Crewman Duties
- Helm
- Lookout
- Tow watch
- Anchor watch
- Rig towing and mooring lines
- Acts as the surface swimmers
- Administer First Aid
- Operate Damage Control Equipment

Lookout Watch
- Report everything you think you see, hear, smell, and feel.

Towing Watch
- Report any unusual conditions, equipment failure, or problems to the coxswain immediately
- Is the tow: In Step, Listing, Yawing
  - In Step – the proper distance between the towed boat and the towing boat to maintain control and prevent breaking the towline.
  - Listing – The static, fixed inclination or leaning of a ship to port or starboard due to an unbalance of weight
  - Yawing – Disabled boat veers from side to side to the other which may cause one or both boats to capsize
- Taking on water, chaffing gear in place, deck hardware failure to stress

Anchor Watch
- Check for strain on the line
- Check for chaffing
- Confirm position of the boat at least every 15 minutes
- Swing circle – length of boat and towline, clear of any obstacles
- Report bearing and range
- Report approaching vessels
- Report major changes in the wind
- Check for current or tidal changes
- Report any unusual conditions

Crew Fatigue
- Cause:
  - Operating in extreme hot or cold weather conditions
  - Eye strain from hours of looking through sea-spray blurred windshields
  - The effort of holding on and maintaining balance
  - Stress
  - Exposure to noise
  - Exposure to the sun
  - Poor physical conditioning
  - Lack of sleep
  - Boredom
Symptoms:
- 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:
- Adequate rest
- Appropriate dress for weather conditions
- Rotate crew duties
- Provide food and refreshments suitable for conditions
- Observe other crewmembers for signs of fatigue

Motion Sickness
- Motion sickness is nausea and/or vomiting caused by an imbalance between visual images and the portion of the middle ear that senses motion.

Symptoms:
- Nausea and vomiting
- Increased salivation
- Unusual paleness
- Sweating
- Drowsiness
- Overall weakness
- Stomach discomfort

Prevention/Medication:
- Stay out of confined spaces
- Stay above deck in the fresh air
- Avoid concentrating on the movement of the boat by looking out over the water toward the horizon or shoreline
- Avoid smoking

Medication Restrictions:
- Without medical supervision
- Within 12 hours of alcohol consumption
- To pregnant crewmembers

Hypothermia
- Hypothermia is the loss of body temperature.

Symptoms:
- Pale appearance
- Skin cold to the touch
- Pupils are dilated and will not adjust properly when exposed to light
- Poor coordination
- Slurred speech / appears to be intoxicated
- Incoherent thinking
- Unconsciousness
- Muscle rigidity
- Weak pulse
- Very slow and labored breathing
- Irregular heart beat
Heat Exhaustion
- A person collapses and sweats profusely
- Victim has pale skin, a pounding heart, nausea, headache, and acts restless

Heat Stroke
- Stops Sweating
- Red skin, hot and dry to the touch
- Characteristic body temperature above 105°
- Headache
- Weak and rapid pulse
- Confusion, violence, lack of coordination, delirium, and/or unconsciousness
- Brain damage

Team Coordination Training
- Control human error, manage safety risks, provide directions for continuous improvement in team performance
- GAR – Green Amber Red
  - Supervision
  - Planning
  - Crew Selection
  - Crew Fitness
  - Environment
  - Event / Evolution Complexity
  - 0-23 Green – Low Risk – Able to Proceed
  - 24-44 Amber – Caution – OinC Approval Needed
  - 45-60 Red – High Risk – Stop Do Not get U/W

Shock
- Causes -
  - Trauma (bleeding, blunt, fractures, and burns)
  - Allergic reactions
  - Hypothermia
  - Drugs
  - Toxins
  - Heart Attack
  - Illnesses such as diabetes
  - Emotional
- Symptoms –
  - Restlessness
  - Fainting
  - Thirst
  - Nausea
  - Weakness
  - Anxiousness
  - Fright
  - Dizziness
Signs
- Pulse – weak and rapid
- Breathing – shallow, rapid, and irregular
- Skin – cold, clammy (sweating)
- Pupils – dilated
- State of consciousness – alert (may be deceiving) to unconscious

Treatment
- Limit patient’s activity – lie down and remain alert for signs and symptoms of shock.
- Face is red – elevate head, Face is pale – elevate tail

Anaphylactic Shock

Causes
- By eating fish or shellfish, berries or oral drugs such as penicillin
- Insects sting from yellow jackets, hornets, wasps, etc., injected drugs, exercise, cold, and inhaled substances such as pollen or dust.

Symptoms
- Skin – itching, hives (raised rash), flushing (redness).
- Swelling of lips, tongue, feet, throat, and hands.
- Respiratory tract – wheezing, shortness of breathe, coughing.
- Gastrointestinal – nausea and vomiting, abdominal cramps, diarrhea.
- Headache
- Altered mental status
- Loss of consciousness

CPR
- Make sure the area around victim is safe to be in.
- Universal Precautions – Gloves, Pocket Mask, etc.
- Tap and Shout, “Are you OK?”
- Call EMS
- Position victim on their back
- Head-tilt chin-lift, or jaw thrust maneuver
- Look, Listen, and Feel for 5-10 seconds
  - Look – chest rises and falls
  - Listen – air exhalation through nose or mouth
  - Feel – breath coming from nose or mouth, if no sign of breathing check the airway to ensure there is nothing blocking it and try opening the airway again.
- No sign of breathing, administer two rescue breaths with a duration of two seconds each.
- Look, Listen, and Feel
- Begin CPR
  - 15 Compressions to 2 Rescue Breaths
  - 5 Compressions to 1 Rescue Breath
- Normal Adult Pulse – 60-100 beats per minute
- Normal Adult Respiration – 16-24 breaths per minute
Heart Attack

- **Symptoms**
  - Severe, crushing type of pain under the breastbone, arms, neck, and jaw.
  - Profuse sweating
  - Shortness of breath
  - Extreme anxiety
  - Nausea and vomiting
  - Bluish discoloration of lips, fingernails, and skin

- **Treatment**
  - Keep the victim quiet and at rest
  - Administer oxygen (if available and trained to do so)
  - Place the victim in the position of most comfort. Sometimes the victim may want to sit up, especially if the person is short of breath
  - Seek immediate medical assistance, activate EMS
  - Determine if the victim is on any type of medication for a heart condition such as nitroglycerin. If so, determine if victim has taken the medication as prescribed
  - Reassure the patient that assistance is on the way or that transport to a hospital is imminent.
  - Transport as quickly, but safely, as possible

Stroke

- **Any bleeding or clotting affecting the blood vessels of the brain.**
- **Symptoms**
  - Unconsciousness
  - Shock
  - Confusion
  - Dizziness
  - Numbness/weakness to one side of the body
  - Seizures
  - Impaired vision
  - Headache
  - Facial droop
  - Difficulty speaking, or limited usage of or difficulty in using a limb.

Bleeding

- **Types of bleeding**
  - **Arterial bleeding** is characterized by blood that is coming from an artery, is bright red, and gushes forth in jets or spurts that are synchronized with the victim’s pulse.
  - **Venous bleeding** is characterized by blood that is coming from a vein, is dark red, and comes in a steady flow.
  - **Capillary bleeding** is characterized by blood that is coming from damaged capillaries (smaller veins), is bright red, and oozes from the wound.

- **Universal Medical Precautions** – protective gloves and goggles, masks and protective gowns or aprons.
- **Direct pressure**
- **Elevation**
- **Pressure points** –
  - Facial, temporal, subclavian, carotid, axillary, brachial, radial and ulnar, femoral, dorsalis pedis, popliteal.
- **Tourniquet** – last resort, only on arms and legs, mark forehead with a T and the time.
Burns

- **Causes:**
  - Thermal
  - Chemical
  - Sunburn
  - Electric shock
  - Radiation

- **Burn Classification**
  - First-degree – mildest form of burn, only the outer layer of skin and produce redness, increased warmth, tenderness, and mild pain.
  - Second-degree – extend through the outer layer of the skin, inner layers of the skin, but not enough to prevent rapid regeneration, blisters and are characterized by severe pain, redness, and warmth.
  - Third-degree – penetrate full thickness of the skin, destroying both the outer and inner layers of skin, severe pain may be absent because nerve ending have been destroyed, color may range from white and lifeless to black (charred).

- **Percentage of a victims body surface area:**
  - Chest = 18%
  - Back = 18%
  - Each Arm = 9%
  - Each Leg = 18%
  - Head = 9%
  - Genitals = 1%

- **Treatment:**
  - First-degree:
    - Immerse in cold water until pain is relieved.
    - Flush chemical burns for at least 20 minutes.
    - Cover with clean or sterile dressing.
  - Second-degree:
    - Use the same treatment as for first-degree burns.
    - Do not break open any blisters.
    - Cover with a dry, sterile, non-adhesive dressing.
    - For deep burns, follow the procedures for third-degree burns.
  - Third-degree:
    - Cover the burn to reduce exposure to air.
    - Cool the burn.
    - Do not remove clothing unless smoldering.
    - Treat for shock even if not apparent.
    - Always obtain medical care.
    - Monitor the patient’s airway.
    - Assess vital signs every 5 minutes.
    - Give nothing to eat or drink.
    - Do not place ice on the burns
    - Do not apply ointments to the burn.
    - Burns of the respiratory tract are always a medical emergency.
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By: BM3 M. T. Carey
www.boatswainsmate.net

- **Chemical Burns:**
  - Wash the chemical away completely, using large quantities of water.
  - Flush the burn for 20 minutes.
  - When the burn involves the eye, flush for 20 minutes.
  - Cover both eyes with a clean, dry, protective dressing and seek medical attention as quickly as possible.
  - Give first aid for shock.
  - If chemical is a powder, brush off as much as possible before flushing.

**Boat Capsizing**
- Account for personnel and if possible inventory survival gear.
- Locate nearest/safest egress route.
- Best swimmer exits first. Deflate/ remove PFD if needed. Carry line if available.
- First swimmer contacts crew inside by tapping on hull. Re-inflate PFD.
- Rest of crew exits one at a time. Second best swimmer last.
- No PYRO use due to gasoline spill.

**Hulls**
- Displacement, Planning, and Semi-Displacement
- Backbone (keel) – flat plate and bar

**Gravity and Buoyancy**
- Center of Gravity – The point at which the weight of the boat acts vertically downwards.
- Buoyancy – The upward force of the water displaced by the hull
- Equilibrium – When a boat is at rest, the center of buoyancy acting upwards/vertically is below the center of gravity acting downwards. Affected by movement of the center of gravity or center of buoyancy or by some outside force, such as wind and waves.

**Types of Stability**
- Transverse – Athwart ships, keeps boat from rolling over.
- Longitudinal – Fore and Aft, keeps boat from pitch poling.
- Static Forces – caused by placement of weight within the hull.
- Dynamic Forces – caused by actions outside the hull such as wind and waves.
- Vessel design features that influence stability include:
  - Size and shape of hull
  - Draft
  - Trim
  - Displacement
  - Freeboard
  - Superstructure, size, shape, and weight
  - Non-watertight openings.

**Personal Marker Light (PML)**
- 8 – 12 hours of light.
Emergency Signal Mirror
- The mirror is used to attract the attention of passing aircraft, boats, or ground rescue teams by reflecting light at them.
- Light reflected in this mirror can be seen at a great distance from the point of origin.
- **Operation**
  - Face a point about halfway between the sun and an object you wish to signal
  - Reflect sunlight from the mirror onto a nearby surface such as the raft, your hand, etc.
  - Slowly bring the mirror to eye-level and look through the sighting hole. You will see a bright light spot, this is the aim indicator
  - Hold the mirror near your eye and slowly turn and manipulate it so the bright light spot is on target

Signal Whistle
- The sound produced by a whistle will attract the attention of rescuers and guide them to the whistle’s origination. During periods of restricted visibility, fog, and darkness, rescuers may hear the sound it produces before they sight the 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.

Smoke and Illumination Signal, MK-124 MOD 0
- Do not dispose of the signal until both ends have been used.
- Only when signals misfire should it be disposed of over the side. Misfires are a safety hazard if kept onboard a vessel.
- When both ends of the signal have been discharged, properly dispose of it. In an actual distress situation, spent signals may be tossed over the side.
- Each end burns for about 20 seconds
- Night end produces a red flare. Two raised bands around its circumference.
- Day end produces an orange smoke.
- Hold the signal downwind and overhead at a 45° angle.

Illumination Signal Kit, MK-79 MOD 0
- Pyrotechnic illumination signal kit that contains seven screw-in cartridge flares and one pencil-type projector.
- Produces a red star display
- Altitude of 250-650 feet for the minimum time of 4.5 seconds
- Luminous intensity is about 12,000-candle power.
- Cock the firing pin of the projector. Move the trigger screw into the angular (safety) slot.
- Mate a signal flare with the projector and rotate clockwise until signal is seated.
- Hold projector overhead with arm fully extended. Slight angle away from the body.
- If signal fails to fire, try again twice by depressing the trigger screw to the bottom of the firing slot with the thumb and releasing it quickly. If it still fails to fire, wait 30 seconds before unscrewing (hang fire).
- Unscrew spent case or misfire and discard by throwing overboard.
Distress Signal Light
- CG-1 emits approximately 50 flashes per minute
- Luminous intensity is 100,000 candlepower
- Under continuous operation, they 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.

Survival Knife
- Basic tool used to free the crewmember from entangling lines.
- It is also used to cut material blocking a path in escaping a capsized or sinking boat.
- It should be a fixed blade, blunt tip.
- Corrosion-resistant material

Personal Emergency Position Indicating Radio Beacon (PEPIRB)
- Emergency use only
- Transmitter capable of broadcasting on both 406 MHz and 121.5 MHz
- The international satellite based search and rescue system (COSPAS SARSAT) monitors 406 MHz and is able to provide a position accurate to within three nautical miles within 90 minutes.

Parachute Illumination Signal MK-127A1
- Nighttime illumination signaling device
- Climbs to an altitude of 650-700 feet before igniting
- Produces a parachute-suspended white star flare that burns for about 36 seconds with 125,000 candlepower
- The signal descends at a rate of 10 to 15 feet per second

Air and Water Temperature Requirements
- 50 degrees or below air temp, 50 degrees or below water temp – Dry suit.
- 50 degrees and above, 50 – 60 degrees water temp – anti-exposure suit.
- Water temperature is above 60 degrees type III PFD.

Types and Characteristics of Line
- Characteristics
  - Small stuff – up to 1.5” in circumference
  - Line – 1.5” to 5” in circumference
  - Hawser – everything over 5” in circumference
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- **Line Type**
  - Plain Laid – made of three strands, right- or left-laid.
  - Cable Laid – made of three right-hand, plain-laid lines laid together to the left to make a larger cable.
  - Plaited – made of eight strands, four right-twisted and four left-twisted, strands are paired and worked like a four strand braid.
  - Braided – usually made from three strands braided together. The most common braided lines are hollow-braided, stuffer-braided, solid-braided, and double-braided.
  - Double-braided – made of two hollow-braided ropes, one inside the other. The core is made of large single yarns in a slack braid. The cover is also made of large single yarns but in a tight braid that compresses and holds the core. This line is manufactured only from synthetics, and about 50% of the strength is in the core.

- **Natural Fiber Line**
  - Manila – abaca plant and is the strongest and most expensive of the natural fibers
  - Sisal – agave plant and is the next in strength to manila, rated at 80% of manila.
  - Hemp – stalk of a hemp plant, rarely used.
  - Cotton – cotton plant, three-strand, right-lay or braided construction used for fancy work and lashings.

- **Synthetic Fiber Line**
  - Nylon – great strength, elasticity, and resistance to weather.
  - Dacron – 80% of the strength of nylon, only stretch 10% of its original length.
  - Polyethylene and Polypropylene – half the strength of nylon, 25% lighter than nylon, it floats.

**Navigation Lights**
- Port side light – red, 112.5°
- Starboard side light – green, 112.5°
- Stern light – white, 135°
- Forward mast light – white, 225°
- Anchor light – all around white light
- Towing light – yellow

**Common Sound Signals**
- Short blast – about 1 second
- Prolonged blast – about 4 to 6 seconds
- Danger signal – 5 or more short blasts
- Coming to port – 2 short blast
- Sailing vessel in reduced visibility – 1 prolonged and 2 short blast

**Maritime Distress Signals**
- Red star shells
- Continuous sounding fog horn
- Orange smoke marker
- Dye marker (any color)
- Red parachute flare
- Flames on a vessel
- November code flag flown over the Charlie code flag
- Emergency Position Indicating Radio Beacon (EPIRB)
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- Orange board with a black square over a black circle
- MAYDAY radio broadcast
- Person waving arms
- Black square flag flown over a black circle flag
- Radio telephone alarm
- Radio telegraph alarm
- SOS – Morse code signal
- Gun fire at intervals of one minute
- High intensity white light flashing at intervals of 50 to 70 times a minute

**Boat Handling**

- **Propeller Rotation**
  - Throttles ahead – propellers move outboard
  - Throttles astern – propellers move inboard
  - Side force –
    - Due to the angle of the propeller shaft, the effective pitch angle is different for ascending and descending propeller blades, resulting in an unequal blade thrust. This net effect is sometimes referred to as sideways blade pressure.
    - For right-handed screw turning ahead, the stern will tend to move to starboard
    - For right-handed screw turning astern, the stern will tend to move to port.
    - For left-handed screw, the action is opposite.

- Tactical Diameter – 180 degree turn
- Final Diameter – 360 degree turn

**3 – Minute Rule**

- For every 3 minutes at a speed of 25 knots you will go 2500 yards.
- 1000 yards in 3 minutes, you are going 10 knots.

**6 – Minute Rule**

- For every 6 minutes at a speed of 30 knots you will go 3 nautical miles.
- 1.5 nautical miles in 6 minutes, you are going 15 knots.

**7 Steps to Survival**

- **Recognition**
  - Admit that your life is in danger. Act!

- **Inventory**
  - Decide what can help and hurt. Do first aid.

- **Shelter**
  - Preserve body heat with materials that insulate and protect you from the environment. Wear the required PPE.

- **Signal**
  - Help rescuers find you. (EPIRB’s, flares, whistles, lights)

- **Water**
  - Find a safe source of water. Drink two to four quarts a day.

- **Food**
  - After you are safe and warm, food will help with the long waits.

- **Play**
  - Stay busy and keep a positive attitude. There will be help on the way.
3 Ways to Retrieve a MOB
- Reach and Grab
- Personal Retrieval Line
- Par-buckling

Anchoring
- Rule of thumb for anchoring, between 5:1 and 7:1
- Rule of thumb for anchoring in heavy weather 10:1
- Parts of an anchor:
  - Shank
  - Flukes
  - Crown
  - Stock
  - Swivel

P-6 Dewatering Pump
- 6.5 hp Honda
- 250 GPM at a 10ft suction lift
- 20ft Collapsible Discharge hose
- 15ft Hard Suction hose with strainer
- W.S. Darley & Company Pump all connections for hoses and pump are color coded
- 2.5 Gal fuel tank (4-6 hr run time) can change fuel tanks while running have approx. 30 sec
- Must be primed first, running pump will not help take suction
- Can’t be run for more than 1 min. with no water
- If pull cord breaks there is a spare cord tied around leg near pulley, take pull cord housing off put knot of spare in notch and wrap clockwise.
- Make sure suction and discharge hoses have gaskets in them.
- Always connect suction hose before putting over side or dropping below deck
- Can pump flammable liquids if absolutely necessary, due to engine being air cooled not water.

Boat Specifications and Environmental Limitations

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**Disabling Casualties**

- **Engine and vessel systems**
  - Engine(s)metallic/non-metallic noises: abnormal metal on metal/knock/clicking.
  - Engine(s) fail to start
  - Engine(s) overheat (uncontrollable).
  - Engine kill switch (motor safety lanyard) inoperable or missing.
  - Engine controls (throttle and shift) inoperable.
  - Engine(s) fail to shift into and out of gear (forward or reverse).
  - Engine motor mounts loose or damaged or missing hardware (including tilt/trim or locking mechanisms.)
  - Battery system won’t charge.
  - Steering system inoperable or restricted (binding or less than full movement).
  - Any fuel leaks on gasoline engines.
  - Any fuel or lube oil leaks on diesel engines dripping onto a hot surface (defined as a surface greater than 400 degrees, even if covered by insulation).

- **Electronics / Navigation**
  - No electronic means of signaling distress (i.e. no radio or EPIRB).

- **Boat Outfit**
  - Bilge pump fails to operate or clearing ports clogged or restricted.

- **Safety and General Materiel**
  - Any electrical arcing and sparking.
  - Any hull breach below the waterline or structural damage that weakens the transom.
  - Collar/Tube systems loose, incomplete, deflated, otherwise not secure or intact.
  - No means of fire fighting (i.e. no portable fire extinguishers plus installed fire system inoperable)
  - Backfire flame arrester inoperable or missing, if required.
Restrictive Discrepancies

- **Engine and vessel systems**
  - Engine(s) operating above normal range.
  - Engine(s) fail to idle properly or stall frequently when engaged.
  - Engine outdrive or outboard fails to fully trim/tilt.
  - Engine(s) alarms inoperative (i.e. high water temperature, VRO).
  - Emergency alarms inoperative (i.e. bilge).
  - Installed fire system inoperative.
  - Battery box(es) missing or not properly secured.
  - Battery terminals not covered or protected against accidental contact with other objects.
  - Any fuel or lube oil leaks on diesel engines dripping onto a surface that is not hot (defined as a surface greater than 400 degrees, even if covered by insulation).
  - Any diesel fuel or Variable Ratio Oil (VRO) oil leak dripping*.
  - Any jacket water, raw water, lube oil or hydraulic oil leaks more than 15 drops per minute.

- **Electronics / Navigation**
  - Compass missing or inoperative.
  - Compass deviation over 5 degrees
  - Fluxgate compass inaccurate over 5 degrees
  - Radio inoperative.
  - Radar inoperative, if so equipped (for night operation or less than one mile visibility).
  - Fathometer inoperative.
  - GPS inoperative.
  - Navigation light(s) inoperative.

- **Boat Outfit**
  - Fire extinguisher(s) missing or inoperative
  - Compass light inoperative (for nighttime operations).
  - Spotlight missing or inoperative (for nighttime operations).
  - SAR vest pyrotechnics or strobe lights unserviceable/missing.
  - Primary towline less than 50% of required length or unserviceable.

- **Safety and General Material**
  - Damage to collar system requiring repair but not impairing the ability of the boat to perform some missions.