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NOTICE

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Although the words “he”, “him,” and “his” are used sparingly in this manual to enhance communication, they are not intended to be gender driven nor to affront or discriminate against anyone reading this material.

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101 Safety

References:

[a] NSTM S9086-TX-STM-010/CH-583 (Series), Boats and Small Craft
[b] OPNAVINST 3500.39B (Series), Operational Risk Management
[c] OPNAVINST 5100.19 (Series) Navy Occupational Safety and Health (NAVOSH) Program
[d] NAVEDTRA 14343, Boatswain’s Mate
[e] Manufacturers Technical Manual
[f] USCG COMDTINST M16114.5B, Boat Crew Seamanship Manual
[g] Craft Specific Boat Information Book
[h] Unit Standard Operating Procedures

101.1 Discuss the concept of ORM. [Ref. b, encl. 1 Pg. 2]

- A decision making tool used by people at all levels to increase operational effectiveness by anticipating hazards and reducing the potential for loss, thereby increasing the probability of a successful mission.
- Increases our ability to make informed decisions.
- Minimize risks to acceptable levels. The amount of risk we will take in war is much greater than that we should be willing to take in peace, but the process is the same.
- Applying the ORM process will reduce mishaps, lower costs, and provide for more efficient use of resources.
- ORM is a group effort that will involve input from all personnel involved in the task.

101.2 Explain the following processes as they apply to ORM: [Ref. b, encl 1]

Identify hazards: Begin with an outline or chart of the major steps in the operation. Next, list all the hazards associated with each step in the operation.

Assess hazards: For each hazard identified, determine the associated degree of risk in terms of probability and severity.

Make risk decisions: First, develop risk control options. Start with the most serious risk first and select controls that will reduce that risk to a minimum consistent with mission accomplishment. Decide if the benefit of the operation outweighs the risk.

Implement controls: Measures that can be used to eliminate hazards or reduce the degree of risk. Listed by order of preference: Administrative Controls, Engineering Controls, Personal Protective Equipment.

Supervise: Conduct follow-up evaluations of the controls to ensure they remain in place and have the desired effect. Monitor for changes which may require further ORM. Take corrective action when necessary.

101.3 Discuss how the following affect safety:

a. Failing to secure for unexpected movement: Unsecured objects may become missile hazards
b. Operating vessel without proper authority and qualification: Lack of safety knowledge and seaworthiness may cause personnel injury or death
c. Operating at unsafe speed: Increases risk of collision and persons falling overboard
d. Removing or making safety devices inoperable: Can cause personnel injury or further injure persons
e. Using defective tools or equipment: May cause personal injury and damage other equipment
f. Unsafe use of tools: Personal injury and damage equipment
g. Working on moving, energized, or otherwise hazardous equipment: Personal injury, never work on energized equipment alone and without CO's approval
h. Skylarking: Be attentive of your surroundings. Lack of attention may cause injury or death.
i. Failing to wear PPE : "last line of defense". May be the only means of protection.
j. Posting a bow lookout: Avoid collisions with other vessels and hazards to navigation.
k. Bad weather: Increases risk of missile hazards, snap back, MOB, exposure (hot or cold), reduced visibility.
l. Frayed or worn lines: Snap back.
m. Improper line handling: Personal injury such as loss of limbs or fingers, snapback, MOB.

101.4 Discuss the safety precautions to be observed during boat operations in regard to weather, sea conditions, and hazards to navigation. [Ref. c, Ch. C4 Pg. 418]

Weather.

- Use navigation lights during periods of reduced visibility.
- Post additional lookouts and stand a more vigilant watch (radar) during periods of reduced visibility.
- Inform TACON of reduced visibility.
- Ensure crew is well rested and fatigue is not a factor.
- Wear rain gear/gortex.

Sea Conditions: In choppy sea reduce the amount of personnel that are onboard if possible.

Hazards to Navigation: Slow down and post the proper lookouts as per the COLREGS.

Boat Operations.

- Ensure that only qualified (Class II or above) swimmers are assigned as boat crew members.
- Do not carry passengers, store, or baggage on the top sides of the boat.
- Know and obey the "Rules of the Road."

- Always post a bow lookout.
- DO NOT cut close to ships anchored or tied up or pass close around the corner of a pier.
- Coxswains must run slowly until there is no danger of collision with any boat or vessel that may be obscured.
- Boats should turn away from ships and seaplanes early and radically or show clearly their intentions.
- In choppy seas reduce boat capacity
- Always display proper lights while underway at night
- Ensure you carry proper fog signaling equipment
- Ensure boat crewmembers wear authorized life jackets under adverse weather conditions, including reduced visibility
- Never allow number of personnel on boat exceed number of life jackets

101.5 State the safety precautions to be observed when working on or around machinery. [Ref. c, Ch. C13 Pg. 462]

- Never place any body part into moving machinery
- Never attempt to ride machinery that is not designed for transport
- Do not wear jewelry, neckties, or loose fitting clothing
- Wear proper protective clothing and equipment suited to the operation being performed
- Do not wear polyester or other synthetic clothing when operating fuel fired equipment
- When working in the vicinity of electrical equipment or electrical cables, be alert to the presence of dangerous voltages and avoid striking such with tools of any kind.
- Compressed air may be used to clean machinery parts that have been properly disassembled provided that the supply air pressure does not exceed 30psi. Wear safety goggles when using compressed air for cleaning.
- Promptly reinstall shaft guards, coupling guards, deck plates, handrails, flange shields, and other protective devices removed as interference immediately after completion of maintenance on machinery or other system components.
- Do not use low pressure air to unclog flammable fluid piping systems unless a specific directive or approved procedure requires it use.

101.6 State the requirements for wearing approved flotation devices aboard the Patrol Craft. [Ref. f, Ch. 6 Section A Pg. 76]

- Each and every person aboard an MESF craft MUST wear an approved flotation device (crew and passengers).
- It is the responsibility of the coxswain to ensure that an adequate number of flotation devices are aboard their craft.

101.7 State the purpose and use of the emergency shutdown/kill switch. [Ref. e]

The over all concept of the shutdown/kill switch is that it is the most immediate way to stop the patrol crafts engines. Each platform differs in the position of the shutdown/kill switch; review the craft manufacturer's technical manual for specific details on the shutdown/kill switch.

101.8 Discuss the following hazards and potential dangers for each of the following. [Ref. c, Ch. C14 3 Pg. 474]

a. Weapons and ammunition handling:
   - Any weapons that are to repaired are to be completed by the duty armorer.
   - Any ammunition that falls more than 4 feet will be reported to the duty armorer.

b. Cross decking weapons or ammunition:
   - Use lanyards when possible
   - Ensure that 2 personnel maintain positive control of equipment at all times.

101.9 Discuss the following hazards on the patrol craft:

a. Missile hazards [Ref. c Ch.1 Pg. 404]
   - Death, Impalement/serious injury.

b. Trip/slip hazards [Ref c ch.3-3 Pg. 405/ Ch. C13 Pg. 463]
   - Man overboard, broken limbs.

c. Electrical shock [Ref. c, Ch. D5 Pg. 559]
   - Exposed wires or connections can cause electrical shock.
   - The ever presence of water increases the risk.
   - Defective electric wiring –electric wiring shall not be permitted in the bilges. Care should be exercised to reduce sparks.
   - Battery charging –produces sufficient hydrogen gas which, if trapped and ignited, will produce an explosion.

d. Fire hazards [Ref. a, sect. 5-2 Pg. 66]
   - Clothing and oily waste or rags –keep engine room clear of clothing. Cleaning rags shall be kept in a closed container.
   - Fuel leaks –fuel in bilges or in a free state in a boat is dangerous. Fumes may be ignited easily.
   - Ventilation –proper ventilation to expel fuel fumes.
   - Bilges and sumps –keep dry. Frequently wash out to clear them of fuel and oil.
   - Dirty engines –greases and oil encrusted on engines will feed a fire, enabling it to get out of control.
   - Smoking –not permitted on any patrol boats.

- Only safety matches should be allowed in any naval boat

101.10 Discuss the potential dangers in each of the following evolutions and the appropriate safeguards for each:

a. Anchoring [Ref. d, Ch. 10H Pg. 10-37]
   - Do not get caught in the bight of the line.
   - Ensure that the anchor line does not get caught in the props.
   - Perform a safety brief prior to anchoring.
   - Use mousing gear on the anchor shackle.
   - Lift with your legs when weighing anchor.
   - Have a second person have a positive hold of you while weighing anchor.
   - Have a second person ensure that the line is safely stowed while weighing anchor.

b. Towing [Ref. d, Ch. 17A Pg. 17-1]
   - Perform safety brief prior to towing
   - Have axe on station
   - Do not get caught in bight of line
   - Coxswain on power vessel is in charge of evolution
   - "Bump" engines ahead one at a time until there is tension on towing hawser
   - Beware of "snapback"
   - Keep personnel clear of snapback areas that could harm personnel

c. High-speed maneuvering [Ref. e]
   - Use a 3 point stance at all times.
   - Coxswain calls out all turns.
   - Be very cautious during high speed turns. Boat may "trip/chine" causing the boat to violently right itself. This could lead to ejection from the craft or other injuries.
   - When conducting screening operations, station a lookout to avoid collision.
   - Ensure situational awareness during turns to ensure that a safe distance is maintained from the COI.

d. Heavy weather [Ref. d, Ch. 10F Pg. 377]
   - Use caution at all times. Never underestimate the power of winds and waves and what they can do to the vessel or crew.
   - Keep crew in the patrol crafts pilot house (if applicable) and seated.

e. Thunderstorm/Ice [Ref. d, Ch. 12 Pg. 12-3, 12-5]
   - Use the proper navigation lights and proceed with caution.
   - Use proper footing.
   - Ensure that personnel are wearing the proper gear.
   - Be aware of thunderstorm with lightning. If possible, find safe haven during lightning storm.
   - If able keep crew in the patrol crafts pilot house (if applicable) and seated.

f. Launching/recovering a boat at a ramp [Ref. e]
   - Perform brief as per SOP
   - Winch handle can cause serious damage to personnel

g. Launching/recovering a boat with a sling [Ref. e]
   - Perform brief
   - Ensure that the slings have been weight tested
   - No one is allowed under the load
   - No one is allowed on the craft when hoisting

101.11 Discuss the dangers and appropriate safeguards for: [Ref. d, Ch. 3 Pg. 3-7]

a. Extreme cold weather operations
   - Hypothermia –loss of internal body temp., can cause incapacitation.
   - Frostbite –development of ice crystals within body tissues. Most likely to occur in air temps. Less than 20 deg.
   - Crew fatigue –cold induced fatigue sets in because the mind loses mental attentiveness and physical coordination diminishes.
   - Coast Guard policy calls for hypothermia protective clothing to be worn when water temp. is below 60 deg. (15.5 C)
   - CO’s Standing Orders
   - Anti-exposure coveralls (Mustang Suits)
   - Keep exposed skin to a minimum

      Frostbite prevention:
      - Cold weather clothing & equipment.
      - Thermal boots.
      - Woolen socks.
      - Watch caps.
      - Gloves.
      - Thermal undergarments (polypropylene) fleece or pile.
      - Rotate crew through the patrol crafts pilot house (if applicable).

      Layered clothing:

         1st layer (wicking):
         - Clothing worn next to the skin must carry or “wick” moisture away from the body.
         - Cotton absorbs and retains moisture robbing body heat through evaporation.
         - Wool stays wet.
         - Synthetic wicking fibers such as polypropylene, Thermax, or Capilene do not retain moisture. They actually draw moisture from skin and transport it to an absorbent outer layer.

2nd layer (insulation):

- Insulating effect is related to how much air it can trap.
- Loose-knit or fuzzy material is better than tight knit material.
- 2 thin layers of a given material are better than 1 thick one
- 2 thin layers are better than 1 thick one.
- Trapping air retains body heat, while absorbing excess moisture from the 1st layer.
- Wool or cotton thermals are an acceptable 2nd layer but a number of synthetic fleece or pile garments do a much better job.

3rd layer (moisture barrier):

- Should stop wind and water so the inner layers can work as designed.
- Anti-exposure coverall, dry suit, or rain gear.
- Dry suits and rain gear have no insulating properties and will require extra insulation for cold weather.
- Most dry suits do not breathe so an absorbent 2nd layer is need so that perspiration has a place to go.

b. Extreme hot weather operations

- Sun burns.
- Dehydration –loss of bodily fluids and electrolytes.
- Heat rash (prickly heat) – breakdown of the body's ability to perspire, decreased evaporative cooling of the skin.
- Heat cramps –painful contractions caused by excessive salt & water depletion
- Heat exhaustion –loss of too much water through perspiration.
- Heat stroke – complete breakdown of the body's sweating and regulatory mechanisms.

Sunburns:

- Premature aging of skin
- Increased chance of skin cancer
- Stay in shade as much as possible
- Use sun screen lotion
- Protective clothing
- Hat with a brim
- Sunglasses with UV protection

Symptoms of dehydration:

- By the time the body loses 5% of body weight in fluids the individual begins to feel nauseated
- When 6-10% of body fluids are lost, symptoms increase in this order:
  - Dry mouth
  - Dizziness
  - Headache
  - Difficulty in breathing
  - Tingling in the arms and legs
  - Skin color turns bluish
  - Indistinct speech
  - Inability to walk
  - Cramping legs and stomach

Prevention of dehydration:

- Adequate fluid intake
- Healthy adults must satisfy their water and electrolyte requirements
- Healthy adults require 2 or 3 liters of fluid a day
- Stay away from liquids such as: tea, alcohol, coffee, and soft drinks, these liquids only speed up fluid loss
- Drink fresh clean water. This is the best and easiest method to replace fluid loss
- Fruit juices and soup are also suitable
- Drinks that do not contain sodium are suitable

Heat rash:

- Interferes with sleep, resulting in decreased efficiency and increased cumulative fatigue
- Makes the individual susceptible to more serious heat disorders
- Accelerates the onset of heat stroke
- Symptoms
  - Pink or red minute lesions
  - Skin irritation (prickling)
  - Frequent severe itching

Heat rash prevention:

- Coxswains and crew members be aware of negative effects brought on by heat rash
- Be alert for symptoms when operating in a hot environment
- Rotate crews between heat related tasks

Heat cramps:

- May occur as an isolated occurrence with normal body temp. or during heat exhaustion
- Recently stressed muscles are prone to heat cramps, particularly those muscles in the extremities and abdomen
- Victims legs will be drawn up and excessive sweating will occur
- Use previous guidelines for other heat related illnesses for the prevention of heat cramps

Heat exhaustion:

- More complex than heat cramps
- A person collapses and sweats profusely
- Victim has pale skin, a pounding heart, nausea, headache, and acts restless
- Use previous guidelines for other heat related illnesses for the prevention of heat exhaustion

Heat Stroke:

- Major medical emergency. Caused by operating in bright sun or working in a hot
- environment, such as an engine compartment
- Symptoms:
  - Skin is red, hot, and dry to the touch
  - Headache
  - Weak and rapid pulse
  - Confusion, violence, lack of coordination, delirium, and/or unconsciousness
  - Brain damage will occur if immediate medical treatment is not given
- Use previous guidelines for other heat related illnesses for the prevention of heat exhaustion

Susceptibility to heat problems:

- Personnel not accustomed to strenuous physical activity in hot & humid environments are particularly susceptible to heat injuries. Excess body weight contributes to this susceptibility
- Clothing that does not breath, greatly increases an individuals susceptibility to heat related illnesses
- Clothing and equip. should be worn so that there is free circulation of air between the uniform and the body surface
- Keeping the body covered with permeable clothing reduces the radiant heat load upon the body
- Fever increases the chance of rapid heat buildup within the body

101.12 Discuss the danger of crew fatigue and ways to prevent it. [Ref. d, Ch. 3 Pg. 3-3]

- Fatigue dramatically reduces the powers of observation, concentration, and judgment

  Causes of Fatigue:
  - Operating in extreme hot or cold weather
  - Eye strain form hours of looking through sea-spray blurred windshields
  - Effort of holding on and maintaining balance
  - Stress
  - Exposure to noise
  - Exposure to the sun
  - Poor physical conditioning
  - Lack of sleep
  - Boredom
  - Motion sickness
  - Glare from the sun
  - Wind and rough sea conditions
  - Rain or snow
  - Vibration (boat engine)

  Symptoms of fatigue:
  - Inability to focus or concentrate/narrowed attention span
  - Mental confusion or judgment error
  - Decreased coordination of motor skills and sensory ability (hearing, seeing)
  - Increased irritability
  - Decreased performance
  - Decreased concern for safety

  Prevention of Fatigue:
  - Adequate crew rest
  - Dress appropriate for weather
  - Rotate crew duties
  - Provide food and refreshments suitable for conditions
  - Observe other crew members for signs of fatigue

101.13 Describe the contents and use of the onboard hazardous material spill kit. [Ref. f]

- Fuel absorbent pads. In the event of a spill over water, the rear scuppers will need to be manually blocked to prevent fuel from spilling into the water.

- Fuel spill sock. A bendable tube filled with absorbent material. This device can be used to wraparound the fill cap on board a patrol craft, or as a barrier in the water to prevent the spread of fuel over the surface of the water.

101.14 Discuss how to avoid hazardous material (HAZMAT) spills, and the actions to be taken in the event of a HAZMAT event. [Ref. c, Ch. B3 Pg. 278-288]

- Avoid HAZMAT spills.
  - Work center sups. Ensure personnel or properly trained on the handling and usage of HAZMAT.
  - Personnel ensure HAZMAT is properly stowed when not in use.

- Actions take in the event of a HAZMAT spill.
  - Discovery & notification.
  - Initiation of action.
  - Evaluation.
  - Containment & DC.
  - Dispersion of gases/vapors.
  - Cleanup & decontamination.
  - Disposal of contaminated materials.
  - Certification of reentry.
  - Follow-up reports

101.15 Explain the safety precautions involved while refueling. [Ref. a Ch. 5.3.6, pg 68]

- Secure engines.
- Secure all non-essential electrical and electronic equipment.
- Verify CO2 bottle ready and available for emergency use.
- Set Fire Watch.
- Ensure clean up materials (i.e. rags/oil absorbent pads) and overflow container are available for use.
- Remove fuel cap.
- Insert fuel nozzle and ensure pump is ready.
- Obtain permission from coxswain to begin refueling.

WARNING: Use a slow filling rate after reaching 70% of tank capacity to prevent fuel "burps" through tank vent.

- Fill tank to 80% of tanks total capacity and stop fueling.
- Remove sounding cap/rod.

- Secure pump.
- Secure and stow fuel hose and nozzle.
- Replace fuel cap.
- Properly stow clean materials and dispose of dirty ones.
- Secure Fire Watch.

102 Basic Damage Control

References:
[a] NSTM S9086-S3-STM-010/CH-555V1R9, Vol. 1, Surface Ship Firefighting
[b] NAVEDTRA 14057-PPR, Damage Control man
[c] NSTM S9086-CN-STM-020/CH-079V2R2, Vol. 2, Damage Control, Practical Damage Control
[d] Craft Specific Boat information Book

102.1 Explain the following extinguishing agents: [Ref. a, sec. 1 Pg. 555-26]

a. Water [Ref. a, sec. 1 Pg. 555-12.2]

Water is a cooling agent and on board ship the sea provides an inexhaustible supply. If the surface temperature of a fire can be lowered below the fuel's ignition temperature, the fire will be extinguished. Water is most efficient when it absorbs enough heat to raise its temperature to 212°F (100°C). At this temperature, the seawater will absorb still more heat until it changes to steam. The steam carries away the heat which cools the surface temperature. Seawater, also called salt water, is used for sprinkler systems and manual firefighting hoses. Fresh water is used on some ships for small diameter quick response hose reels. Seawater is slightly denser (heavier), more electrically conductive and more corrosive of metal surfaces than fresh water.

b. FE-241 (Fire Boy) [Ref. d]

The FE-241 system is a clean agent gas system. When discharged it releases a clean agent gas to totally flood the entire engine space and displacing all the oxygen to snuff out the fire.

- FE241 Agent 20 lb
- Installed in Engine Compartment
- Activated by direct Heat 175 °F

c. ABC [Ref. a, sec. 1 Pg. 555-26]

The ABC extinguishers onboard the patrol crafts are a MONOAMMONIUM PHOSPHATE based extinguisher. There are designed to discharge a dry chemical to brake the continues chemical chain reaction,

- ABC Dry Agent 6 lb

102.2 Explain isolating the source for each of the following:

In general, when a class A or class C fire occurs that does not force the space to be abandoned, affected equipment and systems are to be isolated except for firefighting equipment and lighting.

a. Electrical power [Ref. a, sec. 7 Pg. 555-7.2.5]

Complete electrical isolation will be very difficult due to the number of cables terminating within and traversing a space. The purpose of securing power is to promote the safety of the firefighter, and to reduce ignition sources in the fire space. Effective firefighting may start before electrical power is secured.

b. Salt water systems [Ref. d]

Each platform differs in the procedure for isolating the saltwater system; review the craft manufacturer's technical manual for specific details on the securing of the salt water system.

c. Fuel systems [Ref. d]

Fires fed by pressurized fuel normally can not be extinguished until the fuel source is secured.

Each platform differs in the procedure for isolating the saltwater system; review the craft manufacturer's technical manual for specific details on the shutdown/kill switch.

d. Mechanical systems [Ref. a, sec. 7 Pg. 555-7.2.5]

Every effort should be made to secure and isolate those systems and equipment that are the root cause of a fire or have the potential to feed the intensity of a fire.

102.3 Discuss the procedures for reporting a fire or other malfunctions. [Ref. a, sec. 8 Pg. 555-237]

Per the coxswains direction the Navigator / RTO will call up to the MOC, or boat house if no MOC is present, and report a fire on board the patrol craft, giving the hall number of the patrol craft and also report what action is being taken at that time.

In the case other malfunctions the Navigator / RTO will call up to the MOC (per the coxswain's direction) and inform them of a "Goodwrench" (malfunctions) on the patrol craft. In addition the Navigator / RTO will the hall number of the patrol craft and also report what action is being taken at that time.

102.4 Discuss the use of patches in patching a hole. [Ref. b, Ch. 8 Pg. 8-3]

When the underwater hull is pierced, there are only two possible courses of action. They are as follows:

1. Plug the holes or openings.
2. Establish and maintain flooding boundaries within the ship to prevent further progress of the flooding.

Dewatering can be effective only after these two measures have been taken
The two general methods of making temporary repairs to a hole in the hull are as follows:

1. Put something in it.
2. Put something over it.

In either case, the patches will reduce the area through which water can enter the ship or through which water can pass from one compartment to another.

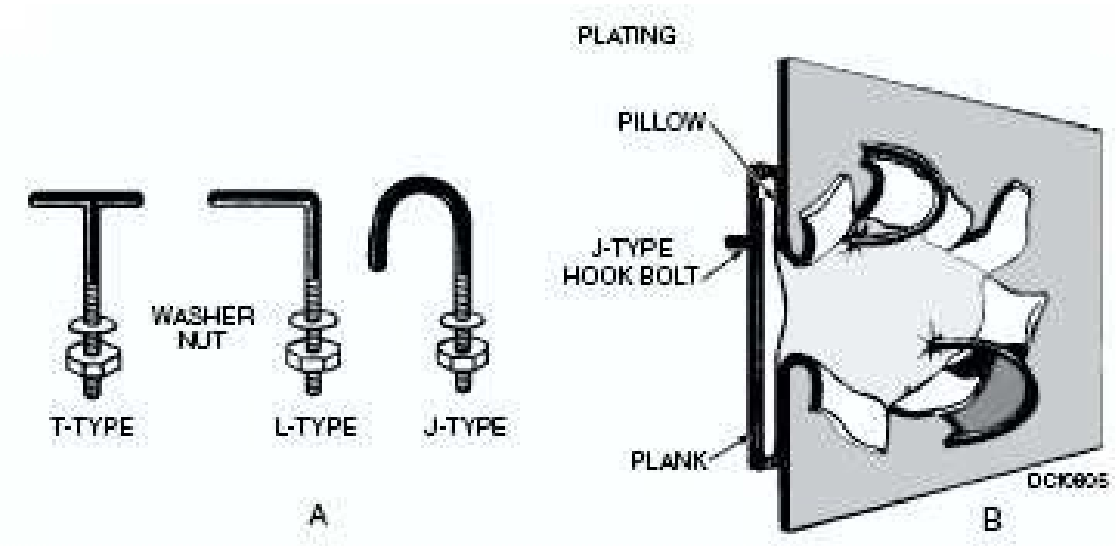

Figure 8-5. A. Types of hook bolts; B. Use of hook bolts in applying a patch.

Figure 8-5 shows T-shaped, L-shaped, and J-shaped hook bolts and how the hook bolts are used to apply a patch. The long shanks are threaded and are provided with nuts and washers. Wood (or sometimes steel) strongbacks are used with hook bolts.

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102.5 Discuss the following as applied to fires and firefighting:

a. Conditions that must exist for spontaneous combustion to take place [Ref. b, Ch. 4 Pg. 4-1]

Combustion is a rapid chemical reaction that releases energy in the form of light and noticeable heat. Most combustion involves rapid OXIDATION, which is the chemical reaction by which oxygen combines chemically with the elements of the burning substance. Even when oxidation proceeds slowly, such as a piece of iron rusting, a small amount of heat is generated. However, this heat usually dissipates before there is any noticeable rise in the temperature of the material being oxidized.

With certain types of materials, slow oxidation can turn into fast oxidation if heat is not dissipated. This phenomenon is known as “spontaneous combustion” and results in a fire. Therefore, materials identified as subject to spontaneous combustion are normally stowed in a confined space where the heat can be dissipated rapidly. Materials, such as rags or papers that are soaked with animal fat, vegetable fats, paints, or solvents, are particularly subject to spontaneous combustion.

For a combustible fuel or substance to catch on fire, it must have an ignition source and be hot enough to burn.

b. Four classes of fires and how each class of fire is extinguished [Ref. a, sec. 1 Pg. 555-1-16 and 17]

CLASS A (Alpha) FIRES. Class A fires involve wood and wood products, cloth, textiles and fibrous materials, paper and paper products. Class A fires are extinguished with water in straight or fog pattern. If the fire is deep-seated, aqueous film forming foam (AFFF) is more effective than sea water and can be used as a wetting agent to rapidly penetrate and extinguish the fire.

CLASS B (Bravo) FIRES. Class B fires involve flammable and combustible liquids such as gasoline, diesel fuel (F-76), jet fuels, hydraulic fluid and lube oil. These fires are normally extinguished with AFFF, Halon 1211, Halon 1301, water mist, Heptafluoropropane (HFP) or potassium bicarbonate (PKP). Class B fires also involve flammable gases, such as acetylene, which should never be extinguished unless there is reasonable certainty that the flow of gas can be secured. Securing the fuel source is the single most important step in controlling a gas fire. See paragraphs 555-1.4.3.3 and 555-8.6.

CLASS C (Charlie) FIRES. Class C fires are energized electrical fires that are attacked at prescribed distances using nonconductive agents such as CO_2 , Halon 1211 or water spray. The most effective tactic is to de-energize and handle the fire as a class A fire. When fires are not deep seated, clean agents that pose no cleanup problem such as Halon 1211 or CO_2 are preferred.

CLASS D (Delta) FIRES. Class D fires involve combustible metals such as magnesium and titanium. Water in quantity, using fog patterns, is the recommended agent. When water is applied to burning class D materials, there may be small explosions. The firefighter should apply water from a safe distance or from behind shelter. Metal fires on board ship are commonly associated with aircraft wheel structures. For further information refer to NAVAIR-00-80-R-14, NATOPS, U.S. Navy Aircraft Firefighting and Rescue Manual.

c. Three ways heat can be transmitted [Ref. a, sec. 1 Pg. 555-1-19 and 20]

GENERAL. Heat from a fire is transferred by one or more of three methods: conduction, radiation, and convection

CONDUCTION. Conduction is the transfer of heat through a body or from one body to another by direct physical contact. For example, on a hot stove, heat is conducted through the pot to its contents. Wood is ordinarily a poor conductor of heat, but metals are good conductors. Since most ships are constructed of metal, heat transfer by conduction is a potential hazard. Fire can move from one fire zone to another, one deck to another, and one compartment to another by heat conduction.

In many cases the skillful application of water, typically applied using fog patterns to rapidly coat and recoat surfaces with a film of water will retard or halt the transmission of heat by conduction. Fog patterns coat surfaces more efficiently than solid streams, reducing run off and the effect on ship stability.

RADIATION. Heat radiation is the transfer of heat from a source across an intervening space; no material substance is involved. The heat travels outward from the fire in the same manner as light; that is, in straight lines. When it contacts a body, it is absorbed, reflected or transmitted. Absorbed heat increases the temperature of the absorbing body. For example, radiant heat that is absorbed by an overhead will increase the temperature of that overhead, perhaps enough to ignite its paint.

Heat radiates in all directions unless it is blocked. Radiant heat extends fire by heating combustible substances in its path, causing them to produce vapors, and then igniting the vapor. Radiant heat flux is the measure of radiant energy (heat) flow per unit area, and is normally expressed in kW/m2 (kilowatts per square meter).

Within a ship, radiant heat will raise the temperature of combustible materials near the fire and, depending on the ship’s design, at quite some distance from the fire. Ship fires can spread as a result of radiating bulkheads and decks. Intense radiated heat can make an approach to the fire extremely difficult. For this reason, protective clothing should be worn by firefighters.

CONVECTION. Convection is the transfer of heat through the motion of circulating gases or liquids. Heat is transferred by convection through the motion of smoke, hot air and heated gases produced by a fire.

When heat is confined (as within a ship), converted heat moves in predictable patterns. The fire produces lighter-than-air gases that rise toward high parts of the ship. Heated air, which is lighter than cooler air, also rises. As these heated combustion products rise, cool air takes their place; the cool air is heated in turn and then rises to the highest point it can reach.

Hot smoke originating at a fire on a low deck will travel horizontally along passageways, and then upward by way of ladder and hatch openings, heating flammable materials in its path. To prevent fire spread, the heat, smoke and gases should be released into the atmosphere. However, the structural design of a ship makes it difficult to rapidly cut openings through decks, bulkheads or the ship’s hull for ventilation. It is imperative that the fire be confined to the smallest possible area. Doors and hatchways should be kept closed when they are not in use. If a fire is discovered, attempts should be made to close off all openings to the fire area until firefighting personnel and equipment can be brought into position to fight the fire.

d. Use of horizontal and vertical fire boundaries to control the spread of fire
[Ref. a, sec. 7 Pg. 555-7-54]

The best way to hold a horizontal and vertical fire boundaries on a small craft is to keep a hatches closed unless absolutely necessary.

102.6 Discuss the direct and indirect methods of firefighting.
[Ref. a, sec. 7 Pg. 555-7-16 through 27]

DIRECT ATTACK TECHNIQUE. There are three distinct techniques available during a direct fire attack: direct attack on the seat of the fire, fog attack to control the fire, and direct attack from the access. After assessing the fire space condition, the team leader must determine the best technique to use.

a. Direct Attack at the Seat of the Fire. When direct access to the seat of the fire is available, the preferred method is to advance to the seat of the fire and apply water directly onto the seat of the fire for. Access to the fire may be straight forward in the early stage of the fire, but heat, gases, gases, and smoke from an advanced fire make access increasingly difficult.

b. Fog Attack (to Gain Control of Fire). When entry can be made into the fire space, but direct access to the seat of the fire is not possible, firefighters may use a fog attack to gain control of the fire and delay or prevent flashover. The following conditions indicate the use of fog attack to gain control:

1. Where overhead gases are burning (known as rollover)
2. Where the seat of the fire is obstructed and water streams cannot be applied directly to the seat
3. Where multiple seats of the fire are growing within a compartment such that one seat of the fire would grow out of control while water is being applied to another seat of the fire

c. Direct Attack from Access. If high temperature denies access to the fire space but the burning material can be reached by a hose stream from an access, water can be applied to the seat of the fire from the access.

d. If conditions become too severe for these direct attack techniques, the attack team must withdraw and use other techniques, such as indirect attack or venting to improve conditions to allow a direct attack.

INDIRECT ATTACK, An indirect attack is the application of water fog into the fire space through an existing access or through a hole cut in a bulkhead or overhead. When heat or other conditions deny access to the fire space, an indirect attack may improve conditions to permit reentry for a direct attack. The following guidance applies only to attacking a class A fire.

a. The basic technique for an indirect attack is to apply water fog to the fire space for some time, then stop the water flow, and then assess conditions in the fire space through a cracked open access. If it appears that the space can be reentered and the direct attack team is ready to enter the space, immediately reenter the space and conduct the direct attack. Otherwise, continue with the cycle of indirect attack and assessing conditions until the space can be reentered. The attack team leader should adjust water fog application times and indirect attack points based on his assessment of conditions.

b. Do not conduct an indirect attack when people are in the fire space or when a direct attack is underway.

c. Isolate the fire space during the indirect attack. Keep the fire space isolated between indirect attacks.

d. A 4 ft. applicator is effective for an indirect attack, but a vari-nozzle with wide angle fog may be preferred for indirect attack to allow for quick reentry and minimal hose handling to mount the direct attack.

e. If the location of the fire is known, conduct the indirect attack from a point that allows application of water to the fire. Obstructions around the fire should be considered.

f. If the fire space is large, it may be desirable to conduct simultaneous indirect attacks from multiple points. If the fire is spread out or its location is uncertain, separate the attack points to maximize coverage of the fire space by water spray. Communications between attack teams is important.

g. Apply water fog continuously for approximately five to ten minutes for the initial attack.

h. Since the indirect attack may not extinguish the fire, temperatures in the fire space may begin to increase after the indirect attack is stopped. After the final indirect attack, enter the fire space as quickly as practical, within one or two minutes. If practical, use the final indirect attack to cool the access route inside the fire space.

102.7 Discuss the firefighting procedures involving ordnance. [Ref. a, Ch. 8 Pg. 555-8-82 and 83]

Since ordnance cook-off could happen quickly and unpredictably in a fire exposure, a rapid initial response is vital. When manual firefighting can be safety conducted. Tight ordnance stowage or vertical bulkhead stiffeners may impede effective application of cooling water to bulkheads. Extinguishing an in-space fire or cooling the hot bulkhead with water or AFFF is generally more effective than wetting down exposed ordnance, but wetting exposed ordnance may help delay cook-off.

102.8 Discuss the basic principles for overhauling a fire. [Ref. a, sec. 7 Pg. 555-214]

The basic principle in overhauling a fire is the attention to detail in that one has to seek out the root of a fire and find all ambers that may cause a reflash. Using fire extinguishers is very effective in overhauling a fire.

102.9 Discuss the importance of securing the source of flooding. [Ref. c, sec. 40 Pg. 79-106]

The impotence of securing the source of flooding is key on a small craft such as the ones used within NECC. It only takes a matter of minuets for a small patrol craft to sink. With out endangering the lives of the crew a coxswain should make all best efforts to securing the source of flooding once the source of the flooding has been located.

102.10 Define the various types of ruptures that could occur to piping. [Ref. c, pg 7-135]

Several types of pipe ruptures are illustrated in Figure 079-42-21. Definitions for the various types of ruptures that could occur to piping systems are as follows:

a. Simple - a rupture with no protruding edges, located on a straight section of pipe.
b. Elbow - a rupture with no protruding edges, located on a curved section of pipe.
c. Severed - a section of pipe that has been completely separated.
d. Compound - a rupture having protruding edges, ruptures in fittings, mangled pipes, and similar piping damage.

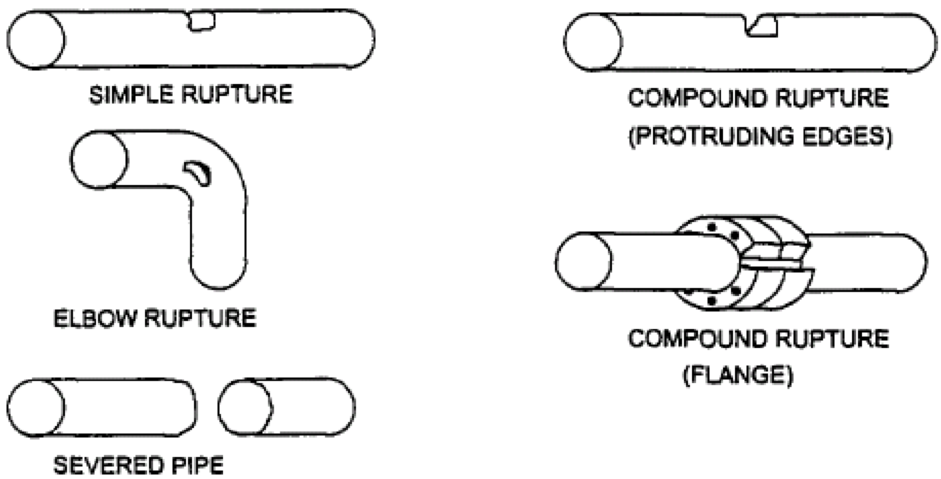


Figure 079-42-21. Types of Pipe Ruptures

102.11 Discuss the use of plugs and wedges in plugging a hole. [Ref. b, Ch. 8 Pg. 8-3]

Dewatering can be effective only after these two measures have been taken

The two general methods of making temporary repairs to a hole in the hull are as follows:

1. Put something in it.
2. Put something over it.

FOR COMPUTING THE AMOUNT OF WATER THAT COULD ENTER A SHIP THROUGH A HOLE IN THE HULL AT ANY ONE INSTANT IN TIME, YOU MAY USE THE FOLLOWING FORMULA.

Q= 0.6A 2 GH
WHERE Q = CUBIC FEET OF WATER/SEC
A = AREA OF HOLE IN SQ FT
G = GRAVITATIONAL CONSTANT 32 FT/SEC
H = HEIGHT OF WATER IN FEET (DEPTH OF HOLE)
.6 = COEFFICIENT OF DISCHARGE FOR SHARP EDGED HOLES
"PUMPS" ARE THE NUMBER OF ELECTRIC SUBMERSIBLE
PUMPS REQUIRED TO HANDLE THE FLOODING

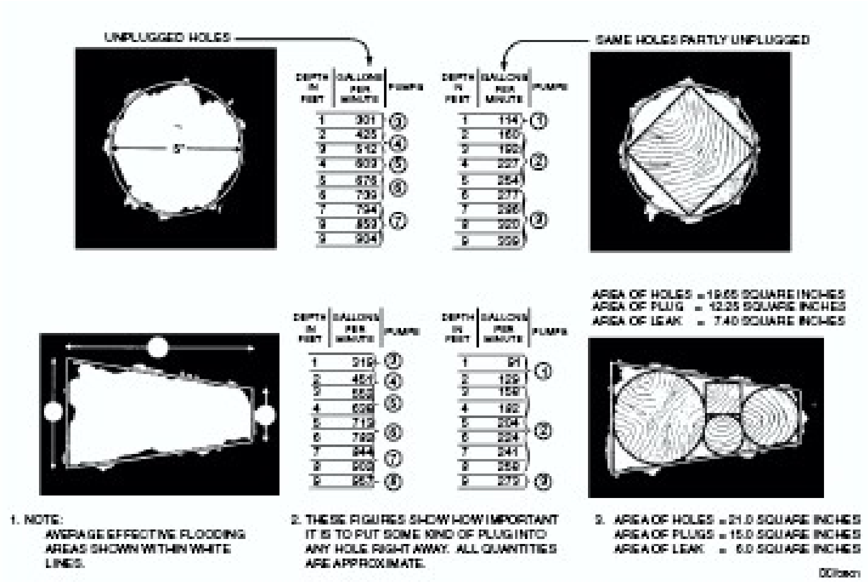


Figure 8-1. Flooding effect comparison; unplugged holes vs. partially plugged holes.

Figure 8-1 shows the flooding effect of unplugged holes and of the same holes after inserting simple plugs.

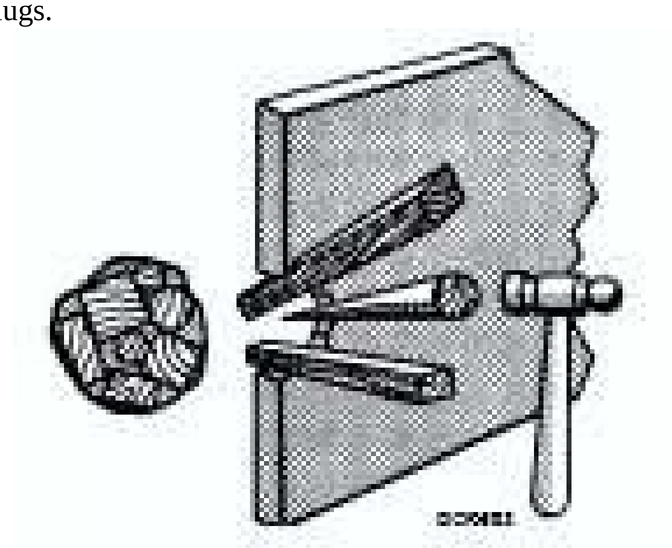


Figure 8-2. Combination of plugs used to plug a hole.

The plugs and wedges may be used individually if they fit the hole. Often however, it is best to use a combination of conical, square-ended, and wedge-shaped plugs to make a better fit in the hole. One such combination of plugs is shown in figure 8-2. It is best to wrap each plug with lightweight cloth before inserting it. The cloth tends to keep the plugs in place and fills in some of the gaps between the plugs. In most cases, plugs will not make a watertight fit. However, you can substantially reduce the rate of leakage by using the plugs and then caulking the remaining leaks with rags, oakum, and smaller wedges

103 First Aid

References:
[a] NAVEDTRA 14295, Hospital Corpsman
[b] NTRP 4-02.1.1, First Aid
[c] NAVEDTRA 14235, Seabee Combat Handbook, Volume 2

103.1 State the purpose of first aid. [Ref. b, Ch. 1, Pg. 1-3]

First aid is the emergency care and treatment of a sick or injured person before professional medical services are obtained. FIRST AID MEASURES ARE NOT MEANT TO REPLACE PROPER MEDICAL DIAGNOSIS AND TREATMENT, but will only consist of providing temporary support until professional medical assistance is available. The purposes of first aid are (1) to save life, (2) prevent further injury, and (3) to minimize or prevent infection.

103.2 Discuss the following steps in initial evaluation of a victim:
[Ref. a, Ch. 4, Pg. 4-3 and Ref. b, Ch. 1]

a. Assess the situation:
Get organized, remain calm, take charge of the situation and act quickly but efficiently.

b. Keep patient lying down:
Unless contradicted you should make your preliminary examination in the position and place you find the victim. Moving the victim before this check could gravely endanger life, especially if the neck, back or ribs are broken. Of course if the situation is such that you or the victim is in danger, you must weigh this threat against the potential damage caused by premature transportation.

c. Identify the injuries:
Gather information immediately from the patient, bystanders, scene, medical dentification devices, mechanism of injury.

d. Check for consciousness:
Is the victim alert? Does he/she respond to verbal stimuli or painful stimuli? Is the victim unresponsive?

e. Check breathing:
Assess for a patent airway, an obstructed airway may quickly lead to respiratory arrest and death. Assess breathing look, listen and feel and if necessary provide rescue breathing. Look for and treat conditions that may compromise breathing, such as penetrating trauma to the chest.

f. Check pulse:

In an unconscious victim check for a carotid pulse, in a conscious patient check radial pulse. If the patient's heart has stopped blood and oxygen are not being sent to the brain. In 4 to 6 minutes irreversible changes begin to occur in the brain if blood and oxygen are not being sent to the brain. In 10 minutes cell death occur if blood and oxygen are not being sent to the brain.

g. Check for injuries:

Check the patient for deformities and injuries, Is the patient lying in a strange position? Are there burns or crushed limbs? For soft tissue injuries first aid treatment consist mainly of stopping the flow of blood, treating for shock, and reducing the risk of infection. DO NOT remove objects embedded in the eyes or skull, and do not remove impaled objects. Impaled objects must be stabilized with bulky dressing before transport.

103.3 Discuss the possible causes for the following injuries: [Ref. a, Ch. 4]

a. Asphyxiation [Pg. 4-16]

Asphyxiation can be cause by complete airway obstruction, insufficient oxygen in the air, inability of the blood to carry oxygen (e.g. carbon monoxide poisoning), paralysis of the breathing center of the brain, or external compression of the body.

b. Hemorrhage (bleeding) [Pg. 4-30]

Causes of hemorrhaging:

- Violent force
- Puncture wounds
- Broken bones
- Blunt force trauma

(Escape of blood) occurs whenever there is a break in the wall of one or more blood vessels. In most small cuts, only capillaries are injured. Deeper wounds result in injuries to veins or arteries. The average adult body contains about 5 liters of blood. 500 milliliters of blood can usually be lost without harmful effect, in fact, that is the amount given by blood donors. However the loss of 1 liter will usually cause shock.

c. Cardiac arrest [Pg. 4-18]

Causes of cardiac arrest:

- Heredity
- Sex (males have a greater risk)
- Age
- Smoking
- High blood pressure
- High blood cholesterol

- Obesity
- Lack of exercise
- Stress
- Uncontrolled diabetes

Cardiac arrest is the complete stoppage of heart function. The heart muscle could be weakened by disease or damaged by trauma or lack of oxygen as in case of pulmonary disease, suffocation or myocardial infarction. If the patient is to live action must be taken to restore heart function. The symptoms of cardiac arrest include absence of carotid pulse, lack of heartbeat, dilated pupils, and absence of breathing.

d. Fractures [Pg. 4-46]

Causes of fractures:

- Falls
- Trauma
- Skylarking

A break or rupture in a bone is called a **fracture**. There are two basic types; open and closed. A **closed fracture** does not produce an open wound in the skin, also known as a simple fracture. An **open fracture** produces an open wound in the skin, also known as a compound fracture. Open wounds are caused by the sharp end of broken bones pushing through the skin; or by an object such as a bullet that enters the skin from the outside.

e. Burns [Pg. 4-56]

Causes of burns:

- Thermal
  - Exposure to hot solids, liquids, gases, or fire
- Chemical
- Acids, alkalis, or other chemicals
- Electrical
- Sunburn

Burns: Exposure to extremes of temperature, whether heat or cold, causes injury to the skin, tissues, blood vessels, vital organs, and in some cases, the whole body. In addition, contact with the sun's rays, electrical current, or certain chemical causes injuries similar in character to burns. Burns and scalds are essentially the same injury, burns being causes by dry heat and scalds by moist heat. Electrical burns may be far more serious than a preliminary examination may indicate. The entrance and exit wound may be small, but as electricity penetrates the skin it burns a larger area below the surface. Chemical burns are cause when acids, alkalis, or other chemicals come in contact with the skin or other body membranes. Alkali burns are usually more serious than acid burns, because alkalis penetrate deeper and burn longer.

f. Shock [Pg. 4-21]

- Hypovolemic Shock
  - Decreased amount of blood or fluids in the body]
- Neurogenic Shock
  - Abnormal enlargement of the blood vessels and pooling of the blood
  - Adequate blood flow cannot be maintained
- Psychogenic Shock
  - Shock like condition
  - Excessive fear, joy, anger, or grief
- Anaphylactic Shock (allergic)
  - Individual is exposed to a substance which his/her body is sensitive
  - Injection of medicines, venom's by stinging insects and animals
  - Inhalation of dust and pollens
  - Ingestion of certain foods and medications
- Cardiogenic: is due to inadequate functioning of the heart.
- Septic: is due to the presence of severe infection.

Shock should be expected in all cases of gross hemorrhage, abdominal or chest wound, crush or blast injuries, extensive large muscle damage, burns involving more than 10% of the body surface area (BSA).

103.4 Define and discuss the following types of fractures: [Ref. a, Ch. 4, Pg. 4-46]

a. Simple (closed)

A **closed fracture** does not produce an open wound in the skin, also known as a simple fracture.

b. Compound (open)

An **open fracture** produces an open wound in the skin, also known as a compound fracture. Open wounds are caused by the sharp end of broken bones pushing through the skin; or by an object such as a bullet that enters the skin from the outside.

103.5 Discuss the signs and symptoms of fractures. [Ref. a, Ch. 4, Pg. 4-46]

- Severe pain
- Cause the injured part to become deformed, or take an unnatural position
- Compare the injured to the uninjured
- Discoloration
- May be impossible for victim to move injured part
- Bone sticking through the skin (open fracture)

103.6 Explain the treatment for the following types of fractures: [Ref. a, Ch. 4]

a. Arm (upper and lower) [Pg. 4-47]

Lower Arm: There are two long bones in the forearm, the radius and the ulna. When both are broken, the arm usually appears to be deformed. When only one is broken, the other act as a splint and the arm retains a more or less natural appearance. Any fracture of the forearm is likely to result in pain, tenderness, inability to use the forearm, and a kind of wobbly motion at the point of injury. If the fracture is open, a bone will show through.

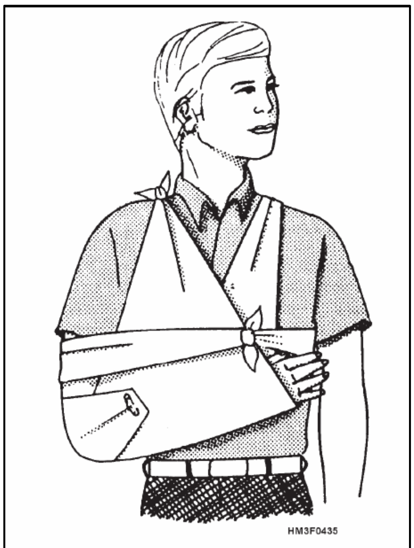


Figure 4-35.—First aid for a fractured forearm.

If the fracture is open, stop the bleeding and treat the wound. Apply a sterile dressing over the wound. Carefully straighten the forearm. (Remember that rough handling of a closed fracture may turn it into an open fracture.) Apply a pneumatic splint if available; if not, apply two well-padded splints to the forearm, one on the top and one on the bottom. Be sure that the splints are long enough to extend from the elbow to the wrist. Use bandages to hold the splints in place. Put the forearm across the chest. The palm of the hand should be turned in, with the thumb pointing upward. Support the forearm in this position by means of a wide sling and a cravat bandage, as shown in figure 4-35. The hand should be raised about 4 inches above the level of the elbow. Treat the victim for shock and evacuate as soon as possible.

Upper Arm: The signs of fracture of the upper arm include pain, tenderness, swelling, and a wobbly motion at the point of fracture. If the fracture is near the elbow, the arm is likely to be straight with no bend at the elbow. If the fracture is open, stop the bleeding and treat the wound before attempting to treat the fracture.

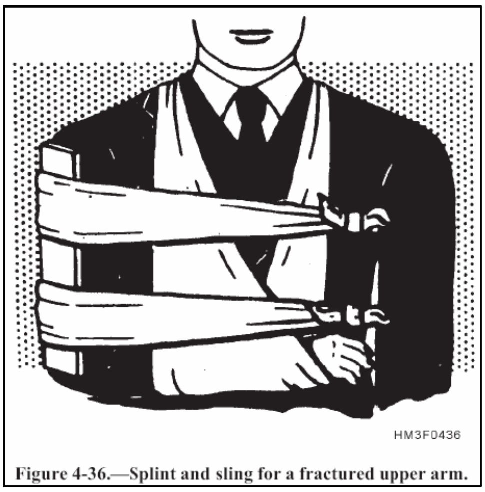


Figure 4-36.—Splint and sling for a fractured upper arm.

NOTE: Treatment of the fracture depends partly upon the location of the break.

If the fracture is in the upper part of the arm near the shoulder, place a pad or folded towel in the armpit, bandage the arm securely to the body, and support the forearm in a narrow sling.

If the fracture is in the middle of the upper arm, you can use one well-padded splint on the outside of the arm. The splint should extend from the shoulder to the elbow. Fasten the splinted arm firmly to the body and support the forearm in a narrow sling, as shown in figure 4-36.

Another way of treating a fracture in the middle of the upper arm is to fasten two wide splints (or four narrow ones) about the arm and then support the forearm in a narrow sling. If you use a splint between the arm and the body, be very careful that it does not extend too far up into the armpit; a splint in this position can cause a dangerous compression of the blood vessels and nerves and may be extremely painful to the victim.

If the fracture is at or near the elbow, the arm may be either bent or straight. No matter in what position you find the arm, **DO NOT ATTEMPT TO STRAIGHTEN IT OR MOVE IT IN ANY WAY**.

Splint the arm as carefully as possible in the position in which you find it. This will prevent further nerve and blood vessel damage. The only exception to this is if there is no pulse distal to the fracture, in which case gentle traction is applied and then the arm is splinted. Treat the victim for shock and get him under the care of a medical officer as soon as possible.

b. Leg (upper and lower) [Pg. 4-48]

Thigh: The femur is the long bone of the upper part of the leg between the kneecap and the pelvis. When the femur is fractured through, any attempt to move the limb results in a spasm of the muscles and causes excruciating pain. The leg has a wobbly motion, and there is complete loss of control below the fracture.

The limb usually assumes an unnatural position, with the toes pointing outward. By actual measurement, the fractured leg is shorter than the uninjured one because of contraction of the powerful thigh muscles. Serious damage to blood vessels and nerves often results from a fracture of the femur, and shock is likely to be severe.

If the fracture is open, stop the bleeding and treat the wound before attempting to treat the fracture itself. Serious bleeding is a special danger in this type of injury, since the broken bone may tear or cut the large artery in the thigh.

Carefully straighten the leg. Apply two splints, one on the outside of the injured leg and one on the inside. The outside splint should reach from the armpit to the foot. The inside splint should reach from the crotch to the foot. The splints should be fastened in five places: (1) around the ankle; (2) over the knee; (3) just below the hip; (4) around the pelvis; and (5) just below the armpit (fig. 4-37). The legs can then be tied together to support the injured leg as firmly as possible.

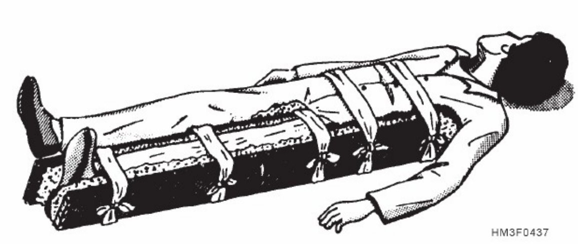


Figure 4-37.—Splint for a fractured femur.

It is essential that a fractured thigh be splinted before the victim is moved. Manufactured splints, such as the Hare or the Thomas half-ring traction splints, are best, but improvised splints may be used. Figure 4-37 shows how boards may be used as an emergency splint for a fractured thigh. Remember, **DO NOT MOVE THE VICTIM UNTIL THE INJURED LEG HAS BEEN IMMOBILIZED**. Treat the victim for shock, and vacate at the earliest possible opportunity.

Lower Leg: When both bones of the lower leg are broken, the usual signs of fracture are likely to be present. When only one bone is broken, the other one acts as a splint and, to some extent, prevents deformity of the leg.

However, tenderness, swelling, and pain at the point of fracture are almost always present. A fracture just above the ankle is often mistaken for a sprain. If both bones of the lower leg are broken, an open fracture is very likely to result.

If the fracture is open, stop the bleeding and treat the wound. Carefully straighten the injured leg. Apply a pneumatic splint if available; if not, apply **three** splints, one on each side of the leg and one underneath. Be sure that the splints are well padded, particularly under the knee and at the bones on each side of the ankle.

A pillow and two side splints work very well for treatment of a fractured lower leg. Place the pillow beside the injured leg, then carefully lift the leg and place it in the middle of the pillow. Bring the edges of the pillow around to the front of the leg and pin them together.

Then place one splint on each side of the leg (over the pillow), and fasten them in place with strips of bandage or adhesive tape. Treat the victim for shock and evacuate as soon as possible. When available, you may use the Hare or Thomas half-ring traction splints.

c. Jaw [Pg. 4-50]

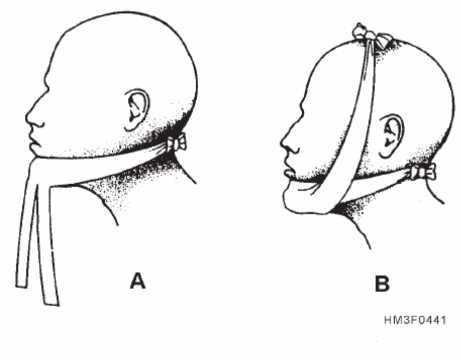


Figure 4-41.—Four-tailed bandage for the jaw.

A person who has a fractured jaw may suffer serious interference with breathing. There is likely to be great difficulty in talking, chewing, or swallowing.

Any movement of the jaw causes pain. The teeth may be out of line, and there may be bleeding from the gums. Considerable swelling may develop.

One of the most important phases of emergency care is to clear the upper respiratory passage of any obstruction. If the fractured jaw interferes with breathing, pull the lower jaw and the tongue well **forward** and keep them in that position. Apply a four-tailed bandage, as shown in figure 4-41. Be sure that the bandage pulls the lower jaw **forward**. Never apply a bandage that forces the jaw backward, since this might seriously interfere with breathing. The bandage must be firm so that it will support and immobilize the injured jaw, but it must not press against the victim's throat. Be sure that the victim has scissors or a knife to cut the bandage in case of vomiting. Treat the victim for shock and evacuate as soon as possible.

d. Nose [Pg. 4-50]

A fracture of the nose usually causes localized pain and swelling, a noticeable deformity of the nose, and extensive nosebleed.

Stop the nosebleed. Have the victim sit quietly, with the head tipped slightly backward.

Tell the victim to breathe through the mouth and not to blow the nose.

If the bleeding does not stop within a few minutes, apply a cold compress or an ice bag over the nose.

Treat the victim for shock. Ensure the victim receives a medical officer's attention as soon as possible.

Permanent deformity of the nose may result if the fracture is not treated promptly.

e. Skull [Pg. 4-51]

When a person suffers a head injury, the greatest danger is that the brain may be severely damaged; whether or not the skull is fractured is a matter of secondary importance. In some cases, injuries that fracture the skull do not cause serious brain damage; but brain damage can and frequently does result from apparently slight injuries that do not cause damage to the skull itself.

It is often difficult to determine whether an injury has affected the brain because the symptoms of brain damage vary greatly. A person suffering from a head injury must be handled very carefully and given immediate medical attention.

Some of the symptoms that may indicate brain damage are listed below. However, you must remember that all of these symptoms are not always present in any one case and that the symptoms that do occur may be greatly delayed.

- Bruises or wounds of the scalp may indicate that the victim has sustained a blow to the head. Sometimes the skull is depressed (caved in) at the point of impact. If the fracture is open, you may find glass, shrapnel, or other objects penetrating the skull.
- The victim may be conscious or unconscious. If conscious, the victim may feel dizzy and weak, as though about to faint.
- Severe headache sometimes (but not always) accompanies head injuries.
- The pupils of the eyes may be unequal in size and may not react normally to light.
- There may be bleeding from the ears, nose, or mouth.
- The victim may vomit.
- The victim may be restless and perhaps confused and disoriented.
- The arms, legs, face, or other parts of the body may be partially paralyzed.
- The victim’s face may be very pale, or it may be unusually flushed.
- The victim is likely to be suffering from shock, but the symptoms of shock may be disguised by other symptoms.

It is not necessary to determine if the skull is fractured when you are giving first aid to a person who has suffered a head injury. The treatment is the same in either case, and the primary intent is to prevent further damage to the brain.

Keeps the victim lying down. If the face is flushed, raise the head and shoulders slightly. If the face is pale have the victim lie in a way so that the head is level with, or slightly lower than, the body. Watch carefully for vomiting. If the victim begins to vomit, position the head to prevent choking on the vomits’.

If there is serious bleeding from the wounds, try to control that bleeding by the application of direct pressure, using caution to avoid further injury to the skull or brain. Use a donut shaped bandage to gently surround protruding objects. Never manipulate those objects.

- Be very careful about moving or handling the victim. Move the victim no more than is necessary. If transportation is necessary, keep the victim lying down.
- In any significant head or facial injury, assume injury to the cervical spine. Immobilization of the cervical spine is indicated.
- Be sure that the victim is kept comfortably warm, but not too warm.
- **Do not** give the victim anything to drink. **DO NOT GIVE ANY MEDICATIONS**. See that the victim receives a medical officer’s attention as soon as possible.

f. Spine [Pg. 4-52]

If the spine is fractured at any point, the spinal cord may be crushed, cut, or otherwise damaged so severely that death or paralysis will result. However, if the fracture occurs in such a way that the spinal cord is not seriously damaged, there is a very good chance of complete recovery, provided that the victim is properly cared for. Any twisting or ending of the neck or back whether due to the original injury or carelessness from handling later is likely to cause irreparable damage to the spinal cord.

The primary symptoms of a fractured spine are pain, shock, and paralysis. Pain is likely to be acute at the point of fracture. It may radiate to other parts of the body. Shock is usually severe, but (as in all injuries) the symptoms may be delayed for some time.

Paralysis occurs if the spinal cord is seriously damaged. If the victim cannot move the legs, feet, or toes, the fracture is probably in the back; if the fingers will not move, the neck is probably broken. Remember that a spinal fracture does not always injure the spinal cord, so the victim is not always paralyzed. Any person who has an acute pain in the back or the neck following an injury should be treated as though there is a fractured spine, even if there are no other symptoms.

Emergency treatment for all spinal fractures, whether of the neck or of the back, has two primary purposes: (1) to minimize shock, and (2) to prevent further injury to the spinal cord. Keep the victim comfortably warm. Do not attempt to keep the victim in the position ordinarily used for the treatment of shock, because it might cause further damage to the spinal cord. Just keep the victim lying flat and do NOT attempt to lower the head.

To avoid further damage to the spinal cord, DO NOT MOVE THE VICTIM UNLESS IT IS ABSOLUTELY ESSENTIAL! If the victim's life is threatened in the present location or transportation is necessary to receive medical attention, then, of course, you must move the victim. However, if movement is necessary, be sure that you do it in a way that will cause the least possible damage. DO NOT BEND OR TWIST THE VICTIM'S BODY, DO NOT MOVE THE HEAD FORWARD, BACKWARD, OR SIDEWAYS, AND DO NOT UNDER ANY CIRCUMSTANCES ALLOW THE VICTIM TO SIT UP.

g. Rib [Pg. 4-50]

If a rib is broken, make the victim comfortable and quiet so that the greatest danger ¾ the possibility of further damage to the lungs, heart, or chest wall by the broken ends ¾ is minimized.

The common finding in all victims with fractured ribs is pain localized at the site of the fracture. By asking the patient to point out the exact area of the pain, you can often determine the location of the injury.

There may or may not be a rib deformity, chest wall contusion, or laceration of the area. Deep breathing, coughing, or movement is usually painful. The patient generally wishes to remain still and may often lean toward the injured side, with a hand over the fractured area to immobilize the chest and to ease the pain.

Ordinarily, rib fractures are not bound, strapped, or taped if the victim is reasonably comfortable. However, they may be splinted by the use of external support. If the patient is considerably more comfortable with the chest immobilized, the best method is to use a swathe (fig. 4-40) in which the arm on the injured side is strapped to the chest to limit motion. Place the arm on the injured side against the chest, with the palm flat, thumb up, and the forearm raised to a 45° angle. Immobilize the chest, using wide strips of bandage to secure the arm to the chest.

Figure 4-40.—Swathe bandage of fractured rib victim.

Do not use wide strips of adhesive plaster applied directly to the skin of the chest for immobilization since the adhesive tends to limit the ability of the chest to expand (interfering with proper breathing). Treat the victim for shock and evacuate as soon as possible.

h. Shoulder [Pg. 4-49

Loosen the clothing around the injured part. Place the victim in the most comfortable position possible. Support the injured part by means of a sling, pillows, if any other device that will make the victim comfortable. Treat the victim for shock.

103.7 Discuss the following types of bleeding: [Ref. b, Ch. 1, Pg. 1-5]

a. Arterial:

Bright red, the blood "spurts" from the wound. Arterial bleeding is life threatening and difficult to control.

b. Venous

Dark red or maroon flows in a steady stream.

103.8 Discuss the following treatment for bleeding: [Ref. b, Ch. 2]

a. Direct pressure [Pg. 2-21]

Direct pressure is the first and most effective method to control bleeding. In many cases, bleeding can be controlled by applying pressure directly to the wound. Place a sterile dressing or clean cloth on the wound, tie a knot or tape directly over the wound, only tight enough to control bleeding. If bleeding is not controlled, apply another dressing over the first, or apply direct pressure with your hand or fingers over the wound. Direct pressure can be applied by the casualty or a bystander. **UNDER NO CIRCUMSTANCES IS A DRESSING REMOVED ONCE IT HAS BEEN APPLIED.**

Elevation should be used together with direct pressure. Do not elevate an extremity if you suspect a broken bone (fracture) until it has been properly splinted and you are certain that elevation will not cause further injury. Use a stable object to maintain elevation. Placing an extremity on an unstable object may cause further injury.

b. Pressure Dressing [Pg. 2-22]

Pressure dressings aid in blood clotting and compress the open blood vessel. If bleeding continues after the application of a field dressing, manual pressure, and elevation, then a pressure dressing must be applied as follows:

a. Place a wad of padding on top of the field dressing, directly over the wound (Figure 2-27). Keep the injured extremity elevated.

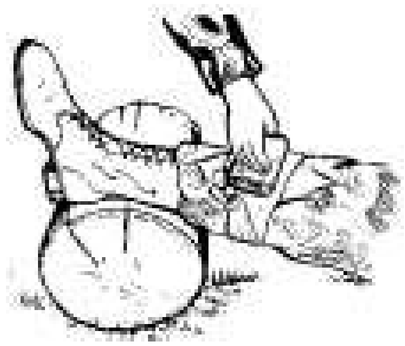


Figure 2-27. Wad of padding on top of field dressing.

NOTE

Improvised bandages may be made from strips of cloth. These strips may be made from T-shirts, socks, or other garments.

b. Place an improvised dressing (or cravat, if available) over the wad of padding (Figure 2-28). Wrap the ends tightly around the injure limb, covering the previously placed field dressing (Figure 2-29).

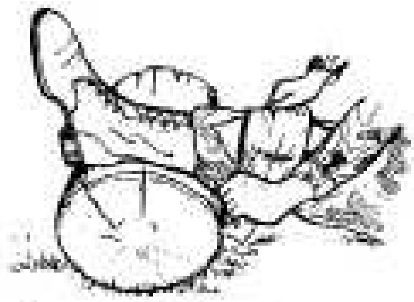


Figure 2-28. Improvised dressing over wad of padding

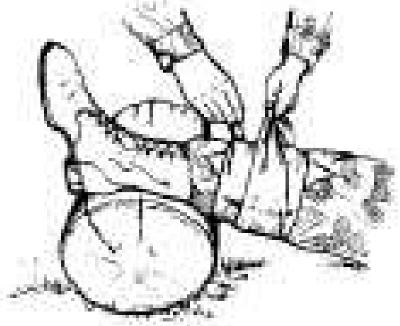


Figure 2-29. Ends of improvised dressing wrapped tightly around limb.

c. Tie the ends together in a nonslip knot, directly over the wound site (Figure 2-30). DO NOT tie so tightly that it has a tourniquet-like effect. If bleeding continues and all other measures have failed, or if the limb is severed, then apply a tourniquet. Use the tourniquet as a **LAST RESORT**. When the bleeding stops, check for shock; administer first aid for shock as necessary.

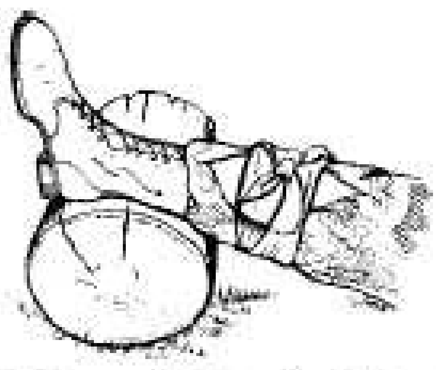


Figure 2-30. Ends of improvised dressing tied together in nonslip knot.

NOTE

Distal end of wounded extremities (fingers and toes) should be checked periodically for adequate circulation. The dressing must be loosened if the extremity becomes cool, blue, or numb.

NOTE

If bleeding continues and all other measures have failed (dressings and covering wound, applying direct manual pressure, elevating the limb above the heart level, and applying a pressure dressing while maintaining limb elevation)

c. Indirect pressure (pressure points) [Pg. 2-24]

In cases of severe bleeding when direct pressure and elevation are not controlling the bleeding, indirect pressure must be used. Bleeding from an artery can be controlled by applying pressure to the appropriate pressure point. Pressure points (Fig. 3-2) are areas of the body where the blood flow can be controlled by pressing the artery against an underlying bone. Pressure is applied with the fingers, thumb, or heel of the hand.

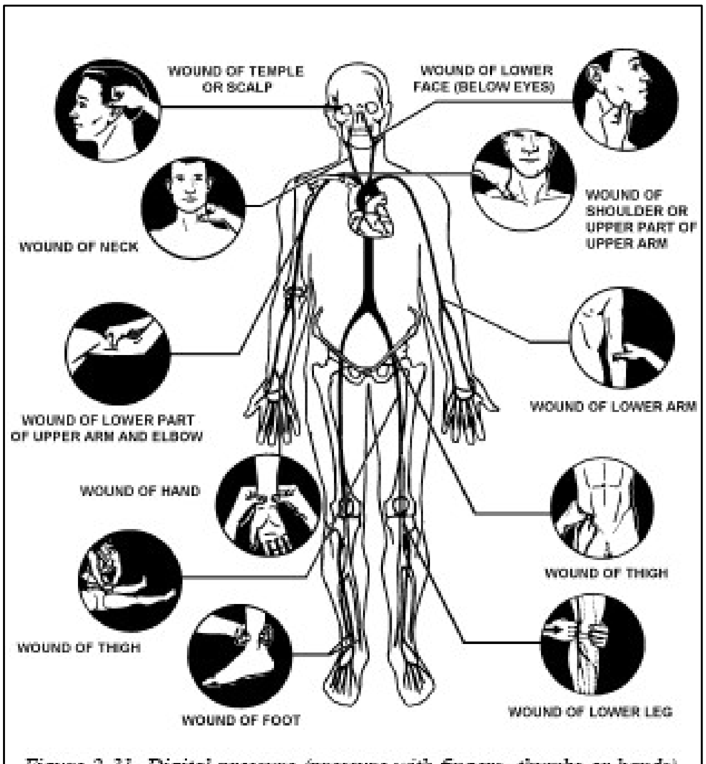


Figure 2-31. Digital pressure (pressure with fingers, thumbs or hands).

PRESSURE POINTS SHOULD BE USED WITH CAUTION; INDIRECT PRESSURE CAN CAUSE DAMAGE TO THE EXTREMITY DUE TO INADEQUATE BLOOD FLOW. DO NOT APPLY PRESSURE TO THE NECK (CAROTID) PRESSURE POINTS, IT CAN CAUSE CARDIAC ARREST.

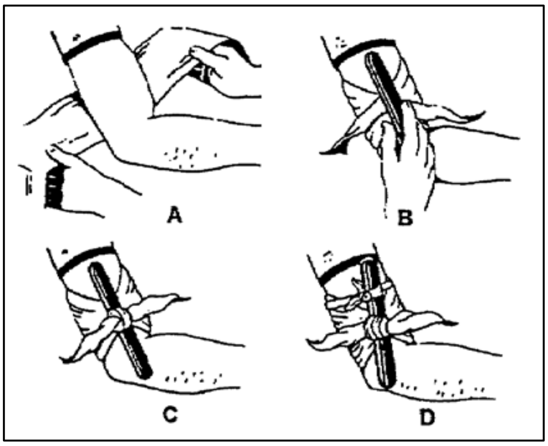
Indirect pressure is used in addition to direct pressure and elevation. Pressure points in the arm (brachial) and in the groin (femoral) are most often used, and should be thoroughly understood. The brachial artery is used to control severe bleeding of the lower part of the upper -arm and elbow. It is located above the elbow on the inside of the arm in the groove between the muscles. Using your fingers or thumb, apply pressure (Fig. 3-2E) to the inside of the arm over the bone. The femoral artery is used to control severe bleeding of the thigh and lower leg. It is located on the front, center part of the crease in the groin. Position the casualty on his or her back, kneel on the opposite side (Fig. 3-2H) from the wounded leg, place the heel of your hand directly on the pressure point, and lean forward to apply pressure. If the bleeding is not controlled, it may be necessary to press directly over the artery with the flat surface of the fingertips and to apply additional pressure on the fingertips with the heel of your other hand.

d. Tourniquet [Pg. 2-25]

A tourniquet should be used ONLY AS A LAST RESORT to control severe bleeding after all other methods have failed and is USED ONLY ON THE EXTREMITIES. Before use, you must thoroughly understand its dangers and limitations. Tourniquets cause tissue damage and loss of extremities when used by untrained individuals. They are rarely required and should only be used when an arm or leg has been partially or completely severed, and when bleeding, is uncontrollable.

The standard tourniquet is normally a piece of cloth folded until it is 3 or more inches wide and 6 or 7 layers thick. A tourniquet can be a strap, belt, neckerchief, towel, or other similar item. A folded triangular bandage makes a great tourniquet. NEVER USE WIRE, CORD, OR ANY MATERIAL THAT WILL CUT THE SKIN.

To apply a (Fig. 3-3) tourniquet, do the following:



1. While maintaining the proper pressure point, place the tourniquet between the heart and the wound, leaving at least 2 inches of uninjured skin between the tourniquet and wound.
2. Place a pad (roll) over the artery.
3. Wrap the tourniquet around the extremity twice, and de a half-knot on the upper surface.
4. Place a short stick or similar object on the half-knot, and tie a square knot.
5. Twist the stick to tighten, until bleeding is controlled.
6. Secure the stick in place.
7. NEVER COVER A TOURNIQUET.8. Using lipstick or marker, make a 'T'' on the casualty's forehead and the time tourniquet was applied.
9. NEVER LOOSEN OR REMOVE A TOURNIQUET once it has been applied. The loosening of a tourniquet may dislodge clots and result in enough blood loss to cause shock and death. DO NOT TOUCH OPEN WOUNDS WITH YOUR FINGERS UNLESS ABSOLUTELY NECESSARY. PLACE A BARRIER BETWEEN YOU AND THE CASUALTY'S BLOOD OR BODY FLUIDS, USING PLASTIC WRAP, GLOVES, OR A CLEAN, FOLDED CLOTH. WASH YOUR HANDS WITH SOAP AND WARM WATER IMMEDIATELY AFTER PROVIDING CARE, EVEN IF YOU WORE GLOVES OR USED ANOTHER BARRIER.

103.9 Discuss the symptoms and treatment of shock. [Ref. b, Ch. 2, Pg. 2-29]

Shock is the failure of the heart and blood vessels (circulatory system) to maintain enough oxygen-rich blood flowing (perfusion) to the vital organs of the body. There is shock to some degree with every illness or injury; shock can be life-threatening. The principles of prevention and control are to recognize the signs and symptoms, and to begin treating the casualty before shock completely develops. It is unlikely that you will see all the signs and symptoms of shock in a single casualty. Sometimes they may be disguised by the illness or injury. The signs and symptoms may not appear immediately, many times, they appear hours later.

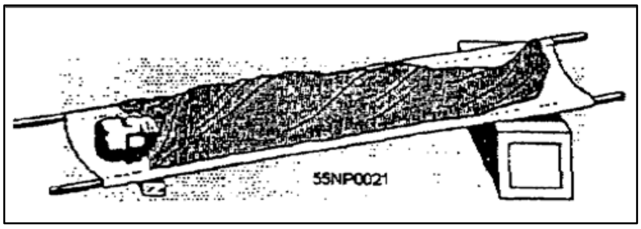
The usual signs and symptoms of the development of shock are:

1. Anxiety, restlessness and fainting.
2. Nausea and vomiting.
3. Excessive thirst (polydipsia).
4. Eyes are vacant, dull (Lackluster), large (dilated) pupils.
5. Shallow, rapid (tachypnea), and irregular breathing.
6. Pale, cold, moist (clammy) skin.
7. Weak, rapid (tachycardia), or absent pulse.

While administering first aid to prevent or treat shock, you must remain calm. If shock has not completely developed, the first aid you provide may actually prevent its occurrence. If it has developed, you may be able to keep it from becoming fatal. It is extremely important that you render first aid immediately.

To provide first aid for shock, do the following:

1. MAINTAIN OPEN AIRWAY - Headtilt/ chin-lift or Jaw-thrust.
2. CONTROL BLEEDING - Direct pressure, elevation, indirect pressure, or tourniquet if indicated.
3. POSITION CASUALTY - Place the casualty on his or her back, with legs elevated 6 to 12 inches. If it is possible, take advantage of a natural slope of ground and place the casualty so that the head is lower than the feet. If they are vomiting or bleeding around the mouth, place them on their side, or back with head turned to the side. IF YOU SUSPECT HEAD OR NECK INJURIES, OR ARE UNSURE OF THE CASUALTY'S CONDITION, KEEP THEM LYINGFLAT.



4. SPLINT - Suspected broken and dislocated bones in the position in which they are found. DO NOT ATTEMPT TO STRAIGHTEN BROKEN OR DISLOCATED BONES, because of the high risk of causing further injury, Splinting not only relieves the pain without the use of drugs, but prevents further tissue damage and shock. Pain and discomfort are often eliminated by unlacing or cutting a shoe, or loosening tight clothing

at the site of the injury. A simple adjustment of a bandage or splint will be of benefit, especially when accompanied by encouraging words.
5. Keep the casualty comfortable, and warm enough to maintain normal body temperature. If possible, remove wet clothing, and place blankets underneath the casualty. NEVER USE AN ARTIFICIAL MEANS OF WARMING.
6. Keep the casualty as calm as possible. Excitement and excessive handling will aggravate their condition. Prevent the casualty from seeing his or her injuries, reassure them that their injuries are understood and that professional medical assistance will arrive as soon as possible.
7. GIVE NOTHING BY MOUTH - Do not give the casualty anything to eat or drink because it may cause vomiting. If the casualty complains of thirst, wet his or her lips with a wet towel.
8. REQUEST MEDICAL ASSISTANCE - Ask bystanders to call the local emergency number or Medical.

103.10 Discuss the symptoms and treatment for the following types of burns:
[Ref. a, Ch. 4, Pg. 4-37]

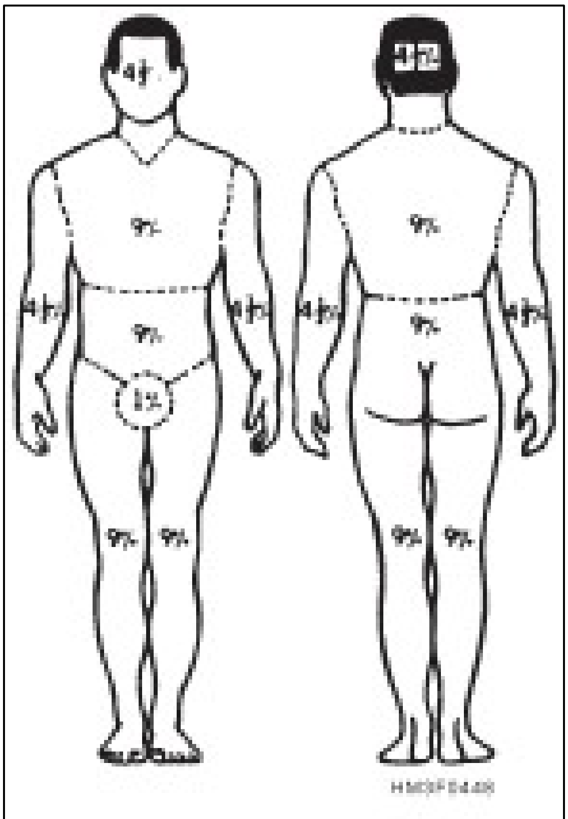


Figure 4-48.—Rule of Nines.

It is important to remember that the extent (size) of the burned area is more important than the depth of the burn. A first-degree burn that covers a large area of the body is usually more serious than a small third-degree burn. The "RULE OF NINES" is used to give a rough estimate of the surface area burned, and aid in deciding the correct treatment. Shock can be expected in adults with burns over 15 percent or in small children with burns over 10 percent of the body surface area (BSA). In adults, burns involving more than 20 percent of the body surface area endanger life and 30 percent burns are usually fatal if adequate medical treatment is not received. The third factor in burn evaluation is the location, burns of the head, hands, feet, or genitals may require hospitalization. The causes of burns are classified as thermal (heat), chemical, electrical, or radiation.

a. First degree

First-degree burns involve only the first (epidermal) layer of the skin. The skin is red, dry, warm, sensitive to touch, and turns (blanches) white with pressure. Pain is mild to severe, swelling (edema) may occur. Healing occurs naturally within a week.

b. Second degree

Second-degree burns involve the first and part of the second (dermis) layer of the skin. The skin is red, blisters, weeping, and looks (spotted) mottled. Pain is moderate to severe, swelling often occurs. Healing takes 2 – 3 weeks, with some scarring and de-pigmentation.

c. Third degree

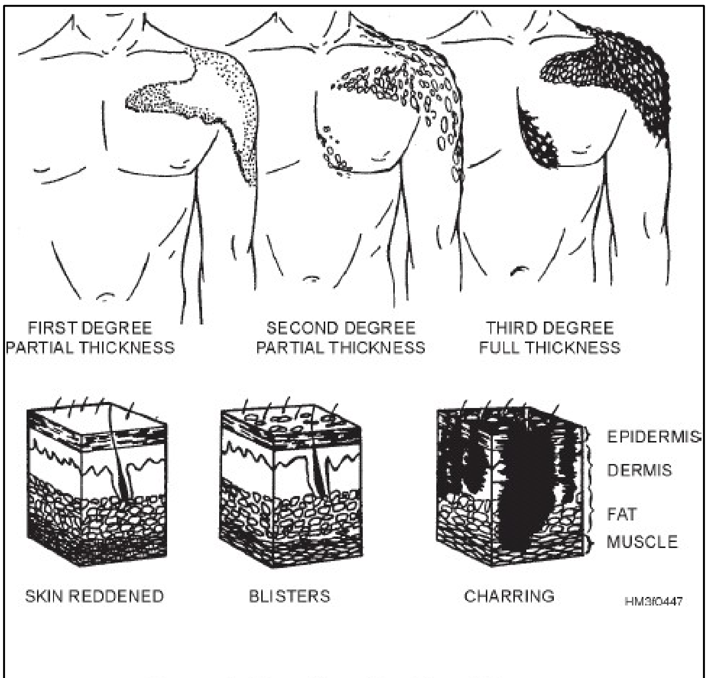


Figure 4-47.—Classification of burns.

Third-degree burns involve all layers (full thickness) of the skin penetrating into muscle, First, second, and third degree burns connective tissue and bone. The skin may vary from white and lifeless to black and charred. Pain will be absent at the burn site if all the nerve endings are destroyed and the surrounding tissue will be painful. There is considerable scarring and skin grafting may be necessary. THIRD-DEGREE BURNS ARE LIFE-THREATENING.

Thermal (heat) burns are caused by exposure to hot solids, liquids, gases, or fire. If the casualty has thermal burns, do the following:

1. MONITOR the airway, breathing and circulation (ABC's). ALWAYS EXPECT BREATHING PROBLEMS WHEN THERE ARE BURNS AROUND THE FACE OR IF THE CASUALTY HAS BEEN EXPOSED TO HOT GASES OR SMOKE.
2. CONTROL BLEEDING using direct pressure, elevation, indirect pressure, or tourniquet if indicated.
3. REMOVE all jewelry from the area, unless the casualty objects. SWELLING MAY DEVELOP RAPIDLY.
4. APPLY cool water to the affected area or submerge in cool water. DO NOT USE ICE OR ICE WATER.
5. REMOVE clothing gently from the burned area. DO NOT REMOVE CLOTHING THAT IS STICKING TO THE SKIN.
6. COVER area with dry, sterile dressings, if possible. Cover large areas with clean, dry sheets. DO NOT BREAK BLISTERS, OR APPLY OINTMENTS OF ANY KIND.

7. TREAT FOR SHOCK - Keep the casualty comfortable, and warm enough to maintain normal body temperature. Elevate the burned area above the heart.
8. REQUEST MEDICAL ASSISTANCE for all burns. If possible, before transport, inform medical of the degree, location of the burn, and percentage of the body area affected.

103.11 Discuss the treatment for chemical burns. [Ref. b, Ch 3, Pg. 3-14]

When acids, alkalis, or other chemicals come in contact with the skin, they can cause injuries that are generally referred to as chemical burns. These injuries are not caused by heat, but by direct chemical destruction of the tissues. The areas most often affected are the arms, legs, hands, feet, face, and eyes. Alkali burns are usually more serious than acid burns; alkalis generally penetrate deeper and burn longer.

If the casualty has chemical burns, do the following:

1. FLUSH AREA immediately with large quantities of fresh water, using an installed deluge shower or hose, if available. Avoid excessive water pressure. Continue to flush the area for at least 15 minutes while removing the clothes, including shoes, socks and jewelry. DRY LIME POWDER (ALKALI BURNS) CREATES A CORROSIVE SUBSTANCE WHEN MIXED WITH WATER; KEEP THE POWDER DRY AND REMOVE IT BY BRUSHING IT FROM THE SKIN. Acid burns caused by phenol (carbolic acid), should be washed with alcohol. Then wash the area with large quantities of water. If alcohol is not available, flush the area with large quantities of water. Cover chemical burns with a sterile dressing.
2. If available, follow the first aid procedures provided in the Material Safety Data Sheet (MSDS) for the chemical.
3. FLUSH the eyes with fresh water immediately using an installed emergency eye/face bath or hose on low pressure for at least 20 minutes. ASK CASUALTY TO REMOVE CONTACT LENSES. Use your hands to keep the eye lids open. Never use a neutralizing agent, mineral oil or other material in the eyes.
4. MONITOR the airway, breathing and circulation (ABCs).
5. WARNING - DO NOT ATTEMPT TO NEUTRALIZE any chemical unless you are sure what it is and what substance will effectively neutralize it. Further damage may be done by a neutralizing agent that is too strong or incorrect. Do not apply creams, cream, or other materials to chemical burns.
6. TREAT FOR SHOCK - Keep the casualty comfortable, and warm enough to maintain normal body temperature.
7. REQUEST MEDICAL ASSISTANCE for all chemical burns. If possible, before transport, notify medical of the name and other pertinent information about the chemical involved, location of the burn, and percentage of the body area affected. SEND THE CONTAINER TO MEDICAL WITH THE CASUALTY.

103.12 Discuss the treatment for the following types of wounds: [Ref. a, Ch. 4]

a. Chest wounds [Pg. 4-38]

Since chest injuries may cause severe breathing and bleeding problems, all chest injuries must be considered as serious conditions. Any victim showing signs of difficulty in breathing without signs of airway obstruction must be inspected for chest injuries. The most serious chest injury that requires immediate first aid treatment is the sucking chest wound. This is a penetrating injury to the chest that produces a hole in the chest cavity. The chest hole causes the lung to collapse, preventing normal breathing functions. This is an extremely serious condition that will result in death if not treated quickly.

Victims with open chest wounds gasp for breath, have difficulty breathing out, and may have a bluish skin color to their face. Frothy-looking blood may bubble from the wound during breathing.

The proper treatment for a sucking chest wound is as follows:

1. Immediately seal the wound with a hand or any airtight material available (e.g., ID card). The material must be large enough so that it cannot be sucked into the wound when the victim breathes in.
2. Firmly tape the material in place with strips of adhesive tape and secure it with a pressure dressing. It is important that the dressing is airtight. If it is not, it will not relieve the victim's breathing problems. The object of the dressing is to keep air from going in through the wound. **NOTE**: If the victim's condition suddenly deteriorates when you apply the seal, remove it **immediately**.
3. Give the victim oxygen if it is available and you know how to use it.
4. Place the victim in a Fowler's or semi-Fowler's position. This makes breathing a little easier. During combat, lay the victim on a stretcher on the affected side.
5. Watch the victim closely for signs of shock, and treat accordingly.
6. Do not give victims with chest injuries anything to drink.
7. Transport the victim to a medical treatment facility immediately.

b. Abdominal wounds [Pg. 4-38]

A deep wound in the abdomen is likely to constitute a major emergency since there are many vital organs in this area. Abdominal wounds usually cause intense pain, nausea and vomiting, spasm of the abdominal muscles, and severe shock. Immediate surgical treatment is almost always required; therefore, the victim must receive medical attention at once, or the chances of survival will be poor. Give only the most essential first aid treatment, and concentrate your efforts on getting the victim to a medical treatment facility. The following first aid procedures may be of help to a person suffering from an abdominal wound:

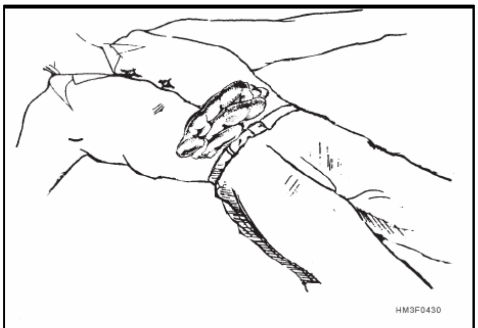


Figure 4-30.—Protruding abdominal wounds.

Figure 4-31.—Applying compresses to a protruding abdominal wound.

- Keep the victim in a supine position. If the intestine is protruding or exposed, the victim may be more comfortable with the knees drawn up. Place a coat, pillow, or some other bulky cloth material under the knees to help maintain this position. DO NOT ATTEMPT TO PUSH THE INTESTINES BACK IN OR TO MANIPULATE THEM IN ANYWAY! If bleeding is severe, try to stop it by applying direct pressure.

- If the intestines are not exposed, cover the wound with a dry sterile dressing. If the intestines are exposed, apply a sterile compress moistened with sterile water. If no sterile water is available, clean sea water or any water that is fit to drink may be used to moisten the compress. Figure 4-30 shows an abdominal wound with the intestine protruding. Figure 4-31 shows the application of compresses large enough to cover the wound and the surrounding area. The compress should be held in place by a bandage. Fasten the bandage firmly so that the compress will not slip around, but do not apply any more pressure than is necessary to hold the compress in position. Large battle dressings are ideal.

- Treat for shock, but do not waste any time doing it. The victim must be transported to a hospital at the earliest possible opportunity. However, you can minimize the severity of shock by making sure that the victim is comfortably warm and kept in the supine position. DO NOT GIVEANYTHING TO DRINK. If the victim is thirsty, moisten the mouth with a small amount of water, but do not allow any liquid to be swallowed. · Upon the direction of a medical officer, start an intravenous line.

c. Head wounds [Pg. 4-37]

Head wounds must be treated with particular care, since there is always the possibility of brain damage. The general treatment for head wounds is the same as that for other fresh wounds. However, certain special precautions must be observed if you are giving first aid to a person who has suffered a head wound.

- **NEVER GIVE ANY MEDICATIONS**.
- Keep the victim lying flat, with the head at the level of the body. Do not raise the feet if the face is flushed. If the victim is having trouble breathing, you may raise the head slightly.
- If the wound is at the back of the head, turn the victim on his side.
- Watch closely for vomiting and position the head to avoid aspiration of vomitus or saliva into the lungs.
- Do not use direct pressure to control hemorrhage if the skull is depressed or obviously fractured.

d. Eye injuries [Pg. 4-36]

Many eye wounds contain foreign objects. Dirt, coal, cinders, eyelashes, bits of metal, and a variety of other objects may become lodged in the eye. Since even a small piece of dirt is intensely irritating to the eye, the removal of such objects is important. However, the eye is easily damaged. Impairment of vision (or even total loss of vision) can result from fumbling, inexpert attempts to remove foreign objects from the eye. The following precautions must be observed:

- DO NOT allow the victim to rub the eye.
- DO NOT press against the eye or manipulate it in any way that might cause the object to become embedded in the tissues of the eye. Be very gentle; roughness is almost sure to cause injury to the eye.
- DO NOT use such things as knives, toothpicks, matchsticks, or wires to remove the object.
- DO NOT UNDER ANY CIRCUMSTANCES ATTEMPT TO REMOVE AN OBJECT THAT IS EMBEDDED IN THE EYEBALL OR THAT HAS PENETRATED THE EYE!

If you see a splinter or other object sticking out from the eyeball, leave it alone! Only specially trained medical personnel can hope to save the victim's sight if an object has actually penetrated the eyeball. Small objects that are lodged on the surface of the eye or on the membrane lining the eyelids can usually be removed by the following procedures:

1. Try to wash the eye gently with lukewarm, sterile water. A sterile medicine dropper or a sterile syringe can be used for this purpose. Have the victim lie down, with the head turned slightly to one side as shown in figure 4-29. Hold the eyelids apart. Direct the flow of water to the inside corner of the eye, and let it run down to the outside corner. Do not let the water fall directly onto the eyeball.

Figure 4-29.—Irrigating the eye.

2. Gently pull the lower lid down, and instruct the victim to look up. If you can see the object, try to remove it with the corner of a clean handkerchief or with a small moist cotton swab. You can make the swab by twisting cotton around a wooden applicator, not too tightly, and moistening it with sterile water.

CAUTION: Never use dry cotton anywhere near the eye. It will stick to the eyeball or to the inside of the lids, and you will have the problem of removing it as well as the original object.

3. If you cannot see the object when the lower lid is pulled down, turn the upper lid back over a smooth wooden applicator. Tell the victim to look down. Place the applicator lengthwise across the center of the upper lid. Grasp the lashes of the upper lid gently but firmly. Press gently with the applicator. Pull up on the eyelashes, turning the lid back over the applicator. If you can see the object, try to remove it with a moist cotton swab or with the corner of a clean handkerchief.

4. If the foreign object cannot be removed by any of the above methods, DO NOT MAKE ANY FURTHER ATTEMPTS TO REMOVE IT. Instead, place a small, thick gauze dressing over both eyes and hold it in place with a loose bandage. This limits movement of the injured eye.

5. Get medical help for the victim at the earliest opportunity.

e. Facial Wounds [Pg. 4-38]

Facial Wounds: Wounds of the face are treated, in general, like other fresh wounds. However, in all facial injuries make sure neither the tongue nor injured soft tissue blocks the airway, causing breathing obstruction. Keep the nose and throat clear of any obstructing materials, and position the victim so that blood will drain out of the mouth and nose.

Facial wounds that involve the eyelids or the soft tissue around the eye must be handled carefully to avoid further damage. If the injury does not involve the eyeball, apply a sterile compress and hold it in place with a firm bandage. If the eyeball appears to be injured, use a loose bandage. (Remember that you must NEVER attempt to remove any object that is embedded in the eyeball or that has penetrated it; just apply a dry, sterile compress to cover both eyes, and hold the compress in place with a loose bandage).

Any person who has suffered a facial wound that involves the eye, the eyelids, or the tissues around the eye must receive medical attention as soon as possible. Be sure to keep the victim lying down. Use a stretcher for transport.

Wounds of the jaw, face and neck are treated, in general, like other fresh wounds. However, in all facial injuries make sure the tongue or injured soft tissue does not block the airway, causing a breathing. If you suspect a neck injury, apply c-collar and prevent further injuries.

103.13 Discuss the following methods of transporting a victim: [Ref. b, Appendix B]

GENERAL RULES

1. Whenever possible, render first aid BEFORE transporting the casualty. Reduce the casualty's pain and make them as comfortable as possible.
2. Use a regular stretcher, with enough people to carry it, so that you will not drop the casualty.
3. Whenever possible, take the stretcher to the casualty, instead of carrying the casualty to the stretcher.
4. Fasten the casualty to the stretcher so that they don't slip, slide, or fall off.
5. Use blankets, clothing, or other material to pad the stretcher and protect the casualty from exposure.
6. Casualties should be lying on their back while being moved. However, in some case, the type or location of the injury will necessitate the use of another position. In all cases, it is important to place the casualty in a position that will best protect them from further injury.
7. Always move the casualty FEET FIRST so the rear bearer can watch for signs of difficulty breathing.
8. Always give a complete account of the situation before turning over the casualty. Include what caused the injury and what first aid procedures have been completed. Also, get the name of the casualty and the person whom you are turning them over to. This is one way of protecting yourself and at the same time ensuring that the patient will be in good hands.

a. Stokes stretcher [Ref. a, Ch. 3, Pg. 3-18]

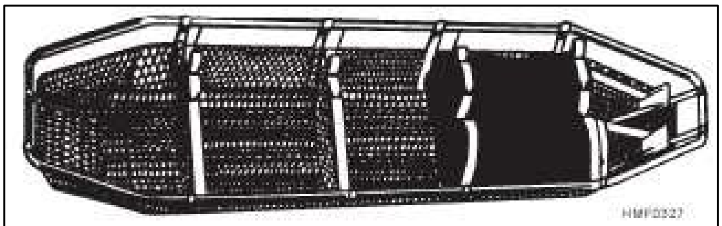


Figure 3-27.—Stokes stretcher.

The most commonly used stretcher for transporting the sick and injured is called the (Fig. 11-11) Stokes (basket) stretcher. It is essentially a wire basket supported by iron rods, and a new version made of molded plastic. It is adaptable to a variety of uses, since the casualty can be held securely in place even if the stretcher is tipped or turned. It can be used with flotation devices to rescue casualties from the water. The Stokes should be, padded with three blankets: Two should be placed lengthwise, so that one will be under each of the casualties’ legs, and the third should be folded in half and placed in the upper part to protect the head and shoulders. The casualty should be lowered gently into the stretcher and made as comfortable as possible. Cover the casualty with one or more blankets. Fasten the casualty and blanket with the straps provided over the chest, hips, thigh, and lower legs. DO NOT PLACE THE STRAPS OVER THE KNEES OR AREAS OF SUSPECTED BROKEN BONES!

b. Blanket drag [Ref. a, Ch. 3, Pg. 3-22]

Blanket Drag: The blanket drag, shown in figure 3.38, can be used to move a person who, due to the severity of the injury, should not be lifted or carried by one person alone. Place the casualty in the supine position on a blanket and pull the blanket along the floor or deck. Always pull the casualty head first, with the head and shoulders slightly raised so that the head will not bump against the deck

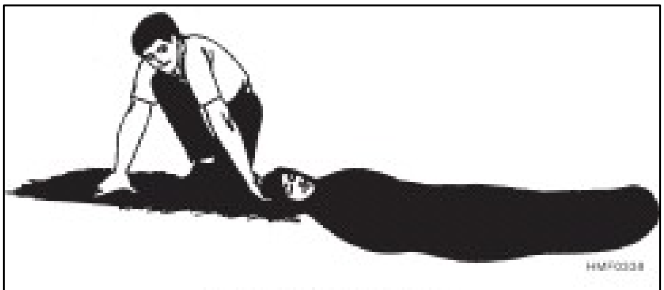


Figure 3–38.—Blanket drag.

c. Fireman carry [Ref. b, Appendix B, Pg. B-6]

The *fireman's carry* (Figure B-3) is one of the easiest ways for one individual to carry another. After an unconscious or disabled casualty has been properly positioned, he is raised from the ground, then supported and placed in the carrying position.

(a) After rolling the casualty onto his abdomen, straddle him. Extend your hands under his chest and lock them together.

(b) Lift the casualty to his knees as you move backward.

(c) Continue to move backward, thus straightening the casualty's legs and locking his knees.

(d) Walk forward, bringing the casualty to a standing position; tilt him slightly backward to prevent his knees from buckling.

(e) As you maintain constant support of the casualty with one arm, free your other arm, quickly grasp his wrist, and raise his arm high. Instantly pass your head under his raised arm, releasing it as you pass under it.

(f) Move swiftly to face the casualty and secure your arms around his waist. Immediately place your foot between his feet and spread them apart (approximately 6 to 8 inches).

(g) Grasp the casualty's wrist and raise his arm high over your head.

(h) Bend down and pull the casualty's arm over and down on your shoulder, bringing his body across your shoulders. At the same time, pass your arm between his legs.

(i) Grasp the casualty's wrist with one hand, and place your other hand on your knee for support.

(j) Rise with the casualty positioned correctly. Your other hand is free for use.

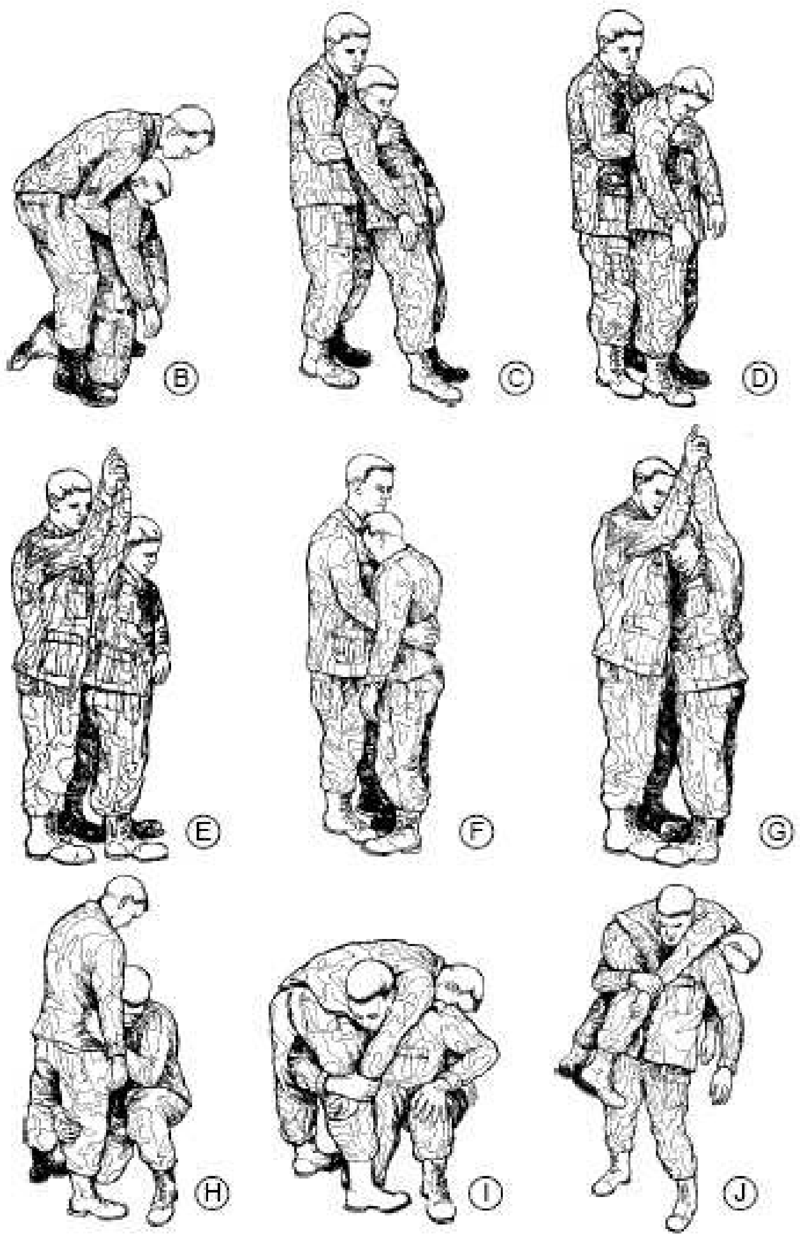


Figure B-3. Fireman's carry (Illustrated A—J) (Continued).

d. 4-handed seat carry [Ref. b, appendix B, Pg. B-24]

Only a conscious casualty can be transported with the *four-hand seat carry* (Figure B-19) because he must help support himself by placing his arms around the bearers' shoulders. This carry is especially useful in transporting a casualty with a head or foot injury for a moderate distance (50 to 300 meters). It is also useful for placing a casualty on a litter.

(a) Each bearer grasps one of his wrists and one of the other bearer's wrists, thus forming a packsaddle.

(b) The two bearers lower themselves sufficiently for the casualty to sit on the packsaddle; then, they have the casualty place his arms around their shoulders for support. The bearers then rise to an upright position.

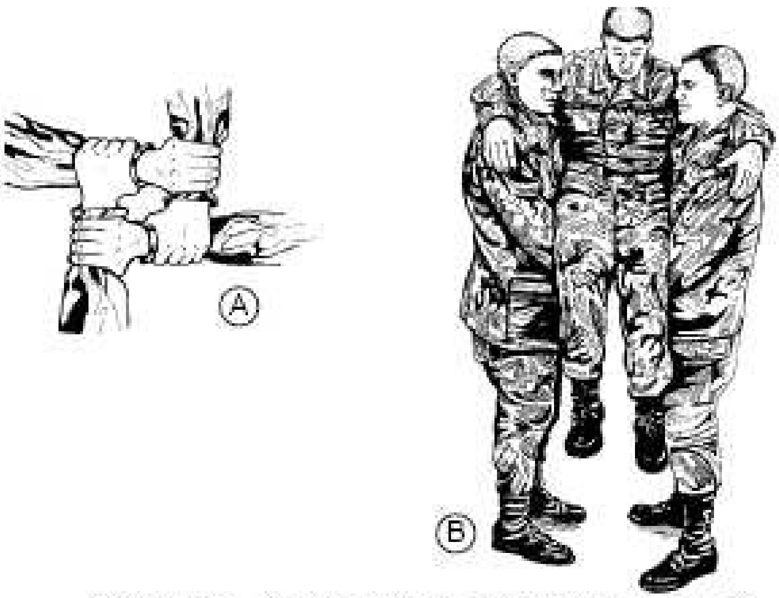


Figure B-19. Four-hand seat carry (Illustrated A—B).

e. Tied-hands carry [Ref. b, Appendix B, Pg. B-25]

The *two-hand seat carry* (Figure B-20) is used when carrying a casualty for a short distance or for placing him on a litter. With the casualty lying on his back, a bearer kneels on each side of the casualty at his hips. Each bearer passes his arms under the casualty's thighs and back, and grasps the other bearer's wrists. The bearers rise lifting the casualty.

Figure B-20. Two-hand seat carry (Illustrated A—B).

f. Pack-strap carry [Ref. b, Appendix B, Pg. B-11]

In the *pack-strap carry* (Figure B-8), the casualty's weight rests high on the your back. This makes it easier for you to carry the casualty a moderate distance (50 to 300 meters). To eliminate the possibility of injury to the casualty's arms, you must hold his arms in a palms-down position.

(a) Lift the casualty from the ground to a standing position, as in the fireman's carry.

(b) Support the casualty with your arms around him and grasp his wrist closer to you.

(c) Place his arm over your head and across your shoulders.

(d) Move in front of him while still supporting his weight against your back.

(e) Grasp his other wrist and place this arm over your shoulder.

(f) Bend forward and raise or hoist the casualty as high on your back as possible so that his weight is resting on your back.

NOTE

Once the casualty is positioned on the bearer's back, the bearer remains as erect as possible to prevent straining or injuring his back.

Figure B-8. Pack-strap carry.

103.14 Define and discuss the causes, symptoms and treatment for: [Ref. b, Ch. 5, Pg. 5-2]

a. Heat stroke

Heat stroke, also known as sunstroke is life threatening emergency. It is not necessary to be exposed to the sun for it to develop. It is less common, but more serious than heat exhaustion. The casualty experiences a breakdown of the sweating mechanism (Fig. 7-4) and is unable to eliminate excessive body heat. If the body temperature rises too high, the brain, Kidneys, and liver may be permanently damaged.
Signs and symptoms of heat stroke include:

- 105 degrees F (41 degrees C) or higher temperature.
- Hot, wet or dry and reddish skin.
- Small (constricted) pupils.
- Headache, nausea, dizziness, or weakness.
- Deep and rapid breathing at first, then shallow and almost absent.
- Fast and weak pulse.

If you suspect heat stroke, do the following:
1. MOVE the casualty immediately to a cool area, place them in a cold water bath. If this is not possible, give a sponge bath by applying wet, cold towels to the entire body. If available place cold packs under the arras and around the neck.
2. MONITOR the airway, breathing and circulation (ABCs).
3. TREAT FOR SHOCK.
4. REMOVE the casualty's clothing, DO NOT ALLOW THE CASUALTY TO BECOME CHILLED.
5. If the casualty is conscious and can drink, give him or her one-half glassful of cool water every 15 minutes. If the casualty vomits, stop giving water. DO NOT GIVE SALT TABLETS.
6. REQUEST MEDICAL ASSISTANCE for heat stroke casualties as soon as possible.

b. Heat exhaustion

Heat exhaustion is caused by the excessive loss of (sweating) water and salt. It is the most common condition (Fig. 7-4) from exposure to hot environments.

Figure 7-4. Symptoms of heat stroke and heat exhaustion.

Signs and symptoms of heat exhaustion include:

1. Pale, cool, (clammy) moist skin.
2. Large (dilated) pupils.
3. Normal or below normal temperature.
4. Rapid and shallow breathing.
5. Headache, nausea, loss of appetite.
6. Dizziness, weakness or fainting.

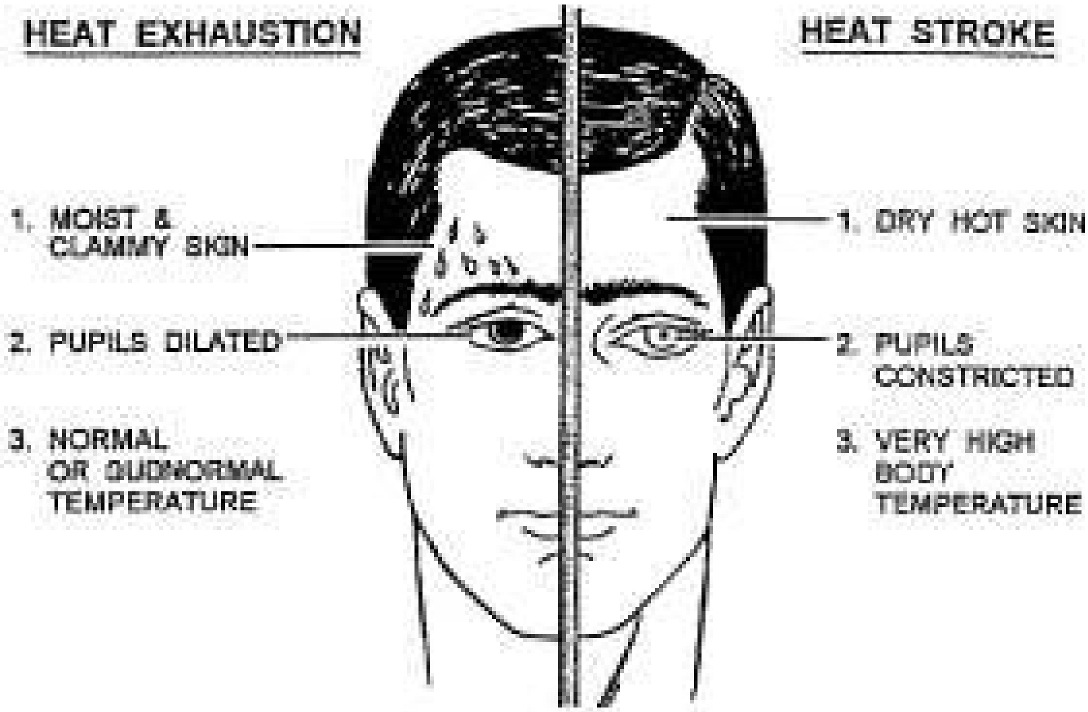


Figure 7-4. Symptoms of heat stroke and heat exhaustion.

If you act heat exhaustion, do the following:

1. MOVE the casualty to a cool area, apply cold, wet compresses and fan the

2. TREAT FOR SHOCK

3. REMOVE the casualties clothing, DO NOT ALLOW THE CASUALTY TO BECOME CHILLED.

4. If the casualty is conscious and can drink, give him or her one-half glassful of cool water every 15 minutes. If the casualty vomits, stop giving water. DO NOT GIVE SALT TABLETS.

5. REQUEST MEDICAL ASSISTANCE for Heat exhaustion casualties as soon as possible.

c. Heat cramps

Heat cramps are muscular pains and spasms resulting from the loss of water and salt from the body. Excessive sweating may result in painful cramps of the muscles of the abdomen, legs, and arms. Heat cramps may also result from drinking ice water or other cold drinks either too quickly or in too large a quantity after exercise. Heat cramps are often an early sign of approaching heat exhaustion.

Signs and symptoms of heat cramps include:

1. 1 Muscle pain and cramps.
2. Faintness or dizziness.
3. Nausea and vomiting.
4. Exhaustion and fatigue.

If you suspect heat cramps, do the following:

1. **MOVE** the casualty to a cool or air conditioned area.
2. If the casualty can drink, give him or her one-half glassful of cool water every 15 minutes. If the casualty vomits, stop giving water. **DO NOT GIVE SALT TABLETS**.
3. **GENTLY** stretch or massage the muscle to relieve the spasm.
4. **REQUEST MEDICAL ASSISTANCE** if the casualty has other injuries, or does not respond to the above procedures.

103.15 Define and discuss the causes, symptoms and treatment for: [Ref. b, Ch. 5]

a. Hypothermia [pg 5-14]

GENERAL COOLING (HYPOTHERMIA)

Hypothermia, an abnormally low body temperature, is a MEDICAL EMERGENCY. It is caused by continued exposure to low or rapidly falling temperatures, cold moisture, now, or ice. Individuals exposed to low temperatures for long periods may suffer harmful effects, even if they are protected by clothing, because cold affects the body slowly, almost without notice.

Signs and symptoms of hypothermia include:
1. Several stages of progressive shivering (an attempt by the body to generate heat).
2. Dizziness, numbness, and confusion.
3. Unconsciousness may follow quickly.
4. Signs of shock.
5. Extremities (arms and legs) freeze.

If you suspect hypothermia, do the following:
1. MOVE the casualty immediately to a warm
2. MONITOR the airway, breathing and circulation (ABCs).
3. RE-WARM by applying external heat to both sides of the casualty. Natural body heat (skin to skin) from two rescuers (buddy warming) is the best method. DO NOT PLACE HEAT SOURCE NEXT TO BARE SKIN. Since the casualty is unable to generate body heat, placing him/her under a blanket or in a sleeping bag is not sufficient.

4. If the casualty is conscious and can drink, give warm liquids. DO NOT GIVE HOT LIQUIDS, COFFEE, ALCOHOL OR ALLOW CASUALTY TO SMOKE.
5. REQUEST MEDICAL ASSISTANCE for Hypothermia as soon as possible.

IMMERSION HYPOTHERMIA

Immersion hypothermia, is the lowering of the body temperature due to prolonged immersion in cold water. It is often associated with limited motion of the extremities and water-soaked clothing. Temperatures range from just above freezing to 50 degrees F (1O degrees C).

Signs and symptoms of immersion hypothermia include:

1. Tingling and numbness of affected areas.
2. Swelling of the legs, feet or hands.
3. Bluish discoloration of the skin and painful blisters.
4.

If you suspect immersion hypothermia, do the following:

1. MOVE the casualty immediately but gently to a warm, dry area.
2. MONITOR the airway, breathing and circulation (ABC's).
3. REMOVE wet clothing carefully, keep casualty warm and dry. DO NOT RUB OR MASSAGE AFFECTED AREA.
4. Do not rupture blisters or apply ointment to affected area.
5. If the casualty is conscious and can drink, give warm liquids. DO NOT GIVE HOT LIQUIDS, COFFEE, ALCOHOL OR ALLOW CASUALTY TO SMOKE.
6. REQUEST MEDICAL ASSISTANCE for Immersion hypothermia as soon as

b. Frost Bite [pg 5-11]

FROSTBITE

Frostbite is damage to the skin due to continued exposure to severe cold. It occurs when ice crystals form in the skin or deeper tissue after exposure to a temperature of 32 degrees F (0 degrees C) or lower. The areas most commonly affected are the hands, feet, ears, nose and cheeks. Frostbite is classified as incipient, superficial or deep.

INCIPIENT FROSTBITE (FROST NIP)

Incipient frostbite affects the tips of the ears, nose, cheeks, toes, and fingers. Casualties normally are unaware of the injury, initially, the affected skin reddens, then becomes (blanched) white and painless. Move the casualty to a warm area. Warm affected areas with a buddy's body heat, or by immersing in warm water. DO NOT RUB OR MASSAGE AFFECTED AREAS. Frostbite requires professional medical attention as soon as possible.

SUPERFICIAL FROSTBITE

Superficial frostbite affects the surface of the skin and the tissue beneath. The skin will be firm, and white, but the underlying tissue will be soft. The affected area may become blue, tingle, swell and burn during thawing. Move the casualty to a warm area. Hands can be re-warmed by placing them under the armpit, or against the abdomen. Feet can be warmed by using a buddy's armpit or abdomen, other areas can be re-warmed by immersing in warm water. DO NOT RUB OR MASSAGE AFFECTED AREAS. Frostbite requires professional medical attention as soon as possible.

DEEP FROSTBITE

Deep frostbite is a MEDICAL EMERGENCY that affects the entire tissue layer. The skin feels hard, and is white to blue in appearance. The purpose of first aid is to protect the affected area from further damage, to thaw the affected area, and to monitor the airway, breathing, and circulation. Move the casualty to a warm area. Re-warm affected areas by immersion in water at 100 degrees F to 105 degrees F (30 degrees C to 41 degrees C). Gently dry the area with a soft towel, place cotton between the toes and fingers to avoid their sticking together. DO NOT RUB OR MASSAGE AFFECTED AREAS. Frostbite requires professional medical attention as soon as possible. DO NOT ALLOW THE AFFECTED AREA TO BE EXPOSED TO THE COLD.

103.16 Discuss the procedures for MEDEVAC of personnel casualties.
[Ref. c, Ch. 3, Pg. 3-1]

Preparing the Patient for Transport. Once emergency medical care has been completed on-scene, the patient must be transferred to the medical treatment facility. A process known as packaging provides the means of properly positioning, covering, and securing the patient to avoid any unnecessary aggravation to the patient’s condition. (covering helps maintain the patient’s body temperature, prevents exposure to the elements, and provides privacy.)

Do not package a badly traumatized patient; it is more important to transport the critical or unstable patient to the medical treatment facility quickly. The most important aspect of each rescue or transfer is to complete it as safely and efficiently as possible.

Care of patient en route. The emergency care a corpsman can offer patients en route is limited only by the availability of supplies, the level of external noise and vibrations, and the degree and ingenuity the corpsman possesses.

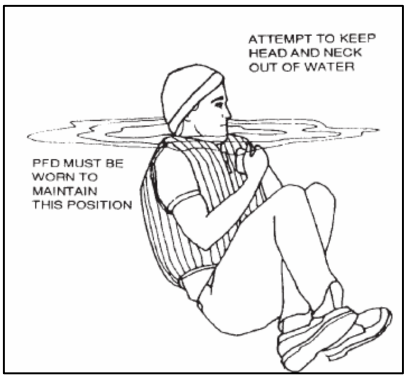
9 LINE MEDICAL EVACULATION REQUEST
Air/ground

1. Grid Location or LAT/LONG of Pickup Site
2. Radio Frequency, Call Sign
3. Number of Patients by Precedence
   __A. Urgent   B. Urgent/surgical
   __C. Priority
   __D. Routine
   __E. Convenience
4. Special Equipment
   A. None
   B. Hoist
   C. Extraction Equipment
   D. Ventilator
5. Number of Patients by Type
   L____# Patients Litter
   A____# Patients Ambulatory
6. Security of Pickup Site (Wartime)
   N-no Enemy
   P- Possible Enemy
   E- Enemy Troops in Area
   X- Enemy Troops Escort Required
6. (Peacetime) Number and Type of Wound, Injury. Specific Information Regarding Casualty(ies).
7. Method of Marking
   A. Panels
   B. pyrotechnic Signal
   C. Smoke Signal
   D. None
   E. Other
8. Patient Nationality and Status
   A. U.S. Military
   B. U.S. Civilian
   C. Non U.S. Mil
   D. Non U.S. Civilian.
   E. EPW
9. NBC/terrain Description (Wartime)
   N. Nuclear
   B. Biological
   C. Chemical
   N/A
9. (Peacetime) Detailed Terrain Feature Description

104 Life Saving and Survival Systems

References:
[a] USCG COMDTINST M16114.5B, Boat Crew Seamanship Manual
[b] NAVEDTRA 14325, Basic Military Requirements

104.1 Discuss the fundamentals of survival swimming. [Ref. a, Ch. 16B Pg. 16-12, 16-13]



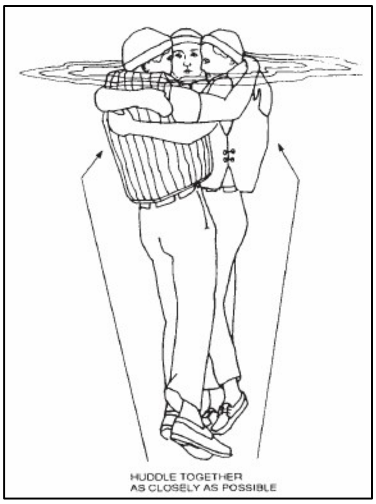
There are water survival skills that should be utilized to increase the chances for surviving cold water immersion including:

1. Immediately upon entering the water, become oriented to the surrounding area. Try to locate your sinking boat, floating objects, and other survivors.

2. Try to board a lifeboat, raft or other floating platform as soon as possible to shorten the immersion time. Body heat is lost many times faster in the water than in the air. Since the effectiveness of the insulation worn is seriously reduced by being water soaked, it is important to be shielded from wind to avoid a wind-chill effect. If able to climb aboard a survival craft, use a canvas cover or tarpaulin as a shield from the cold. Huddling close to the other occupants in the craft will also conserve body heat.

3. While afloat in the water, DO NOT attempt to swim unless it is necessary to reach a fellow survivor or a floating object which can be grasped or climbed onto. Unnecessary swimming will pump out any warm water between the body and the layers of clothing and will increase the rate of body-heat loss. Also, unnecessary movements of arms and legs send warm blood from the inner core to the outer layer of the body resulting in a rapid heat loss.

4. The body position assumed in the water is very important in conserving heat. Float as still as possible with legs together, elbows close to your side and arms folded across the front of your PFD. This is called the HELP (Heat Escape Lessening Position) and minimizes exposure of the body surface to the cold water. Try to keep head and neck out of the water (see Figure 16-17). However, if you're wearing a Type III PFD, or if the HELP position turns you face down, bring your legs together tight and your arms tight to your sides and your head back. Another heat conserving position is to huddle closely to others in the water making as much body contact as possible. A PFD must be worn to be able to maintain these positions in the water (see Figure 16-18).



5. Avoid drown-proofing in cold water. Drown-proofing is a technique where you relax in the water and allow your head to submerge between breaths. It is an energy saver in warm water when a PFD is not worn. The head and neck are high heat loss areas and must be kept above the water. That is why it is even more important to wear a PFD in cold water. If a PFD is not worn, tread the water only as much as necessary to keep your head out of the water.

6. Keep a positive attitude about your survival and rescue. This will extend your survival time until rescue comes. A will to live does make a difference.

104.2 Explain how to use personal clothing for flotation. [Ref. b, Ch. 15 Pg. 15-12, 15-14]

Several articles of clothing, including the white hat, provide some flotation when used properly. The most useful article is your trousers or slacks, which you can inflate to serve as water wings.

1. To remove your trousers, lean forward in the water and slowly slip them down over your hips and legs. Don't let go of them—they may sink.

To inflate your trousers—

2. Zip them; then float them on the surface with the fly or front turned down.

3. Tie a knot in each leg as close to the cuff as possible.

4. Work the garment around on the surface until the legs are over your shoulders and the knots are behind you, leaving the crotch in front of you.

5. Grasp the waist of the trousers with one hand on each side; then extend your arms straight upward, kicking your feet to get your body as high out of the water as you can.

6. When this position is reached, pull the trousers downward smartly on the surface, trapping a pocket of air in each leg.

7. Then gather the waist under the water and hold in one hand. Keep the trousers legs wet by splashing water on them to reduce the loss of the trapped air.

You may use mattress covers, sea bags, laundry bags, and pillowcases in a similar manner. A large amount of debris, such as pieces of wood, empty shell boxes, powder cans, and so forth, is usually present. You can use this debris to stay afloat.

104.3 Discuss the techniques for avoiding the enemy (evasion).
[Ref. b, Ch. 15 Pg. 15-15/15-16]

According to the Code of Conduct for Members of he Armed Forces of the United States, it is your duty to evade capture by the enemy. Your job is to get back to our unit. Your survival will depend on your ability to apply the techniques of evasion. No other reason is more important for making evasion techniques part of your basic combat skills.

Evasion means traveling through enemy-held territory without being captured. Falling into the hands of the enemy is an event that no military person wants to experience. However, at some point in your career you may find yourself in a situation where capture is a possibility. You need to know a few basic evasion principles to decrease your chances of winding up as a guest of the enemy.

During World War II and the succeeding actions in Korea and Vietnam, many of our soldiers, Sailors, and marines were able to avoid the enemy and safely return to friendly forces. They were successful because they applied some or all of the guidelines presented in the following paragraphs. You need to learn this information so that you know how to evade the enemy. It could mean the difference between freedom or capture; interrogation; and possibly, inhumane treatment by enemy forces.

Obviously, the most important consideration in evasion is knowing where the enemy is located. If you don’t know the enemy’s location, watch for the following signs. They can tell you the enemy’s location as well as other valuable information.

1. Signs that groups have passed, such as crushed grass, broken branches, footprints, cigarette butts, or other discarded trash, may reveal their identity and size, their direction of travel, and the time they passed through.

2. Workers in fields may indicate absence of the enemy.

3. Apparently normal activities in villages may indicate absence of the enemy.
Less obvious conditions may indicate the presence of the enemy, such as the following:

   a. The absence of workers in fields is an indication that the enemy is near.
   b. The absence of children in a village is an indication that the children have been hidden to protect them from action that may take place.
   c. The absence of young people in a village is an indication that the enemy controls the village.

Some evasion techniques you may find useful are cover, concealment, and camouflage. To keep yourself from being seen, you may have to hide in bushes or lie flat in shallow ditches using brush as a cover or camouflage.

When evading the enemy, remember the following points:

1. Conceal yourself from enemy aircraft and nearby enemy troops.

2. Move quietly; noises carry in fog, fallen snow, heavy foliage, and over rock faces.
3. Maintain personal hygiene to prevent body odor; cover body waste and scraps of food; avoid activities, such as cooking and smoking, that produce smells; such smells can reveal your location.
4. Don't make sudden, rapid movements that can reveal your location.
5. Select routes for movement that avoid exposed areas and don't show your silhouette against the skyline. Don't leave obvious tracks.

104.4 Discuss the following for individual and group survival.
[Ref. b, Ch. 15 Pg. 15-17 through 15-23]

a. Obtaining water

Without water your chances of living are slight, and all the food in the area means little. That is especially true in hot climates where you sweat a lot. Even in cold weather your body needs at least 2 quarts of water each day; a lesser amount reduces your efficiency.

When you can't find surface water, tap through the earth's water table for groundwater (rain or melted snow that has filtered through the ground). Getting to the water table and its supply of generally pure water depends on the contour of the land and the characteristics of the soil.

In the desert or arid regions, watch for water indicators. Some signs of water include—

• Plants covering animal trails and the direction in which certain birds fly. By searching in areas toward which these birds fly, you will probably find water.

• Places that are visibly damp, where animals have scratched, or where flies hover indicates present surface water. Dig in those spots for water. Leave your handkerchief out on clear nights to collect dew; then squeeze the water into a container. During a heavy dew, you should be able to collect about a pint an hour.

You may find runoff water above the water table. Runoff water includes streams, stagnant pools, and water in bogs. Consider this water contaminated and dangerous even if it is away from human habitation. Boil or treat this water with water purification tablets before you drink it.

If you are unsuccessful in your search for ground or runoff water or if you don't have time to purify questionable water, a water-yielding plant may be your best bet. You can easily get clear, sweet sap that is pure and chiefly water from many plants. Many plants with fleshy leaves or stems store drinkable water. Try them wherever you find them. Desert plants often have their roots near the surface. Pry these roots out of the ground and cut them into 24- to 36-inch lengths. Remove the bark and suck out the water. Not all vines yield palatable water, but try any vine you find. Use the following method for tapping a vine. It will work on any species.

1. Cut a deep notch in the vine as high up as you can reach.

2. Then cut the vine off close to the ground and let the water drip into your mouth or a container.

3. When the water ceases to drip, cut another section off the vine.

4. Repeat this procedure until the supply of fluid is exhausted (fig. 15-10).

c. Eating edible/harmful plants

Experts estimate that about 300,000 classified plants grow on the earth's surface, including many that grow on mountain tops and ocean floors. Of these, 120,000 varieties are edible. Obviously, you won't be able to learn about all of these plants from reading this chapter. But if you know what types of food to look for in the area in which you are stranded, can identify them, and know how to prepare them properly, you should find enough to keep you alive. You may even surprise yourself with a delicious meal.

c. Eating animals

Foods derived from animals have more food value per pound than those derived from plants. Learning what parts of animals you can eat or use in other ways and learning how to prepare animals for cooking increase your chances of survival.

104.5 Discuss the Code of Conduct of the Armed Forces. [Ref. b, Ch. 15 Pg. 15-27 thru 15-28]

ARTICLE I
I am an American, fighting in the forces which guard my country and our way of life. I am prepared to give my life in their defense.

ARTICLE II
I will never surrender of my own free will. If in command I will never surrender the members of my command while they still have the means to resist.

ARTICLE III
If I am captured I will continue to resist by all means available. I will make every effort to escape and aid others to escape. I will accept neither parole nor special favors from the enemy.

ARTICLE IV
If I become a prisoner of war, I will keep faith with my fellow prisoners. I will give no information or take part in any action which might be harmful to my comrades. If I am senior, I will take command. If not, I will obey the lawful orders of those appointed over me and will back them up in every way.

ARTICLE V
When questioned, should I become a prisoner of war, I am required to give name, rank, service number and date of birth. I will evade answering further questions to the utmost of my ability. I will make no oral or written statements disloyal to my country and its allies or harmful to their cause.

ARTICLE VI
I will never forget that I am an American, fighting for freedom, responsible for my actions, and dedicated to the principles which made my country free. I will trust in my God and in the United States of America.

104.6 Describe the types and uses of personal survival equipment (PFD's including tactical flotation vest with body armor, Mustang suit, immersion suits). [Ref. a, Ch. 6 Pg. 6-1 through 6-5]

Type I PFD: The Type I PFD, or "off-shore life jacket," is a one-piece, reversible PFD intended primarily for use by survivors, passengers on towed vessels, or prisoners aboard vessels. A Type I PFD provides an unconscious person the greatest chance of survival in the water. The Type I PFD is the only wearable device required to be reversible. It comes in two sizes, an adult size (90 pounds and over) which provides at least 20 pounds of buoyancy and a child size (less than 90 pounds) which provides at least 11 pounds of buoyancy, and must be international orange in color. turn some unconscious wearers to a face-up position in the water. It comes in different colors and in three categories:

- adult (more than 90 pounds) which provides at least 15.5pounds of buoyancy;
- child, medium (50 to 90 pounds) which provides at least11 pounds of buoyancy ; and
- infant (available in two sizes, less than 50 pounds and less than 30 pounds) which provides at least 7 pounds of buoyancy.

Type III PFD: The Type III PFD, also known as a "flotation aid," is routinely worn aboard boats when freedom of movement is required, the risk of falling over the side is minimal, and the water temperature is greater than 15°C/60°F. It is not designed to turn an unconscious wearer to a face-up position; the design is such that conscious wearers can place themselves in a vertical or slightly backward position. It has a minimum of 15.5 pounds of buoyancy and comes in many sizes and colors. Most approved flotation coats ("float coats")are also Type III PFDs.

Type IV PFD : The Type IV PFD is a MSD approved device that is thrown to a person in the water and is grasped by the user until rescued. The most common Type IV devices are buoyant cushions and ring buoys. Buoyant cushions come in many different colors. Ring buoys must be white or orange in color. One of the disadvantages of the Type IV PFD is that it is not worn, although some can be secured to the body once reached in the water.

Type V PFD: Type V PFDs are also known as “Special Use Devices.” They are intended for specific activities and may be carried instead of another PFD only if used according to the approval condition on the label. For example, a Type V PFD designed for use during commercial white-water rafting will only be acceptable during commercial rafting; it is not acceptable for other activities unless specified on the label. Examples of Type V PFDs are: the MSD work vest with unicellular foam pads, sailboard PFDs with harness, “thermal protective” PFDs(deck suits/exposure suits), and hybrid inflatable PFDs.

Antiexposure Coverall: Antiexposure coveralls are Type V PFD. The antiexposure coverall is the standard garment for cold weather operations with closed cockpit boats. It provides good durability and out-of-water protection from the elements but limited protection from hypothermia in the water. Antiexposure coveralls are constructed with a fabric cover and a closed cell foam lining. These suits provide a full range of movement and come in a variety of sizes. They provide adequate mobility and protection from limited exposure to outside elements such as wind and spray. The flotation characteristics of the coverall are similar to those of the Type III PFD. The approved coveralls feature an orally inflated pillow for a better flotation angle for extended periods of exposure.

Dry Suit: The dry suit shall be worn when operating open cockpit boats when the water temperature is below 10°C/50°F and the air temperature is below 7°C/45°F. It provides protection in areas where exposure to wind, spray, cold water, and hypothermia is likely. The dry suit, with proper undergarments, provides the best protection for crew members in adverse weather and cold water immersion.

WARNING: Dry suits provide no inherent buoyancy. A PFD must be worn over a dry suit at all times while wearing a dry suit.

104.7 Discuss the actions and responsibility of each crewmember during a man overboard. [Ref. a, Ch. 16A Pg. 16-2/16-3]

- As soon as MOB is called, the coxswain will push the memory button on the GPS to mark the exact position (datum)
- At the same time the position is being recorded, turn the boat in the direction the individual fell overboard, sound 5 short blasts, and Contact TACON
- Throw a ring buoy with strobe light (or anything that floats) over the side towards the person in the water
- Crew points to man in the water and gives position reports to coxswain
- Coxswain will call out which side to recover MOB from
- Coxswain will make approach to MOB taking into account the seas/wind
- Crewman will obtain boat hook and blankets to assist in recovery of MOB
- On the 34’ craft the person will be recovered just aft of the cabin using 2 personnel
- Coxswain will secure the engine on the side that the MOB is recovered from and will place the outboard engine in neutral
- Recover MOB and perform first aid
- Contact TACON and make deck log entry

- Once a device is thrown in the water, the coxswain will assign duties to each crew member
- POINTER –on or near the bow
- RECOVERY/PICK-UP –prepare a heaving line to be used in retrieving the person
- The pointer does not relieve all crew members from keeping a visual on the person in the water and pointing him or she out to the coxswain
- Coxswain should brief crew on what type of recovery he'll use (port or starboard)

104.8 Discuss the procedures involved in recovering a person from the water.
[Ref. a, Ch. 16 Pg. 16-1 through 16-7]

- Select an approach suitable for the existing conditions. Two basic approaches.
  - Leeward (against the wind & current).
  - Windward (with the wind & current).

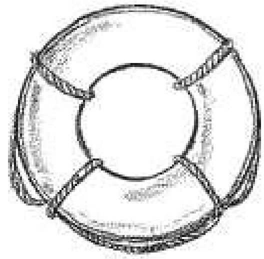
- Leeward:
  - Approach with the bow facing into the greatest force of oncoming resistance at time of pickup. This may be the wind, current, seas, or any combination of the 3.
  - Balance the effect of any swell that might be present.
  - Approach must be made rapidly but as boat nears the person you must slow the boat and reduce your wake enough to where a short burst backing down stops your headway.
  - The person in the water should be next to the recovery area on the boat and the boat should be DIW.
  - Place engines in neutral and when the person is alongside have 2 crew members make the recovery (Secure engine on recovery side).

- Windward: (NOT THE PREFERRED METHOD)
  - Approach with the wind coming form behind the boat
  - Use the windward approach when the person is in a confined space or a leeward approach is impossible
  - Maneuver into a position upwind and up current from the person
  - Place the engine(s) in neutral and drift down to the person
  - Ensure the boat drifts down to place the person on the side of recovery but do not allow the boat to drift over the person

104.9 Discuss the following lifesaving and survival systems. [Ref. a]

a. Life ring [Ch. 6A Pg. 6-3]

The Type IV PFD is a Coast Guard approved device that is thrown to a person in the water and is grasped by the user until rescued. The most common Type IV devices are buoyant cushions and ring buoys. Buoyant cushions come in many different colors. Ring buoys must be white or orange in color. One of the disadvantages of the Type IV PFD is that it is not worn, although some can be secured to the body once reached in the water.

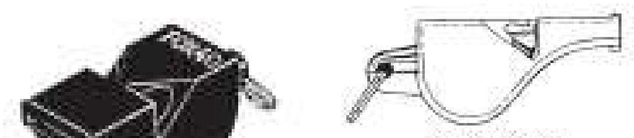

Life Ring
Figure 6-2

b. Whistle [Ch. 6D Pg. 6-10]

The **whistle** is a small, hand-held device that produces a loud sound when you blow into it (see Figure 6-8). The standard whistle is constructed of plastic and resembles a police officer's whistle.

The sound produced by a whistle will attract the attention of rescuers and guide them to your location. During periods of restricted visibility, fog, and darkness, the sound it produces may be heard by rescuers before they sight your distress signal light.

Depending on weather conditions, a whistle's audible sound may be heard up to 1,000 meters/1,100 yards. Any wind has the effect of carrying the sound downwind.


Signal Whistle
Figure 6-8

Place the reed part of a whistle between your lips and blow. If the whistle does not produce a distinct whistle-like tone, quickly turn the whistle over and blow the water out the bail air relief hole and try again.

c. Chemical light [Ch. 6D Pg. 6-4/6-5]

Personnel Marker Light (PML)

A PML is a device that uses either battery or chemical action to provide light for the wearer to be seen during darkness. The yellow-green light of a PML is visible for a distance of approximately one mile on a clear night and lasts as long as eight hours. It is the only chemical light approved for use as a distress signal light on a PFD. A certified PML complies with regulation 46 CFR 161.012 (Coast Guard approved). Large marine supply houses carry Coast Guard approved PMLs. They are specifically designed to be attached to a PFD without damaging or interfering with the PFD's performance. The PML's hard plastic sleeve protects the glass ampules inside the tube from breakage and deterioration from the effects of light. There are three steps needed to activate the PML:

CAUTION: The PML replaces only the distress signal light that is required to be attached to all PFDs in service. It does not replace the distress signal light (SDU-5/E or CG-1 strobe) that boat crew members are required to carry in their boat crew signal kit.

Step / Procedure:

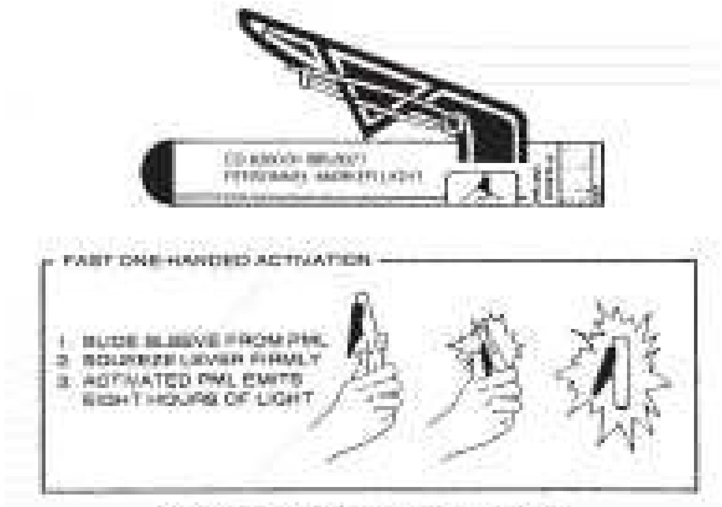
1. Squeeze the handle to break the glass vials of activating chemical compounds suspended inside the tube.
2. Remove the black sleeve.
3. Squeeze the handle again if the PML does not light.

CAUTION: There is a seal at one end of the PML which holds the protective sleeve in place. If this seal is broken, replace the PML immediately.

The intensity of the PML's light signal in cold weather (below 0°C/32°F) is reduced. In colder temperatures, the light will last longer, but will not have the same brilliance as in warmer conditions. Units that consistently operate in temperatures below 0°C/32°F shall use distress signal lights in place of PMLs.

NOTE: Most batteries or chemicals have a useful shelf life of about two years. Therefore, check PMLs for the expiration date (located somewhere on the device) to find out when replacement is in order.

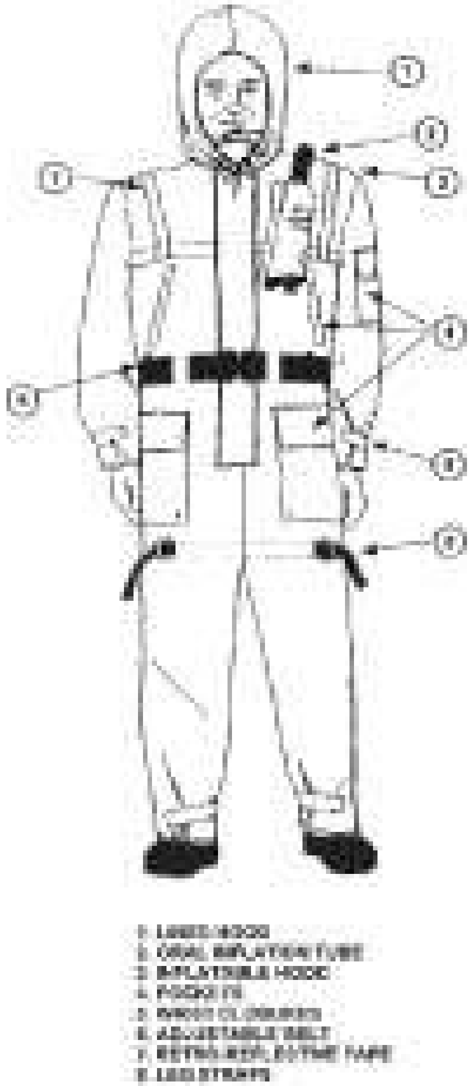
NOTE: The time period a chemical light provides effective illumination depends upon its age and the temperature. A recently purchased light stick used in 21- 27°C/70-80°F temperatures (ideal conditions) will provide 8 to 12 hours of light. As the device gets older, its effective period is considerably less.



Personnel Marker Light (PML)
Figure 6-3

d. Personal survival (Anti-exposure) suit [Ch. 6B Pg. 6-5]

Antiexposure coveralls are Type V PFD. The antiexposure coverall is the standard garment for cold weather operations with closed cockpit boats (see Figure 6-4).It provides good durability and out-of-water protection from the elements but limited protection from hypothermia in the water.



Antiexposure Coverall
Figure 6-4

Characteristics
Antiexposure coveralls are constructed with a fabric cover and a closed cell foam lining. These suits provide a full range of movement and come in a variety of sizes. They provide adequate mobility and protection from limited exposure to outside elements such as wind and spray. The flotation characteristics of the coverall are similar to those of the Type III PFD. The approved coveralls feature an orally inflated pillow for a better flotation angle for extended periods of exposure.

Use
Antiexposure coveralls provide hypothermia protection when the wearer is **only periodically exposed** to conditions which cause hypothermia. When more than periodic exposure is anticipated, even on boats with closed cockpits, a dry suit should be worn.

CAUTION: When wearing this type of suit, it is important to tighten all closures and adjustments before entering the water. A loose-fitting suit may allow too much water in and greatly reduce the thermal effectiveness of the suit leading to hypothermia.

WARNING: Wearing a type I or III PFD over an antiexposure coverall may be dangerous in certain situations. The additional buoyancy may restrict the wearer's ability to swim out from under a capsized boat. In extreme situations, where buoyancy is a limitation instead of an advantage, you may need to remove your PFD.

e. Distress signal light [Ch. 6D Pg. 6-12]

The **Distress Signal Light** is a lightweight, compact, battery operated strobe light that emits a high intensity visual distress signal (see Figure 6-12). The strobe light model that is currently in use is the battery operated SDU-5/E or CG-1 Strobe Light. Some lights are also Coast Guard approved as PMLs

Use

This light is used to attract the attention of aircraft, ships, or ground parties. It is sold on the market as a rescue/anti-collision light. Crew members carry the distress signal light in a pocket, or attach it to a line or belt. Keep it tethered to a garment that you are wearing.

Characteristics

The SDU-5/E and the CG-1 distress signal lights emit approximately 50 flashes per minute. At the peak of each flash, the luminous intensity is 100,000 candlepower. Under continuous operation it will flash for 9 hours, or 18 hours when operated intermittently. On a clear night, the Distress Signal Light has a minimum visual range of five miles. However, the range of visibility will be determined by the height of eye of the observer. For an observer low on a boat, the range will most likely be much less than the advertised five miles.

Distress Signal Light, CG-1
Figure 6-12

Operation

The following are the steps to operate the Distress Signal Light.

Step / Procedure

1. Turn ON. Push the switch in until a click is heard, then release. Light should begin flashing within seconds.
2. Turn OFF. Push the switch in until click is heard, then release. The light should stop flashing.
3. If you test this light and it fails to perform within operational limits, replace the battery. If it still does not operate properly, remove it from service.

104.10 Discuss the operation of lifesaving flares. [Ref. a, Ch. 6D Pg. 6-11/6-12]

<u>MK-14 MOD 0</u>

The MK-124 MOD 0 is a pyrotechnic smoke and illumination signal used day or night as a distress signal at sea or on land. One end produces orange smoke as the day signal and the other end produces a red flare as the night signal. Because of its weight, about 8 ounces, and size, it may be carried in a PFD, vest, antiexposure coverall, or life raft.

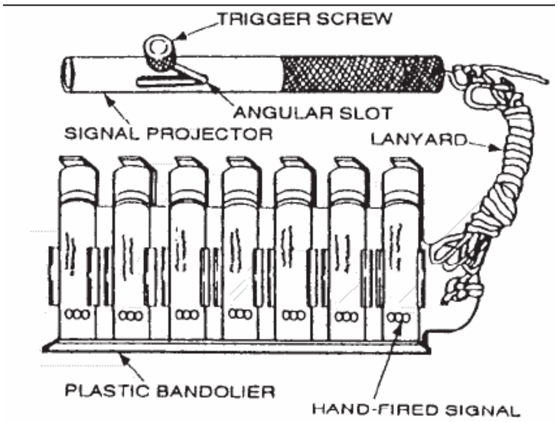
Smoke and Illumination Signal, MK-124 MOD 0

These signals are used to attract vessels, aircraft, and ground rescue teams daylight or nighttime. The signal may be used to indicate wind direction for helicopter hoists. It is labeled with the following operating instructions:

- Do not dispose of the signal until both ends have been used.
- Only when signals misfire should you dispose of them over the side. Misfires are a safety hazard if kept on board a vessel.
- When both ends of the signal have been discharged, properly dispose of it. In an actual distress situation, toss spent signals over the side.

<u>**I**llumination Signal Kit</u>, MK-79 MOD 0
The Illumination Signal Kit, MK-79 is a pyrotechnic that contains seven screw-in cartridge flares and one pencil type projector. The projector in this kit is used to aim and fire a signal cartridge.

The Illumination Signal Kit, MK-79 is used to attract vessels, aircraft, and ground rescue teams.



Illumination Signal Kit, MK-79 MOD 0

105 Crewman Fundamentals

References:
[a] NAVEDTRA 12968, Lookout Training Handbook
[b] NTTP 3-10.1, Naval Coastal Warfare Operations
[c] NAVEDTRA 14343, Boatswain's Mate
[d] NAVEDTRA 14244, Signalman 3 & 2
[e] USCG COMDTINST M16672.2 (Series), Navigation Rules (COLREGS)
[f] NTTP 3-20, Tactical Craft Operations
[g] Unit Standing Operating Orders

105.1 Discuss the duties and responsibilities of a lookout. [Ref. a, Ch. 2, Pg. 6-7]

As a lookout, your primary responsibility is sighting, identifying, and accurately reporting to the responsible authority all objects. To carry out this responsibility effectively, you must do the following:

1. Use correct scanning procedures.

2. Sight and report everything observed in your sector. A normal tendency is to hesitate until you are certain an actual contact has been sighted. Do not hesitate. Many important sightings have been made on hunches. Everything, including previously sighted objects, should be reported when it enters your sector unless it is an object which you have been specifically ordered not to report.

3. Estimate relative bearing, range, position angle, and target angle.

4. Handle and care for binoculars properly and use them wisely.

5. Send accurate reports of all visual information to the bridge and combat information center (CIC) as rapidly as you can.

6. Use correct procedures during restricted-visibility conditions caused by fog, rain, snow, and so forth.

Many electronic devices are now in use for detecting and locating the enemy and as aids in navigating. These delicate instruments, however, can malfunction. They are not infallible. Under some conditions they are turned off entirely so your ship cannot be detected by the enemy. The availability of these devices in no way relieves you of your responsibility to see everything in your sector within range of vision and to report everything you see. Remember, the safety of the ship is dependent on the eyes of one or more human beings.

105.2 Define and discuss the following terms: [Ref. a Ch. 5, Pg. 17]

a. Relative bearing

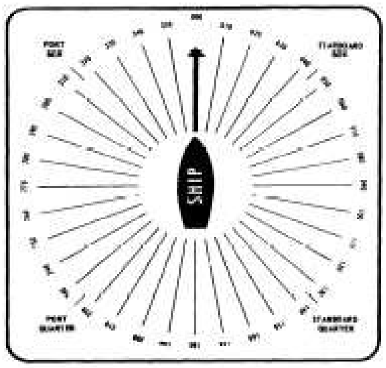


Figure 7.—Relative bearings.

The direction of an object from a ship is called the bearing. Bearing is measured in degrees clockwise around a circle, from 000° to 360°. Relative bearings have the ship's bow as a reference point; true bearings use true, or geographic north, as a reference point; magnetic bearings use the magnetic North Pole as their reference point. All three types of bearings may sometimes coincide, but such a situation is rare and of a temporary nature. Lookouts report objects in degrees of relative bearing. Figure 7 shows the relative bearings around a ship. An object dead ahead is bearing 000°; one on the starboard beam is at 090°, and so on. Study the illustration. Practice pointing to various objects and compare your estimates of their bearing to what they really are. With practice you will be able to report a contact within 10° of its actual bearing.

To prevent confusion, the Navy has established a definite procedure for reporting bearings, ranges, and so forth. Bearings are always reported in three digits, and spoken digit by digit, except that objects dead ahead or astern (000°, 180°); on either beam (090°, 270°); or on either bow (045°, 315°) or quarter (135°, 225°) may be indicated as such. For example, a ship bearing 315° could be reported as being broad on the port bow, although the bearing itself can be used. Do not become excited and neglect to report the bearing. If you say, “There's a periscope ahead,” when it actually is to one side, valuable time can be lost while the COXSWAIN tries to spot it. But if you say, “Periscope bearing Tree Fife Ze-ro,” the COXSWAIN will have no difficulty determining in which direction to look. Note that the word “relative” was not included in our sample report. It is understated that lookouts report only relative bearings.

b. Target angle

Target angle is the relative bearing of your ship from another ship. You may wonder why you should care what your ship bears from another ship, but it can be of great help to the COXSWAIN if you include target angle in your report.

The COXSWAIN uses target angle as an aid in determining the course of action to take when another ship is encountered. Target angle is also useful in gunnery and antisubmarine operations. Assume that you are the starboard lookout and you detect a ship on your starboard bow heading at right angles across your course (figure 10). You report to the COXSWAIN.

SHIP BROAD ON THE STARBOARD BOW (OR 045°)—TARGET ANGLE 315.

Assuming your course to be due north, the COXSWAIN knows the other ship's course is due west. Depending on the speeds of the two ships, if they continue on their present course, a collision may result. Under the International Rules of the Road, this condition is known as a crossing situation, and in a crossing situation the ship to port is the give-way vessel and must keep clear of the other (stand-on) vessel. Your target angle report has alerted the COXSWAIN that a change of course or speed, or both, may be needed and there is now time in which to plan appropriate actions. A 21 change in target angle means that the target has changed course. Following are some examples of initial reports

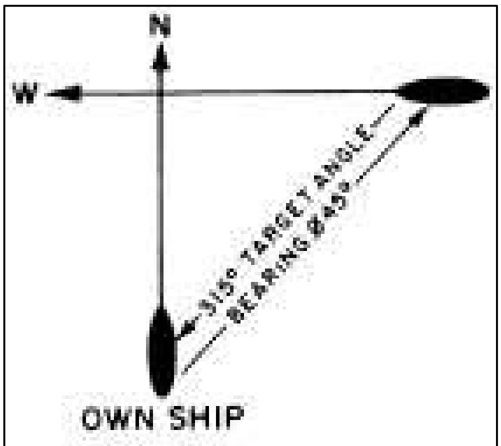


Figure 10.—Target angle.

COXSWAIN—AFT GUNNER—SURFACE CONTACT BEARING TWO EIGHT ZERO— TWO THOUSAND YARDS—TARGET ANGLE ZERO NINER ZERO—MOVING FROM LEFT TO RIGHT SLOWLY.

COXSWAIN—BOW GUNNER— DESTROYER BEARING ONE ZERO ZERO—SIX MILES—TARGET ANGLE ZERO ONE ZERO—CLOSING RAPIDLY.

COXSWAIN—BOW GUNNER—F-14 JET FIGHTER BEARING ZERO FOUR ZERO—POSITION ANGLE THIRTY THREE—MOVING FROM RIGHT TO LEFTVERY RAPIDLY.

c. Range

HEIGHT OF EYE	RANGE TO HORIZON	
FEET	YARDS	MILES
10	7,200	3.6
20	10,200	5.1
30	12,600	6.3
40	14,400	7.2
60	17,800	8.9
80	20,600	10.3
100	23,000	11.5

Figure 11.—Range height table.

A range in yards for each contact reported would be invaluable, but estimating ranges over water is very difficult for the inexperienced lookout because distances are deceptive. Only with a lot of on-the-job experience will you become proficient in estimating ranges to contacts. Question CIC concerning the radar ranges to visual contacts and compare them with your estimated range.

The only readily available reference point you can use when estimating ranges is the horizon. Knowing your height above the waterline will help you estimate ranges because the distance to the horizon varies with the height of the eye. (See figure 11.) At a height of 50 feet, for example, the distance to the horizon is about 16,000 yards (8 miles); at a height of 100 feet, the distance is about 23,000 yards (11-1/2 miles). Practice estimating ranges to other vessels in company whose distances are known or can be easily determined. If your ship does much formation steaming, you will become pretty good at judging distances such as 500, 1,000, and 2,000 yards.

d. Bearing drift

Sound is drifting from left to right, right to left, or remaining steady on same bearing.

The following is a sample of a sound signal report made by the forward lookout:

ALL STATIONS—THIS IS BOW GUNNER—I HEAR TWO WEAK PROLONGED BLASTS—BEARING 015—WITH A RIGHT BEARING DRIFT.

e. Position angle (aircraft)

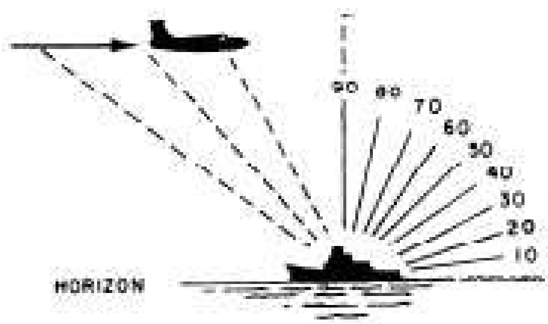


Figure 8.—Position angle.

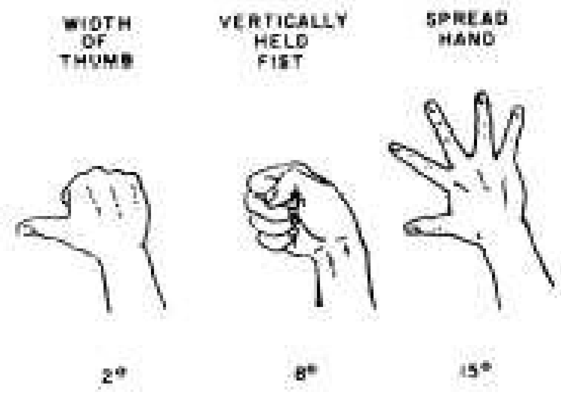


Figure 9.— Position angle aids.

Position angle is the angle, measured in degrees, between the line of sight to the horizon and the line of sight to the detected aircraft. The COXSWAIN does not have time to search from the horizon (0°) to the zenith (directly overhead—90°) for a contact reported without a given position angle. A position angle will quickly locate the target for the COXSWAIN and the antiaircraft gun directors.

Position angles should be given on all aircraft in one or two digits and spoken as a whole, not digit by digit. The reference "position angle" is always spoken before the numerals.

Position Angle	Spoken
0	Position angle Ze-ro
5	Position angle Fife
15	Position angle Fifteen
27	Position angle Twenty Sev-en
85	Position angle Eighty Fife
90	Position angle Ninety

As the aircraft shown in figure 8 approaches the ship, the position angle increases, inform all stations when the angle changes more than 20°. Use the aids shown in figure 9 to help you more accurately determine an aircraft's position angle.

105.3 Define and discuss the following terms: [Ref. a Ch.5, Pg. 22]

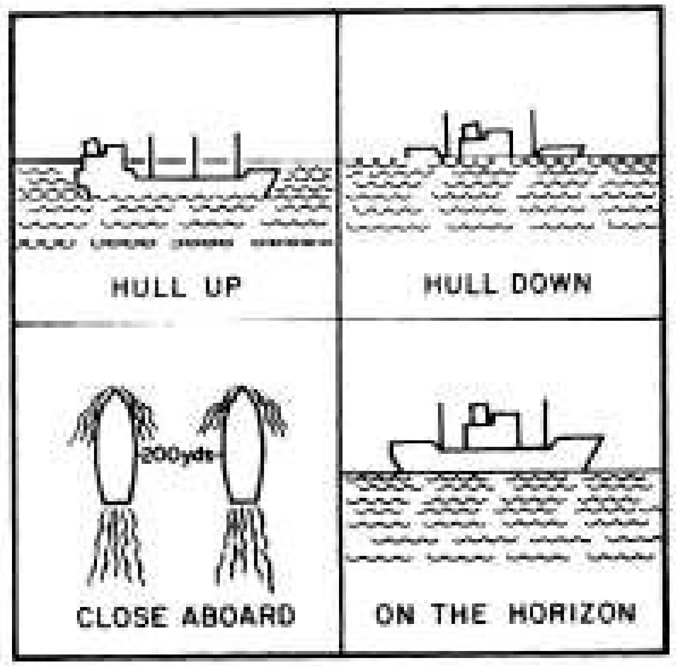


Figure 11.— Range supplement.

a. Hull up

The ship is in from the horizon.

b. Hull down

The ship is over the horizon. Only a part of the superstructure can be seen, but the hull is not yet visible on the horizon.

c. On the horizon

The waterline of the ship's hull appears to be on or near the horizon.

d. Close aboard

The contact reported is extremely close to own ship.

105.4 Describe the essential elements of a SALUTE report. [Ref. b, Annex Y to App. D]

The SALUTE report shall contain the following:

1. **S**ize (number and size of craft being reported)
2. **A**ctivity (what is the craft is doing)
3. **L**ocation (using a grid reference or another agreed-upon system of position reference to include estimated course, speed, range bearing, and target angle of the craft)
4. **U**nit (name, if visible, nationality, type of craft, and number of people observed)
5. **T**ime (when observed)
6. **E**quipment (type of equipment, sensors, and weapons observed).

105.5 Discuss the types and uses of visual detection equipment available on your craft [Ref. f, Ch. 5.2.3.4. Pg. 5-2]

Visual detection equipment typically found on tactical boats includes binoculars and NVDs. Crewmembers should read and understand the NVDs manufacturer's manuals to optimize performance.

105.6 Explain how to adjust binoculars for your vision. [Ref. a, Ch. 3, Pg. 10]

To gain maximum benefit from the light-gathering quality of binoculars, you must adjust the binoculars to obtain proper focus and correct distance between lenses. To obtain proper focus, observe the following steps:

1. Set both eyepieces to the +4 mark.
2. Place the binoculars firmly against the eyebrows and locate a small, well-defined object about l/2-mile distant.
3. Cover one lens (do not touch the glass).
4. Slowly turn the other eyepiece until you see a sharp image, then back off as far as possible without losing the sharpness. (Keep both eyes open; closing one will give an incorrect focus.)
5. Note the reading on the scale, then repeat the above procedure two or three times to obtain the exact setting.
6. Follow the same procedure for the opposite eye.

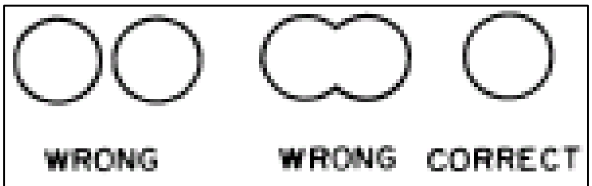


Figure 3.—Proper IPD setting.

The final adjustment is to establish the interpupillary distance (IPD), which is the distance between your eyes. Move the barrels up and down until you see a single circle, as shown in figure 3, then note the reading on the IPD vernier between the barrels. An incorrect IPD setting will strain the eyes and waste part of the binoculars' lightgathering ability. You will not have your own personal binoculars— they are passed from watch to watch—so it is important that you know your focus and IPD settings so that the binoculars may be properly adjusted at night or when there are no objects on which to focus in the daytime. For nighttime use, the focus setting is one mark less than for daytime.

105.7 Discuss the proper care and maintenance of binoculars. [Ref. a Ch. 3, Pg. 11]

Binoculars are fairly delicate instruments; they cannot stand much knocking about. Therefore, keep them on a short strap when wearing them to prevent their banging against solid objects. Keep the lenses dry, otherwise you will not be able to see properly. Do not let them become overheated; the cement around the lenses may melt, allowing moisture to cause the lenses to fog or bubble.

Above all, keep them clean. You must be careful, however, not to damage the lenses. First, blow off loose dust, then breathe on the lenses (except in freezing weather), and gently clean them with lens paper. Rags, plain paper, handkerchiefs, or your sleeve or shirttail should not be used, as they might scratch the lens.

105.8 Discuss the proper way to use binoculars: [Ref. a, Ch. 4, Pg. 13-15; Ch. 8, Pg. 29]

a. During daylight

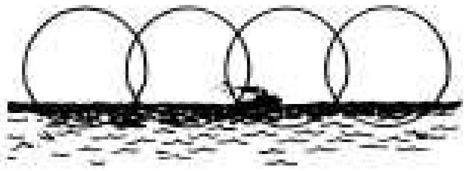


Figure 4.—Scanning, using the step-by-step method.

Effective visual searching does not come naturally; a lookout must learn through practice. In the daytime a person's eyes must stop on an object in order to see it. Try moving your eyes across the water rapidly from object to object and note that as long as your eyes are in motion, you see almost nothing. Now allow your eyes to move in short steps from object to object and you can really see what is there. This is known as the step-by-step method. (See figure 4.)

A ship's lookout cannot be too well-trained, too alert, or too much on the job. Remember—the safety of the ship and the personnel on board depend on the lookout. By seeing things and reporting them quickly and accurately, you might prevent the crew's having to swim the cold waters of the North Atlantic or the shark-infested waters of the South Pacific. The key phrase for all lookouts is BE ALERT!!

In good weather, well-trained lookouts can easily spot planes at 15 miles with the naked eye. With binoculars, and in unusually clear weather, lookouts have detected planes at 50 miles. At night, skilled lookouts can detect objects that the untrained lookout would never suspect were there.

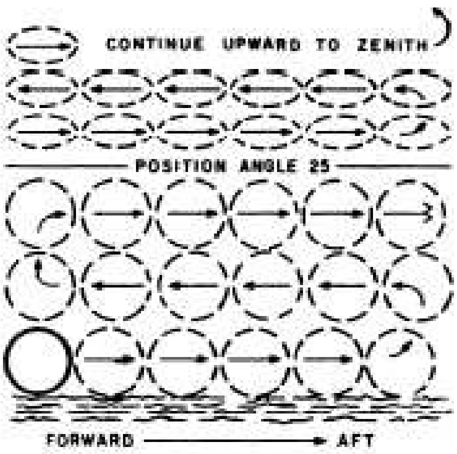


Figure 6.—Sky searching.

SURFACE SEARCHING:

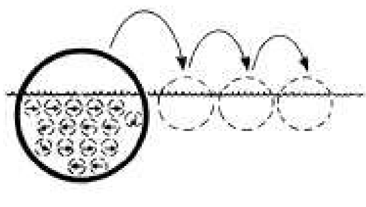


Figure 5.—Surface searching.

Surface lookouts scan the water from the ship to the horizon and are responsible for all contacts in their sector. In searching the assigned sector, always start at the forward part of the sector and search aft. (See figure 5.) To search and scan, hold the binoculars steady so the horizon is in the top third of the field of vision. Direct the eyes just below the horizon and scan for 5 seconds in as many small steps as possible across the field seen through the binoculars. Search the entire sector in 5° steps, pausing between steps for approximately 5 seconds to scan the field of view.

At the end of your sector, lower the glasses and rest the eyes for a few seconds, then search back across the sector with the naked eye. When you sight a contact, keep it in the binoculars' field of vision, moving your eyes from it only long enough to determine the relative bearing.

SKY SEARCHING: Sky lookouts scan from the horizon to the zenith, aided only by sunglasses for protection from glare. Binoculars should only be used when needed to identify a contact that has been sighted with the naked eye.

Scanning of the assigned sector should be accomplished by moving the eyes in quick steps (about 5°) across the sector just above the horizon. Shift the eyes upward about 10° and move them back in quick steps, continuing this type of search from horizon to zenith. (See figure 6.) When the zenith is reached, rest your eyes by blinking them for a few seconds, then start over.

b. In fog

This watch is stationed during fog or conditions of reduced visibility. The watch is stood in those locations where approaching ships can best be seen or heard. It is the duty of the fog lookouts to stand a vigilant watch and to detect and report everything within sight or hearing. A lookout's hearing must not be impaired by S/P telephones / GENTEX . Accordingly, the lookout is assisted by a phone talker (ANOTHER CREWMEMBER THAT IS USING GENTEX) who is in direct or indirect communication with the COXSWAIN and the NAV. / TRO. The fog or restricted visibility lookout's sectors of responsibility are as follows:

FORWARD LOOKOUT: Stationed as far forward and as close to the waterline as possible. Sector extends 30° on each side of the bow (330° - 030°).

STARBOARD LOOKOUT: Stationed on the starboard bridge wing. Sector extends from the forward lookout's boundary to the starboard beam (030° - 090°).

AFT LOOKOUT: Stationed as far aft and as close to the waterline as possible. Sector extends from the starboard beam clockwise to the port beam (090 ° - 270°).

PORT LOOKOUT: Stationed on the port bridge wing. Sector extends from the port bow to the forward lookout's boundary (270° - 330°).

During restricted-visibility conditions, conduct a moderately fast search without binoculars, but have them within reach in case the fog suddenly lifts.

c. At night

DARK ADAPTATION: If you were to go on night watch directly from a lighted compartment, you would be almost blind for a few minutes. This reaction is similar to that you experience when you walk from a lighted theater lobby into a darkened theater.

As your eyes become accustomed to the weak light, your vision gradually improves. After 10 minutes you can see fairly well. After 30 minutes you reach your best night vision. This improvement of vision in dim light is called dark adaptation.

Effective dark adaptation must be planned well in advance. Exposure to excessive glare during the day will hamper the ability of the eyes to adapt to the dark at night. This effect may last for several days if the exposure has been severe; therefore, lookouts scheduled for night watches should wear sunglasses as much as possible in the daytime.

Dark adaptation before going on watch consists of spending at least 30 minutes in darkness or with the eyes protected by red goggles. Wearing red goggles is effective because red light does not affect the eyes. To complete adaptation for a night watch, spend 5 minutes on deck before relieving the watch. These 5 minutes allow the eyes to adjust to the amount of illumination in which they will work.

NIGHT LOOKOUT TECHNIQUES: Dark adaptation alone is not sufficient to ensure the highest visual keenness in the dark. Learning to use the eyes at night is like learning to use a precision instrument; you must practice to acquire the needed ability. In night lookout work, don't sweep the sky or horizon with the eyes. The eyes do not see well when they are moving. Scan the horizon in a series of movements which will allow your eyes to come to periodic rests as they scan the sector. When you are using night eyes, always look a little to one side and out of the corners of your eyes. Pay attention to the things on the outer edges of your field of vision. A faint object may not be recognizable until your gaze has been directed toward it a number of times. Likewise, direct your eyes slightly above or below the horizon, as there are times when you cannot see the actual horizon unless your line of vision is purposely elevated or depressed.

One of the greatest aids to night vision is contrast between object and background. Therefore, a good technique is to concentrate on the point where the sky appears to meet the water. Here objects may loom above the darker water and be seen against the lighter sky.

To summarize dark adaptation and night lookout techniques, remember these things:

1. Protect your eyes from light before going on night duty and while you are out.
2. Don't look directly at any light or illuminated object.
3. Use the corners of your eyes.
4. Keep your eyes moving. Quick short movements and short pauses are better than long sweeping movements and long pauses.
5. Practice what you know about seeing at night until it becomes second nature for you to use your eyes to their best advantage.

105.9 Discuss the proper way to use night vision equipment. [Ref. d, Ch. 2 Pg. 1-2]

Night vision devices belong to a family of precision instruments that use electronic optics for observation, surveillance, and navigation. Night vision sights (NVSs) can be used in conjunction with the IR equipment discussed previously in this chapter.

Night vision devices are used to scan an area accurately and to detect enemy movement, to observe friendly forces, or to accomplish various other tasks associated with night devices.

- Consult owners manual
- Ensure fresh batteries are inserted
- Do not use in bright lighted areas
- Care for the same as Binoculars

105.10 Discuss the proper care and maintenance of night vision equipment.
[Ref. d, Ch. 1-2]

- Consult owners manual/ follow MRC for cleaning / maint.
- Cannot stand knocking around
- Delicate Instruments
- Keep lens dry
- Do not let them get overheated
- Use the PROPER Lens paper, DO NOT USE rags, paper, handkerchief

150.11 Discuss the role and actions of the lookout in a man overboard situation.
[Ref. a Ch. 6, page 25]

The life-buoy watch or anyone else who sees a person fall overboard must shout as loudly as possible, without hesitation, “MAN OVERBOARD, STARBOARD (PORT) SIDE.” This call must be repeated until the conning officer takes necessary action or indicates in some way that the word has been received.

A life ring with a small lighted buoy attached and a marine location marker should be thrown over on hearing “MAN OVERBOARD,” regardless of whether or not the person is seen. When launching a Mk 58 marine location marker, (1) remove tear tape over the water ports and (2) throw the marker over the side. The tear tape must be removed before throwing over the side. This allows the seawater to activate the battery to start the process of igniting the pyrotechnic candle.

If the ship is fueling and highly volatile fuel such as gasoline or jet fuel is in the water, or if under darkened ship condition, do not use a smoke float or flare.

105.12 Discuss the signals used by a vessel in duress. [Ref. a Pg. 33]

Distress signals under both International and Inland Rules are as follows:

The following signals, used or exhibited either together or separately, indicate distress and need of assistance:

1. A gun or other explosive signal fired at intervals of about a minute
2. A continuous sounding with any fog-signalling apparatus
3. Rockets or shells, throwing red stars fired one at a time at short intervals
4. A signal made by light, radio, or by any other signalling method consisting of the group • • • - - -• • •(SOS) in the Morse code
5. A signal sent by radiotelephone consisting of the spoken word "Mayday"
6. The International Code Signal of distress indicated by N.C. (NOVEMBER CHARLIE)
7. A signal consisting of a square flag having above or below it a ball or anything resembling a ball
8. Flames on the vessel (as from a burning tar barrel, oil barrel, etc.)
9. A rocket parachute flare or a hand flare showing a red light
10. A smoke signal giving off orange-colored smoke
11. Slowly and repeatedly raising and lowering arms outstretched to each side
12. The radiotelegraph alarm signal
13. The radiotelephone alarm signal
14. Signals transmitted by emergency position indicating radio beacons

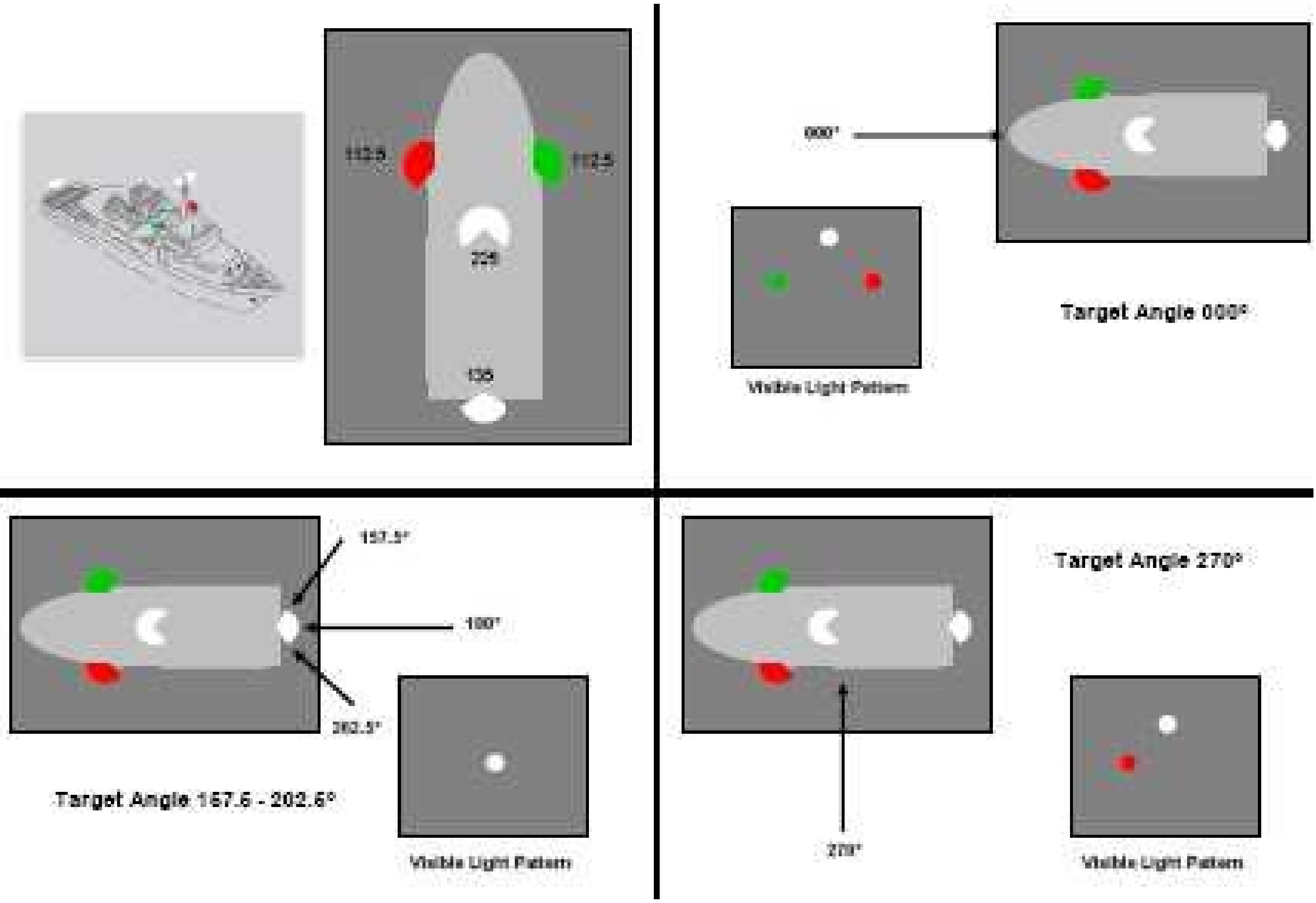
In addition, Inland Rules stipulate that a high intensity white light flashing at regular intervals from 50 to 70 times a minute may be used. There is no basis in the Rules for the popular notion that our national ensign, hoisted upside down, is a recognized signal of distress. No man-of-war would ever subject the colors to that indignity. But if you should see a private craft with the ensign hoisted upside down, it may be in distress and you should report it without delay.

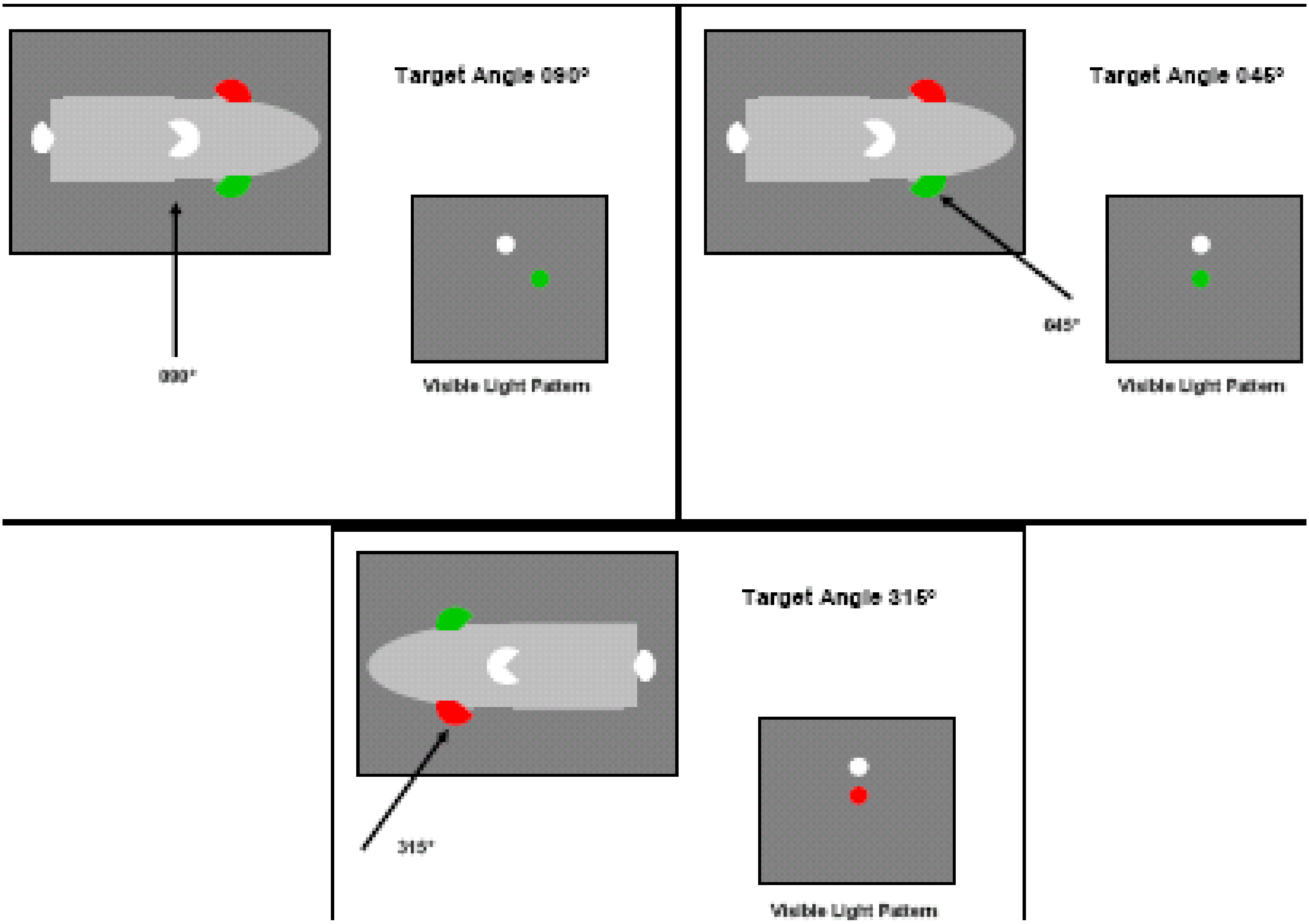
105.13 Explain how to use a contact's navigation lights to determine its target angle. [Ref. a Ch. 5, Pg. 17]

All vessels are required, at a minimum, to display the following lights. By examining the light positions in relation to each other, target angle can be estimated. The following is an example on how to use navigation lights on vessel less than 50 meters. Consideration must be give to various configurations of lights to determine target angle at night. Refer to the following slides:

- All power driven vessels are required to carry white, red, and green running lights when under way.
- White –masthead light fwd part of ship (a second light abaft and higher than fwd one is required on vessels 50 meters or more in length) 225 degrees of arc.
- Red –port side 112.5 degrees of arc.

- Green –starboard side 112.5 degrees of arc.
- Stern light –white 135 degrees of arc.





105.14 Discuss the running lights shown by a vessel underway. [Ref. a, Ch. 10, Pg. 36]

All power-driven vessels are required to carry white, red, and green running lights when under way. Running lights consist of a white masthead light in the forward part of the ship (a second masthead light, abaft and higher than the forward one, is required on vessels 50 meters or more in length), sidelights (red on the portside, green on the starboard side), and a white stern light.

Running lights are fixed so they display an unbroken arc of light over certain portions of the horizon, making them readily identifiable. Running lights and their degree of arc are as follows:

Running Lights Degree of Arc:
Masthead light 225°
Sidelights 112.5°
Stern light 135°

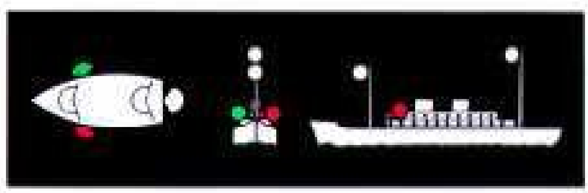


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Figure 21.—Running lights.

105.15 Discuss the meaning of the following special lights shown by a vessel at night:
[Ref. a, Ch. 10, Pg. 37]

Each light configuration has a rime, each rime is listed after the meaning.

a. Red over red
Vessel not under command. (Vessel is dead)

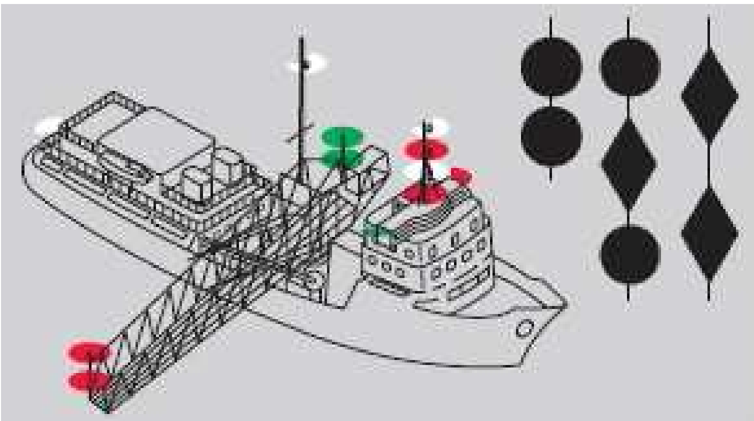
b. Red over white
Engaged in fishing operations. (Fishing at night)

c. Green over white
Vessel engaged in trawling. (Trawling at night)

d. White over red
Pilot Vessel. (Pilot ahead)

e. Red over white over red
Restricted Maneuvering. (Restricted Maneuvering Ahead)

f. Dredge what side to pass
Pass on the side with the green lights, the lights indicate the safe side of the dredge.



g. Red over Red over Red
Vessel Constrained by Draft. (Captain is dead)

h. Red over Green
Sailing Vessel. (Sailing Machine)

105.16 Describe the following types of buoys: (Ref. a, Ch. 10, Pg. 39-40]

a. Can

Can: are cylindrical in shape and are often constructed from large logs, which are trimmed, shaped, and appropriately painted. Some are metal, plastic, or fiberglass.

b. Nun

Nun: are built such that the upper portion you observe resembles a cone with a rounded tip. Like cans, these are also unlighted and will be painted red or have red and green horizontal bands.

c. Spar

Spar: are cylindrical in shape and are often constructed from large logs, which are trimmed, shaped, and appropriately painted. Some are metal, plastic, or fiberglass.

d. Lighted

Lighted: carry batteries and are surmounted by a framework supporting a light. The framework has no navigational significance; it simply supports the light and sound equipment. Many lighted buoys carry a solar panel atop the light to recharge the battery during daylight hours.

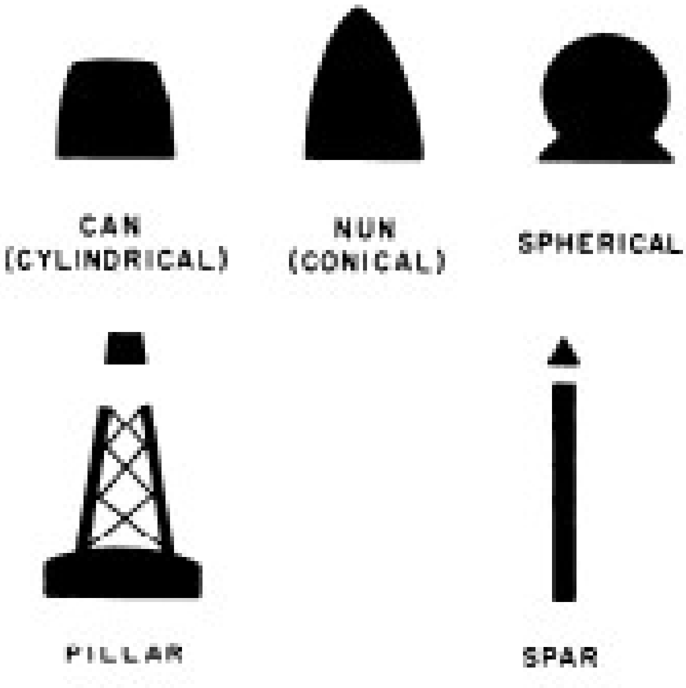


Figure 23.—Basic buoy shapes.

105.17 Describe the characteristics of buoys, day shapes used as channel markers. [Ref. c, Ch. 6 Pg. 6-21]

The IALA system uses buoy shape, color, and, if lighted, rhythm of flashes to convey the desired information to the navigator. The system also uses special top marks, which are small distinctive shapes above the basic aid to facilitate identification.

IALA System A is used in Europe, Africa, and most of Asia, including Australia and New Zealand. In this system, cardinal marks are widely used. Red buoys are kept to port when entering from seaward; green buoys are kept to starboard.

IALA system B is used in North, Central, and South America, Japan, South Korea, and the Philippines. Cardinal marks are permitted in this system but are seldom used. Red buoys are kept to starboard (red right returning) when entering from seaward, green buoys are kept to port. Figure 4-13 shows how the two IALA regions are divided worldwide.

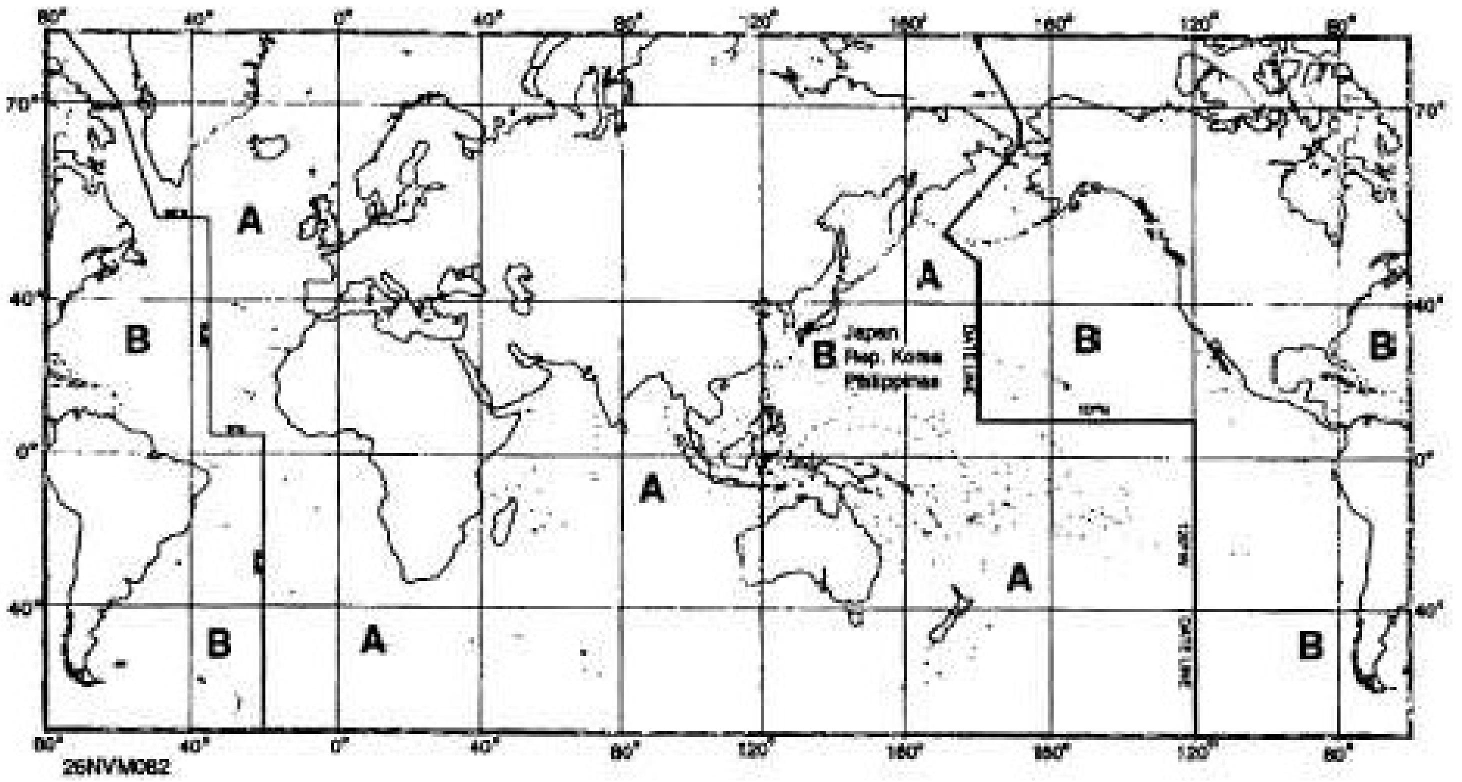


Figure 9-11.—IALA Maritime Buoyage System, buoyage regions A and B.

The system of ATONs used in the United States consists of buoys, lights, and day beacons conforming to the IALA region B guidelines as well as certain variations which are used exclusively in this country. Figures 4-14 through 4-16 graphically display the variations that exist in the U.S. system. Figure 4-14 shows the U.S. ATONs system as seen entering from seaward. Figure 4-15 represents a visual buoyage guide for IALA region B. Figure 4-16 shows how the visual guide would appear on a nautical chart.

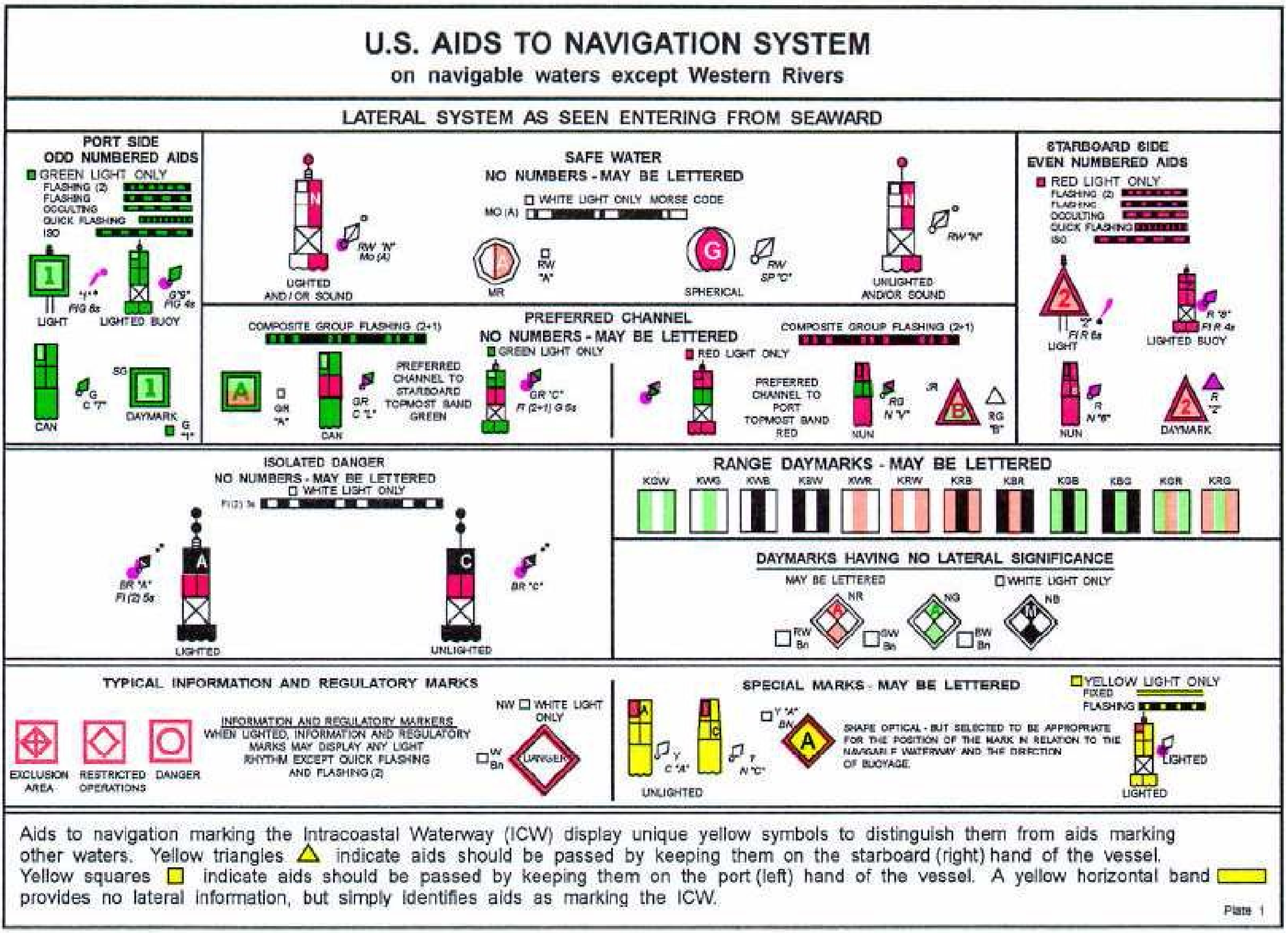
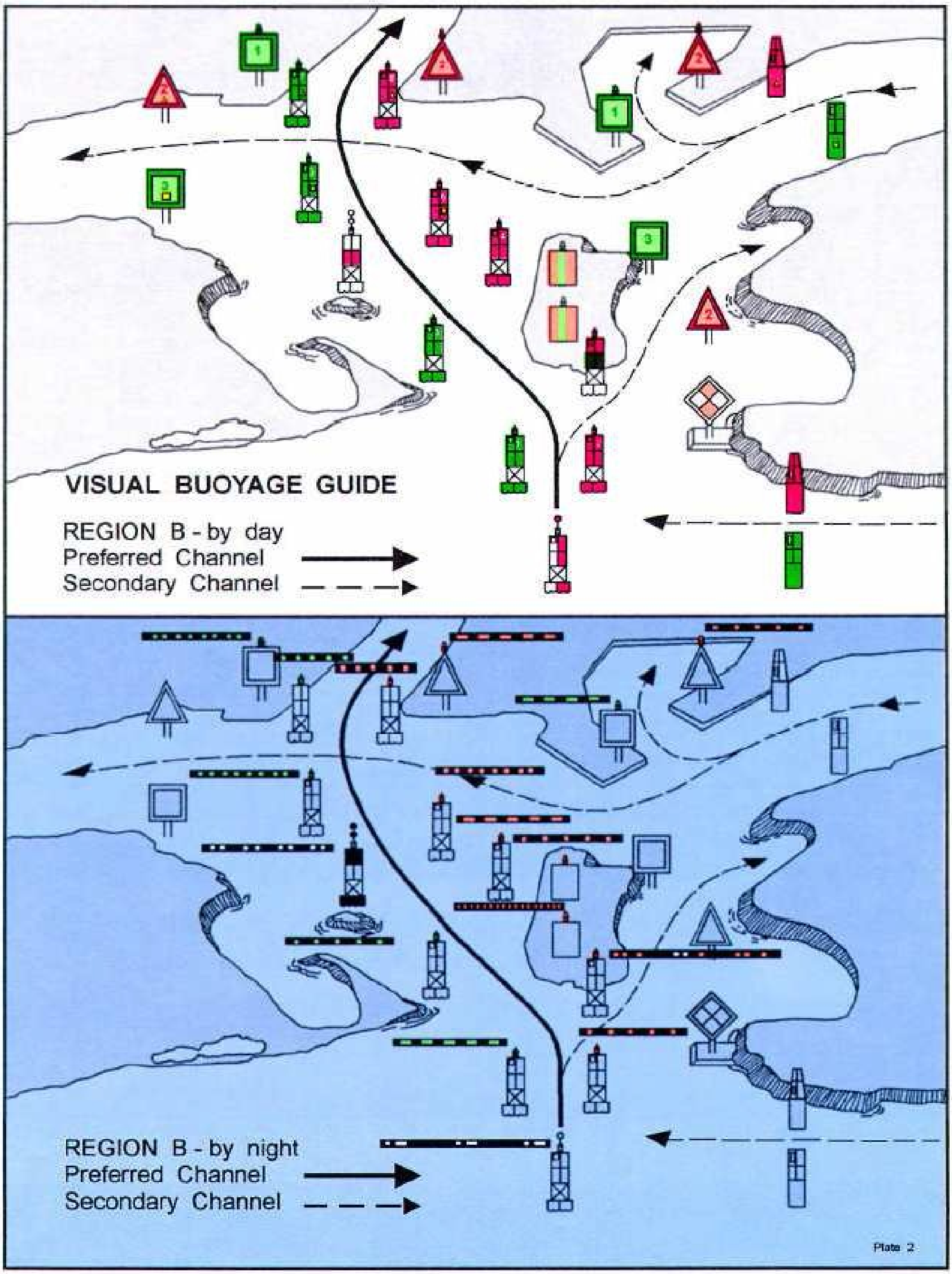


Figure 4-14.—Lateral system as seen entering from seaward.


VISUAL BUOYAGE GUIDE
REGION B - by day
Preferred Channel
Secondary Channel
REGION B - by night
Preferred Channel
Secondary Channel
Plate 2

105.18 Discuss the guidelines for ship recognition and identification.
[Ref. a, Ch. 11, Pg. 41-49]

Sighting contacts and reporting them to the bridge and CIC are the primary duties of the lookout. However, your job as lookout does not end there: the contact must be identified. Ships normally should be identified while they still are distant enough to present only a silhouette to the observer. The types/classes of ships can be determined from silhouettes long before their hull numbers or names can be distinguished. (See figures 24 and 25.)

The first determination to be made is whether a vessel is a merchant (civil) or naval ship. Visual identifications will be plotted and logged in CIC so it is important for you to be able to recognize a friend or foe quickly and accurately.

If you do not know the exact identity of the contact, the thing to do is to describe it. The following guidelines will help in ship recognition.

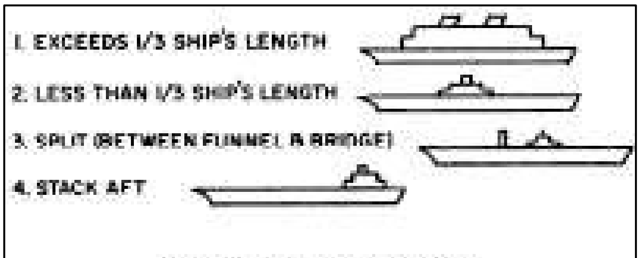


Figure 26.—Superstructure group.

MERCHANT SHIPS: All merchant ships can be placed into one of five basic design groups, depending on the location and shape of the superstructure, location of the stack, and length of the ship. (See figure 26.)

1. TANGO class (transport). Passenger ships or passenger/cargo ships have the superstructure extending more than one-third the overall length of the ship.

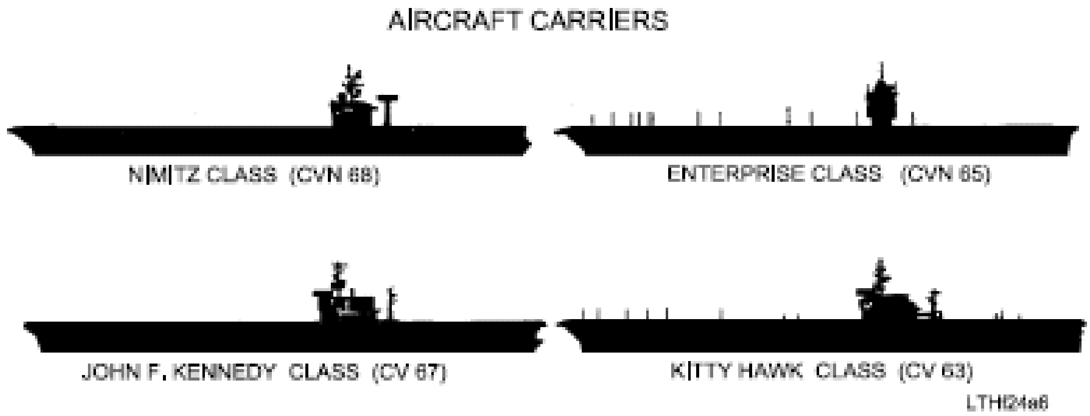
2. FOXTROT TANGO class (freighter transport). Normally includes vessels used for a combination of passenger and cargo transports. They have a block superstructure amidships that is less than one-third the length of the ship.

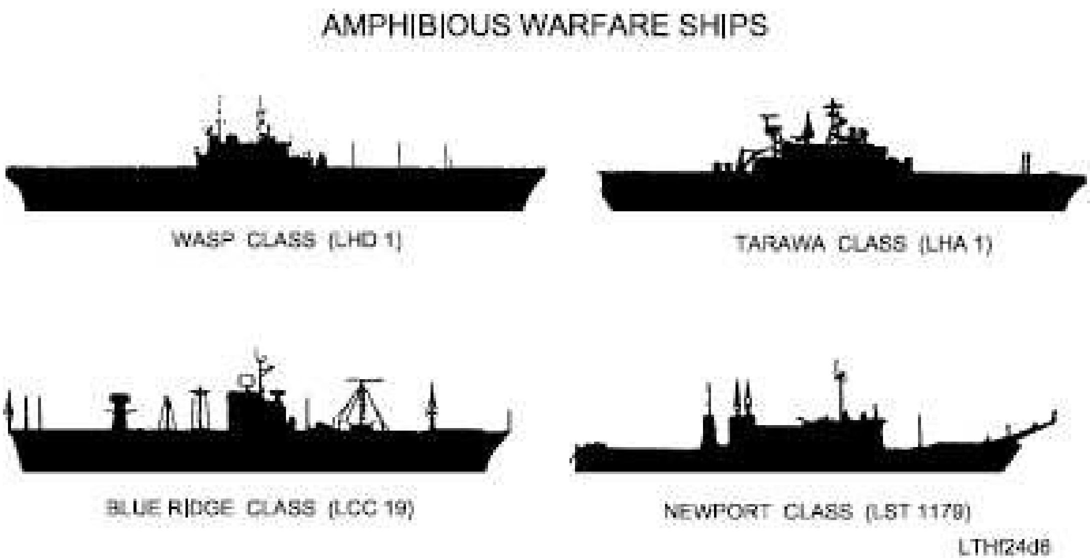
3. FOXTROT class (freighter). Primarily a cargo type that has the superstructure amidships and a distinct separation between funnel and bridge.

4. SIERRA class (stack aft). Cargo vessels or tankers that have the superstructure located entirely in the after one-third section of the vessel.

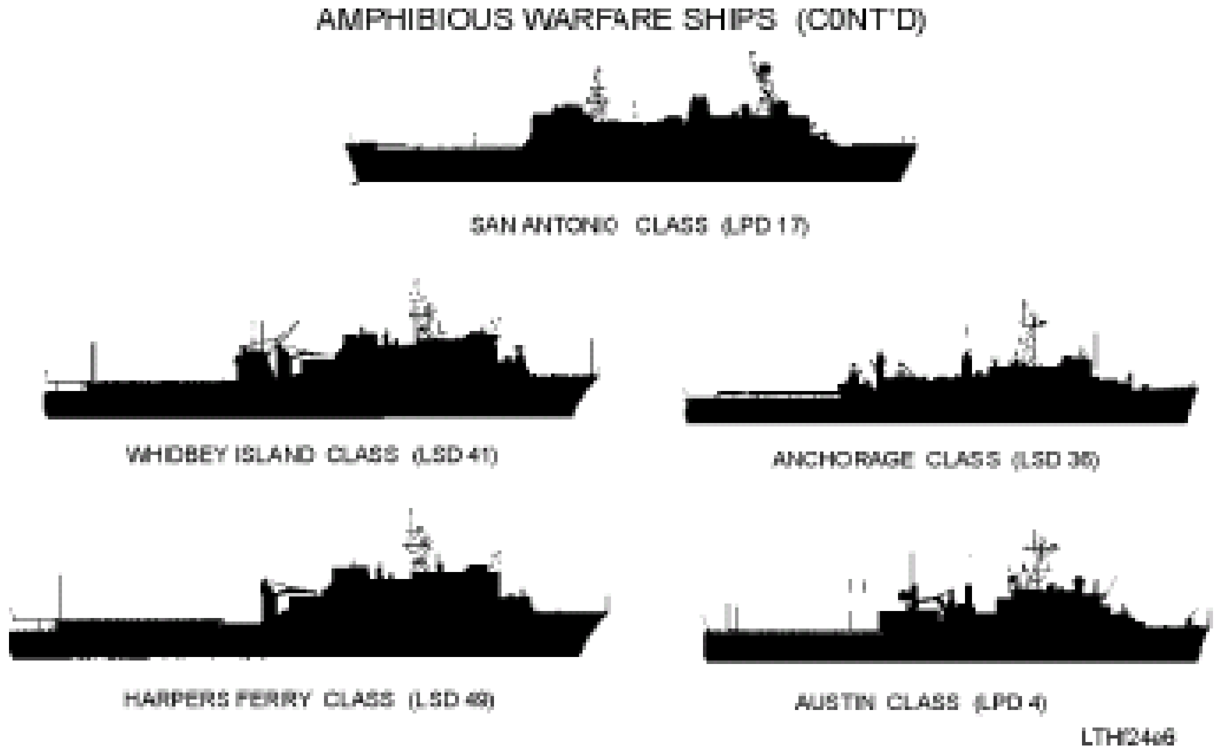
5. NOVEMBER class (miscellaneous). Fishing trawlers, tugs, coastal passenger steamers, junks, and sampans.

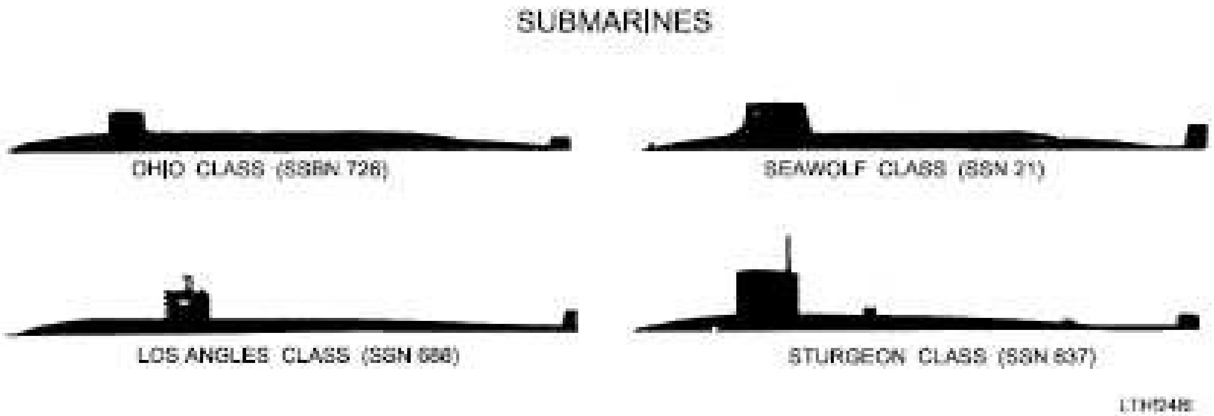
U.S. Navy Warships



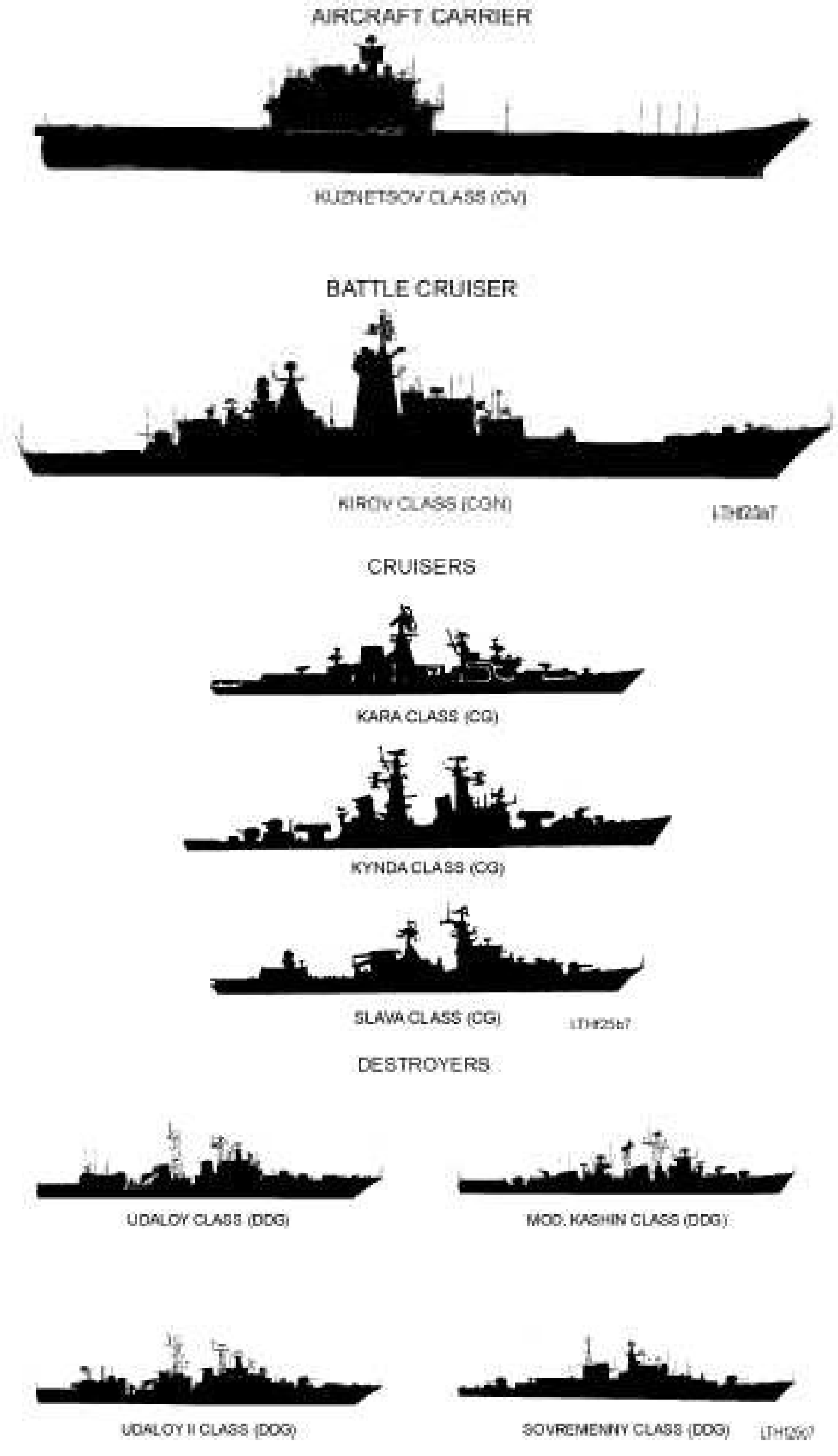


U.S. Navy Warships (cont'ed)





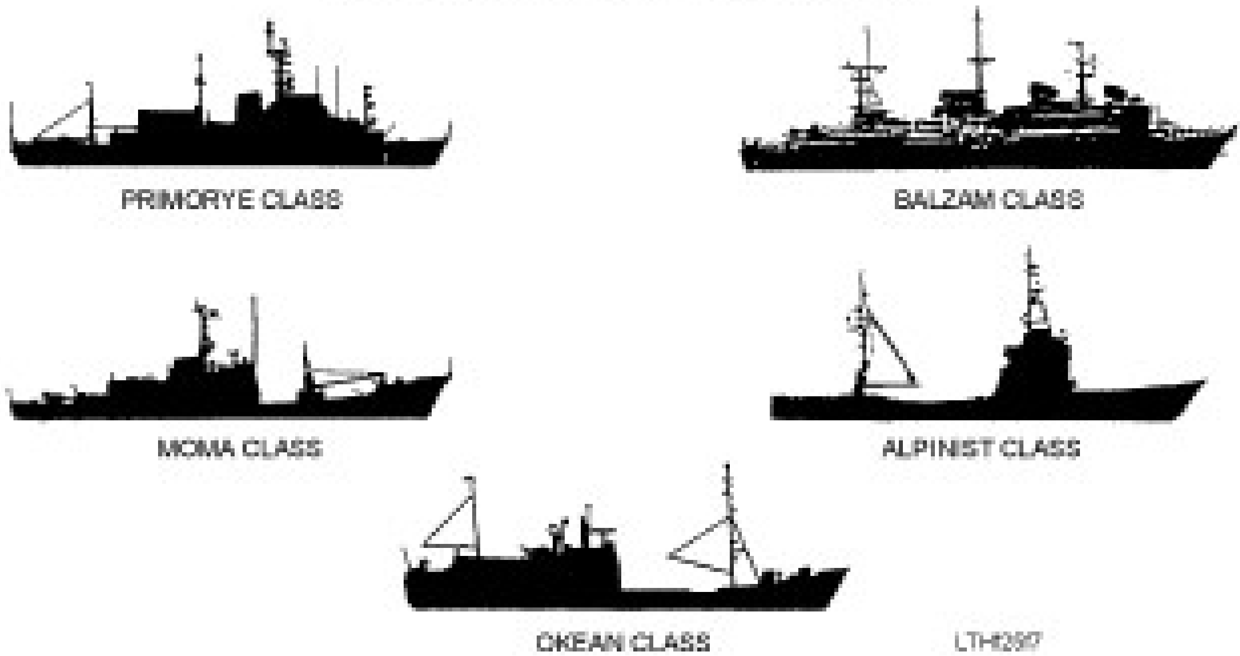
Russian Warships



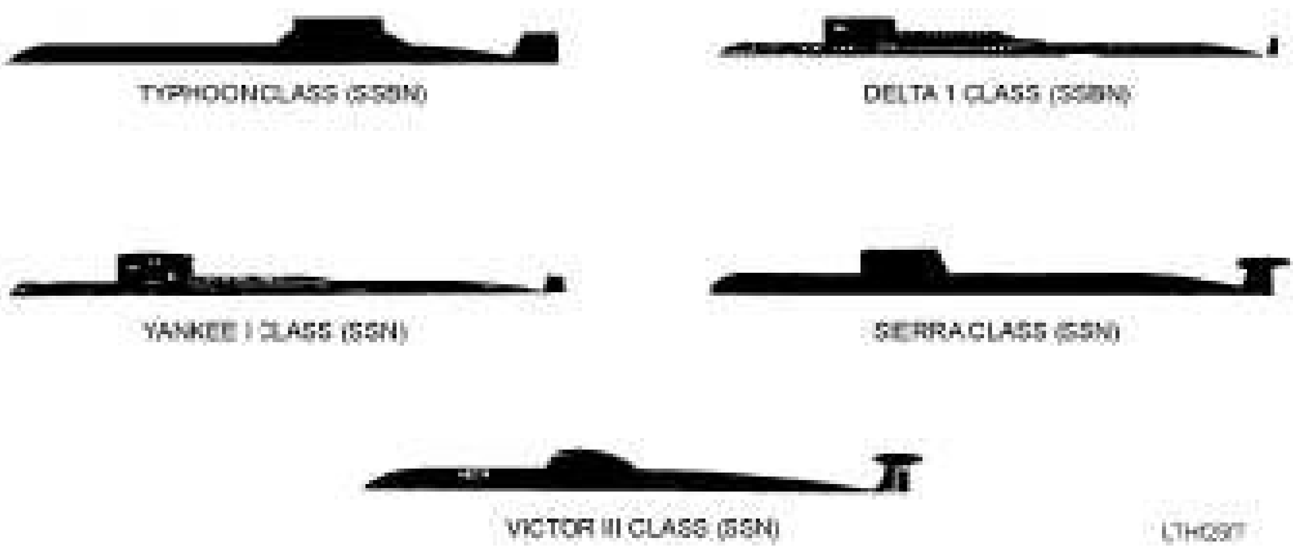
Russian Warships (cont'ed)

Russian Warships (cont'ed)

INTELLIGENCE COLLECTORS (AGI'S)



SUBMARINES



The appearance of smoke on the horizon may often be the first indication of the presence of a ship. As the distance between the observer and the ship decreases, other features appear until a complete distant view is possible. Actual first sighting of the vessel will be of masts, kingposts, funnels, and superstructure because the ship will be hull down. The vessel must then be studied according to a definite plan. The most obvious method is to start forward and work aft noting the prominent features in sequence, as listed below.

1. Masts
2. Funnels
3. Kingposts
4. Cranes
5. Gantries

Hull Design**:** It is unlikely that the hull will be sufficiently distinct at a distance to enable an accurate initial report to be made. However, once the vessel is well above the horizon, distinctive features begin to appear, such as stems and sterns. These features can be added to your amplifying report. By numbering the castles from forward to aft, as in figure 28, an indication of the hull form can be given. For example, a three-island ship is described as having hull form l-2-3, and ships that have no raised castles are classed as flush- decked vessels.
For recognition purposes bows and sterns are grouped into three designs, although there are variations or modifications of most of them. (See figures 29 and 30.)

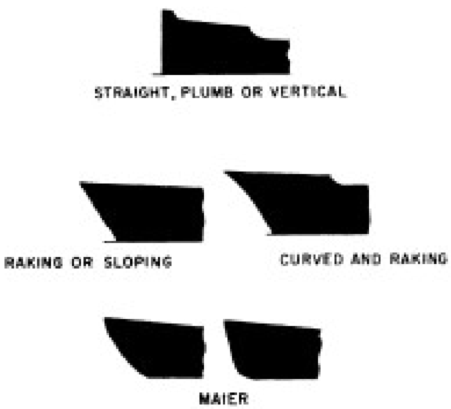


Figure 29.—Bow designs.

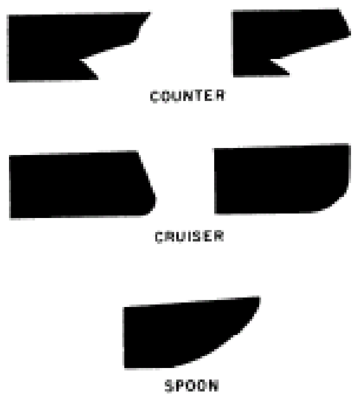


Figure 30.—Stern designs.

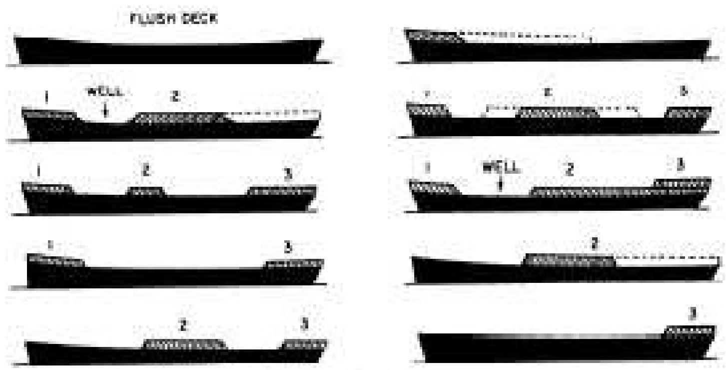


Figure 28.—Basic hull designs.

Stern Types:

1. Counter. The stern is hooked and curved inward.
2. Cruiser. The stern is butted and straight, rounding only at the bottom.
3. Spoon. The stern is angled greatly. A particular feature of German- or Russian-built ships.

105.19 Discuss the guidelines for aircraft recognition and identification.
[Ref. a Ch. 12, Pg. 51-54]

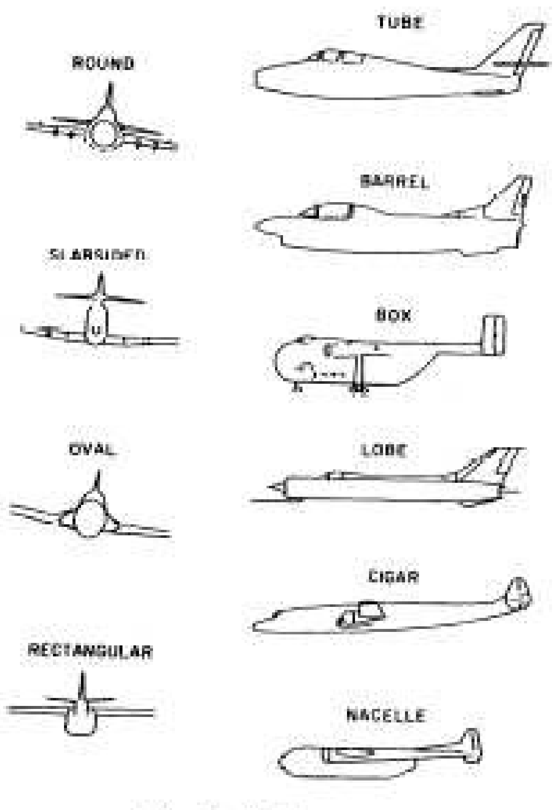


Figure 32.—Fuselage types.

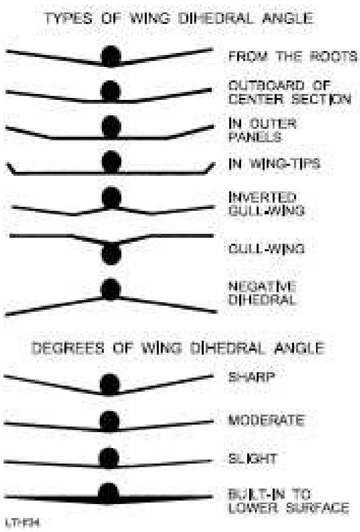
The different types of aircraft presently in use by military and naval powers are so numerous that only them all. Bombers, fighters, fighter bombers, and reconnaissance planes may be propeller-driven or jet, single- or multi-engine, straight-wing, delta-wing, swept-wing, or combinations of these, and various other descriptions.

Instruction in identification of aircraft should consist primarily of classroom lectures, slides, and motion pictures, together with on-the-job instruction when aircraft are operating in the ship's vicinity.

With each advance in aeronautical engineering and design, aircraft are able to fly higher and faster. High speed characteristics tend to make aircraft of different nations look very much alike, thus increasing the difficulty of in-flight identification. For the foregoing reasons, shipboard recognition training should stress ability to recognize aircraft likely to be seen in a local rather than a worldwide area of deployment.

Determination of the friendly or unfriendly character of aircraft is a prime function of the ship's installed IFF system, which can be used to interrogate aircraft long before the craft are within visual range. Exact names and designations may prove unimportant but personnel should be taught to distinguish between the various classes of aircraft—bombers, fighters, reconnaissance, transport, pilotless, and so forth.

Airplanes, like automobiles and people, do differ, and their underlying differences can be detected. Basic aircraft recognition features follow:



1. Fuselage. The fuselage is the main body of the aircraft where all equipments required for control are located and to which the wings and tail units are attached. The foremost part of the fuselage is the nose. Various types of fuselages are shown in figure 32.

2. Wing. The main supporting surface, or airfoils, of an airplane are the wings. Figure 33 shows the most common wing types and positions. The type and degree of wind dihedral angle are shown in figure 34.

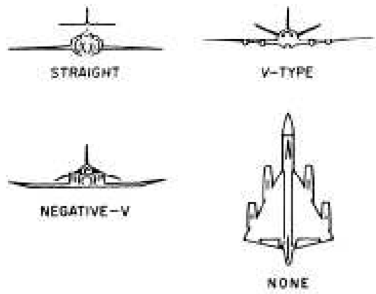


Figure 35.—Horizontal stabilizers.

3. Tail. The tail is the after part of an aircraft and generally consists of stabilizers, elevators, fin, and rudder. See figures 35 and 36 for the various types of horizontal and vertical stabilizers of the tail assembly.

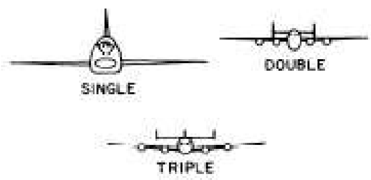


Figure 36.—Vertical stabilizers.

105.20 Define the color, range and arc of visibility for the following lights:
[Ref. e Rules 21-22, Pg. 40-42]

a. Forward masthead
b. Aft masthead (“range” light)

“Masthead light” means a white light placed over the fore and aft centerline of the vessel showing an unbroken light over an arc of the horizon of 225 degrees and so fixed as to show the light from right ahead to 22.5 degrees abaft the beam on either side of the vessel, except that on a vessel of less than 12 meters in length the masthead light shall be placed as nearly as practicable to the fore and aft centerline of the vessel.

c. Starboard running light
d. Port running light

Sidelights" mean a green light on the starboard side and a red light on the port side each showing an unbroken light over an arc of the horizon of 112.5 degrees and so fixed as to show the light from right ahead to 22.5 degrees abaft the beam on its respective side. On a vessel of less than 20 meters in length the sidelights may be combined in one lantern carried on the fore and aft centerline of the vessel, except that on a vessel of less than 12 meters in length the sidelights when combined in one lantern shall be placed as nearly as practicable to the fore and aft centerline of the vessel.

e. Stern light

"Sternlight" means a white light placed as nearly as practicable at the stern showing an unbroken light over an arc of the horizon of 135 degrees and so fixed as to show the light 67.5 degrees from right aft on each side of the vessel.

f. All around lights

"All-round light" means a light showing an unbroken light over an arc of the horizon of 360 degrees.

g. Flashing light

"Flashing light" means a light flashing at regular intervals at a frequency of 120 flashes or more per minute.

h. Special flashing light

"Special flashing light" means a yellow light flashing at regular intervals at a frequency of 50 to 70 flashes per minute, placed as far forward and as nearly as practicable on the fore and aft centerline of the tow and showing an unbroken light over an arc of the horizon of not less than 180 degrees nor more than 225 degrees and so fixed as to show the light from right ahead to abeam and no more than 22.5 degrees abaft the beam on either side of the vessel.

i. Towing light

"Towing light" means a yellow light having the same characteristics as the "sternlight" defined in "stern Light" of this Rule.

105.21 Discuss the special lights and day shapes for vessels engaged in the following activities: [Ref. e]

a. Towing astern [Rule 24, Pg.52]

A power-driven vessel when towing *astern* [Inland] shall exhibit:

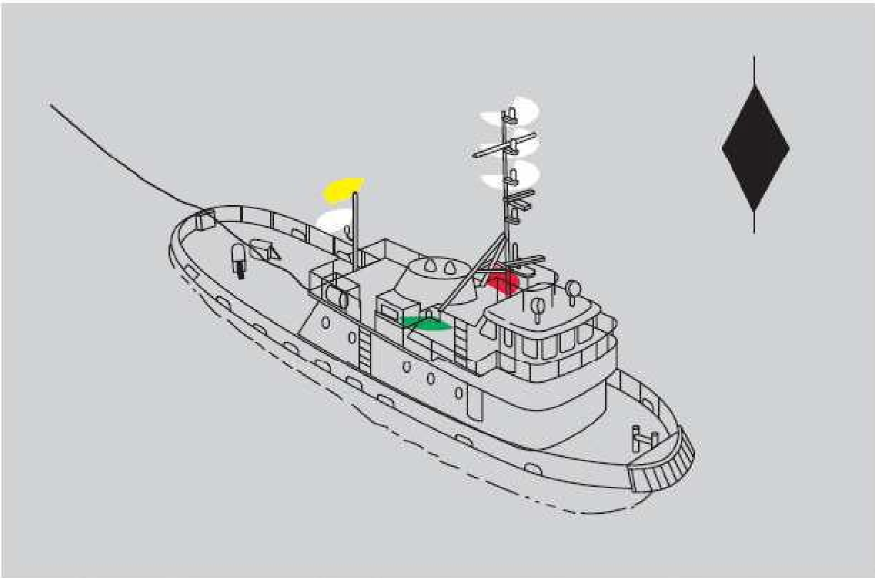
i. Instead of the light prescribed in Rule 23(a)(i) or 23(a)(ii), two masthead lights in a vertical line. When the length of the tow, measuring from the stern of the towing vessel to the after end of the tow exceeds 200 meters, three such lights in a vertical line;

ii. sidelights;

iii. a sternlight;

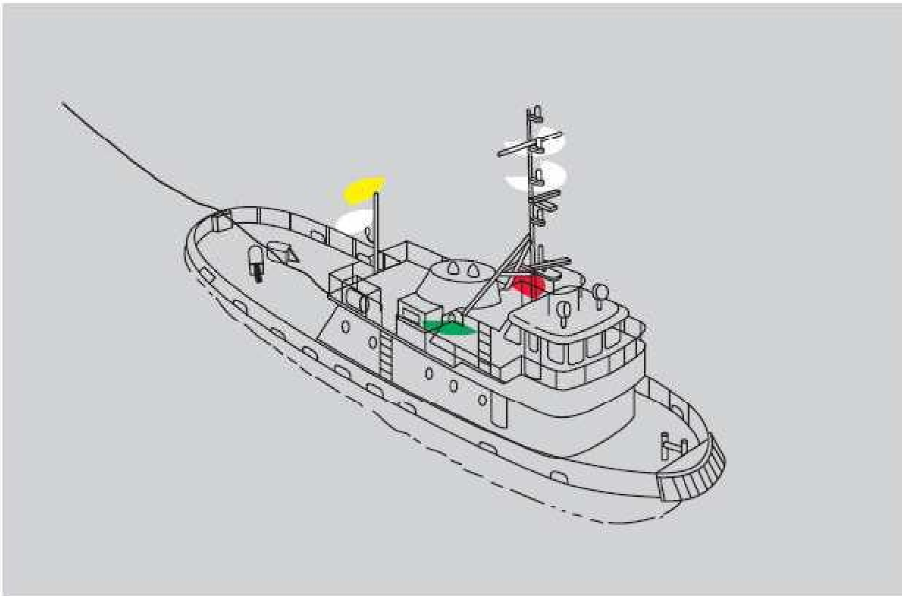
iv. a towing light in a vertical line above the sternlight; and

v. when the length of the tow exceeds 200 meters, a diamond shape where it can best be seen.



Power-driven vessel towing astern—towing vessel less than 50 meters in length; length of tow exceeds 200 meters. Same for Inland.

BOTH INTERNATIONAL AND INLAND

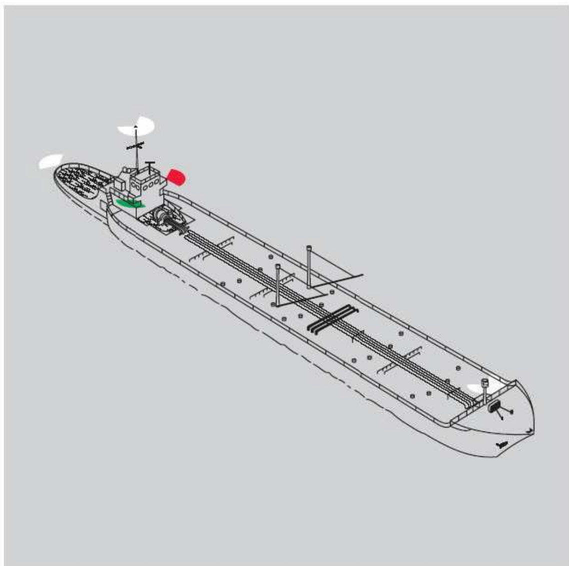


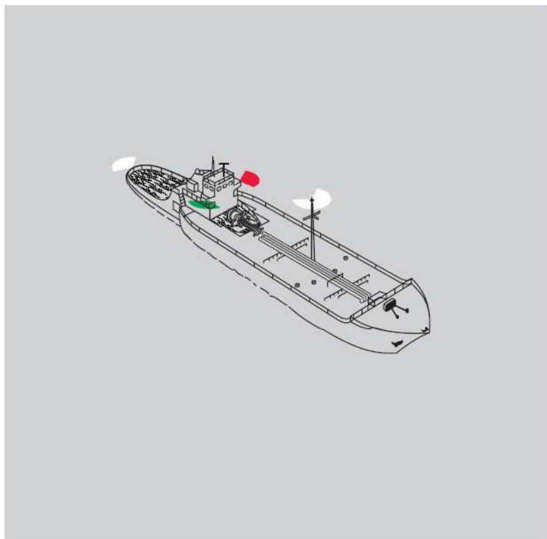
Power-driven vessel towing astern—towing vessel less than 50 meters in length; length of tow 200 meters or less. Same for International.

BOTH INTERNATIONAL AND INLAND

b. Towing alongside [Rule 24, Pg. 52]
c. Pushing tow ahead [Rule 24, Pg.52]

When a pushing vessel and a vessel being pushed ahead are rigidly connected in a composite unit they shall be regarded as a power-driven vessel and exhibit the lights prescribed in Rule 23. (*Pictures of a unit over 50m / unit less than 50m*)





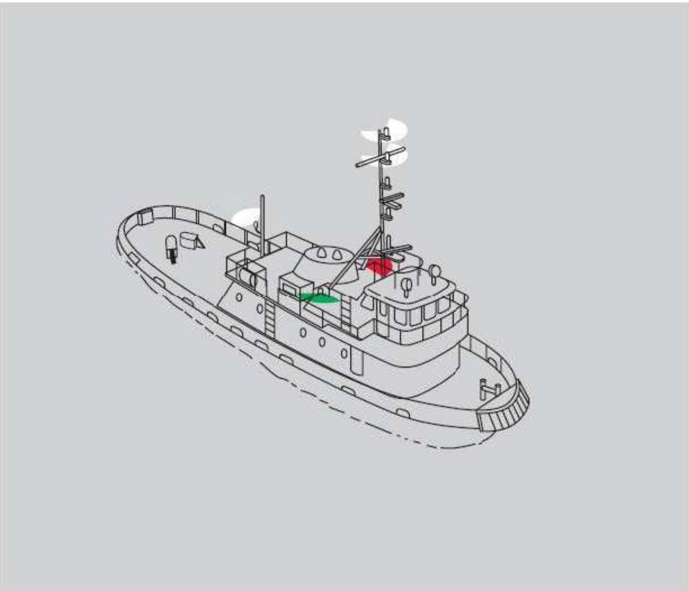
Composite unit underway—less than 50 meters in length.

A power-driven vessel when pushing ahead or towing alongside, except [in the case of a composite unit / as required by paragraphs (b) and (i) of this Rule], shall exhibit:

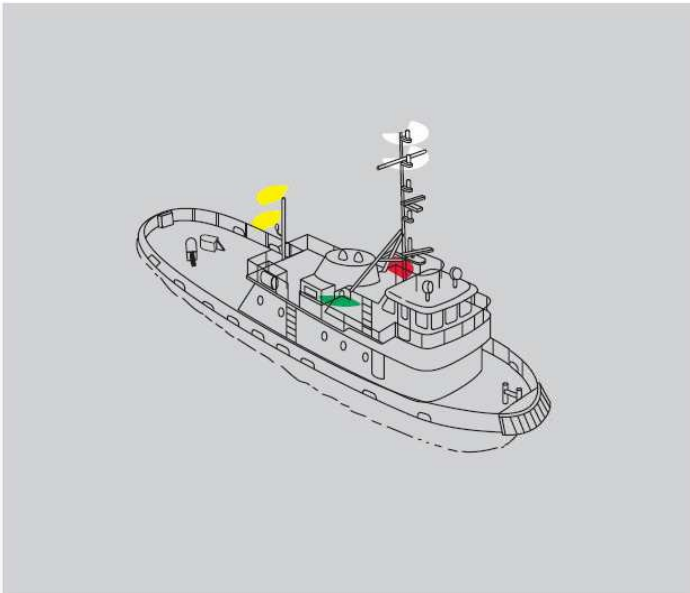
i. instead of the light prescribed in Rule 23(a)(i) or 23(a)(ii), two masthead lights in a vertical line;

ii. sidelights; and

iii. [a sternlight / two towing lights in a vertical line]



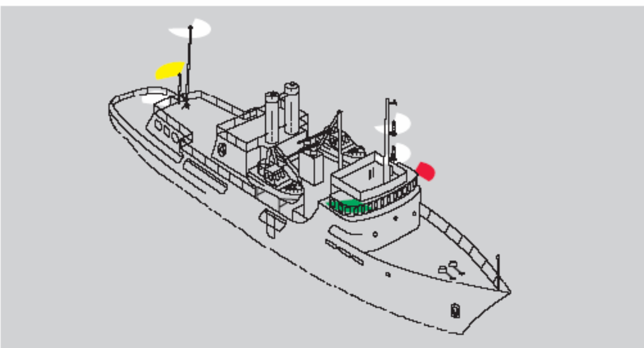
Power-driven vessel pushing ahead or towing alongside—towing vessel less than 50 meters in length.



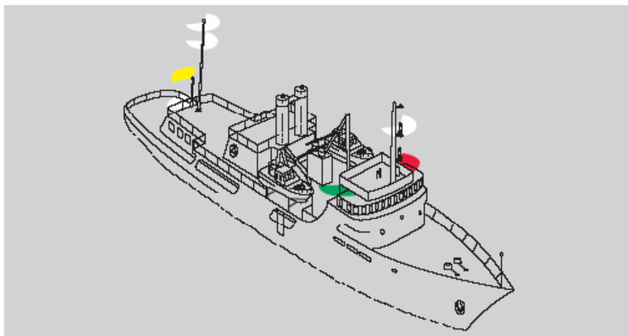
Power-driven vessel pushing ahead or towing alongside—towing vessel less than 50 meters in length.

INTERNATIONAL

INLAND



Power-driven vessel towing astern—length of tow 200 meters or less. The after masthead light is optional for vessel less than 50 meters in length. Same for Inland.



Power-driven vessel towing astern—length of tow 200 meters or less. When masthead lights for towing or pushing are exhibited aft, a forward masthead light is required. Same for International.

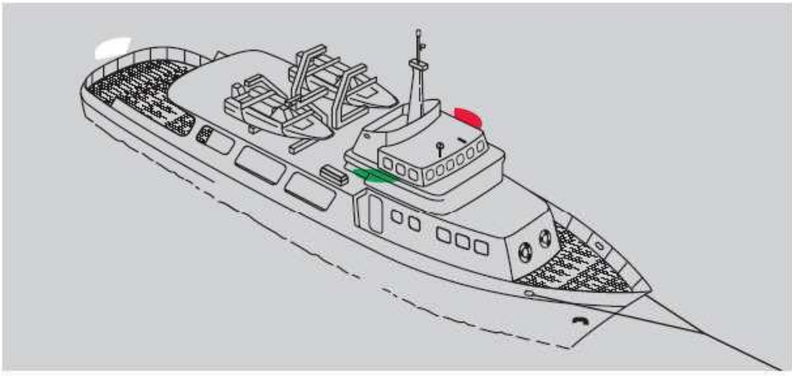
INLAND AND INTERNATIONAL SAME

A vessel or object being towed, other than those mentioned in paragraph (g) of this Rule, shall exhibit:

i. sidelights;

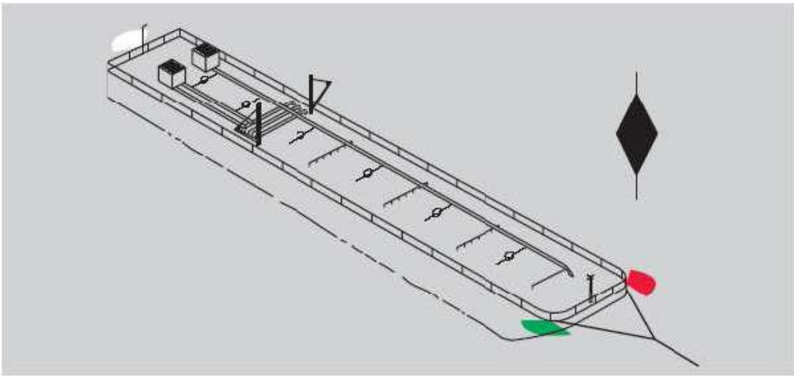
ii. a sternlight;

iii. when the length of the tow exceeds 200 meters, a diamond shape where it can best be seen.



Vessel being towed—length of tow 200 meters or less. Same for International.

INLAND AND INTERNATIONAL SAME



Vessel or object being towed-length of tow exceeds 200 meters. Same for Inland.

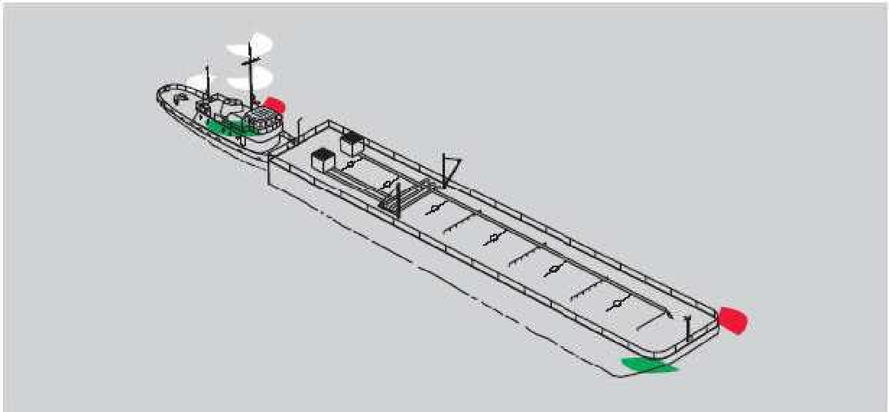
INLAND AND INTERNATIONAL SAME

Provided that any number of vessels being towed alongside or pushed in a group shall be lighted as one vessel, *except as provided in paragraph (iii)* [INLAND] (*pictures of International and Inland configurations*)

i. a vessel being pushed ahead, not being part of a composite unit, shall exhibit at the forward end, sidelights, *and a special flashing light* [INLAND];

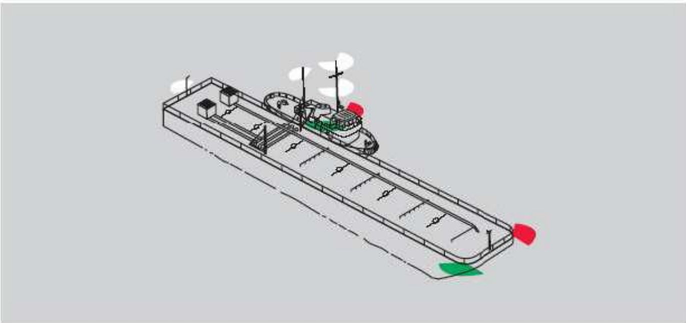
ii. a vessel being towed alongside shall exhibit a sternlight and at the forward end, sidelights, *and a special flashing light* [INLAND];

iii. *when vessels are towed alongside on both sides of the towing vessels a sternlight shall be exhibited on the stern of the outboard vessel on each side of the towing vessel, and a single set of sidelights as far forward an as far outboard as is practicable, and a single special flashing light* [INLAND];

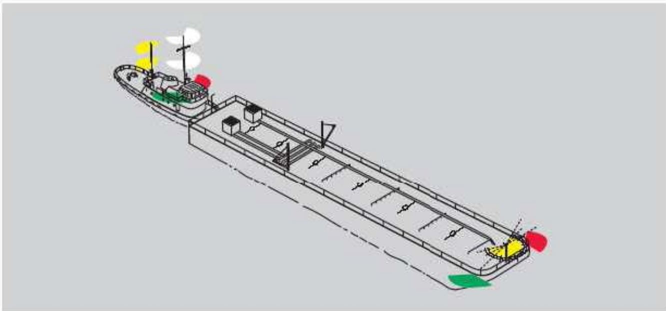


Vessel being pushed ahead, not being part of a composite unit.

INTERNATIONAL ONLY

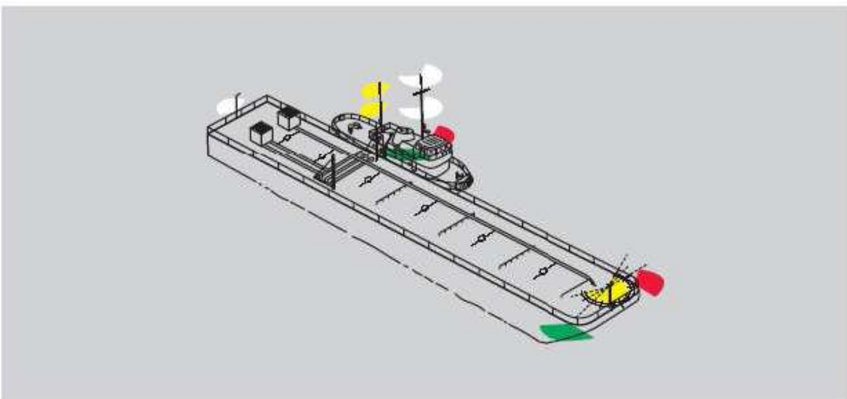


Vessel being towed alongside.



Vessel being pushed ahead, not being part of a composite unit.

INTERNATIONAL ONLY INLAND ONLY



Vessel being towed alongside.

INLAND ONLY

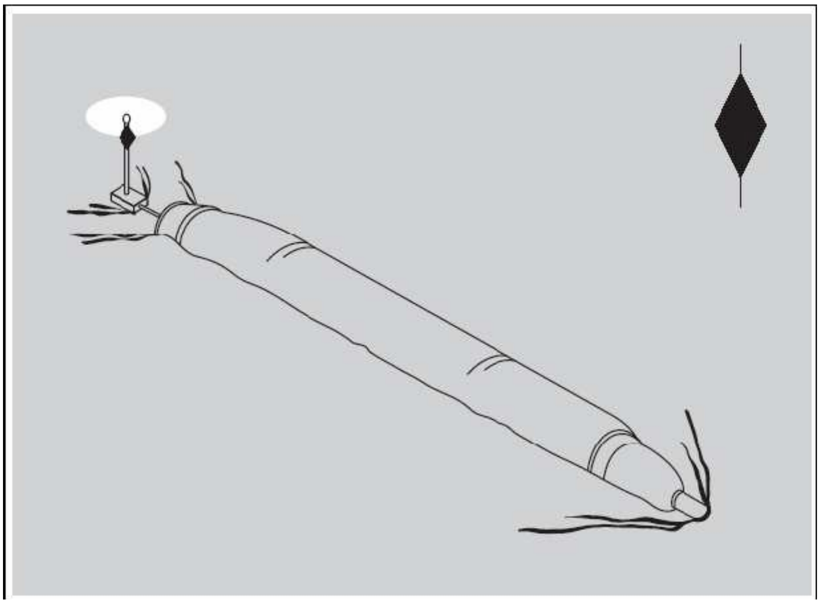
An inconspicuous, partly submerged vessel or object, or *combination of such vessels or objects being towed,* [INTERNATIONAL] shall exhibit:

International	Inland
(i) if it is less than 25 meters in breadth, one all-round white light at or near the forward end and one at or near the after end except that dracones need not exhibit a light at or near the forward end.	(i) if it is less than 25 meters in breadth, one all-round white light at or near each end.
(ii) if it is 25 meters or more in breadth, two or more additional all-round white lights at or near the extremities of its breadth;	(ii) if it is 25 meters or more in breadth, four all-round white lights to mark its length and breadth;

iii. if it exceeds 100 meters in length, additional all-round white lights between the lights prescribed in subparagraphs (i) and (ii) so that the distance between the lights shall not exceed 100 meters. *Provided, that any vessels or objects being towed alongside each other shall be lighted as one vessel or object* [INLAND];

iv. a diamond shape at or near the aftermost extremity of the last vessel or object being towed and *if the length of the tow exceeds 200 meters an additional diamond shape where it can best be seen and located as far forward as is practicable.* [INTERNATIONAL]

v. *the towing vessel may direct a searchlight in the direction of the tow to indicate its presence to an approaching vessel.* [INLAND]



When from any sufficient cause it is impracticable for a vessel or object being towed to exhibit the lights *or shapes* [INTERNATIONAL] prescribed in paragraph (e) or (g) of this Rule, all possible measures shall be taken to light the vessel or object being towed or at least indicate the presence of [such / unlighted] vessel or object.

Notwithstanding paragraph (c), on the Western Rivers (except below the Huey P. Long Bridge on the Mississippi River) and on waters specified by the Secretary, a power-driven vessel when pushing ahead or towing alongside, except as paragraph (b) applies, shall exhibit: [INLAND]

i. *sidelights; and* [INLAND]

ii. *two towing lights in a vertical line.* [INLAND]

Where from any sufficient cause it is impracticable for a vessel not normally engaged in towing operations to display the lights prescribed in paragraph (a), (c) *or (i)* [INLAND] of this Rule, such vessel shall not be required to exhibit those lights when engaged in towing another vessel in distress or otherwise in need of assistance. All possible measures shall be taken to indicate the nature of the relationship between the towing vessel and the vessel being towed as authorized by Rule 36, in particular by illuminating the [towline / tow].

d. Restricted maneuverability [Rule 27, Pg. 88]

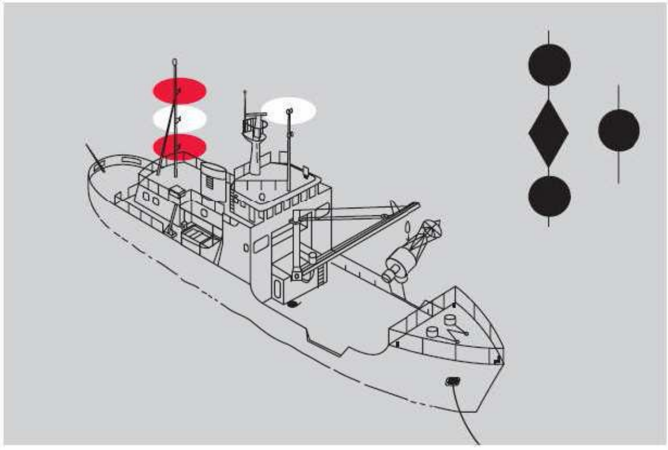
A vessel restricted in her ability to maneuver, except a vessel engaged in mine clearance operations, shall exhibit:

i. three all-round lights in a vertical line where they can best be seen. The highest and lowest of these lights shall be red and the middle light shall be white;

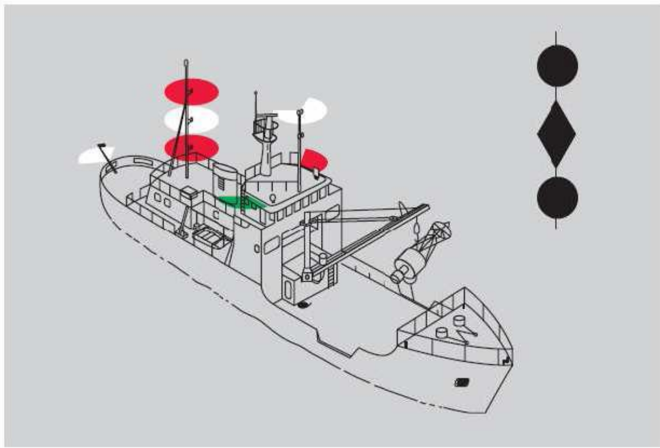
ii. three shapes in a vertical line where they can best be seen. The highest and lowest of these shapes shall be balls and the middle one a diamond.

iii. when making way through the water, [a masthead light or lights/ masthead lights], sidelights and a sternlight in addition to the lights prescribed in subparagraph (b)(i);

iv. when at anchor, in addition to the lights or shapes prescribed in subparagraphs (b)(i) and (b) (ii), the light, lights, or shapes prescribed in Rule 30.



Vessel restricted in her ability to maneuver—at anchor; vessel less than 50 meters in length. Same for International.



Vessel restricted in her ability to maneuver—making way; vessel less than 50 meters in length. Same for Inland.

INTERNATIONAL AND INLAND SAME

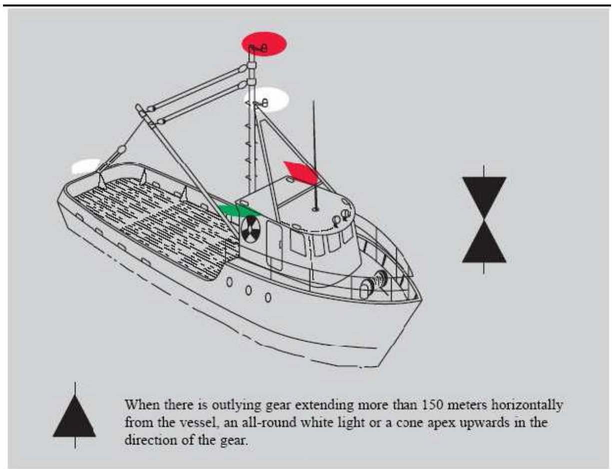
e. Fishing [Rule 26, Pg. 80]

A vessel engaged in fishing, other than trawling, shall exhibit:

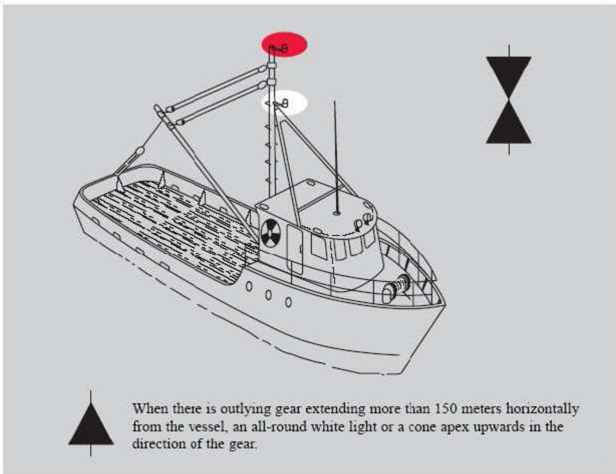
(i) two all-round lights in a vertical line, the upper being red and the lower white, or a shape consisting of two cones with apexes together in a vertical line one above the other;

(ii) when there is outlying gear extending more than 150 meters horizontally from the vessel, an all-round white light or a cone apex upwards in the direction of the gear;

(iii) when making way through the water, in addition to the lights prescribed in this paragraph, sidelights and a stern light.



Vessel engaged in fishing other than trawling—making way. Same for Inland.



Vessel engaged in fishing other than trawling—not making way. Same for International.

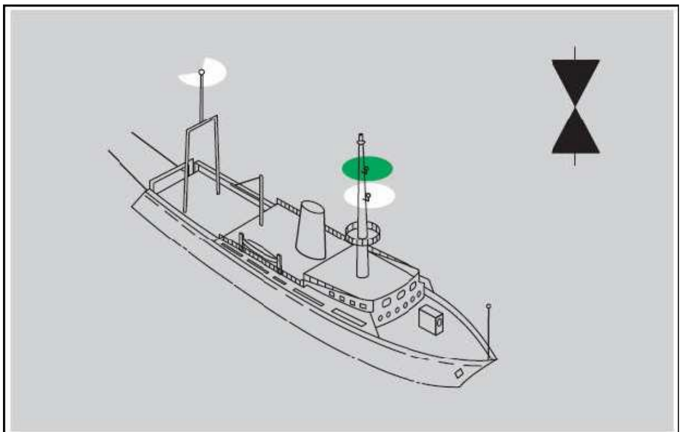
f. Trawling [Rule 26, Pg. 80]

A vessel when engaged in trawling, by which is meant the dragging through the water of a dredge net or other apparatus used as a fishing appliance, shall exhibit:

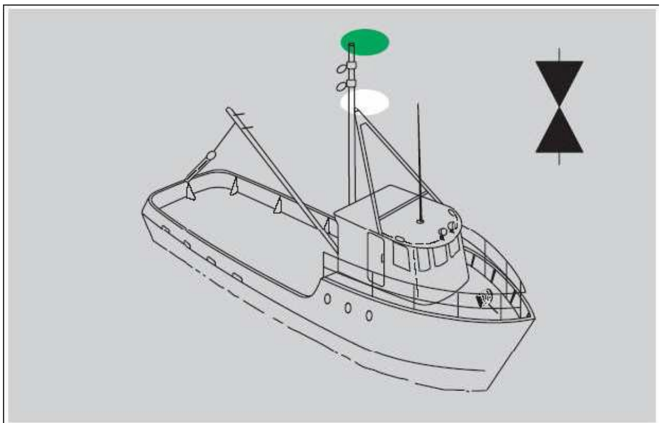
(i) two all-round lights in a vertical line, the upper being green and the lower white, or a shape consisting of two cones with their apexes together in a vertical line one above the other;

(ii) a masthead light abaft of and higher than the all-round green light; a vessel of less than 50 meters in length shall not be obliged to exhibit such a light but may do so;

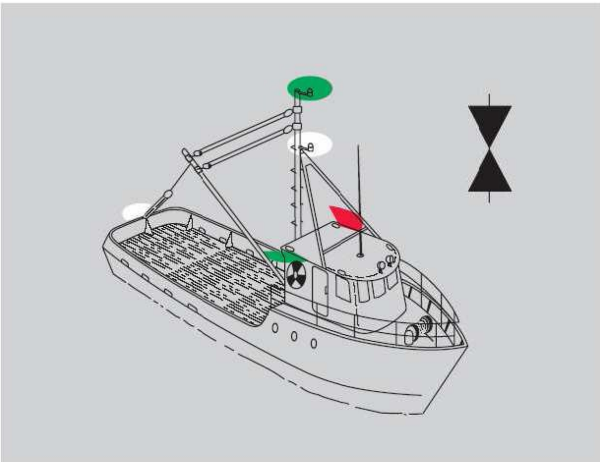
(iii) when making way through the water, in addition to the lights prescribed in this paragraph, sidelights and a stern light.



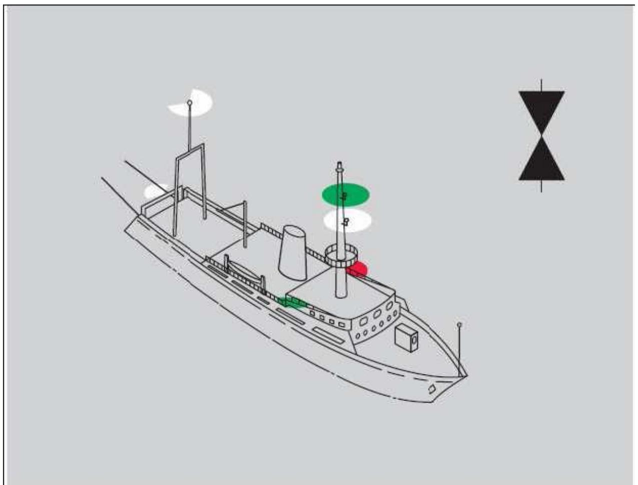
Vessel engaged in trawling—not making way. Same for Inland.



Vessel engaged in trawling—not making way; vessel less than 50 meters in length. Same for International.



Vessel engaged in trawling—making way; vessel less than 50 meters in length. Same for Inland.



Vessel engaged in trawling—making way. Same for International.

INTERNATIONAL AND INLAND SAME

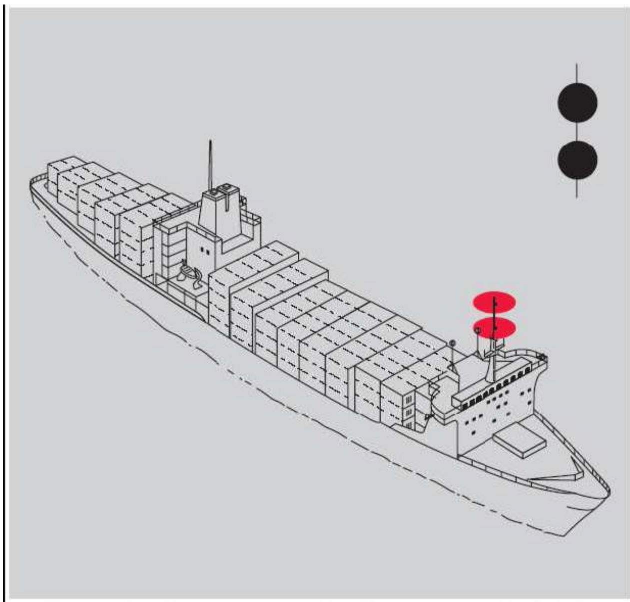
g. Not under command [Rule 27, Pg. 88]

A vessel not under command shall exhibit:

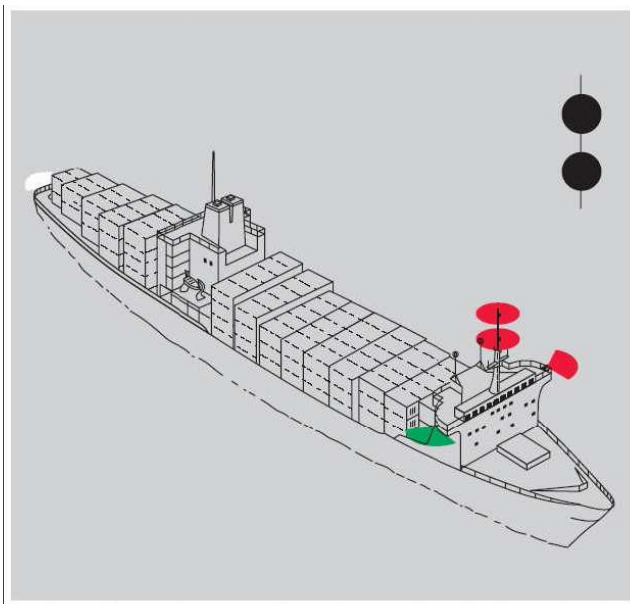
(i) two all-round red lights in a vertical line where they can best be seen;

(ii) two balls or similar shapes in a vertical line where they can best be seen;

(iii) when making way through the water, in addition to the lights prescribed in this paragraph, sidelights and a stern light.



Vessel not under command—not making way. Same for Inland.



Vessel not under command—making way. Same for International.

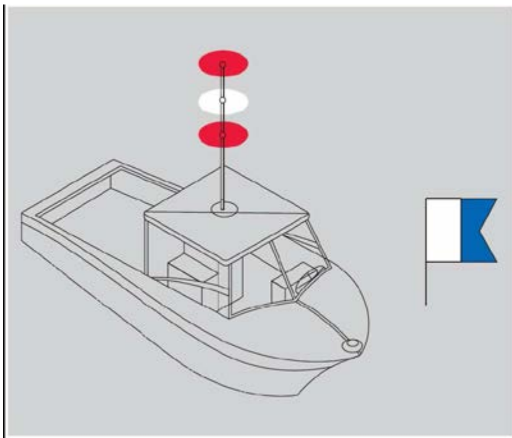
INTERNATIONAL AND INLAND SAME

h. Diving [Rule 27, Pg. 88]

Whenever the size of a vessel engaged in diving operations makes it impracticable to exhibit all lights and shapes prescribed in paragraph (d) of this Rule, the following shall be exhibited:

(i) three all-round lights in a vertical line where they can best be seen. The highest and lowest of these lights shall be red and the middle light shall be white;

(ii) a rigid replica of the International Code flag “A” not less than 1 meter in height. Measures shall be taken to ensure its all-round visibility.

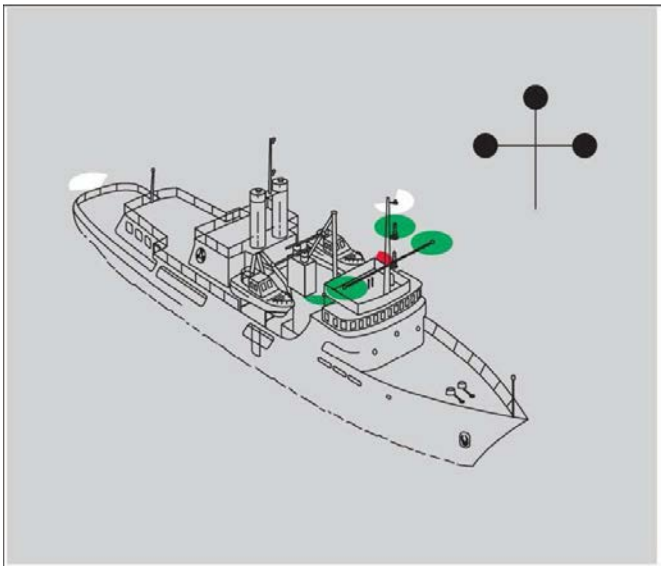


Small vessel engaged in diving operations. Same for International.

BOTH INTERNATIONAL AND INLAND

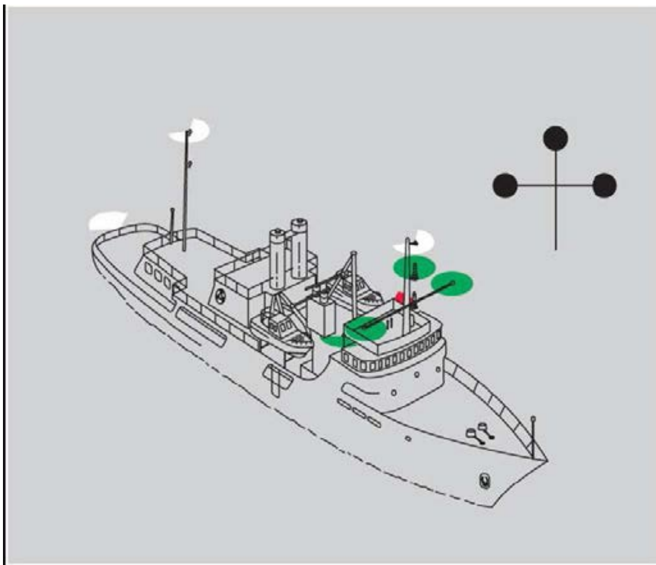
i. Mine countermeasures [Rule 27, Pg. 88]

A vessel engaged in mine clearance operations shall, in addition to the lights prescribed for a power-driven vessel in Rule 23 or to the lights or shape prescribed for a vessel at anchor in Rule 30 as appropriate, exhibit three all-round green lights or three balls. One of these lights or shapes shall be exhibited near the foremast head and one at each end of the fore yard. These lights or shapes indicate that it is dangerous for another vessel to approach within 1000 meters of the mine clearance vessel.



Vessel engaged in mineclearance operations—vessel less than 50 meters in length. Same for Inland.

INTERNATIONAL AND INLAND SAME

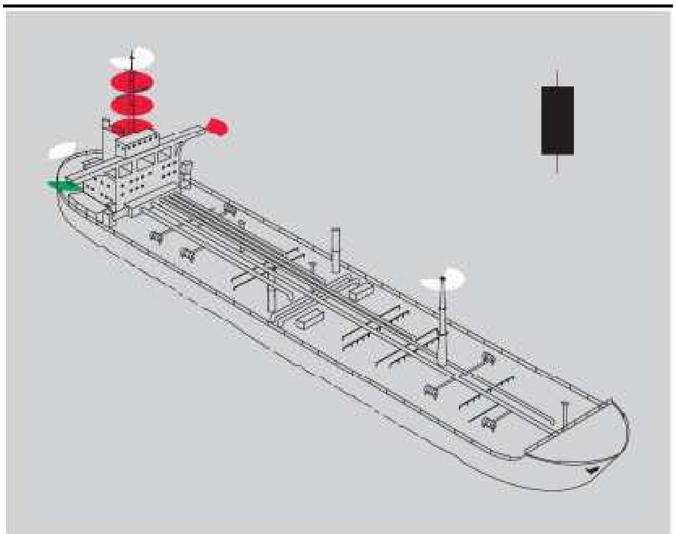


Vessel engaged in mineclearance operations. Same for International.

Vessel greater than 50 meters.
INTERNATIONAL AND INLAND SAME

j. Vessel constrained by draft [Rule 28, Pg. 102]

A vessel constrained by her draft may, in addition to the lights prescribed for powerdriven vessels in Rule 23, exhibit where they can best be seen three all-round red lights in a vertical line, or a cylinder.



Vessel constrained by her draft.

k. Pilot vessel [Rule 29, Pg. 104]

A vessel engaged on pilotage duty shall exhibit:

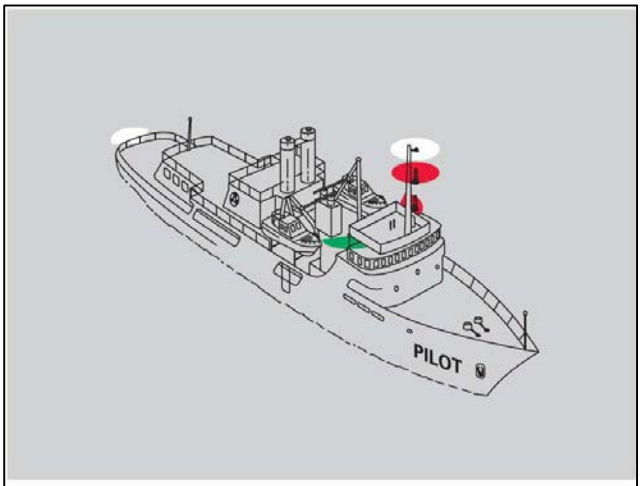
(i) at or near the masthead, two all-round lights in a vertical line, the upper being white and the lower red;

(ii) when underway, in addition, sidelights and a sternlight;

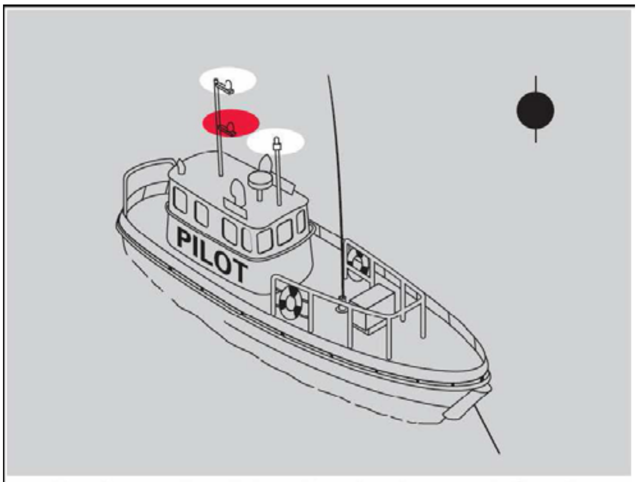
(iii) when at anchor, in addition to the lights prescribed in subparagraph

(iv), the light, lights or shape prescribed in Rule 30 for vessels at anchor.

A pilot vessel when not engaged on pilotage duty shall exhibit the lights or shapes prescribed for a similar vessel of her length.



Vessel engaged on pilotage duty—underway. Same for Inland.



Vessel engaged on pilotage duty—at anchor; vessel of less than 50 meters in length. Same for International.

BOTH INTERNATIONAL AND INLAND

l. Anchored vessel [Rule 30, Pg. 106]

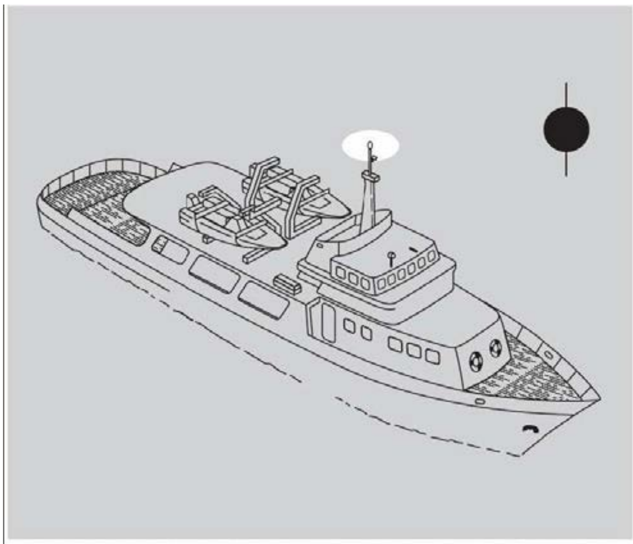
A vessel at anchor shall exhibit where it can best be seen:

(i) in the fore part, an all-round white light or one ball;

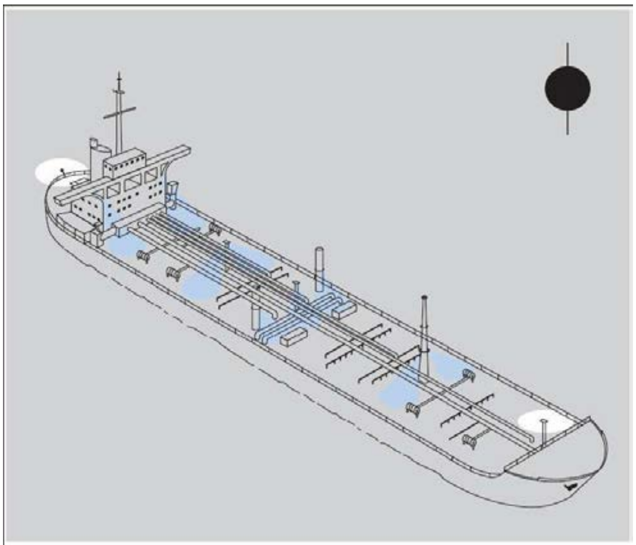
(ii) at or near the stern and at a lower level than the light prescribed in subparagraph (i), an all-round white light.

A vessel of less than 50 meters in length may exhibit an all-round white light where it can best be seen instead of the lights prescribed in paragraph (a) of this Rule.

A vessel at anchor may, and a vessel of 100 meters and more in length shall, also use the available working or equivalent lights to illuminate her decks.



Vessel at anchor—less than 50 meters in length. Same for Inland.



Vessel at anchor with deck illumination. Same for International.

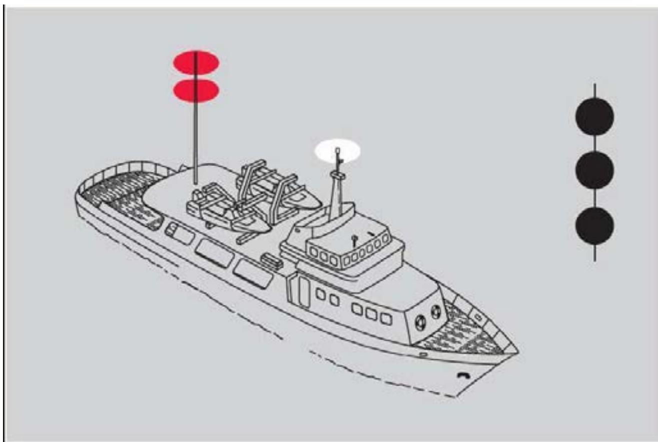
BOTH INTERNATIONAL AND INLAND

m. Vessel a ground [Rule 30, Pg. 106]

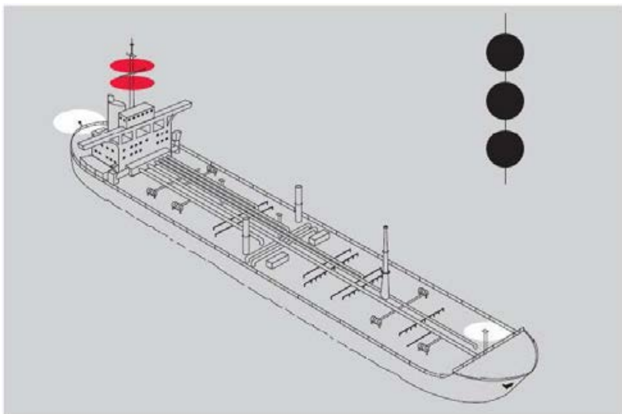
A vessel aground shall exhibit the lights prescribed in paragraph (a) or (b) of this Rule and in addition, if practicable, where they can best be seen:

(i) two all-round red lights in a vertical line; and

(ii) three balls in a vertical line.



Vessel aground—less than 50 meters in length.
Same for International.



Vessel aground. Same for Inland.

INTERNATIONAL AND INLAND SAME

105.22 Define the following sound signals and how long they are sounded: [Ref e]

a. Prolonged blast [Rule 32, Pg. 114]

The term “prolonged blast” means a blast of from 4 to 6 seconds’ duration.

b. Bell [Rule 33, Pg. 114]
c. Gong [Rule 33, Pg. 114]

(a) A vessel of 12 meters or more in length shall be provided with a whistle and a bell and a vessel of 100 meters or more in length shall, in addition, be provided with a gong, the tone and sound of which cannot be confused with that of the bell. The whistle, bell and gong shall comply with the specifications in Annex lII to these Rules. The bell or gong or both may be replaced by other equipment having the same respective sound characteristics, provided that manual sounding of the prescribed signals shall always be possible.

(b) A vessel of less than 12 meters in length shall not be obliged to carry the sound signaling appliances prescribed in paragraph (a) of this Rule but if she does not, she shall be provided with some other means of making an efficient sound signal.

d. Short blast [Rule 32, Pg. 114]

The term “short blast” means a blast of about 1 second’s duration.

105.23 Explain the following sound signals as used by a vessel in international waters and inland waters, as applicable: [Ref. e, Rule 34, Pg. 116]

a. One short blast
b. Two short blasts
c. Three short blasts

INTERNATIONAL MEETING OR CROSSING
—one short blast to mean “I am altering my course to starboard”;
—two short blasts to mean “I am altering my course to port”;
—three short blasts to mean “I am operating astern propulsion”.

INLAND MEETING OR CROSSING
(a) When power-driven vessels are in sight of one another and meeting or crossing at a distance within half a mile of each other, each vessel underway, when maneuvering as authorized or required by these Rules:

(i) shall indicate that maneuver by the following signals on her whistle: one short blast to mean “I intend to leave you on my port side”; two short blasts to mean “I intend to leave you on my starboard side”; and three short blasts to mean “I am operating astern propulsion”.

(ii) upon hearing the one or two blast signal of the other shall, if in agreement, sound the same whistle signal and take the steps necessary to effect a safe passing. If, however, from any cause, the vessel doubts the safety of the proposed maneuver, she shall sound the danger signal specified in paragraph (d) of this Rule and each vessel shall take appropriate precautionary action until a safe passing agreement is made.

INLAND OVERTAKING
(c) When in sight of one another:

(i) a power-driven vessel intending to overtake another powerdriven vessel shall indicate her intention by the following signals on her whistle: one short blast to mean “I intend to overtake you on your starboard side”; two short blasts to mean “I intend to overtake you on your port side”; and

(ii) the power-driven vessel about to be overtaken shall, if in agreement, sound a similar sound signal. If in doubt she shall sound the danger signal prescribed in paragraph (d).

d. Five or more short blasts

When vessels in sight of one another are approaching each other and from any cause either vessel fails to understand the intentions or actions of the other, or is in doubt whether sufficient action is being taken by the other to avoid collision, the vessel in doubt shall immediately indicate such doubt by giving at least five short and rapid blasts on the whistle. This signal may be supplemented by a light signal of at least five short and rapid flashes.

e. Two prolonged and one short blast
f. Two prolonged and two short blasts
g. One prolonged, one short, one prolonged, one short blast

INTERNATIONAL OVERTAKING (Narrow Channel)
(c) When in sight of one another in a narrow channel or fairway:

(i) a vessel intending to overtake another shall in compliance with Rule 9(e)(i) indicate her intention by the following signals on her whistle:

—two prolonged blasts followed by one short blast to mean “I intend to overtake you on your starboard side”;
—two prolonged blasts followed by two short blasts to mean “I intend to overtake you on your port side”.

(ii) the vessel about to be overtaken when acting in accordance with Rule 9(e)(i) shall indicate her agreement by the following signal on her whistle:

—one prolonged, one short, one prolonged and one short blast, in that order.

105.24 State the optional signal that may be sounded by a vessel at anchor or aground to warn an approaching vessel of a possible collision. [Ref. e, Rule 35, Pg. 120]

A vessel at anchor shall at intervals of not more than one minute ring the bell rapidly for about 5 seconds. In a vessel of 100 meters or more in length the bell shall be sounded in the forepart of the vessel and immediately after the ringing of the bell the gong shall be sounded rapidly for about 5 seconds in the after part of the vessel. A vessel at anchor may in addition sound three blasts in succession, namely one short, one prolonged and one short blast, to give warning of her position and of the possibility of collision to an approaching vessel.

A vessel aground shall give the bell signal and if required the gong signal prescribed in the paragraph above this Rule and shall, in addition, give three separate and distinct strokes on the bell immediately before and after the rapid ringing of the bell. A vessel aground may in addition sound an appropriate whistle signal.

105.25 Describe the signals that may be used to attract attention or to indicate distress. [Ref. e, Rules 36, 37, Pg. 124-126]

If necessary to attract the attention of another vessel, any vessel may make light or sound signals that cannot be mistaken for any signal authorized elsewhere in these Rules, or may direct the beam of her searchlight in the direction of the danger, in such a way as not to embarrass any vessel.

105.26 Discuss an Emergency Destruction Plan including destruction of classified material and equipment. [Ref. g]

Each service member should review there CO’s standing orders. Most

105.27 State the appropriate sound signal to be sounded by a vessel in restricted visibility for each of the following conditions: [Ref. e, Rule 35, Pg. 120]

a. **Power-driven vessel underway with no way on:**
Two prolonged blasts every 2 minutes with approximately 2 seconds between.

b. **Sailing vessel underway:**
One prolonged followed by two short blasts every 2 minutes.

c. **Power-driven vessel towing:**
One prolonged followed by two short blasts every 2 minutes.

d. **Power-driven vessel underway with way on:**
One prolonged blast every 2 minutes.

e. **Vessel constrained by draft:**
One prolonged followed by two short blasts every 2 minutes.

f. **Vessel restricted in ability to maneuver:**
One prolonged followed by two short blasts every 2 minutes.

g. **Vessel engaged in fishing:**
One prolonged followed by two short blasts every 2 minutes.

h. **Vessel not under command:**
One prolonged followed by two short blasts every 2 minutes.

i. **Vessel being towed:**
One prolonged followed by three short blasts every 2 minutes.

j. **Vessel engaged in pilot duties**:
A pilot vessel when engaged on pilotage duty may in addition to the signals prescribed above sound an identity signal consisting of four short blasts.

k. Vessel 100 meters or longer at anchor:
A vessel at anchor shall at intervals of not more than 1 minute ring the bell rapidly for about 5 seconds. In a vessel of 100 meters or more in length the bell shall be sounded in the forepart of the vessel and immediately after the ringing of the bell the gong shall be sounded rapidly for about 5 seconds in the after part of the vessel. A vessel at anchor may in addition sound three blasts in succession; namely, one short, one prolonged and one short blast, to give warning of her position and of the possibility of collision to an approaching vessel.

l. Vessel under 100 meters at anchor:
A vessel at anchor shall at intervals of not more than 1 minute ring the bell rapidly for about 5 seconds.

m. Vessel aground:
A vessel aground shall give the bell signal and if required the gong signal prescribed in paragraph (k) of this Rule and shall, in addition, give three separate and distinct strokes on the bell immediately before and after the rapid ringing of the bell. A vessel aground may in addition sound an appropriate whistle signal.

106 Seamanship

References:
[a] NAVEDTRA 14343, Boatswain's Mate
[b] USCG COMDTINST M16114.5B, Boat Crew Seamanship Manual
[c] NAVEDTRA 14067, Seaman
[d] 59086-TW-STM-010/CH-582 Mooring and Towing

106.1 Discuss the following Boat Nomenclature and Terminology: [Ref. b, Ch. 8 Pg. 3-5]

a. Port and Starboard Bows

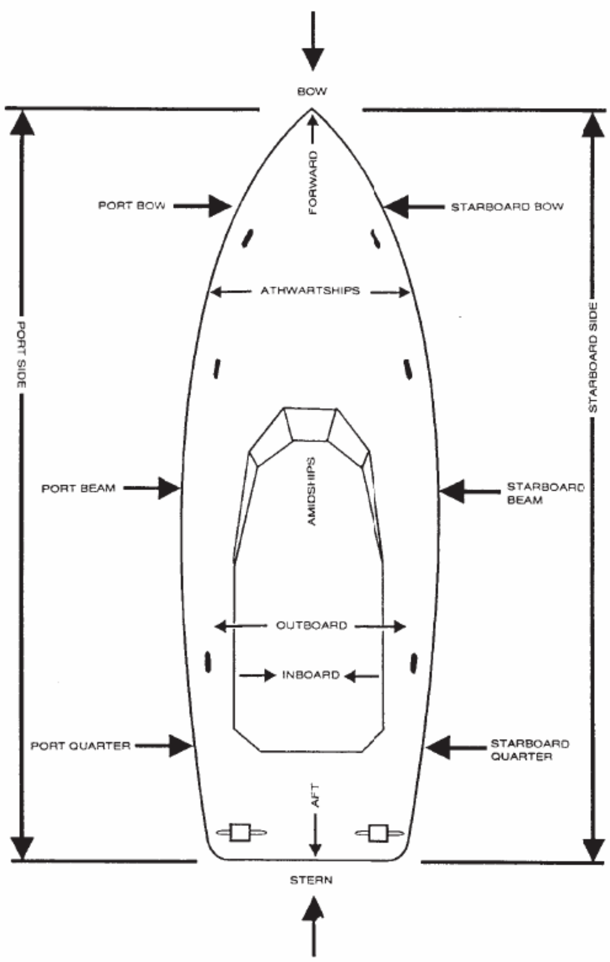
The front end of a boat is the bow. When you move toward the bow, you are going forward; when the boat moves forward, it is going **ahead**. When facing the bow, the front right side is the **starboard bow**, and the front left side is the **port bow**.

b. Stern, including Port and Starboard Quarters

The rear of a boat is the stern. When you move toward the stern, you are going **aft**. When the boat moves backwards, it is going **astern**. If you are standing at the stern looking forward, you call the right rear section the **starboard quarter** and the left rear section the **port quarter**.

c. Amidships, including Port and Starboard Beams

The central or middle area of a boat is amidships. The right center side is the **starboard beam**, and the left center side is the **port beam**.



Position and Direction Aboard Boats
Figure 8-1

d. Athwart ship

A line or anything else running from side to side.

e. Outboard and Inboard

Outboard: From the centerline of the boat toward either port or starboard side.
Inboard: From either side toward the centerline. However, there is a variation in the use of outboard and inboard when a boat is tied up alongside something (e.g., pier or another vessel). The side tied up is inboard; the side away is outboard.

f. Fore and Aft

A line, or anything else, running parallel to the centerline of a boat.

106.2 Identify and discuss the types of line. [Ref. b, Ch. 7 Pg. 3]

Most lines are made of nylon with a circumference of between 5/8” - 1” because the breaking and abrasion and stretch characteristics of nylon is superior to polyester and polypropylene. The NECC craft are required to have 150’ of anchor line.

106.3 Define the following terms:

a. Bight [Ref. b, Ch. 7 Pg. 36]
Loop around a cleat or bitt.

b. Bitter end [Ref. b, Ch. 7 Pg. 36]
The running end or the free end of a line. It is the end of the line that is worked with.

c. Splice [Ref. a, Ch. 2 Pg. 10]
Weaving two separate lines together as one.

d. Eye [Ref. c Ch 3 Pg. 10]
The end of a line that has been backspaced leaving a hole in the middle.

e. Whipping [Ref. b, Ch. 7 Pg. 59]
After splicing a line, taking the bitter end and wrapping small twine around each strand to prevent fraying.

f. Bend [Ref. c, Ch.3 Pg. 11]
A bend is normally used to join two lines together.

g. Chafing gear [Ref. b, Sec. c Pg. 17-8]

Usually canvas material used to wrap a line to prevent it from rubbing on an object and fraying

106.4 Discuss the following types of deck fittings: [Ref. a, Ch. 3 Pg. 3-3 thru 3-4]

a. Bollard

Is a strong cylindrical upright on a pier over which the eye (or bight) of a ships mooring line is placed.

b. Cleat

Is a device consisting of a double ended pair of projecting horns used for belaying a line or wire.

c. Bitts

Are heavy vertical cylinders, usually arranged in pairs, which are used for making fast lines that has been led through chocks. The upper end of a bitt is either larger that the lower end or is fitted with a lip to keep lines from slipping off accidentally. When constructed in pairs, each bitt is sometimes called a barrel.

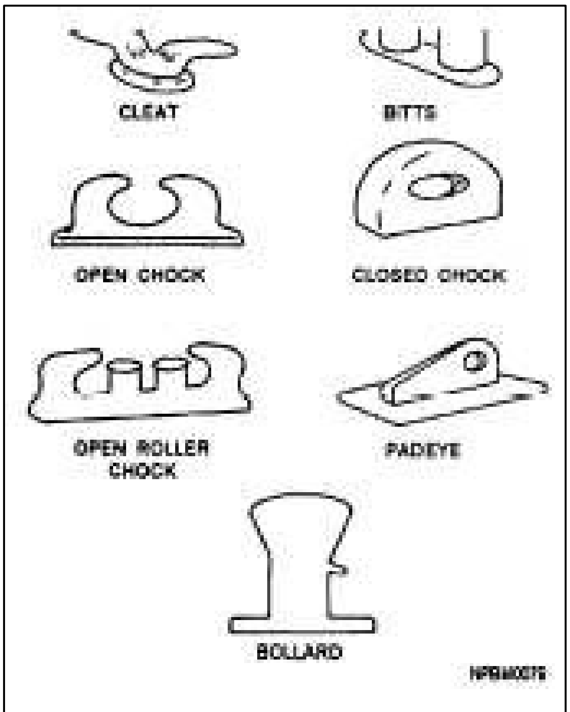


Figure 3-3.—Various deck fittings.

d. Chock

Is a heavy fitting with smooth surfaces through which a mooring line is fed. There are three types of chocks:

Open chock –Mooring chock that is open at the top.
Closed chock –Mooring chock closed by an arch of metal across the top.
Roller chock –Is a mooring chock that contains a roller for reducing friction.

e. Pad eye

Is a plate with an "eye" attached, welded to the deck to distribute the strain over a large area, and to which a block can be hooked or shackled. A padeye can also be used in towing.

106.5 Discuss the stretching characteristics of synthetic line. [Ref. a, Ch. 2 Pg. 2-5]

Synthetic lines have higher breaking strengths than equal sizes of manila line. The synthetic fibers currently used for making line are nylon, aramid, polyester (Dacron) polypropylene, and polyethylene in descending order of strength**.**

106.6 Define and discuss the following: [Ref. c, Ch. 3 Pg. 3-7]

a. Coiling line

The most common method of stowing the extra line on deck or on the dock after making fast to a cleat is to coil it.

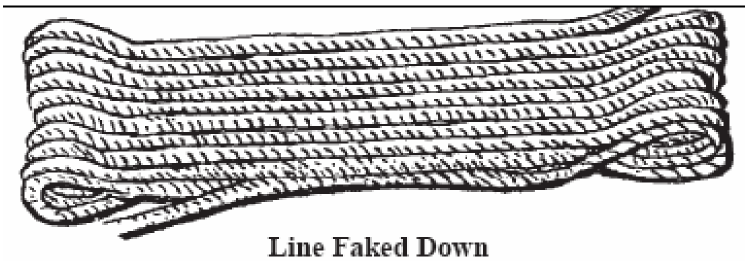
b. Faking down

The act of disposing of a line, wire or chain by laying it out in long, flat bights laid one alongside the other.

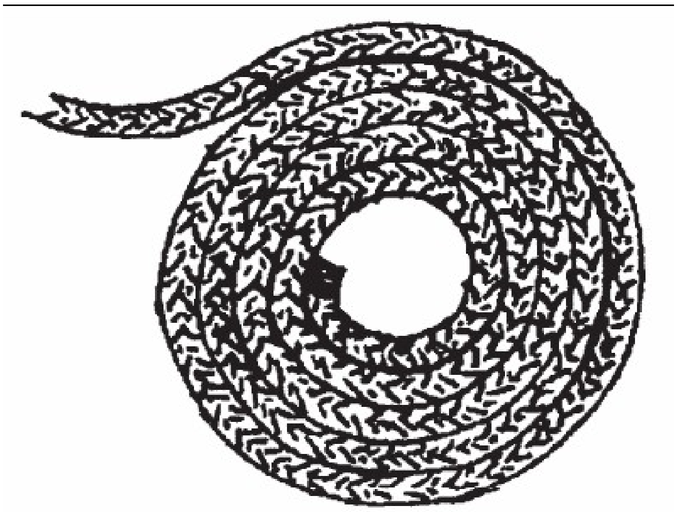
c. Flemishing

Flemishing a line consists of coiling a line clockwise against the deck. It is used for appearance (eg: inspections, seamanlike appearance).

Figure Eight Coils



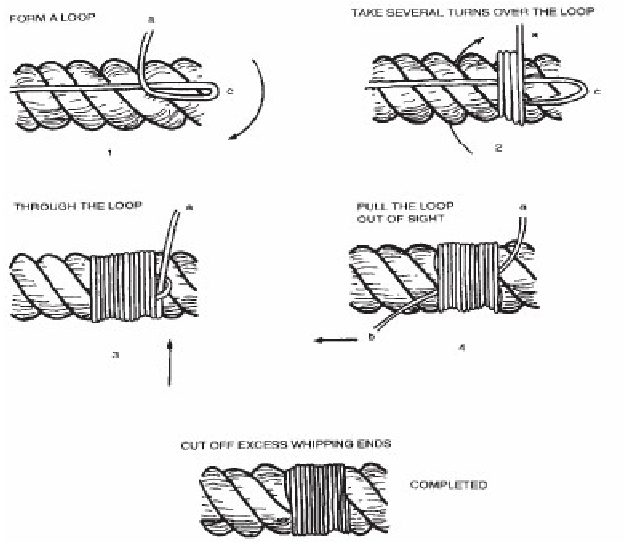
Line Faked Down



Flemishing a Line

106.7 Discuss the proper method of whipping a bitter end. [Ref. b, Ch. 7 Pg. 7-21]

Sometimes called the common whipping, temporary whippings make temporary repairs and secure strands of lines while splicing. They are not very durable and easily unravel if snagged. They are normally done using sail twine, although almost any small stuff will do. The procedures below instruct how to make temporary whipping.
Step Procedure



1. Cut a piece of sail twine or small stuff, in length about ten times the circumference of the line being seized.

2. Lay the sail twine or small stuff alongside the line to be whipped (See figure 7-33.)

3. Form an overhand loop in the sail twine or small stuff such that the loop extends about 1/2" beyond the end.

4. Holding end "a," make a series of turns over the loop toward the bitter end of the line. Make enough so the length of the turns are about equal to the diameter of the line.

5. Slip end "a" through the loop "c."

6. Secure by pulling loop end from sight by pulling on "b."

7. Cut off excess whipping ends or secure them by tying them together with a reef or square knot.

106.8 Discuss the purpose and how to tie the following types of knots:
[Ref. c, Ch. 3 Pg. 3-10 through 3-14]

a. Bowline

The bowline (fig. 3-15) is the standby for putting a loop in the end of a line. It neither slips nor jams, yet unties easily. A bowline is the best knot to use for bending a heaving line or messenger to the eye of a hawser because it is quick to tie and easy to get off.

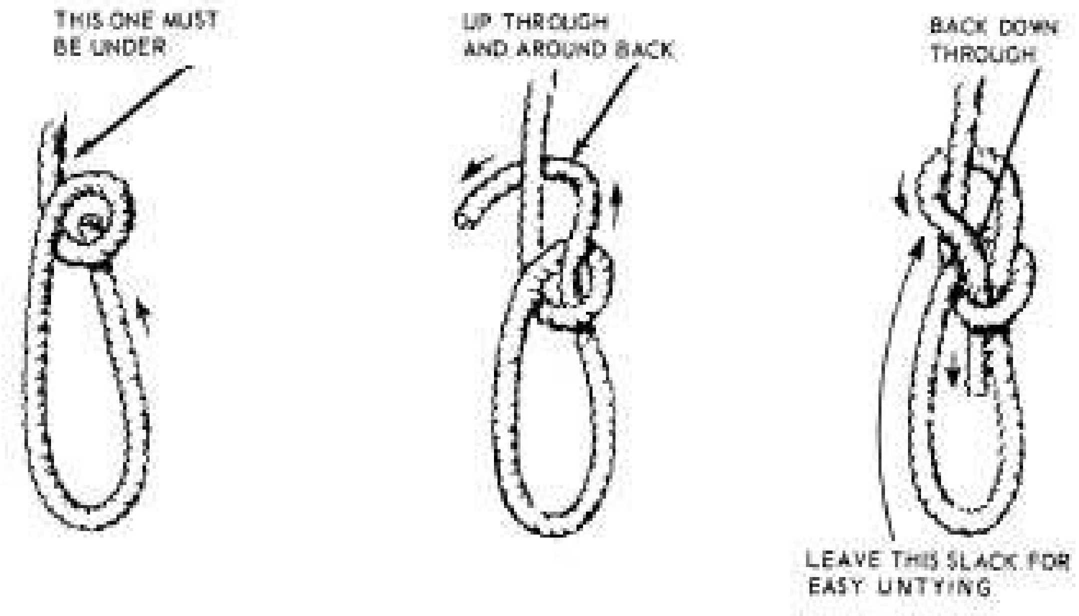


Figure 3-15.–Tying a bowline.

b. Bowline on a bight

The single bowline on a bight comes in handy whenever you need an eye in the center of a line. It can be tied quickly, does not jam tight, and you do not need an end of the line to tie it. To get your securing lines taut, use a single bowline on a bight for securing equipment or cargo.
Tie the knot well up on the standing part and run the bitter end around a stanchion or through a pad eye and back through the eye of the knot. Heave back on the bitter end in a line between the knot and stanchion or pad eye. This gives the same effect as having a block on the line at the knot and, discounting friction, doubles your pull. Heave it taut and secure the end. To tie this knot, form bights A and B, as shown in view 1 of figure 2-21. Next, lay part C between bights A and B, as shown in the second view. Then reach through bight A, over part C, and pull bight B back through A. Tighten by pulling on part D and bight B. (The completed knot is shown in view 3.)

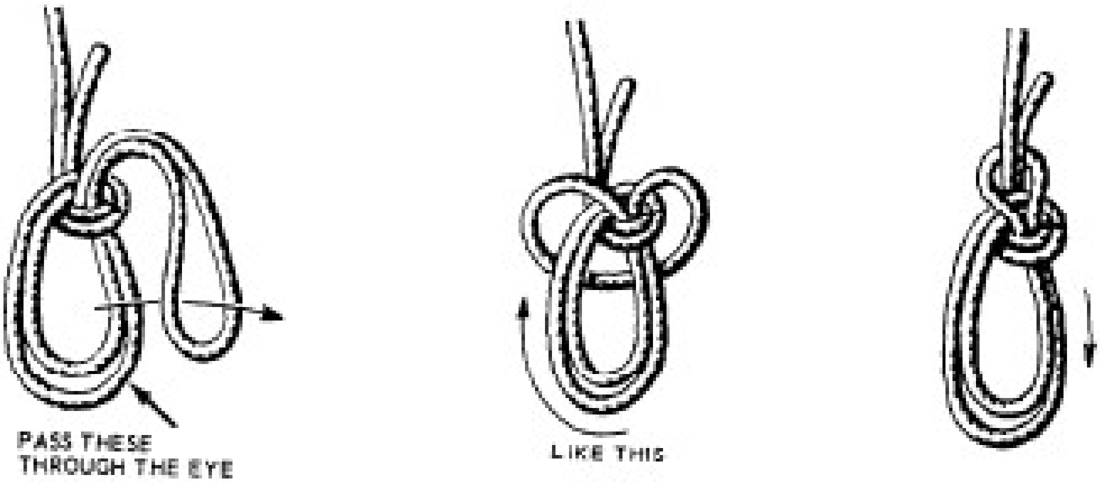


Figure 3-11.–Bowline on a bight.

c. Square knot

For a square knot, both parts of the line must be under the same bight. If one part is up and the other part is down, you have a granny knot, which is of no use to any seaman. Figure 3-12 shows how to get a square knot every time.

Here is the proper procedure for tying a square knot: Take the end in your right hand, say to yourself, "over-under," and pass it over and under the part in your left hand, as shown. With your right hand take the

end that was in your left, say to yourself this time, "under-over," and pass it under and over the part in your left hand.

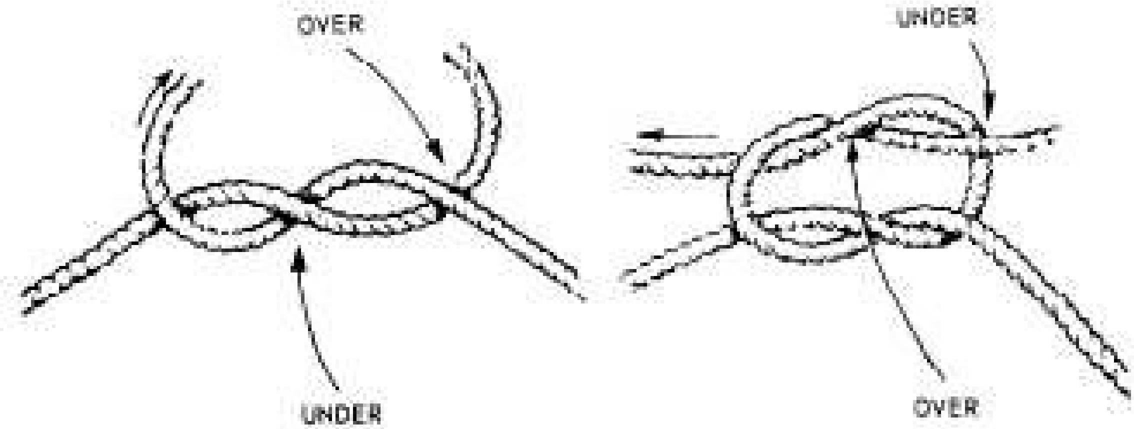


Figure 3-12.–Square knot.

d. Clove hitch

A clove hitch is the best all-round knot for bending to a ring, spar, or anything else that is round or nearly round. This is such a fine knot that the old-time seamen used to call a man who was worth his salt “all in a clove hitch.” Figure 3-19 shows you how to throw one.

A clove hitch will not jam and seldom pulls out. A slack clove hitch, as on a boat painter, however, might work itself out. For that reason, it is a good idea to put a half hitch in the end as in figure 3-20. A half hitch, by the way, never becomes a whole hitch. Put another one on, and all you have is two half hitches, as shown.

The slight disadvantage a clove hitch might have is that it can slide along a slippery spar when the strain is along the spar. The knot that cannot slide this way is the stopper hitch (fig. 3-21). This knot is especially useful for bending a boat painter to a larger line whose end is unavailable. It jams tight on a hard strain, however.

Figure 3-19.–Throwing a clove hitch.

106.9 Discuss the proper method of securing a boat to a pier under the following conditions: [Ref. d, Sec. 3 Pg. 32]

a. Normal conditions

Fenders over with bow and stern line secured to pier or floating dock.

b. In heavy weather

Same as above, doubling up lines, plus the use of spring lines.

d. In areas with a large tidal range

Leaving enough slack in the lines to accommodate for the tide variance.

106.10 Discuss the proper way to rig fenders. [Ref. a, Ch. 3 Pg. 3-4]

- The main objective of fenders is to protect the boat from the pier or another boat
- Fenders should be placed in so that would have the most contact with the pier
- In heavy weather more fenders should be used and staggered to prevent additional damage

106.11 Define and discuss the following line handling terms: [Ref. a, Ch. 2 Pg. 2-23]

a. **Heave around:** Haul in on a line, wire or chain, by means of a powered heaving engine. The call on a boatswain's pipe, that is the signal to start heaving around.

b. **Hold:** Hold what you have, do not take in or let out any line.

c. **Check:** Expresses the general idea to slow. To check a line running out under strain means to allow only enough of it to render around the bitts to prevent the line from parting.

d. **Ease:** relax the strain on the line.

e. **Pay out (Ref. c, AI-7):** expresses the idea to feed out past tense is payed out.

f. **Take the slack out:** take in as much line as needed to make it taut.

g. **Take a strain:** heave around on the line to the point where it is pulling.

h. **Take a turn (Ref. c, AI-9):** take a turn on a cleat, bitt or bollard, to prevent the line from loosening.

i. **Take in:** bring all the line on deck.

j. **Make fast (Ref. c, AI-2):** secure the line to the cleat or bitt.

106.12 Discuss the use of spring lines to assist in mooring and getting underway. [Ref. b, Ch. 10D Pg. 10-62]

When mooring port side too, the bow line could be secured to a bitt, bollard or cleat, and by putting the rudder full left the coxswain could back down on his engine pulling the stern in, or by putting the rudder full right could go forward to accomplish the same thing. When going starboard side too, the opposite actions would be done.

When getting underway from port side, using the bow line, full left rudder, engine ahead will move the stern out from the pier, the shifting the rudder the boat could then back down and away from the pier, the opposite would apply for a starboard side getting underway It is not advised to use the stern line for a spring line when getting underway.

106.13 Discuss the proper method for storing lines. [Ref. c, Ch. 3 Pg. 3-3]

- Anchor and towing lines should be flemished or faked down, then using twine, tied at four to six sections of the line and stored in a cool dry location on the craft.
- Mooring lines should be faked on deck or flemished over a railing.
- Upon completion of towing or anchoring the line should be cleaned in fresh water and allowed to dry.

107 Launch and Recovery

References:
[a] Craft Specific Boat Information Book
[b] NAVEDTRA 14343, Boatswain's Mate
[c] Unit Standard Operating Procedures
[d] NSTM S9086-TX-STM-010/CH-583R3, Boats and Small Craft

107.1 Discuss safety precautions to be observed when hoisting and lowering a boat. [Ref. b, Ch. 5, Pg. 5-6 through 5-7)

Because boats of a given type frequently differ in details of design, you will find that slings for a given boat are not always suitable for use on all other boats of that type. For this reason, slings are marked at the time of manufacture with copper bands showing the type of boat for which they were made. The issuing shipyard adds to the bands the number of the boat for which the slings are issued.

Each sling, after manufacture, must be tested for a 100-percent-over-normal working load; and when issued, a copper seal must be attached, stating the date, where, and by whom the sling was last tested. Any repair activity that has the capability of testing slings, hoisting shackles, rods, pins, chain links, and rings following the applicable plans is authorized to manufacture such equipment following the applicable plans.

Manufacture of slings cannot be accomplished if the equipment is available as a standard stock item.

Before your unit accepts a newly issued, repaired, or altered set of slings, the slings must be tested for fit by hoisting the boat with them, using the normal hoisting equipment.

HOISTING OUT: Regardless of when or how a boat is hoisted out of the water, the coxswain is responsible for making the boat ready and for getting the crew into the boat. The coxswain will ensure that all pre-underway checks are complete. When the boat is ready in all respects and each member of the crew is wearing a life jacket and hard hat, the coxswain reports to the BM in charge.

NEVER ALLOW A SAILOR TO WORK UNDERNEATH A HOISTED LOAD

107.2 Discuss safety precautions to be observed when launching/recovering a boat from/to trailer. [Ref. a]

First and for most always conduct a launch / recovery brief as well as an ORM brief before conducting any launch / recovery operations.

For specific launch / recovery requirements review that Craft's Specific Boat Information Book.

107.3 Define and discuss the roles of the following when launching and recovering a boat on a ramp: [Ref. c]

The fallowing is a general listing of what each one of the launch and recovery roles are, for a detailed role for each position review the standard operating procedures with in ones own command.

Define and discuss the roles of the following when launching and recovering a boat on a ramp: [Ref. c]

a. Launching and recovering supervisor

The launching and recovering supervisor is over all responsible for the entire evolution. The LNR will direct the actions of the coxswain prier to lunch the winch man and the ground guide.

b. Boat coxswain

The boat coxswain is responsible for safety of the craft and crew when getting underway and during the recovery of the craft.

c. Prime mover operator

The prime mover operator is responsible for safely guiding the trailer (and boat) down the ramp and back up.

d. Safety observer

The safety observers is responsible for the over all safety of the entire evolution. Though everyone has the power to stop the launch and recovery of a craft the safety observer is charged with checking for a safe environment for the evolution.

e. Ground guide

The ground guide is responsible for guiding the prime mover down and back up the boat ramp safely.

f. Winch man

The winch man is responsible for the safe operation of the boat winch when releasing and revering a craft.

107.4 Discuss the proper method of using a boat hoist to launch/recover the craft.
[Ref.a]

The fallowing is a general listing of how to launch and recovery using a hoist, for a detailed guide review the standard operating procedures with in ones own command.

Launching by Hoist, Ashore and Afloat.

- Ensure sufficient water depth below hoist.
- Ensure all gear is on board and properly stowed. Outdrive should be in up position.
- Perform all pre-underway engine and communications checks.
- Check hoist area for any hazards during launching.
- Check hoist and sling ensure all weight tests are current.
- Connect sling to boats hoisting points.
- Using hoist, place boat in water.

NOTE: Sea painter may be required.

- Once the craft is in the water the boat crew will board the boat.
- Start engine and perform engine and steering checks. Energize any additional gear required (Comm gear, depth finder, running lights etc.). Raise ensign.
- Disconnect sling from boat and launch boat.
- Retrieve slings and stow hoist.

Recovering by Hoist, Ashore and Afloat.

- Ensure sufficient water depth below hoist.
- Ensure all gear is on board and properly stowed.
- Check hoist area for any hazards during launching.
- Check hoist and sling ensure all weight tests are current.
- Coxswain approaches hoisting point at bare steerage.
- Lower sling to boat and attach sling to boats hoisting points.
- Secure engine and all other energized equipment. Raise outdrives to up position.
- Boat crew will disembark.
- Using hoist, retrieve boat from water.
- Place boat on trailer or skid and secure.
- Disconnect sling from boat and stow hoist.

107.5 Discuss the proper method to launch/recover the craft from/to trailer. [Ref. a]

The fallowing is a general listing of what each one of the launch and recovery positions are to do during the lunch and recovery of a craft, for a detailed role for each position review the standard operating procedures with in ones own command.

LAUNCHING

a. Launching and recovering supervisor

- Will ensure boat bilge plug is in and secure.
- Will ensure that no obstructions are on or around the boat ramp.
- Will verify no obstructions or traffic in channel aft of the boat ramp.
- Check for personnel standing behind the prime mover while backing down the boat ramp.
- Will establish COMMS with boat crew prior to the boat backing down the ramp.
- Ensure that the ground guide is in sight of the driver of the prime mover at all times by standing by the rear of the prime mover
- Ensure the driver backs into water until the lower unit can be submerged and the trailer is submerged to the watermarks. Ground Guide will chock prime mover under direction of the launching and recovering supervisor.
- Will direct the winch man to disconnect winch cable and safety hook from the craft.
- Launching Supervisor will give permission to the Coxswain to get underway when all operating temperatures are stable and engines are at idle.
- Launching Supervisor will direct the ground guide to remove and stow wheel chocks and direct driver to pull the trailer out of the water and drive the prime mover and the trailer off the ramp under recommendations from ground guide.

b. Boat coxswain

- Will ensure boat bilge plug is in and secure.
- Will establish COMMS with Safety Observer prior to the boat backing down the ramp.
- Ensures transmissions are in neutral positions before starting engines.
- Start engines and have engineer ensure that there is cooling water flow and all gauges are within operating parameters.
- Coxswain then will back off trailer and be in command of the craft. Coxswain will drive boat to pier or dock and tie up.

c. Prime mover operator

- Will fallow the directions from the ground guide only, but alimentally the prime mover operator is responsible for backing the trailer down safely.
- Will disconnect the trailer lights cable and pull chocks from prime mover.

d. Safety observer

- Will ensure boat bilge plug is in and secure.
- Will ensure that no obstructions are on or around the boat ramp.
- Will verify no obstructions or traffic in channel aft of the boat ramp.
- Check for personnel standing behind the prime mover while backing down the boat ramp.
- Ensure that the ground guide is in sight of the driver of the prime mover at all times by standing by the rear of the prime mover
- Launching Supervisor will direct the ground guide to remove and stow wheel chocks and direct driver to pull the trailer out of the water and drive the prime mover and the trailer off the ramp under recommendations from ground guide.
- Once the prime mover is parked in place the ground guide will chock prime mover wheels.
- Perform Trailer PMS as appropriate.

e. Ground guide

- Make all signals clearly visible to the driver of the prime mover through the mirrors.
- Direct the prime mover down the ramp into the water, staying in the middle of the ramp using visual reference points on the ramp.
- Ensure the driver backs into water until the lower unit can be submerged and the trailer is submerged to the watermarks. Ground Guide will chock prime mover under direction of the launching and recovering supervisor
- Launching Supervisor will direct the ground guide to remove and stow wheel chocks and direct driver to pull the trailer out of the water and drive the prime mover and the trailer off the ramp under recommendations from ground guide.
- The following hand signals will be used:
    - Stop/hold
    - Move left
    - Move right
    - Straight backward
    - Move forward

f. Winch man

- Will not move toward the craft and prime mover till told to by the launch and recovery supervisor
- Winch man will disconnect the cable ensuring that the winch is not under tension when releasing the handle ratchet mechanism.
- Winch man will release winch cable tension and payout 12 inches or more, ensuring that the cable is not fouled.

WARNING: The winch men must ensure that the winch cable passes through the bow roller mechanism on the winch stand assembly. Do not place hands or fingers through the bow roller mechanism when releasing the winch hook from the craft.

WARNING: The winch handle may cause serious injury to the winch men if the winch cable is not released prior to launching. Ensure winch operator has positive control of winch handle before releasing winch ratchet mechanism

- Winch man will return to truck bed.

Recovery

a. Launching and recovering supervisor

- Will ensure that no obstructions are on or around the boat ramp.
- Will verify no obstructions or traffic in channel aft of the boat ramp.
- Check for personnel standing behind the prime mover while backing down the boat ramp.
- Will establish COMMS with boat crew prior to the boat approaching the ramp.
- Ensure that the ground guide is in sight of the driver of the prime mover at all times by standing by the rear of the prime mover
- Ensure the driver backs into water until the lower unit can be submerged and the trailer is submerged to the watermarks. Ground Guide will chock prime mover under direction of the launching and recovering supervisor.
- Launching Supervisor will give permission to the Coxswain to make an approach to the trailer.
- Once the boat is on the trailer the LnR sup. direct the winch man to connect winch cable and safety hook to the craft.
- Will direct the winch man can return to the truck bed.
- Launching Supervisor will direct the ground guide to remove and stow wheel chocks and direct driver to pull the trailer out of the water and drive the prime mover and the trailer off the ramp under recommendations from ground guide.

b. Boat coxswain

- Will establish COMMS with Safety Observer prior to the boat backing down the ramp.
- Will make an approach to the boat trailer once permission has been given by the launch supervisor.
- Once on the trailer coxswain will ensures the transmissions are in neutral positions before the winch man leaves the truck bed.
- Winch man will guide the boat coxswain onto the trailer using hand signals, after the boat is on the ramp the winch man will give a distance hand signal to the coxswain showing how far till the craft is all the way on the trailer.

- Once the winch man has secured the boat, the launch supervisor will give the coxswain permission the secured the engines.
- Once the engines are secured the coxswain will have the crew remain seated in the pilot house until the prime mover has pulled to the top of the boat ramp.
- Will have the boat washed down.
- Secure the boat.

c. Prime mover operator

- Will fallow the directions from the ground guide only, but alimentally the prime mover operator is responsible for pulling the trailer up and off the boat ramp safely.
- Will connect the trailer lights cable and pull chocks from prime mover.

d. Safety observer

- Will ensure boat bilge plug is in and secure.
- Will ensure that no obstructions are on or around the boat ramp.
- Will verify no obstructions or traffic in channel around the boat ramp.
- Check for personnel standing behind the prime mover while backing down the boat ramp, and forward of the prime mover when pulling up the ramp.
- Ensure that the ground guide is in sight of the driver of the prime mover at all times by standing by the rear of the prime mover when backing down and forward and off to the side of the prime mover when pulling up.

e. Ground guide

- Make all signals clearly visible to the driver of the prime mover through the mirrors.
- Direct the prime mover down the ramp into the water, staying in the middle of the ramp using visual reference points on the ramp.
- Ensure the driver backs into water until the lower unit can be submerged and the trailer is submerged to the watermarks. Ground Guide will chock prime mover under direction of the launching and recovering supervisor.
- Launching Supervisor will direct the ground guide to remove and stow wheel chocks and direct driver to pull the trailer out of the water and drive the prime mover and the trailer off the ramp under recommendations from ground guide.
- The following hand signals will be used:
    - Stop/hold
    - Move left
    - Move right
    - Straight backward
    - Move forward

f. Winch man

- Will not move toward the craft and prime mover till told to by the launch and recovery supervisor.
- Winch man will guide the boat coxswain onto the trailer using hand signals, after the boat is on the ramp the winch man will give a distance hand signal to the coxswain showing how far till the craft is all the way on the trailer.
- Winch man will connect the cable ensuring that the winch is not under tension when releasing the handle ratchet mechanism.
- Winch man will connect winch cable and take it under, ensuring that the cable is not fouled.

WARNING: The winch men must ensure that the winch cable passes through the bow roller mechanism on the winch stand assembly. Do not place hands or fingers through the bow roller mechanism when releasing the winch hook from the craft.

WARNING: The winch handle may cause serious injury to the winch men if the winch cable is not released prior to launching. Ensure winch operator has positive control of winch handle before releasing winch ratchet mechanism

- Winch man will return to truck bed.

107.6 Discuss inspection and testing requirements for lifting apparatus. [Ref. d, pg 7-1, 583-7.3 through 583-7.4]

INSPECTIONS

GENERAL. All slings, bails, and hoisting fittings shall be visually inspected for proper assembly and condition at least once a month or before each lift and they shall not be used if signs of deterioration are noted. Sockets and shackles shall be checked to ensure the intended pins are used. Before conducting any hoisting test, a careful inspection shall be made of all hoisting fittings, slings, or bails to determine whether the parts are in proper condition. After any load test, inspect all components for signs of permanent deformation, cracking of any of the components or supporting boat structure, elongated holes, or bent shackle or socket pins.

WIRE ROPE SLINGS. Wire rope slings shall be inspected for broken or damaged strands, crimps, kinks, cuts, and corrosion. Inspection and removal shall be in accordance with **NSTM Chapter 613** .

WEBBING SLINGS. Webbing slings shall be inspected for abrasion, tears, cuts, snags, punctures and fraying of the webbing and stitching. Slings exhibiting any of the following shall be removed from service:

a. Acid or caustic burns
b. Melting or charring of any part of the sling

c. Snags, punctures, tears or cuts
d. Broken or worn stitches
e. Distortion of fittings
f. Wear or elongation exceeding amount recommended by manufacturer
g. Other apparent defects that cause doubt as to the strength of the sling
h. Loading of the sling beyond its rated capacity
i. Exposure of Red Guard warning yarn
j. Paint present on any part of webbing

Since new webbing exhibits different stretch characteristics from older webbing, the entire sling should be disposed of in lieu of replacing only the bad sling legs. Tying knots in webbing slings will dramatically reduce the strength of the webbing and is not allowed. Paint will also reduce the strength of the webbing and should not be used for stencilling.

KEVLAR SLINGS. Kevlar slings should be inspected for cuts, abrasions, snagging and badly worn areas in the outer jacket. Extensive damage to outer jacket could indicate damage to inner load bearing core.

Slings exhibiting any of the following shall be removed from service:

a. Core has been cut or damaged
b. Slings have been exposed to excessive heat (greater than 150 degrees Fahrenheit)
c. Slings shave been loaded beyond their rated capacity
d. Distortion of fittings
e. Other apparent defects that cause doubt as to the strength of the sling
f. Abrasions or cuts on the jacket which prevent the jacket from providing sufficient protection for the core.

Since new rope exhibits different stretch characteristics from older rope entire sling should be disposed of in lieu of replacing only the bad sling legs. Typing knots in Kevlar sling will dramatically reduce the strength of the sling and is not allowed.

RIGID BAILS. Rigid bails shall be inspected for cracks, deformation, corrosion, crimping, and loose fasteners. Rigid bails that contain cracks, deformation, corrosion, or crimping shall be taken out of service. Loose fasteners and similar discrepancies shall be corrected before the bail is placed into service.

TESTING

HOISTING SLING LOAD TESTS. Job orders or contracts for manufacture of boat slings shall require that the sling and associated hardware not permanently attached to the boat be tested as indicated under the heading of [2]Test Procedures[2] on the respective [2]Hoisting Arrangement and Details[2] drawings. The number for this drawing can usually be found on the hoisting label plate located near the coxswain’s station or in the Boat

Information Book. Test loads are intended to be 100 percent in excess of the design working load of the part. Sling tests shall be performed in load testing equipment designed for that purpose. One-hundred percent overload tests are never performed in the boat. Unless specifications call for testing slings in the same configuration as used, one or more legs may be tested at a time using the straight line pull method at 100 percent overload based on the design load for each leg.

Wire Rope Sling Load Test Periodicity. During normal repair and overhaul availabilities of a ship, all wire rope slings that have not been tested in the preceding 18 months, except those shipped with new boats, shall be retested and marked before issue. Hoisting slings for boats assigned to shore stations shall be subjected to a 100 percent overload test every 24 months.

Webbing Sling Load Test and Replacement Periodicity. Operators of boats provided with webbing slings shall refer to the applicable Maintenance Index Page (MIP) for the periodicity of testing and replacement.

Kevlar Sling Load Test and Replacement Periodicity. Operators of boats provided with Kevlar slings shall refer to the applicable Maintenance Index Page (MIP) for the periodicity of testing and replacement.

Retesting of New Slings. The time interval after which the first periodic testing is required for new slings received from stock or shipped with new boats is taken from the date the slings were placed in service that will be indicated on the in-service tag. If no in-service tag is present the retesting period is taken from the date on the certification test markings. If no test markings are present the sling certification shall be assumed to be out of date and the slings shall be retested.

RIGID BAIL LOAD TESTS. Rigid bails are similar to other permanently installed hoisting fittings in that they are less prone to wear and damage than wire rope, webbing or Kevlar slings. Rigid bails shall be load-tested upon completion of a new boat or after any repairs to the bail. The rigid bail shall be tested by weighting the boat 50 percent in excess of its normal design hoisting weight and lifting it, using the bail, just clear of the water or shop floor for 10 minutes. When conducting the 50 percent overload test, it is absolutely necessary that the correct weight be used. The design hoisting weight is specified on the hoisting test data plate. Only the weight indicated on the hoisting data plate shall be used for the baseline weight for the 50 percent overload test. The added weight shall be distributed, one half forward and one half aft, as near the hoisting fittings as possible, care being taken not to place any significant added weight amidships.

HOISTING FITTING LOAD TESTS. Hoisting fittings permanently attached to the boat shall be load-tested upon completion of a new boat or after extensive repairs have been made to a boat in service. The boat’s lifting slings or bail shall be inspected prior to conducting this test to ensure their adequacy for the test load and to verify that they have been load tested within the required certification period. The boat’s hoisting fittings shall be tested by weighting the boat 50 percent in excess of its normal design hoisting weight and lifting it by its hoisting slings or bail just clear of the water or shop floor for 10 minutes. For boats that have fittings for both sling lifting and davit lifting, the overload test shall be conducted for both configurations. When conducting the 50 percent overload test, it is absolutely necessary that the correct weight be used. The design hoisting weight indicated on the hoisting data plate shall be used for the baseline weight for the 50 percent overload test. The added weight shall be distributed, one half forward and one half aft, as near the hoisting fittings as possible, care being taken not to place any significant added weight amidship.

FIT TESTS. Before finally accepting newly issued, repaired, or altered hoisting slings or bails, ships shall test them for fit by hoisting the boat using the method that normally will be used in service. The boat shall be lifted by its slings and suspended for at least 10 minutes, just clear of the water, deck, or stowage, to minimize damage in case of failure.

107.7 Discuss heavy weather hoisting/lowering/securing and trailoring of boats. [Ref. c]

The main thing about dealing with heavier weather is safety. Additional ORM measures' need to be implemented.

To best understand what is needed for heavy weather hoisting/lowering/securing and trailoring of boats review the standard operating procedures with in ones own command.

108 Anchoring

References:
[a] Naval Coastal Warfare Small Boat Instruction, 3340.1C
[b] USCG COMDTINST 16114.5B, Boat Crew Seamanship Manual

108.1 Define and discuss the following: [Ref. b, Ch. 10H, Pg. 35-37]

a. Flukes: Dig in the bottom and bury the anchor, providing holding power.

b. Shank: Aids in setting and weighing the anchor. Attachment point for the anchor line.

c. Shackle: Used to connect anchor chain to anchor.

d. Anchor line: Used to lower anchor. Connected to anchor chain.

e. Chain: Connects anchor line to shackle.

108.2 Explain the rule for determining the scope of anchor line to be used.
[Ref. b, Pg. 10-38]

The scope is a ratio of the length of rope paid out to the depth of the water. Pay out enough rope so the lower end of the rode forms an angle of 8° (or less) with the bottom. This helps the anchor dig-in and give good holding power.

108.3 Discuss the importance of bottom conditions in anchoring.
[Ref. b, Ch. 10H, Pg. 10-38]

• Bottom depth type can be determined by either using a depth sounder or nautical chart.
• Do not anchor over electrical wires or rocky or coral areas.

Firm sand- excellent holding quality and is consistent.

Clay –excellent holding quality if quite dense, but sufficiently pliable to allow good anchor engagement

Mud –varies greatly from sticky, which holds well, to soft or silt that is of questionable holding power.

Loose sand - fair, if the anchor engages deeply.

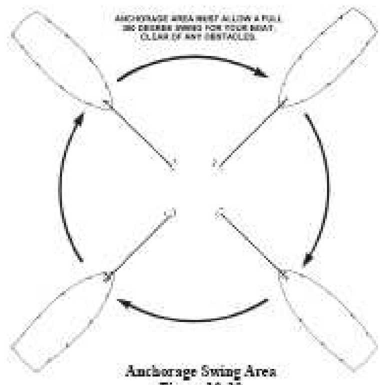
Rock & coral –less desirable for holding anchor unless the anchor becomes hooked in a crevice

Grass –often prevents anchor form digging into the bottom and so provides very questionable holding for most anchors.

108.4 Discuss how to determine the optimum location for anchoring.
[Ref. b, Ch. 10H, Pg. 10-37

Sometimes it may be possible to choose a sheltered anchorage area in shallow water (40' or less).

- Check charts to ensure that the anchorage area avoids any submerged cables or other obstructions.
- If other boats are in the same area, be careful not to anchor too close by the boats.
- Never drop within the swing area of another boat (See figure 10-30).
- Always approach the anchorage into the wind or current (See figure 10-31).



Anchorage Swing Area
Figure 10-30

NOTE*: Never anchor by the stern especially with small boats. Weather and seas may swamp the craft.*

108.5 Discuss the procedures setting the anchor. [Ref. b, Pg. 10-38]

Setting the anchor

An anchor must be "set" properly if it is to yield its full holding power. The best techniques for setting an anchor will vary from type to type; only general guidelines can be given here. Experiment to determine the best procedures for your boat, your anchors, and your cruising waters.

Steps	Procedure
1.	With the anchor on the bottom and the boat backing down slowly, pay out line as the boat takes it, preferably with a turn of line around the bitt or cleat.
2.	When the predetermined scope has been paid out, snub the line quickly and the anchor will probably get a quick bite into the bottom.

If the anchor becomes shod with mud or bottom grass adhering to the flukes, lift it, wash it off by dunking at the surface, and try again.

After anchor is set

After the anchor is set, you can pay our or take in rode to the proper length for the anchorage, and for the prevailing and expected weather conditions. Scope must be adequate for holding, but in a crowded anchorage you must also consider the other boats.

Attach chafing gear to the rode at the point where it passes through the chocks and over the side to prevent abrasion, wear, and tear on the rode and boat.

108.6 Discuss the safety precautions when anchoring and weighing anchor.
[Ref. b, Ch. 10h, Pg. 37-39]

- Check anchor and line for damage
- Avoid kinks and catch points
- Avoid fast/jerky movements of craft while lowering
- Positive control of anchor at all times when weighing anchor
- Proper tying procedures
- Second Man Forward For Safety
- No Rings Or Watches On
- Gloves
- Stay Out Of Bight Of Line
- Avoid Back Strains-Let Boat Do Heavy Work

108.7 Discuss the indications of a dragging anchor. [Ref b, Pg. 10-38]

By observing the anchor line.
- Anchor line Taunt
- Anchor line Jumping

By checking the vessel's position with lines of position or GPS
- Using GPS anchor alarm
- Using Visual Observations

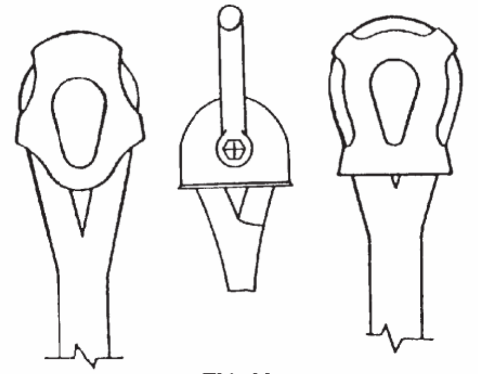
109 Towing

References:
[a] USCG COMDTINST M16114.5B, Boat Crew Seamanship Manual
[b] NSTM Ch. 582 Mooring and Towing

109.1 Discuss the importance of chafing gear in a stern tow. [Ref. a, Ch. 17, Pg. 17-8]

Chafing gear protects towlines, bridles and pendants from wear caused by rubbing against deck edges, gunwales, bulwarks, chocks, taffrail or tow bars.

Preventing chafing damage. Tie layers of heavy canvas or leather with small stuff to the towline, bridle, or wire rope at contact points to prevent chafing damage. Sections of old fire hose also work well as chafing gear. Make sure the chafing gear stays in place for the duration of the tow.


Thimble
Figure 17-6

Thimbles are designed to equalize the load on an eye of a line and provide maximum chafing protection to the inner surface of the eye. On double braided nylon, use thimbles made specifically for synthetic lines (See figure 17-6). Use galvanized “teardrop” shaped thimbles on wire rope.

109.2 Discuss how to rig stern and alongside tow. [Ref. a, Ch. 17, Pg. 17-14]

Towing Astern

Towing Astern: The most common towing technique is to tow the distressed vessel from astern of the rescue vessel.

Making the approach: The on scene assessment gives you the knowledge of how conditions affect both vessels. Knowledge and experience with the towing vessel’s handling and maneuvering should allow one to overcome conditions and put the towing vessel in a safe position for the crew to pass the tow rig.

Establish a danger zone: Before starting the approach, establish an imaginary danger zone around the distressed vessel and approach outside of it. The size of a danger zone depends upon conditions and the arrangement of the distressed vessel. The poorer the conditions, the larger the danger zone.

Maneuver to an optimum position: Maneuver the towing vessel so the crew can maximize use of the best deck work area on the vessel for passing and working the tow rig. This will provide the opportunity for the most vessel control and visibility for the coxswain, while keeping a safe distance from the distressed vessel, and providing a safe "escape route" in case of emergency. This is the optimum position.

***CAUTION**: The coxswain must let crew members know before making correcting maneuvers so that they can tend lines and ready themselves.*

- In calm conditions, make the approach at an angle that allows the crew the best opportunity to pass the tow rig.
  - In rough conditions make your approach into the prevailing wind and seas. If the wind is different from the seas, make your approach into the seas. This usually maximizes control for the coxswain and ensures the most stable platform for the crew.
  - Make the approach at the slowest speed necessary to maintain steerage.
  -
- Once in the optimum position, keep station on the distressed vessel. Station keeping maintains the position and heading relative to the weather and seas, outside the danger zone. This is usually done by use of helm and engine control. To keep station, the coxswain must simultaneously focus on the seas, the bitt and line handlers, and the position with respect to the distressed vessel. Maneuver and apply power early and smoothly as distance and angle to the distressed vessel change. If the towing vessel begins to move towards the danger zone, maneuver to open the distance. If the distressed vessel begins to get away from the towing vessel, close the gap. Use correcting maneuvers (opening and closing) before a problem develops. A small correction early can prevent a large problem later.

***NOTE**: Actual maneuvering techniques vary from vessel to vessel and are mastered by practice and experience. Actual station keeping techniques also vary as the specific wind and sea conditions affect the specific distressed vessel.*

The coxswain now must keep station, outside the danger zone and in a maneuvering zone (usually a 90 degree arc, from 45 degrees off the bow to 45 degrees off the stern, with the distance between vessels no greater than the length of the heaving line) for the crew to pass the tow rig. The coxswain must continue station keeping until the tow rig is connected and the transition to towing astern begins. The crew must make every effort to ensure that passing the tow rig goes smoothly and quickly.

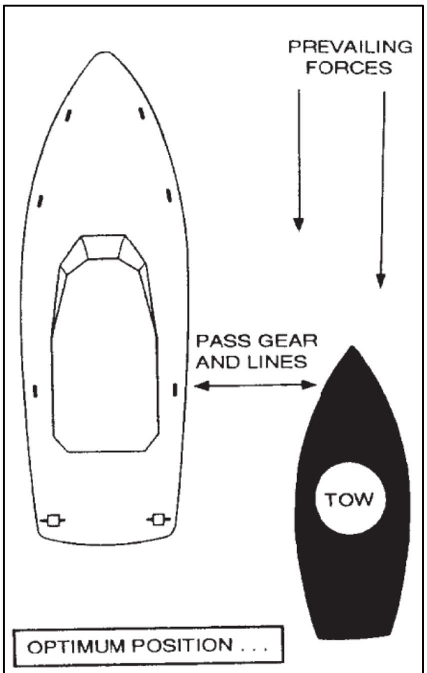
***CAUTION:** Maneuver as required but it is preferable not to make opening and closing maneuvers when lines are over (except the heaving line). Avoid making correcting maneuvers on the face of a wave.*

In calm conditions, station keeping may simply be holding the nearest safe position to take advantage of the best angle for the crew to pass the tow rig. However, even though conditions may be calm, a vessel's wake or a current can suddenly increase the chance of hull to hull contact with the distressed vessel. Plan a safe escape route for all approaches and while station keeping.

NOTE*: A boat crew's teamwork, communications, and experience are key to a safe, successful approach.*

Pass the tow rig: Once maintaining optimum position, pass the tow rig.

- All lines, equipment, and connections should already be inspected, made ready, and double checked.
- Minimize loose towline on deck by paying out directly from the reel. If the towing vessel is not equipped with a towline reel, fake the towline carefully so that it will not kink or tangle. In heavy weather, use caution to ensure line is not washed over the side and into the screw.



Optimum Position for passing the Tow Rig
Figure 17-11

NOTE: *While passing and connecting the tow rig, and transitioning to stern tow, use loud and clear communication between crewmembers and coxswain prevent accidents. Whenever the coxswain directs an action, a crew member must take that action and reply that the action has been taken. Whenever a crew member advises the coxswain of status or action, the coxswain must acknowledge same.*

<u>Calm conditions</u>: Passing the rig in calm conditions (no heaving line):

- Coxswain directs crew to pass the rig.

- Line handler hands over or carefully tosses the end of the rig to a person on the distressed vessel. The person receiving the rig must be physically able to haul it to the connecting point and then attach it properly.

- Line handler advises coxswain that the rig is away.

- Line handler pays out and takes in towline as required eliminating any risk of fouling the propellers, rudders, rigging, or other fixtures. Once again, advise the coxswain of the action successfully executed, and that the towline is properly secured on the towed vessel.

<u>Using a heaving line</u>: Passing a rig using a heaving line:

- Wet both heaving lines to make them more flexible and minimize risk of them becoming tangled.

- Take two-thirds of a heaving line coil into the casting hand leaving the remainder in the other hand.

- Check that the area is clear of people and obstructions.

- Advise coxswain when ready and await direction before casting.

- Coxswain directs cast.

Call out “HEADS UP” as a warning to people on board the distressed vessel to take cover and watch out for the toss.

NOTE*: It takes practice to cast a heaving line properly. Adapt technique to conditions for a safe and successful result.*

Casting: Casting a heaving line:

- Cast a heaving line so it falls across the distressed vessel’s deck.

- Tell coxswain “heaving line cast,” then that it’s retrieved,short, or missed. Advise coxswain whenever a line is in the waters, so no maneuvering will be done.

- If the first cast is not retrieved, quickly recover the lineand advise coxswain when the second heaving line is ready. When coxswain directs, repeat the procedure.

- Untie the unused/unretrieved heaving line from the tow rig (take care to untie the correct line) and advise the coxswain that you’re ready to transfer the rig.

- Coxswain will direct to send the rig; crew replies andbegins transferring the rig. Tend the messenger to reduce the risk of it becoming fouled. Once the rig starts across, maneuvering opportunities become very limited.

- Advise coxswain of tow rig transfer progress (when bridleis clear or aboard distressed vessel, when towline is going over or aboard, etc.).

Connect the tow rig: Methods of tow rig connection generally available are:

- Tow rig to fittings.

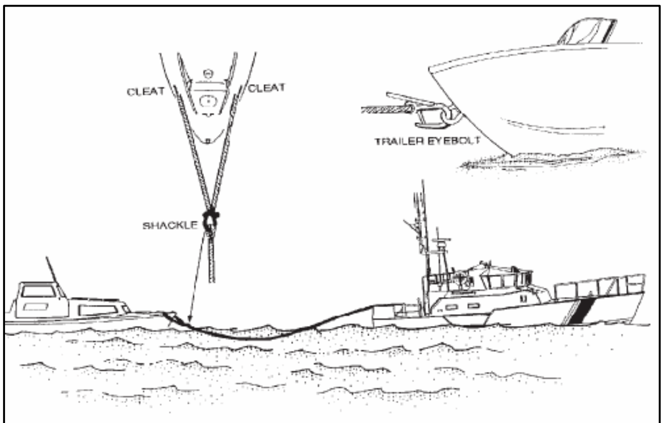
- Tow rig to trailer eye.

<u>Connecting Tow Rig to Fittings</u>: The attachment point(s) for a tow rig must be sound. Towing places a tremendous strain on deck fittings, especially in rough conditions. On the distressed vessel, bow bitts, forward cleats and Samson posts will usually provide the best attachment points. Always use fittings secured to a deck with through bolts and backing plates or those secured to the keel or structural framing. Other fittings, such as pad eyes or capstans, may also provide solid attachment points.

CAUTION*: Though deck fittings should be checked during pre-tow procedures, do not hesitate to stop the connection if something is wrong. If necessary, recover the rig and transfer a crew member to the distressed vessel to physically inspect the fittings.*

Unless the towing vessel puts a crew member aboard the distressed vessel, the towed vessel crew is responsible for these actions. A good brief to the distressed vessel will address each item, but in the rush to get things set up aboard the distressed vessel, the crew may forget important steps. The towing vessel crew must closely watch, and advise when necessary.

CAUTION*: Transfer of people between vessels is not a common practice. Whenever this is considered, it must be conducted with extreme caution for the safety of people on both vessels.*

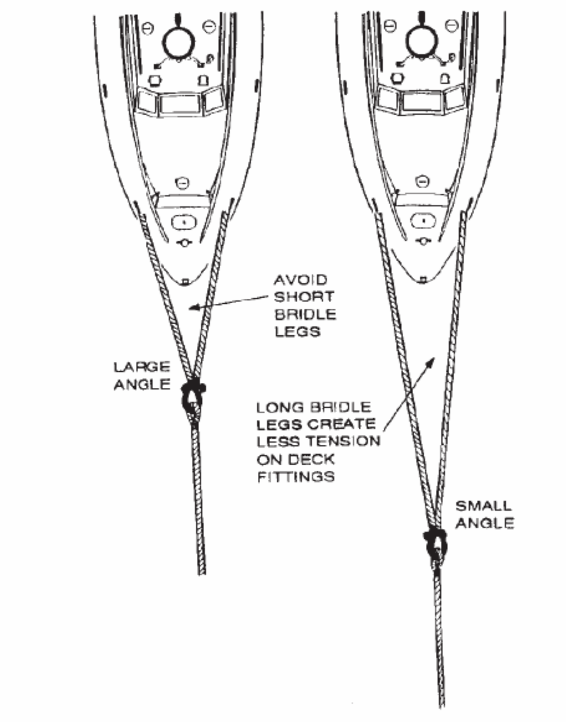


Bridle and Single Point Tow Rig Connection
Figure 17-12

Ensure a fair lead: Lead a single point tow rig (pendant or towline) through or to a fitting as close to the center line as possible. Once led through a secure chock near centerline, the end of the rig can go to a suitable deck fitting (See Figure 17-12).

- Lead the parts of a bridle through chocks, equally spaced from the centerline.

CAUTION: Avoid connecting the towline to an off centerline fitting on the towed vessel. Use a bridle for an equal amount of strain on both sides of the bow.



Towline Connection Showing Bridle Angle
Figure 17-13

Make fast to fittings: Connect the eye of a pendant or towline to posts, bitts, or cleats so that it will not come loose when a strain is placed on the rig. Connect the bridle to fittings located at points that allow equal pull to be exerted on them. Check that the center of the bridle is on centerline or the extension of the centerline. Minimize the angle made where the bridle joins the towline by using fittings as far forward as possible. (See Figure 17-13.)

Install chafing gear: Where necessary, try to protect the tow rig from abrasion or chafing, particularly if the rig takes a sharp turn at chocks or comes close to contact with any obstructions.

Connecting Tow Rig to a Trailer Eye: On smaller, trailer-able boats, the trailer eye is frequently the sturdiest fitting available to attach a tow rig. Attaching a towline to the trailer eye is a dangerous technique. It requires the towing vessel to maneuver very close to a distressed boat and requires crew members to extend themselves over the side between two vessels, or under the flared bow sections of the distressed boat.

CAUTION: *To reduce risk in connecting the tow rig to the trailer eye, use a skiff hook.*

Attach the skiff hook: A newer style of skiff hook with a quick release safety buckle and snap hook clip is in common use. Manufacturer instructions should be reviewed for its proper use. The older style skiff hook requires these steps:

• Connect the skiff hook pendant to the towline using a double becket bend or shackle.

• Slide the skiff hook into the boat hook handle.

• While keeping the pendant taut, extend the boat hook and snap the skiff hook into the trailer eye.

Hook up to the trailer eye: While keeping the pendant taut, extend the boat hook and snap the skiff hook into the trailer eye.

WARNING*: Do not use a shackle to directly connect a towline to a trailer eye. This requires crew members to get too close under the bow of the distressed vessel.*

Transition to Stern Tow:

Start moving away:

• Slowly move the towing vessel out of optimum position and the maneuvering zone.

• Give particular attention to the direction the towline tends and the amount of slack.

• Pay out towline gradually in conjunction with the towing vessel’s movement.

CAUTION*: Do not put a working turn on the bitt until the rig is securely fastened to a tow AND persons on board are clear of the bow.*

Put a working turn on the bitt: Once the towline is secured on the distressed vessel and persons on the towed vessel have cleared the bow, the coxswain instructs the crew member to take a working turn on the bitt. Different towing bitts require different types of working turns. Use a method to provide enough towline-to-bitt contact surface to ensure control of the towline. Smooth towline pay out keeps the towed vessel from being pulled around.

Maneuver to begin tow: Slowly maneuver to a position either in line with the towed vessel's centerline (to tow ahead) or perpendicular to the towed vessel's bow (to change the initial heading).

Maneuver to "pay out" course: Once the distance allows clear movement of a tow, maneuver the towing vessel to allow a smooth pay out of the towline. As tension increases in the tow line, static forces will be felt as the tow rig tries to move the towed vessel. Transitioning is the initial test of strength and performance for the tow rig and connections. Each towing vessel will react uniquely to this initial resistance. The pivot point distance, propulsion and steering, and size difference between towing and towed vessels and weather will determine how the towed vessel will react. Actual maneuvering techniques are mastered through practice and experience. Minimize surge and shock loading.

CAUTION: Gradually come to a pay out course. Rapid movements or changes in direction increase the risk of:

- *fouling the towline in propellers or on deck fittings*
- *shock loads*
- *loss of towline control*

The bitt person must have complete control of the towline. Too much towing vessel headway may cause the bitt person to lose control of towline tension, and the towline will start to run.

***WARNING**: Crews risk injury from a running towline, with the possibilities of injuring their hands and arms in the tow bitt, tow reel, or in bights of line faked on deck. If the towline starts to run, reduce speed immediately. Regain towline control after the line stops running.*

Pay out the tow line: Continue paying out towline until satisfied with the initial amount of towline scope.

Make up the bitt: Once the desired scope of towline is deployed, the coxswain directs the crew to make up the bitt. Slow the forward motion enough to slack the towline, and then apply the proper turns.

***WARNING**: Do not attempt to make up the bitt with a strain on a towline. This increases risk of injury by catching hands, fingers, and arms between the bitt and the towline.*

Set a towing watch: The towing watch has a critical responsibility. In addition to the crew member assigned, it is a collateral duty for all other crew members. The condition of the vessel in tow and the towline must be constantly monitored.

Underway With Stern Tow: The best course to safe haven is not always the shortest distance. Choose a course that gives the best ride for both vessels. At times, you may have to tack (run a zigzag type course) to maintain the best ride. Put into practice your understanding of the dynamic forces in towing to ensure a safe tow.

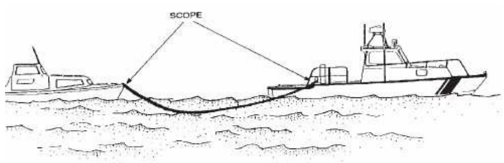
Brief the towed vessel: Pass instructions and information that will apply to each step of the tow astern.

- General safety (PFDs, staying clear of tow rig, tow rig chafe, location of crew).
- Equipment (pumps, drogues).
- Steering (whether to man helm or lock rudder amidships, whether to steer on towing Vessel stern).
- Route you will take, expected weather and seas, destination, estimated time of arrival.
- Lighting, sound signals.
- Communications (primary/secondary radio frequencies, times of status reports).
- Emergencies (breakaways, signals).

Deploy drogue: If drogue deployment is necessary, i.e., to counteract a jammed rudder or other condition, deploy the drogue while barely making way before increasing speed to the planned towing speed.

Maintain a catenary: Once underway with a tow astern, maintain a proper length of towline, gravity causes a "dip" or downward sag to form in the middle of the towline as it is lengthened. This catenary acts as a natural shock absorber for a tow rig and is a major factor in counteracting shock-loading.

Stay in step: Keep the tow in step at a proper distance behind the towing vessel. When the towing vessel is on a wave crest, the towed vessel should also be on a wave crest 2 to 3 waves behind. If the towing vessel is riding up a crest while the tow is sliding down a crest, the towline slackens. Control of the tow may be lost. If an adjustment is not made, when the towing vessel starts to slide down the crest into the trough as the towed vessel starts to climb a crest, the towline becomes taut, shock-loading the tow rig.



Scope of Towline with Catenary
Figure 17-14

- Increase towline scope to get the tow on crest at the sometime as the towing vessel.

- Careful increase or decrease of power to vary towing vessel speed may also help.

Other measures that may help to stay in step include:

- Alter course to increase the angle of the tow to the waves (to approximately 45 degrees).

- Deploy a drogue. In really confused seas, drogue deployment could help by preventing the towed vessel from surfing down the face of a wave.

Sometimes conditions make staying in step impossible. In such cases, use the techniques above and reduce speed to counteract shock loading.

Minimize yaw: The tow is said to yaw when it veers to one side or the other. Yaw can be caused by trim (including list, heeling or rolling, or by a bow-down attitude), rudder problems and wave action. Severe yawing is extremely dangerous and if not corrected, may cause one or both vessels to capsize. Yawing also places tremendous strain on deck fittings and connections. Ways to reduce or minimize towed vessel yaw include:

- Change towline scope.

- Adjust trim (more easily done on a smaller vessel) to raise the bow or counteract list.

- Decrease speed or alter course to reduce effect of waves and wind.

- Deploy a drogue (particularly to overcome rudder problems).

Keep close watch on the action of the tow and immediately report any unusual movements to the coxswain. If yawing cannot be reduced or controlled, it may be prudent to heave to until sea conditions improve or the source of the yaw is corrected.

NOTE: *Currents can cause a relatively constant or gradual offset of the towed vessel from the towing vessel's intended track or heading. Do not mistake this for yaw*

Towing Along Side

When set up properly, an alongside tow allows two vessels to be maneuvered as one. This advantage is necessary when approaching a dock, mooring, or anchorage in sheltered waters, or when maneuvering in congested or restricted waters. Most of the pre-tow procedures used for towing astern described earlier in the chapter remain valid. However, some additional preparations are needed and the make-up of the tow rig and approach will be different. The tow rig configuration and approach will be more like that for mooring.

Preparation: These additional preparations apply for an alongside tow.

Determine side of tow and approach: Determine on which side the tow will be rigged. Note the effect of the weather and physical conditions on both vessels, and use them to your advantage. Although similar to a mooring approach, you must decide whether you want the wind to set the other vessel down on you, or vice-versa. Assess the other vessel's drift rate and aspect to plan the speed and angle of your approach.

- If a vessel smaller than the towing vessel is being rapidly set towards a lee shore or obstructions, consider approaching from leeward, if sea room allows.

WARNING*: Do not place the towing vessel between a larger towed vessel and a lee shore or obstruction .The towing vessel may not be able to overcome the other vessel's momentum before losing all room to maneuver. As with any towing approach, leave an escape route.*

Decide use of towline: If the alongside tow occurs at the completion of a stern tow, decide if the towline will be disconnected from the stern tow, or hauled in while still connected and used as a bow line for the alongside rig. If the stern tow required a bridle, disconnecting part of or all of the rig may be the only option to provide a fair lead for the alongside bow line.

CAUTION: *Use of a towline as the bow line in an alongside tow puts more line lying on deck and may be a tripping or fouling hazard.*

Prepare lines: Ready the proper size and number of lines to rig alongside. Determine where the attachment points on the towed vessel will be for each line.

Determine hull match: Determine hull match. Assess how the two hulls will align alongside. In towing alongside, the tow vessel may be angled, slightly bow-in to the towed vessel, with the towing vessel propeller(s) and rudder(s) aft of the towed vessel's transom, rudder, or outdrive(s).

Rig fenders: Rig all available fenders, except one for hand tending as the tow approaches, in potential contact points. Secure all fenders in place before bringing a tow alongside. Secure fenders using clove hitches or slip clove hitches.

NOTE*: Keep all lines clear of the water.*

Brief towed vessel:

- Advise which side to prepare.

- If already in stern tow, describe shortening-up and whether towline will be used as bow line or whether (and when, "on signal") to cast off.

- Describe your approach and intended position alongside.

- Direct the towed vessel to clear as many obstructions from the side as possible (rigging, lines, outriggers, etc.).

- Direct the towed vessel to place fenders at obvious areas, such as trawler doors or topside vents.

- Designate attachment points.

- Direct crew how to assist.

Make the approach:

Use towline as bow line: The towed vessel is already in a stern tow.

- Use the same methods as shortening the tow to take all headway off the tow before backing down. If the towed vessel has available propulsion, it may be able to assist by briefly backing down. If necessary, use the towline to change the heading of the towed vessel.

- When the tow has stopped all forward movement, the coxswain directs the crew to “break the bitt”. The towing vessel slowly backs and the towline is hauled in. Try to keep some space abeam until the towed vessel is in the proper fore and aft position. As the distance between the vessels decreases and as directed by the coxswain, the crew walks the towline forward to a suitable bow fitting, takes a working turn on the line and takes in slack. The coxswain then moors the towing vessel alongside the towed vessel.

NOTE: *Show the towed vessel crew where to attach the alongside mooring lines. Perform all line handling at coxswain direction, just as in mooring. Always pass the eye of alongside lines to a towed vessel. Keep the working ends of the lines aboard the towing vessel to adjust or relocate as necessary.*

Free approach: Make this approach as if mooring to a pier, but the first line over will be the bow line. There will not be a spring line to check your forward motion with respect to the towed vessel. The coxswain directs the crew to pass the bow line when alongside.

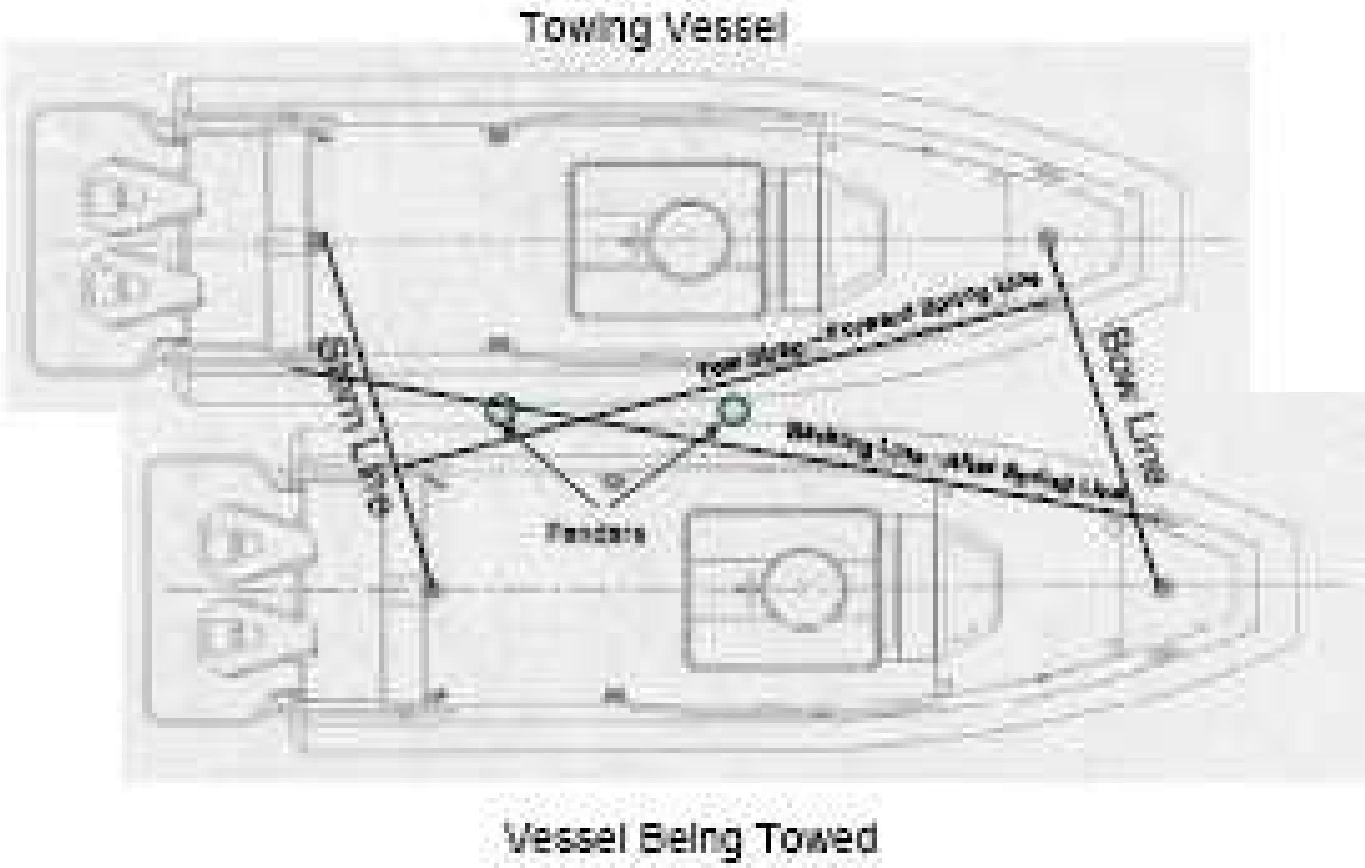
WARNING*: Do not fend of boat with your feet or hands.*

Rig additional lines alongside: Once alongside, with the bow line connected, position the tow so that the towing vessel’s propeller(s) and rudder(s) are well aft of the towed vessel’s stern. This affords best control for maneuvering in confined areas. Check fender placement and make adjustments so they provide maximum protection at contact points.

Calm conditions: If there is little or no movement from wind, seas or current, rig lines in the following order:

- Second line: Rig a stern line from the towed vessel's towing bitt or post. This line holds the stern in while setting up the "spring lines".
- Third line: Rig a "tow strap" (forward spring line) from the towing vessel bow or forward mooring fitting to a point outboard and aft on the towed vessel.
- Fourth line: Rig a backing line (after spring line) from the aft quarter location on the towing vessel to a location forward on the towed vessel.

NOTE*: For maximum control of a tow, all alongside lines should be as tight as possible. Spring lines are tightened by crew members taking up slack obtained when the coxswain throttles forward and reverse on the inside engine, pulling first against the tow strap then backing down against the backing line.*



In wind, seas, or current: If conditions are setting the vessels into danger, i.e., toward shoals or breakwaters, and time is critical, follow this order:

- Second line: Rig a tow strap so that, once secured, the towing vessel can put headway on and move clear of any dangers.

- Third line: With headway still on, rig a backing line. You will need this to slow the towed vessel.

- Fourth line: The stern line.

Maneuvering: Maneuvering with an alongside tow is a challenging boat-handling technique. To do it well and do it safely requires practice and experience. An accomplished coxswain will observe how winds, seas and current affect the combined tow and use these forces to the best advantage, often making the maneuver look easier than it really was.

Approach for mooring: To moor an alongside tow safely and skillfully:

- Anticipate well ahead of time and decrease speed gradually
  - Place the larger vessel against the dock or mooring.
  - Making an approach into the wind and current if possible.
  - Moor on the protected (leeward) side of a dock or pier. Place a crew member in good position as a lookout aboard a towed vessel on approach. This extends a coxswain's vision for clearances and obstructions. Rig fenders and mooring lines from the tow if it is going to be placed against a dock or mooring.

109.3 Discuss the dangers of shock loading a towline. [Ref. a, Ch. 17B, Pg. 17-12 through 17-4]

Combination of Forces and Shock-load: A boat crew rarely deals with only one force acting on the tow. The crew usually faces a combination of all the forces, each making the situation more complex. Some individual forces are very large and relatively constant. Crews can usually deal with these safely, provided all towing force changes are made slowly and gradually. When forces are changed in an irregular manner, tension on the tow rig starts to vary instead of remaining steady.

Example**:** In calm winds and seas, a towing vessel encounters a steady, large amount of frictional resistance, form drag and wave making resistance when towing a large fishing vessel with trawl lines fouling its propeller and net still down. The tow rig and vessel fittings will be under heavy strain, and the tow vessel engine loads will be rather high, but the tow proceeds relatively safely. If suddenly the net tangled and caught on an unseen obstacle, this new "force" acting through the tow rig could immediately increase stress to a dangerous level. This shock-load could part the towline or destroy fittings. (In the example above, the prudent solution would be to make a "safe" tow by recovering the net or marking it and letting it loose before starting the tow.)

Though this example began as a safe and steady tow, a single unexpected incident could have caused a very dangerous situation. Always keep in mind that some degree of shock-loading can occur during any tow evolution.

CAUTION*: Shock-loading may cause severe damage to both towing and towed vessels and overload a tow rig to the point of towline or bridle failure. Shock loading could also cause momentary loss of directional control by either vessel and could capsize small vessels.*

Shock-loading prevention or counteraction: Because of the potential dangers, the tow vessel must use various techniques to prevent or counteract shock-loading, or reduce its effect.

Action Effect: Reduce Slowing down lowers frictional resistance, Towing Speed form drag, and wave making resistance. Reducing these forces will lower the total tow rig tension. In head seas, reducing speed also reduces wave drag, spray drag, and wind drag, lowering the irregular tow rig loads. The total reduction in forces on the tow could be rather substantial. When encountering vessel wake in relatively calm conditions, decrease speed early enough so the towed vessel loses momentum before hitting the wake. A small towed vessel slamming into a large wake will shock-load the tow rig, and may even swamp.

Get the "In Step": Vessels Extreme stress is put on the tow rig in heavy weather when the tow vessel and the towing vessel do not climb, crest or descend waves together. Vessels in step will gain and lose momentum at the same time, allowing the towing force to gradually overcome the towed vessel's loss of momentum, minimizing shock-loading. To get the vessels in step, *lengthen* rather than shorten the towline if possible.

NOTE: *When operating near bars and inlets, getting the vessels in step may be impractical due to rapidly changing water depth and bottom contours.*

Lengthen the towline: A longer towline reduces the effect of shock-loading in two ways. The weight of the line causes a dip in the line called a catenary. The more line out, the greater the catenary. When tension increases, energy from shock loading is spent on "flattening out" the catenary before it is Action Effect transferred through the rest of the rig and fittings. The second benefit of a longer towline is more stretch length. Depending on the type of towline, another 50' of towline length will give 5'-20' more stretch to act as a shock-load absorber. Remember to lengthen the towline enough to keep the vessels in step and minimize the shock load source.

Set a Course to Lessen of the Seas: the Effect Do not try to tow a vessel either directly into or directly down large seas. Tow on a course to keep the seas 30-45 degrees either side of dead ahead or dead astern. This may require “tacking” to either side of the actual desired course.

Deploy a Drogue from the Vessel: Towed This device (covered under Equipment) may help to prevent the towed vessel from rapidly accelerating down the face of a wave. The drogue does add form drag to the tow, but could prevent shock-load.

Constantly In large Adjust Vessel Speed Match Towed Vessel: Towing seas, constant “finesse” techniques may reduce shock-loading. This requires to the coxswain to constantly observe the that of the towed vessel, and increasing or decreasing towing vessel speed to compensate for the effects of approaching or receding seas on the towed vessel. This takes much practice and experience.

NOTE*: Safety demands emphasis on preventing shock-load and reducing its effects. Shock-loading presents a definite possibility of vessel fitting or tow rig failure. One of the more feared possibilities is towline snap-back. Think of this as a greatly magnified version of stretching a rubber-band until it breaks Remember, some nylon cordage can stretch up to an additional 40% of its length before parting.*

CAUTION*: Shock-load can also capsize or swamp the towed vessel. The additional towing force from a shock-loaded towline could cause a smaller vessel to climb its bow wave and become unstable or it could pull the bow through a cresting wave.*

109.4 Discuss the use of the following safety precautions in towing:

a. Emergency breakaway tools and plans
[Ref. b, Ch. A, Pg. A-2 through A-3]

Use axe or fixed blade knife to cut away lines. Be cautious of line snap back.

b. Staying out of the bight of the line [Ref. a, Ch 1, Pg.1-23]

Crews risk injury from a running towline, with the possibilities of injuring their hands and arms in the tow bitt, tow reel, or in bights of line faked on deck. Crewmembers are to stay out of any “snapback areas”

110 Mission and Organization

References:
[a] NWP 3-10, Naval Coastal Warfare
[b] NTTP 3-10.1, Naval Coastal Warfare Operations
[c] Unit Required Operating Capabilities/Potential Operation Environment (ROC/POE)
[d] Unit Standard Operating Procedures
[e] Commanding Officer's Standing Orders
[f] Unit Watch, Quarter, and Station Bill [g]
NTTP 3-20, Tactical Boat Operations

110.1 Discuss the importance of force protection in the following environments: [Ref. b]

a. Harbor defense [Pg. h. 2.5.7]

- Harbor defense operations include port security and involve the point defense of designated water terminals, pier areas, high value units, and/or other designated facilities.
  - Ensure port and harbor areas are maintained free of hostile threats and terrorist actions that would be a threat to support and re-supply operations.

- The Harbor Defense Commander (HDC) will act as the commander for HD operations in the designated area of operations and oversee and coordinate military activities that occur within the waters of the harbor.

b. Maritime pre-positioning force (MPF) operations [Pg. 2.5.2]

- MPF operations include the offload of Maritime Prepositioning Ships (MPS) conducted from anchorage (in-stream) using lighterage or alongside host nation pier facilities.

- MESF forces are routinely deployed to protect these MPS during arrival, offload and back load by providing security to ship-to-shore movement of boats and water/fuel lines.

- MESF operations include conducting of surface and subsurface surveillance, interdiction of threats, and may include the control of small craft and lighterage during conditions of restricted visibility and/or darkness.

c. Amphibious operations [Pg. 1-7]

- During amphibious operations, MESF forces will provide for the defense of inshore areas from surface and sub-surface attack. MESF forces support this mission through the conduct of area surveillance, and command and control of interdiction assets throughout all phases of the assault.

- After the beachhead has been established, MESF units will continue to provide area surveillance and security from ashore and afloat through termination of the operation, including the sustainment by assault follow-on echelon (AFOE) and back-load phases.

d. Riverine operations [Pg. 1-8]

- Riverine operations integrate and employ various types of ships, craft, aircraft, weapons, and naval forces in a concerted effort to achieve and/or maintain control of the Riverine area, which is an inland, coastal, or delta area comprising both land and water.
- Where navigable waterways exist, or where forces are required to use waterways, an effective program to control the waterways and/or interdict hostile movement becomes a decisive factor.
- The Riverine area requires unique capabilities and tactics to achieve success against hostile forces.

e. Joint Logistics Over-the-Shore (JLOTS) operations [Pg. 2-4-2-5]

- Joint Logistics Over-the-Shore (JLOTS) are operations in which Navy and Army forces under a joint force commander, conduct the loading and unloading of ships with or without the benefit of fixed port facilities.
- MESF forces provide surface and subsurface surveillance and threat interdiction, augment landward security functions, and may provide traffic and lighterage control during ship-to-shore movements.

110.1 Define and discuss the following terms:

a. Permissive environment [Ref. d, App. 3 to Annex C Pg. 108-109]

Defined as a friendly controlled environment in which the host country military and law enforcement agencies have control, intent and capability to assist operations.

b. Semi-permissive environment [Ref. d, App. 3 to Annex C Pg. 108-109]

Defined as an environment in which host government forces do not have totally effective control of the territory and population in the intended area of operations.

c. Low intensity conflict [Ref. d, App.3 to Annex C Pg. 108-109]

- LIC examples in regards to U.S. involvement:
  - Lebanon 1983
  - Somalia 2002-2004
  - Bosnia 1995 and 1998

- Non-traditional, asymmetric warfare influencing a limited deployment of political and military forces.
  - No Superpower, major theater of war (MTW) conflict

d. Escalation of force [Ref. b, Pg. 10-6]

- MESF doctrine and military law dictate that an appropriate level of force be used to deter an intruder from entering a security zone.
- Use of Force Continuum:
  - A logical, escalating series of defensive countermeasures (levels of force) which may be employed against a contact of interest (COI) to stop an attack on a high value asset (HVA) or prevent an incursion into a security zone.
  - Focus is on applying the minimum amount of force to achieve the mission objective.
    - A balance of necessity and proportionality
  - Continuum, if used appropriately, will determine:
    - COI intent
    - Requirement for use of force
    - Appropriate and reasonable level of force

- <u>Level 1</u>:
  - Show a waterborne presence
  - Hail by radio and warn to remain clear
  - Verbal hail and warn to remain clear
  - Sound siren
  - Flash blue lights
  - Hand movements
  - Five blasts on horn
  - Maneuver to position between COI and HVA
  - Aggressive maneuvers between COI and HVA to encourage COI to change course
  - Herding contact to cause course change in desired direction
  - Man weapon stations

- <u>Level 2</u>:
  - Use of parachute flares
  - Shine spotlights on the COI pilothouse
  - Blocking the COI by positioning boat to counter the COI's heading
  - Shouldering the COI to cause course change in desired direction
  - Train weapons on the vessel posing an imminent threat (VPIT)

- Level 3:
  - Warning the VPIT that it will be fired upon
  - Firing warning fire (i.e., shots across the bow)
    - Warning shots are authorized both OUTCONUS and INCONUS for naval units

- Level 4:
  - Disabling fire directed at engines to stop a large VPIT
  - Directed destructive fire

110.3 Discuss the importance of determining hostile intent in force protection.
[Ref. b, Pg.10-5]

- An adversary's objective to inflict damage or endanger lives is manifested by hostile intent.
- Hostile intent must be identified as early as possible in order to provide time for a progression of escalating force.
- Boat crews must be prepared to identify and react appropriately to hostile intent in a matter of seconds!

- Identifying Hostile Intent:
  - Intelligence reports
  - Appearance or profile of the COI
  - Forces/watercraft operating in an area without apparent reason
  - Running with navigation lights extinguished at night
  - Failure to respond or react to hails and warnings
  - Attempting to evade security boats in order to enter warning zones
  - Radical or aggressive vessel handling or attempting to ram security boats
  - Running at high speed directly toward an HVA
  - Displaying weapons

110.4 Define and discuss the following types of High Value Assets (HVA):

a. Military ships and vessels [Ref. a, Ch. 6 Pg. 2]

Most military ships and vessels are USNS or USS type vessels, but any military vessel can be classified as an HVA is needed.

b. Commercial ships and vessels [Ref a, Ch. 6 Pg. 1]

Most commercial ships and vessels that are labeled as HVAs are of a large class but any vessel can be classified as an HVA is needed.

c. Waterfront facilities [Ref. b, Ch. 4 Pg. 4.6.3.1]

Strategic Seaports of Embarkation

The U.S. Army's SDDC, in coordination with the Maritime Administration (MARAD), designates specific ports as strategic SPOEs. MARAD issues a port planning order (PPO) to commercial port authorities at the SPOE for the exclusive or priority use of marine terminals and facilities that have been determined to be vital by the SDDC for their use during deployments.

The port authorities can then make plans for minimal disruption of commercial business. Procedures for assigning priority of use and exclusive-use port terminals for military operations are in 46 Code of Federal Regulations (CFR) 340. A National Shipping Authority Service Priority Order (NSPO) directs that priority of use be given to the movement of DOD cargoes. A National Shipping Authority Allocation Order (NAO) gives DOD exclusive use of port facilities. Both of these documents refer to specified terminals and facilities within a port, and both are legally binding. These documents are issued by MARAD at the request of SDDC and give port authorities 48 hours to prepare for military use.

d. Pier facilities [Ref. a, Ch. 6 Pg. 4]

Piers are of high value due to there function of mooring ships and movement of equipment.

e. Friendly military facilities ashore [Ref. b, Ch. 4 Pg. 4.6.3.2]

Controlled ports contain sensitive military facilities, and access to controlled ports is limited for vessels labeled special interest vessels (SIVs) from countries designated by the national command and controlled by the USCG SIV program. Detailed TTP for the treatment of SIVs can be found in the United States Coast Guard Commandant's Instruction (COMDTINST) M16000.12, USCG Marine Safety Manual, Vol. VII, Chapter 8.

110.5 Discuss the following threats and countermeasures as they relate to force protection: [Ref. b, Ch. 5.9.2.1 through 5.9.2.6]

a. Boats with small arms
b. Boats with crew-served weapons

Personnel armed with small arms often are not capable of sinking a patrol boat but could inflict personnel and equipment casualties. However, crew-served weapons could inflict substantial damage on a steel-hulled military or commercial ship and pose a significant threat to personnel on deck, radar, or other electronic equipment.

c. Boats laden with explosives

Assaults by explosives-laden boats or personal watercraft are typically crewed by a suicide squad. In this case, it is much harder to determine hostile intent because the explosive charges will probably be out of sight.

Another method for delivering an explosive device is to float the device on the incoming tide. The device is constructed such that it is of near-neutral buoyancy and then released into the target area. Detonation may be by contact or by remotely operated devices. A significant disadvantage for the enemy is that they must get very close to the target to be effective.

Tankers, container ships, and merchant ships can be used as bomb transport vehicles. In addition, the timed scuttling of any major vessel can effectively block a port, possibly for an extended period of time.

d. Rocket-propelled grenades (RPG's)

Hit and run attacks by small boats equipped with shoulder-fired rocket-propelled grenades (RPGs) are extremely effective. In the littorals this is one of the likeliest and most dangerous threats. The effective range of an RPG is approximately 1,000 meters and an RPG round can inflict significant damage. The weapon is easily concealed, fired very quickly, and several weapons may be carried on board a single small boat. Similar capabilities are associated with antitank weapons such as recoilless rifles and wire-guided missiles.

Patrol craft must be observant of coastal threats as well as waterborne threats because these weapons can be fired from adjacent shorelines. HAD warships and cutters must consider what their reaction would be to a hijacking where use of such weapons is possible or probable from a neutral or even friendly ship. SEALs and special USCG teams may be more appropriate than normal HAD assets.

e. Swimmers

SDVs and minisubs may be used by enemy special forces to insert reconnaissance personnel, saboteurs, mines, or torpedoes. Their target will normally be an HVA and not a patrol boat, but the patrol boat will probably be the first line of defense against them.

An SENSORDET may initially detect these threats using acoustic sensors; however, it is extremely difficult to identify and track these targets in congested, shallow coastal waters. Patrol boats may use concussion grenades against them, though with limited effectiveness. EOD can provide charges to assist in neutralizing an identified submerged aggressor.

f. Air threats

Though patrol boats and HAD warships and cutters can use machine guns to engage hostile small aircraft such as light planes, helicopters, ultra-lights, and hang gliders, detection and engagement can be difficult. Warning zones, broadcasts, and procedures must be established consistent with ROE.

110.6 Discuss the concept of defense in depth as it applies to force protection.
[Ref. g, Ch. 6.2 -6.2.1 Pg. 6-1]

The primary objective of a security zone is to retain operational capability and mission functionality while providing the greatest level of protection to HVAs. Conducting defense in depth using security zones increases the reaction time of the security forces to respond to imminent threats.

Note:
Units of measure for distances in figures have been omitted. Notional numbers are provided but actual distances are dependent upon a variety of tactical factors. Figure 6-4 is the exception as it describes U.S. law.

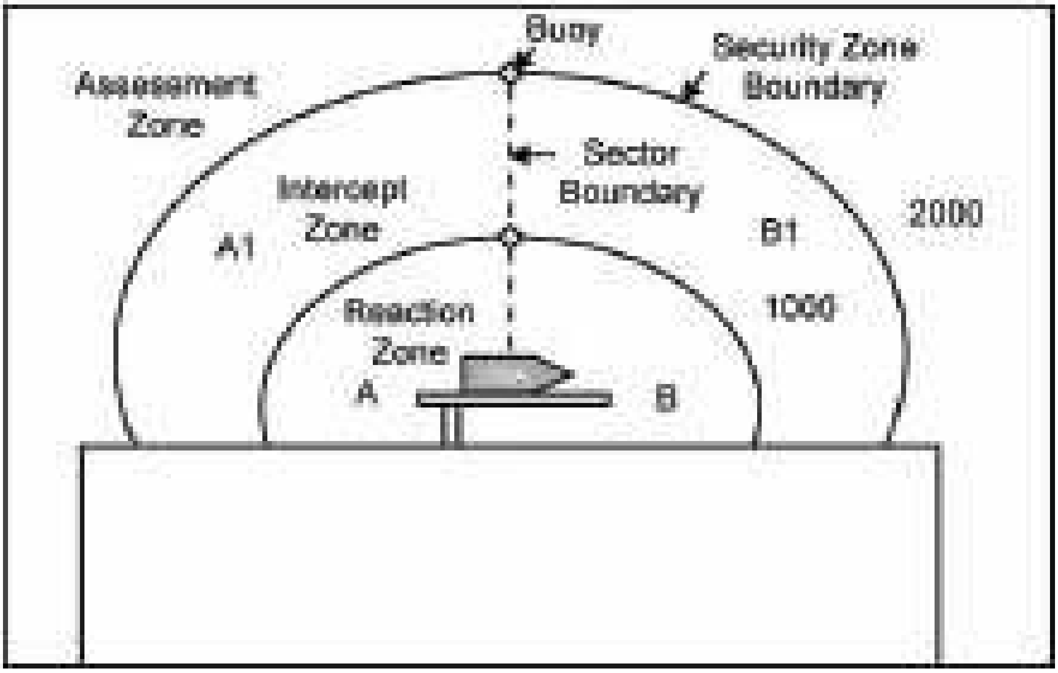


Figure 6-4. Sector Numbering of Pierside Security Zones

The HVA's surveillance and weapons systems should be incorporated in the overall force protection plan. HVA protection starts with an outer layer of defense consisting of air and sea patrols. Offshore USN ships and USCG cutters may be stationed in the inbound approaches to detect and respond. Patrol aircraft (fixed- and rotary-wing) can detect inbound ships to ensure that USN ships and USCG cutters can intercept. Ideally, intelligence and the requirement for pre-arrival reporting will provide cueing for ships and planes prior to actual radar detection. An inner defensive layer is provided by underwater sensors and harbor security patrolling. Tactical boats conducting security operations monitor activities and vessels to detect possible threats to friendly vessels and facilities.

110.7 Define and discuss the following terms: [Ref. g, Ch. 6.3-6.3.3 Pg. 6-2-6-3]

a. Area of Operation (AO) (Definition is in the glossary)

An operational area defined by the joint force commander for land and maritime forces. Areas of operation do not typically encompass the entire operational area of the joint force commander, but should be large enough for component commanders to accomplish their missions and protect their forces. Also called AO. (JP 1-02)

b. Assessment zone

The assessment zone is the outermost security zone for HVA protection and extends to the reach of organic and inorganic sensors. This zone may be integrated into the overall defensive sea area force protection plan. Security forces detect and identify COIs as they approach or pass near the intercept zone. Security forces assigned to a specific HVA typically do not patrol the distant assessment zone, nor do they generally control access or challenge contacts unless their track will approach the intercept zone. Establishing authorities will specify procedures and limits of the assessment zone in appropriate OPORDs or directives for operational areas.

c. Warning/Intercept zone

Ideally, the intercept zone extends at least 1,000 yards/meters from the outer boundary of the reaction zone away from the HVA. This zone is established to increase the time to react to a threat. Screening vessels (SVs) patrol this zone and intercept COIs entering this zone to determine their intent. Vessel traffic in this zone is controlled. Personnel, vehicle, and vessel access control points may be constructed to control shoreside and waterside access from outside the perimeter to this zone. The actual distance for this zone may be based on the FPCON in effect for that AO, physical characteristics of the terrain, activity, and the corresponding threat analysis. The intercept zone may be divided into two or more sectors based on the number of available tactical boats.

d. Threat/Reaction zone

Ideally, the reaction zone extends at least 1,000 yards/meters from the HVA. The reaction zone is where unidentified or potentially hostile contacts are engaged with increasing levels of force until they retreat outside of the zone or are no longer a threat. Potentially hostile threats are not allowed to approach the HVA inside this minimum distance. Any vessel traffic in this zone must be kept under positive control. The actual distance for this zone may be based on the FPCON in effect for that AO. Any attempt to penetrate the reaction zone, after being warned off by security boats, could constitute hostile intent.

110.8 Define and discuss the following: [Ref. g, 6.5.1 and 6.5.2 Pg. 6-6 through 6-7, Ref. b, 6.6.4.3, Pg. 6-11]

a. Screen Vessel

The SV protects the HVA by determining a COI's intent and proactively screening and intercepting COIs in the assessment and intercept zones. The SV detects, identifies, investigates, classifies, reports, warns off, and, if necessary, engages COIs. The SV also escorts COIs out of the intercept zone, secures the transit route of moving HVAs, and restrains traffic at strategic locations, if required.

b. Reaction Vessel

The primary role of the RV is to intercept, engage and, if necessary, destroy any vessel attempting to enter a protected HVA's exclusion zone. The RV provides overwatch and fire support to the SV when it intercepts and investigates a COI. The RV maintains a position that provides the best possible vantage point of the COI so as to be able to maneuver quickly if the COI displays hostile intent or evades the SV and continues toward the HVA. Constant radar coverage is maintained by the RV to maintain situational awareness and to avoid interfering with the fields of fire of static weapons positions.

c. Intercept and escort boats

At times, depending on boat availability and threat conditions, it may be desirable to station one or more boats outside the warning zone for initial contact and escort. The use of I&E boats extends the initial DR of a COI entering the area. They can also be used to warn approaching vessels of the intercept zone and request them to slow or stop prior to entering the zone. Figure 6-5 depicts an I&E deployment. The use of I&E boats is especially important when the security and threat zones must be contracted to less than 1,000 yds due to harbor size or channel restrictions. However, in these conditions the boats should be attuned to threats from adjacent coasts. They may also be required to escort inbound and outbound HVAs and perform other surveillance and harbor patrol missions.

Though the title of intercept and escort boat are not listed in the NTTP 3-20 they are still commonly used with in the MESG.

110.9 Discuss how the following may be employed in support of operations in force protection: [Ref. b]

a. Craft of opportunity [Ch. 6, Pg. 6.6.2.1 Par. 6-7]

COOPs, such as pleasure craft, port small craft, LCMs, or LCUs, with weapon emplacements, may supplement the security boats. These craft may be anchored or stationed in a position to augment the security patrols. Utilizing COOPs is especially important when few security boats are available. When integrating COOPs into a MFP plan, the C2 structure and TACON over these craft must be considered.

b. Floating barriers [Ch. 6.6.2.3 Pg. 6-7]

Floating barriers (e.g., Dunlop Barriers, camels, logs or log booms, nets, and concertina wire) or lines of demarcation may be deployed to augment the waterborne defense of HVAs and increase the defense-in-depth zones. This is especially important when few security boats are available. A line of barges, secured bow to stern between a mooring buoy and the pier, makes a very effective barrier that can deflect or absorb a large portion of the blast from an explosive-laden vessel. These barges can also be used for additional static weapon emplacements and patrol boat berths.

c. Static weapons emplacements [Ch. 6, Pg. 6.6.2.4 Par. 6-8]

Static weapon emplacements may be positioned on piers, anchored or moored vessels, or the HVA to complement waterborne assets. Close coordination and positive communications are required to prevent blue-on-blue engagement.

d. Observation posts [Ch. 6, Pg. 6.6.2.6 Par. 6-8]

OPs complement the visual detection capabilities on the boats and HVAs. Generally, OPs are more protected from the elements and provide an integral part of security zone surveillance operations.

e. Electronic sensors [Ch. 6, Pg. 6.6.2.5 Par. 6-5]

In many cases, boats are deployed in conjunction with an SENSORDET, which will use radar, sonar, TIS/VIS, and other electronic sensors to detect and classify potential threats. Specific capabilities of SENSORDET are detailed in Chapter 3.

f. Acoustic sensors [Ch.3, Pg. 3.4.3 Par. 3-2]

SENSORDET sonar operators supply tactical commanders with a real-time acoustic picture of contacts in the surveillance area. Surface and subsurface activity out to 12 nautical miles (nm) is integrated into the CTP. See Figure 3-2 for acoustic ranges.

g. Anti-swimmer Marine Mammal System [glossary Pg. 6]

The employment of marine mammals by explosive ordnance disposal forces in locating, making, and recovering underwater objects, and in conducting mine countermeasures and other special operations. Also called **MMS.** (NWP 1-02)

110.10 Describe the Required Capabilities and Projected Operating Environment (ROC & POE) for your unit. [Ref. c]

For specific ROC & POE requirements review that ones own Unit Required Operating Capabilities/Potential Operation Environment documents.

110.11 Describe the Watch, Quarter, and Station bill for your unit. [Ref. f]

Review the watch bill as promulgated by the watch quarter, and station bill coordinator.

110.12 Describe your command's organization structure. Define and discuss the roles of the following individuals: [Ref. a, Ch.1, Pg. 5-7]

a. Commanding Officer or Detachment Officer in Charge (OIC)

Commanding Officer or Detachment Officer in Charge (OIC) is responsible for all boat operations and personnel assigned to his or her unit.

b. Executive Officer

- Is responsible for all administrative matters within the unit.
- The XO is the CO when the CO is not present.

c. Detachment Security Officer (Mobile Security Force (MSF) MSF Units)

- Force Protection Officer
- Responsible for Security and Force Protection Planning
- Generates IFPP
- Responsible for organizing and training personnel within the detachments.

d. Chief Engineer

- Is responsible for maintaining all of the boats assigned to the BOAT DET.
- He/She is also responsible for assuring all engineers are fully qualified to work on equipment.

e. Operations Officer

- Is responsible for developing and sending out all message traffic for the unit.
- He/She is also responsible for developing operational plans for the unit.

f. Weapons Officer

- Is responsible for maintaining in good working order all weapons assigned to the unit.
- He/She is also responsible for keeping an accurate inventory of all weapons and maintaining safe storage for the weapons.

g. Training Officer

- Is responsible for developing training plans for the unit.
- He/She is also responsible for tracking unit personnel JQR/PQS qualifications.

h. Command MCPO/SCPO/CPO

- Is responsible for executing command orders.
- They are also the liaison between the junior enlisted and the officer.

i. Full Time Support (FTS) Petty Officer in Charge

- Is responsible for supporting the needs of the command though out the month per the direction of the OIC.

110.13 Define and discuss the roles and responsibilities of the following watch standers: [Ref. d, Tab A to App. 3 to Annex C]

For a more in-depth listing of what the each of the below watch stations is required to do review ones own unit standard operation procedures.

a. Boat Coxswain

The boat Coxswain has ultimate responsibility for his craft and crew, including the employment of crew-served and personal weapons aboard the craft, consistent with U.S. Naval Regulations and this SOP and tactical doctrines. Boat coxswains will be certified by the Commanding Officer and designated in writing.

- Safe navigation of his craft as well as the safety of the crew.
- Ensure that the current authorized allowance of nautical charts and publications are correct and up to date.
- Receive all orders relating to his/her duties from the Patrol Leader and will make all reports in connection therewith directly to the Patrol Leader.
- Maintain all records of observations, contacts and any other pertinent information.
- Coordinates crew activity, overall safety of the crew, fire commencement signals, the mission execution and completion of assigned tasks.
- Responsible for knowledge of current weather conditions, Force Protection Conditions, MOPP levels, the mission and all that pertains to it.
- Maintain the Pass-down Log and give a complete pass-down to the oncoming boat coxswain.

b. Patrol Leader

- MSD Patrol Leaders will be responsible for obtaining briefs on ROE from the TACSUP and will ensure his boat crews are familiar with them before getting underway.

- Any changes in ROE must be communicated to the Patrol Leader, who will respond verbatim, repeating the order word for word, to indicate a clear understanding of the ROE in effect.
- The Patrol Leader will be a fully qualified MSD boat coxswain or may under certain conditions be a Surface Warfare Officer.

c. Watch Officer

- The BOAT DET Watch Officer functions as the liaison between the BOAT DET and the SSO, providing ready guidance on:
- BOAT DET craft capabilities and limitations.
- BOAT DET SOPs and tactical doctrines.
- BOAT DET crew qualifications, capabilities and limitations.
- Reduction in operational capability due to weather, sea state and equipment casualties.
- Status of BOAT DET craft down for maintenance.
- Mission capabilities according to the ROC/POE.
- The BOAT DET Watch Officer may or may not be physically located in the SSO Watch Officer operations center, but he will be readily available for consultation.
- Under certain circumstances, the Boat Det Watch Officer may be required to exercise TACON over the boat detachment, if directed by higher authority.

d. Boat Crew Member

- Operation and maintenance of their weapons.
- Act as line handler for docking procedures.

e. Boat Engineer

- The operations, care, and maintenance of all propulsion, auxiliary machinery, and damage control.
- Supervise all fire fighting, casualties, and carry out the control and restoration of engineering and craft control casualties.
- Maintain required operating and maintenance records, conduct routine inspections of machinery, being alert to detect fire hazards, fire, flooding, fluid leaks, high bilge levels, unusual noises or vibrations and machinery malfunctions.
- Promptly report all significant evolutions and abnormalities to the Boat Coxswain.
- Ensure all fluid levels are correct and fuel tanks are filled prior to and upon completion of each mission
- Give a complete pass-down to the oncoming Boat Engineer or to the maintenance department if applicable.

f. Navigator / RTO

- The operation, care and maintenance of all communication systems, electrical and electronic devices not specifically assigned to other departments.

- Assist the aft gunner in weapons fire and loading.
- Maintains the deck log
- Prepares the sailing list for the coxswain
- Operations and maintains the onboard radios.
- Responsible for maintaining and logging all weapons and CCI gear onboard.

g. Tactical Supervisor (MSF Only)

The TACSUP will generally exercise advisory control over patrol boats in his watch section. Tasking to the Patrol Leader should be general in nature, allowing the Patrol Leader to exercise tactical control of the boats for which he is responsible.
The TACSUP will communicate immediately to the Patrol Leader any incoming information regarding Contacts of Interest (COI's), inbound traffic, departing traffic, or other port movements as necessary.

110.14 Discuss your Commanding Officer's Standing Orders [Ref. e]

See ones own Commanding Officer's Standing Orders to fulfill this line item.

110.15 Discuss the following forces: [Ref. g]

a. Port Security Unit [Pg. 1-7]

Port security units (PSUs), maritime safety and security teams (MSSTs), and maritime security response teams (MSRTs) employ tactical boats to conduct security operations. An overview of tactical boat characteristics and capabilities is provided in Appendix A.

b. Maritime Safety and Security Team [Pg. 1-7]

MSSTs bring rapidly deployable, armed small craft, as well as specially trained LE personnel, to support security operations within CONUS. Primarily, MSSTs provide PS/HD for protection of critical infrastructure and logistics off-loads. Secondarily, MSSTs can support CD/AMIO, and some expeditionary warfare forces as required. The MSST provides waterside security and a modest level of shoreside security. They are equipped with six armed fast boats and staffed to support 24 hours a day/7days a week (24/7) boat operations to enforce moving and fixed security zones around Navy and commercial HVAs and waterside critical infrastructure.

c. Naval Coastal Warfare [Pg. 1-5]

NCW forces are organized under two NCW groups and, in addition to the tactical boat units called inshore boat units (IBUs) and mobile security detachments (MSDs), contain NCW squadrons, mobile security squadrons, and mobile inshore undersea warfare units. Their mission is to protect strategic port and harbor facilities and combat maritime terrorism for U.S., allied, and commercial ships, as assigned, operating within the littoral, at anchorages, and in harbors. NCW forces are employed for missions such as OCONUS port security in theater defense operations and in support of CONUS homeland security and homeland defense operations. For detailed information on NCW forces, refer to NWP 3-10, Naval Coastal Warfare, and NTTP 3-10.1, Naval Coastal Warfare Operations.

As of FEB 2008 all NCW units have been decommissioned and replaced with MESF DIVISIONS. Inshore boat units (IBUs) are now know as Boat Div with each Div. having two boat DETACHMENTS, mobile inshore undersea warfare units MIUWUs have been split into two new types of units, Sensor Detachments and Security Detachments.

d. Naval Riverine Force [Pg. 1-6]

Riverine Group One, located in Norfolk, VA, was commissioned in early 2006 and will have three deployable riverine squadrons. Each riverine squadron will have 12 armored combatant craft, which provide the assault support or tactical troop movement to a Marine infantry company (approximately 120 Marines). Missions for the riverine force include surveillance, riverine patrols, interdiction, and tactical troop movement.

e. Naval Security Force [Pg. 1-6]

Naval security forces provide waterborne security for Navy installations and are part of an installation's organic security force.

f. Submarine Force Protection Detachment [Pg. 1-6]

The Strategic Systems Program provides security for Naval Submarine Base, Bangor, WA and Naval Submarine Base, Kings Bay, GA. Submarine force protection detachments provide security for nuclear-powered ballistic missile submarines in ports other than Naval Submarine Base, Bangor, WA and Naval Submarine Base, Kings Bay, GA and when transiting on the surface in restricted waterways. A secondary mission is to augment law enforcement and physical security at Navy and submarine commands worldwide. There are four detachments, two on the east coast who report to Commander, Submarine Group 10, and two on the west coast who report to Commander, Submarine Group 9.

g. Fleet Antiterrorism Security Team (FAST) Company [Pg. 1-6]

Fleet antiterrorism security team (FAST) companies provide a rapid and mobile short-term security augmentation for installations, naval vessels, and national security assets when terrorist threat conditions exceed the capabilities of permanent security forces. FAST companies have forward-deployed platoons in the European, Pacific, and Central geographic combatant command areas. Combatant commanders normally exercise operational control (OPCON) through their respective maritime component commander.

h. Marine Expeditionary Unit (Special Operations Capable) [Pg. 1-6]

Marine Corps Forces Special Operations Command is a uniquely organized, trained, and equipped expeditionary special operations force (SOF). It is trained to conduct limited tactical boat operations (either as an independent force or together with a naval special warfare detachment). Missions may include gas and oil platform operations, VBSS operations, and insertion and extraction of SOF. When a MARSOC company is attached to a Marine expeditionary unit (MEU), the MEU is designated as special operations capable (SOC). A MEU (SOC) provides combatant commanders with a certified, versatile Marine air-ground task force that provides sea-based forward presence with the inherent operational flexibility to respond rapidly to multiple missions.

110.16 Discuss planning elements for a HVA escort mission [Ref. g, Ch. 6.9.1, Pg. 6-18 through 6-20]

In preparing for an HVA escort mission, the following considerations must be reviewed and incorporated, as applicable:

1. Coordinate with all elements involved with the operation. Review the Plan of Intended Movement, including expectations, intentions, courses, and speeds. If possible, clear the HVA transit route of suspicious vessels. Close coordination with harbor and local civil authorities is essential in achieving maximum safety of the transiting HVA.

2. Coordinate an integrated fire support plan. Weapons employment procedures of the HVA’s embarked security team, CAS, and the tactical boat unit must be deconflicted. Key issues to discuss are areas of responsibility for fire and observation, clearing fields of fire, communications, tactical chain of command, and weapons C2.

3. Coordinate and brief the plan with the HVA’s security officer or embarked security team prior to the start of the escort. If meeting the HVA in Open Ocean with multiple craft ensure contact is made and the formation is identified several miles before approaching the HVA. Request permission to take station and “move freely about the vessel for escort duties.”

WARNING

Do not maneuver in the vessel’s bow blind spot.

4. Specify a radio channel for all elements to monitor. The HVA should direct all communications for the tactical boats to the patrol leader.

110.17 Discuss command and control requirements for an HVA escort
[Ref. g, Ch. 6.9.3, Pg. 6-21]

In some situations, a transiting HVA may be escorted by a dedicated C2 vessel, such as a cutter. The C2 vessel will meet the HVA at the designated pickup point and establish the security zone around the HVA using SVs and RVs. The officer in tactical command (OTC) may take a position either on the C2 vessel or the HVA.

The OTC and/or designated liaison from the tactical boat unit should embark on the HVA to explain tactical boat actions to the vessel's master and embarked security team leaders.

It is vital that weapons release authority and tactical boat placement be delegated to the appropriate level (i.e., patrol leader, coxswains).

Electronic sensors onboard the HVA (i.e., radar) can provide an additional benefit to the tactical boats. All attempts should be made to relay COI information from the HVA to tactical boats.

110.18 Discuss minimum escort requirements [Ref. g, Ch. 6.9.5, Pg. 6-22]

If at all possible, an HVA escort should not be conducted with less than a two-boat detachment. OPCON approval is required before employing a single-boat escort. When exigent circumstances exist, single-boat escorts shall only be undertaken when the HVA has met one of the following conditions:

1. Is in protected waters patrolled by other LE assets

2. Has one or more security teams embarked

3. Is covered by shore side security emplacements.

110.19 Discuss planning elements for protecting multiple assets
[Ref. g, Ch. 6.10, Pg. 6-32 through 6-33]

Often there are multiple HVAs pierside or at anchor that require protection (see Figure 6-28). The security zone principle should be extended to protect all assigned assets. HVAs are placed in the center of the zone and the zone extends in a 360-degree circle around them. This may require the commander to prioritize the defense of HVAs based on available patrol assets. The operational risk assessment based on the likely threats, the criticality of each HVA, and the number and type of patrol assets available enable the commander to determine the level of protection provided to each HVA. These priorities often change based on port activity, arrival and departure of vessels, and threat levels. In most circumstances, teaming tactical boats with shoreside fixed emplacements and defensive positions onboard the HVA and/or pier results in a more effective level of protection.

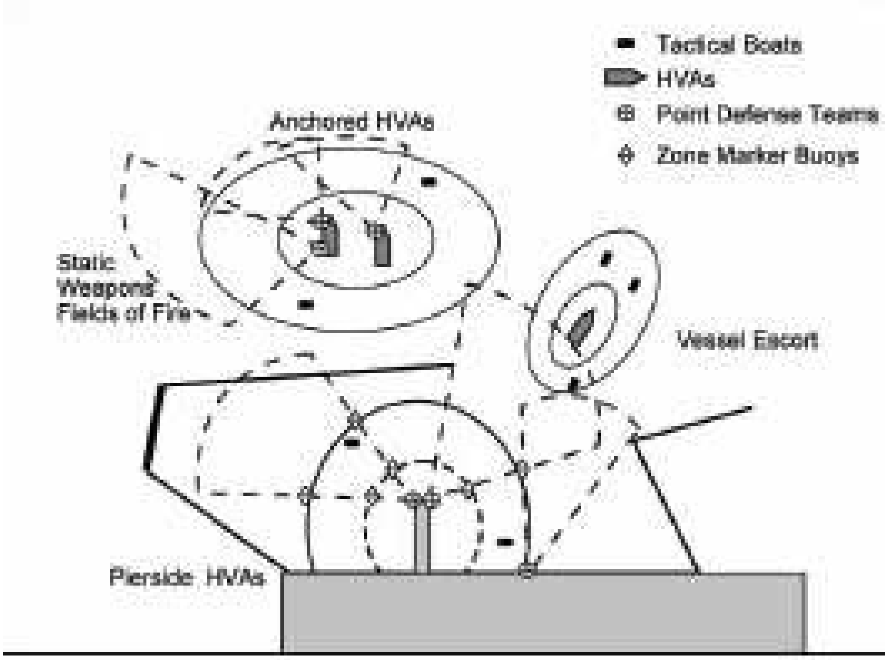


Figure 6-28. Multiple Asset Protection

Note

For more information concerning landside security measures, including static weapons placement and anti-swimmer measures, see the following references: COMDTINST (series), U.S. Coast Guard Maritime Law Enforcement Manual (MLEM); COMDTINST M16000.12 (series), Marine Safety Manual, Volume VII, Port Security, Chapter 7; and NTTP 3-07.2.1, Antiterrorism/Force Protection.

Planning considerations for conducting multi-asset protection are:

1. Compatible communications equipment and SOPs
2. Defined areas of responsibility
3. Clear command and control
4. Integrated fire support plan and weapons placement
5. Type of weapons placements.

110.20 Discuss the elements of a communications plan. [Ref. g, Ch. 9.2.2, Pg. 9-2]

A simple, understandable communications plan is essential to effectively execute any mission. The communications plan is based on the operations and administrative plans that it supports. The communications plan describes how units will communicate internally and with other commands. It provides details on the use of radio circuits, channels, and frequencies and the overall operation of the communications network in the operating area. The plan is prepared in detail to facilitate its use at all echelons and includes:

1. General description of the communications situation, mission, guiding principles, and the concept of operational employment

2. Delegation of tasks and responsibilities

3. Detailed instructions relative to the organization, installation, operation, and coordination of the communications system

4. Assignment and use of callsigns, frequencies, cryptographic aids, authentication systems, brevity codes, prowords, challenge and reply passwords, and reporting formats and times

5. Instructions on countermeasures, cover and deception, security, recognition and identification, and other special communications and electronics functions

6. Instructions concerning communications and electronics logistic support

7. Compatibility of radios

8. Instructions for authentification requirements and procedures

9. Instructions for medical evacuation that are compatible to all deployed units and medical aid craft

10. If remotely monitored sensors are employed, special planning considerations to ensure the allocation, use, and monitoring of sensor-related frequencies, particularly frequencies assigned as sensor transmission and relay frequencies

11. Signal Plan and Loss of Communications Plan

12. Linkup procedures and procedures for crossing boundaries.

111 Surface Engagements with Weapons

References:

[a] NTTP 3-10.1 Naval Coastal Warfare
[b] CJCSI 3121.01A, Standing Rules of Engagement
[c] Craft Specific Boat Information Book
[d] NTTP 3-20, Tactical Boat Operations

111.1 Discuss weapons engagement limitations for tactical craft. [Ref. d, 10.8.2.1, Ch. 10 Pg. 10-9]

Tactical boats are constrained in their ability to engage hostile targets by a number of factors, including:

1. Lack of mobility in narrow waterways and effects of tides and currents

2. Stability of tactical boats

3. Distance to the target

4. Danger of collateral damage to friendly forces and civilians

5. Fields of fire for installed CSW and safety danger zones.

   a. Strong/Weak Side. As many tactical boats are equipped with one heavy weapon and one light weapon, there will be a strong side and a weak side. The coxswain must maneuver the boat to present the strong side to the enemy. The coxswain must recognize that the long range of the heavy weapon may make its use inappropriate due to potential collateral damage. The shorter range of the light weapon may make it a more appropriate weapon.

   b. Head-On Engagement. A fundamental tenet of surface engagement is to present the smallest target to the enemy while bringing maximum firepower onto the target. When engaging a target head on, the coxswain should offset the bow slightly to provide the optimum forward firing position from the strong side, if there is no bow weapon.

   c. Engagement Astern. Some tactical boats can bring multiple weapons mounts to bear simultaneously astern.

111.2 Discuss the following terms:

a. Standing Rules of Engagement (SROE) [Ref. b]

SROE gives general guidance to commanders for various actions that may or may not be taken during operations at all times.

Guided by:
- National Policy Considerations
- International Law

- Foreign Relations
  - Apply only OCONUS

b. Theater Rules of Engagement (ROE) (Theater specific) [Ref. b, Enclosure K]

Promulgated by Combatant Commander (COCOM) for a specific Area of Operations (AO)

- CENTCOM, PACOM, etc..

Specific instructions to combatant units on how they may respond to a perceived threat.

- Unit commanders are guided by these ROE in performance of their duties and are responsible for implementing appropriate procedures within the guidance of the ROE.
- Unit commanders, through their chain of command, can request ROE relaxations of policy.
  - Based on need, specific circumstances, location, etc..
- Rules of engagement NEVER limit a unit's right to defend itself.
- Boat crews must clearly understand the ROE before ever leaving the pier.
  - Part of Patrol Brief
  - Updates/changes to ROE are managed by BOAT DET or SENSOR DET Watch Officer and passed down to Patrol Leaders
- ROE can change based on decisions made by combatant commanders.
- Every crew member must know how he or she will react to a given situation before it happens.

c. Rules of Force [Ref. d, 10.2.5, Ch. 10, Pg. 10-2]

Only such force as is reasonably necessary under the circumstances may be used. Excessive force may never be used. Deadly force is appropriate only in meeting deadly force or dealing with a crime involving the use of, or threatened use of, deadly force. Force shall not be used where assigned duties can be discharged without its use.

When UOF is permitted, the force used must be limited to the minimum necessary and must be designed to achieve the desired result with minimum injury to persons and property. When concurrence from higher authority is not required, if time and circumstances permit, consultation with superiors before using force is encouraged.

When prompt action is required, personnel shall apply the appropriate UOF in a timely manner according to their own best judgments without prior consultations with higher authority. Consistent with the foregoing, UOF is permissible in the following circumstances. More than one of these grounds for UOF may be present when these categories overlap:

1. For self-defense (including defense of others)
2. To prevent a federal crime, or where authorized, a serious state or foreign crime
3. To effect a lawful arrest
4. To protect property USCG personnel have the authority to protect
5. To compel compliance with an order the USCG has authority to issue.

111.3 Discuss the fields of fire from the weapons emplacements on the craft.
[Ref. a, Ch. 10, Pg. 10.7.10.1.1 (10-14)]

Each craft class has its own fields of fire depending on how many weapons can be mounted on the craft. Review each craft schematics for a complete understand of each crafts fields of fire.

111.4 Discuss the techniques for de-confliction between friendly craft.
[Ref. d, 10.8.1, Ch. 10, Pg. 10-8]

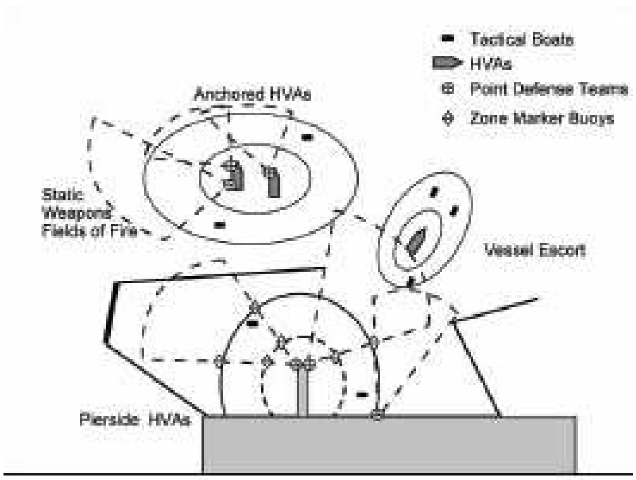


Figure 6-28. Multiple Asset Protection

Employing static weapons to cover defensive zones necessitates well-coordinated maneuvers of tactical boats with consideration of static weapons fields of fire. There are several methods to deconflict waterborne and static weapons, one measure involves dividing the operating area between static weapons' fields of fire zones and boat weapons' fields of fire zones, marked by visible landmarks such as buoys or daymarkers. Boats will remain clear of these fire zones, and each team may pass contact information to the other via the operational commander. This is the preferred approach when employing static weapons from forces non-organic to the tactical boat unit. This approach permits boats and static weapons emplacements to direct fire in an area without direct communications or incurring a blue-on-blue engagement. Figure 6-28 of this publication illustrates a deconfliction scheme involving static weapons ashore and tactical boats.

When geographical considerations do not permit this scheme, it may be necessary to have static weapons' fields of fire covering areas in which boats operate. When this is the case, static weapon crews must hold fire until the boats report or are visually confirmed to be clear of the weapon's sector of fire. A static weapon crew may visually observe a boat exit its sector of fire, but the boat may quickly return to the field, necessitating a clear signal that the boats are clear. This communication should take place on the boat net or the landward security net. In either case, additional radios may be necessary so that continuous monitoring is possible. The greatest potential for fratricide exists when clear, concise, and rapid communications are not employed between shoreside and tactical boats.

In accordance with the defensive fireplan, the gunners coordinate their fires with each other and other boats' to maximize the firepower directed at the enemy. All gunners must be aware of their assigned sector of fire at all times. Field of fire assignments must be briefed during the patrol order. A major consideration when choosing a location from which to fire is avoiding collateral damage downrange, which includes friendly vessels, pier facilities, shore batteries, and populated shorelines. Coxswains should plan firing positions in advance with consideration given for likely avenues of approach.

The static-weapon gunner is responsible for ensuring the field of fire downrange of the target is clear of other friendly forces, neutral shipping and boat traffic, and populated shorelines. However, there may be cases, due to the restrictive nature of the harbor, importance of the HVA, and maneuverability of the COI that may require the immediate destruction of the COI. If fired upon by the COI, the tactical boat should immediately maneuver at the highest possible speed to clear a sector of fire for the static weapons emplacements, notifying the tactical commander immediately by radio. The tactical boat should proceed on a course perpendicular to the firing line between the weapon emplacement and the COI.

111.5 Define and discuss each of the following commands: [Ref. d, Ch. 9, Pg. 9-8]

a. Weapons stowed

Weapons are placed on safe and locked in the "ready-air" position, with the universal gun mount locking pins in place. The weapons are not loaded and the chambers are clear.

b. Weapons ready

Gunners have positive control of the weapons. Universal gun mount locking pins are removed. Weapons may be loaded at the discretion of the coxswain, but rounds are not chambered. Weapons are placed on safe. The M2HB does not have a safety.

c. Surface action port/starboard

Gunners are free to train their weapons on the contact. Rounds are chambered. Safety may be engaged at the discretion of the gunner.

d. Open fire

This command is given by the coxswain to the gunners. Gunners lock weapons on target and are cleared to open fire to engage the target, assuming a clear sector of fire exists. The coxswain may provide specific "open fire" commands as follows: ***Port gunner, open fire on target bearing TWO SEVEN ZERO relative, range EIGHT HUNDRED yards.***

e. Cease fire

This command is given by the boat coxswain and all gunners cease fire immediately. The gunners maintain positive control of their weapons, keeping them at the ready.

Response to Commands. Gunners respond to all firing commands from the coxswain by repeating the order given: ***Port gunner, open fire, aye.***

111.6 Discuss the techniques and limitations of night engagement.
[Ref. d, 10.8.3, Ch. 10, Pg. 10-10]

The keys to a successful night engagement are early detection, proper illumination, and delivery of a high volume of accurate sustained fire against the threat. The patrol leader should provide C2, ensuring that tactical boats maintain positions between the threat and the HVA. Tactical boats should approach the threat from a bow-on aspect. At an appropriate distance from the threat, the tactical boat should fire an illumination round aimed to backlight the target and deliver fire from the strong side against the VPIT. Other engaged tactical boats should follow the actions of the lead boat, firing additional illumination rounds as required. The patrol must maintain a high volume of sustained fire until the illumination expires or the threat is out of weapon range. The patrol then reloads and conducts battle damage assessment.

General guidelines for night weapons engagement using deadly force include the following:

1. Use all available equipment, radar, NVD, searchlights, and illumination flares.
2. Frequent rotation of lookouts should be done to prevent fatigue and boredom.
3. NVD are less effective during close quarter engagements due to muzzle flash, fast moving targets, and lack of peripheral vision.
4. Gunners should use controlled bursts and consider ammunition economy by being cognizant of the amount of ammunition used.
5. Maximize ammunition effectiveness by firing at the attacker's muzzle flash only within the weapon's effective range.
6. Brief, high volumes of fire characterize most night engagements. Only a fraction of fired rounds will effectively hit the target.

111.7 Discuss anti-swimmer measures that may be employed in HVA defense.
[Ref. a, Ch. 6, Pg. 6.6.5 (6-14)]

- Swimmers. Attack by swimmers with personal weapons, explosives or limpet mines. Because of limited endurance by swimmers, either with or without underwater breathing apparatus, they will normally be inserted by boat or subsurface craft, or will embark from a nearby shore. Swimmers are very hard to detect.

- Defensive measures may include underwater obstacles and anti-swimmer grenades.
  - If there is an identified swimmer threat, boats should pay special attention to the likely launch sites and/or platforms for swimmers, bearing in mind those swimmers will be limited by endurance. They will be inserted by boat or underwater swimmer propulsion devices, or will be launched from shore sites within swimming distance of the target.
  - Know when high tide is. Swimmers like to come in with the tide.

111.8 Discuss the indications of a possible hostile intent of COI.
[Ref. a, Ch. 10, Pg. 10.6.1]

The ROE provide unit commanders with the authority and obligation to use all necessary means available and take all appropriate action to defend against a hostile act or demonstrated hostile intent. A hostile act is defined as an attack or UOF by any civilian, paramilitary, or military force or terrorist(s) against the United States, U.S. forces, and in certain circumstances, U.S. nationals, their property, U.S. commercial assets, or other designated non-U.S. forces, foreign nationals, and their property. Hostile intent is the threat of the imminent UOF against any if the categories just mentioned.

An adversary's objective to inflict damage or endanger lives will most often be manifested by hostile intent. Evidence necessary to determine hostile intent will vary depending on the circumstances. All NCW personnel face a significant challenge in determining hostile intent with respect to normal security missions. A guard on post must make a quick assessment of what he believes a potential threat's intentions are. Indicators that could lead him to believe that an individual is demonstrating hostile intent toward himself or those whom he has been tasked with protecting may include but are not limited to any or all of the following:

1. Presentation of a weapon
2. Raising a weapon to the firing position
3. Disregarding verbal commands to halt or turn away (keep in mind this may be due to a language barrier)
4. Taking a threatening posture
5. Making a high speed run toward a post or protected asset
6. Penetrating the barrier plan.

For NCW patrol boats some indicators which, when taken alone or in combination, may lead to a reasonable belief that hostile intent exists include:

1. Intelligence reports
2. Appearance or profile of the COI
3. COIs are operating in an area where they have no apparent reason to be
4. Running with navigation lights extinguished at night

5. Failing to respond or react to hails and warnings
6. Maneuvering in a threatening manner
7. Attempting to evade NCW security boats to enter warning zones
8. Engaging in radical or aggressive vessel handling or attempting to ram NCW security boats
9. Running at high speed directly toward an HVA
10. Displaying weapons.

111.9 Discuss the definition of Hostile act and Hostile Intent [Ref. a, Ch. 10, Pg. 10.6.1]

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8. Engaging in radical or aggressive vessel handling or attempting to ram NCW security boats

9. Running at high speed directly toward an HVA

10. Displaying weapons.

111.10 Discuss warning shot employment and intent [Ref. d, Ch. 7.5.7-7.5.7.1, Pg. 7-18 through 7-19]

Rules for the use of warning shots, disabling fire and destruction fire are determined during operational planning. Tactical boat coxswains may employ warning shots, disabling fire and destruction fire to compel compliance with the order to stop. The use of warning shots prior to disabling fire is not required if the use of warning shots would unreasonably endanger persons or property in the vicinity of the COI.

Note

When operating in international waters (seaward of the territorial sea) warning shots should be used prior to employing disabling fire in compliance with international law.

Warning shots are a signal to a vessel to stop.

Warning shots have been and continue to be authorized overseas and outside U.S. waters. Pursuant to Secretary of Defense authorization, warning shots are allowed within U.S. territorial seas and internal waters to defend against small boat attacks and under specific conditions to protect naval assets. Weapon types authorized for warning shots and specific employment procedures can be found in NTTP 3-07.2.1, Antiterrorism/Force Protection, Appendix E.

Within the U.S., warning shots can only be used over water when a clear line of fire exists and under the tactical direction of a competent authority. They should only be used when there are no other means reasonably available to determine the intent of the approaching vessel/boat. Warning shots are a signal to an approaching vessel to stop and do not constitute UOF. Prior to employing warning shots, forces shall refer to NTTP 3-07.2.1, Appendix E for specific employment procedures. USCG forces shall refer to COMDTINST M16247.1 U.S. Coast Guard Maritime Law Enforcement Manual (MLEM) (series).

111.11 Discuss the Unambiguous Warning Device [Ref. d, Ch. 10.6.3, Pg. 10-6]

The unambiguous warning device (UWD) provides a clear, unambiguous, less-than-lethal means to warn approaching vessels and alert them of their imminent entry into a protected/restricted area. The UWD is fired from the 12-gauge shotgun and produces a audible, concussive, and visual effects. The UWD assists tactical boat crews in ascertaining if hostile intent exists on the part of any vessel intruding into security zones or approaching HVAs. The UWD is not intended as an antipersonnel munition.

111.12 Discuss targeting considerations during engagement. [Ref. d, 10.7.1, Ch. 10, Pg. 10-6]

Targeting will be a dynamic event. Based on target location and motion during the engagement, the aim point for the weapon will change. In general, for targets that are closing, the gunner should choose the lower edge of the target for the aim point. As the range decreases, the aim point should move toward the center of mass of the target. As a target crosses the sector of fire, proper application of a lead angle should assist the gunner in successfully completing the engagement.

When a burst is fired, the vibrations of the gun and mount, variations in ammunition, and conditions of the atmosphere will make each bullet have a slightly different trajectory. The resulting group of trajectories is known as the cone of fire. The dispersion cone can be excessive if the weapon is not properly supported and controlled by the gunner. To minimize the dispersion cone, the gunner should seize the grips firmly with both hands and brace the gun with his body. For changes in elevation, the gunner should stand erect and make changes in elevation by moving hands and arms up and down. For changes in azimuth, the gunner should shift his feet and move around the mount.

If there is doubt as to the tracers' impact, adjustment of fire must be bold, aggressive, and continuous. It is important that the gunner initially opens fire with an adequate lead angle and once established, the tracking should not be reversed. If the initial lead angle is too great, the tracking rate should be slowed and the target allowed to catch up with the tracers. For closing and opening targets, the tracers may intersect the gunner's line of vision to the target. The gunner first sees the tracers passing the target in a tail-to-nose direction. Lead information, based upon a sensing of a tracer that appears to pass the target in this direction, is invalid. The target actually crosses the tracer path only once, entering the path nose first and leaving tail last. Due to the illusion of curvature, the gunner should see this passage when the tracer appears to float by the target in a nose-to-tail direction and should lead when the tracer passes the target nose-to-tail.

111.13 Discuss engagements of enemy boats with CSW fire. [Ref. d, 10.8.2.2, Ch. 10, Pg. 10-9]

Small boats are inherently unsteady platforms from which to fire an automatic weapon or a shoulder-fired RPG. The threat boat may slow or stop as it prepares to open fire. This is a critical response point for the tactical boat and/or static weapons emplacements. A high volume of accurate firepower should be directed on such a boat, if required.

When in formation, the patrol leader should ensure that boats maintain a simple and tight formation when engaging VPITs to avoid fratricide. The patrol must not engage in a melee.

The coxswain must determine the most stable course and speed for employing weapons. Automatic weapons should be fired in short bursts (less than 10 rounds) so at least two tracers are observed during a burst to permit aiming corrections. When DIW, the gunners should train weapons on the target and use the natural roll of the boat to control elevation in vectoring rounds into the target.

112 Mission Planning

References:
[a] NWP 5-01, Naval Planning
[b] NTTP 3-20, Tactical Boat Operations
[c] MCWP 5-1, Marine Corp Planning Process
[d] NTTP 3-10.1, Naval Coastal Warfare Operations
[e] USMC BOL4815 Tactical Planning I

112.1 Describe the following types of orders:

a. Warning Order [Ref. a, Ch. 7, Pg. 7-1]

A WO is a preliminary notice of an order or action that is to follow at some future date. It may be issued to alert subordinate commands to impending operations and to give subordinates time to make necessary plans and preparations. These orders are intended to provide subordinates maximum planning time, provide essential details of the impending operation, and detail major timeline events that will occur with mission execution. In crisis action procedures, a CJCS warning order initiates development and evaluation of courses of action by a supported commander and requests that a commander's estimate be submitted. The JOPES format for a warning order is shown in paragraph D.2.

The amount of detail aWOincludes depends on several factors, but primarily on the available time, communications, and the information subordinate commanders need for proper planning and preparation. TheWOmust clearly inform the subordinate commander of what tasks he must do now as well as possible future tasks. A WO may include the following information (in sequence):

1. Required maps or charts (if changed from the current OPORD)
2. The enemy situation, events, and probable mission, tasks and procedures
3. The higher headquarters' mission
4. The commander's intent statement (when available)
5. The earliest time of movement or deployment or degree of notice the commander gives to the main body (this includes the "no move/deploy before" period)
6. Orders for preliminary action, reconnaissance, surveillance, and observations
7. Service support instructions
8. The rendezvous point or time for assembling or concentrating friendly forces.

b. Operation Order [Ref. a, Ch. 7, Pg. 7-2]

The choice of a COA and the subsequent planning to carry out that action with available forces culminates in the issuing of an "operation order." An operation order is a directive issued by a commander to subordinate commanders for the purpose of effecting the coordinated execution of an operation. Since it is an order to conduct an operation, it normally does not contain assumptions. Unless otherwise stated, an operation order is effective from the date and time it is signed. An operation plan already issued that contains appropriate tasking may be implemented as an order with changes as necessary; in which case, the promulgation of a separate operation order is not required.

All OPORDs have the following commonalties:

1. Use the standard five-paragraph format
2. Provide a mission statement (WHO, WHAT, WHEN, WHERE, and WHY)
3. Convey the commander's intent, concept of operation, and decisions to subordinates
4. Specify an execution time and date
5. Explain the scheme of maneuver
6. Provide subordinates with sufficient forces and assets
7. Provide a completed overlay that graphically illustrates many of the operation's details, including the mission statement (paragraph 2); the commander's intent and concept of operation (paragraph 3a)
8. Enhance initiative
9. Allow for synchronization and agility while minimizing exposure to fratricide
10. Provide major subordinate elements in the task organization that are critical to understanding the commander's intent.

Subordinate commanders may issue an OPORD in cases when:

1. The situation requires deliberate execution.
2. The enemy force is capable of a major, strong, effective, and synchronized action.
3. There is sufficient time available for planning.
4. The friendly forces are not familiar with each other's SOPs.

The JOPES format for an operation order is shown in paragraph D.1.

c. Fragmentary Order [Ref. a, Ch. 7, Pg. 7-2]

A series of FRAGOs may be issued after the basic OPORD to change or modify the desired sequence of events. They are usually issued in the form of a brief oral or written messages and contain timely changes of existing orders to subordinate and supporting commanders while providing notification to higher and adjacent commands.

A FRAGO addresses only those parts of the original OPORD that have changed. The sequence of the OPORD is used and all five paragraph headings must be used.
After each heading, the issuing commander or headquarters will send either "No Change" or the new information, regardless of the paragraph. This ensures that subordinate commanders know (especially if the message is sent over the radio) they have received the entire FRAGO.

In general, a FRAGO should provide:

1. The mission statement
2. The commander’s intent and concept of operation
3. Pertinent extracts taken from more detailed orders
4. Task organization if modified
5. Minimal control measures that promote initiative, synchronization, and agility while minimizing exposure to fratricide
6. Timely changes to existing orders.

When possible, the FRAGO includes a brief outline of the situation. It also refers to previous orders and provides a brief and specific set of instructions. The issuing command designates FRAGOs with the proper classification and requests acknowledgment from the command to which it is issued. During the execution phase of a military action, it might be necessary to issue supplementary orders to address a new or changed situation. Because modern means of communication allow this to be done quickly, commanders are frequently tempted to intervene. However, excessive use of FRAGOs tend to confuse the execution of even the best of plans.

d. Standard Operating Procedures [Ref. a, Pg. 7-3]

SOP are a set of instructions covering those features of operations that lend themselves to a definite standardized procedure without loss of effectiveness. The procedure is applicable unless ordered otherwise.

e. Maritime Tactical Messages (OPGEN/OPTASK/OPSTAT).
[Ref. a, Ch. 7, Pg. 7-3]

The formatted messages included in the maritime tactical message system provide a standardized method for conveying operational instructions for Allied naval forces (refer to APP 4 and ATP 1 Vol 1). The MTMS messages provide a method for ordering specific tasks and/or exchanging information required to control a force at sea. They are used for naval operations but not for joint operations. The following message types are used in the MTMS:

1. OPGEN — General matters of policy, instructions, and aspects common to all forms of warfare and detailed instructions for warfare responsibilities retained by the officer in tactical command.

2. OPTASK — Detailed information for specific aspects within individual areas of warfare and for tasking of resources.

3. OPSTAT — Aspects of information exchange, particularly reporting of operational status.

f. Operation Plan [Ref. a, Ch. 5, Pg. 5-9]

OPLAN is an operation plan for the conduct of joint operations that can be used as the basis for development of an OPORD. It pertains to a single operation or series of connected operations that the force performs simultaneously or in succession. It is used by a higher authority to permit subordinate commanders to prepare supporting plans and orders. An OPLAN identifies the forces and supplies required to execute the CINC's strategic concept and a movement schedule of these resources to the theater of operations. The forces and supplies are identified in time-phased force and deployment data files. OPLANs will include all phases of the tasked operation. The plan is prepared with the appropriate annexes, appendices and TPFDD files as described in the JOPES manuals containing planning policies, procedures, and formats. (Refer to format in paragraph C.1.)

112.2 Describe the contents of the SMEAC formatted patrol briefs and its purpose.
[Ref b, Appdendix. C, Pg. C-1]

SITUATION - Weather, Terrain, Enemy.

- Actions of the enemy(DRAW-D)
  - Defend(how do they defend?)
  - Reinforce(how will they be reinforced?)
  - Attack(how do they attack?
  - Withdraw (how are they expected to withdraw?)
  - Delay (are they (mission of supporting units)

MISSION - A detailed narrative of the mission and how it is to be executed.

EXECUTION - Concept of operations, Fire support plan, Tasks for each unit and detachment, Rules of Engagement.

ADMINISTRATION AND LOGISTICS - Rations, Fuels and consumables, Weapons and ammunition, uniforms and personal equipment, Wounded and prisoner handling.

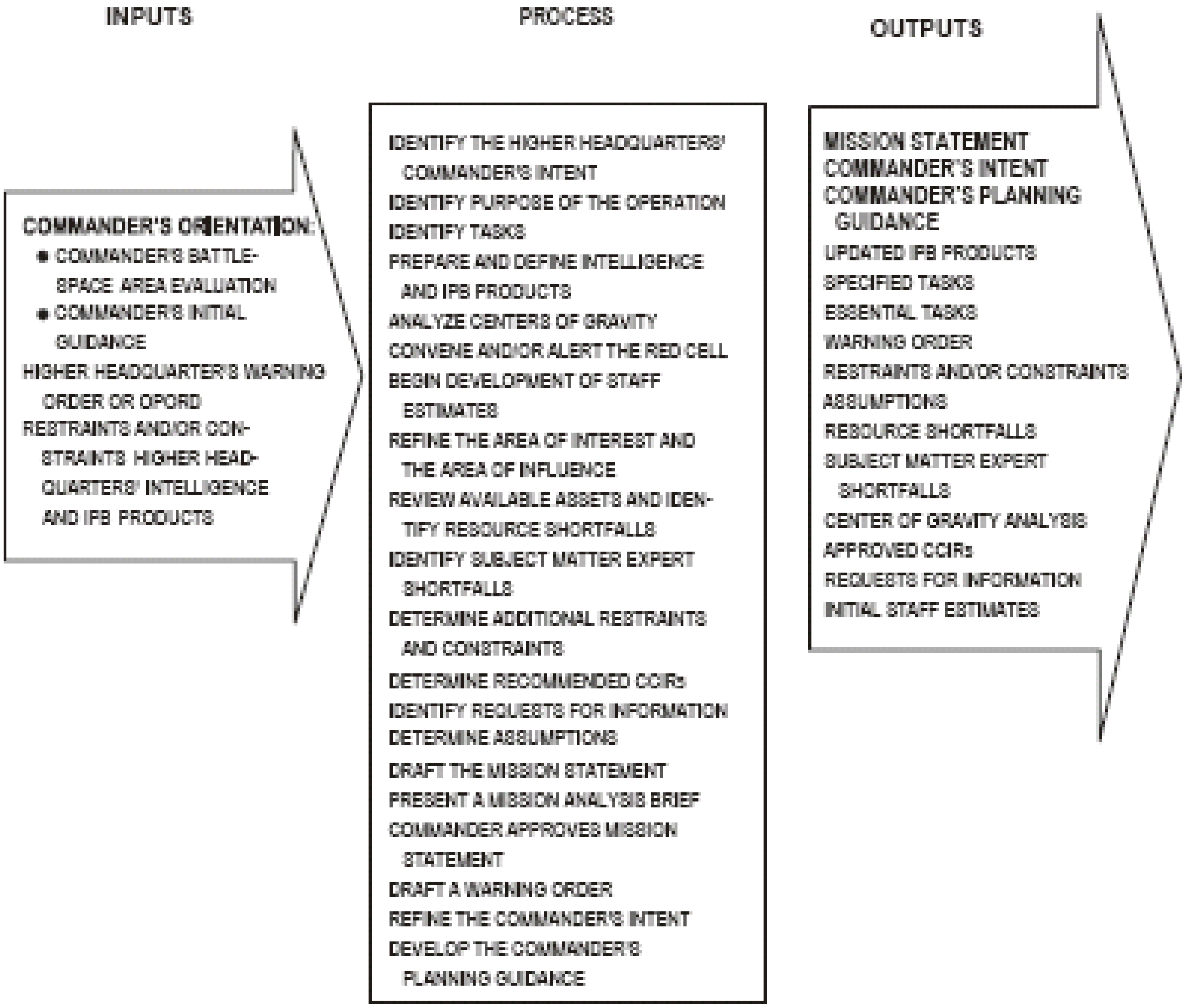
COMMAND AND SIGNAL - Call signs and alternates, frequencies, prowords and brevity codes, EMCON, reports required, challenge and password, emergency destruct, chain of command, location of leaders at each phase.

The standard format for the MSS7 patrol order format is contained below.

112.3 Discuss the following elements of mission planning: [Ref. c]

a. Mission Analysis [Pg. 2-2 through 2-9]

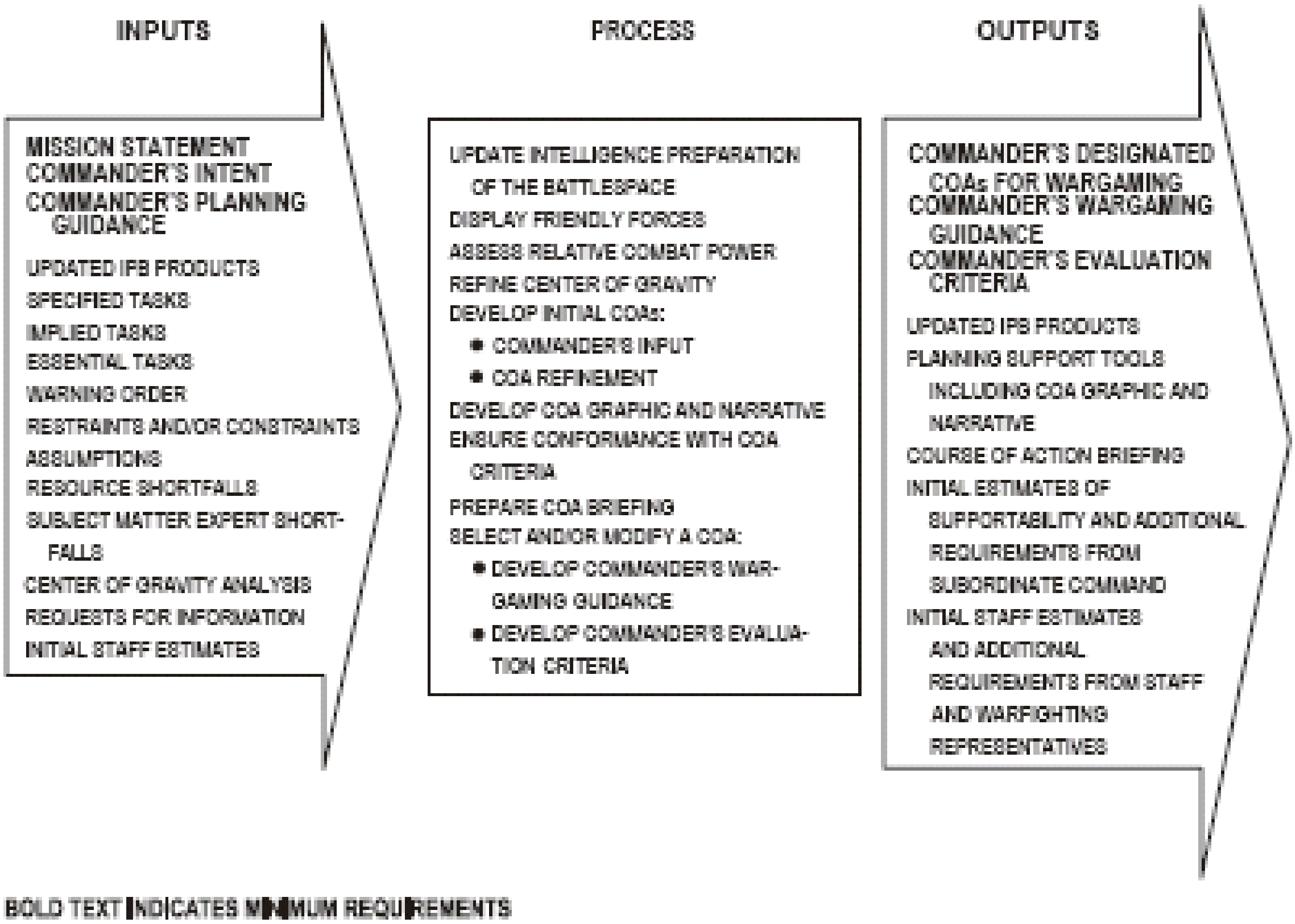
Mission analysis is the first step in planning. Its purpose is to review and analyze orders, guidance, and other information that is provided by higher headquarters in order to produce a unit mission statement. Mission analysis drives the remainder of the Marine Corps Planning Process. The keys to successful mission analysis are preparation, professional competence, and the identification of the operation's purpose and all its essential tasks. A thorough mission analysis focuses the efforts of the commander and the staff, thereby saving time. The staff should be well organized, prepared to plan as required, and begin development of staff estimates during mission analysis. To plan effectively, planners should have access to all documents relative to the mission, area of operations, etc. (e.g., standing operating procedures, operation plans).



BOLD TEXT INDICATES MINIMUM REQUIREMENTS

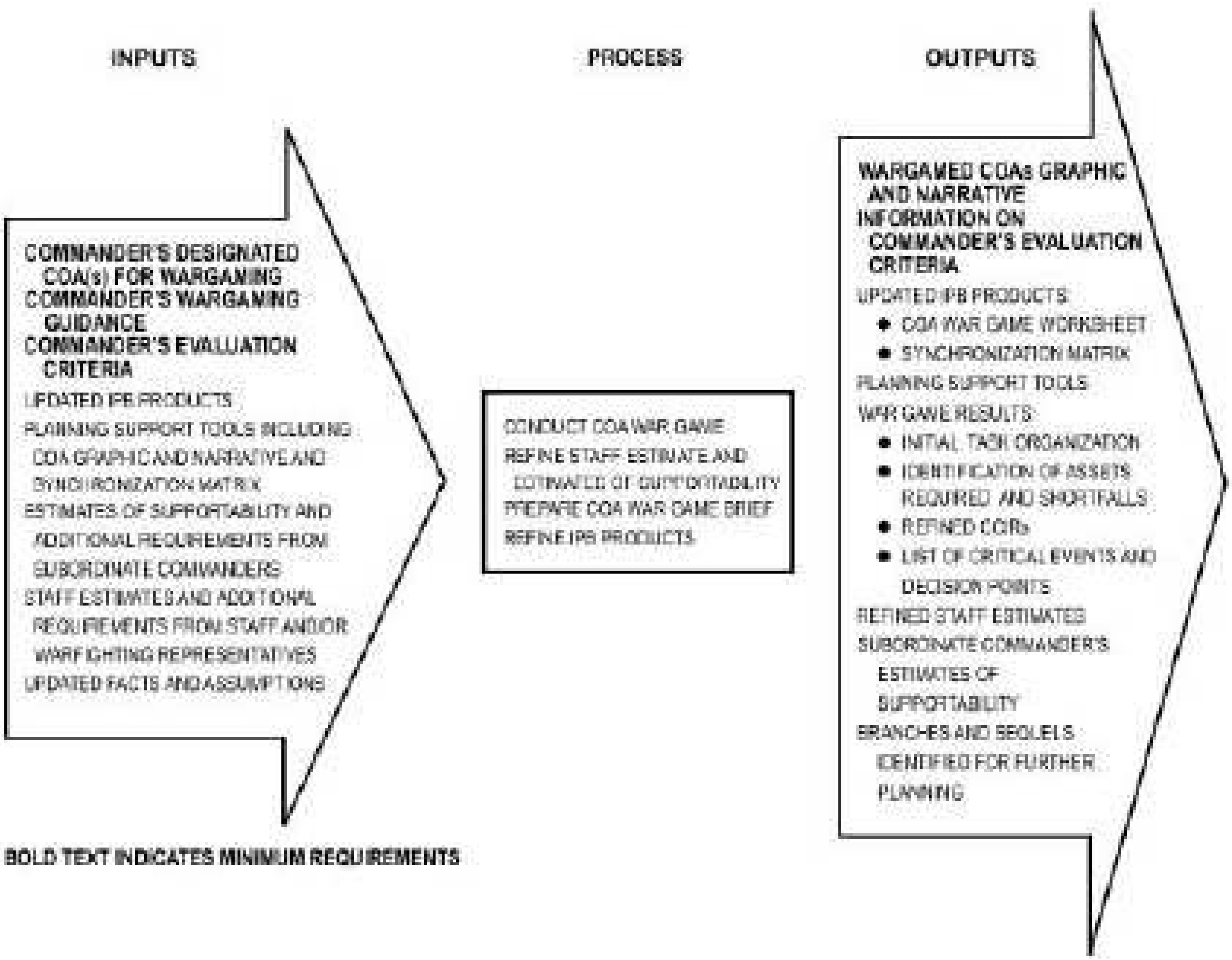
b. COA Development [Pg. 3-2 through 3-5]

A course of action (COA) is a broadly stated, potential solution to an assigned mission. The COA development step of the Marine Corps Planning Process is designed to generate options for follow-on wargaming and comparison that satisfy the mission, commander's intent, and guidance of the commander. During COA development, planners use the mission statement (which includes the higher headquarters commander's tasking and intent), commander's intent, and commander's planning guidance to develop courses of action. Each prospective COA is examined to ensure that it is suitable, feasible, acceptable, distinguishable, and complete with respect to the current and anticipated situation, the mission, and the commander's intent.



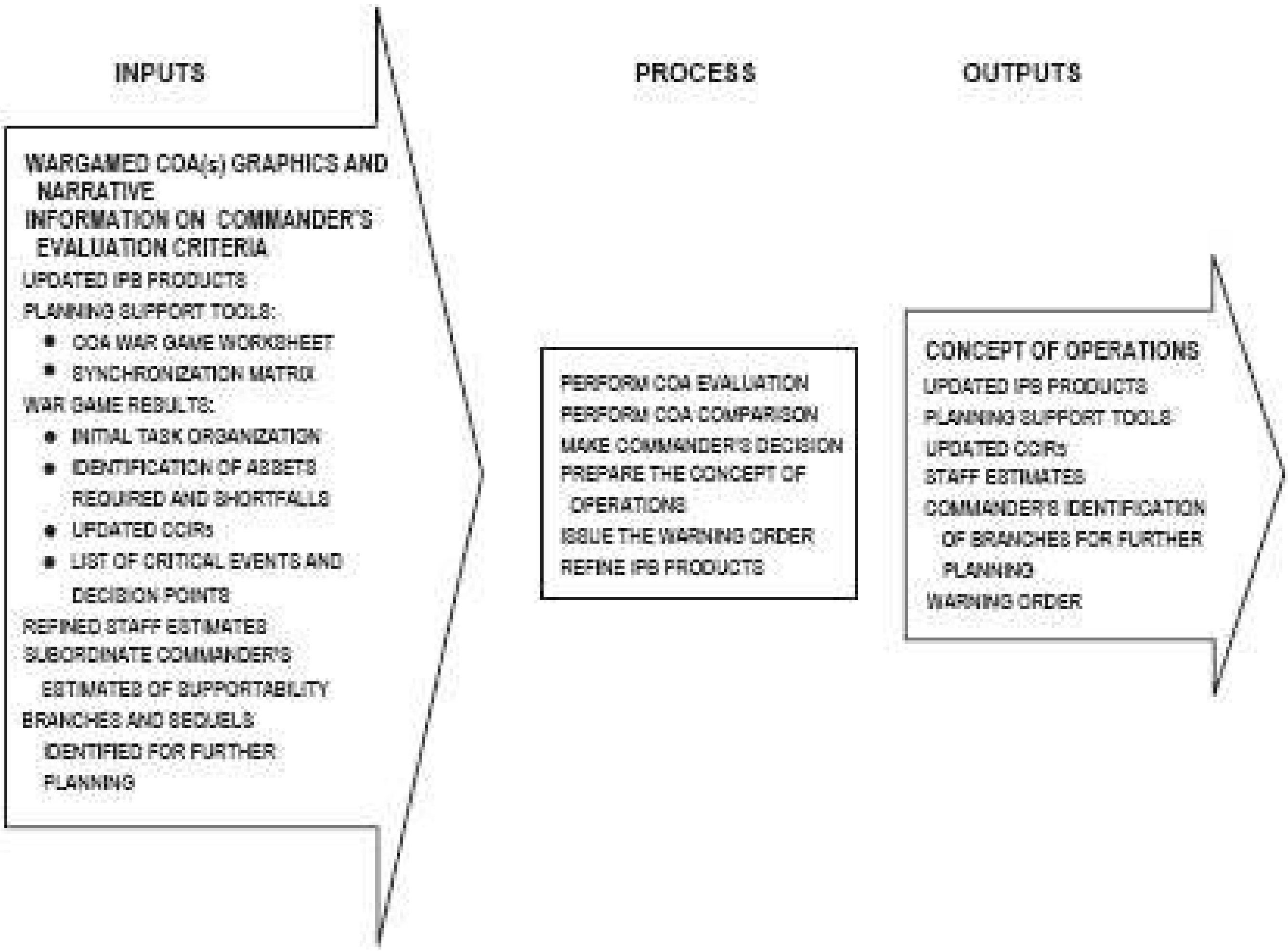
c. COA War Game [Pg. 4-2 through 4-4]

Course of action wargaming allows the staff and subordinate commanders to gain a common understanding of friendly—and possible enemy— courses of action. This common understanding allows them to determine the advantages and disadvantages of each course of action and forms the basis for the commander’s course of action comparison and decision. It is based on wargaming and estimates prepared by the staff and subordinate commanders. Course of action wargaming involves a detailed assessment of each course of action as it pertains to the enemy and the battlespace. Each friendly course of action is wargamed against selected threat courses of action. Course of action wargaming assists planners in identifying strengths and weaknesses, associated risks, and asset shortfalls for each friendly course of action. Course of action wargaming may identify branches and potential sequels that require additional planning. Short of actually executing the course of action, COA wargaming provides the most reliable basis for understanding and improving each course of action.



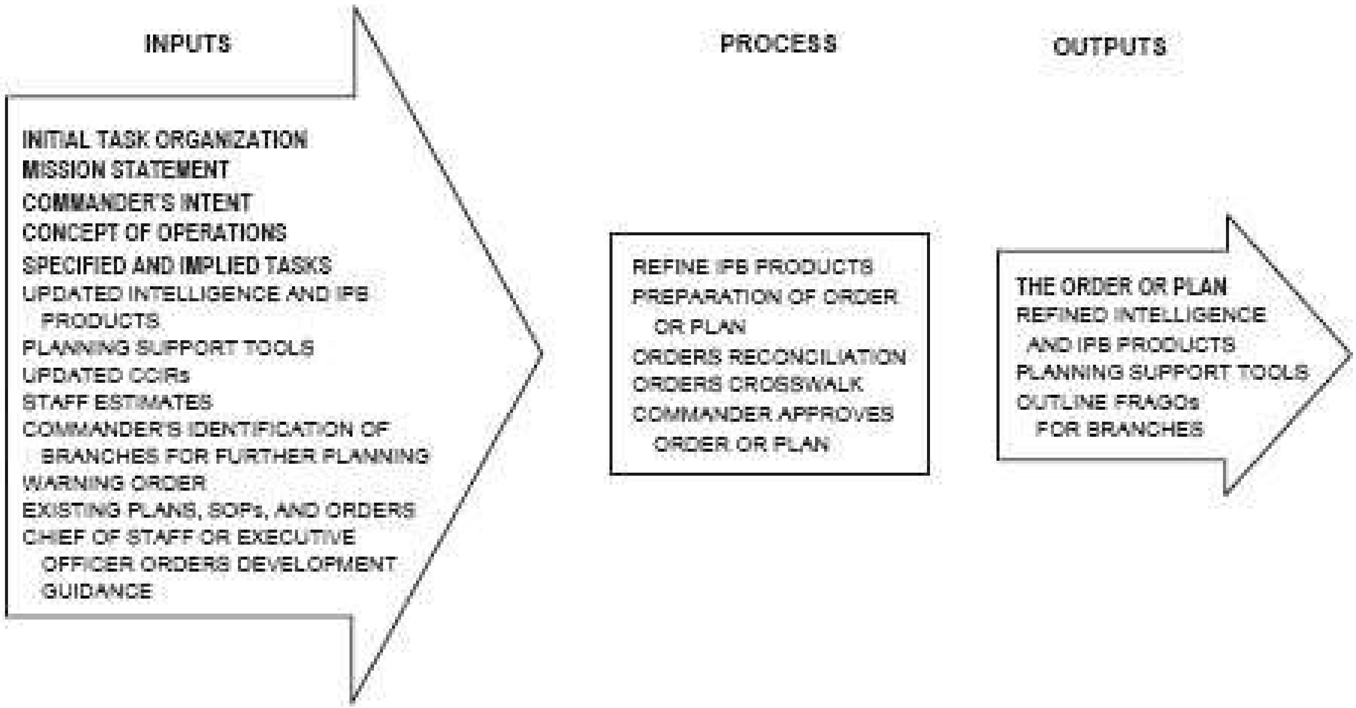
d. COA Comparison and Development [pg. 5-2 through 5-3]

During COA comparison and decision, the commander evaluates all friendly courses of action against established criteria, evaluates them against each other, and selects the course of action that he believes will best accomplish the mission. The commander may also refine his mission statement (including his commander's intent and essential tasks) and concept of operations, and identify any branches of the chosen course of action that needs further staff attention. Finally, a warning order may be issued to subordinate commanders.



e. Order Development [Pg. 6-1 through 6-3]

The orders development step in the Marine Corps Planning Process communicates the commander's intent, guidance, and decisions in a clear, useful form that is easily understood by those executing the order. An order is a written or oral communication that directs actions and focuses a subordinate's tasks and activities toward accomplishing the mission. Various portions of the order, such as the mission statement and staff estimates, have been prepared during previous steps of the Marine Corps Planning Process. The chief of staff or executive officer, as appropriate, directs orders development. The order contains only critical or new information—not routine matters normally found in standing operating procedures. A good order is judged on its usefulness—not its weight.



112.4 Discuss the following six steps of mission planning (BAMCIS).
[Ref. e, Pg. 1 through 5]

a. Begin Planning

Begin Planning. The receipt of a mission triggers the entire BAMCIS cycle; however, tactical planning is anticipatory and continuous. To make effective use of available time, the leader issues a *warning order* to his or her subordinates.

Estimate of the Situation (METT-T). Like troop-leading steps (BAMCIS), the estimate of the situation (METT-T) is a tool, which aids a commander as he plans tactical operations and means

- Mission analysis
- Enemy forces
- Terrain/weather analysis
- Troops and support available
- Time

This tool is especially helpful to a decision maker as a frame of reference, which serves to remind him or her of various factors normally considered during tactical planning.

During this lesson, you will be exposed to a modified version of the factors normally considered in the estimate of the situation. Once you master the basics on the squad level, several additional factors, which will aid in tactical planning on the platoon level and above, will be introduced to you during subsequent tactical planning classes.

Mission analysis. The first step in the estimate is mission analysis, which begins upon receipt of the mission. Mission analysis means the unit leader gains an understanding of the mission:

- Task analysis: The unit leader must identify and understand all that is required for the successful accomplishment of the mission, including tasks received in the unit's task statement and coordinating instructions from the higher commander's operations order.

- Limitations: These are restrictions

    On the freedom of action of the friendly force
    That prohibit the commander from doing something specific

    Examples of limitations are

    Tactical control measures
    Rules of engagement (ROE)
    Statements such as

    - Be prepared to…
    - Not earlier than…
    - On order…

Enemy forces. *The objective of an analysis of the enemy situation is to deduce the enemy's most probable course of action.* Its development comes from sources including enemy

- Doctrine
- Historical data
- Current activities as indicated in the higher commander's operation order

Ideally, the information is used to analyze the enemy situation includes

- Composition, disposition, and strength:

    Describe your enemy
    Identify the forces and equipment the enemy can bring to bear *within your unit's zone or sector*
    Consider known and suspected enemy locations and strength estimates relative to personnel, equipment, and support capabilities. The elements of the acronym SALUTE are helpful when developing and organizing this information.

- Capabilities and limitations. What can and cannot the enemy do to me? Analyze the information listed under composition, disposition, and strength. Analyze strength relative to the enemy's ability to conduct operations against your unit—its ability or inability to conduct various operations against your unit under any reasonably foreseeable situation. Is the enemy force capable of defending, reinforcing, attacking, withdrawing, or delaying? The acronym DRAW-D serves as a reminder of the *minimum* factors to consider. For example,

    Can the enemy effectively attack at night?
    Can the enemy conduct a deliberate defense against us or does he lack sufficient forces and equipment?
    Will the enemy be reinforced by elements of other units as a result of our attack? How long will this reinforcement take? Can reinforcement be done at night—is it a vehicular transported reinforcement force, or will it be traveling on foot?

- Enemy most probable course of action (MPCOA). What will the enemy try to do to me? Analyze the information under composition disposition, strength relative to the enemy's ability to conduct operations against your unit. Deduce the enemy's most probable course of action in relation to your action. For example, "the MPCOA is to *withdraw to the northwest* (as a result of our attack) to attempt to join other enemy forces west of objective Alpha."

Terrain/weather analysis. The logical sequence for rapidly analyzing terrain and weather is OCOKA-W. *Always* consider these factors *from the friendly* ***and*** *enemy perspectives:*

- Observation (the influence of terrain on reconnaissance and target acquisition) and fields of fire (the influence of terrain on the effectiveness of weapon systems)

    What can and cannot be seen from where?
    What can and cannot be hit by fire?

- Cover (protection from effects of firepower) and concealment (protection from observation or target acquisition)

    Where can fires not hit me?

Where can I not be seen?

The analysis of cover and concealment is often inseparable from the consideration of observations and field of fire. Weapons systems must have cover *and* concealment to be most effective and to increase survivability.

- Obstacles. Obstacles are any natural or man-made obstructions that canalize, delay, restrict, or divert the maneuver of movement of a force. You will learn more details about obstacles in subsequent engineering lessons.

- Key terrain. Key terrain is any area whose seizure, retention, or control affords a marked advantage to either combatant. Using the map and information already generated, the unit leader must identify terrain that could be used as positions for weapons or for units to dominate friendly or enemy approaches into or within the objective area. Remember, you do not need to occupy key terrain to control it. You can use direct or indirect fire to control access to key terrain.

- Avenues of approach. Avenues of approach are movement routes to an objective; they permit friendly and enemy forces to advance or withdraw and to capitalize on the principles of

  Mass momentum
  Shock
  Speed

  A viable avenue of approach usually offers mobility corridors, which are areas within the avenue of approach that permit movement and maneuver. When friendly forces are attacking, friendly avenues of approach to the objective must be identified along with enemy avenues of approach that could affect friendly movement (for example, counterattack avenues).

- Weather. Analyze weather using the five military aspects of weather:

  Temperature and humidity
  Precipitation
  Wind
  Clouds
  Visibility (day *and* night)

  To determine the weather's cumulative effect on the operation, you must consider it in conjunction with the terrain associated with the unit's mission. Weather affects

  Equipment (including electronic and optical)
  Terrain (trafficability)
  Visibility

Individual Marines (its greatest effect)

During inclement weather or in extreme heat or cold, the amount of time spent on leadership and supervision must increase as the severity of the weather increases. Inclement weather affects

Visibility and movement
Unit efficiency and morale
Command and control (makes it more difficult)

Poor weather conditions can be as much of an advantage to a unit as it is a disadvantage, depending upon

Unit capabilities
Equipment
Level of training

The unit leader analyzes these five military aspects of terrain and the weather relevant to the mission. Certain situations may elevate one element of OCOKA-W to a level of importance above that of one or more of the remaining elements (extreme weather, for example). Having received the higher commander's analysis, a unit leader can more easily analyze his or her sector or zone with respect to friendly and enemy capabilities. For example, in offensive operations, the unit leader analyzes terrain/weather from the objective area working back to the assembly area.

Troops and support available. Any course of action the unit leader considers must take into account the number of Marines and support assets available for the operation. Consider the

- Mental and physical condition of the Marines
- Marines' level of training
- Status of the Marines' equipment
- Fire support assets
- Logistics

Time. The ability to appreciate the aspects and effects of time and space is one of the most important qualities in a leader. Time is vital to all operations; it drives planning and execution. The unit leader gets his or her indication of time available from his or her commander. The amount of time a unit has to prepare for or to execute an operation determines the detail possible during the planning process. Use initial estimates of time to identify any critical timing in the operation, which may include

- Planning time
- LD time
- Movement time
- Defend-no-later-than time

- Time available to prepare and rehearse the attack or defense
- Time available for reconnaissance
- Transportation means (helo, vehicular, foot-mobile, etc.)

Consider opposed *and* unopposed rates of movement.

b. Arrange for Reconnaissance and Coordination

Arrange for Reconnaissance. Initially the unit leader asks, "What information am I lacking?" If possible, the unit leader arranges for a physical reconnaissance of his or her

- Objective
- Route
- Defensive position

The unit leader considers the

- Route
- Security
- Subordinates to accompany him or her
- Time available for reconnaissance

If a physical reconnaissance is impossible, the unit leader should at least conduct a leader's reconnaissance using a map, aerial photo, or visual reconnaissance from a vantage point.

c. Make Reconnaissance and Update Intelligence

Make Reconnaissance. The commander now acts to answer his or her questions, through a reconnaissance. The recon will either confirm the plan or cause him or her to adjust it. On a physical reconnaissance, selected subordinate leaders normally accompany him or her. The personnel who accompany the leader will vary according to the tactical situation. The leader should take as many subordinate leaders as the situation requires while other subordinate leaders supervise the preparations necessary for the upcoming mission.

d. Complete the Plan

Complete the Plan. After updating his or her estimate of the situation (METT-T) with information gained during the reconnaissance, the leader decides how to accomplish the mission and completes the operation order.

e. Issue the Order

Issue the Order. The leader issues the order orally to subordinate leaders. The lesson on combat orders introduces operations orders and order-issuing techniques.

f. Supervise

Supervise. The leader ensures that his or her plan is adhered to by

- Listening to subordinate leaders as they issue orders
- Inspecting Marines and their equipment
- Observing Marines as they conduct rehearsals

The leader also ensures adherence to any established time line. If any changes to the original plan are required, due to recent changes in the situation, the commander must adjust the plan accordingly.

112.5 Discuss procedures for conducting harbor familiarization. [Ref. d, Ch. 5, Pg. 5-4]

The first measure for any boat deployment is to perform a detailed reconnaissance sweep. This is done by a minimum of two boats, always operating within sight of each other. This sweep is done at slow speed to avoid floating or underwater hazards and to facilitate log keeping and chart making. Coxswains verify charted aids and hazards to navigation, tide range, and currents, and identify possible threats, likely targets, and potential ambush sites that could be used against them. If suitable nautical charts are not available, the boat crews are required to draw detailed harbor maps. At this time, radar mapping of SENSOR DET MSP and PSP blind spots should be conducted. The boats should look for any communication “dead zones” where radio transmission and reception are poor or impossible.

The layout of patrol sectors must take these blind spots and dead zones into consideration. Use of “five minute” radio checks during the sector familiarization will accelerate the identification of communication dead zones. The installation of taller base station antennas or repeater stations may be necessary.

Boat crews, ships, aircraft, and NCWRON watch standers should coordinate a set of navigation references prior to commencing operations. This facilitates easy, rapid communication of contact reports and movement direction. For example, the boat pier may be “Point Alfa,” the end of a breakwater “Point Bravo,” and so forth. Hence, a contact can be reported as being 500 yds north of Point Alfa, and an intercept and escort (I&E) boat could be directed to proceed to a point 1,000 yds east of Point Bravo. This method is much faster and easier than using latitude/longitude for identifying positions and is more easily modified from time to time to increase security. One application where latitude/longitude references is preferred is when placing sonobuoys IAW a written sonobuoy plan, because boat crews can program the points into GPS and navigate throughout the entire plan.

The harbor familiarization should include type and amount of shipping in and out. In most cases, traffic resumes even if stopped for several days during an invasion or occupation. It helps to know what type and amount of shipping and traffic to expect. Inbound shipping needs to be inspected for threats and this burden can be tremendous if the port is a major one.

After the initial invasion or occupation of a port overseas, the “blue water” forces need to depart. HAD likely needs to transfer to a few Navy ships and/or USCG cutters that remain behind offshore. The OSC should meet and discuss operational and logistics goals with senior NCWRON staff. Ideally the supporting ships should send a representative, and pilots who will be flying the approaches each day should attend. As time goes by and turnovers take place, a standard briefing package for new HAD ships and pilots is useful.

113 Navigation Rules

References:
[a] USCG COMDTINST M16672.2 (Series), Navigation Rules (COLREG)

113.1 Describe the major differences between Inland and International Rules of the Road. Rule 1, Pg. 2]

International Rules: The International Rules in this book were formalized in the Convention on the International Regulations for Preventing Collisions at Sea, 1972, and became effective on July 15, 1977. The Rules (commonly called 72 COLREGS) are part of the Convention, and vessels flying the flags of states ratifying the treaty are bound to the Rules. The United States has ratified this treaty and all United States flag vessels must adhere to these Rules where applicable. President Gerald R. Ford proclaimed 72 COLREGS and the Congress adopted them as the International Navigational Rules Act of 1977. The 72 COLREGS were developed by the Inter-Governmental Maritime Consultative Organization (IMCO) which in May 1982 was renamed the International Maritime Organization (IMO). In November 1981, IMO's Assembly adopted 55 amendments to the 72 COLREGS which became effective on June 1, 1983. The IMO also adopted 9 more amendments which became effective on November 19, 1989. The International Rules in this book contain these amendments. These Rules are applicable on waters outside of established navigational lines of demarcation. The lines are called COLREGS Demarcation Lines and delineate those waters upon which mariners shall comply with the Inland and International Rules. COLREGS Demarcation Lines are contained in this book.

Inland Rules: The Inland Rules in this book replace the old Inland Rules, Western Rivers Rules, Great Lakes Rules, their respective pilot rules and interpretive rules, and parts of the Motorboat Act of 1940. Many of the old navigation rules were originally enacted in the last century. Occasionally, provisions were added to cope with the increasing complexities of water transportation. Eventually, the navigation rules for United States inland waterways became such a confusing patchwork of requirements that in the 1960's several attempts were made to revise and simplify them. These attempts were not successful. Following the signing of the Convention on the International Regulations for Preventing Collisions at Sea, 1972, a new effort was made to unify and update the various inland navigation rules. This effort culminated in the enactment of the Inland Navigational Rules Act of 1980. This legislation sets out Rules 1 through 38— the main body of the Rules. The five Annexes were published as regulations. It is important to note that with the exception of Annex V to the Inland Rules, the International and Inland Rules and Annexes are very similar in both content and format. The effective date for the Inland Navigation Rules was December 24, 1981, except for the Great Lakes where the effective date was March 1, 1983.

113.2 Define and discuss the following terms:

a. Vessel [Rule 3, Pg. 6-7]

The word “vessel” includesevery description of water craft, including non-displacement craft and seaplanes, used or capable of being used as a means of transportation on water.

b. Power-driven vessel [Rule 3, Pg. 6-7]

The term “power-driven vessel” means any vessel propelled by machinery.

c. Sailing vessel [Rule 3, Pg. 7]

The term “sailing vessel” means any vessel under sail provided that propelling machinery, if fitted, is not being used.

d. Underway [Rule 3, pg. 7]

The word “underway” means that a vessel is not at anchor, or made fast to the shore, or aground.

e. U.S. inland waters [Rule 3 Pg. 7]

“Inland Waters” means the navigable waters of the United States shoreward of the navigational demarcation lines dividing the high seas from harbors, rivers, and other inland waters of the United States and the waters of the Great Lakes on the United States side of the International Boundary;

f. Restricted visibility [Rule 3, pg. 7]

The term “restricted visibility” means any condition in which visibility is restricted by fog, mist, falling snow, heavy rainstorms, sandstorms or any other similar causes.

g. Vessel constrained by draft [Rule 3, Pg. 6-7]

The term “vessel constrained by her draft” means a power-driven vessel which, because of her draft in relation to the available depth and width of navigable water is severely restricted in her ability to deviate from the course she is following.

h. Vessel restricted in ability to maneuver [Rule 3, Pg. 6-7]

The term “vessel restricted in her ability to maneuver” means a vessel which from the nature of her work is restricted in her ability to maneuver as required by these Rules and is therefore unable to keep out of the way of another vessel.

The term “vessels restricted in their ability to maneuver” shall include but not be limited to:

(i) a vessel engaged in laying, servicing or picking up a navigation mark, submarine cable or pipeline;
(ii) a vessel engaged in dredging, surveying or underwater operations;
(iii) a vessel engaged in replenishment or transferring persons, provisions or cargo while underway;
(iv) a vessel engaged in the launching or recovery of aircraft;
(v) a vessel engaged in mineclearance operations;
(vi) a vessel engaged in a towing operation such as severely restricts the towing vessel and her tow in their ability to deviate from their course.

i. Not under command [Rule 3, Pg. 7]

The term “vessel not under command” means a vessel which through some exceptional circumstance is unable to maneuver as required by these Rules and is therefore unable to keep out of the way of another vessel.

j. Vessel engaged in fishing [Rule 3, Pg. 7]

The term “vessel engaged in fishing” means any vessel fishing with nets, lines, trawls or other fishing apparatus which restrict maneuverability, but does not include a vessel fishing with trolling lines or other fishing apparatus which do not restrict maneuverability.

k. Safe speed [Rule 6, Pg. 14-15]

Every vessel shall at all times proceed at a safe speed so that she can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions.\ In determining a safe speed the following factors shall be among those taken into account:

(a) By all vessels:

(i) the state of visibility;
(ii) the traffic density including concentrations of fishing vessels or any other vessels;
(iii) the maneuverability of the vessel with special reference to stopping distance and turning ability in the prevailing conditions;
(iv) at night, the presence of background light such as from shore lights or from back scatter of her own lights;
(v) the state of wind, sea and current, and the proximity of navigational hazards;
(vi) the draft in relation to the available depth of water.
(b) Additionally, by vessels with operational radar:
(i) the characteristics, efficiency and limitations of the radar equipment;
(ii) any constraints imposed by the radar range scale in use;

(iii) the effect on radar detection of the sea state, weather and other sources of interference;
(iv) the possibility that small vessels, ice and other floating objects may not be detected by radar at an adequate range;
(v) the number, location and movement of vessels detected by radar;
(vi) the more exact assessment of the visibility that may be possible when radar is used to determine the range of vessels or other objects in the vicinity.

l. Risk of collision [Rule 7, Pg. 16-17]

(a) Every vessel shall use all available means appropriate to the prevailing circumstances and conditions to determine if risk of collision exists. If there is any doubt such risk shall be deemed to exist.
(b) Proper use shall be made of radar equipment if fitted and operational, including longrange scanning to obtain early warning of risk of collision and radar plotting or equivalent systematic observation of detected objects.
(c) Assumptions shall not be made on the basis of scanty information, especially scanty radar information.
(d) In determining if risk of collision exists the following considerations shall be among those taken into account:

(i) such risk shall be deemed to exist if the compass bearing of an approaching vessel does not appreciably change;
(ii) such risk may sometimes exist even when an appreciable bearing change is evident, particularly when approaching a very large vessel or a tow or when approaching a vessel at close range.

113.3 Define and discuss the following terms:

a. Give way vessel [Rule 16, Pg. 32-33]

Every vessel which is directed to keep out of the way of another vessel shall, so far as possible, take early and substantial action to keep well clear.

b. Stand on vessel [Rule 17, Pg. 32-33]

(a) (i) Where one of two vessels is to keep out of the way, the other shall keep her course and speed.
(ii) The latter vessel may, however, take action to avoid collision by her maneuver alone, as soon as it becomes apparent to her that the vessel required to keep out of the way is not taking appropriate action in compliance with these Rules.
(b) When, from any cause, the vessel required to keep her course and speed finds herself so close that collision cannot be avoided by the action of the give-way vessel alone, she shall take such action as will best aid to avoid collision.
(c) A power-driven vessel which takes action in a crossing situation in accordance with subparagraph (a)(ii) of this Rule to avoid collision with another power-driven vessel

shall, if the circumstances of the case admit, not alter course to port for a vessel on her own port side.
(d) This Rule does not relieve the give-way vessel of her obligation to keep out of the way.

113.4 Define the following terms and describe the actions to be taken by the give way and stand on vessels for each situation when the vessels are within sight of each other:

a. Difference between International and Inland rules of the road

See 113.1.

b. Head-on [Rule 14, Pg. 30-31]

INTERNATIONAL
(a) When two power-driven vessels are meeting on reciprocal or nearly reciprocal courses so as to involve risk of collision each shall alter her course to starboard so that each shall pass on the port side of the other.
(b) Such a situation shall be deemed to exist when a vessel sees the other ahead or nearly ahead and by night she could see the masthead lights of the other in a line or nearly in a line and/or both sidelights and by day she observes the corresponding aspect of the other vessel.
(c) When a vessel is in any doubt as to whether such a situation exists she shall assume that it does exist and act accordingly.

INLAND
(a) Unless otherwise agreed, when two power-driven vessels are meeting on reciprocal or nearly reciprocal courses so as to involve risk of collision each shall alter her course to starboard so that each shall pass on the port side of the other.
(b) Such a situation shall be deemed to exist when a vessel sees the other ahead or nearly ahead and by night she could see the masthead lights of the other in a line or nearly in a line or both sidelights and by day she observes the corresponding aspect of the other vessel.
(c) When a vessel is in any doubt as to whether such a situation exists she shall assume that it does exist and act accordingly.
(d) Notwithstanding paragraph (a) of this Rule, a power-driven vessel operating on the Great Lakes, Western Rivers, or waters specified by the Secretary, and proceeding downbound with a following current shall have the right-of-way over an upbound vessel, shall propose the manner of passage, and shall initiate the maneuvering signals prescribed by Rule 34(a)(i), as appropriate.

c. Crossing [Rule 15, Pg. 30-31]

INTERNATIONAL
When two power-driven vessels are crossing so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way and shall, if the

circumstances of the case admit, avoid crossing ahead of the other vessel.

INLAND
(a) When two power-driven vessels are crossing so as to involve risk of collision, the vessel which has the other on her starboard side shall keep out of the way and shall, if the circumstances of the case admit, avoid crossing ahead of the other vessel.
(b) Notwithstanding paragraph (a), on the Great Lakes, Western Rivers, or water specified by the Secretary, a power-driven vessel crossing a river shall keep out of the way of a power-driven vessel ascending or descending the river.

d. Overtaking [rules 13, Pg. 28-29]

(a) Notwithstanding anything contained in the Rules of Part B (International) or Rules 4 through 18 (Inland), Sections I and II, any vessel overtaking any other shall keep out of the way of the vessel being overtaken.

(b) A vessel shall be deemed to be overtaking when coming up with another vessel from a direction more than 22.5 degrees abaft her beam, that is, in such a position with reference to the vessel she is overtaking, that at night she would be able to see only the sternlight of that vessel but neither of her sidelights.

(c) When a vessel is in any doubt as to whether she if overtaking another, she shall assume that this is the case and act accordingly.

(d) Any subsequent alteration of the bearing between the two vessels shall not make the overtaking vessel a crossing vessel within the meaning of these Rules or relieve her of the duty of keeping clear of the overtaken vessel until she is finally past and clear.

113.5 Discuss the procedure to be followed when hearing a sound signal forward of your beam in restricted visibility. [Rule 19, Pg. 36-37]

Except where it has been determined that a risk of collision does not exist, every vessel which hears apparently forward of her beam the fog signal of another vessel, or which cannot avoid a closequarters situation with another vessel forward of her beam, shall reduce her speed to the minimum at which she can be kept on course. She shall if necessary take all her way off and, in any event, navigates with extreme caution until danger of collision is over.

113.6 Discuss the following: Inland General Rule 2 which states “nothing in the rules shall exonerate any vessel from complying with the rules of the road” [Rule 2, Pg. 6-7]

- Nothing in the RULES shall exonerate any vessel from the consequences of neglect to comply with the RULES.
- Due regard shall be given to all dangers of navigation and collision. A departure from the RULES may be necessary to avoid danger.

113.7 Discuss responsibilities between vessels with regard to keeping out of the way of one another. [Rule 8, Pg. 18-19]

Due regard shall be given to all dangers of navigation and collision. A departure from the RULES may be necessary to avoid danger.

113.8 Discuss action to be taken to avoid collision. [Rule 8, Pg. 18-19]

(a) Any action taken to avoid collision shall, if the circumstances of the case admit, be positive, made in ample time and with due regard to the observance of good seamanship.

(b) Any alteration of course or speed to avoid collision shall, if the circumstances of the case admit, be large enough to be readily apparent to another vessel observing visually or by radar; a succession of small alterations of course or speed should be avoided.

(c) If there is sufficient sea room, alteration of course alone may be the most effective action to avoid a close-quarters situation provided that it is made in good time, is substantial and does not result in another close-quarters situation.

(d) Action taken to avoid collision with another vessel shall be such as to result in passing at a safe distance. The effectiveness of the action shall be carefully checked until the other vessel is finally past and clear.

(e) If necessary to avoid collision or allow more time to assess the situation, a vessel shall slacken her speed or take all way off by stopping or reversing her means of propulsion.

(f) (i) A vessel which, by any of these rules, is required not to impede the passage or safe passage of another vessel shall, when required by the circumstances of the case, take early action to allow sufficient sea room for the safe passage of the other vessel.

(ii) A vessel required not to impede the passage or safe passage of another vessel is not relieved of this obligation if approaching the other vessel so as to involve risk of collision and shall, when taking action, have full regard to the action which may be required by the rules of this part.

(iii) A vessel, the passage of which is not to be impeded remains fully obliged to comply with the rules of this part when the two vessels are approaching one another so as to involve risk of collision.

114 Navigation Fundamentals

References:

[a] **NAVEDTRA 14338, Quartermaster**
[b] **NOAA Chart #1, Nautical Chart Symbols, Abbreviations and Terms**
[c] **Bowditch Pub. NO. 9, The American Practical Navigator**
[d] **Chapman's, Charles F Piloting, Seamanship, Small Boat Handling. New York. Motor boating and Sailing (series)**
[e] **USCG COMDTINST M16114.5B, Boat Crew Seamanship Manual**
[f] NAVEDTRA 12968-A, Lookout Training Handbook
[g] Global Positioning System Tech Manual

114.1 Describe the chart numbering system. [Ref. a, Ch. 1 Pg. 1-26]

DMA assigns a number to every nautical chart used by the U.S. Navy, regardless of the organization producing the chart. Charts produced by the NOS, and charts of foreign governments are also assigned numbers by DMA so that they may be filed in sequence with the DMAHTC produced charts. DMA charts have numbers consisting of one to five digits. The number of digits generally indicates the scale range, and the number itself indicates the geographical area covered by the chart. The chart numbering system is as follows:

Number of Digits	Scale	Description
1 (1-9)	None	Symbol and flag charts.
2 (10-99)	1:9,000,000 and smaller	These charts depict a major portion of an ocean basin or a large area, with the first digit identifying the ocean basin.
3 (100-999)	Between 1:2,000,000 and 1:9,000,000	These are general charts whose numbers are based on the nine ocean basins.
4 (5000-9999)	Various	This category includes great circle tracking charts, electronic navigation system plotting charts, and special-purpose non-navigational charts and diagrams. Four-digit charts with a letter prefix (EOIOI-E8614) are bottom contour charts.

Number of Digits	Scale	Description
5 (11000-99999)	Larger than 1:2,000,000	In this category are all standard nautical charts at a scale larger than 1:2,000,000. At scales such as this, the charts cover portions of the coastline rather than significant portions of ocean basins.
6 (800000-809999)		This category consists of combat charts and combat training charts. A random numbering system is used to prevent the identification of the geographical area covered by a classified combat chart without referring to the catalog. One reason for this is to allow you to order classified combat charts with an unclassified requisition.

The five-digit category contains all the large-scale and medium-scale charts of the world. These are the primary nautical charts. The five-digit charts are based on the nine regions of the world. The first of the five digits indicates the region in which the chart is depicted. The first and second digits together indicate the geographic subregion within the region, and the last three digits identify the geographic order of the chart within the subregion.

114.2 Define and discuss the following terms: [Ref. a, Ch. 1]

a. Weekly Notices to Mariners [Pg. 1-28]

The chart and publication correction system is based on the periodical, *Notice to Mariners*, published weekly by the DMAHTC and the *Local Notice to Mariners* also published by the U.S MSD weekly to inform mariners of corrections to nautical charts and publications. This periodical announces new nautical charts and publications, new editions, cancellations, and changes to nautical charts and publications. It also summarizes events of the week as they affect shipping, advises mariners of special warnings or items of general maritime interest, and includes selected accounts of unusual phenomena observed at sea. Distribution of the *Notice to Mariners* is made weekly to all U.S. Navy and MSD ships and to most ships of the merchant marine.

The classified Chart and Publication Correction System is based on the *Classified Notice to Mariners*, published on an as-needed basis by the DMAHTC to inform mariners of corrections to classified nautical charts and publications.

The *Notice to Mariners* provides information specifically intended for updating the latest editions of nautical charts and publications issued by the Defense Mapping Agency, the National Ocean Service, and the U.S. MSD. When the *Notice to Mariners* is received, it should be examined for information of immediate value. The list of new charts and new editions of charts and publications should also be checked to assure that the latest editions are on board.

In section I of the *Notice to Mariners,* chart corrections are listed by chart number, beginning with the lowest and progressing in sequence through each chart affected. The chart corrections are followed by publication corrections, which are also listed in numerical sequence.

Since each correction pertains to a single chart or publication, the action specified applies to that particular chart or publication only. If the same correction also applies to other charts and publications, it is listed separately for each one.

Figure 1-18 illustrates the Notice to Mariners format for presenting corrective information affecting charts. A correction preceded by a star indicates that it is based on original U.S. source information. If no marking precedes the correction, the information was derived from some other source. The letter T preceding the correction indicates the information is temporary in nature, and the letter P indicates it is preliminary. Courses and bearings are given in degrees clockwise from 000° true.

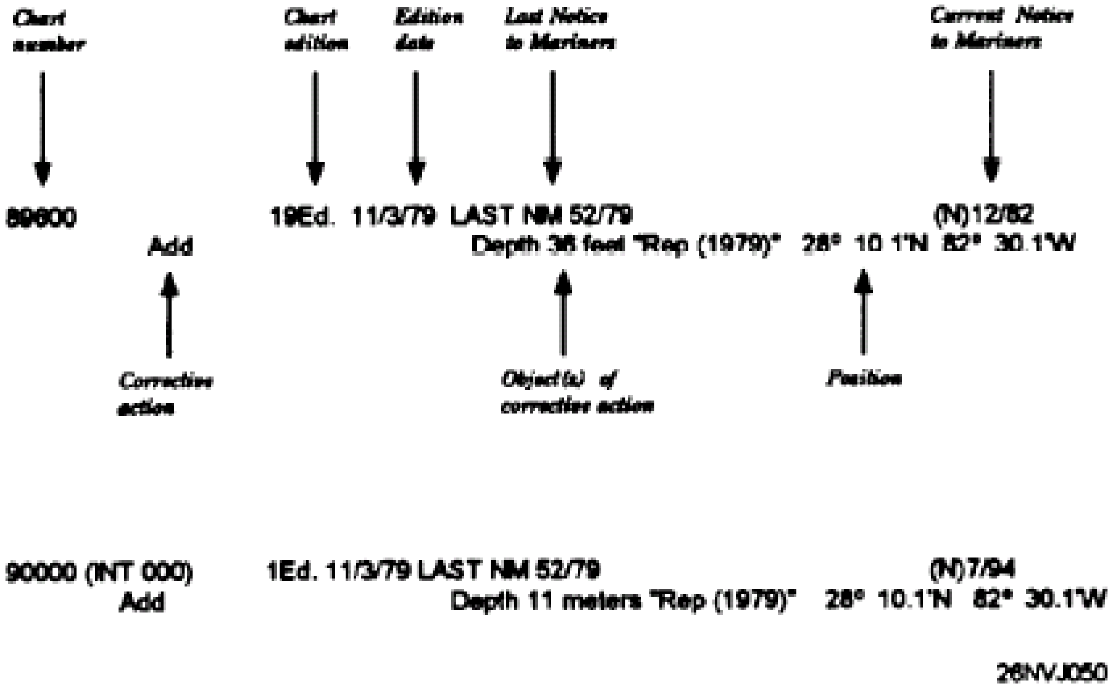


Figure 1-18.—Notice to Mariners format.

b. Broadcast Notices to Mariners [Pg. 1-31]

Notice to mariners, normally broadcast over the radio, generally of immediate interest to navigators.

c. Local Notices to Mariners [Pg. 1-30]

See Line Item A.

d. HYDROLANT/HYDROPAC [Pg. 1-31]

The United States also maintains worldwide coverage using the HYDROLANT/HYDROPAC Navigational Warning System outside of NAVAREAs IV and XII. HYDROLANTs cover the eastern North Atlantic, South Atlantic, North Sea, Baltic Sea, English Channel, Mediterranean Sea, and contiguous areas. HYDROPACs include the western North Pacific, South Pacific, South China Sea, Indian Ocean, Red Sea, Persian Gulf, and contiguous areas. The combination of HYDROLANTs, HYDROPACs, NAVAREA IVs and NAVAREA XIIs provides worldwide notification of the more important marine incidents and navigational changes.

114.3 Discuss the importance of chart scale and why you should use the largest scale chart available for your operating area. [Ref. a, Ch. 1 Pg. 1-16]

The size of the area portrayed by a chart varies extensively according to the scale of the chart. The larger the scale, the smaller the area represented. It follows then that large-scale charts show areas in greater detail. Many features that appear on a large-scale chart do not, in fact, show up at all on a small-scale chart of the same area.

114.4 Define and discuss the following publications: (Ref. a, Ch. 3]

a. Light Lists [Pg. 3-10]

The DMAHTC *List of Lights*, seven volumes, cover foreign coasts of the world (and limited portions of U.S. coasts); these are Pubs. No. 110 through 116. The *List of Lights* volumes include descriptive information similar to *Lights Lists*, but because of their greater coverage areas, they list only lighted aids to navigation and fog signals (lighted buoys within harbors are omitted). Each *List of Lights* is published in a new edition at intervals of approximately 12 months; changes and corrections are included frequently, as they are required, in *Notices to Mariners.*

b. Tide Tables [Pg. 7-1]

The *Tide Tables* are prediction tables published in four volumes by the National Ocean Service. They are *East Coast of North and South America, including Greenland; West Coast of North and South America, including the Hawaiian Islands; Europe and the West Coast of Africa, including the Mediterranean Sea;* and *Central and Western Pacific*

Ocean and the *Indian Ocean* (annual editions). Each volume includes information on the height and time of high and low water at thousands of locations; also included is information on times of sunrise and sunset, moonrise and moonset, and other astronomical phenomena.

c. Current Tables [Pg. 7-1]

Tidal Current Tables are prediction tables published in two volumes by *NOS--Atlantic Coast of North America,* and *Pacific Coast of North America and Asia* (annual editions); each volume includes data on the times and strengths of flood and ebb currents and the time of slack water for thousands of locations; also included are diagrams for certain heavily traveled bodies of water that facilitate determination of optimum transit times and speeds, and astronomical data similar to that in *Tide Tables.*

d. Coast Pilots [Pg. 12-6]

Charts are limited in what can be shown by symbols and abbreviations regarding channels, hazards, winds and currents, restricted areas, port facilities, pilotage service, and many other types of information needed by a navigator for safe and efficient navigation. These deficiencies are remedied by the *Coast Pilots* published by NOS and the *Sailing Directions* published by DMAHTC.

U.S. Coast Pilots are published in nine numbered volumes to cover the waters of the United States and its possessions. They are of great value to a navigator when used with charts of an area both during the planning stage of a voyage and in the actual transit of the area. The contents of *Coast Pilots* have been stored in a computerized data bank, and volumes are reprinted annually with all intervening changes included (except CP8 and CP9, which are revised every 2 years). Interim changes are published in *Notices to Mariners* and *Local Notices to Mariners.*

e. Sailing Directions [Pg. 12-6]

The DMAHTC *Sailing Directions* provide information comparable to the *Coast Pilots* for foreign coasts and coastal waters. They also provide detailed information for the navigation team that cannot be shown on charts. The appropriate volume of *Sailing Directions,* used with charts of a suitable scale, should enable a navigator to approach strange waters with adequate information for the vessel's safety. The *Sailing Directions* are based on a division of the world's water into eight "ocean basins" (but these are not the same as those used for two and three-digit chart numbers). *Sailing Directions* are given three-digit identification numbers starting with DMAHTC Pub No. 121. The *Sailing Directions* are made up of two components and contain information as follows:

> Planning Guides. Each *Planning Guide* covers an ocean basin containing chapters of useful information about countries adjacent to that particular ocean basin; information relative to the physical environment and local coastal phenomena; references to publications and periodicals listing danger areas; recommended ship

routes; detailed electronic navigation systems and buoyage systems pertaining to that ocean basin. Changes for each *Planning Guide* and *En route* volume are prepared and published on an as-required basis determined by the number of accumulated revisions.

En Route Volumes. Each *En route* volume includes detailed coastal and port approach information, supplementing the largest scale chart available from DMAHTC. It is intended for use in conjunction with the *Planning Guide* for the ocean basin concerned. Each *En route* volume is divided into a number of sectors, and for each sector information is provided on available charts (with limits shown on an overall diagram as in U.S. chart catalogs); winds, tides, and currents (shown on an outline chart); off-lying dangers; coastal features; anchorages; and major ports (an annotated chartlet with line drawings of aids to navigation and prominent landmarks).

114.5 Define and discuss the following terms: [Ref. a, Ch. 1]

a. Latitude [Pg. AI-6]

Parallels of latitude are the small circles around and on Earth's surface. For navigation, parallels of latitude have been established. They are all parallel to the plane of the Equator. Since they are all parallel to the Equator, latitude can be measured towards the North Pole and South Pole.

b. Longitude [Pg. AI-7]

Meridians of longitude are the great circles. They all pass through the center of Earth. The prime meridian or 0° of longitude is the starting point for all longitude measurements. Longitude is measured in same manner as latitude except that it is measured **east or west** throughout 180°. The prime meridian is also known as the Greenwich meridian. It is so named because is passes directly through Greenwich, England.

c. Equator [Pg. AI-4]

The second point of reference is the Equator, which divides Earth into two parts, the Northern Hemisphere and the Southern Hemisphere.

e. Meridian [Pg. AI-8]

The axis is the imaginary line drawn between the North Pole and South Pole that forms the first point of reference. The prime meridian or 0° of longitude is the starting point for all longitude measurements.

114.6 Describe how to convert tenths of minutes to seconds of latitude/longitude, and how to convert seconds to tenths of minutes. [Ref. a, Ch. 1 Pg. 1-18]

.MM = SS/60
SS = .MM X 60

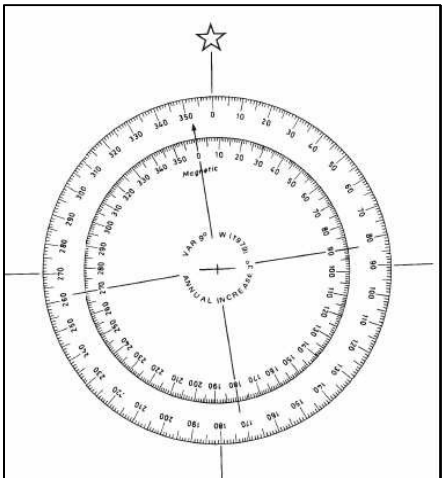
114.7 State the purpose of maintaining a Magnetic Compass Record Book. [Ref. a, Ch. 2, Pg. 2-18]

- Whenever a ship is under way, it is necessary to compare the ship's compasses to make sure that they are operating properly. This is accomplished by using the compass calculations and checking the compasses against the true course.
- Knowing our true heading we can apply our variation and compare the magnetic compasses. A log must be kept to record these changes.
- When under way, the compasses must be compared every one-half hour and at each course change.
- Note: There is an exception; if a ship is in a formation and changing course frequently, or the ship is alongside another ship, each course change does not need to be recorded.
- The purpose of the magnetic compass deviation tables, commonly referred to as "deviation tables," is to provide a means of knowing the deviation of the magnetic compass for any heading. This information is crucial to safe navigation if the gyrocompass fails.

114.8 Define and discuss the following terms:

a. Compass rose [Ref. a, Ch. 2, Pg. 2-6]

Nautical charts usually have one or more compass roses printed on them. These are similar in appearance to the compass card and, like the compass card, are oriented with North at the top. Directions on the chart are measured by using the compass rose (See Figure 14-5). Direction is measured as a straight line from the center point of the circle to a number on the compass rose.


Compass Rose
Figure 14-5

b. Magnetic Compass [Ref. d, Ch. 20, Pg. 2-1]

Magnetic direction is printed around the inside of the compass rose. An arrow points to magnetic North.

c. True bearing [Ref d, Ch. 20 Pg. 2-1]

True direction is printed around the outside of the compass rose.

d. Variation [Ref. a, Ch. 2, Pg. 2-4]

Variation, the difference between true and magnetic north, for the particular area covered by the chart is printed in the middle of the compass rose (as well as any annual change).

e. Annual change [Ref. a, Ch. 2, Pg. 2-5]

Annual change is printed in the vary center of the compass rose.

f. Deviation [Ref. a, Ch. 2, Pg. 2-9]

Deviation may be defined as the amount that the compass is deflected from the magnetic meridian because of the effects of the ship's iron. This is where **permanent** and **induced** magnetism come in to play.

114.9 Describe how to convert true to magnetic bearings, and vice versa.
[Ref. a, Ch. 2, Pg. 2-16 through 2-17]

Determining Variation: You will routinely be tasked with determining variation. This is a simple procedure using simple mathematics and the chart's compass rose. Use the following steps to find your local variation.

Step	Action
1.	Locate the compass rose nearest to the area in which the ship is operating.
2.	Locate the variation and annual increase/decrease from the center.
3.	Locate the year from the center of the compass rose.
4.	Subtract the year indicated from the current year.
5.	Multiply the number of years times the annual change.
6.	Add the sum (or subtract if decreasing) from step No. 5 to the variation in the center of the compass rose.
7.	Round the total off to the closest ½°.

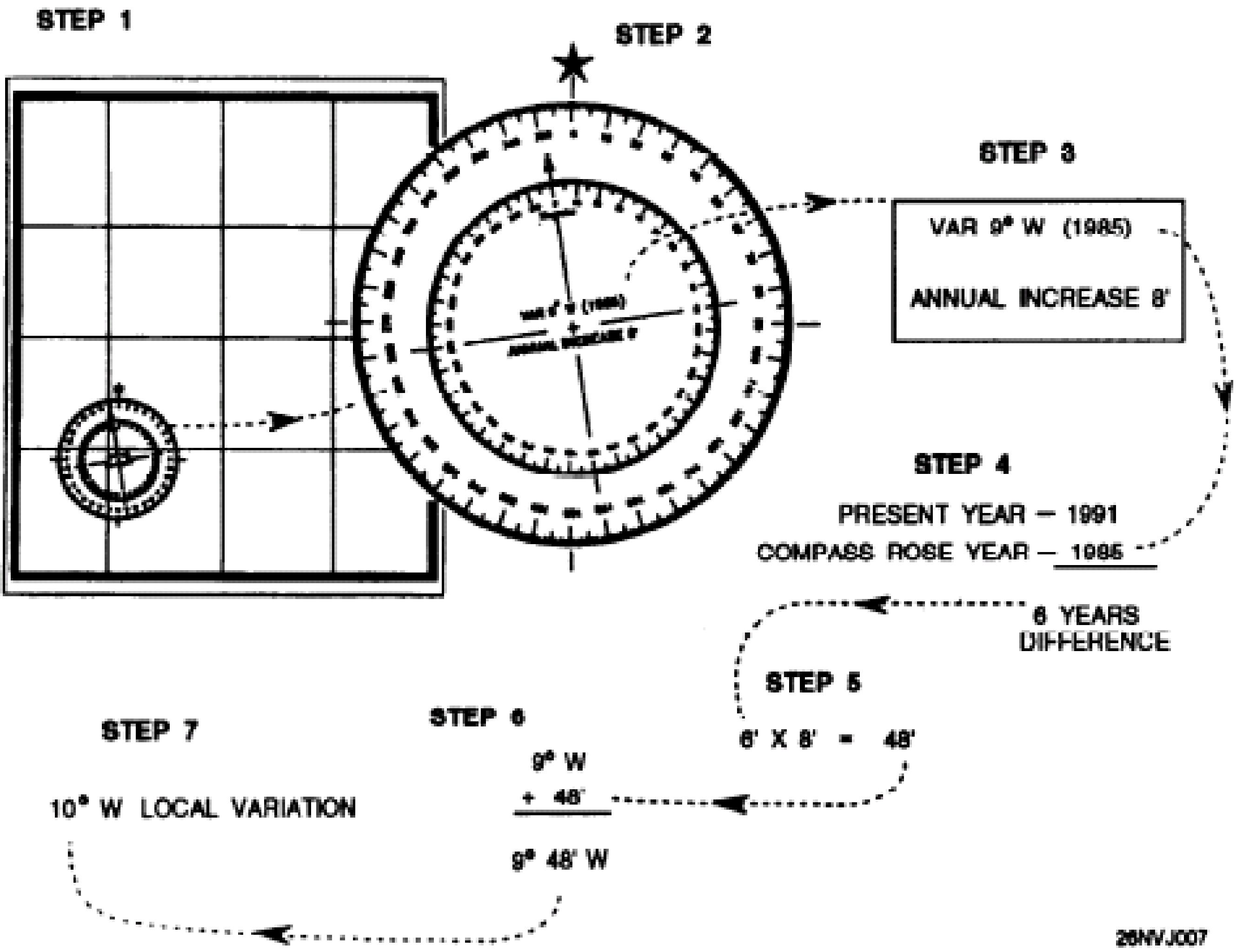


Figure 2-5.—Steps followed to determine variation.

Converting Magnetic v. True

There are several sets of "memory-aids" available to assist you in performing compass calculations. The following simple phrases are designed to assist you in remembering how to convert from one heading expression to another and how to name errors.

Memory Aid Set 1		Memory Aid Set 2	
Can	= Compass	Timely	= True
Dead	= Deviation	Vessels	= Variation
Men	= Magnetic	Make	= Magnetic
Vote	= Variation	Distance	= Deviation
Twice	= True	Count	= Compass
At	= Add	At	= Add
Elections	= Easterly D and V	War	= Westerly D and V
If the Compass is Best the Error is West.		**If the Compass is Least the Error is East.**	

The first set of aids were designed to help you remember the arrangement of the first letters of each word in the phrase. These are arranged representing the three ways of naming a direction (compass, magnetic, true) with the respective differences (deviation and variation) properly placed between them: (CDMVT) compass, deviation, magnetic, variation, true. The first letters in the words *at elections* stand for add east (subtract west), when converting the direction from compass to true. When converting in the opposite direction, the letters are reversed (TVMDC) and the memory aid "timely vessels make distance count at war" informs us to add west (subtract east) error when converting from true to compass.

The second set of memory aids deal with comparison of two compass headings to determine whether to call the difference east or west. If the comparison is between magnetic and compass, and compass is a greater number (best), the difference is west. The same comparison can be made between true and magnetic. In this case, magnetic is considered the same as compass.

Correcting: converting from compass course to a true course.

Uncorrecting: converting from a true course to a compass course

The following table will allow you to visualize the steps necessary to perform compass calculations.

Step	Action
1.	Write down the first letters from the phrase "Can Dead Men Vote Twice."
2.	Ordered course is 180°T; you want to find the compass course to steer. You already know what T is, so write it down.
3.	Let's say that the corrected variation from the center of the compass rose is 11°E.
4.	When uncorrecting, remember that you add westerly errors and subtract easterly errors. The variation is easterly, so subtract it from the true heading to find the magnetic heading.
5.	Next, from the deviation table, figure 2-8, find the value closest to 169°, interpolating as necessary; write it down.
6.	Remember, when uncorrecting you add westerly errors. 15 + 169 = 184.

Now you can see that to head 180° true, you must steer 184° by this particular magnetic compass. In this example, we were uncorrecting (changing from true to compass). We could have used the same method to change from compass to true; but we must remember that when correcting, we add easterly and subtract westerly errors. With an understanding of these rules, we can now go on to applying the lessons learned to a functional part of a Quartermaster's job— recording entries in the Magnetic Compass Record Book.

114.10 Describe the colors and numbering scheme used on buoys, lights and day markers. [Ref. f, Pg. 48-52]

The meaning of the mark depends upon one or more of the following features:
1. By day—color, shape, and topmark
2. By night—light color and phase characteristics

Color

The colors used for lateral marks in Region A are red, green, green with one red horizontal band, and red with one green horizontal band. The colors used for lateral marks in Region B are green, red, red with one green horizontal band, and green with one red horizontal band.

Shape

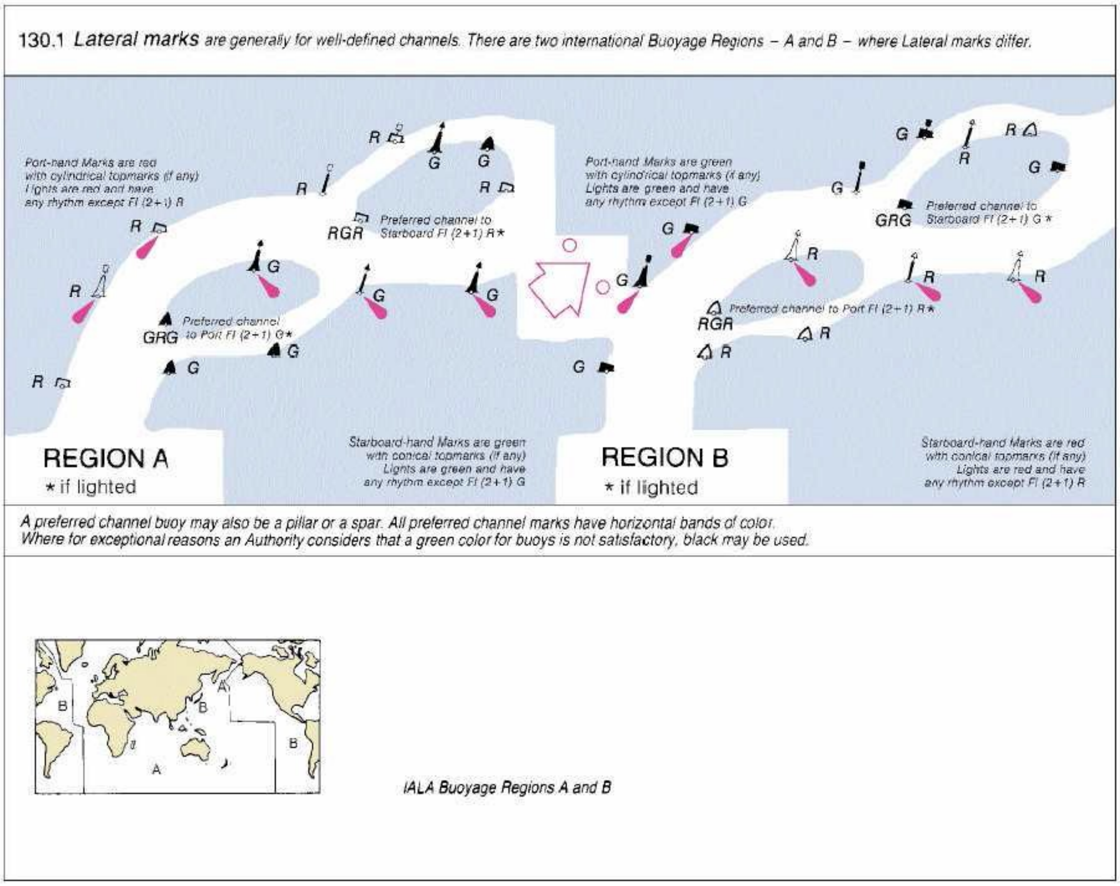
There are five basic buoy shapes (fig. 23); can, nun, spherical, pillar, and spar. With the exception of pillar correct side on which to pass. Can buoys may sometimes be referred to as cylindrical and nun buoys referred to as conical. The term *pillar* is used to describe any buoys that is smaller than a lighthouse buoy and that has a tall, central structure on a broad base. Lighted buoys in the United States are referred to as pillar buoys.

Topmarks

The IALA Maritime Buoyage System makes use of can, nun, spherical, and X-shaped topmarks only. Topmarks on pillar and spar buoys are particularly important to indicate the side on which they will be passed and will be used wherever practical.

Lights

Where marks are lighted, red and green lights are reserved for port and starboard or starboard and port lateral marks. Yellow lights are for special marks, and white lights are used for other types of marks.



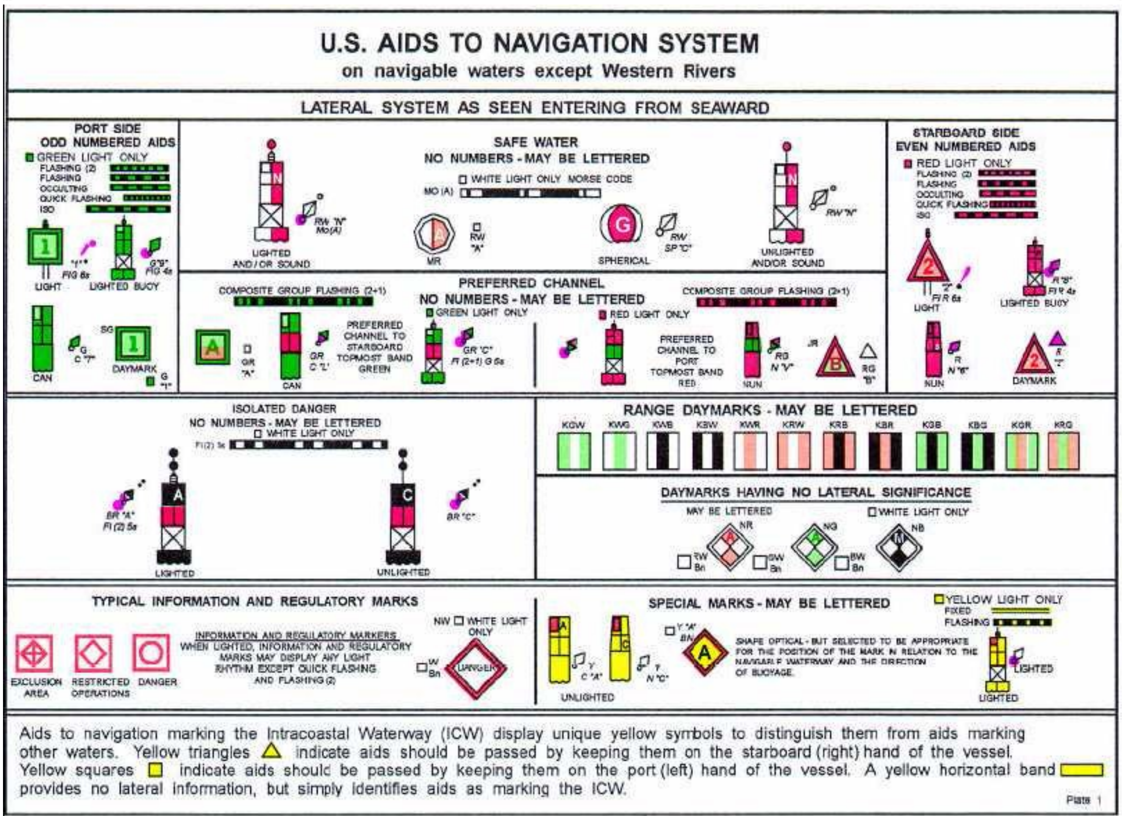
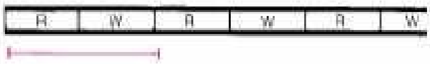


Figure 4-14.—Lateral system as seen entering from seaward.

Light Characters

Light Characters on Light Buoys → Q

	Abbreviation		Class of light	Illustration — Period shown	
	International	National			
10.1	F	F	*Fixed*		F
10.2	*Occulting (total duration of light longer than total duration of darkness)*				
	Oc	Oc	*Single-occulting*		Oc
	Oc(2) Example	Oc (2)	*Group-occulting*		Oc (2)
	Oc(2+3) Example	Oc(2+3)	*Composite group occulting*		Oc(2+3)
10.3	*Isophase (duration of light and darkness equal)*				
	Iso	Iso	*Isophase*		Iso
10.4	*Flashing (total duration of light shorter than total duration of darkness)*				
	Fl	Fl	*Single-flashing*		Fl
	Fl(3) Example	Fl (3)	*Group-flashing*		Fl (3)
	Fl(2+1) Example	Fl (2+1)	*Composite group-flashing*		Fl (2+1)
10.5	LFl	L Fl	*Long-flashing (flash 2 s or longer)*		L Fl
10.6	*Quick (repetition rate of 50 to 79 – usually either 50 or 60 – flashes per minute)*				
	Q	Q	*Continuous quick*		Q
	Q(3) Example	Q(3)	*Group quick*		
	IQ	IQ	*Interrupted quick*		IQ

	Abbreviation: International	Abbreviation: National	Class of light	Illustration (Period shown)	
10.7	Very quick (repetition rate of 80 to 159 – usually either 100 or 120 – flashes per min)				
	VQ	VQ	Continuous very quick		VQ 
	VQ(3) Example	VQ (3)	Group very quick		
	IVQ	IVQ	Interrupted very quick		
10.8	Ultra quick (repetition rate of 160 or more – usually 240 to 300 – flashes per min)				
	UQ	UQ	Continuous ultra quick		
	IUQ	IUQ	Interrupted ultra quick		
10.9	Mo (A) Example	Mo (A)	Morse Code		
10.10	FFl	F Fl	Fixed and flashing		F Fl 
10.11	Al.WR	AlWR	Alternating		AlWR 

Colors of Lights

	International		National			
11.1	W		W		White (only on sector- and alternating lights)	Colors of lights shown on standard charts  on multicolored charts  on multicolored charts at sector lights 
11.2	R		R		Red	
11.3	G		G		Green	
11.4	Bu		Bu		Blue	
11.5	Vi		Vi		Violet	
11.6	Y		Y		Yellow	
11.7	Y	Or	Y	Or	Orange	
11.8	Y	Am	Y	Am	Amber	

Period

12	90s	*Period in seconds*	90s

Elevation

Plane of Reference for Heights → H *Tidal Levels* → H

13	12m 36 ft	*Elevation of light given in meters or feet*	12m

Range

Note: Charted ranges are nominal ranges given in Nautical miles

14	15M	15M	*Light with single range*	15M
	10M	15/10M	*Light with two different ranges* *NOS: only lesser of two ranges is charted*	15/10M
	7M	15-7M	*Light with three or more ranges* *NOS: only least of three ranges is charted*	15-7M

Disposition

15		(hor)	*horizontally disposed*	(hor)
		(vert)	*vertically disposed*	(vert)

Example of a full Light Description

16		Name Fl (3) WRG 15s 21ft 11M Fl (3) WRG 15s 21m 15-11M-NIMA		Name Fl(3)WRG.15s 21m 15-11M
	Fl(3)	*Class of light: group flashing repeating a group of three flashes*	Fl(3)	*Class of light: group flashing repeating a group of three flashes*
	WRG	*Colors: white, red, green, exhibiting the different colors in defined sectors*	WRG	*Colors: white, red, green, exhibiting the different colors in defined sectors*
	15S	*Period: the time taken to exhibit one full sequence of 3 flashes and eclipses: 15 seconds*	15s	*Period: the time taken to exhibit one full sequence of 3 flashes and eclipses: 15 seconds*
	21ft 21m	*Elevation of focal plane above datum: 21 feet or 21 meters*	21m	*Elevation of focal plane above datum: 21 meters*
	11M 15-11M	*Nominal range: NIMA: white 15M, green 11M, red between 15 and 11M*	15-11M	*Nominal range: white 15 M, green 11 M, red between 15 and 11M*

114.11 Define and discuss the following terms:

a. Heading [Ref. a, Ch. 8 Pg. 8-4]

The ship’s heading is always expressed in degrees measured clockwise from 000° through 360°. Commonly referred to as the ship’s head, the heading can be referenced from true north, magnetic north, or compass. The ship’s head is always changing due to the constant yawing motion caused by the effects of the sea and steering errors.

b. Course [Ref. a, Ch. 8 Pg. 8-4]

The course is the direction on which the ship is to be steered. As an example, the helmsman is ordered to come left steer new course 090° T. The helmsman would respond by putting the rudder left and steadying the ship on new course 090°T.

c. Course made good [Ref. e, Ch. 2 Pg. 11-37]

Actual vessel track or course after adjusting for such factors as current and lea way.

To find the course and speed made good since the last fix, use the parallel rulers and compass rose or PMP aligned on the last two fixes to find the course made good (CMG). Measure the distance between the last two fixes to find the speed made good (SMG). Remember from earlier chapters to use the time, speed, and distance triangle. Distance divided by time equals speed. Jot down your results. We now have two elements of our report.

d. Speed through water [Ref. e Ch. 20 Pg. 10-12]

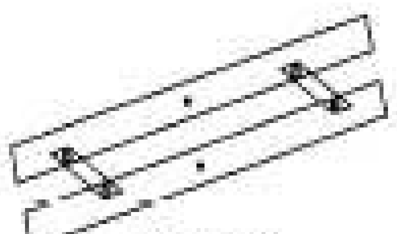
The speed at which a boat is moving in the water taking into account the current.

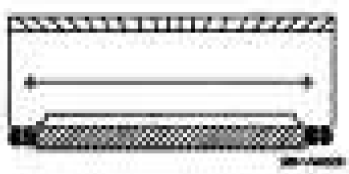
e. Speed over ground [Ref. e, Ch. 20 pg. 12-11]

The speed at which the GPS unit and the person operating it are moving with respect to the earth's surface (ignoring tidal and current activity).

114.12 Define and discuss the following navigational tools: [Ref. a, Ch. 8]

a. Parallel ruler [Pg. 8-13]





Parallel rulers are instruments used for moving lines parallel to themselves, determining direction from the compass rose, and laying out course lines. These are, of course, only a few of the uses of parallel rulers. Some of the other uses include drawing straight lines, advancing lines of position, checking ranges, plotting fixes, and measuring direction from one given point to another. There are other devices available which are easier to use and will do the same job as parallel rulers. The Weems parallel plotter (fig. 8-7) is the most widely used variation of the parallel ruler.

b. Dividers [Pg. 8-14]

A pair of dividers is an instrument or tool used to measure the difference between two given points. It consists of two small pieces of metal, plastic, or wood, hinged at one end, allowing the opposite ends to be separated. There are needles or points placed in the ends of both legs which enable the user to obtain a more accurate measurement and allow the tool to be swung from one length to another without slipping. There are many sizes of dividers, but the 5- and 6-inch sizes have been found to be the most popular and useful. Larger dividers are handy at times, but can be clumsy to use.

c. Compass [Pg. 8-14]

Compasses are not to be confused with the direction finding compass such as the magnetic or gyrocompass. The compasses referred to here are tools that are very similar in appearance to the divider. The distinction between dividers and compasses is that while both divider legs are fitted with needles, the compass legs are fitted with a needle on one leg and a marking lead or pencil on the other. Compasses are useful for scribing circles and arcs such as radar ranges or perhaps showing the limits of a light's visibility. Dividers and compasses (fig. 8-8) will give best results when the adjustment screw at the hinged end is kept tight enough to permit ready use but prevent slippage. The needle points should be sharp, extended to the same length, and locked securely using the locking screw provided.

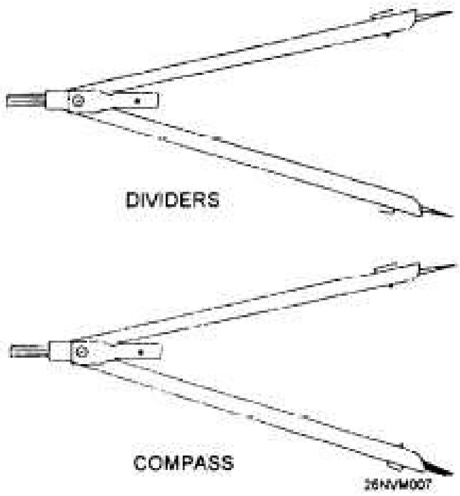


Figure 8-8.—Compass and dividers.

d. Nautical slide rule (time-speed-distance wheel) [Pg. 8-7]

Time, speed, and distance are related by the formula: distance = speed x time. Therefore, if any two of the three quantities are known, the third can be found. The units must be consistent. (The distance scales on nautical charts use nautical miles and yards, unless otherwise stated on the chart. A nautical mile is equal to 2,000 yards.) Thus, if speed is measured in knots and time in hours, the answer is in nautical miles. Similarly, if distance is measured in nautical miles and time in hours, the answer is in knots. If distance is measured in yards and time in minutes, the answer is in yards per minute. Table 19 of *Bowditch* is a speed, time, and distance table that supplies one of the three values if the other two are known. It is intended primarily for use in finding

The following formulas may be used if the speed is measured in knots, the distance in nautical miles, and the time in hours and/or tenths of hours (0.1 hour = 6 minutes).

Distance = Speed x Time
Speed = Distance ÷ Time
Time = Distance ÷ Speed

Example 1. Your ship steams for a period of 4 l/2 hours and covers a distance of 54 nautical miles. What is your speed?

$$S = \frac{D}{T} \qquad S = \frac{54}{4.5} \qquad S = 12 \text{ knots}$$

In example 1, time was given in hours and tenths. When time is given or required in minutes, the same formulas, slightly changed, are still used.

$$Distance = \frac{Speed \times Time}{60} \ (minutes)$$

$$Speed = \frac{Distance \times 60}{Speed}$$

Example 2. How many minutes (m) are required for a vessel to steam a distance of 7 nautical miles at a speed of 7.5 knots?

$$T(m) = \frac{D \times 60}{S} \qquad T(m) = \frac{7 \times 60}{7.5}$$

$$T(m) = \frac{420}{7.5} \qquad T = 56 \text{ minutes}$$

The following is an aid to help you remember these formulas. Simply place the letters in a triangle, as shown in figure 8-1. For distance (D), place your finger over the D and you have S x T. For speed (S), cover the S and you have D ÷ T. For time (T), cover the T and you have D ÷ S

Figure 8-1.—T, S, and D triangle.

<u>Three-Minute Rule:</u> Another way of solving problems of distance, speed, and time is by using the 3-minute rule. The 3-minute rule will help solve mathematical computations without a nomogram or calculator. The rule states: The distance traveled in yards over 3

minutes divided by 100 equals the speed in knots. To simplify, just drop two zeros from any distance traveled in yard in any 3 minute period.

Example 1: Ship travels 1,600 yd. in 3 min. 1,600/100 = 16 (Speed is 16 knots).

Example 2: Ship's speed is 16 kn for 3 min. 16 x 100 = 1,600 yd.

<u>Using a Nautical Slide Rule</u>: To simplify speed, time, and distance solutions, most Quartermasters use a circular slide rule (fig. 8-2), commonly known as a nautical slide rule. When you enter two known variables on the appropriate scales, the third value can be found.

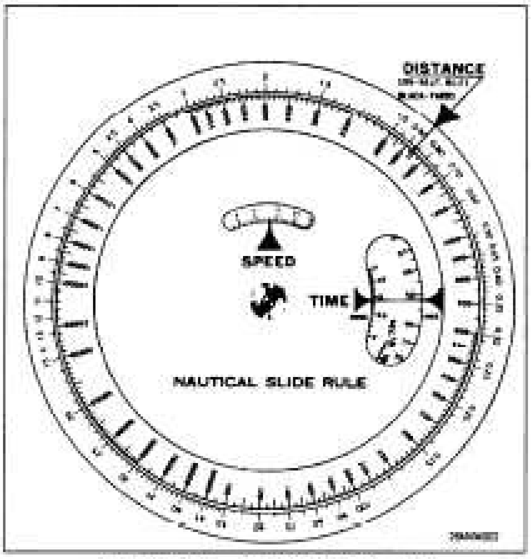
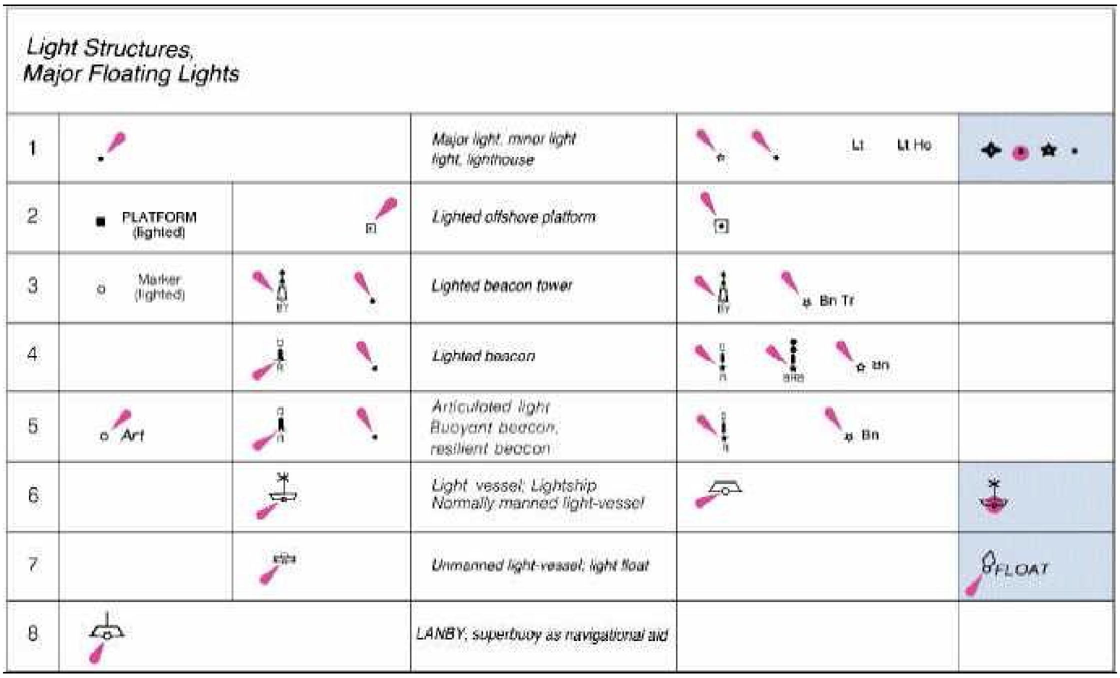


Figure 8-2.—Nautical slide rule.

114.13 Describe the chart symbols for the following navigational features: [Ref. c]

a. Light [Ch. 5, Pg. 63-69]



For detailed list, See NOAA Chart #1 Section P.

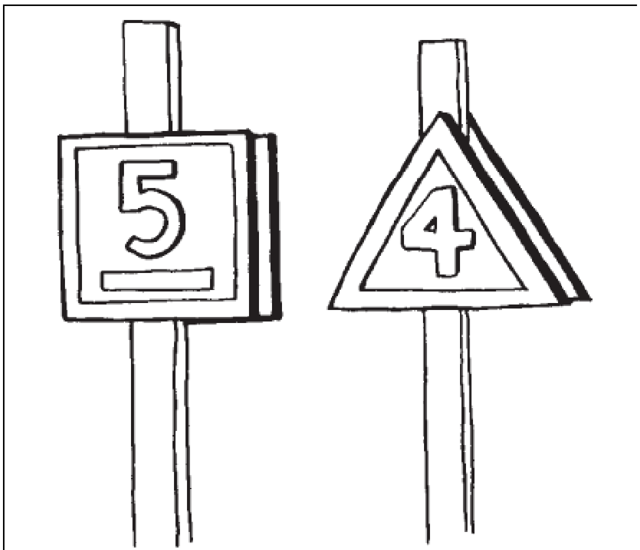
b. Buoy [Pg. 70-73]

Buoys and Beacons				
IALA Maritime Buoyage System, which includes Beacons → Q 130				
1			*Position of buoy*	
Colors of Buoys and Beacon Topmarks				
Abbreviations for Colors → P				
2	G	B G G	*Green and black*	G B G G G
3	R	R Y R	*Single colors other than green and black*	R R Y Y R
4	RG	BY GRG	*Multiple colors in horizontal bands, the color sequence is from top to bottom*	BY GRG BRB
5		RW RW	*Multiple colors in vertical or diagonal stripes, the darker color is given first*	RW RW RW
6			*Retroreflecting material*	
Note: Retroreflecting material may be fitted to some unlit marks. Charts do not usually show it. Under IALA Recommendations, black bands will appear blue under a spotlight.				
Lighted Marks				
Marks with Fog Signals → R				
7		Fl.R Fl.G	*Lighted marks on standard charts*	Fl.G Fl.R
8			*Lighted marks on multicolored charts*	Fl.R Iso RW Fl.G
Topmarks and Radar Reflectors				
For Application of Topmarks within the IALA-System → Q 130			*Topmarks on Special Purpose Buoys and Beacons → Q*	
9			*IALA System buoy topmarks (beacon topmarks shown upright)*	
10		No 2	*Beacon with topmark, color, radar reflector and designation*	No 2 Name
11		No 3	*Buoy with topmark, color, radar reflector and designation*	No 3
Note: Radar reflectors on floating marks are usually not charted.				

For detailed lists, see NOAA Chart #1, Section Q.

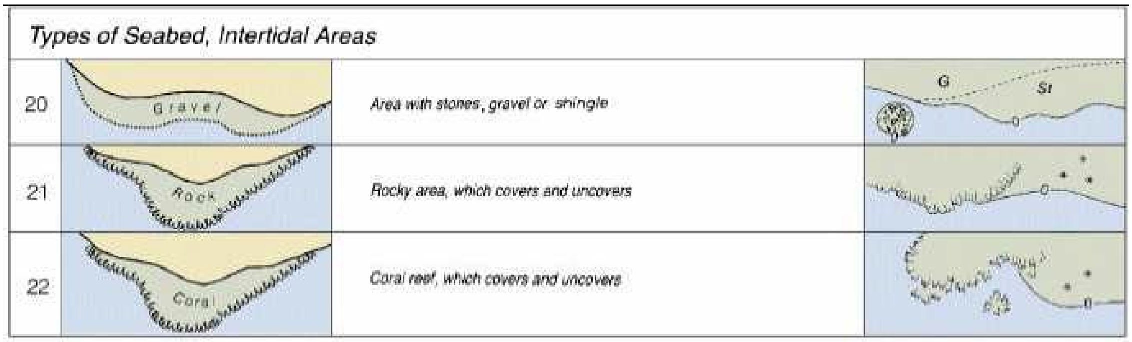
c. Day marker [Pg. 73-76]

Beacons have dayboards attached to a structure. When returning from sea, a triangular shaped dayboard marks the starboard side, and a rectangular shaped dayboard marks the port side of the channel. (See Figure 13-3.)



Daybeacon
"When Returning From Sea"
Figure 13-3

d. Shoal [Ch. i]



Types of Seabed, Intertidal Areas			
20	Gravel	Area with stones, gravel or shingle	G St
21	Rock	Rocky area, which covers and uncovers	
22	Coral	Coral reef, which covers and uncovers	

e. Reef [Ch. K]

16	Co Reef line	Coral reef which covers	Co Co	

f. Obstruction [Ch. K]

Obstructions

Plane of Reference for Depths → H *Kelp, Sea-Weed* → J

40	Obstn	Obstn	Obstruction, depth unknown	Obstn Obstn	#
41	5_1 Obstn	5_1 Obstn	Obstruction, least depth known	4_6 Obstn 16_5 Obstn	
42	21 Obstn 5_1 Obstn	4_6 Obstn	Obstruction, least depth known, swept by wire drag or diver	4_6 Obstn 16_5 Obstn	
43.1	Subm piles Stakes, Perches	Obstn	Stumps of posts or piles, all or part of the time submerged	Obstn	Subm piles
43.2	Snags Stumps Deadhead		Submerged pile, stake, snag, well, deadhead or stump (with exact position)		
44.1	Fsh stks		Fishing stakes		
44.2			Fish trap, fish weirs, tunny nets		
45		Fish traps Tunny nets	Fish trap area, tunny nets area	Fish traps Tunny nets	
46.1	Obstruction (fish haven) (actual shape)	Obstn (fish haven)	Fish haven (artificial fishing reef)		
46.2	Obstn Fish haven (Auth min 42ft)		Fish haven with minimum depth	(2_4) 2_4	
47	Oys		Shellfish cultivation (stakes visible)	Shellfish Beds (see Note)	

g. Restricted area [Ch. N]

2.1	Restricted Area	Limit of restricted area	
2.2	PROHIBITED AREA PROHIB AREA	(Screen optional) Limit of prohibited area (no unauthorized entry)	Entry Prohibited

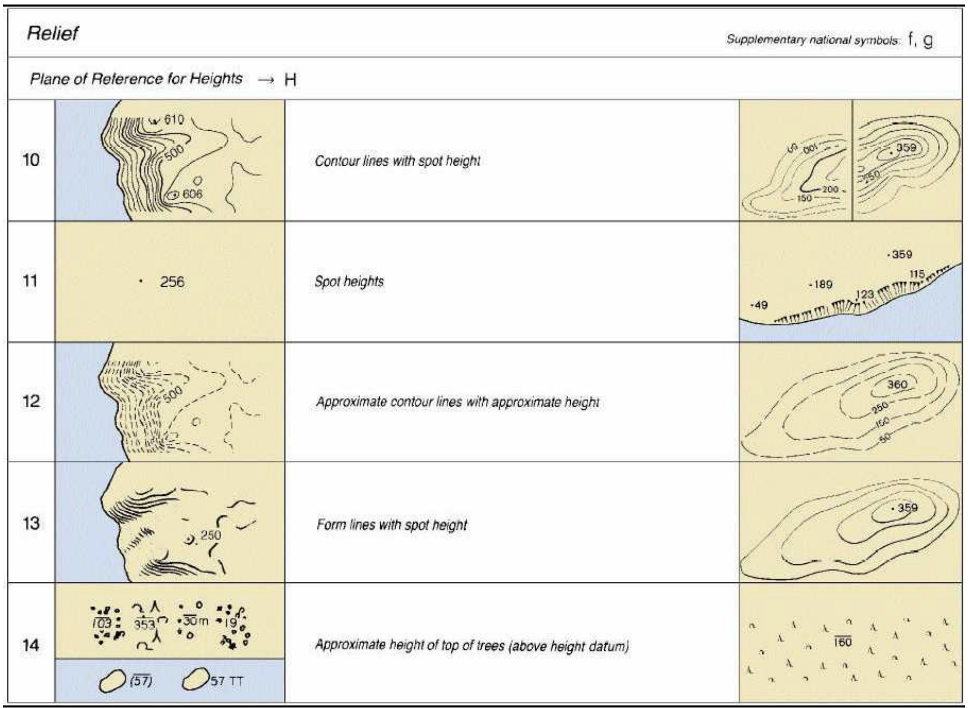
h. Depth markings [Ch. i]

Soundings				Supplementary national symbols: a – c
Plane of Reference for Depths → H				Plane of Reference for Heights → H
10	19 8_2 $6\frac{3}{4}$ / 8_2 19	19 8_2 $6\frac{3}{4}$	Sounding in true position (NOS uses upright soundings on English unit charts and sloping soundings on Metric charts).	12 9_7
11	(23) 1036		Sounding out of position	+ (12) 3375
12		(5)	Least depth in narrow channel	(9_7)
13	$\overline{65}$		No bottom found at depth shown	$\overline{200}$
14	8_2 19 / 8_2 19	8_2 19	Soundings which are unreliable or taken from a smaller-scale source (NOS uses sloping soundings on English unit charts and upright soundings on Metric charts).	12 9_7
15	6		Drying heights above chart datum	4_6 0_6 4_7 3_6 3_8

i. Bottom types [Ch. J]

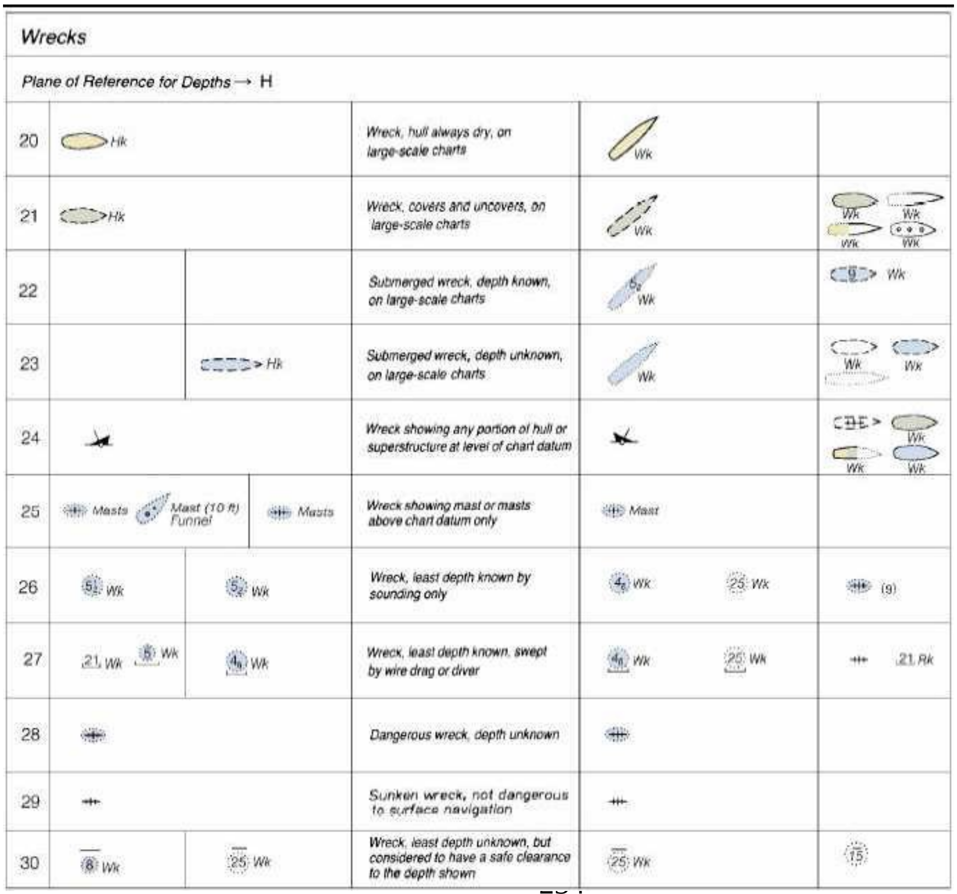
Types of Seabed			
Rocks → K			Supplementary national abbreviations: a – ag
1	S	Sand	S
2	M	Mud	M
3	Cy; Cl	Clay	Cy
4	Si	Silt	Si
5	St	Stones	St
6	G	Gravel	G
7	P	Pebbles	P
8	Cb	Cobbles	Cb
9	Rk; rky	Rock; Rocky	R
10	Co	Coral and Coralline algae	Co
11	Sh	Shells	Sh
12	S/M	Two layers, eg. Sand over mud	S/M
13.1	Wd	Weed (including Kelp)	Wd
13.2	Kelp	Kelp, Seaweed	
14	Sandwaves	Mobile bottom (sand waves)	
15	Spring	Freshwater springs in seabed	

j. Land contours [Ch. D]



Relief			Supplementary national symbols: f, g
Plane of Reference for Heights → H			
10	610, 500, 606	Contour lines with spot height	100, 200, 150; 359, 250
11	· 256	Spot heights	·359, 115, ·189, 123, ·49
12	500	Approximate contour lines with approximate height	360, 250, 150, 50
13	250	Form lines with spot height	·359
14	103, 353, ·30m, 19; (57), 57 TT	Approximate height of top of trees (above height datum)	160

k. Wrecks [Ch. K]



Wrecks						
Plane of Reference for Depths → H						
20	Hk		Wreck, hull always dry, on large-scale charts	Wk		
21	Hk		Wreck, covers and uncovers, on large-scale charts	Wk		Wk Wk Wk Wk
22			Submerged wreck, depth known, on large-scale charts	Wk		9 Wk
23		Hk	Submerged wreck, depth unknown, on large-scale charts	Wk		Wk Wk
24			Wreck showing any portion of hull or superstructure at level of chart datum			Wk Wk Wk
25	Masts; Mast (10 ft) Funnel	Masts	Wreck showing mast or masts above chart datum only	Mast		
26	5₁ Wk	5₁ Wk	Wreck, least depth known by sounding only	4₆ Wk	25 Wk	(9)
27	21 Wk; 5 Wk	4₆ Wk	Wreck, least depth known, swept by wire drag or diver	4₆ Wk	25 Wk	21 Rk
28			Dangerous wreck, depth unknown			
29			Sunken wreck, not dangerous to surface navigation			
30	8 Wk	25 Wk	Wreck, least depth unknown, but considered to have a safe clearance to the depth shown	25 Wk		15

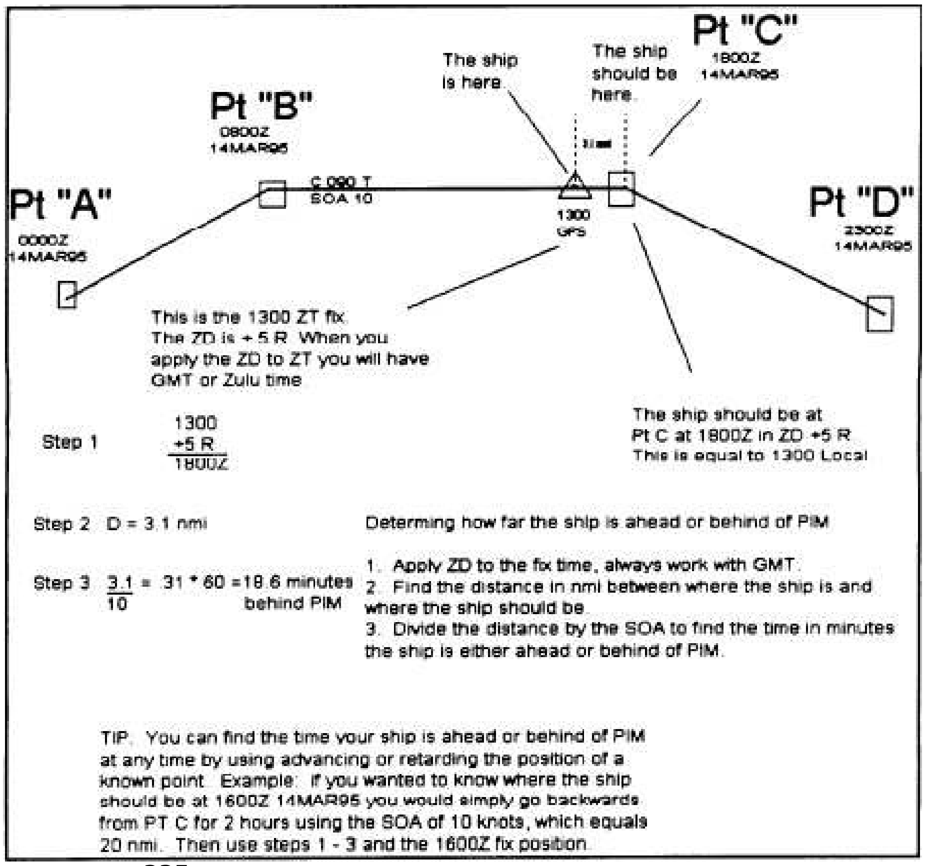
l. Cable crossings [Ch. D]

Submarine Cables				
30.1		Submarine cable		
30.2	Cable Area	Submarine cable area		
31.1		Submarine power cable		
31.2		Submarine power cable area		
32		Disused submarine cable		

114.14 Describe how to lay out a Plan of Intended Movement (PIM). [Ref. a, Ch. 8 Pg. 8-12]

Prior to any ship getting under way, a PIM must be formed. Normally, the senior Quartermaster and the navigator will discuss the best possible routes for the ship to follow. Messages are then sent to group commanders and the ship gets under way. As the QMOW, you will be tasked with tracking the ship's progress.

Tracking is directly related to time, speed, and distance calculation. Figure 8-6 represents a ships track with PIM times and dates annotated. As a rule, PIM is laid out for every 4 hours GMT. When referring to the ship's position in relation to PIM, you should express any values as time ahead or behind PIM. Let's look at an example.



114.15 Define and describe the following terms: [Ref. a]

a. Fix [appendix/ Pg. 8-20]

A relatively accurate position determined without reference to any former position.

b. Estimated position [appendix /pg. AI-4]

The most probable position of a craft determined from incomplete data or data of questionable accuracy.

c. Line of position [appendix /Pg. AI-7]

A line indicating a series of possible positions of a ship as a result of observation or measurement.

d. Compass bearing [Ref. d, Ch. 20]

A bearing is a 3 digit angle measured clockwise from north.

e. Sounding [appendix /Pg. AI-11]

Measured or charted depth of water or the measurement of such depth.

f. Dead reckoning [appendix/ Pg. 8-1]

Determination of position by advancing a previous position for courses and distances.

g. Set [appendix/Pg. AI-11]

The direction toward which a current flows.

h. Drift [appendix/Pg. AI-4]

The leeway of a vessel or amount of set of a tide or current.

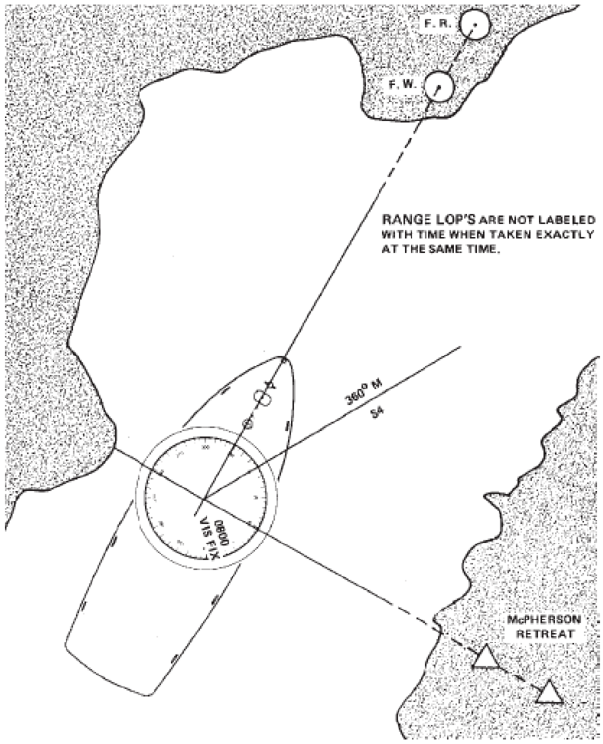
114.16 Describe how to plot a fix using the following techniques: [Ref. d, Ch. 20]

a. Geographic ranges

When two charted objects are in range, as seen from a boat, the boat is located somewhere on a straight line through these objects. Frequently a range will mark the center of a channel.

The boat is steered so as to keep the range markers in line. Ranges may be established navigational aids or natural ranges such as a church steeple and a water tower. When entering or leaving a harbor, it is often possible to fix your position by means of ranges.

Example:
You are steering on a range. While steering on this range (keeping the bow lined up with the two range marks), you note the time is 0800 when two charted objects (for example, a water tank and smoke stack) line up on the starboard side. The boat'sposition is at the intersection of the lines drawn through each set of ranges. (See Figure 14-35) After having observed two sets of ranges which determined a fix, you come to a magnetic course of 330° M to stay in safe water.



Fix by Two Ranges
Figure 14-35

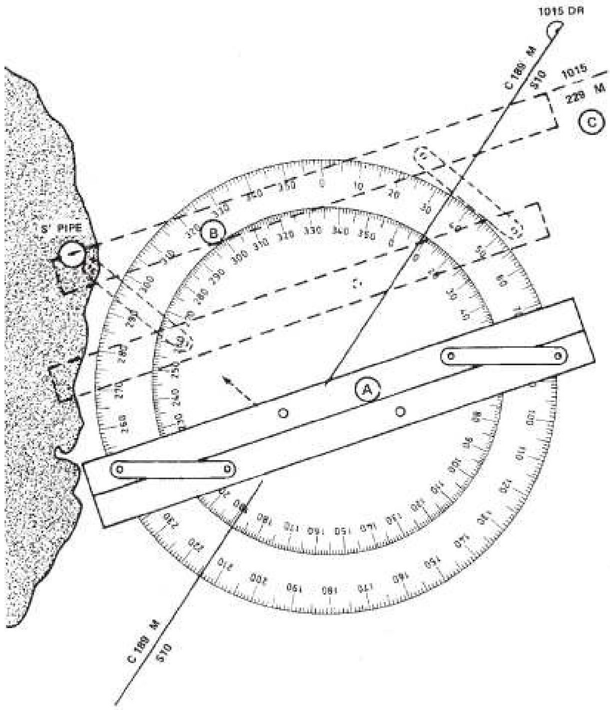
b. Magnetic compass

A bearing or series of bearings can be observed as compass (C), magnetic (14), true (T), or as a relative bearing (visual or radar). The compass bearing reading usually needs to be converted for plotting and then drawn on the chart as a line of position (LOP).

<u>Parallel</u>. One common method of plotting bearings on a chart is using parallel rulers or a course plotter. Follow the procedures below for plotting the bearing on to the chart.
Example:

Your boat is on a heading of 192° compass. At 1015 you obtain a bearing of 040 degrees relative on a water tower. Deviation from the boat's deviation table on the boat's heading is 3°W.

Step	Procedure
1	Correct your compass heading of 192° to the magnetic heading. Write down the correction formula in a vertical line. C = 192° D = 3W° (+E, −W when correcting) M = 189° V = not applicable to this problem T = not applicable to this problem
2	Compute information you have opposite appropriate letter in STEP 1. Subtract the westerly error, 3°W deviation from the compass heading (192°) to obtain magnetic heading (189°)
3	Add the relative bearing (040 degrees) to the magnetic heading (189') to obtain the magnetic bearing (229°); or 189°– (M) <u>+ 040°</u> 229° magnetic bearing
4	Place the parallel rulers with their edge passing through the crossed lines at the center of the compass rose and the 229° mark on the inner ring (magnetic) of the compass rose. (See Figure 14-32)
5	Walk the parallel rulers to the dot marking the exact position of the water tower.
6	Draw a broken line and intersect your course Line (C 189 M).
7	Label a segment of line with the time of the bearing along the top. The segment is drawn near the course line, not the entire length from the water tower.
8	Below the line label the magnetic bearing 229 M.

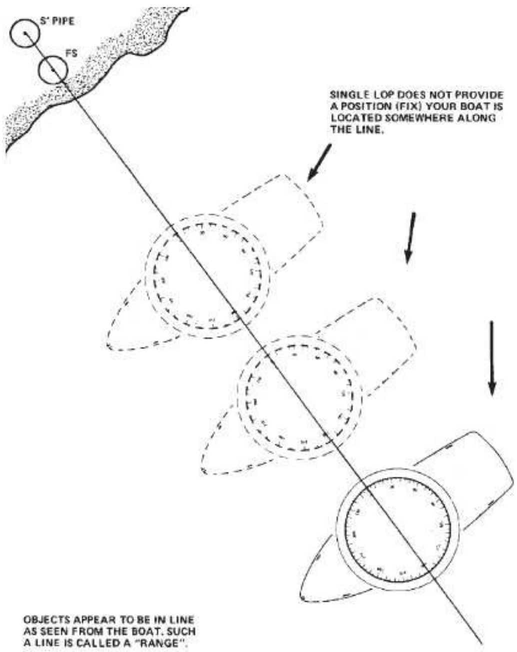


Plotting Bearings
Figure 14-32

At 1015 your boat was somewhere along your LOP. A single line of bearing gives you a line of position but you cannot accurately fix your boat's location by a single LOP. (See Figure 14-32)

<u>Line of Position</u>. The position of a boat can be determined by many methods of piloting. The line of position (LOP) is common to all methods of piloting. For example, if you observe a standpipe and a flagstaff in a line, you are somewhere on the line drawn from the standpipe through the flagstaff and towards your boat. This line is called a range or a visual range.

If the bearing is taken on a single object, the line drawn is called a bearing line of position. The observed bearing



Visual Range LOP
Figure 14-33

direction must be corrected to magnetic or true direction and plotted. The compass rose can be used to provide the direction.

A single observation gives an LOP, not a position – you are located somewhere along that LOP. (See Figure 14- 33)

Selecting objects to obtain a fix. The primary consideration in selecting charted objects to obtain a fix is the angle between the bearings. Also, always attempt to take bearings on object as close as possible to your boat because minor errors in reading are magnified as you increase your distance from the object.

NOTE: An error of 1 degree at 1 mile will result in an error of 100 feet.

Two lines of position. When you have only two LOPs for a fix, the quality of the fix will be maximum when there is a 90 degree difference in the lines. Serious error in position could result if a difference of less than 60 degrees or more than 120 degrees between the two lines exist. Therefore, two LOPs should intersect at right angles or near right angles wherever possible.

Three lines of position. An ideal fix has three or more LOPs intersecting at a single point AND the LOPs have a separation of at least 60 degrees but not more than 120 degrees.

Obtaining fixes. A single line of bearing gives an LOP, and your boat is somewhere along that LOP. You cannot accurately fix your position by a single line of position. Two or more intersecting LOPs or radar ranges must be plotted to obtain an accurate fix.

The greater the number of lines of position or radar ranges intersecting at the same point, the greater the confidence in the fix. For a fix to be accurate, LOPs must be observed at the same time. However, in navigation you can take two or more bearings, one after the other, and consider them observed at the same time (simultaneous).

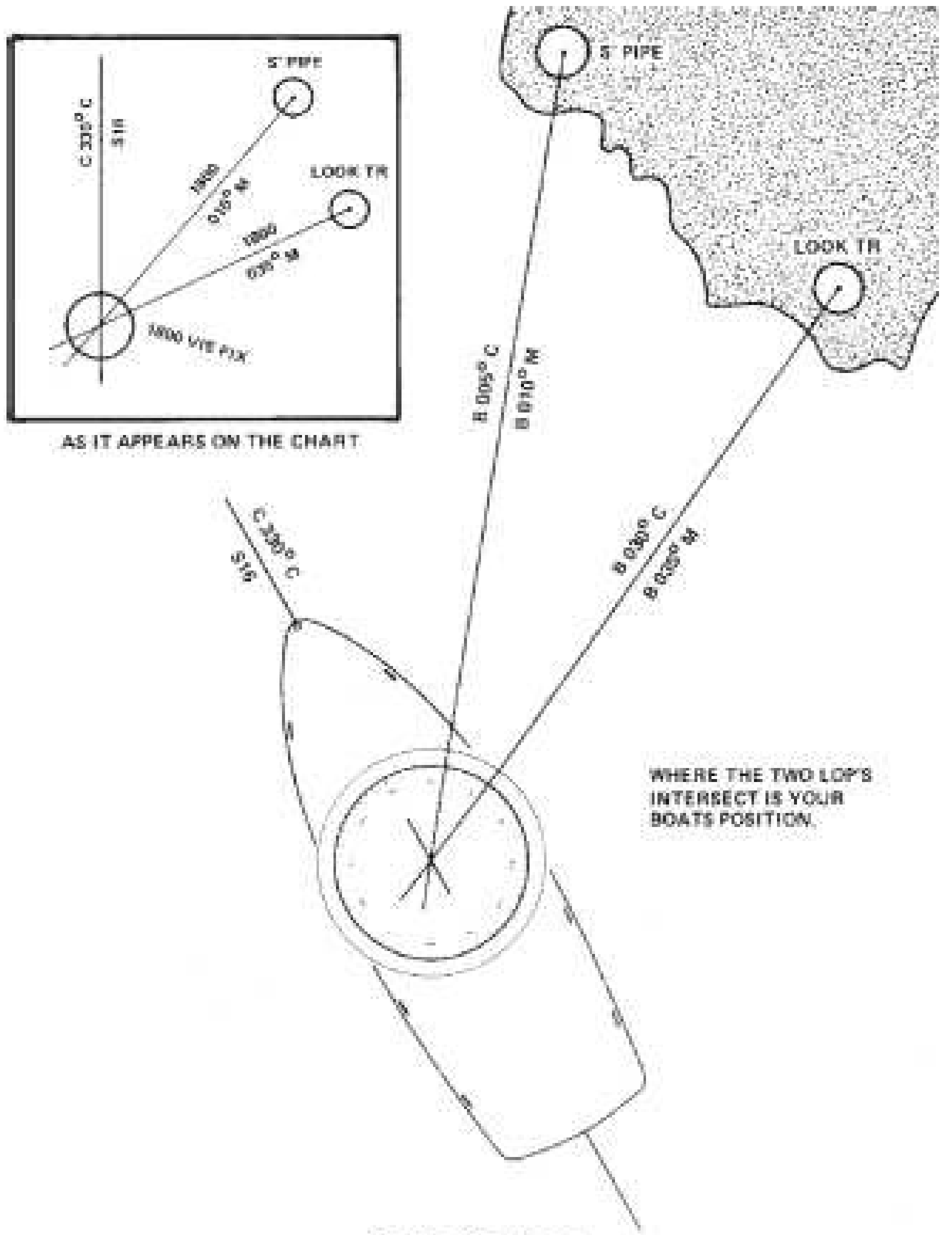
NOTE: For a fix to be accurate, LOPs must be from simultaneous observation (exact same time). Two or more bearings taken one after the other are considered simultaneous.

Obtaining bearings. Bearings are obtained by visual sightings across a compass, hand held bearing compass, relative bearings (Dumb Compass) or by radar. Then the direction to the object sighted on is recorded, converted to magnetic or true direction, and plotted.

Using cross bearings. When using cross bearings the fix is obtained by taking bearings on two well defined objects and plotting the observed bearings on the chart. A more accurate fix can be obtained by taking a third bearing on a well defined object. The three lines of position should form a single point or a small triangle. Your boat's position is then considered to be on the point or in the center of the small triangle. A large triangle is an indication than an inaccurate bearing was taken, double check your measurements.

CAUTION: Do not use the hand held bearing compass on a steel boat, you cannot determine deviation accurately. Each change in position on deck results in an undetermined amount of deviation.

Example:
On a compass heading of 330°, you sight a lookout tower and a standpipe and decide to take a fix. You observe the lookout tower to bear 030° (compass) with the standpipe bearing 005° (compass). Deviation from the deviation table, on the boat'scompass heading (330° C), is 5°E. Plot your fix. (See Figure 14-34)



Two Ranges
Figure 14-34

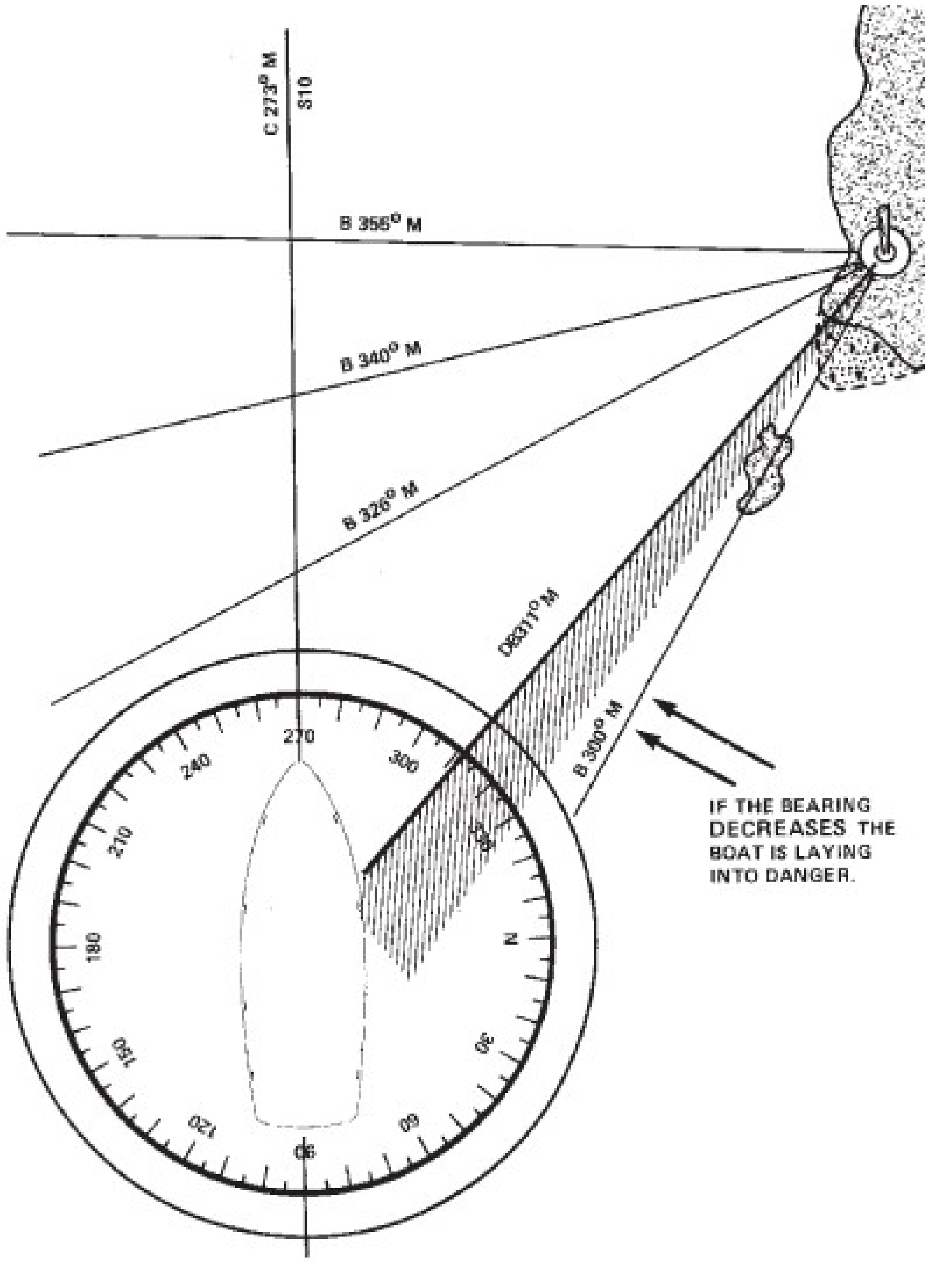
Danger bearings. Danger bearings are used to keep a boat clear of a hazardous area in the vicinity of your track. Danger bearings are the maximum or minimum bearing of a point used for safe passage.

They indicate a charted object whose bearing will place you outside that hazardous area. Examples of such dangers are submerged rocks, reefs, wrecks and shoals. A danger area must be established in relation to two fixed objects, one of which is the danger area.
The other object must be selected to satisfy three conditions:

- Visible to the eye
- Indicated on the chart; and
- Bearing from the danger area should be in the same general direction as the course of the boat as it proceeded past the area.

Plot a danger bearing with the steps below: (See Figure 14-37).

Step	Procedure
1	Correct your compass bearing (030°) and (005°) to magnetic bearings. Write down the correction formula in a vertical line. **Lookout Tower** / **Standpipe** C = 030° / C = 005° D = 5°E (+E, –W) / D = 5°E (+E, –W) M = 035° / M = 010° V = not applicable / V = not applicable T = not applicable / T = not applicable



Danger Bearings
Figure 14-37

When a bearing is observed to be less than the danger bearing, such as 300° M, your boat is standing into danger. Danger bearings should have a series of shot lines drawn on the danger side for easy identification as shown in figure 14-37. The label DB may be proceeded by the letters NMT (not more than) or NLT (not less than) as appropriate.

c. Radar [Ref. a, Pg. 8-50]

Selecting Objects to Shoot
When plotting a radar fix, you will have already been comparing your radar "picture" with the navigational chart. Pick out points that show *prominently* on both the chart and the radar. Try to locate reliable targets that are easy to identify. You cannot afford to guess on what you are using to obtain a range from. Objects not permanently fixed to shore or the ocean bottom such as buoys should not be used when obtaining a radar fix. Tangents also should be used as a last resort.

Shooting Ranges in Proper Order
The order in which you take your radar ranges is just as important as it was in visual bearings. Take radar ranges ahead and astern first because they are changing most rapidly, then take ranges on or near the beam. As is true with visual fixes, time is a critical element. Work quickly, but accurately.

Procedure
Use the following steps to properly plot a radar fix. Figure 8-32 is an illustration of what a fix using three radar ranges looks like.

Step	Action
1.	Locate the distance scales or the latitude scale near your approximate location on the chart.
2.	Measure the distance on the scale using a compass.
3.	Locate the charted navigational point used for the range.
4.	Place the sharp point of the compass on the chart where you took the range and draw an arc in the vicinity of your DR position.
5.	Repeat steps 2 thru 4 for all the ranges obtained.
6.	Locate the area where the lines of position (arcs) all cross each other.
7.	Label the radar fix by putting a small triangle around the intersection of the ranges, with the time of the fix noted close to the symbol.

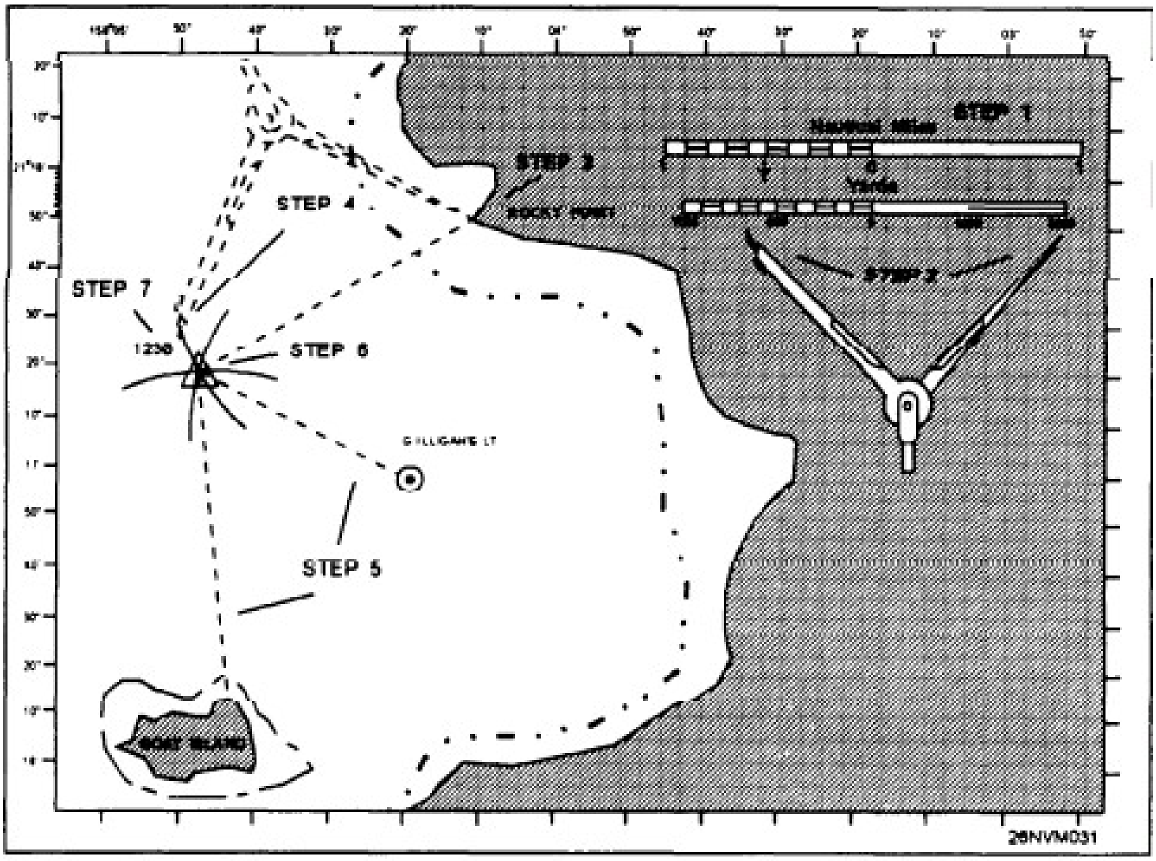


Figure 8-32.—Example of a radar fix.

d. GPS [Ref. a, Pg. 8-20]

The Navstar **G**lobal **P**ositioning **S**ystem (GPS) was developed to provide highly precise position and time information anywhere in the world, regardless of weather conditions. Now fully operational, GPS consists of 21 satellites (plus 3 operational spares). See figure 8-28. The precise stationing of these satellites will provide worldwide coverage with a minimum of 4 satellites in view of any user.

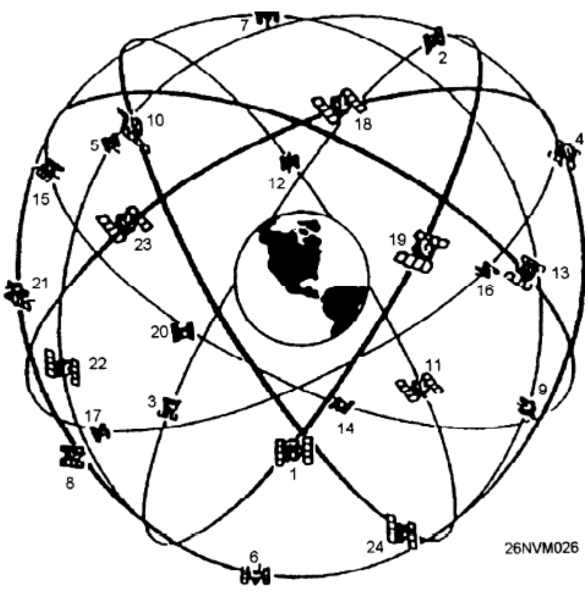


Figure 8-28.—Navstar GPS Satellite Constellation.

Figure 8-29 depicts a simplified view of how a GPS signal is processed.
The AN/WRN-6 Satellite Signals Navigation Set is the receiver that the
Navy uses to obtain and display GPS fixes.

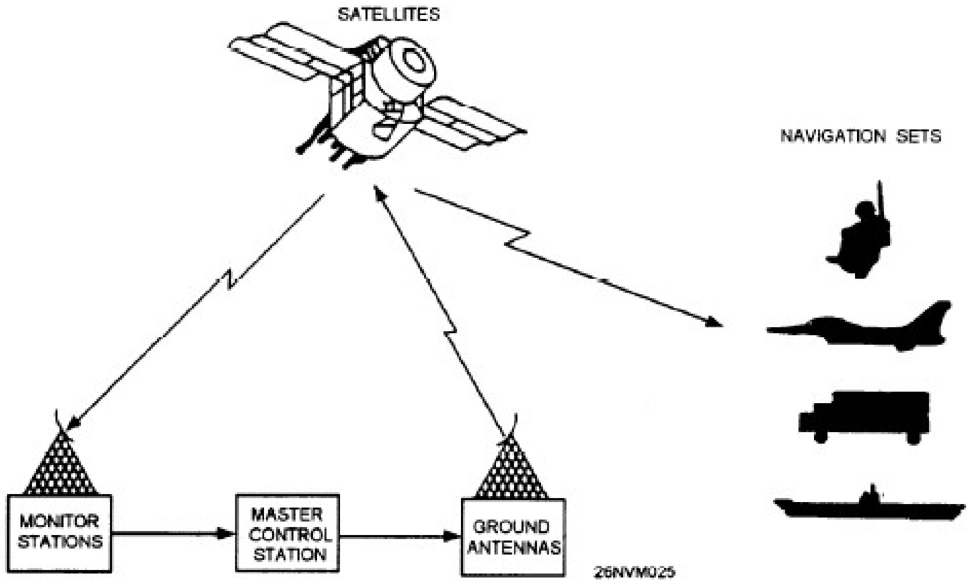


Figure 8-29.—Navstar global positioning system.

114.17 Describe range markers and discuss how they are used in navigating narrow channels. [Ref. a, Ch. 4]

One purpose of a range is to assist mariners in keeping their vessels on the centerline of a channel. The range may be lighted or unlighted and consists of two lights and daymarks located some distance apart with the front display lower than the rear. When the range markers appear one over the other as shown in figure 4-6, the vessel will remain within the limits of the channel. Another purpose of a range is to determine a ship's gyro error.

For a given range, the true bearing of the range axis will be listed in column 2 of the *Light List* immediately below the name of the rear range. As you approach this range and line up the lights and daymarks as shown in figure 4-6, you are on channel centerline. In figure 4-6, if the channel axis is listed as 020° and your ship has the markers in line, your gyro compass should read 020°. If it does not, the difference in degrees will equal your gyro error. While the range

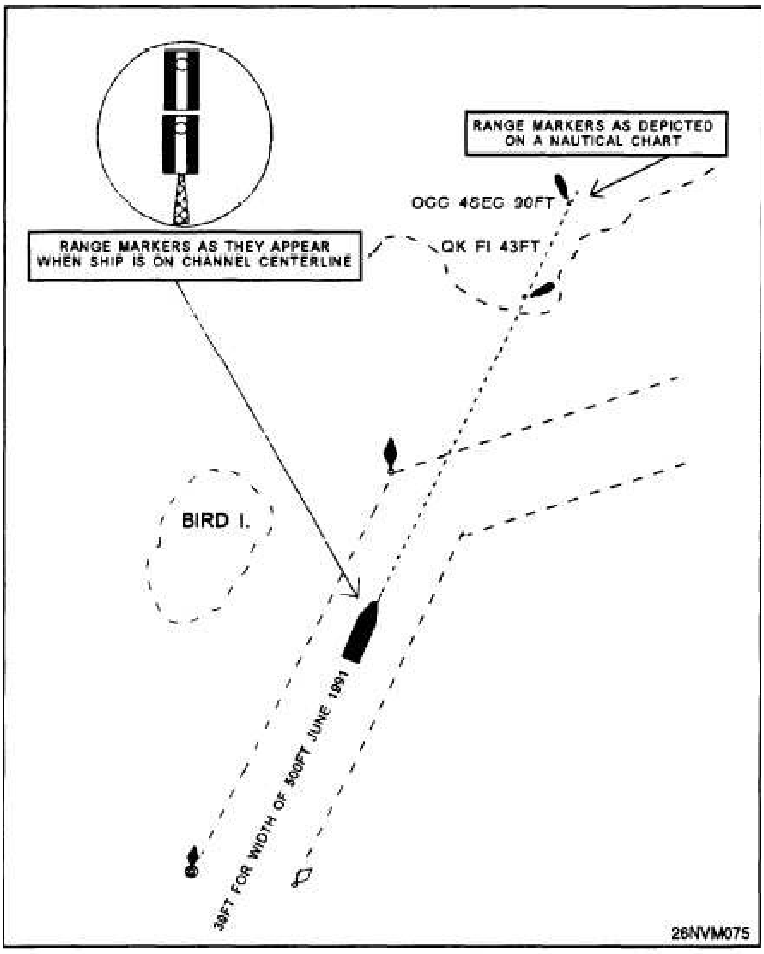


Figure 4-6.—Using range markers.

markers discussed above are precisely positioned to mark a channel, you should also be aware that natural ranges are also used on occasion. For example, a tank and a radio antenna, when observed in line, may form a natural range marking safe water.

114.18 Discuss deviation and variation effects on a magnetic compass.
[Ref. a, Ch. 2, Pg. 4-16]

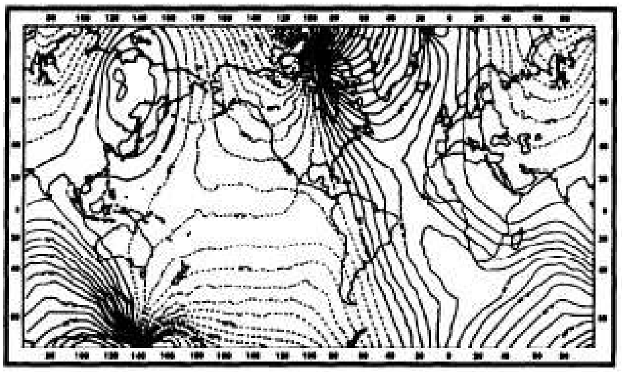


Figure 2-3.—Chart No. 42 showing lines of variation.

Variation
As stated in the topic on magnetism, Earth has magnetic properties and can be thought of as having a powerful magnetic bar near its center. The lines of force appear as illustrated in figure 2-3.

- Earth's magnetic properties are not uniformly distributed.

- Earth's magnetic poles are not at the same position as the geographic poles.

- Magnetic lines of force are called magnetic meridians.

The variation for any area on Earth is **always** equal to the difference between the value of true north and magnetic north.

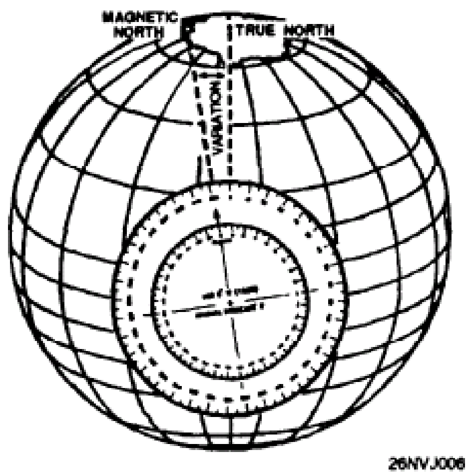


Figure 2-4.—Variation equals the angular difference between true north and magnetic north.

Deviation

Deviation may be defined as the amount that the compass is deflected from the magnetic meridian because of the effects of the ship's iron. This is where **permanent** and **induced** magnetism come in to play.

The **process** of correcting for deviation error is called ***swinging ship.*** The navigator and QM gang will swing the ship through 360 degrees, stopping each 15 degrees and comparing the compass heading against a properly functioning gyrocompass. The results are recorded on the magnetic compass deviation table.

Example: While swinging ship and steady on course 015° by gyro, the magnetic compass reads 016°. It should read 015°; the 1° difference is the amount of deviation. In this case, it is labeled westerly deviation 1.0° W.

114.19 Discuss the purpose and location of a deviation table. [Ref. a, Ch. 1, Pg. 2-10]

The purpose of the magnetic compass deviation tables, commonly referred to as "deviation tables," is to provide a means of knowing the deviation of the magnetic compass for any heading. This information is crucial to safe navigation if the gyrocompass fails.

MAGNETIC COMPASS TABLE

U.S.S. CLEVELAND NO. LPD-7 (BB, CL, DD, etc.)

[X] PILOT HOUSE [ ] SECONDARY CONNING STATION [ ] OTHER

BINNACLE TYPE: [X] NAVY STD [ ] OTHER

COMPASS 7 1/2" MAKE LIONEL SERIAL NO. 13613

TYPE CC COILS K DATE 19 SEP 1984

READ INSTRUCTIONS ON BACK BEFORE STARTING ADJUSTMENT

SHIPS HEAD MAGNETIC	DEVIATIONS		SHIPS HEAD MAGNETIC	DEVIATIONS	
	DG OFF	DG ON		DG OFF	DG ON
0	1.5W	0.0	180	0.0	0.5E
15	0.5W	0.5E	195	0.5E	1.5E
30	0.0	1.0E	210	1.5E	2.0E
45	0.0	0.5E	225	2.5E	2.5E
60	0.0	0.0	240	3.0E	3.0E
75	0.5W	0.5W	255	2.5E	2.5E
90	1.0W	1.5W	270	1.5E	1.0E
105	2.0W	2.0W	285	0.0	0.0
120	3.0W	1.5W	300	0.5W	1.0W
135	2.5W	0.5W	315	2.0W	1.5W
150	2.0W	0.5W	330	2.5W	1.0W
165	1.0W	0.0	345	2.0W	0.5W

DEVIATIONS DETERMINED BY [ ] SUN'S AZIMUTH [X] GYRO [ ] SHORE BEARINGS

B 2--4" MAGNETS RED [X] FORE [ ] AFT AT 15 " FROM COMPASS CARD

C 0 MAGNETS RED [ ] PORT [ ] STBD AT " FROM COMPASS CARD

D 2--5" [X] SPHERES [ ] CYLS AT 12 " [ ] ATHWARTSHIP [ ] SLEWED 0 ° [ ] CLOCKWISE [ ] CTR. CLKWISE

HEELING MAGNET [ ] RED UP [X] BLUE UP 13.6 " FROM COMPASS CARD FLINDERS BAR [X] FORE [ ] AFT 12 "

[X] LAT 23° 24' North [ ] H [X] LONG 130 39' East [ ] Z

SIGNED (Adjuster or Navigator) R. E. FURGUSON

APPROVED (Commanding) J. B. RIDGE CAPT USN

Figure 2-8.—Magnetic compass deviation table.

The figure on the right is an example of a deviation table. The top portion of the table contains the name of the ship, location of the compass (pilothouse), binnacle type, and compass type.

The middle section of the table contains the ship's heading and deviation data.

Example: You want to steer course 090° magnetic. By inspecting the table for ship's heading 090°, you'll notice that the deviation is equal to 1.0° West with DG OFF (DG is an abbreviation for degaussing) and 1.5° West with DG ON. To make good 090°, you would have to actually steer course 091°.

The bottom portion of the table contains information on magnet and flinders bar placement that corrects for excessive deviations.

114.20 Discuss sources of marine weather information. [Ref. c, Pg. 501]

- Local Weather Broadcast on the Marine Band Radio and U. S. Navy Weather Massage Traffic.
- 1-800-WX-BRIEF Will Get You to a Aviation Weather Service That Is Extremely Accurate and up to Date.
- www.weatherunderground.com
- www.noaa.Gov

114.21 Discuss how sea state is affected by: [Ref. e, Pg. A-1]

a. Wind speed

The higher the wind speed, the greater the sea disturbance.

b. Wind duration

At any point on the sea, the disturbance will increase the longer the wind blows at a given speed, until a maximum state of disturbance is reached

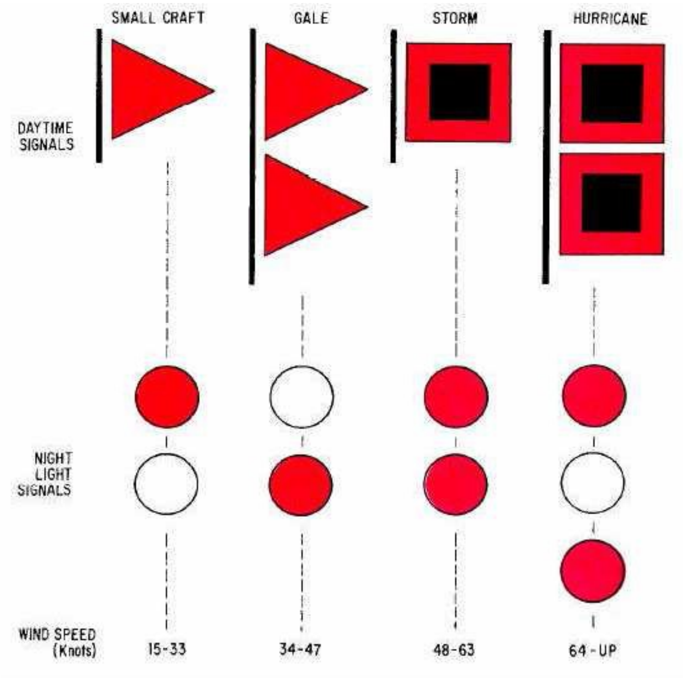
c. Fetch

The unobstructed distance over which the wind blows across the surface of the water.

114.22 Define and discuss the following heavy weather warnings: [Ref. e, Pg. 12-3]

a. Small craft advisory

18-33kts Sustained winds. …Ensurethat the craft is secured to the trailer/dock and all lines are doubled…Normal operations are curtailed unless otherwise directed…If weather forecast predicts sustained winds greater than 33kts remove craft from the water Notify OPCON and TACON as required.



b. Gale warning

34-47kts Sustained winds…Take actions above …secure all loose gear.

c. Storm warning

48-63kts sustained winds…Take Actions above…The commanding officer will make a readiness report to OPCON or TACON. All classified material held by the unit will be secured away from the craft.

d. Hurricane warning

Sustained winds greater than 64kts…Take actions above.

114.23 Describe the sea states defined by the Beaufort scale. [Ref. e, Pg. 12-2]

114.24 Define and discuss the following terms: [Ref. a, Ch. 7]

a. High water [Pg. 7-3]

The maximum height of the water resulting from the rising tide.

b. Low water [Pg. 7-3]

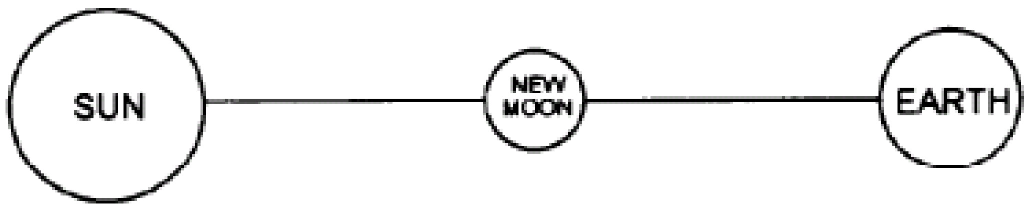
The minimum height of the water resulting from the outgoing tide.

c. Range of tide [Pg. 7-16]

The difference in height between consecutive high and low waters.

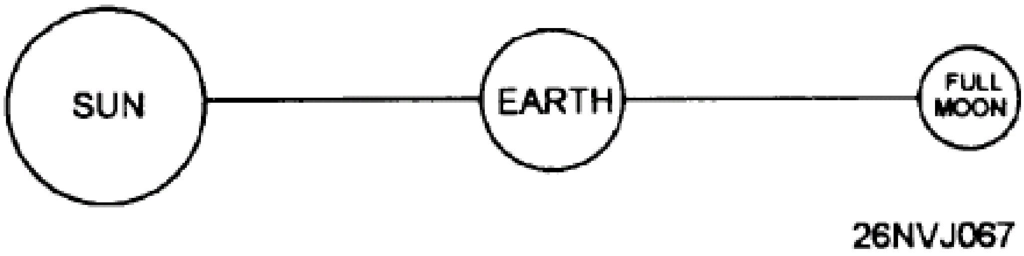
d. Spring tide [Pg. 7-4]

Tides that occur on Earth result from both solar and lunar influences. When these two bodies are in line with Earth, as shown in below figure, their combined effect causes high tides to be higher than average and low tides to be lower than average. These types of tides are referred to as spring tides (and has nothing to do with the season of the year).



e. Neap tide [Pg. 7-4]

When the direction of the Sun and the Moon are 90° apart, as when the Moon is in the first and last quarter, the gravitational effect of the Sun counteracts that of the Moon enough that both high and low tides are lower than normal. These types of tides are referred to as neap tides.



f. Flood current [Pg. 7-16]

When the horizontal movement of water is toward shore or up a tidal river or estuary, the current is said to be flooding.

g. Ebb current [Pg. 7-16]

When the horizontal movement of water is away from shore or down a tidal river or estuary, the current is said to be ebbing

h. Slack water [Pg. 7-16]

The period of time where there is little or no current is called the minimum before flood or ebb.

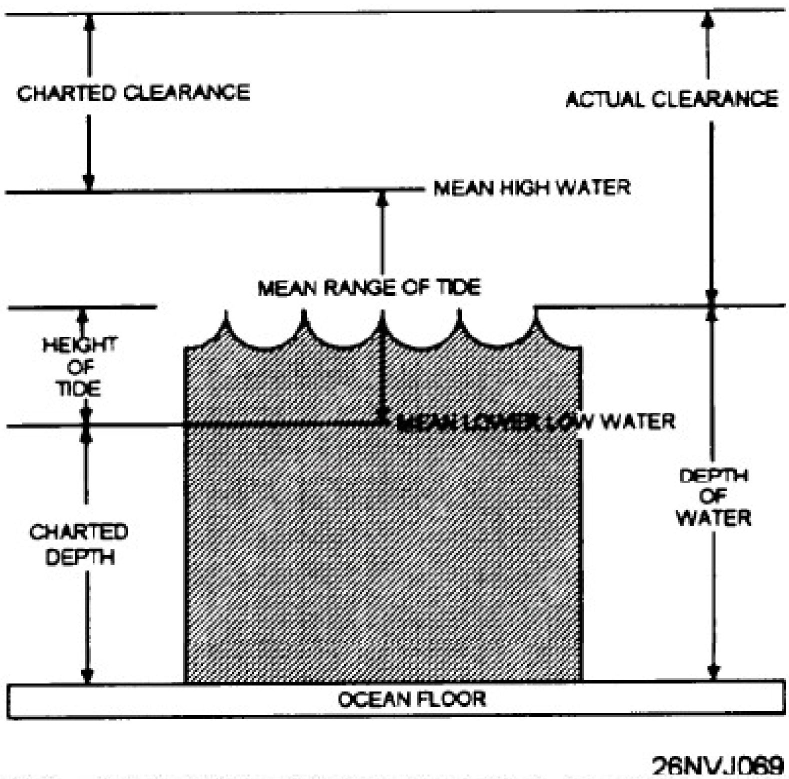


Figure 7-2.—Relationship of terms used when measuring heights and depths.

i. Mean low water [Pg. 7-3]

Mean high water (MHW) The average height of all high-tide water levels, measured over a 19-year period.

Mean low water (MLW)
The average height of all low-tide levels, observed over a 19-year period.

Mean lower low water (MLW)
The average of the lower of the low water levels, observed over a period of 19-years. This is the reference plane currently used on almost all charts covering U.S. waters as the basis of measurement of charted depths and height of tide.

114.25 Define the following GPS terms:

a. COG [Ref. c , Pg. 856]

Course Over Ground: The course is the direction on which the ship is to be steered. As an example, the helmsman is ordered to come left steer new course 090° T. The helmsman would respond by putting the rudder left and steadying the ship on new course 090°T.

b. CMG [Ref. c, Pg. 856]

Course Made Good: Actual vessel track or course after adjusting for such factors as current and leaway. To find the course and speed made good since the last fix, use the parallel rulers and compass rose or PMP aligned on the last two fixes to find the course made good (CMG). Measure the distance between the last two fixes to find the speed made good (SMG). Remember from earlier chapters to use the time, speed, and distance triangle. Distance divided by time equals speed. Jot down your results. We now have two elements of our report.

c. SOG [Ref. c, Pg. 860]

Speed Over Ground: The speed at which the GPS unit and the person operating it are moving with respect to the earth's surface (ignoring tidal and current activity).

Speed can be determined directly using special instruments or indirectly by means of distance and time.

The first method of measuring a ship’s speed and distance involves the use of instruments that directly measure a ship’s motion through the water. Such instruments are called logs. The three types of modern logs in common use today are: the pitot-static log, the impeller log, and the electromagnetic log. Figure 8-3 is an example of a speed log indicator. Each of these logs requires the use of a device called a rodmeter, which is basically a blade or rod that is projected through the bottom of the hull. The rodmeter contains the sensing devices that determine speed. You must be careful not to lower the rodmeter in shallow water as it may strike the bottom.

Another way of determining speed and distance is indirectly using engine or shaft revolutions. This data can be derived, or verified, by running the ship over a measured mile. To do this, you run the measured mile at given engine rpm's, and note the time it takes you to travel the mile. Then using the speed, time, and distance formulas previously given, you determine the speed for that rpm. A table, graph, or both are then prepared that relate rpm to ship's speed.

d. VTD [Ref. g]

Velocity To Destination, Speed required to arrive within a defined time period

e. MOB [Ref. g]

The MOB mark functions to mark man overboard position.

f. BRG [Ref. c, Pg. 855]

Bearing, The horizontal direction of one point to another is expressed as an angular measure

g. DTG [Ref. g]

Distance To Go, Distance remaining on current leg

h. TTG [Ref. g]

Time To Go, Time remaining on current leg

i. WPT [Ref. g]

Waypoint, Reference point of the track

j. RTE [Ref. g]

Route, connection of all waypoints

k. XTE [Ref. g]

Cross Track Error, distance off of intended track

114.26 Define the following RADAR terms: [Ref. c]

a. Rain clutter [Pg. 189]

Beam detects precipitation

b. Sea returns [Pg. 189]

Echoes from waves

c. Radar interference [Pg. 192-193]

Another ships radar

d. False echoes [Pg. 192]

2nd and 3rd returns beyond target

e. Blind sectors [Pg. 190]

Area that you can’t see

f. Side lobes [Pg. 190]

Radio waves escaping at the edges

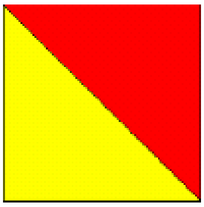
115 Communications Fundamentals

References:
[a] NAVEDTRA 14343, Boatswain's Mate
[b] NAVEDTRA 14244, Signalman 3 & 2
[c] USCG COMDTINST M16672.2 (Series), Navigation Rules (COLREGS)
[d] NTTP 3-20.6.29, Tactical Boat Operations
[e] Ray Marine Owners Handbook(I need this as I cant find it on the web)
[f] COMNCWGRUONEINST 3500.3

115.1 Identify and discuss the meaning of the following emergency flags: [Ref. a]

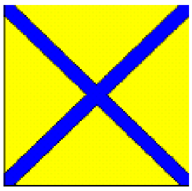
a. Oscar [Ch. 7, Pg. 7-6]

Man Overboard



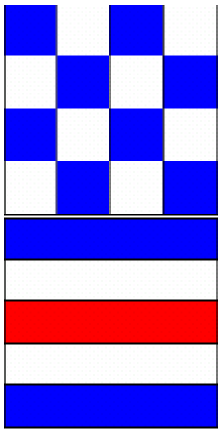
b. Five [Ch. 7, Pg. 7-6]

Breakdown (ship underway)



c. November Charlie [Ch. 6, Pg. 6-38]

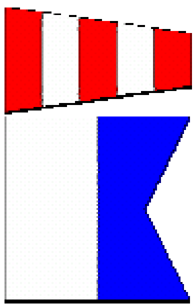
International Distress Signal



115.2 Identify and discuss the following warning flags: [Ref. a, Ch. 7, Pg. 7-6]

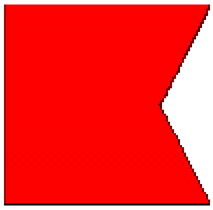
a. Alfa

Diver Down



b. Bravo

Hazardous Evolutions
- Transferring fuel
- Transferring explosives
- Transferring ammunition



115.3 Discuss day and night rescue lifeboat signals from: [Ref. a, Ch. 6, Pg. 6-14]

a. Ship to boat
b. Boat to ship

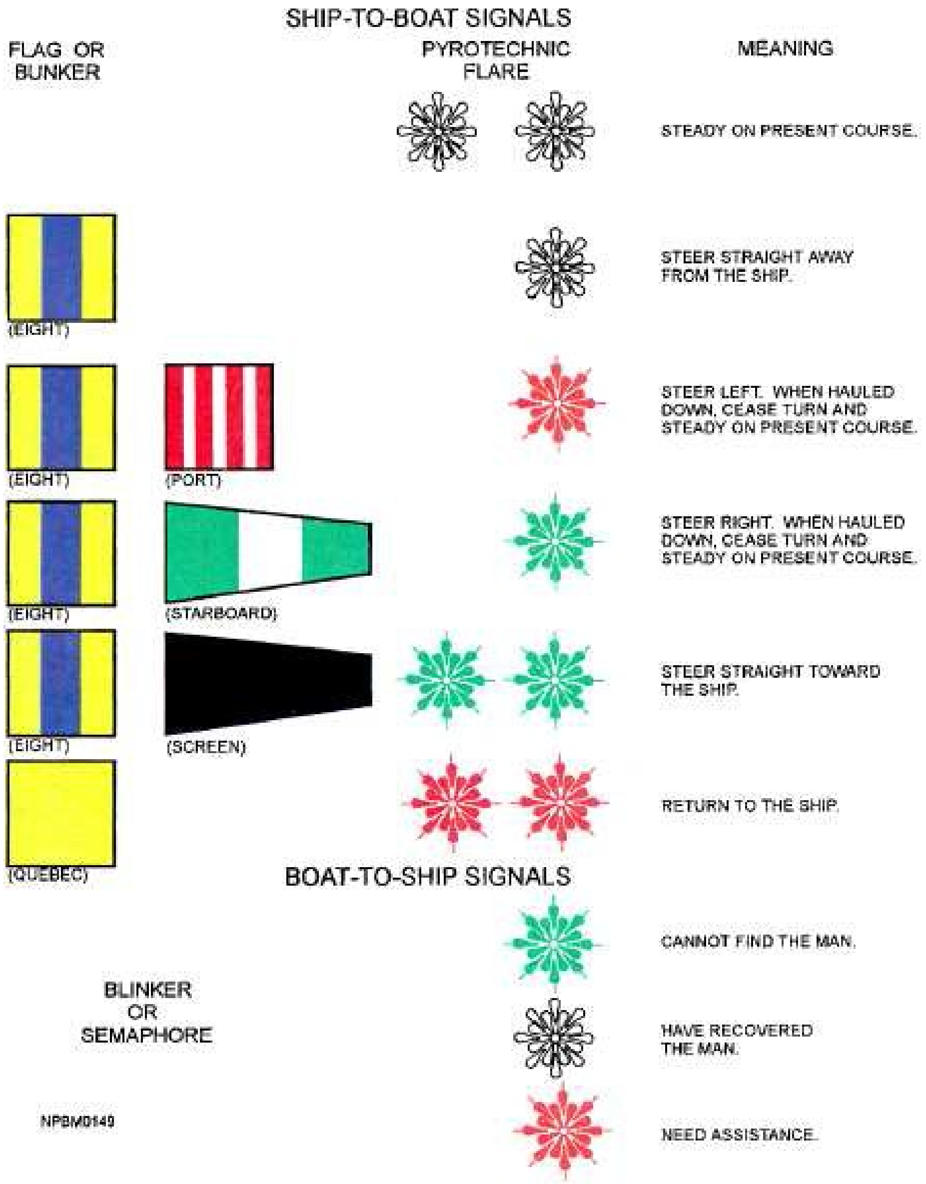


Figure 6-13.—Man overboard/pilot rescue signals.

115.4 Discuss the following communication procedures:

a. Call signs [Ref. b, Ch. 3, Pg. 3-11]

Voice call signs are letters, numbers, or a combination of letters and numbers that identify commands and units of commands. These include ships, aircraft squadrons and wings, shore establishments, type commanders, and task organization components. The voice call signs change daily using the system that is in effect at the time of this writing.

The Navy continues to strive to improve security and at the same time provide an efficient and workable system of call sign identification. Also available is JANAP 119, which contains ship and other joint armed forces voice call signs. Although the publication is always kept up to date, normally it is not used. JANAP 119 provides an adequate backup system, but lacks the security needed today.

b. Radio communication transmitting technique [Ref. a, Ch. 7, Pg. 7.8.9]

Communication is established by a preliminary call and answer. The call-and-answer procedure takes one of three forms: full call, collective call, and abbreviated call. The full call takes the following form:

FOXFIRE— Call sign of station called.
THIS IS From.
STRAWBOSS— Call sign of station calling.
OVER Go ahead; transmit.

The reply is in the same form: STRAWBOSS—THIS IS FOXFIRE—OVER.

If two or more stations had been called, they would reply in alphabetical order of voice call signs.

A collective call may be used when all, or most, stations on the net are addressed. When necessary, the collective call may contain the proword EXEMPT, followed by the call sign(s) of the station(s) exempted from the collective call.

SKIDROW— Collective call.
EXEMPT Exempt.
DITTYBAG— Call sign of exempted station.
THIS IS From.
STRAWBOSS— Call sign of station calling.
OVER Go ahead; transmit.
ADAM, FOXFIRE, and SATAN answer in that order.

In an abbreviated call, the call sign of the station called is omitted when the call is part of an exchange of transmissions between stations and when no confusion is likely to result.

Example:
THIS IS ADAM—OVER

115.5 Discuss the pronunciation of the Phonetic alphabet and numerals in radio calls.
[Ref. b, Ch. 4, Pg. 4-15.16]

•	Alpha	November	0 Zero
•	Bravo	Oscar	1 One
•	Charlie	Papa	2 Two
•	Delta	Quebec	3 Tree
•	Echo	Romeo	4 Four
•	Foxtrot	Sierra	5 Fife
•	Gulf	Tango	6 Six
•	Hotel	Uniform	7 Seven
•	India	Victor	8 Eight
•	Juliet	Whiskey	9 Niner
•	Kilo	Xray	
•	Lima	Yankee	
	Mike	Zulu	

115.6 Discuss the use of Pro-words in radio transmissions. [Ref. b, Ch. 4, pg. 4-16]

Procedure words (prowords) are words and phrases used to speed the handling of RFT messages. They perform the same function and are used in the same manner as prosigns. Most prosigns and prowords have the same meaning. Examples: Over, this is, I say again, roger, all after, disregard this transmission out, say again, wait out, etc.

Table 4-2.—Prowords—Continued

PROWORD	EXPLANATION	EQUIVALENT TO
FLASH	Precedence FLASH.	Z
FROM	The originator of this message is indicated by the address designator immediately following.	FM
GRID	The portion following is a grid reference.	—
GROUPS	This message contains the number of groups indicated by the numeral following.	GR
GROUPS NO COUNT	The groups in this message have not been counted.	GRNC
I AM ASSUMING	I am assuming control of this net until further notice.	ZKA
I AUTHENTICATE	The group that follows is the reply to your challenge to authenticate.	ZNB
IMMEDIATE	Precedence IMMEDIATE.	O
IMMEDIATE EXECUTE	Action on the message or signal following is to be carried out on receipt of the word EXECUTE. (To be used only with the immediate executive method.)	$\overline{\text{IX}}$
INFO	The addressees immediately following are addressed for information.	INFO
I READ BACK	The following is my response to your instructions to read back.	—
I SAY AGAIN	I am repeating transmission or portion indicated.	$\overline{\text{IMI}}$
I SPELL	I shall spell the next word phonetically.	—
I VERIFY	That which follows has been verified at your request and is repeated. (To be used only as a reply to VERIFY.)	C
MESSAGE	A message that requires recording is about to follow. (Transmitted immediately after the call. This proword is not used on nets primarily employed for conveying messages. It is intended for use when messages are passed on tactical or reporting nets.)	ZBO
MORE TO FOLLOW	Transmitting station has additional traffic for the receiving station.	B
NEGATIVE (NEGAT)	Cancel message(s) sent by the delayed executive method. (NEGAT may be used to cancel a single message or a group of messages awaiting execution.)	—
NET NOW	All stations are to net their radios on the unmodulated carrier wave that I am about to transmit.	ZRC 2
NOTHING HEARD	To be used when no reply is received from a call station.	ZGN
NUMBER	Station serial number.	NR
OUT	This is the end of my transmission to you, and no answer is required or expected.	$\overline{\text{AR}}$
OVER	This is the end of my transmission to you, and a response is necessary. Go ahead, transmit.	NR
PRIORITY	Precedence PRIORITY.	P
READ BACK	Repeat this entire transmission back to me exactly as received.	G
REBROADCAST YOUR NET	Link the two nets under your control for automatic rebroadcast.	—

Table 4-2.—Prowords—Continued

PROWORD	EXPLANATION	EQUIVALENT TO
RELAY (TO)	Transmit this message to all addressees (or addressees immediately following this proword). The address component is mandatory when this proword is used.	T OR ZOF
RELAY THROUGH	Relay your message through call sign ______	ZOK
ROGER	I have received your last transmission satisfactorily.	R
ROUTINE	Precedence ROUTINE.	R
SAY AGAIN	Repeat all of your last transmission. Followed by identification data means "Repeat ______ (portion indicated)."	$\overline{\text{IMI}}$
SEND YOUR	I am ready to receive your message, report, etc. (Used only in reply to the offer of a message, etc., on tactical or reporting nets.)	K
SERVICE	The message that follows is a SERVICE message.	SVC
SIGNALS	The groups that follow are taken from a signal book. (This proword is not used on nets primarily employed for conveying signals. It is intended for use when tactical signals are passed on non-tactical nets.)	—
SILENCE (Repeated three or more times)	Cease transmissions on this net immediately. Silence will be maintained until lifted. (Transmissions must be authenticated by use of a self-authentication system, code word, etc.)	$\overline{\text{HM}}$ $\overline{\text{HM}}$ $\overline{\text{HM}}$
SILENCE LIFTED	Silence is lifted. (Transmissions must be authenticated by means of a self-authentication system, code word, etc.)	ZUG $\overline{\text{HM}}$ $\overline{\text{HM}}$ $\overline{\text{HM}}$
SPEAK SLOWER	Your transmission is too fast. Reduce speed of transmission.	QRS
STOP REBROADCASTING	Cut the automatic link between the two nets that are being rebroadcast and revert to normal working.	—
THIS IS	This transmission is from the station whose designator immediately follows.	DE
THIS IS A DIRECTED NET	From now until further notice this net is directed.	ZKB
THIS IS A FREE NET	From now until further notice this net is free.	ZUG ZKB
THROUGH ME	Relay your message through me.	ZOE
TIME	That which immediately follows is the time or date-time group of the message.	QTR
TO	The addressees immediately following are addressed for action.	TO
—TO—	The portions of the message to which I have reference is all that which appears between the groups____ and____.	—
UNKNOWN STATION	The identity of the station with whom I am attempting to establish communication is unknown.	$\overline{\text{AA}}$
USE ABBREVIATED CALL SIGNS	Call signs are to be abbreviated until further notice.	—
USE ABBREVIATED PROCEDURE	As conditions are normal, all stations are to use abbreviated procedure until further notice.	—
USE FULL CALL SIGNS	Call signs are to be sent in full until further notice.	—

Table 4-2.-Prowords—Continued

PROWORD	EXPLANATION	EQUIVALENT TO
USE FULL PROCEDURE	As conditions are not normal, all stations are to use full procedure until further notice.	—
VERIFY	Verify entire message (or portion indicated) with the originator and send correct version. (To be used only at the discretion of, or by, the addressee to which the questioned message was directed.)	J
WAIT	I must pause for a few seconds.	$\overline{AS}$
WAIT-OUT	I must pause longer than a few seconds.	$\overline{AS}$ $\overline{AR}$
WILCO	I have received your signal, understand it, and will comply. To be used only by the addressee. Since the meaning of ROGER is included in that of WILCO, the two prowords are never used together.	—
WORD AFTER	The word of the message to which I have reference is that which follows________.	WA
WORD BEFORE	The word of the message to which I have reference is that which precedes________.	WB
WORDS TWICE	Communication is difficult. Transmit each phrase (or each code group) twice. (This proword may be used as an order, request, or as information.)	QSZ
WRONG	Your last transmission was incorrect. The correct version is________.	ZWF

115.7 Discuss the U.S. Bridge-to-Bridge Radiotelephone Act. [Ref. c, 33 CFR 26, Pg. 208]

A vessel that reaches agreement with another vessel in a head on, crossing, or overtaking situation, as for example, by using the radiotelephone as prescribed by the Vessel Bridge-to- Bridge Radiotelephone Act (85 Stat. 164; 33 U.S.C. 1201 et seq.), is not obliged to sound the whistle signals prescribed by this Rule, but may do so. If agreement is not reached, then whistle signals shall be exchanged in a timely manner and shall prevail.

115.8 Discuss the following methods and elements for calling formations [Ref. d, Ch. 5 Pg. 5-14 through 5-15]

a. Delayed Executive

In the delayed executive method, an order is sent out to the formation and executed at a later time. This method could be used when coming upon an HVA that is to be escorted. The warning proword for a delayed executive method is ***EXECUTE TO FOLLOW***. The following is an example of a delayed executive method command:

*All Tango Units, this is Tango Lead – **EXECUTE TO FOLLOW**. Column formation – column order Tango 05, Tango 11, Tango 18. Speed, 25 knots – distance, 50 yards.*

Tango 11, roger out.

Tango 18, roger out.

*All Tango Units, this is Tango Lead – **Standby**.* (Pause)*. **EXECUTE**. - (Upon execute – units move into position)*

b. Immediate Executive

The immediate executive method is used to communicate a rapid change to boat formation or speed, such as in response to a fast-approaching COI. The warning proword is Immediate Execute. The following is an example of an immediate executive method command:

*All Tango Units, this is Tango Lead – **IMMEDIATE EXECUTE**. Column formation – column order Tango 05, Tango 11, Tango 18. Speed, 25 knots – distance, 50 yards.*

*I say again, **IMMEDIATE EXECUTE**. Column formation – column order Tango 05, Tango 11, Tango 18. Speed 25 knots – distance, 50 yards, - **Standby**.* (Pause)*. Execute.*

(Roger transmission while taking station)

Tango 11, roger out.

Tango 18, roger out.

115.9 Discuss the techniques for executing formations [Ref. d, Ch. 5, Pg. 5-15 through 5-16]

1. Formation execution commands are like facing movements, such as ***Right Face***. The command "***Standby***" is the preparatory command to get ready for the ***Execute*** command. To ensure formation uniformity, all throttle and steering movements must start exactly on the ***Execute*** command.
2. When forming into a column, the number-two boat must get on station and remain there so that trailing boats can assume their positions.
3. When moving to an echelon left or right formation, the bow of a trailing boat should be even with the stern of the boat forward of it.
4. The last boat in a column formation must apply the most throttle to get into position in a new formation.
5. When preparing for a formation change, the patrol leader should be cognizant of all boats' speeds; if they are at or near full throttle, trailing boats will have difficulty getting into formation.

Note

Boat crews roger up in their alfa-numeric assigned call sign/boat assigned identification number, not by position reference number.

115.10 Discuss the definition of a datum point as it relates to SAR [Ref. d, 5.5.2, Ch. 5, Pg. 5-17]

The datum point is a position at the center of the area where it is estimated that the search object is located. A datum marker should be deployed as close to the scene of the incident as possible. The exact time and geographic location of the deployment should be noted. As time progresses, the datum point should be corrected in accordance with wind and current changes.

The datum marker should be a device with zero leeway that can easily be relocated, such as a Class C emergency positioning-indicating radio beacon (EPIRB), which transmits on very high frequency (VHF)-frequency modulation (FM) channels 15/16; or an aircraft datum marker buoy, which transmits on VHF-AM (amplitude modulation). See paragraph 5.5.4 for more information on EPIRB.

WARNING

Do not use 406 megahertz (MHz) or Class A or B EPIRBs as a datum marker. As a second choice, use a life ring strobe light, first disconnecting it from the life ring.

115.11 Discuss the following types of COI hails. [Ref. d, Ch. 7, Pg. 7-17]

a. The initial hail

The initial hail is made on marine band radio when a COI is on a course that will take it in, or close aboard, the intercept zone. The initial hail should be on channel 16. If the COI answers, ask the COI to shift and answer on a working channel. If nothing is suspected, the hail is an informative friendly advisory containing four key points.

a. Who the COI is: *25-foot gray hulled fishing vessel on a course of 225 in the vicinity of pier 9.*

b. Who the tactical boat is: *This is U.S. Navy patrol boat Bravo One on your bow.*

c. What the COI is doing wrong: *Sir, just an advisory that on your present course, you will be entering a restricted area that extends 500 yards in all directions from pier 9.*

d. What the tactical boat wants the COI to do: *Request you alter your course to stay outside the area.*

Avoid giving rudder orders. This initial hail should leave no ambiguity that the COI is approaching a restricted area.

b. The secondary hail

The secondary hail should be more forceful if the COI ignores the first hail, enters the intercept zone, or shows any sign of aggression: *Sir, you are standing your vessel into danger, alter your course away from this area immediately.* Secondary hail can be given on the radio or hailer.

c. The final hail

The final hail should be given if the COI is entering the reaction zone or has displayed hostile intent (time permitting): *Stop your vessel now or you will be fired on.*

Hails should be used in conjunction with levels of force and weapons commands. At all times, the operational commander must be kept informed of the present level of force.

115.12 Discuss the four basic principles of Operational Communications [Ref. d, Ch. 9, Pg. 9-3]

There are four basic principles used in operational communications.

1. Reliability. When given a message, always send the message in its entirety. Use the phonetic alphabet for words that are difficult to pronounce.

2. Security. In electronic warfare environments, always practice COMSEC, such as radio silence, alternative frequencies, authentication, or the use of crypto equipment.

3. Speed. Speed and accuracy are critical when communicating in a tactical situation.
   a. Avoid unnecessary words, such as *Be advised* or *At this time*.
   b. If a transmission is understood, say *Roger* and do not repeat back the transmission.

4. Flexibility. Tactical boat radio operators must typically monitor several radio circuits simultaneously and be capable of responding appropriately.

115.13 Discuss the definitions of the following [Ref. d, Ch. 9, Pg. 9-2 to 9-3]

a. Operations security

Operations security (OPSEC) is the systematic and analytical process by which tactical boats can deny potential adversaries information about capabilities and intentions by identifying, controlling, and protecting evidence of planning and execution of sensitive activities and operations. Challenge and reply procedures are examples of OPSEC.

b. Communications security

COMSEC is the protection resulting from all measures designed to deny unauthorized persons information of value that might be derived from the possession and study of telecommunications, such as cryptographic security, physical security, transmission security, and emissions security.

c. Emission Control

Emission control is the selective and controlled use of electromagnetic, acoustic, or other emitters to optimize C2 capabilities while minimizing, for OPSEC, detection by enemy sensors, mutual interference among friendly systems, or enemy interference with the ability to execute a military deception plan.

115.14 Discuss the following Emcon Conditions [Ref. f, Pg. 376]

a. Alpha

Silence. No electromagnetic or acoustic emission by any unit authorized. The OTC may designate exceptions by line item.

b. Bravo

Silence of all long range electromagnetic radiation. The OTC may designate exceptions as warranted by line item.

c. Charlie

Minimize short range localization. HDC OPCEN and close-in ships, boats, and aircraft silent. Boats on patrol authorized use of search radars (intermittent use may be directed). Essential covered UHF communications authorized for all units. Intermittent use of surface search radar is authorized for contact verifications.

d. Delta

Standard condition. Restrict emissions to those deemed essential for mission accomplishment.

115.15 Discuss position and Ops normal reports [Ref. d, Ch. 9, Pg. 9-4]

Tactical boats underway should transmit, dependent on the OPSEC situation, position and operations normal (Ops Normal) reports on a periodic basis to their ashore C2 element. During periods of increased risk of mishap (i.e., night, bad weather) or in environmental conditions that reduce survival time for a man overboard (i.e., cold, surf), the interval may be decreased. The time interval is determined by the operational commander and issued at the mission brief.

If the unit maintains a written radio log, the contents of position and Ops Normal reports should be logged. If the unit maintains a recorded radio log, no written report of position or Ops Normal is necessary.

115.16 Discuss the codeword "Bead window" including the following [Ref. d, Ch. 9, Pg. 9-4 to 9-5]

An important rule to remember when communicating is that potential adversaries are always listening. Therefore, it is essential to not transmit essential elements of friendly information (EEFI) over non-encrypted equipment. Examples of EEFI include, but are not limited to, times for zone switches, watch turnover times, unit capabilities, and names of unit members.

To notify friendly units when EEFI has been transmitted over an unsecure net, the Beadwindow system was established. The system includes the codeword ***BEADWINDOW*** and numerical designations for the type of violation noted. Additional numerical designations can be added when Beadwindow procedures are incorporated into OPORDs or mission briefs.

If a friendly unit discloses EEFI in the clear, notify the offending station by stating ***BEADWINDOW*** followed by the applicable numerical designation as shown in Figure 9-1. For example, if someone transmits in the clear a message such as *Flag officers will arrive in 30 minutes,* call the offending station and state ***BEADWINDOW*** *Zero Five.* The only proper response from the offending station is *Roger, out.*

a. Proper response

The only proper response from the offending station is *Roger, out.*

b. EEFI

Essential Elements of Friendly Information

c. Bead window numerical designations

DESIGNATION	DESCRIPTION
01 Position	Friendly or enemy position, movement, or intended movement; position, course, speed, altitude, or destination of any air, sea, or ground element.
02 Capabilities	Friendly or enemy capabilities or limitations; force composition or identity, special equipment, weapons, percentages of ammo or fuel.
03 Operations	Friendly or enemy operations, intentions, progress, or results; objectives and mission or situation reports.
04 Electronic Warfare	Friendly or enemy electronic warfare emission control, intentions, progress, or results.
05 Personnel	Friendly or enemy key personnel; movement of flag officers, distinguished visitors, unit commanders, or maintenance personnel indicating equipment limitations.
06 COMSEC	Friendly or enemy communications security; linkage of codes or codewords with plain language; compromise of changing frequencies.
07 Wrong Circuit	Inappropriate transmission; information requested, transmitted, or about to be transmitted that should be passed on another circuit for security reasons.

Figure 9-1. Beadwindow Numerical Designations

115.17 Discuss the codeword "Gingerbread" including the following [Ref. d, Ch. 9, Pg. 9-4]

a. Why you would transmit Gingerbread

A threat may try voice imitative tactics on clear voice circuits. Upon hearing such tactics, transmit the codeword ***GINGERBREAD.*** This will alert other users on the net to the threat's attempts to disrupt operations using voice deceptive tactics.

b. Authentication tables

Friendly stations should attempt to verify the warning station's identity by using the AKAC-874 authentication table maintained at the MAST.

115.18 Discuss Emergency radio procedures for Tactical Craft [Ref. d, Ch. 9 Pg. 9-6]

If a tactical boat declares an emergency, the coxswain should immediately inform the unit holding its communications guard of the nature of the emergency, position, and intentions as discussed during the mission planning brief. If a unit other than the boat's ashore C2 element has the boat's communications guard, this information should be immediately passed to the ashore C2 element by the most expeditious means. In the event the tactical boat misses an Ops Normal report, the unit with the boat's communications guard should attempt to reestablish communications by all available means. If a unit other than the boat's ashore C2 element has the communications guard, this information should be immediately passed to the ashore C2 element by the most expeditious means. These data reports should be sent in an encrypted mode, if possible.

If a tactical boat misses a second Ops Normal report, the closest unit should proceed to the last known position of the boat at best available speed. The ashore C2 element should classify a second missed report as a distress scenario, immediately inform the tactical commander of the situation, and request assistance of all available resources.

115.19 Discuss lost of communication procedures for Tactical Craft [Ref. d, Ch. 9 Pg. 9-6]

Equipment malfunction or atmospheric conditions could cause an underway boat or the ashore C2 element to lose the ability to transmit/receive communications. As part of SOPs, tactical boat units shall have lost communications procedures, which specify actions to be taken if communications are lost between underway boats or the ashore C2 element. The procedures could specify that underway operations are allowed to continue as long as some form of communication is maintained with the boat that lost communications capability. For example, a boat that lost the ability to communicate with the ashore C2 element but can maintain handheld communications with a nearby boat on the same mission could be authorized to continue the mission. Lost communications procedures should contain actions to be taken to notify other boats and the ashore C2 element of the situation, such as sounding the boat's siren for a specified time.

115.20 Discuss emergency destruction bill [Ref. d, Pg 9-7]

Each unit must have an emergency destruction plan. This plan should include reporting requirements for compromised COMSEC material and shall be implemented in the event either partial precautionary or complete emergency destruction of classified material is directed. Classified material should not be allowed to accumulate and should be destroyed as soon as possible after use. The plan should provide for the total, controlled destruction of the command's COMSEC and classified material inventory due to an imminent threat by hostile forces.

115.21 Discuss the FCC approved Marine Band channels and their authorized functions. [Ref. e, Section 3.3.8]

The FCC regulates all sales, marketing, and, use of radios in the U.S., including those onboard any recreational, commercial, state and local government, and foreign vessel in U.S. territorial waters. These regulations are contained in Title 47, Code of Federal Regulations.

The main use of a marine band radio is for bridge to bridge communication.

115.22 Discuss the use and limitations of the following VHF Marine Band channels:
[Ref. e, Section 3.3.8]

a. Channel 9

(156.450MHz) Boater Calling (Commercial and Non-Commercial)

b. Channel 13

(156.650 MHz) - Intership navigation (bridge-to-bridge)

c. Channel 16

(156.800 MHz) - Distress, safety and calling

d. Channel 70

(156.525 MHz) - Digital Selective Calling

115.23 Discuss the proper procedures to be followed when using Channel 16.
[Ref. e, Section 3.3.8]

You may use channel 16 to call a ship or shore station, but if you do so, you **must, must be brief!** We recommend this same procedure be used over channel 9, if channel 9 is used as a calling channel.

For example:

Blue Duck: "Mary Jane, this is Blue Duck" *(the name of the vessel or MMSI being called may be said 2 or 3 times if conditions warrant)*

Mary Jane: "Blue Duck, this is Mary Jane. Reply 68" *(or some other proper working channel)*

Blue Duck: "68" or "Roger"

115.24 Discuss Communications Guard procedures [Ref. d, Ch. 9 Pg. 9-6]

Tactical boat crews shall maintain a communications guard with other operating units at all times during missions. If a unit other than the boat's ashore C2 element assumes the communications guard, that unit shall maintain a direct communications link with the ashore C2 element.

Boat crews shall provide Ops Normal reports to the unit maintaining their communications guard when directed.

Position, course, and speed data should be provided with every other report. In the event that the unit maintaining communications guard loses communications with the tactical boat, all units will attempt to regain communications by all available means (VHF and HF). If communications are not established within a specified time, crews shall follow standing orders of the operational commander or the tactical commander of the mission. If the mission is aborted, the OTC will proceed or vector assets to the tactical boat's last known position.

In the event that the tactical boat loses communications with other assets, the tactical boat will attempt to regain communications by all available means. If communications are not established within a specified time, crews shall follow standing orders of the operational commander or the tactical commander of the mission. If the mission is aborted, the tactical boat will return to the last position passed to the OTC.

116 Boat Etiquette

References:
[a] NAVEDTRA 14067, Seaman
[b] NAVEDTRA 14244, Signalman 3 & 2
[c] NSTM S9086-TX-STM-010/CH-583 (Series), Boats and Small Craft

116.1 Discuss rendering/receiving passing honors for officers/officials embarked in boats. [Ref. a, Ch. 5 Pg. 5-13 through 5-15]

When there is no officer, petty officer, or acting petty officer in a boat lying at a landing, gangway, or boom, the personnel seated in the boat rise and salute all officers passing near. When an officer, a petty officer, or an acting petty officer is in charge, that person alone renders the salute.

Coxswains in charge of boats rise and salute when officers enter or leave their boats unless the safety of the boat would be imperiled.

When boats with embarked officers or officials in view pass each other, hand salutes are rendered by the coxswain and the senior officer embarked. The engine of the junior boat is idled during the salute. After the officer returns the salute, speed is resumed. Coxswains must rise while saluting unless it is dangerous or impractical to do so.

When a powerboat salutes another boat in passing, crew members outside the canopy stand at attention facing the other boat. If a powerboat is carrying an officer or official for whom a gun salute is being fired, the engines are slowed and clutches are disengaged on the first gun, and the boat is headed parallel to the saluting ship. During the salute, only the person honored rises and salutes.

Enlisted personnel who are passengers in the stern sheets of a boat always rise and salute when a commissioned officer enters or leaves. Boat keepers and all other personnel in boats not underway and not carrying an officer, a petty officer, or an acting petty officer in charge, stand and salute when an officer comes alongside, leaves the side, or passes near them. They should remain standing until the boat passes or reaches the ship's side.

Personnel working on the ship's side or aboard a boat do not salute unless ATTENTION is sounded. Salutes aboard powerboats should be extended to foreign military and naval officers. During morning or evening colors, powerboats should be stopped. The coxswain stands at attention and salutes. All others sit at attention.

No junior should overhaul and pass a senior without permission. The junior always salutes first, and the salute is returned by the senior. If doubt exists about the rank of an officer in a boat, it is better to salute than risk neglecting to salute one entitled to that courtesy.

Subject to the requirements of the rules for preventing collisions, junior boats must avoid crowding or embarrassing senior boats. At landings and gangways, juniors should give way to seniors. Juniors should show deference to their seniors at all times by refraining from crossing the bows of their boats or ignoring their presence.

Juniors precede seniors into a boat but leave after their seniors unless the senior officer in the boat gives orders to the contrary. As a general rule, seats farthest aft are reserved for senior officers. In personnel boats and motor whaleboats with no officers embarked, the stern sheets usually are reserved for chief petty officers.

Officers seated in boats do not rise in rendering salutes except when a senior enters or leaves the boat.

The position of attention in a boat is sitting erect. Enlisted personnel who are passengers in running boats with officers maintain silence under ordinary circumstances.

Boats transporting seniors to a landing should be given first opportunity to land. Except when excused by proper authority, boats should stand clear of shore landings and ship's gangways while waiting and crews should not leave their boats. If a long wait is probable during bad weather or at night, permission may be requested to make fast to a boom and for the crew to come aboard.

When a visiting party is alongside, the petty officer in charge should go aboard and obtain permission before allowing any of the visiting party to leave the boat.

116.2 State the conditions that warrant the dipping of the national ensign.
[Ref. b, Ch. 10a Pg. 10-5 through 10-6]

U.S. Navy Regulations stipulates that when any ship under United States registry or the registry of a nation formally recognized by the United States salutes a U.S. Navy ship by dipping its flag, the courtesy is to be returned, dip for dip. If a salute is rendered to a naval vessel when the ensign is not already displayed, such as before 0800 or after sunset (in port), the national ensign shall be hoisted for the purpose of answering the dip and, after a suitable interval, hauled down. If displayed at half-mast, the national ensign must first be hoisted to the peak before answering the dip, then returned to half-mast after a suitable interval.

No U.S. Navy ship shall dip the national ensign unless in return for such compliment. U.S. naval ships (USNS) of the Military Sealift Command do not dip the national ensign to Navy ships, since they are public ships of the United States.

Formal recognition does not necessarily mean that diplomatic relations must exist. Moreover, the fact that diplomatic relations have been severed does not mean that the United States no longer recognizes the existence of the state or the government concerned.

According to the State Department (Protocol) listing of 6/86, the following governments were not formally recognized by the United States and, therefore, are not entitled to a salute:

Albania
Angola
Cuba
Kampuchea
Iran
Libya
Mongolia
North Korea
South Yemen (Peoples Democratic Republic of)
Vietnam (Social Republic of)

Dips by yachts displaying a yacht ensign are also returned. The yacht ensign is similar in design to the U.S. ensign except that the blue field contains a white fouled anchor surrounded by 13 white stars.

Submarines, or such other ships of the line in which it would be considered hazardous for personnel to do so, are not required to dip the ensign.

Of the colors carried by a naval force on shore, only the U.S. Navy flag and the Battalion Colors are dipped in rendering or acknowledging a salute.

116.3 Discuss boat hails used during daylight and night hours.
[Ref. a, Ch. 5, Pg. 5-13 through 5-14]

When a boat approaches a ship, the officer of the deck must know the rank of the senior officer embarked so that a proper reception with the appropriate ceremonies may be extended. During daylight hours, the officer of the deck (OOD) questions the boat coxswain to ascertain the rank of the senior officer by raising an arm straight up, fist clenched. The coxswain replies by showing fingers equal to the number of side boys the officer rates.

Fleet admirals, admirals, and vice admirals rate eight side boys. Rear Admirals, upper and lower, rate six side boys. Captains and commanders rate four side boys, and all other commissioned officers rate two.

Officers of other services rate the same number of side boys as their equivalents in rank. If there are no passengers in the boat who rate side boys, the coxswain gives the OOD a wave off.

At night the OOD hails a boat with “Boat ahoy,” and the coxswain answers, according to the senior embarked, as indicated in table 5-1.

Table 5-1.–Coxswain Replies According to Senior Embarked

OFFICER OR OFFICIAL ABOARD SHIP	COXSWAIN'S REPLY
President or Vice President of the United States	UNITED STATES
Secretary, Deputy or an Assistant Secretary of Defense	DEFENSE
Secretary, Under Secretary, or an Assistant Secretary of the Navy	NAVY
Chairman, Joint Chiefs of Staff	JOINT CHIEFS
Chief of Naval Operations or the Vice Chief of Naval Operations	NAVAL OPERATIONS
Fleet, Force, or Type Commander	(Number) FLEET or abbreviation of administrative title; e.g., 6TH FLEET, PACFLT
A Flag Officer	FLAG OFFICER
A Chief of Staff/Chief staff Officer	STAFF
A Flotilla/Group Commander	(Type) FLOT/GRU (Number); e.g., CRUDESGRU SIX, SERVGRU THREE
A Squadron Commander	(Type) RON (Number); e.g., DESRON TWO
A Division Commander	(Type) DIV (Number); e.g., MINEDIV ELEVEN
A Marine Brigade Commander	BRIGADE COMMANDER
Commanding Officer of a ship or station	(Name of Ship or Station); e.g., NASHVILLE, NAVSTA NORFOLK
A Marine Regimental Commander	REGIMENTAL COMMANDER
Any other commissioned Officer	AYE, AYE
Warrant Officer	NO, NO
Enlisted	HELLO
A boat not intending to come alongside, regardless of rank of passenger	PASSING

116.4 State the rank of an officer embarked in a small boat using the following flag staff insignias: [Ref. a, Ch. 5, Pg. 5-13]

Staffs for the ensign, and for the personal flag or pennant in a boat assigned to the personal use of a flag or general officer, unit commander, chief of staff, or commanding officer, or in which a civil official is embarked are fitted at the peak with devices (shown in fig. 5-11) as follows:

a. Spread eagle

A spread eagle for an official or officer whose official salute is 19 or more guns. The head of the spread eagle must face forward.

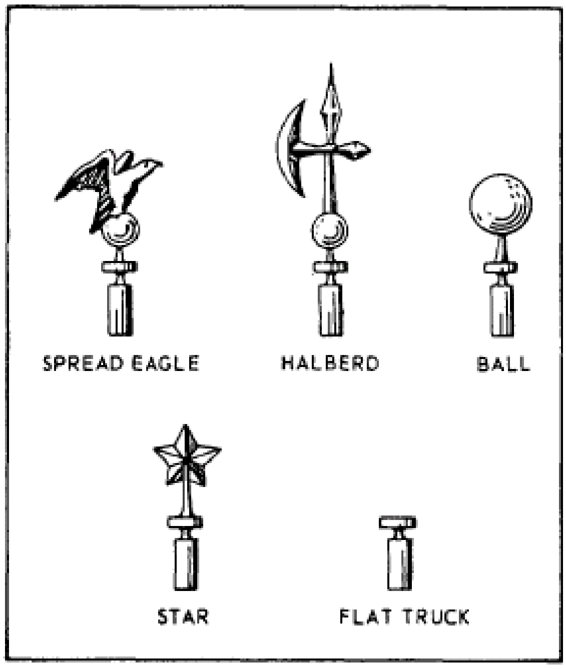


Figure 5-11.–Flagstaff insignia.

b. Halberd

A halberd for a flag or general officer whose official salute is less than 19 guns or for a civil official whose official salute is 11 or more guns but less than 19 guns. The cutting edge of the halberd must face forward.

c. Ball

A ball for an officer of the grade, or relative grade, of captain in the Navy or for a career minister, a counselor or first secretary of an embassy or legation, of a consul.

d. Star

A star for an officer of the grade, or relative grade, of commander in the Navy. The points of the star must face fore and aft.

e. Flat truck

A flat truck for an officer below the grade, or relative grade, of commander in the Navy or for a civil official not listed above, and for whom honors are prescribed for an official visit.

116.5 Discuss small boat recognition methods including color schemes and boat types for the following: [Ref. c, Ch. 3, Pg. 3-9]

a. Flag Officer's barge

Chrome stars shall be fitted on the bow according to the arrangement on the admiral’s flag. The stars shall be of the size and spacing shown on Standard Boat Detail, Sheet 21 (C&R dwg 220598). The official abbreviated title of the command shall appear on the transom in gold leaf decal letters (for example, Surface Force, Atlantic (SURFLANT)).

b. Unit Commander’s gig

Broad or burgee command pennants, as appropriate, shall be fitted on the bow, with the squadron or division numbers superimposed, together with chrome arrows according to Standard Boat Detail, Sheet 7 (C&R dwg 258943). The official abbreviated title of the command shall appear on the transom in gold leaf decal letters (for example, Destroyer Squadron TWO (DESRON 2)).

c. Commanding Officer's gig

Boats assigned to Commanding Officers of ships shall be marked on the bow with the ship type or name and number in chrome letters and numerals with a chrome arrow running fore and aft through the markings. Officers’ boats shall be similarly marked except that the arrow shall be omitted and the letters shall be brass (bright). The ship’s name, abbreviated name, or initials may be used in place of the ship’s type. An assigned boat number may be used in place of the ship’s number.

d. Other ships’ boats

Other ships’ boats shall be marked on the bow with either the ship’s type and number, followed by a dash, and the boat number, such as CV 37-1, or the ship’s name, abbreviated name or initials, followed by a dash, and the boat number, such as NIMITZ-1. These markings should also appear on the transoms of all boats, except whale boats. Letters and numbers shall be of brass, and may be painted black or chrome plated. Type commanders shall designate which of the above methods of markings shall be used on the boats assigned to ships under their command.

117 Boat Handling

References:
[a] NAVEDTRA 14343, Boatswain's Mate
[b] Chapman, Charles F. Piloting, Seamanship, and Small Boat Handling. New York: Motor Boating & Sailing (Series)
[c] USCG COMDTINST M16114.5B, Boat Crew Seamanship Manual
[d] Manufacturers Technical Manual
[e] NTTP 3-20, Tactical Boat Operations

117.1 Discuss the general boat handling characteristics of the craft when:
[Ref. b, Ch. 9]

a. At slow speeds (Gathering headway)

When moving forward in a straight line, advance throttle gradually and firmly. If the vessel is single-screw, outboard, or out-drive, propeller side force will tend to move the stern slightly to starboard. Offset the side force with slight starboard helm. If twin-engine, advance throttles together.

b. Turning

Right and left rudder refer to the direction the rudder must be turn to cause the bow to turn to the right or left as the boat makes headway. When a boat's rudder is put over to make a turn, the stern is kicked away form the direction in which the rudder moves.

c. Stopping

Stopping the boat is achieved by reversing the propeller. Assume that your boat has headway, with the rudder amidships, and the propeller is turning in reverse. The rudder has decreasing steering effect as the boat slows and unequal blade thrust of the reverse propeller tends to throw the stern to port.

d. Backing down

If your boat is dead in the water with the motor or stern drive amidships, and you put it into reverse gear, the stern will be pushed slightly to port by the reversing propeller. The tendency to back to port can easily be overcome by turning the engine or stern drive slightly to starboard. As the boat begins to gather sternway, the water passing by the lower unit will begin to contribute to the steering force. Unlike most single-screw inboard boats, outboard and stern-drive boats back predictably. If the helm is put over to starboard, the motor or stern drive will turn to starboard, and will direct the propeller discharge current to port, moving the stern to starboard.

117.2 Discuss how boat handling is affected by the following: [Ref. b, Ch. 7]

a. Stern drives (Pg. 224)

Stern-Drives are mounted externally but attached to a diesel engine that is inside the hull. This is intended to combine the greater power and efficiency of an inboard engine with the directed-thrust steering, tilt-up capability, and other advantages of outboard propulsion. Boats of stern-drive design can be considered with outboards, except for matters directly relating to engines itself. They are usually in the size category of medium and larger outboard boats, handle similarly, are used for the same general purposes, and can be trailered.

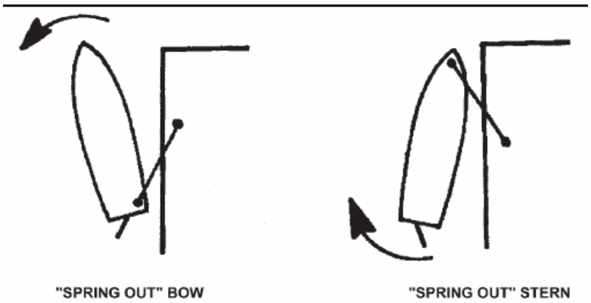
b. Out boards (Pg. 223-224)

An outboard motor is a detachable power plant, complete with driveshaft and propeller, that operates on one to sic cylinders. The fuel tank and operating controls are usually separate. The outboard is clamped of bolted to a cutout in the transom, or mounted on a bracket bolted to the transom. Smaller motors are clamped on for easy removal; medium and larger motors are molted on, and removal is possible but infrequent. The motor can be tilted into or out of the water, either by hand for smaller units or, on larger units, with the help of hydraulics. The medium range has wheel-controlled steering with push-pull cables; larger units will be assisted hydraulically (power steering)

c. Jet drives (Pg. 219)

Jet drive boats essentially have a propeller within the hull of the craft – in effect this is a pump, drawing in water from ahead and ejecting it out the stern. There is no rudder-steering is accomplished by pivoting the jet nozzle from side to side of the centerline. Reversing is done by lowering a deflection plate into the discharged water so as to create rearward thrust. The use of jet drives on small watercraft provides a very high degree of maneuverability and fast acceleration. Steering response is immediate and turns can be very sharp.

117.3 Discuss the use of spring lines to assist in getting underway from a pier. [Ref. a, Ch. 6, Pg. 6-7]



Basic Spring Line Maneuvers
Figure 10-20

Use the spring lines to prevent the fore and aft movement, or the surge of a boat alongside the dock. Use just the after bow spring, or bow spring, #2, (leads aft to the dock from the bow) to “spring out” or move the stern away from the dock. The stern will move away with the rudder full toward the dock and the engines ahead. With the rudder turned full away from the dock, the stern will move toward the dock or “spring in.” Use just the foreword quarter spring, or stern spring, #3, (leads forward to the dock from the quarter) to “spring out” or move the bow away from the dock. By backing down on a boat’s engines with just the forward quarter spring attached to the dock, the bow will move away from the dock (See figure 10-20).

117.4 Describe the steps to be taken in case of vessel grounding. [Ref. b, Ch. 9]

- The first instinctive act on going aground is to gun the engine into reverse in an effort to pull off; this may be the one thing that you should not do.
- In tidal waters the first thing to consider is the stage of the tide. If the tide is rising, and the sea is quiet enough so that the hull is not pounding, time is working for you, and whatever you do to assist yourself will be much more effective with time.
- If you ground on falling tide, you must work quickly and do exactly the right thing or you will be fast.
- The one right thing to do immediately after grounding is to take out an anchor and set it firmly; this is called KEDGE.

117.5 Discuss the following maneuvering situations: [Ref. a, Ch. 6, Pg. 6-7]

a. Port side to landing and getting underway

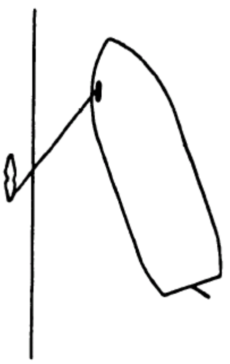


Figure 6-4.—Making a port-side-to landing, using a spring.

Port Side Landing: Making a port-side-to landing is easier than making a starboard-side-to landing, because of the factors discussed already. With no wind, tide, or current with which to contend, you should make the approach normally at an angle of about 20° with the pier. You should have the boat headed for a spot slightly forward of the position where you intend to stop. Several feet from that point (to allow for advance), put your rudder to starboard to bring your boat parallel to the pier, and simultaneously commence backing. Quickly throw the bow line over. Then with the bow line around a cleat to hold the bow in, you can back down until the stern is forced in against the pier. When the wind and current are setting the boat off the pier, make the approach at a greater angle and speed. Make the turn closer to the pier. In this situation, you can get the stern alongside easier by using hard right rudder, kicking ahead, and using the bow line as a spring line, as in figure 6-4. To allow the stern to swing in to the pier, you must not snub the bow line too short. When wind or current is setting the boat down on the pier, make the approach at about the same angle as when you are being set off the pier. Speed should be about the same or slightly less than when there is no wind or current. Commence the turn farther from the pier because the advance is greater. In this circumstance, you should bring the stern alongside by either of the methods described, or the centerline of the boat can be brought parallel to the pier and the boat will drift down alongside.

Getting Underway Port Side: The easiest way to clear a portside- to landing is to use the bow line as a spring line. Cast off the stem fast, give the boat left full rudder, and kick ahead until the stem is well clear. Then cast off the spring line and back out of the slip. You can use another method of clearing the pier by following the maneuvers in figure 6-7.

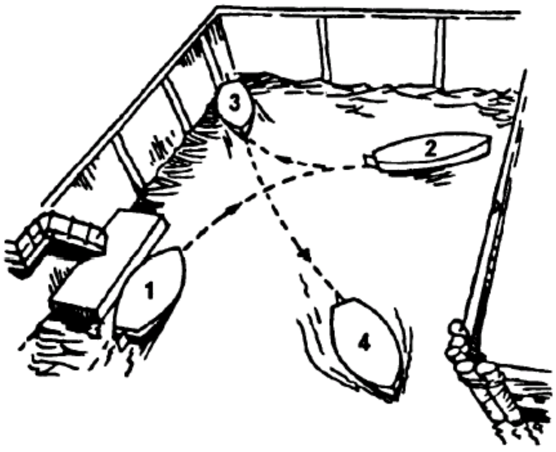


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Figure 6-7.—Another way of turning in a slip.

b. Starboard side to landing and getting underway

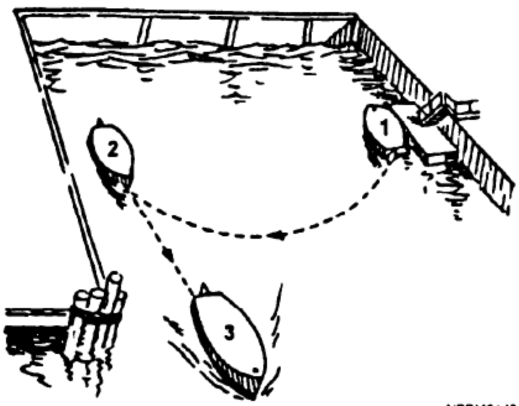

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Figure 6-6.—Turning in a slip.

Starboard Side Landing: Making a starboard-side-to landing is a bit more difficult than making a landing to port. The angle of approach should always approximate that of a port-side-to landing. Speed, however, should be slower to avoid having to back down fast to kill headway, with the resultant swing of the stem to port. A spring line should be used when you are working the stem in alongside the pier. Get the line over, use hard left rudder, and kick ahead. When you cannot use a spring line (as when you are making a gangway), time your turn so that, when alongside the spot where you intend to swing, your bow is swinging out and your stem is swinging in. When it looks as though the stem will make contact, back down; as you lose way, shift to hard right rudder.

Getting Underway Starboard Side: The easiest way to get under way when you are starboard-side-to a pier is to cast off the stem fast, hold the bow line, give the boat hard left rudder, and commence backing. When the stern is clear of the pier and there is no boat or other object astern, cast off the bow line and back out of the slip. When a wind or current is coming from astern or the slip is long, you will do better to turn in the slip (room permitting) as shown in figure 6-6.

117.6 Discuss the effects of the following: [Ref. a, Ch. 6, Pg. 6-4]

a. Side force

In maneuvering a single-screw boat, side force ranks next in importance to propeller thrust. Side force is defined as a force that moves (walks) the stern of the boat in the direction of the propeller’s rotation. Naturally, the upper blades exert a force opposite to that of the lower blades. But the lower blades are moving in greater water pressure; consequently, the force of the lower blades is greater. While going ahead, the stem tends to starboard; while backing, the stern walks to port.

b. Frictional wake current

A vessel moving through water drags some of the water along because of friction between the skin of the ship and the water. This is called frictional wake current. Frictional wake current at the waterline is zero at the bow, increasing to maximum at the stern. It also is maximum at the waterline and decreases with depth toward the keel. It decreases the efficiency of both the propeller and the rudder and also diminishes the effect of side force. The degree of frictional wake increases proportionately to the boat’s speed and is greatest in shallow water. Thus, the higher the speed, the less the effect of side force. To counteract the effect of skin friction, the underwater hulls of ships and boats are streamlined.

c. Screw current

Screw current, caused by the action of a rotating propeller, consists of two parts: the portion flowing into the propeller is the SUCTION CURRENT and the portion flowing away from the propeller is the DISCHARGE CURRENT. Suction current is a relatively minor force in boat handling. Discharge current, however, is a major force in two main respects.

d. Boat and screw going ahead

When a boat is dead in the water, with the right rudder, on and the screw starts turning over, the screw current hits the rudder and forces the stern to port. With left rudder on, the stem moves to starboard. As the boat gathers way, the effect of the screw current diminishes, and the normal steering effect of the rudder controls the boat’s head.

When the boat is proceeding ahead in the normal manner and the rudder is put right, the boat first falls off to port. When the rudder is put left, the boat goes to starboard. The entire boat is thrown slightly to the side, but the stem gives way to a greater extent. The boat advances two or three boat lengths along the line of the original course before it commences to gain ground in the desired direction. At higher speeds, advance is slightly less than at lower speeds, and turns are executed more quickly. Because of advance, trying to execute a turn to avoid an obstacle only a short distance ahead can result in disaster.

e. Boat and screw backing

When you are backing down, four distinct forces are involved in steering. They are discharge current, side force, suction current, and rudder effect. The combination of these forces is such that it is almost impossible to back in a straight line.

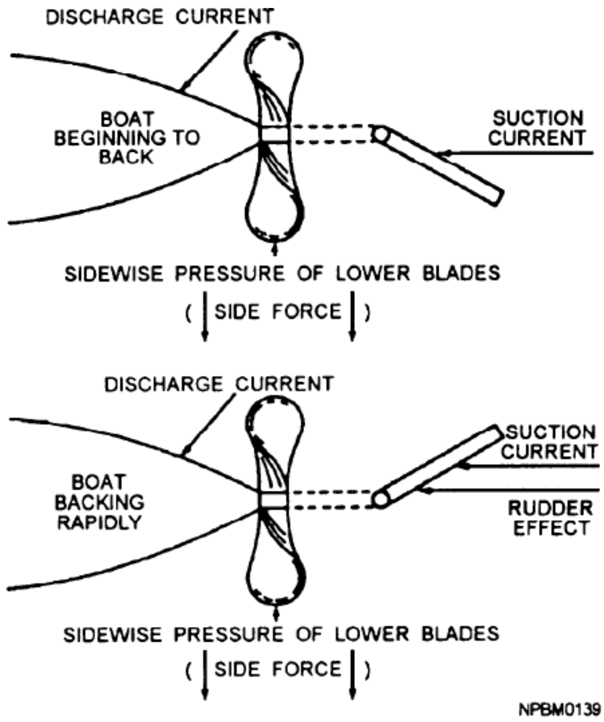


Figure 6-3.—Boat and screw backing.

Discharge current (from the propeller) and side force tend to throw the stem to port. (See fig. 6-3.) The relatively weak suction current acts to throw the boat to the side on which the rudder is, but suction current is negligible at slow speeds, as is rudder effect. But with the rudder on, as the boat gathers sternway, the water through which the boat is moving acts on the rudder and augments (increases) the effect of screw current (fig. 6-3). This usually slows, but does not necessarily stop, the stem's swing to port. When backing long distances, you will find it is necessary to occasionally reverse the rotation of the screw and shift the rudder long enough to straighten out the boat. Strong winds affect backing ships and boats. Ships with high superstructures forward, as well as many boats, will back into strong winds. Until you discover differently, however, assume that a boat will back to port.

f. Boat going astern, screw ahead

A boat going ahead with the screw backing is an important illustrative case, for it is the usual condition when danger is discovered close aboard. You might assume that the rudder would have its usual effect in such a situation, BUT THIS IS NOT TRUE. As soon as the propeller starts backing, the forces discussed earlier combine and begin to cancel rudder effect.

When the rudder is left amidships, the head falls off to starboard, and the boat gains ground to the right as it loses way. This is because both side force and discharge current force the stern to port. When the rudder is put hard right at the instant the screw starts to back, the boat changes course to starboard. The stem continues to swing to port unless, as the boat gathers sternway, the rudder effect is great enough to take charge. When the rudder is put hard left at the instant the propeller backs, the boat's head goes to port at first, and as the speed decreases, the head usually falls off to starboard. Some boats and ships, however, back stem to starboard for a while if there was a distinct change in course to port before the screw started backing.

g. Boat going ahead, screw backing

With the boat going astern, the screw going ahead, and the rudder amidships, side force and screw current are the strongest forces. They oppose each other; hence, the resultant effect is difficult to determine. You must try it on your boat to obtain the answer. When the rudder is put hard right, the discharge current greatly exceeds the side force and the normal steering effect of the rudder, and the stem swings rapidly to port. Throwing the rudder hard left causes the stem to starboard.

117.7 Discuss each of the following evolutions, in terms of the boat handling requirements or each.

a. Getting underway from a pier with an offsetting wind or current [Ref. a, Ch. 6, Pg. 6-7]

- Use just the after bow spring, or bow spring, #2, (leads aft to the dock from the bow) to "spring out" or move the stern away from the dock.
- The stern will move away with the rudder full toward the dock and the engines ahead. With the rudder turned full away from the dock, the stern will move toward the dock or "spring in

b. Getting underway from a pier with an on setting wind or current [Ref. a, Ch. 6, Pg. 6-7]

- Put the outboard engine ahead and go forward (it may be necessary to place the inboard engine in reverse).
- Once you have pivoted to clear the pier take in the bow line and then place both engines in reverse and maneuver as necessary.

c. Getting underway from a pier with a current from ahead [Ref. c, Ch. 10D, Pg. 10-19]

Spring lines are very useful when unmooring with an on-dock set. Use the spring lines to spring stern out.

d. Getting underway from a pier with a current from astern [Ref. c, Ch. 10D, Pg. 10-19]

Spring lines are very useful unmooring with an off dock set. Use the spring lines to spring the stern out.

e. Getting underway from a pier with port or starboard engine only [Ref. c, Ch. 10D, Pg. 10-19]

This assumes that the vessel is a twin-screw, has its port side to windward side of pier, and that there are vessels moored ahead and astern.

Step Procedure:

1. Go ahead on starboard screw, rudder amidship, hold bow spring line (a).

2. Put starboard in neutral, back on port, right rudder, take in spring line (b).

3. As stern clears vessel behind, back on starboard.

4. Get bow away from pier by going ahead on port, while watching stern swing (c).

5. Stop stern swing, if necessary by neutral on starboard.

6. If far enough off pier to clear vessel ahead, go ahead on both engines and steer away from pier.

f. Backing into a narrow slip [Ref. c, Ch. 10D, Pg.10-19]

This assumes that there is no wind or current and the vessel is a single-screw, outboard or I/O. See Figure 10-18.

Step Procedure:

1. Approach at low speed, perpendicular to slip, approximately one-half to one boat-length away.

2. As the amidship section is even with the nearest edge of the slip, apply hard left rudder and “bump” throttle ahead to swing the stern to starboard.

3. As bow swings to port, go to neutral throttle and aim lower unit at the back corner of the slip. Immediately apply astern throttle to stop headway and acquire sternway. Side force will stop swing.

4. Steer lower unit towards slip, just aft of desired final position, offsetting for side force as necessary, using astern clutch speed and neutral to keep speed down.

5. When almost alongside, apply slight left rudder and “bump” throttle ahead, then go to neutral.

g. Coming alongside another craft underway [Ref. c, Ch. 10E, Pg.10-23]
h. Breaking away from another craft underway [Ref. c, Ch. 10E, Pg.10-23]

Introduction: Many missions will require going alongside, in contact with another vessel. Activity can vary from a RIB going alongside a large merchant vessel to a large twin-screw boat going alongside a small canoe. Comparative vessel size, mission requirements and prevailing conditions all dictate maneuvering practices. For many recreational and commercial mariners, your maneuvering alongside their vessel is often the first, "up close and personal" look they get of the Navy.

Determining Approach:

General: When you determine your approach, consider prevailing weather and currents, location, vessel sizes, traffic density. Discuss your intentions with the other vessel's master.

NOTE: *If going alongside a disabled vessel or one that is underway but dead-in-the water, compare relative drift rates. When approaching a larger vessel with a low drift rate, approach from leeward. If approaching a smaller vessel, determine if your vessel makes a wind shadow that will slow the other vessel's drift. In this case an approach from windward may be better and the smaller vessel will then be protected from winds and waves by your vessel.*

CAUTION*: Don't approach from leeward if it will put your vessel and crew in jeopardy, whether from shoal water or obstructions farther to leeward or from smoke or hazardous fumes.*

Course and speed: If prudent, have the vessel maintain a course and speed to make your approach as smooth as possible for both vessels.

Altering course: Most large vessels will not be able to alter course significantly in a limited area to provide ideal alongside conditions. If it is not practical for the large vessel to change course, have it reduce speed so the effects of bow and stern waves are reduced.

Small vessels: Small vessels don't ride well when not making way in any kind of winds or seas. Unless the weather is perfectly calm, have a small vessel maintain a course and speed that makes for safe, comfortable navigation while allowing mission completion. Ensure speed is slow enough for safely coming alongside, but enough for both vessels to maintain steerageway when alongside one another.

Stability: Many sailing vessels are much more stable while under sail than when powering or drifting. Consider coming alongside while the other vessel is under sail. Be sure that spars, standing or running rigging or control lines don't foul either vessel. Discuss the situation with the other vessel's master.

***CAUTION**: Make sure the other vessel does not begin to change course while you are approaching or coming alongside. If this happens, break off and start the approach over once the other vessel is on a steady course.*

Approach from leeward and astern: A large vessel will create a wind shadow and block most of the seas. Take advantage of this as in mooring to the leeward side of a pier. Though a small vessel will probably not block the elements to any degree, approach from leeward to control rate of closure and limit any effect your vessel would have on the small vessel drift.

***NOTE**: If an approach from leeward is not possible (due to sea room or other condition like smoke or hazardous vapors), use caution to prevent being pinned up against the side of another vessel. A bow in approach might provide the most maneuverability.*

Line and fenders: Rig lines and fenders as needed. Remember that the more fenders you use, the better.

Going Alongside:

Introduction: After completing your approach preparations, go alongside. Determine where you want to make contact on both vessels.

***WARNING**: Pick a contact point well clear of a larger vessel's propeller (including in the area of suction screw current), rudder, and quarter wave. Forces from these could cause loss of control.*

Begin to close: Conditions permitting, match your speed to the other vessel, then start closing in from the side.

Angle: Close at a 15 to 30 degree angle to the other vessel's heading.This should provide a comfortable rate of lateral closure at no more than one-half the forward speed.

***NOTE:** If your initial heading was parallel to the other vessel, you will have to increase speed slightly when you start to close at an angle.*

Use a sea painter: In some instances, a sea painter may be used in coming alongside a larger vessel underway. The sea painter is a line used to sheer a boat clear of a ship's side, when underway or at anchor, to hold a boat in position under shipboard hoisting davits and occasionally to hold the boat alongside a ship in order to embark or disembark personnel. It leads from the larger vessel's deck, well forward of where the boat will come alongside. Follow these steps when securing a sea painter to the boat.

Step Procedure:

1. 1 Use a position well forward, yet aft of the bow on the side of the boat that will be alongside the larger vessel.

2. 2 Lead it outboard of handrails, stanchions, and fittings. It makes a pivoting point on the "inboard" bow of the boat.

3. 3 Never secure the sea painter to the boat's stem norto the side of the boat away from the ship. If secured to the "outboard" side of the boat, capsizing could result.

As both the boat and ship have headway, the pressure of water on the boat's bow will cause it to sheer away from the ship. Use this force by a touch of the helm to control sheer, in or out or, by catching the current on one side of the bow or the other. Riding a sea painter helps maintain position and control of the boat.

Follow these steps if using a sea painter.

NOTE: When sheering in or out apply rudder slowly and be prepared to counteract the tendency of the boat to close or open quickly.

Step Procedure:

1. 1 Come along side of the vessel, matching its course and speed. When close aboard the larger vessel, and forward of the desired contact point ask the ship to pass the sea painter.

2. 2 Receive it and secure it to an inboard cleat just aft of the bow.

3. 3 The sea painter is usually passed by use of a heaving line. Quickly haul in the heaving line and adjust the boat's heading and speed to control slack in the sea painter so that these lines do not get into the boat's propeller.

4. 4 Reduce your speed slowly and drift back on the painter (ride the painter).

5. 5 Use helm to hold the boat at the desired position alongside or at some distance off the ship.

6. 6 If set toward the ship, apply rudder to sheer the bow out. If too far away, apply rudder to sheer the bow in. The forward strain on the painter will pull the boat and provide steering way.

NOTE: If approaching a vessel anchored in a strong current, the sea painter provides a means to lay alongside. Procedures are the same as if the vessel is making way. Approach from leeward, against the current.

Make and hold contact: Make contact with the forward sections of your boat (about halfway between the bow and amidships. Use helm and power (if not on a sea painter) to hold your bow in to the other vessel, at the same forward speed. Don't use so much helm or power that you cause the other vessel to change course.

Conduct the mission: When alongside, do what has to be done. Minimize time alongside. If necessary, "make-up" to the other vessel rather than relying on helm and power to maintain contact.

Clearing: Clear the side. Avoid getting set toward the side or stern of the vessel.

NOTE: *If on a sea painter, its strain sheers the boat clear.*

Step Procedure:

1. 1 Sheer the stern in with helm to get the bow out.

2. 2 Apply gradual power to gain slight relative speed.

NOTE*: If on a sea painter, use enough speed to get slack in the line, then cast off once clear. Ensure the sea painter is hauled back aboard the larger vessel immediately to keep from getting it caught in your screws. Avoid it with your vessel. If operating a twin-screw boat, go ahead slowly on the inboard engine. This also helps keeps the boat clear of the ship's side.*

CAUTION*: Never back down when clearing alongside, parallel to another vessel that is making way.*

117.8 Discuss boat operation precautions in rough seas. [Ref. c, Ch. 10, Pg. 10-25]

Preparation: Being prepared is not limited to having the proper or sufficient equipment aboard. Preparation for a heavy weather case involving piloting (which all must if you leave the dock) can begin months before the mission. The primary tool to ensure success in any piloting evolution is local knowledge. The ability to quickly match objects seen visually or on radar with charted objects will increase a coxswain's capabilities. Naturally, calm weather affords the best situation to study your area underway, but observing your AOR during heavy weather from land or sea will enable you to identify hazardous areas particular to inclement weather. Of course, none of the tools available are useful if you are not well versed in how to use them. No amount of studying or classroom instruction can substitute for underway training. You should take every opportunity to pilot, no matter what the conditions may be. The wise coxswain "over navigates" the boat during fair weather so that he or she can acquire the skills to navigate in poor weather without fear or nervous strain.

Piloting equipment: Piloting in heavy weather can be enough of a challenge without the additional burden of substandard equipment. There are a few items that are absolutely necessary and some listed below, if used, will ease the stress of any piloting evolution.

Charts: Often the most neglected but critical piece of piloting equipment is the chart. Naturally, an up-to-date chart in good condition is required. The basic principle of heavy weather piloting is based on the assumption that the coxswain must be topside, near the radar, and standing up so that he or she can see all around the vessel and maintain strong lines of communication with the crew. Anyone who has ever tried to lay down a track line or obtain a fix and plot it while underway knows how awkward it can be. Prepare charts in advance to ease this problem. Using plastic covered or laminated chartlets makes them easy to correct. Lay down the most common routes that you normally take in your AOR, add some DRs for usual speeds traveled, some radar ranges and distances between fixed objects, and you will gain valuable time underway. It is unrealistic to have track lines laid down for every position in the area but you will have information to get you to a point where you can “jump off” from a preset track line and pilot to datum. The initial time you will save will enable you to think about the next stage in your response to a distress

Charts and equipment preparation: The following are some tried and tested methods of chart and equipment preparation, and some common mistakes to avoid.

Personal piloting kit: Take the time to develop your personal piloting kit. MSD standard boats are required to have all the necessary equipment in the chart box as per the type manual, but think of this as backup gear. Build your navigation kit to be user friendly. If space permits, carry duplicates of items that you use most. If you prefer the Weems plotter, carry an extra so that when it slides off the radar shelf and disappears under the coxswain grating, you will have a ready replacement. Any type of carrier that you are comfortable with will suffice. Briefcases, helmet bags, and large container-type clipboards are commonly used.

Chart preparation:

Have the right chart for every mission. All too often, coxswains try to cover their entire operating area with one chart. Piloting in the harbor or river with a large-scale coastal chart is inaccurate and unsafe. Prepare your charts in advance with as much information as possible without cluttering it to the point of being illegible. More than likely, the courses from your dock to your entrance are consistently the same. One occasion where this might not be the case is during heavy weather where the entrance breaks and some alternate course might be needed, depending on the direction of the seas and wind. Draw out tracklines from the point of departure to a position where you would normally station keep before crossing the bar or inlet. Along the trackline, lay out some DR positions to aid in determining speed over ground and position. Be realistic about DRs on boats. If you have a three-mile trackline on a constant course with good water on either side, three minute DRs may be excessive and detract from your ability to monitor what is happening around you.

Chart labeling: Label your chart with all pertinent information. The chart should be labeled using common terminology and it should be neat and easily readable. A good rule of thumb is that anyone should be able to pick up your chart and use it to safely pilot the area. Write course directions and their reciprocals specifying true or magnetic. Distances on all radar ranges and between aids or fixed objects along the track will also help in computing speed. Do not use a red pen or pencil as it will not show up under a red light. Using a highlighter pen for some information on your chart will help in readily identifying important information.

Radar ranges: One of the most underused methods in piloting is radar ranges. Having a beam radar range at your DR positions take a great deal of the guesswork out of navigation. If you have predetermined ranges laid out, you will be able to see at a glance how far left or right of track you are, well before you reach the DR position. Having these ranges will also allow you to make constant minor changes to your course instead of major changes at each DR position. To simplify matters even more, lay out distances fore and aft as well. Often it is impossible to have a fixed object directly ahead or astern, but even an object 10 to 301 off the bow or stern will give you an approximation of your position up your trackline. These fore and aft ranges are also critical in computing speed over ground using the three minute rule and its variations. If you are tasked with piloting to datum, lay out ranges from known points of land or from floating aids to navigation to datum. Try to use ranges as close to directly ahead or astern and directly abeam as possible. As you approach the position, it will be easy to determine if you are right or left and too far up or down the track. Then you can adjust your course as necessary.

Chart stowage: Although it may sound trivial, learn to fold your chart properly. Hopefully, you will have taken the time to make chartlets or laminate charts of a workable size with the most common routes and positions already on them. But a chart cannot be prepared for every possible position and it is very likely that you will have to plot a position on a chart, lay out a trackline, and go. If the urgency of the case puts you on a boat heading to sea in heavy weather, take the time to fold your chart so that it is usable. You will be unable to unfold the chart every time you need the distance scale or compass rose. If possible, datum and ranges to datum should be on the same side of the folded chart. Do as much of the chart work as possible before you leave the dock. Everyone has felt the urgency of getting underway immediately, but remember, you are ultimately responsible for the safe navigation of your boat and no level of urgency will be an excuse for running aground or colliding with another vessel.

Equipment Condition:

Straight edge: Although fairly self-explanatory, it is not uncommon to see coxswains using a set of parallel rules with chips along the edge or screws so loose that it moves freely while you attempt to draw a line. The Weems plotter is underused, and if used properly, can be very helpful in getting quick, reasonably accurate ranges and bearings, especially on a folded chart o rchartlet.

Dividers: This drafting instrument is an integral part of a successful piloting job. A "sloppy" pair of dividers is not only difficult to work with, but poses a hazard if it supplies you with inaccurate information There are numerous types of dividers available today that ensure a reasonable amount of friction to hold the legs in place. Specifically, the type that are adjusted with a center wheel are well suited for heavy weather piloting.

Compass: The compass (or *drawing compass* to distinguish it from the magnetic compass) is much the same as the dividers, but has a pencil lead inserted in one leg and is used for drawing arcs or circles. Always ensure that sharp, spare lead tips are available.

Nautical slide rule: The nautical slide rule is a quick, efficient tool for determining speed, distance, and time. The tool is accurate and easy to use, but also lends itself to decreasing an coxswain's ability to make mental calculations. A firm grasp of the three-minute rule and its variations is crucial for making quick, hands-off calculations of speed over ground.

Red lens flashlight: There is no substitute for a user-friendly red light for night operations. It is often difficult to hold a standard "C" or "D"cell flashlight and work additional navigation equipment simultaneously. Smaller lights, some adjustable with beams, have been modified for attachment to clothing and clipboards, freeing navigator's hands.

Time keeping instruments: It is impossible to pilot a boat without a reliable method of keeping time. There should be two stopwatches on every boat, one in the chart table and one on the navigation receiver. One should always be used as a backup for the other in case they are inadvertently turned off. Remember, you can always compute your speed over ground by backtracking to the time your departed a known point. Always write down your departure time at a fixed aid or landmark for permanent record. It is prudent seamanship for every member of the boat crew to have a watch.

Specific Techniques: There are some practices that relate strictly to boats in heavy weather. First, a realistic approach must be taken. A boat is not designed to be handled in the same way as a cutter. The size of the crew and the motion of the boat in heavy weather make it very difficult to navigate. If a crew member is not below plotting and relaying information to the coxswain, then the coxswain is either below where he cannot monitor the crew, or he is working the radar and cannot check the plots. The coxswain should brief the crew on the scenario and assign duties. If possible, the coxswain should delegate tasks to other crew members as much as possible. For instance, have your helmsman monitor the depth sounder and give you periodic reports, ensuring that water depth does not drop below a specified amount.
Unlike a larger cutter, the boat is a highly maneuverable, shallow-draft vessel that can stop fast and make sharp turns. A common-sense approach using standard navigation practices with the knowledge that the boat never was, is not, and will never be intended to be operated as a cutter will allow you to pilot safely and accurately within the guidelines set forth by higher authority.

117.9 Describe the dangers associated with the three basic motions a boat experiences listed below, and the corrective measures that can be taken to reduce the effects of each.

a. Rolling [Ref. c, Ch. 9b, Pg. 9-2]

When a boat rolls, the force of the center of gravity will move in the same direction as the roll. The downward force of gravity is offset by the upward force of buoyancy and causes the boat to heel.

<u>Heeling</u>: In heeling, the underwater volume of the boat changes shape causing the center of buoyancy to move.

The center of buoyancy will move towards the part of the hull that is more deeply immersed. When this happens the center of buoyancy will no longer be aligned vertically with the center of gravity. The intersection of the vertical line thru the center of bouyancy and the vertical centerline is called the metacenter. When the metacentric height (the distance between center of gravity and metacenter) is positive, that is the metacenter is above center and gravity, the center of buoyancy shifts so that it is outboard of the center of gravity the boat is considered to be stable, and the forces of buoyancy and gravity will act to bring the boat back to an upright position. If the center of buoyancy is inboard of the center of gravity, that is the metacentric height is negative, the forces of buoyancy and gravity will tend to roll the boat further towards capsize (See Figure 9-2).

<u>Listing</u>: If the center of gravity is not on the centerline of the boat, the boat will heel until equilibrium is reached with the center of buoyancy and center of gravity in alignment. This condition is referred to as list.

NOTE*: Heeling is a temporary leaning, listing is a permanent leaning, and both are different from rolling which is a side-to-side motion.*

<u>Moment and forces</u>: The force that causes a vessel to return to an even keel, or upright position is called the vessel’s moment. Both static and dynamic forces can reduce stability and moment. Moments, and the internal and external forces that act to increase or decrease the righting moment, are important factors in determining the stability of a vessel at any given point in time.

<u>Righting moment and capsizing</u>: A righting moment is the force causing a vessel to react against a roll and return to an even keel. Generally, the broader a boat’s beam, the more stable that boat will be and the less likely it is to capsize. For any given condition of loading, the center of gravity is at a fixed position. As a boat heels, the center of buoyancy moves to the lower side of the boat forming an angle of inclination.
Larger changes in the movement of the center of buoyancy will result with any given angle of heel. This change provides greater righting movement, up to a maximum angle of inclination.

Too much weight added to the side of the vessel that is heeled over can overcome the forces supporting stability and cause the vessel to capsize. (See Figure 9-3.) A boat may also capsize when aground as the volume of water beneath the vessel decreases and the vessel loses balance. As the amount of water supporting the vessel is reduced, there is a loss of buoyancy force being provided by that water. In addition, the upward force acting at the point of grounding will increase and cause the unsupported hull to fall to one side.

Static and dynamic forces: Unless acted upon by some external force, a boat that is properly designed and loaded remains on an even keel. The two principle forces that affect stability are static and dynamic forces.

1) Static forces are caused by placement of weight within the hull. Adding weight on one side of a boat's centerline or above its center of gravity usually reduces stability. Flooding or grounding a boat makes it susceptible to static forces which may adversely affect stability.

2) Dynamic forces are caused by actions outside the hull such as wind and waves. Strong gusts of wind or heavy seas, especially in shallow water, may build up a dangerous sea tending to capsize a boat. For a boat crew member this understanding is useful when approaching a vessel to provide assistance. Observing the vessel's roll can provide some initial indications about the stability of the vessel.

- Watch the time required for a complete roll from side to side. The time should remain about the same regardless of the severity of the angle or roll.

- If the time increases significantly or the boat hesitates at the end of the roll, the boat is approaching or past the position of maximum righting effect. Take immediate steps to decrease the roll by changing course or speed or both.

Altering course and speed to control rolling: Dangerous rolling is proceeded by discomfort, or at least a small period of concern. As explained before, rolling is caused when running beam to the seas or slightly quartered off the seas. To correct, alter your course. This interrupts the frequency of the period of contact with the beam seas. If you just slow down in this situation, there will be no difference in the motion of your boat because the speed has no bearing on the frequency of beam seas. When quartering the seas, you may also experience the rolling motion. If you are experiencing a great deal of rolling while quartering, your best course of action is to slow down, again interrupting frequency period. With the combination of altering course and speed, you and your crew should have a more comfortable ride.

b. Pitching [Ref. c, Ch. 9b, Pg. 9-2]

Longitudinal (fore and aft) stability; Longitudinal (fore and aft) stability tends to balance the boat, preventing it from pitching end-over-end (pitch poling). Vessels are designed with enough longitudinal stability to avoid damage under normal circumstances. However, differences in vessel design varies the longitudinal stability characteristics of different vessels depending on the purpose for which a vessel is designed. Some vessels can suffer excessive pitching and offer a very wet and uncomfortable ride during rough sea and weather conditions. Such an uncomfortable ride often affects the endurance and capability of people on vessels you are assisting.

Controlling Pitching: Severe pitching will fatigue or injure your crew long before it damages your boat, and is the least dangerous in heavy weather. Violent pitching can be corrected in the same manner as correcting rolling: alter course and/or speed, interrupting frequency of period of wave encounter. In heavy weather, watch for the possibility of very deep troughs so that the boat can be immediately slowed to reduce the impact as the boat falls into it.

c. Yawing [Ref. c, Addendum B, Pg. 3]

Yawing: Yawing is caused when the boat is operating in a following sea. The wave approaches the stern of the boat, lifts it up, drops it, and travels forward, lifting the bow and dropping it in turn. In theory, this action is similar to pitching, but in reverse and usually much gentler because the boat is motoring away from, instead of into, the waves. As the wave lifts up the stern, the bow of the boat begins to be pushed forward through the water, causing a resistance against the boat’s hull. With the combination of resistance and the speed of the wave, the stern tries to overtake the bow, causing it to broach. Once the wave clears the stern, it lifts the bow of the boat and the stern begins to slide down the backside of the wave, pulling the bow back around and causing the boat to straighten back out.

Controlling Yawing: Running stern-to in heavy seas requires intense concentration, as steering corrections must be made the instant you feel the stern of the boat being lifted by the oncoming swell. If you are traveling too fast and not paying attention, the wave will lift up the stern and broach the boat one direction or the other. You may not be able to correct if the wave gets a hold of the boat and begins to surf it. Once the wave has control of your boat, you are at the mercy of whatever it wants to do to you, such as roll, pitch pole, or striking a floating object. You will have no control; therefore, pay attention so you can apply corrective measures soon enough to prevent any disasters. To keep from yawing, realize that the wave is approaching your stern. If the wave approaching is a large steep wave and the possibility of surfing is great, slow down before the wave gets to you and allow it to pass underneath you. After the wave passes underneath the boat, increase your power to the original RPM. If you are operating in fairly regular seas, steer the boat as you normally would, turn in the direction towards which the stern tends to slip. No increase or decrease in power will be necessary as long as the swells are not big enough to cause your boat to surf. If you find yourself being lifted up and surfed, increase your power. As the bow begins to dig into the trough and veer to one direction, keep power on and turn the helm hard in that direction. This action will cause your boat to dig itself out of the wave and climb up over the top. Another method is to do an “S” turn. The “S” turn is a very effective and safe maneuver as long as it is done in time and done correctly. It is the most often used maneuver.

117.10 Discuss techniques for maneuvering in heavy weather in the following conditions: [Ref. c, Ch. 10F, Pg. 10-25]

a. Negotiating head seas

General: Use your vessel’s inherent capabilities. Bow flare provides additional buoyancy to help lift the bow, but you must meet larger seas much slower than you would smaller ones. A slower speed of approach gives the bow time to rise and meet the waves.

NOTE*: The following parts on maneuvering are general in nature. Remember that each specific boat type will perform differently.*

NOTE*: Keep in mind that aerated, broken, sloughing, or “white” water will not provide as much buoyancy as “green” water. Also, propulsion and helm response will be sluggish. Aerated water favors cavitation.*

Maneuver constantly: Look and drive for the path of least resistance. The best way to get through waves is to avoid as many as possible. Anticipate patterns and take advantage of them.

Breaking waves: Pick your way around breaking waves. Take advantage of any lulls between the higher series of waves. Look for gaps or windows in the breaking waves, but watch them to see if they close out before you approach. Don’t try to steer a perfectly straight course, steer the smoothest course.

Crests: Avoid the highest crests. Stay away from waves that begin to peak in a triangular fashion. A “square” wave leaves no room to maneuver, and the trough behind is much deeper than others.

Working over waves: Work your way over each wave individually. Vary speed and angle of approach to account for differences in each wave.

NOTE: If you must go through a breaking wave, keep headway. Just as the breaking sea hits the bow, increase power to lift the bow so the sea will not spill on deck, then immediately reduce power.

Step Procedure:

1. Slow down, approach at an angle. Too much speed could “launch” a boat as it leaves a crest and result in a severe drop. Approach at a 10-25 degree angle to the

wave rather than straight into it. Cross the crest at this angle to stay in the water and keep the propellers and rudders working.

2. Stay ready to maneuver. You may have to straighten out quickly or to "fall off" to avoid a forming break.

3. Continually adjust boat speed. Increase speed to keep the screw and rudder or drive in the water and working, but then immediately reduce it to minimize wave impact.

4. Don't drive the bow into the wave.

NOTE: *If the sea is about to break directly ahead and plunge onto the bow, back down squarely and quickly to avoid the plunging water. The boat will settle as the aerated froth passes, and propulsion and steering will lose some effectiveness until the white water passes.*

CAUTION*: Don't use so much power to cause cavitation when backing awayfrom a wave. If you cavitate, you will lose all thrust and maneuverability.*

WARNING*: If your vessel is a single-screw, don't attempt this if you were originally going to take the wave on the port bow. Backing down will throw the stern to port and the vessel could end up beam-to the crashing wave.*

Manage your power: Keep one hand constantly on the throttle control(s).

Heavier vessels: Use the following procedures when managing the power of heavier vessels.

Step Procedure

1. Use only enough power to get the bow sections safely over or through the crest.

2. Let momentum carry, and cut back power to let the boat slide down the back side of the swell. When the stern is high, gravity pulls the boat downward and the engines may race somewhat, but stay in gear. Don't decrease RPMs to the point where the engines need time to "spool up" to regain enough power to deal with the next wave.

3. Increase speed in the trough to counteract the reversed water flow and maintain directional control as the next wave approaches.

4. Slow down again and approach the next wave. Lighter Craft (including RHIBs): Use the following procedures when managing the power of light craft.

Step Procedure

1. Use enough power to get the entire boat safely over or through the crest. Lighter craft will not carry momentum so constant application of power is necessary.

2. Keep a slight, bow-up angle at all times.

3. Once through the crest, a slight, bow-up angle, will let the after sections provide a good contact surface if the boat clears the water. A bow up attitude will help to approach the next wave.

4. Increase speed in the trough to counteract the reversed water flow and maintain directional control as the next wave approaches.

5. Slow down again and approach the next wave.

Stay in the water: Don’t “fly through” the crest. Avoid this at all costs.

- • If airborne coming through a wave with a large vessel, you threaten your crew with serious injury and could damage the vessel when it lands.

- • With lighter craft, ensure the after sections stay in contact with the water, but don’t let the bow sections get too high. If the bow sections get too high while going through a crest, the apparent wind or the break can carry the bow over backward. On the other hand, if forward way is lost with the stern at the crest the bow might fall downward, requiring you to redevelop speed and bow-up attitude before the next wave approaches.

<u>Hold on but stay flexed</u>:
Keep a firm grasp on controls or hand holds, but don’t rigidly brace yourself. Staying rigid and tense will quickly sap your strength. If standing, keep your knees flexed.

b. Running before a sea

<u>General</u>: A following sea does not present the high relative closure rate of head seas, but keeping vessel control and stability is probably more challenging. Operation in a following sea, especially a breaking sea, involves the risk of having the stern lifted up and forced forward by the onrushing swell or breaker. Surfing down the face of a wave is extremely dangerous and nearly impossible to control. Quite often, surfing will force the boat to “broach” and capsize or to “pitchpole” end over end. Through proper boat handling, a skilled coxswain may be able to keep a vessel ahead of breaking seas while maintaining control of both direction and speed. Only specially designed vessels like motor life boats have balanced buoyancy and sea keeping abilities to handle extremely rough weather, including large, breaking, following seas. Vessels as this also have the ability to quickly re right after capsize.

Use extreme caution: Be very careful when running in a large following sea. Some boats slip down the back of seas and heel strongly. In large stern seas, the rudder may get sluggish. Depending on the vessel, make your down-swell heading anywhere from directly down-swell to a 15 degree angle to the swells.

***NOTE**: A great deal of skill is needed to maintain a heading in large, quartering seas (30- 45 degrees off the stern), especially in restricted waters. In addition to the action from astern, the forces from abeam will set up a rolling action that causes large changes in the vessel's underwater hull shape (on anything excepta round-bottomed, displacement hull). This causes asymmetric forces that increase steering difficulty, could set up "chineriding," loss of effective helm, and a pronounced veer to the side as the vessel begins to surf along the face of the wave. Even in open water, quartering seas present a challenge.*

Ride the backs of the swells: In waves with a wide regular pattern, ride the back of the swell. Never ride on the front of a wave. On most vessels, wider and flatter after hull sections are more buoyant than the bow. On the front of a wave, the boat may begin to surf, pushed along by the wave. As the bow nears the wave trough, it will tend to "dig in" while stern continues to be pushed. This sets up either a broadside "broach" or an endfor-end "pitchpole" as thebreaking crest acts on the boat.

***CAUTION**: Don't let a wave break over the transomand poop the boat. Be extremely careful in small craft with outboard motors, the relatively low transom-well offers little protection from even a small, breaking wave. A wave that breaks over the transom could fill the cockpit with water and swamp the boat. Without self-bailing, this leaves you vulnerable to capsize by the next wave.*

Where to look: Keep an eye both ahead and astern. If you totally concentrate on the wave ahead, you let your guard down on waves from astern. Since larger waves travel faster than smaller ones, one much larger than the one you are on may move up quickly from astern and catch you unaware.

Speed: Adjust your speed to stay on the back of the swell. Pay extremely close attention to the way the crest ahead of you breaks. If you keep gaining on the crest ahead, slow down.

***WARNING**: Many small craft can travel faster than the largest waves. Don't keep climbing the back of a large wave ahead to its crest. The boat could go over the crest just as it breaks and fall into the trough under the plunging water.*

Keep reserve power: Large seas run at over 20 knots. If the boat is being pulled back towards a following sea, open the throttle. If the boat is still pulled back, watch for "mushy" helm response and engineracing. If either happens, reduce throttle, then apply full throttle to try to kick out of the wave.

Slow, back or come about: If running with the seas and one is gaining astern, avoid it breaking on the transom.

WARNING*: Coming about in large seas can be dangerous. It puts the boat beam-to the seas. Don't trythis unless well trained and experienced. Any close, steep swells will test all your skills. Sluggish rudder, sail area, and irregular waves may cause the stern to slew off and result in a broach.*

Step Procedure:

1. Slow Down: with a well-found vessel, you may be able to just slow enough so the crest passes by before it breaks. This will cause some loss of positive steering and propulsion control as the crest passes because the water in the crest will be moving forward faster than the boat.

2. Back Down: you may need to back and gain sternway to steer before the crest reaches the screws and rudder, particularly if the wave breaks and aerated water will slough past.

3. Come About: the safest point for most vessels to take a breaking sea is nearly bow-on. Always stay aware of the time and distance between crests. If time and distance allow, come about and present the bow to the sea with headway.

CAUTION*: If you must come about before a wave, use judicious helm and throttle. Too much throttle, especially when splitting throttles, could easily result in cavitation and leave no positive control in the face of the oncoming sea.*

c. Traversing beam seas

General: In large beam seas, the wave action will cause the boat to roll. The rolling will cause asymmetric hydrodynamic forces and will affect steering. Do your best to keep drive and rudder immersed.

Breaking waves: Minimize the number of breaking waves you encounter. If traversing near a surf zone, go farther out into deeper water.

Use your local knowledge: Avoid areas that break when no other areas do. Offset your transit from areas of shifting bars.

NOTE*: If you must operate in the surf zone, complete wave avoidance is not possible. The coxswain must be totally involved in operating the boat while the crew carries out the details of the mission (search, recovery, etc.).*

Keep a weather eye to the waves: As with head seas and following seas, the boat will be pulled towards the next, oncoming wave while in the trough, and set down-swell by the crest.

Waves:

1. Look for a lull in the series to cross seas. If necessary, slow to allow a large series of waves to cross ahead.

2. Use caution to avoid a forming break. Watch how the waves break. Plan to cross an oncoming wave well before it begins to break. Don't get caught racing a break to cross at a particular point. Use procedures for negotiating head seas to cross oncoming waves. As with head seas, cross them at the lowest part.

3. Never get caught broadside to a breaking sea. A breaking swell taken on the beam can easily capsize the most well-found vessel.

4. Don't get trapped. If the boat gets into closer and closer seas, look for an out. If shallow water or a current against the seas is on one side, work your way in the other direction.

117.11 Discuss how to keep the two boats "on step" when towing astern.
[Ref. c, Ch. 17B, Pg.17-2]

Extreme stress is put on the tow rig in "In Step" heavy weather when the tow vessel and the towing vessel do not climb, crest or descend waves together. Vessels in step will gain and lose momentum at the same time, allowing the towing force to gradually overcome the towed vessel's loss of momentum, minimizing shock-loading. To get the vessels in step, *lengthen* rather than shorten the towline if possible.

***NOTE**: When operating near bars and inlets, getting the vessels in step may be impractical due to rapidly changing water depth and bottom contours.*

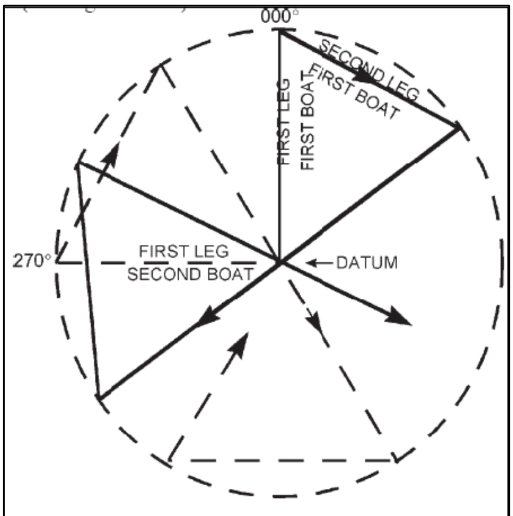
117.12 Discuss how to determine the proper approach for passing a towline.
[Ref. c, Ch. 17D, Pg. 17-12]

Though optimal to make your approach from down wind and down sea, the drift and aspect of the distressed vessel may determine the approach. A vessel with a large superstructure forward, will tend to lay stern-to the wind. (Many outboard powered vessels exhibit this tendency to "weathervane.") A vessel with deep draft and low superstructure will generally lie broadside to the seas. Of course, there are any number of positions in between. The approach to a vessel drifting down wind and down sea, "stern to" the wind and seas will be different from the approach to a vessel lying "beam to." The usual approach by a boat to make a tow is with the bow into the seas.

Determine how you will make the approach and inform your crew. Specifically tell the crew from which side to pass the tow rig (or equipment), when (in what relative position of the two vessels) to pass the tow rig, and whether to use a heaving line.

117.13 Discuss the procedure for conducting a search from a known Datum point using the search patterns listed below: [Ref. e, Ch. 5.5.3, Pg. 5-20 through 5-22]

a. Sector Search Pattern

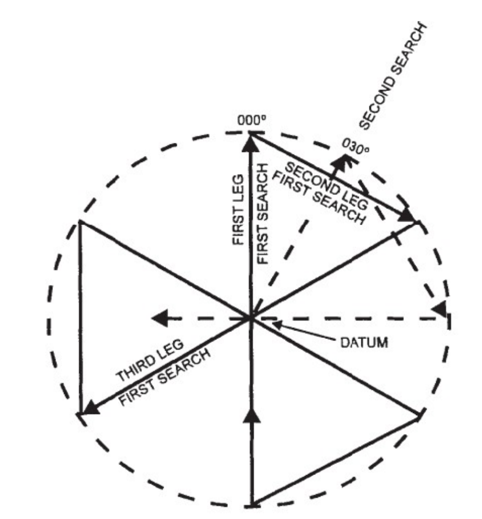


Sector Multiunit (VM)
Figure 15-11

Sector search patterns are used when datum is established with a high degree of confidence but the search object is difficult to detect, such as a person in the water. The search unit passes through datum several times, each time increasing the chances of finding the search object. The pattern resembles the spokes of a wheel with the center of the wheel at datum. Datum should be marked by the first SRU on scene with a Data Marker Buoy (DMB) or other floating object. By marking the center of the search pattern, the coxswain has a navigation check each time the boat passes near the center of the search area (datum). This pattern consists of nine legs. There are two types of sector search patterns.

• Sector Single-unit (VS). The VS pattern is used by a single boat. The first leg begins in the same direction that the search object is drifting toward. All legs and crosslegs of this pattern are of equal length. After running the first leg, your first turn will be 120 degrees to starboard to begin the first crossleg. All subsequent turns will be 120 degrees to starboard to a course determined by adding 120 degrees to your previous course (See Figure 15-10). Notice that after completing the first leg and crossleg, the second and third legs of the pattern are completed in sequence without turning between.

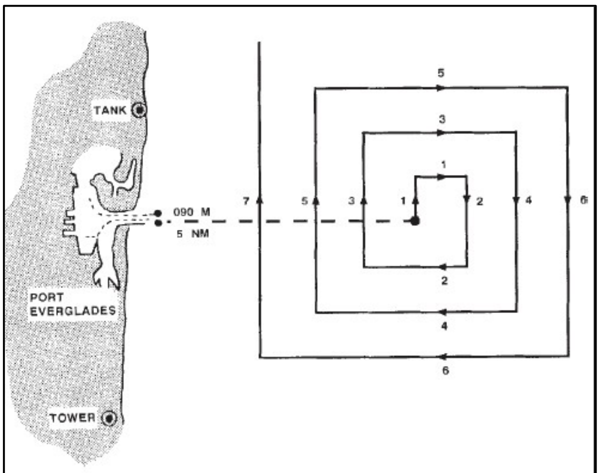
• Sector Multiunit (VM). The VM pattern is used when a second boat is available. The second boat starts at the same datum, but begins the first leg on a course 90 degrees to the left of the first boat. The search is then the same as a VS pattern. The second boat should start the search at a slower speed than the first boat, if both boats start at the same time. When the first boat is one leg ahead of the second boat, the second boat accelerates to search speed. This slow start by the second boat will keep both boats from arriving at the center of the search pattern at the same time (See Figure 15-11).



Sector Single-unit (VS)
Figure 15-10

b. Square Search Pattern

The square search pattern is used when the last known position of a search object has a high degree of accuracy, the search area is small, and a concentrated search is desirable. Sector patterns are good for man overboard searches.



Square Single-unit (SS)
Figure 15-9

• Square Single-unit (SS). In the SS pattern for boats, the first leg is normally in the direction of the search object's drift and all turns are made 90o to starboard (See Figure 15-9).

• Square Multiunit (SM). The SM pattern is used when two units are available. The second unit begins on a course 45 degrees to the right of the first unit's course.

117.14 Discuss following considerations in determining use of various search patterns: [Ref. b, Ch. 15]

a. Weather conditions

Poor visibility increases the need for greater sweep width and reduced track spacing. May also necessitate search patterns which allow more search units.

b. Size of search area

greater number of units needed and sweep width.

c. Size of search object

Increased need for dense search pattern w/ small objects, as well as track spacing.

d. Number of units involved in search

Alters the search pattern, to accommodate the maximum number of units at any single time, to reduce track spacing.

e. Search area location

Answered in 117.13(b)

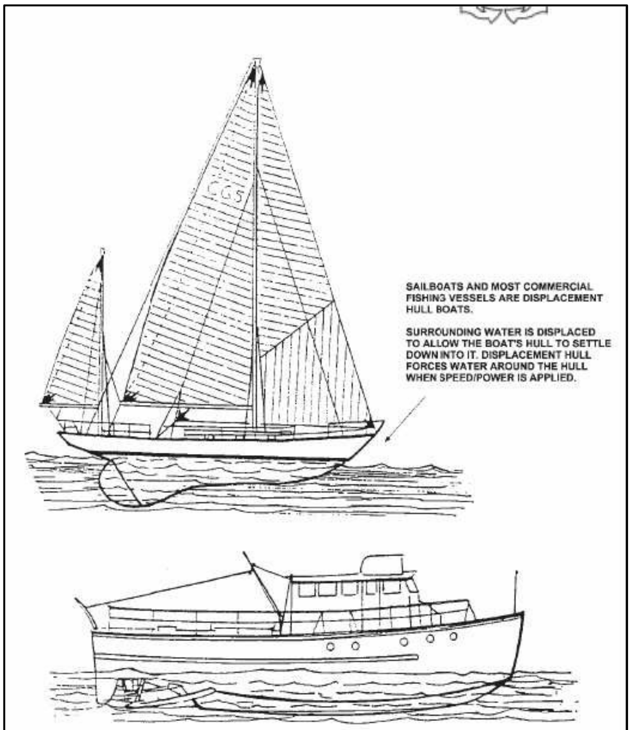
f. Time limitations

Situations in which the following- water temp/availability of pfd/clothing-insulation/water/food- are dire, require more immediate considerations.

117.15 Discuss the following types of boat hulls: [Ref. d, Ch. 8B]

a. Displacement Hull

A displacement hull boat pushes away (displaces) water allowing the hull to settle down into the water. Underway, the hull pushes out this water, creating waves. (See Figure 8-2) The water separates at the bow and closes at the stern. Tremendous forces work against a displacement hull as the power pushing it and the boat's speed both increase. At maximum displacement speed, there is a distinct bow and stern wave. The length of these waves depends upon the boat's length and speed. (The longer the boat the longer the wave length.) The bow and the stern ride lower in the water as you increase speed and the water level alongside, amidships becomes lower than that of the surrounding water.

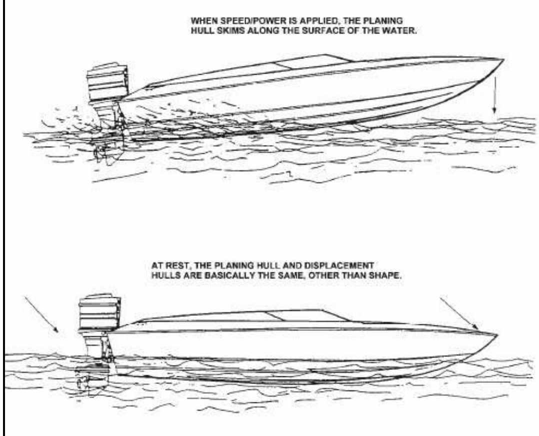


Displacement Hulls
Figure 8-2

This is caused by the increase in the velocity of the water flowing under the boat and its interaction with the **bow** and **stern** wave. As the boat travels along, it rides in a depression created by its own passage. The displacement hull vessel's maximum speed is determined by the vessel's waterline length. Heavy displacement hulls cannot exceed a speed of 1.34 times the square root of their waterline length without requiring excessive power. This speed is known as critical speed. When towing a vessel, you must be careful not to tow beyond that vessel's **critical** speed.

b. Planning Hull

At rest the planing hull and the displacement hull both displace the water around them. The planing hull reacts nearly the same as a displacement hull when it initially gets underway - it takes considerable power to produce a small increase in speed. But at a certain point, external forces acting on the shape cause an interesting effect—the hull is lifted up onto the surface of the water. (See Figure 8-3) The planing hull skims along the surface of the water whereas the displacement hull always forces water around it. This is called planing. Once "on top," the power/speed ratio is considerably altered—very little



Planing Hulls
Figure 8-3

power increase results in a large increase in speed. You must apply power gradually when going from the displacement mode to the planing mode or from the planing mode to the displacement mode. When you decrease the power gradually, the hull makes an even, steady transition, like slowly moving your hand from above the water's surface, through it, and into the liquid below. However, if power is rapidly decreased the transition will be a rough one, for the hull will slap the surface of the water like the slap resulting by hitting a liquid surface with your hand.

Additionally, the rapid "re-entry" into the displacement mode from above the surface, through the surface, and back into the water causes rapid deceleration as the forces in the water exert pressure against the hull. The effect is like rapidly braking an automobile.

c. Semi Displacement hull

The semi-displacement hull is a combination of characteristics of the displacement hull and the planing hull. Many Coast Guard boats are this type (e.g., 44 ft MLB). This means that up to a certain power level and speed (power/speed ratio), the hull remains in the displacement mode. Beyond this point, the hull is raised to a partial plane. Essentially, the semi-displacement hull, like the displacement hull, always remains in the water; it never gets "on top." When in the displacement mode, the power/speed ratio is similar to the power/speed ratio described above for the displacement hull. When in the semi planing mode, it is affected by a combination of forces for the displacement mode and some for the planing mode. Thus, while a small power increase will increase speed, the amount of resulting speed will not be as great as the same power increase would produce for a planing hull.

117.16 Discuss the following physical characteristics of a boats hull: [Ref. d, Ch. 8B]

a. Flare

Flare is the outward turn of the hull as the sides of the hull come up from the water line. As the boat is launched into the water, the flare increases the boat's displacement and creates a positive buoyant force to float the boat.

b. Chine

The turn of the boat's hull below the water line is called the chine. It is "soft" if it is rounded and "hard" if it is squared off. Chine affects the boat's speed on turning characteristics.

c. Transom

The transom at the stern of the boat is either wide, flat, or curved. The shape of the stern affects the speed, hull resistance, and performance of the boat.

d. Beam

Beam and breadth are measures of a boat's Breadth width. Beam is the measurement of the widest part of the hull. Breadth is the measurement of a frame from its port inside edge to its starboard inside edge.

e. Draft

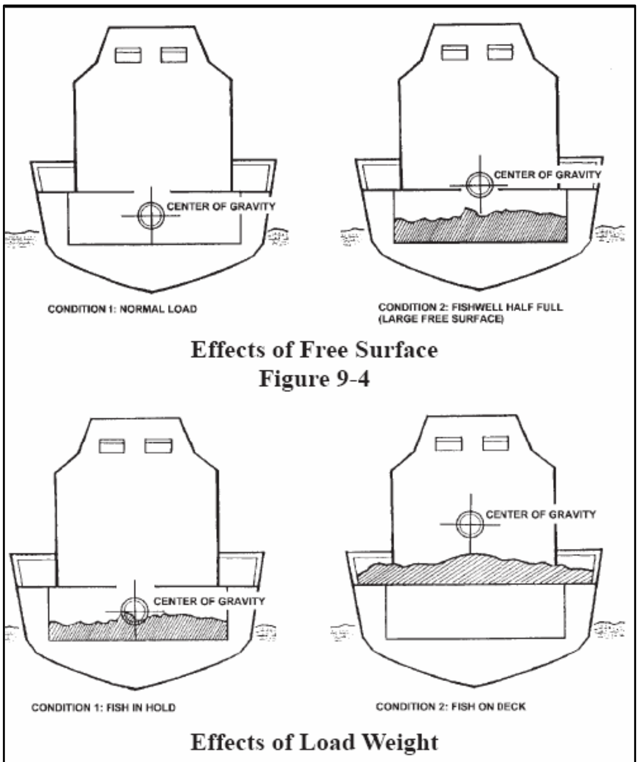
Draft is the depth of the boat from the actual waterline to the bottom of its keel.

117.17 Discuss the effects the factors below have on stability of a boat: [Ref. d, Ch. 9C]

a. Free surface effect
b. Load weight effect

Compartments in a vessel may contain liquids as a matter of design or as a result of damage. If a compartment is only partly filled, the liquid can flow from side to side as the vessel rolls or pitches. The surface of the liquid tends to remain parallel to the waterline. Liquid that only partly fills a compartment is said to have **free surface** and water in such a compartment is called **loose water**. When loose water shifts from side to side or forward and aft due to turning, speed changes, or wave action, the vessel does not want to right itself. This causes a loss of stability. This can cause the vessel to capsize or sink. A cargo of fish free to move about inside a compartment will have the same effect, a condition commonly found on fishing vessels (See Figures 9-4 and 9-5).

***NOTE**: Note that the area of free surface is very important, and in particular its width. If the free surface area doubles in width, its adverse effect on stability will change by a factor of four.*

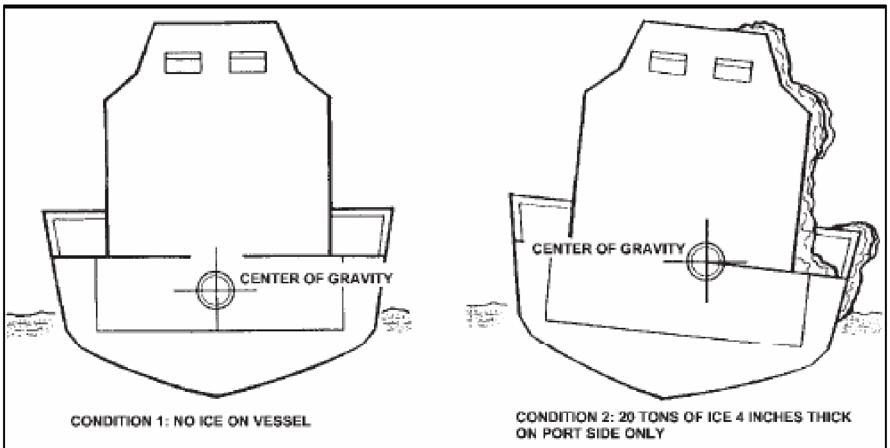


Effects of Free Surface
Figure 9-4

Effects of Load Weight
Figure 9-5

c. Effects of icing

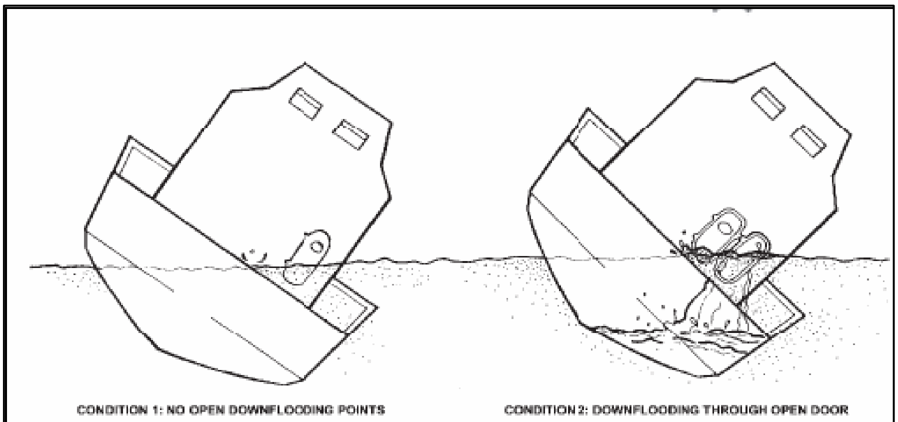
General Icing can increase the displacement of a boat by adding weight above the center of gravity and causing it to rise. This can cause a vessel to heel over and greatly reduce stability. Sea swells, sharp turns, or quick changes in speed can capsize a vessel that has accumulated ice on its topside surfaces. (See Figure 9-6.)



Effects of Icing
Figure 9-6

d. Effects of down flooding

Down flooding is the entry of water into the hull resulting in progressive flooding and loss of stability. Vessels are designed with sufficient stability and proper righting moments as long as they are not overloaded. These design features cannot compensate for the carelessness of a boat crew who fails to maintain the watertight integrity of a vessel and allow it to needlessly take on water. (See Figure 9-7.)

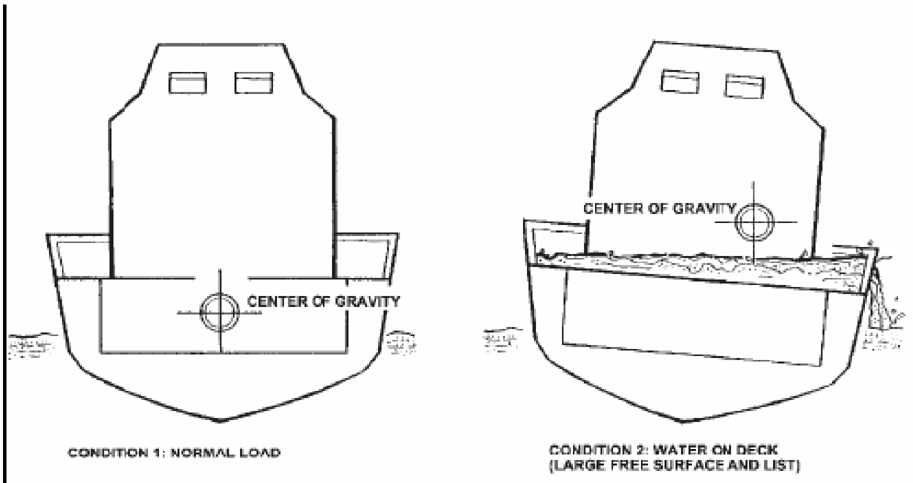


Effects of Downflooding
Figure 9-7

e. Effects of water on deck

Water on deck can cause stability problems by:

- Increasing displacement (increasing draft and decreasing stability and trim).
- Contributing to free surface effect.
- Amplifying the rolling motion of the vessel which may result in capsizing.



Effects of Water on Deck
Figure 9-8

118 Boat Patrol Operations

References:
[a] NTTP 3-10.1, Naval Coastal Warfare Operations
[b] NAVEDTRA 14343, Boatswain's Mate
[c] NTTP 3-20, Tactical Boat Operations

118.1 Discuss the importance of maintaining a minimum two-boat detachment in boat patrols. [Ref. a, Ch. 6 Pg. 6.6.4.5]

Because multiple-boat operations offer flexibility of response, supporting fire, and ambush defense, it is normally desirable to avoid single-boat operations. Therefore, a commander generally assigns boats in elements of at least two to defend an HVA. When requirements exceed assets, it is better to adequately defend some HVAs than to assign single boats to all HVAs.

Other options for protecting HVAs with limited boat assets include:

1. Placing surveillance and PD teams on board ships, either at anchor or during transit, using a pilot boat

2. Using landward security forces for ships pierside

3. Getting a ship underway rather than remaining at anchorage.

118.2 Discuss the following types of boat patrols:

a. Inner harbor patrol [Ref. a, Ch. 5, Pg. 5-6]

Harbor patrols can be implemented to monitor military essential waterways for unsafe conditions and conduct surveillance of anchorages, established water terminals, and other critical port infrastructure per 33 USC 1221.

An inner defensive layer is provided by SECURITY DET and by periodic harbor security patrols undertaken by security boats to monitor activities and vessels in the harbor, and to detect possible threats to friendly vessels and facilities. These patrols provide good deterrent value, and will be conducted randomly and at slow speed. Often these patrols should be conducted prior to or after another scheduled evolution (e.g., HVA escort, sonobuoy placement, etc).

Thorough logs should be maintained. These logs will include dates, times, areas patrolled, and details on all vessels encountered. The vessel information should include ship's name, country of registry, type of vessel, draft, course, speed, position, and any other pertinent information.

Specifically, during a security patrol boat crews should:

1. Check all shipping, noting any HIVs, (SIVs), and COIs.
2. Inspect aids to navigation.
3. Inspect submerged or partially submerged pilings and wrecks.
4. Establish contact with shore-side security patrols in the coastal area.
5. Inspect barriers if applicable.
6. Cover the total patrol area in a random pattern on a nonregular schedule.

In order to avoid establishing regular, predictable patterns when patrolling boats, crews should employ an effective technique called the “dice plan” patrol as shown in Figure 5-1. The boat coxswain marks six numbered positions on the chart within the patrol area. Using a single die, the coxswain rolls the die and proceeds to the indicated position. This is repeated at each position. In this manner, the boat coxswain can be assured of a totally random patrol that cannot be discerned by the enemy. High-speed transit to the different areas can increase the level of deterrence as long as slow patrolling of the numbered position is conducted once the boat has reached its destination.

b. Outer harbor patrol [Ref. a, Ch. 5, Pg. 5-3]

At times it will be necessary to show presence to deter hostile action within the harbor. Some goals for this are to conduct aggressive patrols, conspicuously anchor at highly visible locations, establish waterborne guard posts (WBGP) at chokepoints and key locations, and establish and maintain shore bases throughout the AO.

c. Anchorage area patrol [Ref. a, Ch. 7, Pg. 7-5]

An anchored HVA has a larger threat area around it than a ship pierside and more challenging environmental conditions that require additional FP assets and logistics support. Boats patrolling an anchorage area will generally operate at higher speeds and, since they cover larger, more open areas, have increased fuel consumption.
Sea conditions will often be heavier in anchorage areas, as many anchorages are not in enclosed harbors. These conditions tend to decrease operating speeds and crew endurance. In this scenario, the Mk 6 MMS, listed in Annex A to Chapter 2 and explained in NWP 3-10, is ideal for protection of anchorages and detecting enemy swimmers and divers.

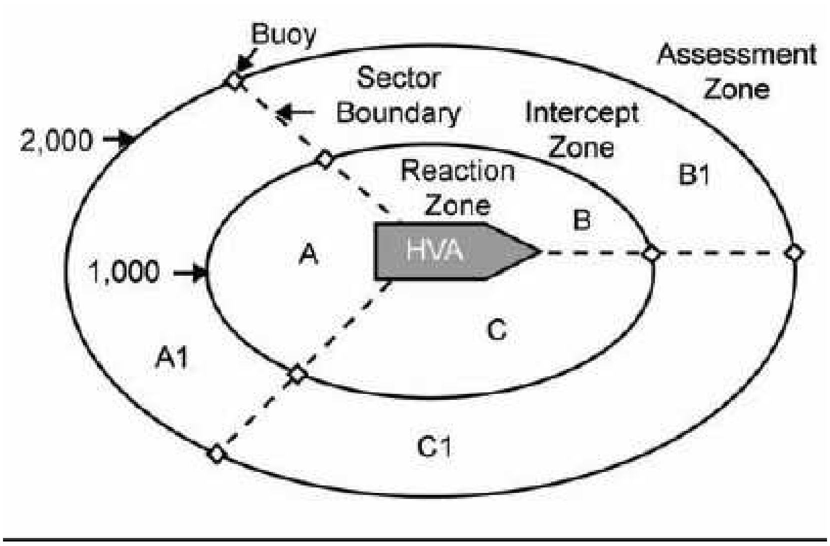


Figure 6-10. Anchored HVA Security Zone Sectors

- 8EAn anchored vessel presents a much different problem
  - Greater area to monitor and defend
  - Threat(s) could come from 360 degree radius
  - Patrol speeds and fuel consumption will likely increase
  - More than 3 boats may be required
  - Sea state / Weather may interfere with operations

d. Reconnaissance and surveillance [Ref. b, Pg. 149]

Periodic reconnaissance patrols should be undertaken to keep current on activities and vessels in the port and to detect any possible threats to vessels and facilities. These patrols will be conducted at slow speed. Thorough logs should be maintained. The log will include dates, times, areas patrolled and details on all vessels in port. The vessel information should include ship's name, country of registry, type of vessel, location within the harbor and any other pertinent information. Specifically, boat crews should:

- Check ships in port, noting any special interest vessels (SIV).
- Inspect port facilities, quays, wharves, pier heads and support structures.
- Inspect aids to navigation and location of field-of-fire buoys.
- Check waterlines of all vessels in port. Note any changes in draft.
- Inspect pilings and sub pier structures for damage or sabotage.
- Establish contact with shore side security patrols in the waterfront area.
- Inspect anti-swimmer nets and other barriers.
- Cover the total patrol area in a random pattern on a non-regular schedule.

e. Intelligence gathering [Ref. a, Appendix g]

The MESG intelligence department provides a cadre of skilled personnel who are trained in intelligence doctrine, operations, and crisis action procedures in support of exercises and real world operations. At a minimum, the intelligence functional capabilities include, but are not limited to:

1. Watch standing
2. Collection management
3. Intelligence systems capability
4. RFI management
5. Intelligence dissemination.

f. Protection of a static High Value Asset (HVA) [Ref. c, Pg. 6-8]

A ship moored to a pier or at an open anchorage presents an attractive, static target to the enemy. The problem of controlling and securing waterside access is demanding. With an HVA moored in a busy harbor, there is considerable difficulty in determining hostile intent, even under the best circumstances. Safe navigation may make strict enforcement of waterside perimeters established to protect an HVA difficult, as rules of navigation allow for emergencies, tidal and wind action, and less skilled craft operators to err. Recreational and commercial activity outside the perimeter of an installation, pier, or port facility makes detection, classification, and identification of threats extremely difficult.

Tactical boats should remain within their assigned sectors of responsibility and use tactical communications. Boats should patrol the outer boundary of their assigned zones. Coxswains should always attempt to maneuver their boats so as to maintain a position between the COI and the HVA. Communication between the HVA and the boat's C2 element is essential, as personnel on the HVA can advise boats of incoming COIs or provide visual coverage in areas not covered by patrolling tactical boats. Generally, make turns to the outside of the sector, so coxswains and crew do not have their backs to an outer boundary. Keep constant observation of any inbound vessels. Tactical boats should use onboard radar equipment and NVDs, when practical, while conducting night patrols. All tactical boats should be equipped with parachute illumination flares and use spotlights intermittently.

g. Protection of an underway High Value Asset (HVA) [Ref. c, Ch. 6 Pg. 6.9]

Tactics for escorting HVAs are similar to those employed for stationary HVAs using a layered defense. The principal task of tactical boats conducting an HVA escort is to determine hostile intent as far from the HVA as possible. As a SV prosecutes a COI to determine intent, at least one other boat assumes the duties of the RV. More so than when protecting a static HVA, escorts are fluid situations. The entire route an HVA takes to reach its final destination should be considered and possible danger areas or chokepoints should be closely watched.

Moving HVAs may include:

1. Military ships and submarines
2. Merchant ships carrying high value cargo
3. High capacity passenger vessels

4. Vessels carrying explosives or other hazardous cargo (i.e., fuels, natural gas, chemicals).

h. Barrier patrol [Ref. a, Ch. 9 Pg. 9.10.3]

A barrier is typically established for one of two main purposes: to gain contact on a suspect vessel expected to transit through a given area, or to defend a particular asset — either stationary or mobile.

i. Waterborne guard-post [Ref. a, Ch. 5 Pg. 5.5.2]

- A waterborne Guard Post is a basically a defensive ambush.
- Patrol boat(s) will set up in an inconspicuous position and wait for enemy or hostile vessels to come into the fields of fire (Kill Zone).
- Can be used as a random antiterrorism measure.
- This technique can be used when a specific threat is identified and is to be neutralized in a specific location.

118.3 Describe how to set up and conduct a barrier patrol. [Ref. a, Ch. 9 Pg. 9.10.3]

To establish a barrier patrol, a barrier axis must be established. This axis is usually a search line normal to (at a 90 degree angle to) the threat axis. In the case of a moving barrier to protect a mobile friendly unit, the barrier may be normal to that unit's path or normal to the threat axis. Once the barrier axis has been established patrol boats are assigned stations/positions along the barrier axis to patrol.

In a barrier patrol, the patrol boats search along the established barrier axis to assure detection of targets approaching the axis. The length of the barrier axis and possible target speed (TS) are critical to establishing a search plan that does not allow a target to go undetected as the patrol boats transit from one end of the axis to the other. In order to achieve the highest probability of target detection, the plan must rely on the following quantitative parameters: DR, TS, and patrol cycle time.

118.4 Discuss how clock face orders may be used in boat formations.
[Ref. a, Ch. 9 Pg. 9.3.8]

Boat formations are sometimes more easily established and changed using positioning instructions based on the face of a clock. This is especially true as the tactical situation develops, requiring a shift in the formation. In these instances, the lead boat is used as the reference. For example, echelon left would be called "Station 7" or "Seven O-Clock." Likewise, a column formation would be "Six O-Clock," and a line abreast to the right would be "Three O-Clock." This system has the advantages of brevity and simplicity.

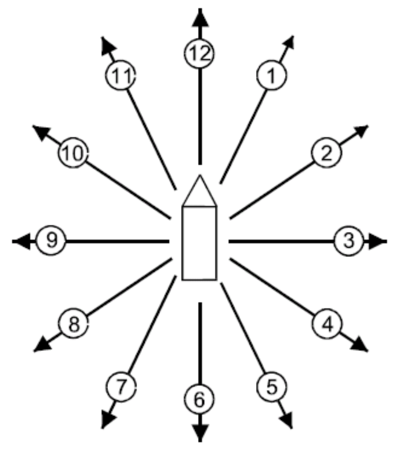


Figure 9-6. Clock Face

118.5 Describe the following formations, and discuss the advantages and disadvantages of each: [Ref. c, Ch. 5 Pg. 5-8 through 5-10]

a. Column

The column provides maximum broadside firepower and is warranted when operating in unfamiliar waters and when there is a suspicion that an area has been mined. Column formations are either line astern or staggered. In a line astern column (see Figure 5-7), all craft are in a single line astern of the lead boat. In a staggered column (see Figure 5-8), which is used on wider waterways with multiple boats, the boats trail alternately offset and astern to the lead boat, even-numbered to the left.

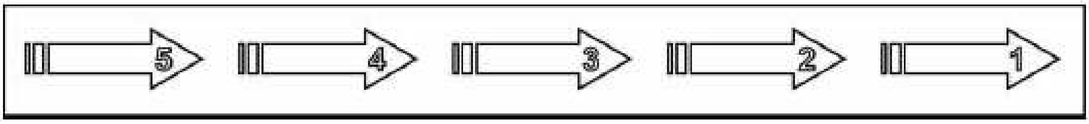


Figure 5-7. Line Astern Column

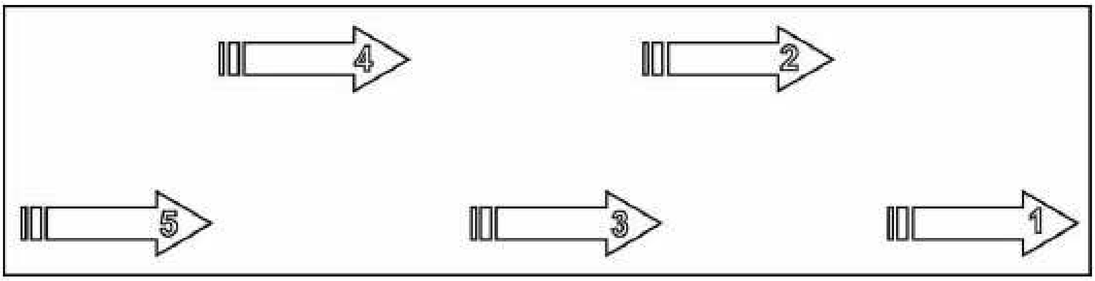


Figure 5-8. Staggered Column

b. Wedge

Used in a medium- to high-threat environment, the wedge allows immediate application of firepower to all sides. In the wedge, boats are positioned in a V (see Figure 5-11) or inverted V. The lead boat is positioned in the center to afford the best vantage point for C2, and trailing boats are flanked behind, even-numbered to the left and odd numbered to the right.

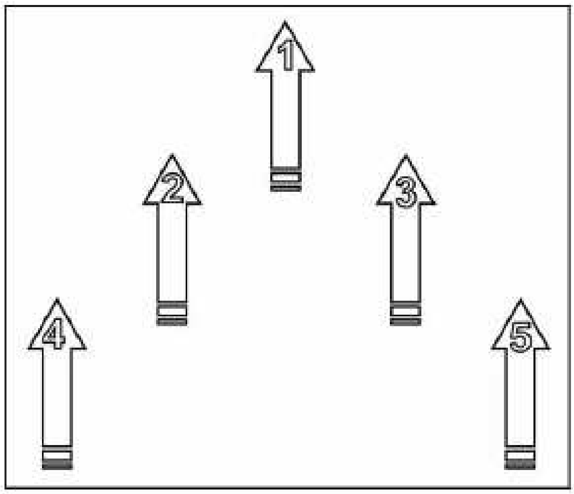


Figure 5-11. Wedge

c. Line abreast

Useful for searching an area for small contacts, the line abreast/on line formation provides maximum firepower forward and aft of the formation and requires a wide waterway with good depth. This formation is not recommended for suspected mined or ambush areas and may need to be changed to circumnavigate obstacles or hazards. In the line abreast/on line formation, boats form in a line abreast of the number-one lead boat, even numbered to its left and odd-numbered to its right (see Figure 5-9).

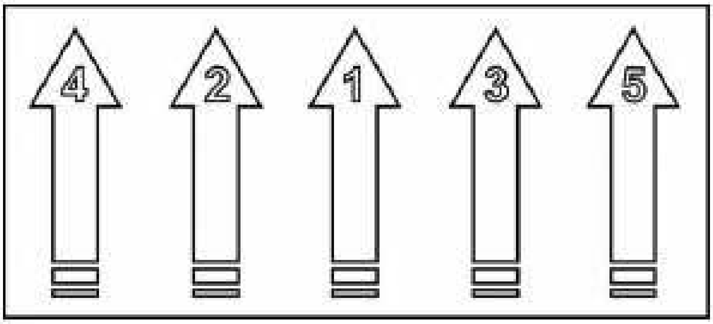


Figure 5-9. Line Abreast/On Line Formation

d. Echelon right
e. Echelon left

Used in a wider waterway when the patrol expects threat activity from the formation's strong side, the echelon left and echelon right provides a good field of fire forward and to the strong left or right flank of the patrol. In an echelon, boats are deployed in a diagonal line aft and left (echelon left) or aft and right (echelon right) of the number-one lead boat (see Figure 5-10).

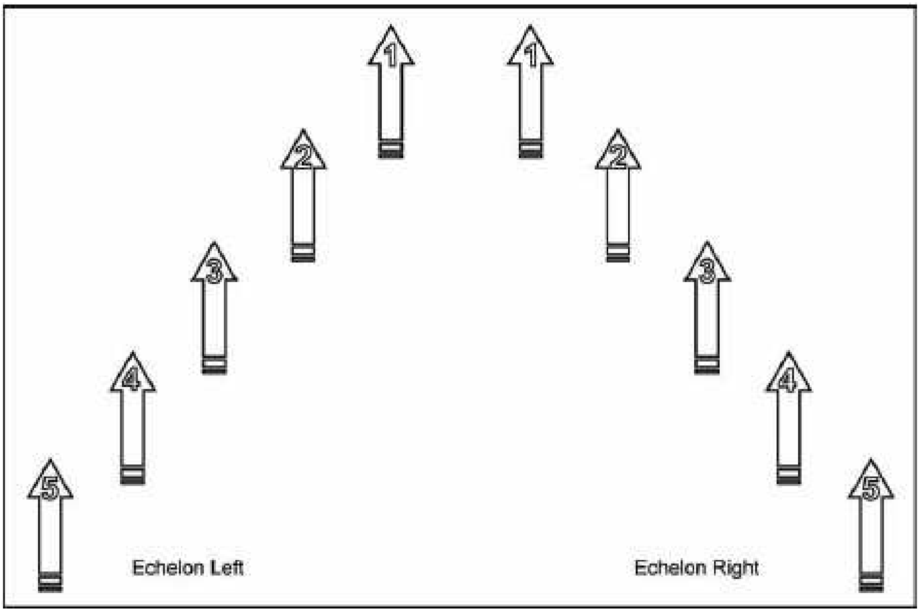


Figure 5-10. Echelon Left and Right

f. Diamond

The diamond is a four-boat formation that provides firepower in all directions and is used in restricted waterways and when the threat could come from any direction. The number-one boat is the tip of the diamond, even to the left, odd to the right, and number four to the rear (see Figure 5-12).

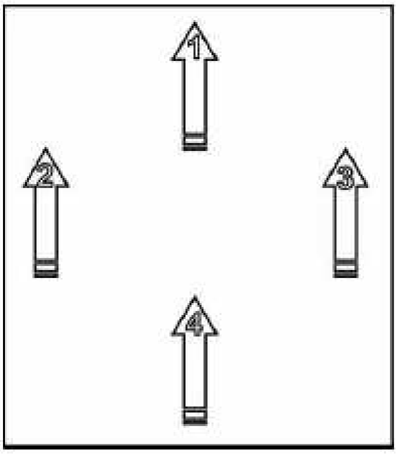


Figure 5-12. Diamond

118.6 Describe how to change formations: [Ref. c, Ch. 5 Pg. 5-11 through 5-12, and MESG PowerPoint.]

a. Column to wedge

When changing from column to wedge, even-numbered boats maneuver to the port side and odd-numbered boats maneuver to the starboard side of the lead boat (see Figure 5-14). Boats other than the lead must increase speed to attain their new positions.

b. Wedge to column

When changing from wedge to column, boats fall into numerical order behind the lead boat (see Figure 5-16). The lead boat maintains speed and the other boats decrease speed as they fall in astern.

c. Column to line abreast

Changing from a column to line abreast/on line is similar to a column-to-wedge maneuver (see Figure 5-15). Even-numbered boats move to the left and abreast of the lead boat; odd-numbered boats move to the right and abreast of the lead boat.

d. Line abreast to column

See MESG PowerPoint.

e. Wedge to line abreast

When changing from wedge to line abreast/on line, boats increase speed until they are on line with the lead boat (see Figure 5-17). Even-numbered boats move on line to the left of the lead boat; odd-numbered boats move on line to the right.

f. Line abreast to wedge

See MESG PowerPoint.

g. Column to echelon right

When changing from column to echelon right or left, boats pull out to port to form an echelon left and to starboard to form an echelon right formation.

h. Echelon right to column

See MESG PowerPoint.

i. Column to echelon left

See MESG PowerPoint.

j. Echelon left to column

See MESG PowerPoint.

k. Line abreast to echelon right

See MESG PowerPoint.

l. Echelon right to line abreast

See MESG PowerPoint.

m. Line abreast to echelon left

See MESG PowerPoint.

n. Echelon left to line abreast

See MESG PowerPoint.

o. Column to diamond

See MESG PowerPoint.

p. Diamond to column

See MESG PowerPoint.

q. Echelon left to echelon right

See MESG PowerPoint.

1. Echelon right to echelon left

See MESG PowerPoint.

118.7 Discuss Tactical Boat Operations. [Ref. c, Ch. 1 Pg. 1.4]

Tactical boat operations are conducted across the full spectrum of maritime missions and operations (see Figure 1-1) and support contingency operations in the continental United States (CONUS) in support of the Department of Homeland Security (DHS) and expeditionary operations outside the continental United States (OCONUS) in support of DOD and the combatant commanders. Organizations that conduct tactical boat operations and their relationship with primary maritime mission areas are shown in Figure 1-2.

Note: *NCW is now known as MESF.*

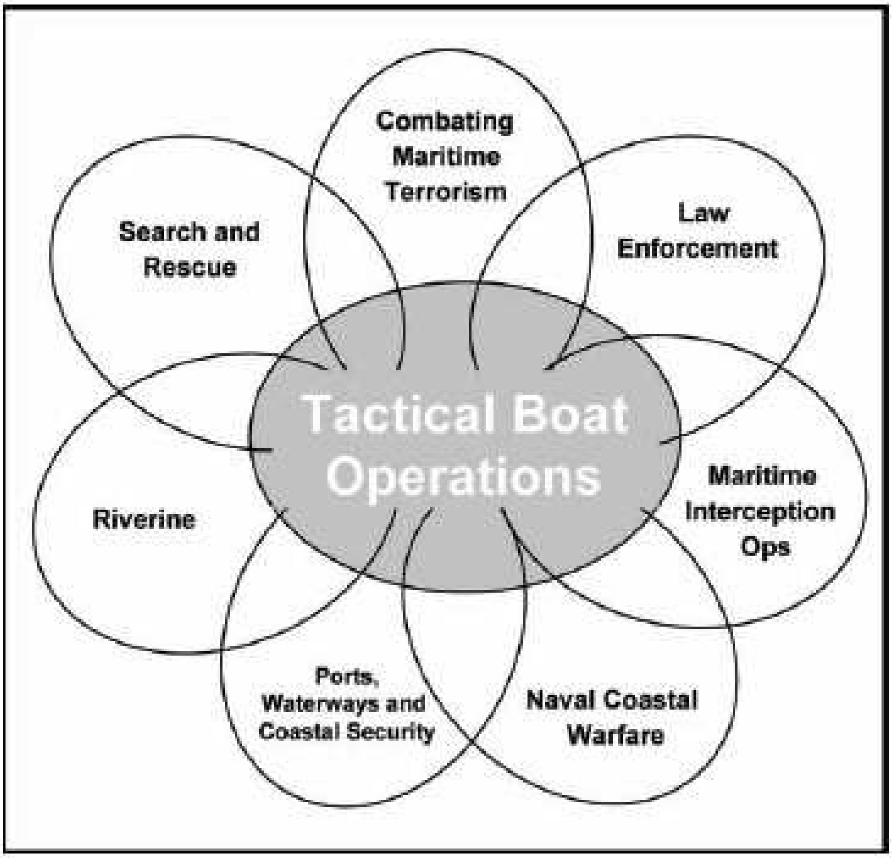


Figure 1-1. Maritime Missions and Operations

PRIMARY MARITIME MISSION AREAS	USN	USMC	USCG
Combating Maritime Terrorism ▪ Antiterrorism/Force Protection ▪ Antiterrorism ▪ Counterterrorism	X	X*	X
Maritime Law Enforcement ▪ Counterdrug/Drug Interdiction ▪ Alien Migrant Interdiction Ops ▪ Visit, Board, Search, and Seizure ▪ Enforcement of Laws and Treaties	X		X
Maritime Interception Operations ▪ Visit, Board, Search, and Seizure	X	X*	X
Naval Coastal Warfare ▪ Harbor Approach Defense ▪ Littoral Surveillance Support Operations ▪ Point Defense (Includes Facility Security) ▪ Port Security and Harbor Defense	X	X*	X
Ports, Waterways, and Coastal Security ▪ High Value Asset Escort ▪ Port Facilities Security	X	X*	X
Riverine Operations ▪ Assault Support ▪ Surveillance, Interdiction, and Security	X	X*	
Search and Rescue (Personnel Recovery) ▪ Combat Search and Rescue ▪ Tactical Recovery of Aircraft and Personnel (USMC)	X	X*	X
*Note: Any execution of these missions by Marine forces (to include MARSOC) will be dependent on tactical boat support from either the USN or USCG along with an established command relationship and done as an ad hoc mission.			

Figure 1-2. Maritime Mission Areas/Organization Matrix

Note

NCW is now known as MESG.

118.8 Discuss the following tactics for Patrol Boat operations [Ref. c, Ch. 5.2.2 Pg. 5-1]

The speed used by tactical boats is dictated by the mission and fuel availability and must be addressed in the mission planning stage. The following guidelines should be considered when considering the speed of tactical boats on a mission.

b. High/Low speed tactic

Deliberate travel at high speed prevents the threat from easily engaging the tactical boat with direct fire and also decreases the threat’s response time, but it increases fuel consumption.

a. Sprint and drift

Use the high/low speed tactic to increase a tactical boat's unpredictability. The boat patrols at an economical speed for a length of time, then transits at high speed to a random point in the patrol area, resuming patrolling at an economical speed.

118.9 Discuss patrol considerations during an area familiarization [Ref. c, Ch. 3.3.2.8 Pg. 3-6]

When a tactical boat unit first enters an operational area, and before its first mission, it should conduct an operations area familiarization. The operations area familiarization verifies charted navigation aids, hazards to navigation, tide range, currents, possible threats, commercial and fishing traffic, and potential ambush sites. During the operations area familiarization, boats should identify communication dead zones, which are areas where radio transmission and reception are poor or nonexistent.

118.10 Discuss the difference between an active and passive security measure in relation to patrol operations [Ref. c, Ch. 5.2 Pg. 5-1]

Active and passive security measures are tactics and techniques used to prevent a threat from using predictability against the tactical boat. A threat can see active security measures but cannot control them. An example of an active security measure is overt patrol operations to intercept, identify, and conduct contact prosecution of COIs. A threat cannot see or does not know about passive security measures. An example of a passive security measure is the use of a listening post/observation post or underwater sensors.

118.11 Discuss zone considerations [Ref. c, Ch. 6.3.6 Pg. 6-4]

The size and layout of a tactical security zone should be the minimum necessary to ensure the safety of the HVA, while minimizing the impact on legitimate port operations. The key factors that determine the size of a security zone are the physical characteristics of the area, the threat, and available assets. Since situations, including threats to ports and vessels, are dynamic, requirements for establishing or continuing security zones must be periodically reviewed.

The speed of tactical boats and the predicted speed of threat boats and weapons' effective employment ranges should also be considered when determining zone sizes. The reaction zone should be extended if needed to allow time for tactical boats to interdict a COI. For example, if four boats are assigned and each boat's area is relatively small, interdiction times may be shorter. When only two boats are assigned, each boat's AO is larger, and more time should be allowed for interdiction prior to a COI's entry in the reaction zone. See Appendix C for data on standard enemy weapon threats and their maximum effective ranges.

It will not always be practical to establish a 1,000-meter reaction zone and 1,000-meter intercept zone because of channel width, port size, traffic patterns, nearby friendly shore facilities, and other considerations. In this case, shore side security forces should be employed in support of waterborne security operations to provide quicker reactions to threats from nearby shorelines or on the water.

Quick reaction time is absolutely critical because of the potential high speed of COIs and closing speeds that may exceed 90 knots. It is necessary to determine hostile intent and take appropriate action as far from the HVA as possible, often in times measured in seconds rather than minutes. Tactical boat reaction times to COIs are significantly reduced as the inbound speed of the COI increases. Tactical boats must assess COIs as quickly as possible in the assessment zone or outer perimeter of the intercept zone to initiate hailing and warning procedures and still allow adequate time for the use of lethal force. Figure 6-2 provides data on how quickly an inbound watercraft will reach an HVA at varying speeds and distances.

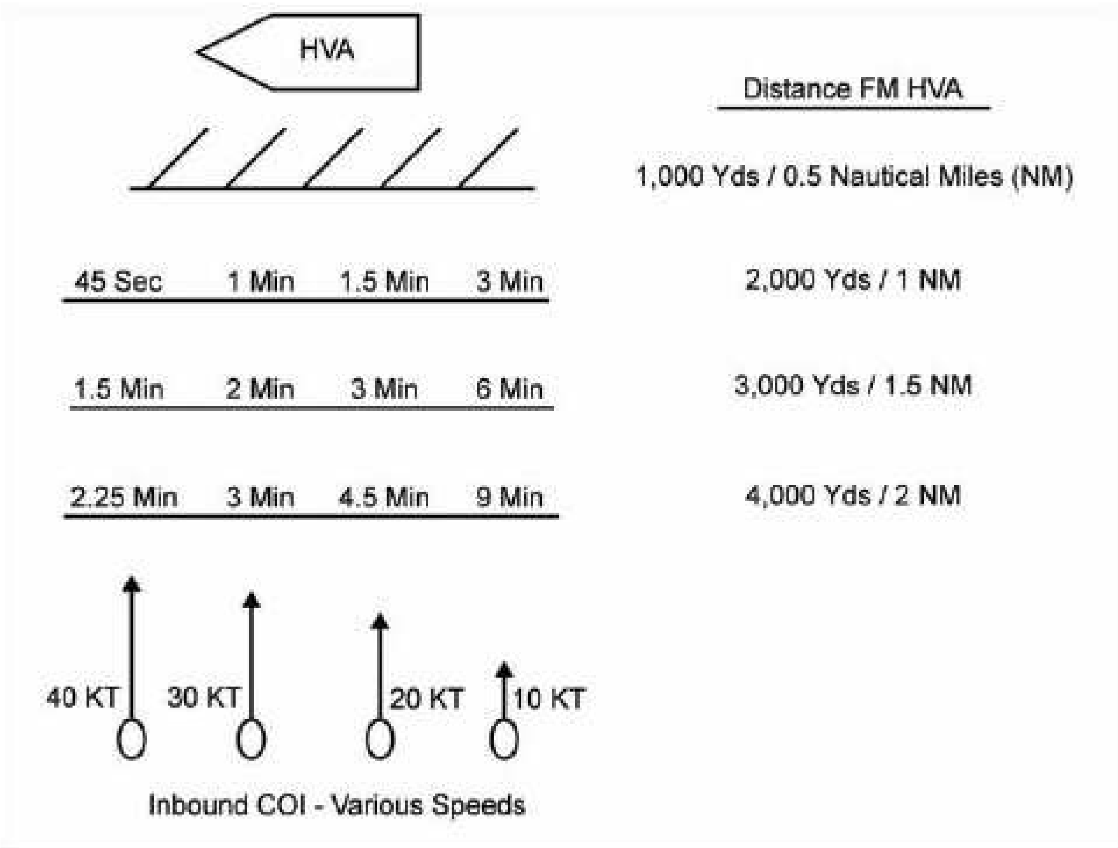


Figure 6-2. Times to Reach the HVA

118.12 Discuss Naval Vessel Protection zones including [Ref. c, Ch. 6.4.1 Pg. 6-5]

a. Authority authorized to establish

The NVPZ is a civil statutory zone established by USCG regulations for the safety and security of U.S. naval vessels in the navigable waters of the United States. The NVPZ is a 500-yard regulated area of water, including a
100-yard exclusion zone, surrounding large USN vessels (including Military Sealift Command ships) and is in effect at all times in the navigable waters of the U.S. (out to 3 nautical miles), whether the vessel is underway, anchored, moored, or within a floating dry dock, except when the naval vessel is moored within a restricted area or within a defensive sea area (see Figure 6-3).

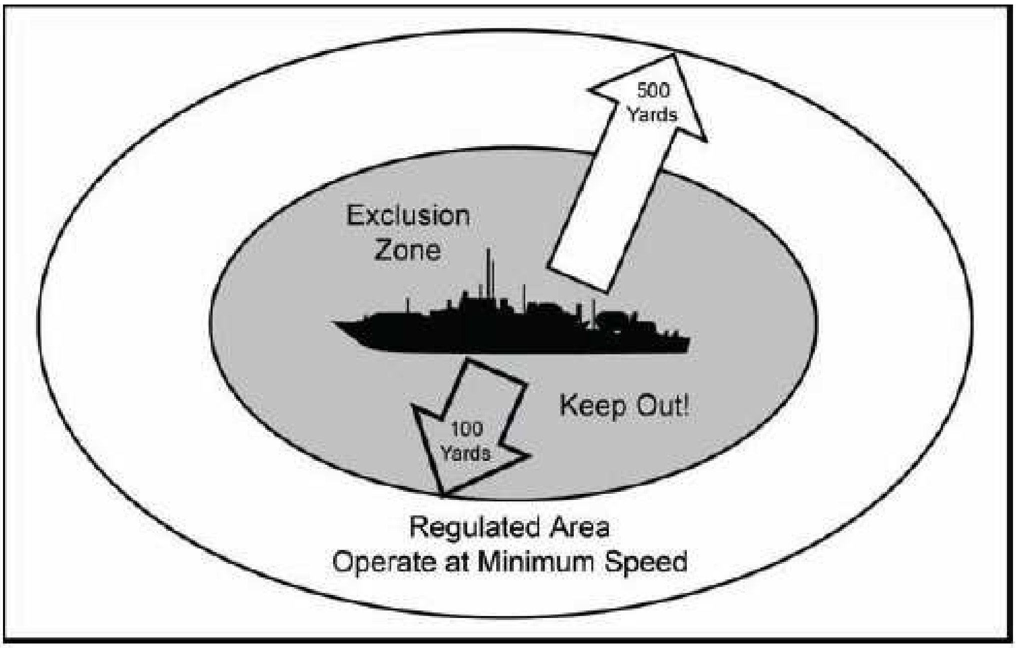


Figure 6-3. Naval Vessel Protection Zone

b. Size of the zones

As defined in the regulation, the 500-yard regulated area of water provides for the safety and security of these vessels. Under normal circumstances, vessels are allowed to pass through the regulated area of the NVPZ but shall operate at the minimum speed necessary to maintain a safe course, unless required to maintain speed by the navigation rules. No vessels or persons are allowed within 100 yards of a naval vessel unless authorized by the USCG, the senior naval officer present in command, or their authorized representative(s).

d. Vessels protected by the NVPZ

The NVPZ is a civil statutory zone established by USCG regulations for the safety and security of U.S. naval vessels in the navigable waters of the United States.

118.13 Discuss the Security zone duties of Tactical craft [Ref. c, Ch. 6.5-6.5.2 Pg. 6-7]

Tactical boats assigned security duties to protect HVAs (moving or stationary) assume the role of a SV or a reaction vessel (RV). However, because waterside security operations are fluid, tactical boats must be prepared to assume either role in any given situation. For example, the RV may assume the role of a SV if a COI gets past the initial SV but hostile intent has not been determined.

Screening Vessel

The SV protects the HVA by determining a COI's intent and proactively screening and intercepting COIs in the assessment and intercept zones. The SV detects, identifies, investigates, classifies, reports, warns off, and, if necessary, engages COIs. The SV also escorts COIs out of the intercept zone, secures the transit route of moving HVAs, and restrains traffic at strategic locations, if required.

Reaction Vessel

The primary role of the RV is to intercept, engage and, if necessary, destroy any vessel attempting to enter a protected HVA's exclusion zone. The RV provides overwatch and fire support to the SV when it intercepts and investigates a COI. The RV maintains a position that provides the best possible vantage point of the COI so as to be able to maneuver quickly if the COI displays hostile intent or evades the SV and continues toward the HVA. Constant radar coverage is maintained by the RV to maintain situational awareness and to avoid interfering with the fields of fire of static weapons positions.

118.14 Discuss Limited access areas including: [Ref. c, Ch. 6 Pg. 6-3]

a. Authority authorized to establish

In addition to security zones established by DOD to protect HVAs, the USCG has primary responsibility to establish LAAs under its jurisdiction. LAAs are established to assist with supervision of vessel and port operations, to ensure navigation and vessel safety, protection of the marine environment, and safety and security of U.S. ports and waterways. The USCG establishes and enforces several types of LAAs.

b. Where they are used

What is being protected, where it is located, and who requires the LAA will determine which type of LAA is used to assert control over an area.

c. Types of Limited access areas

1. Naval vessel protection zone (NVPZ)

2. Safety zones

3. Regulated navigation areas

4. Restricted waterfront areas

5. Security zones.

118.15 Discuss anchored HVA protection including environmental condition challenges. [Ref. c, Ch. 6.8.3 Pg 6-11]

An anchored HVA requires waterborne security 360 degrees around its position (Figure 6-10). The HVA may be used as a lookout/radar platform to identify incoming COIs and vector tactical boats to investigate to maximize the coverage within the security zone. Fixed weapons emplacements onboard the HVA can provide additional coverage. Anchorages have more challenging environmental conditions that require additional force protection assets and logistics support. Boats patrolling an anchorage area will generally operate at higher speeds and, since they cover larger, more open areas, have increased fuel consumption. Sea conditions will often be heavier in anchorage areas, as many anchorages are not in enclosed harbors, which may decrease crew endurance.

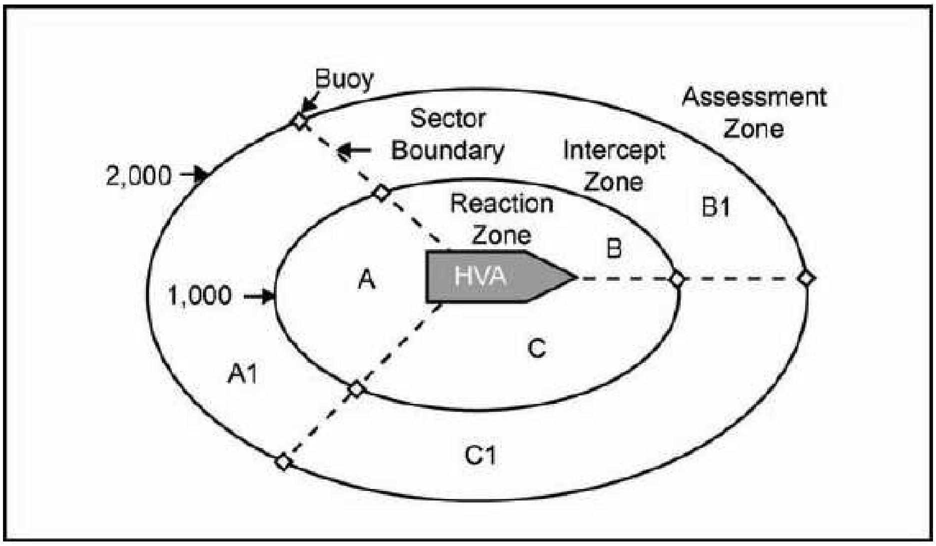


Figure 6-10. Anchored HVA Security Zone Sectors

Figure 6-11 shows sample patrol areas and patterns for two-, three-, and four-boat patrols protecting an anchored HVA.

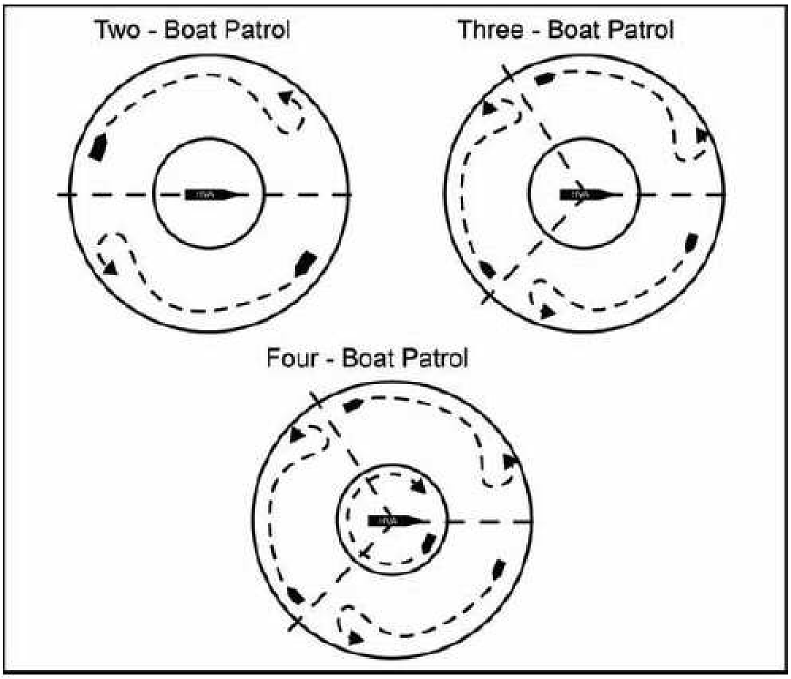


Figure 6-11. Anchored HVA Patrol Patterns

118.16 Discuss moving security zones including [Ref. c, Ch. 6.9.2 Pg. 6-23 through 6-24]

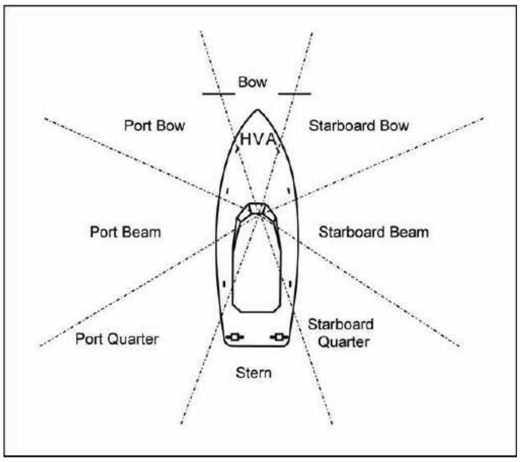


Figure 6-15. Relative Direction from Escorted HVA

Waterborne defense in depth around an HVA is established by creating assessment, intercept, and reaction zones. Commanders should create zones large enough to determine hostile intent and, if necessary, engage a small boat

a. Zones used

Security zones may be divided into sectors to assign tactical boats with an AO and to provide a common reference for COI reporting. Sectors are defined by boundary lines that converge at the HVA and radiate out through the intercept zone outer boundary. All contact reports should be made relative to the HVA bow to avoid confusion. Zones around the HVA should be relative to the HVA and not by security boat number to avoid confusion of boat locations. A tactical boat on the port bow is identified as the port bow boat. If the port bow boat escorts a COI to the port quarter, it becomes the port quarter boat. Figure 6-15 shows the references to be used for tactical boat identification and sector naming convention.

b. Zone size

Zone size is also dependent upon the capability and number of tactical boats and the type and speed of potential threats. For example, if four boats are patrolling, interdiction times should be shorter so zones could be smaller. If a threat analysis reveals the presence of high-speed craft in the area, zones should be widened to allow for engagement farther from the HVA.

It will not always be practical to establish large defensive layers due to channel width, port size, traffic patterns, nearby friendly shore facilities, civil restrictions, and other considerations. In a moving security zone, the HVA should be positioned slightly towards the rear of the RZ to compensate for its forward movement. Figure 6-14 shows an example of a transiting HVA's security zones.

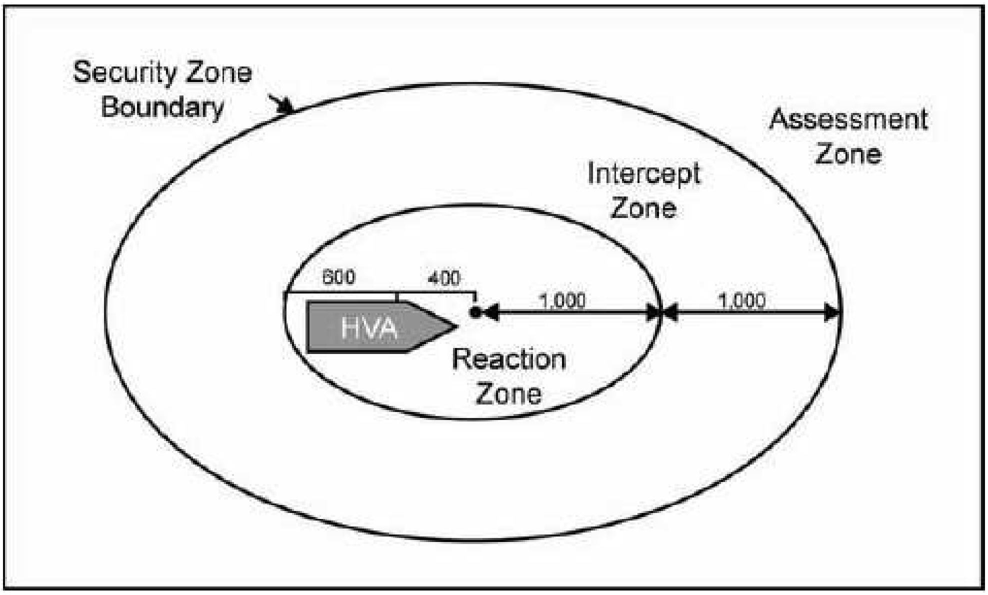


Figure 6-14. Escorted HVA Security Zones

c. COI contact reports

Tactical boats should use the SALUTE format when reporting contacts to other boats or C2 elements. This uniform format is common across the services and allows units to update track information when amplifying data becomes available. A SALUTE report contains the following information:

1. Size (number and size of craft being reported)

2. Activity (what is the craft doing, i.e., fishing)

3. Location (using a grid reference or another agreed-upon system of position reference; include estimated course, speed, true bearing and range to contact, and target angle of the craft)

4. Unit (name, if visible, nationality, type of craft, and number of people observed)

5. Time (when observed)

6. Equipment (type of equipment, sensors, and weapons observed).

Since tactical boats constantly change their positions, the bearing and range-to-contact portions of a SALUTE report can be referenced from a fixed point such as a pier, shore command post, or pierside ship. When this is not practical, predetermined geographic points on the chart can be labeled with codeword's and information can be referenced to those points. For example, Point Alpha could be a piece of land that juts out from the harbor, and part of the SALUTE report could be *Contact bears 270 degrees true, 2,000 yards from Point Alpha.* The reference point also can be the specific boat, which requires the C2 element to have a positive track on each patrol boat. Use of zone locations (i.e., contact entering Reaction Zone Bravo), codeword's (i.e., contact passing Point Zulu from the east), or any other procedure is acceptable as long as it contributes to efficient and effective communications.

After the initial SALUTE report and designation of the contact by the C2 element, additional reports will only consist of new information, such as craft name or persons on board.

118.17 Discuss the maneuvering tactics that may be employed in an HVA escort using – [Ref. c, Ch. 6.9.6-6.9.8 Pg. 6-26-6 through 35]

a. Four Tactical Craft

The optimum protective posture for HVA transit in high-threat waters is a four-boat detachment. A four-boat escort provides the best defense while navigating through narrow waterways and chokepoints and under bridges. The security zone around the HVA is divided into four sectors (two off the bow, two off the stern), each patrolled by a SV (see Figure 6-16). Should a COI enter the intercept zone, the SV covering that sector intercepts the COI while a second boat maneuvers into the gap vacated by the SV and acts as an RV. If it becomes necessary to engage a COI with weapons, the SV will maneuver clear of the threat, allowing the RV a clear field of fire.

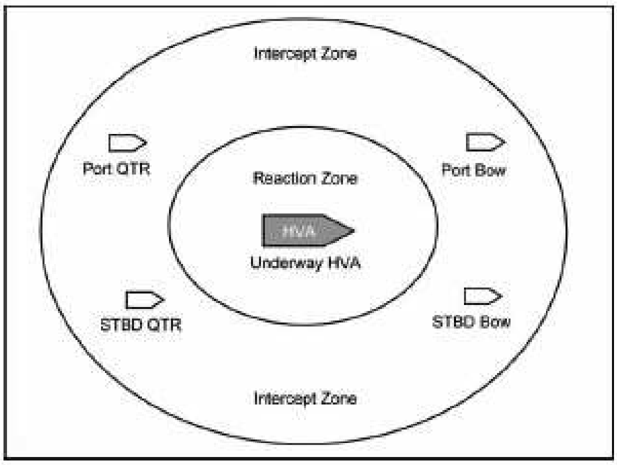


Figure 6-16. Four-Vessel HVA Escort

An alternate formation (diamond escort) has one boat positioned off the HVA's port beam and starboard beam, while the other two boats are positioned forward and aft of the HVA (Figure 6-17). When escorting an HVA through a restricted channel with four boats, position one boat on each beam, one astern, and one slightly off the HVA's bow. The lead SV may be placed well forward of the HVA to provide visibility around bends and obstructions.

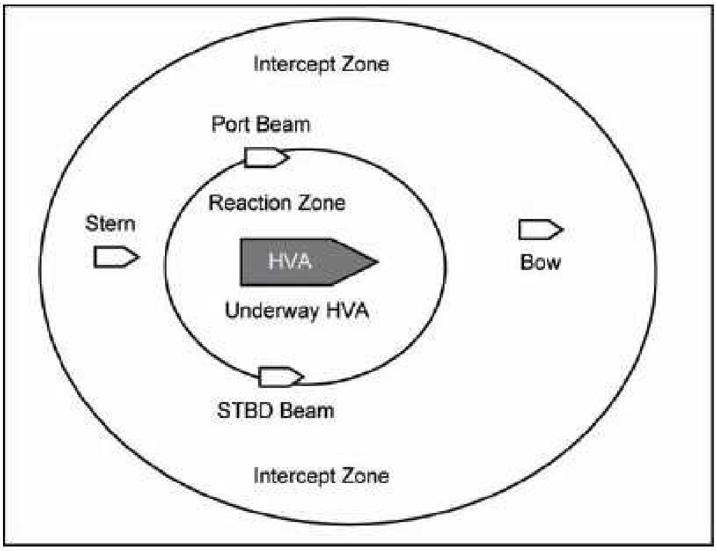


Figure 6-17. Four-Vessel Diamond Escort

The Wedge Escort is used in a medium- to high-threat environment and to provide early warning well ahead of the HVA, i.e., when approaching a bend in the waterway that obstructs the line of sight forward. The lead SV moves well forward of the HVA to see ahead (Figure 6-18). When escorting an HVA through a restricted channel with four boats, position one boat on each beam, one astern, and one slightly off the HVA's bow.

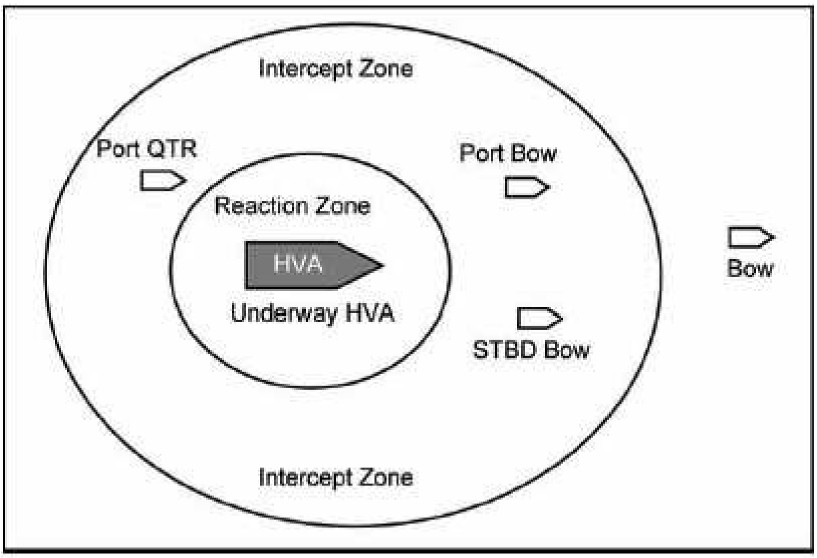


Figure 6-18. Four-Vessel Wedge Escort

Four-Vessel HVA Escort Detect-to-Engage Sequence Figure 6-19 shows a detect-to-engage sequence for a four-boat security element enforcing a security zone around a transiting HVA.

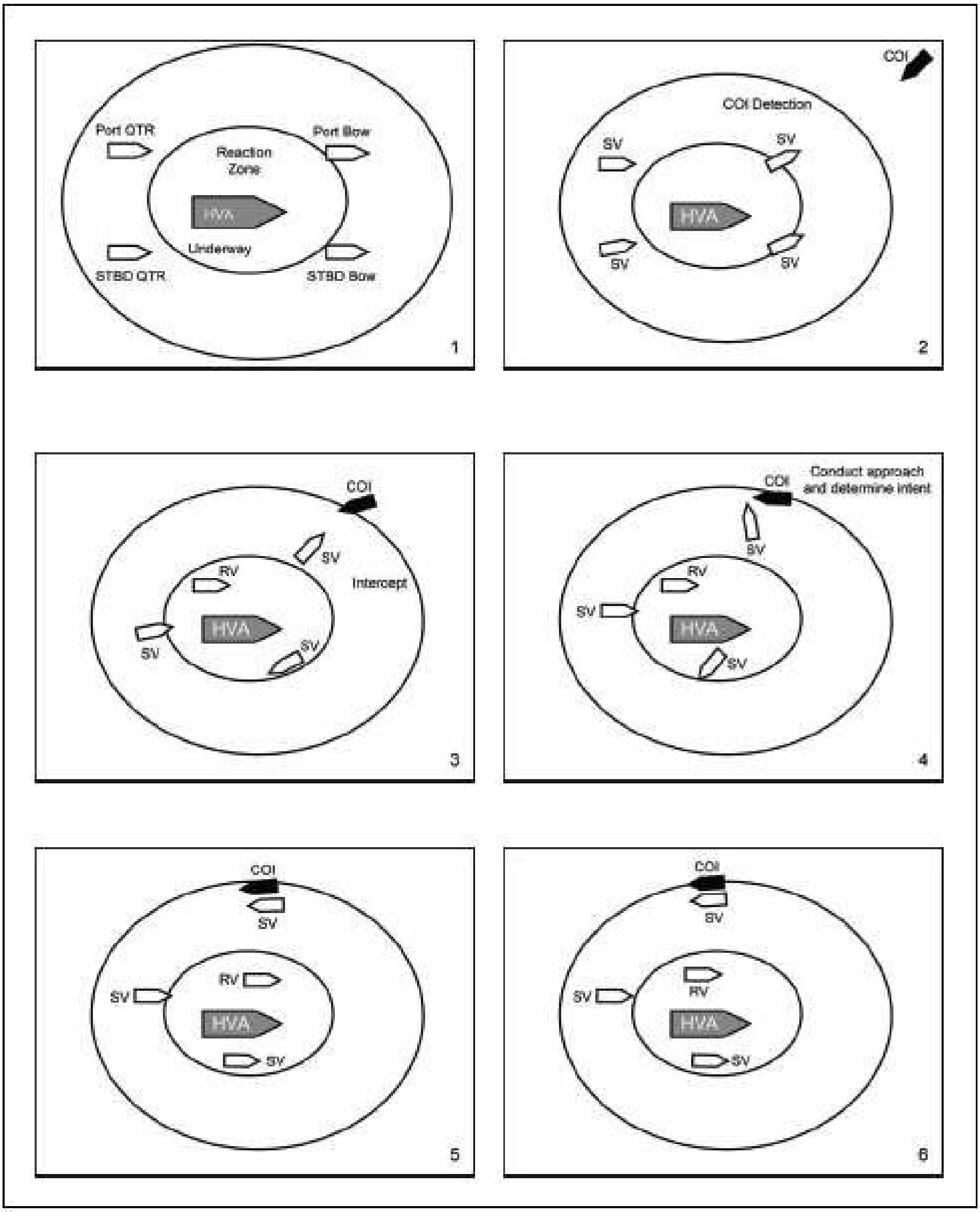


Figure 6-19. Four-Vessel HVA Escort Detect-to-Engage Sequence (Sheet 1 of 2)

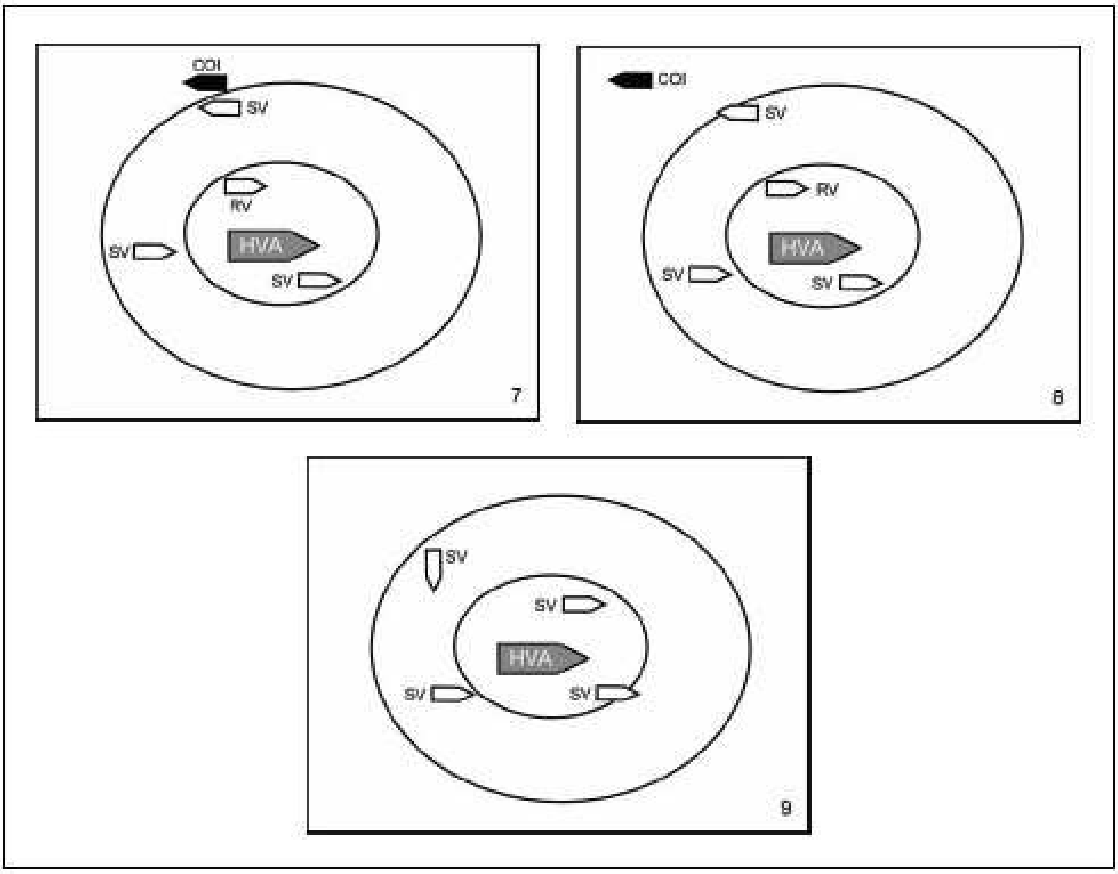


Figure 6-19. Four-Vessel HVA Escort Detect-to-Engage Sequence (Sheet 2 of 2)

Four-Vessel Narrow Channel Escort Detect-to-Engage Sequence Figure 6-20 shows a detect-to-engage sequence for a four-boat security element enforcing a security zone around an HVA transiting through a narrow channel.

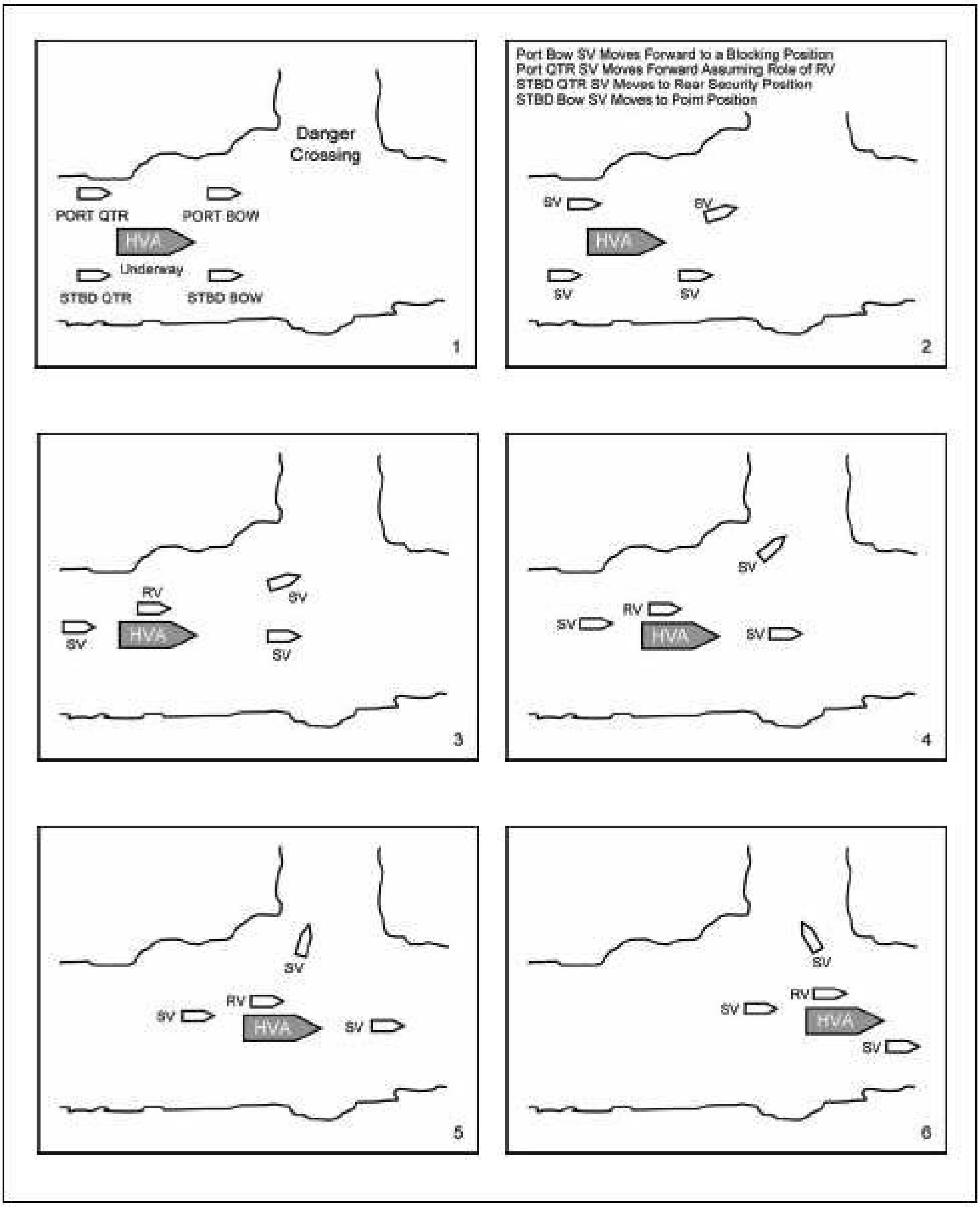


Figure 6-20. Four-Vessel Narrow Channel Escort Detect-to-Engage Sequence (Sheet 1 of 2)

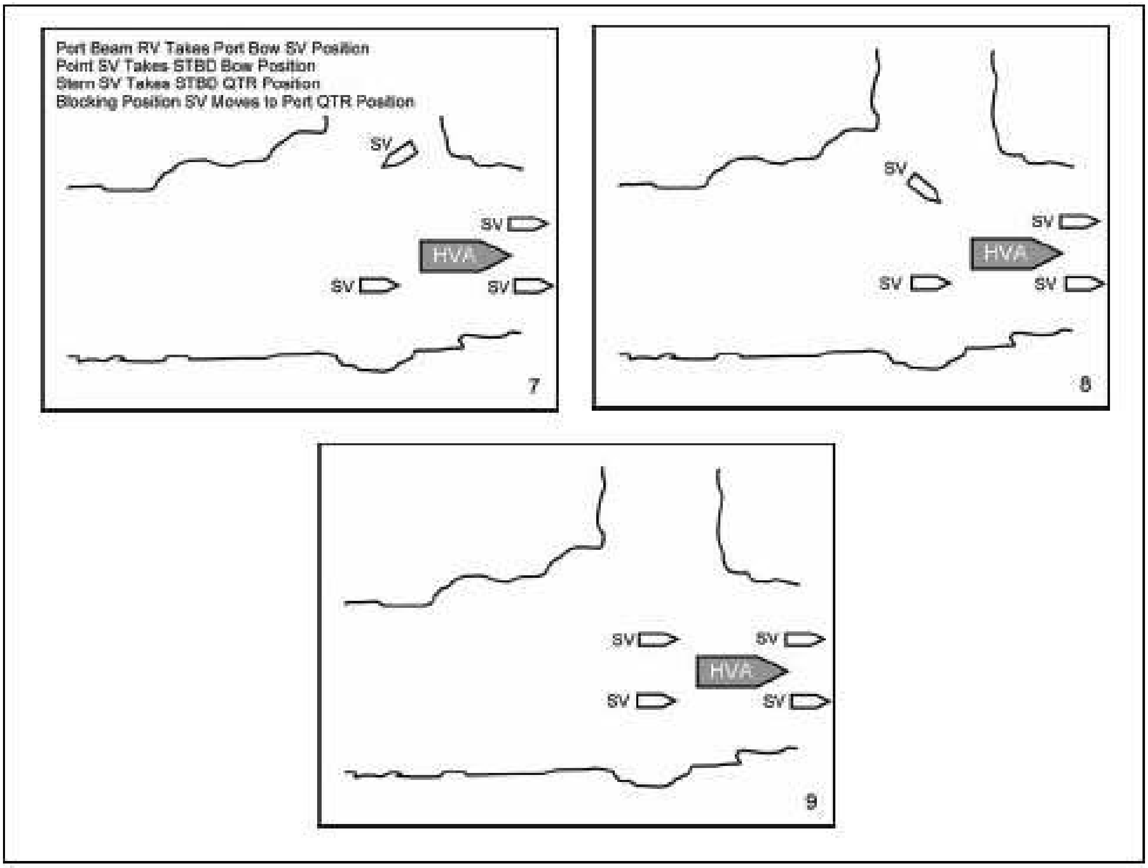


Figure 6-20. Four-Vessel Narrow Channel Escort Detect-to-Engage Sequence (Sheet 2 of 2)

b. Three Tactical Craft

In a three-boat escort, two boats patrol forward of the HVA off its port bow and starboard bow. The third boat is positioned on the port quarter or starboard quarter where the highest potential threat could approach, known as a strong front formation (see Figure 6-21). This avoids placing boats in the unsafe situation of operating directly ahead of the HVA, especially in the case of a large ship, which has a blind area ahead of it. When the HVA is underway in open water, the boats should maintain a 360-degree security zone. In the event of an aggressive movement by a COI, the SV will intercept as far as possible from the HVA. If the COI evades the SV, one of the other two boats (whichever is in the best position to respond) will function as the RV, interposing itself between the COI and HVA.

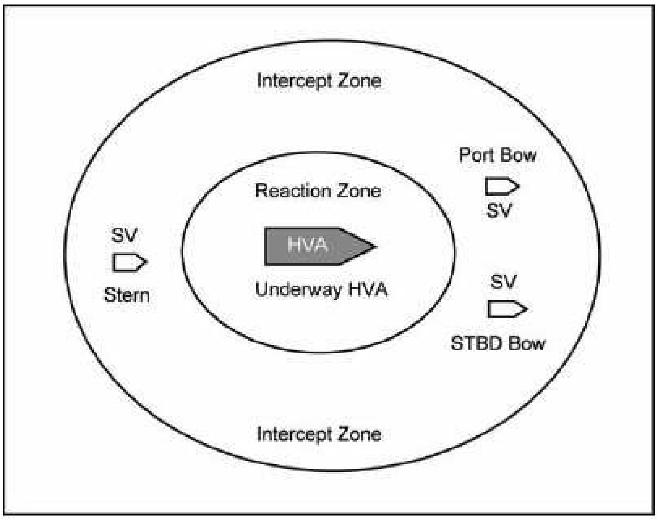


Figure 6-21. Three-Vessel HVA Escort, Strong Front

The largest escort boat should occupy the forward position to provide a visible presence. Faster, more maneuverable boats should be positioned aft to enable quick intercepts.

Note

The figures for three- and four-boat escorts depict ideal conditions. More often than not, the escort will take place in a harbor or restricted channel where establishment of a security zone with 2,000 yards/meters around the HVA may be impossible. The OTC should review the intended track of the HVA and modify the location of the SVs as needed.

An alternative to the strong front formation is the three-boat strong rear escort, where two boats patrol astern of the HVA off its port quarter and starboard quarter. The third boat is positioned on the bow. This formation is used when the likely threat is from astern of the HVA (see Figure 6-22).

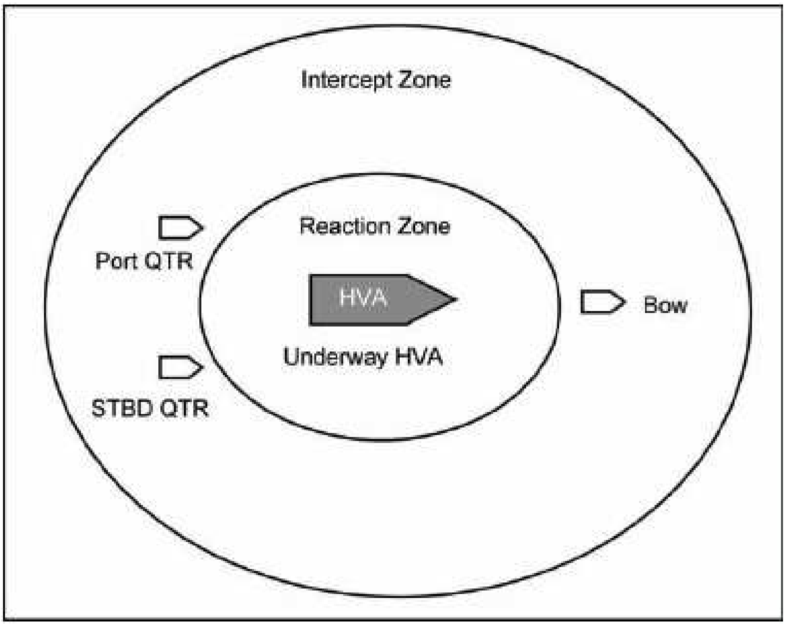


Figure 6-22. Three-Vessel HVA Escort, Strong Rear

c. Two Tactical Craft

When only two boats are available for HVA escort, one of them screens ahead (offset to port or starboard, avoiding the HVA's blind spot) at the edge of the moving intercept zone. The second boat trails astern (offset toward the opposite side of the forward SV) (see Figure 6-25). If either boat encounters a COI, it should engage the COI directly without waiting for the backup boat to get into position. The second boat moves to a position as

RV in case the COI moves past the SV. When this occurs, the RV is leaving the HVA exposed on one side. Coordination with the embarked security team is critical to cover this gap.

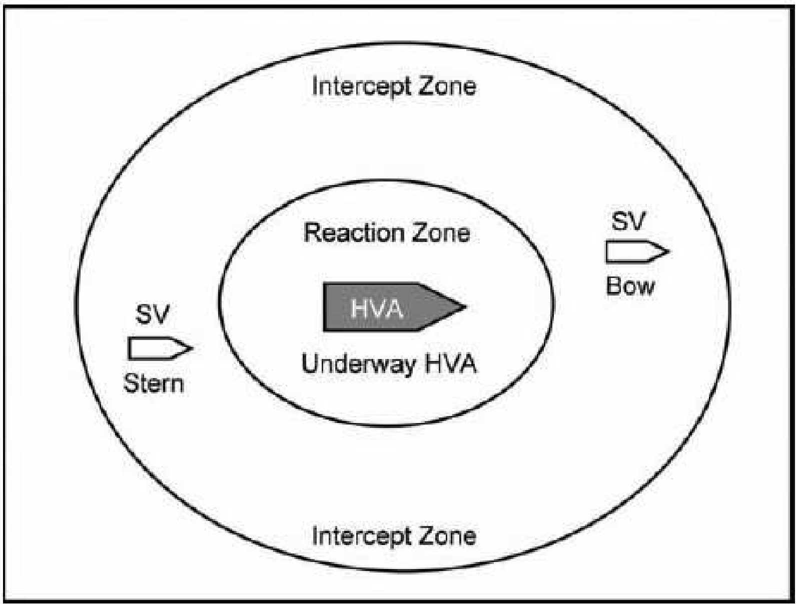


Figure 6-25. Two-Vessel HVA Escort

An alternate two-boat formation for transiting narrow waterways or passing under a bridge is to “circle the wagons” (see Figure 6-26).

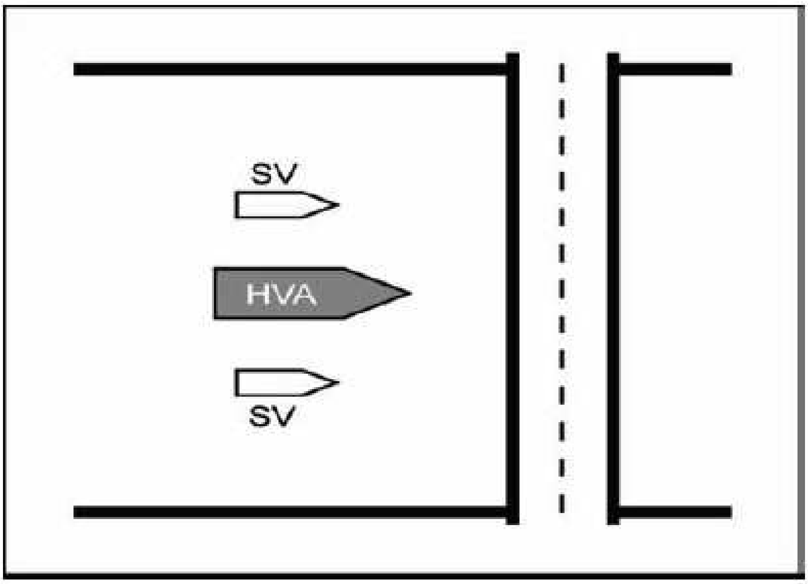


Figure 6-26. Two-Vessel Escort Passing under a Bridge

118.18 Define and discuss the following as they apply to HVA defense:
[Ref. c, 5.2]

a. Overt patrol

An example of an active security measure is overt patrol operations to intercept, identify, and conduct contact prosecution of COIs. A threat cannot see or does not know about passive security measures.

b. Covert patrol

The purpose of a cover patrol is a passive way to protect an HVA. The main focuses of this type of patrol is low impact on the port traffic.

118.19 Discuss the purpose and techniques employed in harbor surveillance patrols.
[Ref a, 1.5.1, 3.6 and 4.6.11.5]

An inshore surveillance operation locates, identifies, and interdicts waterborne threats to HVAs located in ports, harbors, and their approaches.

Mission scenarios and threat conditions will determine the actual location and employment of surveillance systems and sensors. Clandestine or restricted operations may dictate the placement of the RSSC, PSP, and MSP in locations that maximize cover and concealment. Commanding officers (COs) must consider any adverse effects on equipment and mission capabilities when maximizing RSSC concealment. Defiladed locations are preferred and all sites should maximize blending with the local topography. Open and/or exposed sites as well as ridgelines and hilltops should be avoided. Camouflage must be used whenever possible to improve concealment from air, land, and sea. If deployed on a pier or seawall, the RSSC or MSP should be collocated with other structures to the maximum extent possible.

Harbor patrols can be implemented to monitor military essential waterways for unsafe conditions and conduct surveillance of anchorages, established water terminals, and other critical port infrastructure per 33 USC 1221.

119 Engagement Tactics

References:
[a] NTTP 3-10.1 Naval Coastal Warfare Operations
[b] NTTP 3-20, Tactical Boat Operations

119.1 Discuss the following steps in interdicting a COI:

a. Initial reporting, [Ref b, Pg. 8-3]

Provided to TACON with as much info as can be obtained, as soon as possible in "SALUTE" format

b. Classifying [Ref. b, Ch. 6, 6.99 Pg. 6-29]

- Identified / classified by reporter (observer) type of contact is determined by assumed ID.
- Once positive ID has been determined, contact is renamed unknown, cargo, fishing, merchant, etc.

c. Intercepting [Ref. a, Ch. 6.6.4.3.2 Pg. 6-13]

Boat closest to COI intercepts COI at high speed at the outer boundary of warning zone. Approaching COI head-on, forcing it to turn away to avoid collision. Turn in same direction as COI and take up position on its quarter between HVA and COI.

d. Hailing [Ref. b, Ch. 7 Pg. 7-16]

Radio hail (VHF) and warn to remain clear ("merchant vessel, this is navy patrol boat off your____bow…").

e. Warning [Ref. a, Ch. 6.6.4.3.2 Pg. 6-13]

1 Inform COI of its impending trespass and give directions for appropriate exit/ departure ("you are entering a maritime exclusionary zone. Stop your vessel immediately/ proceed in another direction in order to remain clear. …you are in danger").
1 More forceful language may become necessary.

f. Herding [Ref. b, Ch.7, Pg. 7-25]

Maneuvering the patrol boat to cause the COI to change course in the desired direction/ out/ away from the warning zone. Do this in such a way that the COI doesn't have a clear line of attack to the HVA. Keep a 30ft distance.

g. Blocking [Ref. a, Ch. 6.6.4.3.2 Pg. 6-14]

Positioning of the boat in such a way as to prevent the COI from moving any further in a given direction. Normally, you will keep your boat between the HVA and the COI. Keep your distance.

h. Conducting board and search [Ref. a, Ch. 5.8.7 Pg. 5-11]

- Escort COI to a safe location outside the warning zone. This may be on a pier or anchored craft from which the boarding party can take over.
- The procedure should be performed by Coast Guard or host nation assets.
- Many legal ramifications with boarding and searches.

i. Escorting through security zone [Ref. a, Ch. 9.10.1 Pg. 9-9]

Like herding, this involves positioning the boat at the COI's quarter (between COI and HVA) and guiding the COI to an agreed upon location outside the warning zone.

j Actions if fired upon [Ref b., Pg 9-9]

If fired upon by the COI, the tactical boat should immediately maneuver at the highest possible speed to clear a sector of fire for the static weapons emplacements, notifying the tactical commander immediately by radio. The tactical boat should proceed on a course perpendicular to the firing line between the weapon emplacement and the COI.

119.2 Discuss the Rules of Engagement as they relate to COI interdiction.
[Ref. a, Ch.10.6.2.3 Pg. 10-8 to 10-9]

ROE are applicable during all military operations, contingencies, and terrorist attacks occurring outside the territorial jurisdiction of the United States. ROE are promulgated through the chain of command and apply to all subordinate commands.

A principal tenet of the ROE is the commander's inherent authority and obligation to use all necessary means available and to take all appropriate action in self-defense of the commander's unit and other U.S. forces in the vicinity.

When an operational mission is assigned, commanders at every level of command should review applicable ROE and request additional ROE as necessary to ensure mission success. Mission commanders must ensure their subordinate units are aware of the ROE and their role in the assigned mission. The TACON authority, patrol leaders, boat coxswains, and boat crewmembers must know and understand the ROE in force at all times. Any questions must be resolved before getting underway.

Patrol leaders may be required by the tactical situation to use the full range of actions permitted to them under the ROE, without requesting additional authority to engage from the chain of command. In order to provide maximum flexibility for FP against a rapidly evolving threat, the range of actions permitted under the ROE should be granted to the patrol leader. The TACON authority may give specific tactical direction where needed (e.g., engage or disengage).

119.3 Discuss the techniques for escorting a Contact of Interest (COI) through a Security Zone. [Ref. a, Ch. 9-10.1 Pg. 9-9]

See objective 118.17

119.4 Describe techniques for handing off/swapping an escort at sector boundaries. [Ref a, Ch. 9-10.1.4 Pg. 9-11]

Escort Handoff Procedures: The COI escort duty will be handed off at the sector boundary in the warning zone by employing either the insertion or loitering method, or by the boats switching patrol sectors. By whichever means the handoff is achieved, it is important to note that the turnover of the COI is a formal process, initiated only when both boats are ready for the handoff. If the second boat is not prepared, control over the COI may be lost if the first boat leaves station prematurely. Further, the handoff procedure requires practice, careful seamanship and positive communication by radio and/or hand signals between the two escort boats to ensure success.

Insertion Method: Boat 1 is escorting the COI as they approach the sector boundary. Boat 1 signals to Boat 2, “handoff.” Boat 2acknowledges with “roger out” and maneuvers to approach the COI and escort boat from astern. Boat 1 moves slightly away from the COI, and Boat 2 inserts itself between Boat 1 and the COI. Once Boat 2 is on station and has positive control over the escort, the coxswain signals to Boat 1, “Handoff.” Boat 1 signals, “Handoff,” breaksaway and returns to its patrol sector. Net brevity is especially critical at this point as there may be multiple contacts. Figure 9-10 depicts the insertion handoff method.

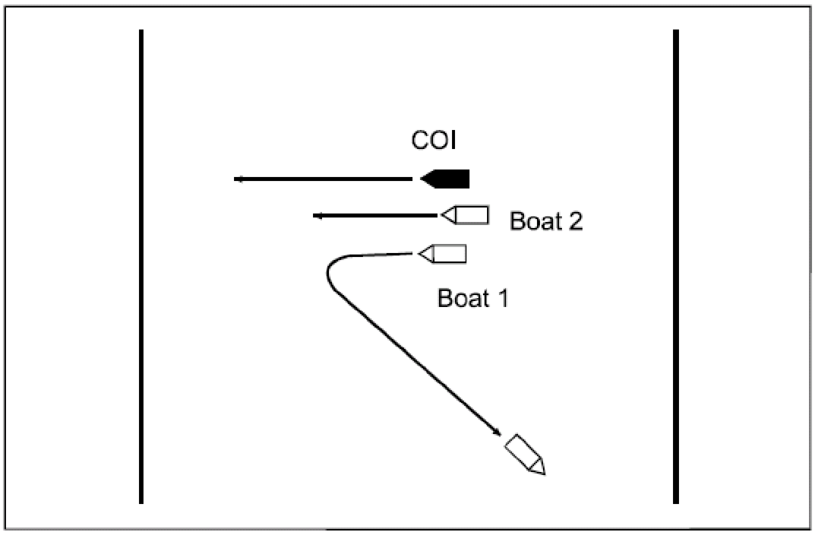


Figure 9-10. Insertion Method

Loitering Method: An alternative method of handoff is for Boat 2 to loiter at the sector boundary. As the COI and escort boat approach, Boat 2 gradually increases speed to parallel their course. Boat 1 breaks away to the outside, leaving Boat 2 with the escort. Figure 9-11 depicts the loitering handoff method.

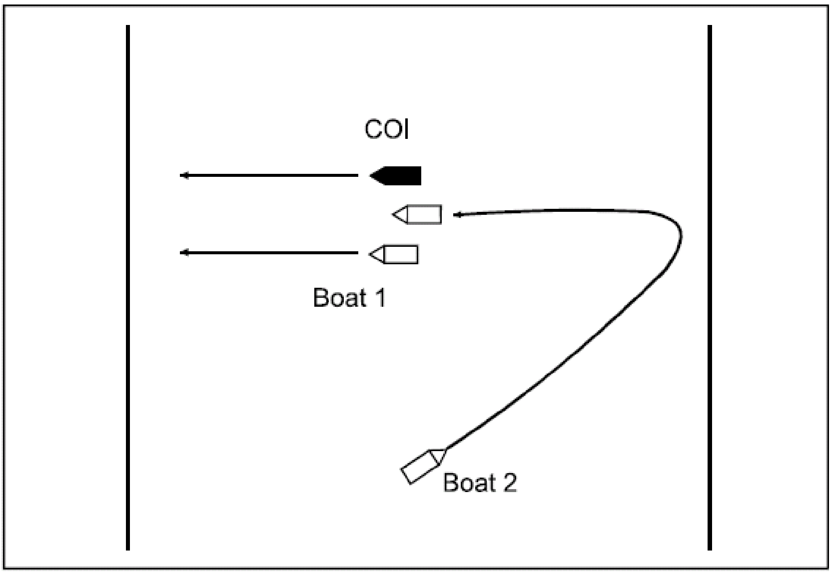


Figure 9-11. Loitering Method

Switching Sectors: If it is not practical to achieve a handoff at the sector boundary (e.g., if the vessels are moving too fast), the two boats will switch sectors. Boat 1 will stay with the escort, while Boat 2 moves to patrol the sector vacated by Boat 1. This is accomplished when Boat 1 signals to Boat 2, “Swap.” Boat 2 acknowledges and takes the other sector.

119.5 Discuss the three phases of contact prosecution [Ref. b, Ch. 7.1 Pg. 7-1]

a. Interception

Tactical boat intercepts are typically initiated after visual or electronic detection, other prompts, and/or intelligence reports. The following factors influence how intercepts are to be conducted.

Detection of Contact of Interest

When in sight or within radar range of the COI, a prudent course of action is to conduct a direct, rapid intercept using a maximum safe speed. This allows the quickest time on scene and lessens the ability of persons aboard the COI to destroy evidence, hide contraband or migrants, or evade intercept.

Intercept Geometry

The relative positions and speeds of the COI and intercepting tactical boat determine the possible intercept routes. In some instances, an immediate intercept may be necessary to avoid a prolonged stern chase. In other cases, the tactical boat may be able to loiter on station and allow a contact to approach it and perform a rapid intercept only after the COI enters a security zone.

The Operational Situation

The operational situation may dictate an immediate intercept or decision to delay the evolution until other conditions are met. Among these factors are:

1. The need to conduct surveillance prior to intercept if, for example, the COI is headed toward a suspected rendezvous with another vessel

2. Potential threat of other COIs

3. Operational security concerns (not divulging the presence of tactical boats)

4. Availability of other tactical boats to execute the intercept

5. Fuel state and fuel conservation

6. Weather and sea state

7. Desire for a day or night intercept.

b. Approach

The approach phase occurs when a tactical boat closes a COI to determine intent. The coxswain typically makes the final decision regarding the method of approach, the speed used, and the distance to which the boat will close.

Note

Within safety constraints, the closer a tactical boat can approach, the better it will be able to exert command presence and conduct a thorough visual examination of the COI. Beware of dangerous objects being thrown from a COI during the approach phase.

c. Engagement

The most important task a tactical boat can execute is determining if a COI has hostile intent. Both DOD and the USCG have specific guidance on how to conduct operations in regard to ROE, policy on the RUF, and the use of deadly force. Discussion of command relationships, the Coast Guard Use of Force Policy (CGUOFP), DOD and DOD guidance as contained in CJCS Instruction (CJCSI) 3121.01 (series), Standing Rules of Engagement/ Standing Rules for the Use of Force for U.S. Forces, are contained in Chapter 10.

This section focuses on the application of these rules, known as a level of force continuum. The techniques used to stop a VPIT are provided in Figure D-1. The UOF to stop a noncompliant vessel (NCV) are provided in Figure D-2 (USN/USMC) and Figure D-3 (USCG).

Note

A commander has the authority and obligation to use all means available and to take all appropriate actions to defend a unit, including elements and personnel, or other U.S. forces in the vicinity against a hostile act or demonstrated hostile intent. At all times, the requirements of necessity and proportionality will form the basis for the judgment of the OSC or individual as to what constitutes an appropriate response to a particular act or demonstration of hostile intent. The requirements of necessity and proportionality are amplified in CJCSI 3121.01 (series), Standing Rules of Engagement/Standing Rules for the Use of Force for U.S. Forces. These standing rules of engagement (SROE) make clear a commander's inherent right and obligation in self-defense, which should be exercised if faced with a hostile act or demonstration of hostile intent.

119.6 Discuss the following types of intercepts that may be used during the intercept phase [Ref. b, Ch. 7.3-7.3.4.5 Pg. 7-3 through7-7]

a. Direct route

The most commonly used intercept follows a direct route toward the COI's predicted position at the maximum available safe speed. This intercept will create a constant bearing, decreasing range situation until the tactical boat enters the approach phase. Advantages of this tactic include simplicity and shortest time on scene. One major disadvantage is that in many situations the direct intercept exposes the tactical boat's profile to the COI. This can lead to early detection and identification of the tactical boat (see Figure 7-1).

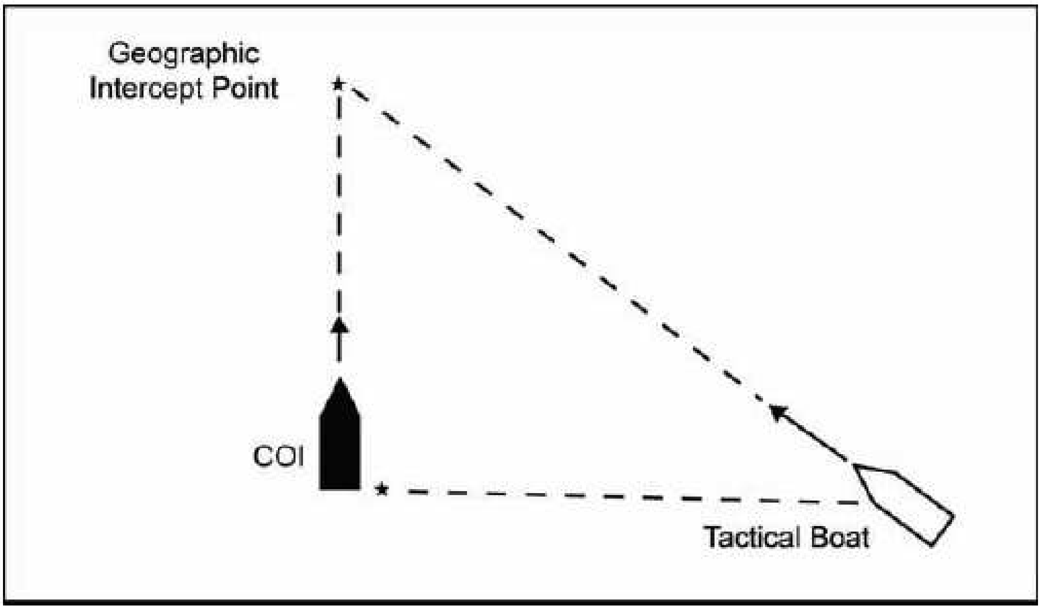


Figure 7-1. Direct Route Intercept

b. Aiming Bow on

To avoid being identified and to increase the element of surprise, an alternative is to aim the tactical boat's bow directly at the COI and alter course to remain bow on the COI. The intercept track will loop left or right as it follows the bearing drift of the COI as seen in Figure 7-2. An advantage of this tactic is that it allows more time to observe activities on the COI. Drawbacks include a longer intercept time and potential doubt aboard the COI as to the tactical boat's intentions as it constantly shifts course to remain bow on.

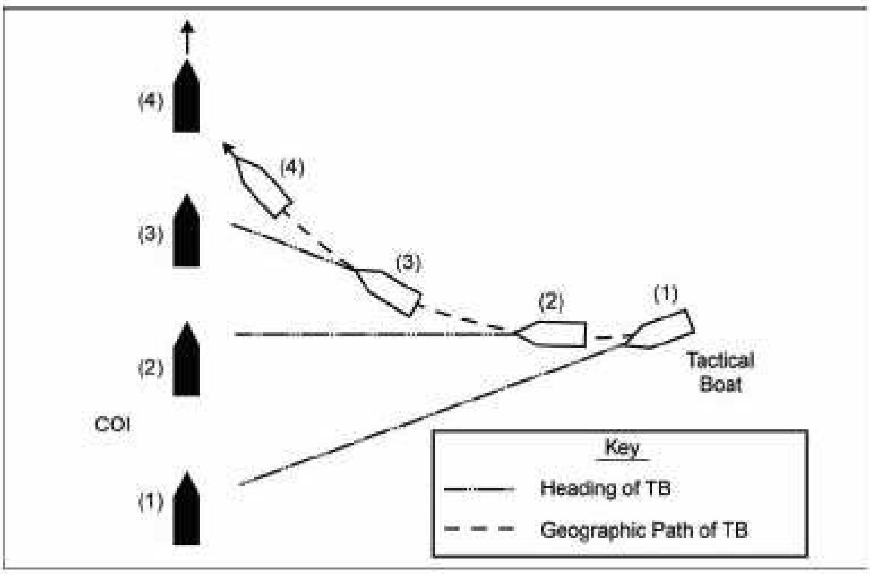


Figure 7-2. Aiming Bow On

d. Dog Leg intercept

In the dog leg intercept, the tactical boat intercepts a point offset from the COI. This allows the intercepting boat to obtain a rough visual identification of the COI while possibly seducing the COI's crew into believing it is not being intercepted (see Figure 7-3). Once reaching a predetermined point, the intercepting boat can veer toward the COI and finish the intercept and approach or continue with other operations.

The dog leg intercept is very useful in the following circumstances:

1. When searching for a specific COI, the dog leg eliminates the need to conduct a full intercept and approach on every vessel. Only those vessels that meet designated criteria during the rough visual identification should be fully intercepted.

2. When patrolling in high traffic areas where numerous potential COIs are present.

3. At night when combined with deceptive lighting schemes.

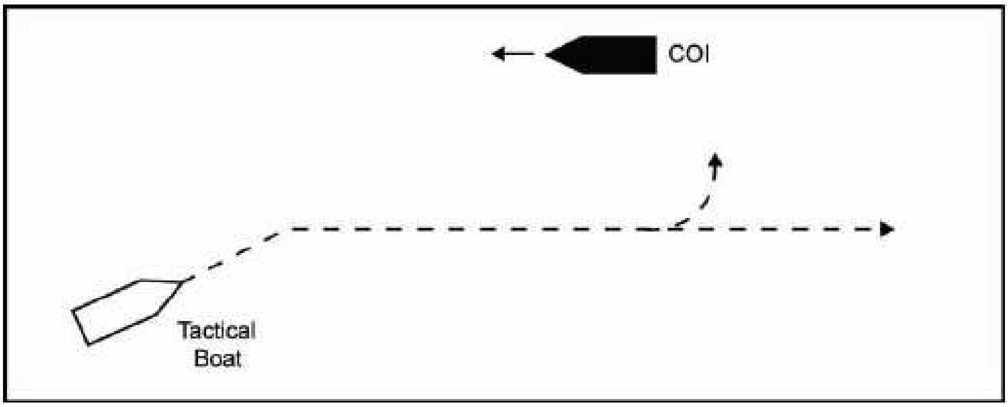


Figure 7-3. Dog Leg Intercept

d. Astern intercept

Maneuvering to conduct an intercept from directly astern the COI can delay counter detection. Experience shows that vessel operators spend most of their effort looking forward and not behind themselves. Similarly, many vessel radars have a blind spot directly astern. When conducting an astern intercept, the intercepting boat should move out of the COI's wake before starting the approach phase to mitigate any danger from materials trailing behind or thrown from the COI.

e. Tactical boat intercept from a ship or cutter

Launching a tactical boat(s) prior to approaching the COI can generate maximum element of surprise. This is an especially valuable means for rapidly stopping and boarding a vessel and should be considered when the COI is expected to try and evade intercepting forces.

There are several variations on this tactic. One is to launch the tactical boat when the COI is still over the horizon. The boat can then steam ahead of the ship to conduct the intercept and approach prior to the ship's arrival on scene.

A second variation involves launching the boat when fairly close to the COI but prior to conducting the approach phase. The ship and boat can approach the COI simultaneously; this eliminates the need to make course and speed changes to launch the boat when maneuvering alongside the COI.

Another option is to launch the boat prior to counter detection and have the boat circle to the opposite side of the COI. When the ship makes the final approach, the boat is properly positioned should the COI attempt to flee (see Figure 7-4). This tactic works especially well at night and when the ship is able to approach close aboard without being detected by the COI.

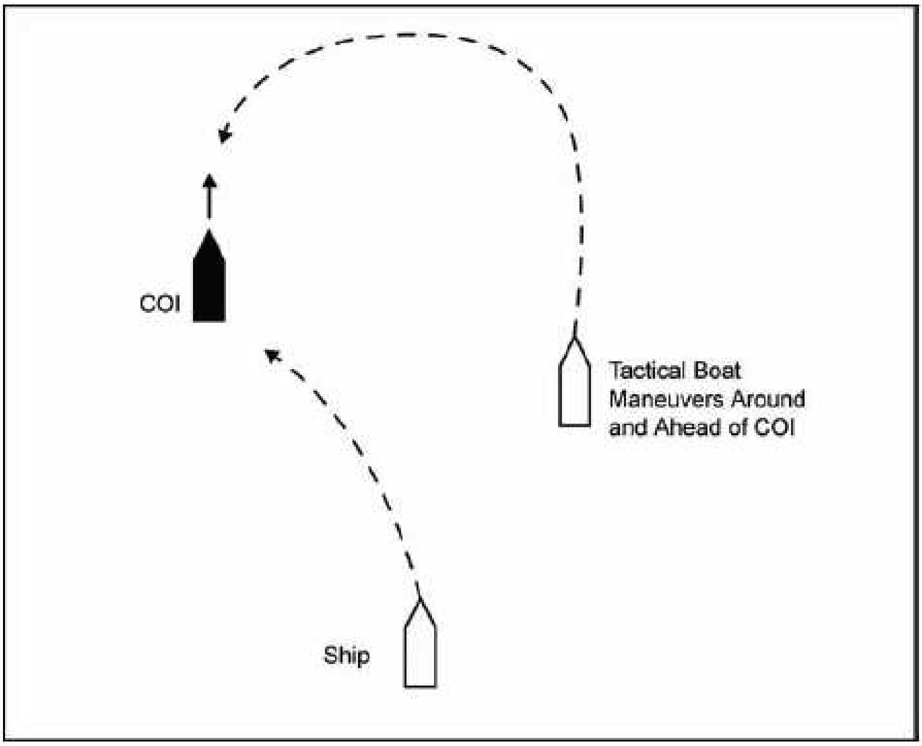


Figure 7-4. Two-Craft Intercept

119.7 Discuss multi boat intercepts [Ref. b, Ch. 7.3.4.6 Pg. 7-7]

In some instances it may be necessary to employ more than one tactical boat to intercept a COI. Multi-boat intercepts are appropriate when:

1. There is a high probability the COI will flee or resist upon intercept.
2. The COI is known to be heavily loaded with migrants and is potentially unseaworthy.
3. A show of force is needed to deter the COI from taking hostile actions.

Multi-boat intercepts can be performed in a myriad of ways and will be driven by the situation at hand and the operational capabilities of the tactical boats. Considerations for multi-boat intercepts include:

1. Approaching simultaneously from opposite sides limits the COI's potential escape routes and offers a strong show of force.
2. Having the quickest boat arrive on scene as soon as able is essential in known emergency cases (i.e., grossly overloaded vessels, sinking vessels).
3. The first boat on scene can maneuver to approach the COI from the opposite direction of the other boats. If the COI flees, it will unknowingly flee toward another tactical boat.
4. In cases where foreign territorial seas or shallow waters offer sanctuary for the COI, the first boat on scene can position itself to cut off a possible escape into these waters.

119.8 Discuss night intercepts [Ref. b, Ch. 7.3.4.6, Pg. 7-8]

An intercept at night can yield much greater stealth and surprise for tactical boats. Conversely, the element of danger is raised over an intercept in daylight.

Many intercept courses will involve the intercepting boat steaming directly, or nearly directly, at the COI. At night, the COI will see both side lights of the boat and may take action to avoid collision. To prevent this reaction, the boat can modify its intercept course slightly to show the COI a single side light.

Night intercepts are also affected by moonlight, which may silhouette the tactical boat or make it clearly visible to the COI. In these cases, aiming bow on or conducting an astern intercept may mitigate early counter detection.

119.9 Discuss the steps to be taken in the event of ambush. [Ref. b, Ch. 5, Pg. 5-20]

Immediate, positive, and aggressive action is required to counter an ambush. Boat crewmembers and embarked troops must be thoroughly indoctrinated as to the basic measures to be initiated in case of an ambush. Tactical boats escorting an HVA must ensure response coordination with security teams embarked on the HVA. Placement of a liaison officer from the tactical boat unit on the HVA facilitates this coordination, especially when it is not possible to conduct planning prior to the operation. Rehearsals should be conducted to develop speed and coordination. The basic principles to be applied are:

1. In a near ambush, the killing zone is under very heavy, highly concentrated, close range fires. There is little time or space for boats to maneuver or seek cover. The longer they remain in the kill zone, the more certain their deaths. Boats in the kill zone immediately assault the threat's position without waiting for order or signal per preplanned rehearsed immediate action. Weapons must be brought to bear immediately on the threat.

2. In a far ambush, the commander must immediately suppress the threat and depending on the mission make a determination to assault the threat or break out of the kill zone. It is vital for the boats to clear the kill zone. If an assault is conducted, execute an immediate movement toward the threat in a direct assault. Supporting elements not in the kill zone lay down suppressive fire and conduct flanking movements to assault the threat.

3. Report to the tactical commander and request support.

4. Use smoke, if available, to counter an ambush or aerial attack.

5. Establish rallying points at periodic intervals along the route to facilitate the collection of stragglers who became separated from the main body.

119.10 Discuss the following types of approaches.
[Ref. b, Ch. 7.4.2 – 7.4.2.3, Pg. 7-10 through7-12]

a. Astern

The safest way to approach another vessel is from abaft that vessel's beam. Approaching from astern reduces relative motion and permits greater freedom to maneuver to avoid collision. The astern approach allows the tactical boat to observe and attempt retrieval of any materials thrown in the water. If previously undetected, the tactical boat may remain unseen longer if approaching from astern. Figure 7-5 shows an astern approach.

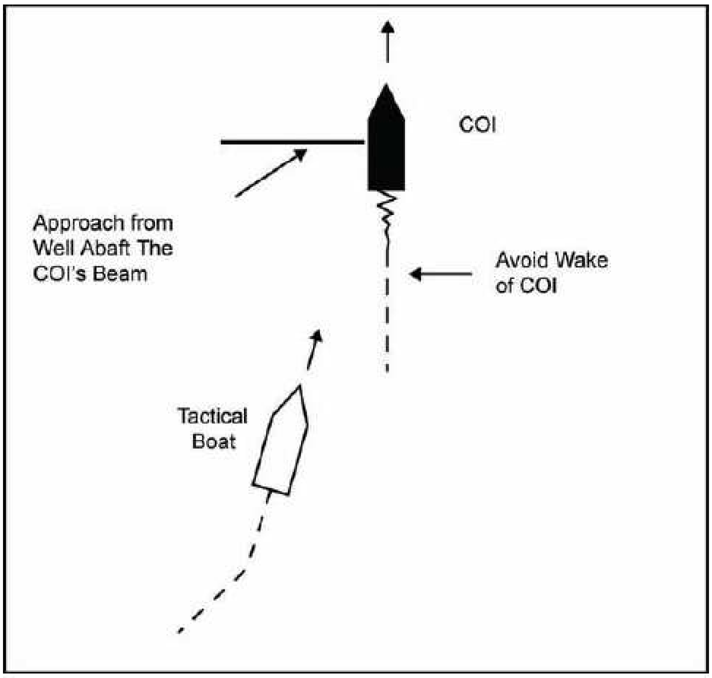


Figure 7-5. Astern Approach

When the tactical boat approaches from astern and takes station abaft a COI's beam, it is possible that the persons aboard the COI may not see the boat. The tactical boat may need to reposition itself off the COI's beam or forward of the beam to get the attention of the persons operating the COI. This situation occurs regularly when intercepting and approaching a vessel with a small crew or where the layout of the vessel's pilothouse limits visibility.

b. Bow on

This approach creates faster closure rate and lessens the tactical boat's time to react to unexpected course or speed changes from the other vessel. An offset up to two points off the bow will provide additional reaction time to unexpected COI actions. When intercepting a slow moving COI such as a sailboat or tug and tow, these concerns are greatly reduced. The head-on approach yields almost certain counter detection.

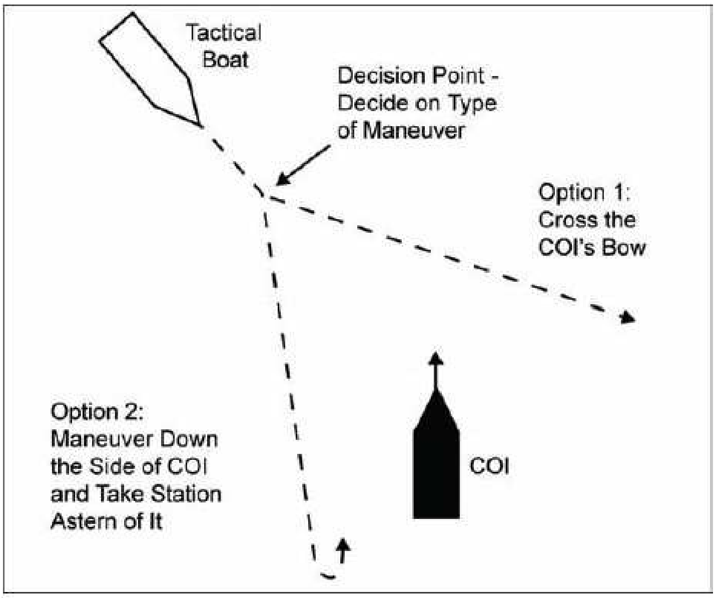


Figure 7-6. Bow-On Approach

The termination of the bow-on approach is when the tactical boat either crosses the COI's bow or passes down its side. Aiming to cross another vessel's bow is the most dangerous form of intercept and should only be used when approaching a very slow moving COI or when desiring to quickly capture the attention of the person operating the COI. Crossing the bow may provide the one and only chance to intercept a high-speed COI. Figure 7-6 shows a bow-on approach.

c. Beam

A compromise between the safety of the astern approach and the danger of the bow-on approach is approaching from broad on the COI's beam. This approach involves a moderate degree of counter detection and danger. After approaching from abeam, the tactical boat can slide aft to take station off the COI's quarter or can later cross the other vessel's bow if necessary. See Figure 7-7.

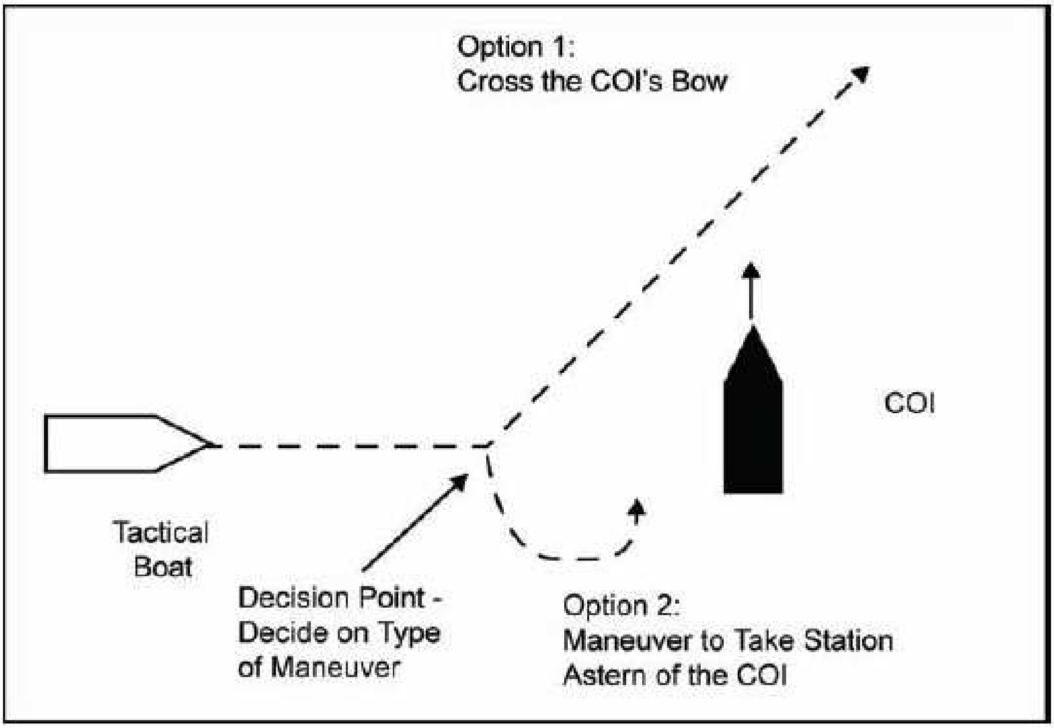


Figure 7-7. Beam Approach

119.11 Discuss the following as related to the approach phase.
[Ref. b, Ch. 7-4 -7.4.2.3, Pg. 7-8 to 7-10]

a. Safety considerations

Approaching another vessel can be a challenging evolution, and the tactical boat must exercise great care. Consider the following safety concerns when determining the method of approach.

b. Risk of collision

As with the intercept, risk of collision is the primary safety consideration during an approach.

c. Speed of approach

The greater the closure rate motion between the two vessels, the less reaction time is available should unexpected maneuvers or other actions occur. An excessively slow approach wastes time and allows personnel on the COI time to prepare for the tactical boat's arrival. The best approach balances these competing needs and allows a safe, controlled, and timely evolution.

d. Escape route

Coxswains should predetermine an escape route in the event the COI makes a threatening course or speed change. Depending on the geometry of the approach, the escape route may require modification as the approach evolves.

e. Obstructions

Coxswains must avoid outriggers and any obstructions that may extend from the COI.

f. Crossing the wake

Avoid crossing a COI’s wake close aboard during an approach. Dangers include injury to personnel due to wave motion on the boat, entanglement in fishing gear, line, or any other material trailing from the vessel, materials intentionally jettisoned by the COI. Trailing lines will often be difficult to spot visually and can foul the propeller, rudder, or under hull appendages of boats.

Crossing a substantial wake at high speed can launch a tactical boat and cause personnel to be ejected from the craft.

Cross a wake well away from the COI. Prior to entering the wake, perform a close visual examination for materials in the water.

g. Relative speed

Coxswains must be cognizant of the relative speed between the tactical boat and COI so as to avoid a collision.

119.12 Discuss Multi boat approaches [Ref. b, Ch. 7.4.2.4, Pg. 7-12]

This approach involves two tactical boats arriving alongside the vessel simultaneously. This approach provides a full view of the COI throughout the approach. See Figure 7-8.

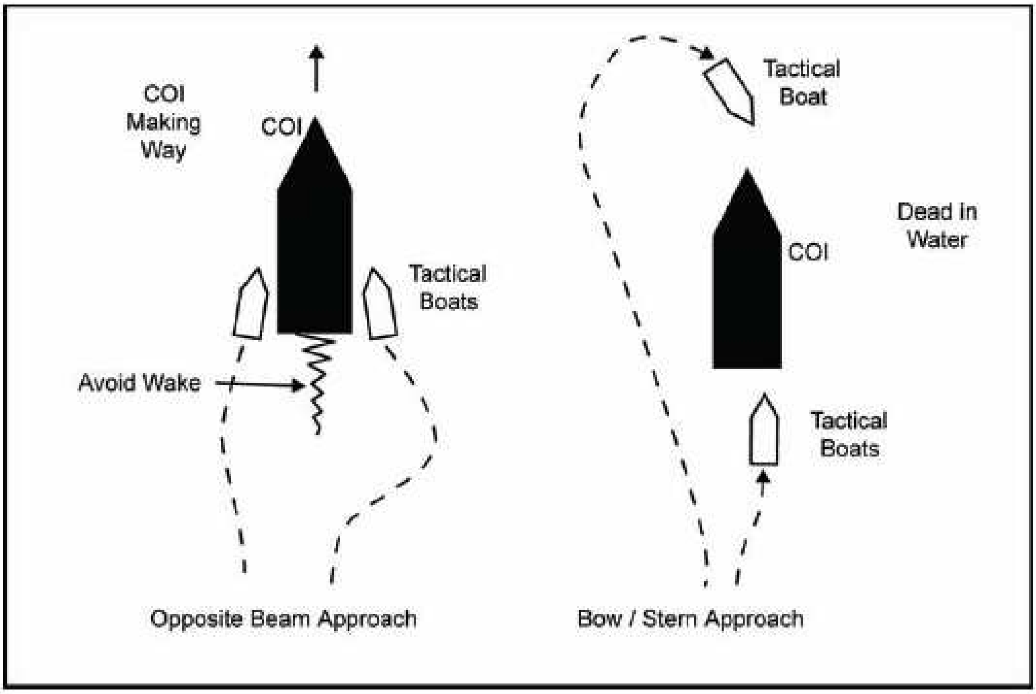


Figure 7-8. Multi-Boat Approach

119.13 Discuss the following considerations when conducting an external inspection of a COI. [Ref. b, Ch. 7.4.4-7.4.5.2, Pg. 7-13through 7-15]

As the tactical boat approaches the COI, the boat crew should conduct a close external examination of the vessel, searching for any signs of illegal activity or potential hazards to a boarding party and small boat. The two commonly used methods for conducting the inspection are the circling and horseshoe methods.

a. Inspection approach methods

Circling

Use this procedure when approaching vessels that are DIW or are creeping ahead at a very slow speed (no greater than 3 to 5 knots). Circle the vessel close aboard at slow speed, conducting a detailed inspection. See Figure 7-10.

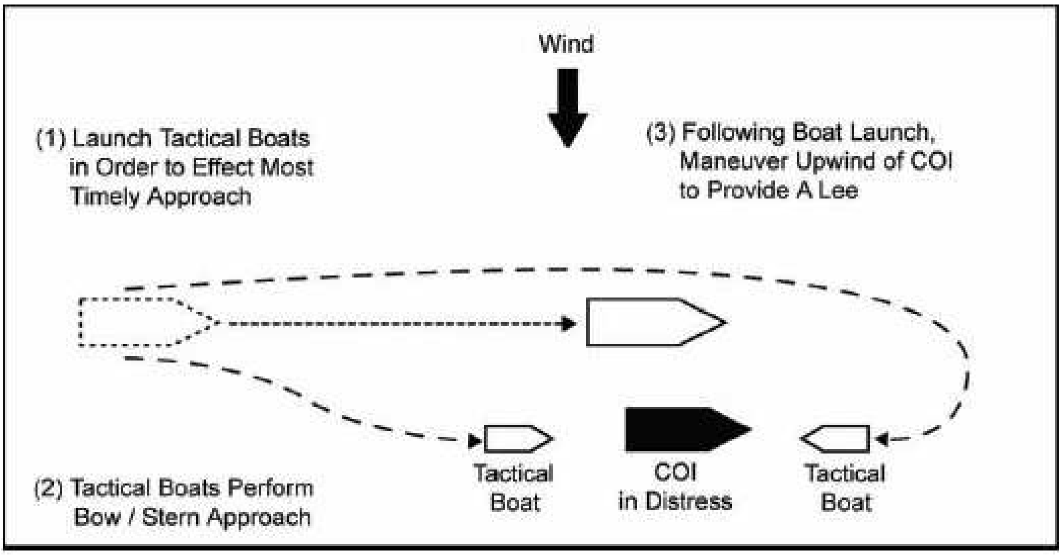


Figure 7-9. Multi-Boat Approach to a Distressed COI

Horseshoe

Use this method when the COI is making way at speeds greater than 3 to 5 knots. Inspect one side of the vessel from bow to stern, cross the stern, and inspect the opposite side from stern to bow. Do not cross the vessel's bow at any time during the inspection. See Figure 7-10.

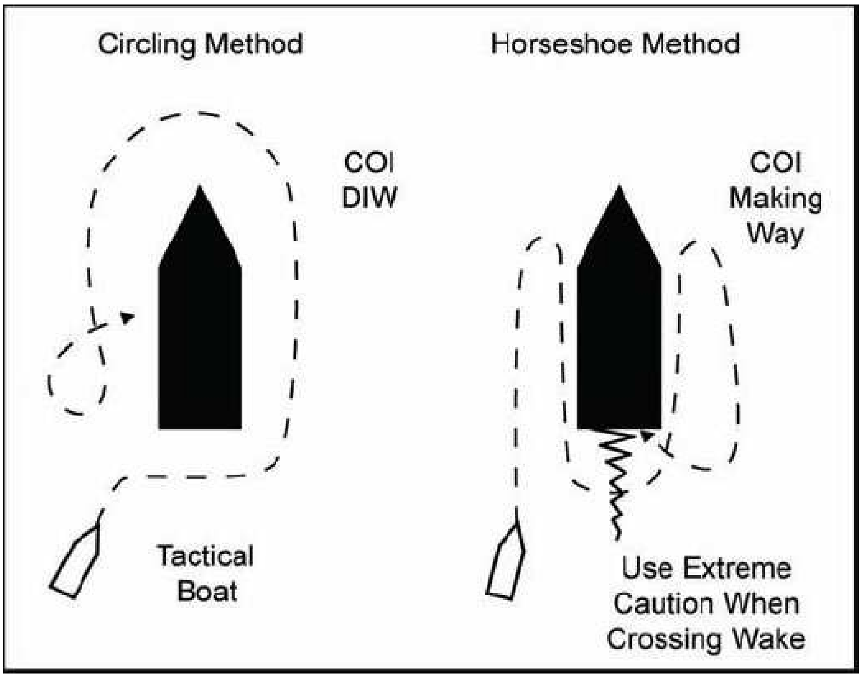


Figure 7-10. Small Vessel Examinations of a COI

Crossing a substantial wake at high speed can launch a tactical boat and cause personnel to be ejected from the craft.

Exercise extreme caution when crossing the wake of the COI vessel, remaining vigilant for any items trailing behind the vessel that may foul the propeller of the tactical boat.

b. Taking station

At the conclusion of the approach, the tactical boat should take station at a safe distance by matching courses and speeds with the COI.

c. Distance

The closer the tactical boat can take station the better it will be able to exert command presence and conduct a thorough visual examination of the COI. Several factors will influence the distance at which the boat will take station:

1. Size and construction of the COI
2. Maneuverability of the intercepting boat
3. Level of threat
4. Sea and wind conditions
5. Presence of other vessels or obstructions in the immediate area.

d. Relative position

The safest position for a tactical boat is to take station off the COI’s quarter. This position allows the easiest surveillance of the COI while affording the greatest protection against collision due to intentional or inadvertent course changes.

A relative position of 150 to 160 or 200 to 210 degrees from the COI allows the best escape routes from a possible ramming. A position closer to the COI’s beam can reduce the ability to escape collision due to a sharp course change by the COI. When station keeping off the quarter, avoid entering the COI's wake. Figure 7-11 shows notional ship and boat positions.

The intercepting vessel can also take station off the other vessel's bow or beam, but these relative positions offer strengths and weaknesses:

1. A bow station allows more room for escape in case of a severe course change by the COI.

2. Stationing off the bow makes surveillance of the COI by the tactical boat more difficult.

3. Station keeping off the beam limits escape routes and is the most dangerous relative position.

119.14 Discuss the techniques used to warn, and if required stop a non compliant vessel [Ref. b, Ch. 7.5.6, Pg. 7-17 through 7-18]

The following are techniques (see Figure 7-12) used to stop a NCV. USCG personnel must specifically follow the process as stated in COMDTINST M16247.1 (series), USCG Maritime Law Enforcement Manual (MLEM); Chapter 4.

USN/USMC	USCG
LEVEL ONE	**STEP I - Command Presence**
Show waterborne presence	Show waterborne presence; insignia displayed/illuminated
Hail by radio and warn to remain clear	Hail by radio
Verbal hail and warn to remain clear (hailer)	Verbal hail and warn to remain clear (hailer)
Sound siren/Five blasts on horn/Flash blue lights	Sound siren/Sound horn/Flash blue lights
Hand movements	Employ signals to warn off (HO 102)
Man weapons stations	Visibly uncover, ready, and man weapons (without pointing at vessel)
Use unambiguous warning device	
Aggressively maneuver between COI and HVA to encourage COI to change course	Maneuver close aboard vessel
Herd contact to cause change in desired direction	Increase number of friendly assets on scene
LEVEL TWO	**STEP II - Low-Level Tactics**
Use of flares or other authorized visual/audible warning devices	Block wind, if sailing vessel Employ lines, nets, or entanglers
Shine spotlights on COI pilothouse	Sever or disconnect fuel lines Use firefighting water on sails or engine
Blocking the COI by positioning boat to counter the COI's heading	Physically block
Shouldering/herding the COI to cause course change in desired direction	Shoulder
Train weapons on COI	
LEVEL THREE	**STEP III - Higher-Level Tactics**
Warning the COI it will be fired upon	Employ 12-gauge string ball projectile
*Warning shots (i.e., across the bow).	Employ 12-gauge rubber fin-stabilized munitions
LEVEL FOUR	**STEP IV - Disabling Fire**
Use disabling fire (directed at engine to stop vessel)	Employ warning shots
Use directed destruction fire	Employ disabling fire
*Authorized OCONUS and CONUS for USN units	

Figure 7-12. Use of Force Comparison

119.15 Discuss Pier side HVA Detect-to-Engage Sequence.
[Ref. b, Ch. 6.8.2.4 – 6.8.2.5, Pg. 6-12-6-16]

Three-Vessel Pierside HVA Detect-to-Engage Sequence
Figure 6-8 shows a detect-to-engage sequence for a three-vessel security element enforcing a security zone around a pierside HVA.

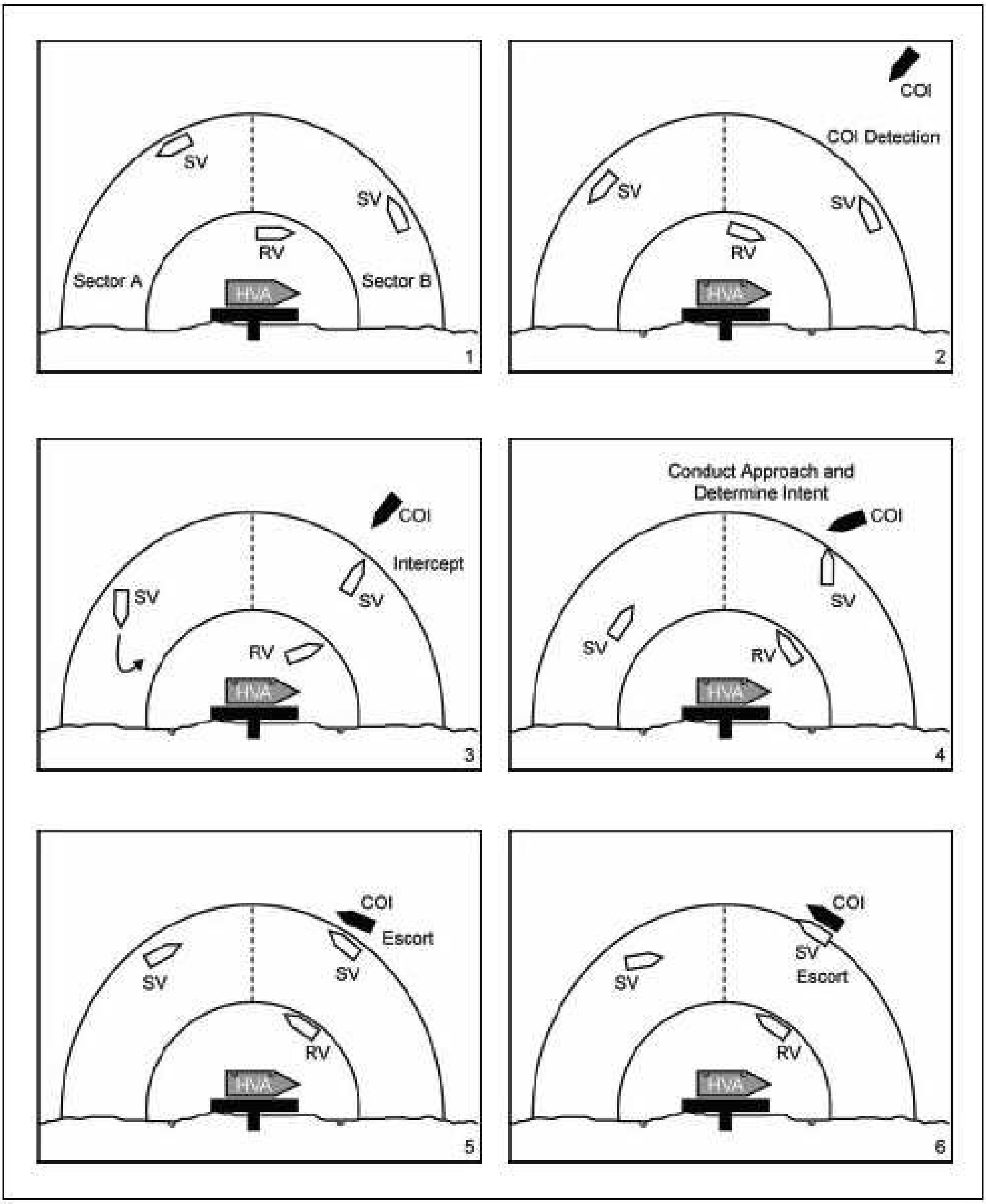


Figure 6-8. Three-Vessel Pierside HVA Detect-to-Engage Sequence (Sheet 1 of 2)

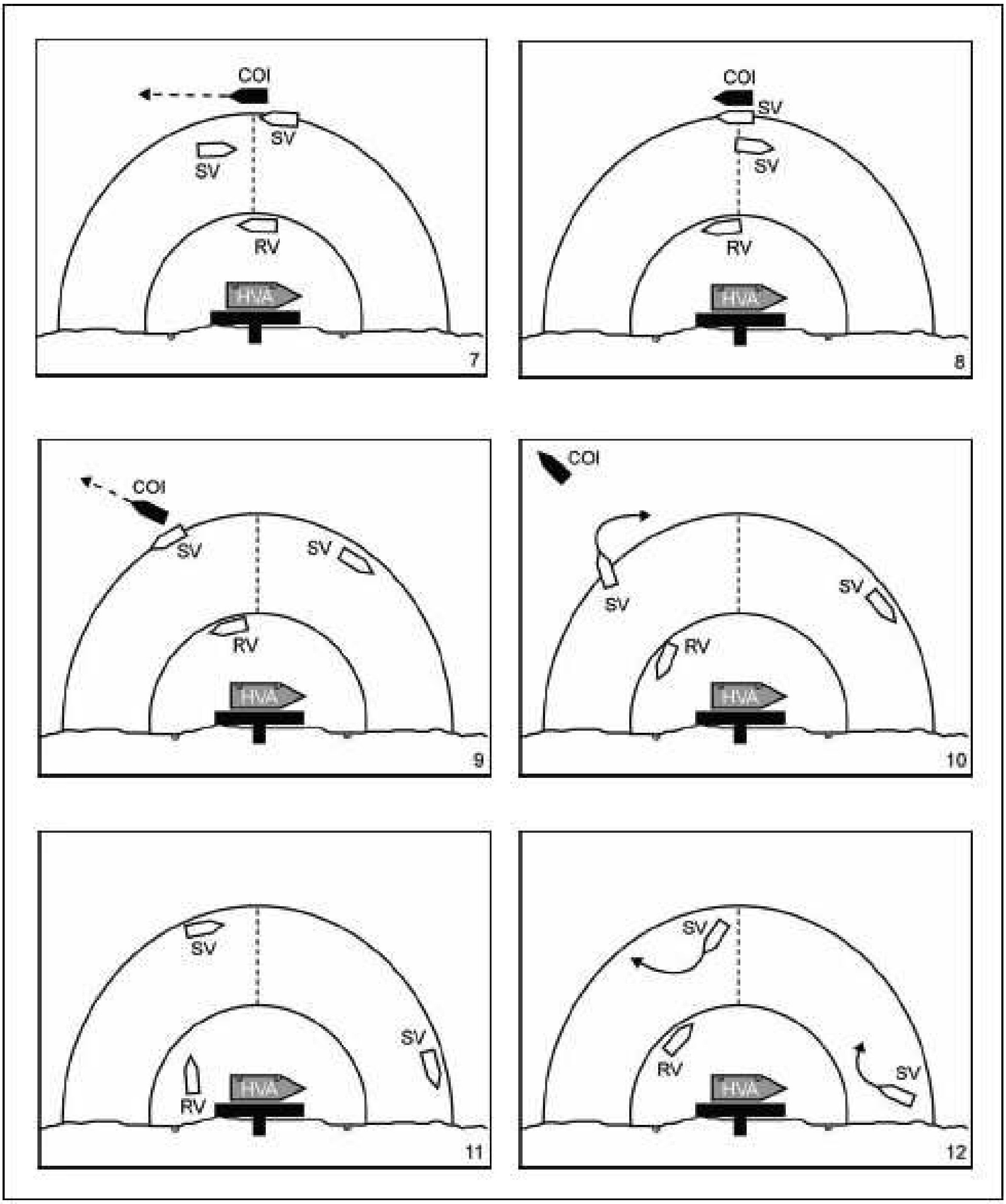


Figure 6-8. Three-Vessel Pierside HVA Detect-to-Engage Sequence (Sheet 2 of 2)

Two-Vessel Pierside HVA Detect-to-Engage Sequence
Figure 6-9 shows a detect-to-engage sequence for a two-boat security element enforcing a security zone around a pierside HVA.

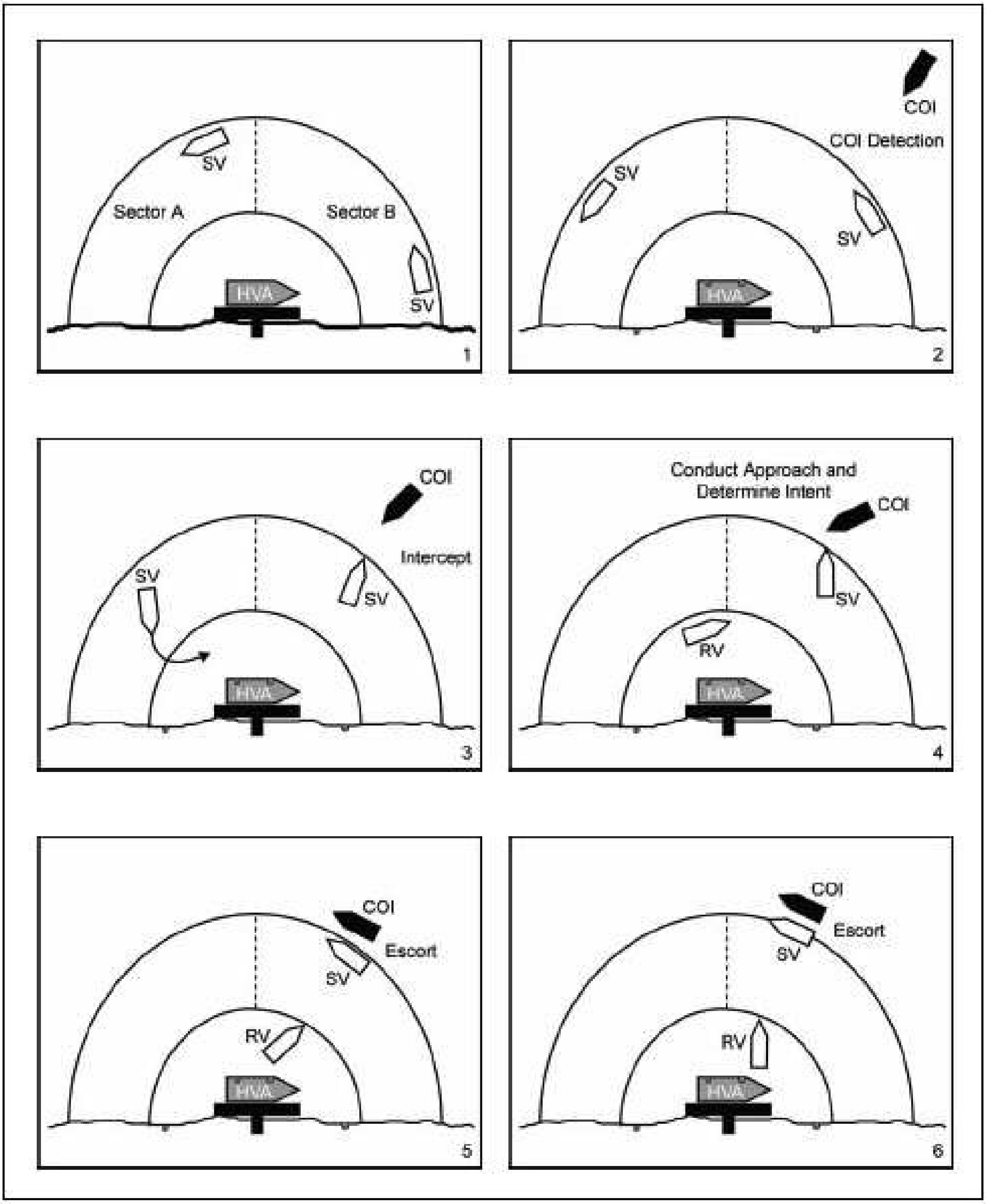


Figure 6-9. Two-Vessel Pierside HVA Detect-to-Engage Sequence (Sheet 1 of 2)

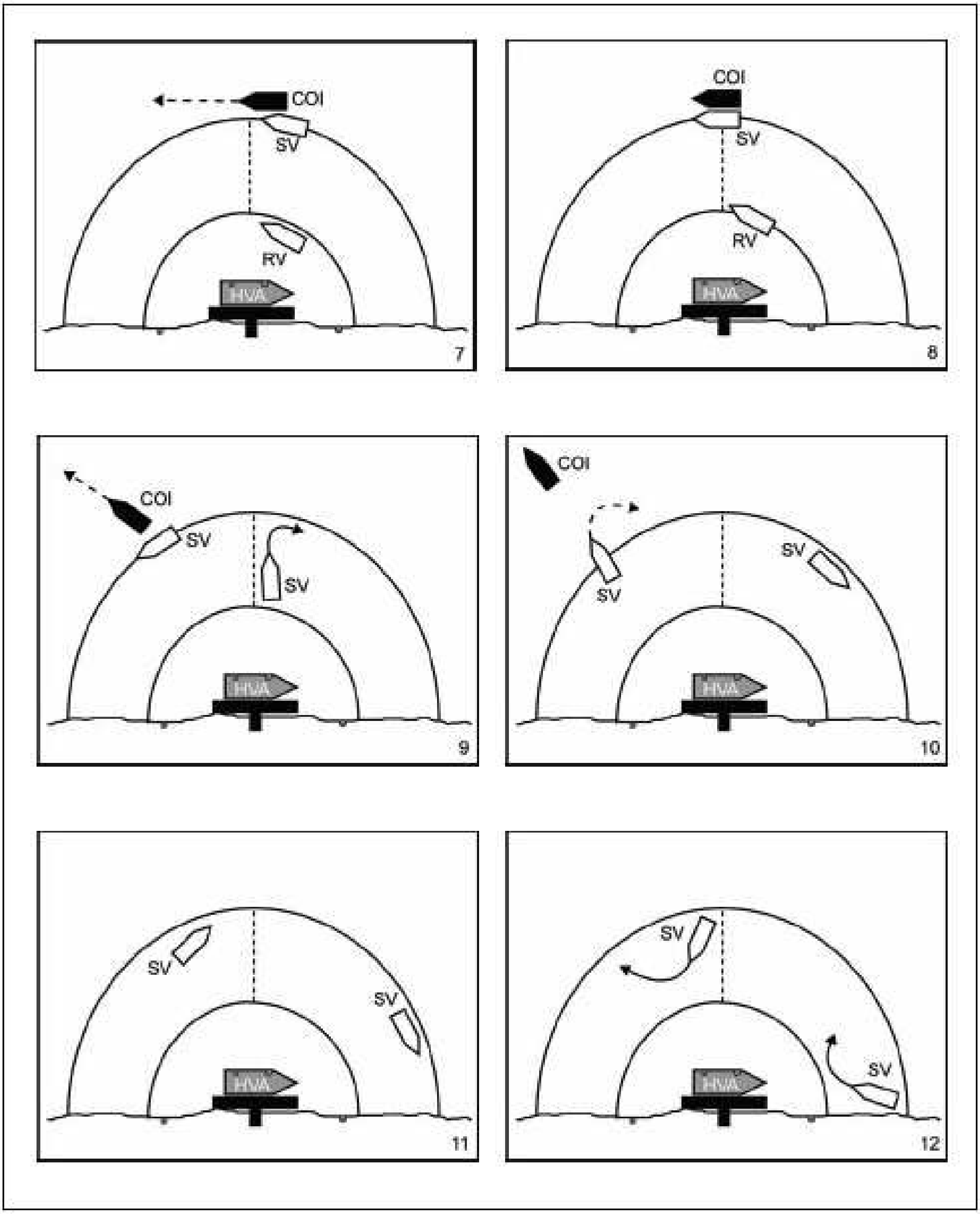


Figure 6-9. Two-Vessel Pierside HVA Detect-to-Engage Sequence (Sheet 2 of 2)

119.16 Discuss the following: [Ref. b, Ch. 5.2.4.1-5.2.5.4, Pg. 5-3 though 5-6]

a. Distance between Patrolling Boats

Spheres of surveillance for patrolling boats should not overlap. Sweep width tables should be used to determine the distance between patrolling tactical boats when searching for a COI of a known size. The distance between patrolling boats can be greater during the day than at night when a lookout's visual range is reduced.

Note

For sweep width tables, see JP 3-50, Personnel Recovery or COMDTINST M16130.2 (series), The U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (NSS) to the International Aeronautical and Maritime Search and Rescue Manual (IAMSAR).

b. Random Patrolling

Random patrolling is an active security measure used to avoid establishing regular, predictable movements. The coxswain proceeds randomly between numbered points, within a patrol area. The points can be marked on the boat's chart. This creates an unpredictable patrolling pattern as shown in Figure 5-1. Incorporating speed variations as described in paragraph 5.2.2 reduces detection and increases survivability.

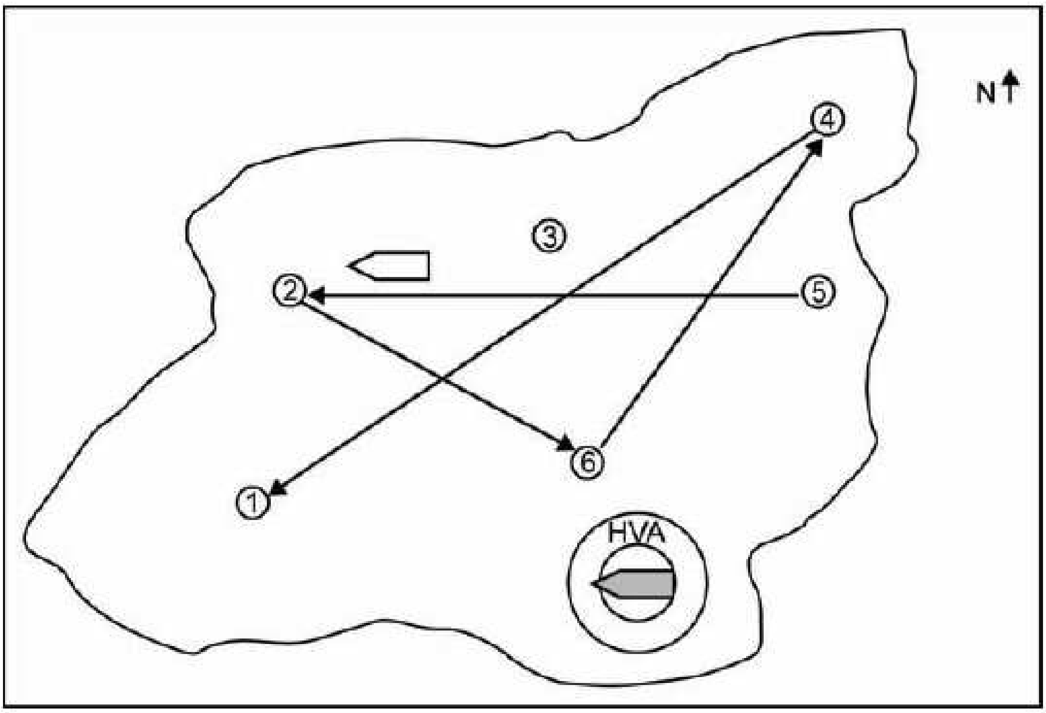


Figure 5-1. Random Patrolling Pattern

c. Traveling over watch

The traveling overwatch technique is used when contact with a threat is possible. The lead tactical boat is separated from trailing tactical boats by a short distance, which varies according to the type and density of terrain. It is important that tactical boats maintain sight of each other. The trailing boats move at variable speeds and may pause for short periods to overwatch the lead boat, adjusting their movements to the lead boat and changes in terrain. The trailing boats overwatch at a distance that allows them to fire or move in support of the lead boat if a hostile force engages the lead boat.

d. Bounding over watch

The bounding overwatch technique is used when contact with a threat is expected. The tactical boats move by bounds, where one boat halts to overwatch another boat while it moves forward. The overwatching boat is positioned to support the moving boat by fire or by fire and movement. There are two types of bounding overwatch techniques: successive bounds and alternate bounds.

1. Successive Bounds. The trailing (overwatch) boat and the lead (bounding) boat exchange cover to provide for maximum security in the successive bounds overwatch technique (see Figure 5-2). The bounding element moves forward an appropriate distance and stops to provide security for the overwatch element. The overwatch element then moves forward to the vicinity of the bounding element. The bounding element proceeds forward under the cover of the overwatch element.

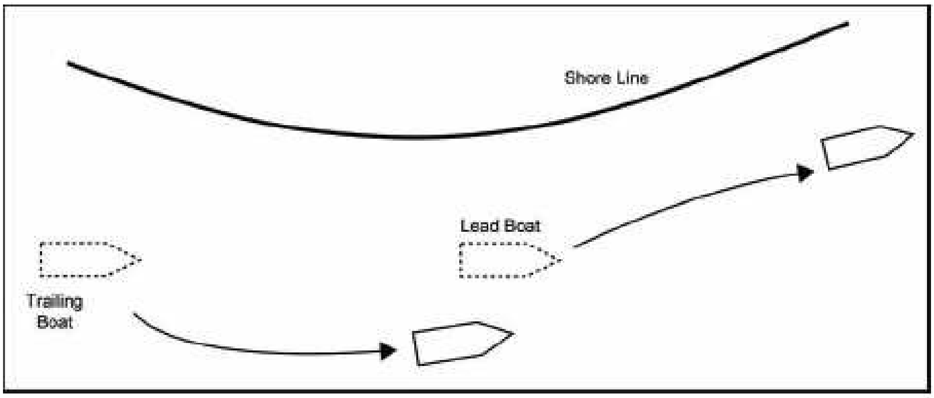


Figure 5-2. Successive Bounds Overwatch

2. Alternate Bounds. The alternate bounds overwatch technique is like a leapfrog movement (see Figure 5-3). The bounding element proceeds an appropriate distance and stops to provide security for the overwatch element as in the successive bounds method. The overwatch element then proceeds past the halted bounding element, which is now the overwatch element, and takes up an overwatch position forward. Movement continues in a leapfrog fashion.

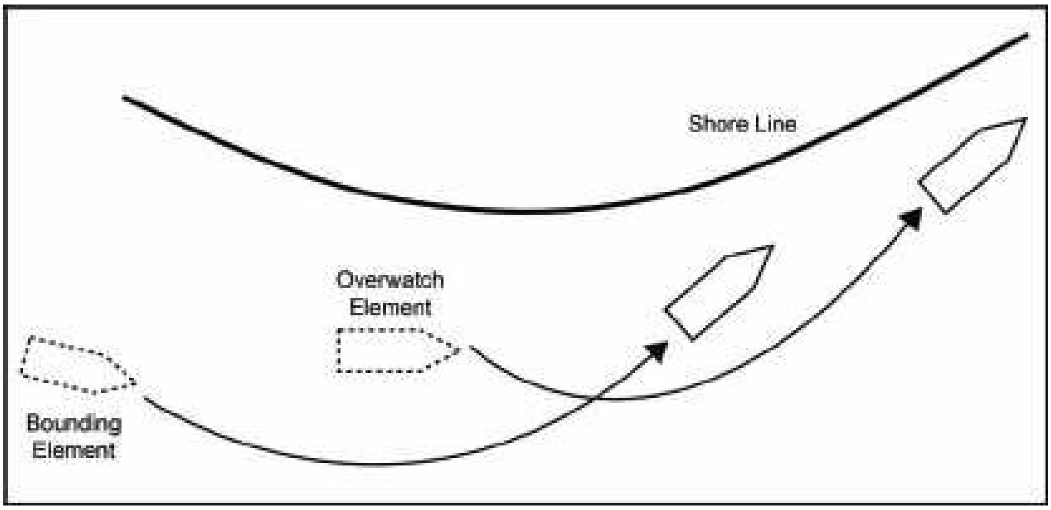


Figure 5-3. Alternate Bounds Overwatch

e. Tactical Halt

The tactical halt technique, i.e., herringbone, is used by tactical boats traveling in column formation to establish security during a deliberate halt or immediate action response. Boats traveling in the column move to left and right angles to the line of movement (see Figure 5-4).

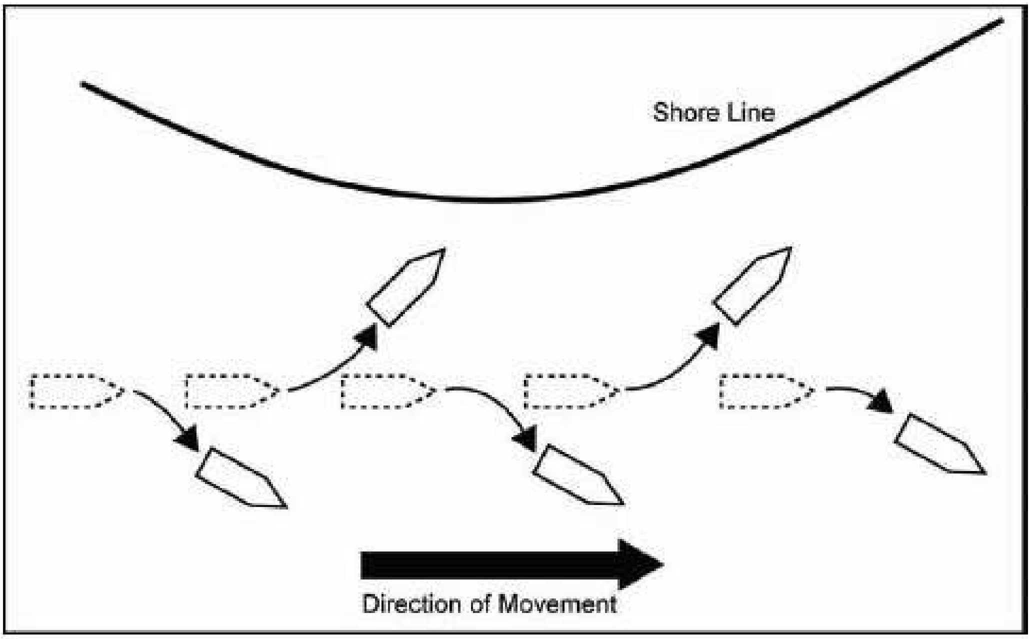


Figure 5-4. Tactical Halt

119.17 Discuss security zone escort tactics including:
[Ref. b, Ch. 7.6.1 -7.6.1.3, Pg. 7-22 to 7-24]

a. Switching sectors

When three or more tactical boats are employed, switching sectors is the preferred method for escorting a COI through a moving security zone. The switch takes place when two tactical boats meet at the sector boundary. The first tactical boat escorts the COI from one sector to another until the COI clears the security zone. The second tactical boat patrols the sector vacated by the boat escorting the COI (see Figure 7-13). This is accomplished when the escorting boat signals switch, which could be a radio signal or hand movement. The second boat acknowledges and takes the other sector.

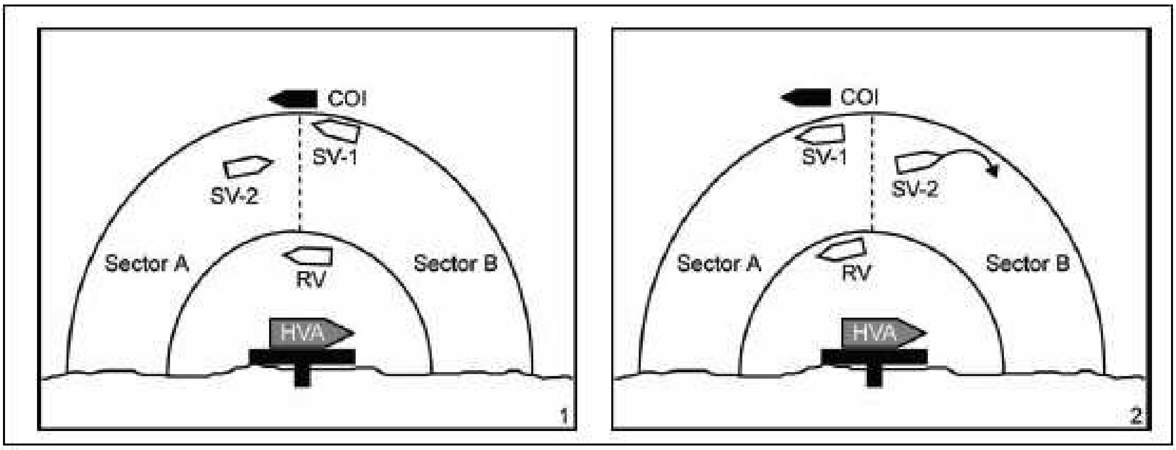


Figure 7-13. Switching Sectors

b. Drop back handoff

The tactical boat assuming the escort maneuvers alongside the boat that is escorting the COI. Once in position, the boat assuming the escort continues to stay between the COI and HVA while the first boat drops back and returns to its patrol sector (see Figure 7-14).

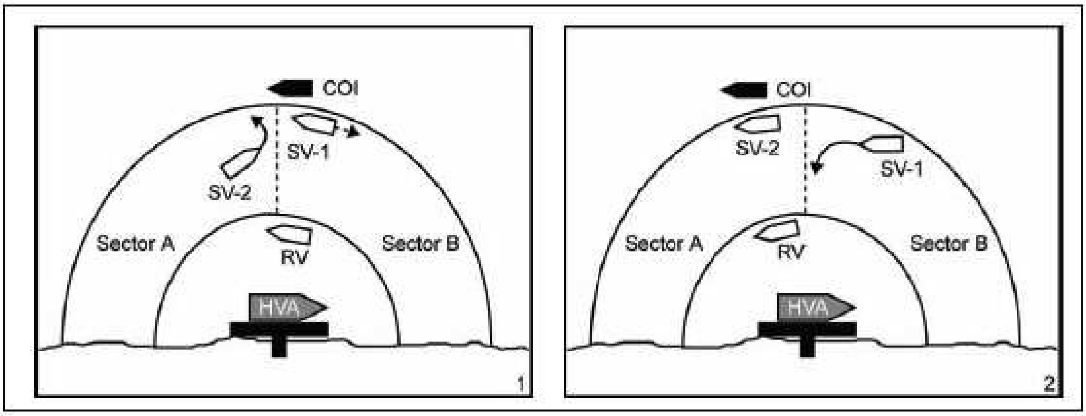


Figure 7-14. Drop Back Hand-Off

Intersection of wakes created during a drop back hand-off is a potential hazard. Crews should be aware of the proximity to other boats and provide warnings to boat crews, as required.

c. Loitering handoff

The tactical boat escorting the COI approaches a second tactical boat at the sector boundary. The escort of the COI is transferred to the second tactical boat, and the original boat returns to its patrol sector (see Figure 7-15).

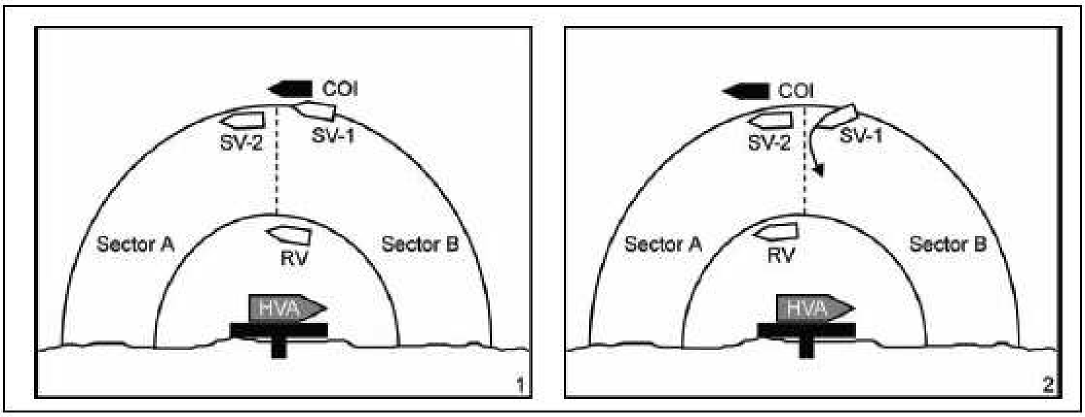


Figure 7-15. Loitering Hand-Off

119.18 Discuss shadowing techniques [Ref. b, Ch. 7.6.2, Pg. 7-24]

Identify and deter any vessel before it becomes a danger. Shadowing a vessel is a good means of deterrence as it communicates to the operator of the COI that security forces are aware of its presence. The fundamental difference between a vessel escort and a vessel shadow is that a COI under escort is under the control of and subject to the orders of the SV. A shadowed COI is exercising freedom of navigation and will not be taken under control (or be the subject of any other involuntary measure) unless it becomes noncompliant or exhibits hostile intent. Vessel shadowing may be used where an operating area includes an international strait or other area where U.S. policy allows freedom of navigation. It is also a procedure that may be appropriate in a harbor or port area if, for example, HN constraints prevent U.S. escort of certain vessels, such as neutral shipping.

SV should maneuver to remain between the COI and the HVA at all times (see Figure 7-16). Assume a passive posture and observe the vessel from a distance, being alert for unusual activity or anything that may be dropped or deployed from the vessel, i.e., mines or contraband. SV should be in a position to take a more aggressive posture

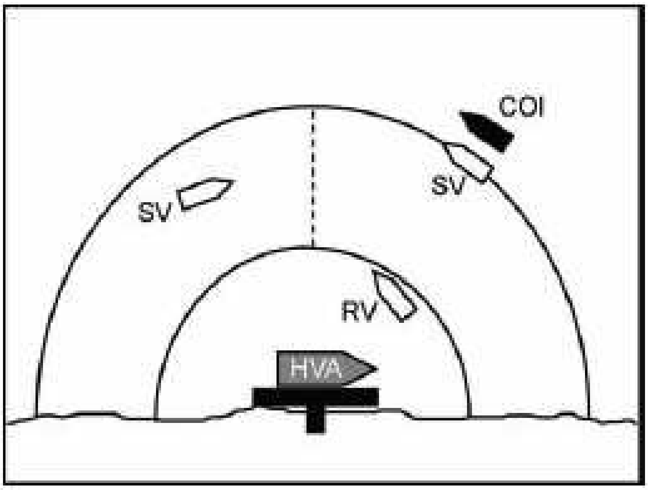


Figure 7-16. Shadowing

119.19 Discuss herding techniques [Ref. b, Ch. 7.6.3, Pg. 7-25]

Herding is conducted when the COI is inside the intercept zone and previous attempts to stop or reroute the COI have failed. The SV maneuvers alongside the COI forcing it to maneuver in a direction away from the HVA without making physical contact (see Figure 7-17). The intention is to force the COI out of the intercept zone, preventing a clear line of attack against the HVA.

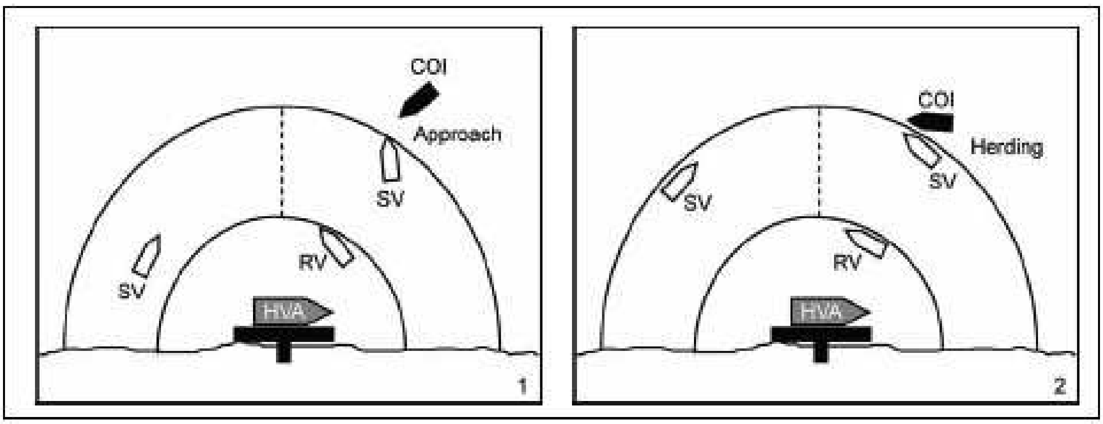


Figure 7-17. Herding

Herding requires aggressive maneuvering and constant communication with the rest of the team. The engaged SV remains with the COI until it clears the intercept zone and its intent to leave is clear.

Note

Herding is an appropriate tactic when handling an intercept zone violator who has not obeyed an order to heave to or depart the zone but does not pose an imminent threat of death or serious physical injury.

119.20 Discuss shouldering techniques [Ref. b, Ch. 7.6.4, Pg. 7-25 to 7-27]

When authorized by the operational commander, shouldering is a method used to physically force a vessel to stop or change course. The goal of shouldering is to contact a NCV with enough force to drive it in a new direction and prevent it from traveling on its intended course, compelling compliance with orders to stop (see Figure 7-18). Employ shouldering only where external appendages on the suspect vessel will not cause additional damage, in moderate to calm weather conditions, and when the target is sufficiently seaworthy to withstand contact without threat of capsizing or holing.

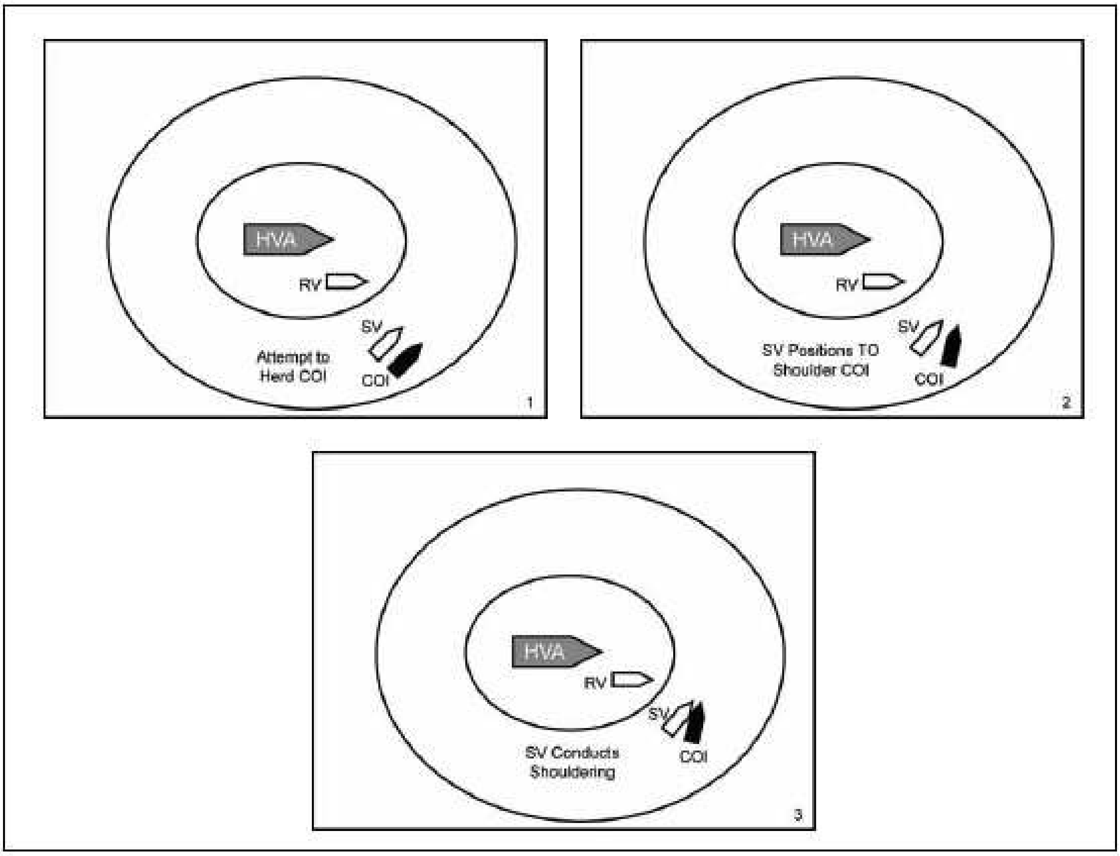


Figure 7-18. Shouldering

WARNING

Shouldering can lead to unintentional structural damage, vessel capsizing, or bodily injury. Coxswains should carefully assess the situation before attempting shouldering. Some factors to consider include the size of the tactical boat compared to the suspect vessel and current weather conditions (i.e., sea state, wind direction, and speed).

Note

Shouldering is an appropriate tactic when handling a reaction zone violator who has not obeyed an order to heave to or depart the zone but does not pose an imminent threat of death or serious physical injury.

119.21 Discuss the clear, engage and neutralize sequence
[Ref. b, Ch.7.6.6, Pg. 7-28-to 7-29]

If the VPIT outmaneuvers the SV, the words ***VPIT AWAY*** or other agreed upon codeword should be transmitted over the radio and repeated three times in a rapid and deliberate tone. Furthermore, if the SV is unable to alter the VPIT’s course away from the HVA or keep up with the vessel because of the VPIT’s greater speed, notify the operational commander. In those cases where it is determined that the VPIT poses an imminent threat of death or serious physical injury, the SV will be instructed to clear the field of fire in order for the RV and/or shoreside weapons to engage the COI with deadly force (see Figure 7-20). The SV will clear the field of fire by turning 90 degrees from course. If feasible, it will proceed at the highest safe speed to a position that can support the RV during engagement of the VPIT.

Note

Figures 7-13 through 7-20 illustrate each technique described within the context of a notional (fixed) security zone. Each of the TTP described in this section may also be used while enforcing a moving security zone or while conducting a variety of other operations where no security zone is established.

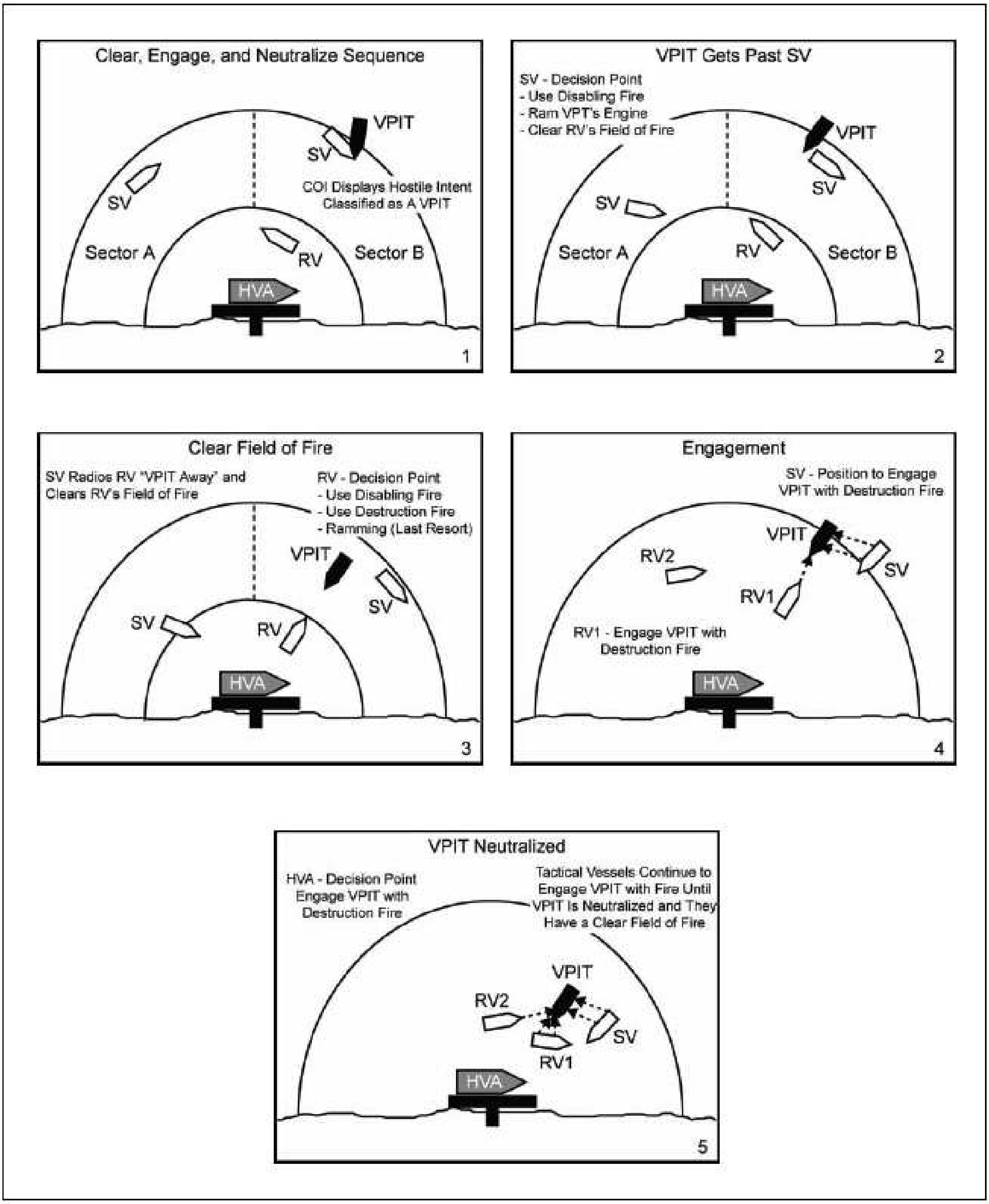


Figure 7-20. Clear, Engage, and Neutralize Sequence

119.22 Discuss the following tactics for ramming [Ref. b, Ch. 7.6.5, Pg. 7-27-7-28]

a. The intent
b. When it is specifically not allowed
c. If it constitutes deadly force

When authorized by the operational commander and when a COI has displayed hostile intent classifying it as a VPIT, and firing is not an option, ramming could be used as a tactic of last resort. The intent of ramming is to damage or destroy the VPIT. Damage to the SV is also highly likely.

Note

Coxswains may not ram a noncompliant COI to damage or destroy it. Ramming is considered deadly force and will only be used against a VPIT as a last resort.

119.23 Discuss the optimum positioning for firing [Ref. b, Ch. 8.6 – 8.6.2, Pg. 8-9 to 8-10]

Warning shots and disabling fire shall be conducted in accordance with current service and operational commander guidance. The following diagrams depict generic positioning for warning shots and disabling fire when delivered from Coast Guard assets.

119.24 Discuss insertion and extraction [Ref. a, Pg. 135]

Insertion and extraction operations can be overt or clandestine and are conducted to land or remove personnel. Overt operations, such as picking up a local official, have no intent to conceal but still require security, which should ideally be provided by other tactical boats. Clandestine operations, such as establishing a listening post, require a minimum of noise and proficiency to execute.

The insertion and extraction method (Figure 5-5) can be modified to accommodate landings from multiple boats by employing the following steps:

1. The lead and trail boats take station to provide overwatch.

2. The lead boat proceeds to the landing site and inserts/extracts personnel while the trailing boat provides overwatch.

3. After executing the insert/extract, the lead boat moves to an overwatch position, and the trailing boat moves to the insert/extract point.

119.25 Discuss the following for the Tactical Boat Coxswain [Ref b, Ch. 4.3.1-4.3.2, Pg. 4.1]

a. Authority

The coxswain has the authority to direct all boat and crew activities during the mission and to modify planned missions to provide for the safety of the boat and the crew. All boat crewmembers must be aware of the coxswain's identity and authority. Successful completion of the assigned mission or the safety of the crew and boat can be jeopardized by a crewmember who does not know who is in command or fails to recognize the coxswain's authority. The coxswain's authority is independent of rank and seniority in relation to all other personnel onboard the boat.

b. Responsibility

The coxswain is responsible for the safe, orderly, efficient, and effective performance of the boat, crew, and passengers during the mission. The coxswain operates the boat during tactical missions and ensures that all personnel onboard the boat fully understand their responsibilities and obligations while the boat is underway.

Responsibilities include:

1. Coordinating crew activity and completion of assigned tasks
2. Issuing weapons engagements orders
3. Maintaining:
    a. Boat logs
    b. Prosecution of contacts
    c. Awareness of current weather conditions
    d. Force Protection Conditions (FPCONs)
    e. Mission-oriented protective posture levels
    f. Mission status
    g. Weapons conditions
    h. Communications with other boats and higher authority
    i. Boat cleanliness

j. Operation of installed and portable equipment such as engines, radar, radios, weapons, navigation gear, night vision devices (NVDs), and cryptographic gear.

119.26 Discuss the definition of a tactical boat coxswain. [Ref. b, Ch. 1.3.1, Pg. 1-1]

A tactical boat coxswain/boat captain has ultimate responsibility for the safety and proper employment of the craft and crewmembers consistent with USN, USMC, and USCG regulations, unit SOPs, and doctrine, including the employment of crew-served and personal weapons aboard the craft. Tactical boat coxswains shall be certified by their respective service. In the USN and USCG, the term coxswain is used to designate the person in charge of the craft; in the USMC, the term boat captain is used. Crewman may be qualified and assigned as helmsman; however, function and authority of a helmsman is not the same as the coxswain.

Note

For brevity, coxswain is used in this manual but refers to coxswain/boat captain.

119.27 Discuss the general guidelines for high speed maneuvering and turns against a COI [Ref. b, Ch. 4.4.2, Pg. 4-3]

Each boat type operates differently in various environmental conditions. A coxswain must train on a specific boat to optimally understand the trim and engine settings for high-speed maneuvering. Although some tactical boats are designed to perform high-speed maneuvers without trim adjustments, engine settings will need to be adjusted to optimize performance of the craft. Guidance regarding techniques for maximum performance, hazardous conditions, and limitations should be found in each boat type operator's handbook and unit SOP.

A coxswain should execute the following general guidelines when conducting high-speed maneuvers against a contact of interest (COI). For detailed tactics, see Chapters 7 and 8.

1. Maneuver the boat in response to the COI's movements; ideally, the coxswain should be in a position to view the COI pilot's hands in order to anticipate the COI's maneuvers.

2. Approach a COI one or two points off the COI's bow, rather than head on, in order to induce the COI to turn.

3. Keep enough distance between the tactical boat and the COI to prevent collision and to deter the COI from making a sharp turn toward the HVA.

4. Every attempt should be made to maintain a position between the COI and the HVA.

5. Do not over steer; this may cause a sudden change in craft aspect, leading to chining and/or an unwanted decrease in speed.

119.28 Discuss elements to consider when handling the craft during a weapons engagement [Ref. b, Ch. 4, Pg. 4.4.3]

High-speed turns are best performed using the following guidance:

1. The coxswain should inform the crew about the direction of the turns to be performed, i.e., “coming port.”

2. The helm should be turned just enough to stay inside the COI’s turn.

3. During the course of the turn, the bow should be pointed at the COI’s stern.

4. The coxswain should throttle back, letting the stern sit down a little, and be ready to throttle check.

5. When crossing the COI’s wake, the coxswain should do so only when absolutely necessary and at close to a right angle as practical in order to minimize the possibility of swamping the boat.

6. After checking the throttle, throttle forward to come to a position on the COI’s quarter.

7. Throughout high-speed maneuvers, crewmembers should act as lookouts, continuously gathering information regarding the position and movement of the COI and maintaining location awareness in relation to the HVA, boundaries, and obstacles, and communicating actions to other waterborne assets.

8. If the COI continues to make evasive maneuvers, maneuver the boat to stay between the COI and the HVA, take appropriate actions based upon the mission brief, and keep the chain of command informed.

Weapons engagements can occur suddenly. The coxswain must be able to control and maneuver the tactical boat during weapons engagements. The coxswain should position the boat to present a minimal target and to maximize the firepower of employed weapon(s). Communication between the coxswain and gunners is key to accurate fires (see Chapter 10 for weapons engagement techniques). Coxswains must consider the following elements when preparing to engage with weapons and throughout the entire engagement:

1. Lack of mobility in narrow/shallow waterways

2. ROE/RUF

3. Determination of hostile intent

4. Stability of tactical boat when maneuvering (i.e., degree of heel in a tight turn)

5. Distance to target

6. Firing arcs, maximum range and effective range of employed weapon(s), and the effects of possible collateral damage to friendly forces, civilians, and property.

7. Appropriate weapon, i.e., a shotgun vice an M2 machine gun if close aboard a COI.

120 Reconnaissance and Intelligence

References:
[a] NWP 3-10, Naval Coastal Warfare
[b] NTTP 3-10.1, Naval Coastal Warfare Operations

120.1 Discuss the purpose of reconnaissance operations. [Ref. b, Pg. 10]

A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area. Also called RECON**.** (JP 1-02)

120.2 Discuss how reconnaissance activities support the overall surveillance mission. [Ref. a, Ch.2, Pg. 2-1]

LSSO refers to the synergy developed between the capabilities of an SENSOR DET and those of the LSS operated and manned by the Naval Space Reserve Program. The combined capabilities of the SENSOR DET and LSS resources provide a naval tactical commander with timely receipt of all weather, day/night maritime and littoral intelligence, surveillance and reconnaissance data from selected national, theater, and tactical systems. The SENSOR DET's role in this operation is one of support only. SENSOR DET personnel do not man or operate the equipment of the LSS. That task falls to personnel assigned to a LSS/NFN unit.

120.3 Discuss how craft interface with the Radar Sonar Surveillance Center (RSSC) van in conducting reconnaissance and surveillance. [Ref. b, Ch.3, Pg. 3-2]

BOAT DET, MSD, and PSU patrol craft are equipped with an X-band navigational radar. The boats are normally deployed in a patrolling and interdiction role, and the radar can be utilized to detect surface vessels, for radar mapping, and navigation aid and chart verification.

120.4 Discuss how craft interface with coast watcher detachments in conducting reconnaissance and surveillance. [Ref. b, Ch.3, Pg. 3-3]

At the commencement of a surveillance mission, patrol craft should coordinate with the SENSOR DET watch officer and perform a radar mapping operation to validate the PSP/MSP radar's capability for detecting the boats, and to determine where radar "blind spots" may be. The patrol craft can then effectively provide radar coverage for the land-based radar "blind spots.

120.5 Discuss how reconnaissance and surveillance information is passed to higher authority. [Ref. a, Ch.2, Pg. 2-1]

Intelligence in support of HAD operations requires extensive knowledge of various intelligence databases that report on ship movements, projected ports of call, and known/suspected ships that have an affiliation with conventional or non-conventional hostile forces. Once the intelligence is received, it must be analyzed to determine what type of threat(s) the vessels may pose, and from that analysis, measures are developed and enacted to counter the threat. This collected and analyzed intelligence should be shared by the most expedient and secure means of communications not only with forces conducting HD/PS, but also with all other agencies that are associated with, or operating within, the AOR. Intelligence sharing serves to validate analysis and recommended countermeasures.

120.6 Discuss reconnaissance techniques in a barrier patrol. [Ref. b, Ch. 9.10.3, Pg. 9-11]

SALUTE Reporting.

(1) Typical SALUTE Report for a Contact of Interest (COI)

(A) Size	How large is the vessel? How many people on board?
(B) Activity	What is the contact doing? Fishing? Trawling? Towing? Milling around smartly?
(C) Location	Give a geographic location in terms of range and magnetic bearing from you or -- better yet -- by reference to a charted landmark or op area sector or grid coordinates.
(D) Unit	Describe the vessel and the people on it. Be specific in describing the color, type of boat, identifying marks, name and registry (if visible).
(E) Time	State the time of the contact report.
(F) Equipment	What equipment is visible on deck? Any weapons? Suspicious antenna arrays?

(2) Initial SALUTE reports may be amplified by further SALUTE reports as more information becomes available.

(A) A sample initial SALUTE report for a contact of interest would be as follows:

> BRAVO ONE this is BRAVO TWO. I have a 50-ft fishing trawler with three people visible on deck, entering sector 3A from the east near point Foxtrot. Blue hull, white superstructure. No distinguishing marks or uniforms. No equipment on deck. The time is 0930.

(I) Once the boat coxswain closes on the contact, he is able to make a more detailed SALUTE report.

BRAVO ONE this is BRAVO TWO. 50-ft fishing trawler has four POB (persons on board). The vessel is proceeding outbound on course 270 with outriggers spread for fishing. Vessel's name is "Theresa Marie," out of Gloucester. Large rust stain on port quarter. Crew wearing yellow raingear. Several unidentified canisters on stern, appear to be 55-gal drums. Time is 0945.

(ii) Another typical scenario might be as follows:

BRAVO ONE this is BRAVO TWO. High-speed craft entering Red Sector inbound at point Juliet. Time is 1245. I will intercept.

BRAVO ONE this is BRAVO TWO. High-speed craft is 30-ft whaler with 2 POB, making high-speed turns just outside Red Sector near Point Juliet. White hull. Open cockpit. Center console. Two long whip antennas. No weapons visible. Time is 1300.

(3) The SALUTE format will also be used for mission debriefs, so BOAT DET coxswains should keep a contact log during the mission. This does not need to be a formal Navy log sheet. A standard Navy wheel book will do. Entries may be made in any convenient format, using a shorthand or personal code, which can be expanded during the debrief.

(A) For instance, the boat coxswain may write "WF 2POB IB 3A 0945 Nets on Dk." This would be expanded at the debrief as follows: "White fishing boat, two persons on board, inbound in sector 3A at 0945 with nets on deck."

(B) Since it is impractical to keep detailed logs on a high-speed patrol boat underway, the primary responsibility for keeping detailed contact logs will be the OTC Watch Officer.