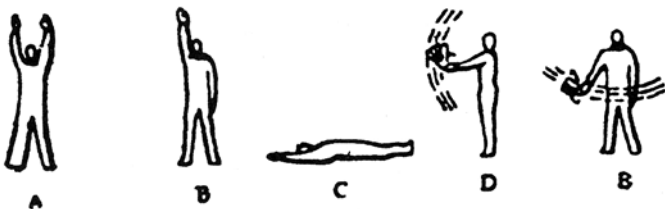


## 7.5. Signals for Communication

Living on a barren island is only a temporary measure; the final rescue relies on the early discovery by the rescue ship or aircraft. Therefore, it is very important to send out signals in time.

1. Give best use of the survival craft's visual signals such as rocket parachute lights, hand flares and buoyant smoke signals by strictly following the instructions. However, these signals are only to be used when the rescue crew is in sight; don't waste any signal lights and don't lose your chance of being discovered.
2. In the daytime, thick smoke by burning damp leaves or stems of plants may be seen from a distance away, and in the night time, flames by burning dry substances may also be detected. In the bright day time, waving colored cloth strips may attract attention.
3. Making sound with a gong or drum may draw the attention of rescuer at a certain distance away.
4. In the daytime, make a signal SOS on the beach or ground using stones, shells or plants, or even human bodies.

When the aircraft flies overhead, the following body signals (Figure 30) may denote meaning:



**Figure 30**

- A. Pick us up.
- B. All OK, Don't wait.
- C. Need medical assistance.
- D. Affirmative (Yes).
- E. Negative (No).

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