

AIDS TO NAVIGATION (ATON) BOAT – SMALL (AB-S)

U.S. Department of
Homeland Security

United States
Coast Guard



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ATON Boat – Small (AB-S) Operator’s Handbook

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Subj: ATON BOAT - SMALL (AB-S) OPERATOR'S HANDBOOK

- Ref:
- a. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - b. Boat Management Manual, COMDTINST M16114.4 (series)
 - c. U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Volume I, COMDTINST M16114.32 (series)
 - d. Aids to Navigation Manual - Structures, COMDTINST M16500.25 (series)
 - e. U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Volume II, COMDTINST M16166.33 (series)
 - f. United States Coast Guard Regulations, 1992, COMDTINST M5000.3 (series)
 - g. Rescue and Survival Systems Manual, COMDTINST M10470.10 (series)
 - h. Boat Crew Seamanship Manual, COMDTINST M16114.5 (series)

1. PURPOSE. This Manual provides technical orientation, performance characteristics, and basic operating procedures for the ATON Boat – Small (AB-S). It also standardizes boat outfit, storage and equipment layout.
2. ACTION. All Coast Guard unit commanders, commanding officers, officers-in-charge, deputy/assistant commandants, and chiefs of headquarters staff elements shall comply with the provisions of this Manual. Internet release is authorized.
3. DIRECTIVES AFFECTED. None.
4. DISCUSSION. This Manual contains information necessary to safely and efficiently operate the AB-S. The operational capabilities, limitations, and emergency procedures are clearly stipulated. The fittings, outfit list, and physical characteristics of the boat are described in detail.

DISTRIBUTION – SDL 162

	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 LIST: *Ba: COMDT(CG-731) (10), Bn: Boat Forces Center (10)

5. PROCEDURE. Operational commanders and unit commanders with an AB-S shall ensure the procedures and limitations detailed within this Manual are followed. Forward any comments, corrections, recommendations, and questions regarding this Manual to the AB-S Facility Manager in accordance with Chapter 1, Section C.1 of this Manual. Design and structural change requests shall be submitted as outlined in Reference (a).
6. DISCLAIMER. This document is intended to provide operational requirements for Coast Guard personnel and is not intended to nor does it impose legally-binding requirements on any party outside the Coast Guard.
7. RECORDS MANAGEMENT CONSIDERATIONS. This Manual has been thoroughly reviewed during the directives 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., NARA requirements, and 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.
8. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS.
 - a. The development of this directive and the general policies contained within it have been thoroughly reviewed by the originating office and are categorically excluded under current USCG categorical exclusion (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, COMDTINST M16475.1 (series)
 - 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 Manual must be individually evaluated for compliance with the National Environmental Policy Act (NEPA), Council on Environmental Policy NEPA regulations at 40 CFR Parts 1500-1508, DHS and Coast Guard NEPA policy, and compliance with all other environmental mandates.

9. FORMS/ REPORTS. None.

Mark E. Butt /s/
Rear Admiral, U.S. Coast Guard
Assistant Commandant for Capability







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CHAPTER 1 Introduction

Introduction This Handbook contains information necessary for the safe and efficient operation of the ATON Boat – Small (AB-S). It defines operational capabilities, limitations, and emergency procedures. In addition, it shows or describes the fittings, outfit list, and physical characteristics of the boat.

In This Chapter This Chapter contains the following Sections:

Section	Topic	See Page
A	Warnings, Cautions, and Notes	1-2
B	Facility Manager	1-3
C	Changes	1-4
D	Action	1-5



Section A. Warnings, Cautions, and Notes

Introduction

The following definitions apply to Warnings, Cautions, and Notes found throughout the Handbook.

A.1. Warning

WARNING 

To avoid personal injury or loss of life, operating procedures and techniques must be carefully followed.

A.2. Caution

CAUTION !

Operating procedures or techniques must be carefully followed to avoid equipment damage.

A.3. Note

NOTE 

An operating procedure or technique is essential to emphasize.



Section B. Facility Manager

Introduction

Office of Boat Forces (CG-731) is the facility manager for the AB-S. The AB-S is a standard boat as defined in References (a) and (b). The Boat Forces Center, through the Standardization Team (STAN Team), provides expertise in all aspects of the boat's operation and maintenance. The STAN Team reviews the boat, its equipment, crew procedures, operational reports, casualty reports (CASREPS), Abstract of Operations (AOPS)/Training Management Tool (TMT), Boat Records and Hull History, etc., and technical manuals continuously to update this information.



Section C. Changes

Introduction

Office of Boat Forces (CG-731) promulgates this Handbook and its changes. Submit recommendations for changes via memorandum to Commandant (CG-731) by USPS First Class Mail or electronic mail. The STAN Team assumes responsibility for receiving and implementing changes to this Handbook. For more information, contact Office of Boat Forces (CG-731), ATON Boat - Small Facility Manager at (202) 372-2458.

The address for CG-731 is:

COMMANDANT (CG-731)
U. S. COAST GUARD HEADQUARTERS
2100 2ND STREET SW STOP 7356
WASHINGTON DC 20593-7356

Attn: AB-S Facility Manager

C.1. Time Compliance Technical Orders (TCTOs)

All Time Compliance Technical Orders (TCTOs) issued since the AB-S has been in service are provided in *Appendix B* of this Handbook. TCTOs issued after the date of the release of this Manual supersede information in this Handbook where applicable.



Section D. Action

Introduction

Operational, supervisory, maintenance support commands, and boat crews will comply with procedures and limitations specified in this publication and any duly issued changes.

D.1. Configuration Control

Configuration control for the AB-S is critical for standardization of equipment and safety of operations.

To maintain fleet wide standardization, unit commanders shall not change or vary the type or location of equipment carried except where noted. Design or structural alterations are prohibited unless specifically authorized by the Office of Naval Engineering (CG-45).

NOTE

Prototype testing of AB-S configuration changes may only be carried out with the specific authorization of the Office of Naval Engineering (CG-45).





CHAPTER 2 Boat Characteristics

Introduction This Chapter describes standard AB-S features. The systems described in this Chapter are covered in more detail in *Chapter 3, Boat Systems*.

NOTE

All illustrations in this Boat Operator’s Handbook are for familiarization only. The location of hull fittings and system components in these illustrations may not accurately reflect proper placement and installation on all hulls. Any discrepancies between the Boat Operator’s Handbook and the AB-S shall be clarified by contacting the AB-S Asset Line Manager at the Small Boat Product Line (SBPL).

In This Chapter This Chapter contains the following Sections:

Section	Topic	See Page
A	General Description	2-2
B	Basic Hull and Deck Construction (Interior and Exterior)	2-6
C	Location of Interior and Exterior Hull Fittings (Structural)	2-12
D	Location of Major Hull Systems and Components	2-20



Section A. General Description

A.1. Design

The AB-S (Figure 2-1) is a shallow-vee, rigid, planing monohull.

A.1.a. Construction

Hull, deck and internal structures of the AB-S are fabricated using marine grade aluminum. A D-shape rubber bumper is installed on the gunwale perimeter to protect the hull from minor collisions or abrasion.

A.1.b. Walking Surfaces

All walking surfaces on the AB-S are covered with non-skid.

A.1.c. Coatings

All exterior and interior surfaces, including the underwater hull, are uncoated.

A.2. Manufacturer

The AB-S was designed and manufactured by:

North River Boats
1750 Green Siding Rd
Roseburg, OR 97491



Figure 2-1
AB-S



A.3. Missions The AB-S is designed as a multi-mission capable boat. Missions include servicing aids to navigation (ATON), search and rescue (SAR), maritime law enforcement (MLE), and ports, waterways, and coastal security (PWCS).

A.4. Boat Specifications The following provides a list of all AB-S boat specifications:

A.4.a. Physical Characteristics	Hull Length	18 FT 6 ³ / ₄ inches
	Length Overall (LOA) (engines down)	20 FT
	Beam Overall	8 FT 3 inches
	Draft, engines tilted up (waterline to keel):	13 inches
	Operational Draft (DIW with engines vertical):	27 inches
	Highest Points:	
	Fixed (Keel to top of Arch)	6 FT 6 inches (Antenna arch)
Unfixed (Keel to tip of antenna)	11 FT 6 inches (VHF-FM antenna)	

NOTE 

With the AB-S on the trailer, the keel to ground distance is 24 inches.

Engines	Twin 50 horsepower (HP) 4-cycle outboard motors
Rated HP	120 HP max
Fuel	Gasoline
Fuel Capacity:	
100%	22 gallons
95% (useable)	20.9 gallons
Electrical Generation	Engine Alternators
Propellers	Fixed pitch, 3-blade, 11 ¹ / ₈ inch diameter, 14 inch pitch



Displacement:

Normal operating condition (boat, full fuel, outfit; no crew or cargo)	2565 lbs
Hoisting condition (boat only, normal operating condition)	2765 lbs
Hoisting condition (boat and trailer, boat in normal operating condition)	3690 lbs

Trailer Information:

Trailer Load Capacity	3450 lbs
Trailer Weight	926 lbs
Weight of Trailer, Boat (fully loaded w/o crew)	3690 lbs

NOTE 

Trailer heights were measured from ground on a properly loaded AB-S.

A.4.b.
Operational
Characteristics
and Parameters

Crew Capacity	4
Maximum Personnel (including crew)	4
Maximum Seas	3 FT
Maximum Winds	15 Knots (KTS)
Range Nautical Mile (NM) at cruising revolutions per minute (RPM) in calm water	77 NM at 5,000 RPM
Top RPM and Speed	30 KTS at 6,000 RPM
Cruise Speed	20 KTS at 3,900 RPM
Towing Capacity (Urgent SAR only)	1 Displacement Tons
Ice Breaking Capability	None

NOTE 

Unit commanders shall comply with the minimum boat crew requirements when dispatching boats for Coast Guard operations in accordance with Reference (c). See *Chapter 4* of this manual for additional Crew Requirements.



NOTE 

AB-S can operate with a minimum complement of two, a Coxswain and crewmember when transiting. Crew and passenger weights shall be 180 lbs per person when calculating weights for other loading configurations. Refer to *Chapter 4* of this Manual for further information.



Section B. Basic Hull and Deck Construction (Interior and Exterior)

Introduction The AB-S hull is made of aluminum. The hull contains a 22 gallon fuel tank. The decks are fabricated of aluminum.

B.1. Hull Construction The hull is a hard chine planing boat design. The hull and frames are marine grade aluminum alloy.

B.1.a. Hull The AB-S hull design is a shallow-vee monohull. The deadrise angle is 10 degrees. The bottom plating is $\frac{5}{32}$ inch thick. Aft voids in the hull are fitted with 43.5 cubic feet of foam for flotation.

B.1.b. Transverse Bulkheads Transverse bulkheads in the AB-S are aluminum. There is one watertight transverse bulkhead approximately amidships below the console.

B.2. Compartment Arrangement/Description The AB-S is a center console boat (Figure 2-2) with a folding, detachable frame and canvas bimini cover. There are three weather tight storage lockers.

B.2.a. Anchor Locker An anchor locker, with fabricated hatch cover (Figure 2-3), anchor and rode, fenders and mooring lines, is located at the bow.

B.2.b. Console And Aft Lockers One storage locker is located on the forward face of the console (Figure 2-4) and one storage locker just forward of the engine splashwell (Figure 2-5)

B.2.c. Console Access Locker This locker (Figure 2-6) provides access to the backside of all of the equipment mounted on the console.



Figure 2-2
Center Console



Figure 2-3
Anchor Locker



Figure 2-4
Console Forward Lockers



Figure 2-5
Aft Stowage Locker



Figure 2-6
Console Locker

B.2.d. Bilge

The bilge access is through a flush mounted, quick acting watertight hatch (QAWTH) in the splash well (Figure 2-7) on centerline, just aft of the rear crew seats. The bilge contains one 550 gallons per hour (GPH) bilge pump and bilge drain plug.



S

Figure 2-7
Quick Acting Watertight Hatch (QAWTH)

CAUTION !

Be careful when working near the engine well; hydraulic steering lines exit the back of the boat and can be easily stepped on/broken, causing a loss of steering.

**B.2.e. Engine
Splash Well**

The engine splash well has a QAWTH to access the bilge pump. Engine steering hydraulic lines and remote throttle, shift and electrical cables penetrate the splash well deck.

**B.3. Deck
Construction**

The AB-S well deck contains an aluminum removable deck plate, secured using bolts and sealant. The deck is watertight and self bailing. All walking surfaces are covered with non-skid.



B.4. Ring Buoy and Strobe Light

A 20 inch ring buoy and strobe light is mounted on the aft port railing. (Figure 2-8).



**Figure 2-8
Ring Buoy**



Section C. Location of Interior and Exterior Hull Fittings (Structural)

Introduction

This Section describes the location of all interior and exterior hull fittings of the AB-S.

C.1. Bow Eye

An aluminum padeye is welded to the stem (Figure 2-9). The bow eye has two holes, one for the trailer winch hook and one for the trailer tiedown strap.



Figure 2-9
Forward Hull Fittings



C.2. Standard Cleats

Six 10-inch stainless steel standard cleats are bolted on top of the gunwale (Figure 2-10). The cleats are positioned to facilitate mooring and assist alongside towing. The cleats are located on the port and starboard sides; two forward, two amidships and two aft.



Figure 2-10
Cleat



C.3. Lifting Eyes

The AB-S is equipped with four welded aluminum lifting eyes (Figure 2-11) suitable for lifting the boat with a crane. Two lifting eyes are located forward on the gunwale, port and starboard, and two are located on the aft quarters. The lifting eyes are pull tested to 6 times the normal lifting load, which equates to a pull test of 2,503 lbs on each forward lifting eye and 5,897 lbs on each aft lifting eye. Sling arrangements (Figure 2-12) are given for reference below.



Figure 2-11
Lifting Eyes

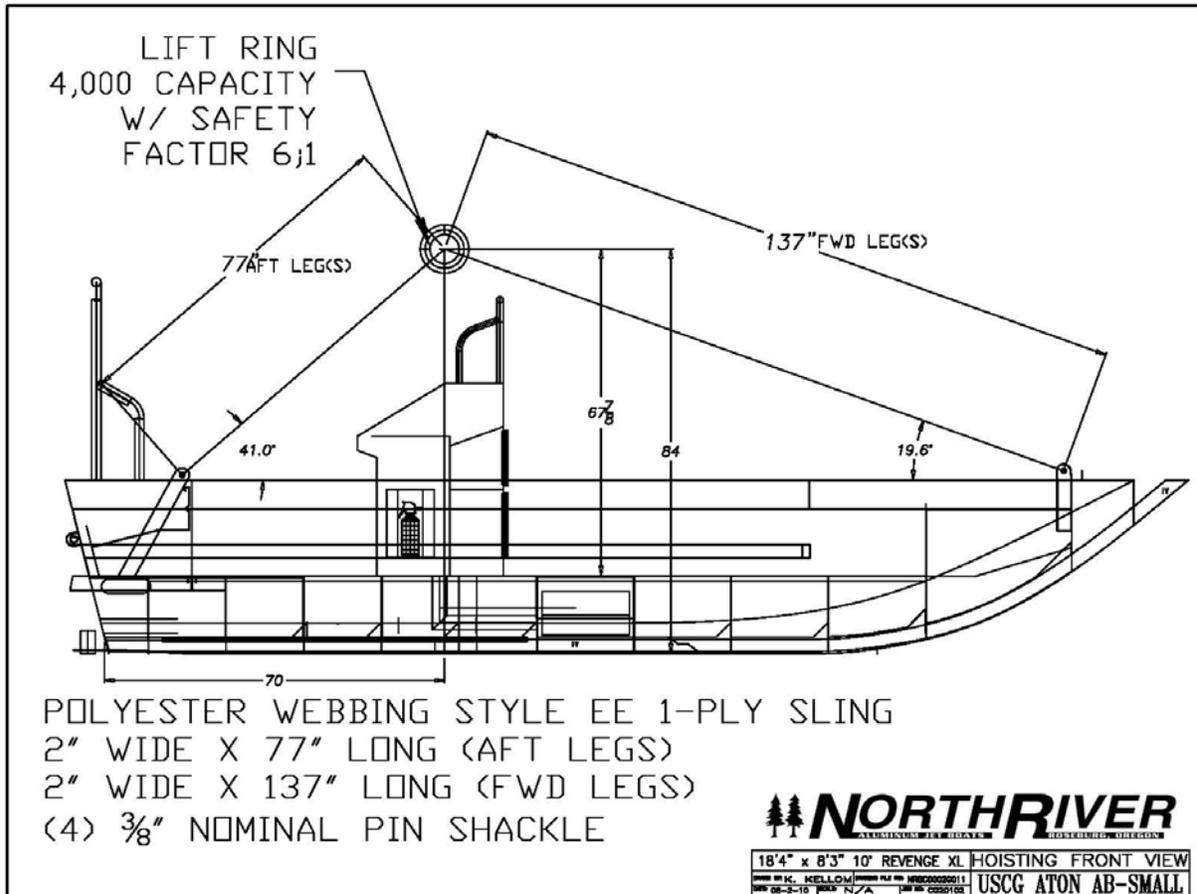


Figure 2-12
Sling Arrangement



C.4. Forward Bitt The forward bitt (Figure 2-13) can be used for anchoring, mooring, or when being towed.

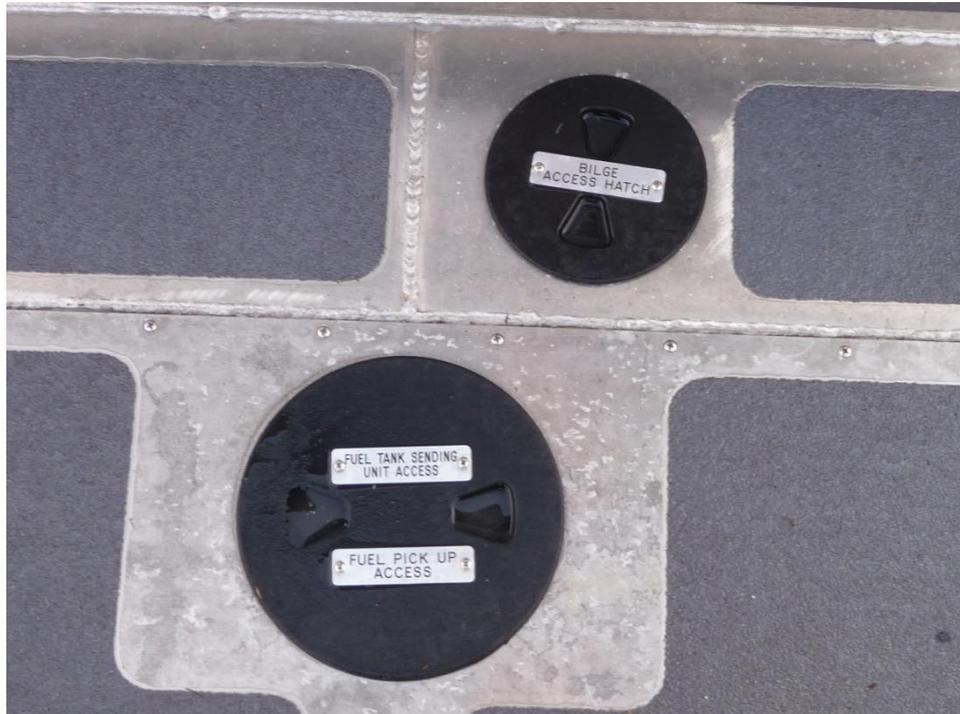


Figure 2-13
Forward Bitt



**C.5. Deck
Cover/Hatches**

Two flush mounted, watertight, plastic access covers are fitted in the deck (Figure 2-14). They provide access to fuel tank fittings and the midships bilge. The hatches are threaded and are removed and replaced by hand.



**Figure 2-14
Deck Hatches**

**C.6. Canopy
Top**

A canvas bimini cover over the center console affords the crew protection from the elements. The cover is mounted on a folding stainless steel framework. It can be removed by detaching two snap hooks and two fastpins.



C.7. Antenna Arch

A welded arch of aluminum tubing is installed above the transom (Figure 2-15). There is a folding plate on top of the arch to which all antennae are mounted.



Figure 2-15
Antenna Arch



C.8. Bow Ladder A removable bow ladder is provided for servicing aids. It is held in place by fastpins in two sockets on the bow. (Figure 2-16).

WARNING 

When using the bow ladder, make sure all PPE is worn and that all safety procedures applicable to ATON work are followed. Additional climber safety considerations are contained in Chapter 4 of Reference (d).



Figure 2-16
Bow Ladder



Section D. Location of Major Hull Systems and Components

Introduction

This Section describes the location of the major hull systems and components installed on the AB-S.

D.1. Batteries

Two dual-purpose 12 volts direct current (VDC) marine grade lead-acid batteries are installed on the AB-S. These batteries provide power for engine starting and onboard electronics. They may be paralleled to combine their power in an emergency.

D.2. Outboard Engines

Twin Honda Marine 50 HP 4-cycle outboard engines are installed (Figure 2-17).

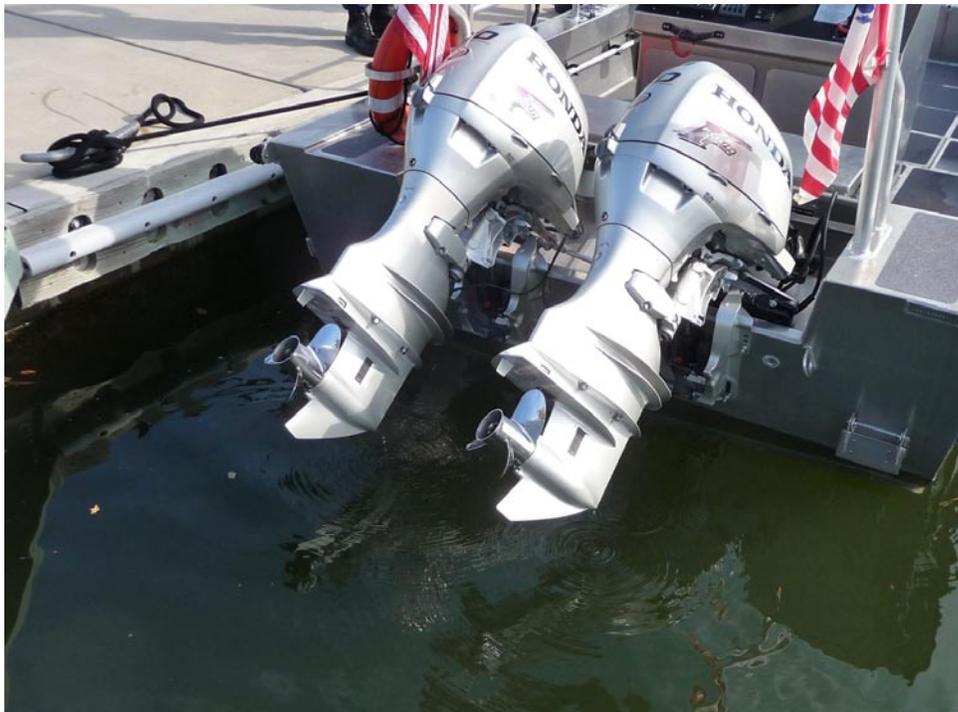


Figure 2-17
Honda Outboards



D.3. Fuel System A single 22 gallon fuel tank is installed inside the hull beneath the welldeck, just forward of the console locker. The fuel fill port is located on the starboard gunwale (Figure 2-18).



Figure 2-18
Fuel Fill Port



D.4. Center Console

The AB-S is a center console boat (Figure 2-19). The console provides for engine and steering operation, boat systems control and monitoring, and communications and navigation equipment operation.



Figure 2-19
Center Console

D.5. Steering System

Hydraulic steering for the outboards consists of the following components (Figure 2-20 and Figure 2-21):

- (01) Steering wheel,
 - (02) Helm pump,
 - (03) Interconnecting hydraulic hoses,
 - (04) Single outboard steering cylinder,
 - (05) Tie rod.
-



Figure 2-20
Steering Wheel and Helm Pump



Figure 2-21
Steering Cylinder



D.6. Navigation and Communications

The navigation and communications equipment are located on the Coxswain's console.

D.7. Antennas

All electronics' antennas are located on the antenna arch (Figure 2-22). They can be lowered for trailering and when operating in areas with restricted vertical clearance.



Figure 2-22
Antennas



D.8. Anchor

The anchor is stowed in the anchor locker at the bow. The anchoring system is comprised of (Figure 2-23):

- (01) Danforth type anchor, Fortress model G-11,
 - (02) 6 FT of galvanized steel anchor chain,
 - (03) 150 FT of 3 strand nylon line,
 - (04) Anchor stowage bag.
-



Figure 2-23
Anchor System



**D.9. Depth
Sounder
Transducer**

The depth sounder transducer is mounted external to the hull on a tab welded to the bottom edge of the transom (Figure 2-24).

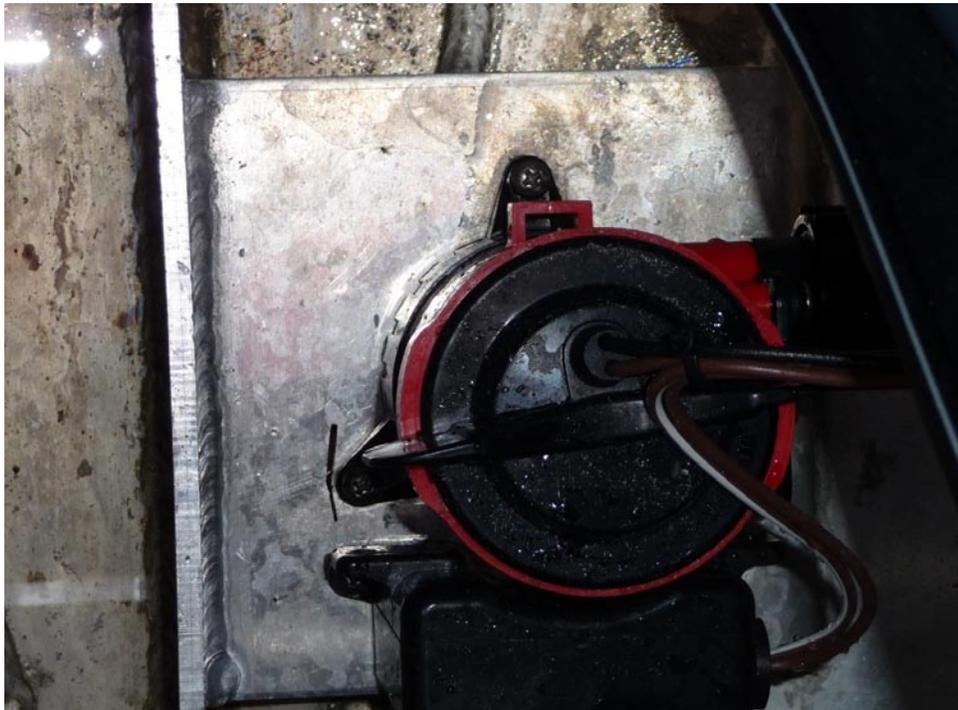


**Figure 2-24
Transducer**



D.10. Bilge Pumps

One 12 VDC submersible bilge pump is located in the aft portion of the bilge, just forward of the transom. Access to the bilge pump is through the bilge QAWTH in the splash well deck (Figure 2-25).



**Figure 2-25
Bilge Pump**





CHAPTER 3 Boat Systems

Introduction

This Chapter discusses the AB-S mechanical, electrical, and manual operating systems. Information contained in this Chapter describes basic characteristics and provides information to assist boat crews in safe and efficient operations.

NOTE *GS*

Maintenance must be conducted in accordance with the proper Coast Guard and Manufacturer's requirements in order to prevent the voiding of the warranty on any parts, damage to the vessel, or endangerment of the safety of the crew.

In this Chapter

This Chapter contains the following Sections:

Section	Topic	See Page
A	Propulsion System	3-2
B	Hull Fuel System	3-22
C	Hull Systems	3-26
D	Electrical System	3-30
E	Communications/Navigation System	3-38
F	Fire Extinguishing Equipment	3-46
G	Bilge System	3-47
H	Cathodic Protection System	3-49
I	Trailer System	3-50



Section A. Propulsion System

Introduction

The propulsion system for the AB-S consists of twin Honda, outboard engines. This Section provides a brief description of the subsystems and equipment comprising the propulsion system.

NOTE

All references to engine locations are taken standing behind the engine propeller looking forward.

A.1. Engines

The AB-S has two Honda Marine, four-stroke, in-line, three cylinder, sea water cooled outboard engines. Each engine is rated at 50 HP at 6,000 RPM (Figure 3-1, Figure 3-2, and Figure 3-3). The dry weight of each engine is approximately 225 lbs.

A.1.a. Speed

The low idle speed is 850 ± 50 RPM in neutral.

The maximum engine speed is 6000 RPM.



Figure 3-1
Honda Outboards

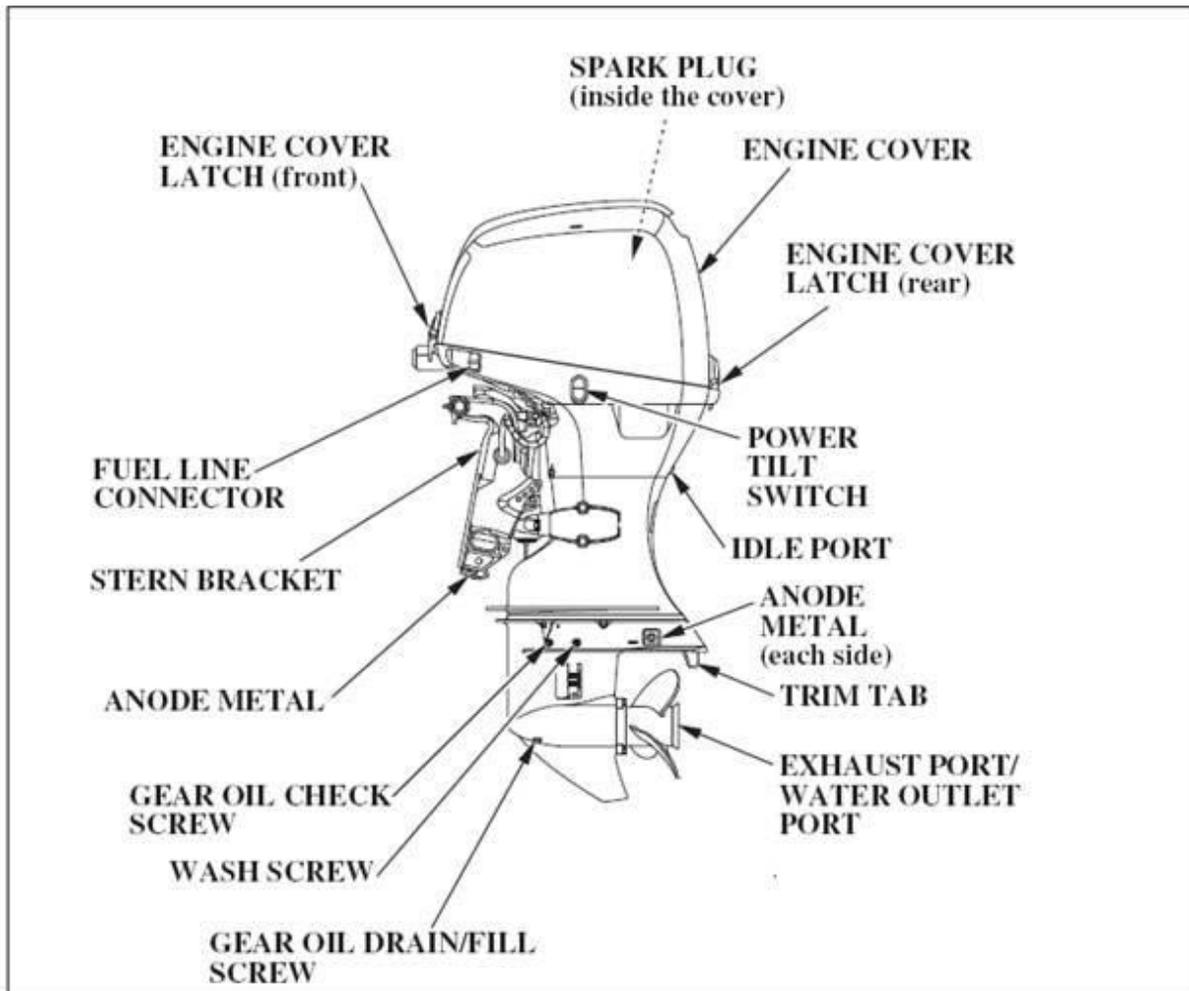
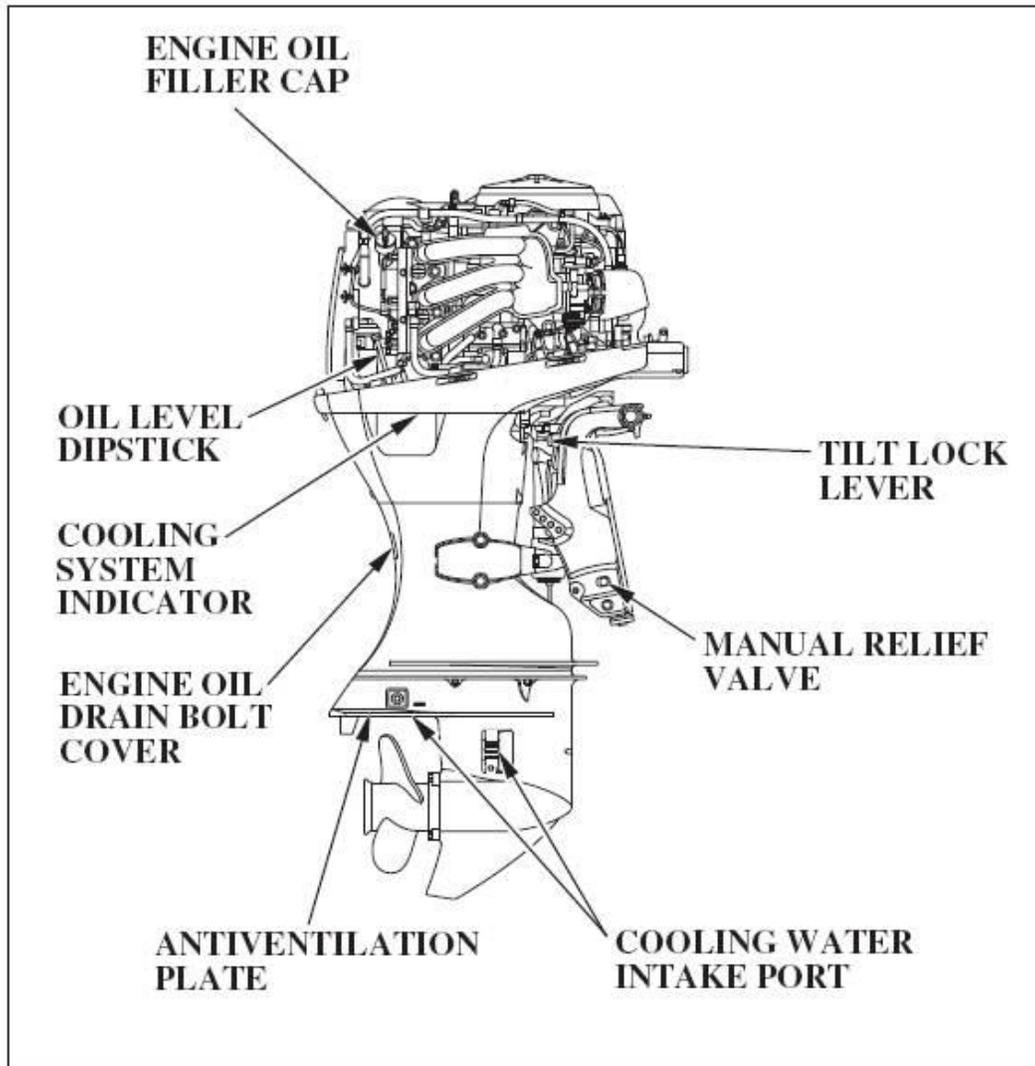


Figure 3-2
Honda Outboards Diagram 1



**Figure 3-3
Honda Outboards Diagram 2**

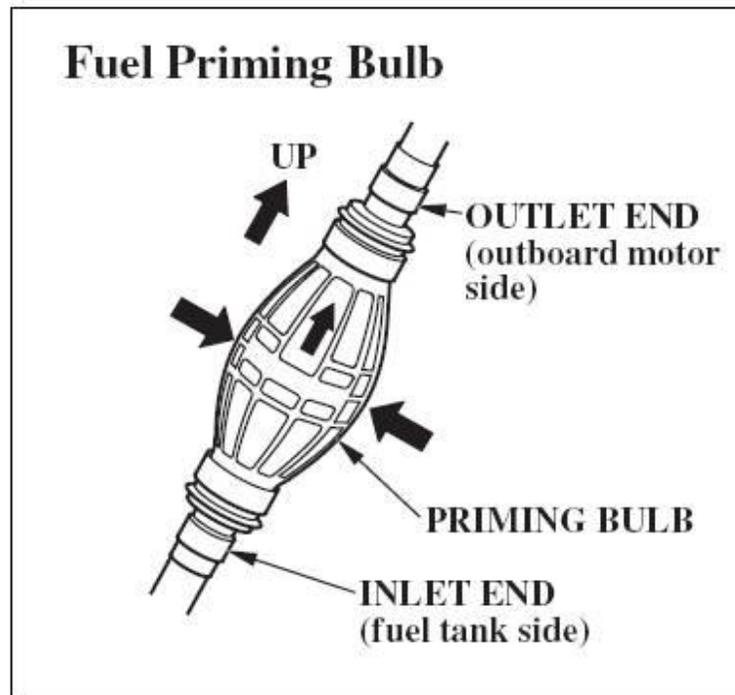


A.2. Engine Fuel System

The engine fuel system requires unleaded 86-octane gasoline or higher, containing no more than 10% ethanol (E10) or 5% methanol by volume.

A.2.a. Fuel Priming Bulb

A fuel priming bulb (Figure 3-4), located in the inlet line to each outboard engine, primes and pressurizes the outboard engine fuel system for starting. The fuel priming bulbs are located in the splashwell.



**Figure 3-4
Fuel Priming Bulb**



A.2.b. Fuel Filter and Water Separator

A water separator with a translucent cup (Figure 3-5) is located under the engine cover on the port side, forward, of each engine and, by means of a red ring float, provides a visual indication of water in the fuel. Excess water also sets off a buzzer at the console and a flashing indicator on the speedometer. The water separator should be emptied and cleaned when excessive water is present.

A low pressure fuel filter is mounted inside the translucent cup. The filter is a disposable cartridge style filter and should be replaced periodically in accordance with the AB-S maintenance schedule.

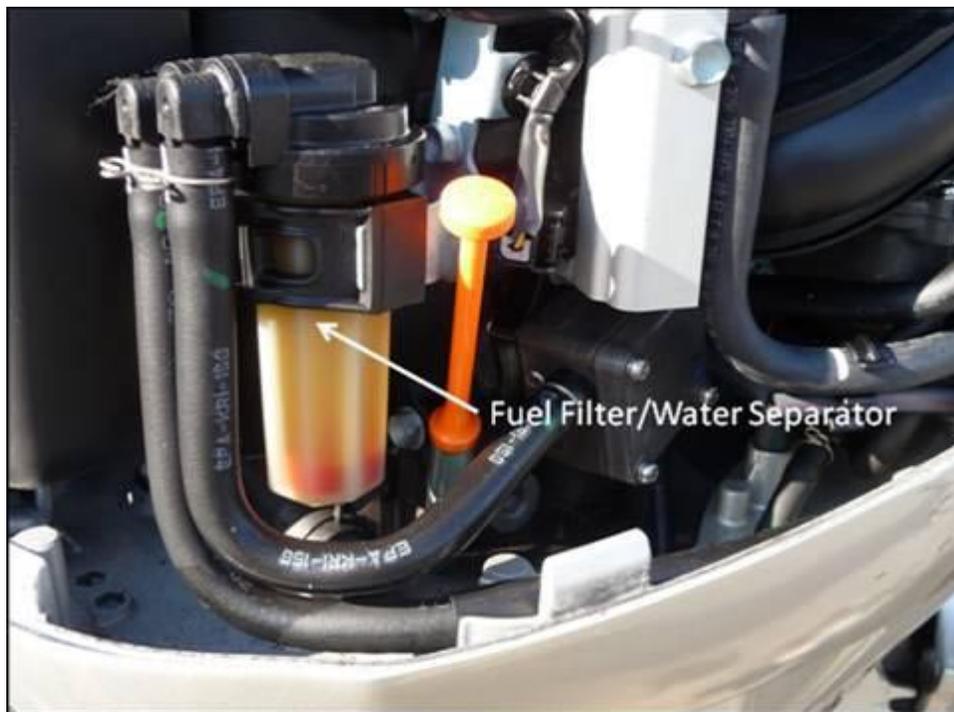


Figure 3-5
Engine Mounted Fuel Filter/Water Separator

A.2.c. Injection System

The engine incorporates an electronically controlled, multi-port fuel injection system. A common high pressure fuel rail provides fuel to each injector.

A.3. Engine Cooling System

Each engine has a self contained raw water cooling system regulated by an engine thermostat. When operating in salt water, the engines must be flushed with fresh water after operation.



-
- A.3.a. Seawater Cooling Pump The engine cooling system pump is a rubber impeller pump located in the lower unit of the outboard. The impeller has a service life that is limited and must be inspected/replaced in accordance with the AB-S maintenance schedule.
-
- A.3.b. Seawater Strainer Two cooling water intake ports (Figure 3-6) are located on the port and starboard sides of the lower outboard fairing directly above the horizontal propeller shaft and one on the bottom of the antiventilation plate. Each port has a removable intake screen to prevent debris from flowing into the cooling system.
-
- A.3.c. Seawater Discharge Cooling water discharges in the engine exhaust through the hub of the propeller. A cooling system flow indicator (Figure 3-6) on the starboard side of the engine cover shows that water is circulating through the engine cooling system.
-

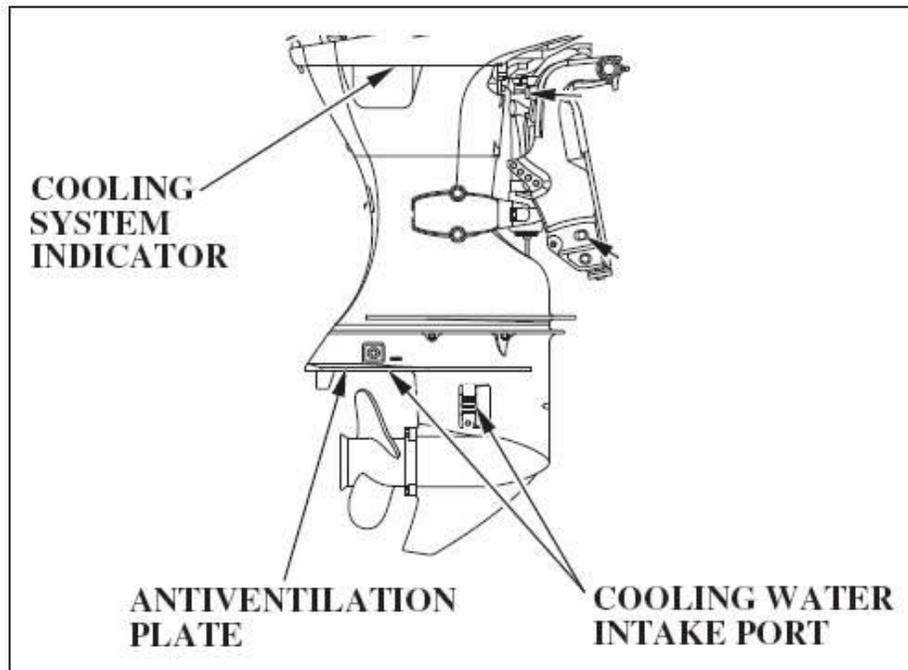


Figure 3-6
Engine Cooling



A.4. Lubrication Systems

The engine oil lubrication system is a wet-sump, pressure system.

The engine gear case utilizes a splash lubrication system.

A.4.a. Engine Lube Oil

The engine oil system has a capacity of 2.2 quarts of SAE 5W-30, API standard (SG, SH, SJ). The oil drain plug (Figure 3-7) is located on the aft side of the engine behind a small rectangular cover. A spin-on, disposable oil filter is mounted on the port side of the engine block (Figure 3-8).

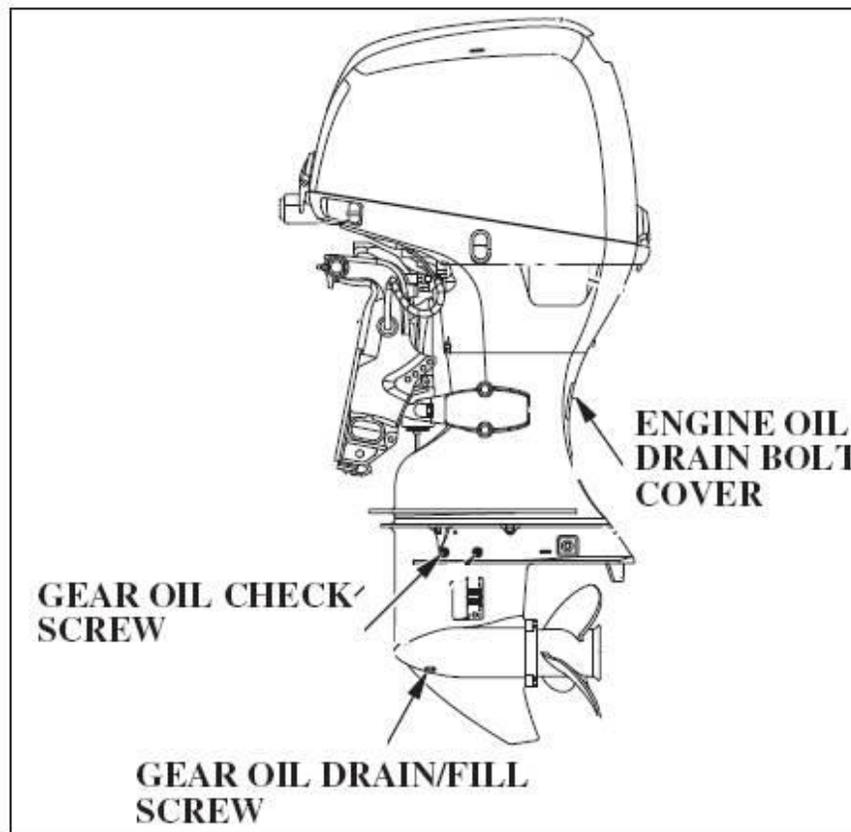


Figure 3-7
Engine Oil Drains



**Figure 3-8
Engine Oil Filter**

A.4.b. Engine Gear Case Oil

The gear case requires .43 quarts of SAE 90 outboard motor gear oil, API standard (GL-4). A gear-oil-check screw (Figure 3-2) is located on the forward port side of the engine directly above the anti-ventilation plate. The gear oil drain/fill screw (Figure 3-2) is located on the port side of the horizontal propeller shaft fairing.

A.4.c. Engine Oil Fill Cap

The engine oil fill cap (Figure 3-9) is located under the engine cover on the aft starboard side of each engine.

A.4.d. Engine Oil Dipstick

The engine oil dipstick (Figure 3-9) is located under the engine cover on the aft starboard side of each engine.



Figure 3-9
Engine Oil Fill and Dipstick

A.5. Ignition System

The ignition system is a fully transistorized battery ignition system with three spark plugs and three ignition coils.

A.6. Starter

A direct cranking 12 VDC starter is mounted on the forward side of each engine.



A.7. Engine Key Switch Panel

The AB-S has one engine key switch panel (Figure 3-10) mounted next to the throttles. Each engine has an ignition key switch for starting, labeled “OFF ON START”. The key switch is interlocked to allow engine starting only with the throttle lever in the neutral position.



Figure 3-10
Ignition Key Switches

A.7.a. Engine Alarms

Engine warning lights are incorporated in the engine digital tachometers, which are mounted above the throttle controls (Figure 3-10). A buzzer and visual indicator activate if any of the following conditions occur:

- (01) Low oil pressure (green oil pressure light turns off)
- (02) Engine overheat (red high temperature light illuminates)
- (03) Abnormality in charging system (red charging system light illuminates)
- (04) Abnormality from any of the engine sensors (red check engine light illuminates)

NOTE

If the engine overheat alarm sounds, the engine speed will automatically be reduced and the engine will stop after 20 seconds.



NOTE *sw*

If oil pressure becomes low, the engine speed will gradually decrease. Engine RPM will not increase above idle until oil pressure returns to normal.

A.7.b. Engine Kill Switch

One engine kill switch is installed between the ignition key switches that controls both of the engines (Figure 3-10). The engine kill switch clip must be inserted in the engine kill switch before the engines start and run. The kill switch clip is attached to an 18 inch lanyard, which must be attached to the operator. Should the operator/Coxswain fall away from the controls, the engines will immediately stop. A spare engine kill switch lanyard is included in the boat outfit.

NOTE *sw*

The engine kill switch lanyard should be clipped to the operator below the waist to help prevent the lanyard from being entangled on the engine throttles and helm during boat operations.

A.8. Engine Gauges

Each engine has a dedicated digital tachometer and shares a single speedometer/multifunction gauge (Figure 3-11).



**Figure 3-11
Engine Gauges**



A.8.a Guage
Displays

- (01) The speedometer/multifunction gauge displays the following functions:
- a) Boat speed,
 - b) Fuel level,
 - c) Battery voltage (per engine),
 - d) Tripmeter,
 - e) Fuel flow meter (per engine or total),
 - f) Water separator water accumulation alarm.
- (02) The tachometers display the following functions:
- a) Engine RPM,
 - b) Engine hours of operation,
 - c) Engine trim level indicator,
 - d) Engine alarms.
-



A.9. Engine Controls

The gearshift and throttle controls (Figure 3-12) for both engines are located on the starboard side of the console top. Each lever controls engine RPM and ahead or astern movement. Moving the throttle lever 35° from neutral selects the gear, forward or reverse, and further movement increases engine speed. The port throttle lever contains the power trim/tilt switches for both engines. These rocker-type switches, labeled UP and DN, change the angle of the outboard motor to trim the boat for normal operations, shallow water operations, beaching, launching, and/or mooring.

A fast idle button is located on the side of each lever so that when pushed in, the lever can be moved forward or backward to increase engine RPM without engaging the propeller.



Figure 3-12
Engine Throttles



CAUTION!

The engines must be up and locked for all trailering evolutions.

A.10. Outboard Power Trim/Tilt

Each outboard engine can be angled to trim the boat for normal operations, shallow water operations, beaching, maintenance, launching, and/or mooring.

A.10.a. Power Trim/Tilt Switch

The local power trim/tilt switch (Figure 3-13) is mounted on the portside of the engine, just below the cover. The power tilt switch will operate without turning the ignition on. The switch is used when the engine is stopped to raise the engine for mooring, trailering, or maintenance.

Remote power trim/tilt switches for both engines are mounted on the port throttle lever at the console top (Figure 3-12).



Figure 3-13
Local Engine Tilt Switch



A.10.b. Tilt Lock Lever

The tilt lock lever (Figure 3-14) is used to support the engine in the *fully raised* position. The lever is manually activated and is located between the engine housing and the frame of the engine.

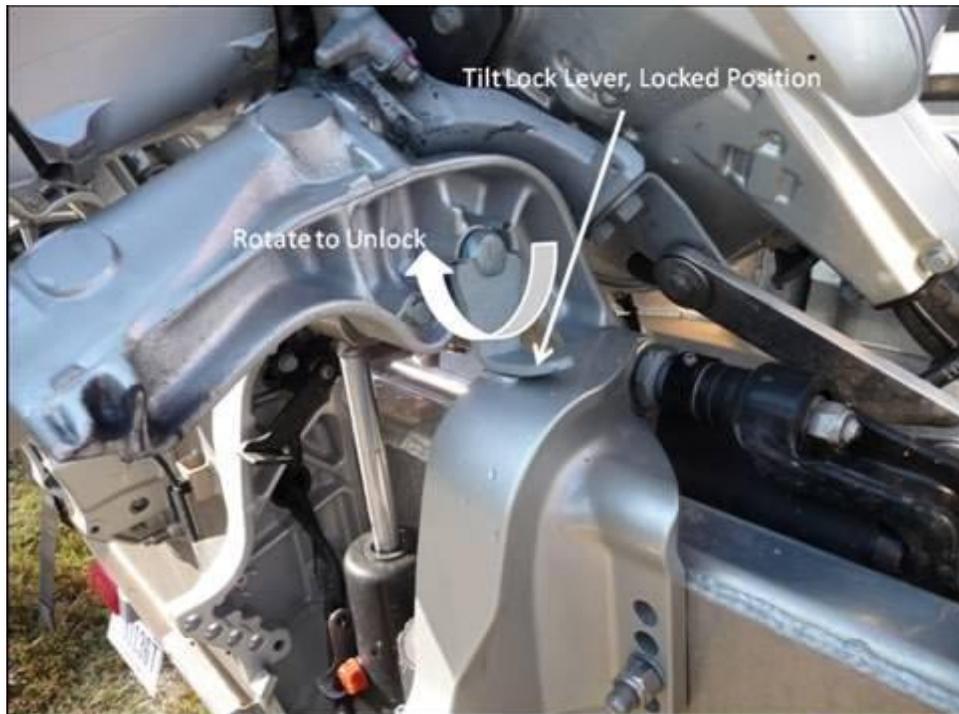


Figure 3-14
Tilt Lock Lever

A.10.c. Manual Relief Valve

The manual relief valve (Figure 3-15) is located on the starboard side of the engine's stern bracket and is used in conjunction with the tilt lock lever (Figure 3-14). By inserting a screwdriver in the manual release valve and turning the screw counter-clockwise to release the pressure, the engine can be manually raised or lowered when battery power is not available.



WARNING 🖐

If the engine is tilted up and the manual release screw is turned counter-clockwise, the engine will tilt down rapidly. Ensure there are no personnel under the engine when performing this operation.

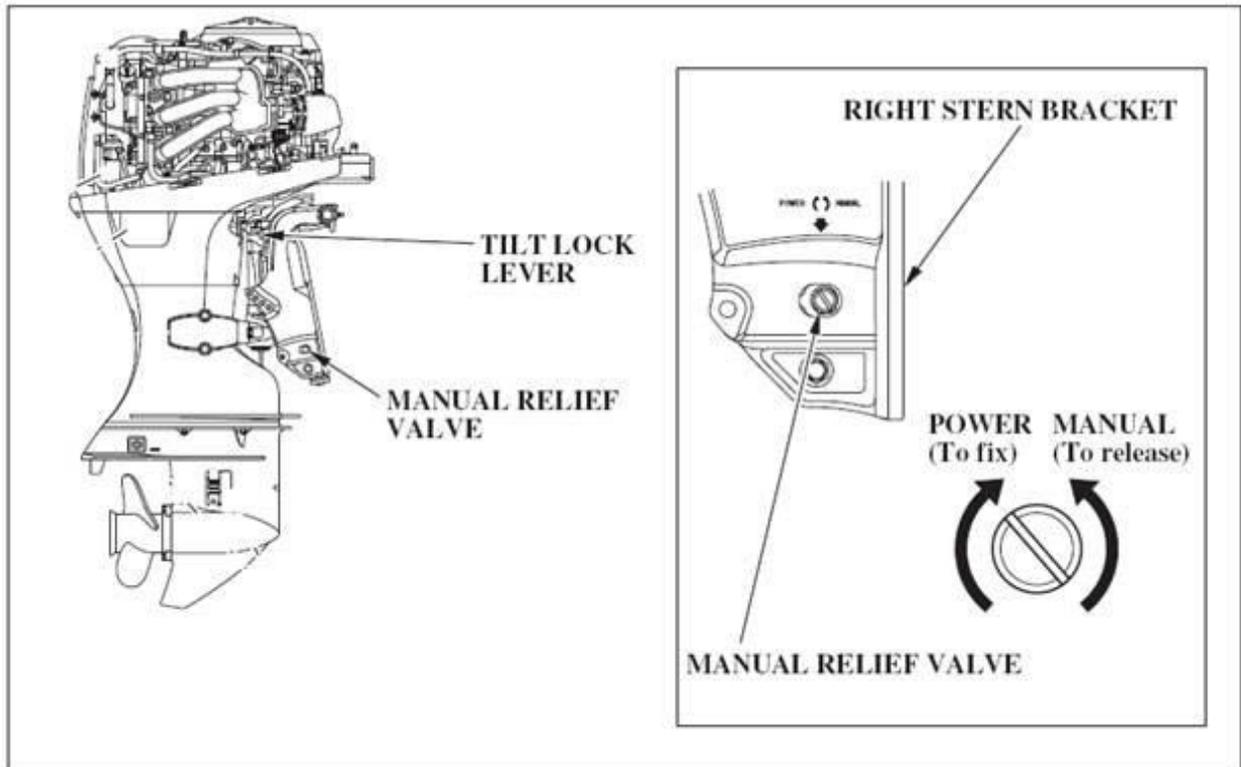
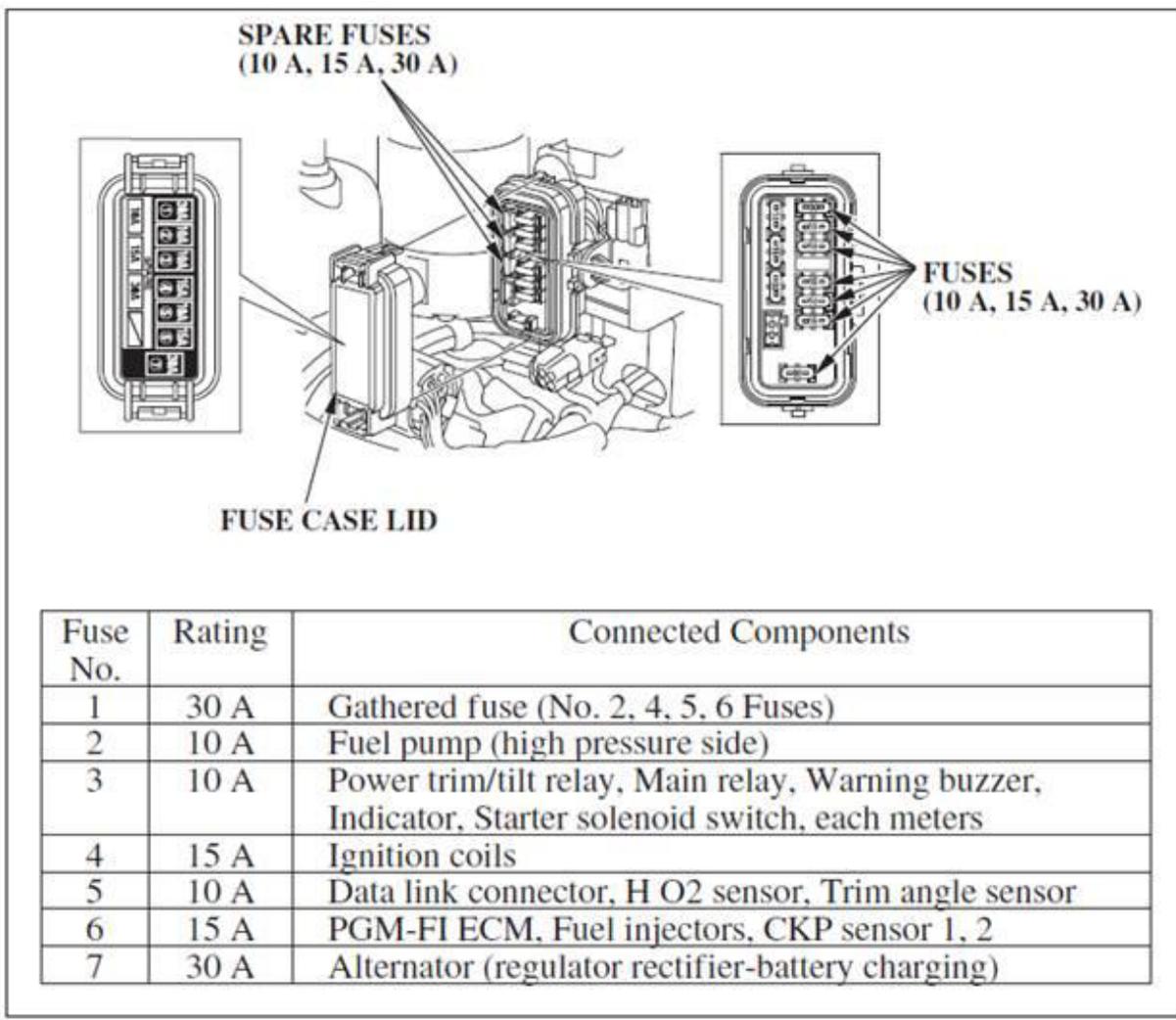


Figure 3-15
Engine Manual Tilt



A.11. Fuse Panels A fuse panel is located under the outboard engine cover (Figure 3-16). The side-mounted fuse panel houses 10 amp, 15 amp, and 30 amp fuses for the ignition switch circuit, fuel pump, ignition coils, alternator, power trim/tilt switch circuit, and electric starter circuit.



**Figure 3-16
Engine Fuses**



CAUTION !

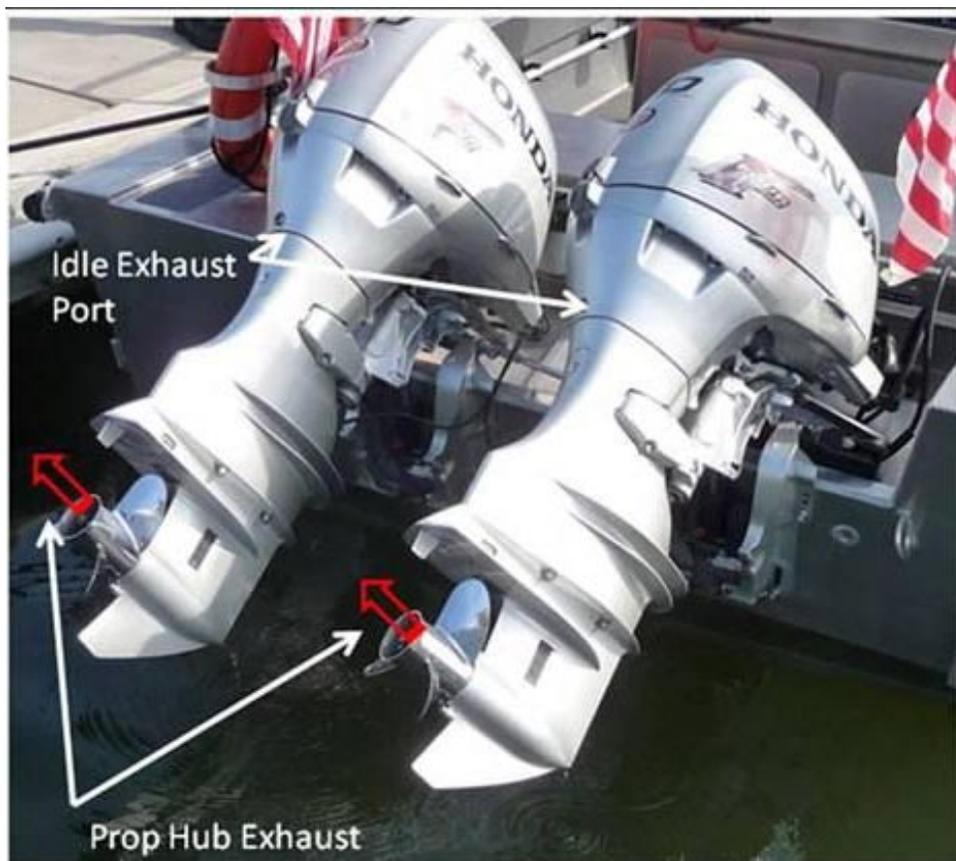
Changing the propeller configuration will change the operating characteristics of the boat. Any recommended changes must be submitted in accordance with Reference (a).

A.12. Propellers

AB-S utilizes a stainless steel, three-blade fixed pitch propeller with an 11 1/8 inch diameter and 14 inch pitch. Both propellers are right handed. Aluminum propellers are optional, as the AB-S is intended to be able to operate in shallow, debris-filled waters.

A.13. Engine Exhaust

The engine exhaust gases discharge through the idle exhaust port located on the aft end of the engine (Figure 3-17) and around the propeller shaft out through the hub of the propeller.

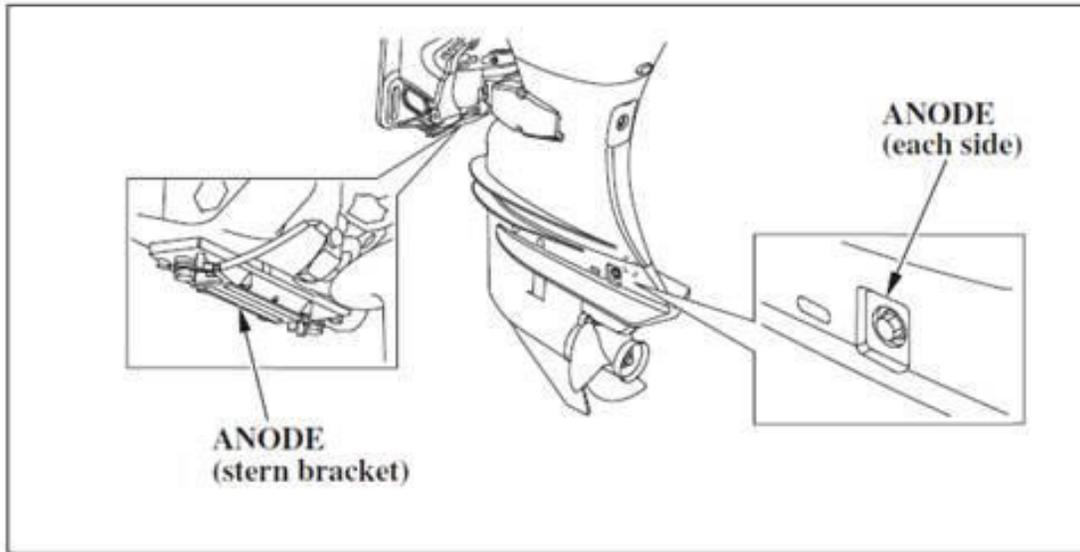


**Figure 3-17
Exhaust**



A.14. Sacrificial Anodes

Sacrificial anodes (Figure 3-18) are used to protect the outboard motor from corrosion. Two of the anodes are located on the gear case and one on the stern bracket.



**Figure 3-18
Engine Anodes**

A.14.a.
Hydraulic
Steering
Cylinders

A front mounted hydraulic steering cylinder is connected to the starboard engine tiller arm to control boat steering (Figure 2-20). The tiller arms are connected with a tie rod to provide equal, uniform directional control of the engines, but does not interfere with independent engine trim, tilt, and throttle. The steering cylinder is located in the engine splashwell.

NOTE 

The AB-S does not incorporate any power steering or auto-pilot system.



A.14.b. Steering Helm

A stainless steel steering wheel with rubber grips is mounted on a Uflex UP28FM helm pump (Figure 3-19). The hydraulic lines connect to the rear of the helm unit and can be accessed inside the console locker. The steering system has a 4 1/2 turn lock-to-lock response.



**Figure 3-19
Helm Pump**



Section B. Hull Fuel System

Introduction The fuel system provides 22 gallons of gasoline for operating the two outboard engines.

NOTE 

Maintenance must be conducted in accordance with the proper Coast Guard and Manufacture's requirements in order to prevent the voiding of the warranty on any parts, damage to the vessel, or endangerment of the safety of the crew.

B.1. Principles of Operation Fuel is stored in a 22 gallon aluminum fuel tank. Each outboard engine draws fuel from the tank using separate fuel pickup tubes and dedicated inline fuel filtering systems.

B.1.a. Fuel Tank The fuel tank for the AB-S is a single 22 gallon tank, fabricated from marine grade aluminum. The tank is not integral to the hull and is mounted under the well deck, just forward of the console. The fuel tank can be inspected and/or removed by removing the bolted access plate.

B.1.b. Fuel Tank Level Sensor Access to the fuel tank level sensor (Figure 3-20) is accomplished through a threaded, plastic access cover located just forward of the console on centerline. The fuel level is read on the speedometer/multifunction gauge mounted at the helm.



Figure 3-20
Fuel Tank Fittings

B.1.c. Fuel Fill The fuel tank is filled from the fuel fill station on the starboard gunwale (Figure 2-17).

B.1.d. Tank Vent Fitting The tank is vented back into the fuel fill at the fuel fill station. The vent hose tank fitting can be accessed through an aluminum access cover located just below the gunwale (Figure 3-21).



Figure 3-21
Fuel Tank Vent Access

B.1.e. Fuel Lines

Fuel flows from the tank to the engines through USCG Type A1 fuel lines. Each engine has its own fuel pick up at the fuel tank (Figure 3-20). Fuel lines are routed from the tank aft in the port side below deck raceways.

B.1.f. Fuel Cut Off Valves

Fuel cutoff valves are installed on the inlet ports of the fuel/water separators (Figure 3-22) to isolate the fuel/water separator and stop fuel flow to the engines. Access to the fuel cutoff valves is in the splashwell.

B.1.g. Primary Fuel Filters

In addition to the engine mounted fuel filters, each outboard engine has separate water separating fuel filter (Figure 3-22), installed inline in the fuel lines and located in the splashwell. Each filter has a ten micron disposable filter element.



Figure 3-22
Fuel Cutoff Valves

**B.1.h. Primer
Bulbs**

A fuel priming bulb (Figure 3-4), located in the inlet line to each outboard engine, primes and pressurizes the outboard engine fuel system for starting. The fuel priming bulbs are located in the splashwell.



Section C. Hull Systems

Introduction

The hull of the AB-S is fabricated from marine aluminum with an attached 2 inch D-shaped rubber gunwale bumper. The hull is a hard-chine planing boat design with a shallow - vee and 10 degree dead rise.

The bottom plating is $\frac{5}{32}$ inch thick. Aft voids in the hull are fitted with 43.5 cubic feet of foam for flotation. The boat's hull has sufficient buoyancy and stability to float upright if swamped.

NOTE

Maintenance must be conducted in accordance with the proper Coast Guard and Manufacture's requirements in order to prevent the voiding of the warranty on any parts, damage to the vessel, or endangerment of the safety of the crew.

CAUTION !

To prevent galvanic corrosion of the aluminum hull, the outboard engines should be raised out of the water when the boat is moored for prolonged periods of time.

C.1. Draft

The hull's deepest draft with the engines raised is 13 inches at the keel.

C.2. Beaching Plate

A beaching plate is installed over approximately the forward half of the keel to prevent hull damage.

C.3. Bilge Access Points

The bilge access is through a flush mounted, QAWTH in the deck, on centerline, in the splashwell, as well as through a threaded plastic fitting just forward of the console.

C.4. Scuppers

Two self-bailing deck drains (Figure 3-23) penetrate the transom on the port and starboard sides. The deck drains are one-way scuppers with hinged metal flaps to hinder the back flow of water.

C.5. Crew Seats

The cover of the aft stowage locker provides seating for the two crew members.

C.6. Hull Drain Plug

A threaded plug is provided at the bottom of the transom to facilitate water removal from the bilge when the AB-S is trailered (Figure 3-24).



Figure 3-23
Scupper Flaps



Figure 3-24
Hull Drain Plug



C.7. Bow Ladder

A removable bow ladder is provided for servicing aids. It is held in place by fastpins in two sockets on the bow. (Figure 3-25).



Figure 3-25
Bow Ladder

NOTE

The bow ladder is rated for one person and a dayboard at a time (approximately 270 lbs.).

WARNING

When using the bow ladder, make sure all PPE is worn and that all safety procedures applicable to ATON work are followed. Additional climber safety considerations are contained in Chapter 4 of Reference (d).



C.8. Storage Cover

A storage cover is provided to protect the AB-S during extended periods of storage on the trailer (Figure 3-26).



**Figure 3-26
Storage Cover**



Section D. Electrical System

Introduction A 12 VDC electrical system is installed on the AB-S.

NOTE 

Maintenance must be conducted in accordance with the proper Coast Guard and Manufacturer's requirements in order to prevent the voiding of the warranty on any parts, damage to the vessel, or endangerment of the safety of the crew.

D.1. Alternator Each outboard has a belt driven alternator driven by the crankshaft located under a protective cover on the top of the engine. Each alternator is rated at 12 VDC, 17 amps.

D.2. Batteries Two 12 VDC marine grade dual-purpose, lead-acid batteries are installed on the AB-S. Both batteries have 420 CCA each. The batteries are located in the forward, lower console locker. Low or high battery charge is shown on the alarm lamp unit on the console dash panel. Both batteries are secured in plastic battery trays with a battery strap.

D.3. Starter A direct cranking starter is mounted on the forward side of each engine (Figure 3-27). The starter requires 12 VDC and a 52 ampere hours starting battery. The starter receives power directly from the isolation switch for the port battery, located in the lower forward console locker.

NOTE 

The bilge pump control switch is wired directly to the batteries and remains energized when the battery isolation switches are in the OFF position.



Figure 3-27
Engine Starter



D.4. Battery Switches

The battery isolation switches are located in the lower forward console locker (Figure 3-28). The switches have an OFF and ON position. The batteries can be paralleled using the EMERGENCY PARALLEL switch.



Figure 3-28
Battery Isolation Switches and 50 Amp Breaker



D.5. Console Switch Panels

There are three 12 VDC circuit breaker panels on the console, panel SP-1 (Figure 3-29), panel SP-2 (Figure 3-30) and panel SP-3 (Figure 3-31). Each breaker is labeled and has an indicator light that illuminates when the circuit is energized.

(01) Panel SP-1 contains circuit breakers for:

- a) Heading Sensor,
- b) Spot Light,
- c) 12V Outlet,
- d) 12V Outlet,
- e) Horn,
- f) Spare.

(02) Panel SP-2 contains circuit breakers for:

- a) Subpanel,
- b) MFD-8,
- c) RD-30,
- d) VHF,
- e) Simrad,
- f) AIS.

(03) Panel SP-3 contains circuit breakers for:

- a) Nav. Lights,
 - b) Anchor Light,
 - c) Spare,
 - d) Spare.
-



Figure 3-29
Panel SP-1



Figure 3-30
Panel SP-2



Figure 3-31
Panel SP-3

D.6. Lighting

The lighting systems on the AB-S provide navigation lights and a spot light.

D.6.a.
Navigation
Lights

The navigation lights (Figure 3-32) are controlled from the SP-3 circuit breaker panel.

The normal underway running lights are:

- (01) Red light – port side of center console
 - (02) Green light – starboard side of center console
 - (03) All around white light – antenna arch on centerline
-



Figure 3-32
Side Navigation Light

D.6.b. Spot
Light

One, handheld narrow beam spot light is stowed in the forward upper console locker (Figure 3-33). The spot light contains a low power 55 watt halogen bulb and a high power 100 watt bulb, either of which are selectable by the operator. The spotlight cord plugs into a dedicated outlet on the port side of the console (Figure 3-34) and receives power from the SPOT LIGHT circuit breaker on the SP-1 circuit breaker panel.



**Figure 3-33
Spot Light**



**Figure 3-34
12 VDC Outlets**

D.7. Electrical Outlets

Two electrical outlets located port side of the console are provided for 12 VDC power (Figure 3-34). The outlets receive power from the 12V OUTLETs circuit breakers on the SP- 1 panel.



Section E. Communications/Navigation System

Introduction

All of the standard marine communications and navigation equipment is mounted on the console of the AB-S. The radio communications system consists of a single Standard Horizon GX5500S VHF-FM radio.

The AB-S utilizes a Scalable Integrated Navigation System (SINS) that is built around the Furuno MFD8 NAVnet 3D system. The SINS system on the AB-S includes the following:

1. ACR Nauticast 2680 Class B AIS Receiver
 2. PG-500R Heading Sensor
 3. RD-30 Multi Display Unit
-

E.1. Operator's Console

All of the standard marine communications and navigation equipment is mounted on the console of the AB-S.

E.2. Furuno 1834C/NT System

The Furuno MFD8 system contains an 8 inch NAVnet 3D/chart plotter/multi-function display unit (Figure 3-35). The display unit is capable of displaying heading, depth, charts, and global positioning system (GPS) data. The system receives power from the MFD8 circuit breaker on the SP-2 panel.



Figure 3-35
NAVnet 3D MFD8



E.3. Heading Sensor

The AB-S is equipped with a PG-500R heading sensor mounted in the console locker (Figure 3-36). The PG-500R can output true heading as well as magnetic heading. The heading sensor receives power from the HEADING SENSOR circuit breaker on the SP-1 panel.



Figure 3-36
Heading Sensor

E.4. RD-30 Multi-Display

The RD-30 (Figure 3-37), is a multi-functional display that can display any of the following information:

- (01) Boat's position in LAT/LONG coordinates
- (02) Boat's speed
- (03) Boat's course
- (04) Water depth

The display can be set up to display any, or combinations of the above type of information. The display format can also be selected by the operator in digital, graphical, analog, or highway formats.

The RD-30 receives power through the RD-30 circuit breaker on the SP-2.



Figure 3-37
RD-30 Display

E.5. DGPS

The Simrad MX510 DGPS display is located on the console top (Figure 3-38). The DGPS antenna is mounted on the starboard side of the antenna arch (Figure 3-39). The MX510 receives power from the SIMRAD circuit breaker on the SP-2 panel.



Figure 3-38
Simrad MX510 DGPS

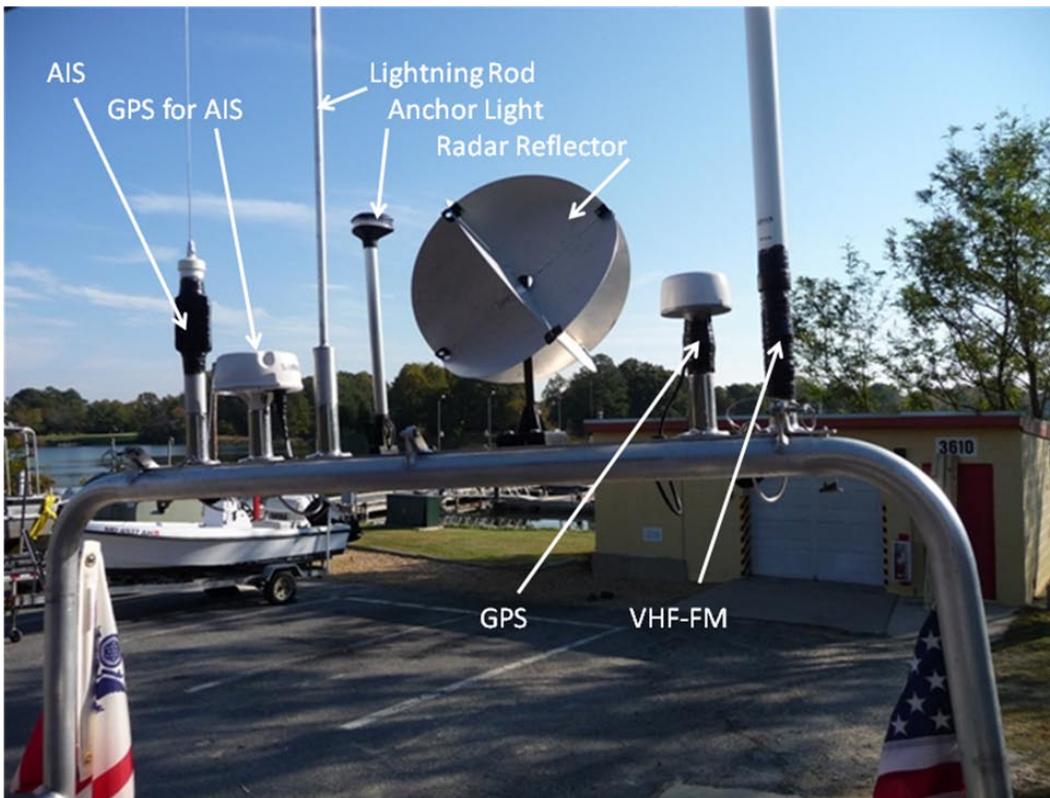


Figure 3-39
Antennas



**E.6. VHF-FM
Radio
(Standard
Horizon)**

A VHF-FM radio with Digital Selective Calling (DSC) and power output selection between 25 watts high power and 1 watt low power is flush mounted in the console top (Figure 3-40). A whip antenna for the unit is mounted on the antenna arch (Figure 3-39). The radio receives power from the VHF circuit breaker on the SP-2 panel.



**Figure 3-40
VHF-FM Radio**



E.7. ACR Nauticast AIS

An ACR Nauticast 2680 Class B AIS transponder is installed inside the console (Figure 3-41). A Shakespeare antenna is connected to the radio and mounted on the canopy top, starboard side (Figure 3-39). A Furuno GPA017S/S GPS antenna is also connected to the unit and mounted on the antenna arch (Figure 3-39). The AIS receives electronic data messages from AIS equipped ships with position, and course/speed data. The AIS has a dedicated GPS channel which, when activated, transmits the AB-S's position and course/speed information. The AIS receives power from the AIS circuit breaker located on panel SP-2.



Figure 3-41
AIS Transponder



E.8. Horn

One horn (Figure 3-42) is mounted on the front of the console, port side. The horn is controlled by a momentary contact HORN toggle switch on the console. The horn receives power from the HORN circuit breaker on the SP-1 panel.



Figure 3-42
Horn



**E.9. ATON
Positioning
Laptop**

A mounting bracket (Figure 3-43) is mounted on the top of the console, port side. The bracket is specifically designed to safely and securely hold the laptop during transit and ATON operations. The laptop receives power from an internal battery. Positioning data is supplied by a pigtail from the NAVNET 3D SINS.



**Figure 3-43
AtoN Positioning Laptop**



Section F. Fire Extinguishing Equipment

Introduction

Two 2 lb dry chemical portable fire extinguishers for class B and C fires are installed on the AB-S. One extinguisher is located in a recess on the port side of the console and one in a recess on the starboard side. (Figure 3-44).



Figure 3-44
Fire Extinguisher



Section G. Bilge System

Introduction

The bilge system consists of one installed bilge pump with a float switch and separate bilge pump control switch. The system is designed to remove small amounts of water that occur due to condensation, small leaks, or water used to clean decks and other surfaces.

G.1. Bilge Pump and Float Switch

The bilge has one fixed, submersible bilge pump (Figure 3-45) that operates on 12 VDC. The pump is located beneath the bilge QAWTH in the splash well. The bilge pump is rated at approximately 550 GPH. A float switch is installed next to the pump.

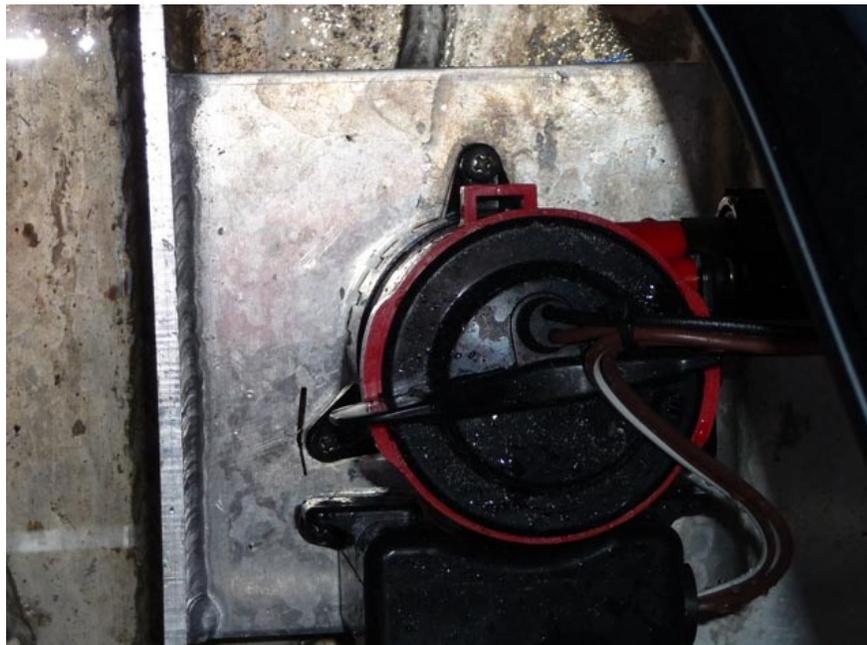


Figure 3-45
Bilge Pump



G.2. Bilge Pump Panel

The bilge pump control switch is located on the console top (Figure 3-46). The bilge pump is protected by a 5 amp, inline, pushbutton circuit breaker.



**Figure 3-46
Bilge Pump Control**



Section H. Cathodic Protection System

Introduction

The hull cathodic protection system (Figure 3-47) helps to reduce corrosion on exterior hull surfaces.

CAUTION !

To prevent galvanic corrosion of the aluminum hull, the outboard engines should be raised out of the water when the boat is moored for prolonged periods of time.

H.1. Sacrificial Anodes

The cathodic protection system installed on the boat consists of a single sacrificial aluminum anode bolted to mounting tabs, just off centerline to port on the transom, below the waterline. Each engine contains several anodes to reduce corrosion on engine components, see *Chapter 3, Section A.14*, for more details.



Figure 3-47
Hull Anode



Section I. Trailer System

Introduction

The trailer that accompanies the AB-S is custom built by EZ Loader Boat Trailers (Figure 3-48). It is designed to transport the AB-S on public roadways.

WARNING

Lack of preventative maintenance contributes to a significant amount of trailering mishaps each year. In fact, poor maintenance endangers the safety of the boat crew, you, and the public.

NOTE

The only trailer authorized for the AB-S is the EZ Loader trailer designed for this class of boat.



Figure 3-48
AB-S Trailer



I.1. Tow Vehicle The tow vehicle must be capable of handling the weight of the trailer (including boat and equipment), as well as the weight of the passengers and equipment carried inside the vehicle. This may require that the tow vehicle be specially equipped with the following:

- (01) Engine of adequate power.
- (02) Transmission and rear-end designed for towing.
- (03) Larger cooling systems for the engine and transmission.
- (04) Heavy-duty brakes.
- (05) Load bearing hitch attached to the frame, not the bumper.
- (06) Heavy duty suspension.

NOTE 

The towing vehicle must be rated at the combined weight of the boat and trailer. The vehicle's towing limitations can be found in the owner's manual.

NOTE 

If the combined weight of the boat, trailer, personnel, and equipment are too close to the tow vehicle's rating, consider using a second vehicle to transport some of the extra personnel and equipment to provide an additional safety margin.

I.2. Hitch

The trailer hitch is attached to the tow vehicle's frame providing a secure fitting from which to attach the receiver and ball mount (Figure 3-49).

The hitch must be capable of carrying 6,000 lbs or greater. The hitch must be stamped (by the manufacturer) or have a manufacturer sticker stating the class and the rated towing capacity (6,000 lbs or greater).



**Figure 3-49
Trailer Hitch**

I.3. Ball Mount and Ball

The ball mount attaches to the trailer hitch, which provides a secure fitting to mount the trailer ball.

The trailer coupler must be secured on the hitch ball using the safety latch mechanism. If the safety latch does not easily slide into place, reposition the trailer coupler to ensure proper fit.

The ball mount must have a capable trailer weight of 6,000 lbs or greater. The ball mount must be stamped by the manufacturer, or have a sticker affixed from the manufacturer stating the rated towing capacity is 6,000 lbs or greater. Should a ball mount require hardware (bolts and nuts), the hardware must have a rating of 6,000 lbs or greater.

The ball size must be 2 inch and have a rating of 6,000 lbs or greater. It shall be stamped and clearly legible. The ball should be inspected often for cracks, abnormal wear, and proper lubrication.

The height of the ball mount should be positioned so that the trailer will be pulled level. Adjusting the height of the ball mount is critical to ensure this condition is met. The tongue weight should be approximately 600 lbs when the trailer is level.



I.4. Trailer Coupler, Safety Chains and Hydraulic Brake Actuator

The trailer coupler attaches to the ball of the tow vehicle (Figure 3-49). The coupler engages the ball and provides a positive mechanical lock between the trailer and tow vehicle. The coupler must be for a 2 inch ball and have a rating of 6,000 lbs or greater. It shall be stamped and clearly legible.

Two safety chains attached to the trailer provide trailer retention to the vehicle should the coupler disengage from the ball. The safety chains must be rated for 6,000 lbs or greater. One end of the safety chain is bolted directly to the trailer. The bitter ends are attached to the tow vehicle's hitch with $\frac{1}{2}$ inch galvanized safety hooks that are rated for 2 tons.

The breakaway lever actuating wire (hydraulic brake actuator) is attached to the vehicle during towing operations. Should the coupler disengage from the ball, the actuator wire will be pulled forward, actuating the breakaway lever automatically, thus applying the trailer's brakes. The actuator wire must be attached to the hitch by using a $\frac{1}{4}$ inch shackle plus an additional $\frac{1}{2}$ inch shackle. The breakaway lever actuating wire is a standard length and should not be altered in any way (Figure 3-49).

I.5. Trailer Construction and Equipment

The primary frame of the trailer is made up of galvanized rectangular tubing. The suspension is a torsion axle system that contains one axle, two tires, and one spare. Three tie-down straps are provided to secure the boat to the trailer. The wheels are attached to the hub system.

The trailer lights are light emitting diodes (LEDs), which include: braking, tail and clearance lights.

**CAUTION !**

Always use a designated “spotter” when hooking up the trailer. The spotter can provide detailed instructions to the tow vehicle operator when backing up, which will prevent damage to both the tow vehicle and trailer.

I.6. Hooking Up the Trailer

When attaching the tow vehicle to the trailer, the same procedures should be performed every time. Whether you are transiting to a local boat ramp just down the road or going on a long trip, the trailer should always be completely attached to the tow vehicle.

Follow these steps for attaching the trailer to the tow vehicle:

Step	Action
1	Using a spotter, carefully back the tow vehicle so that the trailer ball is aligned under the trailer’s coupler.
2	Using the hand-crank tongue jack, lower the trailer coupler until it is completely seated on the trailer ball.
3	Engage the coupler latch and insert the coupler latch pin to ensure it does not come undone during transit.
NOTE 	<p>The coupler latch pin should have a lanyard long enough to facilitate insertion and removal.</p>
4	Attach the safety chains. They shall be crisscrossed and have enough slack to allow for sharp turns in both directions, yet short enough to not drag on the ground.
5	Attach the breakaway lever actuating wire. Ensure there is enough slack in the actuator cable to allow for sharp turns in both directions, yet short enough to not drag on the ground.
6	Connect the wiring harness to the tow vehicle. The wiring harness (pigtail) should have enough slack to allow sharp turns in both directions, and be short enough as to not drag on the ground.
7	Check trailer lights to ensure they are operating properly.



CAUTION !

Once connected to the tow vehicle, ensure the trailer is being towed level to the ground. If the trailer is not level to the ground, a drop bar/ball mount of a different height may be necessary and/or the trailer coupler may need adjustment.

CAUTION !

Do not exceed the maximum weight rating on the trailer. Exceeding the maximum rating voids the manufacturer's warranty and may lead to failure of the trailer, causing damage to the boat and creating an unsafe towing condition.

I.7. Securing the Boat to the Trailer

Before taking the trailer and boat into tow, you must first ensure that the boat is properly secured to the trailer. **Damage to the boat and trailer could result if the two are not properly connected.** Strap down the AB-S in the following manner:

- (01) Tie-down straps must be attached and tightened between the transom tie-down fittings and the trailer (Figure 3-50), one on each side of the transom.
- (02) A tie-down strap must be attached and tightened between the bow eye and the trailer (Figure 3-50),
- (03) The bow tie-down strap must be connected to the lower hole in the bow eye (Figure 3-50),

Tie-downs shall be rated for at least 6,000 lbs and be the same style and model as the issued tie-downs that came with the EZ Loader trailer.

The winch strap shall not be used as a tie down and must not exceed light strain (Figure 3-51).



**Figure 3-50
Trailer Transom Tie-Downs**



Figure 3-51
Bow Tie-Down Strap

WARNING 🖐

Do not overload the trailer by carrying additional equipment or personal gear in the boat. Additional trailering information can be found in the upcoming Coast Guard Trailering Manual, COMDTINST M11240.10 (series).

WARNING 🖐

The boat and trailer will hinder the driver's ability to judge distances and negotiate turns.

I.8. Towing Precautions

Pulling a trailer presents several problems: more time is required to brake, accelerate, pass, and stop. The presence of the boat on the trailer will increase the size of the vehicle's blind spots, especially when using rear view mirrors for backing. The turning radius is also much greater; curbs and roadside barriers must be given a wide berth when negotiating corners.

Prior to operating on the open road, the vehicle operator should practice turning, backing up, and other maneuvers at a level, non-congested parking area. Backing a trailer is a challenge, even to the most experienced drivers, and requires considerable practice.



The AB-S and trailer are closely matched to the minimum trailer-truck-hitch requirements. Safe trailering requires that the trailer be properly balanced and loaded. Overloading a trailer on the highway is as dangerous as overloading your boat on the water. Carrying additional equipment (beyond the boat outfit) or personal gear on the boat may add substantially to the trailer’s gross weight and play havoc with the load distribution.

Vehicle speed shall not exceed posted speed limit or 60 mph (whichever is less) in ideal weather and road conditions. For wet road surfaces, speed should be reduced by 30%. While towing a boat, following distance should increase to five seconds rather than the normal three seconds following distance.

NOTE *GR*

Many units require tow vehicle operators to complete a unit generated Performance Qualification Standard (PQS) before they tow a trailer.

CAUTION !

The bimini cover must be removed before trailering at speeds greater than 5 mph. The cover will not withstand trailering speeds. Trailering with the bimini cover in place will void the warranty if damaged during over the road transits.

I.9. Trailering Checklist

Before your trip, ensure the following items have been checked:

Step	Action
1	Check intended routes for restrictions on bridges and tunnels, and low overhead clearances. All antennas must be rotated to the down position and all masts must be removed. With the antennas in the down position the highest point of the trailered boat becomes the top of the folding antenna mount plate, at 9 FT 2 inches above the ground.
2	The tow ball and coupler must be the same size, and tow ball with nut/washers have to be tightly secured (the vibration of road travel can loosen trailer hardware).
3	Confirm the coupler is completely over the ball, and the latching mechanism is locked down and secured with the locking pin.
4	The safety chains are securely attached, crisscrossing under the coupler to the hitch. Should the hitch fail, the trailer’s tongue would be held up by the wire cables, allowing the trailer to follow in a straight line, thus preventing the coupler from dragging on the road.



Step	Action
5	Ensure the hydraulic brake actuator safety wire is attached to the hitch.
6	Ensure the tongue jack is fully cranked up and rotated to the stowed position.
7	Vehicle side-view mirrors should be large enough and adjusted for the driver. This will provide an unobstructed rear view on both sides of the vehicle.
8	Check all vehicle and trailer lights' signal operation. When trailer lights are submerged during launching/recovery, they have a greater chance of failure. Always disconnect the trailer-wiring harness before submerging the trailer's lights.
9	Test the brakes before getting on the road. Drive forward and apply the brakes several times at slow, safe speeds; this will help determine a safe stopping distance.
10	Check all tires, including the trailer's spare tire and towing vehicle tires, for condition and proper air pressure. Improper air pressures will cause difficulties in steering. Read the tire sidewall and trailer specifications to determine tire pressure required. Furthermore, check for tire wear, cracks, bubbles, or foreign objects imbedded in the tire. When trailer wheels are immersed in water (especially salt water), the bearings should be inspected and greased on a regular basis in accordance with Preventive Maintenance Schedule (PMS) procedures.
11	Ensure that engines are tilted up, tilt lock is in the locked position and engines are turned all the way to port.
12	Ensure the trailer is loaded evenly, from front to rear as well as side-to-side. Too much weight on the hitch will cause the rear of the tow vehicle to sag and will make steering more difficult.

**CAUTION !**

Always use a spotter when backing a trailer! Windows should be open and tow vehicle radio should be off.

I.10. Launching the Boat

Once at the boat ramp, use the following procedures to launch the boat:

Step	Action
1	Use a spotter to help back the trailer down the boat ramp to the water's edge. Remember to set the parking brake.
2	Remove all tie-down straps that secure the boat to the trailer. DO NOT disconnect the trailer winch connection.
3	Disconnect trailer-wiring harness from tow vehicle.
4	Visually inspect the boat's hull and engines for any damage that may have occurred during transit.
5	With a crew member in the boat, have another crew member stand-by to release the trailer winch connection once in the water.
6	Carefully back the trailer into the water until approximately three-quarters of the boat is floating free of the trailer. Set the towing vehicle's parking brake.
7	Check spaces for flooding.
8	Lower engines into the water and start. Ensure the water level in the vicinity of the outboards is sufficient for operation and clear of hazards.
9	If crew is satisfied with condition of boat/engines and is ready to get underway, release the trailer winch connection and carefully push/power the boat back off the trailer.
10	Carefully pull tow vehicle forward, clear of boat ramp.

NOTE *GR*

After launching or recovering the boat, always rinse down the trailer with fresh water and check the trailer lights for proper operation.



CAUTION !

During recovery, ensure the bow is in contact with the trailer bow stop. This will ensure proper loading and weight distribution.

CAUTION !

Trailer chafing skids or “bunks” must be kept in good condition to prevent scratching and gouging of the hull.

I.11. Recovering the Boat

When finished with boat operations, use the following procedure to recover the boat:

Step	Action
1	Disconnect trailer-wiring harness from tow vehicle.
2	Using a spotter, carefully back trailer down the ramp until approximately three-quarters of the trailer is submerged. Set parking brake.
3	Align the center of the boat with the center of the trailer and carefully maneuver the boat onto the trailer. Check water level in the vicinity of the trailer and trim engines up or secure as needed.
4	Attach trailer winch to top hole in bow eye of boat and pull boat forward onto the trailer. Always ensure boat stays centered on trailer.
5	Secure engines on boat (if still running).
6	Raise both engines, place tilt locks in the locked position and turn engines to port.
7	Slowly pull the tow vehicle forward until the trailer is clear of the water.
8	Attach all tie-down straps securing the boat to the trailer. Fold the antenna arch to the lowered position and remove bimini cover, if installed.
9	Ensure trailer lighting is operating properly.
10	Do a complete visual inspection of the tow vehicle, trailer, and boat before transiting on highway.



CHAPTER 4 Crew Requirements

Introduction

Reference (e) provides minimum standards and guidelines for competence on board the AB-S. Each crewmember should be familiar with the duties of the other crewmembers in addition to his or her own duties. It is important for a crewmember to know and commit to memory all important characteristics of the boat and its equipment, and which procedures to follow in the event of a casualty.

In this Chapter

This Chapter contains the following Sections:

Section	Topic	See Page
A	Minimum Crew	4-2
B	Coxswain	4-3
C	Boat Crew Members	4-4
D	Passengers	4-5
E	Safety Equipment	4-6



Section A. Minimum Crew

Introduction

Units shall comply with the minimum boat crew requirements prescribed in Reference (c).

A.1. Certified Crewmembers

All crewmembers shall meet the qualification requirements prescribed in Reference (e).



Section B. Coxswain

Introduction

The U.S. Coast Guard places great trust in each Coxswain and his or her ability to accomplish the assigned missions in a safe and professional manner even under adverse conditions. The position of Coxswain is one of high regard and great responsibility.

The Coxswain is responsible for the boat, its crew, and passengers during every mission. The Coxswain assigns and directs all onboard functions during each operation.

B.1. Authority and Responsibility

The extent of the authority and responsibility of the Coxswain is specified in Reference (f) as follows:

“The Coxswain shall be responsible, in order of precedence, for the safety and conduct of passengers and crew; the safe operation and navigation of the boat assigned; and the completion of the sortie or mission(s) assigned or undertaken pursuant to USCG policy and regulations. An underway Coxswain will, at all times, respond within the limits of capabilities and legal authority to observed hazards to life or property, and violations of law or regulations.”

The Coxswain is the direct representative of the Commanding Officer (CO) or Officer-in-Charge (OIC) and as such (subject to *Articles 88-89* of the *UCMJ*), has the authority and responsibilities that are independent of rank or seniority in relation to other personnel embarked. The authority and responsibility of the Coxswain exist only when the boat is engaged on a specific sortie or mission.

B.2. Relief of Responsibility

The only person embarked in the boat who may relieve the Coxswain of the responsibility as described above is:

- (01) CO,
 - (02) OIC,
 - (03) Executive Officer (XO), or
 - (04) Executive Petty Officer (XPO).
 - (05) A senior officer at the scene of a distress emergency or other abnormal situation, who exercises authority under the provisions of Reference (f), whether or not other units are involved.
-



Section C. Boat Crew Members

Introduction

Under direct supervision of the Coxswain, the crew is responsible for line handling, acting as lookout, and assisting the Coxswain as required during all evolutions or maneuvers.

C.1. Certified Boat Crew Member

The Boat Crew Member must be certified in accordance with References (c) and (e).

Additionally, the Boat Crew Member may be responsible for operating the communications/navigation equipment when directed by the Coxswain.

C.2. Additional Crewmembers

Additional crewmembers are assigned by the Coxswain and certified by the CO/OIC based upon mission requirements.



Section D. Passengers

Introduction

The AB-S is designed to carry a Coxswain, Boat Crew Member, and up to two additional crewmembers or two passengers while carrying out high-speed mission activities. Passengers shall be seated as directed by the Coxswain.



Section E. Safety Equipment

E.1. Personal Protective Equipment

During all AB-S operations, crewmembers shall wear personal protective equipment (PPE) as required by Reference (g).

WARNING

The use of the kill switch is required whenever the boat is started or has way on. The kill switch is located next to the throttles (**Figure 3-10**). The clip for the kill switch **MUST** be inserted into the switch body before the engines are started. The 36 inch lanyard **MUST** be properly attached to the operator at all times during boat operation. The engine kill switch lanyard should be clipped to the operator below the waist. A second kill switch lanyard **MUST** be carried onboard to enable remaining crewmembers to operate the boat in the event the operator is ejected.

NOTE

The Coxswain is responsible for ensuring that all required personal safety equipment is worn, and worn correctly.



CHAPTER 5 Operational Guidelines

Introduction This Chapter describes how to use the AB-S in the safest and most efficient manner. These policies and performance criteria should be used as guidelines for AB-S operations. Within these guidelines, consider local operating conditions, district regulations and the skill of the crew to determine how the AB-S capability is to be used. These factors must be considered prior to each sortie or mission.

In this Chapter This Chapter contains the following Sections:

Section	Topic	See Page
A	Operating Parameters	5-2
B	Performance Data	5-6



Section A. Operating Parameters

Introduction

The readiness of the AB-S shall be continuously monitored to ensure that it is capable of unrestricted operations. This monitoring is accomplished through a variety of programs, including daily boat checks, the boat preventive maintenance schedule (PMS) schedule, engineering inspections, and Ready for Operations (RFO) evaluations and Standardization Team inspections.

Operating parameters for the AB-S and crewmembers include the following areas:

- (01) Disabling casualties
 - (02) Restrictive discrepancies
 - (03) Major discrepancies
 - (04) Minor discrepancies
 - (05) Responsibilities
 - (06) Environmental limits
-

A.1. Disabling Casualties

Disabling casualties are those that make the boat not serviceable (Table 5-1). *Appendix D* contains a listing of disabling casualties. If a disabling casualty is identified, the boat shall not get underway until the casualty is corrected.

Disabling casualties shall be reported immediately to the Operational Commander. The boat shall be immediately placed in “Charlie” status and repaired. If the casualties cannot be repaired within 48 hours, a CASREP shall be sent within 24 hours of the casualty.

A.2. Restrictive Discrepancies

Restrictive discrepancies are those which restrict the operations of the boat such that it can perform some missions, but not all missions safely (Table 5-1). *Appendix E* contains a listing of restrictive discrepancies.

A.2.a. Reporting Restrictive Discrepancies

Restrictive discrepancies shall be reported to the Operational Commander if the discrepancy cannot be repaired within one hour. The boat shall be immediately placed in a “Charlie” status and shall not get underway until the discrepancy is corrected, or a waiver has been received. If the discrepancy cannot be repaired within 48 hours, a CASREP shall be sent within 24 hours of the discrepancy. The Operational Commander is responsible for monitoring the progress of repairs to these discrepancies.



A.3. Major Discrepancies

Major discrepancies are those that degrade the effectiveness of the boat to perform one or more missions (Table 5-1). *Appendix F* contains a listing of major discrepancies. The occurrence of major discrepancies shall be documented. A plan to correct these discrepancies shall be formulated and carried out. The Operational Commander is responsible for monitoring the status of repairs to these discrepancies.

A.4. Minor Discrepancies

Minor discrepancies do not affect the operational readiness of the boat (Table 5-1). However, a boat with minor discrepancies does not meet the standardization criteria established for the boat. The occurrence and repair of minor discrepancies shall be documented and monitored at the unit level.

In the event that the addition of portable equipment, not part of the standard boat outfit, is necessary to meet mission needs, units are authorized to temporarily carry this extra equipment. This authorization is on a case-by-case basis only, and care must be taken to properly secure any extra gear and to ensure it does not interfere with safe egress or the boat's standard outfit/systems. Under no circumstances shall permanent alterations be made to power, stow or in any way accommodate extra equipment.



A.5. Responsibilities

The Coxswain is always responsible for the safe operation of the boat. The Coxswain must decide if the mission warrants subjecting the crew and boat to the danger defined by the mission, weather and sea conditions anticipated.

A.5.a. Disabling Casualty – Underway

In the event that the boat sustains a disabling casualty while underway, the boat shall immediately contact the base and return, if possible.

A.5.b. Restrictive Discrepancy – Underway

In the event the boat sustains a restrictive discrepancy while underway, the Coxswain should not normally proceed without authorization, unless aborting the mission would increase the level of risk. The situation and recommendations must be effectively communicated to the Operational Commander to allow for prudent risk assessment by all levels. The following is the procedure for communicating the discrepancy while underway:

Step	Procedure
1	The Coxswain shall immediately notify the Operational Commander with all pertinent information and a recommendation as to whether to continue or abort the mission.
2	The Operational Commander shall notify the Coxswain as to whether or not continuing the mission is authorized, and the conditions under which the boat may be operated.



Casualty/Discrepancy	Consequence	Required Action
<p><u>Disabling Casualty</u> “Boat is not serviceable.”</p>	<p>Not authorized to get underway. Notify the Operational Commander immediately.</p>	<p>Assign “Charlie” status to the boat, and commence repairs immediately. Submit CASREP if applicable.</p>
<p><u>Restrictive Discrepancy</u> “Boat and crew cannot perform <u>all</u> missions safely.”</p>	<p>Operations restricted. Notify Operational Commander if repairs cannot be made in one hour.</p>	<p>Create repair plan and set deadline for completion of repairs. Operational Commander shall monitor progress of repairs. Any operations before restrictive discrepancies are repaired require written waiver. Submit CASREP if applicable.</p>
<p><u>Major Discrepancy</u> “Boat and crew can perform all missions but <u>some</u> degradation in effectiveness or readiness should be expected.”</p>	<p>Operations unrestricted. Discrepancy occurrence and repair is documented.</p>	<p>Maintenance plan is carried out. Operational Commander shall monitor status of repairs to the discrepancies.</p>
<p><u>Minor Discrepancy</u> “Boat and crew readiness not affected nor impaired. Boat does not meet standards.”</p>	<p>Operations unrestricted. Discrepancy occurrence and repair is documented.</p>	<p>Maintenance plan is carried out. Operational Commander monitors completion of maintenance/repair.</p>

**Table 5-1
Discrepancies**

**A.6.
Environmental
Limits**

The following warnings apply to operation of the AB-S.

WARNING 

The following is a critical operational and environmental limitation:
 A thorough risk assessment shall be conducted prior to employing the AB-S in seas greater than specified in *Chapter 2, Section A* of this handbook.

WARNING 

Do not operate in ice, breaking seas or surf conditions.
 A thorough risk assessment shall be conducted prior to employing the AB-S in seas greater than specified in *Chapter 2, Section A* of this handbook.



Section B. Performance Data

B.1. Fuel Consumption

Fuel consumption and operating range is affected by engine tuning, weather conditions, trim, type of evolution and operating area. Figure 5-2 shows typical fuel consumption at full load condition.

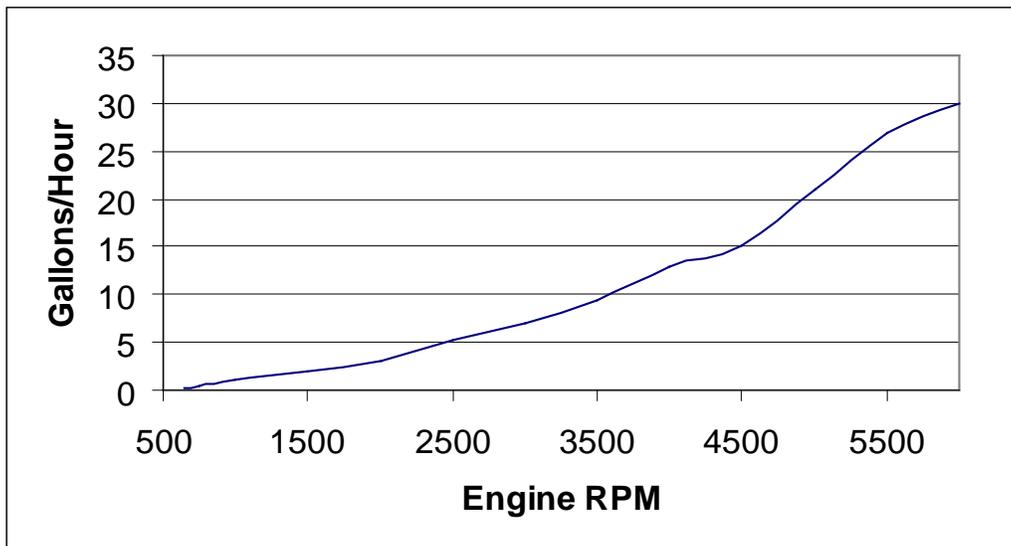


Figure 5-1
Fuel Consumption



B.2. Seakeeping

Positioning the vessel with respect to the wind, seas, and other craft, is essential to prevent damage to the hull or injuries to the crew.

WARNING 

The Coxswain is responsible for ensuring that all required personal safety equipment is worn, and worn correctly.

B.2.a. Operating in Beam Seas

Operating with the seas on the beam is more uncomfortable than dangerous when following basic small boat handling guidelines. Use the following techniques to minimize danger:

- (01) Tacking - With large seas on your beam, tack across the seas at a slight angle in a zigzag fashion. This prevents exposure of the beam to heavy swells.
- (02) Changing Course - To change course heading, allow the boat to lose headway, turn the wheel hard over, and apply power to come smartly to the new heading.

WARNING 

The position of the boat in relation to a breaking wave crest is critical. Severe wave slap will occur in the area approximately two boat lengths in either direction of the breaking water, however, this area presents less danger of capsize.

CAUTION !

When operating in beam seas, do not allow the boat to become “dead-in-the-water” (DIW) and be hit broadside by a wave.

B.2.b. Operating in Following Seas

Following seas present the greatest dangers to the AB-S. The boat does not have the balanced buoyancy or ability to lay-to in a following sea. The operational limitations are the controlling guideline and must be followed at all times.

CAUTION !

Do not power the boat over the crest of a wave and into the trough of the next wave or bury the bow into the back of the next wave.



B.3. Stability

By virtue of hull design and equipment placement, the AB-S displays positive buoyancy. Ensuring the bilge areas are always free of water and eliminating the free surface affect of liquids in the bilges are essential to maintaining stability of the AB-S.

CAUTION !

Do not use rapid accelerations from DIW to full speed except when necessary. This conserves fuel and helps prolong engine life.

B.4. Speed

The AB-S achieves a maximum speed of approximately 30 KTS.

NOTE *sw*

Maximum speed/power should be used only when operationally necessary. Under non-urgent conditions, proceed at cruise speed.



CHAPTER 6 Mission Performance

Introduction

The actions and techniques described in this Chapter are products of field experience. They are intended to give boat crewmembers information on how the AB-S performs and reacts in various mission scenarios. The information is not intended to provide the “only way” to perform an action or complete a mission. Boat crews should use effective communications and teamwork skills along with this general information to adapt their actions to each unique mission scenario.

Information in this section alone does not qualify a crewmember. Observe these procedures and apply skills developed through practice to effectively use the AB-S to perform missions.

In this Chapter

This Chapter contains the following Sections:

Section	Topic	See Page
A	Starting Procedures	6-2
B	Underway	6-5
C	Handling Characteristics	6-6
D	Operating with Helicopters	6-10
E	Anchoring	6-11
F	Towing	6-13
G	Securing Procedures	6-14



Section A. Starting Procedures

Introduction

A number of checks and procedures must be performed prior to, during, and after engine start.

CAUTION!

The AB-S should not be started until it is in the water or until water is provided to the water pump from another source. Serious damage to the engine will occur if no cooling water is provided.

A.1. Pre-Start

The following pre-start checks must be accomplished before the first mission of the day and prior to engine start:

Step	Action
1	Ensure bilge area is free of all liquids.
2	Turn battery switches to the ON position.
3	Ensure fuel tank is full, verify fuel level gauge as required.
4	Ensure the port and starboard cooling water intakes on the lower engine shaft housing are free of debris.
5	Check outboard engine cover gasket for damage. Check that outboards are secure to the transom and all mounting hardware is tight.
6	Trim engines down until lower unit is submerged (ensure full tilt/trim travel on each engine).
7	Ensure engine oil level is filled to 'FULL' mark.
8	Check hydraulic steering system for leaks at helm and at steering cylinder by outboards.
9	Squeeze fuel primer bulbs until firm.
10	Ensure the engine kill switch clip is installed and lanyard attached.
11	Install start keys and turn key to ON position. Ensure the engine alarm system is operating.



A.2. Engine Starting

The following procedures must be followed for starting the engines:

Step	Action
1	Ensure that the throttle levers are in the neutral position.
2	Ensure electronics, antennas, and speakers are secured.
NOTE 	Engines must be started before turning on the electronics to prevent faults from occurring in the electronics.
3	Ensure the engine kill switch clip is installed and lanyard attached. One spare clip and lanyard must be onboard and stowed at the console.
4	Turn the key to start position until engine starts.
5	Check outboards for nominal or adequate cooling water output at telltale discharge on each engine.
CAUTION!	If cooling water output is not evident, immediately secure engine and investigate.
6	Check crew and passengers for appropriate PPE including helmets (if required).



A.3. Energizing Equipment

The following steps must be completed prior to getting underway:

- (01) Close (turn ON) all of the remaining switches on the 12 VDC breaker panels,
 - (02) Energize and test all installed electronic components in the following order,
 - a) NAVnet 3D MFD8 multi-function display (MFD) unit (wait until it boots up,
 - b) MX512 Differential Global Positioning System (DGPS) system
 - c) RD-30 display unit,
 - d) All other electronics.
 - (03) Conduct a test of the hydraulic steering ensuring that motors respond appropriately,
 - (04) Test throttles operation in *forward* and *reverse*,
 - (05) Ensure gear is properly stowed.
-



Section B. Underway

Introduction

It is the responsibility of the Coxswain and crewmembers to ensure that once the boat is underway, the boat and its systems are operated in a safe and efficient manner. The safety of the crew and any embarked personnel is also incumbent on all crewmembers.

After getting underway, monitor all appropriate machinery gauges. If an abnormal condition develops, take corrective action to prevent further damage in accordance with Reference (c). Report any abnormal conditions to the Coxswain.

B.1. Personal Protective Gear

Always observe requirements of this Manual, Reference (g), and Reference (h) for wearing protective clothing, personal flotation device (PFD), seat belts, and boat crew signal kits.

WARNING



The use of the kill switch is required whenever the boat is started or has way on. The kill switch is located below the throttle (**Figure 3-14**). The activation clip (with red plastic cap) for the kill switch **MUST** be inserted into the switch body to start the engine. The 36 inch lanyard **MUST** be properly attached to the Coxswain at all times during boat operation. A second kill switch lanyard with activation clip **MUST** be carried onboard to enable remaining crewmembers to operate the boat in the event the Coxswain is ejected.

NOTE



When operating the boat with minimal crew, effective crew communications are critical. Speak loud enough to be heard over the background noise. Ensure the receiver hears and understands the message being passed. A common strategy is to have the receiver repeat back the message that was sent.

B.2. Communications

Crew communications and coordination is the key to safe operations. Crewmembers should inform the Coxswain of their location when moving about the deck. Engine noise can make crew communications difficult on AB-Ss. Speak loudly and clearly and repeat as necessary until acknowledged.



Section C. Handling Characteristics

Introduction

Boat handling is a complex skill that requires knowledge and practical, underway experience to build confidence and skill level. Always use forethought and finesse when handling the AB-S. Know the boat's handling features, monitor weather conditions and be aware of the operating limitations of the boat.

In this Section

This Section contains the following information:

Topic	See Page
Turning	6-7
Pivoting	6-7
Head Seas	6-8
Buoyancy in Head Seas	6-8
Beam Seas	6-8
Following Seas	6-9
Effects of Wind on Maneuverability	6-9
Station Keeping	6-9



C.1. Turning

Because the AB-S incorporates outboard engines that use propulsion thrust for directional control, the boat can make a much tighter turn than the same craft with a shaft, propeller and rudder.

When operating at high speed, it is critical that the engines be trimmed down (in) before making hard turns or maneuvers. Trimming the engines down (in) causes the bow of the boat to be pushed down by the thrust of the engines and is considered the safest position when accelerating, performing hard maneuvers, and heading into wind and waves.

Performing high-speed turns and maneuvers with the engines trimmed out (up) or level can result in hooking a chine, where the chine of the boat abruptly catches the water. The result can be violent in nature, the physical forces of which may cause personnel in the boat to be thrown in the direction of momentum.

WARNING



High-speed turns while “trimmed out” (up) or “trimmed level” can result in “hooking a chine”, causing a violent reaction which may create immediate loss of control of the boat and sufficient force to pitch crewmembers overboard.

CAUTION !

The AB-S is sensitive to changes to the Longitudinal Center of Gravity (LCG). These changes can occur by adding or subtracting weight, or through simple crew movements. These changes will change the way the boat handles in any given situation. The Coxswain must assess any LCG change and may have to make many trim adjustments during a mission.

Prior to making turns at higher speed, crew and passengers must be forewarned and given the opportunity to prepare themselves for the maneuver. The forces created as the boat turns at high speeds will result in injury and ejection if crews are not properly restrained.

C.2. Pivoting

The AB-S rotates in a transverse direction about a vertical axis at approximately the front of the console when engines are fully trimmed in. Because of this characteristic (which provides other benefits such as straight-line tracking and planing), Coxswains must be aware of the boat’s turning capabilities



C.3. Head Seas

Traveling into head seas does not present any problems to the AB-S if the boat is properly trimmed and being operated within its operational parameters.

**C.4. Buoyancy
in Head Seas**

The primary consideration when advancing in head seas is to maintain forward momentum and keep the bow into the swell. The buoyant construction of the boat allows it to ride up over oncoming seas.

When operating at or near the maximum sea limiting factor, the Coxswain must use both hands to operate the steering and throttle to keep the bow from burying into the seas. AB-S Coxswains shall avoid breaking seas.

Taking larger head seas slightly off of either bow can create a more comfortable ride, as the boat may proceed more gently off the back of the wave instead of slamming violently. The speed and angle of approach will have to be adjusted as needed for the optimum ride. This is sometimes referred to as quartering the seas, which is not to be confused with taking a following sea on the quarter.

C.5. Beam Seas

Whenever possible, the Coxswain should avoid steering a course parallel (broadside) to heavy swells. Tack across the swells at a 30° to 40° angle. If necessary, steer a zigzag course, making each leg as long as possible, and adjust the boat speed for a safe and comfortable ride. Seas directly off the beam of the boat can cause adverse rolling conditions.

When transiting parallel to the seas, the boat will tend to ride the contour of the wave surface. This means that the boat's vertical axis will remain perpendicular to the surface on which the boat is operated. A wave face of 20° will cause a 20° heel.



CAUTION !

Extreme caution should be exercised when operating in following swells (Refer to: *Section 5.B.2.b, Operating in Following Seas*).

C.6. Following Seas

Following swells up to 3 FT can be safely negotiated as long as the boat remains stable as it travels down the front of the swell. Powering over the crest of a wave can cause the bow to bury into the back of the next wave and cause extensive damage. In bad weather, AB-Ss are relatively safe running before the sea due to their speed. If caught in breaking seas, this advantage is used to ride the back of the waves while adjusting speed as required.

C.7. Effects of Wind on Maneuverability

In calm or negligible wind and seas, the AB-S responds well using standard twin-screw operating practices. In stiff winds, several design features combine to make handling this boat challenging. With the majority of weight and the deepest draft aft, the bow is very susceptible to the effects of the wind. Moderate winds may have an effect on maneuverability and can often be the predominant environmental factor in maneuvering situations. In some cases, it can be difficult to recover and turn the bow into the wind at slow speeds.

C.8. Station Keeping

The AB-S is capable of keeping station on an object or vessel utilizing the installed GPS system. However, the Coxswain must manage the effects of environmental forces to keep station. The Coxswain should be aware of:

- (01) Maintaining distance, position and aspect with respect to another vessel or object.
 - (02) Formulating a technique for matching craft drift rate with other vessel and then overcoming that vessel.
 - (03) Developing a safe escape route to get clear of a vessel or object.
 - (04) Utilizing techniques to safely pace the AB-S to another vessel and maneuver around it.
 - (05) The boat tends to work well with its stern to the wind. If stern-to station keeping is not an option, the operator must use extra care to counteract environmental factors.
-



Section D. Operating with Helicopters

Introduction

The AB-S was not designed to conduct helicopter hoisting operations and presents many safety obstacles. Therefore, conducting helicopter training on this platform is prohibited.

In the event of an extreme emergency requiring helicopter hoists from an AB-S, crewmembers shall rely on knowledge gained from qualification tasks associated with boat crewmember training and appropriate operational risk management (ORM).

In the event of an emergency requiring a helicopter hoist, the on-scene helicopter pilot shall provide appropriate instruction for a safe hoisting evolution.

NOTE

Crewmembers on boats less than 40 FT in length are only required to possess knowledge of helicopter operations for qualification purposes. Always refer to Reference (e) for current qualification requirements.



Section E. Anchoring

Introduction

The AB-S does not often drop anchor. However, the boat is fitted with an anchoring system designed for use when the boat must stand by a location or in an emergency.

WARNING

If the anchor line fairlead is from any point other than the bow, there is the potential for a tripping hazard and possible capsizing. Never anchor from the stern.

WARNING

Standing on top of the anchor locker while working the anchor bitt, may cause a person to fall overboard. Personnel should stand on the well deck when working the anchor bitt.

NOTE

Anchoring procedures are described in Reference (h).

E.1. Anchoring the Boat

The anchor locker at the bow contains a 6 lb Fortress anchor, 6 FT of chain and 150 FT of anchor rode.

Take the following steps to safely anchor the boat:

Step	Procedure
1	Open the anchor locker hatch and remove the anchor stowage bag. Close the anchor locker hatch.
2	Remove the anchor and rode from the stowage bag. Ensure that the anchor and rode are ready to drop without tangles.
3	As directed by the Coxswain, the anchor should be dropped over the bow well clear of the boat.
4	Once the anchor is tending “up and down”, the Coxswain should back down until the desired amount of scope is attained. Secure the anchor line to the forward bitt. The Coxswain can now back down to set the anchor.



E.2. Weigh Anchor

Take the following steps to safely weigh anchor:

Step	Procedure
1	Position one crewmember at the forward bitt. As the Coxswain moves the boat slowly forward, the crewmember takes up the slack in the line.
2	Once the anchor is at “short stay”, the anchor line should be secured at the forward bitt.
3	Crewmembers can then attempt to manually break the anchor free from the bottom. If unable to do so, the Coxswain should move the boat slowly forward until the anchor breaks free.
4	Once free, crewmembers can pull the remaining anchor line and the anchor onboard.
5	When the anchor is onboard, the Coxswain should take up a stable course so that the crewmembers can safely stow the anchor and ground tackle.



Section F. Towing

Introduction

Towing a vessel requires a high degree of awareness of all potential hazards, as well as full knowledge of the capabilities and limitations of the particular components within the towing operation. The safety of your crew and the crew of the towed vessel is more important than property.

WARNING

Due to their limited size and hull design, AB-Ss are more susceptible to tripping. A boat is said to be tripping when it is towed sideways by an opposing force on its own towline. There is imminent danger that a boat will capsize when in a tripping situation. If your boat is caught in a tripping situation, the Coxswain must attempt to maneuver to position the stern back under the towline; or sever the towline at the cleat.

NOTE

Towing procedures are described in Reference (h).

F.1. Angular Momentum

Overcoming angular momentum can be far more hazardous on smaller non-displacement hulls such as the AB-S. When changing the direction of the tow, the towed vessel will develop angular momentum; the vessel's heading begins to change and it wants to keep changing in that same direction. Attempts to correct angular momentum can create a tripping hazard. Coxswains need to anticipate how the momentum will affect the towed vessel's motion and apply an offsetting force early and gradually.

F.2. Alongside Towing

Sea state, location of installed rub rails and the flare of the other vessel's hull increases the likelihood of damage if the two vessels roll towards each other. A thorough risk assessment, including asset selection, is essential to reduce the potential of personnel injury and property damage.

F.3. Approaches

The prevailing winds and seas can greatly affect the ability to safely approach and take another vessel in tow. Moderate winds may have an effect on maneuverability and can often be the predominant environmental factor in maneuvering situations. In some cases, it can be difficult to recover and turn the bow into the wind at slow speeds.



Section G. Securing Procedures

Introduction

Once a mission is complete, it is essential that boat equipment be correctly secured to enhance subsequent equipment performance and equipment longevity. Take the following steps, in the given order, to secure the boat properly and to prepare it for the next mission:

Step	Procedure
1	Secure all non-essential electrical and electronic gear.
2	Ensure all equipment necessary to moor the boat is available on deck.
3	Idle and stop engines.
4	Secure all non-essential breakers and switches on the 12 VDC power panel.
5	Raise the engines out of the water when the boat is moored for prolonged periods of time.
6	Turn the battery switches OFF.
7	Secure all pyrotechnics as directed by U.S. Coast Guard instruction or station operating requirements.
8	Check and refill all machinery fluid levels.
9	Refuel the boat.
CAUTION !	Keeping the boat clean and neat is very important to control corrosion. Having aluminum in contact with dissimilar metal, particularly a copper alloy, can cause major corrosion problems. Something as small as a penny left in the bilge can cause serious damage. Maintaining corrosion control is the responsibility of everyone in the crew.
NOTE <i>↪</i>	The mission is not complete until the boat is ready for the next mission.



CHAPTER 7 Emergency Procedures

Introduction

Responding to equipment casualties and emergencies aboard the AB-S should be second nature to all members of the crew. The ability of crewmembers to take immediate action to control emergency situations is critical to prevent a bad situation from getting worse. While every event is different, step-by-step procedures help gain control of the casualty and aid in troubleshooting. Each crewmember should mentally rehearse the procedures each member of the crew would follow during any operational casualty. Teamwork is the common thread that allows the crew to succeed.

The first step in responding to all casualties is to protect the immediate safety of all crewmembers and to communicate the nature of the casualty to the crewmembers. It is the Coxswain's responsibility to keep the Operational Commander informed of all emergencies encountered during the operation of the boat.

The Coxswain and crew should work together to determine if equipment casualties can be safely repaired while underway. The Coxswain must decide whether a casualty has impacted the ability of the boat and crew to complete the mission. The Coxswain should not make the decision in a vacuum; input from other crewmembers and the Operational Commander should be used to determine whether to continue with the mission. The following factors should be considered:

	Factors
1	The safety and physical condition of the crew and boat.
2	Equipment limitations due to the casualty.
3	Current and forecasted weather and sea conditions.
4	The urgency of the mission.



In this Chapter This Chapter contains the following Sections:

Section	Topic	See Page
A	Capsizing	7-3
B	Collision With Submerged Object (or Bottom)	7-4
C	Steering Casualty (Hydraulic)	7-5
D	Steering Casualty (Electrical)	7-6
E	Running Gear Failure	7-7
F	Engine Fire	7-8
G	Fire in the Auxiliary Machinery Compartment	7-9
H	Loss of Control of Engine RPM	7-10
I	Loss of Fuel Oil Pressure	7-11
J	Loss of Lube Oil Pressure	7-12
K	Engine High Water Temperature	7-13
L	Low Voltage Alarm/Loss of Electrical Charging System	7-14
M	Flooding	7-15
N	Hard Grounding	7-16
O	Damage to Foam Collar	7-18
P	Loss of Power to Communications/ Navigation Equipment	7-19
Q	Generator Emergency Procedures	7-20



Section A. Capsizing

A.1. Symptom(s)

The AB-S is a fast, highly maneuverable platform, capable of performing a variety of missions. With proper boat handling and by avoiding operating in surf and extreme seas, it is unlikely the boat would capsize.

A.2. Actions

If the boat is bottom side up, take the following actions:

Step	Action
1	Ensure PFD is secure.
2	Inflate PFD, if required.
WARNING 	Depending on the situation it may require crewmembers to get clear of the boat prior to inflating their PFD.
3	Swim clear of the boat.
4	Activate Personal Locator Beacon (PLB).
5	If nighttime, activate strobe/Personnel Marker Light (PML).
6	Account for all crewmembers.
7	Stay as close to the boat as possible. If possible, climb back atop the capsized hull to aid in search and rescue efforts.
NOTE 	After capsize, if possible climb atop the hull. The boat is inherently buoyant even after capsize. Boat is designed to remain afloat with crewmembers on it in capsize position.



Section B. Collision With Submerged Object (or Bottom)

B.1. Symptom(s)

The boat strikes a submerged object or temporarily runs aground.

B.2. Actions

Take the following actions:

Step	Action
1	Reduce engine RPM on both engines, and place engines in neutral.
2	Notify crew of casualty.
3	Determine what was hit, where the object is located, and if it can still be seen.
4	Verify current position, depth of water, evaluate situation and notify the Operational Commander.
5	Crewmember checks bilges for flooding or obvious damage.
6	Crewmember rigs the anchor, if directed by Coxswain.
7	Crewmember checks outboards for obvious damage.
8	Crewmember checks for proper cooling water circulation at each of the outboard cooling water flow indicators.
9	Coxswain conducts steering checks for damage or limitations.
10	Coxswain will check engine RPM in both neutral and engaged at various speeds while crewmember is checking for vibration/flooding and to assess damage to propulsion system.
11	Return to unit at reduced speed and/or single engine, if warranted, to prevent additional damage or vibration.
12	Coxswain coordinates with the Operational Commander for tow or other assistance when risk assessment indicates crew or boat safety will be jeopardized through continued operation.
<p>NOTE </p>	<p>The boat should be trailered to determine extent of damage; especially if there is a vibration.</p>



Section C. Steering Casualty (Hydraulic)

C.1. Symptom(s)

The helm turns in either direction with sluggish or no response of the outboards.

C.2. Actions

When a partial or complete loss of steering control occurs, take the following actions.

Step	Action
1	Reduce engine RPM on both engines, and place engines in neutral.
2	Notify crew of casualty.
3	Verify current position, evaluate situation and notify Operational Commander.
4	Check for steering fluid leaks at the outboard steering cylinder, in the engine well and the bilge, and the front and back sides of the helm pump.
5	Crewmember rigs the anchor, if directed by Coxswain.
6	Coxswain coordinates with unit for tow or other assistance when risk assessment indicates crew or boat safety will be jeopardized through continued operations.



Section D. Steering Casualty (Electrical)

Not applicable on this platform.



Section E. Running Gear Failure

E.1. Symptom(s) Engine RPM increases but does not correspond to an increase in the hull's speed.

E.2. Actions When the outboard engine gear fails, take the following action:

Step	Action
1	Reduce engine RPM on both engines, and place engines in neutral.
2	Notify crew of casualty.
3	Verify current position, evaluate situation and notify Operational Commander.
4	Crewmembers should check the sea aft of the transom for any visible oil sheen.
5	Trim up engines and check lower units and props.
6	Coxswain attempts to put engine in gear while crewmember listens for grinding or vibrations.
7	Coxswain reports status of casualty to the Operational Commander.
8	Return to unit at reduced speed and/or single engine, if warranted, to prevent additional damage or vibration.
9	Coxswain coordinates with unit for tow or other assistance when risk assessment indicates crew or boat safety will be jeopardized through continued operations.



Section F. Engine Fire

F.1. Symptom(s)

Smoke is sensed by sight or smell coming from the outboard engine.

F.2. Actions

When presence of fire is confirmed, take the following actions.

Step	Action
1	Reduce engine RPM on both engines, and place engines in neutral.
2	Notify crew of casualty.
3	Verify current position, evaluate situation and notify Operational Commander.
4	Coxswain secures engines, verify position.
5	Stop fuel to both engines using the fuel cutoff valves at the fuel filters in the splashwell.
6	Combat fire using portable fire extinguisher.
7	Crewmember secures all non essential electrical power breakers (all except VHF-FM radio) with Coxswain concurrence.
8	Crewmember rigs the anchor, if directed by Coxswain.
9	Establish fire watch, with portable fire extinguisher.
10	Coxswain coordinates with Operational Commander for tow or other assistance, emphasizing crew safety.



Section G. Fire in the Auxiliary Machinery Compartment

Not applicable on this platform.



Section H. Loss of Control of Engine RPM

H.1. Symptom(s)

Engine fails to respond properly to throttle control.

H.2. Actions

Identify the cause, prevent further damage, and take the following actions:

Step	Action
1	Reduce engine RPM on both engines, and place engines in neutral.
2	Notify crew of casualty.
3	If engine RPM can not be reduced, secure engine while in gear by pulling the engine kill switch.
4	Verify current position, evaluate situation and notify Operational Commander.
5	Check throttle and shift control cable runs.
6	Check throttle cables and arm on engine.
7	If engine fails to secure, stop fuel to both engines using fuel cutoff valves.
8	Crewmember rigs the anchor, if directed by Coxswain.
9	Return to unit at reduced speed and/or single engine, if warranted, to prevent additional damage or vibration.
10	Coxswain coordinates with unit for tow or other assistance when risk assessment indicates crew or boat safety will be jeopardized through continued operations.



Section I. Loss of Fuel Oil Pressure

I.1. Symptom(s) The AB-S experiences erratic or unstable RPM or engine stops completely.

I.2. Actions Take the following actions:

Step	Action
1	Reduce engine RPM on both engines, and place engines in neutral.
2	Notify crew of casualty.
3	Verify current position, evaluate situation and notify Operational Commander.
4	Crewmember rigs the anchor, if directed by Coxswain.
5	Check fuel tank level.
6	Crewmember checks bilge for fuel.
7	Check all fuel cutoff valves to ensure that they are open.
8	Secure engines.
9	Check the primary fuel filters for accumulated sediment and water in the bowls. Drain water or sediment, if required.
10	Check engine mounted fuel filter and water separator for signs of contamination.
11	Check the entire fuel system for obvious leaks.
12	Return to unit at reduced speed and/or single engine, if warranted, to prevent additional damage or vibration.
13	Coxswain coordinates with unit for tow or other assistance when risk assessment indicates crew or boat safety will be jeopardized through continued operations.



Section J. Loss of Lube Oil Pressure

J.1. Symptom(s) The alarm sounds and the green lube oil pressure light turns OFF on the ignition control panel.

J.2. Actions Take the following actions:

Step	Action
1	Reduce engine RPM on both engines, and place engines in neutral.
NOTE <i>↪</i>	If oil pressure becomes low, the engine speed will gradually decrease automatically. Engine RPM will not increase above idle until oil pressure returns to normal.
NOTE <i>↪</i>	The lube oil alarm is variable, which means that at any given engine RPM, the oil pressure must be within a certain range or the alarm will sound. The lube oil alarm may be directly related to engine temperature; an overheating engine may set the lube oil alarm off.
2	Coxswain immediately secures the affected engine.
3	Notify crew of casualty.
4	Verify current position, evaluate situation and notify Operational Commander.
5	Crewmember rigs the anchor, if directed by Coxswain.
6	Crewmember should check the sea aft of the transom for any visible oil sheen.
7	Allow oil to drain to sump for several minutes, then crewmember check the engine lube oil level.
8	If the cause is not correctable, do not restart the engine.
9	Return to unit at reduced speed on a single engine, if warranted, to prevent additional damage.
10	Coxswain coordinates with unit for tow or other assistance when risk assessment indicates crew or boat safety will be jeopardized through continued operations.



Section K. Engine High Water Temperature

K.1. Symptom(s)

The alarm sounds and the red engine high temperature light illuminates on the ignition control panel.

NOTE *↪*

If the engine overheat alarm sounds, the engine speed will automatically be reduced and the engine will stop after 20 seconds.

K.2. Actions

Take the following actions:

Step	Action
1	Reduce engine RPM on both engines, and place engines in neutral.
2	Notify crew of casualty.
3	Determine which engine overheated and check for cooling water flow at the cooling water flow indicator.
4	Secure the engine that has overheated.
5	Verify current position, evaluate situation and notify Operational Commander.
6	Crewmember rigs the anchor, if directed by Coxswain.
7	Check engine cover with the back of the hand to ascertain any abnormal temperature.
8	Check around engine cover for evidence of steam.
9	Tilt engine up and check cooling water intake screen for obstructions.
10	Return to unit at reduced speed on a single engine, if warranted, to prevent additional damage.
11	Coxswain coordinates with unit for tow or other assistance when risk assessment indicates crew or boat safety will be jeopardized through continued operations.

**Section L. Low Voltage Alarm/Loss of Electrical Charging System**

L.1. Symptom(s) A low voltage reading on the voltmeter and/or the alarm sounds and the red abnormality in charging system light illuminates on the ignition control panel.

L.2. Actions Take the following actions:

Step	Action
1	Reduce engine RPM on both engines, and place engines in neutral.
2	Notify crew of casualty.
3	Verify current position, evaluate situation and notify Operational Commander.
4	Secure effected engine, prior to checking alternator belt.
5	Check condition of alternator belts for damage, slippage and proper tension.
6	Check electrical connections at the alternator.
7	Check electrical connections at all battery connections.
8	Secure all non-vital equipment at the 12 VDC breaker panels.
9	Establish secondary communications with station (handheld portable VHF-FM radio) in case primary power is lost.
10	Coxswain coordinates with unit for tow or other assistance when risk assessment indicates crew or boat safety will be jeopardized through continued operations.



Section M. Flooding

M.1. Symptom(s) Bilge pump(s) automatically activate and/or degraded boat handling from added weight.

M.2. Actions Take the following actions:

Step	Action
1	Notify crew of casualty.
2	Verify current position, evaluate situation and notify Operational Commander.
3	Crewmembers should attempt to find the cause and take corrective actions necessary to control or stop the flooding.
4	Crewmember rigs the anchor, if directed by Coxswain.
5	Activate bilge pump as required.
6	After damage has been assessed, determine whether it is safe to proceed with the mission or return to the unit.



Section N. Hard Grounding

N.1. Symptom(s)

The AB-S hits bottom and becomes hard aground (unable to initially float free).

N.2. Actions

Assess the resulting damages; take the following actions:

Step	Action
1	Reduce engine RPM on both engines, and place engines in neutral.
2	Notify crew of casualty and assess condition of crew.
3	Verify current position, evaluate situation and notify Operational Commander.
4	Crewmember inspects bilge for obvious flooding or damage.
5	Crewmember checks for proper engine cooling water circulation. Secure engine if cooling is inadequate.
6	Crewmember rigs the anchor, if directed by Coxswain.
7	Crewmember takes depth sounding all around the boat. Coxswain determines deepest water, extent of grounding, and potential for underwater damage.
8	Consider present and future state of tide, current or other weather conditions with regard to re-floating or salvage operations.
9	Coxswain determines safest direction to deep water and method for extracting boat safely with least damage.
10	Conduct checks of propulsion system integrity prior to attempting re-floating or salvage. Take caution to reduce further damage.
11	Conduct check of steering system integrity. Check for limitations. Take caution to reduce further damage.
12	Coxswain maneuvers into safe water and conducts steering check. Identify limitations and isolate areas of damage.



Step	Action
13	Coxswain will check engine RPM in both neutral and engaged at various speeds.
14	Return to unit or appropriate haul-out facility at reduced speed to prevent additional damage, if necessary.
15	Coxswain coordinates with unit for tow or other assistance when risk assessment indicates crew or boat safety will be jeopardized through continued operations.



Section O. Damage to Foam Collar

Not applicable on this platform.



Section P. Loss of Power to Communications/ Navigation Equipment

P.1. Symptom(s)

VHF-FM, AIS, NAVnet, or GPS system(s) fail to operate properly.

P.2. Actions

If there is no power to operate the communications/navigation equipment, take the following actions:

Step	Action
1	Notify crew of casualty.
2	Verify current position, evaluate situation and notify Operational Commander using a handheld portable VHF-FM radio.
3	Coxswain directs crewmembers to investigate for cause of casualty.
4	Crewmembers check the engines and verify the condition of the alternator belts and that the electrical connections to the alternator are secure.
5	Check battery voltages using engine gauges.
6	Crewmembers ensure that all SINS switches are on and that no circuit breakers are tripped or fuses are blown.
7	Crewmembers report all findings to Coxswain.
8	Secures all non-vital equipment at the 12 VDC breaker panels.
9	Coxswain coordinates with unit for tow or other assistance when risk assessment indicates crew or boat safety will be jeopardized through continued operations.



Section Q. Generator Emergency Procedures

Not applicable on this platform.



APPENDIX A Outfit List and Stowage Plan

Introduction

This appendix is the standard stowage plan for the AB-S outfit. No deviation from this list is authorized, except in the event that the addition of portable equipment, not part of the standard boat outfit, is necessary to meet mission needs, units are authorized to temporarily carry this extra equipment.

NOTE

This authorization is on a case-by-case basis only, and care must be taken to properly secure any extra gear and to ensure it does not interfere with safe egress or the boat’s standard outfit/systems. Under no circumstances shall permanent alterations be made to power, stow or in any way accommodate extra equipment.

In this Appendix

This appendix contains the outfit list and stowage plan for the AB-S.



Item	Quantity
Anchor Locker	
Fortress 6 lbs Anchor (stowed in bag with chain & rode)	1 each
³ / ₈ inch 316 SS Anchor Shackle w/Captive Pin	1 each
³ / ₈ inch x 9 FT Galvanized Anchor Chain	1 each
³ / ₄ inch Plastic Anchor Line Thimble (spliced in eye)	1 each
Anchor Line, 2 ¹ / ₄ inch Circumference, Three Strand x 150 FT	1 each
Mooring Lines, 2 inch Circumference DBN x 30 FT	2 each
Fenders, Cylindrical 5 ¹ / ₂ inch Diameter 15 inch Length	2 each
Item	Quantity
Main Deck	
Fire Extinguisher Type 1-A, 5-B:C (mounted in recesses on the port and starboard sides of the console)	2 each
Kill Switch Lanyard (spare stowed on rubber handgrab on console)	2 each
Boat Hook, Telescoping, 8 FT (mounted below port gunwale in clips)	1 each
20 inch Throwable Life Ring (port side of antenna arch in bracket)	1 each
Life Ring Strobe Light (attached to life ring)	1 each
Boat Paddles (stowed in clips below P&S gunwales)	2 each
National Ensign (on removable flag mast)	1 each
CG Ensign (on removable flag mast)	1 each
Throw Bag	1 each
Snap Hook (attached to throw bag)	1 each



Item	Quantity																		
Upper Forward Console Lockers																			
Spot Light	1 each																		
Flashlight (w/D size batteries)	2 each																		
Portable Signal Air Horn, Push Button, w/5.5 ounce Propellant	1 each																		
Spot Light Stowage Mount	1 each																		
First Aid Kit	1 each																		
Binoculars, 7 x 50 Marine Waterproof	1 each																		
Bag with 4 Ratchet Straps, Small Wrenches, 2 Phillips Head and 2 Flat Head Screwdrivers, 2 Pair of Pliers	1 each																		
Navigation Kit	1 each																		
Lower Forward Console Lockers																			
12 VDC Batteries	2 each																		
<table border="1"> <thead> <tr> <th data-bbox="175 1020 1222 1075">Item</th> <th data-bbox="1222 1020 1448 1075">Quantity</th> </tr> </thead> <tbody> <tr> <td colspan="2" data-bbox="175 1075 1448 1129">Life Vest Stowage Locker</td> </tr> <tr> <td data-bbox="175 1129 1222 1184">Chain Hooks</td> <td data-bbox="1222 1129 1448 1184">2 each</td> </tr> <tr> <td data-bbox="175 1184 1222 1239">Bucket</td> <td data-bbox="1222 1184 1448 1239">1 each</td> </tr> <tr> <td data-bbox="175 1239 1222 1293">Lightning Arrestor</td> <td data-bbox="1222 1239 1448 1293">1 each</td> </tr> <tr> <td data-bbox="175 1293 1222 1348">Lifejackets</td> <td data-bbox="1222 1293 1448 1348">1 each</td> </tr> <tr> <td data-bbox="175 1348 1222 1402">Mooring Lines, 2 inch Circumference DBN x 30 FT</td> <td data-bbox="1222 1348 1448 1402">2 each</td> </tr> <tr> <td data-bbox="175 1402 1222 1457">Fenders, Cylindrical 5¹/₂ inch Diameter 15 inch Length</td> <td data-bbox="1222 1402 1448 1457">2 each</td> </tr> <tr> <td data-bbox="175 1457 1222 1512">Tool Kit</td> <td data-bbox="1222 1457 1448 1512">1 each</td> </tr> </tbody> </table>		Item	Quantity	Life Vest Stowage Locker		Chain Hooks	2 each	Bucket	1 each	Lightning Arrestor	1 each	Lifejackets	1 each	Mooring Lines, 2 inch Circumference DBN x 30 FT	2 each	Fenders, Cylindrical 5 ¹ / ₂ inch Diameter 15 inch Length	2 each	Tool Kit	1 each
Item	Quantity																		
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Fenders, Cylindrical 5 ¹ / ₂ inch Diameter 15 inch Length	2 each																		
Tool Kit	1 each																		



Item	Quantity
Nav Kit Containing: (Required Inland and Near Coastal only.)	1 kit
Briefcase w/CG Logo	1 each
Charts (as required per AOR)	various
Pencils	5 each
Pencil Sharpener	1 each
Stop Watch	1 each
Search Pattern Wheel	1 each
Parallel Plotter	1 each
Dividers	2 each
Slide Rule, Nautical	2 each
Anemometer, Hand Held	1 each
Penlight w/Red Lens	1 each
Tide Book (pages as required)	various
Coast Pilot (pages as required)	various
NAVRULS	1 each
Light List (pages as required)	various



APPENDIX B Time Compliance Technical Orders (TCTOs)

Introduction This appendix contains a list of authorized TCTOs for the AB-S.

NOTE *↪*

For a complete breakdown of the Engineering Change Number, see Chapter 41 of Reference (a).

In this Appendix This appendix contains the TCTOs for the AB-S.

Topic	See Page
Time Compliance Technical Orders (TCTOs))	B-2



APPENDIX C Materiel Inspection Checklist

Introduction This appendix is meant to be a systematic means to inspect **any** AB-S and ensure the entire boat is prepared to meet mission demands. This enclosure should be used in conjunction with Appendix A and B.

This checklist may be locally reproduced.

In this Appendix This appendix contains the following information:

No.	Area	See Page
N/A	Materiel Inspection Checklist	C-2
I	Hull	C-3
II	Deck	C-4
III	Bilge	C-6
IV	Systems	C-7
V	Outboard Engines and Steering Actuator	C-8
VI	Console	C-10



Materiel Inspection Checklist

Boat Number: _____

Station: _____

Date: _____

- References:**
- (01) *Aids to Navigation (AtoN) Boat- Small (AB-S) Operator’s Handbook*, COMDTINST M16114.49 (series)
 - (02) *Naval Engineering Manual*, COMDTINST M9000.6 (series)
 - (03) *Coatings and Color Manual*, COMDTINST M10360.3 (series)
 - (04) *Coast Guard Rescue and Survival Systems Manual*, COMDTINST M10470.10 (series)

Inspection Standards: The following inspection standards apply to the AB-S hull, machinery, equipment, outfit, and all installed systems and accessories:

- (01) Operates smoothly and correctly.
- (02) Free of grease, oil, rust, and corrosion.
- (03) All fluid levels and pressure readings are within tolerances.
- (04) Protective coatings applied correctly and neatly.
- (05) Free of rips, tears, abrasions, and cracks.
- (06) Outfit and equipment correctly installed, adjusted and stowed to specifications and design (see Appendix A).
- (07) Labels, test dates, and placards properly indicated.
- (08) Free of non-standard/unapproved installations or equipment.
- (09) Maintained according to current manufacturer’s guidelines and Commandant Directives.

Inspection Guidelines: Inspections require a minimum of *two* personnel, preferably one Boatswain’s Mate and one Machinery Technician, who possess extensive AB-S experience and a strong working knowledge of the contents of all references listed above. This Materiel Inspection Checklist is only applicable to boats in a “Bravo” or “Ready for Sea” condition. Each item on the checklist should be judged against applicable standards and references. Additional discrepancies, uninstalled TCTOs, etc. should be listed.

Inspected By: _____ **Date:** _____

Inspected By: _____ **Date:** _____



I. Hull

ITEM	SAT	UNSAT	REMARKS
Hull (visible surfaces)			
Rubber Rub Rails			
Lettering/Numbering/Decals			
Waterline			
Bow Eye			
Anode			
Depth Sounder Transducer			
Self-Bailing One-Way Scuppers			

REMARKS: _____



II. Deck

ITEM	SAT	UNSAT	REMARKS
Deck Plates (Hardware and Sealant)			
Deck Covering (Non-Skid)			
Console and Canopy			
Deck Access Covers			
Engine Well Platform			
Forward Bitt			
Cleats			
Lifting Eyes			
Anchor Locker			
Console Forward Lockers			
Console Electric Access Lockers			
Life vest Lockers			
Bilge Hatch			
Radio & Navigation Antennas			
Service Ladder			
Horn			
GPS Antennas			
Side Navigation Light (Red/Green)			
Anchor Light			



ITEM	SAT	UNSAT	REMARKS
Spot Light			
Windshield			

REMARKS: _____



III. Bilge

ITEM	SAT	UNSAT	REMARKS
Electric Bilge Pump and Float Switch			
Hull Drain Plug			

REMARKS: _____



IV. Systems

ITEM	SAT	UNSAT	REMARKS
Crew Seats			
Battery Switches			
Batteries and Battery Locker			
Battery Switch 12 VDC Breaker			
12 VDC Bus Bars & Terminal Lugs			
Anchor & Line			
Primer Bulbs (Fuel hose – Inline)			
Fuel Tank Level Sensor			
Fuel Filters (Sierra)			
Fuel Fill/Vent			
Fuel Fill and Vent Lines			
Fuel Cutoff Valves			
Portable Fire Extinguishers			

REMARKS: _____



V. Outboard Engines and Steering Actuator

ITEM	SAT	UNSAT	REMARKS
Engine			
Engine Cover			
Oil Dipstick			
Oil Fill Cap			
Propeller			
Engine Attachment Points			
Cooling Water Flow Indicator			
Cooling Water Intakes			
Anodes			
Starter			
Alternator			
Belts			
Hoses			
Water Separator Bowl			
Wiring			
Control Cables and Linkage			
Steering			
Helm Pump			
Steering Cylinder			
Attaching Hardware			



ITEM	SAT	UNSAT	REMARKS
Tie Rod			
Hydraulic Lines and Fittings			

REMARKS: _____



VI. Console

ITEM	SAT	UNSAT	REMARKS
Ignition Panels (Start Keys, Engine Kill Switch Clips, and Lanyards)			
Communications/Navigation Equipment			
VHF Radios			
Depth Sounder			
Microphones			
Engine Throttle Control			
Steering Wheel			
Power Panels and Switches			
Engine Gauges and Warning Lights			

REMARKS: _____



APPENDIX D Disabling Casualties

Introduction

This appendix contains disabling casualties for the AB-S. Refer to *Chapter 5, Section A* of this Handbook for steps to follow if any of these casualties occur.

In this Appendix

The disabling casualties list covers the following subject areas:

Topic	See Page
Engine Parameters	D-2
Engineering System Components	D-2
Boat Outfit	D-3
Electronics/Navigation	D-3
General Materiel	D-3
Trailer	D-3



Engine Parameters

-
- (01) Engine Lube Oil Pressure. Green Engine Oil Pressure Light extinguishes on ignition panel, engine RPM is automatically limited to 1800 RPM.
 - (02) Engine Cooling Water. Red overheating indicator illuminates on the ignition panel, engine speed is automatically reduced to 1800 RPM. If condition continues for another 20 seconds, the engine automatically shuts down.
 - (03) Fuel filter separator alarm activated.
-

Engineering System Components

- (01) Engine fails to start.
 - (02) Uncontrollable overheating.
 - (03) Inoperable visual or audible alarms.
 - (04) Metallic/non-metallic noise: metal-on-metal/fuel-knock/bearing/clicking.
 - (05) Excessive engine vibration.
 - (06) Any gasoline fuel system leak.
 - (07) Engine oil level empty (no oil on the dipstick).
 - (08) Any engine wiring insulation damaged or chafed resulting in an exposed conductor.
 - (09) Engine surging (over 50 RPM).
 - (10) Engine over speed (over 6000 RPM).
 - (11) Loss of engine control.
 - (12) Continuous electrical breaker trip.
 - (13) Continuous failure of outboard engine fuses.
 - (14) Steering system inoperative.
 - (15) Engine mount hardware loose or missing.
 - (16) Loose/missing propeller coupling nut.
 - (17) Loose/disconnected engine control hardware.
 - (18) Loose/Disconnected steering actuator hardware.
 - (19) Electrical arcing and sparking.
 - (20) Odor of insulation overheating.
-



Boat Outfit

- (01) Missing engine kill switch activation clip and lanyard.
- (02) Missing spare engine kill switch lanyard.
- (03) Portable fire extinguisher missing or unserviceable.

**Electronics/
Navigation**

- (01) No electronic means of signaling distress (i.e., no radio).
- (02) 12 VDC system will not energize.

**General
Materiel**

Hull/transom plate breach below the waterline.

Trailer

Truck and complete hitch system (hitch, ball mount, and ball) not rated at 6,000 lbs or greater "Weight Carrying Only", rating must be marked by manufacturer's sticker or stamp.





APPENDIX E Restrictive Discrepancies

Introduction This appendix contains restrictive discrepancies for the AB-S. Refer to *Chapter 5* of this Handbook for steps to follow if any of these casualties occur.

Engine and Boat Systems

- (01) Engine performance:
 - a) Minimum RPM of 4500 for two minutes.
 - b) Overheating indicator illuminates, alarm sounds.
 - (02) Any leaks
 - a) Outboard cooling water components.
 - b) Outboard engine lubrication system components.
 - c) Steering actuator help pump, hoses or fittings.
 - (03) Inoperable tilt/trim system.
 - (04) Inoperable fuel gauge.
 - (05) Installed bilge pump missing/inoperative
-

Boat Outfit

Missing anchor/line/shackles.

Electronics/Navigation

- (01) Navigation lights inoperative or displaying improper characteristics.
 - (02) Depth sounder inoperative.
 - (03) GPS inoperative.
 - (04) Electronics: VHF-FM transceiver inoperative.
 - (05) Horn inoperative.
-

General Material and Safety

- (01) Holes/cracks in the hull/transom plate above the waterline.
 - (02) Portable fire extinguishers not secured in bracket.
 - (03) Missing non-skid section (8½ x 11”).
 - (04) Missing boat crew survival vest.
-



Trailer

- (01) Damage or deformation of the wheel rim flange which results in exposure of the tire bead (sealing surface) and/or damage or deformation which warps the circular shape of the rim.
 - (02) Brake rotor damage.
 - (03) Tire air pressure below 40 PSI.
 - (04) Tire tread depth less than $\frac{1}{8}$ inch.
 - (05) Brake/tail light extinguished or one or more LEDs extinguished in the light.
 - (06) Missing/loose lug nut(s).
 - (07) Missing or flat, improper size, damaged or worn tire(s).
 - (08) Trailer running lights inoperative or wrong characteristic.
 - (09) Any brake fluid leak from the brake system.
 - (10) Brake actuator or back up solenoid inoperative or no fluid.
 - (11) Wheel bearings or brakes have excessive noise or play.
 - (12) Structural cracks.
 - (13) Missing safety wire cables or brake emergency chain.
 - (14) Emergency brake latch fails to operate.
 - (15) Missing tie down straps (2 required/not including winch strap).
-



APPENDIX F Major Discrepancies

Introduction

This appendix contains major discrepancies for the AB-S. Refer to *Chapter 5* of this Handbook for steps to follow if any of these casualties occur.

Engine and Boat Systems

- (01) Bilge pump hoses missing hose clamps.
 - (02) Loose/missing fittings, nuts, bolts, brackets, etc.
 - (03) Loose/missing hardware on the engines used for attaching accessories and sensors.
 - (04) Battery terminal loose or corroded.
 - (05) Engine control cables loose.
 - (06) Any loose wire terminal.
 - (07) Fluid levels below minimum required.
 - (08) Zincs corroded more than 50%.
 - (09) Any engine wiring insulation damaged or chafed, without an exposed conductor.
 - (10) Damage/inoperative locker latch/locks.
 - (11) Any standard boat machinery, with the exception of those listed on the disabling or restrictive list, not operating properly.
-

Boat Outfit

- (01) Life ring and/or distress light (missing/unserviceable).
 - (02) Missing throw line bag.
 - (03) Missing mooring lines.
 - (04) Missing/inoperable flashlight.
 - (05) Missing/inoperable boat hook.
 - (06) Missing fenders.
 - (07) Fire Extinguisher PMS not recorded on equipment tag or improperly completed.
-



**Electronics/
Navigation**

- (01) Compass light inoperative.
 - (02) Any standard boat electronics, with the exception of those listed on the restrictive list, not operating properly.
-

**General
Material and
Safety**

- (01) Improperly repaired damage to hull.
 - (02) Damage to antenna arch or folding mount.
 - (03) Loose/missing/improper fittings, nuts, bolts, brackets, etc.
 - (04) Improperly stored gear (to include non-standard/additional gear).
 - (05) Missing/improperly outfitted first aid kit.
 - (06) Any standard boat machinery or system, with the exception of those listed on the disabling or restrictive lists, not operating properly.
-

Trailer

- (01) Loose, missing, or improper hardware.
 - (02) Brake fluid level low.
 - (03) Nonstandard type tie-down straps.
 - (04) Missing section of DOT reflective tape.
 - (05) Missing/damaged/misaligned bunks.
 - (06) Missing/damaged tire change kit.
 - (07) Tire air pressure 41-65 PSI.
 - (08) Tire air pressure above 80 PSI.
 - (09) Clearance light extinguished.
 - (10) Bearing lubricator damaged or missing.
 - (11) Damaged/missing trailer jack.
 - (12) Damage or deformation of the wheel rim flange which does not result in exposure of the tire bead (sealing surface)
 - (13) Any standard trailer machinery or system, with the exception of those listed on the disabling or restrictive lists, not operating as designed.
-



APPENDIX G Vehicle – Trailer Matching Checklist

Introduction This appendix is meant to help the unit match an appropriate vehicle to a specific towing mission.

NOTE *↪*

When obtaining weights, units should ensure that vehicles have a “normal” load in them. If a crew of four normally deploys and carries gear with them, then ALL weights should be obtained with the same people in vehicle with the same gear.

In this Appendix

This Section includes the following information:

Topic	See Page
Trailer	G-2
Tow Vehicle	G-2
Hitch System	G-3



Trailer-Truck-Hitch Matching Checklist

Trailer

1. _____ **GROSS TRAILER WEIGHT (GTW):** Obtained from trailer, boat and normal “load” sitting detached from tow vehicle on scales. Boats should be at full fuel level and loaded with whatever gear is normally onboard during trailering operations.

2. _____ **TRAILER TONGUE WEIGHT (TTW):** This is usually obtained from detaching the trailer with normal load from the tow vehicle and weighing only the weight produced by the jack stand or nose-wheel. It is important to have the trailer adjusted to the height that it would be towed at.

Tow Vehicle

3. _____ **BASE CURB WEIGHT (BCW):** This is the weight of the vehicle with fuel and no passengers or cargo. This number can be obtained from the vehicle owner’s manual or the manufacturer.

4. _____ **GROSS VEHICLE WEIGHT (GVW):** This is the Base Curb Weight (BCW) plus the weight of any passengers and cargo. To obtain this weight, detach the trailer from the tow vehicle and weigh the vehicle with the passengers and cargo onboard.

5. _____ **GROSS AXLE WEIGHT – FRONT (FRONT GAW):** This is the total weight placed on the front axle. To determine the FRONT GAW, drive your vehicle to a scale and with the trailer attached park only the front wheels of the tow vehicle on the scale. This is your FRONT GAW.

6. _____ **GROSS AXLE WEIGHT RATING – FRONT (FRONT GAWR):** This is the total weight the front axle is capable of carrying. This information is printed on the safety placard located on the driver’s door.

7. _____ **GROSS AXLE WEIGHT REAR (REAR GAW):** This is the total weight placed on the rear axle during towing operations. To obtain the REAR GAW place all four wheels of the tow vehicle leaving the trailer wheels off of the scale. From this number, subtract your FRONT GAW. This is your REAR GAW.



- 8. _____ **GROSS AXLE WEIGHT RATING – REAR (REAR GAWR):** This is the total weight the rear axle is capable of carrying. This information is printed on the safety placard located on the driver’s door.
- 9. _____ **GROSS VEHICLE WEIGHT RATING (GVWR):** This is the maximum allowable weight of the fully loaded vehicle.
- 10. _____ **GROSS COMBINATION WEIGHT (GCW):** This is the weight of the towing vehicle and fully loaded trailer, including passengers and any cargo.
- 11. _____ **GROSS COMBINATION WEIGHT RATING (GCWR):** This is the maximum allowable weight of the towing vehicle and fully loaded trailer, including passengers and any cargo. This number is typically found in the owner’s manual or through your local dealer.
- 12. _____ **MAXIMUM TRAILER TOWING RATING (MTTR):** Maximum amount the vehicle is designed to tow. This number is typically found in the owner’s manual or through the manufacturer’s representative.

Hitch System

- 13. _____ **HITCH CAPACITY (HC):** This is the weight that the hitch is designed to safely tow. This information is typically found on a plate attached to the hitch frame.
- 14. _____ **TOW BALL RATING (TBR):** This is the weight that the towing ball is designed to safely handle. It is typically stamped onto the top of the ball.
- 15. _____ **TONGUE WEIGHT RATING (TWR):** This is the weight that the hitch system is designed to safely support. This number is typically stamped on the hitch frame.
- 16. _____ **DRAW BAR TONGUE RATING (DBTR):** This is the tongue weight that the draw bar is designed to safely carry. This is typically found stamped on the top of the draw bar.



Appendix G – Vehicle – Trailer Matching Checklist



APPENDIX H List of Acronyms

Introduction

This appendix contains a list of acronyms used throughout the Handbook.

In this Appendix

This appendix contains the following information:

Topic	See Page
List of Acronyms	H-2

ACRONYM	DEFINITION
AB-S	ATON Boat – Small
AES	Advanced Encryption Standard
AGND	Aground
AIS	Automatic Identification System
AOPS	Abstracts of Operation
AOR	Area of Responsibility
ATON	Aids to Navigation
BCW	Base Curb Weight
CBP	Customs and Border Patrol
CO	Commanding Officer
CASREPS	Casualty Reports
COMDTINST	Commandant Instruction
DAMA	Demand Assigned Multiple Access
DBN	Double Braided Nylon
DBTR	Draw Bar Tongue Rating
DES	Digital Encryption Standard
DGPS	Differential Global Positioning System
DIW	Dead-in-the-Water
DOT	Department of Transportation
DSC	Digital Selective Calling
EPA	Environmental Protection Agency
EPIRB	Emergency Position Indicating Radio Beacon
FFCS	Full Function Crew Station
GAW	Gross Axle Weight
GAWR	Gross Axle Weight Rating
GCWR	Gross Combination Weight Rating



ACRONYM	DEFINITION
GPH	Gallons Per Hour
GPS	Global Positioning System
GTW	Gross Trailer Weight
GVW	Gross Vehicle Weight
GVWR	Gross Vehicle Weight Rating
HC	Hitch Capacity
HF	High Frequency
HP	Horsepower
I/O	Inboard/Outdrive
ICCS	Integrated Crew Communications Systems
ICV	Intercommunicating Fill Valve
KTS	Knots
kW	Kilowatt
LCD	Liquid Crystal Display
LCG	Longitudinal Center of Gravity
LED	Light Emitting Diode
LOA	Length Overall
LOS	Line of Sight
MAW	Mounted Automatic Weapon
MCS	Master Control Station
MFD	Multi-function Display
MLE	Maritime Law Enforcement
MLEM	Maritime Law Enforcement Manual
MSST	Maritime Safety and Security Team
MTTR	Maximum Trailer Towing Rating
NM	Nautical Mile
NSN	National Stock Number
OHIP	Overhead Instrument Panel

ACRONYM	DEFINITION
OIC	Officer in Charge
ORM	Operational Risk Management
OTAR	Over the Air Re-keying
PFD	Personal Flotation Device
PLB	Personal Locator Beacon
PML	Personnel Marker Light
PMS	Preventive Maintenance Schedule
PPE	Personal Protective Equipment
PQS	Performance Qualification Standard
PSI	Pounds per Square Inch
PWCS	Port, Waterways, and Coastal Security
QAWTH	Quick Acting Watertight Hatch
RF	Radio Frequency
RFO	Ready for Operations
RPM	Revolutions per Minute
RT	Receiver/Transmitter
SAR	Search and Rescue
SBPL	Small Boat Product Line
SINS	Scalable Integrated Navigation System
SOLAS	Safety of Life at Sea
SOP	Standard Operating Procedure
SPD	Single Point Davit
SSB	Single Side Band
STAN Team	Standardization Team
TBCM	Tactical Boat Crew Member
TBR	Tow Ball Rating



ACRONYM	DEFINITION
TCOXN	Tactical Coxswain
TCTOs	Time Compliance Technical Orders
TMT	Training Management Tool
TTW	Trailer Tongue Weight
TWR	Tongue Weight Rating
UNWY	Underway
VAC	Volts Alternating Current
VDC	Volts Direct Current
VHF-FM	Very High Frequency-Frequency Modulated
WAAS	Wide Area Augmentation System
WOT	Wide Open Throttle
XO	Executive Officer
XPO	Executive Petty Officer



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