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Transportation

**MANAGEMENT, OPERATION,
MAINTENANCE AND USE OF U.S. AIR FORCE
WATERCRAFT**

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This instruction implements Air Force Instruction (AFI) 24-304, *Management, Operation, Maintenance and Use of US Air Force Watercraft*. It contains information previously found in Air Force Regulation (AFR) 75-58 and its supplements, as well as Technical Orders 39-1-3, 39-1-5, 39-1-8, 39-1-9, 39-1-10, 39-1-15, 39-1-17 and 39-1-18, which have all been rescinded, with responsibility for watercraft management being placed on the major commands. It does not apply to the Air Force Reserve Command nor the Air National Guard. This instruction may be supplemented as required by local commanders. Send recommended changes pertaining to this instruction to HQ AFSPC/LGTV, 150 Vandenberg St., Ste 1105, Peterson AFB CO 80914-4540.

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Chapter 1

WATERCRAFT MANAGEMENT

1.1. Responsibilities:

1.1.1. Headquarters Air Force Space Command (HQ AFSPC), Transportation Branch (LGTV), is the office of primary responsibility (OPR) for watercraft management for AFSPC. This office:

1.1.1.1. Sets procedures for managing AFSPC watercraft.

1.1.1.2. Coordinates management actions related to AFSPC watercraft.

1.1.1.3. Approves or disapproves new watercraft authorization requests for hard-hulled vessels.

1.1.1.4. Directs the reassignment of operational vessels when necessary to meet requirements. If vessels were purchased with base or unit Operation and Maintenance (O&M) funds, reassignment will not be directed without concurrence of the owning unit.

1.1.1.4.1. Analyzes alternatives listed in paragraphs 1.1.2.1.11.1 through 1.1.2.1.11.5. to prove the transfer cost-effective.

1.1.1.4.2. Coordinates with other MAJCOMs before a decision is made to transfer an asset to the Defense Reutilization and Marketing Service (DRMS).

1.1.1.5. Provides requirements for preventive and scheduled watercraft maintenance. Unscheduled maintenance (breakdown or accident repairs) will be performed by the units IAW the applicable technical data.

1.1.1.6. Coordinates on and provides needed assistance for depot-level repair proposals.

1.1.1.7. Reviews and validates watercraft requirements and authorizations for all mission watercraft regardless of length. This will be accomplished at a minimum of every 3 years and should normally be accomplished in conjunction with vehicle validation visits. The Revalidation of Watercraft Requirements and Authorization Report must include:

1.1.1.7.1. The description and number of watercraft by location.

1.1.1.7.2. The requirement for the watercraft.

1.1.1.7.3. The estimated length of time the requirement will exist.

1.1.1.7.4. An estimate of the condition of the watercraft and the estimated remaining life.

1.1.1.7.5. An assessment of alternatives to using AF-owned assets to accomplish the mission.

1.1.1.8. Conducts staff assistance or inspection visits to operational watercraft units at least every 3 years, in conjunction with validation trips. Knows and understands the role and mission of watercraft at each site. Assesses the condition of watercraft, quality of maintenance performed, operation and master's log documentation, berthing and maintenance facilities and ability of vessels and personnel assigned to meet their mission responsibilities as related to watercraft operation and maintenance. Follows up on corrective actions initiated by the local unit to correct deficiencies cited in such visits.

1.1.1.9. Ensures watercraft authorization and assets are properly accounted for in the appropriate management system.

1.1.1.10. Forecasts, budgets and funds new acquisitions and depot-level repairs which are beyond the financial capability of the using unit and base. Coordination with other MAJCOMs, DRMS and Naval Sea Systems Command (NAVSEA) to locate a serviceable asset is mandatory prior to new procurement. Support and assistance is available from NAVSEA for procurement of vessels larger than 33 feet. Contact HQ AFSPC/LGTV for assistance.

1.1.1.11. Closely tracks operations and maintenance costs reported on AF Form 615, Unit Watercraft Operations and Cost Summary Report. Builds a reliable cost history to use in budgeting and to use as a basis for comparison of alternatives to Air Force owned and operated vessels. Vessels may be added to the On-Line Vehicle Interactive Management System (OLVIMS) as an equipment item with an "X" registration number. If cost data entered into OLVIMS is sufficient to cover AF Form 615 requirements, a locally generated OLVIMS report with all required data may be submitted in lieu of AF Form 615.

1.1.2. Units:

1.1.2.1. Submit an AF Form 601, **Equipment Action Request**, for new authorizations or changes to existing watercraft authorizations IAW [AFI 24-304](#), paragraph 3.1. The justification, Block 21 of AF Form 601, will include:

1.1.2.1.1. A complete description of the vessel.

1.1.2.1.2. The application of present watercraft.

1.1.2.1.3. The proposed mission of the watercraft and impact if not approved.

1.1.2.1.4. Anticipated workloads.

1.1.2.1.5. Date required.

1.1.2.1.6. Principles of operation such as knots, range and crew required.

1.1.2.1.7. Type of hull and dimensions.

1.1.2.1.8. Special features required for carrying out the mission and sole source justification (if required).

1.1.2.1.9. Environmental considerations or conditions of operation such as off-shore, deep sea, etc.

1.1.2.1.10. The estimated cost of the new vessel and a summary of the estimated annual costs to include all costs projected to reflect in the AF Form 615, **Unit Watercraft Operations and Cost Summary Report, Version 1**. (See paragraph [1.7](#).)

1.1.2.1.11. A summary of research accomplished to show other alternatives to new procurement are not available or are not cost effective. Each of the following alternatives will be addressed in this summary. A simple answer consisting of "Not Available" or "Annual cost estimated at \$____, cost per hour estimated to be \$____", will be sufficient for this requirement.

1.1.2.1.11.1. Commercial Leasing or Chartering.

1.1.2.1.11.2. Contractor Furnished Equipment (CFE).

1.1.2.1.11.3. Other organizations, either on base or at other bases.

1.1.2.1.11.4. Other DoD activities providing support.

1.1.2.1.11.5. Other federal, state or local agencies providing support.

1.1.2.2. Forecast, budget and fund new procurements and depot-level repairs within the financial capability of the unit or base. Vessels not listed by the General Services Administration (GSA) will be procured through competitively bid contracts. Vessels listed by GSA may be procured through GSA supply schedules or through competitively bid contracts, whichever is more economical overall. If costs are beyond local capability, forward requests for funds along with the AF Form 601 to HQ AFSPC/LGTV.

1.1.2.3. Ensure watercraft are operated as outlined in this publication and in appropriate technical data.

1.1.2.4. Determine and specify the minimum crew total (by rank/grade/civilian equivalent and quantity) for each assigned watercraft. In determining crew total, operational safety is the prime factor. As a general guide, [Table 1.1](#) shows the suggested minimum crew sizes recommended for the watercraft lengths indicated. Crew sizes may be adjusted based on mission workload requirements, type of vessel, contractual requirements and other factors as determined by MAJCOM or local command authority.

Table 1.1. Suggested Minimum Crew Requirements.

Length of Vessel	Minimum Crew
Less than 30 feet	2
30 to 60 feet	4
More than 60 feet	6

1.1.2.5. Program and fund for organizational and intermediate maintenance. Program and fund for depot-level repairs within the capability of the unit or base. Ensure maintenance and inspections to AFSPC watercraft are accomplished.

1.1.2.6. Ensure watercraft waste disposal complies with applicable Federal, State and local standards, as well as host nation requirements, if applicable.

1.1.2.7. Report locally purchased vessels to HQ AFSPC/LGTV for assignment of watercraft hull numbers.

1.1.2.8. Send required reports, requests and correspondence to MAJCOM IAW this instruction.

1.2. Definitions and Abbreviations:

1.2.1. AFEMS. Air Force Equipment Management System.

1.2.2. Air Force Watercraft. All vessels and associated equipment, regardless of length, authorized or acquired to directly support an AFSPC operational mission. Excludes Morale, Welfare and Recreation (MWR) vessels.

1.2.3. CFE. Contractor Furnished Equipment.

1.2.4. DRMS. Defense Reutilization and Marketing Service.

1.2.5. GFE. Government Furnished Equipment.

1.2.6. MWR Watercraft. Vessels acquired and used solely to support MWR activities. This instruction does not apply to MWR watercraft, unless on temporary loan from the operational inventory.

1.2.7. NAVSEA . Naval Sea Systems Command.

1.2.8. SUPSHIP. Supervisor of Shipbuilding, Conversion and Repair.

1.3. Waiver Requests. Requests for clarification and waivers to this instruction, including justification, may be sent to HQ AFSPC/LGTV via the parent Numbered Air Force for LG approval.

1.4. Watercraft Navigation Requirements. Air Force watercraft are navigated and piloted IAW US Coast Guard navigational rules and local regulations that apply. Coast Guard documents may be obtained from the US Government Printing Office or from local Coast Guard Marine Inspection Offices. Foreign government requirements, when applicable, must also be complied with.

1.5. Procedures for Using Watercraft:

1.5.1. AFSPC watercraft are to be used for official missions only.

1.5.1.1. In an emergency, mission watercraft must be used to support safety of life at sea, to the extent possible without serious danger to the vessel or individuals aboard. When a distress signal is received from any source concerning an emergency within the range of the vessel, the vessel will respond at the fastest reasonable speed to render aid.

NOTE:

A National Defense priority is the only authorized deviation from this procedure.

1.5.1.2. If the vessel cannot respond to a distress signal, the boat's master makes the proper entry in the ship's log and notes all the facts relating to the incident.

1.5.2. The boat master of each Air Force watercraft is the single commander of the craft. The boat master assigned to each vessel is responsible for its operation, maintenance, safety and security unless properly relieved by the Officer in Charge (OIC), Noncommissioned Officer in Charge (NCOIC) or the appropriate civilian equivalent authority of the watercraft activity. Any deviations must be reported promptly and in detail in the watercraft's log and the commander notified of the incident(s) at once.

1.6. Eligibility Criteria for Watercraft Personnel. Boat masters must have a current master's license and engineers must have a current engineer's license. These licenses must be consistent with the tonnage and horsepower of the vessel being operated and be issued by the U.S. Coast Guard or other competent maritime authority, foreign or domestic, having jurisdiction over the waters in which the vessel operates.

1.7. AF Form 615, Unit Watercraft and Operations Cost Summary Report. Military or contracted units operating watercraft must send a completed AF Form 615 for each vessel to HQ AFSPC/LGTV by the 15th of the first month of each quarter. Reports will be completed shown in [Table 1.2](#).

Table 1.2. Summary Report Data.

<u>Entry</u>	<u>Field Description</u>	<u>Remarks</u>
1	Using Command	Always AFSPC
2	Using Organization Address	Squadron or Unit to which vessel is assigned
3	Report Period	Period covered
4	Vessel Registration Number	AFLC or AFSPC assigned vessel number
5	Number of Sorties	Total number of sorties operated in support of the primary mission during the reporting period
6	Number of Hours	Total hours vessel operated in support of the primary mission during the reporting period
7	Fuel Type	M-Mogas; D-Diesel; G-Gasohol, O-Other
8	Gallons Consumed	Total gallons consumed during the reporting period
9	Cost	Total cost of fuel consumed during the reporting period
10	Quarts Consumed	Total quarts of lubricating oil charged to vessel during the reporting period
11	Cost	Total cost of lubricating oil charged to the vessel during the reporting period
12	Organization Maintenance Cost	Total expense for supplies used in organizational (operator or direct user) maintenance during the reporting period. (i.e. hose lamps, light bulbs and other parts, both high cost and low cost)
13	Intermediate/Contract	Total expense for supplies used in intermediate maintenance or cost of contract support of intermediate level maintenance during the reporting period. Include parts used during repairs performed in a repair shop or on-site by a mechanic or other qualified individual not assigned duties as an operator or crew member of the vessel. Basically covers all repairs beyond the capabilities of the operator or crew, but does not include depot repairs.
14	Shipyard Contract Cost	Depot level repair cost. Units may leave blank.
15	Obligation Authority	Depot level repair funds transferred from HQ AFSPC/LGTV to the unit for major repairs will be entered by HQ AFSPC/LGTV staff. Units may leave blank.
16	Total Cost	Sum of items 9, 11, 12, 13, 14 and 15. Units may leave blank if items 14 or 15 are greater than zero.
17	Average Cost per Hour	Divide item 16 by item 6. Units may leave blank if items 14 or 15 are greater than zero.
18	Date Assigned	Date, numerical month and year (MM/YY) the vessel was originally assigned to using organization

<u>Entry</u>	<u>Field Description</u>	<u>Remarks</u>
19	Date	Date, numerical month and year (MM/YY), of the last haul-out according to Chapter 2 of this instruction
20	Source	Who performed last haul-out (U-Unit; C-Contract)
21	Next Haul-out Due	Date of next scheduled haul-out according to Chapter 2 of this instruction
22	Awaiting Contract	Number of days vessel was out of service awaiting contract maintenance
23	Contract Maintenance	Number of days vessel was out of service undergoing contract maintenance
24	Depot Maintenance	Number of days vessel was out of service awaiting or undergoing depot maintenance
25	Organizational Maintenance	Number of days vessel was out of service undergoing user or intermediate level maintenance
26	Days VDP	Number of days vessel was out of service awaiting parts. There must be work stoppage for entries in this block.
27	Remarks	Any comments deemed appropriate (overdue scheduled haul-out, scheduled maintenance and inspections; condition of vessel, etc.)

1.8. Watercraft Historical Records:

1.8.1. Watercraft units must maintain historical records or jacket files on all active operational mission watercraft. As a minimum, these records must contain:

1.8.1.1. Allowance and authorization source documents, date of assignment, acquisition documents and hull number it replaced, if any.

1.8.1.2. Copy of most recent annual revalidation and requirements review.

1.8.1.3. Copy of contracts pertaining to vessel.

1.8.1.4. Cumulative register or log of vessel expenditures, especially maintenance costs. This information should be broken down on an annual basis by organizational, intermediate and depot-level maintenance costs. A complete set of AF Form 615(s) for the life of the vessel will suffice for this requirement.

1.8.1.5. Copies of any other letters and messages regarding vessel modifications, correspondence referring to depot projections and programmed replacements and any other documents deemed appropriate by local authority.

1.8.1.6. Copies of AFTO Form 280(s), **USAF Watercraft Life Support Equipment Inventory**.

1.8.1.7. Copy of items noted for a particular vessel during the staff assistance or technical visits.

NOTE:

When it is not practical to file above documents in a single jacket file by vessel hull number, records may be maintained at other locations at the discretion of the watercraft unit. In such cases, however, the jacket file must be annotated to show location of records. If mandatory documents were not retained before publication of this instruction, place a memo stating this in the file. Documents dated before publication of this instruction are not subject to inspection for compliance with this instruction, but must be retained in the file to ensure a complete history of the vessel is available.

1.8.2. HQ AFSPC/LGTV will establish and maintain a historical file for each vessel managed and supported by AFSPC. The file must contain, at a minimum, the location, hull number, NSN, nomenclature, present and past use (if known), acquisition cost, estimated replacement cost and copies of all AF Form 615(s). It may also contain any other correspondence and/or documentation deemed appropriate.

1.9. Watercraft Grounding Reports and Incidents. All accidents, incidents or groundings will be reported immediately to the Harbor Master, Installation Commander, Installation Safety Office, Security Police and HQ AFSPC/LGTV. They will also be reported to any other appropriate authority such as the Coast Guard or foreign equivalent, if required by said authority.

Chapter 2

WATERCRAFT CARE, INSPECTION AND MAINTENANCE

2.1. Purpose. This chapter defines the normal limits of responsibility for the various echelons of maintenance. It also establishes care, inspection and maintenance responsibilities for AFSPC watercraft. Finally, establishes haul-out inspection criteria for AFSPC watercraft. Some items may not apply to all vessels or locations. Units may submit requests for waivers, detailing reasons why an exemption should be made, to HQ AFSPC/LGTV.

2.2. Responsibilities. Responsibility for items throughout this chapter may be assigned to either the using organization or to an intermediate maintenance facility as required. As a general guide, tasks are considered to be user responsibility unless a lack of expertise, capability or adequate facility prevents the user from safely and successfully performing a particular service or repair.

2.3. Echelons of Maintenance:

2.3.1. Organizational Maintenance. Accomplished by personnel assigned to the watercraft activity (the users of the vessel). The users are responsible for maintenance and replacement of Titles A, B and some D assets. (See paragraph 7.2.3.) The using organization:

2.3.1.1. Performs daily and periodic inspections of watercraft IAW the checklist in AFTO Form 17, **Marine Masters' Operation and Maintenance Log**. These inspection items are minimum requirements and may be supplemented by individual units to meet their particular needs. The periodic and calendar inspections will be accomplished within a 10 percent plus or minus window of the scheduled interval(s).

2.3.1.2. Accomplishes preventative maintenance to include chipping, painting and all other superficial repairs to hull, fixtures and installed systems. This will include maintenance of all Title A, B and some D equipment, its brackets and supports and installed systems.

2.3.1.3. Maintains all logs, records, vessel drawings, commercial manuals, etc.

2.3.1.4. Provides personnel assigned to the using activity to perform these functions. In the case of contractor operated watercraft, tasks will be accomplished by fully qualified contractor personnel.

2.3.2. Intermediate Maintenance:

2.3.2.1. Intermediate maintenance involves the repair, overhaul or replacement of Title C and some Title D equipment. This type of maintenance is usually associated with base level specialty shops or locally contracted civilian repair shops.

2.3.2.2. Contractor operated maintenance shall be as outlined above and contractually agreed on.

2.3.2.3. Intermediate repairs to installed or accessory equipment will be performed only by qualified personnel. A qualified person shall be one who has military school endorsements or equivalent civilian certification for the various crafts and trades which may be involved.

NOTE:

No person shall weld on any part of an aluminum hull who has not successfully passed a service school course in aluminum welding or hold a valid certification from the American Society of Welders, other industry accepted certifying agency or foreign equivalent with local jurisdiction at overseas locations.

2.3.3. Depot-Level Maintenance. Depot-level maintenance is complex and is beyond the capability of the intermediate maintenance activity. It is normally accomplished contractually through commercial shipyards. Repairs of this type shall be coordinated through and may be funded by, HQ AFSPC/LGTV.

2.4. Maintenance Responsibilities:**2.4.1. Base:**

2.4.1.1. The unit commander or his designated representative will ensure all inspections are completed and properly documented IAW AFTO Form 17 and applicable technical data.

2.4.1.2. Develops and follows a haul-out schedule for the upcoming fiscal year.

2.4.1.3. Performs emergency haul-outs for suspected or actual damage to underwater hull or gear.

2.4.2. AFSPC:

2.4.2.1. Provides support as necessary to users and intermediate level repair shops.

2.4.2.2. Ensures inspection and maintenance responsibility is established for watercraft in storage, if said vessel is not assigned to a unit.

2.5. Haul-Out Intervals:

2.5.1. The haul-out inspection interval is established to coincide with the life expectancy of underwater components and paint protective qualities and serve as a guide to preclude watercraft deterioration. All watercraft hauled out for scheduled inspection of underwater hull gear or bottom paint will be thoroughly cleaned. Discrepancies noted during this inspection will be corrected prior to launching.

2.5.2. The normal interval between haul-out inspections, regardless of hull construction or operational environment, is 36 months. If justified, this interval may be extended when approved by HQ AFSPC/LGTV.

2.5.3. It is highly recommended that vessels larger than 30 feet be inspected and surveyed by an outside, independent source in conjunction with the haul-out inspection. This will help detect structural or other unsafe conditions which may not be found by vessel operators or local maintenance personnel. Possible sources for this service are the American Bureau of Shipping (ABS), U.S. Coast Guard or a commercial marine surveyor.

2.6. Safety. If any vessel is considered to be unsafe to operate, the vessel log will be annotated to reflect the unserviceable condition and the vessel will not be operated until the unsafe condition is removed.

2.7. General Vessel Maintenance:

2.7.1. Haul-Out and Launch of Vessels. Launch vessels for operation and withdraw for maintenance, using marine railway/slipway or other available equipment. Block and support adequately to

eliminate any undue stress and strain to the hull structure while in storage. Inspect all zinc plates upon haul-out. Before launching, all docking plugs must be checked and secured in place. All through-hull valves must be secured before launching and all compartments, voids, tanks and spaces must be checked for water-tight integrity.

2.7.2. Inspection of Vessels. Closely inspect the vessel's hull shell plating, bow ramp, zinc plates and ice sheathing before launching the vessels. Record any damage found in the vessel's logbook according to technical data. Repair ice sheathing before launching. At the end of use, after vessels have been hauled out, closely inspect again to determine if any new damage occurred during vessel operation.

2.7.3. Vessel Cleaning . Keep the vessel's exterior (hull, decks, cargo spaces and pilot house) in a clean and orderly condition. Keep decks free of grease, oil and other safety hazards. Remove all trash, dunnage, dirt and debris daily.

2.7.4. Preventative Inspection. Remove all necessary floorplates, gratings, hatches or other partitions to completely expose all voids and other dead areas in the hold and bilge areas. Inspect exposed areas for residual water, dampness and debris. Assure limber holes are free of blockage and determine source of unusual water accumulation. At the time of determination, correct the problem if within their capability or turn it over to maintenance personnel who are capable. The above areas should be kept clean and free of debris at a minimum of quarterly intervals.

2.7.5. Corrosion Control. Keep the vessel's hull (below and above the waterline), decks, cargo well, pilot house, interior spaces, void spaces, compartments and bilges, etc., free of corrosion. Prepare surface with hand tool cleaning, power tool cleaning and/or blast cleaning equipment before painting as methods of corrosion control.

2.7.6. Vessel Painting. Paint the vessel's hull, decks, cargo well, pilot house, interior spaces, void spaces, compartments, bilges, etc., according to applicable technical data. Touch up paint as necessary.

2.7.7. Engine Room Cleaning and Painting. Keep the vessel's machinery spaces in a clean and orderly condition. All machinery and equipment must be wiped down and kept free of excessive oils, grease, dirt, etc. The machinery, lazaret spaces and equipment must be scaled and painted.

2.7.8. Vessel Markings. Paint the vessel's Air Force hull designator markings and insignia according to paragraph 6.5. of this instruction. Touch up painting must also be accomplished.

2.7.9. Ice Sheathing Renewal. Inspect the vessel's ice sheathing before launching vessels. Record, repair and replace damaged sections and renew retaining bolts as needed.

2.7.10. Welding. Perform welding repairs according to applicable technical standards. Welding repairs will be accomplished by competent personnel holding valid certification from a competent military or civilian authority, for the method, position and materials involved in the welding repair. Perform quality assurance inspections during the welding repair. Weld preparation, alignment, fit-up, joint preparation, etc., must be checked. After completion of weld repairs, welds must be visually inspected for undercut, lack of penetration, lack of fusion, cracks, craters, etc. Dye penetrant or magnetic particle testing of suspect welds must be used when required.

2.7.11. Hatches, Water-Tight Doors, Access Plates and Similar Equipment. Inspect the vessel's access hatches, trunks, water-tight doors and manhole covers annually for water-tightness. Hatches and gaskets must be repaired or renewed when needed to ensure a water-tight fit.

2.8. Vessel Records and Logbooks:

2.8.1. Maintain the vessel's logbook according to guidelines in **Chapter 4** of this instruction.

2.8.2. AFTO Form 17. All maintenance, repair and overhaul performed on the vessel must be recorded in the vessel's logbook. Specific instructions for completing AFTO Form 17(s) are in **Chapter 4** of this instruction.

2.8.3. AFTO Form 280, Watercraft Equipment Inventory. Complete according to **Chapter 7** of this instruction.

2.8.4. AF Form 615, Watercraft Operations and Maintenance Cost Summary. Complete according to **Chapter 1** of this instruction.

2.9. Scheduled Maintenance and Inspections. Schedule organizational and intermediate maintenance of marine engines and associated equipment according to technical data. If technical references are not available or insufficient, follow the schedule of instructions below on lubrication and preventative maintenance:

2.9.1. Check maximum revolutions per minute (RPM) daily while the vessel is in operation. Normal operation should be 200-300 RPM less than maximum capability.

2.9.2. Check gauges and instruments daily for proper function when operating engines; monitor instrumentation to ensure all systems are functioning at normal ranges of operation.

2.9.3. Check the engine lubrication oil level daily. Add oil as needed to maintain correct level. Visually check for oil leaks around the filter and external oil lines.

2.9.4. Install engine oil filters and gaskets at normal scheduled maintenance intervals or as directed by applicable service manuals, whichever is shorter. Select proper grade of oil according to engine manufacturer's instructions.

2.9.5. Check and adjust coolant level daily IAW technical and user manuals.

2.9.5.1. Periodically drain coolant from the heat exchanger raw water inlet and outlet. Remove the zinc anodes from the inlet side of the raw water pump and the heat exchanger. Clean anodes and reinstall or replace as necessary.

2.9.5.2. Clean the heat exchanger according to engine manufacturer's instructions. Reinstall the heat exchanger after cleaning and refill with manufacturer's recommended coolant.

2.9.5.3. If a coolant filter is installed, change the filter element as part of the scheduled maintenance routine.

2.9.6. Hoses, Lines and Piping. Before operational periods, make a visual check for any damage to the cooling, fuel and lube oil systems, air or hydraulic hoses, lines and piping. Repair or replace damaged components. Ensure all connections and clamps are secure.

2.9.7. Sea Water Strainers. Inspect strainers for cleanliness daily during operations. If a compound pressure or vacuum gauge has been installed, check daily to see if operating pressure or vacuum is normal. Ensure strainers are kept free of debris or foreign material.

2.9.8. Raw Water Pump. Check and prime raw water pump as necessary. Inspect pump to ensure all parts (impeller, shaft, bearings, etc.) are in good condition. Repair or replace worn parts.

2.9.9. Fuel System:

2.9.9.1. Check fuel tank levels daily. Keep fuel tanks filled to reduce condensation to a minimum. Drain off water at the bottom of the fuel tanks at daily intervals.

2.9.9.1.1. Before operational periods, check and tighten all fuel tank fittings as necessary. Check condition of the fuel lines and repair or replace parts as needed.

2.9.9.1.2. Add diesel fuel soluble type biocides (fuel treatment), if required, to treat the fuel system.

2.9.9.2. Fuel and Water Separator Filters. If installed, check at daily intervals. Check for presence of water in fuel and drain as necessary. On units without observation bowl, open drain momentarily and drain into container to check for water. Change element at required intervals.

2.9.9.3. Fuel Strainer and Filter. Check before operational periods and at monthly intervals during operations. Install new elements when lube oil filters are changed or sooner if required. Check fuel pressures at the cylinder head fuel inlet manifold and the inlet restriction at the fuel pump in order to check if fuel filter elements are restricted. Change fuel filter elements if fuel pressures at the inlet manifold fall below manufacturer's specifications.

2.9.10. Air Cleaners and Air Silencers. Check air cleaner element to ensure it is clean and unclogged before operational periods. Ensure engines do not have an intake restriction or reduced air supply to the engine. Air cleaners must be thoroughly checked for dirt accumulation at the oil sump, tray type screen, center tube and hood. Clean the blower screen and gasket assembly on air silencers with fuel oil and dry with compressed air.

2.9.11. Air Box Drain. Check air box drain before operational periods. Inspect and clean with solvent, blow out lines with compressed air and inspect for leaks after servicing.

2.9.12. Ventilating System. Check and record the crankcase pressure. Remove the externally mounted crankcase breather assembly and wash the steel mesh pad, when needed, in clean fuel oil. Breather pads in the cylinder block must be cleaned at the time of engine overhaul.

2.9.13. Blower Screen. Inspect the blower screen and gasket assemblies. Clean the screens in fuel oil and dry with compressed air.

2.9.14. Starting Motor. Inspect, lubricate and repair or replace parts of the starting motor and clutch drive as necessary. Repair or replace parts as necessary.

2.9.15. Battery Charging Alternators and Generators. Inspect terminals for corrosion, loose connections and frayed wiring. Lubricate generator bearings and bushings. Maintain proper drive belt tension.

2.9.16. Inspect and Service Batteries. Check the electrolyte levels and add distilled water as needed. Keep battery terminals clean. Inspect cables, clamps and hold down brackets. Replace damaged parts, clean and coat with grease as needed. Check electrical system if batteries become repeatedly discharged.

2.9.17. Engine Controls. Inspect and service the engine control mechanisms (clutch and throttle controls). Lubricate controls where needed. Check and adjust clutch valve, throttle and brake linkages. Inspect cables and pulleys, replace when necessary.

2.9.18. Drive Belts. Check before operational period and weekly during operations. Inspect condition and tension of all drive belts, pumps, alternators and any other accessory drive belts. Replace belts as required and adjust tension as needed.

2.9.19. Overspeed Governor . Lubricate the overspeed governor, if equipped. Make necessary adjustments of speed settings as required.

2.9.20. Shutdown System. On manual or automatic shutdown systems, inspect and operate or test the shut down system before operational periods. Set the pressure sensitive bellows to the proper setting as specified by the manufacturer's recommendations. Replace the temperature sensing valve when required. Make adjustments and repairs as needed.

2.9.21. Power Take Off (PTO). Check the PTO bearings for lubricants at monthly intervals during operations. Lubricate sparingly according to manufacturer's specifications.

2.9.22. Marine Gear. Check the oil level daily in the marine gear during operations. Add proper grade of oil when required. Before operational periods, thoroughly clean the removable oil screen and breather. Rinse in clean oil and blow dry with compressed air. Reinstall components and refill the marine gear with oil according to manufacturer's specifications. On torq-matic marine gear, replace the full flow oil filter element every time the marine gear oil is changed.

2.9.23. Engine and Marine Gear Mounts. Check the engine and marine gear mounting bolts and condition of mounting pads or shims. Tighten, repair or replace parts as needed.

2.9.24. Exhaust System. Check the exhaust manifold, connection flanges, risers, silencers, flexible connections, etc., for exhaust leaks frequently. Repair or replace parts as needed.

2.9.25. Engine Tune-Up. Perform engine tune-ups when required. Adjustments in some valve and injector operating mechanisms, governor, etc., are required periodically to compensate for normal wear on parts. Check injector timing and exhaust valve clearance. Make necessary height adjustments between the injector follower and injector body according to engine manufacturer's specifications.

Propeller shafts must be inspected for any damage, cracks, excessive vibration, etc. The shafts must be removed and shaft cutlass bearings replaced at approximately 7-year intervals or sooner if required. Thoroughly inspect the shafts for fractures, runout, etc., at the time of bearing replacement. Inspect the condition of shaft logs (internally) while bearings have been removed.

Rudders must be inspected annually for any signs of damage or corrosion. Repair any damaged areas. Remove the rudders at approximately 7 year intervals and rudder logs, stocks and bearings and associated components must be inspected and repaired or overhauled. Rudder stock packing glands will be inspected and packing renewed as necessary.

The bow ramp and ramp hoisting mechanisms must be inspected annually. The pneumatically or hydraulically operated ramp hoisting mechanisms and the manually operated hoisting mechanism must be inspected, operated and tested. The ramp structure must be inspected for any damage. Damaged areas will be repaired or replaced.

2.10. Unscheduled Maintenance, Repair, Overhaul and Replacement of Vessel Components, Marine Engines and Associated Equipment. Perform unscheduled maintenance, repairs, overhaul and replacement of marine engines, auxiliary equipment and other associated items according to manufacturer's specifications. After vessels have been launched into the water at the beginning of the operational

period and after performing repairs to the bilge, steering or drive systems, perform an operational test of the systems prior to operation in open water.

Chapter 3

DETERMINATION OF ECONOMICAL REPAIR ALLOWANCE FOR AIR FORCE WATERCRAFT

3.1. Purpose. This chapter outlines procedures for making economic repair or replacement decisions on AFSPC mission watercraft and for avoiding costly repairs when cost effective alternatives exist.

3.2. General. Operational necessity and economic feasibility will be the basic factors considered in any decision to repair AFSPC mission watercraft, in the same basic manner as vehicle repair decisions. Procedures in this chapter shall be adhered to whenever repair decisions are made.

3.3. Procedures:

3.3.1. Establishing Costs. The using unit, with assistance from a competent repair activity, will determine the estimated cost and extent of organizational, intermediate and depot level repairs or maintenance required on mission watercraft.

3.3.2. Repair Authority:

3.3.2.1. If the estimated cost does not exceed the one-time repair allowance, local repair authority is automatic. If the estimated cost does exceed the one-time repair allowance, unit or base funds are available and no replacements are projected, local repair authority is also automatic. If the estimated repair cost exceeds the one-time repair allowance and no funds are available or local recommendation is to not expend the funds, the repair estimate and request for disposition instructions will forwarded to HQ AFSPC/LGTV in the same manner as vehicle disposition requests.

3.3.2.2. Emergency haul-outs will be performed only to prevent loss of government property, to render a vessel safe and seaworthy and to prevent a mission abort. Any emergency haul-out requiring costs in excess of \$25,000 for haul-out, inspection and patch-up (render the vessel floatable) shall require a detailed report to HQ AFSPC/LGTV, coordinated through the unit commander, explaining the reason and necessity of the high costs. This report will include an estimate of total (emergency and routine) costs to render the vessel serviceable.

3.3.2.3. The life expectancy for AFSPC vessels is 30 years for vessels over 30 feet in length and 20 years for vessels 30 feet or less.

3.3.3. Using **Table 3.1.**, multiply current vessel replacement cost by the appropriate listed factor to determine the one-time repair limit in dollars.

Table 3.1. AFSPC Mission Watercraft Repair Allowance Table.

More than 30 Feet		30 Feet or Less	
Remaining Life in Years	Repair Allowance Factor (percent)	Remaining Life in Years	Repair Allowance Factor (percent)
30	75	20	75
29	73	19	72

More than 30 Feet		30 Feet or Less	
Remaining Life in Years	Repair Allowance Factor (percent)	Remaining Life in Years	Repair Allowance Factor (percent)
28	71	18	69
27	69	17	66
26	67	16	63
25	65	15	60
24	63	14	57
23	61	13	54
22	59	12	51
21	57	11	48
20	55	10	45
19	53	9	42
18	51	8	39
17	49	7	36
16	47	6	33
15	45	5	30
14	43	4	27
13	41	3	24
12	39	2	21
11	37	1	18
10	35	0 (or exceeded)	15
9	33		
8	31		
7	29		
6	27		
5	25		
4	23		
3	21		
2	19		
1	17		
0 (or exceeded)	15		

3.3.3.1. No repair shall exceed 75 percent of the replacement cost of the vessel.

3.3.3.2. The one-time repair limit will not drop below 15 percent of the replacement cost of the vessel, regardless of age or usage.

3.3.3.3. If vessels are loaded in the base vehicle maintenance activity's On-Line Vehicle Integrated Management System (OLVIMS), the automated one-time repair limit computed by OLVIMS may be used in lieu of the above manual calculation.

3.3.4. Disposition Authority. Disposition requests for vessels with a replacement cost of \$10,000 or more will be forwarded to HQ AFSPC/LGTV. Vessels which exceed the one-time repair allowance and have a replacement cost of less than \$10,000 may be condemned and disposed of by the installation commander. This authority may be delegated no lower than the Transportation Commander and will not be delegated to a contractor.

Chapter 4

MARINE MASTER'S OPERATION AND MAINTENANCE LOG

4.1. Responsibility. Masters of vessels will be responsible for:

NOTE:

The terms "Marine Masters Operation and Maintenance Log", "AFTO Form 17" and "the log" are interchangeable.

- 4.1.1. Ensuring the current copy of the log is stowed aboard his vessel in such a manner as to be readily available for use but secure from loss or destruction from hazards of weather or mission operation.
- 4.1.2. Ensuring all entries in the log are made as outlined in this instruction and properly signed upon completion.
- 4.1.3. Ensuring when all daily entry pages of the log are full the completed copy of the log is preserved in a secure place ashore in such a manner and for such periods of time as are described in this instruction and a new log book obtained.
- 4.1.4. Ensuring all reasonable efforts are made to salvage the log in the event the vessel is stricken at sea or any other situation in which the log book could be lost or destroyed.
- 4.1.5. Ensuring that when transferring a vessel to another accountable agency the current log and all previous logs covering no less than the last 2 calendar years and as far before that time as possible, are forwarded to the person in charge of the gaining activity.

4.2. General Instructions:

- 4.2.1. All completed logs will be stored in a dry and secure storage space with immediate access for a period of 2 calendar years from the closing date on the cover of each log. After the expiration of 2 calendar years, completed logs will be stored in a general staging area which is sufficiently secure to preserve the logs in a legible condition for a period of 3 more calendar years, after which they will be disposed of IAW existing regulations.
- 4.2.2. In the event of a base closure, permanent transfer of a vessel to a storage site or any other circumstances in which disposition of current "in use" or stored AFTO Form 17(s) is in question, transfer them to HQ AFSPC/LGTV.
- 4.2.3. Vessels temporarily removed from the assigned station for purposes of normal, depot or contract maintenance will have the active logs retained by the unit and stored in a secure place, preferably the same location as the closed or historical logs.
- 4.2.4. If an AFSPC vessel is involved in a marine disaster, incident or any circumstance from which legal action may be reasonably expected to occur, all AFTO Form 17(s) of any age, including the one currently in use, shall be impounded by any competent authority and presented to the person or agency investigating the incident.
- 4.2.5. Lost or Missing AFTO Form 17(s).** Whenever an AFTO Form 17 is lost for any reason, all efforts compatible with the circumstances will be made to recover the log. If the current "in-use" AFTO Form 17 is permanently lost, a new one will be obtained. The statement, "Log for current

period lost", will be entered in the space provided in the cover directly below the word "Station". Page ii of the new AFTO Form 17 will be completed as fully as possible. Page iii will be used to record:

4.2.5.1. Cause of The Missing Log, e.g., "Lost Overboard - (when and how)", "Destroyed by fire - (circumstances)", "Not aboard vessel when received", etc.

4.2.5.2. Any information pertinent to the "Condition of the Vessel" which may be known by personnel present or available.

4.2.5.3. A report on the condition of the vessel after a thorough inspection of the entire vessel as outlined in pages iv and v of AFTO Form 17.

4.2.6. Use of the AFTO Form 17(s): The "Ship's Log" is the most important document in existence pertaining to a given vessel. It is not to be used for any other purpose than those herein designated. The log is to be used as:

4.2.6.1. The "Ship's Log".

4.2.6.2. The "Condition of the Vessel" report.

4.2.6.3. A record of general information concerning the vessel.

4.2.6.4. A record of all required inspections of the vessel.

4.2.7. Completion of AFTO Form 17(s). The following instructions provide guidance for making entries and deletions in the Ship's Log as well as for its preservation and utilization:

4.2.7.1. Only authorized personnel shall make entries in or handle logs, except in the face of marine disaster when all personnel aboard the vessel are required to assist the master of the vessel in his efforts to salvage and preserve this document.

4.2.7.2. All entries shall be printed or clearly and legibly handwritten. All signatures and initials will be written in payroll form. All signatures, initials and entries will be made in ink only.

4.2.7.3. Deletions or erasures of entries to or removal of pages from, AFTO Form 17(s), are prohibited. Corrections to existing entries will be made by ruling a single line through the incorrect entry in such a manner as to leave the original entry legible. The person editing the entries shall initial or sign all corrections made.

4.2.7.4. A maximum effort to avoid grease, dirt, smudges and abusive handling which may cause deterioration will be exercised in using AFTO Form 17(s).

4.2.7.5. The log will be utilized each day the crew is on duty. When no mission or runs are scheduled, entries will be made concerning work accomplished by the crew while aboard the vessel and the hours thereof. On those days when neither the master of the vessel nor any crew member reports aboard, the master of the vessel will annotate the log on the next day the vessel is operated stating no one was aboard for the period not accounted for.

4.2.7.6. On watercraft which are used intermittently such as cranes, dredges and ship to shore lighters, the log will be kept only when the unit is in operation.

4.2.7.7. For permanently moored vessels such as pontoon piers and dock barges, the person in charge of the vessel will annotate the log and briefly state its condition at regular intervals not to

exceed 30 days, upon examination or receipt of acceptable information on the marine equipment within his/her jurisdiction.

4.2.8. Maintenance of AFTO Form 17(s). These instructions are to be followed as closely as possible. However, due regard should be given to any special circumstances which may render a departure from these instructions necessary to meet the requirements of local application.

4.2.8.1. Front Cover. Front:

4.2.8.1.1. "From": Date the log was newly initiated.

4.2.8.1.2. "Boat Number": Air Force designator.

4.2.8.1.3. "To": The date of the last entry of the log upon completion. (Fill in only when this log is to be closed out and another initiated.)

4.2.8.2. Front Cover. Inside:

4.2.8.2.1. "Commonly Used Radio Frequencies": Self-explanatory.

4.2.8.2.2. If new log is a continuation, copy remainder of information from the previous log, updating where appropriate.

4.2.8.2.3. If vessel has been transferred from another station, enter local data.

4.2.8.3. General Data. Page ii:

4.2.8.3.1. "VESSEL": Masters of self-propelled vessels shall fill in all blocks.

4.2.8.3.2. "VESSEL": Persons in charge of non-selfpropelled vessels shall fill in the top line and enter "N/A" in all nonapplicable blocks of the second line, with these exceptions:

4.2.8.3.2.1. For cargo barges, the block for "Speed", under the heading "Maximum Limits", shall be ruled out and the letters "MGT" printed in. The figure for the Maximum Gross Tonnage (MGT) (in long tons) allowance for the barge will be entered.

4.2.8.3.2.2. For crane barges, "MLC" shall be substituted in the same block and the Maximum Lifting Capacity (MLC) (in long tons) with the boom at the optimum angle entered.

4.2.8.3.2.3. For dredges, the letters "SPD" shall be substituted in the same block and the suction pipe diameter (SPD) (in inches) shall be entered.

NOTE:

For sectional cargo barges, the gross tonnage allowance per section will be used. Disregard duck-bill and skegg sections or "made-up" allowances.

4.2.8.3.3. Masters of self-propelled vessels shall fill in all appropriate blanks under the caption "Engines".

4.2.8.3.3.1. On single engine vessels, use the subhead "Center".

4.2.8.3.3.2. On vessels with portable propulsion units ("Sea Mules", outboard engines, etc.) use the subhead "Center".

4.2.8.3.3.3. Vessels dependent on towing for mobility and having fixed power units aboard, will use either the appropriate subhead blocks or rule them out and use Roman numerals, numbering from forward to aft.

NOTE:

“Self-Propelled” within this instruction shall exclude vessels capable of limited low speed self mobility, but which normally use another vessel to move it from one location to another.

4.2.8.3.4. The caption “Generators” is applicable to all vessels with fixed equipment aboard.

4.2.8.3.4.1. The block sub-headed “Lifting Gear Capacity” shall be filled in for all vessels with towing reels, capstans, power davits (lifeboat or cargo) or cargo booms. Exceptions are crane barges which shall utilize this block for noting the maximum long ton capacity of the whip (when so equipped) with the boom at the optimum angle.

4.2.8.3.4.2. For single lift cranes insert the letters “N/A”.

4.2.8.3.5. The "REMARKS" block will be used to record configuration changes to the vessels main or auxiliary engine or equipment changes which would alter any of the basic data required under the "VESSEL," "ENGINES" or "GENERATORS" headings.

4.2.8.3.5.1. Entries will briefly state cause, reason and authorization for change with date change was completed; i.e., "Port main engine burned out - caused by excessive sea weed clogging sea-strainer (both sides). Overheating of engine not noted due to operation in progress. Date and sign.

4.2.8.3.5.2. After the narrative statement enter all pertinent information in the same order and titled as in the appropriate blocks above. Date and sign.

4.2.8.3.5.3. No entries under the "GENERAL DATA" headings will be changed or ruled out; i.e., incorrect entry under "VESSEL," Block 2, "Length 14'6", Beam 58'4" should be entered correctly under "REMARKS". "Length" block under "VESSEL" should read 58'4". "Beam" block should read 14'6"; date and sign.

4.2.8.4. Page iii. This page will be used as previously noted. A further use of this page can be made for brief narrative description of "items-of-interest," concerning characteristics of the vessel or its machinery and not properly fitting elsewhere in the log.

4.2.8.5. Pages iv through ix. All masters of vessels and chief engineers are required to be fully conversant with all of the material contained on these pages.

4.2.8.6. Page 1. Beginning with page 1, all entries made in the AFTO Form 17 become the permanent historical record of the vessel. Therefore, all entries must be made in a timely, accurate and concise manner. The Master of the vessel makes all decisions regarding which events are entered in the log. All groundings or events of any kind involving damage to the vessel shall be entered. A "page" of the AFTO Form 17 consists of both the left and right hand pages when the book is opened. A new page will be started each day the crew is on duty, whether for ship's maintenance or under way, except as noted previously. The following instructions are to be used as guidelines when making entries in the log:

4.2.8.6.1. Time. Enter local time of entry in log.

4.2.8.6.2. MISSION, DEPARTURE POINT, ETC. Enter all pertinent data as to work done aboard ship, missions run, weather conditions special personnel aboard etc. Note all official radio reports made. In the event of an incident requiring a special "Incident Report," enter position, course, speed, prevailing weather and time when the incident occurred.

4.2.8.6.3. DEP., ARR., TET (Total Elapsed Time), MILES RUN. Self explanatory; use only when underway or for dock trails.

NOTE:

The sum of TET and MILES RUN columns will be entered in the appropriate blocks.

4.2.8.6.4. CONDITION OF THE VESSEL. This block will be left blank when the vessel is fully operational. When a condition exists that adversely affects the safety or operational capability of the vessel, the following symbols will be entered:

4.2.8.6.4.1. RED X. This indicates that some known serious condition or problem exists which renders the vessel unseaworthy.

4.2.8.6.4.2. RED HORIZONTAL DASH. This indicates that a required inspection, although due, has not been completed. This symbol also implies that the "Condition of the Vessel" is unknown and that a "Red X" condition may exist. The vessel will be considered as "Nonoperational," until the "CLEARED" or "EXCEPTIONAL RELEASE" lines are signed.

4.2.8.6.4.3. RED DIAGONAL LINE. This indicates that known defects or the need for maintenance exists. The vessel will be considered as "Nonoperational," until the "CLEARED" or "EXCEPTIONAL RELEASE" lines are signed.

4.2.8.6.4.4. When a regular inspection reveals that a condition or problem exists which affects the safety of the vessel and which cannot be immediately corrected, one of the above listed symbols will be entered in the "CONDITION OF THE VESSEL" block. Conditions which cannot be immediately corrected, will be recorded in the "Delayed Discrepancies" pages at the end of the AFTO Form 17. The date, nature of the condition, corrective action(s) and other pertinent data will be entered, with an estimated date for a "CLEARED" entry. The next entry will be the date the condition was corrected, how it was done (replaced engine, repaired unit) etc.

4.2.8.6.4.5. The authority for signing the EXCEPTIONAL RELEASE line in the "CONDITION OF THE VESSEL" block is vested in the responsible Commander or the Master of the Vessel.

4.2.8.6.4.6. The authority for signing the "CLEARED" line in the CONDITION OF THE VESSEL block is vested in the assigned Master of the vessel and will be signed when conditions warranty.

4.2.8.6.5. INSPEC COMP. Self explanatory. A check in the "NO" block must generate an appropriate symbol in the "CONDITION OF THE VESSEL" block.

4.2.8.6.6. TEH. TOTAL ELAPSED HOURS. Self explanatory.

4.2.8.6.7. MAIN ENGINE HOURS. Applicable to self-propelled vessels only.

4.2.8.6.8. AUXILIARY ENGINE HOURS. Applicable to all vessels with power units aboard, either fixed in place or portable.

4.2.8.6.9. FUEL. Enter total gallons of fuel aboard whenever an engine (main or auxiliary) is started, in "START" block. Enter total gallons of fuel aboard when all engines (main or auxiliary) are stopped in "FINISH" block. Enter total amount of fuel expended in "EXPEND" block.

NOTE:

On those vessels having an engine(s) in continuous operation, use the "START" and "FINISH" block entries at convenient 24-hour intervals; i.e., 0800 hrs - 0759 hrs, etc.

4.2.8.6.10. OIL. Same as for "FUEL" entries.

NOTE:

Oil already in engine(s) will not be considered in the entries.

4.2.8.6.11. NEXT PERIODIC INSPECTION DUE. Enter the cumulative hours since last inspection, as outlined on pages iv through vii in the AFTO Form 17.

4.2.8.6.12. OIL CHANGE DUE. See inside of back cover and make appropriate entries in blocks provided.

4.2.8.6.13. DATE HAULOUT DUE. Enter appropriate date carried forward from date of last haul-out as applicable to type of vessel, in accordance with [Chapter 2](#).

4.2.8.6.14. NAME & GRADE AND DUTY. Enter last name, initials, grade and duty of all personnel aboard the vessel, whether assigned as crew or as authorized passengers, listing crew by seniority of duty first.

4.2.8.6.15. MASTER'S SIGNATURE. Upon completion of each dated page, the Master of the vessel will affix his payroll signature in ink. This will confirm that all entries made in the log are true and correct to the best of his knowledge.

NOTE:

If more than one numbered page is used on a given date, each of the pages for the same date will be signed by the master.

4.2.8.6.16. MASTER. Enter last name, initials and grade of assigned Master of the vessel.

4.2.8.6.17. DATE. Print clearly the day of the month, the month (standard 3 letter abbreviations will be used) and the year; e.g., 17 Mar 98.

NOTE:

Julian dates; e.g., 96077 and numeric abbreviations, e.g., 17/3/76, WILL NOT be used.

4.2.8.6.18. TIME, etc. Continued from other side of page.

4.2.8.7. Delayed Discrepancies. (pages 81- 87). See paragraph [4.2.8.6.4.4](#).

4.2.8.8. Inside back cover. See paragraph [4.2.8.6.12](#).

4.3. Incident Reports. It will be the responsibility of the Master of the vessel to report all groundings, accidents, incidents or occurrences of any kind involving damage to the vessel, through chain of command by quickest means available, to HQ AFSPC/LGTV. An immediate oral report, followed by a written "INCIDENT REPORT", will be prepared and forwarded through command channels, as soon as possible. Written reports will contain adequate information concerning the incident to determine the probable extent of damage to the vessel. Oral reports will include vessel designator and pertinent details. Written reports will include the vessel designator, position, course, speed, weather prevailing at time of incident, time incident occurred, date, total time vessel was aground, type of bottom where grounding occurred, narrative description of how ground incident occurred, how vessel was refloated, observed and estimated damage to hull (above and below waterline) and underwater gear, seaworthiness and necessity for immediate haul-out and inspection.

Chapter 5

STORAGE, INSPECTION AND PREPARATION PROCEDURES

5.1. Purpose. The purpose of this chapter is to provide personnel responsible for the storage, inspection and preparation of Air Force watercraft with technical information which will permit maintenance of equipment in open or closed storage for specified periods of time.

5.2. Responsibility. It will be the responsibility of the local maintenance officer to ensure proper protection of base-assigned boats in storage, including the establishment of a program for periodic inspection.

5.3. General Instructions:

5.3.1. Whenever complete boats are withdrawn from service for storage requiring preservation for future return to service or other disposition, the instructions for such special storage will specify compliance with the provisions outlined herein. The wide variety of equipment assigned to the Air Force precludes the possibility of covering every phase of storage procedure in this instruction. For more detailed information, it will be necessary to consult appropriate technical data covering the particular boat being stored.

5.3.2. Normally, watercraft up to and including an overall length of 40 feet will be placed in covered storage when space is available. However, open storage can be utilized as necessary at the discretion of the local maintenance officer. Watercraft placed in open storage will be covered with heavy canvas.

5.3.3. Storage, inspection and preparation procedures pertaining to marine engines will be in accordance with the appropriate technical data.

5.4. Types of Storage:

5.4.1. Type "A" Storage. Boats placed in short-term storage for a period of 7 days or less. (Available for service within 24 hours.)

5.4.2. Type "B" Storage. Boats placed in storage for a period of 30 days or less. (Available for service within 7 days.)

5.4.3. Type "C" Storage. Boats placed in storage for an extended period which exceeds 30 days. This typically includes those vessels removed from service for off-season storage.

5.5. Haul-Out and Hull Inspection:

5.5.1. Haul-Out:

5.5.1.1. Haul-out vessels on facilities adequate to allow the vessel to rest in a well supported position in order to prevent any twisting, sagging or hogging. Accomplish inspection and load testing of lifting equipment (elevator, hoist, slings, shackles, bolts, rings, etc.) periodically in accordance with current directives.

5.5.1.2. Marine Railway Handling. If the original cradle designed for the vessel being hauled out is not available, the marine railway car shall have satisfactory blocking constructed to carry the load of the vessel equally on the keel and chines.

5.5.1.3. Lift-Handling (Crane or Derrick). If lift-handling is available, care will be taken that the crane or derrick is of ample capacity to handle the boat and cradle at the necessary operating radius of the crane or derrick. It is absolutely essential that boats 50 feet or more in length be lifted in a suitable sling cradle arrangement. Boats under 50 feet in length may be lifted on suitable slings. Wooden cradles shall be ballasted sufficiently to allow them to sink when placed in the water, thus allowing the boat to be hand-walked into its cradle. Ensure lifting crane or derrick is of ample capacity and that gear is in serviceable condition before boat is hauled out.

5.5.1.4. Cleaning. Immediately upon removal from water, thoroughly wash down and clean the bottom of the boat by means of suitable brushes, scrapers and an adequate supply of fresh water. Remove all underwater growth, barnacles, rust, scale and loose paint.

5.5.2. Hull Inspection:

5.5.2.1. Steel Hull Inspection. Inspection after the bottom is thoroughly washed down shall include the following:

5.5.2.1.1. Check welded steel hulls for weld breaks, rust, scale, pitting, corrosion, electrolysis and worn or damaged plates. Check along seams, in particular, for breaks.

5.5.2.1.2. Check riveted steel hulls for loose or pitted rivets.

5.5.2.1.3. Check steel plates for thickness (drill test holes where necessary).

5.5.2.1.4. Check the entire length of the hull for corrosion--the waterline area in particular. This area of the hull is subject to the full effect of salt air and water deterioration.

5.5.2.1.5. Check bottom area adjacent to propeller for indication of deterioration due to propeller cavitation.

5.5.2.2. Aluminum Hull Inspection. Inspection, after the bottom is thoroughly washed down, shall include the following:

5.5.2.2.1. Check welded aluminum hull for weld cracks, scale, pitting, corrosion, electrolysis and worn or damaged plates. Check along seams, in particular, for cracks.

5.5.2.2.2. Check the entire hull for areas where paint has been scraped or knocked off for electrolysis damage and corrosion.

5.5.2.2.3. Check aluminum plates for thickness (drill test holes where necessary).

5.5.2.2.4. Check bottom area adjacent to propeller(s) for indication of deterioration due to propeller cavitation.

5.5.2.3. Plastic Hull Inspection. Inspection, after the bottom is thoroughly washed down, shall include the following:

5.5.2.3.1. Check entire hull for cracks or damage to hull.

5.5.2.3.2. Check underwater metal running gear, propeller(s), struts, shaft(s) and rudder(s) for damage, electrolysis and corrosion.

5.6. Wet Storage:

5.6.1. Selecting A Wet Storage Location:

5.6.1.1. Shelter From Elements. The locations selected should be sheltered from excessive currents, waves, ground swells and high winds. Permanent moorings should be placed where the bottom affords good holding ground and where vessel will have room to swing.

5.6.1.2. Depth of Water. Water must be of sufficient depth to ensure water under the keel at all times. Due allowance should be made for the maximum depth of wave troughs at dead low tide. The bottom should be searched for rocks, old piling or other objects which might be present.

5.6.1.3. Marine Growths and Animals. Wooden vessels, unless metal sheathed or specially painted, should not be placed in wet storage in waters infested by the teredo or other boring worms. Tropical and subtropical waters always harbor such worms. Waters above the 30th degree of latitude are less apt to be dangerous; however, the teredo is prevalent on the Pacific coast up to Alaska. The polluted waters of harbors generally support less marine growth than clear, clean waters. Industrial pollution may cause other deteriorate conditions.

5.6.1.4. Ice Conditions. Vessels will not be stored in waters which will freeze over unless specially protected for such conditions.

5.6.1.5. Sun and Heat. Wooden vessels stored in the sun or in hot, dry climates are apt to shrink badly and dry- out excessively. Shrinkage should be counteracted by wetting down decks, superstructure and topsides frequently when it is impractical to adequately shelter such vessels from the sun.

5.6.2. Moorings, Lines and Chafing Gear. The following is set forth for the general guidance of operating activities; complete coverage of all possible conditions is impractical. Refer to applicable technical data.

5.6.2.1. Permanent Moorings. Permanent moorings should consist of a mushroom anchor or concrete monolith of sufficient weight and with suitable chain, pennant and gear. Permanent moorings will be raised at least once each year for inspection and necessary repairs. Kedge, stockless or navy type anchors will not be used for permanent moorings.

5.6.2.2. Dockside Mooring Lines. Mooring lines will be of sufficient length to allow the vessel to rise and fall with the tide. Where the rise and fall of the tide is excessive, special arrangements may be necessary.

5.6.2.3. Chafing Gear. Vessels at individual moorings require little chafing gear. Metal mooring buoys not taken on board may be fitted with rope bumpers to prevent scarring hulls of vessels. Vessels moored at dockside or in banks at dockside must be carefully protected by chafing gear. Log fend offs and fenders or bumpers of woven fiber rope, old fire hose, old hawsers, woven canvas, corkfilled canvas, old rubber tires, old cork life preservers, saplings, etc., may be utilized. No spikes, tie rods, timbers or similar objects should protrude from the dockside which might injure the vessel. Log fend-offs are logs or heavy timbers floated between the vessel and pier and so fastened that they may rise and fall with the tide, thus preventing vessel from riding against piling or pier timbers.

5.6.2.4. Vermin Guards. Rat guards, wire mesh screening and other shields or devices to prevent entry of rodents and other vermin will be used wherever affective protection can be accomplished.

5.6.3. Preparation of Hull for Wet Storage. A clean vessel which drains properly and is well ventilated will be easy to maintain while in storage.

5.6.3.1. Dry-Docking. All vessels will be dry-docked prior to being placed in wet storage, unless recently dry-docked and serviced. (Refer to **Chapter 2** for required periodic haul-out and bottom inspection). While in dry-dock the following work will be accomplished:

5.6.3.1.1. Inspect the entire underwater body inside and outside. Correct any structural deficiencies such as broken or worn planking or wasted plates.

5.6.3.1.2. Renew all zinc plates as needed.

5.6.3.1.3. Clean all sea chests, sea valves, strainers, scuppers, overboards or openings which penetrate the hull below the main deck; put in good condition and close.

5.6.3.1.4. Open, inspect, repack if necessary and then tighten propeller shaft stuffing box.

5.6.3.1.5. Thoroughly clean the underwater body of all marine growths, scale, rust or loose paint.

5.6.3.1.6. Inspect and caulk seams of wooden vessels.

WARNING: *Paints, primers, lacquers and varnishes must be handled carefully and used only in a well ventilated approved area. Avoid prolonged breathing of vapors. Avoid eye and repeated skin contact. Keep away from sparks and flames.*

5.6.3.1.7. Apply at least 1 coat of anti-fouling paint on bottom of wooden vessels without metal sheathing. Do not paint vessels completely sheathed with copper but inspect the copper to ensure that no openings exist. Inspect and paint vessels completely sheathed with galvanized sheet steel, as specified below for steel hulls.

5.6.3.1.8. Treatment of steel vessels to be placed in extended wet storage will be governed by the actual condition of the vessel as well as the date of the last haul-out and painting. Further, should the projected period in storage extend beyond the next regularly scheduled haul-out, this fact must be taken into consideration when determining to what extent treatment is to be accomplished. Buff the underwater body as necessary and apply 2 coats of anti-corrosive paint on all exposed surfaces. Then apply 1 coat of anti-fouling paint to the entire underwater surface. Treat the exposed surfaces above the waterline with 2 coats of zinc chromate, then paint the entire surface above the waterline with 2 coats of regular paint. Also treat all propellers, exposed shafting, struts, rudders, pintles, stocks and other appendages of ferrous metal as required.

5.6.3.2. Removals and Cleaning. Remove and store separately all portable equipment, spare parts, tools, deck gear, instruments, utensils supplies, stores, etc., except fire fighting equipment. Clean the interior of the vessel from stem to stern. Use insecticides where required. Remove all scrap, dirt and foreign matter from all parts of the vessel. Thoroughly clean the bilges and free all limbers, scuppers, etc. Thoroughly clean, then neutralize and gas-free bilges if fuel or other inflammable liquids have been allowed to accumulate in the bilges (or other locations). Remove all scale, rust and loose paint.

5.6.3.3. Tanks and Bunkers:

5.6.3.3.1. Clean, drain and dry all tanks. Empty, clean and gas-free all tanks, paint lockers or other containers of fuel or inflammable liquids or gases (including liquid barges). Test to ensure safety or remove from the vessel.

5.6.3.3.2. Remove all solid fuels from the vessel. Clean and wash down all bunkers or other containers.

5.6.3.4. Piping Systems. Drain all piping systems and those parts of machinery or equipment to which they are attached, except the hydraulic system of the ship's telemotor and refrigerant piping (if any). Do not leave water or other liquid in any toilet, pipe, fixture, machine or appliance which would promote corrosion or which might freeze. If it is impossible to drain any system completely, add anti-freeze compound to the water remaining to give adequate protection for expected temperatures. Tightly close all sea valves, cocks, overboard valves, etc.

5.6.3.5. Drainage. Ensure that all parts of the vessel will drain to the bilges or overboard. Provide scuppers, limbers or other means of drainage for low spots, pockets or depressions as necessary.

5.6.3.6. Ventilation. The importance of proper ventilation of vessels in storage cannot be over-emphasized. Proper ventilation will do more to prevent corrosion in steel vessels and rot in wooden vessels than any other factor. The following procedure will be utilized for ventilation:

5.6.3.6.1. Secure all interior doors, hatches, manholes, scuttles and openings of any sort in the open position to ensure the free circulation of air to every compartment, cupboard, locker or enclosure of the vessel. Lift and stow on edge floor boards or floor plates to ensure ventilation of bilges. No compartment or pocket of the vessel will be isolated.

5.6.3.6.2. Test all doors, hatches, manholes, scuttles, hinged ports, ventilators, etc., leading from interior to exterior for water tightness and close. Leave certain openings as necessary to ensure that every compartment of the vessel is adequately vented to the outside air, either directly or through another compartment. Arrange such openings so that rain or spray will not enter. Use shields, covers or baffles on large vessels. Covers constructed of a ridge pole and slats covered with canvas or asbestos roofing may be constructed over openings or over an entire small vessel. Such covers allow ventilation and still protect the vessel from rain, snow and sun. Do not sacrifice ventilation to prevent entry of rain or snow. Rain or snow are preferable to poor ventilation, provided no machinery, equipment, upholstery, etc., is allowed to get wet.

5.6.3.7. Make suitable arrangements to pump the vessel's bilges. Ensure such arrangements will be of sufficient capacity to keep the vessel afloat in case of damage to the hull and will have a capacity no less than that of the main bilge pump of the vessel.

5.6.4. Hazards and Precautions. Outlined below are the principal hazards to vessels in storage and the precautions to be taken:

5.6.4.1. Fire. Clean the vessel thoroughly and dispose of paper, rags, waste, etc. Clean tanks and bunkers. Maintain adequate fire extinguishers, which will be filled, inspected, recharged periodically and ready for use. Ensure adequate shore-mounted firefighting equipment is available. Do not allow smoking, hot work or other ignition sources in the vicinity of stored vessels.

5.6.4.2. Sinking. Secure moorings in deep water free from obstructions. Close valves and sea connections. Ensure there is no leakage past the propeller shaft gland. Ensure adequate bilge pumping facilities are available. Ensure mooring tackle, king posts, cleats and/or bollards on vessel and pier are adequate.

5.6.4.3. Ensure adequate ventilation, proper painting and adequate drainage are provided to prevent corrosion and rot.

5.6.4.4. Pilferage. Do not allow unauthorized personnel on or near the vessel. Adequately guard or lock up the vessel.

5.6.4.5. Inclement Weather. Activities maintaining vessels in wet storage will arrange to get advance warning of inclement weather from U.S. Coast Guard, Navy or Weather Bureau Stations. Inspect vessels in wet storage prior to expected inclement weather to ensure adequacy and soundness of moorings, mooring lines, cleats, king posts, chafing gear, etc. Apply additional tackle if winds in excess of 50 MPH are expected. Close openings not needed for minimum ventilation requirements. Check and make fast all gear. Pump bilges. Check anti-freeze protection.

5.7. Dry Storage:

5.7.1. Selection of Dry Storage Location. All vessels will be stored on firm, level ground where possible with precautions taken to prevent settling of the vessel. Where vessels are stored on sloping ground, they will be blocked so their water lines are horizontal to ensure proper drainage. Storage locations will be sheltered from high winds as much as possible.

5.7.1.1. Sun and Heat. The effect of sun and intense heat is not as harmful to steel vessels as it is to wood vessels as long as they are well ventilated. Wooden vessels will be protected from intense sun and the glare reflected from hard dry ground. The best location for small craft storage is under sheds, trees or improvised shelters and preferably where there is thick grass or weeds. Such weeds or grass should not be destroyed but should be encouraged up to a height of approximately 12 inches. Foliage will not be allowed to engulf vessels or to become high or thick enough to create a fire hazard during dry weather.

5.7.1.2. Fire fighting equipment will be available at locations selected.

5.7.1.3. Wetting Down Wooden Vessels. The planking and timbers of wooden vessels will shrink badly upon drying out if stored dry for long periods. Hulls will be floated for several days and topsides, decks and superstructure wetted down annually. If signs of shrinkage appear between these annual treatments, the entire vessel will be hosed down to allow the wood to absorb water. Water may be retained in small quantities inside the hull for brief periods to allow swelling, provided care is exercised not to strain the hull due to weight of the water.

5.7.2. Blocking and Cradles. The basic principles of proper blocking of vessels for storage are as follows:

5.7.2.1. The structural members of vessels are designed to take the load of the vessel afloat as the weight of the vessel and all its machinery and equipment is supported by water pressure on the entire underwater portion of the vessel. Thus, the load is widely distributed and the strain to which any member is subjected is relatively small. Proper blocking can give support similar to that given in the floating position. Thus, it follows that many supports well distributed are preferred to fewer, stronger supports which allow concentrated loads on parts of the vessel.

5.7.2.2. Hauling cradles built for specific vessels are usually intended to support the vessel during the hauling operation only. Vessels which are to be stored in such cradles will be adequately blocked in addition to the support furnished by the cradle.

5.7.2.3. Docking plans of affected vessel will be utilized where necessary for planning and preparing storage arrangements.

5.7.2.4. Blocking will consist of keel blocks, bilge blocks and shores.

5.7.2.5. The longitudinal distribution of blocking will support all parts of the vessel. Supports will be spaced more closely under those parts of the vessel in which heavy items are installed. Main engines, boilers, generators and masts are examples of such weights. Care will be used in placing and shimming keel blocks to ensure support all along the keel. Keel blocks will be so arranged that the waterline of the vessel is horizontal. Block all long, unsupported spans or overhangs. The line of the keel will be sighted and measured to ensure straightness or proper curvature according to the vessel's plans.

5.7.2.6. The decks of vessels will be shored and braced beneath heavy equipment such as large winches, towing engines, etc. Such loads will be transmitted through suitable supports to structural members of the ship which are in turn adequately braced by keel or bilge blocks immediately below such supports.

5.7.2.7. Jacks and wedges will be used freely in blocking vessels, but care will be used to avoid straining any part of the vessel unduly by jacking or wedging.

5.7.2.8. Rudders of all large vessels and propellers and shafting of large twin screw vessels will be supported.

5.7.3. Preparation of Hull for Dry Storage. Use procedures recommended for preparation of hull for wet storage for hulls being prepared for dry storage with the following additions and exceptions:

WARNING: Paints, primers, lacquers and varnishes must be handled carefully and used only in a well ventilated approved area. Avoid prolonged breathing of vapors. Avoid eye and repeated skin contact. Keep away from sparks and flames.

5.7.3.1. Paint or "touch up" bottoms of wood vessels with anti-fouling paint only to the extent that no bare wood is left unprotected. This procedure applies to vessels in Types "A", "B", and "C" storage.

5.7.3.2. Paint bottoms of steel vessels with 1 coat of anti-corrosive paint.

5.7.3.3. Leave sea valves open to promote drainage.

5.7.3.4. Loosely assemble propeller shaft stuffing boxes.

5.7.3.5. Remove existing hull drain plugs or drill holes not less than 3/4 inch not more than 1 1/2 inches in diameter through the hull at the lowest point or points in each watertight compartment. On steel hulls, weld a double plate of suitable thickness to the outside of the hull at location of the proposed hole. Drill hole through hull and double and tap from the inside to receive a pipe plug. Ream finished holes in carvel-planked wooden hulls to receive a softwood plug. Do not drill holes in clinker-built vessels or in vessels with plywood hulls. For such vessels, other arrangements will be made for removing accumulated water. From interior, mark all holes permanently and prominently to preclude the possibility of launching the vessel without plugging the holes. Shelter small vessels with a cover consisting of a ridge pole and slats covered with canvas or roofing material. Do not allow such covers to interfere with ventilation. Similar covers may be constructed over large openings or other parts of larger vessels susceptible to weather. Open boats may be stored bottom side up.

5.7.4. Maintenance While in Dry Storage: WARNING: It is absolutely essential that bilges be kept clean. Dirty bilges and/or gasoline fumes are dangerous.

5.7.4.1. Inclement weather:

5.7.4.1.1. Activities maintaining vessels in open, dry storage will arrange to get advance warning weather from U.S. Coast Guard, Navy or Weather Bureau stations. Inspect vessels in dry storage prior to expected inclement weather to ensure soundness of blocking and shores, adequacy of anti-freeze precautions, of covers and lashings and closure of openings normally left open. Winds of hurricane force have been known to exert enough pressure on the side of a vessel to cause wedges under shores to drop out, thus leaving the vessel liable to turning over on its blocking.

5.7.4.1.2. Immediately after inclement weather, inspect vessels for soundness of blocking and shores, condition of covers and lashings and evidence of freezing. Remove covers over openings to allow complete airing of the vessel. Do not leave vessels so opened unattended. Check vessels for accumulations of undrained water or snow.

5.7.4.2. Scheduled Inspections:

5.7.4.2.1. During periodic inspections, make a careful check of blocking and shores. Sight and measure the keel line to ensure proper alignment of keel blocks and freedom from settling. Check covers for adequacy of protection, soundness of lashings and to ensure proper ventilation. Covers and all openings normally closed will be opened for several hours at least once a month to thoroughly air the vessel. Check vessel for evidence of shrinkage, rot, corrosion, poor drainage, excessive condensation or poor ventilation. Check the condition of paint, protective films, seals, wrappings, etc. Wet down vessels showing signs of shrinkage.

5.7.4.2.2. Include necessary repainting and also reprocessing of machinery and equipment in semiannual inspections. These semiannual overhauls should be performed in the fall and spring so differences in arrangements for summer and winter storage (such as anti-freeze precaution, additional covers for winter weather, etc.) may be accomplished.

5.8. Preparation and Maintenance of Machinery and Equipment. The general preparation and treatment of boats and accessories outlined herein will be accomplished for each type of storage defined in paragraph 5.4. Following is a list of basic principles which will be considered when processing machinery and equipment for storage:

5.8.1. Finished surfaces of ferrous metal invariably require protection.

5.8.2. Exposed threaded fastenings and pipe fittings should always be processed to prevent corrosion and freezing.

5.8.3. Lubricating oils and greases are not adequate protection against corrosion. Corrosion-preventive compound should be used.

5.8.4. Fuels almost always contain corrosive substance.

5.8.5. Petroleum products rot rubber and deteriorate electrical insulation.

5.8.6. Nameplates, finished surfaces, electrical contacts, threaded fastenings, valve stems, match markings, assembly markings or any parts which move past other parts with close clearances should never be painted over.

5.8.7. Encrustations of dirt, scale, salt, grease, etc. are always sources of corrosion even when coated.

5.8.8. Mating surfaces which move in relation to each other and which cannot be fully coated with a preservative without disassembly, should be lubricated with a rust-inhibiting oil or grease and moved periodically to work the lubricant over all parts of the surfaces.

5.9. Type "A" Storage:

5.9.1. General Instructions:

5.9.1.1. Boats in Type "A" storage will be maintained in serviceable operating condition including compliance with all "Immediate Action", "Urgent Action" and "Routine Action" technical data and such modifications as are specifically directed by HQ AFSPC/LGTV or other authorized offices. Boats in Type "A" storage are to be available for service within 24 hours after receipt of movement instructions.

5.9.1.2. Ordinarily boats to be placed in Type "A" storage will be hauled out if 12 months or more have elapsed since the last haul out. If more than 12 months have elapsed, it may not always be necessary to remove the boat from the water. Local conditions, such as climate, type of water, amount and character of industrial pollution or freedom from it; whether boat has been anchored or docked in a strong current or no current, have a pronounced effect on retarding or accelerating marine growth on hull bottom or deterioration of bottom paint. If competent authority has established routine haul outs can be safely extended to longer periods than 12 months due to local conditions, these findings will govern. Boats that are considered not in serviceable condition will be hauled out as soon as possible.

5.9.2. Hull Inspection. Refer to paragraph 5.5.2.

5.9.3. **Underwater Gear** . When boat is hauled out, inspect all underwater gear as outlined herein. If the boat is not to be removed from the water, the inspection will follow such procedure as may apply.

WARNING: Paints, primers, lacquers and varnishes must be handled carefully and used only in a well ventilated approved area. Avoid prolonged breathing of vapors. Avoid eye and repeated skin contact. Keep away from sparks and flames.

5.9.3.1. Check propellers for bending, nicks, pitting and cracks. Propellers should be in serviceable condition and of recommended diameter and pitch as indicated by applicable technical data covering the boat being stored. Remove all rust, scale or loose paint and paint all portions except bore, counterbore and keyway with 1 coat of appropriate primer and 1 coat of anticorrosive paint on propellers of ferrous metals. Do not paint bronze propellers. Thoroughly clean bore, counterbore and keyway and coat with anti-corrosive compound on both of above types. Ensure continuity of protective film by periodic inspections.

5.9.3.2. Check propeller shafts by rotating by hand. Note any defective conditions which may develop indicating that shaft has been sprung or bent. Note condition of bearing area to see that it is not badly scored. Shafts should be in serviceable condition insofar as straightness, bearing areas, tapers, keyways and threads are concerned. If shaft is steel, it will be thoroughly cleaned and coated with rust-preventive compound for protection from corrosion while boat is out of water.

NOTE:

Protect rubber bearings from oils and/or greases. The propeller nut shall be fitted with fairwater cap filled with tallow. Be sure to check the rubber gasket between propeller and bronze bearing sleeve. Seal with a mixture of white lead and linseed oil. When checking shaft on boat equipped with rubber bearing, be certain to lubricate bearing before turning by pouring water only through grooves.

5.9.3.3. Struts and bearings shall be in serviceable condition and in alignment with propeller shaft. Check strut mounting pad bolts for tightness and leaks, as well as for rotting of planking and doublers.

5.9.3.4. Rudders should be in serviceable condition. Check for fore and aft and lateral bending or distortion. Inspect blade for porosity and metal fatigue (pits or cracks). Check the correct alignment of the blades with the bridge indicator. (On craft with indicator installed). Examine fastenings on rudder stuffing boxes for tightness and inspect for rot condition around boxes. Check to see that rudder stock fits box properly. Inspect rudder stuffing boxes for leaks and condition of packing.

5.9.3.5. Underwater Hull Fittings. Inspect all intake scoops and outlets to see that they are securely fastened, free from obstructions and in serviceable condition. Check all seacock outlets and through hull connections in the same way. Make an inspection for rot conditions around all underwater fittings. Examine zinc blocks for condition and replace if necessary. Check all shafts, struts, rudders and underwater hull fittings for evidence of electrolysis.

5.9.3.6. Shaft Logs. Check shaft log for tightness to hull and note condition of gasket. Check rubber neck stuffing box connector hose and clamps for condition. Inspect stuffing boxes for leaks and check condition of packing.

5.9.4. Engines. Refer to applicable technical data on engines.

5.9.5. Angle Drive and Reduction Gear. Check gear box oil tank to see that oil is maintained at correct level. Check all connections and lines for leaks. Examine oil strainer element and replace if necessary. Check oil system to see that it is operative. See that tank vent is free from obstruction. Check heat exchanger installation as indicated in applicable technical data covering the boat being stored. Check universal joints on drive shaft assembly for condition and lubricate if required and check for alignment. Check leads to gages for leaks and verify gages are operative and accurate.

Inspect steering system for proper operation, checking for wear, misalignment, binding or looseness of individual parts. See that all parts are properly lubricated. If there is more than one control position aboard the boat, see that all wheels coincide at marked midship position.

5.9.6. Engine Controls (Spark, Throttle, Heat, Etc.)

5.9.6.1. Manual. Where manual controls are used, check for smooth, positive operation and see that they are properly lubricated, adjusted and securely fastened in place.

5.9.6.2. Hydraulic. Hydraulic controls will be checked for proper operation. See that the proper level of fluid maintained in reservoir and all tubing and connections are free from leaks. Make all necessary adjustments and lubricate as required. Check for synchronization if more than one unit is installed.

5.9.7. Clutch Control:

5.9.7.1. Manual. If manual controls are installed, check for smooth, positive operation. Make all adjustments and lubricate as required.

5.9.7.2. Electric-Hydraulic. If electric-hydraulic system is installed, see that system is working properly. Check all electrical components to see that they are in good condition and properly adjusted and all electrical connections are tight and free from corrosion. Check hydraulic system to see that proper fluid level in reservoir is maintained and all tubing, fittings and connections are tight and free from leaks. Check pump, relief valve and actuating cylinder for proper operation and adjustment and see that strainers are clean.

5.9.8. Fuel System. Before boat is hauled out, inspect all deck tank filler caps to see that they fit properly and are tight. Check all tank vents to see that they are free from obstruction and are working properly. Examine all tanks to see that they are securely fastened in place. Check all lines, connections and valves to see that they are tight, free from leaks and in operative condition. In installations, including wobble pumps or electric pumps, check to see that all parts are operative and free from leaks. Inspect all strainers and see that they are clean and in serviceable condition. Check fuel gages for operation, freedom from leaks and accuracy. After inspection is completed, all fuel will be removed from system, observing all possible precautions for prevention of fire or explosion.

WARNING: If any odor of gasoline persists, check all points of system thoroughly until source of odor is located. Take necessary action to eliminate source of fumes.

5.9.8.1. Self-Sealing Fuel Cells. Spray cell interiors thoroughly with a light lubricating oil. Use only enough oil to completely cover interior surfaces without forming pools of oil inside on the bottom of tank.

5.9.8.2. Metal Fuel Tank. If interior of tank is easily accessible through hand hole plate so all interior surfaces can be covered, spray thoroughly with a light lubricating oil. If interior of tank is not easily accessible, interior surfaces will be protected by flushing with a light lubricating oil. Tanks will be filled until oil shows in filler at a level above tank top in order to ensure complete coverage of interior. Oil should then be pumped from tank leaving an oil film on interior surfaces. Use light lubricating oil for either spraying or flushing operation.

5.9.8.3. Oil used for flushing fuel tanks will be retained and reused for the same purpose by storing in clean drums. Storage drums will be plainly marked "FLUSHING OIL - FUEL TANKS." Flushing oil will be cleaned as required by running through filter or screen before storing.

5.9.8.4. Fuel tanks will not be removed from boat except for repair, replacement or when necessary to repair hull or paint bilges if areas beneath tanks are otherwise inaccessible. If access hatches do not permit removal when necessary, adequate hatch openings will be provided the first time it is necessary to remove tanks.

5.9.9. Lubricating System. Inspect all components of external systems. See that storage tank or deck filler caps fit and tight. See that storage tank mountings are secure, all connections and lines are free from oil leaks and in operative condition. See that proper level is maintained throughout period of storage. Check oil for condition by cleaning outlet strainer, clean all filters and renew filter elements as necessary. When oil is cooled by external heat exchanger, this unit will be inspected and maintained as indicated in applicable technical data covering boat being stored.

5.9.10. Engine Coolant:

5.9.10.1. Salt Water Cooled. Inspect all sea cocks, check valves, bypass valves, strainers and pumps for proper operation. Examine all connections and lines for leaks. Check thermostats to see that they are in good condition and operating properly. Clean salt water strainers and lubricate all required points. Check to see that sufficient water is going through exhaust pipe overboard.

5.9.10.2. Fresh Water Cooled (heat exchanger). Check system for proper operation. Check thermostats for proper operation. See that coolant is maintained at proper level throughout storage and tank vent is free from obstruction. Check all connections, lines, hoses and valves for leaks. Lubricate pumps if required. Check linkage on salt water outlet and inlet valve for proper operation and adjustment. Examine condition of zinc electrode in exchanger units and replace if necessary. Make a visual inspection to see that sufficient salt water is being supplied to cool exhausts.

CAUTION: If there is danger of below-freezing temperature during period of storage, add sufficient antifreeze to coolant solution to protect below the lowest temperature expected.

5.9.11. Electrical System:

5.9.11.1. The electrical system will vary considerably in complexity with the size of the boat and even on different boats of the same model there can be considerable variation in the installations; therefore, these instructions can be taken only in general. In most cases, the technical data applicable to the boat to be stored will give more specific information and guidance.

WARNING: Flammable gases may be present around battery area. To avoid any possibility of a gas explosion, make sure the battery terminals are not shorted to ground during handling/maintenance avoid any action that may cause sparks or open flame. Since the gas driven off toward the end of a charge is an explosive mixture of hydrogen and oxygen, care must be exercised to have the space where batteries are located well ventilated during and for some time after the charging period.

5.9.11.2. Check all batteries to see that the electrolyte is at the proper level and they are in a fully charged condition. These inspections will be made at weekly during period of storage to see that battery is in good condition at all times. Inspect all terminals periodically to see that they are free from corrosion. Check system to see that it is operative and all connections are tight and free from corrosion.

5.9.11.3. Check the generator brushes and commutators. Check any charging equipment to see that it is working properly. As main power plants will be run for a relatively short period during the time the boat is stored, if at all, it may be necessary, depending on current consumption, to operate auxiliary installation to maintain batteries.

5.9.11.4. If it is not necessary to run auxiliaries for power, generators should be run for a short period weekly or treated as outlined in applicable engine technical data to keep cylinder walls and operating parts covered with corrosion-preventive compound. Check all voltage regulators for condition and operation. Check all electrical circuits to and from switchboard(s) and instrument panels to see that all circuits are in proper working order. See that all circuits are tight and free from corrosion. Check necessary service on generators and engines in technical data pertaining to boat being stored.

5.9.12. Fresh Water System:

5.9.12.1. Cold Water. Check deck fillers for fit and tightness. Check all lines, valves, connections and outlets for leaks. See that tanks are secure in their mountings. If pressure system is

installed, check for proper operation and lubrication. See that all gages are free from leaks, operative and accurate. Inspect all faucets and pumps to see that they operate properly and do not leak.

5.9.12.2. Hot Water. On boats carrying hot water systems independent of or in conjunction with, the space heating system, check system for operation. Check lines, valves, check valves, joints and connections for leaks. Check circulating pump for adjustment, then lubricate. Check heating unit for condition and adjustment. Check all insulation for condition. Check expansion tank for tightness of installation and see that it is mounted securely and insulation is in good condition.

5.9.13. Sanitary System. Check all toilet installations for proper operation and freedom from leaks. Inspect all lines, connections, hose joints and valves for leaks and tightness. See that all drains and strainers are clean.

NOTE:

Before and during freezing weather, sea cocks shall be shut off and sanitary system drained.

5.9.14. Fire Extinguishing System (CO₂): WARNING: Make these checks with the discharge head removed from the cylinder, checking one cylinder circuit control at a time, thus eliminating danger of accidental discharge. Maintain fire protection at all times. Weigh cylinders to see that they are at proper weight. See that cylinders are securely mounted when replaced. Check gas distribution lines for operational condition with compressed air. Observe all "WARNINGS" indicated in applicable technical data covering boat being stored.

5.9.14.1. On all boats with permanent installation, check all cable connections and release boxes for continuity or smooth operation as the case may be and check discharge heads to see that cutter mechanism operates freely.

WARNING: If any tank shows a loss of weight of 10 percent or more, it shall be replaced or recharged to full weight.

5.9.14.2. Water Foam. Boats equipped with foam system will be examined to see that system is operative and that all lines, connections, hose joints and valves are tight and free from leaks or obstructions. Inspect pump strainer and clean. Inspect packing glands for leaks and adjustment. Check system for air leaks and foam generator for operation according to procedure outlined in applicable technical data on boat being stored.

5.9.14.3. Portable Hand Extinguishers. Check all CO₂ portable extinguishers for proper weight and see that they are in upright position. See that all dry type extinguishers are filled to proper level and check for operation. After inspection and corrective action have been performed, replace for use against possible fire during storage.

5.9.15. Bilge Pumping System. See that limber holes are open so bilge water can flow freely, then check system for operation. Inspect all pipes and valves. Check valves and hose joints for leaks and condition. See that all strainers are free from obstruction. Check pumps for operation and lubrication.

5.9.16. Heating System:

5.9.16.1. Gasoline. On boats with electrically driven units installed, inspect all fuel lines for leaks electric lines for chafing and looseness. Check all connections to units for tightness, all pump strainers for cleanliness, exhaust pipes for condition and freedom from obstruction and individual units for operation.

5.9.16.2. Hot Water. On boats with hot water heat installation, check all lines, joints, valves, radiators and fittings for tightness and freedom from leaks. Check system for operation. Drain all water from system. (Fuel oil used for heating can remain in storage tank.) See that insulation is intact wherever it is installed on piping. If blowers are used in conjunction with radiators, check and lubricate the motors.

5.9.16.3. Steam. On boats equipped with steam heat, check system to see that it is operative. Then check lines, joints, valves, radiators and fittings to see that all insulation is in good condition. Unless system is to be used throughout period of storage, drain all water from system. Any pump or blower motors that may be used in or with system should be checked and lubricated.

5.9.17. Ventilation System:

5.9.17.1. Electrical. Check all blowers for proper operation. See that all blower motors are properly lubricated and that brushes and commutators are in good condition. See that all electrical connections are tight and all installations secure.

5.9.17.2. Pipes and Ducts. Check all metal ducts and pipes for evidence of corrosion, all joints are tight and all pipes and ducts are securely supported. See that all external vents are securely fastened in place and are of correct type for location and facing in correct direction. Check all vent screens for condition and freedom from obstruction.

5.9.18. Lighting and Signaling System. Inspect all light circuits visually to see that they are operative. Examine searchlights for operation and alignment and see that lenses and mirrors are clean. Check and lubricate mechanical remote controls for smooth, positive operation. Check all watertight outlets to see that they are tight and that rubber gaskets are in good condition. Inspect running lights and see that lenses and globes are clean and in good condition and that bulbs and gaskets are in good condition. Electrically operated air horns shall be checked for operation, lubrication and tone adjustment. See that diaphragm is in good condition and horn button points are clean and free from corrosion. Check oil level in motor and compressor. Check inter-communication system for operation and check circuit continuity or individual instrument if any part of system is inoperative.

5.9.19. Communications:

5.9.19.1. Receivers and/or transmitters. All receivers and/or transmitters and associated equipment will be inspected as indicated in applicable technical data covering equipment installed. Correct any deficiencies and lubricate all parts requiring it. Equipment will remain installed unless otherwise directed.

5.9.19.2. Direction Finder. See that unit is operating. Check level of water in battery and condition of charge of battery. See that battery terminals are free from corrosion.

5.9.20. Refrigerator. If electrical unit is installed, see that unit is operative. Defrost unit and allow to remain in operation. Check brushes and commutator and remove all dust from motor and compressor unit. Check belt for tightness and lubricate motor. Clean unit and inside of cabinet with baking soda solution. If ice type box is used, clean inside of cabinet with baking soda solution and wash out ice storage compartment with water. Check and clean the drain.

5.9.21. Galley Stove:

5.9.21.1. Electric Range. Check for operation and clean.

5.9.21.2. Kerosene. Clean unit and check valve stem packing nuts for leaks. Check pump and pressure tank for operation and leaks. Check all lines and connections for leaks.

5.9.22. Windshield Wipers. Lubricate wiper arm shaft and check operation of arm. Check adjustment and condition of blade.

5.9.23. Armament. All machine guns will be inspected and maintained in accordance with applicable technical data covering individual weapons. All ammunition will be returned to local ordnance representative.

NOTE:

Check applicable technical data on boat being stored for additional information on proper procedure. Once checked and serviced, armament will remain in position.

5.9.24. Classified Equipment. Equipment classified as "Confidential" or higher will be left installed unless otherwise directed and must be protected as appropriate to the level of classification.

5.9.25. Repairs. After inspection has been completed, all conditions requiring repair or correction will be accomplished. Hull repairs will be completed to the satisfaction of the Marine Maintenance Inspector before puttying, sanding and painting. Painting will then be accomplished in accordance with [Chapter 6](#).

5.10. Type "B" Storage:

5.10.1. General Instructions. Boats in type "B" storage will be maintained so that perfect operating condition can be attained within 7 days after receipt of movement instructions. "Perfect operating" condition will be construed to mean compliance with all "Immediate Action", "Urgent Action" and "Routine Action" technical data and such modifications as are specifically directed by HQ AFSPC/LGTV or other authorized office. Type "B" storage will normally be dry storage and provision will be made for proper protection of boat from weather conditions. All provisions of paragraph [5.5.1](#) will be strictly complied with as they apply to the particular method of hauling the hull out of the water. If possible the boat should be hauled out on its designed rack and retain on this cradle throughout period of storage. Care must be taken to see that boat is located properly so that full support is given to all heavy interior weights, that cradle is level and properly supported and that hull lines will not be distorted during period of storage. If the cradle is not available, extreme care must be used in shoring up hull during haul out and when boat is in final storage position, so that all interior weights are fully supported and hull lines are not distorted. Specific information covering procedure for shoring up individual hull types when cradles are not available will be appended to the applicable technical data.

5.10.2. Hull Inspection. The hull will be washed off while still on the ways. As soon as it is in place a thorough inspection of the exterior will be made following procedure outlined in paragraph [5.5.2](#). After inspection has been completed, all conditions requiring repair or correction shall be accomplished immediately. All repairs will be completed to the satisfaction of the Marine Maintenance Inspector or Maintenance Officer before puttying, sanding and painting. Painting will be accomplished in accordance with [Chapter 6](#). The final coat of paint will not usually be applied until orders have been received to make boat ready for active service.

5.10.3. Underwater Gear:

5.10.3.1. Propellers, Propeller Shafts, Struts and Bearings, Rudders, Underwater Hull Fittings and Shaft Logs. Refer to paragraphs [5.9.3.1.](#) through [5.9.3.6.](#)

5.10.3.2. Engines. Refer to applicable technical data on engines.

5.10.3.3. Angle Drive or Reduction Gear (Separate Unit). Refer to paragraph [5.9.5.](#) During haul-out period make all operational checks and observations and perform maintenance. Drain all oil from tank and angle drive. Spray inside of tank with corrosion preventive compound and spray gears in drive by removing inspection plate and rotating gears until all gear and bearing surfaces are satisfactorily covered. Spray or brush drive shaft and all surfaces of propeller shafts with corrosion-preventive compound. Flush drive heat exchanger with fresh water and see that all standing water is drained from system.

5.10.3.4. Steering Gear. Refer to paragraph [5.11.7.](#)

5.10.3.5. Engine Controls (spark, throttle, heat, etc.):

5.10.3.5.1. Manual. Refer to paragraph [5.9.6.1.](#)

NOTE:

Make a "dry run" check on operation occasionally throughout period of storage.

5.10.3.5.2. Hydraulic. Refer to paragraph [5.9.6.2.](#)

5.10.3.6. Clutch Controls:

5.10.3.6.1. Manual. Refer to paragraph [5.9.7.1.](#)

5.10.3.6.2. Electric-Hydraulic. Refer to paragraph [5.9.7.2.](#)

5.10.3.7. Fuel System. Refer to paragraph [5.9.8.](#)

5.10.3.8. Lubricating System. Refer to paragraph [5.9.9.](#) When boat has been placed in storage location, drain all oil from lubricating system and motor, then spray inside of tank or tanks with corrosion-preventive compound. If oil is cooled by heat exchanger system, the heat exchanger will be serviced in accordance with instructions contained in paragraph [5.10.3.9.2.](#)

5.10.3.9. Engine Coolant:

5.10.3.9.1. Salt Water Cooled. Accomplish all operational checks in accordance with instructions contained in paragraph [5.9.10.1.](#) while boat is being brought into yard for haul out. When preparing for storage, be sure that all water is drained from system, then flush out with fresh water. Again be sure that all water is removed. Remove thermostats, if possible, while flushing. Treat inside of system with corrosion-preventive compound, in accordance with applicable technical data on treatment of engines for storage.

5.10.3.9.2. Fresh Water Cooled (Heat Exchanger). If engines are cooled by heat exchanger system, all operational checks will be made prior to haul out. Perform necessary maintenance after boat is stored. Allow coolant to remain in system making sure that mixture is protected from freezing if required, that rust inhibitor has been added and that proper level is maintained in storage tank. Drain any standing salt water from exchanger system and flush with fresh water. If exchangers require cleaning, refer to applicable technical data covering boat being stored for procedure.

5.10.3.10. Electrical System. Proceed with inspection of electrical system in accordance with instructions contained in paragraph **5.9.11.** of this instruction and applicable technical data pertaining to boat being stored. Electrical busses and connections shall be greased to prevent corrosion, care being taken to prevent such grease from coming in contact with rubber insulation. Batteries will be charged as condition requires throughout period of storage. If Tungar or other charging equipment is part of the electrical system, it will be used by obtaining current from available source at point of storage. Otherwise batteries will be charged by means of portable charging equipment available.

NOTE:

Storage batteries may be removed and placed in suitable building protected against freezing and kept on a tricycle charger, care being taken to keep electrolyte at required levels. Dry cell batteries shall be removed from all equipment such as flashlights, radios, direction finders, intercommunication systems, etc. and returned to Air Force Stock.

5.10.3.11. Fresh Water System:

5.10.3.11.1. Cold Water. Check in accordance with instructions contained in paragraph **5.9.12.1.** and accomplish all maintenance procedures. Drain all water from system. Flush out with fresh water and blow out all lines with compressed air to ensure that there is no standing water in the system. Cover inner surfaces of galvanized tanks (not required in copper, monel and terneplate) with zinc dust, then drain off excess and allow to dry.

5.10.3.11.2. Hot Water. Check and perform required maintenance in accordance with instructions contained in paragraph **5.9.12.2.** Drain all water from system, blowing lines out with compressed air if necessary.

5.10.3.12. Sanitary System. Check all toilet installations to see that they are operative and in first class condition, making certain all water is withdrawn from various units of system. System shall be thoroughly flushing with fresh water then rechecked to see that there is no standing water in any part of system. Leather gaskets in pumps shall be removed, soaked in Neat's foot oil or equivalent and reinstalled.

5.10.3.13. Fire Extinguishing Systems:

5.10.3.13.1. If CO₂ system is installed, refer to paragraph **5.9.14.** When all units and lines have been checked, reinstall in operating condition so that system may be used in the event of interior fires.

5.10.3.13.2. Water Foam System. Refer to paragraph **5.9.14.2.** and perform items while boat is still in water. Perform any corrective action after boat is hauled out. Flush system thoroughly with fresh water and see that all standing water is blown out.

5.10.3.13.3. Hand Extinguishers (CO₂ and Dry). Refer to paragraph **5.9.14.3.**

5.10.3.14. Bilge Pumping System. Refer to paragraph **5.9.15.** See that there is no water trapped in any part of system.

NOTE:

If any boats are equipped with external drain plugs, remove them after hull is in final storage location, so that all water remaining in bilge can be drained.

WARNING: Be sure to reinstall plugs before boat goes back into water.

5.10.3.15. Heating System:

5.10.3.15.1. Gasoline. Refer to paragraph [5.9.16.1](#).

5.10.3.15.2. Hot Water. Refer to paragraph [5.9.16.2](#).

5.10.3.15.3. Steam. Refer to paragraph [5.9.16.3](#).

5.10.3.16. Ventilating System:

5.10.3.16.1. Electrical. Refer to paragraph [5.9.17.1](#). Keep all vents open, as well as port lights, doors, hatches, lockers and drawers. Also open all removable sections of floor boards throughout boat so that a free circulation of air may be maintained through hull during period of storage. If hull is stored under canvas, be sure that there is provision for continuous ventilation and that cover is opened periodically to prevent rot and mildew.

5.10.3.16.2. Pipes and Ducts. Refer to paragraph [5.9.17.2](#).

5.10.3.17. Lighting and Signaling System. Refer to paragraph [5.9.18](#).

5.10.3.18. Communications:

5.10.3.18.1. Receivers and/or Transmitters. All receivers and/or transmitters and associated equipment will be inspected as indicated in applicable technical data covering unit installed. If there is evidence of more than mild deterioration, the sets will be removed, repaired and packaged in accordance with dehydration instructions contained in applicable technical data covering same. Package will be marked for identification and stored a board boat. If no evidence of deterioration is found, correct other deficiencies and prepare for storage in accordance with methods found suitable for area in which boat is located. Equipment will remain installed.

5.10.3.18.2. Headphones and Microphones. Headphones and microphones will be packaged together in accordance with dehydration instructions contained in applicable technical data covering same. Package will then be marked for easy identification and stored on boat.

5.10.3.18.3. Whip or Mast Type Antennas. Whip or mast type antennas will be disassembled and, if subject to corrosion, treated with corrosion-preventive compound and boxed or stored in space provided for same or stowed on deck.

5.10.3.18.4. Direction Finder. See that unit is operable. Check level of water in battery, condition of charge and see that terminals are free from corrosion. Further treatment of this unit will be the same as set up in paragraph [5.9.19.2](#). and in accordance with condition of unit.

5.10.3.19. Refrigerator. Refer to paragraph [5.9.20](#). After performing maintenance and corrective action, pump down compressor unit, turn off and remove water from ice trays.

5.10.3.20. Galley Stove:

5.10.3.20.1. Electric. Refer to paragraph [5.9.21.1](#).

5.10.3.20.2. Kerosene. Refer to paragraph [5.9.21.2](#).

5.10.3.21. Windshield Wipers. Refer to paragraph [5.9.22](#).

5.10.3.22. Armament. All machine guns will be removed, tagged with boat number and turned over to local ordnance representative to hold until required. All ammunition will be returned to local ordnance representative.

5.10.3.23. Classified Equipment. Equipment classified as "Confidential" or higher will be removed and handled in accordance with current instructions for such type equipment.

5.10.3.24. Cockpit Canopy. Where installed, the cockpit canopy should be left up throughout the period of storage so that it can receive free circulation of air and remain dry and free from mildew.

5.10.3.25. Miscellaneous Equipment. Equipment such as rope gear, fenders, mats and lines will be checked when boat is put into storage to see that they are thoroughly dry and in first-class condition. Check periodically throughout period of storage. Lines will be coiled and tagged for identification. Check bedding for mildewed condition during this period. Protect all exposed brass with coating of light oil or grease. See that all life vests are dry when stored and check periodically to see that they remain dry and free from mildew during the period of storage.

5.11. Type "C" Storage:

5.11.1. Boats to be placed in type "C" or extended storage are those which are to be out of service for a period of 30 days or more or pending further disposition by higher authority. All "Immediate Action" and "Urgent Action" technical data applicable to type boat being stored will be recorded, but will not be complied with unless and until specific authority is received to make boat available for return to service. Boats to be placed in type "C" storage will be placed in dry storage and provision will be made for proper protection from weather.

5.11.2. Hull Inspection. Wash hull while still on the ways and make a thorough inspection of hull exterior following procedures outlined in paragraph [5.5.2](#). Record all conditions but take no corrective action, except preventive maintenance required to prevent further deterioration, until authorized to do so.

5.11.3. Underwater Gear:

5.11.3.1. Propellers. Inspect propellers carefully and record all maintenance necessary to place in serviceable condition. Check to see that diameter and pitch are correct for boat type. Cover propellers with coat of light engine oil or grease.

5.11.3.2. Propeller Shaft. Inspect propeller shaft carefully as to alignment and condition of bearing areas, tapers, keyways and threads; then record. Clean shafts thoroughly and, if made of steel, coat with rust preventive; if bronze or monel, coat with light engine oil or grease. Fit propeller nut with fairwater cap filled with tallow.

5.11.3.3. Struts and Bearings. Inspect struts and bearings and record any conditions needing correction. Cover struts with coat of light engine oil or grease.

5.11.3.4. Rudders. Inspect blade and record any condition requiring correction. Check alignment of blade or blades with bridge indicator, where installed and record any deviation.

5.11.3.5. Rudder Stuffing Boxes. Examine fastenings on stuffing boxes for tightness and inspect hull for rot condition around boxes. Check to see that rudder stock fits box properly. Inspect rudder stuffing boxes for leaks and condition of packing. Record corrective action to be taken.

5.11.4. Underwater Hull Fittings. Inspect all scoops and through hull connections to determine condition and see that all openings are free from obstructions. Check for rot conditions in hull area about all fittings. Examine zinc blocks for condition. Check all shafts, struts, rudders and underwater hull fittings for evidence of electrolysis. Record all corrective action necessary to bring to first class condition.

5.11.5. Shaft Logs . Refer to paragraph **5.9.3.6.** Record conditions requiring correction.

5.11.6. Engines (Including Auxiliaries). Refer to applicable manufacturer catalogs on engines. Note and record any condition requiring corrections.

5.11.7. Steering Gear. Inspect system for proper operation, checking for wear, misalignment, binding or looseness of individual parts. Record necessary corrective action. Lubricate all points as required. Brush light oil or grease on all bronze parts and spray or brush any exposed steel or iron parts of steering gear with corrosion-preventive compound. Check to see that midship marks on steers coincide if there is more than one control position.

5.11.8. Engine Controls (Spark, Throttle, Heat, Etc.):

5.11.8.1. Manual. Check all manual controls for smooth positive operation. Record any corrective action necessary to bring to first-class condition. Lubricate all controls thoroughly. (Make a periodic "dry run" check of operation throughout period of storage.)

5.11.8.2. Hydraulic. Check for proper operation. Check system for leaks and see that fluid is maintained at proper level in reservoir. Where units are installed in parallel, check for synchronization. Record all conditions requiring correction.

5.11.9. Clutch Controls:

5.11.9.1. Manual. If manual controls are installed, check for smooth, positive action, performing all required lubrications. Then brush or spray all exposed steel or iron with corrosion-preventive mixture. Record all conditions requiring correction.

5.11.9.2. Electric-Hydraulic. If electric-hydraulic controls are used, check systems for proper operation. Check all electrical components for condition and adjustment and record any corrective action required. Check hydraulic system to see that it is leak-free and that proper fluid level is maintained. Check all parts for operation and adjustment and clean strainers. Record conditions requiring corrective action. Brush or spray any exposed steel or iron surfaces in system with corrosion-preventive mixture.

5.11.10. Fuel System. Before boat is hauled out, inspect fuel system in accordance with instructions contained in paragraph **5.9.8.** After inspection is completed remove all fuel from system, observing all possible precautions for prevention of fire or explosion.

5.11.11. Lubricating System. Make all inspections and record all conditions which need correction in accordance with instructions contained in paragraph **5.9.9.** Then drain or pump all oil out of lubricating systems of all gasoline-powered engines and proceed as outlined in applicable technical data on engines. If heat exchangers are used to cool oil, accomplish preventive maintenance in accordance with procedures outlined in applicable technical data covering boat being stored.

5.11.12. Engine Coolant:

5.11.12.1. Raw Water Cooled. Be sure that all water is drained from system and then flush out thoroughly with fresh water. Remove thermostats during flushing operation. Make inspection for proper operation before boat is hauled out and record all conditions that require correction. Coat system lines by means of spray or by running corrosion-preventive mixture so that all inner surfaces are covered with mixture, then drain.

5.11.12.2. Fresh Water Cooled (Heat Exchangers). On engine cooled by means of a heat exchanging system, check all units for operation before boat is hauled out. Record all conditions requiring correction to place systems in first-class condition. While coolant is still hot, check system to see that it is completely filled with coolant as outlined in applicable technical data on engines. Remove, inspect and clean heat exchanger units if they have been operated for a period of 6 months or more than 1,000 hours. Clean exchangers in accordance with procedures outlined in applicable technical data applying to boat being processed. Retain coolant for further use if exchangers are removed from system.

5.11.13. Angle Drive or Reduction Gear (Separate Unit). Refer to paragraph **5.9.5.**, except that equipment not in first-class operating condition will be recorded instead of immediately corrected. If heat exchangers are used, service in accordance with instructions contained in applicable technical data applying to boat being processed.

5.11.14. Electrical System. Proceed with inspection of electrical system in accordance with instructions contained in paragraph **5.9.11.** and technical data pertaining to individual boat. Record all conditions to be corrected. Remove all storage batteries and place in Air Force stock or on charging line depending on condition and age.

5.11.15. Fresh Water System (Potable):

5.11.15.1. Cold Water. Refer to paragraph **5.9.12.1.**

5.11.15.2. Hot Water. Refer to paragraph **5.9.12.2.**, but record any conditions requiring correction. Drain all water from system, blowing lines out with compressed air, if necessary.

5.11.16. Sanitary System. Proceed in same manner as in paragraph **5.10.3.12.**, except that necessary corrective action is recorded instead of accomplished.

5.11.17. Fire Extinguishing System:

5.11.17.1. CO2 System. If CO2 system is installed, proceed as directed in paragraph **5.9.14.**

5.11.17.2. Water Foam. Check system as directed in paragraph **5.9.14.2.** and record deficiencies instead of correcting. After system is thoroughly flushed, introduce corrosion-preventive mixture by either spray or flooding and drain lines to ensure all surfaces are completely protected.

5.11.17.3. Hand Extinguishers (CO2 and Dry). Check as indicated in paragraph **5.9.14.3.** Units in serviceable condition may be returned to brackets for use in case of possible fire or placed in Air Force stock as may be decided locally.

5.11.18. Bilge Pumping System. Accomplish inspection and maintenance operations as directed in paragraph **5.9.15.** See that there is no water trapped in any part of the system.

NOTE:

If any boat is equipped with external drain plugs, remove the plugs after hull is in final storage location so that all water remaining in bilge can be drained.

WARNING: Be sure to reinstall docking plugs before boat goes back into water.

5.11.19. Heating System:

5.11.19.1. Gasoline. Proceed in accordance with paragraph [5.9.16.1](#).

5.11.19.2. Hot Water. Proceed in accordance with paragraph [5.9.16.2](#).

5.11.19.3. Steam. Proceed in accordance with instructions contained in paragraph [5.9.16.3](#). Note all record conditions requiring corrective action.

5.11.20. Ventilating System:

5.11.20.1. Electrical. Inspect all blowers for proper operation and check all vents for position and see that screens are cleaned of any obstruction. Record all conditions that need correction. Lubricate all blower units.

5.11.20.2. Pipes and Ducts. Proceed as indicated in paragraph [5.9.17.2](#)., except that conditions requiring corrective action will be noted and recorded for future action.

5.11.20.3. Vents, Doors, Hatches, etc. Keep all vents open, as well as all port lights, doors above and below deck, drawers and lockers and hinged hatches. Open all removable floor boards so that free circulation of air can be maintained during period of storage. If hull is stored under canvas cover, be sure that it is well ventilated at all times and opened periodically to keep mildew and rot from developing.

5.11.21. Armament . Turn in all machine guns and ammunition to local ordnance representative for disposition.

5.11.22. Communications:

5.11.22.1. Receivers and Transmitters. Inspect all receivers, transmitters and associated equipment as indicated in applicable technical data covering unit installed. If no evidence of deterioration is found, correct other deficiencies and prepare units for storage in accordance with procedures found suitable for area where boat is located. Leave equipment installed unless local procedure recommends handling otherwise. If there is evidence of deterioration, remove, repair and package the unit in accordance with instructions contained in applicable technical data. Mark for easy identification and store aboard boat. Follow this same procedure in packaging if local conditions make removal advisable.

5.11.22.2. Headphones and Microphones. Package headphones and microphones together and prepare in accordance with procedure outlined in applicable technical data. Mark package for easy identification and store on boat.

5.11.22.3. Whip or Mast Type Antennas. Disassemble whip or mast type antennas, coat with rust preventive compound and box or store in space provided or stow on deck.

5.11.22.4. Direction Finder. See that unit is operative. Check battery for condition of charge and water level. Remove battery and return to Air Force stock or put on charging line as required.

Prepare the unit for storage in the same manner as outlined for other communication units aboard and in accordance with instructions contained in paragraph [5.9.19.2](#).

5.11.23. **Classified Equipment.** Remove equipment classified as "Confidential" or higher and handle in accordance with current instructions for such type equipment.

5.11.24. Refrigerator. Refer to paragraph [5.9.20](#).

5.11.25. Galley Stove:

5.11.25.1. Electric. Refer to paragraph [5.9.21.1](#).

5.11.25.2. Kerosene. Refer to paragraph [5.9.21.2](#).

5.11.26. Windshield Wipers. Refer to paragraph [5.9.22](#).

5.11.27. Cockpit Canopy. Refer to paragraph [5.10.3.24](#).

5.11.28. Lighting and Signaling System. Inspect system as outlined in paragraph [5.9.18](#) of this instruction, noting all deficiencies and recording same. Grease electrical busses and connections to prevent corrosion, care being taken to prevent grease from coming in contact with rubber insulation. Remove storage batteries and return to Air Force stock or put on charging line, as required. Remove dry cell batteries from all equipment such as flashlights, radios, direction finders, intercommunication systems, etc. and return to Air Force stock.

5.11.29. Miscellaneous Equipment. Thoroughly dry and store all fenders, mats and lines so that air can circulate freely but remain dry at all times. (Coil and tag lines for identification.) In order to ensure this, it may be necessary to make periodic checks and to have such equipment in the sub or in circulating air. Protect all equipment of steel such as anchor, deck fittings, crane, capstans, winches and galvanized or plain wire rope from corrosion by a coating of corrosion-preventive mixture. Return all life vests, ring buoys, bedding, cushions, navigating equipment, medical equipment, galley equipment, deck stores, etc., to Air Force stock for general use unless decided otherwise locally.

NOTE:

Coat any exposed, unpainted steel or iron surfaces with corrosion-preventive compound before boat is covered and make periodic checks to see that no corrosion condition sets up throughout period of storage. Rescue cranes, blocks, rope and winches used in conjunction with this equipment will be carefully inspected to see that all parts are in serviceable condition and in perfect working order. Lubricate properly and protect from corrosion and mildew as may apply.

5.12. Preparation for Service:

5.12.1. General. Boats ordered into service that have been in type "A" storage will require little or no preparation. Boats that have been in type "B" or "C" storage will require more careful and thorough preparation. General procedures are outlined in the following paragraphs and will be supplemented by the instructions contained in the applicable technical data on the type of boat being prepared for operation.

5.12.2. Type "A" Storage:

5.12.2.1. **Hull Exterior.** Accomplish all repairs and necessary corrective action before hull is returned to service.

5.12.2.2. Hull Interior. Accomplish all necessary corrective repairs and all organizational maintenance, specified in applicable technical data covering boat being prepared. Repair as necessary and reinstall any equipment such as radio sets, fire extinguishers, propellers, rudders, etc., that may have been removed from the boat.

5.12.2.3. Engines. If engines have been processed in accordance with applicable technical data as required, no further preparation is necessary.

5.12.3. Type "B" Storage:

5.12.3.1. Hull Exterior. Accomplish all corrective action required prior to returning boat to service. Apply final coats of paint as necessary in accordance with [Chapter 6](#).

5.12.3.2. Hull Interior. Accomplish all necessary corrective action. Fill and chlorinate the fresh water system for safe use. Check toilet and sink pumps for proper operation. Close ports, hatches, lockers and drawers and replace floor boards or plates. Check engine and electrical system for proper operation.

5.12.3.3. After all necessary checks have been made, place boat into service in accordance with applicable technical data covering operating instructions for the particular boat being put in service.

CAUTION: A boat that has been in dry storage may dry out and open seams. Hull drain plugs may not have been replaced. Connections on equipment that were removed for inspection or repair may not have been made watertight on reinstallation. Therefore, when using marine railway to launch boat, boat will be placed in water to the point that it floats free of the cradle. Then check will be made for leaks or water being taken through hull fittings. If possible, boat will be left in this position long enough to make certain that no water is being taken through open seams and so that bottom planking can swell if water is being taken on. If crane and sling are used to put boat in water, boat will be lowered to the point that it floats and same checks as above made. If boat cannot be left on railway or in slings until it is certain that hull is tight, a careful watch will be kept until it is certain that hull is tight and not taking on water.

5.12.4. Type "C" Storage:

5.12.4.1. General. When a boat that has been in type "C" storage is ordered into service, all conditions or deficiencies that have been recorded as requiring correction will be corrected. All "Immediate Action", "Urgent Action" and "Routine Action" Technical Orders and such modifications as are specifically directed by Headquarters, will be complied with before launching.

5.12.4.2. Hull Exterior. After all corrective action has been accomplished, apply final coats of paint as necessary. Install propellers just before boat is put into water. Clean all hull and deck fittings and equipment, underwater and topsides, that have been protected with corrosion-preventive compound. Use cleaning solvent applied with a rag.

WARNING: Solvent, P-D-680, Type II is toxic to skin, eyes and respiratory tract. It is highly recommended to find and use a suitable substitute which is less dangerous to people and the environment. If no other solvent is available, use in a well ventilated area, avoid prolonged breathing of vapors, avoid eye and repeated skin contact and keep away from sparks and flames.

5.12.4.3. Hull Interior. Accomplish all corrective action and close all ports, hatches, lockers and drawers before boat is put in water. Check all fenders, mats, rescue nets and lines to see that they

are dry and in good condition. If left installed check radio and direction finder equipment for signs of corrosion. If this equipment has been processed for protected storage, unpack and prepare for operation. Set up ship or mast antennas after corrosion-preventive compound has been removed from parts. After boat is in the water and all engines prepared for operation, make further operational checks on generators and then on electrical circuits. After refrigerator has been checked, keep it in operation. Clean all external surfaces that have been protected with corrosion-preventive compound with solvent. Check fluid levels in all hydraulic systems. If heat exchangers have been removed for cleaning, check all points of installation for leaks. Check coolant system for proper amount of coolant with rust-inhibitor added. Check battery installation to see that connections are tight and corrosion-free. Chlorinate drinking water tanks and lines to ensure potability.

5.12.4.4. Engines. Prepare engines for service in accordance with applicable technical data.

CAUTION: Before operation of boat, all rubber hose connections and hoses will be checked for signs of deterioration from contact with corrosion-preventive compound and defective pieces replaced. After engines and equipment have been prepared for service, the boat will be put in operation in accordance with the operating instructions outlined in the applicable technical data covering boat. Refer to paragraph [5.12.3.3](#), and caution note following, for additional precautions prior to launching boat.

Chapter 6

PAINTING AND MARKING INSTRUCTIONS

6.1. General. The following procedures are provided for cases when technical data is not available for a given vessel or situation. If technical data for a vessel is available and covers the procedures to be used for surface preparation and painting, it will take precedence over the procedures in this instruction.

6.1.1. The painting and marking instructions contained herein are outlined in various sections pertaining to the different major types of watercraft. The watercraft shall be painted and marked in accordance with instructions for the pertinent category. In the event further instructions are required on any specific type, requests for information shall be forwarded to HQ AFSPC/LGTV.

6.1.2. Watercraft in type "A" storage at marine areas pending assignment will be painted in accordance with this instruction. Watercraft in types "B" and "C" storage will receive only sufficient coats (or spot-painting) for protection against deterioration until such time as an assignment is made. Upon assignment, painting and marking required for complete compliance with this instruction will be accomplished.

6.1.3. Watercraft awaiting disposal action, whether assigned or in storage, will be painted only as necessary to prevent deterioration. Watercraft on which condemnation action has been initiated due to damage or deterioration will not be painted.

6.2. Hazards of Painting:

6.2.1. Many paints and solvents are hazardous. They may be highly flammable, injurious to the eyes and skin or dangerous if swallowed. Among these are vinyl solvent coatings and epoxy coatings. To be on the safe side at all times, follow these rules and precautions:

6.2.1.1. Store materials in well ventilated areas, away from heating equipment, open flames and direct sunlight.

6.2.1.2. Keep containers tightly closed at all time. Check stored containers frequently for seeping for bulging. Dispose of containers which are bulged from inside pressure.

6.2.1.3. Avoid sparks or open flames near open containers. Extinguish all pilot lights on water heaters, furnaces or other equipment on all levels. DO NOT SMOKE while mixing or applying these materials. No welding, grinding or cutting shall be allowed in areas adjacent to painting operations.

6.2.1.4. When paints mixed with toxic vehicles or solvents are sprayed, the following conditions shall apply:

6.2.1.4.1. In confined spaces such as tanks and compartments, personnel exposed to such spraying shall be protected by any and all measures specified by OSHA, AFOSH, EPA or any other legitimate agency.

6.2.1.4.2. In large, well ventilated areas, personnel exposed to such spraying shall be protected by canister type gas mask or chemical cartridge filter mask.

6.2.1.4.3. When paints are applied by brush or roller a chemical cartridge filter mask may be used provided the atmosphere is not hazardous to life.

NOTE:

All respiratory protective equipment shall carry the appropriate approval for the use for which it is intended.

6.2.1.5. When paints and tank coatings dissolved in highly volatile, toxic and flammable solvents with flash points at or below 80 degree Fahrenheit are applied in confined spaces, the following special precautions shall apply:

6.2.1.5.1. Sufficient exhaust ventilation shall be provided to keep concentrations of vapors below 10 percent of the lower explosive limit (LEL). Frequent tests by a competent person shall be made to ascertain that concentration.

6.2.1.5.2. If ventilation fails or the concentration rises above 10 percent of the lower explosive limit, painting shall be stopped and area evacuated until safe conditions are once again established.

6.2.1.5.3. Ventilation shall be continued after completion of the work until the space is vapor free. Tests to determine this condition shall be made after the ventilation has been stopped for at least 10 minutes.

6.2.1.5.4. Exhaust ducts shall discharge clear of working areas and away from ignition sources. In the case of vessels, care shall be exercised to ensure that lower compartments are not contaminated.

6.2.1.5.5. All motors and control equipment shall be of the explosion proof type. Fans shall have nonferrous blades. Portable air ducts shall also be of nonferrous material. Metallic parts shall be bonded and grounded.

6.2.1.5.6. Only non-sparking paint buckets, spray guns and tools shall be used. Metallic parts of paint brushes and rollers shall be insulated. Staging shall be erected in a manner which ensures that it is non-sparking.

6.2.1.5.7. Only explosion proof lights shall be used.

6.2.1.5.8. A competent person shall inspect all power and lighting cables to ensure the insulation is in excellent condition, they are properly placed and there are no connections or splices within the area of work or within 50 feet of the area of work.

6.2.1.5.9. The face, hands, eyes, head and other exposed parts of the bodies of personnel working with these highly volatile paints shall be protected. All footwear shall be non-sparking such as rubber boots or rubber soled nail free shoes. Coveralls and other clothing shall be cotton. Rubber rather than plastic gloves shall be used.

6.2.1.5.10. No matches, cigarette lighters or other ferrous articles shall be taken into the areas where work is being done.

6.2.1.5.11. All solvent drums or cans taken into the work area shall be placed on nonferrous surfaces and shall be bonded and grounded. Vessels being filled from a drum (or can) shall be bonded to the drum while materials are being transferred.

6.2.1.5.12. Personnel shall be protected by air line respirators.

6.2.1.6. When working in enclosed spaces or when a hazard to life exists, a safety observer equipped to effect rescue and summon help shall be posted outside of the work area in a position to observe the workers.

6.2.1.7. In enclosed areas where egress is difficult, tag lines and safety harnesses shall be used.

6.2.1.8. When work is to be done in enclosed spaces, all possible openings consistent with good ventilation practices shall be uncovered.

6.2.1.9. Portable ladders or like means of egress shall be provided from tank or pits.

6.2.1.10. Personnel shall avoid skin contact with paints or solvents. They will wash frequently and change clothing when wet or contaminated with paints or solvents. They will use protective creams and clothing to reduce or eliminate skin contact.

6.2.1.11. Personnel working over or near water shall wear life jackets. Hard hats, when used, shall be nonconductive.

6.3. Preparation of Surface:

6.3.1. Cleaning. All surfaces must be thoroughly clean and dry prior to application of paint.

WARNING: Solvents can be flammable and toxic to skin, eyes and respiratory tract. Use in a well ventilated area. Avoid prolonged breathing of vapors. Avoid eye and repeated skin contact. Keep away from sparks and flames.

6.3.1.1. On wood, canvas and aluminum surfaces, thoroughly sand, removing all waxes and varnishes to a bare surface as outlined in paragraph **6.3.2**. Remove dirt and dust with fresh water. Remove any remaining oils or grease using a clean rag and naphtha cleaner. Dry thoroughly prior to painting.

6.3.1.2. On steel surfaces remove rust and mill scale by sand-blasting or power wire brushing, depending upon extent of area and location of surface. Remove oil and grease with dry-cleaning solvent, remove loose dirt and dust with a tack rag dampened with solvent.

6.3.2. Sanding. The various types of surfaces will be sanded in accordance with the following:

6.3.2.1. Sand wood lightly to a hard, smooth surface. Remove dust with brush or rag dampened with solvent.

6.3.2.2. Sand canvas deck surfaces carefully so that fabric is not exposed or cut. Remove dust with brush or rag dampened with turpentine.

6.3.2.3. In general, aluminum should not be sanded. Non-clad aluminum alloys may be sanded, but clad aluminum should be sanded only when no other method of preparing the surface is available. Anodized or chemically treated aluminum should not be sanded. If sanding of clad aluminum is considered essential, the anodized or chemical treatment should be reapplied after sanding.

6.3.2.4. Feather edges of sanded areas as necessary to remove loose flakes and ensure a neat appearance.

6.3.3. Preservative Treatment. The treatment of wood surfaces shall be in accordance with the following:

WARNING: Do not permit smoking, welding or other source of fire near the treating operation or the treated material for a drying period of 24 hours; maintain adequate ventilation to ensure removal of flammable vapors. Paints, primers, lacquers and varnishes must be handled carefully and used only in a well ventilated approved area. Avoid prolonged breathing of vapors. Avoid eye and repeated skin contact. Keep away from sparks and flames.

6.3.3.1. Treat all new wood being installed during time of repairs, excluding outside bottom planking up to the painted waterline, with wood preservative. Treatment shall be done by either dip, brush or spray method after all shaping, boring and fitting is completed. If practical, treated surfaces should not be painted within 48 hours after application of preservative.

6.3.3.2. Do not treat exterior surface of bottom planking below the painted waterline as such treatment will adversely affect the adhesive qualities of the bottom paint. Treat all faired and cut surfaces of plywood with varnish prior to installation.

6.3.4. Prime Coats. The use of prime coats will be as follows:

6.3.4.1. On all wood surfaces (excluding outside bottom up to the painted waterline) newly installed or from which oil paint has been removed to the bare wood, apply the first coat of paint thinned with 1 pint of boiled linseed oil to 1 gallon of paint.

6.3.4.2. On all aluminum surfaces newly installed or from which oil paint has been removed, apply only a coat of zinc chromate metal primer.

6.3.4.3. On all steel surfaces (excluding outside bottom up to the painted waterline) newly installed or from which oil paint has been removed, apply 1 coat of pretreatment coating followed by 1 coat of zinc chromate metal primer.

6.3.5. Glazing. After primer coat is dry on work that was exposed to bare wood and before applying paint on other work, fill cracks, depressions and open seams with lacquer glazing putty. After putty dries hard, sand surface to a smooth finish and wipe free of dust before painting.

6.3.6. Application of Paint:

6.3.6.1. Weather Conditions. If possible, do not paint when temperature is below 10 degrees Celsius (50 degrees Fahrenheit) or above 38 degrees Celsius (100 degrees Fahrenheit). Do not paint in wet or damp weather and whenever practicable do not paint in direct bright sun. To keep work dust-free, do not paint on windy days.

6.3.6.2. Where To Start. In most cases, the most convenient order for painting is from the highest point down. The following is for guidance:

CAUTION: Cover machinery with paint cloths to afford sufficient protection from sanding dust and paint.

6.3.6.2.1. Remove the moveable deck gear and equipment from the boat for painting.

6.3.6.2.2. Paint all horizontal and vertical surfaces of the superstructure.

6.3.6.2.3. Paint all deck and cockpit surfaces, including fixed equipment and deck machinery.

6.3.6.2.4. Paint topsides down to boot top.

6.3.6.2.5. Paint bottom and boot top, in that order.

6.3.6.2.6. When painting the interior, follow the same order by painting overhead surfaces first, then vertical surfaces and then the deck of flats and bilges.

6.3.6.3. Preparation of Paint:

WARNING: Paints, primers, lacquers and varnishes must be handled carefully and used only in a well ventilated approval area. Avoid prolonged breathing of vapors. Avoid eye and repeated skin contact. Keep away from sparks and flames.

6.3.6.3.1. Manufacturer's Instructions. Prepare paint in accordance with manufacturer's instructions indicated on the container. When thinning is required and manufacturer's specific instructions are not available, the following instructions will be used for guidance:

6.3.6.3.1.1. Thin cellulose nitrate dopes with cellulose nitrate dope and lacquer thinner. For brush application proportions will be not more than 1 part thinner to 4 parts dope, by volume. For spray application proportions will be not more than 1 part thinner to 1 part dope, by volume.

6.3.6.3.1.2. Thin enamels for spraying with volatile mineral spirits paint thinner using approximately 1 part thinner to 4 parts enamel, by volume.

6.3.6.3.1.3. Thin lacquers with cellulose nitrate dope and lacquer thinner using minimum amount required to adequately thin. To reduce blushing, thin with blush retarding cellulose nitrate dope and lacquer thinner using minimum amount required.

6.3.6.3.1.4. Thin enamels for brush application with volatile mineral spirits paint thinner, using thinner as required.

6.3.6.3.1.5. Thin paint with volatile mineral spirits paint thinner or with turpentine, using thinner as required.

6.3.6.3.1.6. Thin zinc chromate metal primer, with thinner. For brush application proportions will be approximately 1 part thinner to 1 part primer. For spray application proportions will be not more than 2-1/2 parts thinner to 1 part primer.

6.3.6.3.1.7. Thinning instructions for anti-fouling paint, aluminum paint and zinc dust paint are outlined in paragraphs [6.3.6.4.3.](#) through [6.3.6.4.6.](#)

6.3.6.3.1.8. All paints should be vigorously and thoroughly mixed before application. Settled paint in a can contains excess oil or vehicle at the top, while the pigment settles at the bottom. A power shaker vibrates the can vigorously while it is closed and effects a thorough blending of pigment and vehicle. When a portable electric paint mixer or a less intricate mixer is used to stir the paint, the can of paint to be mixed must first be opened. Lids should be removed in such a way as to not deform the lid so it can be used to reclose the can. This is to be done by using a flat tool such as a screw driver to pry up the lid only enough to loosen it. Do this all around the lid and no damage will be done to either can or lid. Satisfactory paint mixing can be achieved by using a paint mixing attachment. This consists of a dual propeller shaft which can be attached to a portable power drill and inserted in a paint can for thorough mixing. However, due to the danger of sparks from electrical equipment igniting the paint fumes, only such electric drills which are certified non-sparking or totally enclosed shall be used inside compartments and other enclosed or poorly ventilated areas. If such equipment is not available, use mechanical paint shakers,

pneumatic drills or stir by hand. When power shakers or mixers are not available, it is necessary to mix the paint by hand. To do this, pour off most of the clear liquid at the top of the container and mix the remainder thoroughly with a broad paddle. Add a small amount of the clear liquid and stir well, using a Figure 8 motion with the paddle. Repeat the process, adding a small amount of liquid at a time, until all of the liquid has been added and the paint is uniform. Next, "box" the paint. Boxing is performed by pouring the paint back and forth between two containers. This ensures a homogenous mixture. After the paint has been thoroughly mixed, all particles of pigment, dirt and skin should be removed by straining through a wire screen or cheesecloth. Any paint left over from a job should be strained before storing.

6.3.6.3.2. Apply paint in even coats and brush out well. Thick uneven coats will blister, crack or peel; on surfaces which cannot be covered adequately with 1 thin coat, allow a minimum of 24 hours between coats under good weather conditions; under less favorable weather conditions allow 48 hours or more when practical. Sand lightly between coats with garnet paper and remove dust with brush or rag dampened with turpentine.

6.3.6.3.3. Touch Up. Paint work will be touched up as necessary to afford maximum protection against deterioration and to maintain a good appearance.

6.3.6.4. Preparation and application of special paints:

WARNING: Paints, primers, lacquers and varnishes must be handled carefully and used only in a well ventilated approved area. Avoid prolonged breathing of vapors. Avoid eye and repeated skin contact. Keep away from sparks and flames.

6.3.6.4.1. Anti-Fouling Paint. Special procedures are required for the application of anti-fouling paint in order that the most effective results may be obtained. Follow instructions provided with paint.

6.3.6.4.2. Preparation of Bottom, Wood Watercraft. Prepare bottom in accordance with the following procedures:

6.3.6.4.2.1. Immediately after haul-out, scrub or scrape bottom thoroughly removing all barnacles, marine growth, etc. and rinse off with fresh water.

6.3.6.4.2.2. Allow bottom to dry thoroughly.

WARNING: Most anti-fouling bottom paints are toxic. Take necessary precautions against breathing dust when sanding to avoid toxic effects.

6.3.6.4.2.3. If old paint is in good condition, sand to a smooth, hard surface with garnet paper. Feather edges of exposed or scuffed areas, then glaze seams, screw heads and depressions as necessary with lacquer glazing putty.

6.3.6.4.2.4. After putty dries hard, sand surface to a smooth finish and wipe free of dust.

6.3.6.4.2.5. If old paint is in poor condition or it is of a type that is known to react unfavorably to anti-fouling paint, remove all such paint to the bare wood.

6.3.6.4.2.6. When applying bottom paint on plywood, either newly installed or from which all oil paint has been removed, it is necessary to first apply a sealing coat of thinned varnish, oil type, after surface is sanded to prevent reaction of anti-fouling paint with ply-

wood binder. After varnish is thoroughly dry, sand lightly with garnet paper. A varnish sealer coat is not required prior to apply anti-fouling paint to plastic-faced plywood.

6.3.6.4.3. **Mixing of Anti-Fouling Paint.** If no instructions are provided by the manufacturer, preparation of anti-fouling paint will be in accordance with the following instructions:

6.3.6.4.3.1. Mix paint in normal manner, either by hand or by mechanical mixer. A longer period of mixing is required to bring all pigment into suspension in anti-fouling paint than is required with most other types of paint.

6.3.6.4.3.2. When paint is mixed by hand, pour the vehicle into a clean can, break the pigment with a paddle and slowly add vehicle to pigment, stirring thoroughly until completely blended.

NOTE:

Do not thin more paint than required for immediate use. Do not use this thinner in other paints. Brushes used to apply anti-fouling paint, are best cleaned with this thinner.

6.3.6.4.3.3. Add appropriate paint thinner in the ratio of 1 part thinner to 4 parts paint and mix thoroughly.

6.3.6.4.4. **Application of Anti-Fouling Paint:**

6.3.6.4.4.1. Apply paint by brush, flowing it on evenly in same manner used to apply enamel.

6.3.6.4.4.2. When applied over paint in good condition 1 coat is usually sufficient. Apply 2 coats on new or exposed wood, allowing 12 hours drying time between coats and lightly sanding first coat prior to application of second.

6.3.6.4.4.3. Prior to launching and after final coat is thoroughly dry, burnish surface lightly with artificial waterproof abrasive paper (This procedure is not mandatory when impractical due to the time factor involved; however, burnishing will ensure maximum protection and service life from the paint.)

6.3.6.4.5. **Aluminum Paint, Mixing Instructions.** Use the following instructions for mixing aluminum paint if no instructions are available:

6.3.6.4.5.1. Proportions for mixing aluminum paint are 1 gallon of clear cellulose nitrate lacquer to 12 ounces of aluminum paste, pigment, Type 2, Class A and approximately 1 gallon of cellulose nitrate dope and lacquer thinner. Quantities of lacquer and pigment must be in exact proportions.

6.3.6.4.5.2. Add small amounts of lacquer to the pigment. Stir thoroughly between each addition of lacquer. After the pigment is well dispersed, add the lacquer-pigment mixture to the balance of the lacquer. Then as required, adding small amounts of thinner and stirring well between each addition.

6.3.6.4.5.3. Strain the final mixture through a 35-40 mesh screen to remove all unmixed particles.

6.3.6.4.6. **Zinc Dust Paint, mixing instructions (if manufacturer instructions are not available):**

6.3.6.4.6.1. To 1 gallon of zinc enamel, add 11.1 pounds of zinc dust pigment in increments of 2-1/2 to 5 pounds and stir until no lumps or dry particles of the rest remain.

6.3.6.4.6.2. Do not mix dust and liquid until immediately prior to application; mix only enough for immediate use.

WARNING: After final application of zinc dust paint, flush tank twice with fresh water before placing it in service. Failure to flush tank thoroughly will permit loose particles of the coating to remain in the water supply system.

6.3.6.4.7. Zinc Dust Paint, Application Instructions: Thoroughly clean tank of all oil paint coatings by sandblasting, if practicable or by means of a power wire brush. It is especially important to remove entirely the zinc chromate after picking paint and circulate unheated air through the tank for 12 hours. Apply a second coat and again circulate unheated air for 12 hours.

6.4. Painting Instructions . Instructions in this section pertain to the colors and types of material used in painting the various areas and pieces of equipment on all standard types and provide guidance for painting nonstandard types of air force watercraft. If technical data for vessels contradicts this instruction, the technical data reference will take precedence.

6.4.1. Waterborne Range Clearance Watercraft:

6.4.1.1. Exterior. Paint the exterior in accordance with the following instructions. Colors will match as closely as possible to original or, if original colors are not available, vessels will be painted in a color and pattern which retains a military appearance. If no color pattern or technical data is available, use other like military vessels as an example.

6.4.1.1.1. Paint all outside and top areas of boat super-structure, including deck houses, cabin trunks and exteriors, bridge wings, masts, derricks, flagstuffs and ventilators down to the main deck and dinghies or lifeboats with synthetic gloss enamel.

6.4.1.1.2. Treat awnings, windbreaks, flag bags and canvas covers on boats, compasses, pelorusses and searchlights with 1 coat of compound canvas preservative, followed by 1 coat of paint to match surrounding area.

6.4.1.1.3. Paint surfaces subjected to frequent handling (door frames, handrails, etc.) with deck enamel. Paint surfaces which are desired to be highlighted for safety reasons (grab rails, handrail cables, edges of steps, stanchions, etc.), as well as fittings located on deck which constitute a trip hazard (bits, cleats, anchors, windlasses, etc.) with deck enamel in a color which contrasts the surrounding area.

6.4.1.1.4. Use of black paint on surfaces and fittings will be held to a minimum in order that the benefit of contrasting colors will not be lost.

6.4.1.1.5. Paint other surfaces and fittings (window and port light rims, stowage racks, electrical boxes, etc.) on which a color contrast is not required, to match the adjacent surfaces.

6.4.1.1.6. Paint main and cockpit decks, coamings and cockpit interiors with deck enamel. Vertical surfaces of deckhouse extending below the main deck into the cockpit area will be painted a contrasting color down to the cockpit deck.

6.4.1.1.7. Paint all ventilator interiors with enamel in a contrasting color.

6.4.1.1.8. Paint light screen on the port side with red enamel; paint light screen on the starboard side with green enamel.

6.4.1.1.9. Paint ring buoys and non-inflatable lift rafts with yellow exterior and interior gloss enamel and mark with black enamel. Refer to paragraph 6.5. for marking instructions.

6.4.1.1.10. Paint hull, topsides to boot top, with exterior hull enamel.

6.4.1.1.11. Paint engine exhausts, through transom or side, with heat resisting glyceryl phthalate gloss enamel.

6.4.1.1.12. Paint the boot top with black enamel.

6.4.1.2. Paint the hull bottom below the boot top with anti-fouling paint. See special instructions on preparation and application procedures outlined in paragraph 6.3.6.4.

6.4.1.3. Interior Painting:

6.4.1.3.1. Paint hull and cabin interiors (vertical and overhead surfaces) with interior, fire retardant, semi-gloss enamel.

6.4.1.3.2. Paint engine rooms, engine compartments or the interiors of engine boxes, including overhead and side walls, upward from a point 6 inches above decks of walking flats or from chine line with sufficient coats of interior, fire retardant, semi-gloss enamel to cover original color. Do not apply a finish coat in order that full effectiveness may be obtained from the fire retardant qualities of the paint.

6.4.1.3.3. Paint engine room decks of walking flats and washbands with deck enamel.

6.4.1.3.4. Paint decks and washbands in other interior with deck enamel.

6.4.1.3.5. Treat bilges and undersides of flats, if unpainted, with wood preservative, pentachlorophenol and leave unpainted. Paint bilges and underside of flats, if presently painted, with semi-gloss enamel.

6.4.1.3.6. Paint metal tanks and fittings in the bilge areas with deck enamel. Prime exterior surfaces of metal tanks not previously painted or from which oil paint has been removed, apply coat of pretreatment coating, followed by 1 coat of zinc chromate primer, before application of finish coat. Do not paint self-sealing fuel cells. Treat interior of potable and fresh water tanks made of galvanized metal with 2 coats of zinc dust paint. See paragraph 6.3.6.4.6. for mixing and application instructions. Do not treat interior of copper, monel or terneplate tanks.

6.4.1.3.7. Paint all machinery, including propulsion engines and auxiliaries, electric motors, pumps and accessories with aircraft gloss enamel. Mask openings, moving parts and items such as spark plugs and ignition leads, to prevent engine being made inoperative by paint.

6.4.1.3.8. Prime interior and exterior surfaces of battery boxes. Apply 2 coats of acid resisting finish lacquer.

6.4.1.3.9. On surfaces presently finished natural and in good condition, sand lightly and apply oil type gloss varnish. If such surfaces are not in good condition, remove varnish to bare wood with paint remover. Thoroughly flush the surface on which paint remover has been applied with fresh water and prepare in accordance with instructions throughout paragraph 6.3. Paint with applicable color.

6.4.2. General Purpose Watercraft, Propelled:

6.4.2.1. Exterior Paint:

- 6.4.2.1.1. Unless otherwise specified in succeeding paragraphs, paint all exterior vertical surfaces of deckhouses, cabin trunks and bridge wings with hull exterior enamel.
- 6.4.2.1.2. Paint vertical surfaces of deckhouses, cabin trunks and bridge wings on main deck of tug boats with hull exterior enamel.
- 6.4.2.1.3. Paint life preserver box exteriors, life raft supports, ready service boxes, vegetable lockers (on deck), upper side of pilothouse visors, stationary windshield, window frames, lifeboats, motor launches and dinghies aboard watercraft and other similar items with hull exterior enamel.
- 6.4.2.1.4. Paint boat booms, exterior of booby hatches, davits, lower portion of galley smoke pipes, log booms, masts, spars, booms, kingports, "A" frames, boiler or stovepipes (pipes extending through main stack), spreaders, main stack and exterior of ventilators, with exterior oil type paint.
- 6.4.2.1.5. Paint boat falls, tubs, cockpit sides, hatch coamings, expansion trunks, underside of exterior deckheads, movable windshields and other similar items with semi-gloss enamel.
- 6.4.2.1.6. Paint cockpit floors, desk (steel, wood or canvas covered), inboard side of bulwarks, gangways and boarding ladders, interior of life preserver boxes, top of houses, transoms and top of trunk cabin with deck enamel.
- 6.4.2.1.7. Paint washband on vertical surfaces of deckhouses, cabin trunks and bridge wings on main deck of tug boats with enamel.
- 6.4.2.1.8. Paint anchors, blocks, boathooks, bulwark caps, compass and pelorus stands, deck fittings (bits, cleats, chocks, pads, etc.), deck machinery and controls, door fittings, handrails, handrails stanchions, hawse pipes, mast collars, upper section of masts located aft of stack monkey gaffs aft of stack, rudder quadrants exposed on deck, standing rigging, spreaders, stem rollers, thresholds, tillers, guards, fenders, chafing strips, searchlights (if painted) and other similar items with enamel.
- 6.4.2.1.9. Do not paint polished brass and chrome plated fittings or light fixtures.
- 6.4.2.1.10. Treat awnings, canopies, windbreaks, flag bags, hatch cover tarpaulins and canvas covers on boats, compasses, pelorusses and searchlights with 1 coat of canvas preservative compound followed by 1 coat of paint to match surrounding area.
- 6.4.2.1.11. Paint life rafts and ring buoys with yellow exterior and interior gloss enamel and mark with black enamel. Refer to paragraph 6.5. for marking instructions.
- 6.4.2.1.12. Paint fire main connections, hose racks, spanner wrenches, axes and interior of cowl ventilators with red enamel.
- 6.4.2.1.13. Paint light screen on the port side with red enamel and on the starboard side with green enamel.
- 6.4.2.1.14. Paint chain plates, exterior of airport and deadlight frames, life preserver racks and jack and flag staffs with color to match adjacent surface.

- 6.4.2.1.15. Paint upper section of galley smoke pipe and boiler or stovepipes through main stack with heat resisting, glyceryl phthalate gloss enamel.
- 6.4.2.1.16. Paint anchor chains, if not galvanized, with asphalt varnish.
- 6.4.2.1.17. Paint name boards with white hull exterior enamel and letter with black enamel. Letters and numbers will be 8 inches tall and approximately 5 inches wide. Letters and numbers will be shaped and proportioned as required.
- 6.4.2.1.18. On watercraft fitted with a main stack, paint the stack with heat resisting, glyceryl phthalate gloss enamel.
- 6.4.2.1.19. Paint the underside of pilothouse visor with synthetic semi-gloss enamel.
- 6.4.2.1.20. Paint waterways with enamel.
- 6.4.2.1.21. On surfaces presently finished natural, if in good condition, apply oil type gloss varnish. If such surfaces are not in good condition, remove the varnish to bare wood with paint remover. Thoroughly flush the surface on which paint remover has been applied with fresh water and prepare in accordance with instructions outlined in paragraph 6.3. Paint with applicable color.
- 6.4.2.1.22. Do not paint wire rope running rigging. Lubricate with gear chain and wire rope lubricant.
- 6.4.2.1.23. Paint hull, topsides to boot top (including bulwarks, if applicable), with semi-gloss oil enamel.
- 6.4.2.1.24. Paint engine exhausts, through transom or side, with heat resisting glyceryl phthalate gloss enamel.
- 6.4.2.1.25. Paint the boot top with enamel.
- 6.4.2.2. Bottom:
- 6.4.2.2.1. On wooden vessels, paint the bottom below the boot top with anti-fouling paint. Refer to special instructions on preparation and application procedures outlined in paragraph 6.3.6.4.
- 6.4.2.2.2. On steel vessels, paint the bottom below the boot top with 2 coats of anti-corrosive steel ship bottom paint, followed by 1 coat of anti-fouling ship bottom paint.
- 6.4.2.2.3. Treat steel underwater gear and fitting in the same manner as the bottom of steel vessels.

NOTE:

Do not apply paint to radio ground plates or zinc plates.

- 6.4.2.2.4. Apply 1 coat of anti-fouling ship bottom paint to bronze underwater gear and fittings.
- 6.4.2.2.5. Paint draft numerals at the bow and stern on following vessels: Tugs, barges, lighters, tankers, floating dry-docks, landing craft, utility and salvage vessels. Paint load waterline length with hull exterior enamel. Place figures at the bow and stern on port and starboard sides as near the fore and aft perpendiculars as is practicable. On vessels with transom sterns, draft

figures will be located at the center of the transom sterns, draft figures will be located at the center of the transom only. Figures shall be shaped and proportioned in accordance with paragraph 6.5. The height of the draft figures projected onto a vertical plane will be 6 inches and so located that the bottom edge of the figure will designate the draft indicated by that figure. Sufficient draft figures will be placed at the bow and stern to show 1 draft mark above the deepest draft and 1 below the lightest draft. No draft figures will be placed on vessels of less than 45 feet in length.

6.4.2.3. Interior:

6.4.2.3.1. Unless otherwise specified in succeeding paragraphs, paint hull and cabin interiors (vertical side and overhead surfaces) with fire retardant, interior semi-gloss enamel, followed by a finish coat of interior gloss enamel. Space painted will include crews quarters, state-rooms, day rooms, galleys, pantries, mess and wardrooms, passageways, storerooms, wash-rooms and toilet and shower spaces.

6.4.2.3.2. Paint chart rooms, pilothouses and radio rooms with gloss enamel.

6.4.2.3.3. Paint engine rooms, engine compartments and the interior of engine boxes with fire retardant, interior semi-gloss enamel. No finish coat will be applied in order that full effectiveness may be obtained from the fire retardant qualities of the paint.

6.4.2.3.4. Paint holds, lazarettes, magazines, pump rooms, reefer spaces and resistor rooms aluminum. Instructions for aluminum paint are outlined in paragraph 6.3.6.4.5. Treat wood surfaces of holds, lazarettes and reefer spaces, if unpainted, with wood preservative, pentachlorophenol and leave unpainted.

6.4.2.3.5. Paint interior and exterior surfaces of battery boxes with acid resisting lacquer.

6.4.2.3.6. Paint decks, flats, gratings and washbands in engine rooms, interior spaces, holds and storerooms with deck enamel.

6.4.2.3.7. Refer to paragraph 6.4.4. for painting of bilges and voids.

6.4.2.3.8. Treat bilges and underside of flats in wood vessels, if unpainted, with wood preservative, pentachlorophenol and leave unpainted. Paint bilges and underside of flats in wood vessels, if presently painted, with exterior enamel.

6.4.2.3.9. Paint gear lockers with semi-gloss enamel. Do not paint lamp and paint lockers sheathed with galvanized steel. Paint chain lockers with enamel.

6.4.2.3.10. Prime exterior surfaces of tanks, if unpainted, with zinc chromate metal primer. Apply finish coat to match the adjacent surface. Do not paint interior of fuel tanks. Prime interior of ballast tanks with 2 coats of zinc chromate metal primer. Treat interior of potable and fresh water tanks made of galvanized metal with 2 coats of zinc dust paint. Refer to paragraph 6.3.6.4.6. for mixing and application instructions. Do not treat interior of copper, monel or template tanks.

6.4.2.3.11. Paint all machinery, including propulsion engines and auxiliaries, electric motors, pumps and accessories, with aircraft gloss enamel. Mask openings, moving parts and items such as spark plugs and ignition leads, to prevent engine being made inoperative by paint.

6.4.2.3.12. Paint engine room gratings and front panels of switchboards with deck enamel.

6.4.2.3.13. On interior trim presently finished natural, if in good condition, apply oil type gloss varnish. If such surfaces are not in good condition, remove varnish to bare wood with paint remover. Thoroughly flush the surface on which paint remover has been applied with fresh water and prepare in accordance with instructions in paragraph 6.3. Paint with applicable color.

6.4.3. General Purpose Watercraft, Nonpropelled:

6.4.3.1. Exterior:

6.4.3.1.1. Unless otherwise specified in succeeding paragraphs, paint all exterior surfaces of barges (crane, fuel, open cargo, covered cargo and self-propelled derricks) with semi-gloss enamel.

6.4.3.1.2. Paint anchors, blocks, cable reels, deck fittings (bits, cleats, chocks, pads, etc.), deck machinery and controls, handrails, handrail stanchions, hose racks, manholes and deck plates, exterior piping and trunk hatch covers, valve handles and other similar items with enamel.

6.4.3.1.3. Paint davits, booms and "A" frames with oil type exterior paint.

6.4.3.1.4. Paint valve bodies on liquid cargo barge pipelines with enamel.

6.4.3.1.4.1. Do not paint stems, gland nuts, yoke studs and other threaded parts; buff to a bright finish and apply a light film of lubricant.

6.4.3.1.4.2. Identify valves by appropriate stencils, using black enamel.

6.4.3.1.5. Identify piping on liquid cargo barges by appropriate stencils, using yellow deck enamel. Letters will be 1 inch high except on pipes under 2 inches in diameter, on which lettering will be reduced proportionally. Indicate direction of flow by arrows.

6.4.3.1.6. Paint gasoline tanks and piping (auxiliary engine supply) with yellow deck enamel and identify by stencil, using black enamel. Letters on tank will be 2 inches high and placed on both sides and ends. Letters on pipe will be of appropriate size for diameter of pipe.

6.4.3.1.7. Paint other auxiliary supply tanks with exterior enamel and identify by appropriate stencils, with letters 2 inches in height using hull exterior paint.

6.4.3.1.8. Paint engine exhaust pipes with heat resisting glyceryl phthalate gloss enamel.

6.4.3.1.9. Paint ring buoys with yellow exterior and interior gloss enamel and mark with black enamel. Refer to paragraph 6.5. for marking instructions.

6.4.3.1.10. Paint light screens in accordance with instructions in paragraph 6.4.1.1.8.

6.4.3.1.11. Paint anchor chains, if not galvanized, with asphalt varnish.

6.4.3.1.12. Paint the hull with exterior enamel.

6.4.3.2. Bottom:

6.4.3.2.1. Paint the bottom with 2 coats of anti-corrosive steel, ship bottom paint, followed by 1 coat of anti-fouling ship bottom paint.

6.4.3.2.2. Paint draft numerals on all barges with hull exterior enamel. At the bow and stern place figures on port and starboard sides as near the fore and aft perpendiculars as practicable.

Shape and proportion figures 6 inches high and locate so that the bottom edge of the figure will designate the draft indicated by that figure. Place sufficient draft figures at the bow and stern to show 1 draft mark above the deepest draft and 1 below the lightest draft.

6.4.3.3. Interior:

6.4.3.3.1. Paint interior vertical and overhead surfaces of living quarters with fire retardant, interior semi-gloss enamel, followed by a finish coat of interior gloss enamel.

6.4.3.3.2. Paint interior vertical and overhead surfaces of machinery with fire retardant, interior semi-gloss enamel. No finish coat will be applied in order that full effectiveness may be obtained from the fire retardant qualities of the paint.

6.4.3.3.3. Paint interior vertical and overhead surfaces of houses on covered or warehouse type barges with aluminum paint. Proportions and mixing instructions for aluminum paint are outlined in paragraph [6.3.6.4.5](#).

6.4.3.3.4. Paint decks and washbands in living quarters with deck enamel.

6.4.3.3.5. Paint decks and washbands in machinery spaces with deck enamel.

6.4.3.3.6. Paint interior decks of cargo spaces on covered or warehouse type barges with deck enamel. Do not paint washbands on interior surfaces of cargo spaces.

6.4.3.3.7. Paint all machinery (pumps, generators, etc.) with aircraft gloss enamel.

6.4.3.3.8. Paint exterior surfaces of tanks to match the adjacent surface. Identify tanks and piping by appropriate stencils, using paint of contrasting color.

6.4.4. Paint bilges and below deck voids (spaces not used for fuel or cargo) with 1 coat of pretreatment coating, followed by 2 coats of zinc chromate primer.

6.4.5. Application Procedures, Bituminous Emulsion:

6.4.5.1. Bituminous Emulsion shall be applied to bilge areas, peak spaces, underside of walking flats and below-deck voids of steel-hulled watercraft, propelled and nonpropelled, in accordance with the following instructions and procedures:

WARNING - SAFETY PRECAUTIONS: Bituminous product may irritate the bare skin, especially in sunlight or enclosed, improperly ventilated spaces. They may also be irritating in contact with the skin of a person who is perspiring. Accordingly, all exposed parts of the body on which spray or liquid may fall, including face, neck, hands and arms should be totally covered with protective clothing. If some of the emulsion dries on the skin, it should be removed with a suitable powdered hand soap, which is not injurious to the skin and which in turn can be removed by rinsing with water. Solvents such as turpentine, mineral spirits and benzol should definitely not be used since they are absorbed into the skin and may cause harmful effects. All the precautions for spray painting, including the use of respirators, goggles and face masks should also be followed. These guards should be used even though the emulsions will not emit toxic fumes. At the conclusion of each day's operations, personnel applying this coating should wash all exposed parts of the body with soap and water. The above precautions should also be observed during removal of bituminous emulsion from surfaces to which it has been applied. It is emphasized that strict adherence to the foregoing precautions is necessary to prevent burns which may result from prolonged contact of this material with the skin.

6.4.5.2. Surface Preparation. The surface must be cleaned thoroughly to bare metal. Immediately before painting, dust should be removed, preferably by using a damp cloth or swab and the surface uniformly wet (but not flooded with water). The surface should be moist at the time of application. This procedure is required when the emulsion is applied by spraying. It is not required but is recommended when application is made by brush.

6.4.5.3. Mixing. Thorough mixing is one of the most important steps in the application. Material should be mixed using a motor driven portable agitator until a uniform creamy consistency is obtained. No water should be added before mixing or before application.

NOTE:

Do not apply this material on galvanized or nonferrous surfaces. This material may be used in lieu of pre-treatment, followed by zinc chromate primer.

6.4.5.4. Application should not be attempted at temperatures below freezing. Before using, the material should be screened through a No. 16 mesh screen, which may then be cleaned with water while emulsion is still wet or with benzol after it has been set. Both brush and spray allocation are permissible. Emulsion is not to be warmed before application. Brushes should be soaked in water 24 hours before use. In brushing, material should not be thinned out excessively. Application of each coat shall be adjusted to a spreading rate of as near 100 square feet per gallon as possible. At this rate the wet film thickness is 16 mils which is reduced on drying to about 10 mils, minimum allowed.

6.4.5.5. Drying. Each coat must be allowed to dry before application of subsequent coats and before the coating is placed in service. Drying time is largely controlled by the amount of moisture in the air. In well ventilated spaces the coating will appear to be dry in approximately 1 to 2 hours, but a 24-hour period should be allowed where practicable. In closed or confined spaces exhaust ventilation must be provided.

6.5. Marking and Insignia:

6.5.1. Marking:

6.5.1.1. Range Clearance Watercraft. The Air Force boat designation will be carried on both sides near the bow and on the transom of all watercraft. This designation will consist of the service designation placed above the boat designator and serial number. For example, USAF over P50-2108.

6.5.1.1.1. The designation at the bow will parallel the sheer line; the designation on the transom will parallel the waterline. The letters USAF will be 3/4 the height of the characters in the identification number and the space between the 2 lines of the designation will be 1/4 the height of the characters in the identification number. If guard moldings on the transom interfere with exact spacing of the characters, conform to indicating location as closing as practicable. Use enamel for application of designators.

6.5.1.1.2. The boat designator and serial number only will be carried on the forward cabin or on the forward deck of watercraft. Parts of grabrails, fittings or trim directly in the field of the individual characters will be painted accordingly.

6.5.1.1.3. Lifeboats and dinghies will carry the designator and serial number of the mother boat on stern transom only. When these boats have been assigned designator and serial numbers, these will be marked on the bow.

6.5.1.1.4. Service designation and boat designator serial number will be carried on the face of ring buoys and non-inflatable life rafts on a line around the circumference and centered on the width. Service designation will be placed at top of ring buoy or other end of life raft. Both parts of the designation will read from left to right. Letters and numbers will be in proportion to the size of the item.

6.5.1.2. General Purpose Watercraft, Propelled. The Air Force boat designation will be carried on both sides near the bow and on the transom of all general purpose watercraft. This designation will consist of the service designation placed above the boat designator and serial number. For example, USAF over P31-2116.

6.5.1.2.1. Location and layout of the bow transom designations will be IAW paragraph **6.5.1.1.1**. The designation at the bow will parallel the sheet line; the designation on the transom will parallel the waterline. The letters USAF will be $\frac{3}{4}$ the height of the characters in the identification number and the space between the 2 lines of the designation will be $\frac{1}{4}$ the height of the identification characters. If guard moldings on the transom interfere with exact spacing of the characters, conform to indicated location as closely as practicable.

6.5.1.2.2. Propelled general purpose watercraft will not carry the designator and serial number on the cabin or forward deck.

6.5.1.2.3. Life boats and dinghies will carry the designator and serial number as outlined in paragraph **6.5.1.1.3**.

6.5.1.2.4. Ring buoys and non-inflatable life rafts will carry the full designation as outlined in paragraph **6.5.1.1.4**.

6.5.1.2.5. All characters will be shaped and proportioned in accordance with paragraph **6.5.1.1.1**. Use hull exterior enamel for application of designators.

6.5.2. Insignia:

6.5.2.1. Watercraft. The star insignia will be carried on all watercraft. On all USAF watercraft the size and location of the insignia will conform to the size of vessel. The insignia is a white, 5 pointed star inside a blue circumscribed circle with a white rectangle. The overall size of the insignia is based on the diameter of the star circle. The length of the white rectangle is 1 radius of the circle and the width is $\frac{3}{4}$ of the radius. The rectangle shall be placed on each side of the star so that the top edges will form a straight line with the top edges of the 2 points beneath the top point of the star. A red horizontal stripe shall be centered in the white rectangle at each side of the star; width of the red stripe shall be $\frac{1}{6}$ of the radius of the star circle. The entire design shall be outlined by a blue border; width of the border shall be $\frac{1}{8}$ of the radius of the star circle.

6.5.2.1.1. Waterborne Range Clearance Watercraft. The insignia will be carried on all watercraft insignias and locations as per size of the vessel.

6.5.2.1.2. General Purpose Watercraft, Propelled: Location of the insignia will be in accordance with the following instructions:

6.5.2.1.2.1. Cabin Type General Purpose Watercraft: Forward cabin roof.

6.5.2.1.2.2. Open Type General Purpose Watercraft: Top of the engine box, with rectangle on fore and aft centerline and the star pointing to port.

Chapter 7

WATERCRAFT AND EQUIPMENT INVENTORY

7.1. Purpose:

- 7.1.1. To implement the basic inventory and accountability control on USAF watercraft.
- 7.1.2. To provide a standard inventory checklist (AFTO Form 280, **Watercraft Equipment Inventory**) for equipment required or authorized to make USAF watercraft fully equipped and operationally ready.
- 7.1.3. To provide instructions for the preparation, use, maintenance and disposition of AFTO Form 280.
- 7.1.4. To establish guidelines for the classification of various types of loose gear and equipment assigned to and used aboard, USAF watercraft.

7.2. General Information :

- 7.2.1. All equipment will be inventoried annually or upon change of accountable officer, whichever occurs first. More frequent inventories may be performed if necessary.
- 7.2.2. The AFTO Form 280 is the official authorization for all equipment aboard USAF watercraft. Therefore, it may be used as justification for requisitioning new and replacement equipment for USAF watercraft, provided said equipment is necessary to perform official mission requirements.
- 7.2.3. Explanation of "Titled" equipment. "User Maintained" means the using organization will maintain these items, arrange for maintenance by another party or provide funds for contract maintenance of same. "Intermediate maintenance" means a base level or equivalent dedicated repair organization, such as the Vehicle Maintenance shop, will maintain these items.
 - 7.2.3.1. Title A. Those items of equipment not normally secured or fastened to a vessel or so loosely secured as to be readily removed by hand without tools; e.g. anchors, fire hoses, spare tiller, gratings, etc. (User Maintained)
 - 7.2.3.2. Title B. Those items of equipment which are so installed as to require some tools and technical instruction for removal; e.g., electronic gear, compass, galley range, etc. Generally requires base level removal/maintenance. (User Maintained)
 - 7.2.3.3. Title C. Those items of equipment which are so installed as to be an integral part of the vessel; e.g. main engines, generators, deck winches, etc. Generally requires a fully equipped shop and qualified mechanic capability for removal/maintenance. (Intermediate Maintenance Shop)
 - 7.2.3.4. Title D. Expendable material such as ships stores, fuel, various engine filters, etc. Such items as galley/mess utensils, linens, deck/engine room hand tools, etc. will be inventoried as Title D. (Mixture of User and Intermediate Shop maintained)
 - 7.2.3.5. Title S. Those items of equipment which are installed aboard a vessel to meet special mission requirements and generally cannot be adapted for any other purpose; e.g. parasail tow winch, jump/drag training tower and associated gear, missile retrieving crane/cradles, etc. (User Maintained)

7.2.3.6. Title X. All classified equipment. This equipment will be treated in accordance with applicable security regulations. Title X equipment will be recorded on a separate AFTO Form 280 which will, in turn, be treated at the security level required by existing security regulations. (User Maintained)

7.3. Responsibilities:

7.3.1. HQ AFSPC/LGTV:

7.3.1.1. Maintains a current inventory of each AFSPC owned, operated or leased vessel.

7.3.1.2. Maintains a current copy of AFTO Form 280 for each vessel in the AFSPC inventory.

7.3.2. Using Activities:

7.3.2.1. Maintain a current and accurate copy of AFTO Form 280 on file and readily available for USAF watercraft permanently or temporarily assigned to their jurisdiction.

7.3.2.2. Forward updated copies of AFTO Form 280(s) to HQ AFSPC/LGTV within 30 days after completion of each inventory, whenever an addition or deletion is made to a vessel's AFTO Form 280 and whenever a vessel is reassigned from another activity to their jurisdiction.

7.3.2.3. Forward an accurate copy of AFTO Form 280 to the Commanding Officer of the gaining activity whenever a vessel is reassigned from their jurisdiction to another activity.

7.3.2.4. Prepare a Certificate of Transfer upon transfer of accountability as shown in [Figure 7.1](#).

7.3.2.4.1. This certificate must be signed by both the accountable officer being relieved and by the designated successor.

7.3.2.4.2. One copy goes to the officer being relieved of accountability, 1 copy must be filed with the local watercraft AFTO Form 280 files and 1 copy sent to HQ AFSPC/LGTV.

7.4. Instructions for Use of AFTO Form 280. This form is the property record used to maintain accountability for USAF watercraft and watercraft equipment. Every transaction that affects the asset position (including authorized changes), will be recorded on this form.

7.4.1. General Instructions.

7.4.1.1. One form will be established and maintained for each mission assigned vessel.

7.4.1.2. All entries must be posted in ink.

7.4.2. Preparation of AFTO Form 280:

7.4.2.1. Block 1. Enter the complete vessel designator number.

7.4.2.2. Block 2. Enter the command, base, state or country and organization to which the vessel is assigned.

7.4.2.3. Block 3. Enter date on which vessel was assigned to the activity recorded in Block 2.

7.4.2.4. Block 4. Self explanatory.

7.4.2.5. Block 5. Number each line item entry in sequence.

7.4.2.6. Block 6a. Enter the class or title of equipment being inventoried. Only 1 class or title of equipment will be inventoried on a page.

7.4.2.7. Block 6b. Enter the common usage or marine term, for the item. Like items will be given same title and nomenclature on all watercraft; e.g. anchor(s), regardless of type will be called anchor(s).

7.4.2.8. Block 6c. Enter a brief description of the item: e.g., anchors, Danforth, 150 lb.; propellers, Hyde, bronze 39 x 34; etc. Where feasible add model or serial number of assemblies; e.g. Engine, GM diesel 16V-71/7162-7000; pump, Jabsco/mod 18300-0000/180GPM; etc.

7.4.2.9. Block 6d, e and f. Enter the quantity for each item listed starting in Column D. At the next annual inventory, enter quantity in Column E and so forth. In order to minimize man-hours expended for inventory, each page of AFTO Form 280 should serve for 3 years or 3 separate inventories, whichever occurs first.

7.4.2.10. Block 7a, b and c. Enter date of inventory and name/rank/grade of person responsible for the entries and court. The date and signature in Block 7a will be approval for all line item entries in Block 6b and 6c, as well as the actual count in Block 6d. In like manner the date and signature for Block 7b will apply to Block 6b, c and e and Block 7c dates and approves Block 6b, c and f, respectively.

7.4.2.11. Block 8a, b and c. Enter signature, rank/grade and date of accountable officer whose signature appears on the Certificate of Transfer, as "receiving officer," or, whomever he may delegate to assume this responsibility. As in paragraph 7.4.2.10., the approval signature must correspond to the inventories of Blocks 6d, e and f.

7.4.2.12. When all the lines on a page are filled in, start another page. Fill in all the headings as herein described with the exception of Block 5, which will be a continuation of the item number sequence.

7.4.2.13. When all the items of a title are recorded, start a new page for the next title of items being inventoried.

7.4.2.14. The AFTO Form 280 with preprinted items in Blocks 6a, b and c will be completed and attached as the last page of the title A inventory.

Figure 7.1. Certificate of Transfer (Sample).

CERTIFICATE OF TRANSFER	

(Date)	
<p>“I certify that the balances shown on the _____ watercraft (Organizational Title) equipment property records (AFTO Form 280), as of above date, are true and correct to the best of my knowledge and belief and that the property this date has been turned over to _____</p> <p>_____.”</p>	
Signed _____	
(Relinquished Officer)	
<p>“I certify that I have received from _____, my predecessor, property (Relinquishing Officer) pertaining to the above designated records for which my said predecessor was accountable and I have, this date, assumed accountability for said property.”</p>	
Signed _____	Date _____
(Receiving Officer)	

Chapter 8

DESIGNATION AND SERIAL NUMBER IDENTIFICATION OF AIR FORCE WATERCRAFT

8.1. Purpose. This chapter establishes a system for assigning designator numbers to all USAF watercraft and to document the assignment and disposal of every watercraft entering the Air Force inventory. Towable boats having assigned trailers shall have the same Air Force designator number on the boat affixed to the trailer. Reporting is established for identification purposes and to provide inventory location data. This is not a programming document.

8.2. Air Force Designator Numbers:

8.2.1. AFSPC watercraft will be designated or redesignated under the following circumstances:

8.2.1.1. Watercraft which are presently in the Air Force system and for which an Air Force designation has not been previously assigned.

8.2.1.2. Watercraft entering the Air Force system as a result of procurement, lease, loan or other action whereby new or used watercraft are assigned to and operated by or for, an Air Force activity.

8.2.1.3. Watercraft which have had extensive modifications which would affect operational characteristics or where the mission of the watercraft is changed.

8.3. Explanation of Designator System:

8.3.1. The designator system establishes alphabetical designators which denote the general types and/or specific missions for USAF watercraft, as shown in [Table 8.1](#).

Table 8.1. Watercraft Designator Codes.

B	Barge, Utility	L	Lighter	S	Salvage
C	Cargo	MR	Missile/Drone Recovery	T	Tanker
D	Dredge	P	Personnel	TG	Tug
F	Ferry	RD	Repair Dock	TR	Training - Recovery

8.3.2. The appropriate alphabetical designator identifies the type of vessel, i.e., "B" for barge and is followed by a numerical designator established to identify the linear length of each vessel. For example, B-90 identifies a barge 90 feet long. Actual boat length in inches shall be reflected to nearest length in feet (6 inches or more shall be identified to next foot length). Upon completion of an extensive modification a letter will be added to the numerical designator, i.e., B-90A. Additional modification to the same vessel will be reflected by a successive change in the letter.

8.3.3. The numerical designator is followed by a specifically assigned serial number. This portion of the designation will not change, nor will the same number be assigned to more than 1 piece of floating equipment; thus, any watercraft can be positively identified even though the alphabetical designator has been changed and a letter suffix has been added to the numerical designator. Normally, watercraft designations will be assigned at time of construction or, upon request, when a designation is required for picking up an item on property account records. Requests for assignment of designations shall be forwarded to HQ AFSPC/LGTV.

8.4. Designators and Types.

Table 8.2. Designators and Types.

B-45	45 foot Barge, 21-ton Deck Cargo
B-110	110 foot Barge, 250-ton Deck Cargo
C-56	56 foot Landing Craft
C-74	74 foot Landing Craft
D-41	41 foot Dredge, Steel, 8-inch Diameter
F-65	65 foot Ferry
MR-65	65 foot Missile Retriever
MR-85	85 foot Missile Retriever
P-21	21 foot Personnel Rescue
P-26	26 foot, Plastic, Open
P-36	36 foot, Utility
P40A	40 foot, Passenger Cabin (Modification by Installation of Cabin)
P-50	50 foot, Passenger and Cargo, Open
P-65	65 foot, Passenger, Cabin
P-85A	85 foot, Passenger (Modified for Personnel Carrier)
TG-45	45 foot Tug, Harbor
TG-65	65 foot Tug, Harbor
TR-31	31 foot Training Tow Parasail

8.5. Redesignation. When the hull or superstructure of a watercraft has been extensively modified or when a different type engine has been installed which changes the speed or operational characteristics of the watercraft, the using activity shall submit a request for determination of the correct designation of the watercraft to HQ AFSPC/LGTV.

8.6. Reporting:

8.6.1. Typewritten or reproduced copies of Identification Survey Form (See [Table 8.3.](#)) prepared in triplicate with two 8 x 10-inch outboard profile photographs attached will be submitted on the following USAF watercraft:

8.6.1.1. Watercraft for which an Air Force designation has not been previously assigned.

8.6.1.2. Watercraft acquired through normal supply channels or by outright purchase or transfer from another service or activity outside the Air Force.

8.6.2. All Air Force watercraft will have an Air Force designation assigned.

8.7. Marking. As soon as possible after receipt of a watercraft designation or redesignation, the activity to which the watercraft is assigned will mark the watercraft accordingly, using paragraph [6.5.](#) of this instruction for guidance.

8.8. Watercraft Inventory and Location Data:

8.8.1. The assignment, reassignment, transfer, loan or disposal of every watercraft in the AFSPC inventory shall be approved by or reported to HQ AFSPC/LGTV, who establishes historical data on all Air Force vessels.

8.8.1.1. MO in remarks column denotes Military Operated--AF maintained.

8.8.1.2. CO in remarks column denotes Contractor Operated--AF maintained.

Table 8.3. Identification Survey.

Date of Survey				
Base Assigned			Date Assigned	
1. Redesignated No			2. Present Equipment No	
3. Accountable SO No			4. Type of Service	
5. Type of Equipment			6. Length Overall	
7. Beam Overall			8. Length Waterline	
9. Speed in Knots			10. Bottom (Round or Vee)	
11. Construction			12. Builder	
13. Range			14. Year Built	
15. Design or Drawing No			16. Make of Engine(s)	
17. Rated Horse-Power			18. Type and Model(s)	
19. Fuel Capacity			20. Auxiliary Generator Unit(s) - Make and Model	
21. Capacity in Watts and Volts			22. Fuel Capacity	
23. No. of Units Installed			23a. Propeller Size	
OTHER AUXILIARY UNITS				
Nomenclature	Mfr	Cap or Size	Model or Type	How Operated
24. Bilge Pump				
25. Fuel Transfer Pump				
26. Auto. Fire Ext System				
27. Refrigerator (Elec)				
28. Galley Stove				
29. Water Pressure Pump				
30. Fire Pump				
31. Capstan or Windlass				
32. Cargo Winch				
33. Toilets				

OTHER AUXILIARY UNITS				
Nomenclature	Mfr	Cap or Size	Model or Type	How Operated
34. Heating Plant				
35. Search Light				
36. Hot Water Heater				
37. Communication Eqp				
38. Other				
39. Remarks				

Chapter 9

PREPARATION OF WATERCRAFT FOR SHIPMENT

9.1. Purpose. This chapter provides detailed instructions and procedures for the preparation of AFSPC watercraft for shipment and preparation for service after shipment is complete. Regardless of the condition of the watercraft or the method of shipment, watercraft will be shipped with all equipment or an appropriate notation will be entered in the ship's log reflecting any shortage and the reason for it.

9.2. Preparation of Hull, Engines, Accessories and Miscellaneous Items :

9.2.1. Hull:

9.2.1.1. Watercraft to be shipped as serviceable will be thoroughly inspected for overall condition, including underwater gear and bottom paint and for completeness. All corrosion preventative measures specified herein shall be taken. When a serviceable watercraft is being shipped, it should be in an operable condition after parts stowed for shipment are restored to original location or service.

9.2.1.2. A reparable or excess watercraft will be shipped with a clean hull and all equipment stowed to prevent damage to the watercraft and/or equipment. Logs and engine form (AFTO Form 17) will be completed and properly stowed aboard. All corrosion preventative measures specified herein shall be taken.

9.2.1.3. Items such as flag staffs, windshields (other than hinged type), searchlights, horns, navigation lights, cowl vents, etc., will be removed to prevent damage to equipment or shipping cover.

9.2.1.4. When electrical equipment has been removed, tape the loose ends of electric connections and cover any openings in the hull or superstructure with plywood or waterproof paper strong enough to resist normal damage. Waterproof paper covering will be sufficient at those locations which are also protected by a canvas cover.

9.2.1.5. All accessories or items of equipment removed will be processed IAW applicable procedures outlined herein. If space is available equipment will be stored inside.

WARNING: Fuel system tasks will be performed only in areas approved by the fire protection and safety representatives. Ensure bonding and grounding and use only non-sparking tools.

9.2.1.6. Fuel will be entirely removed from tanks with all required safety precautions being taken during removal. All tank filler opening deck plates and ventilator openings for which deck plates are furnished will have their covers securely turned down.

9.2.1.7. Hull drain plugs (if installed) will be removed, bilges thoroughly drained and plugs replaced and fastened securely after water is drained.

9.2.1.8. Disconnect storage battery leads and tape and secure the ends to prevent chafing or a possible short.

WARNING: Flammable gasses may be present around battery area. To avoid any possibility of a gas explosion, make sure the battery terminals are not shorted to ground during handling or maintenance. Avoid any action which may cause sparks or open flame.

9.2.1.9. As far as possible, equipment will be stored inside to prevent pilferage.

9.2.1.10. Any openings in the hull or superstructure caused by removal of equipment not specifically covered herein shall be sealed with moisture-proof paper and tape or with a watertight plywood section.

9.2.1.11. Propellers will be removed to eliminate the possibility of damage to blades during loading and unloading. Propeller nuts, cotter pins or fairwater nuts will be placed in the shaft and tightened. The propeller key will be placed in the shaft keyway and held securely with pressure-sensitive tape. Wrap the shaft end with burlap or paper, securely held in place, to protect machined surfaces. Propellers will be crated in a suitable wooden box and adequately secured within the box, which will be stowed in the watercraft.

9.2.1.12. Steel shafts will be coated with a suitable compound to prevent damage. Bronze or monel shafts will not require protection.

CAUTION: When compound is used on shaft, do not use in area of rudder strut bearings, because they are deteriorated by oil. Seal bearing area off with greaseproof barrier material held in place with pressure sensitive tape. Rudders will be left in place unless otherwise indicated.

9.2.1.13. The propeller shaft coupling to the engine will be disassembled (1/2- to 1-inch separation) and safety wired to the engine coupling. Coupling bolts, nuts and washers removed will be placed in a bag and fastened to the coupling.

9.2.1.14. Preparation of the hull for overseas movement will include all precautions previously indicated. In addition, it is imperative the hull interior be thoroughly ventilated, either by using the boat ventilators (watertight) to get a through current of air below decks or by opening doors and windows daily for several hours to ensure maximum ventilation. By using either of these methods, conditions conducive to wet and dry rot can be avoided and mildew and fungi growth eliminated or decreased. Preparations for overseas movement will be made so all possible conditions which could lead to direct or indirect hull damage will be avoided and so the watercraft will arrive at its destination ready for active service with a minimum expenditure of time and effort. Unnecessarily elaborate preparation should be avoided, but no part or point requiring special treatment should be overlooked. Corrosion preventative treatment should be applied to items that require continuous maintenance under service use. If an item requires routine maintenance against corrosion only once a month, it will not normally need corrosion preventive treatment if movement will take less than 30 days.

9.2.2. Preparation of Engines:

9.2.2.1. Engine preparation for a short movement (10 days or less) can be less thorough than that necessary for an overseas or other extended movement. For the degree of corrosion prevention treatment, dependent on time factors, refer to the applicable technical data for the engine.

9.2.2.2. Engines, reverse gears, vee or angle drives and reduction gears will be run up to normal operating temperature and oil will be removed before a watercraft is hauled out for shipment. Replace all oil plugs. The engine crankcase and reverse gear, vee or angle drives and reduction gear openings not positively sealed by plugs will be sealed and/or securely covered with a greaseproof barrier.

9.2.2.3. If the AFTO Form 17 is not available, initiate a new form, including any known history of the engine(s).

9.2.2.4. If a protective period of 30 days is exceeded before the engine is placed in use, it will be treated or retreated IAW applicable portions of the technical data for the engine.

9.2.3. Engine controls (throttle, reverse gear, primer, choke, etc.) and instruments (tachometer, pressure and temperature gauges, ammeters, etc.) will be given corrosion preventative treatment if movement is longer than 10 days.

9.2.3.1. Manual controls will require no preparation beyond normal lubrication.

9.2.3.2. Hydraulic, hydraulic-electric and electric controls (receivers, transmitters, etc.) will have fluid levels checked and actuator units wrapped in a moisture-proof protective covering. Openings into housing or case of associated units will be sealed. Electrical parts of control systems will be protected by enveloping housings or cases with a waterproof barrier or by sealing openings into housings with tape.

9.2.4. Instruments and instrument panels will have glass faces covered with waterproof barrier or the entire panel will be covered and sealed with a waterproof barrier. Openings into cases or housings will be sealed.

9.2.5. Engine telegraphs will have their operating heads protected from moisture and dust by wrapping in moisture-proof barrier. Telegraphs above the deck in exposed locations will be covered with waterproof barrier, then protected with a plywood housing. Chains, wires, pulleys and control arms will require normal lubrication.

9.2.6. Accessories and Associated Equipment will be treated individually. Items not covered specifically in this section, but of a similar nature, will be processed using these procedures as guidance.

9.2.7. Anchors and Anchor Chains. Anchor chains will be removed from the anchor and anchor rope. For rail shipment no preparation is necessary beyond cleaning. For overseas shipment, if the anchor is not galvanized or when there is evidence of corrosion on plated chain, coat it with a suitable compound. For either type of shipment, tag the chain to indicate from which anchor it was removed, if not interchangeable and stow in the chain locker or forepeak, secured against any movement.

9.2.8. Boat Davits will be removed from their sockets and secured. Exposed surfaces on painted davits will be cleaned, retouched and surfaces coated with a suitable compound.

9.2.9. Instruction Books, Parts Manuals, Technical Data and Other Literature will be wrapped in waterproof paper and stored in a dry, well-protected, locker space. For overseas shipment, place in a waterproof envelope or container. Seal the entire package by dipping in sealing compound. After treatment, wrap in waterproof paper again and stow securely to prevent movement, marking contents on the outside. A tag will be fastened to the steerer post or binnacle indicating the location of such items.

9.2.10. Cable:

9.2.10.1. Wire rope used for anchor or hoisting cable and carried on a winch reel will be thoroughly coated as it stands on the reel with a suitable compound. The reel will then be securely wrapped with 2 layers of greaseproof paper. For overseas shipment, wire rope will be removed from its reel and the entire length coated with compound, the rebound and the reel wrapped.

9.2.10.2. Wire rope used for life lines or on stanchions will receive no treatment for rail shipment. Wire rope, other than corrosion-resistant, will be coated with compound for overseas movement.

9.2.11. Canvas or canvas covered items such as life vests, canopies, tarpaulins, etc., whenever untreated for mildew, must be thoroughly dried and stowed in dry locations below deck. Whenever wrapping is necessary for protection from dirt or grease, use material appropriate for required protection. For overseas movement, unless items are definitely mold- and fungus-proofed, they will be treated with a field treatment fungicide and wrapped in waterproof barrier. If items cannot be given such mold and fungus treatment, they will be wrapped in suitable containers and sealed. Before sealing the containers, insert enough dehydrating agent (silica gel) for full protection of the cubic content of the package. Be sure the agent does not come into direct contact with the materials to be protected.

9.2.12. Deck Lockers. Wooden deck lockers will be secured to the deck or, if loose or removable, stowed below. Doors or lids will be securely locked or battened down. Steel lockers will have the lids or doors securely fastened; tack weld if no easier means is adequate.

9.2.13. Dories, Dinghies and Rafts. Dinghies carried in chocks on the cabin top or dories carried in chocks, keel up, will be securely lashed in place whenever road clearances will permit shipment in that location. If not or if exposed to possible damage, remove and lash them securely to the deck, keel up or place in the cockpit or cabin, whenever size will permit and securely lash in place. Whenever the watercraft is not shipped under cover, rafts will be removed from the exterior chocks and securely stowed below.

9.2.14. Fire Extinguishers:

9.2.14.1. Dry chemical extinguishers in the interior will be left mounted in their brackets. Exterior extinguishers will be removed, packed in boxes, secured against damage or movement and stowed below. Inspection tags will remain on the extinguishers, regardless of location.

WARNING: Do not activate the soda acid extinguishers; the canister could explode. Use eye and skin protection when handling acid and only in a well ventilated area.

9.2.14.2. Soda acid extinguishers will be shipped dry and the containers for acid refill will be packaged IAW ICC regulations. Acid carboys, hoses and nozzles will be shipped in the boat and secured against movement. The extinguisher, after removal of acid, can be returned to the bracket if this is secure enough to hold it against movement during shipment. Otherwise, it will be boxed and stored below.

9.2.14.3. Carbon Monoxide extinguishing systems (CO₂ or Lux), manual or automatic, will be left connected. Check the systems to determine that all mounting clamps on cylinders and piping joints are tight, that the inspection tag on the CO₂ cylinder is current and that tanks are filled to proper weight. Portable CO₂ extinguishers, if securely held in the mounting bracket and located in the interior, will remain in brackets. Those mounted on hanger-type brackets will be boxed and stowed below. All inspection tags will remain with the extinguishers.

9.2.15. Galley Equipment:

9.2.15.1. All unpainted, nongalvanized metal galley equipment subject to corrosion will be coated with a corrosion preventative compound for overseas shipment.

9.2.15.2. Items of loose metal galley equipment will be nested together as much as possible without allowing undue movement or distortion of any article. Stow in galley lockers, putting paper or cardboard filler around items in the lockers to prevent movement. Cutlery will be wrapped and placed in the proper drawer or box and secured.

9.2.15.3. Unremovable items of equipment such as cabinets, work benches, sink, pump, racks, etc., should be protected if boxes of equipment are stowed in galley areas. Use wood housing or waterproof paper for protection, if necessary.

9.2.15.4. Electric stoves will be cleaned and all loose pieces of equipment removed and stowed or boxed and sowed. Fastenings to the deck or bulkhead will be checked for security. Secure the oven door against opening with tape or rope.

9.2.15.5. Refrigerators will be thoroughly cleaned and all loose equipment removed from the interior. Empty or drain any water and secure the doors and drawers against opening. Check fastenings to the decks for security. Refrigerant will remain in the unit. Place Kraft paper between the compressor pulley and belt for overseas shipment. If compressor is separate from unit, build a protective housing over it.

9.2.16. Lines and Ropes. Cordage will be thoroughly dried, coiled, tied, with marlin or heavy cord, tagged for identification and stowed below in a dry place.

9.2.17. Hinges, Fasteners and Locks. Unpainted and unplated metal surfaces of hinges and fasteners that are subject to corrosion will be coated. Locks will be treated internally with powdered graphite and key openings sealed with tape. Coat bolt surfaces with a light oil and work back and forth to ensure coverage.

Horns will not be removed unless required for clearance. The horn mouth and external openings will be sealed. When necessary to remove the horn, disconnect the electrical leads and tape ends remaining on the boat. Place horn in a cardboard box and stow below.

9.2.18. Keys. All keys except the key used to lock the cabin or compartment after preparation is complete will be placed in the key locker. If there is no key locker, wrap each key individually in waterproof paper and tag. Place all keys in a cloth bag and secure to the steering wheel or binnacle in the pilothouse. Keys used to lock the cabin or compartments after preparation will be identified, tied together and delivered to the service representative responsible for the boat.

9.2.19. Mechanical Equipment:

9.2.19.1. Deck Equipment. Unremovable mechanical equipment installed on deck will have exposed surfaces subject to corrosion coated with compound. For overseas shipment, particularly if the boat is not shipped under cover, corrodable, exposed surfaces will be prepared as previously outlined and the entire unit completely covered with waterproof paper. Whenever necessary, a protective wood housing will be constructed and installed.

9.2.19.2. Pumps. Bilge pumping and water pumping systems should be completely drained of water, using low pressure compressed air is necessary. All openings to the interior of the pumping system will be sealed off.

9.2.20. Miscellaneous Fittings. Exhaust pipe outlets, intake scoops, through-hull connections, tank vents, etc., will be covered. External openings will be fitted with a snugly fit wood plug, if possible and covered with waterproof paper held securely in place.

9.2.21. Electrical Equipment (Except Communications):

9.2.21.1. Storage Batteries:

9.2.21.1.1. All battery leads will be disconnected at the battery. Terminals, lugs and battery top will be cleaned with a solution of soda ash or baking soda, then rinsed with clean water. Never use hot water or steam to clean the batteries. Coat terminals and lugs with petrolatum. Leads will be wrapped with greaseproof paper, tagged as to polarity and secured. Batteries will be checked for tightness, security and condition. Check the charge with a hydrometer. If reading is 1,265 or less, recharge the battery. Remove caps and fill to 3/8 inch above the plates. Replace caps tightly and make sure vent holes are open.

9.2.21.1.2. Whenever batteries are shipped dry, as will be the case for overseas shipment, no special preparation is necessary. When possible, dry batteries will be mounted and secured in their proper location with the leads left disconnected. Coat terminals and leads with petrolatum. Carboys for electrolyte for batteries will be prepared IAW ICC regulations and securely fastened to the boat flooring.

CAUTION: Do not use excelsior or any other inflammable material for padding of electrolyte shipping boxes.

9.2.22. Generators and electric motors will require no special preparation beyond sealing all openings from moisture and dirt. For overseas shipment the unit will be cleared externally and all openings sealed with waterproof paper. Internal parts such as brushes, commutators, collector rings, etc., will not be treated with corrosion preventive material. On larger generator sets (3KW and higher), check the manufacturer's instruction book to determine whether any special precautions need to be taken with brushes and brush holders. Gasoline driven generators will have the engine prepared IAW applicable technical data.

9.2.23. Electrical Switches (Switchboard). No special preparation is necessary for rail shipment except to make sure all switches are secured in the off position. For overseas shipment, knife switches will be coated with compound and secured in the off position. All make-up connections and wiring at the back of switches and the switchboard will be sprayed with shellac.

CAUTION: Seal any openings in electrical meters or control instrument housings on switchboard with tape before spraying.

9.2.24. Electrical Fixtures and Outlets. No special preparation is necessary for rail shipment. Make sure all bulbs are turned securely into screw type sockets and that screw covers are in place on all exterior fittings. For overseas shipment, external Navy-type fittings will require no special preparation beyond making sure all screw caps are turned down tightly. Interior fittings or standard types, will require no preparation except that plug-in outlets with exposed outlet openings will have these openings sealed with tape.

9.2.25. Navigation Instruments:

9.2.25.1. All openings to the interior of fixed units will be completely sealed. Unless there is danger of damage from other objects stowed in the same compartment as the fixed unit, no other protection is necessary. Otherwise, a wood protective housing will be installed and securely blocked or braced against shock.

9.2.25.2. All loose navigational instruments will be packaged for protection and whenever possible, stowed in a locked compartment. For overseas shipment, instruments should be wrapped for moisture protection as well as against shock. The clock and barometer will be removed and similarly packed.

9.2.26. Radio and Electronic Equipment:

9.2.26.1. For rail shipment no special corrosion control measures are necessary. Loose items of equipment will be wrapped and packed, using filler material to prevent movement and damage and with the boxes secured against opening. Stow in the radio room, if applicable or in a protected location.

9.2.26.2. For overseas movement, all items of loose equipment not already export-packed will be identified by tags and stowed in the radio compartments or in protected locations. Items of equipment already mounted will be wrapped with waterproof wrapping without disturbing mountings. Before wrapping packages, the required number of desiccant bags will be inserted. Seal all joints and edges with tape. If the equipment cannot be completely wrapped, cover it and secure the edges of the wrapping to the shelf surface to make a waterproof barrier. After proper preparation, watercraft with radio rooms will have doors locked throughout shipment, except during ventilation periods.

9.2.26.3. Antennas, masts and coaxial cables on the 40-, 63- and 85-foot boats will be removed, protected as required and stowed securely.

9.2.26.4. Direction finders will be wrapped in the same manner as radio equipment to make a moisture proof barrier around the equipment.

9.2.27. Water and Fuel Tanks: WARNING: Naphtha is flammable and toxic. Use in a well ventilated area. Avoid prolonged breathing of vapors. Avoid eye and skin contact. Keep away from sparks and flames.

9.2.27.1. Potable Water Tanks will be shipped dry. Whenever valves are not provided for draining, break the line and the lowest point or points and drain the system completely. Remake all connections and securely replace all plugs. For overseas shipment, if the tank has not already been treated with zinc dust, spray with zinc dust, thinning with naphtha as required. Allow the paint to dry thoroughly, replace the cover and secure.

9.2.27.2. Fresh Water Cooling Tanks. Water will remain in the fresh water cooling tanks and lines; make sure enough antifreeze is added if freezing temperatures are expected.

WARNING: Fuel system tasks will be performed only in areas approved by the fire protection and safety representatives. Ensure bonding and grounding and use only non-sparking tools.

9.2.27.3. Fuel Tanks:

9.2.27.3.1. Fuel tanks will be either drained or pumped completely dry. All fuel lines, filters, pumps and carburetors will be drained, disconnecting lines or removing the plugs at the lowest point. After completely draining the system, reconnected and secure all lines and replace and tighten all plugs. A sufficient number of portable CO₂ fire extinguishers will be available for instant use during this operation.

9.2.27.3.2. For rail movement metal tanks will not be processed; self sealing tanks will be sprayed lightly but thoroughly with SAE10 oil for either type of movement, making sure to leave no excess oil on the bottom of the tank. Metal fuel tanks on watercraft being shipped overseas will be treated in the same manner, using a corrosion preventing mixture of compound and oil.

9.2.28. Miscellaneous Equipment Preparation:

9.2.28.1. Steerer Cable and Chain. No special treatment is required for rail movement. For overseas movement the chain will be lightly sprayed or coated with compound. All wire rope used for the steerer system will be coated with the same compound, making sure all parts passing through elbows, channels, tubes or over sheaves are thoroughly covered. Make sure all lubricating fittings on the steerer system (rod or cable) are filled with the proper lubricant before shipment.

9.2.28.2. Steering Wheel. If the steering wheel is subject to possible damage through movement, remove it from the hub and stow below. For rail movement, leave it installed but secure against movement. Steerers showing exposed surfaces of metal subject to corrosion will either have such surfaces painted or coated with compound, as appropriate. If necessary to protect other objects from compound, wrap the coated surfaces with paper. If the steerer is removed, replace the nut, put key in the keyway and secure in place.

9.2.28.3. Exterior Lights. No special treatment is required except for removal of lights necessary for clearance or because of possible damage. Leads and openings through cabin top will be made waterproof. All items removed will be protected and stowed below.

9.2.28.4. Sanitary equipment and lines will be drained of all water and hosed clean with fresh water. After water is completely removed, external openings to seacocks may be sealed.

CAUTION: If freezing temperatures are to be encountered, leave seacocks and valves open to eliminate chance of damage. (Hull openings will remain sealed.)

9.2.28.5. Medical and First Aid supplies. Whoever such equipment is not supplied in a hermetically sealed container, it will be packed in a cardboard box with filler material to keep it from moving, the cover will be sealed and the box stowed in a safe, dry location. For overseas shipment, medical items not hermetically sealed will be placed in a fiberboard box, wrapped in paper, sealed with a dip coat of sealing compound and overwrapped in Kraft paper to prevent damage. For either type of shipment, boxes will be stowed to minimize the chance of damage by movement of other objects.

9.2.28.6. Windshield and Windows. For rail movement no special preparation is needed if safety glass is installed and if the boat is shipped under cover. Whenever shipped without cover, glass in the windshield and windows will be covered with plywood covers, 1/2 inch thick, securely fastened in place and edges against the hull will be made waterproof with tape.

9.2.28.7. Windshield Wipers. Remove blades and arms and remove external wiper body if the windshield is to be covered with plywood. Stow removed equipment below. "Cory" screens will remain in place and an external housing of plywood will be built over the regular cover, as required. All joints of the cover will be made watertight. If the boat is shipped with a canvas cover, this protection is not required.

9.2.28.8. Ventilators (removable) will be removed and deck plates screwed in place or watertight plywood covers will be used to cover openings. Whenever ventilation is required (as in overseas shipments) special vents may be made to provide necessary ventilation.

9.2.28.9. Screens. Interior window screens and all port light and marine window screens will remain in place. When the watercraft is shipped under cover, exterior screens will also remain in place. Coat surface of copper screens lightly with a light oil or corrosion preventive mixture for overseas shipment.

9.2.28.10. Spare parts shipped with the watercraft will be appropriated packaged.

9.2.28.11. Mattresses, pillows, seat cushions and linens. For rail shipment all such items will be boxed or securely wrapped in paper to protect them from dust and grease. When ever they will not be stowed in a completely dry place during shipment, the packaging will also contain a waterproof lining or wrapping of paper. (More than 1 item can be wrapped together.) Seat cushions (leather) should have a layer of paper between each cushion when wrapped together. When wrapping is necessary for protection from dirt or grease, use material appropriate for required protection. For overseas movement, unless items are definitely mold- and fungus-proofed, they will be treated with a field treatment fungicide, (Dri-Seal or equivalent) and wrapped in waterproof barrier. If items cannot be given such mold and fungus treatment, they will be wrapped in suitable containers and sealed. Before sealing the containers, insert enough dehydrating agent (silica gel) for full protection of the cubic content of the package. Be sure the agent does not come into direct contact with the materials to be protected. All items will be stowed below and located so as to not be damaged by movement or contact with sharp objects.

9.2.29. Stowage of Boxes, Packages, Parts, etc., in or on the watercraft. Parts removed, as listed, will be packed and stored as indicated. After such processing, items which cannot be stowed securely in regular boat storage space will be boxed in wooden boxes or crates for protection. Items will be grouped together in boxes to keep their weight and bulk within the limits of handling and clearance. Boxes will be pack to keep materials requiring similar corrosion treatment together and, particularly, to keep operational items removed from the exterior (propellers, running lights, horn, etc.) accessible and easy to identify for reinstallation. Boxes will be clocked, cleated or braced to the cabin deck or bulkhead. All boxes will have a shipping list of contents or a tag to indicate contents, securely fastened to the outside.

9.2.30. Final Preparations:

9.2.30.1. For rail movement, all walking flats and gratings will be securely fastened to prevent movement in transit. For overseas shipment, at least one section in each watertight compartment will be left open for ventilation. Secure the loose sections so they will not move during shipment.

9.2.30.2. Moveable furniture will be blocked and/or braced to prevent movement.

9.2.30.3. All rotating and moveable parts will be locked in place and/or tied to prevent movement.

9.2.30.4. All port lights will be secured in a closed position.

9.2.30.5. All deck openings, hatches and doors will be covered and made waterproof with canvas and battens or any other approved method.

9.2.30.6. All plywood covers for windows, ventilators and hull openings will be made of 1/2 inch water resistant plywood. Covers are required for overseas shipment or rail shipment when not shipped under cover. Edges of panels will be made watertight. Plywood will be left unpainted.

9.2.30.7. A quantity of clean rags will be stowed aboard in a dry place for use in preparing for service upon arrival at destination.

9.2.30.8. For overseas shipment and for protracted rail movement, ventilation of the hull must be ensured. Substantial, well-secured shields or housings will be applied fore and aft to one or more of the existing openings in the ventilation system. These shields or housings will be louvered and screened to prevent the entrance of cinders, water and vermin. In larger hulls all interior doors (except radio room door) should be secured in the open position and a floor section opened in each compartment to permit air circulation through the watercraft and into the bilge. When possible,

vents should be spaced far enough apart so movement of the carrier, if the watercraft is in an exposed location, will create a positive circulation of air through the hull. Whenever possible on ship movements, arrangements should be made to open the hull interior periodically for more thorough ventilation.

9.2.30.9. The forwarding activity will provide 2 copies of this instruction for guidance in placing the boat in service. Place this literature in a waterproof envelope, clearly marked to indicate the contents and secure to the binnacle or steering wheel post.

9.3. Cradles (Loading and Unloading):

9.3.1. Cradles. When a cradle is not available and expertise in designing such cradles is available locally, local design and assembly is to be utilized. If no expertise is available, approved cradle designs for watercraft will have to be obtained from Navy or commercial shipyards. Assembly using these designs can be accomplished in-house or by contract, according to available expertise and conditions.

9.3.2. Loading. The boat is secured to the cradle by carrying substantial cross timbers thwartship and resting them on blocking placed on deck with padding placed under the blocking. This blocking should be located so as to spread strains to deck frames and bulkheads. The cross timbers are secured to the cradle saddles with iron rods of adequate size, threaded on both ends for take-up. Heavy pattern washers should be used under the nuts. For smaller boats, 24 feet and under, wood cross members of appropriate size can be used to hold the boat to the cradle. Steel strapping or cotton webbing can also be used, if secured to one side of a cradle member and carried over a flat deck surface, with necessary padding underneath to protect paint and wood from damage, then tightened by strapping in the center for steel straps or securing with heavy nails to cradle member on other side using a plywood anchor plate over webbing. The cradle of larger boats should be secured to the carrier deck and supplemental bracing built. For smaller craft, the cradle should be either through bolted to the car floor to prevent movement, anchored to the car stake socket, held in place with heavy cleats or securely spiked to the car deck with metal straps over fore and aft members of the cradle (held by cleats on the car deck). Supplemental bracing may then be eliminated if crossties across the bow and transom, secured to the cradle with iron rods, will prevent fore and aft or lateral movement on the cradle. Boats loaded in end-door cars will have their bows butted against closed end of the car with enough padding to prevent damage to the stems and a supplementary bracing carried across the car at the transom, spiked to the car sides and supported from the floor to prevent hull movement. If more than one boat is shipped in the same car, butt bow of the second one against transom bracing of the first and brace transom of the second boat like that of the first or place boats diagonally and secure their cradles to the car deck. Cradles will be secured to the car floors by bolts or cleats. In all rail shipments, obtain several "No Bumping" signs from the railroad company and fasten them securely and prominently to the car exterior or to the boat hull or cover so they may be easily seen by railroad crews.

Make sure that any crane or hoisting equipment, trailer, blocking, rollers, winches, etc., used in loading a boat on a cradle and a cradled boat on a carrier (whether Government or contractor's equipment), is adequate for this purpose. By selecting the loading equipment necessary to adequately handle given weights, safety of property and personnel can be ensured.

9.4. Preparation of watercraft for service after shipment:

9.4.1. When the boat reaches its destination, the local base transportation officer will inspect loading on the car, truck, ship or barge before uncovering the boat, to determine the boat did not move on its cradle and that there is no indication of exterior damage to the hull or of trespass or vandalism. After the cover is removed or the interior opened, the Transportation Officer will check to determine that no damage has occurred inside the boat from movement of boxes or parts or from external impact and that there is no evidence of trespassing, vandalism, theft or pilferage. All reports of damage will be made by the Transportation Officer IAW standard procedures. After the boat has been inspected by the Transportation Officer, it will be released to the accountable officer for necessary preparation for service.

9.4.2. If on arrival at the receiving activity, the boat is not to be placed in use or if the purpose of the movement was to move it to a storage point, it will be prepared IAW the provisions of **Chapter 5** of this instruction for the type of storage applicable.

9.4.3. Check the boat bottom to determine that the seams are tight. If they are slightly open, fill with laundry soap (on a newly painted bottom). When the boat is being returned for maintenance work or Class B or C storage, this operation will not be necessary. After the boat is in the water, keep a close watch on it to see that no water is taken on until the seams have closed up.

9.4.4. Remove all preservative coatings where contact will cause damage or where they will interfere with operation. Use cleaning solvent for removal. Coatings on steerer cables and similar apparatus will not require removal.

9.4.5. Remove all external plugs, plywood covers, paper or tape seals from hull openings, doors, windows, equipment and accessories. Make sure any drain plugs (if installed) are tight. Open before tightening to remove any water.

9.4.6. Reinstall all propellers, rudders, electrical equipment, ventilators, masts, etc., removed for shipment.

9.4.7. After the boat is placed in the water, connect the propeller shaft to the engine, using a feeler gauge to check for correct alignment. After the boat is removed from its cradle, store the cradle for further use.

9.4.8. Connect any linkage that was left loose and untie or unlock all secured controls. Check the storage batteries for condition of charge. Recharge them if below 1,240 and connect into the boat system.

CAUTION: Leave all electric switches in "Off" position except those required for starting and operating engines or generator plants until they are started and operating correctly. After making a check of individual switches and circuits, use only switches required for further operation.

9.4.9. "Unpickle" the engine IAW applicable technical data. Do not run the engine until the boat is placed in water and the shafts are coupled. See that the water system is filled if the engine is a fresh-water cooling-type. Check the antifreeze for serviceability according to local climate. Check water overflow as soon as the engine is started to be sure proper water circulation is established. After the fuel tanks are filled and before starting the engine or auxiliaries, check the fuel lines for leaks at points indicated on tags attached to the binnacle or steerer post. Recheck these points during subsequent operation for 10 days after the first operation. Make this check both prior to and after, starting the engine(s).

9.4.10. Check all equipment with shipping tickets and the Boat Equipment Check List. Report any shortages that have occurred during movement to the Transportation Officer for necessary action in establishing proper claims and take necessary action to requisition same.

9.4.11. After the engine is operative, try all controls for proper operation and adjustment and check all pieces of operative equipment to determine that all items are in satisfactory condition. After all checks are completed, the boat may be put in to routine operation. Use the pertinent boat operating technical data for guidance in operation of boat controls, etc.

9.4.12. Run disinfecting solution, prepared under the supervision of the local surgeon, into potable water tanks and water supply lines; flush thoroughly before using.

JOHN D. LADIEU, Col, USAF
Director of Logistics

Attachment 1

WATERCRAFT INVENTORY

Table A1.1. Inventory.

Hull Number	Authorized NSN	Assigned NSN	Unit	Acq-Cost	Acq-Date	Repl Cost	Year Mfg	Life-Exp
B-22-2104	1930-00-375-2957	1935 00 NL	45 SW Patrick	Unk	Unk	\$114 K	Unk	20
B-81-9501	1930-00-375-2967	1930-P-BARGE	45 SW Ascension	\$327 K	1997	\$327 K	1995	30
B-81-9502	1930-00-375-2967	1930-P-BARGE	45 SW Ascension	\$327 K	1997	\$327 K	1995	30
P-40-1935	1940-00-619-4019	1940 ONL	45 SW Patrick	Unk	Unk	\$100 K	Unk	30
TG-45-1919	1925-00-375-3001	1925-00-375-3001	12 SWS Thule	\$76 K	1953	\$1.5 M	1953	30
TG-71-9001	1925-00-375-3002	1925-00-375-3002	12 SWS Thule	\$317 K	1990	\$2.7 5M	1990	30
U-17-8801	1940-00-479-9294	1940-00-479-9294	45 SW Ascension	\$6.1 K	1988	\$9K	1988	20
U-17-8802	1940-00-479-9294	1940-00-479-9294	45 SW Ascension	\$6.1 K	1988	\$9K	1988	20
U-17-8804	1940-00-479-9294	1940-00-479-9294	45 SW Canaveral	\$6.1 K	1988	\$9K	1988	20
U-20-8501	1940-01-103-3424	1940-01-103-3424	45 SW Ascension	\$12. 5K	1985	\$25K	1985	20
U-22-8802	1940-01-103-3424	1940-01-103-3424	45 SW Canaveral	\$12. 5K	1988	\$25K	1988	20
U-25-8701	1940-01-262-5743	1940-01-262-5743	45 SW Canaveral	\$60 K	1987	\$85K	1987	20
U-25-9101	1940-01-262-5743	1940-01-262-5743	12 SWS Thule	\$60 K	1990	\$85K	1990	20
U-33-8801	1940-01-262-5743	1940-01-262-5743	45 SW Canaveral	\$60 K	1988	\$85K	1988	30
Note: Total: 14 Vessels - \$5,450,000 combined current value								