CONSTRUCTION SPECIFICATION for PT 625-660

Documents Provided by Dave Buck (as purchased from the National Archives)
<table>
<thead>
<tr>
<th>Section Code</th>
<th>INITIAL</th>
<th>BY</th>
<th>Date</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>216</td>
<td>SD</td>
<td>4-15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>445</td>
<td>OW</td>
<td>4/11</td>
<td></td>
<td>22 APR 1944</td>
</tr>
<tr>
<td>451</td>
<td>WX</td>
<td>4/17</td>
<td></td>
<td>Please return to 451 for rephotographing.</td>
</tr>
</tbody>
</table>

**DATE—SERIAL NUMBER**

**CONFIDENTIAL**

<table>
<thead>
<tr>
<th>Enclosures</th>
<th>Files</th>
<th>Cross File</th>
<th>File No</th>
</tr>
</thead>
<tbody>
<tr>
<td>HW</td>
<td></td>
<td></td>
<td>C-PT625-660/31-5</td>
</tr>
<tr>
<td>SC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 451

C-PT625-660/S1-5(451)

CONFIDENTIAL

To: Assistant Supervisor of Shipbuilding, USN,
Higgins Industries, Inc.,
New Orleans 19, La.

Subj: Motor Torpedo Boats PT625-660 - Machinery Specifications.

Ref: (a) BuShips ltr. C-PT625-660/S1-3(451); C-PT625-660/S1-5
of 12 Feb. 1944.

Encl: (H.W.) By Registered Mail.
(A) Modification No. 1 of 15 April 1944 to Special
Spec. for Machinery for U. S. Motor Torpedo
Boats PT65-524 (80-Ft. Hull) and PT625-660

1. The above enclosure is forwarded to supplement special speci-
fications previously furnished with reference (a) and will form a part
thereof. These modifications will be included in the specifications
before final printing.

Elaine Dale
By direction of
Chief of Munson

CC: 445 516 . 0420426
Section 516

C-PT65-524/91-5  ESG/rfs
C-PT65-520/91-5  4-17-44
CONFIDENTIAL

To: Higgins Industries, Inc.,
New Orleans, Louisiana.

18 APR 1944

Via: Supervisor of Shipbuilding, USN, New Orleans.

Subj: PT625-680 - Specifications and Plans for.

Ref: (a) NAVSHIPS (451) conf. Special Specifications for Machinery for PT655-680.
(b) Contract Plan PT625-501015-54161 arrangement of Machinery and Shafting.
(c) Contract Plan PT625-501015-54162 Diagrammatic Arrangement of Fuel Oil Supply System.
(d) Contract Plan PT655-501015-52167, Alt. 0 - Main Distribution Panel.
(e) SUPSHIP, NOLA ltr PT625-680/L4 (10592) (MHT-8) of 5 April 1944.

Enclos: (h/w)
(A) Two copies, Serial Nos. 17 and 18, of ref. (a).
(B) Four copies of ref. (b).
(C) Four copies of ref. (c).
(D) One copy of ref. (d).

1. Enclosures (A) - (D) returned to the Bureau by reference (e) are forwarded herewith for the contractor's files.

2. The remainder of plans listed in reference (e) were turned over to Mr. Levy of Higgins Industries by Mr. Panoff to be returned to Higgins Industries.

H. D. Case
By direction of
Chief of Bureau

CC:
660
Section 451

C-PT625-660/S1-3(451)
C-PT625-660/S1-5

CONFIDENTIAL

To: Assistant Supervisor of Shipbuilding, USN.
Higgins Industries, Inc.
New Orleans 16, La.

Subj: Motor Torpedo Boats PT625-660 (76-Foot) - Contract Plans and Specifications. (Hull)

Ref:
(a) Buships ltr. C-PT625-660/S1-3(451) C-PT625-660/S1-5 of 12 Feb. 1944.
(b) Buships ltr. C-PT625-660/S1-3(451) of 17 April 1944.
(c) Buships ltr. PT660/S60/600/660s-516) of 19 April 1944.

Encl: (H.W.) By Registered Mail.

<table>
<thead>
<tr>
<th>Buships No.</th>
<th>Title</th>
<th>No. &amp; Kind</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) PT625-501G1-408121</td>
<td>Lines &amp; offsets- - - - - - 1 V/D &amp; 2 L/Fs.</td>
<td></td>
</tr>
<tr>
<td>(B) # # 408122</td>
<td>Outboard profile &amp; deck plan- - - - -</td>
<td></td>
</tr>
<tr>
<td>(C) # # 408123</td>
<td>Inboard profile &amp; arrgt. plan- - - - -</td>
<td></td>
</tr>
<tr>
<td>(D) # # 408124</td>
<td>Lavatory and galley plumbing- - - - -</td>
<td></td>
</tr>
<tr>
<td>(E) # # 408125</td>
<td>Bilge system and self bailers- - - -</td>
<td></td>
</tr>
<tr>
<td>(F) Detail Specs. for Bldg. Motor Torpedo Boats PT625-660 (76-Foot), (Hull) Ser. Nos. 9-17- - - - - - 10 copies.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. The above enclosures, consisting of the contract plans and specifications (Hull) for the subject vessels, are forwarded for use in connection with the construction of these vessels.

2. It is requested that the receipt forms attached to the specifications be filled in, signed, and returned to the Bureau without a forwarding letter.

3. Contract plans and specifications (Machinery) were forwarded with references (a) and (b).

4. Attention is invited to reference (c) which forwarded additional information concerning the contract plans and specifications for the electrical installations on these vessels.

F.E. Peider
By direction

CC:
445
516f
Section 451

G-PT665-624/B1-5(451)
G-PT625-660/B1-5

CONFIDENTIAL

To: Naval Attaché, London

Via: Chief of Naval Operations (ONI)

Subj: Motor Torpedo Boats — Specifications for.

Ref: (a) ALUSNA dispatch of 2 June 1944.

Enc1: (H.W.) By Registered Mail.

(A) Det. Spec., for Bldg. Motor Torpedo Boats
PT665-624 (50-foot hull) dated 31 Mar. 1944,
Ser. No. 46-———-—-—-—-—-—-—-—-—-1 copy.

(B) Det. Spec., for Bldg. Motor Torpedo Boats
PT625-660 (75-foot hull) dated 15 April 1944,
Ser. No. 26-—-—-—-—-—-—-—-—-—-—-—-—

(C) Special Spec., for Machy. for Bldg. Motor
Torpedo Boats PT665-624 (50-foot hull) and
PT625-660 (75-foot hull) dated 25 Jan. 1944,
Ser. No. 49 together with Mod.-Ent. No. 1-—-—-—-

1. The above enclosures are forwarded as requested in reference
(a).

2. It is requested that the receipts be filled in, signed,
and returned to the Bureau without a forwarding letter.

Logan McKee
3D Engr.

CG: 616F
205
July 15, 1944

Superintendent of Shipbuilding
22 Virginia Court
New Orleans, La.

Attention: Lt. Comdr. C. W. Leveau

Gentlemen:

This will acknowledge receipt of one copy of
detail specifications covering the construction of
torpedo boats PT 525-680, incl.

It is requested that six additional copies of
these specifications be forwarded to this company in
order that all personnel concerned will be informed
of information contained therein. Your attention in
this matter will be greatly appreciated.

Very truly yours,

HIGGINS INDUSTRIES, INC.

A. J. Higgins, Jr.
Vice-President
17 July 1944

To: Chief of the Bureau of Ships - Code 516

Subj: Contract NObs-1680 - PT 625-660 - Specifications covering the construction of - Request for.

1. It is requested that six additional copies of subject specifications be forwarded to this activity.

C.W. LEVEAU
By direction
ORDER FOR REPRODUCTIONS

AND

ORDER FOR MAILING

Mail To:

Assistant Supervisor of Shipbuilding, USN;
Higgins Industries, Inc.,
New Orleans 19, La.

Mail No. 3066249

Dated: 21 July 1944

REFERENCE:

SupShp ltr. No. 1680 (976a)(Mt-8) of 17 July 1944.

CONFIDENTIAL

Make prints and send originals and prints to Bureau.
Make and forward prints and return originals to Bureau.
Make prints, forward originals, and send prints to Bureau.
Forward attached enclosure.

NUMBER OF COPIES

6

TYPE

copies

DETAIL AND SPECIAL SPECIFICATIONS FOR BUILDING MOTOR TORPEDO BOATS NO. 625-660, SERIAL NO. 115-120.

NOTE: It is requested that the receipt in front of the specifications be filled in, signed, and returned to the Bureau without a forwarding letter.

21 JUL 1944

0722304

E. K. LUTRECHT

L. W. KLOPPER

(Signature of maker)

By direction

U.S. GOVERNMENT PRINTING OFFICE
ROUTE SLIP

<table>
<thead>
<tr>
<th>Code of Originating Section</th>
<th>Initialed by</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>5164</td>
<td>S</td>
<td>3.4</td>
</tr>
</tbody>
</table>

DATE—Serial Number

<table>
<thead>
<tr>
<th>Enclosures</th>
<th>File</th>
<th>Cross File</th>
<th>File No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HW</td>
<td>S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td></td>
<td></td>
<td>31-5</td>
</tr>
</tbody>
</table>
SPECIFICATIONS
for the
construction
and
equipment of
HIGGINS' DESIGN 79-ft. TRIPLE SCREW,
HIGH SPEED MOTOR TORPEDO BOAT
2. INTENT OF SPECIFICATIONS AND GENERAL DESCRIPTION:

(a) Intent: These specifications are intended to accompany the drawings hereinafter mentioned to which they shall be a supplement covering the important items in construction and outfitting this boat. Any discrepancy between said plans and these specifications shall be governed by these specifications. Note: Contractor shall furnish material in accordance with these specifications which supersede specifications dated October 25, 1941. Where the contractor's specifications conflict with the Navy Department Specifications, the latter shall apply.

These specifications have been rewritten in accordance with approved changes, improvements and amendments and represent the vessel as built and approved by the Trial Board, with the Board's recommendations incorporated herein, and in accordance with the Bureau of Supplies and Accounts Letter Nos 94729 (SPH-6) dated 9 October, 1942.

(b) General Description. This boat will be of the hard chine "V" bottom, double planked type, with longitudinal girders and box trusses extending fore and aft the full length of the vessel. Accommodations shall provide for a crew of 8 men and 2 officers, as further shown by Drawing 2602-2-E Bureau Plan #484520.

3. MACHINERY:

Three (3) gasoline propelling engines of 1550 H.P. each (Packard Model 4-E-2 600) will be installed direct drive, without the use of V-drives. One 2½ KW, 24 volt D C auxiliary Generator for lighting and charging of the engine batteries will be installed. Both the propelling engines and Generator are furnished by the Government and installed by the Contractor.

Four (4) fuel tanks of a total capacity of approximately 3,000 gallons shall be furnished and installed by the Contractor, where indicated on the plans.

4. DESIGN FEATURES:

The hull of this vessel shall be such as to permit easy riding qualities and to prevent undue stress upon the hull structure. In addition, utmost care will be taken to preserve the continuity of longitudinal and transverse strength so that all forces acting upon the hull are equally distributed and transmitted to every member of it. All jointed scarfs, and fastenings shall be well made and well distributed.

5. (a) ACCOMPANYING PLANS:

<table>
<thead>
<tr>
<th>Contractors No.</th>
<th>Bu. Ships No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2602-2-P</td>
<td>484576</td>
</tr>
<tr>
<td>2602-2-C</td>
<td>484592</td>
</tr>
<tr>
<td>2602-2-E</td>
<td>484590</td>
</tr>
<tr>
<td>2602-6A</td>
<td>555552</td>
</tr>
<tr>
<td>2602-5U</td>
<td>484545</td>
</tr>
<tr>
<td>2602-7JJ</td>
<td>555558</td>
</tr>
</tbody>
</table>
Docking plan, Booklet of General Plans and a set of detail plans to be furnished with each vessel.

Instruction pamphlets and books to be furnished for all operating equipment.

6. BOAT SPEED AND TRIALS:

Preliminary acceptance trials shall be made for each vessel in accordance with instructions furnished by the Bureau of Ships.
HULL CONSTRUCTION

(a) Keel

The keel shall be fashioned from 6" x 12" long leaf yellow pine. It shall be in two or three lengths, carefully scarfed same set in urea formaldehyde water-proof glue, and bolted together with 5/8" diameter bronze or monel bolts. It shall be double rabbeted to receive inner and outer planking. After being worked, and before setting up, the keel shall receive two coats of linseed oil to prevent drying out, checking, or splitting.

(b) Stem, Knee, and Forefoot

The stem will be fashioned from 11" x 22" Mexican or Honduras mahogany; the knee from 6" x 15" Mexican or Honduras mahogany; and the Forefoot from 6" x 15" Honduras or Mexican Mahogany; all to be doubled rabbeted to receive the planking. The stem, knee, and forefoot to be securely bolted together with 1/2" bronze or monel "T" head bolt; with washers fitted under the nuts. The face of the stem and the forward part of the keel to be protected with a 1-inch half-round bronze molding, securely fastened to stem and keel with flat head bronze wood screws. All bronze fastings to be "Everdur" or equal. In case bronze is not available, hot dip galvanized materials may be substituted at the discretion of the supervisor.

(c) Transom Frames:

The transom to be framed with bounding pieces of 2" x 6" spruce, and stiffened with 8 vertical members of 1 3/8" x 6" spruce. The transom to be securely tied to bottom and deck stringers by the use of "Eureka" Bonded-Wood knees. Aluminum, galvanized iron, or bronze angle brackets will be fitted at the chines, sheer and keel, and securely through-bolted to same. All spruce lumber used to be first treated with Wood Life Preservative, or equal, to minimize decay, etc.

(d) Floor Timbers:

The floor timbers to be double; one forward and one aft of each bottom frame, through-bolted to the frame with 1/4" galvanized iron carriage bolts, as are shown on fastening schedule Drawing No. 2602-6A. Filler pieces of spruce to be fitted between these double floors to stiffen them and to provide good bearing surface for keel fastenings. Large limber holes shall be provided in all floors except at water-tight bulkheads. Brass limber chains to be installed on each side of keel through the timbers between watertight bulkheads and fitted with replaceable cadmium plated steel springs to allow simple and efficient operation. A sluice valve shall be provided in the forward peak watertight bulkhead for drainage to lower parts of the hull. A readily removable floor hatch to be provided for access to this valve. The floor timbers will be fastened to the keel with 3/8" diameter Monel metal or bronze carriage bolts with a special aluminum or galvanized iron clamp type washer fitted under nut.

(e) Transverse Frames:

1. Transverse frames spaced 15" on centers.
2. Bottom Frames fabricated from 1-1/8" spruce or mahogany and 3 or 4 plies of Red Lauan on each side, all hot-glued together under pressure, with phenolic resin glue. Bottom frames finished 1-5/8" x 6".
3. Side Frames: The side frames to be of spruce or mahogany 1-1/4" thick by 5-3/4" deep.
Generally, all frames shall be accurately parallel to lay full width on the planking and kned together at chines and sheer with 1/8" flanged aluminum or galvanized iron brackets, through-bolted to side and bottom frames and deck beams with 1/4" galv. iron carriage bolts.
(f) Web Frames and Initial Bulkheads: Web frames consisting of flanged aluminum brackets to be fitted on every other frame throughout the engine compartment. These are to be carefully and securely fastened to bottom and side frames and to longitudinal stringers and engine beds with 1/4" gusseted iron carriage bolts and aluminum rivets. Partial gussets are to be fitted between decks, sides and bottom. In addition, aluminum bulkhead cut away so as not to obstruct passage in the engine room and bounded with two (2) 2" x 2" x 1/4" aluminum angles from deck down across and back up to the deck to be fitted on frame #38 in the center of the engine room. This bulkhead shall be securely tied into the engine beds of the two main propelling engines.

(g) Hull Planking:

1. Bottom Planking: The bottom to be double planked; the inner planking or 3/8" Red Luan, laid diagonally in approximately 6" strakes, and nailed to the frames. The outer bottom planking 3/4" finished Red Luan, laid longitudinally, in approximately 6" strakes, in as long lengths as possible, and fastened to frames with 2-1/2" #16 bronze flat head wood screws. Between the inner and outer planking a layer of #12 duck canvas shall be laid in non-oxydizing wood and fabric preservative, plastic glue. This canvas to be attached to the inner planking with copper staples to hold securely in place. 1/2" thick plywood butt blocks, approximately 6' wide by 8' long fitted between frames at all buts. Butts to be properly distributed so as to preclude the loss of longitudinal strength. Bronze machine screws will be used to through-bolt the planking to the butt blocks. The inner planking shall be fastened to the outer planking on both inner planking and outer planking seams with copper rivets and with copper washer under the rivet heads. Three (3) screws to be used in every outer planks on every frame and driven flush only and puttyed. Seams or outside planking to be fastened with paint, caulked with cotton and filled with lead putty.

The side planking of the hull to be in two thicknesses; the inner planking of 3/8" Red Luan, laid diagonally, and nailed to the frames; the outer planking of 5/8" Red Luan, laid diagonally in opposite direction, in approximately 6" strakes and fastened to the frames with 2-1/2" #16 flat head bronze wood screws. Seams to be caulked up to 6" above L.W.L. Duck Planking is identical to the bottom planking, except that outside strakes shall be 1/2"x2-3/16", fastened to deck beams with 2" #12 bronze flat head wood screws, and elastic seam composition used.

(h) Transom: The transom to be shaped as shown on the plans and double planked identical to the hull side planking. The corners of the transom, and side and bottom planking to be protected with 2" brass angles continuous from sheer to chines, across bottom and up to sheer, securely screwed to the transom frames, let in flush, and sanded after installation to insure a smooth finish. (Note: This same protection to be provided at the chines continuous from about 4 or 5 feet aft of the stem.)

(i) Bulkheads: All transverse bulkheads to be of 5/8" Eureka Bonded-Wood and located on frames #6, #19, #26, #30, #46, #51, #56, and all but 56 to be watertight to at least two feet above the L.W.L. Longitudinal members to be attached to bottom frames with aluminum or galvanized iron angles and to longitudinal bulkheads with spruce corner posts through-bolted. Canvas gaskets and Eureka Bonded-Wood doubling pieces to be fitted around longitudinals and caulked to insulate water tightness. Where access is desirable through water-tight bulkhead cast aluminum watertight doors will be installed, as better shown on Inboard Profile and Arrangement Plan Drawing 2602-2-L, Bureau 484580.
The chines will be molded from 3" x 5" long leaf yellow pine in two or three lengths, each side, carefully scarf
ureda glued and through-bolted. The chines fastened to the side frames on every other frame with 5/16" galv. carriage bolts and to bottom frames, on every other frame, with 5/16" galv. Carriage bolts, with washer fitted under nut. The upper edge of the chine will be maintained at a slight angle downward and inboard to prevent the formation of a water-pocket between the side planking and the top of the chine.
2. Sheer Clamps: The sheer clamps shall be molded from 2" x 4" spruce to fit snug against the frames and the covering board, properly spliced at the forward sections to take the curve of the side and carefully scarfed and through-bolted to provide a continuous longitudinal member. The sheer clamp to be through-bolted to the side frames on every frame with 1/4" galv. iron carriage bolts and through-bolted to the covering board between frames with 5/16" galv. iron carriage bolts. The forward sections may be long leaf yellow pine to facilitate making severe bends.

3. Covering Boards: Covering boards to be 2" x 8" Red Lauan, in long lengths with horizontal scarfs urea glued and through-bolted to butt block, rabbeted 2" to receive the deck planking, and fastened in addition to the bolts previously mentioned through the sheer clamp by bolts on every frame through the deck beams.

(k) Main Longitudinal Strength Members:

1. Main Girders. The main girders will be located one on each side approximately 24" from ship's center-line and continuous from frame #6 to the transom as better shown on Drawing #2602-5U, Bureau #481543. The upper and lower members of this girder to be 2" x 4" spruce. Both members scarfed urea glued and through-bolted to form a continuous piece of the same section. On every frame and between the upper and lower members shall be fitted 2" x 5" spruce struts with grain running vertical. Through-bolts to be used on every other frame to tie the girder to the frames, and in addition aluminum angles fitted on every frame except where through-bolted or in the way of bulkheads and other obstruction, with 1/4" galv. carriage bolts, bolting through and through the angles, stringers, struts and floor frames. These girders to be fitted with 1/8" galv. steel scabs continuous on the outboard sides from frame 17 to the transom. The scabs will be bolted to the main girder with 1/4" galv. carriage bolts.

2. Intermediate Bottom Stringers.

The intermediate stringers to be of 2" x 6" spruce continuous from just forward of Frame #4 to the transom, and fastened to the frames with aluminum angles and 1/4" galv. carriage bolts with through-bolts to the bottom frames on every other frame; these through-bolts will be 5/16" bronze or galvanized iron, with washer under nut.
Two longitudinal bulkheads, one each side of the center-line continuous from frame #6 to the transom, shall be installed. These to consist of an upper and lower member, tied together with 3/8" Eureka Bonded-Wood and with vertical and diagonal struts to form a rigid box truss, at the same time incorporating usable and valuable compartments throughout the boat, as can better be seen by referring to Drawings #2602-5U, Bureau #484543, and 2602-2-E, Bureau 484580. The lower member to be 2" x 6" spruce, tied to the bottom frames, chines and side frames with aluminum gusset plates and aluminum angles, (see Drawing #2602-6A). The upper member to be 2" x 6" spruce, notched or tight fit against deck beams and through-bolted through deck beams with 1/4" galv. carriage bolts; Both the upper and lower members to be continuous from just abaft Frame #2 to the transom. The Eureka Bonded-Wood bulkhead to be bolted to the upper and lower members with 1/4" galv. carriage bolts, with washers under nuts, and heads. Stiffening of this bulkhead and diagonal truss work is best shown on Drawing #2602-5U, Bureau #484543. These stiffeners to be screwed, glued and bolted to the bulkhead. Where diagonal stiffeners cross each other, care will be taken to let them into each other with tight fitting joints. Where the longitudinal bulkheads intersect with the transverse bulkheads, 2" x 2" spruce corner posts will be fitted on each side of the transverse bulkheads between the upper and lower members of the longitudinal bulkheads. 1/4" galvanized carriage bolts will tie longitudinal bulkheads to these corner posts and will tie the corner posts to each other through the transverse bulkheads. The longitudinal bulkheads will be lightened with cut-out holes as shown on Drawing #2602-2-E, to provide access to the various compartments between the longitudinal bulkheads and the side of the hull.
4. **Intermediate Deck Stringers:**

The intermediate deck stringers shall be 2" x 6" spruce let into deck beams slightly to give a flat bearing surface, and through-bolted with 1/4" galv. carriage bolts. These deck stringers shall be placed vertically over the intermediate bottom stringers. The intermediate deck stringers to be continuous from just forward of Frame #4 to the transom.

5. **Main Deck Stringers:**

The main deck stringers to be 2" x 6" spruce, let into deck beams slightly to give a flat bearing surface and through-bolted with 1/4" galvanized carriage bolts; these deck stringers to be placed vertically over the main girders and between frames #19 and #22, #24 and #30, and #46 and #51, longitudinal bulkheads to be fitted between the main girder and the main deck stringer. (Note: All deck and bottom longitudinal members will be symmetrical about the center-line and at the forward end will be fitted with breast hooks and through-bolted tying the longitudinal members to each other to the stem and to the floor frames where possible. At the stern, these longitudinals are securely kned with Eureka Bonded Wood gussets to the transom frame vertical stiffeners.)

(1) **Deck Beams, and Hatches:**

The deck beams to be of spruce, laminated in three pieces to finish, 1-1/4" thick, 4" deep. In the way of all hatches, the chart-house well, Sampson post, etc., these frames will be fitted with headers or sills of spruce. In the way of all deck openings, filler pieces shall be fitted over deck stringers to support the deck and all deck openings will be so arranged to come between deck stringers so as not to detract from their strength.

All access hatches through the main deck to be not less than 20 inches x 20 inches clear opening. They will be constructed of Eureka Bonded-wood and are raised three (3) inches above main deck level to permit easy passage and to prevent seepage of water below. Hatches have positive adjusters. The engine installation hatch shall be secured by through bolts.

(2) **Main Engine Foundations:**

The main engine foundations to be of 2" x 6" galv. steel angle hot dipped galvanized after drilling. These angles to be secured to the longitudinal members with 5/16" chrome vanadium steel bolts. The engine bed gussets shall be tied into the engine room web frames and the aluminum bulkheads on Frame 38 and securely riveted to same. The engine beds to be so arranged that the thrust from the engines will be absorbed and distributed by the main girders and the intermediate stringers to all parts of the hull. Lightening holes to be placed in the engine beds to provide access to the engine hold-down bolts and to essential parts of the engines themselves, but to be located where vertical stiffness is necessary. Where steel members come into contact with wood members, faying surfaces will be coated with white lead.
The guard rails to be made in two pieces. The inner piece 2\" x 6\" spruce; the outer 1-1/3\" x 2-1/2\" oak, continuous from the stem to and across the transom at the sheer. These guard rails will be tapered with some concave on the under side to prevent hanging up when tied to a dock or to another vessel and fitted with 1\" half-oval galvanized molding. (Note: This section of the guard rail and the function thereof can better be seen by referring to Drawing #2602-6A). The inner guard rail will be bolted to the sheer clamp and to the covering board. The outer rail to be screwed only to the inner rail and installed in short lengths to prevent damage to hull in the event the guard rail is torn off the boat and to permit easy replacement thereof, without the necessity of replacing the whole rail.
(c) **Flats and Floorings:**

Interior flats and flooring to be of 3/8" Eureka-Bonded Wood, laid over 3/4" x 2" spruce floor beams. All flooring to be laid in such a manner that it may be quickly removed. Where access to the bilges for inspection or operation of valves, etc., is necessary, access hatches with finger holes will be provided. All access hatches to be metal bound.

(p) **Forepeak Drainage:**

After construction, Navy Pitch shall be poured, while hot, forward of frame #2 and allowed to accumulate forward of frames #2, 3, 4, 5 and 6 up to the bottom of the limber holes and the sluice valve, to prevent the formation of water pockets at these points.

(d) **Scarfs and Joints:**

All scarfs to be carefully fitted, and before assembly all faying surfaces will be set in urea formaldehyde water-proof glue under pressure of bolt fastenings. All joints, as where side frames and bottom frames overlap, and where floor frames overlap the bottom frames, to be painted and coated with white lead before assembly. All battens, inner planking, etc., which are impossible to paint, after assembly, shall be painted at least two coats before assembly.
If bronze fastenings are unobtainable, galvanized fastenings may be used at the discretion of the Supervisor of Shipbuilding.

10. STEERING GEAR, RUDDER, ETC.

(a) The Rudder to be of the balanced spade-type with steel frame and monel plate. The blades shall be of a hydrofoil section. The rudder stock will be monel, 3" diameter where it passes through the hull, tapered inside the rudder blade, and tapered at the upper end to 1-1/8" diameter at the upper bearing. The upper end shall be squared for the use of an emergency tiller and tapped with a thread-ahole to receive a removable lifting eye. The rudder blade to be fastened to the stock by welding the frame-work first to the stock and then spot-welding the blade plates to the framework. After fabrication of the rudder blades they will be ground and polished to give a smooth fair surface.

(b) Rudder Ports to be cast Manganese bronze of Higgins design. The flange on the outside of the hull to be so made as to let in flush with the outer planking. 2" thick Honduras mahogany backing blocks, covered with 1/8" brass or galvanised plate, securely bolted and screwed to frames and backing block will be fitted and let into frames in the way of rudder ports. Six, 1/2" counter-sunk head Monel or bronze bolts will be used to secure rudder ports through the bottom planking to the backing blocks. The rudder ports to be fitted with cast bronze stuffing glands, packed with square flax packing, and provided with lock nuts. Spanner wrenches for same will be provided and stowed in the lazarette.

(c) Rudder Carriers:

The weight of the rudders and the thrust therefrom will be carried by an aluminum plate and angle framework, securely tied to the bottom stringers and the main girders and to the side longitudinal bulkheads. Steel bearings to be bolted to this framework to support the upper end of the rudder stocks and to provide a bearing surface for thrust rings installed with taper pins to carry the weight of the rudders.

(d) Steering Gear:

The steering gear drive will be as follows: The steering wheel to be 28 inches in diameter, vertical wood spoke type with pivoted handle for spinning. This wheel to be installed on the bridge and will drive through a double sprocket and roller chain to the torque shaft of 1-1/8" O.D. 7/8" I.D. seamless steel tubing. The torque shaft to be located in the bilges and fitted with three universal joints and a spline for and play. At each bulkhead there will be a combination shaft seal and bearing. There will also be a rubber mounted bearing in the center of the engine room. At the stern, this shaft will enter an especially designed gear box giving a reduction of 27 to 1, operating a stub shaft and toggle arm. This toggle arm will be connected to tiller arms on each rudder, to give a cam action and an increase in the effective gear ratio. The toggle arm to be fitted with suitable and substantial rudder stops to prevent bending of the connecting drag links.

(e) Emergency Tiller:

An emergency tiller shall be provided and stowed in the lazarette. The tiller arm to be of aluminum pipe, bent to shape. The connecting link to fit over the squared portion of the port rudder stock and will bear in a watertight socket. This link to project above the deck and will be squared for the tiller. A drag link of steel tubing for connecting the two rudders together shall be provided.

(f) Steering Direction:

The steering gear to be so arranged that the bow of the boat turns with the direction of the wheel.
The chart house will be located as shown on the plans. Construction to be principally of spruce and Eureka Mahogany Bonded-Wood, with spruce sills, as better shown on Drawing 52602-5P, Eureka 484520. These sills to be bolted through the deck with 1/4" galv. carriage bolts, with backing blocks fitted under the deck. The Eureka Bonded-Wood sides of the chart house shall be securely
bolted to the aforementioned bulkheads. Spruce uprights and corner pieces of adequate proportions will be fitted and rabbeted to take chart house sides and roof. Chart house roof beams spaced approximately 12" on center and to be 7/8" x 2" oak, steamed and crowned approximately 7 inches in 8'-6".

There will be ten apertures in the chart house for light and ventilation. Two of these apertures are metal framed and of the hinged type, also arranged with curtains for complete black-out. Black-out curtains will be provided for all windows, ports and ventilators. Details of chart house construction are covered by drawing No. 2602-5-BB. The after end of the chart house will be equipped with a panel door, hinged on one side and in the middle so far as to fold out of the way. All radio equipment, including transmitter and receiver, and other apparatus as furnished by the government will be installed on the starboard side of the chart house. The chart table and lockers for charts and navigation instruments will be installed on the port side. A door to be provided in the after bulkhead of the compartment below the chart room for access to the ammunition stowage space. A telescopic whip type antenna furnished by the government shall be installed as desired. This antenna to be sheathed with rubber to a sufficient height to prevent injury to personnel.

Access from the chart house to the crew's quarters will be provided by a double hinged panel door and companionway ladder.

The telegraph controls and throttle controls to be located directly in front, and to the right of the steering wheel, as are the horn button, siren button and engine-room telegraph signals. Bridge instruments to be located to starboard in chart house and visible through companion door.

(No: Due to the emergency and to the scarcity of certain metals, it will be possible for substitution in any case at the discretion of and with written authority from the Supervisor of Shipbuilding.)

Hand grabs of oak or mahogany to be fitted wherever convenient, both inside and outside of the chart house and will be securely bolted to the chart house structure. Suitable type hand grabs to be also furnished throughout the boat as needed.

12. BOOBY HATCHES:

Removable collapsible, canvas, pipo or wood frames booby hatches to be fitted on forecastle, and engine room access hatches. All access hatches except wardroom to be hinged at the forward side to allow opening and use during rainy or rough weather.

13. SIGNAL MAST:

The signal mast shall be removable, of spruce, with an anchor light. Connections for the masthead light will be made through a watertight socket. In circuit with this shall be a blinker key to permit the use of this light for signalling.

14. INTERIOR ARRANGEMENT

(a) Forecastle: The forecastle shall provide sleeping accommodations for 8 men, with transom seats and portable tables to accommodate the entire crew of 10 men for use. It will also enhance the galley and the crew's toilet. (Note: For a better understanding see Drawing 2602-2-B.) The galley to be equipped with a 2-burner electric hot plate; a small but adequate sink with combination drain board and work table; and a refrigerator (24 volt D.C.) of approximately 8 cubic feet capacity. Two 50-gal. fresh water tanks to be located below the forecastle floor and connected to the sink and crew's lavatory. Stowage space for can goods, etc., to be provided. The crew's toilet to be located on the starboard side and will contain a lavatory, medicine cabinet with a mirror, and a marine toilet (Sands "Sanetta" or equal) will also be provided.
The ward room is intended for the use of the first and second officers. A desk will be provided with drawers, pigeon holes and book shelves. Each berth to be built-in with stowage space below. A large hanging locker to be located on the starboard side. Two aluminum pipe frame or wooden arm chairs will be provided. The officers' lavatory will be centrally located and will contain a lavatory, water closet, 50-gal. fresh water tank, and medicine cabinet with mirror. A companion ladder leading from the ward room to the bridge so constructed as to be readily removable and at the same time with wide treads and with enough
slope for comfortable passage will be installed. A wide transom seat with cushion will be located on the port side.

(c) Forward Fuel Tank Compartments: The forward fuel tank compartment will be located between frames #26 and #30, to port and starboard of the officers' lavatory. Bulkheads fore and aft both inboard and outboard shall be provided with stowages to adequately support the tanks and prevent bulging during rough weather.

(d) Engine Room: The engine room will occupy the space between frames #30 and #46, the two wing engines being forward and the center engine aft of the aluminum web frame on frame #30. The operator's station to be located between the two wing engines and forward of the center engine, with clutch lever extensions convenient to this station and a 24" x 24" hatch located directly above the operator, the companion ladder just forward of the center engine. The instrument panel located directly in front of the operator's station on the center line, on the forward engine room bulkhead. This instrument panel includes all instruments, gauges, etc. for the engines; the telegraph dials; and warning lights. The engine fresh water expansion tanks to be located on the bulkheads or overhead with gauge glasses in direct sight of the operator. The auxiliary generator shall be located on the starboard side aft. On the port side, aft, will be located a workbench, lockers for tools, spare parts, etc., and shelves for miscellaneous equipment. The starboard battery box located adjacent to the generator, the port battery box under the workbench. The switchboard located on the starboard side above the battery.

(e) After Tank Compartments: The two after tanks, of approximately 700 gallons each capacity, to be located between frames #46 and #51, to port and to starboard of the after crew's lavatory. An auxiliary fuel tank of 50 gallons capacity with separate fill vent, etc., for use in conjunction with the generator will be located between.

(f) Mattresses and Cushions: All mattresses to 5" thick, latex or other acceptable material. All seat cushions 3" thick, imitation leather covers.

(g) The space between frames #51 and #56 will be used as a stowage room or for additional tank capacity.

15. Plumbing:

All toilets, lavatories, and galley sink to be equipped with adequate size discharge lines, with overboard connections through streamlined, high speed suction scoops and will be equipped with shut-off valves for emergency purposes. Intakes to toilets will be equipped with high speed pressure scoops and shut-off valves. Where possible, discharge from lavatories will be through the sides of the hull, above the waterline, but in the boat top to prevent discoloration.

16. TANKS:

(a) Fresh Water Tanks: The total fresh water tank capacity to be approximately 150 U. S. standard gallons, in 3 tanks, as previously mentioned; all tanks to be constructed of aluminum. 5' diameter hand-hold plates, together with drain plugs, vents, supply and sounding pipes to be fitted. All tanks well secured and checked in position.

(b) Fuel Tanks: There will be four...
Each tank to be equipped with a manhole approximately 16" x 18" clear opening, the cover to which will be bolted down on a soft synthetic rubber gasket. All fittings to the tanks to be located in the manhole cover and include the fill line, vents and take-outs. The fill pipes will be equipped with a synthetic rubber boot to prevent the escape of fumes into the tank compartment. A special wrench to be provided for removing the deck plate and the cover of the fill pipe. There will be a drain to discharge overboard any gasoline spilled during filling. There will also be a vent from the tank itself overboard. This will be equipped with a backfire trap or flame arrester of stainless steel screen. Both high and low suction to be provided. The high suction spaced at such a distance from the bottom of the tank to permit removal of all but the last 150 gallons. The purpose of this arrangement is to permit use of the tank even when it is damaged.
or partially filled with condensate. The two forward tanks to be approximately 800 gallons each; the two after tanks approximately 700 gallons each. All tanks to be well baffled to prevent sloshing and aeration of the fuel, and will be supported by numerous spruce stiffeners covered with felt in various thicknesses. The felt in turn to be covered with parafilm. All surfaces touching the tank to be coated with vaseline before the tank is set to prevent any accumulation of moisture. There will be two strong-backs set in longitudinally over the top of each tank. These constructed of spruce and fitted with aluminum cheek pieces at each end. "D" bolts to be used at each and through the transverse bulkheads to hold the tanks down. These "D" bolts shall be set up to put a very light strain on the top of the tank when it is empty and should not be tightened down after the tank has been filled. Graduated sounding sticks to be provided; one for the forward tanks and one for the after tanks. In addition, liquidometers manufactured by the Level- orator Corporation will be installed with dials in the main instrument panel.

(c) Auxiliary Fuel Tanks: The auxiliary fuel tank previously mentioned to be constructed of aluminum, fitted with swash plates, clean-out cover and drain plug.

(d) Lubrication Oil Storage: It is assumed that it will be more convenient to store lubricating oil in regular 5-gal. cans, as received from the producers. Provisions to be made for the stowage of such cans and lashing them in place.

VENTILATION:

Combination of both natural and forced ventilation will be employed. One large blower of 500 cfm against 1/2" static pressure Model B12 of the JLG Electric Company to be located in the wardroom on the port side discharging into a duct which leads through the ward room into the forecastle. This duct fitted with 4" x 4" adjustable registers to control the direction of air flow. Provision to be made so that these registers may be revolved 30 degrees with the minimum amount of trouble. The galley to be equipped with a blower of the same manufacture of about 200 cfm, taking air from a hood over the stove and discharging above the main deck. Each tank compartment to be equipped with one blower, identical to that in the galley, taking air from the bilges through a flame arrestor screen and discharging above deck. The air intakes to the tank compartments to be 5" screw cap covers, properly labeled, through the main deck. There shall be two 4" hood ventilators located in the forecastle; one 4" vent in crew's toilet; two 4" hood ventilators in the ward room; and six 6" hood ventilators in the engine room. All are provided with locking devices so that they may be set in any position and are also provided with stump covers for use in rough weather. Blowers with a total capacity of 1800 to 2000 CFM to be installed in the engine compartment, to accomplish ventilation of the engine room.
Following is a list of deck fittings and their locations:

One - Bow casting or bullnose with 4" opening, securely fastened to the stem and main breasthook.

One - Samson post of 4½" x 4½" long leaf yellow pine, extending through the deck and securely fastened to the stem and bulkhead on frame ¾ and fitted with a Norman pin 1" diameter by 16" long.

Two - Skene bow chocks located forward for use with the Samson post and bolted to covering board.

Three - Skene stern chocks located on each corner of the transom and on the center of the transom for use in towing or mooring.

Four - Cast steel galvanized deck cleats.

One - Forward jack staff witted with a socket for the union jack and to carry the forward life line.

One - Forward life line of 1/4" galv. steel cable, canvas covered.

Two - Handrail stanchions at stern, one to be fitted with socket for Ensign staff and stern light.

One - stern life line 1/4" galv. steel cable, canvas covered.
A toe rail of mahogany is fitted around the deck, approximately 5" from the sheer where necessary.

20. **LIFE SAVING EQUIPMENT**

10 Adult size Kapok filled life jackets of an approved type will be furnished and stowed under forecastle deck. Two 24" ring buoys with water lights to be furnished and stowed on the outboard side of the bulwarks alongside the bridge. Stowage facilities for the life rafts to be furnished by the Government will be installed.
21. **BILGE SYSTEM:**

A light weight, high capacity centrifugal pump will be driven off the generator and connected to a system of copper tubing bilge lines to the low point of every watertight compartment with separate shut-off valves so that any one or a number of compartments may be pumped, with the exception of the forecastle. This pump to be a 1-1/4" Higgins' Turbine Pump, or equal. The pump shall also be connected to a sea suction through the bottom of the hull and provided with a water faucet adaptable for attaching ordinary garden hose, for use in washing down the deck, as a shower, and in the event of a necessity for fighting fire. In addition, there will also be installed in this bilge system, a Navy type hand bilge pump with bulkhead mountings. The whole system to be fitted with numerous hose connections to insure flexibility and to prevent transmission of vibration.

22. **FIRE FIGHTING APPARATUS:**

One 75-lb. CO₂ system to be installed in the engine room; this system having seven jets discharging under the engines and into the low points of the bilges. In addition, one 35-lb. CO₂ system will be located in the Officers' lavatory to discharge and fill the forward tank compartment; and one 35-lb CO₂ system to be located in the tank compartment, aft, to discharge and fill the after tank compartment. "BREAK GLASS" pull boxes will be located as follows: One on the after wardroom bulkhead; one by the engine room access hatch; one on the after engine room bulkhead, and three on deck, properly labeled and identified. In addition, one 2-lb. CO₂ hand portable extinguisher located in the forecastle for use in the galley and in the forecastle; one 2 lb. CO₂ portable extinguisher located in the ward room; also two 2-lb. CO₂ hand portable units located in the engine room, one to port, and one to starboard. Also, one 2-lb. CO₂ hand portable unit on the forward bulkhead of the store room, and one in chart room. All fire extinguishers to be installed in accordance with best marine practice.

23. **THROTTLE AND TELEGRAPH:**

The throttle and telegraph system to be entirely mechanical and provided with an interlock to prevent opening of the throttle except when telegraph is in the "ahead" position. The throttles to be controlled by 1/8" stainless steel wire rope, running over plastic and aluminum sheaves to the engines. In each line shall be a spring tension unit which takes up and equalizes any weaving or working of the boat. The telegraph sender to be connected to individual dials in the engine room by means of Arens Bowden wire. A warning light in front of operator and signal to be installed in the engine room with a watertight button adjacent to the control housing on the bridge.

24. **PROPELLER SHAFTING:**

Propeller shaft for each engine to be furnished by the Government and will be machined by the manufacturer to fit the Packard engine reverse gear flange on one end and to fit the Government furnished propeller on the other end. Shafts are of "H" monel, precision straightened.
Each propeller shaft to be fitted with a cast manganese bronze shaft strut, the strut equipped with rubber bearing (Goodrich Utless, or equal.). Shaft bearing spacing is such as to equalize the stresses on the shaft. (Note: Refer to detailed drawing of shafts and struts).

SHAFT LOGS AND STUFFING GLANDS:

The shaft logs to be of bronze or brass. Shaft logs to be fitted with canvas gaskets and set in white lead or marine glue, and edges ground off and faired to produce the least possible resistance of appendages. Stuffing glands shall be of the flexible type to maintain watertightness even when the shafts are bent or badly out of alignment. Clearance between the shafts and the shaft logs to be not less than 3/32". Stuffing glands to be attached to shaft logs by rubber hose and packed with not less than 3/8" graphited flax packing. The shaft log fastened to the hull with flat head countersunk 3/8" Monel or bronze bolts closely spaced and fitted with 1-1/4" Red Lauan backing blocks.
27. **PROPPELLERS:**

Propellers to be furnished by the Government.

28. **NAVIGATION LIGHTS:**

The vessel to be provided with navigation lights painted the color of the superstructure. Lights wired in a first class manner, with switches located in the chart house; name plates provided at each switch; circuits provided for the masthead light, bow light, stern light, and side lights.

29. **FOG BELLS:**

A ships bells of cast bronze will be mounted on the bridge. This bell engraved with the vessel's identification mark.

30. **SIREN:**

A siren ("Sireno", as manufactured by the Portable Light Co., or equal) to be installed on the chart house, with watertight push-button control convenient to operator's station.

31. **COMPASS AND BINNACLE:**

One aircraft type liquid compass ("Pioneer", or equal) to be installed in a lighted binnacle directly in front of the helmsman's position. The compass shall be adjusted by the government.

32. **HARDWARE:**

All hardware, interior and exterior, such as hinges, drawer pulls, door knobs, and lock sets, door holders, padlocks, clothes hooks, door fasteners, hatch lifts, etc. to be plain bronze or brass or other approved materials. Duplicate keys to be furnished for all locks and an appropriately marked key board and locker shall be mounted in the ward room.

33. **ENGINE ROOM FLOORING:**

The engine room flooring to be plywood painted with "Ferrox". Portable sections fitted wherever access is desired.

34. **RADIO:**

Radio equipment furnished by the Government and installed by the contractor.

35. **MACHINERY:**

The Government is to furnish the main propelling engines equipped with radio shielding delivered to the plant of the contractor. The contractor will pay all expenses of handling the engines thereafter and install said engines in the boat in a proper and approved manner. The engines to be installed with complete central control, fresh water cooling system, heat exchangers, electric starting batteries with trays, throttle control and instrument panels. The engines shall be carefully aligned and fastened down with chrome vanadium steel bolts wired together to prevent loosening from vibration.
The exhaust from each manifold of each engine is separate and
to be constructed as follows: The exhaust pipe itself to be made
in one single piece of 5" inside diameter by .109 wall copper tube.
Around this copper tube will be spiraled two 3/8" I.D. by .062
wall, copper tubes to form a dual thread with maximum spacing of
approximately 6". The outer jacket to consist of high pressure steam
hose with a neoprene cover forged into elbows with 6" inside diameter
by 1/4" wall on 24" center line radius. These elbows will be made
to various segments of a circle in an effort to standardize for
replacement. At the joints of the rubber elbows, cast bronze inserts
with water passages will be welded to the exhaust pipe, the hose
in turn being clamped to these inserts. At the tail pipe, there
is no solid connection to the overboard fitting; however, the exhaust
pipe will project into muffler with loose fit. This connection is
sealed by a short straight length of hose, which does not transmit
engine vibration to the hull. The exhaust pipe to be attached to
the engine by means of a floating flange and a soft aluminum gasket. The overboard connection or muffler to be constructed on sound acoustic principals. The muffler causes exhaust gases to pass on an arc of a circle in such a way that the high velocity or noisy gases are thrown off on a tangent and discharged under the water while the low velocity and relatively quiet gases pass out through a 5" opening which is exposed to the atmosphere. These mufflers to be of cast manganese bronze and fitted with fins or foils to produce a vacuum under way and also fitted with butterflys which may be closed when silent operation is desired, and flapper valves to prevent re-entry of water. The exhaust pipe within the hull to be supported by stanchions, so placed that vibration of the engine does not transmit itself to the hull or vice versa.

(b) Engine Cooling System: Each engine to be equipped with an oil heat exchanger and fresh water heat exchanger. Salt water to be taken into and through these exchangers by means of scoop circulation, i.e.; a pressure scoop forcing water in and a suction scoop pulling water out when underway. All connections from the engines to the exchangers to be kept as short and direct as possible, and in accordance with the recommendations of the engine manufacturers in all instances. Thermostats to be used on both the fresh water, and oil systems. Individual oil sump tanks of 30 gallon capacity to be installed, also oil filters in both the in and out lines. Whenever practical and when material is available aluminum tubing will be used for both fresh water and oil. Individual expansion tanks of 15 gal. capacity will be strapped to the bulkheads or overhead with proper connections to the engines.

(c) FUEL SYSTEM: As previously stated, both high and low suction will be installed in each tank. Two selector valves to be used - one for the forward tanks, and one for the after tanks. These to be remotely controlled from the main instrument panel, with plainly marked dials and handles. The main fuel lines then come from fore and aft to a location below the main instrument panel where they manifold together, thence to the three engines. Two wobble pumps will be used, either with built-in bypass relief valves or external bypass relief valves, depending on the availability of the former. All valves to be properly tagged and the system so arranged that fuel may be shifted from any one tank to any other tank at the rate of approximately 125 gallons per hour in the event of damage. The gasoline strainers will be located below and adjacent to the engine fuel pump. All fuel lines 1/4" I.D. standard synthetic rubber gasoline hose, with brass fittings. All turns and bends to be made to such a radius and all special fittings to be so designed as to conform to the recommendations of the S. A. E. Transactions for 1941. (Vajpor investigations.)

(d) Engine Controls: All engine controls will be located convenient to the operator. This includes starting switches, starter buttons, individual throttles and clutch levers, etc.,
Bottom paint, bronze; side paint, dark blue; paint furnished by Navy. Deck and super structure paint, dark blue; paint furnished by Navy. Interior of chart house, same as deck. Forepeak, light grey except steps which are red no-skid. Forecastle white. Identification letters, etc., will be painted as designated. Draft marks will be painted, bow and stern, to port and starboard, as desired. Floor inside of gun turrets, deck strip from bridge to 20MM gun and 20MM gun are to be painted with non skid paint. Ward room, white except for trim in natural mahogany such as desks, etc., Engine room light grey with all piping which backgrounds against light grey painted light grey, and all piping which backgrounds against engine painted the color of the engine. In addition, all piping is to be striped for identification, with at least one stripe to each piece of pipe, according to the following color scheme:

Oil in - Yellow  
Oil out - black  
Fresh water - blue  
Sea water - green  
Fuel - red.

No hose connections are to be painted.
(Note - All flooring in ward room and forecastle to be painted red no-skid with a 3" mop strip with only minor variations.
Lazarette, light grey with no exceptions. All wooden ladders natural mahogany, treads painted with grey "Ferrux".

37. EQUIPMENT:

2 - 75 lb. Danforth anchors
2 - fathoms - 3/8" galv. chain
30 - fathoms 1" anchor rope with thimble and shackle
4 - dock lines, 14 fathoms, 7/8" dia., with 36" splice spliced into one end and the other end back-spliced or served.
2 - Heaving lines, 10 fathoms, 1/4" dia.
2 - Coir fenders 10" diameter with lanyards
6 - Rope fenders 6" x 24" with lanyards.
2 - Coir deck mats.
1 - Flag staff
2 - Boat hooks, 10 ft. Ash.
1 - Ship’s bell and mount
1 - Siren
1 - Oil anchor light, galvanized
1 - Set of canvas covers:
   1 - Search light cover.
   1 - Siren cover.
   2 - Spray hoods for hatches
   11 - Cowel vent covers.  2 - Gun turret covers
   4 - Sets of torpedo tube covers for muzzles and firing gear.
   1 - 20 M.M. gun cover.
8 - 1/4" cotton boat hood lanyards - 18" long.
1 - 3/8" shackle - 3/4" pin.
1 - Sea anchor.
1 - Life line, forward
1 - Stern life line.
2 - 24" Life rings, cork or balsa, lettered, with lanyard & water light.
1 - Bridge grating, 18" x 24"
   Cotton rope for mast halyards, etc., as required, 1/4" dia.
11 - Ventilating cowls and blackout covers
1 - Set of deck plate wrenches.
1 - Set of fuel measuring rods
1 - Boarding ladder.
6 - Fire extinguishers, 2# CO2
1 - Set special boat tools
1 - Set companion and access ladders.
1 - Set engine tools (government furnished).
1 - Set keys for all locks (2 each)
1 - Key locker
1 - Nams plate.
3 - Padlocks.
2 - Trouble lights with cords
1 - Search light
1 - Lead and line
1 - Upholstery as follows:
   Officer's quarters -- all cushions covered with Fantasote or equal and filled with sea-hair, or air foam, if desired, in which case removable washable canvas covers will be furnished.
2 - Good quality canvas armchairs
2 - Berth Cushions (mattresses)
2 - Thin mattresses
Crew's Quarters--
4 - Berth cushions (mattresses)
1 - Mattresses for upper berths
Radio Room--
1 - Stool (Upholstered)
Miscellaneous--
1 - Crew's mess table, drop leaf.
EQUIPMENT (Continued)

1 - Galle3r and mess set as follows: 1 sink strainer, 1 small and 1 large baking pan, 1 large and 1 small frying pan, 1 double boiler, 1 kettle, 1 tea-kettle, 1 percolator (12 cup size), 2 food jugs, 1 S.C. pot, 1 tray, 1 turner, 1 bread knife, 1 large fork, 2 paring knives, 2 cooking spoons, 1 ladle, 1 can-opener, 1 fruit knife, 1 butcher knife, 1 large meat knife, 6 tablespoons, 12 dinner forks, 12 knives, 18 teaspoons 12 soup spoons, all of the above cutlery Stainless Steel; 12 glasses, 12 cups, 12 saucers, 12 soup bowls, 12 plates, 12 bread and butter plates, 1 sugar, 1 creamer, 1 salt and pepper set, 2 platters, 2 vegetable dishes. All table dishes or Earthenware of similar lightweight material.

38. HEATING:

A sealed combustion chamber, gasoline heating unit, manufactured by the Stewart Warner Company, of 80,000 B.T.U. per hour capacity, to be located in the port side of engine room. It shall be accessible for starting, operating and servicing. A duct system to all living compartments to be provided; also an arrangement to by pass all hot air into the engine room for quick starting during cold weather. The ducts to be covered with asbestos where necessary to prevent charring of the wood. Exhaust silencers to be fitted both for the gasoline motor and for the combustion chamber.
General: There shall be one system of electrical wiring. All lighting and power wiring will be 24 volts, direct current. The signal and ignition systems will be 24 volts direct current. There shall be a main switchboard located in the engine room.

A Seven Circuit Fuse panel will be located flush above starboard locker in officer's quarters, and will have fuse protection for lighting, with distribution as follows, general lights, running lights, signals, searchlights, chart lights and two spares.

STORAGE BATTERIES

Two 24 volt storage batteries per vessel, each consisting of two 12 volt trays 200 ampere hour heavy duty Exide (or equal) shall be supplied and installed by the contractor in the engine room adjacent to the Auxiliary generator. These batteries to be so connected to and through the switchboard in such a manner that they may be used individually or in parallel for starting and ignition for each of the three main engines and for all necessary lighting and power supply. Provision shall be made in the switchboard so that these batteries may be charged or floated individually or in a parallel by one or more of the engine generators and or the auxiliary generator. The batteries shall be inclosed in a wooden suitably lead lined box with an easily removable cover. There shall be air intakes on the after end of the box and a hose line at the forward end from the top of the box to a ventilator on deck to provide proper ventilation.

Switchboard:

The switchboard will be of the dead front type and to have the following equipment:

1 - D. C. Voltmeter 0-40 volts
1 - D. C. Ammeter 100-0-100 amperes
1 - 30 ampere switch, 3 poles in parallel - general lights
1 - ditto - ignition system
1 - ditto - ventilation
1 - ditto - ordnance
1 - ditto - oil heaters
1 - 100 ampere ditto - stove and refg.
1 - 100 ampere ditto - auxiliary generator
1 - 30 ampere ditto - radio
2 - 200 ampere ditto - batteries

There will be a 400 ampere copper buss for the positive connection of the battery and the positive leads to the three magnetic starter switches. This buss will be connected ahead and independent of any of the above switched and meters. The engine starter solenoids will be mounted and connected in the switchboard. The negative side of the battery shall be connected to the ground (See para. on grounding).

Wiring:

All electrical wiring throughout the boat will be of cable having the following specifications: It shall be copper wire with 60% rubber insulation and a copper metal basket weave enclosure over the conductors and under the jacket, for radio shielding, or of such type and kind as may be approved by Supships.

Distribution Panel:

This panel to be circular in shape and flush mounted. The fuse holders are to be Little Fuse Company, fuse extractor post No. 1213 and the fuses to be 10 amp. 5 AC Vibration proof fuses, or equal.
Feeders:

From switchboard to auxiliary generator, two No 2/0 wires, one wire going to auxiliary generator fuse for generator circuit; one wire going to positive buss for starting circuit, A 2/0 wire from negative side of generator to generator frame & thence to common return. From switchboard to Distribution Panel 2 #8 wires in parallel, same to common return.
From switchboard to stov. and refrigerator - 1 #2/0 wire, same to common return.

From switchboard to radio - 2 #8 wires in parallel, same to common return.

From switchboard to Ordinance - No wiring.

From switchboard to Oil Heaters - 2 - #14 wires in parallel, same to common return.

From switchboard to each engine starter - 1 #250,000 C.M. Cable.
From switchboard to each battery - 1 #250,000 C.M. Cable.
From switchboard to Ventilation - 1 #14 2 cond. Cable to galley and forward blowers.

1 - #14 2 cond. cable to both gasoline tank blowers.
Light wiring #14
Signal wiring #14

**Engine Wiring:***

All wiring between engine sending units, generators, voltage regulators, instrument panel and switchboard, shall be Belden Aircraft wire or equal in aluminum copper weave radio shielding flexible conduit. From ignition switch in switchboard to Starboard ignition coil and thence to main instrument panel shall be #12 wire, from switchboard to port and center ignition coils #16 wire; from magneto to ignition switches #16 wire. From three temperature, tachometer, and manifold pressure sending units to instrument panel #20 wire. From switchboard to each starter button #12 wire. From each generator to voltage regulator, 2 #4 and 1 #12 wire. From each voltage regulator to switchboard 2 #4 wires. Atop the starter motor of each engine there shall be a junction box from which an individual conduit shall go to each sending unit, including the generator. From this junction box, there will be a 1" conduit to the junction box of the voltage regulator. From each regulator box to instrument panel and to switchboard a 1" conduit. There shall be mounted in the chart house, tachometer and manifold pressure instruments. Magneto switches for each engine, which shall be fed from engine room instrument panel thru a 1-1/4" conduit, will be located on the bridge. By the Engine Room deck hatch, there shall be a set of 7 emergency cut off switches. One switch for each magneto of each engine and one for auxiliary generator engine. These switches are to be arranged that they can be operated individually or simultaneously by a master control arm. This switch box to connect to instrument panel with a 3/8" conduit and to auxiliary generator with 1/4" conduit.

**Fixtures and Fittings:**

All numbers listed below are of Oceanic catalog which may be substituted, with fixtures and fittings of equal quality if obtainable; if not obtainable fixtures and fittings of such design and material as approved by the Supervisor of Shipbuilding may be substituted.

Bridge: Telegraph Key No. 1314, Push Button No. 9486 Combination Switch and receptacle No. 978, Desk Lights, No. 4900 chrome plated.

Lighting: Aft tank room, storeroom, and steering compartment: One light fixture each.
Forecastle: One light fixture on forward bulkhead, one light fixture on each inboard face of intermediate dock stringer in center of forecastle.

Crew's Lavatory: One light fixture over mirror.

Gallye: One light fixture on port bulkhead.

Ward Room: One desk light over desk, one light fixture in each berth, one light fixture on aft bulkhead. Officers Lavatory: one light fixture over mirror.

Engine Room: Four light fixtures with wall switch appropriately
spaced, one double row "acle, on each side bulkhead", two light fixtures to show on instrument panel on front bulkhead with wall switch.

Chart House: One desk light by radio equipment, one desk light by chart table, one light fixture on center of ceiling.

Navigation lights: In a panel located in chart house, the following equipment shall be installed:

- One switch for portlight.
- One switch for starboard light.
- One switch for bow light.
- One switch for stern light.
- One switch for top mast light.
- One switch for wake light.

The mast light shall be permanently mounted atop mast and a telegraph blinker key mounted on the bridge connected electrically to parallel with the chart house switch. The two side lights shall be mounted in their respective screens and connected thru a rubber cord and plug to a flush deck receptacle.

The searchlight will be furnished and installed by the contractor and mounted on a bracket on the bridge. It shall be electrically connected thru a rubber cord and plug, to a combination receptacle and switch mounted below the searchlight. A telegraph key to be mounted on the bridge and connected electrically to parallel with the above switch for searchlight signalling.

Siren: One push button to be installed on the bridge to control the siren. The siren shall be mounted on the forward center section of the chart house roof.

Engine Signal: One push button mounted on the bridge to operate simultaneously a high wattage colored signal light and a high pitch horn in the engine room.

General Quarters: One push button mounted on bridge to operate General Quarters horn located in forecastle.

Bridge Signal: One push button installed in the engine room in such position as to be within easy reach of the operator, connected to a low pitch buzzer located near the steering wheel.

Grounding: On each of the two main girders running the length of the boat adjacent to the keel, there will be attached a galvanized steel scab 1/8" thick and 12 or more inches wide beginning under the forecastle aft bulkhead, and extending back to the transom, all joints to be welded. These two scabs are to be electrically bonded together twice, with 3/0 wire, once in the fore section and again near the battery box and switchboard. These scabs are to be also electrically bonded to all engine frames, gasoline tanks, all piping, torpedo tubes, bridge armor plates and deck gun mounts. They are to be used as ground and common return for the electrical system. The negative side of the battery, negative side of all generators and negative side of all engine starters are to be electrically connected to these scabs. The electrical connections to these scabs are to be made thru copper soldered lugs bolted to the scabs.

Addenda to Switchboard: In the lower aft wall of the switchboard there shall be installed a Russell and Stroll shore plug and receptacle No. 3332 and No. 3336 or equal. This receptacle shall be connected to the load side of the ammeter shunt.

In the forward wall of the switchboard there shall be

---
In the forward wall of the switchboard there shall be installed three No. MK - 305 General Electric Circuit breakers of equal. These breakers are to be connected in series with their respective generators and the main positive bus. These circuit breakers will act as disconnect switches for the engine generators as well as protection against accidental closing of the reverse current relay of the voltage regulators. (Note: These circuit breakers are installed to protect the present and unsatisfactory voltage regulators, and are to be discontinued if and when the engine manufacturer supplies the new and improved type which is capable of withstanding vibration.

**Addenda to Engine Wiring:** All engine instruments, panels and voltage regulators are to be furnished, as part of the engine equipment and installed by the contractor. In addition to the above a small toggle switch shall be furnished and installed by the contractor to control the field circuit of the engine generator. This
switch to be located in the junction box of each voltage regulator.

40. **MISCELLANEOUS AND AMENDMENTS**

(a) Armament to be installed as directed by the Bureau of Ships, at present in accordance with Bureau of Supplies and Accounts letter No. 94729 (SPM2), dated 7 February 1942 and change letter Nos-94729 (772a), Nos-94730, Nos-95384, from Chief, BuShips to Chief, BuShipsA, dated 28 May 1942.

(b) An adequate ice box cooling plant shall be furnished and installed in an accessible location.

(c) An air compressor unit capable of adequately servicing the four torpedo tubes shall be furnished and installed, properly piped and aired.

(d) Any part of parts of equipment and installation and items pertaining thereto, which are necessary for the proper operation of the vessel shall be furnished by the contractor regardless of whether or not they have been fully and adequately described in these specifications or omitted therefrom. It is evident that it is not practicable to enumerate in the specifications all details of fittings or appurtenances of the equipment, nor is it necessary to do so, it being understood that they shall be supplied by the contractor without extra compensation notwithstanding such omission.

(e) Each vessel shall be supplied with a combustible gas alarm, either fixed or portable of such type and design as approved by the Supervisor of Shipbuilding.

(f) One cradle to be supplied for each vessel, every forth cradle to be equipped with wheels for ease of handling.

(d) Pressure switches will be installed to cut off blowers when CO2 systems are operated. These switches to be of a type as approved by the Supervisor of Shipbuilding.