TECHNICAL MANUAL

SHIPBOARD DAMAGE CONTROL MANUAL FOR

LANDING CRAFT UTILITY (LCU)

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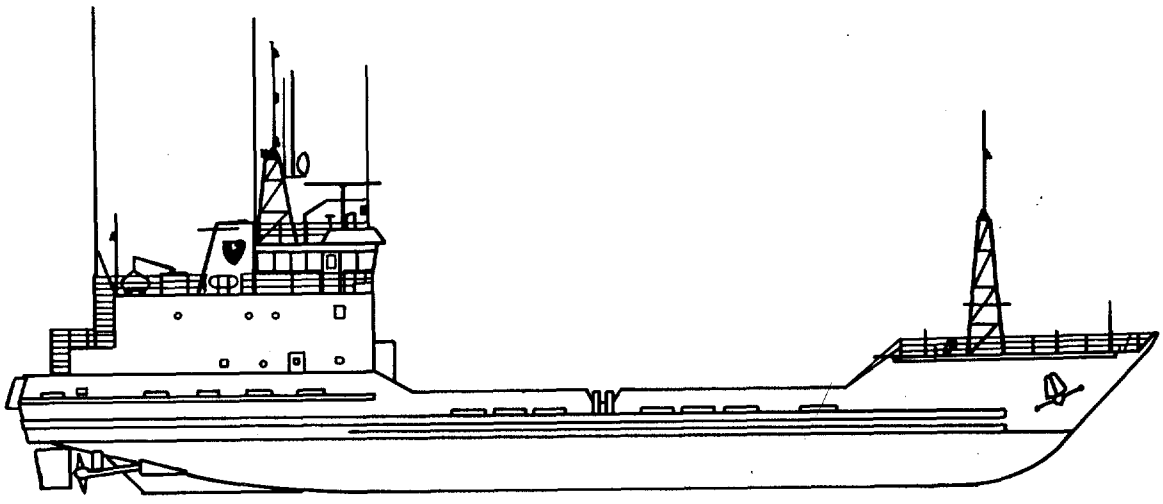

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HEADQUARTERS
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Shipboard Damage Control Manual for

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-MCTS, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished directly to you.

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CHAPTER 1

GENERAL INFORMATION

SDC FIXES SHALL BE USED ONLY IN COMBAT OR OTHER EMERGENCY CONDITIONS AT THE DISCRETION OF THE VESSEL MASTER. DAMAGE SHALL BE REPAIRED BY STANDARD MAINTENANCE PROCEDURES AS SOON AS PRACTICABLE.

Section I. DAMAGE CONTROL INTRODUCTION

1-1. PURPOSE. This Shipboard Damage Control (SDC) manual covers the assessment and repair of equipment failures occurring under emergency conditions (e.g., battle damage, fire, etc.). This repair is sometimes limited to such means of fixing as bypassing, patching, or jury-rigging components, or the use of alternative procedures to restore the equipment/system performance to a minimum operating condition. Operating procedures should be restricted to testing a system, subsystem, or component for the purpose of damage assessment, or for the purpose of testing a component or assembly after a repair has been performed. If any change to normal operating procedures is made, the new procedures must be provided to the operator.

1-2. SCOPE. Damage control includes the functional combination of all equipment, material, devices, and techniques designed to prevent, minimize, or restore wartime or peacetime damage. This includes passive defense for conventional, nuclear, biological, and chemical warfare, and all active defensive measures short of those designed to prevent successful delivery of enemy attack by military means or sabotage.

1-3. IMPROVEMENT. You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Mail your DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to:

Commander, U. S. Army Troop Support Command
ATTN: AMSTR-MCTS
4300 Goodfellow Blvd.
St. Louis, Mo. 63120-1798

Section II. OBJECTIVES

1-4. OBJECTIVES - BASIC. The three basic objectives of shipboard damage control are:

a. Take all practicable preliminary measures to prevent damage.

b. Minimize and localize such damage as does occur.

c. Accomplish, as quickly as possible, emergency damage repairs, restoration of equipment, and the care of injured personnel.

1-5. ATTAINMENT. These objectives are attained by:

a. Preserving stability and fumetight/watertight integrity.

b. Maintaining the operational capability of vital systems.

c. Preventing, isolating, combating, extinguishing, and removing the effects of fire and explosion.

d. Detecting, confining, and removing the effects of nuclear, biological, or chemical contamination.

e. Preventing personnel casualties and facilitating care of the injured.

f. Making rapid repairs to structure and equipment.

The damage control organization has the same objectives in peace and war, although the threat is accentuated in war. The ship's ability to perform its assigned mission will depend upon the effectiveness of damage control.

Section III. PRINCIPAL CHARACTERISTICS

1-6. SUMMARY. The following is a brief summary of the LCU's principal characteristics:

Length (Overall)	174.0 feet
Beam (Maximum)	42.0 feet
Depth (Amidships)	11 feet, 6 inches
Maximum Draft (Full Load Displacement)	Fwd 7 feet 10 inches Aft 9 feet 3 inches Mean 8 feet 6-1/2 inches
Fuel Capacity	91,138 Gallons
Fresh Water Storage Capacity	4,642 Gallons
Maximum Continuous Speed	12.0 Knots (Approx.)

(Characteristics, CONT.)

Cruising Speed (Normal Load)	10.0 Knots (Approx.)
Range-Full Load at Cruising Speed Fuel Reserve	4,500 Nautical Miles with 50%
Main Engines	Two Cummins KTA 50-M 1250 BHP @ 1800 rpm
Generators	Two Cummins NT-855-CG2 250 kW @ 1800 rpm
Emergency Generator Diesel	Cummins 4 BT 5.9GC 40 kW @ 1800 rpm
Bow Thruster	Cummins NT-855-M 300 BHP @ 1800 rpm

Special Features:

Bow Ramp	Enables off-loading of cargo to remote, undeveloped beaches.

CHAPTER 2

EFFECTS OF DAMAGE

SDC FIXES SHALL BE USED ONLY IN COMBAT OR OTHER EMERGENCY CONDITIONS AT THE DISCRETION OF THE VESSEL MASTER. DAMAGE SHALL BE REPAIRED BY STANDARD MAINTENANCE PROCEDURES AS SOON AS PRACTICABLE.

Section I. TYPES OF DAMAGE

2-1. GENERAL. Knowing the type of damage and what emergency repair action to take can save the ship and its crew to permit it to continue on the assigned mission or give it the capability to return to a base for more extensive repairs. Generally, most damage can be classified as follows:

a. Large holes below the waterline.

b. Small holes and cracks below the waterline.

c. Holes in the hull above the waterline.

d. Punctured, weakened, or distorted bulkheads.

e. Flooded machinery compartments or other vital spaces.

f. Warped or sprung doors and hatches.

g. Weakened or ruptured beams, supports, and other strength members.

h. Ruptured or weakened decks.

i. Wreckage interfering with system function.

j. Ruptured or cracked pipe lines.

k. Severed or damaged electric cables.

l. Broken or distorted foundations under machinery.

m. Broken or pierced machinery units.

n. Fire with its attendant heat, smoke, and other damage.

2-2. NATURE OF DAMAGE. The nature of repairs that a ship requires depends upon the type of damage, type of vessel, and location of damage. Collisions, grounding, and storms have in many cases caused damage so severe as to threaten the survival of very large ships. Self-inflicted damage can stem from inadequate preparation or from general neglect. Other causes impairing stability are deck icing in cold weather, excessive deck load, overloading any area in general, improper removal of ballast, and free surface effect in tanks or bilges.

Section II. BELOW WATERLINE DAMAGE

2-3. BELOW WATERLINE DAMAGE - GENERAL. Underwater damage may be from battle damage or from collision damage caused by contact with another ship or by underwater obstacles, fixed or floating.

Below waterline damage to a hull resulting from collision, explosive device, or grounding might not cause a ship to immediately sink or require abandonment but the following can occur:

a. List.

b. Flooding with sea water and/or fuel oil.

c. Impairment of vital operating systems in damaged area.

d. Fire.

The list of the ship can be presumed to be due to off-center weight. If the ship is underway when damaged and the probability of receiving further underwater damage is possible, prompt removal of list is the prime consideration. List has many undesirable effects:

a. Impaired speed due to increased propulsion resistance, increased difficulty in operating the main propulsion plant, and possible improper immersion of screws.

b. Impaired maneuverability.

c. Impaired overall stability due to list and improper trim.

d. Increased difficulty in servicing and operating deck equipment.

e. Ultimate swamping or sinking.

A combat hit which strikes the ship's side below the waterline can cause all the effects outlined above and, in addition, may seriously decrease hull strength. A hit near the stern may damage or carry away one or both propellers and can render inoperative or destroy the rudders and steering gear.

Damage causing total flooding of tanks or void spaces below the water-line, although reducing the reserve buoyancy, may have a beneficial effect on stability if there is no list and sufficient freeboard exists. The amount of such flooding that the ship can withstand depends upon the ballast and cargo distribution before the damage occurs. New ballasting figures must be calculated using the methods described in the Trim and Stability Booklet to ensure that a safe amount of reserve buoyancy remains.

If an underwater weapon (mine or torpedo) is fuzed to explode on contact with the ship's hull, a hole is torn in the shell and the interior of the ship is subjected to blast and fragment attack, followed by a violent inrush of water. Surrounded by a liquid medium, underwater weapons do not depend upon their casing for fragment attack, but instead, tear loose large chunks of the ship's structure and hurl them into the ship with projectile-like violence.

Wiring circuits may be severed by blasts and fragments. Severed and grounded cables will interrupt power in the immediate vicinity and can short the entire electrical system. If the damaged area is aft, machinery spaces can be flooded. The power plant can be affected; possibly all propulsion will be lost.

Underwater damage depends mainly on the weight of the bursting charge. Because of the large amounts of explosive used in modern mines and torpedoes, the holes opened in the shell of the ship by these weapons will be very large.

Flame from incandescent gases created by explosion, unless dampened by liquids, can spread through the affected area. Hot fragments can also start fires in remote areas. Acrid smoke and toxic gases from explosion and fire will necessitate the use of oxygen breathing apparatus.

When a vessel sustains underwater damage, violent shock may break or derange delicate radio, radar or navigation equipment. Brittle materials such as valve bodies or cast-iron base plates under machinery can be fractured even at considerable distances from the damaged area. Shock frequently opens circuit breakers. Violent heaving of decks can cause personnel injury, particularly to those who are standing at the time of impact.

2-4. WATERTIGHT SPACES. Watertight integrity below the main deck of the LCU is provided by the installation, during construction, of athwartships bulk- heads at frames 5, 17, 25, and 44.

At or above the main deck, compartments are protected by watertight doors as follows:

At the main deck level, watertight doors forward protect the damage control locker, the bosuns storeroom, and the paint locker.

Port side main deck watertight doors lead to the galley, and the dry provisions storeroom.

Starboard side main deck watertight doors lead to the passageway, and the air conditioning and the emergency generator room.

Section III. FIRE

2-5. FIRE DAMAGE. In addition to the structural damage caused by battle or collision, fire is almost certain to follow. Unless the fire is extinguished speedily and effectively, more serious damage than that caused by the initial problem can result. Many ships have been lost by fire. Experience indicates that steel ships can become floating furnaces, fed by the combustible and flammable materials carried on board. Some ships have become blazing infernos which had to be abandoned and later sunk by our own forces because fires got out of control and prevented the effective application of damage control actions.

Fire may cause the loss of a ship after other damage has been repaired or minimized. There is a substantial amount of combustible material on board the LCU. Fire must be considered a potential hazard requiring every effort to eliminate, control, and extinguish.