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PROCESSOR: cat

TSL-107-10-64

UNDER-WATER CORROSION

ON

USS FISKE (DD-842)

SR 007-08-07, Task 2822

Lab. Project 9400-34, Technical Memorandum 3

2 SEP 1964

Physical Sciences Division

Approved:

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Ref: (a) BUSHIPS ltr SR 007-08-07 Ser 633P-911 of 3 Jul 1963
(b) BUSHIPS Technical Manual, Chapter 12, Section VII, of 15 Apr 1962

Figures:

(1) Photo L-19369-28 - USS FISKE (DD-842), Stern Area Showing Hull-Mounted Zinc Anodes.

(2) Photo L-19369-29 - USS FISKE (DD-842), Starboard Rudder, Inboard.

(3) Photo L-19369-30 - USS FISKE (DD-842), Starboard Rudder, Outboard, Lower Bearing Region.

(4) Photo L-19369-31 - USS FISKE (DD-842), Starboard Rudder Section, Showing Exposed Stock Nut and Housing.

(5) Photo L-19369-32 - USS FISKE (DD-842), Starboard Bilge Keel, Mid Section.

(6) Photo L-19369-33 - USS FISKE (DD-842), Starboard Bilge Keel, in Way of Sea Chest.

(7) Photo L-19369-34 - USS FISKE (DD-842), Port Side, Vicinity of Forward End of Bilge Keel.

(8) Photo L-19369-35 - USS FISKE (DD-842), Sonar Dome Fairing Strip, Starboard Side.

1. The subject inspection was conducted at the New York Naval Shipyard on 23 March 1964, under the general authorization of reference (a), which requested the U. S. Naval Applied Science Laboratory to investigate major ship corrosion problems. The last complete overhaul of the USS FISKE, (DD-842) was made in May 1962 at the Charleston Naval Shipyard. The ship was in warm waters for the greater part of the time prior to docking at the New York Naval Shipyard.

2. Principal hull corrosion was found at stern areas and bilge keel vicinity. The ship had been initially equipped with thirty-two zinc anodes at the stern. Of these, nineteen remained, but were heavily encrusted with corrosion products. Paint had stripped in areas immediately adjacent to the zincs, but in most cases rust was not evident. Figure(1)shows the distribution and appearance of the zincs; location of the missing zincs is indicated by steel straps.

3. Rudder - Paint was not evident on about 2/3 of the rudder area, as illustrated in Figure (2). The greatest extent of rudder corrosion was found in the vicinity of the aft end of the rudder skegs (both inboard and outboard); pits and striations up to

3/16-inch were observed. Paint was virtually absent in these areas. This condition is illustrated in Figure (3). The blue cast in the photograph is a result of adverse lighting conditions. Outboard cover plates of both rudders were missing, with 1/8-inch corrosion pits found principally on the aft rudder partitions, Figure (4). It is noted that current Navy practice, specified in reference (b), prohibits the use of galvanic anodes on the rudder, probably because of hydrodynamic effects. The absence of cover plates would also create frictional drag, but in New York Naval Shipyard tests conducted 28 January 1964, maximum speed of about 32 knots was maintained during a 10-hour full-power run, and no vibrational abnormalities were observed. The ship's engineering officer also found nothing unusual in the ship's operation. Use of faired zinc anodes on the rudder skegs, together with grounding of the rudder, would probably not interfere with ship's operations, and would help protect a major area of corrosion.

4. Under side of port and starboard propeller rope guards were severely corroded, with four bolts missing as a result of corrosion. The starboard after stern tube bearing fairwater sleeve was completely perforated in four to five areas. One hole was about 5 inches in diameter, others were 1 to 2 inches in diameter.

5. Corrosion in the vicinity of the starboard bilge keel is shown in Figures (5) and (6). The most severely damaged areas are near bolts, seams, and especially the hull opening shown in Figure (6). The blue area above the opening was actually a rough, black coating, with no marine growth visible. The area in the vicinity of the forward section of the port bilge keel is shown in Figure (7). Corrosion damage is especially evident at lap edges and corners. Corrosion of upper fairing strip seam on the sonar dome is shown in Figure (8). Some pits were about 3/8-inch deep. The sonar dome was probably stainless steel below the lower fairing strip seam, as indicated by a magnet test. Galvanic action would therefore partially account for the severe corrosion.

6. The following measures are recommended for minimizing corrosion of rudder skeg and adjacent rudder areas:

a. Ground rudder to the hull, preferably from the top of the rudder stock.

b. Modify reference (b) to permit attachment of faired zinc anodes to the rudder skegs, in vicinity of the pintles. Fairing may be accomplished with a suitable hull-smoothing compound.

7. This Laboratory will continue its periodic examination of ship corrosion and report significant findings.

I. GELD
Principal Investigator

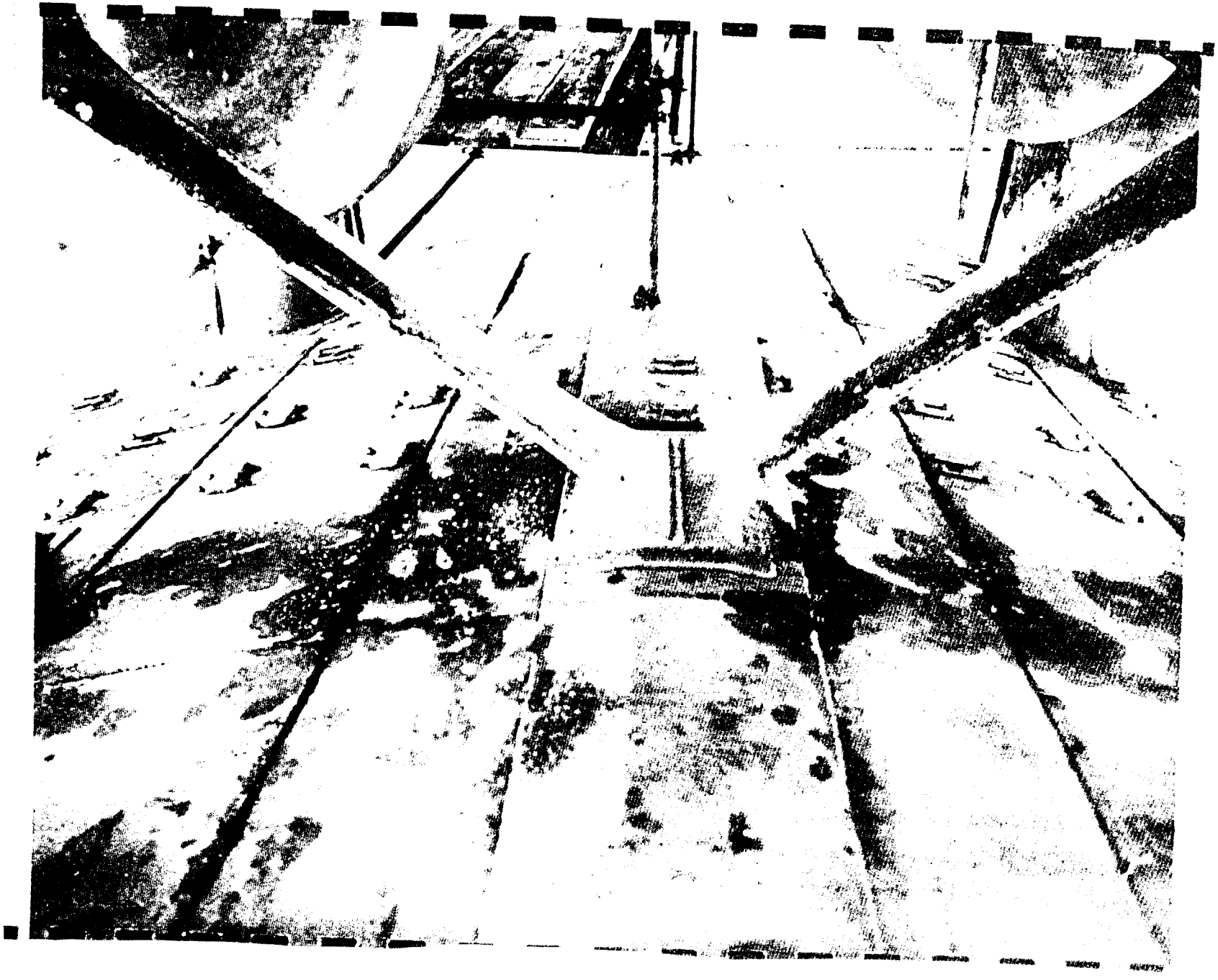

FIGURE 1

USS FISKE (DD-842), Stern Area

Showing Hull Mounted Zinc Anodes

PHOTO L-19369-28

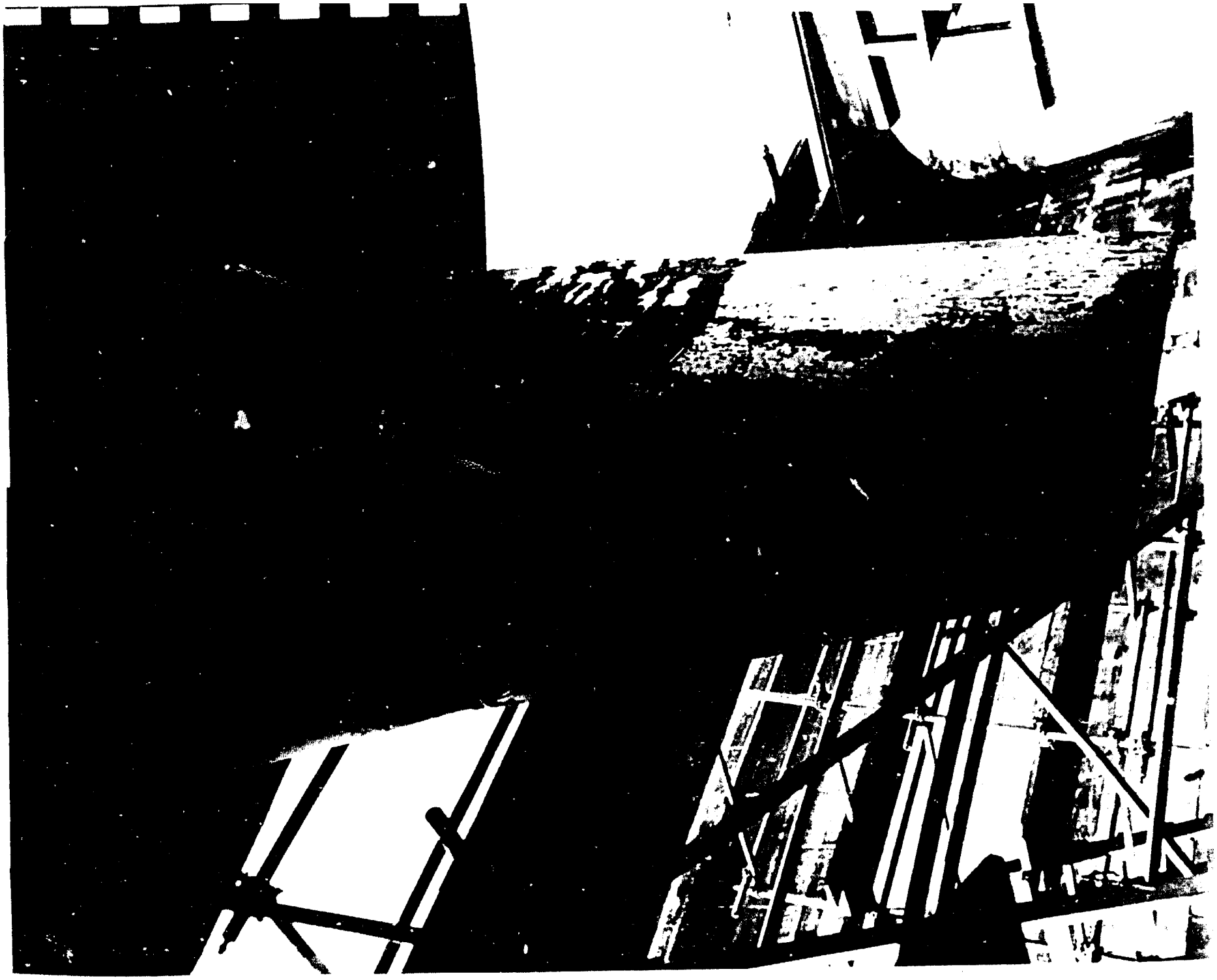

FIGURE 2

USS FISKE (DD-842), Starboard Rudder,

Inboard

PHOTO L-19369-29

FIGURE 3

USS FISKE (DD-842), Starboard Rudder,

Outboard, Lower Bearing Region

PHOTO L-19369-30

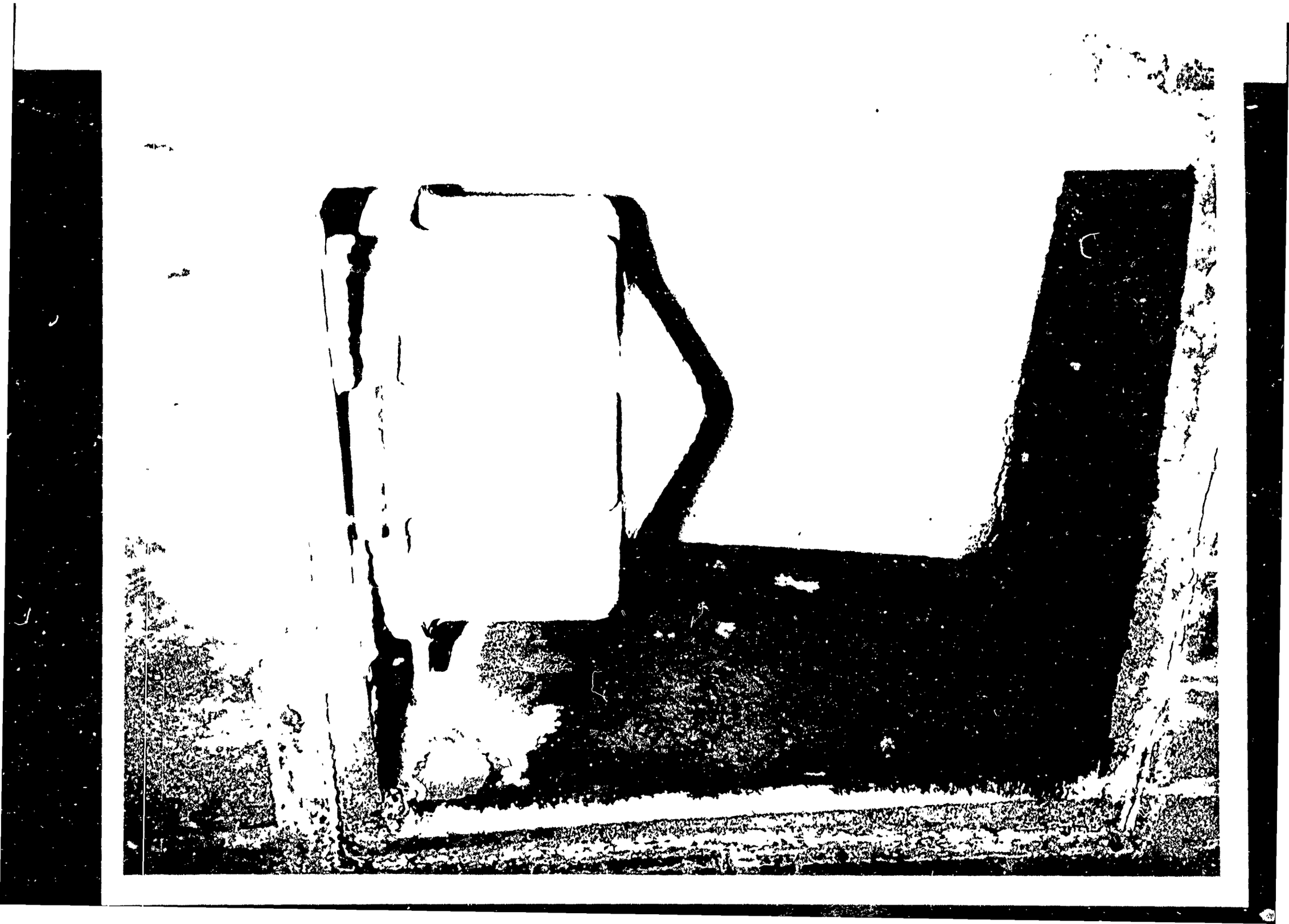

FIGURE 4

USS FISKE (DD-842), Starboard Rudder Section,

Showing Exposed Stock Nut and Housing

PHOTO L-19369-31

FIGURE 5

USS FISKE (DD-842), Starboard Bilge Keel,

Mid Section

PHOTO L-19369-32

FIGURE 6

USS FISKE (DD-842), Starboard Bilge Keel,

In Way of Sea Chest

PHOTO L-19369-33

FIGURE 7

USS FISKE (DD-842), Port Side

Vicinity of Forward End of Bilge Keel

PHOTO L-19369-34

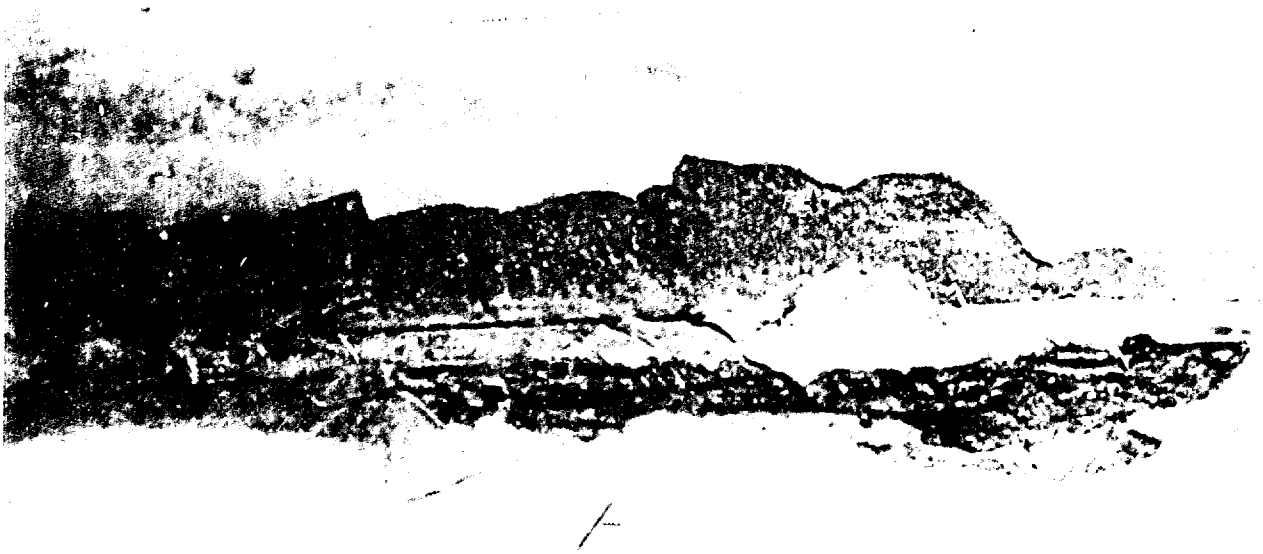

FIGURE 8

USS FISKE (DD-842), Sonar Dome Fairing Strip,

Starboard Side

PHOTO L-19369-35