

UNITED STATES COAST GUARD

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U. S. COAST GUARD
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29 August 1956

NAVIGATION AND VESSEL INSPECTION CIRCULAR NO. 7-56

Subj: Manned LSTs; structural reinforcement and drydocking; hull inspection requirements

1. Purpose. To provide a minimum structural standard for conversion of the subject vessels for manned operation in merchant service on Ocean, Coastwise or Great Lakes waters, and to provide an adequate, uniform basis for hull inspection of these vessels subsequent to conversion.

2. Directive superseded. This circular supersedes Merchant Marine Safety Instruction No. 10-56 which will be canceled with the next issue of the Directives and Publications Index.

3. Discussion.

a. The instructions contained herein are identical with those previously contained in Merchant Marine Safety Instruction No. 10-56, except for the provision relative to periodical drydockings and for the addition of an alternative method of bottom butt reinforcement.

b. Since the first conversion of the subject type vessels to merchant service following World War II, in addition to losses of converted LST type vessels operating under foreign flags, two American flag vessels of this type have foundered under circumstances indicating structural failure as the most probable cause of the casualties.

c. These casualties, with their attendant very large loss of life, indicate an urgent need for a better understanding of the limitations of the LST type as compared to an ordinary merchant vessel of the same size. It is the purpose of this instruction to point out and emphasize these limitations and to specify necessary conditions to the continued certification of such vessels.

d. The basic war-built LST hull was designed to permit rapid fabrication by inexperienced shipyards and for an immediate and urgent, specific military purpose--the transport and beach landing of tanks and other heavy vehicles.

e. Implementing the first consideration, shell and deck plating butts were made as joggled laps at bulkheads, and joggled laps were used for gages, including the critical connection of the garboard strakes under the center vertical keel (no flat plate keel being fitted), and the also critical bottom

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seams under the longitudinal bulkheads. These points proved adequate to the short-time military purpose, but on a long-time basis are susceptible to accelerated corrosion and to possible metal fatigue. The possible seriousness of these occurrences is aggravated by the fact that the plating concerned is generally thinner than would be required in a normal merchant vessel of the same size.

f. Implementing the second consideration, these vessels as well as being lightly built were designed with machinery aft and with a keel drag so that the hull depth aft is greater than it is forward. This was done in order to facilitate beaching, and with the maximum military cargo of approximately 1,700 tons normally distributed resulted in a 6-foot trim, 11-foot mean draft, and satisfactory freeboards forward and aft. However, when appreciably greater amounts of cargo are permitted to be carried, the draft is not only increased, but with a uniform distribution of cargo the vessel approaches a condition of equal drafts forward and aft with less freeboard forward than aft. This condition is not desirable from the viewpoint of avoiding shipping of seas and, accordingly, there is a tendency to crowd cargo in the midlength of the vessel, with the result that both hull girder sagging stresses and local bending stresses are increased. It is now believed that this factor has in the past not been adequately considered, and that the drafts in excess of 12 feet should be limited to vessels on very restricted routes or arranged to carry some cargo aft, so as to be able to attain satisfactory trim without undue cargo concentration in the midlength.

4. Instructions. Based on the foregoing considerations, the following instructions apply to the hull inspection and certification of all LST type vessels for manned operation in merchant service.

a. Vessels currently certificated may be continued in the services for which certificated, subject to full compliance with the following hull inspectional requirements:

(1) At each periodical drydocking the complete shell and deck plating shall be thoroughly examined and all hull spaces shall be entered and thoroughly examined internally as well as externally, except that fuel oil tanks may be audiogaged in lieu of being gas-freed and entered, unless appreciable set-up or indentation exists in which case they shall be gas-freed and entered. However, fuel oil tanks shall be gas-freed, rendered suitable for entry, entered and examined at least once every four years. All areas showing evidence of wastage since the previous survey shall be checked by drilling or audiogaging in the presence of an inspector. In particular, very close attention should be paid to the condition of the shell and deck plating adjacent lapped butts at bulkheads, and adjacent to the lapped seams in way of the center vertical keel and the longitudinal bulkheads. Lapped butts of existing LSTs in merchant service are reinforced as indicated by Fig. 3, except that similar reinforce-

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ments are also fitted on the deck butts. Hatch corners and other discontinuities should be examined for evidence of cracking. All joggled seams should be examined. Hull fittings should be checked. Structure which is appreciably distorted should be faired or replaced. Structure which is repeatedly found distorted is to be reinforced.

(2) In order to provide guidance as to the rate of deterioration, blueprints showing the location and value of all gagings taken at the previous survey shall be maintained aboard the vessel. At each survey the Coast Guard inspector making the survey will refer to the print applicable to the previous survey to determine the extent of change in the vessel's condition.

(3) Because of the variety of ways in which corrosion can occur, the assignment of suitable percentage limits of maximum allowable wastage cannot be done in a very exact way. However, in the case of the LSTs, in view of the lighter than normal plating and structural members, less than normally acceptable deterioration should be permitted. In general, $\frac{1}{4}$ " deck plating, $\frac{3}{8}$ " stringer plating, $\frac{5}{8}$ " sheer strakes, and $\frac{3}{8}$ " bottom plating including the bilge strakes should be replaced when wasted more than 15%. The balance of the hull plating, bulkheads, and internals should be replaced when wasted more than about 25%. Where the local areas of the joggled lapped seams and strapped lapped butts and, in particular, the areas adjacent to the transverse and longitudinal bulkheads and the center vertical keel, previously referred to in instruction (1), show appreciable deterioration or any evidence of cracking in the plating as may be evidenced by weeping, the plating concerned shall be replaced even though this deterioration is quite localized. Replacement deck plating shall be $\frac{1}{16}$ " thicker than the original thickness of replaced plating. When replacing bottom plating in way of the center vertical keel and the longitudinal bulkheads, the new material shall consist of insert plating, replacing both adjoining plates of the existing joggled lapped joint, of sufficient width across the joint to butt to sound material, but in no case less than 60 in. width in way of center vertical keel and 24" in way of longitudinal bulkheads. Such replacement insert plating shall be $\frac{9}{16}$ " in thickness. Scattered pits may be repaired by welding where the condition of the plating is otherwise satisfactory, but patch plates are not to be used. In installing all replacement plating, care shall be taken that internals are released and rewelded as necessary.

b. Vessels being newly certificated will be permitted only limited routes depending upon the nature of the service and the extent of conversion alterations. It is intended, however, that in the case of all such vessels sufficient structural modification shall be made so as to correct known elements of weakness in the basic LST design. The following requirements, which pertain to conversions retaining essentially the original vessel arrangement, relate to correction of the major structural deficiencies. Depending upon the circumstances, equivalent alternative measures may be considered, or other alterations required. Before any vessel shall be newly certificated, the vessel shall be examined in dry dock and plans covering in full detail

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all modifications from the basic LST structure and arrangement including those called for herein shall have been submitted to and approved by the Commandant (MMT):

(1) Existing $\frac{1}{4}$ " deck plating between frames $12\frac{1}{2}$ - $35\frac{1}{2}$ inclusive shall be replaced with $5/16$ " plating, with all seams and butts flush and butt-welded in lieu of the present joggled laps.

(2) Existing $3/8$ " stringer plate between frames $11\frac{1}{2}$ - $36\frac{1}{2}$ inclusive shall be replaced with $\frac{1}{2}$ " plate, with flush butts and seams.

(3) Bottom plating for a 60" width in way of the keel and for not less than a 24" width in way of the longitudinal bulkheads shall be replaced by new strakes of $9/16$ " thickness fitted with flush butts and seams. New plating in way of keel shall extend between frames $12\frac{1}{2}$ - $35\frac{1}{2}$. New plating in way of longitudinal bulkheads shall extend between frames $13\frac{1}{2}$ - $34\frac{1}{2}$.

(4) Longitudinals in way of new plating fitted in accordance with instructions (1) - (3) shall be made continuous by the fitting of insert web plates at transverse bulkheads.

(5) Existing lapped butts in shell plating at frames 13 - 35 inclusive shall either be reinforced by the fitting of scalloped doubler straps as shown by Fig. 3, or the modified reconstruction shown by Fig. 4 shall be used. Where the reinforcement shown by Fig. 3 is used, it is necessary that all existing faulty welds, both external and internal be corrected before straps are fitted. Use of the construction shown by Fig. 4 eliminates the existing fillet welded lapped butts, and consequent need for any repair work thereon.

(6) If corrosive or otherwise damaging cargoes are to be handled, all structure affected thereby is to be suitably increased to the thickness which would be normally applicable.

(7) Balance of vessel's structure is to be renewed as necessary following the general standards indicated by requirement (a)(3).

(8) In installing all replacement plating care shall be taken that internals are released and rewelded as necessary.

(9) Bow doors are to be welded closed with suitable reinforcing and a collision bulkhead is to be fitted.

(10) Except for the differences resulting from the required structural changes applicable to vessels newly certificated after the effective date of this instruction, the general conditions and requirements for hull inspection and applicable to replacement of wasted or damaged material, as contained in instruction (a)(1)-(3), are applicable to such newly certificated vessels.

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5. Action. Instructions as contained in paragraph 4 will be complied with by OCMI's in the inspection, repair or conversion and certification of subject vessels.

6. Effective date. Upon receipt.



H. T. JEWELL
Rear Admiral U.S. Coast Guard
Chief Office of Merchant Marine Safety
By direction of the Commandant

Encl: (1) Fig. 1 - LST Midship Section
(2) Figs. 2 and 3 - Strap Reinforcement of Shell Lapped Butts
(3) Fig. 4 - Reconstruction of LST Lapped Butts

Dist. (SDL NO. 63)

A: None

B: e(35); c(10); l(3); d(2)

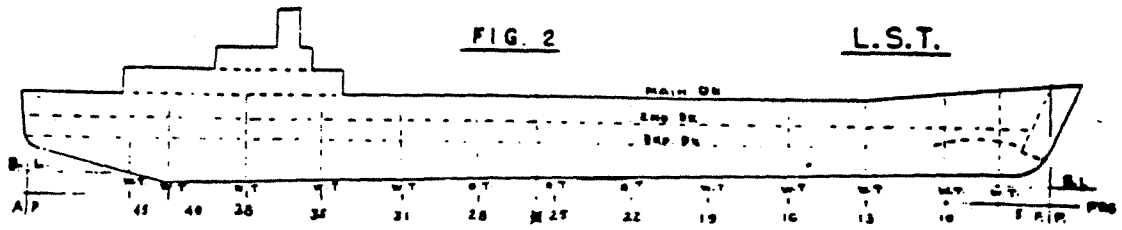
C: m(4); o(2)

D: i k (1)

E: m(1)

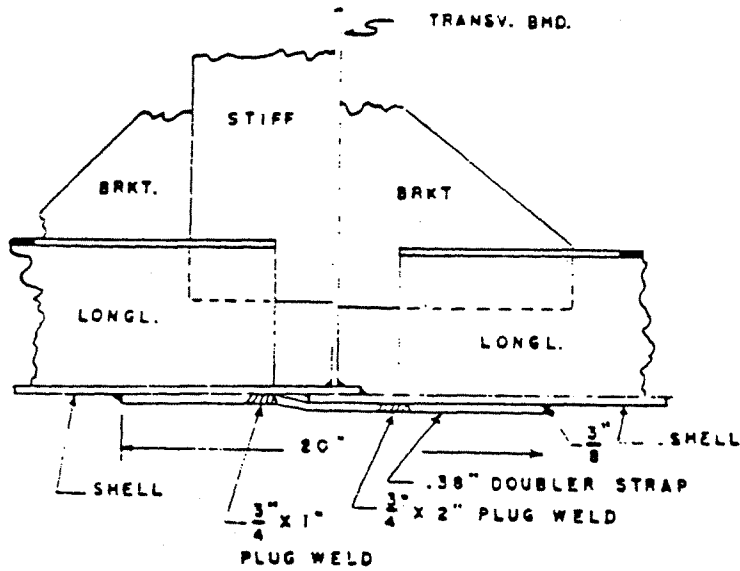
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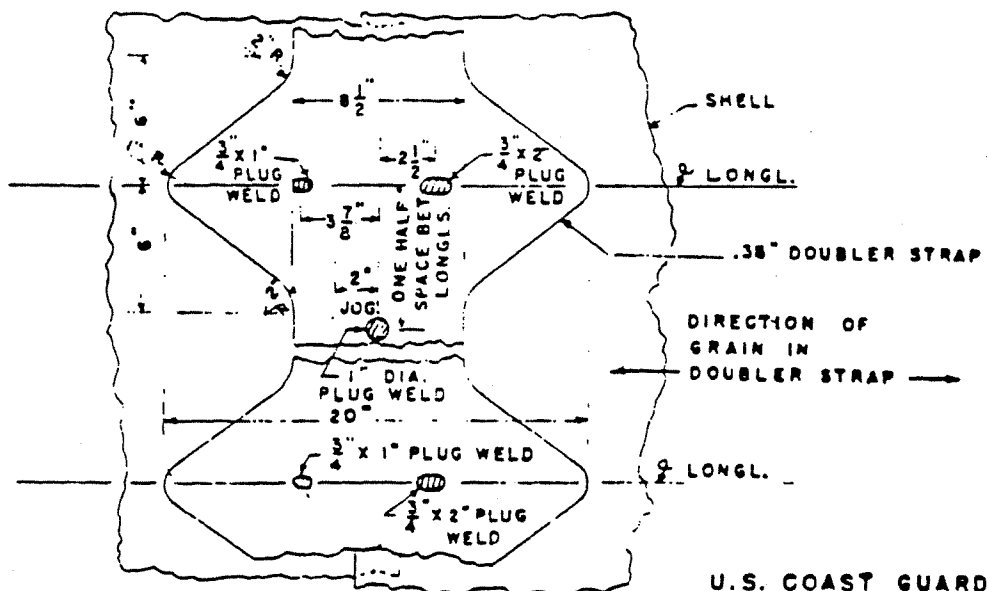


STRAP REINFORCEMENT OF SHELL LAPPED BUTTS, FRGS. 13-35 INCL.

FIG. 3
ELEVATION



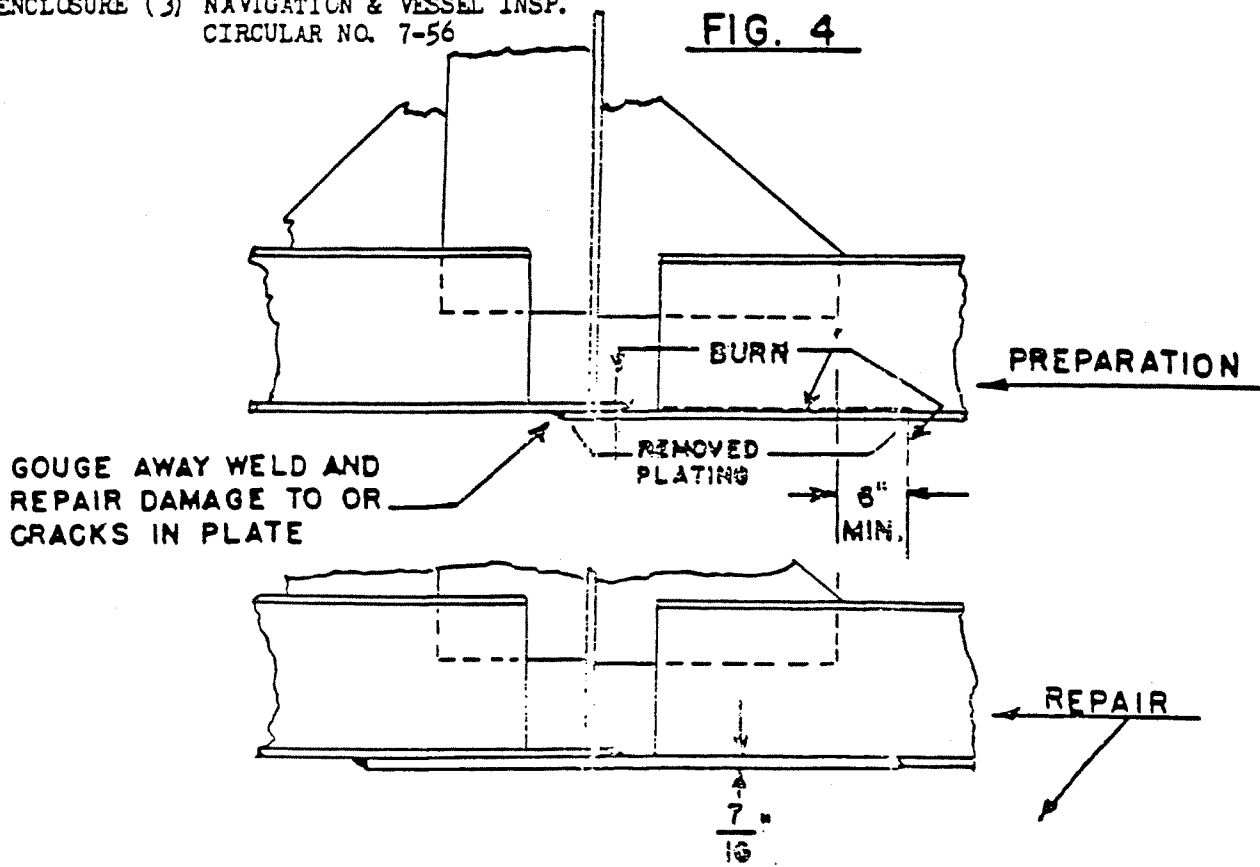
PLAN



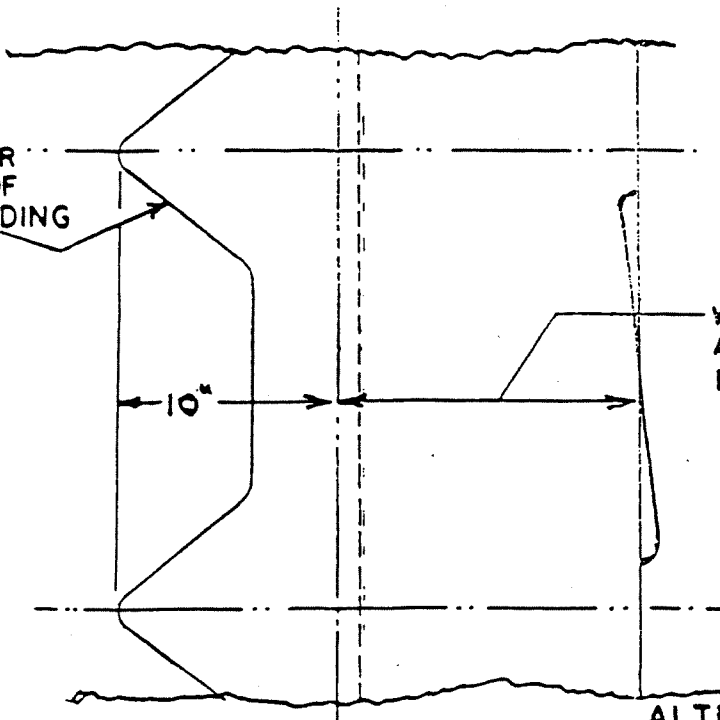
SCALE: 1/2" = 1'-0"

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FIG. 4



SAME CONTOUR AS ONE SIDE OF FIG. 3, PRECEEDING



ALTERNATIVE LST
HULL BUTTS ALTERATION
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