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MILITARY SPECIFICATION

OUTBOARD MOTOR, GASOLINE, WITH CARRYING CHEST

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers a medium size (25 to 40 horsepower) heavy-duty type outboard motor with a 27-1/2 inch motor leg length, complete with plywood carrying chest.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, and standards. Unless otherwise specified, the following specifications and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: USA Belvoir Research and Development Center, ATTN: STRBE-DS, Fort Belvoir, VA 22060-5606 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 2805

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SPECIFICATIONS

FEDERAL

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| QQ-S-781 | - Strapping, Steel, and Seals. |
| PPP-B-601 | - Boxes, Wood, Cleated-Plywood. |
| PPP-B-636 | - Boxes, Shipping, Fiberboard. |
| PPP-P-40 | - Packaging and Packing of Hand Tools. |

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| MIL-P-116 | - Preservation, Methods of. |
| MIL-V-173 | - Varnish, Moisture and Fungus Resistant, (for Treatment of Communications, Electronic, and Associated Equipment). |
| MIL-R-196 | - Repair Parts, Accessories, and Kits, Mechanical, Packaging of. |
| MIL-T-704 | - Treatment and Painting of Materiel. |
| MIL-L-2104 | - Lubricating Oil, Internal Combustion Engine, Tactical Service. |
| MIL-L-2105 | - Lubricating Oil, Gear, Multipurpose. |
| MIL-G-3056 | - Gasoline, Automotive, Combat. |
| MIL-F-3541 | - Fittings Lubrication. |
| MIL-G-3859 | - Grease Guns, Hand-Operated, Lever, Push and Screw Type. |
| MIL-C-5541 | - Chemical Conversion Coatings on Aluminum and Aluminum Alloys. |
| MIL-G-10924 | - Grease, Automotive and Artillery. |
| MIL-C-12044 | - Chests, Plywood. |
| MIL-P-15024/6 | - Plates, Identification, Equipment. |
| MIL-G-20241 | - Gasket Material, Wool Felt, Impregnated, Adhesive, pressure-Sensitive. |
| MIL-L-21260 | - Lubricating Oil, Internal Combustion Engine, Preservative and Break-In. |
| MIL-S-81733 | - Sealing and Coating Compound, Corrosion Inhibitive. |

STANDARDS

FEDERAL

- | | |
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| FED-STD-H28 | - Screw Threads Standards for Federal Services. |
| FED-STD-101 | - Test Procedures for Packaging Materials. |

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MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129	- Marking for Shipment and Storage.
MIL-STD-130	- Identification Marking of US Military Property.
MIL-STD-461	- Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference.
MIL-STD-889	- Dissimilar Metals.
MIL-STD-1474	- Noise Limits for Army Materiel.
MS35844	- Plug, Machine Thread, Magnetic: Drain.
MS49006	- Plugs, Pipe, Magnetic-Headless; Aluminum, Iron, or Steel.

(Copies of specifications standards, and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

AMERICAN SOCIETY FOR TESTING AND MATERIAL (ASTM)

D 3951 - Standard Practice for Commercial Packaging.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

NATIONAL BOAT AND YACHT COUNCIL, INC. (ABYC)

Standards and Recommended Practices for Small Craft.

(Application for copies should be addressed to the American Boat and Yacht Council, Inc. (ABYC), P.O. Box 806, Amityville, NY 11701.)

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Rule 442 - Usage of Solvents.

(Application for copies should be addressed to the South Coast Air Quality Management District, 9150 Flair Drive, El Monte, CA 91731.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

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2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Description. The outboard motor, hereinafter referred to as "motor", shall consist of a two-stroke cycle gasoline engine, mounting bracket, forward and reverse reduction gears, one size propeller, and a separate fuel tank. Power shall be transmitted from a vertical drive shaft through heavy-duty reduction gears to a horizontal propeller shaft.

3.2 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 4.3 and 6.3).

3.3 Material. Material shall be as specified herein. Materials not specified shall be selected by the contractor and shall be subject to all provisions of this specification. Corrosion-resisting materials such as corrosion-resistant steel, copper, brass, bronze, copper-nickel alloys, high-strength aluminum alloys, and reinforced plastic (fiberglass) shall be used to the maximum practicable extent in the fabrication of the outboard motor.

3.3.1 Material deterioration and control. The motor shall be fabricated from compatible materials, inherently corrosion and deterioration resistant or treated to provide protection against the various forms of corrosion and deterioration that may be encountered in any of the applicable storage and operating environment to which the item may be exposed.

3.3.1.1 Dissimilar metals. Dissimilar metals, as defined in MIL-STD-889, shall be electrically insulated from one another to minimize or prevent galvanic corrosion. Insulation may be provided by an insulating barrier such as a corrosion inhibiting sealant conforming to MIL-S-81733 or chromate tape conforming to MIL-G-20241. Protection against any galvanic corrosion could also be obtained by exclusion of the electrolyte if feasible.

3.3.1.2 Identification of materials and finishes. The contractor shall identify the specific material, material finish or treatment for use with components and sub-components, and shall make information available, upon request, to the contracting officer or designated representative.

3.3.2 Recovered materials. For the purpose of this requirement, recovered materials are those materials which have been collected from solid waste and reprocessed to become a source of raw materials, as distinguished from virgin raw materials. The components, pieces and parts incorporated in the motor may be newly fabricated from recovered materials to the maximum extent practicable, provided the motor produced meets all other requirements of this specification. Used, rebuilt or remanufactured components, pieces and parts shall not be incorporated in the motor.

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3.4 Threads. All screw threads shall be in accordance with FED-STD-H28.

3.5 Design. The maximum brake horsepower (bhp) of the engine shall be not more than 0.9 hp per cubic inch displacement throughout the operating speed range of the corrected horsepower curve (horsepower (hp) versus revolutions per minute (rpm)). The corrected hp curve shall be determined in accordance with the procedures outlined in the Standards and Recommended Practices for Small Craft published by the American Boat and Yacht Council, Incorporated. The 27-1/2 inch motor leg length shall be the distance from the horizontal bearing surface of the transom mounting bracket to the propeller axis and shall have a tolerance of plus or minus 0.50 inch from the nominal specified length. The motor leg shall be streamlined to minimize drag and prevent water from entering the boat over the transom. The unit weight of the motor, complete except for fuel tank, shall be not more than 160 pounds.

3.6 Human factors engineering.

3.6.1 Noise limits. The noise of the motor shall not exceed the limits specified in MIL-STD-1474, category D, for steady state noise with the motor's housing attached. An acoustical insulating material can be used in the motor's housing to reduce the noise levels.

3.7 Reliability. The specified Mean-Time-Between-Failure (MTBF) shall be 55 hours when the outboard motor is tested as specified in 4.5.2.4.

3.8 Maintainability.

3.8.1 Maintenance support. Assemblages or support elements such as technical manuals, repair parts, special tools, or lubrication charts, as specified (see 6.5 and 6.6), shall be adequate to perform the intended function of assisting or conducting maintenance operations when tested as specified in 4.5.2.5.1.

3.8.2 Maintenance ratio. The motor shall have a maintenance ratio of not more than 0.06. Maintenance ratio is defined as the ratio of the total active maintenance man-hours required (scheduled and unscheduled) to the total operating time. Man-hours for repair of replaced components and scheduled before-and-after operation checks are excluded.

3.9 Performance. The motor shall perform as specified herein when using the gasoline and oil specified in 3.21 and the lubricants specified in 3.22. The motors shall be operated for the duration of the tests specified herein, except 4.5.2.8 and 4.5.2.9, without maintenance or repair other than that specified in the recommended maintenance schedule which shall be submitted by the contractor and approved by the Government prior to testing.

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Under full open-throttle operation, the motor shall deliver static thrusts between the limits of 430 and 500 pounds in forward gear, and between the limits of 360 and 420 pounds in reverse gear. The contractor shall submit to the contracting officer a maximum recommended operating speed in rpm for the motor. If cavitation is experienced during the tests specified herein, the engine speed shall either drop off or the engine shall be able to sustain the overspeed without failure. The motors shall be operated 250 hours, in addition to the run-in and test time specified.

3.10 Controls. Controls shall be designed to prevent the engine from being started in gear with the throttle above the one-half full open throttle position and to prevent gear shifting when engine speed could cause damage from shifting. Controls shall be grouped together and designed for operation by personnel wearing cold weather gloves. Controls shall move without binding and shall maintain their settings during operation without being held by hand. Controls shall include a positive means of stopping the engine other than by stalling with the throttle control. Controls and their positions shall be clearly identified by permanent (no decals) marking.

3.10.1 Steering. An integral, tiller-type handle shall be provided to change direction of propeller thrust of not less than 60 degrees from center to extreme right position and from center to extreme left position. The handle shall be hinged to provide for compactness. A device shall be provided for connecting two motors to permit steering in unison when the motors are mounted with 25.50, plus or minus 0.12 inch, center-to-center horizontal separation. One-half of the connecting device shall be furnished with each motor and shall contain a quick disconnect coupling on the end. Each half of the connecting device shall be identical to the other half.

3.10.2 Throttle. The throttle for engine speed control shall be operated by a twist-grip on the steering handle. The throttle shall synchronize throttle and spark in correct relationship for optimum performance throughout the operating range of the engine. The throttle control shall control engine speed from idle to full engine speed for both forward and reverse operation and shall be limited to prevent stalling the engine at the minimum speed position.

3.10.3 Gear shift. The gear shift shall be capable of operating the power-transmission system through a complete shift cycle (neutral to forward to neutral to reverse to neutral) 2,000 times at maximum shift range engine speed without loosening, permanent deformation, or failure of any component.

3.11 Fuel system. A means for manual priming of the fuel system shall be furnished.

3.11.1 Carburetor. The carburetor shall be the Venturi type with adjustable low speed, and either adjustable or fixed high speed jets.

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3.11.2 Fuel tank. The separate fuel tank shall have a 6 or 7 gallon capacity, carrying handle, and a fuel gage. The fuel tank shall be fabricated from corrosion-resistant material or treated to be corrosion resistant. The filler opening cap shall be secured to the tank by a detachable chain.

3.11.3 Fuel lines. Fuel lines shall be installed to prevent chafing by moving parts or vibration, shall be strain-free, and shall contain no loops or rises which could cause vapor lock. The fuel supply line shall contain a nylon or equivalent fuel filter. The fuel line shall be not less than 6 feet long and shall have quick-disconnect fittings for connecting to the engine fuel inlet. The fuel line shall be gasoline and oil resistant and shall not deteriorate due to aging, sunlight, heat, cold, or salt water. An automatic valve shall be provided in the quick-disconnect fitting to close off the fuel line from the fuel tank when the line is disconnected from the engine.

3.12 Ignition system. A high tension magneto or breakerless ignition shall be furnished. The ignition shall be protected from contamination and any coils shall be waterproof. The ignition points, if used, shall be corrosion-resistant material and shall be adjustable without using special tools. Ignition timing marks shall be provided. All wiring shall be installed to prevent straining or chafing of components during operation.

3.13 Cranking system. An automatic rewind starter rope shall be furnished for cranking the engine. The rope shall be synthetic, heavy-duty, commercial type. Rope guides shall be furnished to prevent chafing. An auxiliary starting sheave shall be incorporated for use in the event the automatic rewind starter becomes inoperative. The automatic-rewind cranking mechanism shall be capable of completing not less than 2,000 cranking operations without loosening, failure, or permanent deformation of any component.

3.14 Exhaust system. An underwater exhaust system shall be provided. An automatic exhaust relief which is directed away from personnel shall be included to divert exhaust gas from the underwater exit to atmospheric exit when the outboard motor is operating in reverse gear to prevent back pressure increase and propeller cavitation.

3.15 Cooling system. A positive circulating water cooling system shall be provided. The system shall be self-draining in the operating position when the outboard motor is not running.

3.16 Propeller. The propeller shall have three or four blades and shall be fabricated from die cast aluminum or stainless steel. The size (diameter and pitch) of the propeller shall be selected for compatibility with 3.9 and shall be die stamped on the hub. A shock absorbing means, which is integral with the propeller, such as a slip clutch, shall be furnished which will prevent damage to the motor when the propeller strikes an underwater object. Shear pins shall not be allowed.

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3.17 Housings. Motor components such as engine, gears, and pump shall be enclosed in housing of corrosion-resistant material. The housings shall protect the components from damage under normal operating, handling, and shipping conditions. The housings shall afford protection to operating personnel from the hazards of moving parts and parts subject to high temperatures. The housings shall permit access, without the use of special tools, to spark plugs and carburetor for servicing and repair.

3.18 Mounting bracket. The transom mounting bracket shall provide secure attachments to transoms for the minimum range of slopes from 0 degrees to 20 degrees from the vertical without impairment of steering or free tilting in forward and neutral operation. The bracket shall hold the motor while operating at full power in forward and reverse gears. The motor shall not tilt while operating in reverse gear at full power. The bracket shall conform to the controlling dimensions shown in figure 1.

3.19 Handles.

3.19.1 Tilt handle. A tilt handle, with sufficient strength and anchor to lift the complete motor, shall be located near the top rear corner of the engine cover to permit tilting the motor forward when mounted on a boat transom.

3.19.2 Lifting and carrying handle. The motor shall be provided with a lifting and carrying handle to permit manual lifting for transom installation and to permit the unit to be hand-carried by two persons. The handle shall be balance-located so that no part of the motor shall touch the ground when the handle is held 32 inches from the ground. Means for attaching a 1/2-inch diameter safety line to the handle or a nonsteering part of the motor shall be provided.

3.20 Chest. Each motor shall be furnished in a chest conforming to MIL-C-12044 with skids provided on the bottom of the chest for forklift handling. The chest shall separately accommodate in as compact a manner as possible the complete motor, steering connecting device, fuel tank with fuel line, repair parts and maintenance tools, and any technical publications. The motor shall be supported in a horizontal position with blocking and securely fastened in the chest. The fastening device shall be removable with conventional handtools. Means shall be provided to secure all items to withstand the chest tests specified herein without damage to or shifting of any item in the chest; loosening or failure of clamping devices, supports, or blocking; or damage to the chest other than compression failure of the impacted member.

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3.21 Fuel mixture. The motor shall be tested with a fuel mixture containing the following components in the ratio specified by the contractor for normal operation. The recommended gasoline and oil mixture (ratio) shall be conspicuously designated and displayed on both the outboard motor and the fuel tank (see 3.11.2).

3.21.1 Gasoline. Gasoline shall conform to MIL-G-3056, type I; metallic lead content 2.75 to 3.17 grams per gallon.

3.21.2 Oil. Oil shall conform to MIL-L-2104, grade 30, QPL designation MD-1.

3.22 Lubrication.

3.22.1 Lubricants. The motor shall be assembled, run-in (broken-in), tested, and delivered with the following military lubricants.

3.22.1.1 Grease. Where required, the motor shall be lubricated with grease conforming to MIL-G-10924 except that sealed bearings, when furnished may be lubricated with standard commercial greases.

3.22.1.2 Gear oil. Gear oil reservoirs shall be filled to operating levels with lubricating oil conforming to MIL-L-2105, grade 90.

3.22.1.3 General purpose oil. Where oil can points are provided on external parts, the motor shall be lubricated with oil conforming to MIL-G-2104, grade 30.

3.22.2 Lubrication fittings. Lubrication fittings shall conform to MIL-F-3541, types I, II or III. Fittings shall be located in a protected position and shall be accessible to a hand-operated grease gun conforming to MIL-G-3859 with a 10-inch flexible extension. Accessibility to fittings shall be provided without the removal or adjustment of accessories or parts. Panels and plates equipped with hand-operable, quick-disconnect fasteners may be removed to provide accessibility.

3.22.3 Pressure-release device. A pressure-release device shall be provided where the use of pressure-lubricating equipment will damage grease seals or other parts.

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3.22.4 Filling, draining, and checking provisions. Gear housings or other lubricant reservoirs shall be equipped with either dipsticks, check holes not less than 1/2-inch pipe size, or sight holes to determine the level of the lubricant. Each reservoir shall be equipped with a magnetic drain plug, size conforming to MS35844 or MS49006 and a means for filling with lubricant. The drain outlet shall be located so that removal of the plug will result in complete drainage of the lubricant from the enclosure. Accessibility to the drain plugs, the filling means, and the lubricant level checking device shall be obtained without the removal or adjustment of components, except engine housing panels and plates equipped with hand-operable, quick-disconnect fasteners may be removed.

3.23 Electromagnetic interference. Ignition components shall conform to the requirements of MIL-STD-461, class C1, Group II, integrally suppressed and shielded.

3.24 Fungus and moisture resistance. The electrical circuitry including all components and connections except as specified below, shall be protected from the effects of fungus growth and moisture by an overall treatment with a varnish conforming to MIL-V-173, composition as specified in 3.24.1 with 1 percent copper 8-quinolinolate (by weight) based on the nonvolatile content of the varnish:

- a. Components or circuit elements that are inherently fungus and moisture resistant or which are hermitically sealed need not be treated.
- b. Components or circuit elements whose functions will be adversely affected by the varnish coating shall not be treated.

When used, the varnish shall be applied by spray, brush, or a combination of both to give a minimum dry-film thickness of 1 mil to component or element surfaces previously cleaned and prepared so that the surfaces are free from all foreign matter which would interfere with the adherence or function of the varnish.

3.24.1 Composition. Composition II shall be used only in the case when local air pollution regulations governing the application of varnish precludes the use of composition I. When composition II is used, the contractor shall provide evidence to the Government that the use of composition II is required, and shall certify that the composition II material complies with Rule 442, South Coast Air Quality Management District.

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3.25 Identification marking. The motor and accessory equipment shall be identified in accordance with MIL-STD-130. The marking shall be applied to the motor on plates conforming to MIL-P-15024/6 size and shape to suit application, and shall include the following information:

OUTBOARD MOTOR, GASOLINE

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NSN _____

(Contract No.) _____

MFR _____

SER. No. _____

3.26 Instruction plates. The motor and accessory equipment shall be equipped with instruction plates describing the starting procedure and other special or important procedures, cautions, and warnings necessary to operate and service the motor. The instruction plates shall be the same material and type of marking as identification plates. Instruction plates shall be located for optimum visibility to the operator. Instruction marking may be included on identification plates specified in 3.25.

3.27 Treatment and painting. Those portions of the motor which are normally painted, and all surfaces of the motor and fuel tank which are exposed during normal usage shall be cleaned, treated and painted in accordance with MIL-T-704, type B, or a process which has been approved by the contracting officer. Color of the finish coat shall be as specified (see 6.2). Paint shall not cover markings on plates. Flexible fuel lines and wires having a flat black appearance need not be painted. Aluminum coolant passages shall be coated with a chemical film with protection equivalent to that provided by MIL-C-5541, class 1A. Coolant passages of other materials shall be treated to provide corrosion-resistance equivalent to that specified above for aluminum.

3.28 Government-loaned property. The following property in the quantities indicated will be loaned by the Government (see 6.4):

<u>Item No.</u>	<u>Description</u>	<u>Identification</u>	<u>Quantity</u>
1	Boat, Landing, Inflatable: Assault Craft	NSN 1940-00-540-5609	1
2	Bridge, Floating: Raft, Light, Tactical	NSN 5420-00-542-4719	1

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3.29 Workmanship. All parts, components, and assemblies of the motor including castings, forgings, molded parts, stampings, bearings, seals, and machined surfaces shall be clean and free from sand, dirt, fins, pits, sprues, scale and other harmful extraneous material. External surfaces shall be free from burrs, dents, chipped paint, and rough or sharp edges and corners. Fasteners shall be tight without distorting the components being held. Operable components shall function without binding or causing interference of movement.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Component and material inspection. The contractor is responsible for insuring that components and materials used are manufactured, examined, and tested in accordance with referenced specifications, standards, and drawings, as applicable.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows.

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).
- c. Inspection of packaging (see 4.6).

4.3 First article inspection.

4.3.1 Examination. The first article motor shall be examined as specified in 4.5.1. Presence of one or more defects shall be cause for rejection.

4.3.2 Tests. One, first article motor shall be tested as specified in 4.5.2.1 through 4.5.2.6.2 and 4.5.2.7 through 4.5.2.14 and four, first article motors shall be tested as specified in 4.5.2.6.3. Failure of any test shall be cause for rejection.

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4.4 Quality conformance inspection.

4.4.1 Sampling. Sampling for examination and tests shall be in accordance with MIL-STD-105, Inspection.

4.4.2 Examination. Samples selected in accordance with 4.4.1 shall be examined as specified in 4.5.1. AQL shall be 2.5 percent defective.

4.4.3 Tests.

4.4.3.1 Individual. Each motor shall be tested as specified in 4.5.2.2. Failure of the test shall be cause for rejection.

4.4.3.2 Samples. Samples selected in accordance with 4.4.1 shall be tested as specified in 4.5.2.8, except the entire 50 hour test may be conducted in a test tank provided the motor achieves equal or less than the minimum, and equal or more than the maximum engine speeds recorded on the first article motor tested on the Government-loaned pneumatic assault boat at full open throttle by using special test propellers. The fuel mixture may be that recommended by the contractor in lieu of that specified in 3.21. AQL shall be 2.5 percent defective.

4.5 Inspection procedure.

4.5.1 Examination. The motors shall be examined as specified herein for the following defects:

101. Materials not as specified.
102. Materials are not resistant to corrosion and deterioration or treated to be made resistant to corrosion and deterioration for the applicable storage and operating environment.
103. Dissimilar metals as defined in MIL-STD-889 are not effectively insulated from each other.
104. Contractor does not have documentation available for identification of material, material finishes or treatments.
105. Used, rebuilt or remanufactured components, pieces or parts incorporated in the motor.
106. Screw threads are not as specified.
107. Dimensions and weight not as specified.
108. Components and controls not as specified.
109. Fuel system not as specified.
110. Carburetor not as specified.
111. Fuel tank not as specified.
112. Fuel lines not as specified.
113. Ignition system not as specified.
114. Cranking system not as specified.
115. Exhaust system not as specified.

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- 116. Cooling system not as specified.
- 117. Propeller not as specified.
- 118. Housings not as specified.
- 119. Mounting bracket not as specified.
- 120. Tilt handle not as specified.
- 121. Lifting and carrying handle not as specified.
- 122. Chest not as specified.
- 123. Fuel mixture not as specified.
- 124. Lubrication not as specified.
- 125. Lubrication fittings not as specified.
- 126. Pressure release device not as specified.
- 127. Filling, draining and checking provisions not as specified.
- 128. Electromagnetic interference suppression components and network not identical with approved model.
- 129. Fungus and moisture treatment not as specified.
- 130. Identification or instruction marking not as specified.
- 131. Treatment and painting not as specified.
- 132. Workmanship not as specified.

4.5.2 Tests.

4.5.2.1 Test conditions. Prior to test, the motor shall be lubricated as specified in 3.22. The fuel mixture and lubricants shall be as specified in 3.21 and 3.22 for the tests specified in 4.5.2.6 through 4.5.2.12. Ambient temperatures shall be between 32° F and 120° F for all tests.

4.5.2.2 Run-in. Operate the motor in water for a period of time long enough so that no special run-in procedures will be required when the motor is issued to final users. The minimum run-in period shall be 30 minutes. Check all controls for proper operation and make necessary adjustments. Nonconformance to 3.9 or 3.10 shall constitute failure of this test.

4.5.2.3 Noise level measurement. Measure the noise level at the operator's position while operating the motor at maximum revolutions per minute. Nonconformance to 3.6.1 shall constitute failure of this test.

4.5.2.4 Reliability. The motor shall be tested for the specific MTBF (see 3.7) as specified in 4.5.2.8 and 4.5.2.9. The occurrence of 2 or more reliability failures (see 4.5.2.4.1) in the 50 hour test (4.5.2.8) or the occurrence of 6 or more reliability failures (see 4.5.2.4.1) in the 200 hour test (4.5.2.9) shall constitute a failure of this test.

4.5.2.4.1 Reliability failure definition. A reliability failure is defined as an event in which malfunction occurs resulting in the replacement of the malfunctioning material (part/component) by a like item, the removal and repair of the malfunctioning item, any repairs required because of faulty workmanship in manufacture; or adjustments requiring direct support level maintenance for

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above. Additionally, any impending malfunction detected which constitutes or would cause serious damage to the equipment if continued in operation is considered to be a chargeable mission failure. Also, those malfunctions occurring as the result of another failure or improper maintenance procedures or operator error are excluded from consideration as chargeable failures. Any failure which is determined to be a contractor design deficiency will be grounds for rejection of the item.

4.5.2.5 Maintainability.

4.5.2.5.1 Maintenance support evaluation. Maintenance operations required during first article testing shall be accomplished to determine conformance to 3.8.1. Failure of the support elements to maintain the outboard motor as specified shall constitute failure of this test. Errors or inadequacies in the manuals shall not be considered in assessing the maintenance ratio or the MTBF.

4.5.2.5.2 Maintenance ratio. The maintenance ratio shall be computed during first article testing. Nonconformance to 3.8.2 shall constitute failure of this test.

4.5.2.6 Performance.

4.5.2.6.1 Engine. The outboard motor shall be tested in accordance with procedures outlined in the Standards and Recommended Practices for Small Craft published by the American Boat and Yacht Council, Incorporated. A corrected horsepower curve shall be developed from low idle to full speed using fuel specified in 3.21. Upon completion of the test, the motor shall be subjected to tests specified in 4.5.2.6.2. Nonconformance to 3.9 shall constitute failure of this test.

4.5.2.6.2 Test run. Mount the complete motor on the Government-loaned boat and make a trial run in open water with the operator and two passengers aboard. Check the throttle steering and gear shift operations by turning the boat to port and starboard while running ahead and astern at various speeds up to full-open throttle for not less than 15 minutes. Start and stop the motor according to instructions not less than five times. Nonconformance to 3.9 or 3.10 shall constitute failure of this test.

4.5.2.6.3 Raft turning. Mount four motors on the Government-loaned light tactical bridge raft. Operate the raft in a turn with one outboard and one inboard motor operating in full throttle reverse and the other two motors operating in full throttle forward position. The two motors operating in reverse shall be adjacent. Orient the two reverse motors; propellers toward the direction of turn and two forward motors' propellers away from the direction of turn. After the raft has stabilized speed, revolve the inboard reverse motor until the propeller centerline is parallel to the ponton gunwales. Operate at wide open throttle for 10 minutes. Return the reverse motor to its original position and

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turn the other inboard motor until its propeller is parallel to the ponton gun-wales. Operate for 10 minutes. Exchange the two inboard motors with the two outboard motors and repeat the test. Nonconformance to 3.9 shall constitute failure of this test.

4.5.2.7 Static thrust. With the motor mounted as specified in 4.5.2.6.2, fasten the boat to a stationary object with a line incorporating a tension dynamometer or spring scale having a capacity of not more than 1,000 pounds and calibrated in increments of not more than 10 pounds. Operate the motor at full throttle in forward and reverse gears against the line and record the maximum static pull for each direction. Nonconformance to 3.9 shall constitute failure of this test.

4.5.2.8 50-hour endurance. Mount the motor on the Government-loaned boat and operate in water for 50 hours at full-open throttle in gear. The boat shall be secured to provide static operation for the first 25 hours (10 hours in reverse and 15 hours in forward gear) and released to run free with only the operator aboard for the last 25 hours in forward gear. Record average tachometer rpm readings for both operating conditions. Nonconformance to 3.9 or 3.10 shall constitute failure of this test.

4.5.2.9 200-hour endurance. Mount the motor on the Government-loaned boat or a test tank and operate statically in water at full throttle for 75 hours in forward gear and 25 hours in reverse gear. Following the 100 hours of full throttle operation, operate the motor according to the following 10-hour schedule for a total of 100 hours.

Cycle - Operation schedule

Throttle setting	Duration (Hours)
1/4	1
1/2	1
3/4	2
Full	2
3/4	2
1/2	1
1/4	1

Nonconformance to 3.9 shall constitute failure of this test.

4.5.2.10 Cranking. With the fuel line disconnected and spark plugs installed, crank the motor 2,000 times by hand. Evidence of component loosening, failure, or permanent deformation shall constitute failure of this test.

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4.5.2.11 Gear shifting. Operate the gear shift mechanism through 2,000 complete cycles at maximum shift range engine speed. Evidence of component loosening, failure, or permanent deformation shall constitute failure of this test.

4.5.2.12 Beaching. Mount the motor on the Government-loaned boat and add 500 pounds to the boat, evenly distributed to maintain trim. The motor may be rigged for remote control to provide safety to the operator. Propel the boat at full-open throttle onto a sandy beach whose slope causes the motor to strike bottom before the boat runs aground. Repeat the test for a total of 25 beachings. Nonconformance to 3.9 or 3.16 shall constitute failure of this test.

4.5.2.13 Chest impact. Load and secure all motor items into the chest. Conduct two pendulum impact tests, one on each end of the chest, in accordance with FED-STD-101, method 5012. Conduct one edgewise drop test on the engine end of the chest in accordance with FED-STD-101, method 5008.1. Evidence of damage, shifting, loosening, or nonconformance to 3.20 shall constitute failure of this test.

4.5.2.14 Electromagnetic interference. The first article motor shall be tested to determine conformance to 3.23. The contractor shall furnish the contracting officer a report of tests. Disapproval of the report shall constitute failure of this test.

4.6 Inspection of packaging.

4.6.1 Quality conformance inspection of pack.

4.6.1.1 Unit of product. For the purpose of inspection, a completed pack prepared for shipment shall be considered a unit of product.

4.6.1.2 Sampling. Sampling for examination shall be in accordance with MIL-STD-105.

4.6.1.3 Examination. Samples selected in accordance with 4.6.1.2 shall be examined for the following defects. AQL shall be 2.5 percent defective.

- 133. Preservation of motor not as specified for level A.
- 134. Preservation warning tag not attached to starter handle as specified for level A.
- 135. Cooling system and fuel system not drained as specified for level A.
- 136. Repair parts and maintenance tools not preserved and consolidated as specified for level A.
- 137. Steering connecting device, fuel tank, and fuel lines not preserved as specified, when required for level A.
- 138. Components not secured within the chest as specified for level A.
- 139. Preservation and packing not in accordance with the reference document as specified for commercial.

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- 140. Housing not as specified for level A packing.
- 141. Strapping not as specified or not located as specified for level A packing.
- 142. Marking missing, illegible, incorrect, or incomplete for level A or commercial.

5. PACKAGING

5.1 Preservation. Preservation shall be level A or commercial as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Motor. With the engine running smoothly at 3/4 open-throttle speed, preservative lubricating oil conforming to MIL-L-21260, grade 30 shall be atomized sprayed into the carburetor throat until the motor chokes to a stop. The fuel and cooling systems shall be completely drained. The spark plugs shall be removed and 1 ounce of the preservation oil specified herein atomized sprayed into each cylinder while the motor is being slowly cranked. The spark plugs shall be replaced. A warning tag shall be attached to the starter handle bearing the information, "ENGINE PRESERVED: DO NOT CRANK (SEE MANUAL)." The motor shall be placed and secured within the chest provided.

5.1.1.2 Repair parts. Repair parts for each motor shall be preserved in accordance with the level A requirements of MIL-R-196. Parts not specifically covered in MIL-R-196 shall be preserved in accordance with the applicability, selection and application provisions of MIL-P-116.

5.1.1.3 Maintenance tools. Maintenance tools shall be preserved in accordance with the level A preservation and packaging requirements of PPP-P-40.

5.1.1.4 Steering connecting device and fuel tank. The steering connecting device and fuel tank with fuel line shall be preserved, when required, in accordance with the applicability, selection and application provisions of MIL-P-116.

5.1.1.5 Technical publications. Technical publications shall be preserved in accordance with MIL-P-116, method IC-1 or IC-3 and secured to the motor.

5.1.1.6 Consolidating. Repair parts and maintenance tools shall be placed together in a close fitting box conforming to PPP-B-601, domestic type, style optional, except the top of the box shall be hinged to permit closure and re-useability.

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5.1.2 Commercial. Each complete motor shall be preserved in accordance with ASTM D 3951.

5.2 Packing. Packing shall be level A or commercial as specified (see 6.2).

5.2.1 Level A. The motor and all other components, preserved as specified in 5.1, shall be placed in the chest and secured to prevent movement or damage. The chest lid shall be closed and secured and the chest covered with a close fitting fiberboard housing consisting of two sides, two ends, and a top, constructed in accordance with PPP-B-636, V3c, or V3s, style optional. The housing shall extend to the bottom of the chest and shall be secured in place with strapping conforming to QQ-S-781, class 1, type I or IV, size as applicable, finish A. The strapping shall be placed adjacent to the skids.

5.2.2 Commercial. Each complete motor, preserved as specified in 5.1, shall be packed in accordance with ASTM D 3951.

5.3 Marking.

5.3.1 Military. Marking for military levels of protection (level A) shall be in accordance with MIL-STD-129.

5.3.2 Commercial. Marking for commercial packaging shall be in accordance with ASTM D 3951. In addition, shipping weight and cube data shall be marked on the shipping container.

6. NOTES

6.1 Intended use. The motors are intended for military use in propelling floats, ponton rafts, assault boats, and other floating or stream-crossing equipment in fresh or salt water service.

6.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. When a first article is required for inspection and approval and number of units required (see 3.2).
- c. Color required (see 3.27).
- d. Degree of preservation and packing required (see 5.1 and 5.2).

6.3 First article. When a first article inspection is required, the item will be tested and should be a first produced motor. The first article should consist of five or more units. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, tests, and approval of the documents first article.

REPLACES MIL-STD-129, WHICH IS OBSOLETE

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6.4 Government-loaned property. The contracting officer should arrange to loan the property specified in 3.28.

6.5 Data requirements. The contracting officer should include requirements for such data as technical publications, instructional materials, illustrated parts lists, and contractor's maintenance and operation manual to be furnished with each outboard motor.

6.6 Provisioning. The contracting officer should include provisioning requirements for repair parts and maintenance tools as necessary (including any special tools), and instructions on shipment of motors.

6.7 Classification change. Type II motor has been discontinued since it is no longer required.

Custodians:

Army - ME

Navy - SH

Preparing activity:

Army - ME

Project 2805-0533

Review activity:

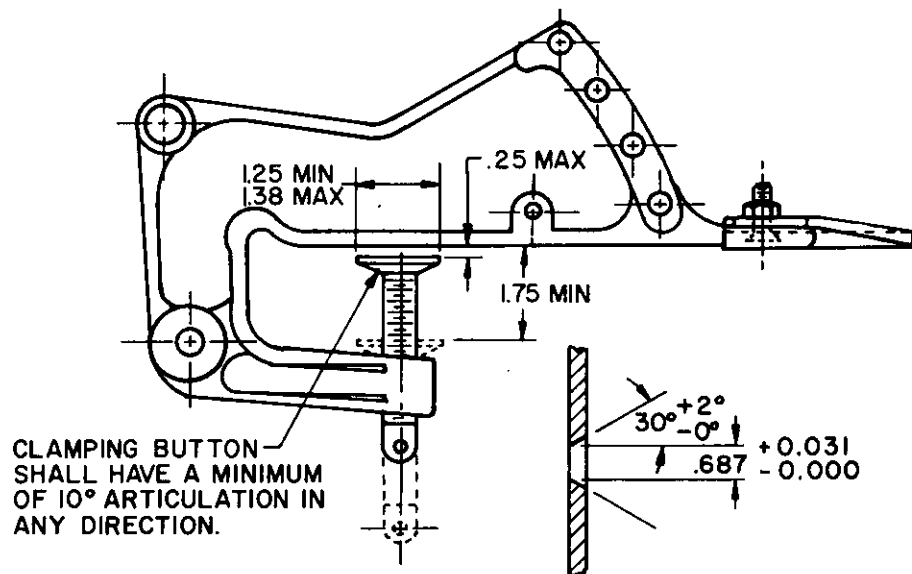
Army - EL

DLA - IS

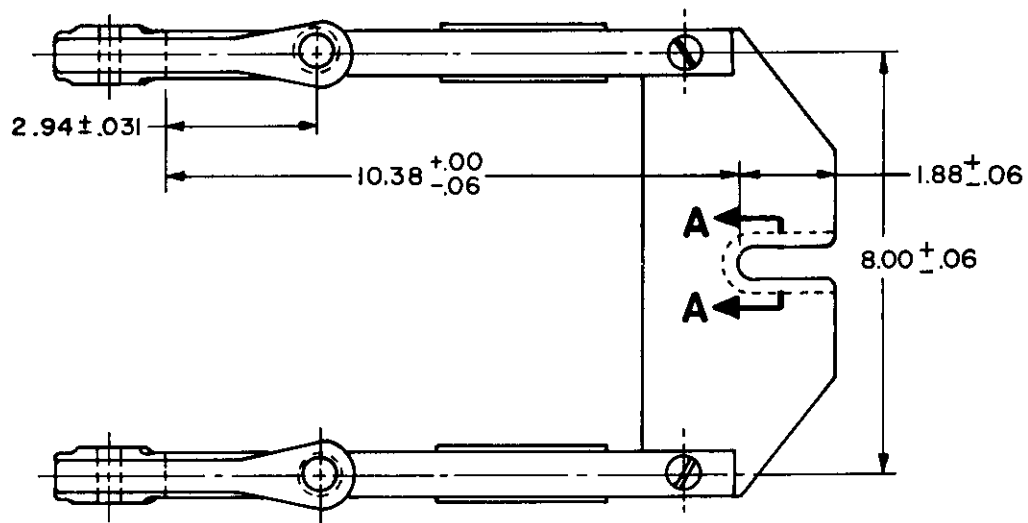
User activity:

Navy - MC

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SECTION A-A



NOTE: UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES.

**FIGURE 1. Controlling dimensions for
outboard motor bracket.**

X-605A

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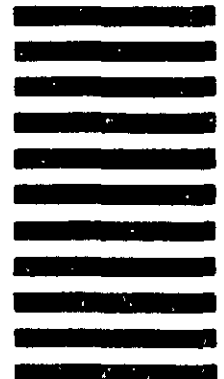
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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL*(See Instructions - Reverse Side)***1. DOCUMENT NUMBER**

MIL-O-11585F

2. DOCUMENT TITLE

Outboard Motor, Gasoline, with Carrying Chest

3a. NAME OF SUBMITTING ORGANIZATION**4. TYPE OF ORGANIZATION (Mark one)**☐

VENDOR

☐

USER

☐

MANUFACTURER

☐

OTHER (Specify): _____

b. ADDRESS (Street, City, State, ZIP Code)**5. PROBLEM AREAS****a. Paragraph Number and Wording:****b. Recommended Wording:****c. Reason/Rationale for Recommendation:****6. REMARKS****7a. NAME OF SUBMITTER (Last, First, MI) - Optional****b. WORK TELEPHONE NUMBER (Include Area Code) - Optional****c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional****8. DATE OF SUBMISSION (YYMMDD)**