



COMDTCHANGENOTE 16500  
11 MAR 2016

COMMANDANT CHANGE NOTICE 16500

Subj: CH-2 TO AIDS TO NAVIGATION MANUAL – SEAMANSHIP, COMDTINST  
M16500.21A

1. PURPOSE. This Commandant Change Notice publishes changes to the Aids to Navigation Manual – Seamanship, COMDTINST M16500.21A.
2. ACTION. All Coast Guard Unit commanders, commanding officers, officers-in-charge, deputy/assistant commandants, and chief of headquarters staff elements shall comply with the provisions of this Commandant Change Notice. Internet release is authorized.
3. DIRECTIVES AFFECTED. With the addition of this Commandant Change Notice, the Aids to Navigation Manual – Seamanship, COMDTINST M16500.21A, is updated.
4. DISCLAIMER. This guidance is not a substitute for applicable legal requirements, nor is it itself a rule. It is intended to provide operational guidance for Coast Guard personnel and is not intended to nor does it impose legally-binding requirements on any party outside the Coast Guard.
5. MAJOR CHANGES. This Commandant Change Notice removes Sections A-E & G, from Chapter 6 following the promulgation of the Domestic Icebreaking Tactics, Techniques and Procedures (TTP), CGTTP 3-91.9 and moved Section F into updated Section A. It updates Chapter 14, replaced the term “small boat(s)” with “boat(s)” and adds Section E, Buoy Operations from Boats. It also corrected formatting errors and removed or updated information contained in the TOC and glossary.
6. ENVIROMENTAL ASPECT AND IMPACT CONSIDERATIONS.
  - a. The development of this Commandant Change Notice and the general policies contained within it have been thoroughly reviewed by the originating office in conjunction with the Office of Environmental Management, and are categorically excluded (CE) under current USCG CE#33 from further environmental analysis, in accordance with Section 2.B.2. and Figure 2-1 of the National Environmental Policy Act Implementing Procedures and Policy for Considering Environmental Impacts, COMDINST M16475.1 (series).

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	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
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NON-STANDARD DISTRIBUTION:

b. This directive will not have any of the following: significant cumulative impacts on the human environment; substantial controversy or substantial change to existing environmental conditions; or inconsistencies with any Federal, State, or local laws or administrative determinations relating to the environment. All future specific actions resulting from the general policies in this Commandant Change Notice must be individually evaluated for compliance with the National Environmental Policy Act (NEPA), DHS and Coast Guard NEPA policy, and compliance with all other environmental mandates.

7. DISTRUBUTION. No paper distribution will be made of this Commandant Change Notice. An electronic version will be located on the following Commandant (CG-612) web sites. Internet: <http://www.uscg.mil/directives/> and CGPortal: <https://cgportal2.uscg.mil/library/directives/SitePages/Home.aspx>.

8. PROCEDURE. Remove and replace the following sections of the Aids to Navigation Manual – Seamanship, COMDTINST M16500.21A.

<u>Remove</u>	<u>Replace/add</u>
Cover	Cover and blank back page
Pages: i-xxxiv	Pages: i-xxxiii
Pages: 6-1 to 6-28	Pages: 6-1 to 6-7
Chapter 14	Chapter 14

9. RECORDS MANAGEMENT CONSIDERATIONS. This Commandant Change Notice has been evaluated for potential records management impacts. The development of this Commandant Change Notice has been thoroughly reviewed during the directives clearance process, and it has been determined there are no further records scheduling requirements, in accordance with Federal Records Act, 44 U.S.C. 3101 et seq., National Archives and Records Administration (NARA) requirements, and the Information and Life Cycle Management Manual, COMDTINST M5212.12 (series). This policy does not have any significant or substantial change to existing records management requirements.

10. FORMS/REPORTS. None.

11. REQUEST FOR CHANGES. Recommendations for improvement shall be submitted to the Office of Cutter Forces (CG-751).

JOHN P. NADEAU /s/  
Rear Admiral, U.S. Coast Guard  
Assistant Commandant for Capability



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## List of Acronyms

Acronym	Definition
ANB	ATON Boat (55 or 64 feet)
ANSI	American National Standards Institute
ANT	Aids to Navigation Team
ATON	Aids to Navigation
BDS	Buoy Deck Supervisor
BUSL	Buoy Boat, Utility Stern Loading
CCA	Chromated Copper Arsenate
<b>CG-LIMS</b>	<b>Coast Guard – Logistics Information Management System</b>
CO	Commanding Officer
CPP	Controllable Pitch Propeller
DIW	Dead in the Water
DPS	Dynamic Positioning System
GAR	Green, Amber, Red (Risk Assessment Tool)
IATONIS	Integrated ATON Information System
IPS	Improved Plow Steel
IWRC	Independent Wire Rope Core
LLL	Left Lang Lay
LRL	Left Regular Lay
NEM	Naval Engineering Manual (COMDTINST M9000.6(series))
NSTM	Naval Ships' Technical Manual
OIC	Officer in Charge
ORM	Operational Risk Management
PPE	Personal Protective Equipment
PQS	Personal Qualification Standard
PS	Plow Steel
RLL	Right Lang Lay
<b>SDS</b>	<b>Safety Data Sheets</b>
RRL	Right Regular Lay
SPE	Severity, Probability, Exposure (Risk Assessment Tool)
TANB	Trailerable ATON Boat
TCT	Team Coordination Training
TRLB	Temporary Lighted Buoy
TRUB	Temporary Unlighted Buoy
<b>USAIMS</b>	<b>United States Aids to Navigation Information Management System</b>
WLL	Working Load Limit
XIP	Extra Improved Plow Steel (Wire Rope), also EIPS
XXIP	Extra, Extra Improved Plow Steel (Wire Rope), also EEIPS



## GLOSSARY

<b>Term</b>	<b>Definition</b>
<b>Acetylene</b>	A colorless, highly flammable or explosive gas, C <sub>2</sub> H <sub>2</sub> , used for metal welding and cutting. When combined with compressed oxygen, it is used for heating, cutting, and welding aids to navigation components, such as cutting and connecting buoy mooring chain. These gases are stowed under pressure in special bottle-shaped steel cylinders.
<b>Adrift</b>	A floating, unmoored object moving with the prevailing wind and tide, such as a buoy broken loose from its mooring. (2) Not in proper storage; “ <i>gear adrift.</i> ”
<b>Advance</b>	Distance a vessel travels in the direction of its original course from the time the rudder is put over until it has turned through 90 degrees.
<b>Aids to Navigation (ATON)</b>	Any device external to a vessel or aircraft intended to assist a navigator to determine his position or safe course, or to warn him/her of dangers or obstructions to navigation.
<b>ATON Characteristic</b>	The audible, visual, or electronic signal displayed by an aid to navigation to assist in the identification of an aid to navigation.
<b>Aids to Navigation System, Short Range</b>	A group of interacting external reference devices intended to collectively provide sufficient and timely information with which to safely navigate within and through a waterway when used in conjunction with updated nautical charts and other commonly available material. The system includes all navigation devices within visual, audio, or radar range of the mariner. (2) Refers to the particular marking scheme used by a system of aids.
<b>Aids to Navigation Boat (ANB), Buoy Boat, Utility Stern Loading (BUSL)</b>	Specialized boats usually attached to Aids to Navigation Teams (ANT) designed for facilitating the performance of maintenance to aids to navigation, including responding to ATON discrepancies.
<b>Aids to Navigation Team (ANT)</b>	Shore-based USCG unit, whose primary mission is maintaining aids to navigation and responding to ATON discrepancies. These units are assigned a variety of boats, trucks, and other equipment to accomplish the ATON mission.



<b>Assigned Position (AP)</b>	The assigned position of an aid to navigation in latitude and longitude.
<b>Auxiliary Hoist</b>	The secondary hoist on a crane or boom. Number 2 and 3 hoist on a WLIC. A wire rope or line rove through a fixed block or sheave for hoisting. Sometimes referred to as a single whip; does not provide a mechanical advantage. A double whip is rigged with a running block, a block that moves with the load being hoisted and provides mechanical advantage. <i>Slang would be to say "Whip".</i>
<b>Avast</b>	An order to cease; stop; or hold, as in " <i>Avast heaving.</i> "
<b>Backfire</b>	When operating gas torches, a backfire occurs when the flame on a torch momentarily regresses into the torch tip and then immediately reappears or goes out completely, usually with an accompanying "pop" sound. It may be caused by the torch touching the object being heated, particles obstructing the gas flow, or the tip overheating. (2) A sustained backfire is defined as the sustained burning of the flame back inside the torch, usually at the mixer, but could also happen further upstream under certain conditions. Sustained backfires are often accompanied by a hissing or squealing sound and/or a smoky, sharp-pointed flame. (3) A <i>flashback</i> occurs when the flame regresses "upstream" of the torch's mixing chamber, which is a much more serious condition than a backfire. It is caused by the reverse flow of gases upstream into the hoses or other equipment.
<b>Bail</b>	A lifting or mooring appendage, usually permanently attached to an object designed for hoisting, griping, or mooring an object, " <i>inker bail, buoy bail, mooring bail, etc.</i> "
<b>Barrel sling</b>	A two or more legged sling fitted with hooks designed to attach to the drum ends.
<b>Battery box</b>	A steel watertight box attached to the bell stand of a lighted buoy to house batteries. Also refers to a weather tight box, usually plastic, mounted on a lighted beacon (fixed aids to navigation).
<b>Battery pocket</b>	A steel cylinder welded in the interior of lighted steel buoys (3 1/2X8 and larger) to accommodate battery racks. These pockets are accessed via battery pocket covers, which when properly installed ensure battery pocket watertight integrity.
<b>Battery pocket vent</b>	Metal tubing fitted to the buoy packets and vented near the top of the buoy cage through a check valve.



<b>Battery rack</b>	A steel rack for holding batteries, used when a steel battery box cannot be used. It is inserted into the battery pocket of a lighted buoy.
<b>Beacon</b>	A fixed aid to navigation. Beacons are either lighted or unlighted and located on land or water. Unlighted beacons are referred to as daybeacons and lighted beacons are referred to as lighthouses, lights, or ranges.
<b>Belay</b>	To fasten a line by winding it around a cleat or belaying pin with a series of "S" turns. (2) To disregard, as in " <i>belay my last command.</i> "
<b>Belaying pin</b>	A wood or steel pin around which rigging lines are fastened.
<b>Bight</b>	A loop of line, wire rope, or chain.
<b>Bits</b>	A pair of short strong posts fixed to the deck of a vessel used to secure a line or hawser, such as a mooring or tow line.
<b>Bitter end</b>	The last part of a line, hawser, or wire rope or the last link of a chain.
<b>Block</b>	A device consisting of an outside shell and internal sheave (wheel) through which a line or wire rope may be passed. (See Chapter 4)
<b>Block and block</b>	<i>See Two-Blocked.</i>
<b>Boat hook</b>	A wood or aluminum pole with a hook attached to one end, used to fend off, hold on, or retrieve.
<b>Bollard</b>	An upright strong post on a dock or pier to which lines or hawsers may be secured.
<b>Boom</b>	A long spar projecting from the base of a mast or A-frame, used to support hoisting tackles or purchases.
<b>Bottom gripe</b>	Gripes applied to the bottom of the buoy body (hull) of a tube buoy when it is in the prone position. (See Chapter 4)
<b>Bow thruster</b>	A propeller set in a tunnel in the bow of a vessel used to steer the bow to port or starboard.
<b>Brushing</b>	Clearing vegetation that obscures or endangers a beacon (fixed aid to navigation).
<b>Bull chain</b>	A section of chain rigged fore and aft inboard of the working buoy port (the buoy port in which a buoy is to be hoisted aboard or deployed). (See Chapter 4)



<b>Bulwark</b>	Section of plating forming an extension of a vessel's side above the weather deck.
<b>Buoy</b>	A floating aid to navigation. A buoy is either lighted or unlighted and can be equipped with sound signals and radar enhancement devices.
<b>Buoy appendages</b>	Buoy mooring equipment, such as chain, bridle, shackles, swivel, etc. and sound producing equipment, such as bells, gongs, whistles, and horns.
<b>Buoy body (hull)</b>	The cylindrical section of a buoy that provides floatation. Buoy hulls are constructed of either steel or non-ferrous materials.
<b>Buoy bridle</b>	Two equal lengths of chain connected by an iron ring. The bitter ends of the two legs are attached to the buoy and ring is attached to the mooring chain through shackles and a swivel.
<b>Buoy cage (tower)</b>	The skeleton framework of a lighted or sound buoy mounted to the buoy body, which supports the radar reflector, optic, and other signal equipment.
<b>Buoy chock</b>	A wooden wedge specially shaped to fit buoy hulls.
<b>Buoy critters</b>	Mussels and other assorted marine animals found on buoys and moorings.
<b>Buoy lifting bail</b>	Lifting bail at the top of a buoy body to facilitate hoisting and griping or securing the buoy to the deck.
<b>Buoy mooring</b>	The chain, wire rope, synthetic line, or combination that connects a buoy to its sinker or anchor. In most cases the sinker or anchor as well as the attaching hardware are considered part of the buoy mooring.
<b>Buoy mooring chain</b>	A string of connected steel rings or links joined together to form a specific length. They are typically manufactured to a length of 90 feet referred to as a shot of chain. Buoy mooring chain is used to moor a buoy to the seabed.
<b>Buoy mooring eye</b>	Mooring bail on the bottom of the buoy hull to which the buoy's mooring is usually attached.
<b>Buoy pocket</b>	See Battery Pocket.
<b>Buoy port</b>	An open section in the bulwarks on each side of the buoy deck to facilitate recovering and deploying buoys.
<b>Buoy saddle</b>	Two wooden blocks connected – at a specified width – with two steel



rods and shaped to fit the contour of a buoy hull. They are designed to cradle a buoy on a horizontal surface, such as a buoy deck, dock, or truck bed.

- Buoy tender** A vessel specially designed for maintaining aids to navigation, particularly buoys and associated moorings.
- Buoy tube** A heavy gauge steel tube fitted with a counterweight attached at the other end to the bottom of some lighted buoys. The tube of a whistle buoy is hollow to accommodate a whistle or wave turbine generator.
- Cage line** A line **passed** through the cage of a buoy to steady the buoy while it's alongside a buoy tender or when being hoisted or deployed (see Chapter 4).
- Can buoy** An unlighted buoy that displays a cylindrical shape above the water line.
- Capstan** A vertical drum revolving on a spindle used to exert power required to heave around on an anchor chain, a line or hawser. Capstan drums are either smooth or provided with several raised ribs referred to as whelps.
- Cargo net** A square net of varying sizes made of natural or synthetic line, wire rope, nylon straps or chain. It is used for slinging certain cargo or may be used as a safety sling, slung between a vessels or a vessel and pier during loading operations.
- Cast** To throw, as in "*casting the lead to ascertain the water depth.*" To cause to fall, such as to turn from the wind or cause a vessel to "*fall off.*" (2) Cast off; remove lines from a dock, vessel, buoy, or other object.
- Cat's Paw** A hitch made in the bight of a line. (2) Light airs or light baffling winds which temporarily ruffle surface of the water.
- Chafe section** The section of a buoy mooring chain between the riser and bottom sections. It is in constant movement and thus typically experiences the most wear.
- Chafing gear** Additional material placed over sections of line that are prone to wear.
- Chain hook** A handled metal hook about 32 inches long used to manually move bights of chain about the deck (See Chapter 4).
- Chain sling** *See sling.*
- Chain stopper** A mechanical device used to stop off "live" chain, i.e. chain that is attached to an object outside the vessel or lead over the side.



<b>Check</b>	A line handling command meaning to keep strain on a line but slacking it as necessary to prevent the line from parting.
<b>Chock</b>	A metal deck fitting through which lines and hawsers are passed, usually to change their direction. Lines and hawsers must be threaded through a closed chock, while a bight of line can be placed in an open chock. (2) Blocks, usually wood, used to provide stability for ATON equipment and general cargo.
<b>Chromated Copper Arsenate (CCA)</b>	A chemical wood preservative containing chromium, copper and arsenic. CCA is used in pressure treated wood, such as pile, timbers, and lumber to protect it from rotting due to insects and microbial agents.
<b>Cleat</b>	An anvil-shaped deck fitting for securing or belaying lines.
<b>Come-along (Lever hoist)</b>	A hand operated ratchet lever winch. It provides mechanical advantage for moving or securing loads. Its ratchet acts as a mechanical brake that keeps the wire rope, line, or strap from unwinding.
<b>Commissioned</b>	The action of placing a previously discontinued aid to navigation back in operation.
<b>Cotter pin</b>	A split pin with two tines that are split and bent at various degrees. Primarily used aboard ATON units to keep bolts and nuts from backing off.
<b>Counterweight</b>	Weight added to the lower portion of a buoy to provide stability.
<b>Cradle</b>	A steel support permanently affixed to a vessel to place (rest) the boom, crane arm, or pile driving lead and hammer when not in use. (2) Support for a boat when stowed on deck or ashore.
<b>Crane</b>	A lifting machine powered to lift, lower, or horizontally move loads.
<b>Crane arm/boom</b>	A beam, spar, or skeletal structure projecting from the base of a crane, used to support hoisting tackles or purchases.
<b>Creosote</b>	A highly toxic wood preservative obtained from high temperature distillation of coal tar (a mixture of organic substances) and over one hundred other components. It is used to protect wood; primarily piles, timber utility poles, and railroad ties and is applied by pressure methods. It is capable of causing serious chemical burns if exposed to bare skin. Although it has been replaced with CCA in all ATON and Coast Guard construction applications, there are still old creosote piles and timbers in



use throughout the Coast Guard.

<b>Crossdeck</b>	A large line or wire rope – usually taken to power – used to provide positive horizontal control over heavy objects when they are being brought aboard, deployed, or moved aboard vessels.
<b>Cross-over tube</b>	A small tube running between the battery pockets of buoys with more than one battery pocket. The tube allows the free passage of air between the battery pockets and the outside atmosphere through the battery pocket vents. This serves to vent potentially dangerous explosive vapors from the battery pockets to the outside atmosphere.
<b>Daybeacon</b>	<i>See Beacon</i>
<b>Daylight control (DLC)</b>	A photoelectric cell that senses the amount of sunlight. It activates an electronic on/off switch in the flasher which turns the light on at dark and off during the daylight hours.
<b>Daymark</b>	Daytime characteristic of an aid to navigation.
<b>Dead In the Water (DIW)</b>	An object or vessel that is not making progress; not moving under its own power; lack of self-propulsion.
<b>Deck load</b>	General term referring to a vessel's buoy or construction deck load.
<b>Discontinue</b>	To remove from operation (temporarily or permanently) a previously authorized aid to navigation
<b>Dolphin</b>	A marine structure consisting of at least three piles driven into the seabed, usually at an angle and held together with large bolts or wire rope. Dolphins may be used as part of a dock structure or as an aid to navigation.
<b>Dredge</b>	To drag an anchor to control a vessel in current or during close-quarters maneuvering. (2) A vessel equipped with machinery for deepening channels and harbors.
<b>Drift</b>	The rate/speed at which a vessel moves due to the effects of wind, wave, current, or the accumulative effects of each. Usually expressed in knots.
<b>Drum</b>	The part of a capstan, winch, or windlass which line, hawser, or wire rope is wound. (2) A cylindrical shaped receptacle, a barrel.
<b>Dump board</b>	A wood or steel platform used as a lever with the fulcrum positioned on the outboard end used to set small sinkers, usually up to 500 pounds. Fixed dump boards are located on some vessels that are capable of



handling 1500 pound sinkers. Sometimes referred to as a teeter board.

<b>Dunnage</b>	Lumber or other material used to protect cargo in the hold of a ship as well as the ship's cargo hold; planks placed on deck to add friction between the flat surface of an object and a steel deck.
<b>Ease</b>	To reduce the amount of applied rudder by a certain amount, or in the absence of an amount, to reduce it by half. <b>(2)</b> To reduce the speed of a vessel. <b>(3)</b> To reduce the tension on a line or hawser.
<b>End fitting</b>	The termination fitting at the end of a wire rope, such as a " <i>poured fitting, pressed fitting, etc.</i> "
<b>End for end</b>	To reverse something to facilitate even wearing, generally referring to buoy mooring chain or wire rope rigging – neither practice is recommended.
<b>Extinguished</b>	A lighted aid to navigation which fails to show its advertised light characteristic.
<b>Fairlead</b>	A point, usually a specialized fitting, such as a block, chock, or roller used to change the direction and increase effectiveness of a line or cable.
<b>Fake</b>	To lay out a line, hawser, or chain in long flat bights that will pay out freely without fouling.
<b>Fathom</b>	A unit of measurement that equals 6 feet.
<b>Fender</b>	A device constructed of wood, line, synthetic foam, rubber, or plastic rigged on a vessel, dock, or pier to absorb the shock and reduce chafing effects of contact between vessels or between a vessel and pier.
<b>Fiege fitting</b>	A three-piece wire rope end-fitting consisting of a sleeve, a plug and a covering socket. (See Chapter 4 )
<b>Fishhook</b>	The end of an individual broken wire that protrudes from the surface of a wire rope.
<b>Fix</b>	A geographical position determined by measuring the angle, bearing, or distance of established terrestrial references or electronic positioning data received from a global satellite system.
<b>Fixity</b>	When a pile penetrates the seabed to a depth where the pile will be adequately supported by the surrounding soil enabling it to resist applied overloading lateral forces to the point of structure failure (see Soil failure).



<b>Flashback</b>	<i>See Backfire</i>
<b>Flasher</b>	An electronic device that regulates the flash duration of a light.
<b>Flat bottom buoy</b>	A lighted buoy with a flat bottom that allows it to sit upright on a flat surface.
<b>Foul</b>	To entangle, confuse, knot, or obstruct. Jammed, knotted, or entangled; not clear for running referring to line, hawsers, wire rope, or chain.
<b>Grapnel hook</b>	A device used to drag the seafloor to recover sunken objects such as buoys. Grapnel hooks come in various sizes and weights and consist of from three to five hooks (claws, flukes).
<b>Gripe</b>	To secure an object using gripes, such as “ <i>gripe the buoy</i> ”. (2) Chain, synthetic web material, line, or wire rope used with ratcheting devices to secure objects in place. (See Chapter 4)
<b>Ground tackle</b>	Anchors, cables, chain, windlass, capstan and all associated gear used in dropping or heaving in anchors and securing a vessel at anchor.
<b>Gypsy head</b>	A small auxiliary drum at the end of a windlass. Used to apply power to lines and hawsers.
<b>Guy/Vang</b>	A line, wire rope or chain used to steady a mast, boom, or gaff; can be part of running or standing rigging. (See vang)
<b>Hand-over-hand</b>	Hauling chain using two purchases, not a recommended method of retrieving buoy or anchor chain. (2) Hauling in a line or hawser by personnel passing their hands alternately one before the other.
<b>Happy hooker</b>	<i>Slang.</i> A mechanical line reeving device used to thread a hook, <b>sling or line through a bail or lifting point</b> of an object outside a vessel, such as a buoy.
<b>Hatch</b>	An opening in a vessel’s deck affording access to lower compartments.
<b>Hatch cover</b>	A watertight covering for a hatch.
<b>Hawser</b>	A large fiber or synthetic line with a circumference of 5 inches or more, typically used for mooring or tow lines.
<b>Head block</b>	A large wood block, typically a section of a 12”x12” timber, used to support the upper buoy body of a lighted tube buoy (a buoy with its counterweight at the end of a buoy tube) when it is the prone position. (See Chapter 4)



<b>Head gripe</b>	<i>Slang. See "Top Gripe."</i>
<b>Heat and beat</b>	To join two section of chain together. (2) A rivet pin chain shackle used to join two section of buoy chain.
<b>Heat and beat anvil</b>	A steel device used to steady a heat and beat shackle and chain during the heat and beat process, i.e. heating the pin and striking it with large hammers or sledgehammers. Heat and beat anvils may be mounted on a head block to bring it off the deck for more efficiency. The most efficient design is shown in figure 4-34, where the anvil is supported with four strong pipes welded to a bottom plate.
<b>Heave around</b>	To take in line, hawser, chain, or wire rope; manually or by taking to power with a gypsy head, capstan, winch, capstan, etc.
<b>Hitch</b>	Securing a line to a hook ring or spar. There are various types of hitches, such as a clove hitch, rolling hitch, timber hitch , etc.
<b>Hog/Hogging stress</b>	The condition of a vessel in which the bow and stern have drooped; when the midship section of a vessel is supported by a wave crest and the bow and stern are poised over a trough.
<b>Hogging chain</b>	The act of using a line or wire rope to haul buoy chain into a mechanical chain stopper. (2) A shot of buoy chain run under a seagoing buoy tender and secured on deck at either side. Used for transferring a mooring from one side of the vessel to the other when relieving buoys or when setting extraordinary heavy moorings for larger buoys on West Coast bars, such as the Columbia River.
<b>Hogging line</b>	A line or wire rope taken to power to haul buoy chain into a mechanical or hydraulic chain stopper.
<b>Hoist</b>	To rise up or lift with a line, wire rope, or other rigging gear, usually taken to power or rigged for mechanical advantage, such as a block and tackle.
<b>Horse collar</b>	A semi-circle shaped steel device mounted to a chain stopper to keep buoy chain in the chain stopper during chain retrieval operations.
<b>Hot pack</b>	A portable system of temporary batteries attached to a lighted buoy to provide emergency power to the light system when the primary power system has failed. With the advent of solarization, external buoy battery boxes, Light Emitting Diode (LED) lanterns, hot packs are rarely necessary.



<b>Inboard</b>	Toward the fore-and-aft centerline of the ship; inside the deck edge or shell plating, as opposed to outboard.
<b>Jet cones</b>	Conical steel plates with an opening at the apex used to moor river buoys to the riverbed. They are jetted into the river bed with high pressure water hoses and pipes.
<b>Jetting</b>	The use of high pressure water to displace river/seabed soil to facilitate inserting piles or other anchoring/mooring appendages.
<b>Jetty</b>	A structure usually constructed in pairs with rock or concrete built from shore to extend an inlet into deeper water, and/or protect a river mouth or harbor entrance from storms and shoaling and/or direct the flow of current.
<b>Kedging</b>	To move a vessel by hauling in on a line, chain, or wire rope fastened to an anchor that has been dropped some distance from the vessel.
<b>Keel haul</b>	To drag an object under a vessel's keel from one side of the vessel to the other, such as to " <i>keel haul a buoy.</i> "
<b>Kingpost</b>	Post supporting a boom on a vessel; the upright that supports the boom of some cranes.
<b>Kink</b>	A tight curl, twist, or bend caused by a doubling or winding of something about itself such as line, wire rope, chain, or hose.
<b>Lamp</b>	An incandescent light bulb used in lighted aids to navigation.
<b>Lamp changer</b>	A mechanical device that replaces an inoperable lamp by rotating an operating lamp into the lantern's focal plane.
<b>Lattice boom</b>	A skeletal boom extending projecting from the base of a crane, used to support hoisting tackles or purchases. Lattice boom cranes are used aboard USCG Inland Construction Tenders (WLIC).
<b>Lay/Lay length</b>	<i>See Chapter 4</i>
<b>Lead line</b>	A line with unique markings used to determine water depth weighted on one end with a lead weight. The markings on a standard lead line are attached to the line at various lengths to indicate the water depth in fathoms. Lead lines can also be used to help determine the type of bottom by adding tallow or soap to the cavity in the bottom of the lead – "arming the lead."
<b>Lifeline</b>	A line, chain, or wire rope rigged on vessel weather deck stanchions for



personnel safety.

<b>Line</b>	Term for fiber or synthetic rope greater than 1-1/2 inches in circumference but less than 5 inches in circumference.
<b>Live chain</b>	Chain that is attached to an object outside the vessel or led over the vessel's side; chain that has the possibility of running, i.e. freely paying out usually over the side.
<b>LWP (Left Watching Properly)</b>	An aid to navigation is exhibiting the proper characteristics, including position, as defined in the appropriate USCG Light List. Used to reflect the status of an ATON after a service delivery unit has performed maintenance; when a previously discrepant ATON is restored to a condition so that it exhibits its proper characteristics.
<b>Main Hoist</b>	When used in rigging, refers to the weight handling purchase on the crane or boom with the greatest lift capacity, usually a multiple purchase.
<b>Major light</b>	(1) Operational – The nominal range of a beacon is 10 nautical miles or greater. (2) Structure – A beacon of relatively complex construction, such as mono-pile or ice-resistant structures built in deep water (greater than 25 feet) on shore whose overall height usually exceeds 75 feet.
<b>Marker buoy</b>	A small float anchored to the seabed used to temporarily mark a location on the water.
<b>Marlinspike</b>	A multipurpose pointed steel tool used to separate the strands of wire rope when splicing, to loosen screw pins, removing shackle split keys, applying seizings, etc.
<b>Marry</b>	To join together, such as two ropes joined in a seizing.
<b>Mechanical advantage</b>	The ratio of output force working on a load produced by a machine to the input force, such as the advantage gained by using a multiple purchase.
<b>Messenger</b>	A smaller line attached to the eye of a hawser to facilitate passing the hawser to a vessel or pier.
<b>Minor light</b>	(1) Operational – The nominal range of a beacon is less than 10 nautical miles. (2) Structure – A beacon of relatively simple construction, such as single or multiple pile structures built in shallow water or on shore whose overall height usually doesn't exceed 75 feet.
<b>Modeer shackle</b>	A narrow elongated shackle with a removable keyed pin specially



designed for handling mooring chain. (See Chapter 4)

**Mouse/Mousing**

A small collar made of small stuff, line, or wire with the purpose of holding something in place. (2) A collar placed over the hook jaw to prevent a load from “unhooking” – can be applied by passing two or three turns of line, small stuff, or wire across the hook jaw; a spring loaded mechanical latch.

**SDS (Safety Data Sheet)**

A form containing data regarding a particular substance; intended to provide personnel, including emergency personnel, with procedures for handling or using a particular substance in a safe manner. It includes information such as the substance’s physical data (melting point, boiling point, flash point, etc.), toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill-handling procedures. (*Formerly MSDS – Material Safety Data Sheets*)

**Nipper chain**

A section of rigging chain fitted with rings on both ends. It is used to recover chain or other objects by passing the chain around the object, slipping one ring through the other, and cinching the nipper chain around the object.

**Nub**

*Slang for A portion of a pile protruding from the seabed.*

**Nun buoy**

An unlighted buoy displaying a conical shape above the water line

**Off station**

A buoy that is not on its assigned position and has not been temporarily relocated.

**Outage**

*Slang for Extinguished; a lighted aid to navigation that has failed to operate as advertised.*

**Outboard**

Outside of a vessel’s hull; away from the center or keel line, the opposite of inboard.

**Overriding turns**

Turns placed over existing turns on a capstan or winch.

**Oxy-Acetylene torch**

A torch that mixes specific amounts of acetylene with oxygen producing an intense flame. Uses include cutting chain, steel piles, buoys and structure parts, heating rivet pins, and welding.

**Padeye**

A steel eye, often with a link attached, affixed to a vessel to accommodate securing cargo or other objects, such as buoys, and to facilitate temporary or permanent rigging arrangements.

**Pallet**

A portable platform usually constructed of wood, used for cargo handling operations.



<b>Pawl</b>	A steel hinged lever that prevents backward movement of line, wire rope, webbing, or chain under tension, such as a “ <i>riding pawl</i> .”
<b>Pear link</b>	An oblong metal link narrow at one end and wide at the other, attached to the end of a sling or pendant.
<b>Pelican hook</b>	A hinged hook fitted with a sliding ring to facilitate releasing; used to stop off buoy mooring or anchor chain.
<b>Pendant</b>	A length of wire rope, synthetic material, or chain fitted with an oval or pear link on one end and a hook on the other end; also referred to as a picking pendant.
<b>Pigtail</b>	The section of mooring from the bitter end to where the mooring chain is attached to the sinker bail, typically 3 to 5 links. The pigtail is used to hang a sinker in a chain stopper.
<b>Pile</b>	A heavy beam of timber, concrete, or steel, driven into the seabed as a foundation or support for an ATON beacon/structure.
<b>Plumb (a hatch)</b>	To rig a tackle directly over a hatch opening.
<b>Point load</b>	Occurs when a load is not centered on the hook but rests near the point (end) of the hook.
<b>Poured socket</b>	A closed socket end fitting affixed to the end of wire rope by pouring resin or hot zinc. Poured sockets are sometimes referred to as spelter sockets.
<b>Preventer</b>	(1) A purchase of a crane or boom rigged to prevent the boom from snapping back should a sudden shift in weight or hoisting purchase failure occur during hoisting operations. (2) A length of chain used to secure a river buoy to the deck during buoy retrieval operations on the Western Rivers.
<b>Primary battery</b>	A type of battery which cannot be recharged.
<b>Punt</b>	Rectangular shallow boat used on many smaller tenders and during flood relief operations.
<b>Purchase</b>	A device, such as a winch or block and tackle used to obtain mechanical advantage, such as the “Main Purchase” in a crane or boom. A purchase can be rigged with multiple blocks or as a single line.
<b>Radar reflector</b>	Flat pieces of radar reflective material placed on or built into an object to make it more radar reflective than it would be ordinarily. Certain



unlighted and most all lighted aids have these.

<b>Ratchet load binder</b>	Turnbuckle style ratchet binder consisting of a barrel with two opposite threaded rods each fitted with a hook or other type of rigging gear on the end. A ratchet mechanism is attached to the barrel center which is operated by a handle which retracts or extends the threaded rods to apply or release tension on a gripe down system. Also known as a "Steamboat Jack." There are pneumatic versions available.
<b>Ratchet tie down straps</b>	A tie down device consisting of a synthetic strap (available in a variety of widths and lengths) and ratchet mechanism to apply and release tension.
<b>Ready for riding</b>	To place chain in a pelican hook in preparation to place the chain under strain, such as when attempting to free a sinker from the seabed.
<b>Recharged</b>	Replacing the batteries in a lighted aid to navigation or an aid that otherwise requires power.
<b>Recovered</b>	An aid to navigation that has been retrieved after being reported adrift, aground, missing, sunk, or destroyed.
<b>Reeve</b>	To pass a line, wire rope, hawser, or hook through a hole, ring, pulley, or block.
<b>Reeving line</b>	A line attached at one end to a line reeving device, such as a "Happy hooker", with the other end attached to the tip of a hook. Used primarily for reeving a hook in a buoy bail.
<b>Refusal</b>	When a pile has been driven to the point where 20 blows from a diesel hammer fails to drive the pile more than an average of 1/8 inch per blow.
<b>Retroreflective tape</b>	Specially constructed adhesive tape that reflects light back along the same path that it first contacted the material, which is different from a mirror's reflective properties that reflect light off at a different angle. Used for numbers and borders on buoys and dayboards.
<b>Relieved</b>	Replacement of an aid to navigation, typically a buoy, with an aid of similar type and characteristic.
<b>Relighted</b>	To return an extinguished aid to navigation to its advertised characteristic.
<b>Relocated</b>	Authorized relocation of an aid to navigation from its previous assigned position.



<b>Reset</b>	A buoy returned to its assigned position after being reported off station, adrift or missing.
<b>Riding pawl</b>	A safety stopper designed to stop anchor chain from running when anchored, weighing anchor, or securing the anchor for sea. It is lifted up to the "open" position when the anchor chain is run out. Sometimes referred to as a "cat's paw."
<b>Rigging</b>	A system of lines, wire rope, and other gear used to support masts and booms, referred as standing rigging. Rigging designed to move is referred to as running rigging, such as weight handling booms, cranes, and associated gear.
<b>Rivet-pin shackle</b>	A chain shackle used join sections of buoy chain. The pin is heated with a special oxy-acetylene torch and peened to keep it in place. (See "Heat and Beat")
<b>Roller chocks</b>	A fairlead chock fitted with rollers to reduce the friction on lines, hawsers, and wire rope.
<b>Rotten stop</b>	Small line, usually ¼" fiber line (6-thread) used to lash bights of mooring chain or towing line intended to check chain or hawser payout speed.
<b>Saddle</b>	<i>See Buoy saddle.</i>
<b>Safe Working Load (SWL)</b>	An outdated term. Use Working Load Limit (WLL) instead.
<b>Safety chain or Safety device</b>	A chain, lifeline, or safety net rigged to span the buoy port opening. It is "dropped" (removed) during certain buoy deck operations.
<b>Safety shackle</b>	Either a chain or anchor type shackle that uses a bolt pin, (i.e. a bolt capped with a nut on one end), which employs a cotter pin to keep the nut from backing off.
<b>Sagging</b>	The condition of a vessel in which the bow and stern are supported by succeeding wave crests and the midship section is poised over a trough.
<b>Screw pin shackle</b>	A shackle where one of the openings is threaded to accept a threaded tip pin.
<b>Secure</b>	(1) To cease or stop doing something, such as " <i>secure the fire main.</i> " (2) To fix in place; to make ready for sea so that the movement of a vessel upon the sea will not upset cargo, objects, or other gear.
<b>Seizing</b>	To wrap with small stuff or wire, as one line to another or a line to



another object.

<b>Set</b>	(1) The direction toward which a vessel or floating object is moving – measured in degrees (usually true versus relative). (2) An order to deploy something, such as “ <i>set the buoy.</i> ”
<b>Sheave</b>	The wheel in a block on which a line, wire rope or hawser rides; a pulley.
<b>“Shoot the tube”</b>	To enter the hollow counterweight tube of a whistle buoy to remove (scrape) "buoy critters" (small marine organisms) from inside the tube.
<b>Shot</b>	A standard section of chain that equals 90 feet or 15 fathoms.
<b>Side-load</b>	When a horizontal force is applied to a crane or boom, such as dragging a load sideways instead of positioning the hoisting purchase directly over a load.
<b>Sinker</b>	A buoy anchor constructed of concrete or cast iron varying in weight. Concrete sinkers are occasionally referred to as “rocks.”
<b>Skeleton tower</b>	A steel tower made up of vertical, horizontal, and diagonal components. They are either square or tapered.
<b>Slack</b>	To release tension on a line, wire rope, or hawser without losing control.
<b>Sling</b>	A single or multiple legged device used to hoist loads. Slings are typically constructed of wire, synthetic, or fiber rope, or chain. One end of a sling leg is typically fitted with a transition link which is attached to a hoisting device (crane or boom hook) or a master link in the case of multiple legged slings. The other leg end(s) is fitted with a transition link connected to a rigging apparatus, such as a hook, shackle, etc.
<b>Slushing</b>	The application of specialized lubricant on wire rope. This lubricant should be applied with a pressure lubrication system equipped with scraper plates designed to remove old lubricant and dirt. Care should be taken to avoid solvent cleaners as the solvent may remain in the rope’s core, allowing corrosion and shortening the rope’s service life..
<b>Small stuff</b>	Term for fiber or synthetic rope less than 1-1/2 inches in circumference.
<b>Snap hook</b>	A hook moused by a spring loaded latch.
<b>Snatch block</b>	A single-sheaved block with a hinged strap that can be opened to accept the bight of a line or wire rope.



<b>Soil failure</b>	Occurs when the seabed soil around a pile is not strong enough to adequately resist overloading lateral forces causing the pile to lean.
<b>Solar panel</b>	A panel of photovoltaic cells used on lighted aids to navigation to convert sunlight to electricity that recharges solar batteries. These batteries provide the power required for the aid's light and other electrical equipment.
<b>Soundings</b>	Water depth readings.
<b>Spelter Socket</b>	<i>See Poured Socket.</i>
<b>Split key shackle</b>	A chain shackle whose pin is secured by a spreading the tines of a flat split key rove through the end of the pin. Split key shackles come in a variety of sizes and are widely used in the aids to navigation maintenance for connecting chain, bridles, and swivels and other mooring appendages to buoys and sinkers.
<b>Spot</b>	To position a boom to facilitate the proper reeving of a hook into an object to be hoisted.
<b>Spuds</b>	Long vertical metal or metal-framed wooden timbers that are hoisted and lowered in through spud wells by means of a winch, boom, or crane. Used to firmly hold a vessel or barge in place during ATON or other weight handling operations.
<b>Stability</b>	The measure of a ship's ability to return to its original position when it is disturbed by a force and the force is removed.
<b>Stand by</b>	The order to wait at the ready; i.e. to be ready to execute the next order quickly.
<b>Station keep</b>	To keep a vessel within a certain distance of a given location on the water.
<b>Steamboat jacks</b>	<i>See Ratchet load binder</i>
<b>Steerageway</b>	A rate of headway sufficient to make a vessel answer its helm.
<b>Stow</b>	To place or arrange gear in its proper place. <b>(2)</b> To fill by packing tightly
<b>Strain</b>	Under heavy tension; to sustain heavy and varied stresses, as in “ <i>a vessel straining at its moorings in a storm.</i> ”
<b>Strike</b>	<b>(1)</b> To take down, as in “ <i>strike the wind pennant.</i> ” <b>(2)</b> Engage in



intense training to prepare an enlisted person for a technical rating.

<b>Structure failure</b>	Occurs when overloading lateral forces cause a structure's foundation to fail, such as a pile breaking or bending.
<b>Surge</b>	To allow a line or hawser to slip around a windlass; sudden slipping of a line or hawser under tension. <b>(2)</b> Onward motion of, or caused by, a swell or wave. <b>(3)</b> Increased activity, as in " <i>surge operations</i> ."
<b>Swing arms</b>	A pair of steel arms that ride on steel pins that are welded perpendicular to the hull of flat bottom lighted buoys directly opposite each other. Swing arms extend down towards the buoy's counterweight, provide connecting points for a buoy bridle, and pivot around the pins to compensate for the buoy's movement in a seaway.
<b>Swingbolt</b>	Stainless steel bolts that pivot on pins welded to a buoy battery pocket used to secure the pocket cover ensuring a watertight seal.
<b>Swivel</b>	A fitting that consists of two separate fitting joined so as to allow each fitting to turn independently of each other. Used in buoy moorings, anchor ground tackle, and weight handling gear.
<b>Tackle</b>	A purchase or set blocks rove with line, wire rope, or chain for obtaining a mechanical advantage for hoisting or pulling.
<b>Tag line</b>	A line used to steady a load being hoisted and moved with weight handling gear.
<b>Tension</b>	Placing strain on line, hawser, wire rope, or chain to remove all slack; to tighten.
<b>Tensor</b>	Similar to a steamboat gripe in function, a tensor is an industrial tool to secure loads on deck or cargo hold. Features a screw-type action with eccentric loading. While turning the drive head with a impact wrench, ratchet, or breaker bar, the large outer barrel telescopes over the inner barrel and pulls the anchoring points together.
<b>Tongs</b>	Any of various implements consisting of two arms hinged, pivoted, or otherwise fastened together, for seizing, holding, or lifting something
<b>Top Gripe</b>	Gripes applied to the top head of a tube buoy body when it is in the prone position. (See Chapter 4)
<b>Topping lift</b>	Multiple purchase rigged to support, hoist, and lower a boom.
<b>Transfer</b>	The distance a vessel travels right or left of its original course from the time the rudder has been put over until it has swung 90 degrees from its



original course.

<b>Tripping line</b>	A line secured to an eye on the back of a lifting hook for controlling and clearing it from a lifting bail.
<b>Tube buoy</b>	A lighted buoy with a counterweight tube affixed to the buoy bottom head. It rests in the prone position on flat surfaces.
<b>Two-block</b>	When a tackle has reached the limit of its hoist and the upper and lower blocks meet each other. Sometime referred to as "Chock-a-block".
<b>Up-and-down</b>	Buoy mooring or vessel anchor chain leading overboard is perpendicular to the sea surface, i.e. it tends neither forward, aft, inboard nor outboard.
<b>Up behind</b>	The command to remove the strain off a line or hawser, remove it from a capstan, windlass, cleat, or bitts, and allow it to go completely slack.
<b>V-band</b>	A stainless steel clamping devise used to seal a lid to its container providing a watertight seal. V-bands are found on some aid to navigation lanterns.
<b>Vangs</b>	Multiple purchases leading from each side of the boom to attachment points on the port and starboard side of a vessel. Vangs are usually powered by mechanical winches and control the lateral movement of a boom. On some booms, vangs are rigged to provide horizontal control of the boom in addition to lateral control.
<b>Vent valves</b>	A specialized version of a check valve, they are designed to seal the vent lines on lighted buoys if it heels over more than 30 degrees or submerges.
<b>Weather hitch</b>	A knot used to secure a line after belaying. A bight is twisted on top of itself and cinched down.
<b>Whelp</b>	One of the projecting ribs fitted on the periphery of a capstan barrel or gypsy head to give better grip to the line. Also, one of the sprockets on the wildcats of a windlass which engages the links of the chain cable.
<b>Whip</b>	<i>Slang for Auxiliary Hoist.</i>
<b>Winch</b>	Machine used for hoisting or heaving.
<b>Wire rope</b>	Rope consisting of steel wires twisted together forming strands, which are laid helically around a core constructed of fiber material (natural or synthetic) or steel.



**Wire rope clip**

Mechanical means of securing wire rope together consisting of a U-bolt, roddle (saddle) and nuts.

**Working load limit (WLL)**

A rating for weight handling gear that describes the operational load limits when uniformly applied in a straight pull. Working load limits are permanently affixed to weight handling gear.



## Chapter 6

# ATON Operations in Ice

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**Introduction**

The methods suggested in this chapter are techniques that have been employed successfully by others. Because every situation cannot be covered in this text, ensure a deliberate risk assessment is conducted; discuss all identified hazards and mitigating strategies prior to the evolution. Thoughtful innovation is encouraged and the methods described in this section have worked well in the past.

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**In this chapter**

This chapter contains the following sections:

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A	ATON Operations in Ice	6-3

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## Section A. ATON Operations in Ice

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- Introduction** Some buoy tenders will be required to service buoys in ice conditions. The manner in which the buoy is worked will depend on variables such as type and thickness of the ice, **proximity** of shoal water, and speed and direction of ice movement.
- 
- A.1. Considerations** Always try to use ice and wind conditions to your advantage. Never approach a buoy in ice without maintaining a good plot of the location of both the tender and the buoy. Reference points are often obscured or unreliable because of poor visibility. Distance and speed of advance are more difficult to determine in moving ice.
- 
- A.1.a. Patience** Never rush an evolution; there are too many accidents that can happen when people are working on a cold slippery buoy deck. If one plan isn't working, it is advisable to stop, allow the crew to warm up, and develop a new plan.
- 
- A.1.b. Precautions** Precautions should be taken to minimize danger to the crew. Ensure that personnel on deck are adequately clothed and equipped with proper PPE. Sending a person out on the ice should be only a last resort. If you must send someone out, ensure that the person is wearing a **properly outfitted dry suit with appropriate thermal protective layers** or a survival suit and that the person is attached to a life line and carrying a boat hook. The boat hook is used to probe the ice for weak spots, or is carried horizontally to break a fall should the person go through the ice.
- 
- A.1.c. Remove the Ice** When working a buoy with significant ice growth, always remove as much ice as possible from the buoy before bringing it on deck. Often, a buoy in otherwise open water will have a collar of ice at the waterline. Removing this ice while the buoy is outboard of the buoy port allows you to maintain better control of the buoy. It also prevents damage to the main purchase from exceeding the weight limit and reduces the chance of a crewman being injured by falling ice or by slipping on deck.
-



### A.1.d. Methods of Ice Removal

Several methods have been tried over the years to remove ice from buoys. Generally any method that causes the buoy hull to vibrate without damaging the buoy or endangering personnel will be effective. The vibration of the metal breaks the ice away from the buoy hull. Blacksmith hammers, sledge hammers, pry bars, and air hammers have all been used effectively. Shotguns with 00 buck shot work well for clearing **bails** as does low pressure hot water from a garden hose.

### WARNING

Do not attempt to lift a buoy by the cage. Buoy cages were never designed for lifting a buoy. Keep in mind that there may be several tons of accumulated ice on the buoy. It is not unusual for ice-covered buoys to hang horizontal when lifted out of the water.

### A.2. Working in Ice

Buoy tending in pancake, skim, or fast ice, less than four inches thick, is the same as buoy tending in open water since buoys in ice of this type are usually visible.

#### A.2.a. The Approach

When working a buoy in fast ice, in excess of four inches, approach the buoy as close as possible. This will prevent ice from getting between the vessel and the buoy and forcing the buoy too far away to be hooked. This **may require driving directly on or toward the buoy and could result in contact with the buoy forward of the buoy port.** Use only enough power to bring the buoy abeam the ship at the buoy port. This way you can use the ice to stop your forward movement and maintain station while working the buoy. The buoy may be on its side but still visible above the surface. If the buoy is heavily iced, it may be necessary to clear the lifting bail with a shotgun or hot water from a low pressure garden hose.

#### A.2.b. Locating a Buoy Under the Ice

A buoy that has been forced under the ice can be located by relieving the pressure around the buoy, allowing the buoy to surface. In **large plate or fast ice**, it may be necessary to **cut relief tracks.** Determining what the wind direction was several days before **may** give you an indication as to which direction the buoy and chain **are** led. **Creating reliefs in the ice may help surface the buoy and** minimize chances of wrapping a buoy in the screw. Buoys often leave a trail of broken ice as they force their way to the surface. This trail is very useful in finding buoys that have been dragged from AP. **If it is believed the sinker is on AP,** keep the stern of the vessel well clear of the estimated watch circle. If unable to cut relief tracks due to shoaling, station a person on the forecastle with a marker. If the buoy is driven under during the approach, toss the marker over at the bow. This will give the conning officer an idea of his/her speed in relation to the ice and help prevent



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overriding the buoy. Once a buoy has been brought alongside, maneuver the vessel so moving ice is forced around the bow and just clears the buoy. Take care to not get canted so far that the ice sets the ship onto the buoy and mooring. The unequal pressures present in ice make it nearly impossible to keep station with anything other than the bow facing into a moving ice field. A pass by the buoy position may also crack the ice and allow the buoy to surface.

Once the location of one buoy has been obtained, it is likely that other buoys in the area may be set the same direction and distance from their respective AP.

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### **A.3. A Buoy Alongside In Moving Ice**

Because of the deceptive nature of a moving ice field, it can present one of the most challenging buoy evolutions. The ice is usually of varying thicknesses and consistencies, which will introduce variable forces to your station keeping problem in the same manner as a gusting wind. The tender can actually be set away, onto, or worse, overshoot the approach on a buoy that has gone under the ice. Since the ice and the tender are constantly moving, if the buoy is forced under the ice it will be almost impossible to gauge the tender's movement or location in relation to the buoy. A natural range works well, but may not be available. The best way to approach this situation is to determine the direction the flow is coming from. If there is sufficient sea room for maneuvering, break a track from the buoy into the flow. This way the buoy will surface in a broken track and will be visible during the approach. You will find it necessary to maintain turns in a moving ice field in the same manner as stemming a current. The critical part of the evolution is to lift the buoy hull clear of the ice before the unbroken ice field reaches the buoy. Depending on the ice field's speed of advance and the icing on the **bails**, this evolution may have to be repeated several times.

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#### **A.3.a. Clearing the Lifting Bail**

Sometimes a boat hook, low pressure hot water from a garden hose, large shackle on a heaving line, or shotgun with 00 buck will clear the lifting **bail**. It may even be necessary to swing a small sinker from the main to knock ice loose. In the worst cases, ramming the buoy may be required to clear enough ice so you can hook the buoy. This procedure is described in detail later. After the buoy is hooked, get the chain into the stopper as quickly as possible. Moving ice will break around the chain and you can effectively stem a flow while lifting the sinker. Again, you should always maintain a constant plot of your position in moving ice.

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### A.3.b. Clearing Ice from a Buoy by Ramming

Heavy ice accumulation may force the tender to remove ice by ramming the buoy with the bow. During the execution of this evolution, use only enough speed to make contact with the buoy. At the time of impact the tender should be backing to prevent overriding or striking the buoy so hard as to cause damage to the cage. Under no circumstances should so much speed be used that the buoy advances past the buoy port. It will be necessary to place a person on the forecastle to call distances and directions for the conning officer. Buoys have a tendency to "walk" away from the bow of a cutter, and course corrections may be necessary.

### NOTE

**Because of the potential for serious damage to the buoy hull, ramming should be used only to remove ice in excess of 24 inches.**

### A.4. Towing Buoys in Ice

It may be necessary to drag the buoy to safer water before attempting further retrieval efforts. Towing a buoy in ice is very dangerous and should be executed only after everyone involved understands the evolution. Towing a buoy away from a shoal because of prevailing ice movement may be necessary to prevent hazard to the vessel. Because of the dangerous nature of this evolution, it should be considered only when faced with the possible loss of the buoy hull. It is much cheaper to replace a lost buoy than to replace hull plate.

#### A.4.a. Procedure

Buoys should be towed by a line attached to a bail. The buoy should never be towed while hooked into the main purchase. Instead, the line should be passed through the chock forward of the chain stopper and attached **to bits on the foc'sle**. Enough slack should be left in the towline to allow the buoy to slip into the track left by the vessel as it backs away from the shoal. Another method of towing a buoy is to use a large round sling attached to the lifting bail and secured to the pelican hook on deck. There may be an initial hesitation if the sinker is well mudded in.

### WARNING

**There is great potential for parting the towline on a stubborn mooring. All personnel must be kept well clear of the towline when towing a buoy in ice.**



### **A.5 Sinkers on Ice Buoys**

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Experience has shown that lifting the sinker during a fall seasonal relief may increase the odds that the seasonal ice buoy may go off station during periods of heavy moving ice. It is therefore recommended not to lift the sinker until the spring relief season. This will give the sinker six to eight months before the next ice season to firmly settle itself into the bottom. This recommendation only applies to softer bottom types such as sand or mud.

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## Chapter 14

# ATON Operations from Boats

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### Introduction

Aids to Navigation (ATON) boats, either deployed from a cutter or Aids to Navigation Team (ANT), are designed to service floating or shore side aids that larger cutters cannot access or do not require the physical presence of the cutter to conduct the required servicing. ATON boats range in size from small ridged hull inflatable boats to the 64' Aids to Navigation Boats (ANBs). Some are outfitted with heavy lifting equipment while others are used primarily for personnel and equipment transportation.

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### In this chapter

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C	Towing Buoys with Boats	14-9
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## Section A. General Boat Information

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<b>Introduction</b>	This chapter contains generic information covering the range of ATON related boats used in the Coast Guard.
<b>A.1 Standard Boats</b>	Primary ANT boats (26', 49', and 55') and their respective standard evolution are not covered in this chapter. The standard evolution for those boats is covered in the applicable Boat Operator's Handbook: <ul style="list-style-type: none"><li>(a) 26' Trailerable Aids to Navigation Boat Operator's Handbook, COMDTINST M16534.1 (series)</li><li>(b) 49' Buoy Utility Stern Loading Boat Operator's Handbook, COMDTINST M16114.22 (series)</li><li>(c) 55' Aids to Navigation Boat Operator's Handbook, COMDTINST M16534.2 (series)</li></ul>
<b>A.2 Non-Standard Boats</b>	The Non-Standard Boat Operator's Handbook, COMDTINST 16114.28 (series) contains general requirements, guidelines, and information for boat crews to improve safety and effectiveness of non-standard boat operations. However, this handbook does not provide mission specific information.
<b>A.3 Training and Qualification</b>	Boat training and qualification procedures/requirements are contained in the U.S. Coast Guard Boat Operations and Training (BOAT) Manual Volume I, COMDTINST M16114.32 (series) and Volume II, COMDTINST M16114.33 (series).
<b>A.4 Boat Seamanship</b>	General boat seamanship information is contained in the Boat Crew Seamanship Manual, COMDTINST M16114.5 (series).
<b>A.5 Special Considerations</b>	Special consideration should be kept in mind with regard to stability and weight handling aboard these boats. Due to their smaller size, care must be taken to prevent capsizing from environmental conditions (current, wind, seas), improper deck storage or excessive deck load limits. <b>Gear shall be properly secured at all times.</b>

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## Section B. Personnel Deployment

**Introduction** One of the primary missions for ATON boats is to transport servicing personnel and/or equipment to an aid. Whether carrying out discrepancy response or scheduled maintenance, ATON boats with their shallower drafts, greater speed/maneuverability, and reduced operating costs can service a large number of aids allowing larger cutters to carry out other missions.

**B.1 Floating Aids** Transferring personnel and equipment between a boat and a floating aid requires steady boat handling and good communication between the coxswain and ATON technicians. Since the environmental conditions (current, wind, seas) affect the boat differently than the buoy, approaching the buoy and timing the transfer requires practice and coordination. The following steps shall be utilized when transferring personnel from a boat to a buoy:

- a. Upon arrival, circle the buoy (if conditions allow) looking for any debris (above and below waterline) that would impede your approach.
- b. Watch the buoy's movement in the water. Pay particular attention to how the buoy rolls and behaves in the seas.
- c. Coxswain and servicing crew discuss how the approach will be made and where the transfer will take place.
- d. Conduct a deliberate risk assessment and discuss results before beginning the approach.

**NOTE** 

**In most cases, the coxswain will approach the buoy heading into whichever element (current, wind, seas) is having the strongest effect on the boat. The servicing crew will generally cross over to the buoy from the boat's bow.**

- e. Coxswain approaches the buoy and informs the servicing crew when it is safe to transfer over to the buoy.

**NOTE** 

**If equipment is to be transferred between the boat and buoy, place one person on the buoy and then transfer the equipment rather than trying to jump the buoy carrying the equipment. Servicing personnel should NOT remove any PPE prior to the transfer and have both hands free to grab onto the buoy during the transfer.**



- f. Once servicing personnel are safely on the buoy, coxswain makes additional approaches as needed to transfer equipment. The use of tag or tending lines is highly recommended to ensure equipment is not lost.

**NOTE** 

**If conditions permit, the boat may tie off to the buoy to assist with personnel and equipment transfers. Caution should be used to ensure the boat and aid are not damaged from repeated contact together and that the buoy could be dragged off station by the extra strain on the mooring.**

**CAUTION!**

**The boat SHALL NOT leave the area while a servicing crew is working a buoy. The boat will remain on scene to provide support if needed.**

**CAUTION!**

**Boat crews shall not tie off to an aid and abandon the boat to service an aid to navigation. At a minimum, a certified crew member shall remain in the boat at all times.**

- g. Once service to the buoy is complete, the boat approaches the aid to recover any equipment and servicing personnel. If conditions have changed while the aid was being serviced (current/wind/wave direction), the coxswain shall re-evaluate the conditions and pass the new plan for approach and pick-up to the servicing crew.

**NOTE** 

**The coxswain should always monitor local conditions. If conditions deteriorate making service crew recovery or boat return questionable, servicing should be stopped and/or not attempted.**

## B.2 Fixed Aids

While fixed ATON structures do not move like a buoy, they still can offer quite a challenge to approach and service. Often there is only one access point (ladder) which may not be positioned in the best location for the current environmental conditions. It may be necessary to drop personnel off at one location (ladder) but better to transfer equipment from another (downwind/current from aid). Also, there may be limitations due to surrounding hazards (rocks, shoals, etc.) that do not allow access to the aid from some directions.

As with floating aids, a detailed risk assessment of all on-scene conditions shall be conducted by the boat crew. While some special circumstances may require different approach tactics, in most cases the



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procedures for transferring personnel and equipment to a floating aid apply to working a fixed aid.

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**NOTE** 

**One benefit of working a fixed aid is that once the boat is in contact with the structure, a small amount of power can be applied to assist with keeping the boat in position (conditions permitting). Caution should be used however – too much power could cause damage to the boat and/or structure.**

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**B.3 Shore Aids**

Often boats are the preferred method for accessing shoreside aids. Limited or no access from shore, ease of equipment transportation, and speed of response compared to shoreside access make boat-to-shore operations an important skill for boat crews.

While grounding a boat is something coxswains would prefer not to do, sometimes it is required to access some aids and can be done safely with minimal risk to the boat and crew. Learn as much about the aid and area you will be operating in, detailed information regarding service by boat (preferred access points, charts, local knowledge, etc) should be maintained in the aid's record.

As with floating and fixed aids, a detailed risk assessment of all on-scene conditions should be conducted by the boat crew before attempting the operation. The below steps shall be utilized when deploying personnel from a boat to either shore or a jetty/breakwall to service an aid to navigation:

- a. Upon arrival, assign crew duties and brief plans for the operation based on risk assessment.
  - b. Place lookout(s) in a safe location(s) where they have a clear view in front of and behind the boat. Lookouts can also have a boat hook (or similar device) to assist with depth sounding or pushing off obstructions.
  - c. If the boat is an inboard/outboard or outboard, trim up the lower-unit /out-drive to a point where maneuverability is maintained but the boat's draft is reduced.
  - d. Approach the landing point at a slow speed.
  - e. Once contact with the shore has been made, determine if that location will be safe to offload equipment and personnel. If landing point is unsatisfactory, slowly back away to clear water.
  - f. Once it is determined that the boat's location will be safe for offloading equipment and personnel, begin the transfer.
-



**NOTE** 

The movement of personnel and equipment will change the draft of the boat. If possible, a small amount of power can be applied to the engine to ensure the bow stays in contact with the landing point.

**CAUTION!**

Pay particular attention to the boat's stern and propulsion system. Wind or currents may cause the stern to swing towards hazards making departure difficult or impossible. Maintain a position perpendicular to the shore keeping the boat's propulsion system in safe water. The use of a small anchor positioned off the stern may be necessary.

**WARNING** 

**Do not attempt to beach a boat in any kind of surf condition. ATON Boats are not designed for operations in the surf!**

- g. Once equipment and personnel have been transferred, back the boat away from shore slowly following the same path used for the approach.



## Section C. Towing Buoys with Boats

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**Introduction** The decision whether or not to tow a buoy depends greatly on the situation. Towing a free-floating buoy from one boat to another is completely different from towing a buoy that still has its mooring attached or attempting to re-float a grounded buoy. Each situation must be thoroughly reviewed and a detailed risk assessment must be conducted and discussed.

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**NOTE** 

**Additional information regarding towing with boats can be found in the Boat Crew Seamanship Manual, COMDTINST M16114.5 (series).**

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### C.1 Floating Buoys

Towing a free-floating buoy (no mooring) can be a challenge. How the buoy **moves** through the water depends on its shape and size. While buoys are predominantly round in shape allowing for relatively smooth movement through the water, larger lighted buoys have counterweights that hang many feet below the waterline. Towing the buoy astern is the best option, but alongside is possible for close quarters maneuvering. Some considerations for towing free-floating buoys are:

- a. Towline(s) should only be attached to the buoy's lifting bail and not to the cage or other appendage.
  - b. Always ensure the boat that is conducting the tow has the power to successfully complete the mission.
  - c. Ensure the buoy is watertight and all battery pocket covers are secured in place.
  - d. For larger lighted buoys with deep counterweights, make sure there is sufficient water depth to tow the buoy and that it will not become fouled or run aground.
  - e. If towing a long distance, consider deploying a drogue from the buoy to assist with stability and reduce yawing.
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### C.2 Grounded Buoys

For buoys that have either broken free from their mooring or have been dragged ashore, the possibility of re-floating the aid by towing exists. The buoy's location, physical condition (damaged, holed, etc.), size, asset availability and crew safety are primary factors to consider when attempting to re-float a buoy. Using a truck and crane or a helicopter might be better alternatives to hazarding a boat and crew.

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**WARNING** 

**Attempting to re-float a grounded buoy is extremely hazardous! Operational risk management procedures shall be followed before any attempt is made.**

When re-floating a grounded buoy consider the following:

- a. If it will be a while before re-floating is attempted, consider rigging an anchor(s) (if mooring is missing/damaged) to prevent the buoy from being pushed further ashore.
- b. Conduct a thorough inspection of the buoy. Ensure the aid's hull is in satisfactory condition and will not sink if re-floated.
- c. When ready to tow, detach the mooring (if possible). If unable to detach mooring, determine where the chain and sinker are in relation to the buoy and how they might affect the towing operation.
- d. Remove any/all hardware (lanterns, solar equipment, etc.) to prevent further damage.
- e. Determine which direction the buoy will be towed. Try to pick a route that is clear of obstacles such as rocks, shoals, reefs.
- f. Re-float the buoy at high tide.

**C.3 Towing Buoy With Mooring Attached**

While it is always best to hoist a buoy's mooring clear of the bottom before attempting to re-position, towing a buoy (including mooring) might be necessary at times. Two examples of when you would need to tow a buoy with its mooring are: if a buoy tender is not be able to get to the buoy ( i.e. water depth/shoaling) or if the aid is reported off station and the primary servicing unit is not available to recover the aid prior to it being washed ashore.

**WARNING** 

**Attempting to tow a buoy with its mooring still attached is extremely hazardous! Operational risk management procedures shall be followed before any attempt is made.**

Things to consider before attempting to tow a buoy with its mooring attached:

- a. Determine the aid's mooring length/size from records.
- b. Use a boat with sufficient power and equipment to tow the buoy and mooring.
- c. Determine how far the buoy needs to be towed. In some circumstances, it might be better to tow the buoy a shorter distance into



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safe water allowing it to be recovered by a larger cutter.

- d. If attempting to tow the aid back on station, locate the assigned position first with a marker buoy. This will serve to provide a heading for the boat crew to steer toward.
- e. Ensure the direction of the tow will not drag the sinker over any submerged cables/pipelines.
- f. Once hooked up, take a slow strain to determine if the buoy's sinker is still attached.
- g. DO NOT tow the buoy into an area where the water depth exceeds the length of the mooring.

**WARNING** 

**Buoy towing operations require connecting the towline to an acceptable and rated fitting designed for towing. NOT using the appropriate fitting may damage the boat or cause serious injury to crewmembers.**



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## Section D. Wire Sweeping with Boats

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**Introduction** Whenever a structure has been destroyed (severe weather, ice, collision, etc.) the wreckage must be located and recovered at the earliest possible opportunity. If not recovered (or adequately marked), it could become a hazard to navigation and place a severe liability burden on the Coast Guard. One method to locate submerged wreckage is by wire sweeping the area with either one or two boats.

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**NOTE**  **While wire sweeping is primarily used to locate the wreckage from a structure, it can also be used to locate sunken buoys.**

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**D.1 Overview** When using either method of wire sweeping, be patient and persistent. While there is a chance that a wooden aid may have floated away after it has been knocked down, it may also have broken above the mud line leaving a stump that can cause severe damage to a vessel that strikes it. There is never any doubt where the remains of a steel or concrete structure are; they're on AP. Your job is to find them. It's not uncommon to search for hours, or even days, for a downed structure. In most cases the structure can be located, either on AP, or if it's wooden, it may have drifted to a nearby shore. It cannot be said too often, or emphasized too strongly, that we must employ every method at our disposal to locate and remove the wreckage of destroyed ATON structures. Side scan sonar is an ideal tool if it is available to the unit. If you are unable to locate the wreckage via boat, it may be necessary to bring in divers. Again, steel or concrete wreckage **must** be located.

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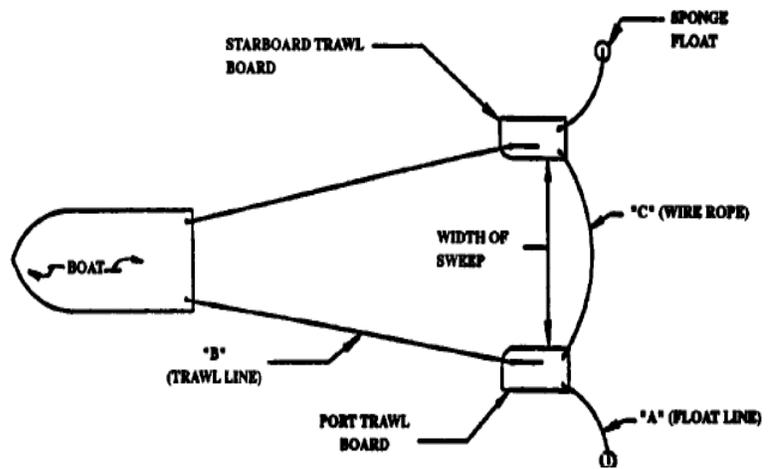


**D.2 Sweeping with One Boat**

Using one boat method, the boat tows either a grapnel, wire sling, or utilizes a trawl board wire sweep rig over the search area **at a slow speed**. The preferred method (and the one that covers more bottom area and has a better chance to locate the wreckage) is the trawl board method. This rig consists of two small wooden or metal trawl boards, similar to those used on commercial fishing boats, towed behind the boat off of each quarter. These boards are weighted so they will sink to the bottom and are attached to the bridle in such a manner that when pulled they are forced apart, thus providing an opening of approximately 20 feet between the boards. A small wire rope cable (i.e., 1/4") approximately 60' long is stretched between the boards and will drag the bottom hanging on the wreckage. After the wreckage is located (normally by the boat being stopped), the boat then pulls back to the boards and the wire cable is disconnected from the boards. One eye of the cable is then passed through the other and pulled tight. Like the two boat method, a small marker buoy, or TRUB/TRLB, is attached to the end of the cable. When the Construction Tender arrives to rebuild the aid, it will use the wire to assist in recovering the wreckage (see **Table 14-1 and Figure 14-1**).

Water Depth	Width of Sweep	"A"	"B"	"C"
Up to 14'	35'	25'	100	50'
Up to 14'	60'	25'	125	75'
Up to 20'	35'	35'	125	50'
Up to 20'	60'	35'	150	75'

"A" – Float Lines (3/8" Hemp or Synthetic)  
 "B" – Trawl Lines (3/8" to 1/2" Hemp or Synthetic)  
 "C" – Wire Rope (3/16" Diameter)



**Figure 14-1**  
**One Boat Wire Sweeping Diagram**

**Table 14-1**  
**One Boat Wire Sweeping Dimensions**

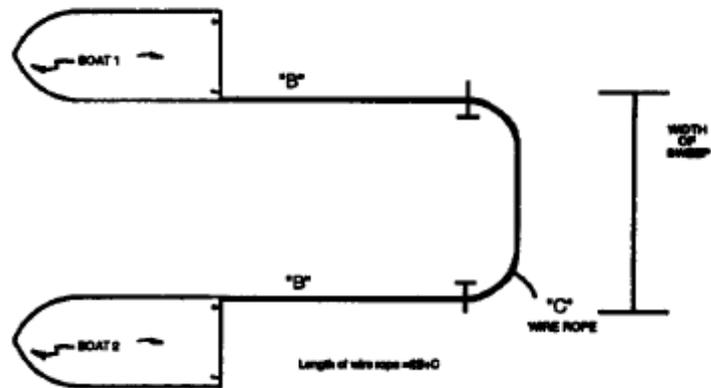


**D.3 Sweeping with Two Boats**

This consists of two boats running parallel courses at slow speed with either a wire cable (normally 1/4" - 3/8") or small chain (3/16" - 1/4") strung between the boats. The wire cable, or chain, dragging the bottom will hang on the obstruction, stopping the movement of the boats. After the boats have pulled back to the location of the wreckage, they then pass one end of the cable (both ends have eye splices) through the other eye and tighten the cable. The cable is then buoyed with a small marker float, or TRUB/TRLB, and left for the Construction Tender to recover. The Construction Tender will either utilize the cable to recover the wreckage or as an aid to pass a larger wire or chain around the wreckage before recovery (see **Table 14-2** and **Figure 14-2**).

Water Depth	Width of Sweep	"A"	"B"	"C"
Up to 14'	35'	25'	100	50'
Up to 14'	60'	25'	125	75'
Up to 20'	35'	35'	125	50'
Up to 20'	60'	35'	150	75'

"A" – Float Lines (3/8" Hemp or Synthetic)  
 "B" – Trail Lines (3/8" to 1/2" Hemp or Synthetic)  
 "C" – Wire Rope (3/16" Diameter)



**Figure 14-2**  
Two Boat Wire Sweeping Diagram

**Table 14-2**  
Two Boats Wire Sweeping Dimensions



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## Section E. Buoy Operations from Boats

**Introduction** Buoy operations are inherently dangerous and are best accomplished from boats with installed weight handling gear; buoy davit, “A” frame boom, or articulating crane. Buoy evolution procedures for those boats are contained in the appropriate Boat Operators Handbook (BOH).

**NOTE** *↪* **Normal buoy operations should only be performed from boats assigned to ATON units.**

**E.1 Overview** A situation may exist when ATON boats without installed weight handling gear will be required to conduct buoy operations by hand. In those rare cases, the unit CO/OIC may grant specific authorization to conduct the evolution. Authorization shall not be granted unless ALL of the following criteria are met:

- a. Conduct a deliberate risk assessment and discuss all hazards and any mitigating strategies prior to the evolution.
- b. The buoy shall be 5<sup>th</sup> class or smaller (foam or plastic).
- c. The mooring shall NOT be larger than ½ inch diameter.
- d. The sinker shall NOT be more than 100 pounds (dry weight).
- e. The water depth (on scene position) shall NOT exceed 25 feet.

**E.2 Recovering the Buoy** The following are basic procedural steps for recovering a buoy and mooring by hand:

- a. Bring the buoy onboard, stop off the mooring, break the buoy from its mooring and secure the buoy.
- b. Bring the mooring to short stay by hand (utilizing the hand-over-hand method), record the “found” position and determine if the sinker can be broken out by hand.
- c. If sinker can be broke free by hand, bring the sinker onboard and secure it. Otherwise, rig an appropriate size safety line between the buoy mooring and a suitable attachment point on the boat and break the sinker free from the bottom with the boat. Once free, bring the sinker onboard and secure it.

**WARNING** 

**Use extreme caution when using the boat to “break free” the sinker. The low freeboard, excessive power or even the lightest of current can cause the boat to swamp or capsize when driving on a sinker.**

**E.3 Setting the Buoy**

The following are basic procedural steps for setting a buoy and mooring by hand:

- a. Hang the sinker, ensure it is below the bottom of the boat, and temporarily secure using rotten stop (small stuff) to a suitable attachment point on the boat and connect chain to buoy.
- b. Deploy the buoy; pay out chain using hand-over-hand technique until all chain is carefully over the side.
- c. Over AP cut rotten stop to sinker and record “set” position.

**E.4 Precautions**

Always observe the following safety precautions when conducting buoy operations by hand from boats:

- a. Position an additional crewmember within reach of the person actually handling the buoy and/or mooring to serve as a safety observer or back up. They shall be ready to assist the person in an extremis situation or to prevent injury to personnel or equipment.
- b. Appropriate gloves shall be worn to help protect the hands of personnel handling or may be handling the buoy, mooring, and/or sinker.

**WARNING** 

**A buoys mooring shall NEVER be wrapped around any part of a person’s body.**

**CAUTION!**

**The CO/OIC and boat coxswain will ensure strict adherence to the parameters, criteria, procedures, and safety precautions outlined in this section when recovering or setting a buoy by hand.**

**NOTE** 

**This Section only applies to ATON boats without installed weight handling equipment. No other variations to the standard ATON evolution for ATON boats are authorized.**