Military Sealift Command
Washington Navy Yard
Washington, D.C. 20398-5100

COMSC INSTRUCTION 12410.32

DAVIT-LAUNCHED INFLATABLE LIFERAFT

TRAINING GUIDE

T-AH 19 MERCY
T-AH 20 COMFORT

COMSCINST **12410.32**	**COG CODE N13**	DATE **20 NOV 1991**

DEPARTMENT OF THE NAVY
COMMANDER MILITARY SEALIFT COMMAND
WASHINGTON NAVY YARD BLDG 210
901 M STREET SE
WASHINGTON DC 20398-5540

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COMSC INSTRUCTION 12410.32

Subj: DAVIT-LAUNCHED INFLATABLE LIFERAFT TRAINING GUIDE

1. Purpose. To provide training for U.S. Navy personnel designated to serve as liferaft commanders on board USNS MERCY and USNS COMFORT in conformance with the level of proficiency required by the U.S. Coast Guard.

2. Applicability. This instruction relates to the operation of the davit-launched inflatable liferafts installed on board T-AH MERCY class ships only.

3. Action. Masters of hospital ships are urged to forward to COMSC (N14), via their cognizant Area Commander, comments and recommendations for improvement of the Davit-Launched Inflatable Liferaft Training Guide.

D.F. CHANDLER
Vice Commander

Distribution:
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CHAPTER 1

INTRODUCTION

1-1 INTRODUCTION

a. The T-AH 19 Class Hospital Ship has been designed to commercial shipbuilding standards with U.S. Coast Guard (USCG) Passenger Ship and American Bureau of Shipping (ABS) requirements.

b. The ships are assigned to the Military Sealift Command and operated by a civilian crew. The Medical Treatment Facility is operated by the Bureau of Medicine and Surgery and manned by U.S. Navy personnel.

c. In accordance with U.S. Navy Regulations Article 0733, the Master is responsible for the efficient operations, navigation and safety of the ship. All emergency drills, such as fire and abandon ship drills, will be supervised and controlled by the Master. In case of disaster at sea, he will direct all emergency actions.

d. The Master has paramount authority over all persons assigned to or embarked in the ship. He shall enforce all laws of the United States and all applicable orders and regulations of the Department of the Navy, the U.S. Coast Guard and Commander, Military Sealift Command. Incase of emergency, nothing in this instruction shall be construed as preventing the Master from pursuing the most effective action, in his judgment, for rectifying the condition causing the emergency and for the preservation of life and property.

e. This instruction has been developed to train the personnel onboard hospital ships in the operation of davit-launched inflatable liferafts. The training program has been designed to provide practical knowledge in the safe launching of inflatable liferafts and the practice of survival at sea. Each student will be capable of inflatable liferaft “command” upon successful completion of the course.

f. The initial training has been developed for delivery in three segments:

(1) Classroom instruction and video tape program

(2) Practical demonstration

(3) Examination

g. Each student attaining the required level of proficiency in each segment is designated by the Master to serve in the capacity of liferaft "commander" with responsibility for the operation of davits, launching in various seaways, use of the equipment contained in the liferaft and the safety of the passengers assigned to the liferaft. The person in charge of each liferaft shall have a list of persons assigned to the liferaft.

h. Training Objectives. For U.S. Navy personnel designated to serve as liferaft commanders:

(1) Knowledge of operation and function of liferaft davits

(2) Knowledge of liferafts and equipment

(3) Practical handling of liferafts

(4) Launching: clear away, swing out, lower and retrieve fall

(5) Demonstrate ability to carry out the orders necessary for safe launch and the safety of the passengers aboard

(6) Knowledge of hazards involved in launching in various seaways and possible listing conditions of the ship

(7) basic survival at sea

(8) Emergency signals

i. Summary of Equipment

(1) 12 DAVITS FOR LIFERAFTS (6 PER SIDE)

(2) 60 DAVIT LAUNCHED INFLATABLE LIFERAFTS

(3) FIVE RAFTS PER DAVIT

(4) 22 FLOAT FREE – BOAT DECK, STARBOARD SIDE, AFT OF BOATS

(5) 2 FLOAT FREE – FORECASTLE

(6) ALL INFLATABLE LIFERAFTS ARE 25 PERSONS CAPACITY

j. T-AH Shipboard Organization. The Ship's Master is the Commanding Officer. He is responsible for:

(1) Safe and efficient navigation of ship.

(2) For the training of the crew, and Military Treatment Facility personnel in use of all lifesaving equipment.

(3) The ship's Master (commanding officer) and his department heads are all licensed officers who receive their licenses from the United States Coast Guard (USCG). The USCG is the federal agency, which has been appointed by Congress to regulate the operation of the U.S. merchant marine. The USCG also is responsible for inspecting the USNS MERCY and the USNS COMFORT and issuing rules and regulation for the safe operation of these ships.

(4) All USCG regulations are found in Title 46 of the CODE OF FEDERAL REGULATIONS (CFR). You will find all rules and regulations pertaining to the operation and construction of the USNS MERCY and the USNS COMFORT in Chapter 1 as well as the rules and regulations for the construction and outfitting of the davit-launched inflatable liferafts.

(5) The specification for inflatable liferafts (46 CFR 160.051) is contained in Chapter 6 of this instruction.

SHIPBOARD ORGANIZATION

The following diagram shows the organization of the HOSPITAL SHIPS USNS MERCY and the USNS COMFORT

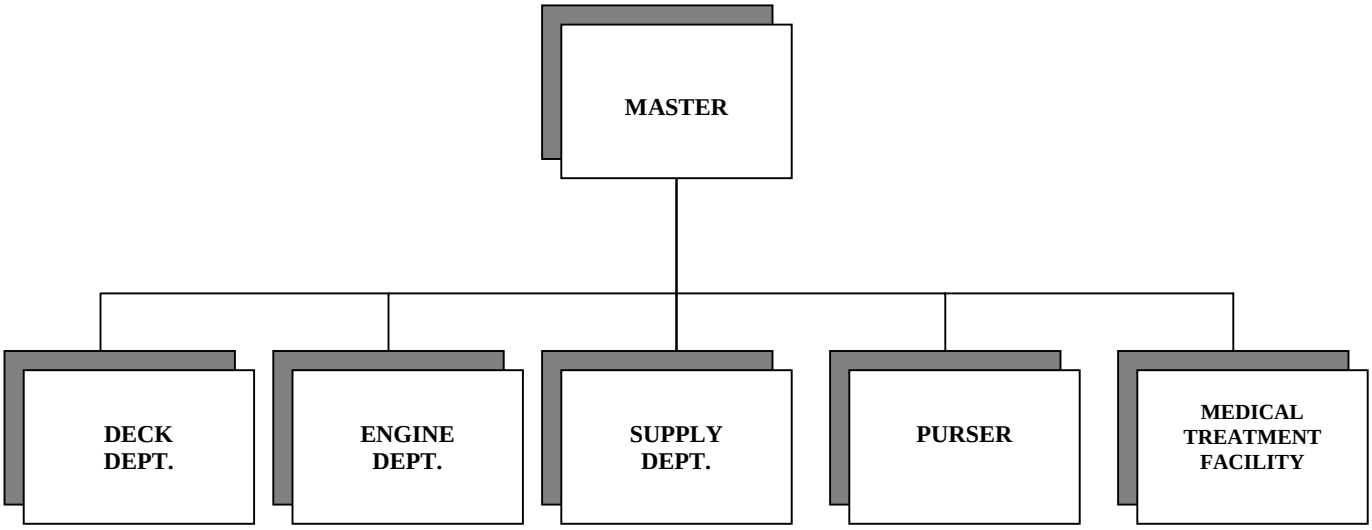


FIGURE 1-1

CHAPTER 2

USING INFLATABLE LIFERAFTS

2-1 INTRODUCTION

a. The inflatable liferaft is as important a lifesaving device as the lifeboat. Drills with liferafts are not conducted, because the raft container is sealed until ready for automatic or manual launching. Therefore, it is important to learn about the current design of rafts. Inflatable liferafts are inspected at 12-month intervals. The inspection is done at a Coast Guard approved service facility.

b. Inflatable liferafts must be Coast Guard approved. Liferafts have a range of sizes.

(1) Liferafts on ships that do not make international voyages hold 4 to 25 people.

(2) Liferafts on ships that make international voyages hold 6 to 25 people.

c. The number of persons the liferaft will hold is marked on the container and the raft itself. The manufacturer's name is also shown on the container. A 25 person inflatable liferaft complete with case and equipment does not weigh more than 400 pounds.

2-2 LIFERAFT STOWAGE

Liferafts are stowed in a cradle, on an open deck. This is done so they can float free if the ship sinks before you can manually launch the raft.

a. The liferaft container is strong, weather tight and tamper proof.

b. The raft container has small holes on the bottom for condensation drainage and air circulation. The container must be stowed with the words "This Side Up" on top to be sure the holes are on the bottom.

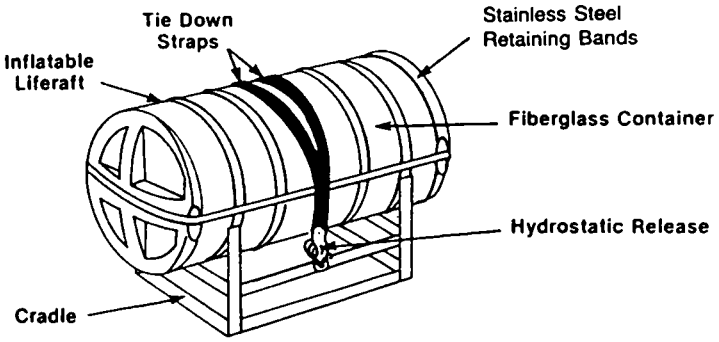
c. Most containers are made of fiberglass.

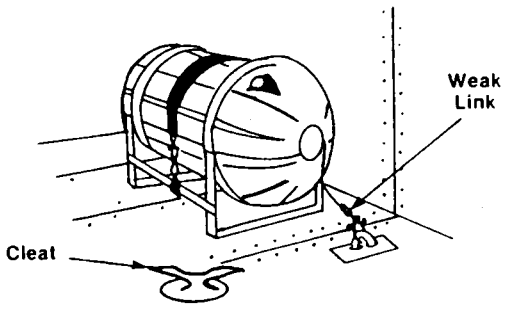
d. The container is usually held together with packing bands, which break when the raft is inflated.

e. A watertight gasket seals the halves of the container together.

f. The container rests in a cradle that is permanently secured to the ship's deck.

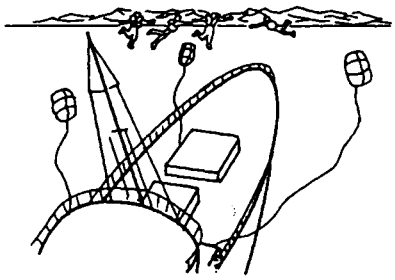
Liferaft in Container



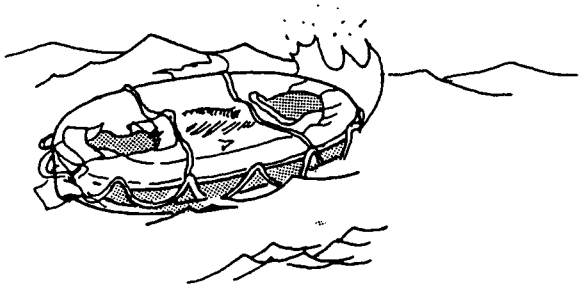


Liferaft in Stowed Position Aboard Ship

FIGURE 2-1

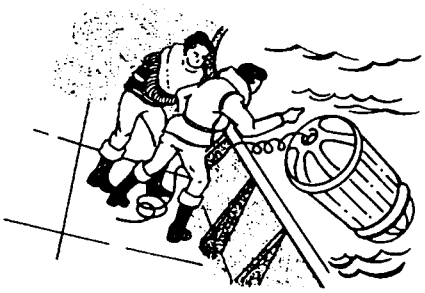


Liferafts Launched Automatically From Ship

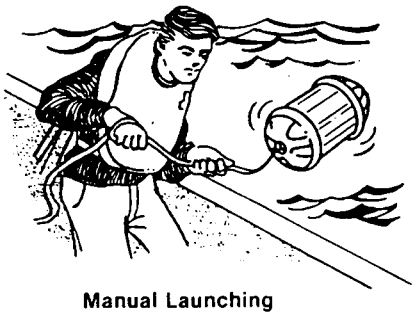


Partially Inflated Liferaft Surfaces After Automatic Launch

FIGURE 2-2



Manual Launching
Raft Tossed Overboard;
Painter Secured to Pad Eye



Manual Launching
Painter Fully Extended;
Sharp Pull Activates Inflation Device

FIGURE 2-3

g. The container may be secured to the cradle with a tie down strap.

h. The tie down strap has a securing device called a hydrostatic release. A cleat near the cradle secures the painter/operating cord when launching manually.

2-3 AUTOMATIC LAUNCHING

a. The hydrostatic release is triggered by water pressure. It releases the container at a depth of 10 to 15 feet.

b. The container will float free toward the surface of the water.

c. The 100-foot long painter/operating cord is attached to the deck or cradle with a weak link. The other end of the operating cord is attached to the raft inflation tank and the raft's towing bridle.

d. As the ship sinks below 100 feet, most of the operating cord is pulled out of the container. It activates the raft's inflation system. The raft will inflate. The raft container separates and the two halves float free.

e. The raft's buoyancy causes the weak link to break allowing the raft to float free of the ship.

2-4 MANUAL LAUNCHING

a. It is not necessary to wait for the ship to sink for the raft to be launched. To manually launch the rafts:

(1) Push or kick the hydrostatic release plunger to release the tie down straps.

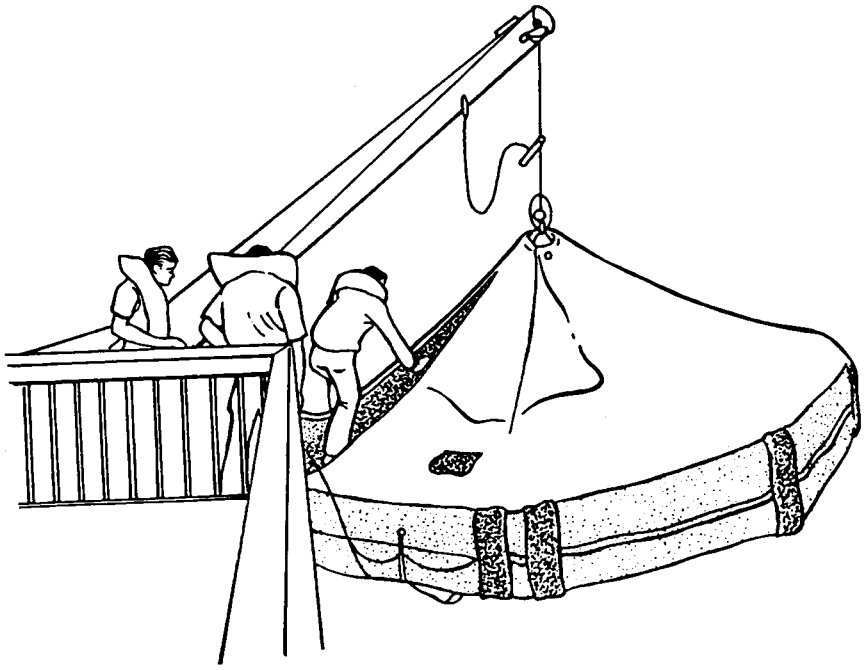
(2) Take the container to the lee side of the ship.

(3) Tie the painter/operating cord to a strong part of the ship and throw the entire container overboard.

(4) Pull the cord out its full length (100 feet) and pull it sharply. This starts the raft's inflation system.

b. The cord also acts as a painter to hold the raft alongside the ship until it can be boarded. The painter is cut from the raft after all persons have boarded.

NOTE: DAVIT-Launched rafts have two operating painters. The red 100-ft. painter is used for manual Launching. The blue flat web painter is used for davit launched inflation only.



Davit Launched Raft

FIGURE 2-4

DAVIT - LAUNCHED
INFLATABLE LIFERAFT

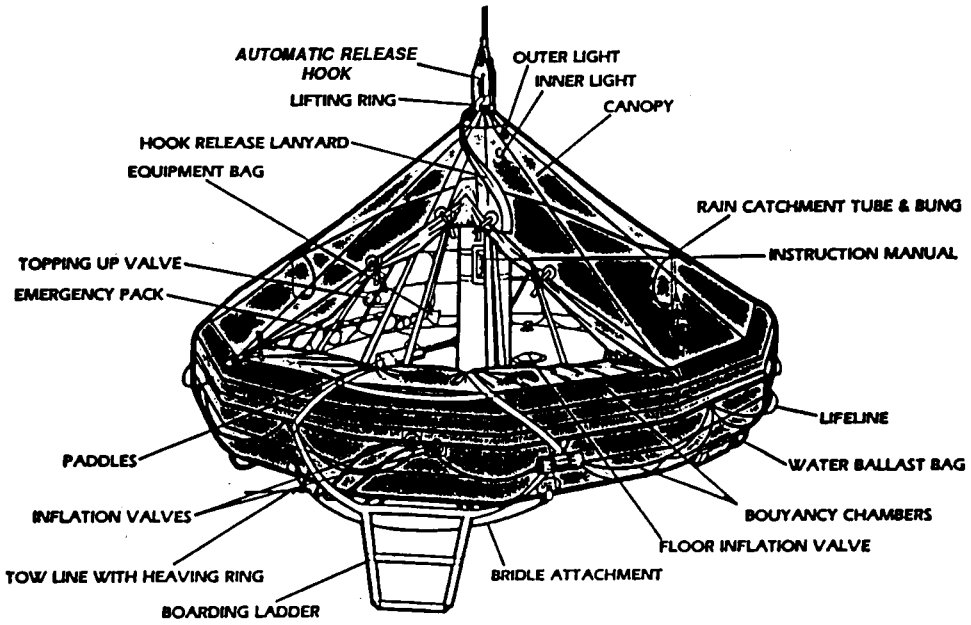


FIGURE 2-5

2-5 DAVIT LAUNCHING

The hospital ship has sixty inflatable liferafts, which are davit launched from the ship's deck. The passengers and crew can board from the ship's deck. The passengers and crew can board from the deck and be lowered to the water. This makes it possible for the passengers to board the raft dry. Davit launched rafts are sturdier than ordinary rafts, so they will hold the raft's full load while suspended from a davit.

2-6 DESIGN

Inflatable liferafts may be round, oval, octagonal (8 sided) or boat shaped. Design may vary among manufacturers.

a. Buoyancy Tubes. Buoyancy tubes make the raft float. Buoyancy tubes are on the outer edge of the raft. They are made of thick, nylon reinforced rubber. Buoyancy tubes make the raft float. They are divided into at least two compartments. The raft will carry its rated number of persons even when half the compartments in the buoyancy tubes are deflated.

b. Carbon Dioxide. Carbon Dioxide (CO_2) is usually used to inflate the raft. The CO_2 cylinder is on the bottom of the raft.

(1) It is activated by a sharp tug on the RED 100 foot painter/operating cord or the BLUE painter when davit launching.

(2) The tug activates the CO_2 valve cable. This allows CO_2 to enter the buoyancy tubes.

(3) CO_2 can escape through leaks in the tubes. The gas is odorless, tasteless and colorless, so you must watch for leaks.

(4) If you breathe air with a large amount of CO_2, you can suffocate; always leave the curtains open if you know the tubes are leaking. Fix the leak as soon as possible.

c. Pressure Relief Valves

(1) They are fitted in the tubes, so extra gas can automatically escape. It is normal for gas to escape right after the raft is inflated.

(2) You can tell it is escaping by a hissing sound coming from the valve. The sound should stop in a few minutes.

(3) Cap valves soon after inflation to stop loss of gas from waves acting on the tubes.

(4) During the day, temperature rises may cause the gas to expand enough to activate the valves.

(5) At night, when temperature drops, you might have to pump up the tubes with the inflation pumps because the air in the tubes might contract.

Sometimes, pressure relief valves do not work correctly. If gas continues to escape from the pressure relief valve, you can fix it with a safety valve plug from the repair kit. Then pump the tube back up.

d. Inflation and Deflation

(1) The raft's floor is inflatable.

(a) Inflate the floor with the inflating pump in cold climates to insulate occupants from cold seawater.

(b) Leave the floor deflated in warm climates to allow cooler seawater to cool the inside of the raft.

(2) Deflation plugs are provided to deflate the raft after rescue.

e. Boarding ladder

(1) A boarding ladder and towing bridle are at each end of the raft. The two are usually combined. In addition to boarding and towing the raft, the raft can be hoisted aboard a ship by hooking onto one or both towing bridles.

(2) Lifelines are inside and outside the raft for survivors to steady themselves.

f. Lights

(1) Two lights are on the canopy. They automatically activate when the raft inflates. They are powered by dry cells or water activated batteries and can operate for at least 12 hours. The external recognition light can be seen from two miles away. The other light is inside the canopy.

(2) Putting out the lights in the day by unscrewing the bulbs or by a pull-apart plug does not extend battery life. Remove the cells from the water and shake water out of them. This prolongs their use if the cells can be reached under the raft.

g. Insulation. The canopy has two layers to insulate the inside from extreme temperatures. The canopy pops up automatically as the arch tubes inflate. The canopy has tubes to collect rainwater. The canopy is colored Indian orange or some other bright color, which will stand out on a whitecapped sea.

h. Water Pockets. Water pockets are under the floor. They have holes to allow seawater into them to slow the raft's drifting and make it more stable.

2-7 RIGHTING A CAPSIZED RAFT

a. A righting strap is on the underside of the raft to right if it capsizes or inflates upside down. The righting strap runs the full width of the raft. If a capsized raft can be righted before the inverted (upside down) canopy fills with water, one person can easily right it.

(1) Some rafts right while you are climbing onto them. Others are more difficult.

(2) Swim to the side marked "RIGHT HERE." If it is not marked, go to the side where the CO_2 cylinder is.

(3) Reach up and grab the righting strap.

(4) Pull yourself onto the raft. It may help to kick your feet out as if swimming.

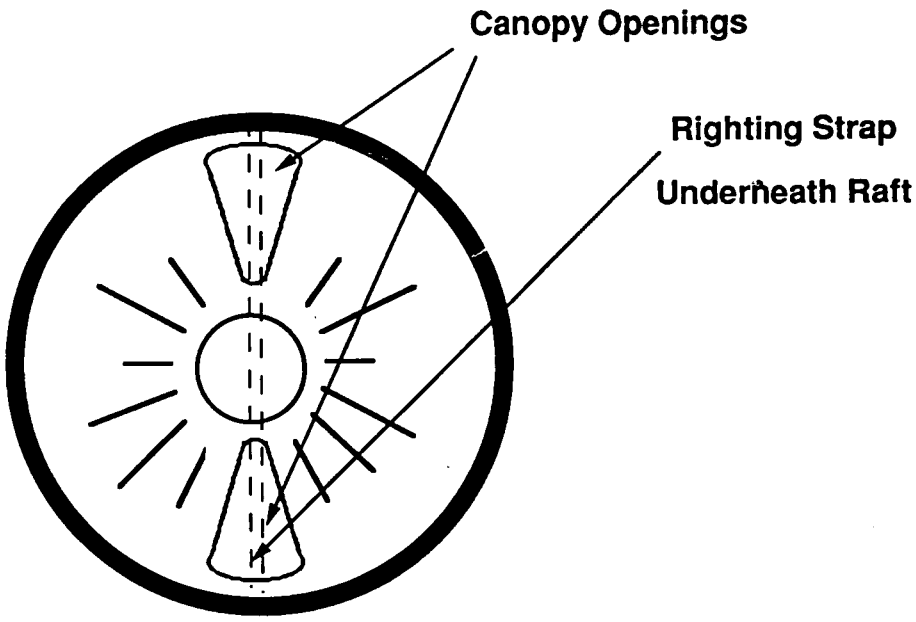
(5) If this doesn't work, put your feet or knees into the external lifelines to help you pull yourself up on the raft.

(6) Stand on the edge, where the CO_2 cylinder is located.

(7) Lean back with all your weight while pulling on the righting strap with your hands.

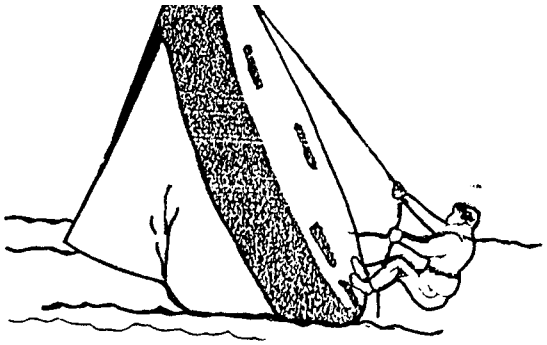
(8) If the canopy is clear of water, the raft will begin to follow you.

(9) If the raft is large, it will land on your head unless you bend your knees and spring backwards just as the raft begins to free fall. This should allow your head to clear the raft.

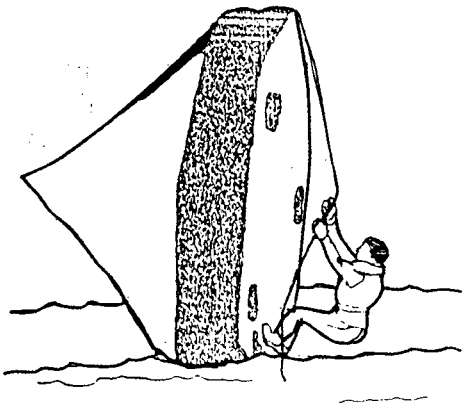


Overhead View of Round Raft Righting strap is shown underneath raft parallel to the canopy openings. This type rights well even when filled with water.

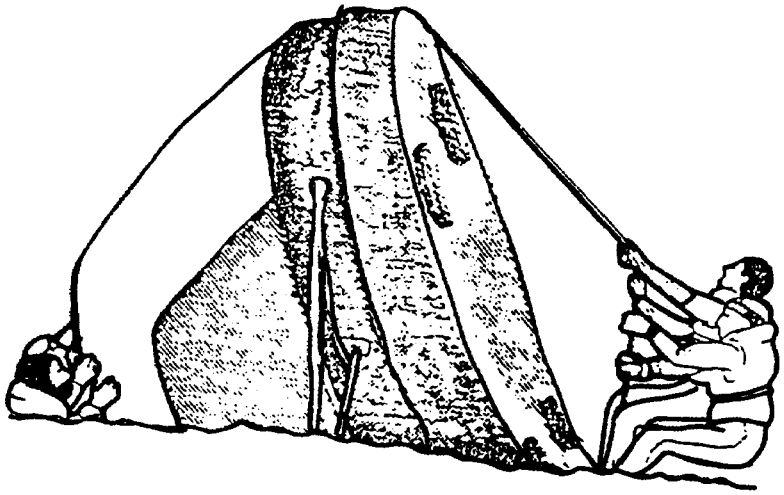
FIGURE 2-6



Standing on edge where CO_2 Cylinder is located.



Knees bent ready to spring clear of raft.



Righting a capsized raft with water trapped in the canopy.

FIGURE 2-8

b. If the raft lands on top of you, do not panic. The bottom of the raft is soft and flexible. There will be an air pocket caused by your head pushing against the floor. You can catch a breath of air, and using your arms, face up, pull yourself out from under the raft. If you try to swim out face down, the raft may hang up on the back of your life preserver. If this happens, it will be difficult for you to get out from underneath the raft.

c. If the inverted canopy fills with seawater, the raft may be difficult to right. Generally, round rafts have the righting strap parallel to the canopy openings. This allows the water to flow freely out of the raft while the raft is being righted.

d. If the raft is oval with the righting straps at right angles to the canopy openings, water tends to stay trapped in the canopy. It may take several persons to right this type of raft.

e. One person may right a waterlogged raft. He/she can pull and walk the righting strap through his/her hands until the opposite side is pulled over. This takes a lot of strength, and may be very difficult to do. It can be done without climbing aboard the raft.

f. If one person cannot right a capsized raft, the canopy probably has filled with seawater, which cannot escape. Try two persons pulling on the righting strap. If this does not work, get several persons in the water on the opposite side of the raft. These persons should work the water out of the canopy by pushing up on the canopy while two people pull on the righting strap.

2-8 BOARDING THE LIFERAFT

a. Liferafts may be boarded:

(1) At the embarkation deck if a davit launched raft is used.

(2) By climbing down a ladder.

(3) From the sea.

b. If you can, stay dry when getting off a vessel.

c. When boarding from the sea:

(1) Place your feet on the boarding ladder.

(2) Reach inside the raft and grab the internal lifelines, if there are no external handholds.

(3) Do not grab hold of the canopy to pull yourself. It will tear easily.

d. Boarding Injured Personnel. Two people can help an injured person board an inflatable liferaft using these steps:

(1) Place their outboard knees on the top of the buoyancy tube.

(2) Turn the injured person with his back toward them.

(3) Grab the injured person's lifejacket with their inboard hands.

(4) With their outboard hands, grab the injured person's upper arms.

(5) Push the injured person slightly down into the water and using his buoyancy to help them, string him up and over into the liferaft, back first.

(6) The rescuers fall back to either side of the raft's floor. This allows the injured person to fall between them.

2-9 LIFERAFT EQUIPMENT

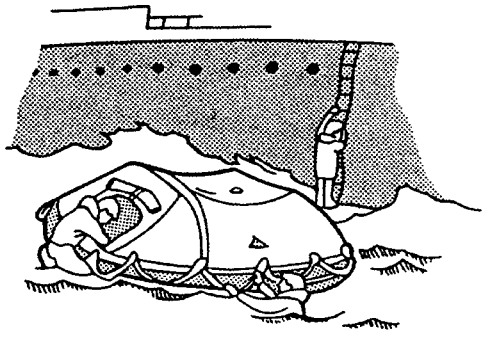
a. Liferafts are provided with equipment to handle the raft, survive at sea and alert rescuers. The following list is for liferafts on ocean service ships.

(1) Heaving Line: A buoyant 100-foot heaving line, with a buoyant quoit (small floating ring) at one end is provided. The other end is attached to the raft near the after entrance.

(2) Instruction/Survival Manual: A booklet printed on water-resistant material should be hanging in a clear envelope from one of the canopy arch tubes. The manual describes how to use the raft's equipment. It also contains internationally recognized distress signals and survival information.

(3) Instruction Card: A plastic card hangs from the inside canopy. The card shows immediate steps to be taken by survivors upon entering the raft.

(4) Jackknife: One jackknife is provided on rafts for up to 12 persons. Two are on larger rafts. The knife has a can opener. One knife, in a pocket near the forward entrance, can be used to cut the painter. If the raft has a floating sheath knife, it can replace the jackknife.



Boarding a Liferaft From the Sea

FIGURE 2-9

HELPING AN INJURED PERSON ABOARD THE RAFT

FIGURE 2-10

(5) Paddles: Two 4-foot long paddles are included.

(6) Inflation/Dewatering Pump: A pump is provided, so survivors can keep the raft inflated. It can also be used to pump water out of the raft by switching the hose.

(7) Sea Anchors: Two sea anchors are provided. One attaches to the outside of the raft and streams automatically when the raft is inflated. The other is a spare. Each sea anchor has 50 feet of nylon line attached.

(8) Bailers: Two flexible bailers are provided on rafts carrying 13 or more people. One bailer is carried on smaller rafts.

(9) Sponges: Two large cellulose sponges are provided.

(10) First Aid Kit: A kit containing first aid supplies is provided.

(11) Flashlight: A Coast Guard approved flashlight with three spare batteries and two spare bulbs is provided. It is waterproof and has a blinker button for signaling.

(12) Signal Mirror and Whistle: A mirror and whistle for signaling rescue units is provided.

(13) Red Rocket Parachute Flares: Two red rocket parachute flares are provided. They are approved for 3 years of service.

(14) Hand-held Red Flares: Six hand-held red flares are provided. They are approved for 3 years of service.

(15) Provisions: One pound of hard bread or its approved nutritional equivalent is provided for each person. The food is packed in sealed cans.

(16) Water: One and one half quarts of water are provided for each person. The water comes in sealed packets.

(17) Can Openers: Three can openers are provided.

(18) Drinking Cup: A flexible drinking cup marked in ounces is provided.

(19) Fishing tackle Kit: A kit containing fishing tackle is provided.

(20) Anti-seasickness Tablets: Six anti-seasickness tablets are provided for each person.

(21) Repair Kit: A repair kit for repairing the buoyancy tubes is provided. The kit contains: a roughing tool, five rubber tube patches (two inch diameter) and cement. The cement is flammable. Ensure no smoking while making repairs. These are used for patching small holes. They can only be used if the are around the hole can be kept dry while you are patching the hole.

b. To patch small holes:

(1) Roughen the surface of the area that needs patching.

(2) Apply cement to both the patch and the area around the hole. Be sure the patch is one inch larger than the hole.

(3) Allow both to dry, and apply a second coat of cement to both.

(4) When both are tacky, press the patch on the hole.

(5) Do not completely inflate the raft until the patch has had 24 hours to dry.

c. Six sealing clamps are also included in the kit for plugging large holes and any hole area which cannot be kept dry enough to use cement.

(1) Loop the cord on the clamp around your wrist to prevent losing the clamp.

(2) Dip the clamp into the water. This makes the clamp slippery, so it can be inserted easily.

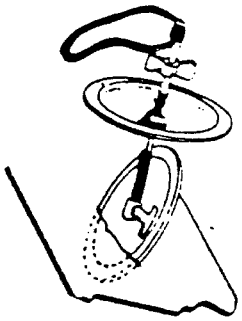
(3) Push the bottom plate through the hole. If the hole is too small, carefully enlarge it, so the clamp can be forced in.

(4) Pull the bottom clamp against the inner surface of the tube, and slide the top clamp over it.

(5) Adjust the clamp to completely cover the hole. Hold it in place and screw down the wing nut, until it is tight.

Clamp Repair Procedures

a.



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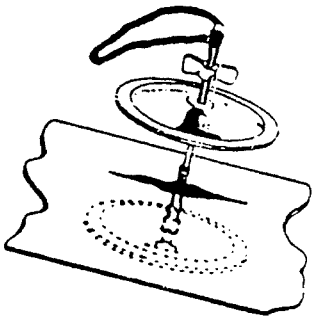

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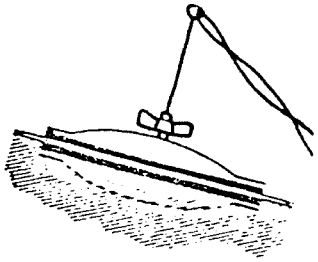


FIGURE 2-11

CHAPTER 3

DAVIT LAUNCHING PROCEDURES

3-1 DAVIT LAUNCHING PROCEDURES

a. TO LOWER DAVIT ARM

PULL GRIPE RELEASE LANYARD

RAISE BRAKE HANDLE TO LOWER DAVIT TO FULL OUTBOARD POSITION

WARNING WARNING WARNING

DO NOT RELEASE RAFT HOOK FROM DAVIT UNTIL FULL OUTBOARD POSITION IS REACHED.

b. POSITION RAFT

PUSH OR KICK THE PLUNGER ON THE HYDROSTATIC RELEASE. THIS RELEASES THE TIE DOWN STRAPS THAT HOLD THE RAFT IN THE CRADLE. REMOVE THE TIE DOWN STRAPS.

POSITION RAFT IN LAUNCH AREA

MAKE BOWSING LINES FAST TO DECK CLEATS – ALLOW SOME SLACK FOR LIFTING

DETACH WEAK LINK FROM END OF RED PAINTER

MAKE FAST RED AND BLUE PAINTERS TO STRONG POINT

RELEASE RAFT HOOK FROM DAVIT

PULL RED WEBBING AND WITHDRAW RING

ATTACH RAFT HOOK TO RAFT LIFTING RING AND SNAP SHUT

c. DEPLOY RAFT

INSERT HANDWHEEL ON WINCH

ROTATE HANDWHEEL UNTIL STOP REACHES DAVIT

PULL BLUE PAINTER HARD TO INFLATE RAFT

NOTE: THE TOP AND BOTTOM SECTIONS OF THE RAFT CONTAINER REMAIN ATTACHED TO THE RAFT TO PREVENT INJURY TO PERSONS BELOW THE RAFT BEING LAUNCHED

REMOVE HANDWHEEL AND STORE ONDAVIT

BOWSE RAFT TIGHTLY TO SHIP'S SIDE

d. BOARD RAFT

BOARD RAFT TWO PERSONS AT A TIME – RAFT CAPACITY IS 25 PERSONS

SIT UNIFORMLY AROUND RAFT TO SPREAD LOAD EVENLY

e. LOWER RAFT

RELEASE AND CLEAR AWAY BOWSING LINES AND BLUE AND RED PAINTERS

WARNING WARNING WARNING

REMOVE HANWHEEL FROM WINCH BEFORE RELEASING BRAKE

RAISE BRAKE HANDLE TO LOWER RAFT TO WATER

WHEN CLOSE TO OR ON WATER SURFACE, PULL LANYARD TO COCK RAFT HOOK FOR AUTOMATIC OPENING

IF HOOK FAILS TO OPEN AUTOMATICALLY WITH RAFT FLOATING, PULL LANYARD AGAIN FIRMLY

f. RETRIEVE HOOK

RAISE FALL WITH QUICK-RETURN WHEEL

STOP WHEN HOOK REACHES WIRE PENDANT

PULL HOOK IN WITH RECOVERY LINE

REPEAT PROCEDURES AS ACCOMPLISHED FOR THE FIRST RAFT

g. STOWING THE DAVIT

ATTACH RAFT HOOK TO DAVIT

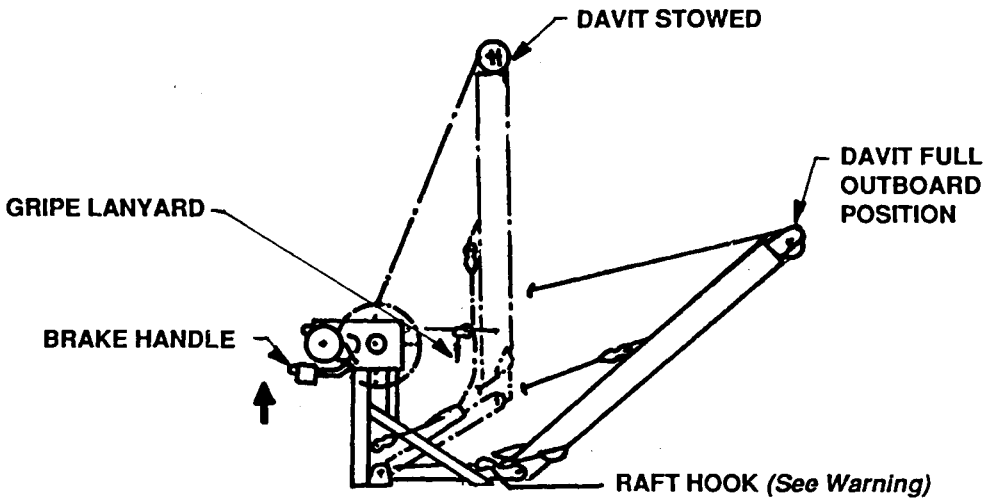
INSERT HANDWHEEL ON WINCH

ROTATE HANDWHEEL UNTIL DAVIT REACHES STOPS AT FULL INBOARD POSITION

REMOVE HANDWHEEL AND STORE ON DAVIT

SECURE GRIPE RELEASE HOOK

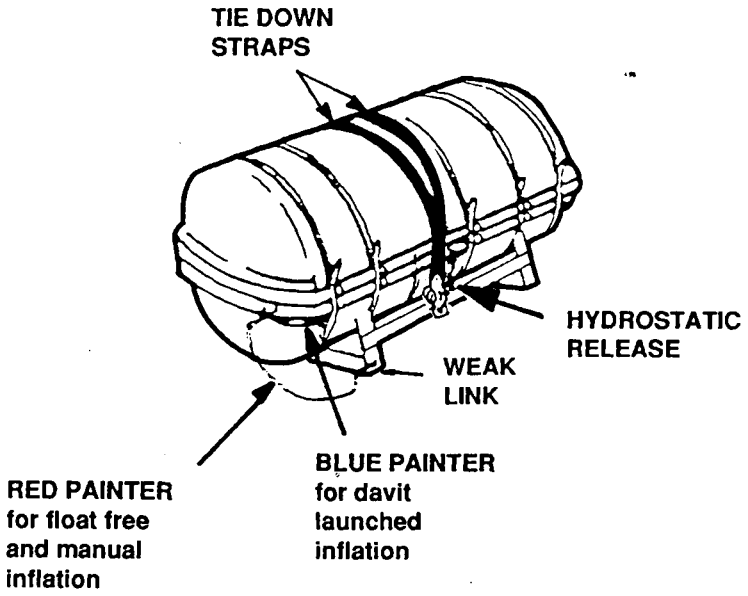
Lower DAVIT Arm



- PULL GRIPE RELEASE LANYARD
- RAISE BRAKE HANDLE TO LOWER DAVIT TO FULL OUTBOARD POSITION
- WARNING: DO NOT RELEASE RAFT HOOK FROM DAVIT UNTIL FULL OUTBOARD POSITION IS REACHED

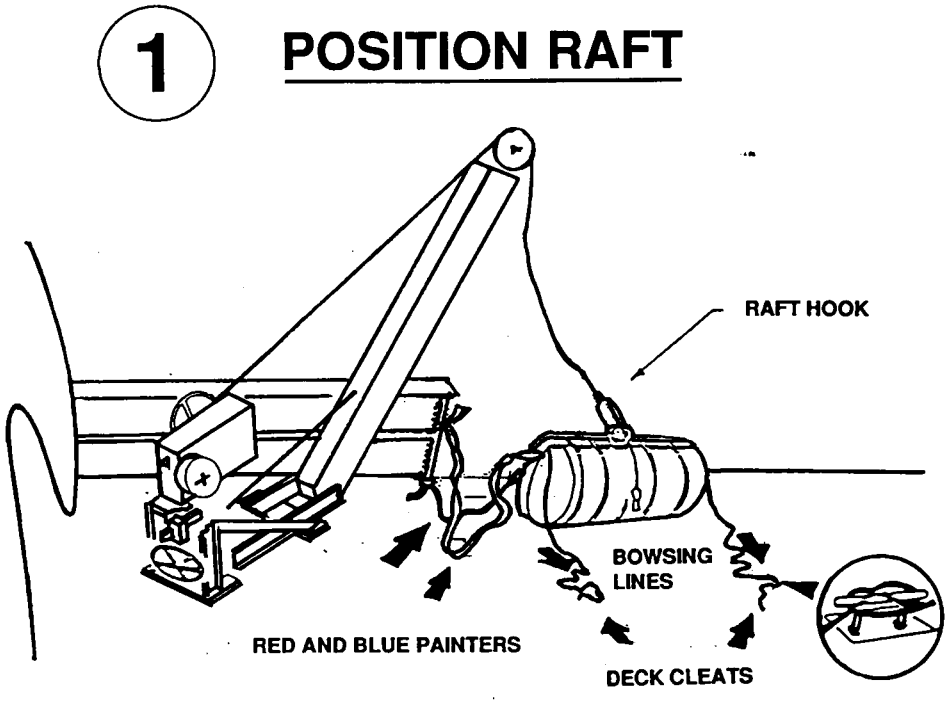
FIGURE 3-1

TYPICAL RAFT INSTALLATION
RELEASE CONTAINER FROM LASHINGS AND MOVE TO LAUNCH POSITION AS SHOWN IN (1)



NOTE: The gripes that hold the raft in the cradle are attached to the hydraulic (hydrostatic) release. Pushing in on or kicking the plunger on the diaphram releases the tie down gripes (straps).

FIGURE 3-2



- POSITION RAFT IN LAUNCH AREA
- MAKE BOWSING LINES FAST TO DECK CLEATS. ALLOW SOME SLACK FOR LIFTING.
- MAKE FAST RED AND BLUE PAINTERS TO STRONG POINT.
- RELEASE RAFT HOOK FROM DAVIT
- PULL RED WEBBING AND WITHDRAW RING. ATTACH HOOK TO RING AS SHOWN IN (2)

FIGURE 3-3

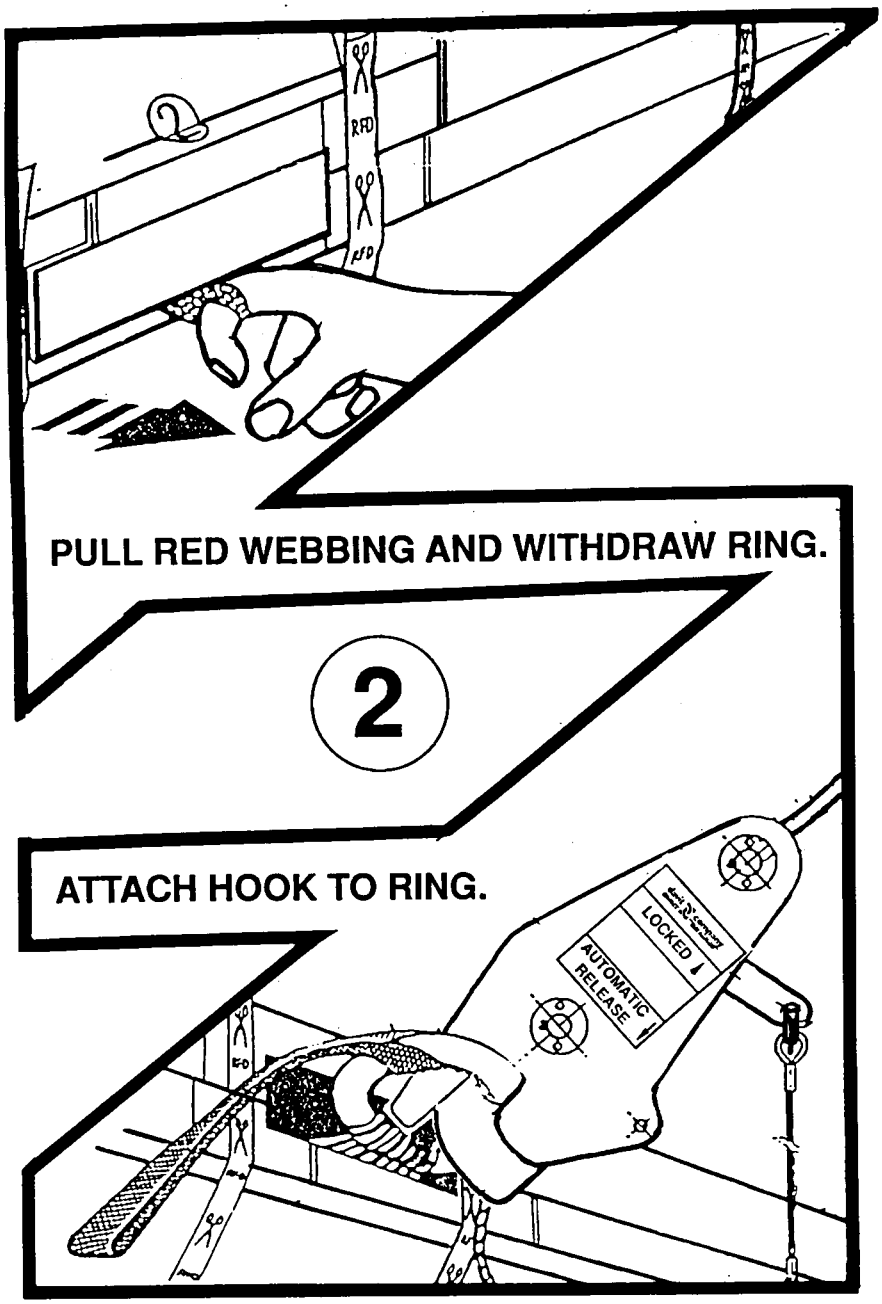
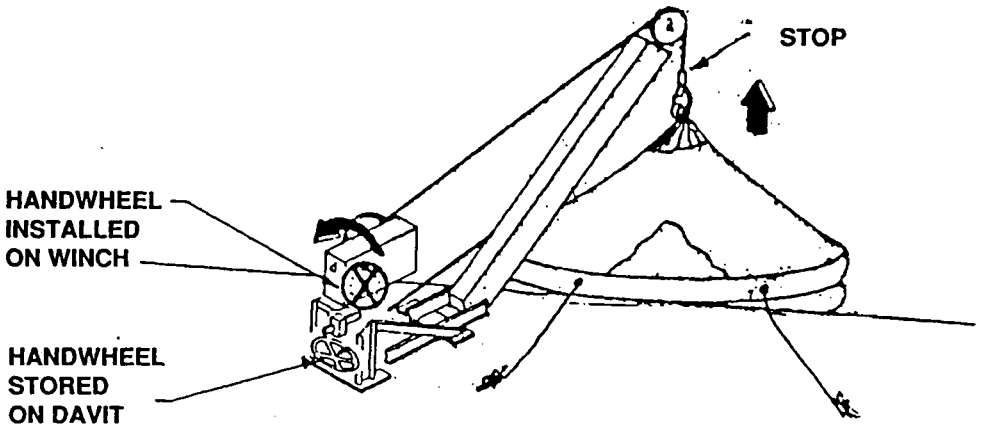

RED
RED
PULL RED WEBBING AND WITHDRAW RING.
2
ATTACH HOOK TO RING.
LOCKED
AUTOMATIC RELEASE

FIGURE 3-4

3 DEPLOY RAFT

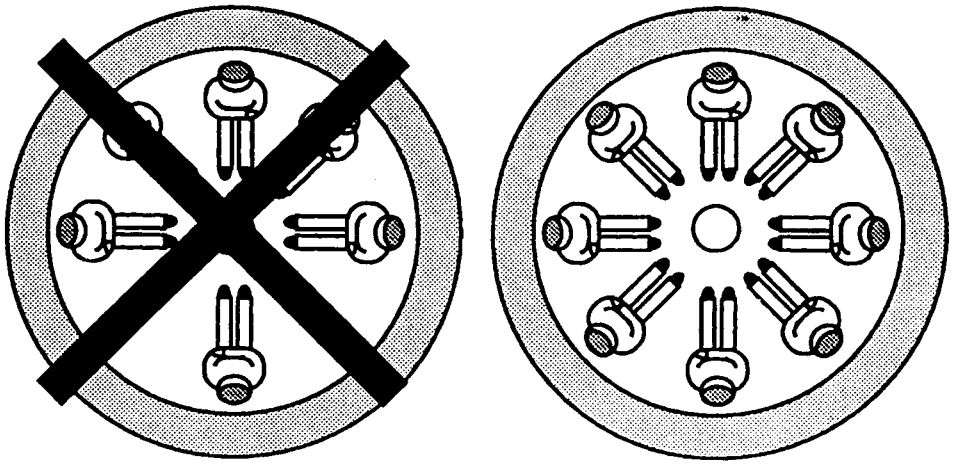


- **INSERT HANDWHEEL ON WINCH.**
- **ROTATE HANDWHEEL UNTIL STOP REACHES DAVIT**
- **PULL BLUE PAINTER HARD TO INFLATE RAFT.** ***(See note below)***
- **REMOVE HANDWHEEL AND STORE ON DAVIT**
- **BOWSE RAFT TIGHTLY TO SHIP'S SIDE**

NOTE: WHEN THE RAFT INFLATES THE TOP AND BOTTOM SECTIONS OF THE CONTAINER REMAIN ATTACHED TO THE RAFT. THE CONTAINER SECTIONS ARE SUSPENDED BELOW THE RAFT ON TWO SHORT LANYARDS. ONCE THE RAFT IS WATERBORNE THE CONTAINER CAN BE CUT FREE OF THE RAFT.

FIGURE 3-5

4 BOARD RAFT

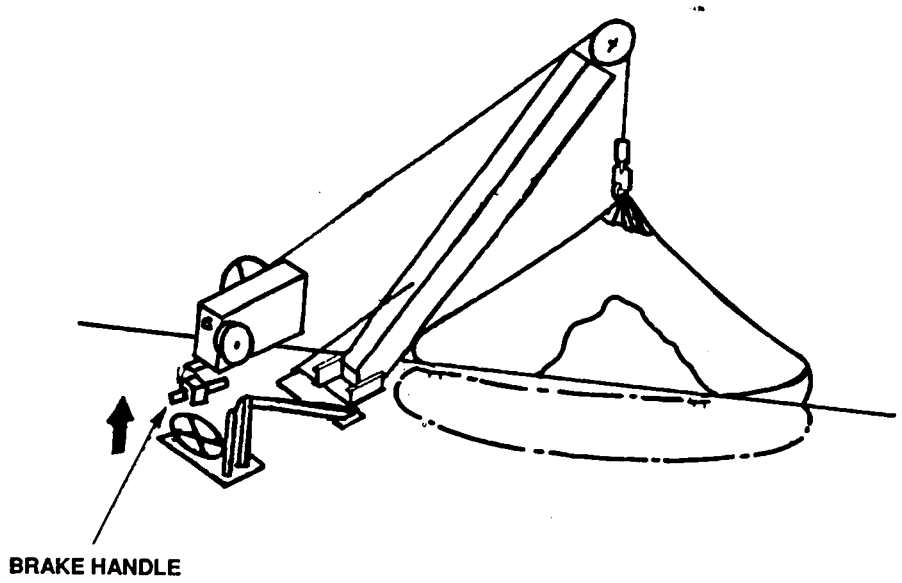


NO YES

- BOARD RAFT. DO NOT EXCEED RATED LOAD CAPACITY
- SIT UNIFORMLY AROUND RAFT TO SPREAD LOAD EVENLY

FIGURE 3-6

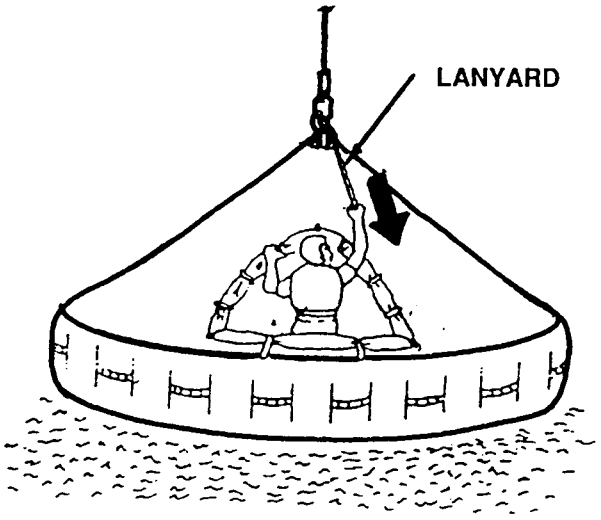
5 LOWER RAFT



- **RELEASE & CLEAR AWAY BOWSING LINES AND INFLATION PAINTERS.**
- **WARNING: REMOVE HANDWHEEL FROM WINCH BEFORE RELEASING BRAKE.**
- **RAISE BRAKE HANDLE TO LOWER RAFT TO WATER.**

FIGURE 3-7

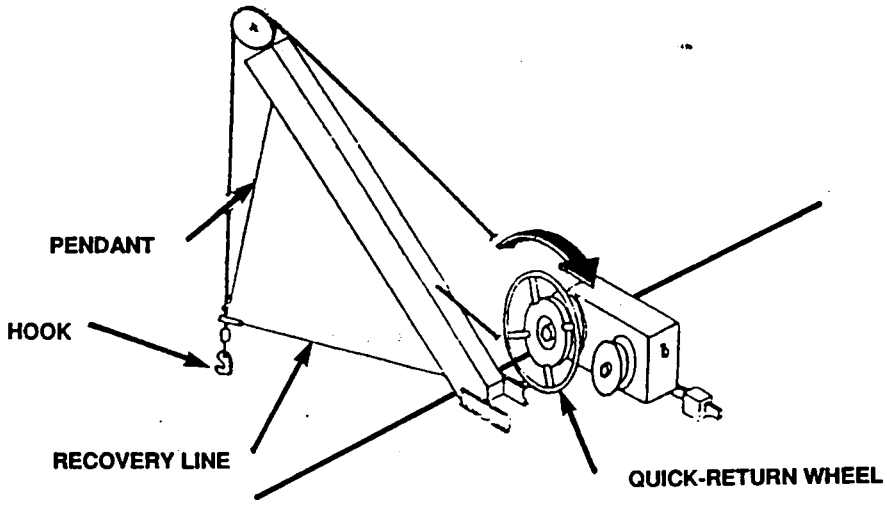
6 UNHOOK RAFT



- **WHEN CLOSE TO OR ON WATER SURFACE, PULL LANYARD TO COCK HOOK FOR AUTOMATIC OPENING.**
- **IF HOOK FAILS TO OPEN AUTOMATICALLY WITH RAFT FLOATING, PULL LANYARD AGAIN FIRMLY.**

FIGURE 3-8

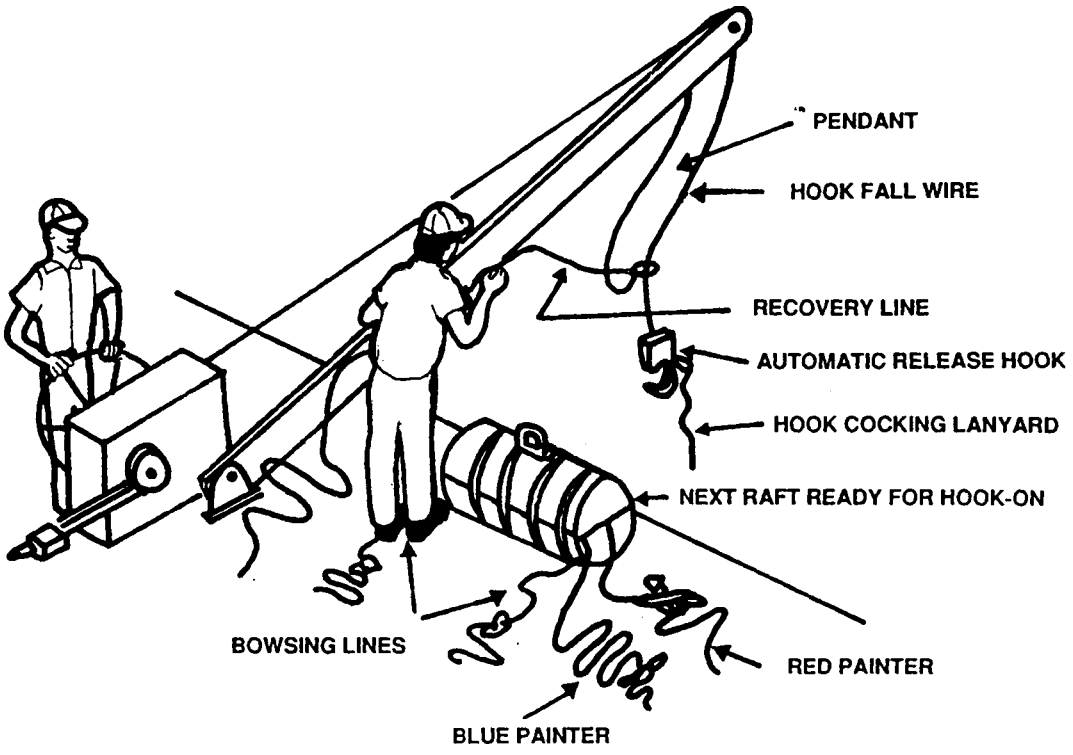
7 RETRIEVE HOOK



- **RAISE FALL WITH QUICK-RETURN WHEEL. STOP WHEN HOOK REACHES WIRE PENDANT.**
- **PULL HOOK IN WITH RECOVERY LINE.**
- **REPEAT STEPS 2 THRU 6 TO LAUNCH SUBSEQUENT RAFTS.**

FIGURE 3-9

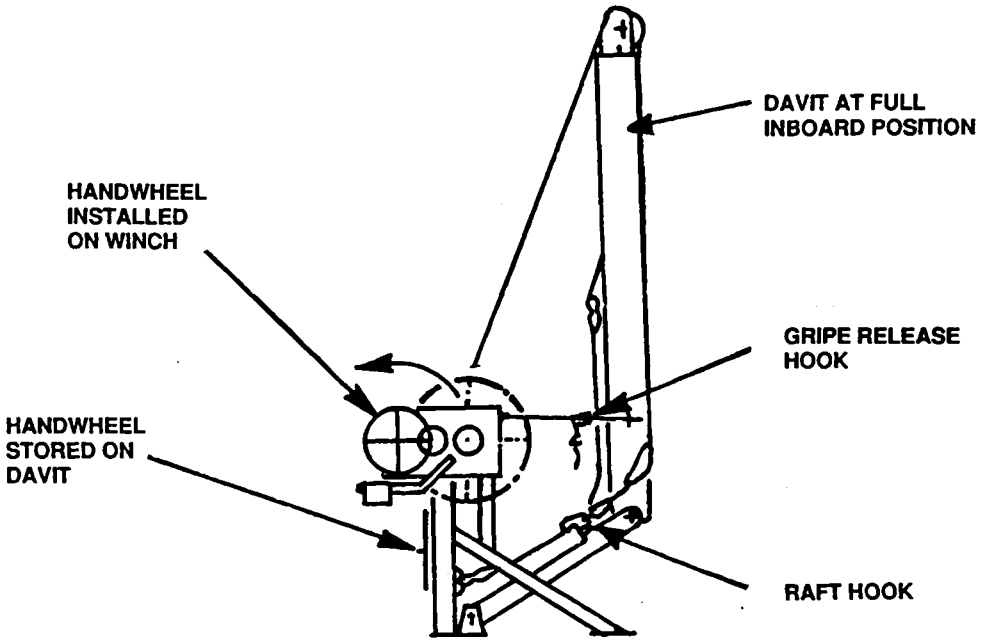
8 HOOK RECOVERY



- AFTER RECOVERY OF HOOK, PULL IN WITH THE RECOVERY LINE AS SHOWN.
- ATTACH HOOK TO NEXT RAFT RING AND LOCK HOOK.

FIGURE 3-10

9 STOWING DAVIT



- ATTACH RAFT HOOK TO DAVIT.
- INSERT HANDWHEEL ON WINCH.
- ROTATE HANDWHEEL UNTIL DAVIT REACHES STOPS AT FULL INBOARD POSITION.
- REMOVE HANDWHEEL AND STORE ON DAVIT.
- SECURE GRIPE RELEASE HOOK.

FIGURE 3-11

SAFETY NOTES/WARNINGS

1. **BE SURE HANDWHEEL IS REMOVED FROM WINCH BEFORE RELEASING BRAKE.**
2. **WHEN LOWERING DAVIT ARM, DO NOT RELEASE RAFT HOOK FROM DAVIT UNTIL FULL OUTBOARD POSITION IS OBTAINED.**
3. **WHEN UNHOOKING RAFT, DO NOT COCK HOOK FOR AUTOMATIC OPENING UNTIL ON OR NEAR WATER SURFACE.**
4. **REFER TO INSTRUCTION MANUAL FOR DETAILED OPERATING/MAINTENANCE INSTRUCTIONS.**

FIGURE 3-12

AUTOMATIC RELEASE HOOK

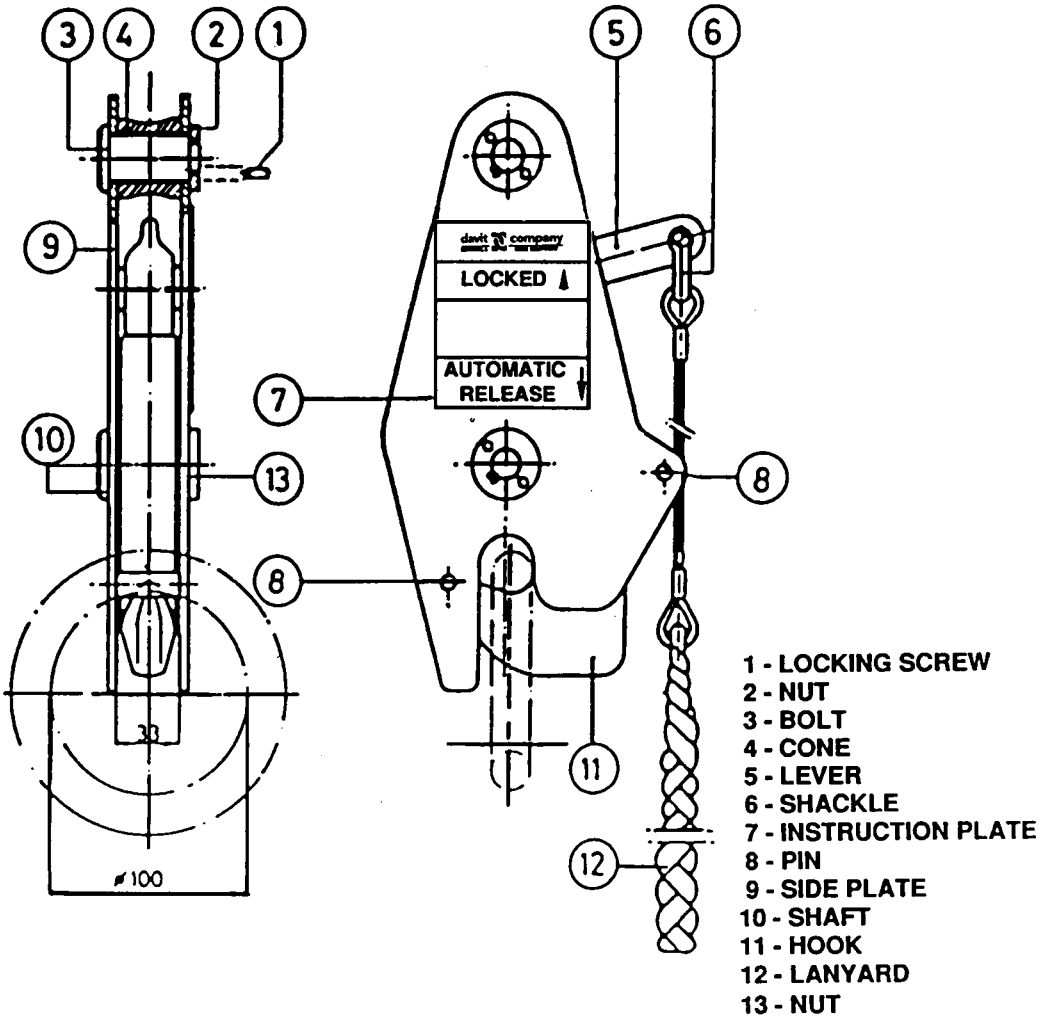


FIGURE 3-13

Directions for use

— **The Automatic Release Hook engages on the raft/boat suspension ring and remains locked by means of a built-in safety catch. When the craft is being lowered the safety catch is tripped from within the boat/raft by pulling the lanyard. The raft/boat will automatically release when it becomes waterborne.**

— **The engaging operation is carried out by hand. When the hook is closed the lever is pushed up into the "locked" position and then both the hook and the safety catch are engaged.**

— **After the weight of the raft has been taken on the hook the lanyard may be pulled. This trips the safety catch into its "release" position, but the weight of the raft continues to keep the hook closed.**

— **Immediately the raft becomes waterborne the weight of the raft is removed from the hook, and spring pressure causes the hook to open and release the raft.**

— **The Automatic Release Hook is made of stainlesss steel.**

FIGURE 3-14

CHAPTER 4

EMERGENCY SIGNALS

4-1 EMERGENCY SIGNALS

a. Station Bill. The station bill shall set forth the various signals to be used for the calling of the crew to their stations and for giving instruction while at their stations.

b. Fire Alarm Stations

(1) The fire alarm signal shall be a continuous blast of the whistle for a period of not less than 10 seconds supplemented by the continuous ringing of the general alarm bells for not less than 10 seconds.

(2) For dismissal from fire alarm stations, the general alarm shall be sounded three times supplemented by three short blasts of the whistle.

c. Boat Stations

(1) The signal for boat stations or boat drill shall be a succession of more than six short blasts followed by one long blast of the whistle supplemented by a comparable signal on the general alarm bells.

(2) Where whistle signals are used for handling the lifeboats and liferafts, they shall be as follows:

TO LOWER LIFEBOATS AND LIFERAFTS	1 SHORT BLAST
TO STOP LOWERING LIFEBOATS & LIFERAFTS	2 SHORT BLASTS
FOR DISMISSAL FROM BOAT STATIONS	3 SHORT BLASTS

4-2 DISTRESS SIGNALS

The following signals, used or exhibited either together or separately, indicate distress and need of assistance. The signals listed are specified in Annex IV, International Regulations For Preventing Collisions at Sea.

a. A gun or other explosive signal fired at intervals of about a minute.

b. A continuous sounding with any fog-signaling apparatus.

c. Rockets or shells, throwing red stars fired one at a time at short intervals.

DISTRESS SIGNALS
72 COLREGS

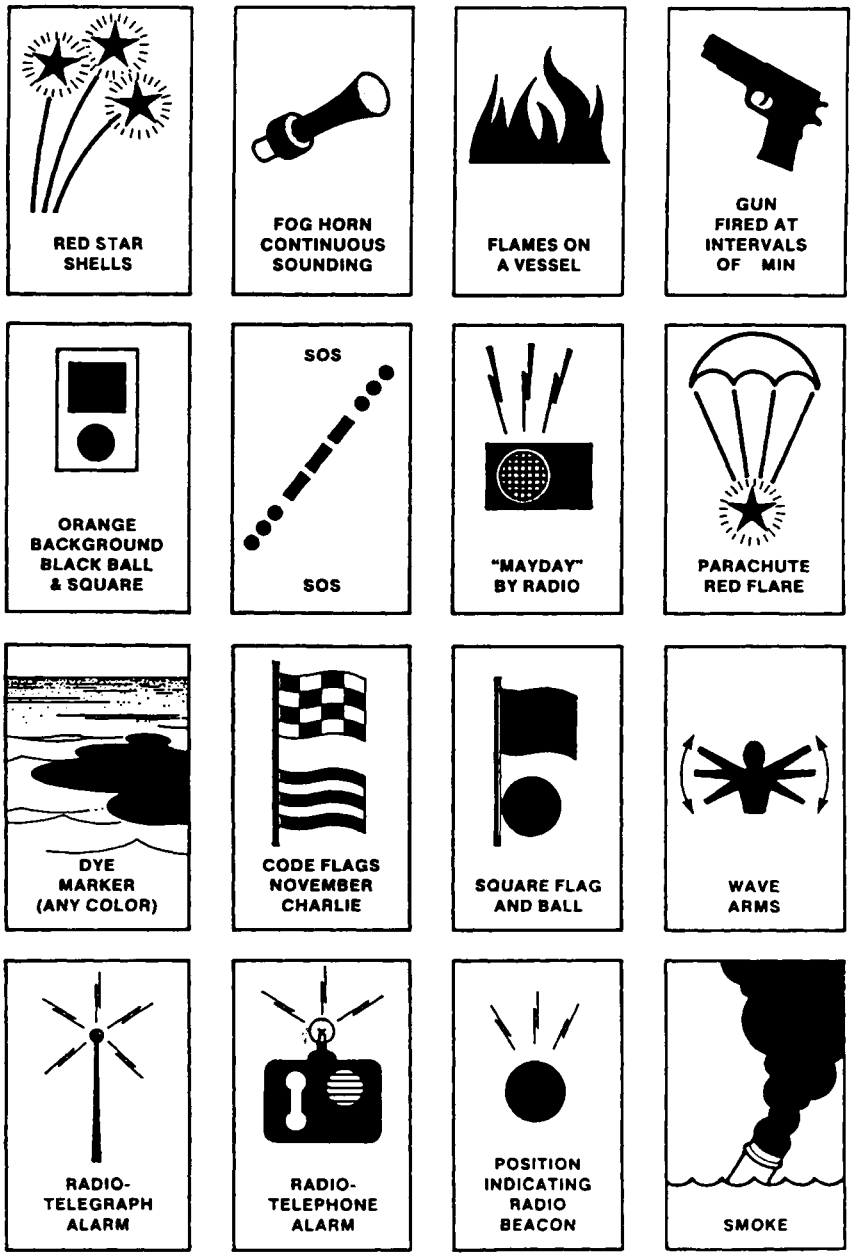


FIGURE 4-1

d. A signal made by radiotelegraphy or by any other signaling method consisting of the group …- - - -…. (SOS) is Morse code.

e. A signal sent by radiotelephony consisting of the spoken word “Mayday.”

f. The International Code Signal of distress indicated by N.C.

g. A signal consisting of a square flag having above or below it a ball or anything resembling a ball.

h. Flames on the vessel (as from a burning tar barrel, oil barrel, etc.).

i. A rocket parachute flare or hand flare showing a red light.

j. A smoke signal giving off orange-colored smoke.

k. Slowly and repeatedly raising and lowering arms outstretched to each side.

l. The radiotelegraph alarm signal.

m. The radiotelephone alarm signal.

n. Signals transmitted by emergency position-indicating radio beacons.

o. A piece of orange-colored canvas with either a black square and circle or other appropriate symbol (for identification from the air).

p. A dye marker of any color.

4-3 SIGNALING DEVICES

a. Signaling Mirrors

(1) Read the instructions for the particular kind of signaling mirror in your survival equipment.

(2) Don’t wait until you see a rescue craft to use the signaling mirror. When the sun is shining, flash the mirror all around the horizon. An aircraft can spot the flash long before you would see the aircraft. The signaling mirror may save your life. Use it as long as the sun is shining.

b. Whistles

(1) In calm weather, your voice can be heard only a few hundred yards away. If you keep screaming, you will become hoarse and lose your voice.

(2) A whistle, on the other hand, can be heard up to 4 miles away in favorable weather conditions. It could come in handy when you are floating in the water trying to attract the attention of nearby rescuers. A whistle can be used over and over again. It can be used in fog and at night or during the day.

c. Pyrotechnics. Pyrotechnics are signals such as rockets, flares and smoke. Instructions for operating various brands of pyrotechnics are written by the manufacturers, so they are different. Once you are settled in your survival craft, read the instructions on each type of pyrotechnic. Then, you'll know how to use them when a ship or aircraft is spotted. Keep the pyrotechnics close by or immediate use, so you can signal when necessary.

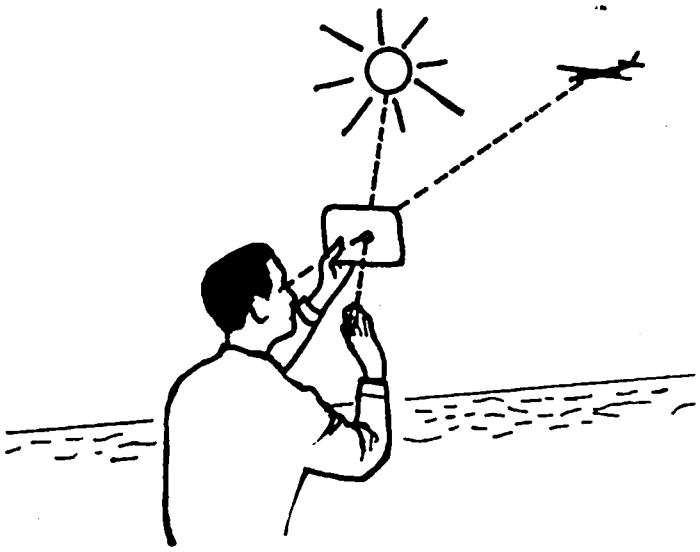
(1) Fire the signals downwind on the left side of the survival craft. Pyrotechnics have burning particles which may fall down. They may burn you or damage the raft. Hold them at a slight angle over the water.

(2) Only use smoke signals during the daytime. Smoke does not glow in the dark.

(3) Only us pyrotechnics when you can see a ship or plane. Do not waste them.

(4) Use rockets when a vessel is spotted on the horizon. A rocket will get the signal up high, where it can be seen from a greater distance.

(5) An aircraft directly overhead is more likely to spot a hand flare than a flare covered with a parachute.



Signalling Mirror

FIGURE 4-2

Military Sealift Command
Washington Navy Yard
Washington, D.C.
20398-5100

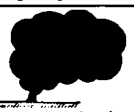
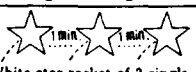
LIFESAVING SIGNALS
HELICOPTER RECOVERY PROCEDURES
AND
BREECHES BUOY INSTRUCTIONS

LIFESAVING SIGNALS (in accordance with SOLAS 74)

DEPARTMENT OF
TRANSPORTATION
U.S. COASTGUARD
CG-811 (Rev. 10-79)

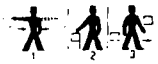
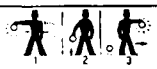
FIGURE 4-3

I. Reply from Life-Saving Stations or Maritime Rescue Units to distress signals made by a ship or person.

	Manual signals	Light signals	Other signals	Signification
Day signals		 Orange smoke signals	 Combined light and sound signal *(thunder-light)* of 3 single signals fired at intervals of approx. one minute.	"You are seen–assistance will be given as soon as possible." (Repetition of such signal shall have the same meaning.)
Night signals		 White star rocket of 3 single signals fired at about 1 minute intervals	None	
If necessary, the day signals may be given at night or the night signals be given by day.				

II. Landing signals for the guidance of small boats with crews or persons in distress.

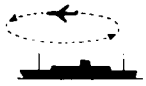
Day signals	 Vertical motion of a white flag or of the arms	or firing of a green star signal	or code letter K given by light or sound-signal apparatus	"This is the best place to land."
Night signals	 Vertical motion of a white light or flare	or firing of a green star signal		
A range (indication of direction) may be given by placing a steady white light or flare at a lower level and in line with the observer.				

Day signals	 Horizontal motion of a white flag or of the arms extended horizontally	 or firing of a red star signal	or code letter S given by light or sound-signal apparatus	"Landing here highly dangerous."
Night signals	 Horizontal motion of a white light or flare	 or firing of a red star signal		
Day signals	 1. Horizontal motion of a white flag 2. placing of the flag in the ground 3. carrying a second flag in the direction to be indicated	 1. or firing of a red star signal vertically and 2. a white star signal pointing towards the better landing place	or code letter S followed by a. code letter R (• — •) if a better landing place is to the right of the direction of approach b. code letter L (• • •) if a better landing place is to the left of the direction of approach	"Landing here highly dangerous. A more favorable location for landing is in the direction indicated."
Night signals	 1. Horizontal motion of a white light 2. placing of the light on the ground 3. carrying a second light in the direction to be indicated	 1. or firing of a red star signal vertically and 2. a white star signal pointing towards the better landing place		

III. Signals to be used in connection with the use of shore lifesaving apparatus.

	Manual signals	Lights signals	Other signals	Signification
Day signals	 Vertical motion of a white flag or of the arms	or firing of a green star signal	None	In general: "Affirmative" Specifically: "Rocket line is held." "Tail block is made fast." "Hawser is made fast." "Man is in the breeches buoy." "Haul away."
Night signals	 Vertical motion of a white light or flare	or firing of a green star signal	None	
Day signals	 Horizontal motion of a white flag or arms extended horizontally	 or firing of a red star signal	None	In general: "Negative" Specifically: "Slack away." "Avast hauling."
Night signals	 Horizontal motion of a white light or flare	 or firing of a red star signal	None	

IV. Signals used by the aircraft engaged on search and rescue operations to direct ships towards an aircraft, ship, or person in distress.

Procedures performed in sequence by aircraft			Signification
 1. Aircraft circles the surface craft at least once	 2. Crosses the surface craft course close ahead at low altitude opening and closing throttle or changing the propeller pitch	 3. Heads in the direction in which the surface craft is to be directed	"The aircraft is directing a surface craft towards an aircraft or surface craft in distress." (Repetition of such signals shall have the same meaning.)
 Crossing the surface craft wake close astern at low altitude, opening and closing the throttle or changing the propeller pitch			"The assistance of the surface craft is no longer required." (Repetition of such signals shall have the same meaning.)

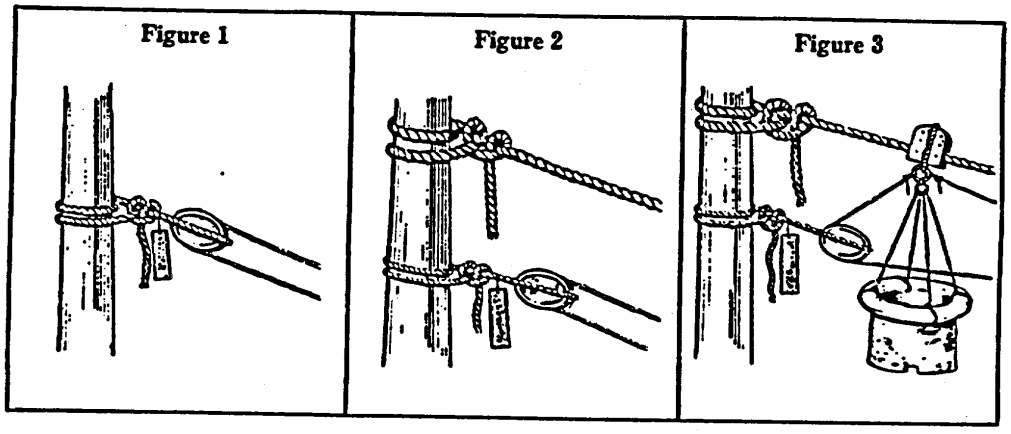
BREECHES BUOY INSTRUCTIONS

If your vessel is stranded and a shot with a small line is fired over it, get hold of the line and haul on board until you get a tailblock with an endless line rove through it; make the tailblock fast to the lower mast, well up, or in the event the masts are gone, to the best place to be found; cast off small shot line, see that rope in block runs free, and make a signal to shore. *(Figure 1.)*

A hawser will be bent to the endless line on shore and hauled off to your ship by the lifesaving crew. Make hawser fast about 2 feet above the tailblock and unbend hawser from endless line. See that rope in block runs free and show signal to shore. *(Figure 2.)*

Lifesavers on shore will then set hawser taut and by menas of the endless line haul off to your ship a breeches buoy. *(Figure 3.)*

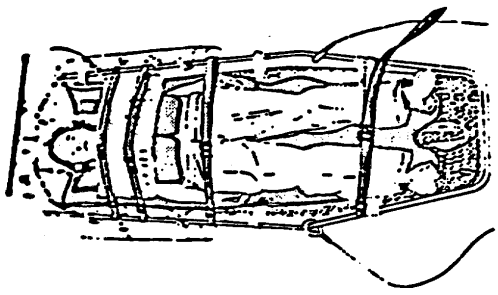
Let one man get clear into breeches buoy, thrusting his legs through the breeches; make signal to shore as b before, and he will be hauled ashore by the lifesavers and the empty buoy returned to the ship.



HELICOPTER RECOVERY PROCEDURES

1. Lower all booms and masts that are capable of being lowered.
2. Clear a suitable area, preferably aft.
3. When the helicopter arrives, vessel should maintain a speed of 10-15 knots with the relative wind 30 degrees off the bow on the port side.
4. Unnecessary personnel should stand clear.
5. Secure all loose gear in or near the hoisting area as the helicopter may cause gale force winds in the hoisting area.
6. The helicopter may maneuver to the side while the person to be evacuated is being prepared.
7. Allow the rescue device (*basket or litter*) to make contact with the vessel to discharge static electricity before it is touched by any shipboard personnel.
8. Shipboard personnel should guide the rescue device to the deck using the steadying line.
9. Do not remove rescue device from hoisting area with cable attached; if it has to be moved, unhook the cable first.
10. Do not attach the unhooked cable to any part of the vessel.
11. The person to be evacuated should be briefed on the proper use of the rescue device.
12. The person to be evacuated should wear a lifejacket and be made as comfortable as possible.
13. Upon signal the helicopter will maneuver back over the vessel and lower the hook. Fasten it to the rescue device.
14. Give the "thumbs up" signal when ready to hoist.
15. Personnel on deck should use the steadying line to prevent swinging the rescue device while it is being hoisted

BASKET



LITTER

INTERNATION MORSE CODE

MORSE SYMBOLS

ALPHABET

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 ––..		

NUMERALS

1 .––––	6 –....
2 ..–––	7 ––...
3 ...––	8 –––..
4 ....–	9 ––––.
5	0 –––––

FIGURE 4-4

CHAPTER 5

SURVIVAL

5-1 ABANDONING SHIP

a. Lifejackets

(1) One of the most important pieces of equipment is your lifejacket. Lifejackets are officially known as Personal Flotation Devices (PFDs).

(a) The term personal indicates how the jacket should be tied to fit you. It is a very important, personal survival item.

(b) The word flotation means that the jacket will hold you in the upright floating position without you having to swim.

(c) Whatever you call it, take care of it and keep it ready for use.

(2) The most common lifejacket has top and bottom tie tapes and a hooked body strap in the middle.

(a) The top and bottom tapes are tied in a bow knot just like your shoes.

(b) The body strap is hooked and pulled tight by its end webbing.

(c) Lifejackets are equipped with the following to make rescue easier:

1. A signaling whistle attached to the end of a cord.

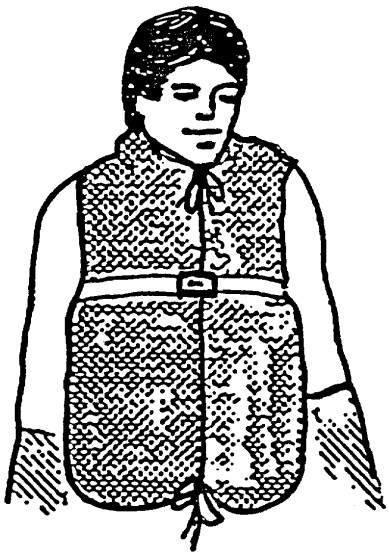
2. A small light.

3. Reflective patches to return the light in the direction of a searchlight and make the jacket easier to see.

b. Entering the Water

(1) If you have time, put on extra clothing. Include an outer layer of wind and waterproof clothing with head cover and gloves.

(2) Secure your lifejacket properly. Pull all ties tight. If you do not secure your lifejacket properly, you could injure your head when you jump.



Personal Flotation Device

Jump Position

FIGURE 5-1

(3) Get down to a height of less than 30 feet if possible. Below 15 feet is ideal.

(4) If you jump from higher than 30 feet you will probably injure yourself. It will depend on the height from which you jump and the angle in which your body hits the water.

(5) If you have false teeth, eyeglasses, contact lenses or a glass eye, remove them. Also remove any sharp objects from your pockets.

c. Abandon Ship Position

(1) Cover nose and mouth with left hand.

(2) Cross over left hand with right hand and hold lifejacket securely.

(3) Look down to be sure nothing is in the way.

(4) With toes over the edge, step off, looking ahead, feet together.

(5) Remain in this position until you bob back up to the water surface.

(6) Board the survival craft as soon as possible.

d. Saving Your Strength

(1) One you are in the water, get away from the danger.

(2) Swim as slowly as possible toward safety.

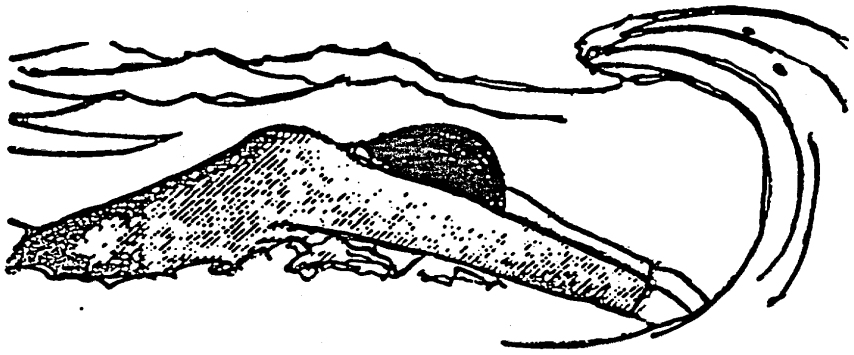
(3) Do not swim or thrash about any more than you need to because you will lose body heat and strength.

(4) You'll need strength to pull yourself into the survival craft.

(5) Let your lifejacket support you in the face-up position.

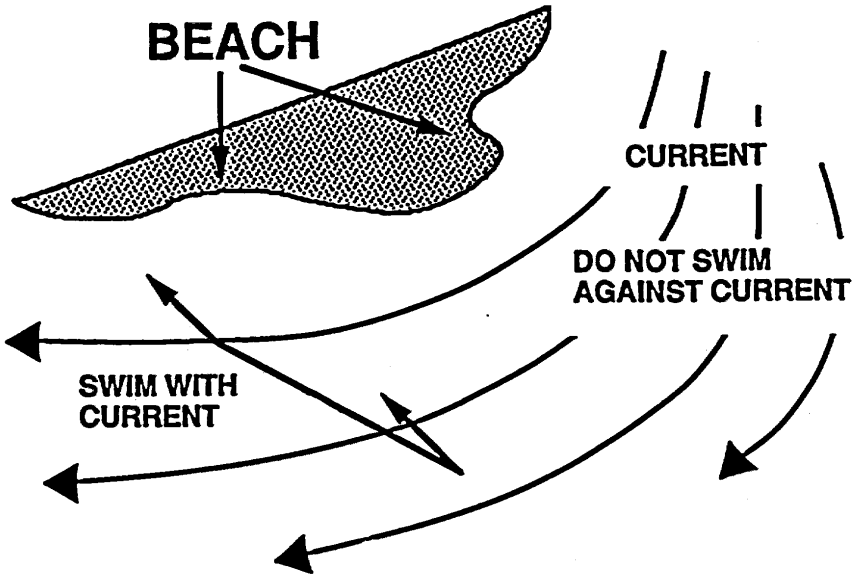
5-2 SWIMMING FOR SURVIVAL

a. Dealing with wave slap. In rough weather, waves and spray may be blown into your face. Protect your face by supping your hands over your nose and mouth. It will also help you breath normally.



Swimming into a wave

FIGURE 5-2



Swimming with current

FIGURE 5-3

b. Swimming in Surf. If you are in the water near a beach, knowledge of the tides, currents and surf will help you. Small waves break in shallow water. Large waves break further out.

(1) If the surf is small, you can ride a small wave in (body surf) by swimming forward with it as the crest picks you up. Roll out of it just before the wave breaks.

(2) If the surf is high, swim toward shore while in the trough between waves.

(3) When the next wave comes, cover your nose and mouth, hold your breath with your back to the wave until it passes.

(4) If you do not have a lifejacket and you are a good swimmer, you may face the wave and dive under it.

c. Swimming in Currents. Waves may break on reefs and bars miles from shore. Look for a channel or opening where the waves do not break as they go to shore. Water currents are dangerous:

(1) If you get caught in a current, don't fight it.

(2) Swim parallel to the shore or diagonally across the current just as you would in a river current.

(3) Head toward shore only after you are out of current.

d. Swimming through Burning Oil. You may need to abandon ship by jumping into water covered with burning oil. If you can, jump into the water at the bow or the stern, on the windward side of the vessel. Do not swim through burning oil or debris. If you must go through flames to get to safety, swim underwater.

(1) Remove your lifejacket and your shoes. It makes swimming easier.

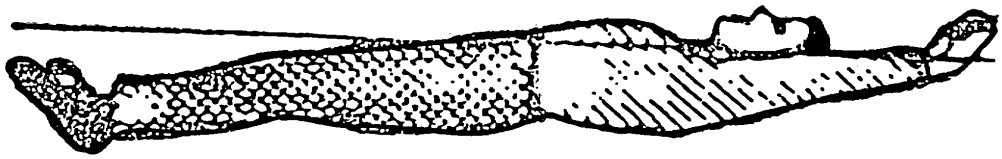
(2) Keep other clothing on. It protects you from flames and debris.

(3) Stay underwater as long as you can.

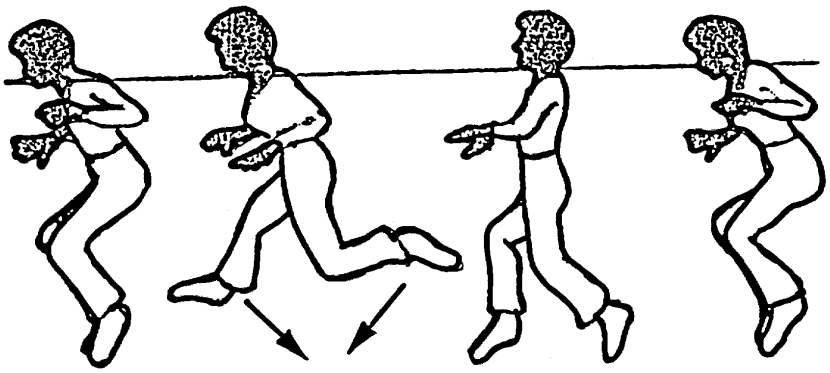
(4) When you need to breathe, come to the surface with your arms over your head.

(5) Use your hands to break the surface and move them in a circular, thrashing motion to beat away the burning oil.

(6) Turn your back to the wind. Continue to beat away burning oil with your hands.

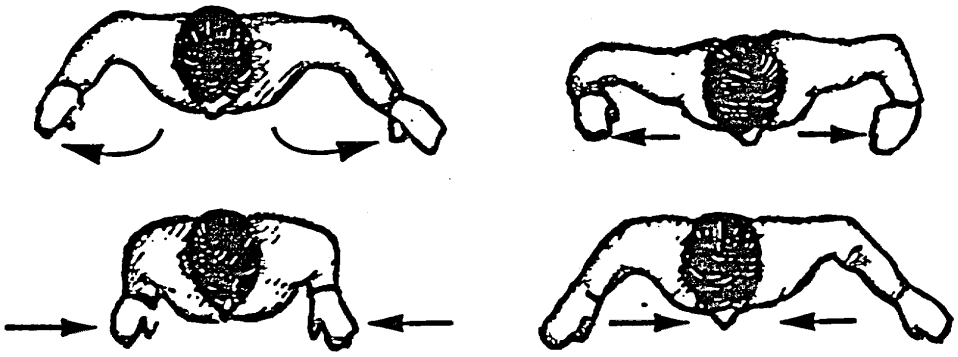


BACKFLOAT



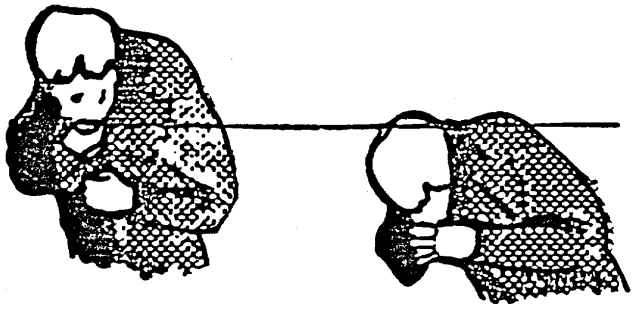
TREAD AND SCULL

FIGURE 5-4

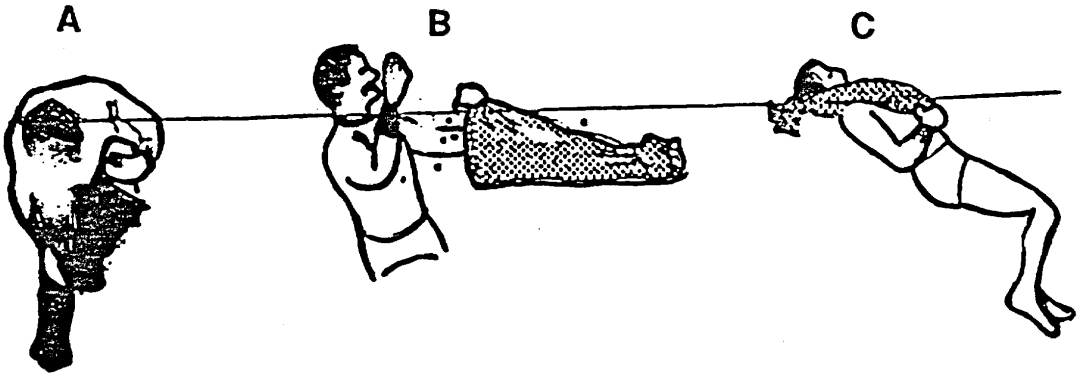


Hand action for sculling (overhead view)

FIGURE 5-5



Shirt Flotation



Pants Flotation

FIGURE 5-6

(7) Take a deep breath and go back under water feet first.

(8) Swim to windward, underwater towards safety.

e. Floating With No Lifejacket. If you don't have a lifejacket, find floating debris to hold on to. If you can't find any debris to help you float, don't panic and thrash about. You will only wear yourself out. You can stay afloat with no lifejacket by using one of the methods below.

(1) Air trapped in clothing. Your clothes have a lot of air trapped in them. Use this trapped air to stay afloat. Relax. Lie on your back with your head back so your nose and chin are above water. The more you thrash about, the more air will escape from your clothing.

(2) Backfloat. If the seas are calm:

(a) Lie on your back with your head above water.

(b) Let your arms and legs relax. Some people can float well this way; others sink, because they do not relax.

(c) Try to keep your lungs full of air. Do not panic if your face does sink.

(d) Gently work your hands to help raise your chin out of the water.

(e) Take a short breath.

(f) Let yourself sink. You will go down a little and then come up.

(g) Your face may not come all the way above water, but it will come close.

(h) After a while, you will learn to gulp breaths after you drift up and to rest and relax as you go underwater.

(3) Tread and scull. If you want to raise your head and look around or call for help, you will need to tread water. There are many methods to treading water. The following method is called the single scissors kick.

(a) Leg action for treading

1. Put legs together.

2. Bend the knees.

3. Work legs like scissors, back and forth.

(b) Hand action for sculling. While moving your legs in the above manner:

1. Place your hands palm down on the water.

2. Press hands down several feet in the water, moving them slowly side to side.

3. Bring hands back to the surface.

4. Repeat the motion.

5-3 CLOTHING

Clothing protects you against exposure. Only remove clothing that weighs you down, or clothing you can use to keep afloat.

a. Shirts. To use your shirt to stay afloat:

(1) Button it at the collar, so it's tight at the neck.

(2) Take a deep breath.

(3) Bend your head forward.

(4) Pull the shirt to your mouth and blow between the second and third buttons. Air will rise to form a bubble at the back of the shirt.

(5) Hold the shirt collar tightly to stop the trapped air from escaping.

b. Pants. To use your pants to stay afloat:

(1) Remove your pants while in a jellyfish float position.

(2) Tread water.

(3) Tie both legs together as close to the bottom cuff as possible.

(4) Pull the zipper up.

(5) Hold the back of the waistband with one hand. Splash air into the open waist. Use our free hand and strike downward with your palm. Carry the motion through to a point just below the open waist.

(6) Slip your head between the legs of pants which were tied together.

5-4 DEALING WITH SHARKS

Vibrations and odors appear to attract sharks at a distance. But at short range they are drawn to what they can see. The danger of being attacked by a shark is greatly exaggerated. The most important thing to remember about sharks is that they are unpredictable. They are very curious and will investigate any object in the water.

a. Sharks are likely to attack something that's dead, or wounded and bleeding.

b. Blood in the water attracts and excites them. If you or other survivors are bleeding, stop the flow of blood as quickly as you can.

c. Be very careful if you clean fish at the edge of the survival craft.

d. Don't trail your hands or fleet in the water when sharks are nearby.

e. Stay with your shipmates. Sharks are less likely to attack groups than a single person.

f. Remain still and quiet in the water.

g. Clothing, especially a dark color, is good protection. Light colored objects seem to attract sharks.

5-5 ORGANIZING FOR SURVIVAL

a. Good leadership and high morale are very important for survival. Good leadership creates high morale. The leader must take the responsibility of keeping other survivors as organized, calm and comfortable as possible.

(1) Every survivor must keep a positive attitude after abandoning ship.

(2) Do not give up. Believe that you are going to be rescued.

(3) Do everything you have learned to do to keep alive. Many people have dies because they give up the will to fight for their lives.

b. The leader

(1) If there are ship's officers in the craft, the senior officer will take command.

(2) If there are not officers, the senior crewmember with a lifeboatman endorsement will take command.

(3) If it is not clear who is the senior member, a leader should be elected.

(4) If you are in charge, tell the other survivors what you are and will be doing. When you do something or tell someone else to do something, explain to everyone why it's being done. This will help prevent the other survivors from worrying or having doubts.

(5) Do everything you can to stop the crew from being scared. Use the materials in the survival craft to show the survivors that there is shelter, safe flotation, food, water, signaling devices and companionship for them. Be a cheerful but firm leader. Keep things organized and always maintain positive discipline.

c. Establish a routine. If you are the senior person in the survival craft, do the following:

(1) Collect sharp objects or potential weapons.

(2) Have a roll call.

(3) Establish a routine and assign duties to able survivors, such as:

(a) Ration keeper

(b) Lookouts

(c) Repair party

(d) Bailers

(e) First aid persons

(f) Signaling

(4) Keep the minds of the survivors occupied during waking hours. Don't overdo it.

(5) Avoid unnecessary work.

(6) Organize one hour watches in pairs. One watchstander with duties outside and one with duties inside.

(7) Outside:

(a) Look for ships, survivors, aircraft and useful wreckage.

(b) Gather useful wreckage.

(c) Flash the signal mirror all around the horizon when the sun is shining.

(8) Inside:

(a) Maintain the craft (bailing, etc).

(b) Look after equipment.

(c) Supervise things while others rest.

(d) Attend to injured persons.

d. Stay together

(1) Your best chance for survival is to remain in the area of the sinking. DO NOT LEAVE THE SCENE.

(2) The old saying, "There is safety in numbers," is important to your survival. If lifeboats make it off the vessel, use them to collect the rafts and tie them together. Two or more boats and rafts tied together are easier to spot. When you stick together rations, equipment, knowledge and comfort can be shared.

(3) Search for Emergency Position Indicating Radio Beacons (EPIRBS) that may have floated free from the ship if they were not taken off during abandoning the ship. If an EPIRB is found, keep it upright and in the water. Tie it off to the liferaft or lifeboat.

(4) Boats should also make several thorough searches of the disaster area to look for lone survivors or dead bodies. During these searches, any equipment, food or other useful debris may be collected and shared with the group.

5-6 BEACHING SURVIVAL CRAFT

a. General

(1) Avoid landing through surf unless absolutely necessary. The Coast Guard and lifesaving organizations of foreign nations, whose duties require the launching and beaching of boats through surf, have crews familiar with local conditions, boats designed for this operation and persons trained and physically conditioned. These conditions do not usually exist for a merchant vessel survival craft, particularly when children and elderly persons may be among those to be landed.

(a) Put your lifejacket back on before entering the surf line.

(b) It is better to go through a break in the reef, at the mouth of a stream or wherever you see a suppression or valley in the shoreline.

(c) Openings in reefs may also be discovered by the action of breakers. Waves that do not break on the reef but continue their run toward whore, mean a channel or area generally clear of rock and coral.

(2) Because the surf appears smoother when viewed from a survival craft, use extreme caution before entering the surf. Take time to study the pattern of the waves before trying the beach the survival craft.

b. Beaching lifeboats

(1) In a pulling boat (a boat powered by rowing):

(a) Keep the boat's bow to sea; row to meet breaking waves.

(b) Beach the boat stern first.

(c) Use the sea anchor to assist in keeping the boat from broaching (beaching from the side).

(d) The oars may be backed if sea conditions allow.

(2) In a power-driven boat:

(a) It may be best to use the oars.

(b) If beaching bow first is attempted using the engines, the sea anchor can be towed to slow the boat for greater control.

(c) Be very careful to avoid fouling the propeller with the lines from the sea anchor.

c. Beaching liferafts

(1) Use extreme caution when beaching a liferaft.

(a) Do not attempt this at night unless it is necessary. The senior person will probably stream the sea anchor and wait until daybreak to paddle the raft ashore.

(b) The raft may be punctured by sharp rocks and coral found near a beach. You and the other people may be spilled into the water.

(c) The depth of the water, its temperature, the physical condition of the survivors and the distance to shore should be considered.

(d) Open the canopy curtains to reduce wind resistance if going against the wind.

(2) If landing a raft with help from an onshore breeze:

(a) Take in the sea anchor in the morning when the breeze blows toward shore.

(b) Stream the sea anchor at night to prevent the raft drifting away from shore.

(c) When close to land paddles can be used. However, the raft is hard to paddle. The extra work may be too much for weak survivors. It may be necessary to rely on wind and waves.

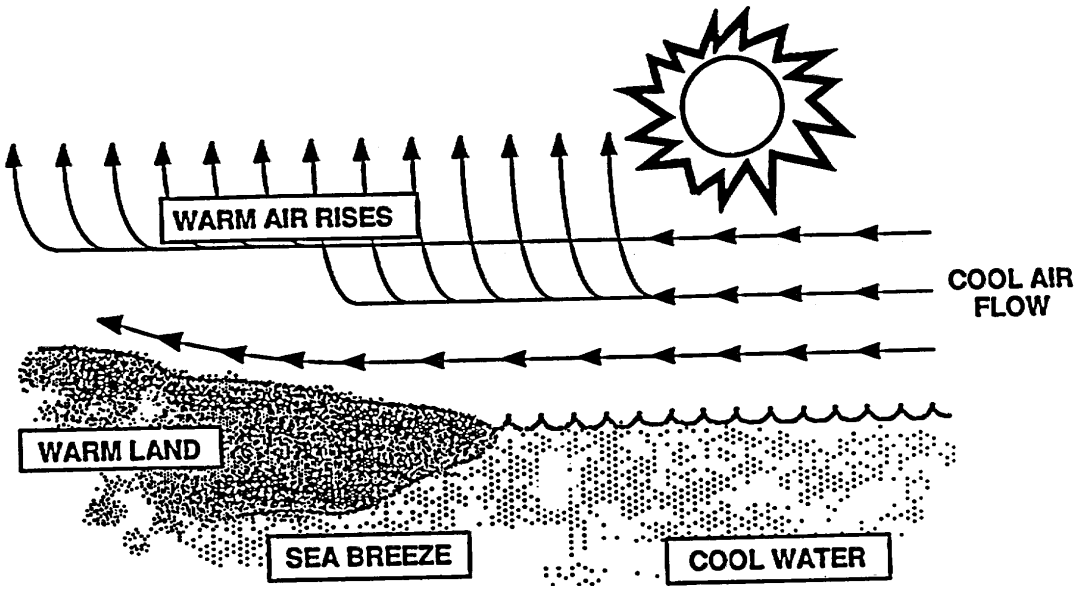
d. Sea breezes near land

(1) If drifting near shore you are more likely to get an onshore wind (pushing you toward the beach) after the sun rises and begins to heat the land.

(2) In the daytime, the sun heats the air over the land. Over water, the air temperature remains almost the same. As the air over the land is warmed relative to the air over the water, the heavier air over the water moves toward the shore, to replace the heated, lighter air.

(3) In this way sea breezes are created.

(4) Sea breezes sometimes blow over 15 knots and can be much stronger when they are in the same direction as the normal wind. The normal wind is caused by the existing atmospheric pressure over the area.



SEA BREEZES NEAR LAND

FIGURE 5-7

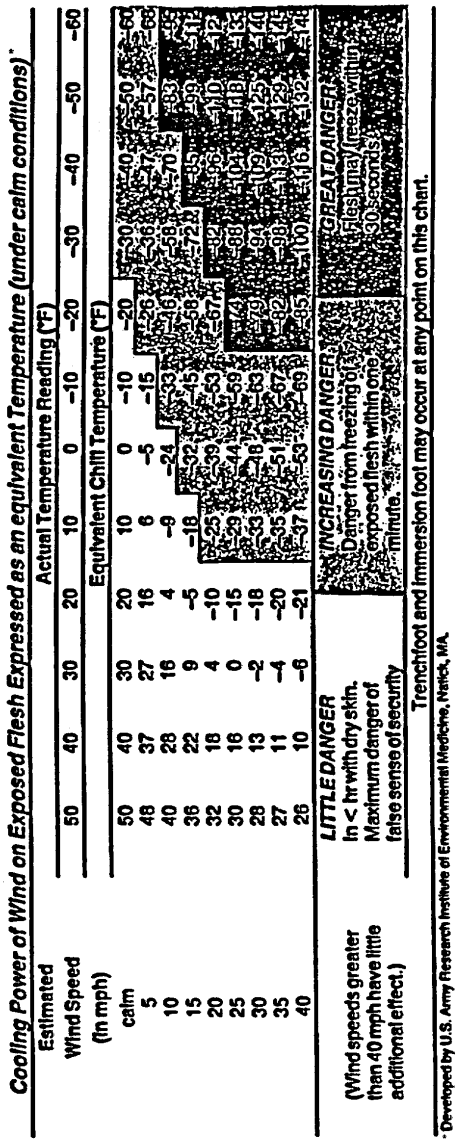

Cooling Power of Wind on Exposed Flesh Expressed as an equivalent Temperature (under calm conditions)*
Actual Temperature Reading (°F)
Estimated Wind Speed (in mph)
Equivalent Chill Temperature (°F)
calm
5
10
15
20
25
30
35
40
LITTLE DANGER
(Wind speeds greater than 40 mph have little additional effect.)
In < hr with dry skin. Maximum danger of false sense of security
INCREASING DANGER
Danger from freezing of exposed flesh within one minute.
GREAT DANGER
Flesh may freeze within 30 seconds.
Trenchfoot and immersion foot may occur at any point on this chart.
* Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

FIGURE 5-8

5-7 COLD WATER SURVIVAL

a. Water conducts heat 25 times faster than air. In the water you can lose body heat very quickly. If you are in the water and its temperature and weather conditions are severs, your life expectancy may be greatly reduced. You can survive if you learn how to prevent hypothermia, its symptoms and first aid for hypothermia victims.

b. What is Hypothermia? Hypothermia is the loss of body heat. Normal body temperature is 98.6°F. If your temperature is lower you are a hypothermia victim. Hypothermia can occur in or out of water. If it happens out of the water, such as working on deck, it is because you have not prepared for cold weather, or you think you can handle the weather when you really can't.

(1) Hypothermia usually occurs when the air temperature is between 30° and 50°F.

(2) When low temperatures combine with wind, the possibility of hypothermia increases. This happens because of windchill.

(3) Windchill is the effect of the wind on body temperature. Wind carries off body heat which reduces its temperature. Windchill makes low temperatures more severe.

(4) Wind and ship speed together make air temperatures feel much lower.

(5) Hypothermia victims may not realize it is dangerous to be wet in such temperatures.

(6) Victims become wet from sweating, being out in the rain or snow or from being splashed or sprayed by waves.

(7) Survivors who have spent some time in a survival craft can easily become hypothermia victims.

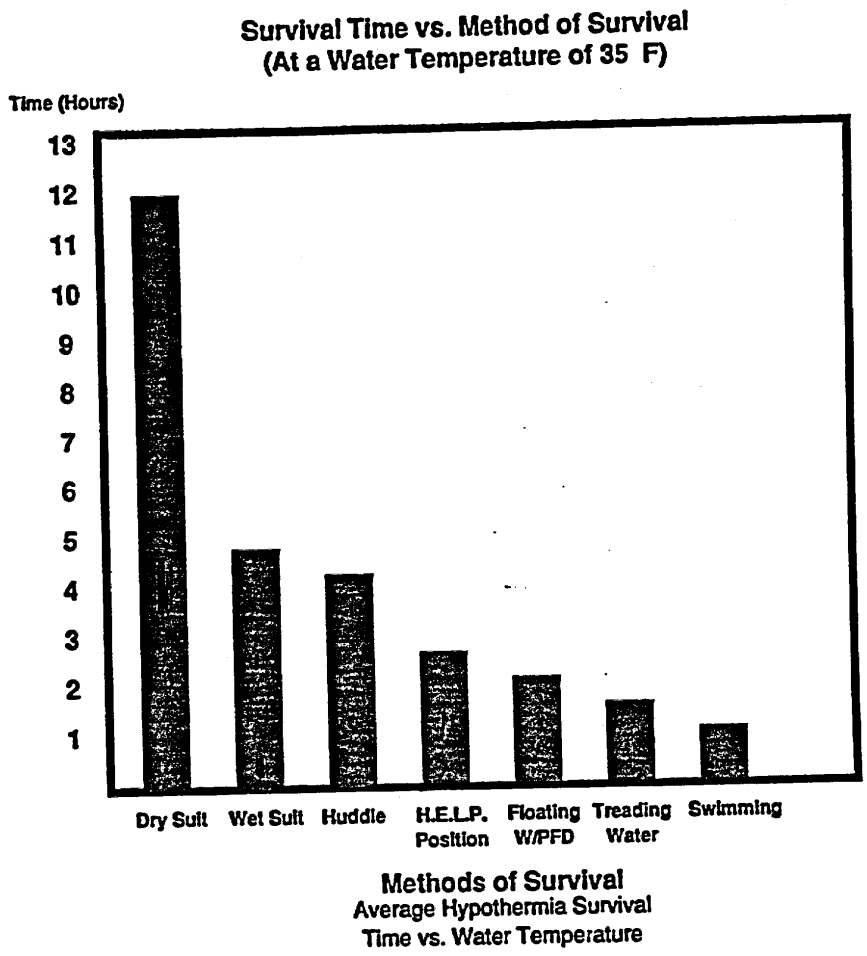
c. Preventing Hypothermia and Death from Cold Water

(1) Wear several layers of insulating clothing.

(a) The outer layer should be water proof.

(b) A dry exposure suit covering the entire body except for the eyes and nose is ideal.

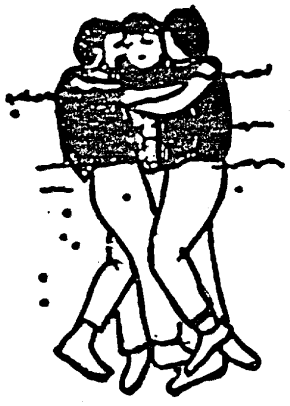
(2) Wear a life preserver or an exposure suit.



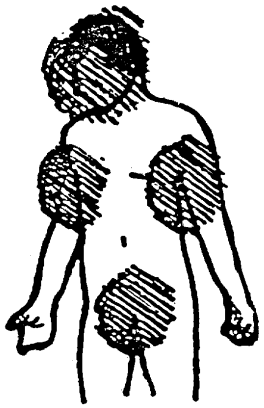
THE CHART ON THIS PAGE SHOWS A ROUGH ESTIMATE OF WHEN HYPOTHERM MAY OCCUR. MANY THINGS CAN INCREASE OR DECREASE SURVIVAL TIME, SUCH AS BODY FAT, PHYSICAL FITNESS, CLOTHES AND EXERCISE. THIS CHART DOES NOT SHOW WHEN UNCONSCIOUSNESS MIGHT OCCUR. HYPOTHERMIA USUALLY CAUSES UNCONSCIOUSNESS AND THE RISK OF DROWNING LONG BEFORE IT CAUSES DEATH.

FIGURE 5-9

Heat Escape Lessening Posture (HELP) Position



Huddle Together



Areas of greatest heat loss

FIGURE 5-10

(3) Enter the water slowly to prevent sudden shock to the system.

(4) Stay as still as possible in the water. This keeps more air trapped in your clothing for flotation and thermal insulation.

(5) Move slowly toward floating objects.

(6) Get as much of your body out of the water as possible.

(7) If forced to remain in the water get into the HELP (Heat Escape lessening Posture) position as much as possible.

(a) Hold the inner sides of your arms tight against the side of your chest.

(b) Press your thighs together and hold them close to your groin. This position will help keep your head out of the water. It helps you keep your body heat and may increase your survival time by 50%. This protects the areas of greatest heat loss which are the head, neck chest sides and groin.

(8) If with other survivors, huddle together with sides touching sides. This cuts down on heat loss from the head, neck, chest sides and groins. It also provides rescuers with a large visual target and is good for morale.

d. Symptoms of Hypothermia. Hypothermia may not be easy to spot. Look for these symptoms:

(1) Shivering

(2) Blue or gray color and bluish lips

(3) Slow or difficult breathing

(4) Mental confusion

(a) Forgetfulness

(b) Change in personality

(c) Loss of ability to make decisions

(d) Makes wrong decisions

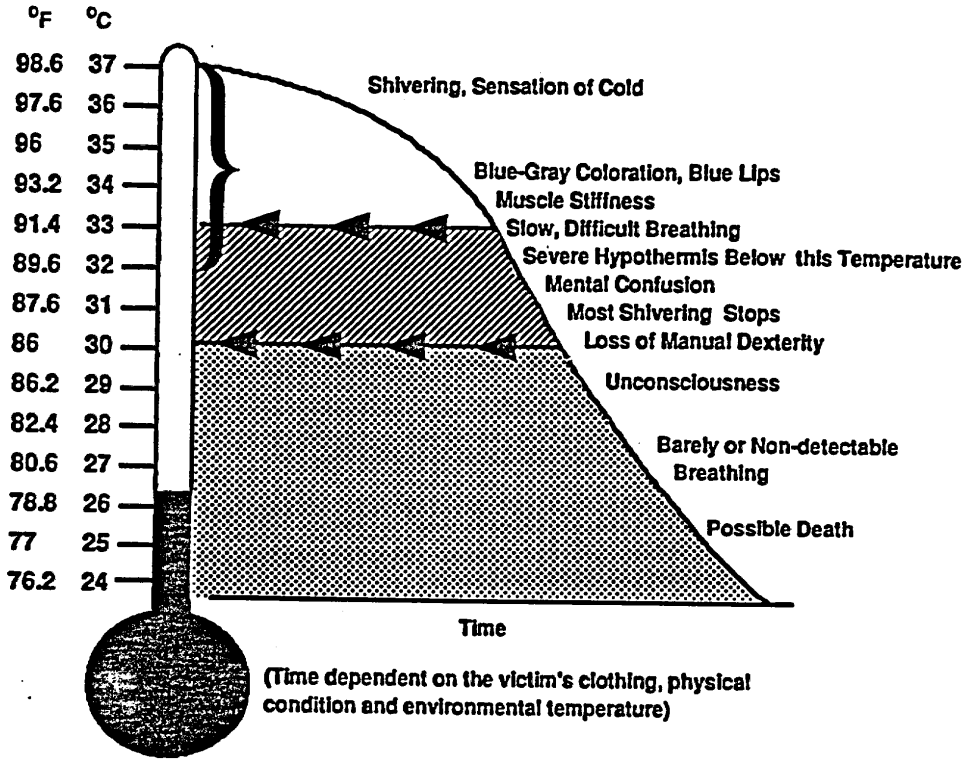

°F °C
98.6 37
97.6 36
96 35
93.2 34
91.4 33
89.6 32
87.6 31
86 30
86.2 29
82.4 28
80.6 27
78.8 26
77 25
76.2 24
Shivering, Sensation of Cold
Blue-Gray Coloration, Blue Lips
Muscle Stiffness
Slow, Difficult Breathing
Severe Hypothermis Below this Temperature
Mental Confusion
Most Shivering Stops
Loss of Manual Dexterity
Unconsciousness
Barely or Non-detectable Breathing
Possible Death
Time
(Time dependent on the victim's clothing, physical condition and environmental temperature)

FIGURE 5-11

(5) Stiff or uncoordinated body movements

(6) Loss of ability to use hands and feet

(a) Muscle spasms

(b) Drunk or drugged appearance

(7) Unconscious

(8) Appears dead

e. Symptoms Related to Deep Body Core Hypothermia

(1) You may no have a thermometer available. You may use two other ways to identify hypothermia:

(a) Symptoms.

(b) Time of exposure to cold.

(c) If the victim is confused and acts drunk or drugged and seems about to or does pass out, assume core temperature is 91°F or below. This is sever hypothermia.

(2) Symptoms can be deceiving. Every person is different. If the person has been exposed to cold for a long time under conditions which should produce severe hypothermia, treat him as though he has severe hypothermia.

(3) Symptoms alone can be misleading. Time the victim has been exposed can be misleading also. The most reliable way to identify the severity of hypothermia is by body core temperature. Rectal temperatures 10 to 15 cm deep must be obtained. Oral temperature is not reliable in a hypothermia victim. Deep body core temperature is the only reliable source of hypothermia severity. Recovery is possible from as low as 18°C (64.4°F).

f. First Aid for Mild Hypothermia

(1) Move the victim into a warm environment and allow his body to warm naturally.

(2) Watch the victim closely for worsening symptoms.

(3) If in doubt, treat the victim for sever hypothermia.

g. First Aid for Sever Hypothermia

(1) Remove the victim from the cold surroundings. Handle him as little and as gently as possible (his heart is in an unstable condition). Don't let the victim exercise (you do the lifting). Wrap him in a blanket.

(2) Prevent further heat loss. Gently remove the victim's wet clothing. Cut the clothes off to keep from shaking his body. Rewarming should not be started except under qualified medical supervision. But if medical help is not available it will be necessary to accept the risk and begin rewarming the victim. The following methods apply gentle heat and should be used only to prevent further heat loss. They are not rewarming methods:

(a) One or more rescuers use their naked body against the victim's naked body in a sleeping bag or under a blanket.

(b) Use your warm breath. Breathe into the victim's mouth as he inhales. This mouth to mouth resuscitation can be used even when the victim is breathing on his own. Your breath contains enough oxygen for the victim's needs. Be careful to breathe with the victim, not against him.

(c) Two rescuers can breathe close to the victim's nose. This will provide some warm air for his lungs.

(3) Get the victim to a hospital or other medical facility as soon as possible. Rewarming of a sever hypothermia victim must be done under proper medical supervision. His body has undergone serious biochemical and fluid changes. Transport as soon as possible. If possible, avoid bumping and jostling the victim while moving him.

(4) Don't give up on a hypothermia victim too soon. Victims have fully recovered who had no apparent life signs for up to 44 minutes. Body core temperature has fallen to as low as 64°F, then, after proper treatment, recovery was complete. When hypothermia is suspected, complete recovery is possible even though life signs have disappeared. Get the victim to a hospital.

5-8 COLD CLIMATE TIPS

a. Keep warm and dry.

b. Huddle together for warmth.

c. Avoid exposure.

d. Rotate the lookout often.

e. In the liferaft, close the canopy curtains or close the doors in an enclosed lifeboat.

f. Do simple exercises to help stay warm. These keep blood circulating, but do not waste energy:

(1) Open and clench your fists.

(2) Stretch your arms and legs.

(3) Wiggle your toes, ankles, fingers and wrists.

5-9 PRESERVE BODY FLUIDS – AVOID SEASICKNESS

a. Liferafts are very uncomfortable to ride in. Your raft will be in constant motion even on a calm sea. Every time someone moves inside, or the water moves underneath, the raft will wiggle. You will be confined in a cramped and stuffy space. Even the most experienced seafarers can get seasick in a raft. Seasickness must be avoided if at all possible. It is a very miserable illness and can affect your will to survive.

b. Take a seasickness pill before you abandon ship if you can. If you can't, take the seasickness pills provided in the raft's supply kit as soon as all of your shipmates have been helped into the raft. The pills will keep you from vomiting. Vomiting empties your stomach of valuable fluids. You must preserve (keep) these body fluids. If you lose them, they will be difficult or even impossible to replace as long as you're in the raft.

c. Remember how cramped your survival conditions may be. If one person vomits, others will probably do the same.

5-10 COVER UP

The dangers from exposure to cold are obvious, but don't forget the sun, wind, rain and sea. Don't cook yourself in the sun. Serious burns and loss of valuable body fluids can result from a sunburn. Wear light clothing, or stay under cover.

a. Liferafts comes with a built in canopy to protect you.

b. Covered liferafts are excellent protection from exposure to the sun and weather.

5-11 HOT CLIMATE TIPS

a. If possible, keep a breeze blowing through the survival craft. Sometimes you can change the position of the sea anchor to increase ventilation (movement of the air).

b. Avoid sunburn.

c. Reduce need for water by avoiding any extra exertion. If you exert yourself, you will sweat and use a lot of fluids.

d. Keep the outside of the raft wet.

e. Wet your clothing during the day with sea water.

5-12 DRINKING WATER

a. Survival times

(1) The normal, healthy body (at rest) can stay alive for over 40 days with as little as 11 ounces of fresh water each day and no food.

(2) 2-3 ounces of drinking water each day can keep 3 persons healthy for 10 days.

(3) Without fresh water, person may be delirious in 4 days and may die in 8-12 days.

b. Issuing water

(1) Do not issue water during the first 24 hours unless you have an unlimited supply. The body is already full of water. If you drink more, it will probably be wasted in the form of urine.

(2) After 24 hours, your body will be dryer and will absorb the water you drink.

(3) If a survivor is injured, you may give him water during the first 24 hours. The survivors will need it to replace the fluid he lost through bleeding or burns. Only give water if he is conscious.

After 24 hours, you may issue a full ration of water for each person. Divide the ration into 3 equal parts. One part should be drunk at sunrise, one at midday and one at sunset.

c. Rain water

(1) You may collect more water by catching rain water. In an open lifeboat you can use the boat cover and boat buckets to catch rain water.

(2) Parts of the raft canopy are designed to catch water. Rain water catchment tubes take the water into storage bags inside the raft. The storage bags are in the equipment container. Salt spray may dry on the canopy. The salt might be washed in with the first few ounces of rain water. It might be very difficult to collect uncontaminated rain water when the seas are rough and waves are constantly being blown on the canopy.

(3) The lookout should alert everyone when it rains. Fill all available containers with rain water. Use the equipment accessories bag, ration packs and empty tin cans. After all containers have been filled, everyone should drink as much rain water as they can.

d. Condensation. Water might condense on the inside canopy of the inflatable liferaft. Use one of the cellulose sponges that is provided in the raft equipment to soak up the water. Squeeze the water out and drink or store it. Keep a sponge clean for this purpose.

e. Eating snow and ice

(1) In the Arctic Sea you can collect "old salt-water ice." It is blue with smooth, rounded corners. It is usually pure enough to eat or drink.

(2) Do not eat "salt ice." Salt ice is gray and milky.

(3) Ice or snow will chill your stomach and reduce body temperature. If on the verge of hypothermia, don't eat ice/snow. Let it melt and get as warm as possible.

f. Never drink sea water or urine

(1) Rain, ice and condensation are good sources of water.

(2) Do not mix salt water, urine or animal fluid with fresh water to stretch your water supply.

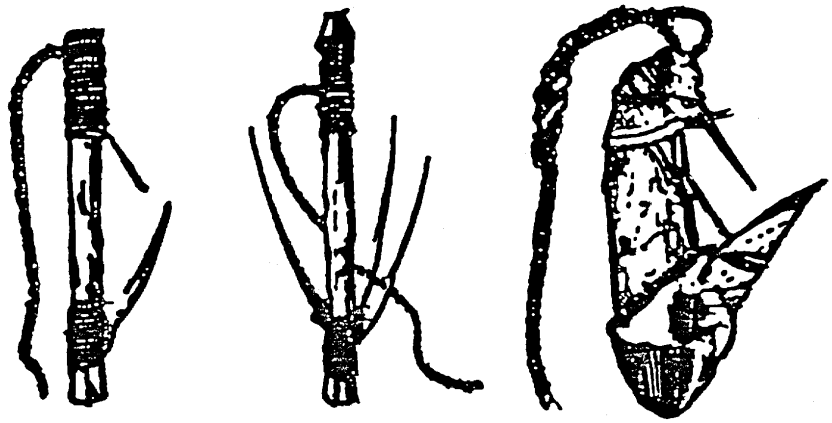
(3) Drinking sea water will worsen thirst and increase water loss by drawing body fluids from the kidneys and intestines. The salt goes to the brain and causes delirium and convulsions.

(4) Drinking sea water and urine may cause madness and death.

5-13 FOOD

a. Food from emergency provisions

(1) The emergency food pack in your survival craft is highly concentrated. It is full of carbohydrates and vitamins. It does not contain salt and is low in protein, (salt and protein quickly use up valuable body fluids).



Fishhooks can be made from wood or a large jacknife with the blade open and tied as shown.

FIGURE 5-12

(2) Do not eat during the first 24 hours. After 24 hours, eat 4 ounces each day. In a lifeboat the food will last 9 days. In a liferaft the food will last 5 days.

(3) You will have extra rations (food and water) if the boat or raft is not carrying its full number of passengers.

(4) If you have no water, do not eat food. Your body needs water for digesting food. Eating without drinking fresh water could cause death.

b. Food from the sea. The sea has many different forms of life. If you have enough fresh water, you will probably not starve to death. Remember, water is a must. Because fish and birds are rich in salt and protein, more water is needed to digest them. Do not eat food from the sea unless you have 2-3 times more water than your daily ration. If you do not have enough water to drink with your seafood, or if you can't catch any seafood right away, don't panic. You probably abandoned ship with excess body fat. Your system will use the fat, if you do not eat. One pound of body fat will probably keep your system working at the same rate as two meals. The rate at which body fat and protein are changed to heat and energy depends on air temperature, your activity and mental state. You can live longer on stored energy if you keep your mind and body relaxed. Do not overwork yourself or expose your body to very hot or cold temperatures.

(1) Fish

(a) Most fish that are found in the open sea can be eaten. If they are found closer to shore they might be poisonous. They are fish that blow themselves out of have spines or bristles. The puffer, porcupine and parrot fish are poisonous.

1. The flesh of fish caught in the open sea is good to eat, cooked or raw. Many tribes and some nations commonly eat fish raw.

2. The heart, liver and blood of a fish are good to eat.

3. Intestinal walls are edible, but the contents may be dangerous unless cooked.

4. The stomachs of large fish may contain edible small fish partly digested.

5. Fish eyes contain a lot of water.

(b) You can catch fish by using the fishing kit provided with your equipment. Instructions are inside the kit. If you lose your fishing kit, use the following method to catch fish:

1. If you have a knife, you may stab large fish near the surface, or spear them by tying your knife to a paddle, oar or boat hook. Slash with your knife in schools of small fish.

2. Fishhooks can be made from wood split from the lifeboat. This wood is notched and held together with thread from the equipment or unraveled from cloth.

3. A jackknife can be made into a large fishhook. Wedge the blade open with a piece of wood and tie as shown in figure 21.

4. Flying fish may be available. Many survivors have lived on them alone.

a. Some may glide into your craft or against it.

b. At night, flying fish (and most other fish) are attracted by light.

c. Shine your light up on the side of your white craft or cloth and flying fish will often glide toward the light and into the boat. Often, a bright moon shining on a white object will draw them.

(c) If you catch more fish than you can eat, squeeze or chew the juice of the flesh and drink it. Fish juice tastes like raw oyster or clam juice. To squeeze it out:

1. Cut a piece of fish without bones of skin into tiny pieces.

2. Wrap it in cloth with long ends.

3. Have two people twist the ends tightly.

4. The juice will drip out.

(d) To chew it out:

1. Chew a small piece of fish.

2. Suck out juice and swallow it.

3. Spit out the remaining flesh.

(e) To dry fish:

1. Cut it in thin narrow strips and hang in the sun.

2. If it is well dried and kept dry, it will often stay good for several days. It may even taste better dried.

3. Fish that are not cleaned may spoil in half a day. Clean your fish and immediately eat it or dry it.

(2) Turtles

(a) The whole meat, blood and juice of a turtle are good to eat.

(b) Meat is against the shell under the backbone. Cut through the ribs to get it.

(c) After a turtle's head is cut off, it may still bite and the claws scratch. Watch out.

(d) Hot sun brings clear oil out of the turtle fat. Dip your food in it.

(3) Seaweed

(a) Raw seaweeds are tough and salty.

(b) They are difficult to digest.

(c) Eat them only if you have plenty of fresh water.

(d) Small edible crabs, shrimp and fish often live in the seaweed.

(e) Lift it out of the water slowly and carefully.

(f) Shake it over the survival craft.

(g) Get rid of the jelly fish and eat the remaining morsels.

(4) Birds

(a) All seabirds, their livers and blood, can be eaten and are nourishing.

(b) Birds may land on the survival craft, or on your hand or back. Grab them.

(c) Birds can be caught by dragging a baited fishhook behind the craft. As they swallow the hook, pull on the line. The hook catches the bird like a fish.

(d) Catch every bird you can. Use the feathers as fishing lures. Use the meat and guts for fish bait. Use the feathers to help keep you warm.

(e) Birds follow schools of fish, so they can show you where they are. When birds are feeding on a school of fish, they sometimes get so excited that you can get right up to them. Don't forget the fish they are feeding on.

c. Urinate soon after boarding

(1) If you did not urinate within a few hours before boarding the craft, do so within two hours. The traumatic effects of a disaster at sea may make urination difficult. You may damage your bladder if you do not pass urine. Here are two methods that might help you urinate:

(a) Have someone pour sea water slowly back and forth in a cup in front of you.

(b) Hang over the side with the water waist high. The cool water should help.

(2) After several days with little drinking water, do not be alarmed if your urine appears dark and thick. Such a reaction to dehydration is normal.

d. Sitting on lifejackets for protection. In moderate seas, when there is no danger of the raft capsizing, you should take your lifejacket off and sit on it. The raft constantly moving under you tend to wear your skin until soreness occurs. Your lifejacket provides a cushion that will prevent such soreness.

5-14 SURVIVAL ASHORE

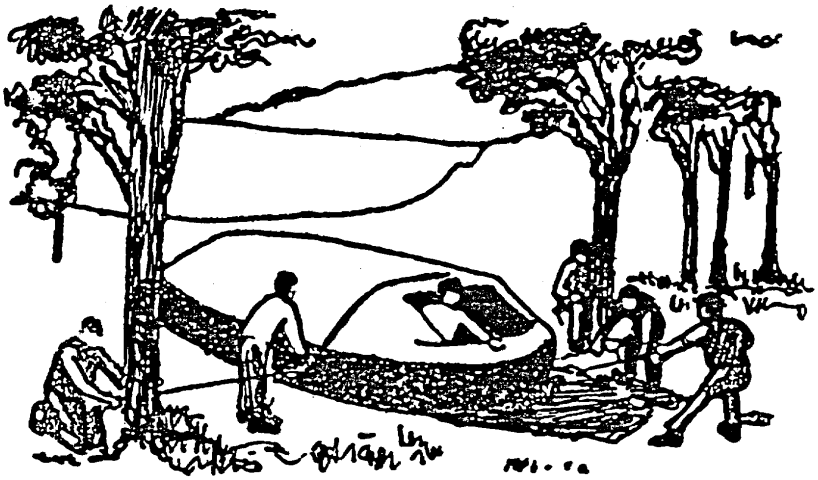
a. If you make it ashore were there are no people, you must:

(1) Obtain water and food.

(2) Protect yourself from exposure.

(3) Attract attention of rescuers.

b. Survival ashore depends on how well you use your head. Much has been written on land survival. Since the publication is concerned mainly with water survival, the three priorities above will be briefly discussed.



Securing the raft on land

FIGURE 5-13

c. Protect from exposure

(1) There are dangers from exposure ashore. You must protect yourself from extreme hot and cold weather. If you come ashore in a raft, you have a ready-made shelter hut. That is a good reason to get your raft and equipment ashore without damaging it.

(a) Carry the raft above the high water level.

(b) Remove the CO_2 cylinder, so the raft will rest evenly on the ground.

(c) Tie the raft to trees or rocks or anchor it to keep sudden storms from moving the raft.

(d) Don't build a campfire close enough to the raft to damage it with sparks or heat.

(2) In arctic climates, shelter can be made from snow blocks or by digging a cave in the snow. There should be two holes for ventilation. One can be the entrance and the other higher up.

(3) In tropical climates, shelter can be made form trees and branches.

d. Attracting attention of rescuers

(1) Have a pile of dry materials ready to light, if a ship or aircraft is spotted. Damp materials give off the most smoke for day signals. Flames are best for night signals.

(2) Make a SOS sign on an open place in large letters at least 12 feet high. Make the letters from anything that will be easy to see such as rocks, seaweeds or dirt trenches. It will be easier for an aircraft to spot very large letters that are made from things that can be easily seen.

(3) If you move your camp, make a large arrow on the ground in the direction you are moving. Leave a note behind stating when you departed and the reasons why.

e. Obtaining water and food

(1) Water is more important than food. Without water, food will do you no good.

(2) Drinking water might be found along the shore by digging a hole about 100 yards above the high tide mark. Fresh water will be found first, because it is lighter than salt water, so don't dig any deeper than is necessary. Usually, you should dig about a foot deeper after the first water starts to seep through. Scoop the water off the top. It may taste somewhat salty, but it should be safe to drink. If it is too salty, dig another hole somewhere else.

(3) Water can also be obtained from steams, lakes or ponds.

(4) You can also get water by melting snow and ice, collecting rain and eating or draining some types of plants. If in doubt about the purity of the water, boil it before drinking.

(5) Food sources include much of the seafood and birds described for water survival. Any animals which can be killed are useful. Many types of wild plant food can be eaten, if you know what to look for.

CHAPTER 6

SUBPART 160.051 – INFLATABLE LIFERAFTS

Rejected individual ring life buoys or the entire lot may be re-worked and re-submitted for inspection at the discretion of the District Commander.

[CGFR 65-9, 30 FR 11478, Sept. 8, 1965, as amended by CGD 75-008, 43 FR 9772, Mar. 9, 1978]

§ 160.050-6 Marking.

(a) Each ring buoy must have the following information in waterproof lettering:

Type IV Personal Flotation Device.
Inspected and tested in accordance with U.S. Coast Guard regulations.
(Name of buoyant material) buoyant material provides a minimum buoyant force of (32 lb. or 16¼ lb.).
Approved for use on recreational boats less than 16 feet in length and all canoes and kayaks, and only as a throwable device on all other vessels.
U.S. Coast Guard Approval No. 160.050/(assigned manufacturer's No.)/(Revision No. `lodel No.).

Subpart 160.051—Inflatable Liferafts

AUTHORITY: R.S. 4488, as amended, R.S. 4491, as amended, secs. 1, 2, 49 Stat. 1544, 1545, as amended, sec. 3, 70 Stat. 152, sec. 3, 68 Stat. 675; 46 U.S.C. 481, 489, 367, 390b, 80 U.S.C. 198; E.O. 11239; Treasury Department Orders 120, July 31, 1959, 15 FR 6521; 167-14, Nov. 26, 1954, 19 FR 8026; 167-20, June 18, 1956, 21 FR 4894; CGFR 56-28, July 24, 1956, 21 FR 5659; 167-38, Oct. 26, 1950, 24 FR 8857.

§ 160.051-1 Applicable specifications.

(a) *Specifications.* The following specifications, of the issue in effect on the date inflatable liferafts are manufactured, form a part of this subpart for guidance purposes only:

(1) *Military specifications:*

MIL-L-19496 (Ships)—Lifeboat, CO_2 inflata- : Mark 5, 15-person capacity.
MIL-C-17415 (Ships)—Cloth, coated, and webbing, inflatable boat and miscellaneous use.

(b) *Copies on file.* Copies of the specifications referred to in this section, as well as the various reference specifications forming a part thereof, shall be kept on file by the manufacturer, together with the approved plans, specifications, and certificate of approval. They shall be kept for a period consisting of the duration of approval and 5 years after termination of approval, except that the approval certificate shall be returned for cancellation immediately following the termination date. The Military Specifications may be obtained from the Commanding Officer, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pa. 19120.

(c) Permissible extension. Manufacturers of inflatable liferafts having approval numbers 160.051/49 or lower may continue to manufacture rafts under the terms of that approval until 1 January 1975. Those manufacturers having approval numbers 160.051/50 or higher shall comply with the requirements of this subpart.

[CGFR 65-9, 30 FR 11470, Sept. 8, 1965, as amended by CGD 73-160R, 39 FR 9669, Mar. 13, 1974]

§ 160.051-2 Alternate construction.

(a) *Requirements.* Inflatable life rafts or components which differ from the requirements set forth in this specification may be given consideration for approval provided:

(1) The manufacturer can demonstrate that the raft or component has at least three years of successful operational experience which has been accumulated in marine atmospheres at sea in frigid as well as tropic conditions, or by tests which are the equivalent thereof.

(2) Complete detail plans and specifications are submitted.

(3) The raft can pass the tests outlined in § 160.051-5.

(4) The manufacturer has arranged for maintenance and servicing in accordance with § 160.051-6.

[CGFR 59-26, 24 FR 5545, July 9, 1959]

§ 160.051-3 Type and sizes.

(a) *Definition.* An inflatable liferaft is defined as meaning an abandon-ship flotation appliance designed to support a specified number of persons clear of the water, which is stowed in a folded or collapsed condition and is capable of withstanding severe launching shock and which is inflated by gas or air into a raft designed for rugged service.

(b) *Sizes.* Inflatable liferafts shall be not less than 4 (6 for vessels on international voyages) nor more than 25-

person sizes. An inflatable liferaft, complete with case and required emergency equipment, shall not weigh more than 400 pounds.

[CGFR 59-26, 24 FR 5545, July 9, 1959, as amended by CGFR 65-9, 30 FR 11478, Sept. 8, 1965]

§ 160.051–4 Design.

(a) *General.* Inflatable liferafts may be circular, octagonal, elliptical or boat shaped and the design shall incorporate the material and construction details outlined in Military Specification MIL-L-19496 for guidance. All materials used in the construction of inflatable liferafts shall be of good quality and suitable for the purpose intended, and shall not be subject to undue deterioration from the effects of weathering aboard ship under the conditions of usual stowage, nor from contact with salt water or spray or petroleum products. Where dissimilar materials are used in combination, provision shall be made to prevent such deleterious effects as loosening or tightening due to differences in thermal expansion, freezing or buckling of parts, galvanic corrosion, or other forms of contamination. Consideration may be given to materials and construction which differ from those required by Military Specification MIL-L-19496 if it can be shown by tests and/or other means that the proposed material or construction is at least as suitable for the intended use.

(b) *Body.* The bottom of the raft shall be waterproof and fitted with an inflatable floor which can be inflated or deflated as desired. A life line festooned in bights shall be provided around the periphery of the liferaft. A boarding ladder and towing connection shall be fitted at each end of the liferaft. Suitable pockets or equivalent shall be fitted for stowage of hand pumps, repair kits, instruction manuals and other equipment needed immediately on launching. Reinforcing patches shall be substantially fitted in way of the attachments for the righting line, painter, sea anchor line, etc. The holders for retaining the gas or air pressure containers shall be substantially fitted and sufficiently strong to retain the containers when the raft is inflated or when the raft is dropped into the water. All exposed surfaces shall be reasonably smooth and free from sharp protrusions or projections which might be injurious in boarding or occupancy. Water pockets to improve stability and reduce drifting shall be fitted on the underside of the floor.

(c) *Canopy.* The design shall incorporate an inner and outer canopy to insulate the occupants from the weather which shall become automatically erected upon initial inflation of the raft. The canopy shall provide adequate headroom and provision shall be made for furling the ends to allow entry of occupants, free passage of air, and adequate room for paddling. Provision for catching rain water shall be incorporated in the canopy.

(d) *Laps and seams.* The amount of lap shall be sufficient to make the seams as strong as the coated cloth joined and the seams shall be required to withstand a test load equal to the coated cloth tensile strength.

(e) *Color.* The outside of the canopy shall be colored Indian orange (Cable No. 70072, Standard Color Card of America) or other color of high conspicuity against a background of a white-capped sea. The remainder of the raft may be the natural color of the finished coated cloth, except that the underside of the floor shall be dark blue, dark grey or black.

(f) *Containment.* For each type of raft, manufacturers shall design and provide suitable containment constructed so as to be capable of withstanding hard wear under conditions encountered at sea. A liferaft in its container shall be inherently buoyant and shall be arranged so as to display evidence of use or tampering, such as by the use of a suitable seal, or equivalent. The arrangement shall be such that if the vessel sinks, the raft will float free and inflation will take place automatically. The "Instructions for Inflation" requirement of § 160.051-8(b) shall consist of brief instructions for manually launching and inflating a raft. These instructions shall be legibly printed on material that is durable, water and wear resistant. These instructions shall be permanently at-

tached to the exterior of each raft container in two locations, one on each side of the container.

(1) *Rigid container.* The container shall be constructed of metal, wood, or plastic, and shall be capable of being securely fastened aboard ship and arranged for quick release of the liferaft. The container shall be weathertight except that provision shall be made for drainage and the circulation of air. A container shall have an interior surface smooth and free from splinters, barbs, or rough projections. The interior surface of a container made of fibrous glass reinforced plastic shall be finished with a gel coating. The words "This Side Up" shall be shown on the exterior of a container on the side opposite the drain holes in blocked letters 1 inch in size. Rigid containers shall be the normal means of containing inflatable liferafts except for the installations provided for in paragraph (f)(2) of this section.

(2) *Fabric container.* A fabric container shall be made of coated fabric in accordance with Military Specification MIL-C-17415. All fasteners and hardware shall be made of noncorrosive metal. Fabric containers shall be provided with carrying handles, nameplates and markings in accordance with § 160.051-8. Fabric containers may be used with liferafts that are reinforced for suspension as described in paragraph (j) of this section to operate in conjunction with certain approved launching devices.

(g) *Inflation.* Inflation shall take place upon the pulling of a lanyard or by some equally simple means which may be accomplished manually both from the deck of a vessel and by a swimmer in the water. In addition, inflation connections shall be provided for use with the hand pump of § 160.051-7(b)(9).

(h) *Buoyancy.* The principal buoyancy shall be located at the periphery of the inflatable liferaft and shall be subdivided into not less than two compartments, either of which must be capable of supporting the rated number of persons out of the water. Where more than two compartments are incorporated in the design, the raft shall be capable of supporting the rated number of persons out of the water with one-half of the compartments deflated. In either case, the deflation of any one compartment shall not unduly jeopardize the stability of the raft.

(i) *Capacity.* The maximum number of persons for which an inflatable liferaft may be rated shall be the overall horizontal clear area inside the raft in square feet (including thwarts if fitted) divided by 4, or the volume of the principal buoyancy compartments in cubic feet (which for this purpose shall not include the arches, canopy supports, or thwarts) divided by 3.4, whichever is the lesser.

(j) *Launching reinforcement.* Any liferaft which is to be suspended from or operated in conjunction with an approved launching device such that any of the raft's components are subjected to loads and stresses in addition to those of its inflation system or normal waterborne loading, shall be suitably reinforced with load carrying lines, slings, netting or their equivalents. These reinforcements shall be designed with a minimum factor of safety of 6 on the ultimate strength of the reinforcement based on the raft's normal carrying capacity.

[CGFR 59-26, 24 FR 5545, July 9, 1959, as amended by CGFR 65-9, 30 FR 11478, Sept. 8, 1965; CGD 72-133R, 37 FR 17040, Aug. 24, 1972]

§ 160.051-5 Inspections and tests.

(a) *General.* Whenever any work is being done on components or the assembly of inflatable liferafts, the manufacturer shall notify the Commander of the Coast Guard District in which the factory is located in order that he may assign a marine inspector to the factory to witness the applicable tests and satisfy himself that the quality assurance program of the manufacturer is satisfactory.

(1) The marine inspector shall be admitted to any place in the factory where work is done on the inflatable liferafts or component parts or materials, and he may take samples of parts or materials entering into construction for further inspections or tests. The manufacturer shall provide a suitable place and the apparatus necessary for the performance of the tests to be witnessed by the marine inspector.

(2) Tests at c[illegible]mercial or [illegible]overnment laboratori[illegible] when ap[illegible].cable, shall be at the expense of the manufacturer. Suitable material affidavits or invoices for essential materials entering into construction shall be obtained by the manufacturer from his suppliers and he shall maintain a file showing the lot numbers of the inflatable liferafts for which such materials were used.

(b) *Lot size.* A lot shall consist of not more than 50 inflatable liferafts of the same design and size. Lots shall be numbered serially by the manufacturer and if at any time during the processing of a lot, any change or modification in materials or production methods is made, a new lot shall be started.

(c) *Routine inspections and tests.* Manufacturers of approved inflatable liferafts shall maintain quality control of the materials used, manufacturing methods, workmanship, and the finished product, and shall make full inspections and tests as necessary to maintain the quality of the product. The fact that certain tests are required as enumerated below does not relieve the manufacturer from making any and all other tests, inspections, or other determinations as may be necessary to assure the quality of all materials, parts and the finished product. The following inspections and tests shall be conducted by the manufacturer in the presence of the marine inspector, and records of such tests shall be kept on file by the manufacturer for a period of 5 years and shall be made available to the Coast Guard marine inspector upon demand:

(1) *Inspection.* Each completed inflatable liferaft shall, in addition to all other inspections during process of fabrication or testing, receive 100 percent visual inspection for surface defects, obvious mis-arrangements or dimensional non-conformance, and for general conformance to the applicable requirements of the manufacturer's approved plans and specifications, and non-conforming units shall be rejected.

(2) *Over-pressure test.* Each raft shall be individu[illegible] tested by inflating with air to [illegible] times its working pressure and allowed to stand for 10 minutes. At the end of 10 minutes the

raft sh[illegible] signs of seam slippage o[illegible] shall the pressure decrea[illegible] than 5 percent. Relief [illegible]tted, shall be made inoperative for this test and each valve shall be tested to determine that it relieves the pre[illegible]ure at not more th[illegible] 140 percent of the designed working pressure and will reseat at the designed working pres[illegible]ure. Upon completion of this test, the raft shall immediately be subjected to the test required by paragraph (c)(3) of this section.

(3) *Working pressure [illegible]akage test.* Each principal buoyancy compartment as well as other inflated compartments of every liferaft shall be individually tested for gas-tight integrity by inflating with air to its working pressure, allowed to stand one hour, and then checked and readjusted as necessary to the original working pressure. After standing 6 hour[illegible]ne pressure shall not have decreas[illegible] by more than 10 percent, compensation being made for the difference in temperature and barometric pressure. During the test more than one compartment may be tested at one time, but adjacent compartments shall be [illegible]pened to the atmosphere during the test.

(4) *Infla[illegible]on test.* For lots of less than 30, o[illegible] specimen shall be tested. For lots [illegible]t least 30, but [illegible] more than 50, two speci[illegible]mens shall [illegible]ested. The specimens [illegible]all be se[illegible]ed at random from the lot after t[illegible] rafts have been folded and packed [illegible] their containers with equipment. When the directions on the container are followed, the specimen shall break free from its con[illegible]ner and inflate [illegible]n principle buo[illegible]ncy compartment on the periph[illegible]y of the raft to the designed sha[illegible] and approximate dimensions in no[illegible] more than 30 seconds at 70° F. At the end of this 30 seconds interval, the canopy support tubes are not required to be fully erect. The specimen shall reach it[illegible] designed working pressure with t[illegible] canopy fully erect in not more than 1 minute 30 seco[illegible]ds after the first inflation valve is operated. The specimen shall be allowed to stand for 1 hour to allow the gases inside to come to room temperature. The pressure in all the principal buoyancy compartments shall be

approximately the designed working pressure. If the specimen(s) fails this test the entire lot shall be subjected to the inflation test.

(d) *Lot acceptance or rejection.* When the inspections and tests prescribed by paragraphs (a), (b), and (c) of this section, above have been completed satisfactorily and all nonconforming units eliminated, and the inflatable liferafts comprising the lot are considered suitable, the lot shall be accepted, and the containers shall be marked in accordance with § 160.051-8(a).

(e) *Preapproval inspection and tests.* The prototype raft shall be inspected and tested at the plant of the manufacturer in the presence of a marine inspector in accordance with paragraphs (c) (1) through (4) of this section. If the inspections and tests are satisfactory, the raft shall be repacked together with its equipment in the container with the cylinder(s) charged and the raft in all respects ready for use. The container shall be shipped prepaid to the Field Testing and Development Center, Coast Guard Yard, Baltimore, Md., 21226, for testing in accordance with paragraphs (e)(1) through (12) of this section. The following additional material shall be forwarded at that time: Completely charged cylinder(s) (one or two depending on the number used in the raft design), 2 yards of all coated cloth used, and two seams 7 inches wide by 12 inches long made in exact accordance with the manufacturer's plans and specifications.

(1) *Seam strength.* It shall be demonstrated that the sample seams can withstand a test load equal to the coated cloth tensile strength.

(2) *Drop test.* The inflatable liferaft, complete with all its equipment shall be set for operation and dropped into water from a height of not less than 60 feet. The raft shall not be inflated until it has been demonstrated that the raft in its carrying case will remain afloat for not less than one-half hour. The operating lanyard shall then be pulled and the raft shall break free from its case and assume its designed shape with canopy erected and in all respects ready for boarding. The raft shall not sustain damage which would be sufficient to prevent its use as emergency abandon-ship flotation equipment, nor shall the equipment suffer damage sufficient to affect its usefulness.

(3) *Loading, seating and swamp test.* The raft shall be loaded with the number of persons it is intended to carry. Each person used in this test shall be an adult wearing an approved life jacket and the average of the weight of all persons used in the test shall not be less than 165 pounds. It shall be demonstrated that the floor can be inflated, that there is sufficient head room, and that the occupants have adequate room and access to the equipment. The floor shall then be deflated and the raft flooded. In this condition the raft shall support the number of persons it is intended to carry and remain seaworthy.

(4) *Stability test.* The full complement of the raft shall be crowded to one side and then to one end and in each case the freeboard shall be adequate to prevent the raft being swamped. The floor shall be deflated for this test.

(5) *Damage test.* It shall be demonstrated that the buoyancy and stability required by § 160.051-4(h) can be obtained when the raft is in a condition simulating damage. The freeboard in damage condition shall be adequate to prevent the raft from being swamped.

(6) *Righting test.* It shall be demonstrated that the liferaft is capable of being righted by one man if it inflates in an inverted position.

(7) *Boarding test.* It shall be demonstrated that the liferaft can be boarded from the water, within 30 seconds of the time the operating lanyard is pulled, by an adult suitably clothed and wearing an approved life jacket.

(8) *Towing test.* It shall be demonstrated that when a tow line is attached to the towing connection the loaded raft can be satisfactorily towed at a speed of five knots.

(9) *Jump test.* It shall be demonstrated that an adult, suitably clothed and wearing an approved life jacket, can jump on the canopy of the liferaft from a height of not less than 15 feet without damage to the canopy.

(10) *Mooring out test.* The raft shall be ballasted with weights equivalent to its capacity, (165 pounds per person) and moored out for 30 days. Topping up will be permitted each morning of the test if necessary. Upon completion of the test period the buoyancy compartments shall be tested in accordance with the over pressure test requirements of paragraph (c)(2) of this section.

(11) *Temperature Exposure.* (i) *General.* The packed raft must be exposed in a test chamber to a temperature of —22° F, inflated and then repacked and exposed to a temperature of 150° F and inflated.

(ii) *Procedure.* (a) Thermocouples or similar instrumentation must be located at the inflation cylinders and at the center of the packed raft.

(b) The packed raft must remain exposed in the chamber until the test temperature has been reached.

(c) Inflation must take place in the test chamber. However, for elevated temperature test, raft may be removed from chamber if inflation begins within one minute of its removal.

(iii) *Results.* (a) The raft must achieve design shape with its canopy erect within three minutes after exposure to the low temperature.

(b) The raft fabric must not show signs of cracking, tackiness, or slipping seams and must be in all respects ready for use after exposure to both low and elevated temperature inflation tests.

(12) *Launching load test.* The following applies to a liferaft subject to the provisions of § 160.051-4(j) that is to operate in conjunction with a launching device approved in accordance with Coast Guard specification 160.063. It shall be demonstrated that the raft while suspended or loaded by its launching connection(s) can sustain a distributed deadweight load of 2.2 times its normal carrying capacity for a period of one-half hour. The normal carrying capacity shall be equivalent to the number of persons allowed (165 pounds per person) together with the weight of equipment carried, plus 10 percent of the total load including the weight of the raft. The distributed deadweight load on the raft together with the raft's attachment(s) and rigging to a test fixture shall so interact as to simulate the loads and stresses that the raft will undergo when operated with an approved launching device.

[CGFR 59-26, 24 FR 5546, July 9, 1959, as amended by CGFR 65-9, 30 FR 11479, Sept. 8, 1965; CGD 73-160R, 39 FR 9669, Mar. 13, 1974]

§ 160.051-6 Servicing.

(a) *Frequency.* All inflatable liferafts shall be serviced every twelve months at approved servicing facilities.

(b) [Reserved]

(c) *Service manual.* Manufacturers of inflatable liferafts shall prepare service manuals which shall include instructions for opening, inspecting, testing, repairing and repacking each of their approved liferafts. Where extensive repairs are necessary the inflatable liferafts shall be returned to the manufacturer.

(1) *Instruction placard.* Each manufacturer of inflatable liferafts shall provide the appropriate number of instruction placards to the master or operator of the vessel on which his particular inflatable liferafts are carried. The instruction placard shall include simple instructions and illustrations showing the operations of launching and inflating the inflatable liferaft, which shall be submitted for approval to the Commandant w: the other items required by § 16. .51-9(a). In size, such placard shall not be greater than 14 inches by 20 inches.

(d) *Servicing facilities and personnel.* Servicing facilities shall be clean, free from excessive dust, drafts, and strong sunlight and arranged so that even temperatures can be maintained. The floor shall be smooth and kept clean and free from oil, grease, and abrasive materials. Equipment for performing the necessary tests and repairs shall be provided. After a raft manufacturer has indicated his choice of a servicing facility to the cognizant Officer in Charge, Marine Inspection, the servicing facility shall apply to the cognizant Officer in Charge, Marine Inspection, for an inspection of his facility. The Officer in Charge, Marine Inspection, shall determine the adequacy of equipment and spaces and competence of the personnel and shall

submit a report of his findings to the Commandant. The Commandant will issue a letter to the manufacturer, with copies to the servicing facilities and to cognizant Officer in Charge, Marine Inspection, indicating which servicing facilities have been approved as a prerequisite to approval of the inflatable liferafts, and which must be maintained to keep the approval in effect. Thereafter, all material and personnel changes in a listed facility shall be subject to the approval of the cognizant Officer in Charge, Marine Inspection.

(1) *Servicing equipment.* The equipment provided at the plant shall be as recommended by the raft manufacturer and shall include the following:

(i) A complete set of plans for the inflatable liferafts to be serviced.

(ii) A current copy of the Coast Guard Specification 160.051.

(iii) A current copy of the manufacturer's service manual.

(iv) Hot presses (if applicable).

(v) Safety-type glue pots or equivalents.

(vi) Abrasive devices.

(vii) A source of air pressure.

(viii) Mercury or water manometer.

(ix) Thermometer.

(x) Barometer, aneroid or mercury.

(xi) Calibrated torque-wrench for assembling the inflation system.

(xii) Accurate weighing scale.

(xiii) A stock of repair materials, spare parts, and stowage accessories as specified by the manufacturer. Limited "shelf life" items need not be stocked if they can be procured readily from manufacturer within a reasonab. e, to the satisfaction of the co: Officer in Charge, Marine Inspection.

(xiv) A complete stock of the equipment required to be stowed in the inflatable liferafts, except that items of equipment which may be readily procured need not be stocked.

(2) *Trained personnel.* (i) The servicing facility shall be staffed by one or more persons who have successfully completed a factory training course in the servicing of approved inflatable liferafts and have documentary evidence thereof. Persons who can show proof of equivalent practical experience in this field will be acceptable in lieu of factory-trained personnel.

(ii) The cognizant Officer in Charge, Marine Inspection, shall maintain and provide a servicing facility with a list of its employees who qualify under paragraph (d)(2)(i) of this section to service the rafts. This list shall include the names of persons subsequently employed for the work since the issuance of the original servicing facility letter described in this paragraph.

(3) *Qualifying tests.* A marine inspector shall observe the servicing of at least one inflatable liferaft of the type and manufacture to be serviced after approval of the facility, from the time of unpacking until inspected, repaired and repacked. This raft shall satisfactorily pass the inflation test required by § 160.051-5(e)(4). In addition three rafts shall be packed in the presence of the marine inspector (or the same raft may be deflated and repacked three times) and then successfully inflation-tested to prove the correctness of the stowage. The latter three tests need not run beyond the three minutes specified for complete inflation.

(e) *Inspection.* The assignment of a marine inspector to witness the inspections and testing shall be scheduled with the Officer in Charge, Marine Inspection, at least 24 hours in advance. The marine inspector shall witness the servicing of each inflatable liferaft and conduct a working pressure leakage test as outlined in § 160.051-5(e)(3), except that the waiting period may be 2 hours in lieu of 6 hours. Each inflatable liferaft, subject to § 160.051-4(j), having a suspension system which is integral with the liferaft and is intended to be used in launching operations shall be proof tested by a suspension test of 1.1 times the normal carrying capacity as specified in § 160.051-5(e)(12). All equipment shall be inspected for condition and outdated water, signals, etc. shall be replaced. The cells for the lights required under § 160.051-7(b)(c) of this title shall be renewed when a raft undergoes its annual servicing. Damaged or faded instruction labels on the container of a raft shall be replaced at annual servicing. Inflation cylinders shall be weighed and recharged if the

weight loss exceeds 5 percent of the weight of the charge. After the raft has been satisfactorily serviced and repacked, the container shall be sealed as required by § 160.051-4(f) and the metal inspection plate of the container described in § 160.051-8(a) will be stamped "Passed" together with the date, and the Marine Inspection Office identification letters. The following additional conditions apply:

(1) *Recording.* The servicing facility shall maintain a complete record of each inflatable liferaft serviced. This record shall be made available to the Officer in Charge, Marine Inspection, upon request. The record shall include the following:

(i) Serial number of the raft.

(ii) Date raft inspected and repacked.

(iii) Initials of witnessing marine inspector.

(iv) Identity of the ship receiving the raft.

(v) Date of issuance to the ship.

(2) *Servicing certificate.* A certificate shall be issued by the servicing facility for each inflatable liferaft inspected and serviced. It shall indicate the serial number of the raft, the date of inspection and the initials of the marine inspector. This certificate will be retained in the vessel's files as evidence of compliance with the annual inspection requirement. A copy of the servicing certificate shall be furnished to the marine inspector.

(f) *Special fifth-year inspection tests.* In addition to the above annual inspection requirements, an inflatable liferaft shall undergo the following special tests at 5-year intervals after its date of manufacture:

(1) *Inflation cylinders.* The inflation cylinders shall be retested and marked in accordance with the regulations of the Department of Transportation as noted in § 147.04-1 of Subchapter N (Dangerous Cargoes) of this chapter.

(2) *Gas inflation.* An inflatable liferaft, at 5-year intervals after its date of manufacture, on its arrival at a servicing facility, shall be removed from its container and, while still folded, shall be inflated by the operation of its gas cylinder(s) in the presence of a marine inspector. Rafts showing minor leaks from the inflation can be repaired at the servicing facility, but any rafts that are ten (10) or more years past their dates of manufacture that leak extensively or show fabric damage from this inflation shall be retired from service and their nameplates showing Coast Guard approval shall be removed by the marine inspector. Rafts that satisfactorily pass the above gas inflation test shall then undergo the usual annual servicing described above. A raft that satisfactorily passes the gas inflation test shall have the date and the port at which it was performed stamped on the container inspection plate described under § 160.051-8(a).

(3) *Inflation cylinder valves and seals.* After a raft has completed the tests of paragraph (f) (1) or (2) of this section, the poppet pin assembly, including its seals, O-rings and gaskets made of rubber, shall be renewed on the inflation heads of the gas cylinders by the activity approved to perform the hydraulic testing outlined in paragraph (f)(1) of this section. An inflation cylinder that has been recharged shall stand for at least 2 weeks and be checked for leakage by weighing before being returned to service.

(46 U.S.C. 375, 416; 49 U.S.C. 1655(b); 49 CFR 1.4(b), and 1.46)

[CGFR 59-26, 24 FR 5547, July 9, 1959, as amended by CGFR 61-15, 26 FR 9300, Sept. 30, 1961; CGFR 65-9, 30 FR 11479, Sept. 8, 1965; CGD 72-133R, 37 FR 17041, Aug. 24, 1972; CGD 72-133, 38 FR 5338, Feb. 28, 1973; CGD 75-186, 41 FR 10437, Mar. 11, 1976]

§ 160.051-7 Equipment.

(a) *General.* All inflatable liferafts, regardless of the service, shall be provided with the equipment required by paragraph (b) of this section. In addition, liferafts intended for ocean service vessels shall be provided with the equipment set forth in paragraph (c) of this section and those intended for limited service vessels shall be provided with equipment set forth in paragraph (d) of this section.

(b) *Items required for all rafts.* The following equipment for ocean service and limited service liferafts shall be stowed outside of the equipment containers so as to be readily available:

160.023 of this Subchapter Q (Specifications). All overage signals are to be replaced when a raft undergoes its annual servicing. A signal previously in service in a raft can be packed if its allowed 3-year period of service has not expired.

(9) *Sponge, cellulose.* Two Type 1, Size 10 cellulose sponges.

(10) *Water.* One and one-half quarts of drinking water per person in approved hermetically sealed containers constructed and filled in accordance with Subpart 160.026 of ..... Subchapter Q (Specifications). Service life of this equipment shall be limited to 5 years from date of packing. One pint of this requirement per person may be replaced by desalting kit(s) approved in accordance with Subpart 160.058 of this Subchapter Q (Specifications), that shall be capable of producing an equal amount of fresh water. A container of drinking water with a date of manufacture showing that its allowed 5-year period of service has not expired can be packed in a raft.

(11) *Jackknife.* On rafts accommodating 13 persons or more, an approved jackknife shall be provided in addition to that required by paragraph (bX4) of this section.

(12) *Signal whistle.* One signal whistle of the ball type, made of corrosion-resistant construction, with a 36-inch lanyard attached, and in good working order.

(13) *Can openers.* Three means of opening hermetically sealed containers shall be provided. Special blade(s) on the approved jackknives are accepted in this accounting in addition to any can opener(s) the blades or cutting edges of which shall be sheathed to prevent damage to the raft and its equipment.

(14) *Fishing tackle.* One emergency fishing tackle kit in accordance with Subpart 160.061 of this Subchapter Q (Specifications).

(15) *Antiseasickness tablets.* Six antiseasickness medicinal tablets for each person the raft is rated to carry.

(d) *Limited service equipment.* Equipment for liferafts intended for limited service shall be stowed in water-tight containers which are tied to the inside of the raft with short lengths of nylon line, webbing or equivalent. The contents of each water-tight equipment container shall be listed on a plastic card attached to the container's opening. The following limited service equipment shall be provided:

(1) *Bailer.* One flexible plastic bailer not less than 6 inches in diameter.

(2) *Flashlight.* An approved type I, size 3 flashlight constructed in accordance with Subpart 161.008 of this Subchapter Q (Specifications). Three spare cells (or one 3-cell battery) and two spare bulbs in a waterproof container shall be provided with each flashlight. Batteries shall be replaced at each servicing of the liferaft.

(3) *Repair kit.* A repair kit consisting of six sealing clamps in accordance with Military Specification MIL-L-19496, five 2-inch diameter tube patches and cement compatible with the raft fabric together with a roughing tool. Repair kit cement shall be replaced when a raft undergoes its annual servicing. A tube of cement shall show by a date of manufacture on its exterior, or by an accompanying affidavit, that it has been manufactured within 18 months of the time that the cement is packed in a raft.

(4) *Signals.* One hand-held rocket-propelled parachute red flare distress signal constructed in accordance with Subpart 160.036 of this Subchapter Q (Specifications), and two hand red flare distress signals or two hand combination flare and smoke distress signals constructed in accordance with Subpart 160.021 or Subpart 160.023 of this Subchapter Q (Specifications). All overage signals are to be replaced when a raft undergoes its annual servicing. A signal previously in service can be packed in a raft if its allowed 3-year period of service has not expired.

(5) *Sponge, cellulose.* One type 1, Size 10 cellulose sponge.

[CGFR 59-26, 24 FR 5547, July 9, 1959, as amended by CGFR 65-9, 30 FR 11480, Sept. 8, 1965; CGFR 70-143, 35 FR 19965, Dec. 30, 1970; CGD 72-133R, 37 FR 17041, Aug. 24, 1972; CGD 72-133, 38 FR 5338, Feb. 28, 1973; CGD 73-201R, 38 FR 31297, Nov. 13, 1973]

§ 160.051-8 Nameplate and marking.

(a) *Nameplate.* Each inflatable liferaft and container shall have perma-

terious effects of sunlight. A "float free" link made of stainless steel rod with a nominal breaking strength, including attachments of 500 pounds shall connect the end of the painter to the vessel. In addition, a separate steel cleat with horns not less than 3 inches in length shall be installed adjacent to the cradle for belaying the end or each raft's painter to the ship when manually launching. The launching instructions on the container shall include the following: (i) "When stowing the raft, connect the steel link to the vessel" and (ii) "Before launching the raft by hand, pull out the line from the container and make it fast to the cleat provided." Existing rafts previously approved under this specification shall be altered to comply with the above when the rafts are next serviced.

(9) *Pump, inflation-deflation.* An inflation-deflation pump with hose in accordance with Military Specification MIL-L-19496, or equivalent.

(10) *Righting gear.* Suitable hand holds or straps on the underside of the floor to enable a righting moment to be exerted. Such straps shall be a web material of adequate strength. The righting strap shall run the full width of the liferaft and shall be secured to the buoyancy chamber on both sides of the raft.

(11) *Sea anchor.* Two sea anchors in accordance with Military Specifications, MIL-L-19496 or equivalent, each fitted with 50 feet of ¼-inch diameter braided nylon line or equivalent; one anchor to be stowed inside the raft and ready for use and the other stowed outside the raft which will stream automatically without entanglement when the raft is inflated.

(12) *Towing connection.* A suitable towing connection at each end of the raft.

(13) *Instruction card.* A plastic card suspended from the inside canopy showing the immediate steps to be taken by survivors on entering a raft as recommended by Intergovernmental Maritime Consultative Organization Resolution 181, dated October 29, 1969. This card shall also explain the noise that can be expected to accompany the operation of any CO_2 relief valves that may be installed.

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(c) *Ocean service equipment.* Equipment for liferafts intended for ocean service shall be stowed in watertight containers which are tied to the inside of the raft with short lengths of nylon line webbing, or equivalent. The contents of each watertight equipment container shall be listed on a plastic card attached to the container's opening. The following ocean service equipment shall be provided:

(1) *Bailer(s).* Bailer(s) shall be of flexible material not less than 6 inches in diameter, one of which shall be provided on rafts accommodating 12 persons or less, and two on rafts accommodating 13 persons or more.

(2) *Drinking cup.* A flexible plastic drinking cup graduated in ounces.

(3) *First-aid kit.* An approved first-aid kit in accordance with Subpart 160.054 of this Subchapter Q (Specifications).

(4) *Flashlight.* An approved size No. 3 flashlight constructed in accordance with Subpart 161.008 of this chapter. Three spare cells (or one 3-cell battery) and two spare bulbs in a waterproof container shall be provided with each flashlight. Batteries shall be replaced at each servicing of the liferaft.

(5) *Mirror, signaling.* One signaling mirror of an approved type.

(6) *Provisions.* One pound of hard bread or its approved equivalent for each person. Provisions to be packaged in hermetically sealed cans of an approved type.

(7) *Repair kit.* A repair kit consisting of six sealing clamps in accordance with Military Specification MIL-L-19496; five 2-inch diameter tube patches and cement compatible with the raft fabric together with a roughing tool. Repair kit cement shall be replaced when a raft undergoes its annual servicing. A tube of cement shall show by a date of manufacture on its exterior, or by an accompanying affidavit that it has been manufactured within 18 months of the time that the cement is packed in a raft.

(8) *Signals.* Two hand-held rocket-propelled parachute red flare distress signals constructed in accordance with Subpart 160.036 of this Subchapter Q (Specifications), and six hand red flare distress signals constructed in accordance with Subpart 160.021 or Subpart

(1) *Boarding ladder.* A boarding ladder or equivalent at each entrance to the raft. In addition, hand holds or equivalent on each side of each entrance to assist in boarding.

(2) *Heaving line.* A buoyant heaving line not less than 100 feet in length and having a breaking strength of not less than 250 pounds fitted with a buoyant quoit at one end with the other end attached to the raft near the after entrance.

(3) *Instruction manual.* An instruction manual, printed on water-resistant film or plastic coated paper and suspended in a clear film envelope from one of the canopy arch tubes, shall describe the raft and its equipment, including the use of the inflation pump, repair kit, sea anchor, etc. This manual shall also contain all of the survival information recommended in Inter-Governmental Maritime Consultative Organization Resolution 181, dated October 29, 1969, as amended, together with the illustrated table of lifesaving signals from CG-811 (Rev.). The plastic Instruction Card described under § 160.051-7(b)(13) can be contained in the same envelope with the instruction manual if arrangements are made for the card to be visible from either face of the envelope.

(4) *Jackknife.* A jackknife of an approved type constructed in accordance with Subpart 160.043 of Subchapter Q (Specifications) of this chapter, shall be fitted in a pocket near the forward entrance.

(5) *Lights.*

(i) The canopy required in § 160.051-4(c) must have a light attached to the—

(*a*) Top; and

(*b*) Inside.

(ii) The lights required in paragraph (b)(5)(i) of this section must—

(*a*) Operate automatically when the raft is inflated;

(*b*) Be capable of 12 months service;

(*c*) Be watertight; and

(*d*) Be powered by wateractivated or dry cells that are—

(*1*) Capable of operating the light for 12 hours after being stored for a period of time up to 24 months; and

(*2*) Renewed when the raft undergoes annual servicing.

(iii) The light required in paragraph (b)(5)(i)(*a*) of this section must be—

(*a*) Installed with a power source that operates the light for 12 hours; and

(*b*) Capable of being seen from a distance of 2 miles or be one of the light types listed in Table 1 of this section.

(iv) The light required in paragraph (5)(i)(*b*) must be provided with a separate power source that—

(*a*) Operates the light for 12 hours; and

(*b*) Has a means of interrupting the current to the lights.

(6) *Lifelines.* Two lifelines of not less than 9/16 inch nylon tubular webbing, or equivalent, shall be fitted: One around the outside periphery and the other around the inside of the raft. The outside lifeline shall be festooned in bights, not more than 24 inches long and fastened at intervals not exceeding 18 inches, which shall hang within 3 inches of the waterline when the raft is fully loaded.

TABLE 1

Light type	Light output (minimum) [1]	Flash frequency cycles/min.	
		Minimum	Maximum
Steady incandescent	5.0 candela	0	0
Flashing incandescent	5.0 effective candela.	50	70
Flashing stroboscopic	0.5 candela-second flash.	50	70

[1] The minimum light output shall be maintained in all directions of the upper hemisphere.

(7) *Paddles.* Two paddles, 4 feet long.

(8) A painter shall be provided for launching and holding the raft during boarding. It shall be of nylon line, or equivalent, or a type easily gripped, 100 feet in length, and stowed so that it will run free when the raft is launched and not cause inadvertent inflation before the raft is in the sea. The nominal breaking strength of the painter when unknotted, including attachments, shall be 3,000 pounds for rafts approved for capacities of 10 or more persons, and 1,500 pounds for rafts approved for capacities of less than 10 persons. The end of the painter protruding from the container of the raft shall be resistant to the dele-

nently attached a substantial nameplate of compatible material on which is embossed or imprinted the name of the manufacturer, the approval number, the manufacturer's model number and serial number, the number of persons for which the inflatable liferaft is approved, and the lot number. In addition, the container shall be marked "Ocean Service Equipment" or "Limited Service Equipment" as applicable, together with the Marine Inspection Office identification letters, the date, and the letters "USCG". A raft container shall also be provided with a stainless steel plate of 0.032-inch minimum thickness of sufficient size for showing a stamped record of the data of the annual inspections and the gas inflation tests described respectively in §§ 160.051-6(e) and 160.051-6(f)(2).

(b) *Marking.* Marking shall be clearly and legibly applied in a color contrasting to its background, using materials which are permanent for the life of the inflatable liferaft as follows: Instructions for inflating; directions for righting if the raft inflates in an inverted position; directions for boarding; position and use of items stowed outside the equipment containers; contents of equipment containers, and warning against tampering.

(46 U.S.C. 375, 416, 481; 49 U.S.C. 1655(b); 49 CFR 1.4(b), and 1.46)

[CGFR 59-26, 24 FR 5548, July 9, 1959, as amended by CGFR 65-64, 31 FR 562, Jan. 18, 1966; CGD 75-186, 41 FR 10437, Mar. 11, 1976]

§ 160.051-9 Procedure for approval.

(a) *Preliminary plans and specifications.* Inflatable liferafts for use on vessels subject to Coast Guard inspection are approved only by the Commandant, U.S. Coast Guard, Washington, D.C. 20593. Before any action is taken on any design arrangement and construction of the inflatable liferaft, material specifications, and a description of construction methods with a list of servicing facilities and their qualified employees, must be submitted to the Commandant through the Coast Guard District in which the inflatable liferafts are built.

(b) *Pre-approval inspections and tests.* If the drawings and specifications are satisfactory, the Commander of the Coast Guard District in which the inflatable liferaft is to be built shall be notified in writing when fabrication is to commence. A marine inspector will be assigned to observe the construction in accordance with the plans and specifications, and upon completion will witness the tests described by § 160.051-5(c)(1) through (4). The raft shall then be forwarded to the Field Testing and Development Center, Coast Guard Yard, Curtis Bay, Baltimore, Md. 21226, for testing in accordance with § 160.051-5(e)(1) through (12). The commandant will bill the manufacturer for the costs of the tests performed.

(c) *Final plans and specifications.* After the tests have been successfully completed, the manufacturer shall present to the inspector four copies of the plans and specifications including any corrections, changes or additions which may have been found necessary since the original submittal.

(d) *Commandant's approval action.* Upon receipt of the inspector's report of the examinations and tests conducted at the manufacturer's plant, four copies of corrected drawings and specifications, and a report of the pre-approval tests conducted at the Coast Guard Yard, the Commandant will determine compliance of the inflatable liferaft with the requirements of this subpart and its suitability for type or brand approval for use on inspected vessels. Suitable documentary evidence of compliance with the requirements of § 160.051-6 will be required before approvals are issued.

[CGFR 59-26, 24 FR 5548, July 9, 1959, as amended by CGFR 65-64, 31 FR 562, Jan. 18, 1966; CGFR 66-33, 31 FR 15297, Dec. 6, 1966; CGD 72-133R, 37 FR 17042, Aug. 24, 1972]