

**TREASURY DEPARTMENT
UNITED STATES COAST GUARD**


COMMANDANT
U.S. COAST GUARD
WASHINGTON, DC

24 Jan 1963

NAVIGATION AND VESSEL INSPECTION CIRCULAR NO. 2-63

Subj: Guide for Inspection and Repair of lifesaving Equipment

1. Purpose. The attached "Guide for Inspection and Repair of lifesaving Equipment" is intended to disseminate to Coast Guard marine inspectors, chipping companies, and vessel owners general information relating to acceptable procedure. to be followed in the inspection and repair of lifesaving equipment.
2. Discussion. For same. time there has been evidence of the need for the promulgation of guidance material for the inspection and repair of lifesaving materiel. Although some of the attached guides were derived from previously issued instructions and circulars, most have been collected from the experiences of marine inspection personnel throughout the country. This circular was prepared by the Merchant Marine Technical Division. Its intention is to combine the most up-to-date technical information available with the best inspection procedures. However, it is expected that with experience in the use of these guides, need for amendments or additions may be evidenced. Constructive comments and suggestions will be welcome, and as necessary, revisions will be issued.
3. Action. This information is furnished for guidance purposes and as such is not intended to be a directive. Nothing herein shall be taken as amending the applicable regulations or as prescribing or limiting the authority and responsibility of the Officer in Charge, Marine Inspection, in the exercise of his good judgment.
4. Effective Date. Upon receipt.


A. W. JOHNSON
Captain, U. S. Coast Guard
Acting Chief, Office of Merchant
Marine Safety

Encl: Guide for Inspection and Repair of Lifesaving Equipment

Dist: (SDL No.76)

A: None
B: n(35); c(10); e l(3); b d p(1)
C: k(p only); o(4);
D: i(2); k(1)
E: m(1)

GUIDE FOR INSPECTION & REPAIR OF
LIFESAVING EQUIPMENT

Prepared By
MERCHANT MARINE TECHNICAL DIVISION
U.S. Coast Guard
Washington, DC

December 1962

GUIDE FOR INSPECTION & REPAIR OF LIFESAVING EQUIPMENT

SECTION 1 - PURPOSE

This guide is intended to summarize, in a general way, technical data and background information pertaining to the inspection and repair of various lifesaving equipment. It is not intended to specify the degree of thoroughness of any inspection, which must be left to the inspector. Nor is it designed to be a substitute for the exercise of good judgment in the solution of any particular repair problem. It is intended to serve the following purposes:

- (a) Summarize and consolidate technical information pertaining to the inspection and repair of lifesaving equipment.
- (b) Promote uniformity in the approach to inspection and repair requirements throughout the various marine inspection offices.

GUIDE FOR INSPECTION & REPAIR OF LIFESAVING EQUIPMENT

SECTION 2 - GENERAL

The performance of an adequate inspection requires a knowledge of where to look and what to look for. With respect to lifesaving equipment, the inspector is looking for deficiencies which could affect the usage for which the equipment is intended. The inspector should impress upon the ship's officers that emergency equipment should be ready for use at all times and not just when the inspector is expected aboard. When drills are performed for Coast Guard inspectors, the inspector should always remember that his purpose is to witness the drills not conduct them. He should, however, not hesitate to advise the officer in charge of any drill of any unsafe conditions or practices he may notice during a drill.

The major categories of deficiencies commonly found in lifesaving equipment are as follows:

- (a) Deterioration, general or local.
- (b) Insufficient equipment on board.
- (c) Unacceptable or non-approved equipment on board.

When in the course of inspecting lifesaving equipment deficiencies are encountered, the inspector must determine what repairs or replacements are required to maintain the seaworthiness of the equipment. This calls for considerable discretion because the line of demarcation between what is seaworthy and acceptable and what is not is necessarily approximate and subject to some range of interpretation. The following factors must be weighed in making this determination:

- (1) Lifesaving equipment is required emergency equipment and must of necessity be maintained in safe and reasonable operating condition at all times.
- (2) The period of time involved before the next scheduled inspection of the equipment under consideration.
- (3) Whether the repair work contemplated is necessary to restore seaworthiness or is a maintenance measure to insure prolonged utilization of the equipment. In the first case repair must be required. In the second case the condition should be called to the attention of the owner so that he may exercise his own good judgment.

Once a decision has been reached by the inspector that repair is necessary, the specific requirement detailing the nature and extent of work should be written. In order to facilitate the economical repair of lifesaving equipment, all requirements should be given to the owner or his representative at the earliest moment possible. The general rule is to "renew or restore as original", i.e., to replace the defective structure and to restore the structure so that it will fulfill its original design purpose.

GUIDE FOR INSPECTION & REPAIR OF LIFEVING EQUIPMENT

SECTION 3 - INSPECTION OF LIPESOATS, LIPE RAITS, LIPE FLOATS AND BUOYANT APPARATUS, DAVITS, WINCHES AND APPURTENANCES

I. METAL LIFEBOATS

Deterioration is probably the most common single defect found in lifeboats. This can be caused by a number of things including corrosion, electrolysis, rubbing, chafing, aging and/or inadequate maintenance, etc. Past experience has shown that deterioration in metal lifeboats will most likely occur in:

- (a) Flat sections of garboard strake along both sides of the keel..
- (b) Sheer strake areas adjacent to wood gunwales, where fitted.
- (c) Shell plating in way of penetrations and fittings, such as drain plug, cradle pads, name plate, etc.
- (d) Rivets.
- (e) Lower edge and bottom of engine box.

It should not be construed, however, that the foregoing are the only places where deterioration may occur. All surfaces of the boat should be inspected and tested as found necessary. In most instances, the air tanks and floor boards should be removed so as to make all portions of the hull accessible.

There are no fixed rules concerning when and where hammer testing should be used. This is left to each inspector's discretion. However, it is suggested that only those areas indicating deterioration should be hammer tested and that the testing be accomplished with the blunt end of any hammer used. The pointed end of the hammer should be reserved for probing to determine the extent of deterioration in plating previously found to be defective. The indiscriminate use of hammer testing and the holding of satisfactory plating with pointed hammers have been the cause of many complaints by owners. Normally, the condition of a plate can be determined by lightly striking the plate with the flat end of the hammer.

If the plate responds with a clear ringing sound, it should be in good condition. If the hammer response is in the form of a "dull thud", the plate is probably in poor condition and a more thorough examination should be made.

All air tanks should be examined for deterioration and also tested for tightness by removing the cap. If, when the cap is removed, a vacuum or air pressure is indicated, the tank should be deemed satisfactory. When using compressed air for retesting the tank, more than one pound of air pressure should not be used. When inspecting buoyancy units, the outer wrappings should be examined for damage and each unit weighed. Those units which are overweight may be set aside for further examination. All wood items in the boat should be examined closely for deterioration, damage, and to ascertain that they are painted international orange.

The releasing gear and its attachments should be examined with emphasis given to the following:

- (a) Center pieces of universal joints. Excessive stress in these will be evidenced by hairline cracks, bent lugs, etc. Replacements should be in kind as originally installed or otherwise specifically be approved.
- (b) Preventer bars.
- (c) Release handle, toggle pin and keeper clip. A warning plate should be attached with surrounding area painted a contrasting color.

Normally, where a suspension test is required for annual or biennial inspection, the boat in the light condition should be lowered to a point where the keel is approximately one foot above the surface of the water. Then the boat should be loaded evenly throughout its length to its allowed weight capacity. The boat should then be lowered partially into the water. With the boat partially in the water but the falls under tension, the releasing gear should be operated to check the release of the boat from the falls. Deadweight used in the loading may be in the form of water, sand bags and/or other suitable material depending on the owner's preference. Personnel in the boat during lowering or raising operations should be kept to a minimum and should be cautioned to use life lines. The basis for deadweight loading is 165 lbs. of weight for each person of the capacity of the boat. Weights should be kept as low in the boat as possible to prevent capsizing. When water is used, it should be metered or otherwise measured and personnel entering the boat should be cautioned about the free surface effect. Water should not be used if, in the inspector's opinion, it will cause damage to the mechanical parts of the boat.

Routine recertification suspension tests should normally not be conducted at the embarkation deck level. Should it be impractical to load a lifeboat near the water level for routine test purposes, consideration may be given to other arrangements. In some instances, suspension tests on lifeboats have been accepted at any time within the quarter preceding the certification inspection.

The initial installation suspension test requires that the boat be loaded at the embarkation deck and then lowered to the water. The regulations specifically state that no person shall be aboard a lifeboat during an installation suspension test.

During the lowering of the boat, checks should be made that the governor brake adequately controls the speed of lowering, and the winch brake is capable of stopping and holding the lifeboat by the action of the counterweight alone. The lifeboat then should be lowered so that it is partially in the water and the releasing gear operated remotely by means of a previously secured life line or other convenient means.

The lifeboat casualty records reveal that there have been many personnel casualties as a result of the maintenance, handling and testing of lifeboats. All hands should be cautioned that when working about lifeboats the old sailing vessel seaman's motto of "One hand for the ship and one hand for self-preservation" is one well worth practicing.

Lifeboat tests should not be conducted if the required davit span life lines or other suitable safety lines are not rigged.

When conducting speed of lowering trials, it is convenient to mark the life-boat falls, such as with white paint, with two marks a measured distance apart. The stop watch should be started when the first mark passes a fixed point and stopped when the second mark passes that point. The distance to be timed should be during the free run at approximately the maximum speed of lowering. It is

the intention of the regulations that the terminal speed of a fully equipped lifeboat without passengers exceed the minimum speed of 40 feet per minute and that the terminal speed of the same lifeboat fully equipped with weights equivalent to a full complement of passengers should not exceed a maximum speed of 120 feet per minute. For emergency boats the minimum speed is 60 feet per minute and the maximum is 160 feet per minute.

All equipment in the lifeboat should be inspected, and tested if necessary. The expiration dates of pyrotechnic signals and emergency drinking water should be checked and the items renewed if out-dated. Masts, rigging, and sails should be examined for condition and adequacy. The amount of emergency rations, drinking water and condensed milk should be noted and the containers examined for deterioration. Flashlight batteries should be renewed yearly. The condition of rowlocks, hatchets, lifelines and other. required equipment should be inspected and renewal made if necessary. The bilge pump should be examined and tested for proper operation.

When inspecting motorboats, the engine should be checked for satisfactory starting and operation. The bilge area under the engine should be reasonably clean, and the electrical wiring, exhaust and cooling water piping should be checked for condition. When possible, the operation of the motorboat in the water should be witnessed so as to observe the engine cooling system. When operation is not observed underway, the inspector should operate skin valves and check intake screens to make certain they are open. The inspector should insure that the fuel tanks have been emptied and the fuel changed within the past year. Change. of fuel at times other than regular periods should be recorded in the mate's work log.

When inspecting hand-propelled boats, the gear case should be examined to determine the condition of the oil. Condensation often occurs in the gear case and this results in a mixture of oil and water which can cause severe corrosion. If this has happened, the gear case. should be cleaned thoroughly and the oil renewed.

II. PLASTIC LIFEBOATS

Reinforced plastic lifeboats should be visually inspected at frequent intervals after installation aboard ship. The following outline briefly describes the type of defect or deficiency which an inspector should look for during his inspection:

- (a) Connections to the boat's hull and steel supports. Reinforced plastics do not exhibit ductility or ability to take a permanent deformation as does steel. Therefore, if any supporting member deflects or deforms, stresses are introduced into the plastic structure which add to the normal stresses caused by service loads. If any damage to the support structure occurs, immediate steps should be taken to permit the plastic to revert to its normal shape. The plastic structure never should be sprung or pulled in to meet the mating surface.
- (b) Fasteners or connection areas. All bolts should be checked for tightness. Failures may occur in the bolt hole area due to insufficient distance between the bolt holes and the edge of the laminates, or insufficient bearing area under the bolt heads. Defects may appear as elongated bolt holes, fasteners pulled through the laminate, cracks, fastener heads sheared off, fractures or de-laminations.

- (c) Secondary bonded stiffeners. Separation or peeling action may occur due to inadequate surface preparation, poor adhesive or poor application. (Fasteners are commonly used at the ends and the center of a stiffener to prevent peeling.)
- (d) Condition of woodwork and tanks where applicable.

III. RIGID LIFE RABTS.

All interior and exterior structure should be examined for deterioration and the air tanks should be checked for tightness. All required equipment should be checked for condition, quantity and expiration dates where applicable. The stowage should be examined and the releasing gear tested, when fitted.

The inspector should check to determine whether the rafts have been stripped, cleaned and thoroughly overhauled within the past twelve months period. Although there are no painting requirements, it is suggested that the decks of the rafts be painted international orange or an equivalent highly visible color.

IV. INFLATABIE LIFE RAPTS.

These rafts should be inspected at approved servicing facilities only, once each year. In checking the rafts at the servicing facilities, the inspector should observe that the proper packing procedure is followed in detail to avoid possible inflation failure. Available publications on inspection procedures at the approved facilities are:

- (a) Specification Subpart 160.051, Paragraph 6(e).
- (b) Navigation and Vessel Inspection Circular No.12-61.
- (c) Individual manufacturer's approved servicing manual.

During shipboard inspections, the inspector should observe that the cradle stowage i.s in good condition; that the moving parts are properly lubricated and that the seal on the container has not been broken. He also should determine the date of the last servicing by examining the date on the servicing certificate.

V. LIFE FLOATS AND BUOYANT APPARATUS

When inspecting life floats and buoyant apparatus, the inspector should amine all exterior surfaces for condition of covering, straps, life line, platform and seine floats, where applicable. Tapping the wood body of the float or buoyant apparatus lightly with a hammer will occasionally reveal decayed areas.

Nested life floats or buoyant apparatus should be removed from stowage and separately inspected for condition. Life floats and buoyant apparatus should be stowed on battens or with wooden spacers between them for air circulation and rapid drying. The inspector also should see that all life floats and buoyant apparatus have been cleaned and thoroughly overhauled during the past twelve months. When the inspector deems it necessary, the covers should be removed for further examination of buoyant material. If doubt exists as to the buoyancy, a test should be conducted using a weight criteria of 32 pounds per person for a peripheral body type buoyant apparatus, or

40 pounds per person for a box-float type buoyant apparatus or life float. All required equipment and air tanks should be examined for condition.

VI. DAVITS, WINCHES AND APPURTENANCES

During the inspection, the inspector should examine the following items on all davits and winches:

- (a) Structural and operating members for distortion, cracks or corrosion.
- (b) Welds for cracks or corrosion.
- (c) Bolts for looseness or corrosion.
- (d) Sheaves for excessive wear, and freedom on their pins.
- (e) Bearing and bushings not operating properly.
- (f) Brake and clutch linings and corresponding metallic friction surfaces.
- (g) All operating parts for excessive wear.
- (h) Wire rope for condition.
- (i) Control mechanism.
- (j) Lubrication.
- (k) Limit switches for good contact and freedom from moisture.
- (l) Insulation of dissimilar metals.

When inspecting mechanical davits, the inspector should observe that the trunnion pin, where fitted, and the grease fittings are free from rust, paint or foreign matter. The welds should be hammer tested if deemed necessary.

Condensation on the inside of the hollow sections of the arms on gravity davits may cause deterioration in the metal. Suspected areas should be hammer tested. Also, the condition of the safety screen on the underside of the davit trackways should be examined. The inspector should insure that the stopper or locking bar on the trackway does not interfere with the raising of the davit arms, and that the davit arm rollers are free and not frozen.

On winches using external brakes for lowering, the brake band assembly pins should be carefully examined. If necessary, the entire assembly should be removed to determine the condition of the brake band, lining and drums. Worn linings should be renewed. Heavy rust and pitting on the drums should be removed by refinishing the surface.

On winches having internal brakes for lowering, the brake assembly should, in all instances, be opened for examination.

On winches utilizing centrifugal brakes, the assembly should be opened for examination of shoe linings or rough surfaces on the drums. Brake shoes should clear the drum when the winch is stopped and the springs should permit the shoes to contact the drum upon application of hand pressure.

Where there are winches, care should be taken to determine that the quill shaft grease seals have not failed. In cases where the seals have failed, the internal conical brake shoes should be replaced.

When the appurtenances are inspected, lifeboat falls, blocks, sheaves, etc. should be examined for condition and operation. The inspector should ask the mate when the falls were last renewed, ended, or otherwise modified. This information should aid in his overall evaluation. One critical area on gravity davit lifeboat falls is that between the bitter or dead end and the floating block. In this area, special attention should be given to the section which passes over the standing blocks on the davit heads. Rust has a tendency to accumulate in this area due to the fact that the falls in this area do not move and are not self-lubricated. In addition, parts of the wire falls which are hidden behind blind sheaves may sometimes be neglected because they are not easily reached for lubrication. Also, in some instances, the wire falls, where they enter the floating blocks, may chafe on the upper tie pin of the blocks when the blocks are in the housed position.

Lifeboat falls should be renewed if.

- (a) A number of wire threads are broken.
- (b) A section appears attenuated or deformed.
- (c) Improper size, type or length.
- (d) Fishhooked.

The inspector should observe that all sheaves are in good condition and free to move, and that the area on the davit arm behind the sheaves is free from corrosion and not holed. He should also check the condition of turnbuckles, sockets, shackles, etc., where applicable.

All limit switches, controllers and emergency disconnect switches should be opened for examination and testing. The limit switch should be checked for correct cut-out position, when lifeboat is hoisted and two-blocked. Also, the condition of contacts and roller alignment should be noted. Arms on limit switches should be inspected to insure that they are not frozen and that they are properly keyed to the shaft. Plugs should be removed from motors to drain any accumulated condensation.

As the boat is raised, each limit switch should be tested by hand operation of the limit switch arm and also by automatically allowing the davit arm to actuate the switch. In both cases, the switch should operate properly. The main line disconnect is tested by opening while raising the boat.

GUIDE FOR INSPECTION & REPAIR OF LIFESAVING EQUIPMENT

SECTION 4 - REPAIRS OF LIFEBOATS, LIFE RAFTS, LIFE FLOATS AND BUOYANT APPARATUS, DAVITS, WINCHES MID APPURTENANCES

I. LIFEBOATS

A. General

The following general procedures should be followed as much as possible to qualify a damaged or deteriorated metal lifeboat as an acceptable repaired or overhauled lifeboat:

1. The lifeboat should be stripped of all removable parts and equipment way of the proposed repairs and generally free of rust for examination prior to writing requirements.
2. All steel lifeboats, with the exception of welded types, are required by regulation to be made of galvanized material. If the galvanizing is completely gone in any area, corrosion and wasting of the Steel generally will be rapid. Hence, special attention should be given to locating any of these deteriorated areas that may exist and correcting the condition accordingly.
3. All former temporary or unsatisfactory repairs should be removed and satisfactory permanent repairs made.
4. All deteriorated parts or equipment required to be in the lifeboat should be satisfactorily repaired or replaced.
5. Although not required by regulations, lifeboats should be painted to prevent corrosion.
6. A lifeboat should undergo a weight suspension test after extensive repairs involving strength members have been made.

B. Steel Types

1. Normally the use of patches for lifeboat repairs should be discouraged; however, there are a few exceptions when they may be permitted. These are mechanical damage such as punctures, and localized deteriorated areas in way of name plates and drain plugs, etc. In these cases a 6" to 8 1/2" circular or square patch with rounded corners may be used as a permanent repair. Riveting and lapping of the patch should be as for hull plate seams.
2. Areas of deteriorated or damaged plating may be repaired by cropping the plate to good metal the full width of the strake. The minimum length of cropped area should be approximately 30" provided the lengths to the next butt of the adjacent plating on either side of the repair are at least 30". Otherwise, the new plate should extend to this next butt. Where cropped plates are used, butt seams should be staggered approximately 12" from those in adjacent strakes.

3. In wood gunwale boats, deteriorated plating is found sometimes in the sheer strake along the boundaries where the wood and metal plating are joined. In this case, the deteriorated plate may be cropped to a width of approximately 10", provided there is good metal at this level, the full length of the plate. This eliminates the needless disassembly of the thwarts, side benches, etc.
4. Large areas of deteriorated or damaged plating should be repaired by renewing the plate.
5. Cropped or replacement plates should be riveted as per original construction. Huck Commercial Lockbolts may be used in lieu of rivets provided the following conditions are satisfied:
 - (a) The type of head should be approximately the same as the rivet heads used for the original rivets.
 - (b) The bolt diameter should be not less than that required for original rivets.
 - (c) The bolts and collars should be cadmium plated.
 - (d) Due to the close fit of the air tanks to the hull on some boats, care should be taken to insure that the huck bolt ferrule doesn't rub against the air tanks.
6. All riveted seam and butt laps, laps of plating on keel, gunwale, stem, and stern post, should be made over felt laid in wet red lead, P.A.W. tape or other acceptable alternate method. In general the tape or felt, etc., should be 1 1/4" to 1 1/2" in width.
7. where welding is used to repair damaged keels or gunwales, all approved type electrodes listed in CG-190, Equipment Lists, may be used except Types E-6012, E-6013, E-6014, and E-6024. All welding should be accomplished by qualified welders. Galvanizing or other equivalent corrosion protection should be applied after welding.
8. In the case of welded type lifeboats, the following repair procedures should be followed:
 - (a) Crop the wasted area to good metal.
 - (b) Thoroughly clean all areas to be welded.
 - (c) Use rounded type insert welded from the outside of the shell. qualified welders familiar with the techniques of welding thin gauge materials should be used.
 - (d) All slag from the inside surface of the weld should be removed.
 - (e) Galvanizing or other equivalent corrosion protection should be applied after all surfaces are clean.

- (f) A hose test to determine watertightness of repair should be performed.

C. Aluminum Boats

1. Paragraphs B(1), (2), (3), (4) are applicable to this type boat.
2. Replacement plates should be of the same alloy as the remaining shell plating (usually 6061-T6) and should be joined to the remaining or cropped plating with 6053-T61 aluminum alloy rivets. Aluminum Huck Commercial Lockbolts, or equivalent, may be used in lieu of rivets provided the following conditions are satisfied:
 - (a) The type of head should be approximately the same as used in the original construction.
 - (b) The bolt diameter should not be less than that of the rivets used in the original construction.
 - (c) The bolt material should be 6061-T6 aluminum alloy.
3. All riveted seam and butt laps, laps of plating on keel, gunwale, stem and stern post should be made over boundary bar tape such as: P.A.W. tape, Trantex V-20 vinyl tape, EC-1202 butyl rubber tape, or equivalent insulating non-absorbent material. In general, the insulating tape should be 1 ¼ " to 1 ½ " in width and the faying joint should be caulked with D362-Type I by Par Paint and Color Co., 95-01 Foster Caulking Compound by Benjamin Foster Corp., USNGN by G. W. Kaull Co., EC-1126 Bead Sealer by Minnesota Mining and manufacturing Co., DAP Twin-T mastic tape by Dicks, Armstrong-Pontius Co., 5021-Grey Mortite by J. W. Mortel Co., 575.1 by Press Tite Div. of American Marietta Co., Elastic Seam Compound Type II by H. B. Fred Kuls Co., or equivalent caulking compounds to prevent the entrance of moisture. Under no circumstances should red lead be applied nor should an absorbent felt be used as a tape in the riveted joint whether or not saturated with red lead.
4. In repairing gripe or chock doublers, stainless steel should not be used. Instead, the following general procedures should be followed in order to minimize corrosion:
 - (a) All aluminum lifeboats should have aluminum doubler plates installed in way of the gripes, davit and deck chocks, and cradles. The doublers should be located port and starboard at each end of the lifeboat, and should be the same alloy (usually 6061-T6) and thickness as the bottom plating. The area of the doublers should be such that, notwithstanding slight shifts of the boat in the stowed position, the doubler plates will always provide a complete bearing surface. A width of six inches should be sufficient for the gripe doublers.

- (b) The doublers should be fastened to the shell plating with ~6053-T61 aluminum rivets spaced at 18 rivets per foot around all edges of the doubler plating.
 - (c) Prior to riveting, the complete surface between the shell plating and the doubler should be treated with proper insulating compounds. After riveting, the faying joint may need to be caulked depending on the insulating material used. In any case, caulking of this joint is desirable to prevent entrance of moisture. There are now a number of insulating and caulking compounds such as those listed in paragraph 3 above which are excellent for insulating and sealing. Some of the various insulating tapes for aluminum applications such as indicated in paragraph 3 above are also satisfactory if all joints are positively and continually sealed. The difficulties with tapes occur when the joints are not properly sealed and the tapes act as wicks for the seepage of salt water.
 - (d) Coverings for girdes, chocks and cradles. It is important to completely insulate the aluminum from girdes, chocks and cradles through use of a material which will act as chafing gear and which will not hold salt water. Materials such as canvas, sponge rubber and leather are unsatisfactory. Such materials as neoprene, solid rubber sleeves or sheets, unicellular products, etc. would be far more satisfactory.
 - (e) There is another potential source of trouble in the contact of the wood blocks of the skates which are fitted to aluminum lifeboats. Skate designs should show the wood blocks faced with not less than $\frac{1}{4}$ " micarta or its equivalent.
5. Where welding is used to repair damaged keels and gunwales, only an inert gas arc welding method should be used. The following AWS-ABTM Classification electrodes should be used with their corresponding type aluminum alloys:

<u>Alloy</u>	<u>Electrode</u>
6061-T6	ER 4043 or ER 5356
5086-H112	ER 5356

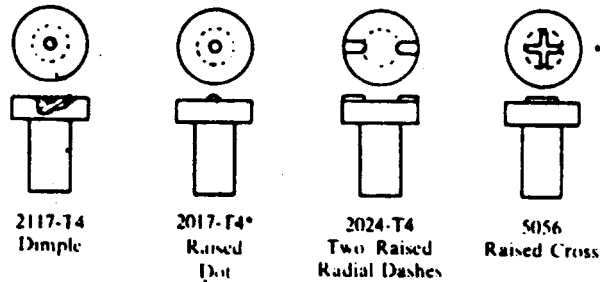
6. The following identification markings are used on aluminum alloy rivets except that rivets over $\frac{3}{4}$ inch in diameter and all sizes of high button head rivets are identified on the end of the shank with either the full alloy number or the Standard Shank Marking shown below, for polystyrene cores, the buoyancy unit should be considered satisfactory.

D. Steel & Aluminum Types, Common repairs

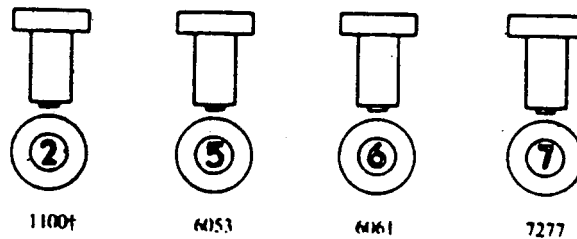
1. Faulty seams in metal air tanks can be repaired usually by resoldering provided that the reconditioned tank will withstand a 1 lb. test without failure. Patching of any face of an air tank is not practicable, and therefore, if repairing is desired by the owner, the entire defective face would require renewal.

Rivet Identification Markings

Head Markings



Shank Markings Raised Numbers on Shank Ends



* Not a standard rivet alloy.
† 1100 not marked unless so specified.

2. Approved plastic buoyancy units may be substituted for metal air tanks provided that they are of the same cubic capacity and shape. Where buoyancy units have been found to be over-weight, the following repair procedures should be followed:
 - (a) The outer wrapping of the unit should be opened to permit drainage of any water in the buoyancy unit, prior to weighing for test.
 - (b) After the loose water has been removed, the buoyancy unit should be reweighed. If the new weight is equal to or less than the sum of the original weight stamped on the name plate and an allowance is made of 0.15 pounds per square foot of area of the outer surface for polyurethane core material, or 0.12 pounds per square foot
 - (c) The drainage opening in the outer wrapping and any other cover defect using fiber glass and resin should be repaired to insure watertightness.
 - (d) For buoyancy units equipped with a cover, drainage of water is accomplished by prying off the cover. The weighing procedure and allowances are the same as in paragraph (b) above. when the cover is renewed and bonded in place, the seam should be covered with fiber glass tape impregnated with catalyzed resin to insure a watertight container.
3. Certain foam-in-place materials such as rigid polyurethane have been authorized for use in built-in side tanks as a repair method for such lifeboats as well as other

type lifeboats at the discretion of the cognizant OCMI. Since the component materials of the foam are highly reactive, certain toxic gases and dust will be emitted. Breathing of these toxic gases could be detrimental to good health resulting in incapacitation or hospitalization for several days. Therefore, personnel present during foaming operations should wear air masks even though ventilation may be considered adequate. Also protective clothing such as goggles, rubber gloves and coveralls should be worn to protect from splattering.

(a) Prerequisites to production foaming of lifeboats:

- (1) The contractor performing the lifeboat tank foaming operations should obtain from the manufacturer of the foam an affidavit certifying that each lot of foam furnished meets the applicable requirements of MIL-P-21929 and that the tests of the foam were witnessed by a Government inspector. In lieu of the above, an affidavit from a recognized independent testing laboratory certifying that each lot of foam has been tested by them and meets the applicable requirements may be accepted.
 - (2) After the above required affidavit has been obtained, the contractor should, before commencing the lifeboat tank foaming operations, prove in the presence of a Coast Guard inspector that by following the manufacturer's directions he can produce an acceptable foam which has the required density and does not exceed the allowable water absorption rate.
 - (3) Once each day before resuming the foaming of life boat air tanks and, in addition, before using a new lot of foam, the contractor should prove, in the presence of a Coast Guard inspector, that he can continue to produce acceptable foam by making a sample pour in any suitable container.
4. In repairing side benches & thwarts, the inspector should insure that sufficient clearance is left between the shell and the wood to preclude a moisture build-up which could ultimately cause the shell to waste through in this area.
5. Motor lifeboats
 - (a) The engine should be overhauled when it is inoperative or when operating conditions indicate overheating, mechanical trouble or any other condition which would affect the operating status of the boat.
 - (b) The propeller shaft should be removed for examination and the condition of the bearings observed. If excessive wear or clearance is noted, repairs or replacements should be made as necessary.
6. All other parts of lifeboats not mentioned above which are damaged due to corrosion or otherwise should be renewed as original in so far as reasonable and practicable.

7. A hose test should be performed on all butts and seams to test for watertightness of the shell after plate renewal or repair.

E. Fiberglass Reinforced Plastic (FHP) Lifeboats

1. As is common with all relatively new materials, it will take time and experience to compile dependable data on the inspection and repair techniques for fiberglass reinforced plastics as currently used for lifeboats. This is due to the fact that the composite laminate is created in place by combining several basic materials by hand or machine under a wide variety of environmental conditions. As a guide for the inspection and repair of plastic lifeboats, the following publications are recommended:
 - (a) Military Specification XrL-R-19907C - Repair Kit, Glass Reinforced Plastic Laminate - Appendix Section
 - (b) U. S. Navy Training Film - MN 859~ Reinforced Plastics- Inspection and Quality Control
2. In general, the following rules may be used in the repair of FRP lifeboats:
 - (a) General. Where defects such as cracks, holes, fractures, or delaminations are found, it should be first deter-mined whether the part should be repaired or replaced. This decision is left entirely to the inspector's judgment and depends on many factors, such as extent of damage, accessibility of damaged area, and structural application of the part. In general, repairs can be accomplished in way of damaged areas of considerable size if epoxy resin is used and correct repair procedures are employed.
 - (b) Single skin. Where damaged areas do not extend through the entire laminate, the part should be sanded down to the undamaged surface, scarfed back two to four inches from the defective area. Sufficient plies of number 1000 cloth should then be cut in graduated sizes to form the patch. Starting with the smallest piece, the patch is built up, impregnating one ply at a time.. Where the patch is built up slightly above the surrounding surface, a layer of PVA or cellophane is rolled out over the lay-up. After cure, the patch is sanded fair and smooth. Deep scratches and grooves, which do not extend into the glass area, can be repaired with resin. where damage extends through the laminate, the entire defective area should be removed. Small holes in a damaged panel may be made with a hole saw and larger holes by a saw, hacksaw or sabersaw. In preparing the hole to be patched, rounded corners are preferable to sharp corners. Edges surrounding the damaged areas should be scarfed for about 2 to 4 inches from the opening. Both sides should be beveled, if accessible.
A flexible disc sander using a coarse or medium grit cloth say be used for beveling. The patch area must be clean and dry before lay-up. The patch, composed of plies of Number 1000 cloth in graduated sizes, is impregnated on a piece of parting film. If both sides are beveled, two

plates are impregnated. Backing plates are made for each side of the patch. These may be of plywood or sheet metal formed to fit the contour of the area to be patched. After the patch is cured, it is sanded fair and smooth. If the damage is through a laminate which is accessible from only one side, the damage is cut out and the edge scarfed in the conventional manner. One ply of impregnated cloth is then laid up across the hole and allowed to cure. The patch is then laid up in the resulting depression

- (c) For FRP lifeboats constructed with outer and inner hulls, inter-space foams quite often are used in lieu of installing regular air tanks or buoyancy units. Where replacement of foam is required as a result of hull repairs, foam-in-place polyurethane or other applicable rigid unicellular plastic foam may be used. If foam-in-place materials are used, the safety precautions of paragraph D.3. above should be followed.
- (d) Damaged steel connecting structure or supports should be repaired or replaced.
- (e) Fasteners should be replaced or retightened as necessary.
- (f) Unpainted laminate should be coated with clear resin when surface erosion causes the pattern of the glass reinforcement to become prominent.
- (g) Painted laminates should be repainted only when the paint peels, blisters or becomes chipped.
- (h) Where welding is used to repair damaged steel keels or gunwales, all approved type electrodes listed in CG-190, Equipment Lists, may be used except Types E-6013, E-6014 and E-6024. For welding repairs to aluminum keels and gunwales, refer to paragraph C(5) above for correct type electrodes. All welding should be accomplished by Coast Guard approved welders.

II. LIFE RAFTS

A. Rigid Types

- 1. Repairs or replacement of parts should be to original construction standards. All materials used and procedures followed should be appropriate for the repair to be performed. Should technical problems occur regarding the repair of these rafts, Commandant (MMT-3) should be consulted for procedures to follow.

B. Inflatable Types

- 1. Except for external examination of the container and stowage of the equipment, this type of raft should be inspected and tested only at one of the inflatable life raft manufacturer's approved servicing facilities. The inspector assigned to witness servicing of inflatable life rafts at a servicing facility should use the manufacturer's Coast Guard approved servicing manual to evaluate the repairs, conduct tests, and approve the servicing and repacking of the rafts. Each

manufacturer's servicing manual contains a listing of the minor repairs that can be accomplished at a servicing facility. Also contained in this manual is a listing of the major repairs which require the return of a raft to the manufacturer. Cognizant OCMI's should be provided with an office copy of the manufacturer's service manual to facilitate the inspection of inflatable life rafts.

III. LIFE FLOATS AND BUOYANT APPARATUS

A. Emergency or Minor Repairs

1. Emergency or minor repairs to life floats and buoyant apparatus may be permitted subject only to acceptance by the Coast Guard inspector at the next inspection.

B. General Repairs, Reconditioning or Rebuilding

1. No life floats or buoyant apparatus may be repaired extensively or rebuilt for use on inspected vessels which does not have the original builder's name plate affixed. This plate must contain the initials of the marine inspector who passed the equipment at the builder's plant. Before any general repair, reconditioning or rebuilding work is undertaken on any life float or buoyant apparatus, it should first be examined by a marine inspector who will determine what work must be done to satisfactorily repair the equipment. If considered necessary the marine inspector or OCMI may require the canvas wrapping to be completely removed for examination of the buoyant material. Periodic inspections should be made as the renovation of the equipment progresses, and a final inspection made when the work is completed. Any life float or buoyant apparatus requiring complete or partial recovering, or which requires renewal of the wood platform, should have an additional flame plate affixed, which bears the following data:

REBUILT BY

(Name and Address of Company)

Date _____ Capacity _____ persons.

Inspected by _____ USCG
(Inspector's Initials)

2. The reconditioning or rebuilding of life floats and buoyant apparatus should be accomplished by the original builder. However, where this is not practical, the reconditioning may be done by someone other than the builder, provided the OCMI is satisfied with the materials and the workmanship of the repair facility.
3. Life floats or buoyant apparatus requiring only painting, renewal of netting, lines, seine floats, etc. will not be fitted with this additional name plate. All materials used and procedures followed should be in accordance with the original construction in each case in so far as is reasonable and practicable. When large numbers of life floats or buoyant apparatus are reconditioned, at least one in each lot of 25 should be subjected to a drop test and buoyancy test as described in the applicable specification. Where small lots are reconditioned, one should be so

tested. If in the judgment of the marine inspector the condition of the renovated equipment is such as to war-rant the belief that a drop test and buoyancy test are not necessary, such tests may be dispensed with. However, if there is any reason to doubt whether any life float or buoyant apparatus is suitable for the purpose³ the marine inspector should require such tests as he may deem necessary regardless of the number of floats or buoyant apparatus involved.

4. Where balsa life floats appear heavy due to excessive amounts of paint or water absorption, they should be weighed. If the weigh determined exceeds 110-120% of the original weight, a buoyancy and drop test should be made in order to evaluate the serviceability of the life float.

C. Reconditioning with Fibrous Glass Covering

1. In addition to the above, the following general procedures may be used for the reconditioning and fibrous glass covering of life floats and buoyant apparatus:
 1. Completely strip old floats of all rigging, straps, and canvas wrappings. Remove all paint, chisel out rotted areas and sand the balsa core.
 2. After the canvas wrappings have been removed and prior to any recovering, a Coast Guard Inspector should examine the life float body and rigging for condition. In addition, he should determine the amount of buoyant material, if any, to be replaced in accordance with paragraph 3 below.
 3. Fill minor indentations with plastic wood composition compatible with the polyester resin system to be used for external covering. Larger void areas, totaling not more than 10% of the volume of the original balsa core, should be fitted with glued in place cellular cellulose acetate or other approved unicellular buoyancy material compatible with the resin system.
 4. Apply one sealer or undercoat of resin of approved formulation with additives to assure a watertight coating and good adherence to the core. Apply clear or pigmented resin and glass fiber coating not less than 1/8 inch thick. Glass may be in cloth, woven roving, matting or shredded strand form and shall comprise 30% to 45% by weight of the shell. Surface coat should be clear or pigmented depending on the owner's choice. Resin should be fire retardant grade.
 5. Platform slats should be replaced as needed. Upon completion of repairs, the platform should be finished with two coats of water-resisting spar varnish or protective paint.
 6. Floats and buoyant apparatus should be rigged with float ropes, nets and straps of polypropylene or other approved synthetic fiber.
 7. After fiberglass recovering, tests for strength and buoyancy should be conducted on at least one piece of equipment out of each lot of 25 or less.

8. Upon successful completion of repairs and tests as required, an additional non-corrosive "rebuilt" name plate should be attached to each life float or buoyant apparatus.

IV. DAVITS AND WINCHES

1. Due to the strength considerations involved, the repair or replacement of parts for davits and winches should be as original construction. All materials used and procedures followed should be in accordance with approved plans. Normally, marine inspection offices are not equipped with copies of the original approved plans; therefore, where technical problems occur or plan approval regarding repairs to davits or winches is desired, Commandant (MMT-3) should be consulted.

GUIDE FOR INSPECTION & REPAIR OF LIFESAVING EQUIPMENT

SECTION 5 - INSPECTION AND REPAIR OF OTHER LIFESAVING EQUIPMENT

I. LIFE PRESERVERS

A. Stowage of Life Preservers

1. Life preservers should be thoroughly dry when stowed and should be provided with adequate ventilation.
2. They should be kept clear of the bottoms of lockers or deck storage boxes where moisture might accumulate.
3. They should be stowed away from excessive heat.

B. Inspection of Life Preservers

1. Life preservers are most often of the kapok type, although fibrous glass, cork, balsa wood, and unicellular plastic foam may be encountered. In general, the longer a life preserver has been in service, the more time-consuming is its examination.
2. Despite the mildew inhibitor treatment required for the cloth, webbing, tapes and thread of life preservers, certain areas of the envelope eventually will rot. This may take place over a long period of time or fairly rapidly under unfavorable conditions. More often than not, the most seriously affected surfaces of the envelope will appear stained, faded, or otherwise discolored. Where these areas appear, they should be finger tip-tested by twisting with the tips of the fingers.
3. If a strap is missing completely, it may not be detected unless the inspector develops a habit of examining with this possibility in mind. The first strap to be missing would usually be the neck strap. It is most convenient, therefore, for an inspector to pick up the life preserver by its neck strap while inverting it to examine the reverse side.
4. Kapok and fibrous glass life preservers will rather frequently become waterlogged and unserviceable. This is particularly true of old life preservers which have been exposed to oil vapors or new life preservers where the plastic (kapok or fibrous glass) film pad covers have been punctured and remain wet and difficult to dry. Such life preservers should be rejected or subjected to a buoyancy test.
5. Other common noted defective conditions are:
 - (a) Straps missing or partially ripped from the jacket.
 - (b) Broken cork inserts which distort the life preserver.
 - (c) Missing laces from fibrous glass life preservers.
 - (d) Missing hardware.

- (e) Absence of proper marking showing the name of the vessel.
- (f) Envelope is torn, gnawed or otherwise seriously perforated.

C. Additional Inspections of Balsa and Cork Life Preservers

1. The areas of the envelope in way of the edges of the buoyant material are exceptionally susceptible to the most wear or chafing and will usually be the first surfaces to fail the twist test as described above.
2. If there is some question concerning the size of the cork or balsa insert blocks, they should be checked for length, breadth, and thickness. In this connection a simple fork-shaped gauge can be made which will assist the inspector in checking the dimensions of the cork and balsa blocks.
3. All cork or balsa blocks should be checked for condition. Those life preservers that contain crumbled, granulated or a large number of broken pieces of cork or balsa should be replaced.

D. Buoyancy Test

1. A buoyancy test to determine a minimum of 16 ½ pounds buoyancy should be conducted when there is doubt as to the buoyancy of any life preserver on board. The period of submersion should be at least 12 hours, but need not be longer than 24 hours. A test weight consisting of about 19 pounds of steel will provide approximately 16 ½ pounds weight when submerged in water. This weight can be hung from an arm hole or strap with a retrieving line attached. This buoyancy test may be conducted on any life preserver, and is especially applicable to any which has punctured inner pads, or has been crushed, is suspected of being waterlogged, or any life preservers which the marine inspector may have cause to doubt.

E. Repairs

1. Minor or emergency repairs to otherwise sound life preserver covers may be made to life preservers which are otherwise in satisfactory condition. Such repairs do not require the prior approval of the OCMI but must be acceptable to either the Coast Guard marine inspector or the boarding officer. Satisfactorily repaired small holes and tears in the cover fabric ordinarily should be acceptable. However, tears which would adversely affect strength, such as in way of a tie tape, could render a life preserver unserviceable. Tapes or straps should not be repaired, but may be renewed.
2. The reconditioning and cleaning of life preservers (usually accomplished only in large quantity lots) should not be attempted except by those duly qualified and approved by the U. S. Coast Guard.

II. BUOYANT VESTS, BUOYANT CUSHIONS AND WORK VESTS

A. General

1. The guide for the inspection, repair and testing of life preservers (Section 5-I) is in general applicable for the inspection, repair and testing of buoyant vests, buoyant cushions and work vests.
2. The following exceptions or comments are considered to be worthy of note.

B. Buoyant Vests and Buoyant Cushions

1. Buoyant cushions and/or buoyant vests are acceptable only on motorboats of classes A, 1 or 2 not carrying passengers for hire.
2. Buoyant cushions and/or buoyant vests are not acceptable as approved lifesaving equipment unless they are in "Good and serviceable condition."
3. The dual service of the buoyant cushions as a seat cushion and lifesaving device causes them to become unserviceable rather rapidly in many instances due to the packing of the kapok and/or puncture of the inner plastic pad covers.
4. The weight required to test buoyant cushions for adequate buoyancy is about 22 ½ pounds of steel to provide approximately 20 pounds of submerged weight.
5. Buoyant vests should be tested with about 18 pounds of steel or iron to provide approximately 15 ½ pounds of weight submerged.

C. Work Vests

1. All work vests are constructed of unicellular plastic foam inserts in a cloth covering or of vinyl dipped plastic foam. In the cloth type vests, the inserts are removable so that the cover may be laundered. Inspectors should insure that the inserts are in good condition. Where inserts are missing or the fabric cover damaged, replacement items may be procured from the manufacturer provided the refitted vest is satisfactory to the inspector.
2. Buoyancy tests on work vests should be the same as for life preservers, namely about 19 pounds of steel or iron to provide approximately 16 ½ pounds weight under water.

D. Identification or Making labels

Buoyant vests and buoyant cushions are identified by a Coast Guard approval number and the manufacturer's model number which are contained on a label attached to the cushion or vest. Despite the fact that permanent type labels are required, the permanency of cushion labels has long left a great deal to be desired. Research is being conducted looking toward more permanent labels. Many complaints have been received because otherwise acceptable cushions have been rejected for unreadable labels. The ends of safety are not served by rejecting acceptable equipment due to faulty labeling. The Coast Guard inspectors and the boarding officers should use considerable discretion in dealing with this problem. If the boarding officer or the inspector is convinced that the cushion or vest was approved and is actually in good and serviceable condition except for an unreadable label, he may accept the equipment as complying with the intent of the regulations until further notice on this

subject is received. However, care should be exercised by the inspectors and boarding officers in order that equipment which has never been approved will not be given an unintentional avenue of acceptance.

III. RING LIFE BUOYS

A. Inspection

Ring life buoys may be of cork, balsa wood, unicellular plastic foam, or fibrous glass type. In canvas-covered balsa or cork ring life buoys, the inspector should look for tears, holes, gouges, or rot in the canvas covering, especially at parts which have been in contact with the metal brackets. The stitching, the canvas straps holding the line in place, and the line itself must be in good condition. Any part of the ring buoy that feels damp during the inspection probably will have its canvas rotted at that point. Also, inspectors should check for intact buoy body. If in doubt, a test may be made with 50 pound pull in three positions by inserting a foot inside the ring and pulling. The lifeline around each ring buoy, as well as its canvas strap, may be tested by yanking as the ring buoy is suddenly dropped. Defective parts of plastic foam or fibrous glass covered ring buoys also should be detected by the inspector. However, other than gouges or checks in the plastic foam, cracking of the fibrous glass coverings or casings and eventual deterioration of canvas straps or Manila line (on older models only), few defects develop.

B. Repairs

1. Emergency or minor repairs to cork or balsa wood ring buoys may be permitted subject only to acceptance by the Coast Guard marine inspector at the next inspection.
2. General repairs and the recovering of ring buoys may be accomplished in accordance with the following guide provided prior approval of the cognizant OCM' is obtained. The following guides are suggested conditions:
 - (a) Only buoy bodies which are in good and serviceable condition as determined by examination and strength tests of each uncovered body should be re-covered.
 - (b) Re-covering should be in a manner and with materials at least equivalent to those prescribed for new construction, except that fabric Indian Orange or Munsell Color 7.5 Red 6/10 will be acceptable.
 - (c) A marine inspector should examine all re-covered buoys, both before and after re-covering. Prior to re-covering, the bodies of all reconditioned cork life rings should be given a suspension (strength) test. All re-covered buoys which are satisfactory should be marked in waterproof ink by the inspector with his initials in the space provided,
 - (d) All re-covered buoys should be legibly marked in waterproof ink with the following wording:

“Re-covered by _____

(Name and Address of Company)

Date _____ (Inspector's Initials) _____”

GUIDE FOR INSPECTION & REPAIR OF LIFESAVING E~IPNENT

SECTION 6 - INSPECTION AND REPAIR OF APPROVED SUPPLEFENTAL LIFESAVING EQUIPMENT

I. WATER LIGHTS

1. Water lights are required to be attached to the ring buoys with a line of sufficient length.
2. The carbide type may be examined by smelling for the presence of a carbide odor, by looking over the surface carefully for signs of parting at any of the soldered seams, especially in way of the pull ring, and by shaking. Sogginess indicates unsatisfactory carbide, while a dry rattle indicates carbide in good condition. Water lights with any of the above defects should be surveyed and replaced by new lights in good condition. If defects are suspected, care should be taken to see that the light is not shaken, as under certain conditions, this may cause generation of gas and possibly an explosion. Therefore, no repairs should ever be attempted for carbide waterlights.
3. Electric type waterlights may be examined by inverting them to see that they light, and checking for signs of corrosion or lack of watertightness. The bezel ring (swivel collar for the lens) should be checked to see that the threads are covered with water-resistant lubricating graphite grease. Repair or replacement of parts should be as original construction and should be satisfactory to the cognizant OCMI.

II. EMBARKATION-DEBARKATION LADDERS

1. Particular attention should be given to the deck padeyes and shackles or lashing attaching the ladder to the deck. Then a good practical test for this entire equipment is for the mate to drop the ladder over the side of the ship as would be done in the case of an emergency. Defects in the ladder will normally show up as a result of this type of test.
2. Regardless of whether or not the above test is accomplished, the ladder(s) should be unrolled so the chain, rivets and steps may be inspected. Replacement or repair parts should be as original construction and subject to the satisfaction of the cognizant OCMI.

III. DISTRESS SIGNALS

A. General

1. The following types of distress signals are included in this group: Hand Red Flare, Floating Orange Smoke, Hand Combination Flare and Smoke, Pistol-Projected Parachute Red Flare, Hand-Held Rocket-Propelled Parachute Red Flare, and Hand Orange Smoke. It should be ascertained that all pyrotechnic distress signals are dry, stowed in a watertight container, and the dates of manufacture not more than 3 years prior to date of inspection; otherwise, they should be replaced with new signals.
2. A limited number of outdated pyrotechnics may be allowed to be retained on board, stowed in the portable magazine chest, provided their container is legibly

marked "OUTDATED" - "FOR DRILLS." Many ships use such items to instruct the crew.

B. Signal Pistols for Parachute Red Flare Distress Signals

1. Pistols should be examined to make sure that they are cleaned, oiled, and ready for use.
2. The flare cartridges should be checked to make sure that they will fit into the pistol. There have been occasions where the cartridges have been too large to fit.
3. The operation of the firing pin should be checked. This may be accomplished by opening the breech, cocking the pistol, placing a piece of soft material in way of the firing pin, and then pulling the trigger. The material may then be examined for perforation by the firing pin.

IV. FIRST AID KITS

1. First aid kits should be checked for completeness of contents against the list inside the lid, and that the contents are dry and in good usable condition. A new case should be obtained if excessive rust is noted around the hinges or identification is obliterated on metal cases. Plastic cases should be checked for rips, holes or other malfunctions which would affect the watertightness requirement.

V. EMERGENCY DRINKING WATER

1. Cans of water should be carefully examined for corrosion, retention of vacuum (slap test), date of manufacture, and general condition. All cans which are excessively dented, badly rusted, or which are more than 5 years old from the date on the top of each can should be rejected.

VI. PROVISIONS AND CONDENSED MILK

1. Cans containing provisions or condensed milk should be rejected if they are rusty or bulged. If in doubt that the contents are good, one or more representative samples of each should be opened for inspection. In any event, cans which will not last until the next scheduled vessel inspection should be replaced.

GUIDE FOR INSPECTION & REPAIR OF LIFESAVING EQUIPMENT

SECTION 7 - INSPECTION AND REPAIR OF MISCELLANEOUS APPROVED EQUIPMENT

I. GAS MASKS, SELF-CONTAINED BREATHING APPARATUS, AND SUPPLIED-AIR RESPIRATORS

- A. All repairs of gas masks, self-contained breathing apparatus, and supplied-air respirators should be done by the manufacturer or his authorized service facility. Replacement of certain parts, such as a face-piece or length of hose, may be done by the ship's personnel. A spare canister or cylinder of compressed air or oxygen is required for each gas mask or breathing apparatus. For oxygen re-breathing apparatus, one-hour type, a spare unit of the cardioxide used to remove the CO₂ from the exhaled breath, also should be carried.
- B. The examination of gas masks, self-contained breathing apparatus, and hose masks should be carefully made as follows:
 1. Canisters should be shaken to determine loose or rattling contents. Normally, canisters do not make any sounds when shaken if they are in good condition.
 2. The hose should be examined for condition and loose connections. The hose may develop holes, splits and tears due to accidents, usage or incorrect stowage. The latter also may cause kinks or undue stretching in the hoses or a permanent set in the rubber masks if stowed under extremely warm temperatures.
 3. Some masks lose their elasticity rather rapidly, often causing the face masks that are made of wartime rubber or other compounds to become tacky. This is true particularly if oil vapors or fumes come in contact with such face masks for a prolonged period.
 4. Incorrect stowage also may cause the rubber outlet valves to become sticky, resulting in the valves hardening and cracking.
 5. Cracks are sometimes present around the eyepiece. If the rubber shows small checks or pin holes, it should be replaced.
 6. The condition of the head harness, including hardware, should be checked.
 7. The bayonet connections should be thoroughly examined to see they are free from rust and grease and have not been damaged.
- C. Regarding the maintenance of each type of breathing apparatus, the instruction list packed with each unit may be checked.

II. FLAME SAFETY LAMPS

Flame safety lamps always should be inspected or filled in the open air where fuel vapors cannot accumulate and become a hazard. It should be ascertained that flame screens are in place, in good condition, and that an adequate fuel supply for the safety lamp is on board.

III. LINE-THROWING APPLIANCES

A. Lyle Guns

Lyle guns and accessory equipment are no longer approved for new installations, but those guns which are presently in service and in good condition may remain until no longer serviceable. In addition to checking for required equipment, inspectors should examine the condition of the projectiles to insure that they have been cleaned and are free of rust and corrosion. Also, he should insure that the projectiles fit the barrel of the gun and that the powder is black powder (not smokeless) and is in the proper size bags marked in accordance with regulations and stowed in a watertight non-ferrous container.

B. Other Line-Throwing Appliances

For other line-throwing appliances such as the shoulder gun and impulse-projected rocket types, the inspector should check the equipment included against the complete list on the instruction placard packed with the appliance, and ascertain that the projectiles will slide easily into the barrel of the gun. The gun or pistol launcher should be cleaned and oiled and ready for use. The stowage kit should be clean and free from oily rags or other debris.

C. Special care should be taken in the inspection of the 3" manila auxiliary line for the Lyle and impulse-rocket appliances. The inspector should insure that this line is in good condition since it is normally stowed in a box and is subject to moisture, mildew, and rot.