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BUREAU OF SHIPS GROUP

TECHNICAL INSPECTION REP[redacted]T

Classification (Cancelled) (Changed to CONFIDENTIAL)
By Authority of Joint Chiefs of Staff Action of 15 April 1949
By ______ Date ______
1st Lt. APSWP

OPERATION CROSSROADS.

U.S.S. FALLON (APA81)

TEST ABLE (U).

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Director,
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Washington, D. C. 20301

[redacted]

(11) 1947,
(12) 76p.
(14) XRD-70

OPERATION CROSSROADS

DIRECTOR OF SHIP MATERIAL

JOINT TASK FORCE ONE

CONFIDENTIAL

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GROUP-3
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1 JAN 1965

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BUREAU OF SHIPS GROUP

TECHNICAL INSPECTION REPORT

Classification (~~Cancelled~~) (Changed to CONFIDENTIAL)
By Authority of Joint Chiefs of Staff Action of 15 April 1949
By [signature] Date [illegible]
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USS FALLON (APA81)

Page 1 of 76 Pages

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U.S.S. FALLON (APA 81)

SHIP CHARACTERISTICS

Building Yard: Consolidated Steel Corp.; Wilmington, California.

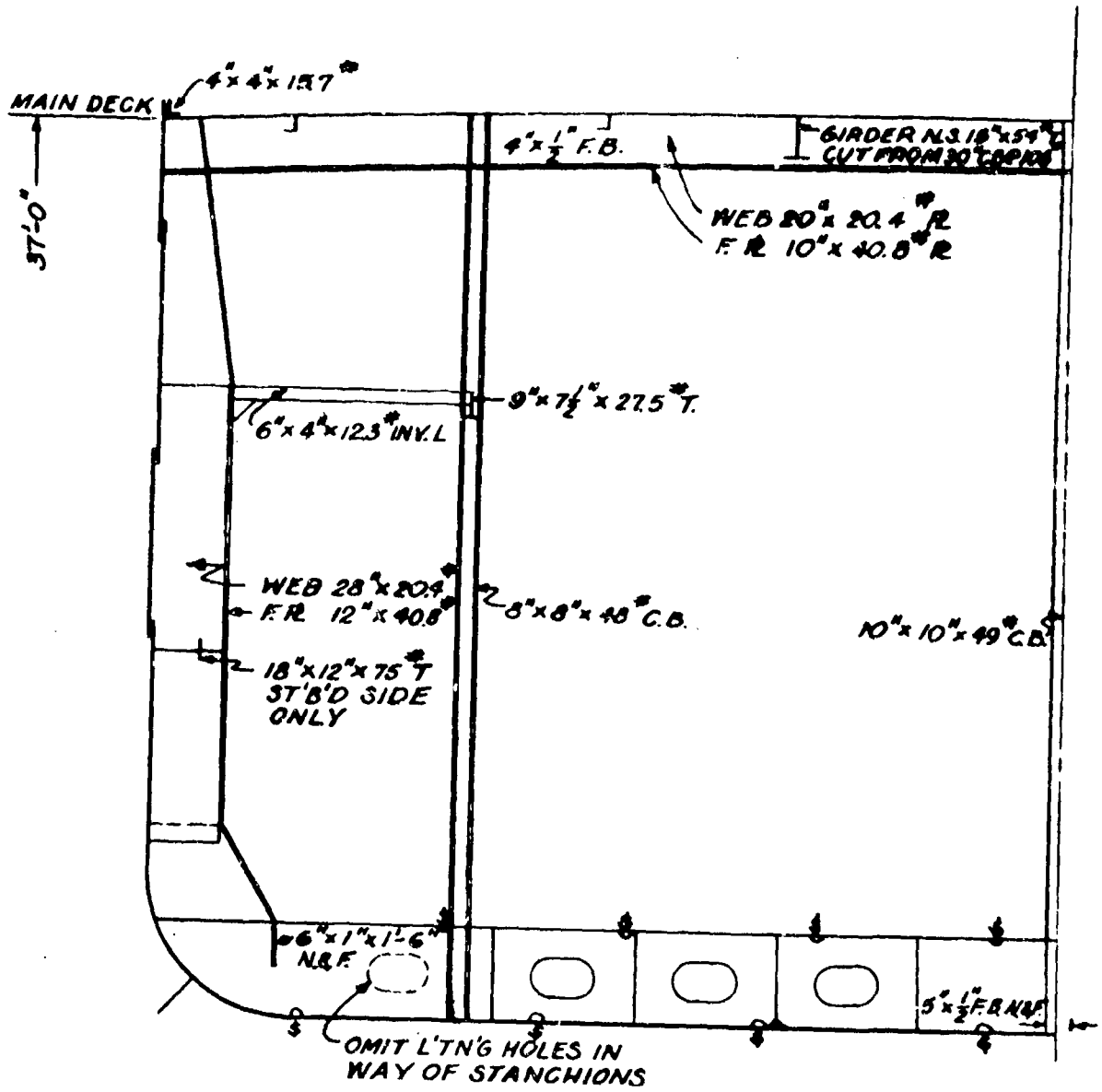
Commissioned: 14 February 1945.

HULL

Length Overall: 426 feet 0 inches.
Length on Waterline: 400 feet 0 inches.
Beam (extreme): 58 feet 0 inches.
Depth (molded to upper deck): 37 feet 0 inches.
Drafts at time of test: Fwd. 11 feet 11 inches.
Aft. 17 feet 6 inches.
Limiting displacement: 7,080 tons.
Displacement at time of test: 6,458 tons.

MAIN PROPULSION PLANT

Main Engines: Two sets of Westinghouse steam turbines, directly connected to Westinghouse main generators. Two main shaft motors.
Main Condensers: Two are installed in ship.
Boilers: Two Babcock and Wilcox boilers are installed in ship. 465 psi gauge - 750° F.
Propellers: Two are installed.
Main Shafts: Two are installed in ship.
Ships Service Generators: Five are installed in ship. Three - 250 KW. - 450 V. - A.C. and Two - 100 KW. - 120/240 V. - D.C.



FRAME 76 LOOKING AFT

MIDSHIP SECTION

TEST A

TECHNICAL INSPECTION REPORT

OVERALL SUMMARY

1. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

There was no flooding, hence no change in drafts or list.

(b) Structural damage.

HULL

The after bulkheads of the superstructure and the port bulwarks on the superstructure and navigating deck level are dished slightly. There is slight dishing of weather doors on the port side of the superstructure near the after end. Miscellaneous items located in the superstructure and fabricated of plating weighing less than five pounds are distorted. The outer casings of both stacks are somewhat dished.

MACHINERY

The outer casing of the after stack was slightly dented. The sheet metal cover of one electric drinking fountain was blown off.

ELECTRICAL

Structural damage was not observed.

(c) Other damage.

HULL

There is no damage other than controller failure on one deck winch.

(b) Fires and explosions.

HULL

With the exception of a burned bellygripe pad on No. 2 boat davit, all fires occurred in experimental equipment placed on board.

Fires on the forecastle deck included two cardboard boxed cartons of battle helmets, a cardboard box of buckle type artics, and cartons of U.S. Army Quartermaster clothing. The later fire seemed to have been started by either the anchor ball or the brass encased anchor light that had been hanging from the forestay overhead and fell into the test equipment.

A galvanized expanded metal rat cage was blown from a signal halyard to the signal bridge and burned the outline of the cage on deck where it fell. A life jacket placed over the cage is burned only where it came in contact with the metal cage.

Several turns of galvanized wire had been wrapped in a horizontal direction around a wooden box support for a lead box containing photographic film. The wooden box is severely burned where the wire made positive contact with the box.

Canvas covered chafing gear on No. 2 boat davit gripe is burned away where wire serving had been used, but is only moderately scorched elsewhere.

Several common characteristics of the above burned material were noted. All were metal objects of high surface mass ration. All of the objects were insulated from the ship; the metal helmets were insulated from each other by cardboard boxes; the buckled-type artics, by the cardboard box; the rat cage, by the signal halyard; the wire turns on the lead box support, by the box itself; and the wire serving on the gripe, by the canvas parcelling. It should be mentioned that other equipment on the forecastle in similar type cartons were not a cause of fire and that a box of laced-type rubber artics is untouched.

MACHINERY

There was no evidence of fires or explosions.

ELECTRICAL

A minor fire occurred in a pile of Army Quartermaster Corps stores on the forecastle deck. The anchor light was burned from the forestay and fell to the deck in this area.

(c) Shock.

HULL

There is no evidence of shock.

MACHINERY

There was no evidence of shock.

ELECTRICAL

A moderate amount of shock caused the breaking of a few lamp bulbs throughout the ship and some minor comparable damage.

(d) Pressure.

HULL

The pressure wave emanated from about 200 degrees relative. Damage due to the air blast is slight. Exposed sheet metal is generally distorted. Superstructure plating is undistorted except on the after faces where it is very slightly dished. Exposed doors are dished slightly. The stacks are distorted slightly on the port side. The critical plating weight is about five pounds since plating above this weight is not damaged.

MACHINERY

Blast pressure slightly dented the outer casing of the after stack, blew off the sheet metal cover of one electric drinking fountain, and tore the circuit breaker of #3 cargo winch loose from the switchboard.

ELECTRICAL

No certain indication of pressure was shown by any effects on electrical equipment. Two cargo lights of commercial manufacture had spot welded trunnion clips torn off by either the blast pressure or by shock.

(e) Effects apparently peculiar to the atom bomb.

HULL

If radioactivity is disregarded, the intensity of heat was the only peculiarity observed. The possibility of induced heating of ungrounded metals is discussed in (b).

MACHINERY

None.

ELECTRICAL

The heating of cable as mentioned above and the blistering of paint was due, apparently, to radiant heat emanating from the focus of the blast. This was the only effect noted as being peculiar to atomic explosions.

III. Effects of Damage.

(a) Effect on machinery, electrical, and ship control.

HULL

No damage.

MACHINERY

No. 2 cargo winch was inoperable because the circuit breaker was torn loose from the switchboard. This was easily repaired by the ship's force. Otherwise, the test had no effect on machinery or ship control from a machinery viewpoint.

ELECTRICAL

There was no effect on propulsion and ship control caused by damage to electrical equipment.

(b) Effect on gunnery and fire control.

HULL

No damage.

MACHINERY

No comment.

ELECTRICAL

There was no effect on gunnery and fire control caused by electrical equipment damage.

(c) Effect on water-tight integrity and stability.

HULL

No effect.

MACHINERY

No comment.

ELECTRICAL

No failure of electrical systems had any effect on water-tight integrity and stability.

MACHINERY

No. 2 cargo winch was inoperable because the circuit breaker was torn loose from the switchboard. This was easily repaired by the ship's force. Otherwise, the test had no effect on machinery or ship control from a machinery viewpoint.

ELECTRICAL

There was no effect on propulsion and ship control caused by damage to electrical equipment.

(b) Effect on gunnery and fire control.

HULL

No damage.

MACHINERY

No comment.

ELECTRICAL

There was no effect on gunnery and fire control caused by electrical equipment damage.

(c) Effect on water-tight integrity and stability.

HULL

No effect.

MACHINERY

No comment.

ELECTRICAL

No failure of electrical systems had any effect on water-tight integrity and stability.

(d) Effect on personnel and habitability.

HULL

The habitability of the ship is unimpaired.

MACHINERY

It is not believed that there would have been any personnel casualties below decks if the ship had been manned. Habitability was not affected.

ELECTRICAL

There was no failure of electrical equipment that in any way affected the habitability of the vessel.

(e) Total effect on fighting efficiency.

HULL

The explosion would have had little, if any, effect on the fighting efficiency of the vessel.

MACHINERY

None.

ELECTRICAL

The fighting efficiency of the vessel would have been slightly reduced by the failure of the cargo winch controller, which would have slowed unloading.

IV. General Summary of Observers' Impressions and Conclusions.

HULL

Damage is superficial. While injury might have been suffered by some personnel exposed topside, the vessel would be able to fulfill its mission.

MACHINERY

The FALLON was beyond the effective range of the explosion in Test A.

ELECTRICAL

A blast of heat and a pressure wave struck the vessel causing only minor damage. A ship's force could have quickly repaired or neutralized the damage that did occur in the electrical equipment.

V. Preliminary General or Specific Recommendations of Inspection Group.

HULL

Light sheet metal enclosures, especially flag bags, appear to be the items most easily affected by air blast, even at considerable distance from the explosion. Flag bags, lockers, and similar equipment now exposed on the superstructure, should be built into the deck house proper.

MACHINERY

None.

ELECTRICAL

The damage to electrical equipment is not of a nature or amount to call for any recommendations.

TECHNICAL INSPECTION REPORT

SECTION I - HULL

GENERAL SUMMARY OF HULL DAMAGE

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

There was no flooding, hence no change in drafts or list.

(b) Structural damage.

The after bulkheads of the superstructure and the port bulwarks on the superstructure and navigating deck level are dished slightly. There is slight dishing of weather doors on the port side of the superstructure near the after end. Miscellaneous items located in the superstructure and fabricated of plating weighing less than five pounds are distorted. The outer casings of both stacks are somewhat dished.

(c) Other damage.

There is no damage other than a controller failure on one deck winch.

II. Forces Evidenced and Effects Noted.

(a) Heat.

Heat radiation came from about 200° relative. Damage is slight and is confined to a single layer of paint in most cases. There is no deck scorching. Exposed vertical surfaces are scorched but not blistered. Painted wood surfaces suffered greater damage than comparable coatings on steel. Painted areas where drainage and rust was permitted to accumulate, are blistered. Several small fires were ignited in special U.S. Army equipment installed for test.

(b) Fires and explosions.

With the exception of a burned bellygripe pad on No. 2 boat davit, all fires occurred in experimental equipment placed on board.

Fires on the forecastle deck included two cardboard boxed cartons of battle helmets, a cardboard box of buckle type artics, and cartons of U.S. Army Quartermaster clothing. The latter fire seemed to have been started by either the anchor ball or the brass encased anchor light that had been hanging from the forestay overhead, and fell into the test equipment.

A galvanized expanded metal rat cage was blown from a signal halyard to the signal bridge and burned the outline of the cage on deck where it fell. A life jacket placed over the cage is burned only where it came in contact with the metal cage.

Several turns of galvanized wire had been wrapped in a horizontal direction around a wooden box support for a lead box containing photographic film. The wooden box is severely burned where the wire made positive contact with the box.

Canvas covered chafing gear on No. 2 boat davit gripe is burned away where wire serving had been used, but is only moderately scorched elsewhere.

Several common characteristics of the above burned material were noted. All were metal objects of high surface-mass ratio. All of the objects were insulated from the ship; the metal helmets were insulated from each other by cardboard boxes, the buckled-type artics, by the cardboard box; the rat cage, by the signal halyard; the wire turns on the lead box support, by the box itself; and the wire serving on the gripe, by the canvas parcelling. It should be mentioned that other equipment on the forecastle in similar type cartons were not a cause of fire, and that a box of laced-type rubber artics is untouched.

(c) Shock.

There is no evidence of shock.

(d) Pressure.

The pressure wave emanated from about 200° relative. Damage due to the [illegible] blast is slight. Exposed sheet metal is generally distorted. Superstructure plating is undistorted except on the after faces where it is very slightly dished. Exposed doors are dished slightly. The stacks are distorted slightly on the port side. The critical plating weight is about five pounds since plating above this weight is not damaged.

(e) Effects apparently peculiar to the atom bomb.

If radioactivity is disregarded, the intensity of heat was the only peculiarity observed. The possibility of induced heating of ungrounded metals is discussed in (b).

III. Effects of Damage.

(a) Effect on machinery, electrical and ship control.

No damage.

(b) Effect on gunnery and fire control.

No damage.

(c) Effect on water-tight integrity and stability.

No effect.

(d) Effect on personnel and habitability.

The habitability of the ship is unimpaired.

(e) Effect on fighting efficiency.

The explosion would have had little, if any, effect on the fighting efficiency of the vessel.

IV. General Summary of Observers' Impressions and Conclusions.

Damage is superficial. While injury might have been suffered by some personnel exposed topside, the vessel would be able to fulfill its mission.

V. Preliminary General or Specific Recommendations of Inspection Group.

Light sheet metal enclosures, especially flag bags, appear to be the items most easily affected by air blast, even at considerable distances from the explosion. Flag bags, lockers, and similar equipment now exposed on the superstructure, should be built into the deck hours proper.

VI. Instructions for Loading the Vessel Specified the Following:

ITEM	LOADING
Fuel Oil	95%
Diesel Oil	95%
Ammunition	100%
Potable and reserve feed water	Full Load
Salt water ballast	None

Details of the actual quantities of the various items aboard are included in Report 7, Stability Inspection Report, submitted by the ship's force in accordance with "Instructions to Target Vessels for Tests and Observations by Ship's Force" issued by the Director of Ship Material. This report is available for inspection in the Bureau of Ships Crossroads Files.

DETAILED DESCRIPTION OF HULL DAMAGE

A. General Description of Hull Damage.

Structural damage as a result of Test A is negligible and is confined to the superstructure. Miscellaneous items located on the superstructure and fabricated of less than five pound plate are distorted. General photos of the exterior are shown on pages 40 to 55 inclusive.

B. Superstructure.

(a) Description of damage.

The after bulkheads of the superstructure and the port bulwarks on the superstructure and navigation deck levels are dished slightly. There is slight dishing of weather doors on the port side of the superstructure at the after end. The port flag bag is demolished. The starboard flag bag is dished about six inches, The stacks are distorted along the port side with maximum distortions about five inches deep. (Photos 2168-8, 6, 7; pages 56 , 57 , and 58).

(b) Causes of damage.

The damage to the superstructure was caused principally by the air blast wave. Heat radiation scorched paint.

(c) Evidence of fires in the superstructure.

There were no fires in the superstructure.

(d) Estimate of relative effectiveness against heat and blast of various plating thickness.

The critical plating weight appears to be about five pounds. Plating above this weight is undamaged.

(e) Constructive criticism of superstructure design.

No comment.

C. Turrets, Guns and Directors.

No damage.

D. Torpedo Mounts, Depth Charge Gear.

Not Applicable.

E. Weather Deck.

There is no structural damage to the weather deck. About half of the upper deck hatch pontoons of No. 2 hold are distorted and blown into the hold. Two strongbacks are twisted. Two main deck pontoons were displaced and fell into the hold. Several small fires occurred. They are discussed in Item S.

F. Exterior Hull.

The only apparent damage to the exterior hull is a slight dishing between frames on the port side between frames 40 and 50. Scrutiny of photographs taken before Test A reveals that this damage existed before the test.

G. Interior Compartments (above w.l.).

No damage.

H. Armor Decks and Miscellaneous Armor.

Not Applicable.

I. Interior Compartments (below w.l.).

No damage.

J. Underwater Hull.

No damage.

K. Tanks.

No damage.

L. Flooding.

None.

M. Ventilation.

No damage.

N. Ship Control.

No damage.

O. Fire Control.

No damage.

P. Ammunition Behavior.

No damage.

Q. Ammunition Handling.

No damage.

R. Strength.

No damage.

S. Miscellaneous.

(a) Fires.

Only a few small fires were started on this ship, all of which could have been easily controlled if personnel had been functioning on board. The majority of these small fires occurred in U.S. Army test equipment exposed on the forecastle near the bow. The fires seem to have been started by a source heretofore not recognized nor brought out by observations on other ships.

The largest fire occurred at about frame 10 on the starboard side of the forecastle in bundles of exposed U.S. Army test equipment including khaki pants, blankets, shoes, and mess kits. The metal anchor ball and brass encased anchor light, prior to the test had been hanging from a halyard attached to the forestay, about 15 feet above and 10 feet aft of the center of the test equipment. Crew members, upon returning to the ship after the blast, found that the halyard had been burned. The burned area indicated that the fire had apparentl een started by either the anchor ball or the light case. (Photo 18-8-2, page 59).

Two cardboard containers of Army battle helmets, without liners but having cardboard separators between the helmets, were completely burned away. The helmets were severely scorched; the cardboard separators were partially burned and scorched; and the chin straps included in the con ainers were completely burned. Identical containers in the immediate vicinity of the helmet boxes and enclosing such materials as bottled insect sprays, unwrapped laundry soap, rain ponchos, and raincoats were scorched externally in varying degrees. All scorched material was in the direct line of radiation.

At frame 14, port side of the forecastle, two cardboard boxes of boots were exposed. One box containing Artics with metal buckles, was completely burned including all parts of the boots except the buckles. The other box which held laced-type Artics is unaffected except for external scorching.

A wooden rack holding a lead box of lead plates separating photographic film was secured to the deck about 12' inboard of the waterway at about frame 43, port, by galvanized seizing wire. Before the test, the wire had been wrapped several times about the rack in a horizontal plane and looped over the top of the lead box. The ends of the wire were secured to clips on the deck. (Photo 1848-4, page **60**). When the crew returned, they found that the wire had been broken; the lead box overturned towards the stern of the ship; and the rack was on its side. The wire remained wrapped about the rack. At the corners of the rack where the wire made positive contact with the wood, deep burning occurred. This phenomena appeared on all corners except that which was inboard after the rack had toppled, and which was behind the lead box. The position of the rack and lead box after toppling is shown in photo 1848-5, page **61** . It would appear from the burning effects that if the lead box actually shielded the unburned corner, the rack must have toppled prior to the test, although it had been considered stably secured by the medical crew that had installed it.

The gripes for No. 2 boat, frame 70 to 80 port side, were hanging loosely from the davits at the time of the test. The gripes were wrapped with heavy manila line, wound with light manila line, and parcelled with canvas. The forward gripe wrapping was secured with marline at both ends. The canvas of this wrapping was scorched and torn but showed no continuous burning. The after gripe wrapping was secured at the lower end with marline but at the upper end with galvanized wire. It is notable that downward from the wire serving for about half way the entire wrapping, canvas and manila lines, is entirely burned away, while the lower part is intact except for scorching of the canvas parcelling. It should be mentioned that the galvanized serving was insulated from the gripe itself by the canvas. (Photo 1848-6, page **62**).

A rat cage of galvanized metal screening was hung from the starboard signal yardarm on the regular outboard signal halyard. A standard Navy kapok life jacket was wrapped about the cage in order that it might be kept afloat should it be blown overboard by the blast. The returning crew found that the halyard had been parted and that the rat cage had fallen to the deck

of the signal bridge, where it remained almost upright. A spot was burned in the deck painting approximately the size of the bottom of the cage. (Photo 1848-8, page 63). The life jacket was found to have been heavily scorched at the areas where it was in contact with the cage.

Hay and wood chips, marline and canvas did not show any noticeable change or singeing. All of the burning seems to follow the unique pattern, outlined in the cases given above, that only inflammable material in contact with insulated metal was set afire. In each case it may be noted that there was no ground connection between the metal in contact with the material burned and the metal of the ship. The metal anchor light case and the anchor ball were insulated by the halyard; the helmets were insulated from the deck by the cardboard containers and from each other by the separators; the boots with buckles were insulated by the container; the wire about the wooden racks was free of the deck after it had been broken; the wire serving on the after davit was insulated from the gripe by the canvas wrapping; and the rat cage was suspended by a non-conducting halyard. It would seem from this evidence that at the particular range of this ship from the blast, direct heat radiation played little part in setting fires but that there was heat inducted in insulated metal objects of a magnitude sufficient to burn the surrounding material. It might be possible that some extremely short wave radiation from the bomb explosion induced molecular disturbances in ungrounded metallic materials generating a local heat source. It should also be noted that the metallic objects in which the heat effects were seemingly inducted had fairly large surface to mass ratios.

(b) Painted Surfaces.

Paint damage from radiation is slight. Radiation came from about 195° relative. There is more paint scorching of decks. Interiors were untouched. Painted wood surfaces are more susceptible to heat damage than similarly placed coatings on steel. Toludine red is completely burned in one or two places. Several places over which rust and waste had dripped showed excessive paint damage in the form of blistering. General photographs of paint damage are shown on pages 64 to 70 , inclusive.

TECHNICAL INSPECTION GROUP

SECTION II - MACHINERY

GENERAL SUMMARY OF MACHINERY DAMAGE

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

No data taken by machinery group.

(b) Structural damage.

The outer casing of the after stack was slightly dented. The sheet metal cover of one electric drinking fountain was blown off.

(c) Other damage.

The circuit breaker of #4 cargo winch was torn loose from the switchboard by the blast pressure. There was no other damage affecting the machinery of this vessel.

II. Forces Evidenced and Effects Noted.

(a) Heat.

Paint was scorched and blistered on exposed surfaces. There was no other evidence of heat in machinery spaces or on exposed machinery.

(b) Fires and explosions.

There was no evidence of fires or explosions.

(c) Shock.

There was no evidence of shock.

(d) Pressure.

Blast pressure slightly dented the outer casing of the after stack, blew off the sheet metal cover of one electric drinking fountain, and tore the circuit breaker of #2 cargo winch loose from the switchboard.

(e) Effects apparently peculiar to the atom bomb.

None.

III. Effects of Damage.

(a) Effect on machinery and ship control.

No. 2 cargo winch was inoperable because the circuit breaker was torn loose from the switchboard. This was easily repaired by the ship's force. Otherwise, the test had no effect on machinery or ship control from a machinery viewpoint.

(b) Effect on gunnery and fire control.

No comment.

(c) Effect on water-tight integrity and stability.

No comment.

(d) Effect on personnel and habitability.

It is not believed that there would have been any personnel casualties below decks if the ship had been manned. Habitability was not affected.

(e) Total effect on fighting efficiency.

None.

IV. General Summary.

The FALLON was beyond the effective range of the explosion in Test A.

V. Preliminary Recommendation.

None.

DETAILED DESCRIPTION OF MACHINERY DAMAGE

A. General Description of Machinery Damage.

(a) Overall condition.

The overall condition of the machinery was not changed by Test A. No effects of the blast were found after inspection of all machinery and operation of same under normal working conditions.

(b) Areas of major damage.

None.

(c) Primary cause of damage in each area of major damage.

Not Applicable.

(d) Effect of target test on overall operation of machinery plant.

The test had no effect on the operation of the machinery plant.

B. Boilers.

Undamaged. Both boilers were steamed after the test and functioned normally. Hydrostatic tests indicate no change in the tightness of the boilers.

The outer casing of the after stack was slightly dented by the blast pressure. This has no effect on operation. (Photos 2168-6, 7, 8; pages **57** , **58** , and **56**).

C. Blowers.

Undamaged. All four blowers were operated for 24 hours at pressure of 6 inches of water (approximately one-half of full load). No defects were found.

D. Fuel Oil Equipment.

Unda maged. All fuel oil equipment was operated under service conditions after Test A.

E. Boiler Feedwater Equipment.

Undamaged. All boiler feedwater equipment was operated under service conditions after Test A and functioned normally.

F. Main Propulsion Machinery.

Undamaged. Both turbines were operated under service conditions after the test and functioned normally.

G. Reduction Gears.

Not Applicable.

H. Shafting and Bearings.

Undamaged. Shafting was turned during normal operation after Test A. Shafting and bearings were inspected during this operation. No defects were found.

I. Lubrication System.

Undamaged. All of the lubrication system has been used under service conditions since the test and functioned normally.

J. Condensers and Air Ejectors.

Undamaged. Condensers have been inspected and operated at a vacuum of 29 inches since the test. They functioned normally.

K. Pumps.

Undamaged. No. 1 main circulating pump was in poor condition before Test A, but its condition was not changed by the

test. All other pumps were operated under service conditions after Test A and functioned normally.

L. Auxiliary Generators (Turbines and Gears).

Undamaged. The ship's service generators were operated under service conditions after Test A, and functioned normally.

M. Propellers.

Undamaged. The propellers were checked from the water surface and the interior of the ship while the main shafts were being turned over. They functioned normally.

N. Distilling Plant.

Undamaged. Both distilling sets were placed in operation immediately after Test A. They functioned normally.

O. Refrigeration Plant.

Undamaged. The refrigerating plant was placed in operation immediately after Test A. It functioned normally.

P. Winches, Windlasses, and Capstans.

No. 4 cargo winch, frame 40 port, was inoperable after Test A because of its circuit breaker having been torn loose from the switchboard by the blast. This was easily repaired by the ship's force. There was no mechanical damage to the winch.

Except for the above, there was no damage to winches, windlasses, davits, or capstans during Test A. All of this equipment was operated under service conditions after the test and functioned normally.

Q. Steering Engine.

Undamaged. Both steering units were operated through the full throw of the rudder after Test A and functioned normally.

R. Elevators, Ammunition Hoists, Etc..

Undamaged. Ammunition hoists and the gasoline hoist were operated under service conditions since Test A. They functioned normally.

S. Ventilation (Machinery).

Undamaged. All ventilation blowers were operated and heaters inspected after Test A.

T. Compressed Air Plant.

Undamaged. The air compressor was operated satisfactorily under service conditions after Test A, and functioned normally.

U. Diesels (Generators and Boats).

Undamaged. The emergency diesel generator and the diesel fire pump were operated under service conditions after Test A. They functioned normally.

V. Piping Systems.

Undamaged. All piping was tested under service conditions after Test A. No defects were found.

W. Miscellaneous.

There was no damage to miscellaneous equipment as a result of Test A, except that the sheet metal casing of one electric drinking fountain in the passageway opening into #2 cargo hatch was blown open. However, this fountain was undamaged mechanically.

TECHNICAL INSPECTION REPORT

SECTION III - ELECTRICAL

GENERAL SUMMARY OF ELECTRICAL DAMAGE

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

Drafts and list were not observed.

There was no flooding.

(b) Structural damage.

Structural damage was not observed.

(c) Damage to electrical systems.

Damage to electrical equipment was confined to a small number of broken lamp bulbs, damaged searchlights and cargo lights, and a disabled cargo winch controller.

II. Forces Evidenced and Effects Noted.

(a) Heat.

The heat coming from the blast caused a slight exuding of the sheath through the armor of two unpainted cables on the main mast, and blistered paint on equipment directly exposed.

(b) Fires and explosions.

A minor fire occurred in a pile of Army Quartermaster Corps stores on the forecastle deck. The anchor light was burned from the forestay and fell to the deck in this area.

(c) Shock.

A moderate amount of shock caused the breaking of a few lamp bulbs throughout the ship and some minor comparable damage.

(d) Pressure.

No certain indication of pressure was shown by any effects on electrical equipment. Two cargo lights of commercial manufacture had spot welded trunnion clips torn off by either the blast pressure or by shock.

(e) Effects peculiar to the atom bomb.

The heating of cable as mentioned above and the blistering of paint was due, apparently, to radiant heat emanating from the focus of the blast. This was the only effect noted as being peculiar to atomic explosions.

III. Effects of Damage.

(a) Effect on propulsion and ship control.

There was no effect on propulsion and ship control caused by damage to electrical equipment.

(b) Effect on gunnery and fire control.

There was no effect on gunnery and fire control caused by electrical equipment damage.

(c) Effect on water-tight integrity and stability.

No failure of electrical systems had any effect on water-tight integrity and stability.

(d) Effect on personnel and habitability.

There was no failure of electrical equipment that in any way affected the habitability of the vessel.

(e) Total effect on fighting efficiency.

The fighting efficiency of the vessel would have been slightly reduced by the failure of the cargo winch controller, which would have slowed unloading.

IV. General Summary of Observers' Impressions and Conclusions.

A blast of heat and a pressure wave struck the vessel causing only minor damage. A ship's force could have quickly repaired or neutralized the damage that did occur in the electrical equipment.

V. Recommendations.

The damage to electrical equipment is not of a nature or amount to call for any recommendations.

DETAILED DESCRIPTION OF ELECTRICAL DAMAGE

A. General Description of Electrical Damage.

(a) Overall condition.

The overall condition of the electrical plant was very good.

(b) Areas of major damage.

There were no areas of major damage. Very minor heat and blast damage was observed on the weather surfaces.

(c) Primary causes of damage in each area of major damage.

The blast pressure, blast heat and shock were the only causes of damage.

(d) Operability of the electric plant.

1. Ship's service generator plant - not affected.

2. Engine and boiler auxiliaries - not affected.

3. Electrical propulsion gear - not affected.

4. Communications - not affected.

5. Fire control circuits - not affected.

6. Ventilation - not affected.

7. Lighting - a few service lamps, two searchlights and two cargo lamps were disabled by the A test.

(e) Damage was confined to a few broken lamp bulbs, a few searchlights with minor breakage, and a cargo winch controller in which a coil holding bolt was sheared.

B. Electrical Propulsion Rotating Equipment.

After Test A, the two electrical propulsion generators and corresponding motors were inspected and jacked over. The machines were satisfactorily operated on dock trial at on-third ahead and astern speed and then operated in service for approximately seven hours. No damage to the machines was revealed by the inspection and operation.

C. Electrical Propulsion Control Equipment.

The two electrical propulsion control boards were examined after Test A and were found to be undamaged. The boards were subsequently operated without difficulty for dock trial and change of berth.

D. Ship's Service Generators.

The three ship's service A.C. turbo-generator sets with main excitation D.C. units; and the two ship's service D.C. turbo-generator units were examined following Test A and no damage was found. The sets were operated to supply normal load without difficulty.

E. Emergency Generators.

The emergency diesel generator was inspected and then operated to supply ship's load, following Test A. No damage to the machine was found. The machine started without difficulty upon the return of the ship's force after the test.

F. Switchboards and Distribution Panels.

The two ship's service switchboards, two distribution boards, emergency switchboards, and distribution panels through the ship were inspected following Test A and no damage was found. The boards and panels were operated normally after inspection.

G. Wiring, Wiring Equipment and Wireways.

1. Inspection of wiring and wiring equipment after Test A revealed negligible damage.

2. An unpainted armored cable on the after side of the mainmast was found to have been heated sufficiently to cause slight exudation through armor and charring of cable sheath. Adjacent similar cables, painted, were unharmed.

3. A rubber covered portable cable temporarily installed over the fantail was severely charred but still usable.

H. Transformers.

No transformers on the vessel were found to have been damaged in any way by Test A. The transformers were operated regularly for ship's service in the period following the blast.

I. Submarine Propelling Batteries.

This item is not applicable.

J. Portable Batteries.

The diesel starting, gyro compass, and other portable batteries were inspected following Test A. No displacement, acid spillage or breakage was found in any battery.

K. Motors, Motor-Generator Sets and Motor Controllers.

1. Only minor damage to motors, motor-generator sets and motor controllers was found on inspection after Test A.

2. The controller, Cutler Hammer cargo winch controller #228212, for cargo winch No. 2, had the retaining bolt on the contactor holding coil sheared off, allowing the coil to drop. The controller is completely enclosed within the winch casing and the damage could only be caused by shock. The lack of any other similar damage in the controller or in nearby controllers indicates that the particular unit may have been faulty.

3. A plastic bulls-eye on GE push button station CR 2942 2KP9C, 01 deck, on aft side of bulkhead 108; was exposed directly to the blast. It was pitted and burned by the heat.

L. Lighting Equipment.

1. The "A" Test caused moderate breakage of lamps. About a dozen rough service lamps were broken throughout the vessel, most of these being located on main deck. The broken lamps were all in protected spaces and were all broken by shock.

2. One lamp socket in the after crew's head and one plastic lamp shade on a bracket lamp in the wardroom were broken. The type numbers on these two items are not known.

3. Two commercial type cargo lights manufactured by Revere Electric Co. (type not marked) were mounted one on either side of the foremast. Both lights failed under the blast in the same way, each having one spot welded trunnion clip broken from the lamp barrel. The lamps were not broken.

M. Searchlights.

1. The "A" Test caused damage to two searchlights on the vessel.

2. The 24" signal searchlight, navy model 39113, mounted on the port side of the forward stack, had the glass arc observation port broken. The port was facing the blast.

3. On the port wing of the signal bridge, the 12" signal searchlight navy model 95213 had the two prong lamp shattered by the blast. It is not known in what direction the light was facing at the time of the blast.

N. Degaussing Equipment.

The degaussing panel was inspected after the "A" Test, and the system, consisting of "M" coil only, was energized to full current. No damage was found in the equipment, nor was any damage found in the type "K" compass compensating coils mounted on the steering and the standard compasses.

O. Gyro Compass Equipment.

An inspection after Test A showed no damage to the master gyro-compass nor to any repeaters. The gyro was started up and settled on the meridian in four hours. All repeaters followed properly. At the time of the staff inspection, the system had been operating for five days.

P. Sound Powered Telephones.

The vessels sound powered telephone system was manned for "underway" condition after Test A, and functioned satisfactorily. On inspection, one handset, located on the port side of the signal bridge, was found to have a slightly charred rubber lead and a charred phenolic nameplate but was serviceable. No other damage to the system was found.

Q. Ship's Service Telephones.

There are no ship's service type phones aboard the vessel.

R. Announcing Systems.

1. An inspection of the "1 MC" announcing system revealed no damage after Test A. The system operated satisfactorily on test.

2. A PAB, "Beachmaster" speaker set, mounted on the flying bridge, was operable after the A test, although the blast on the back of the speaker bent one extension leg and scorched the paint on the speaker.

3. The PAB tripod leg extension is too light for service use.

S. Telegraphs.

No telegraphs were found damaged by the A test. All telegraphs functioned properly during the underway period following the test.

T. Indicating Systems.

All indicating systems were tested after the A blast and found to be satisfactory and in good order.

U. I.C. and A.C.O. Switchboard.

The combined I.C. and A.C.O. switchboard, located in the central station at frame 78 main deck, was inspected and found undamaged after the A blast. The board tested out satisfactorily.

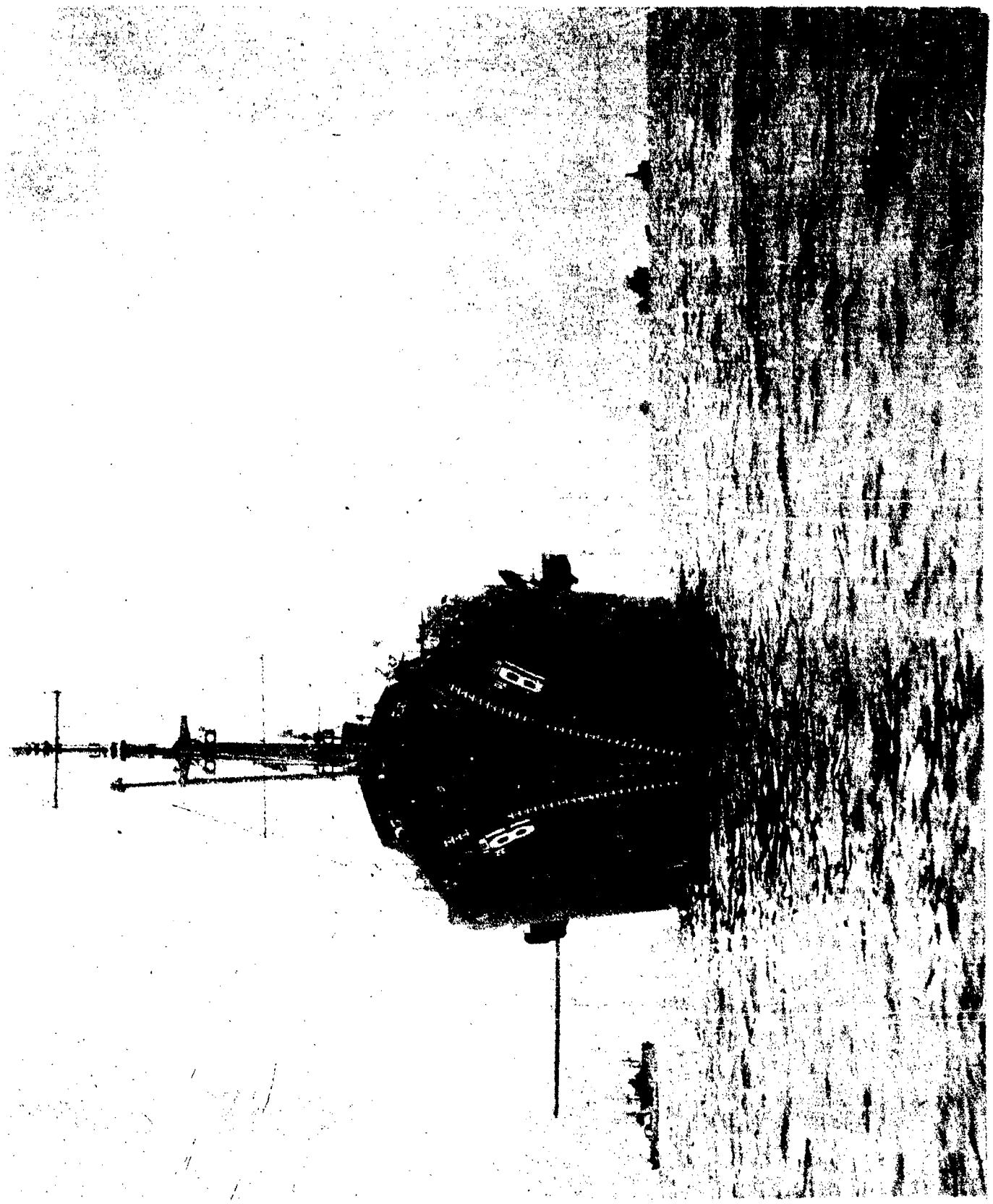
V. F.C. Switchboard.

There is no F.C. switchboard on the vessel.

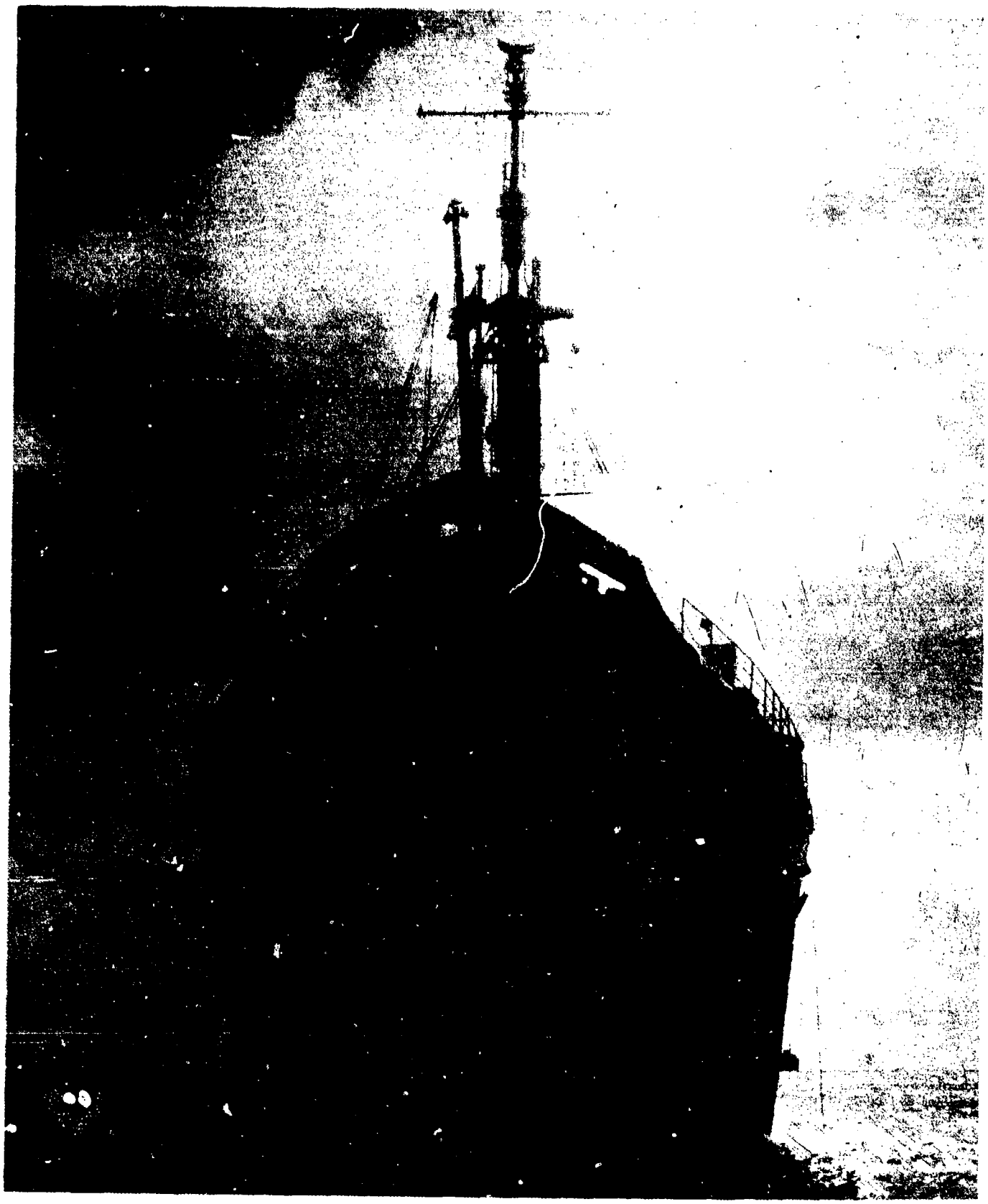
SECTION IV

PHOTOGRAPHS

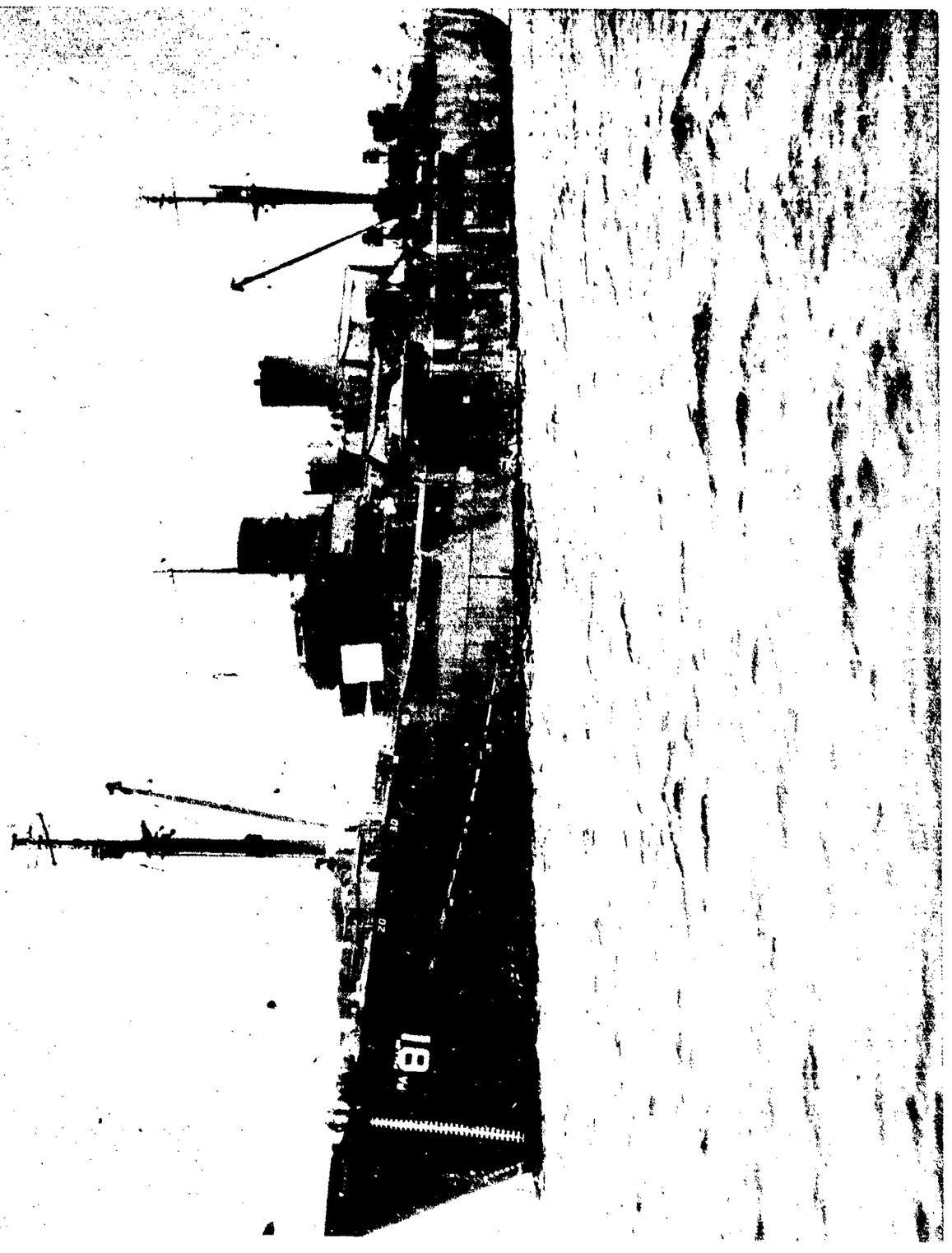
TEST ABLE



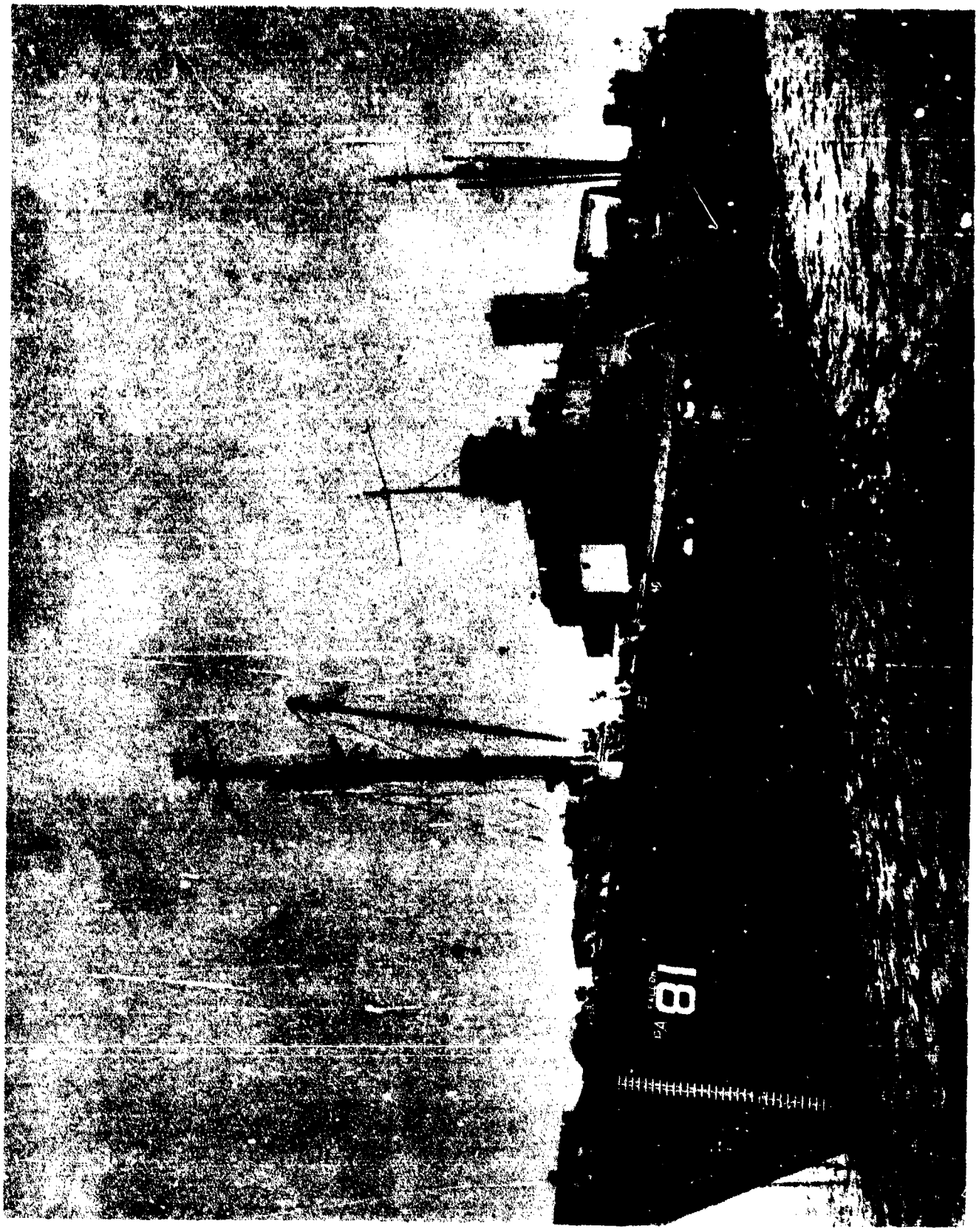
BA-CR-196-159-27. Exterior view from dead ahead before Test A.



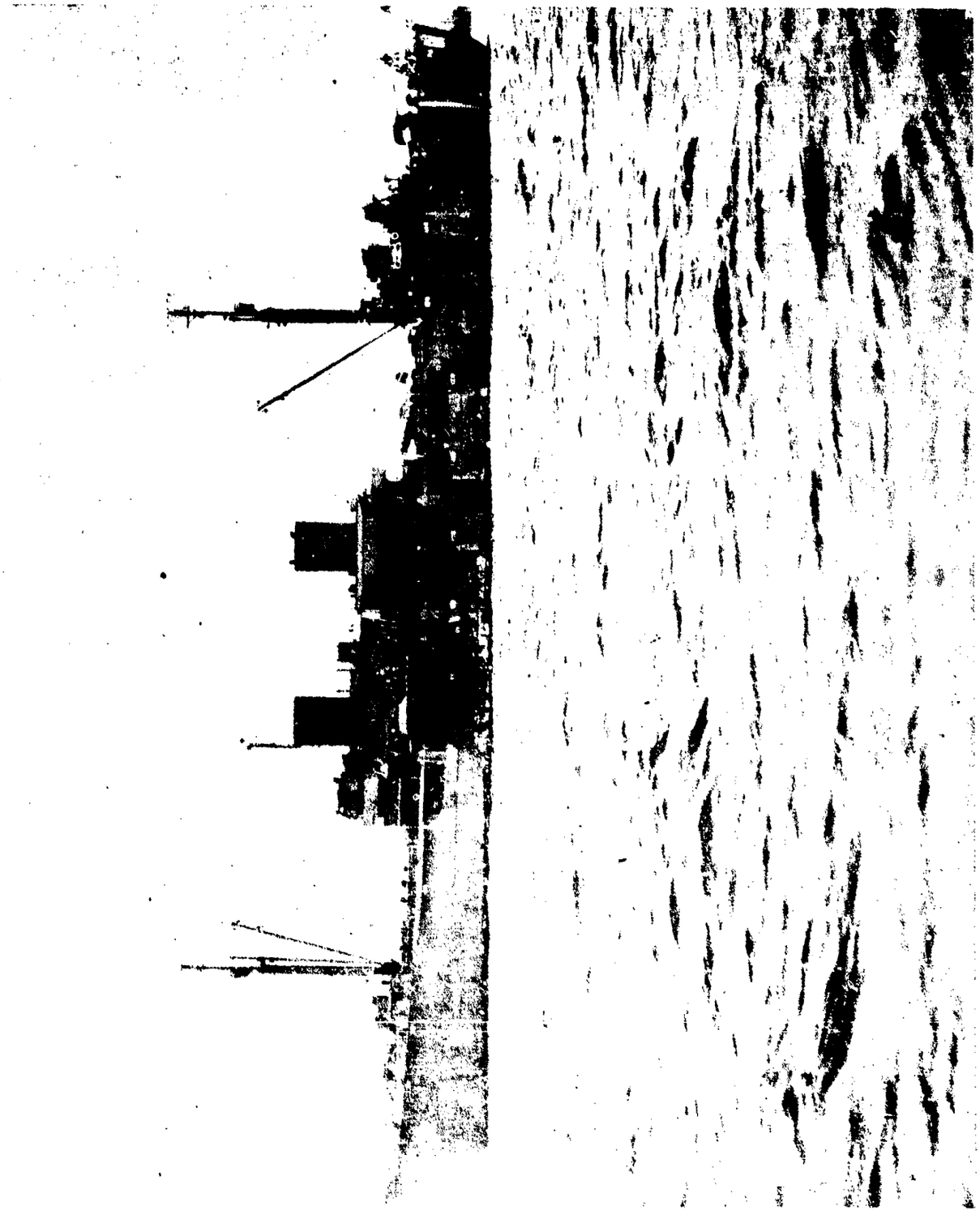
AA-CR-227-50-72. Exterior view from dead ahead after Test A.



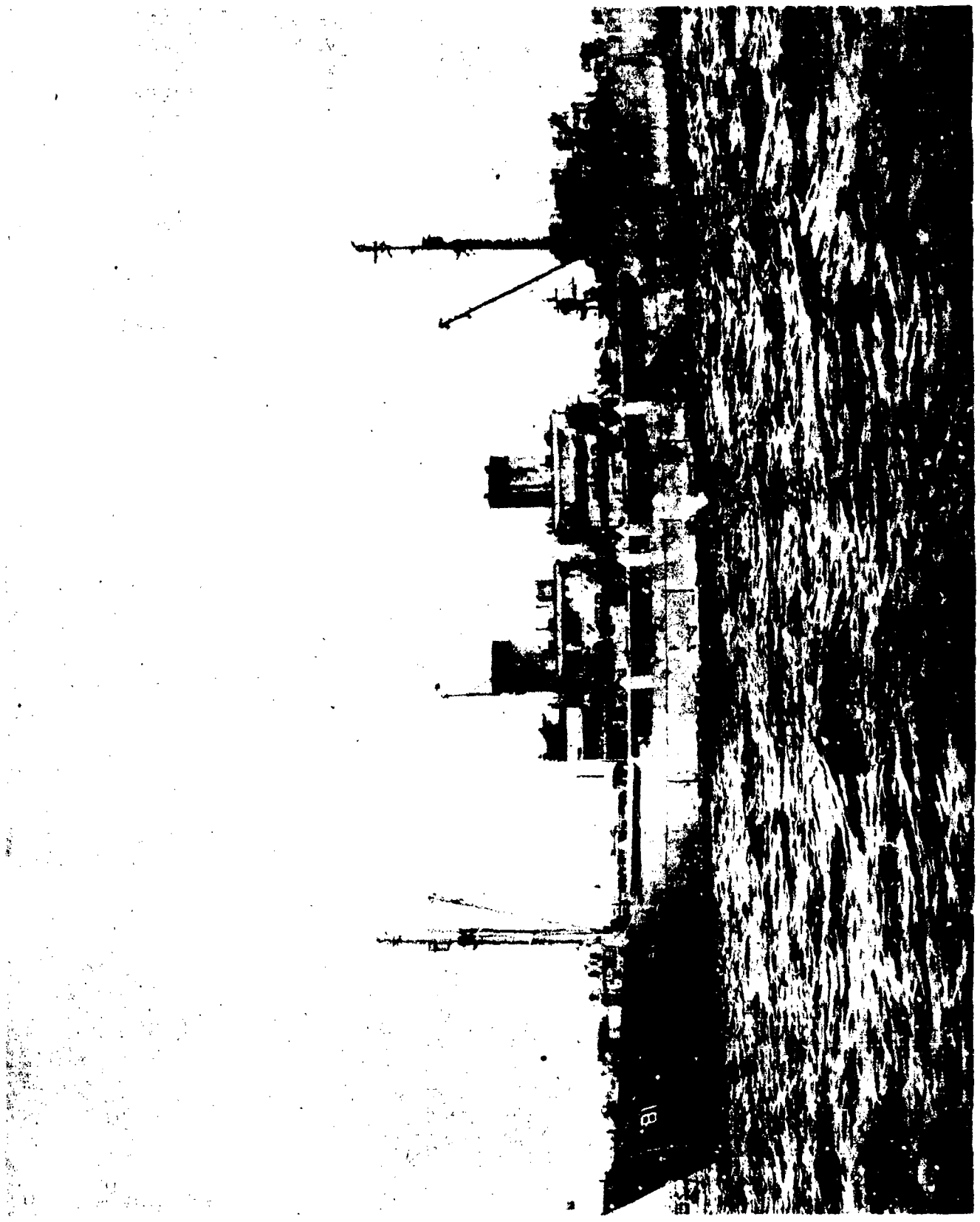
BA-CR-196-159-26. Exterior view on port bow before Test A.



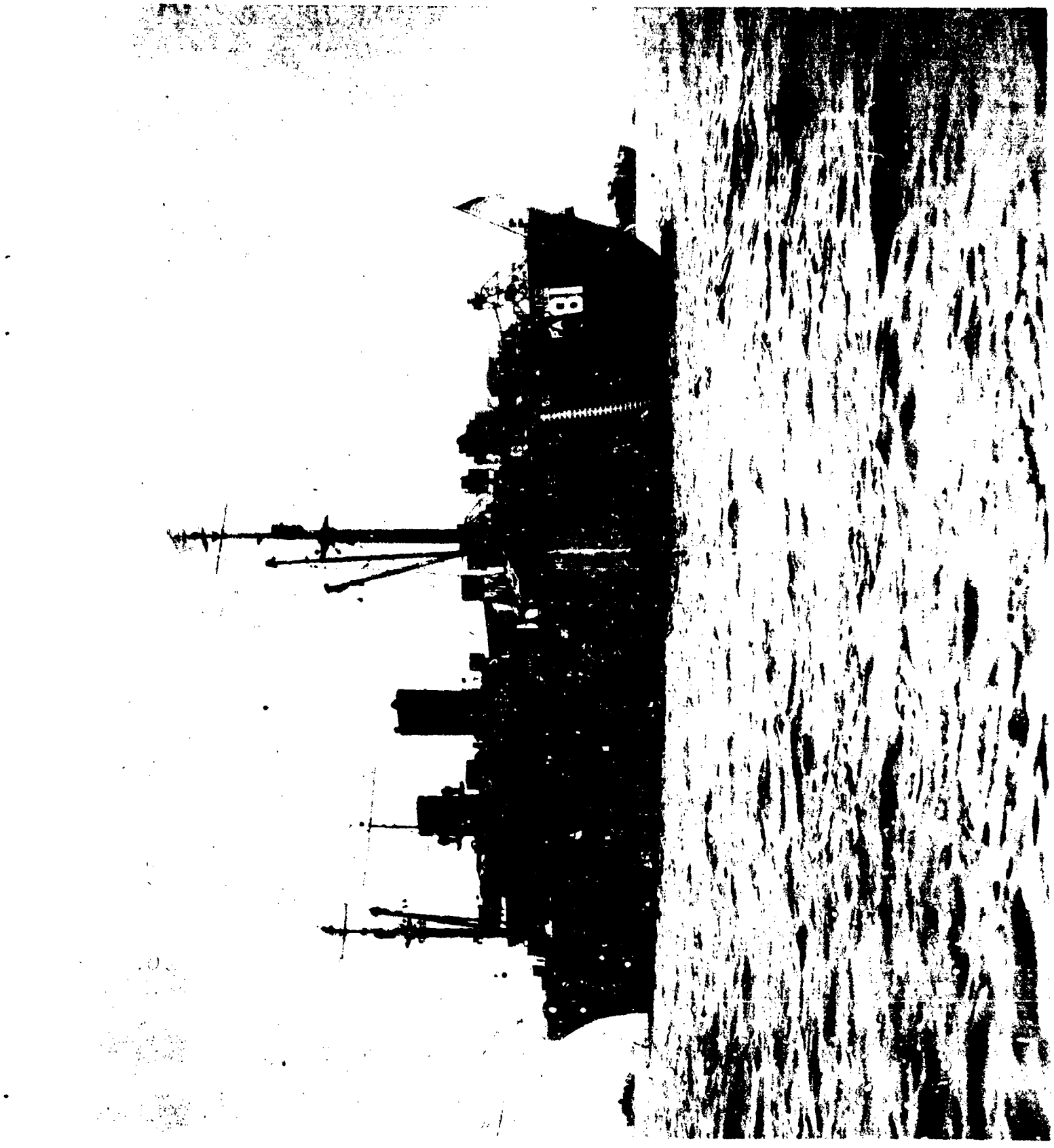
AA-CR-227-50-71. Exterior view on port bow after Test A.



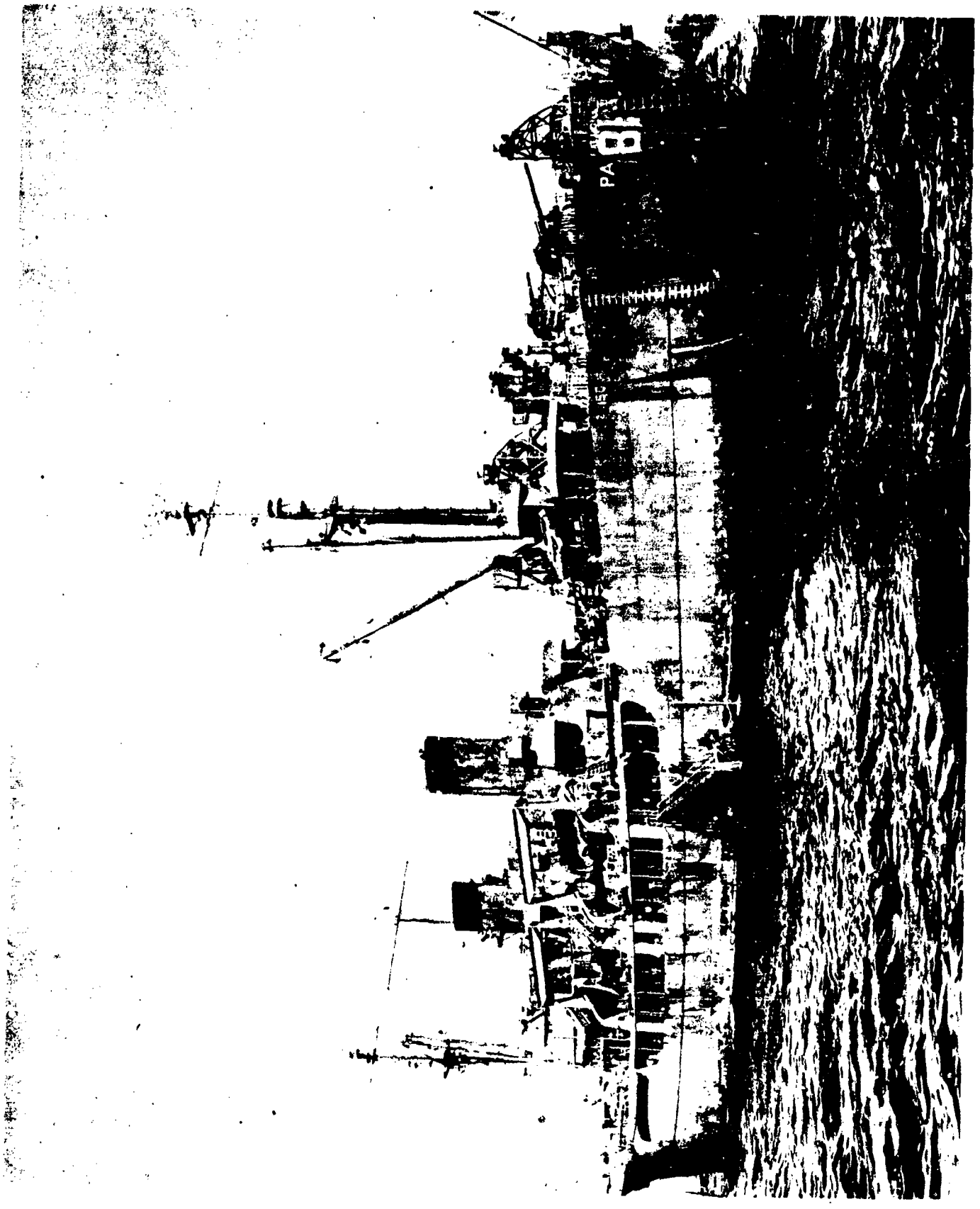
BA-CR-196-159-25. Exterior view on port beam before Test A.



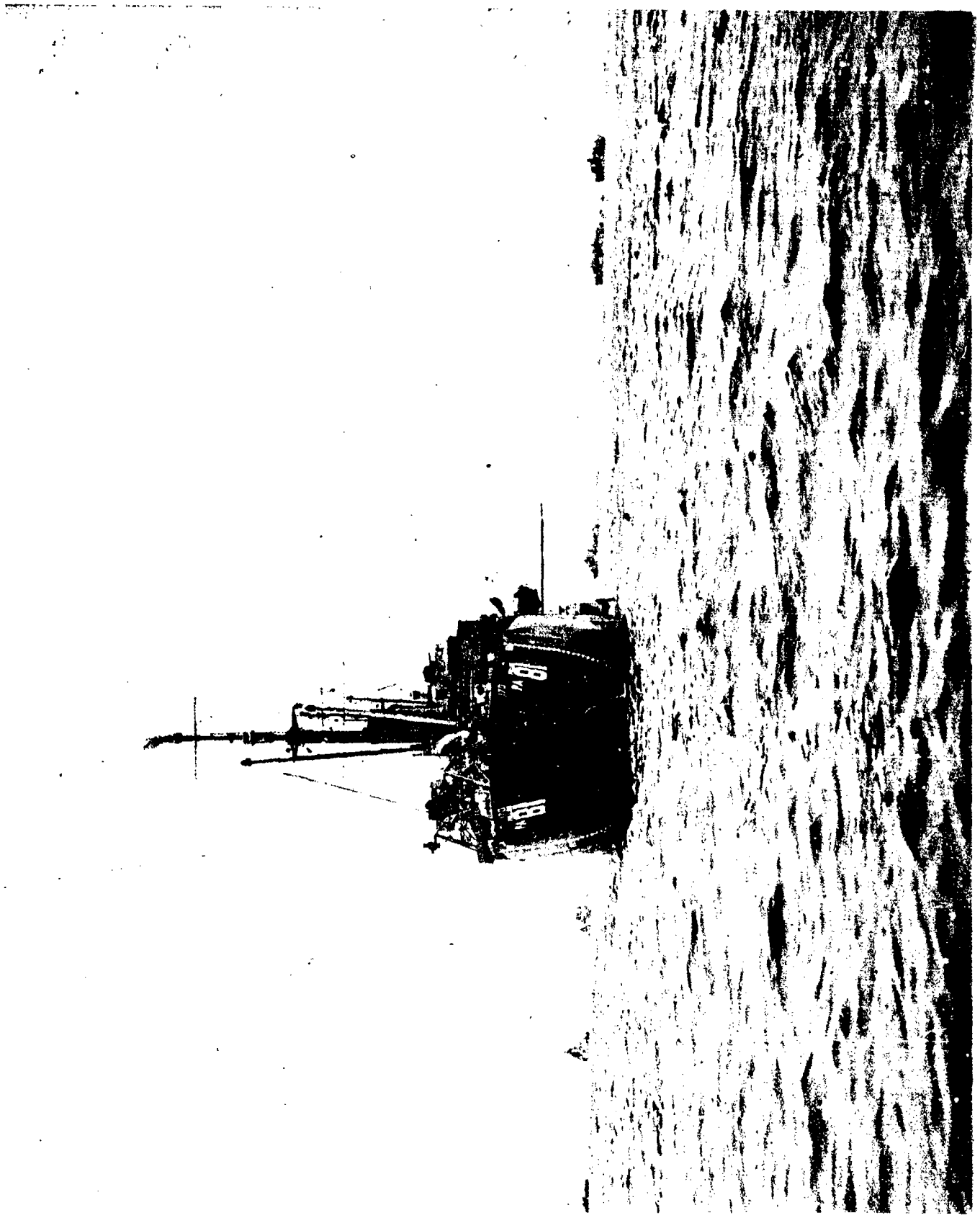
AA-CR-227-50-78. Exterior view on port beam after Test A.



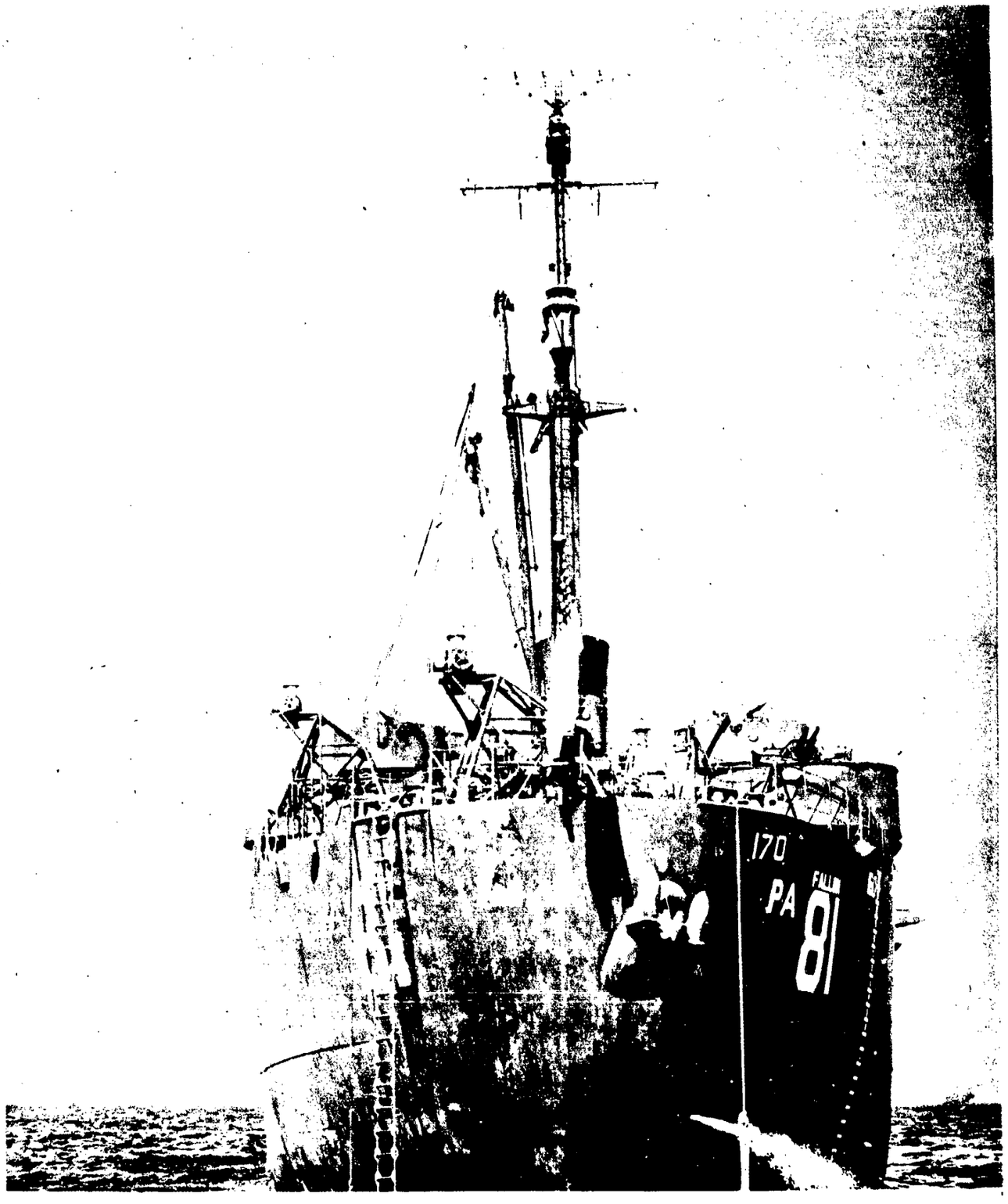
BA-CR-196-159-32. Exterior view on port quarter before Test A.



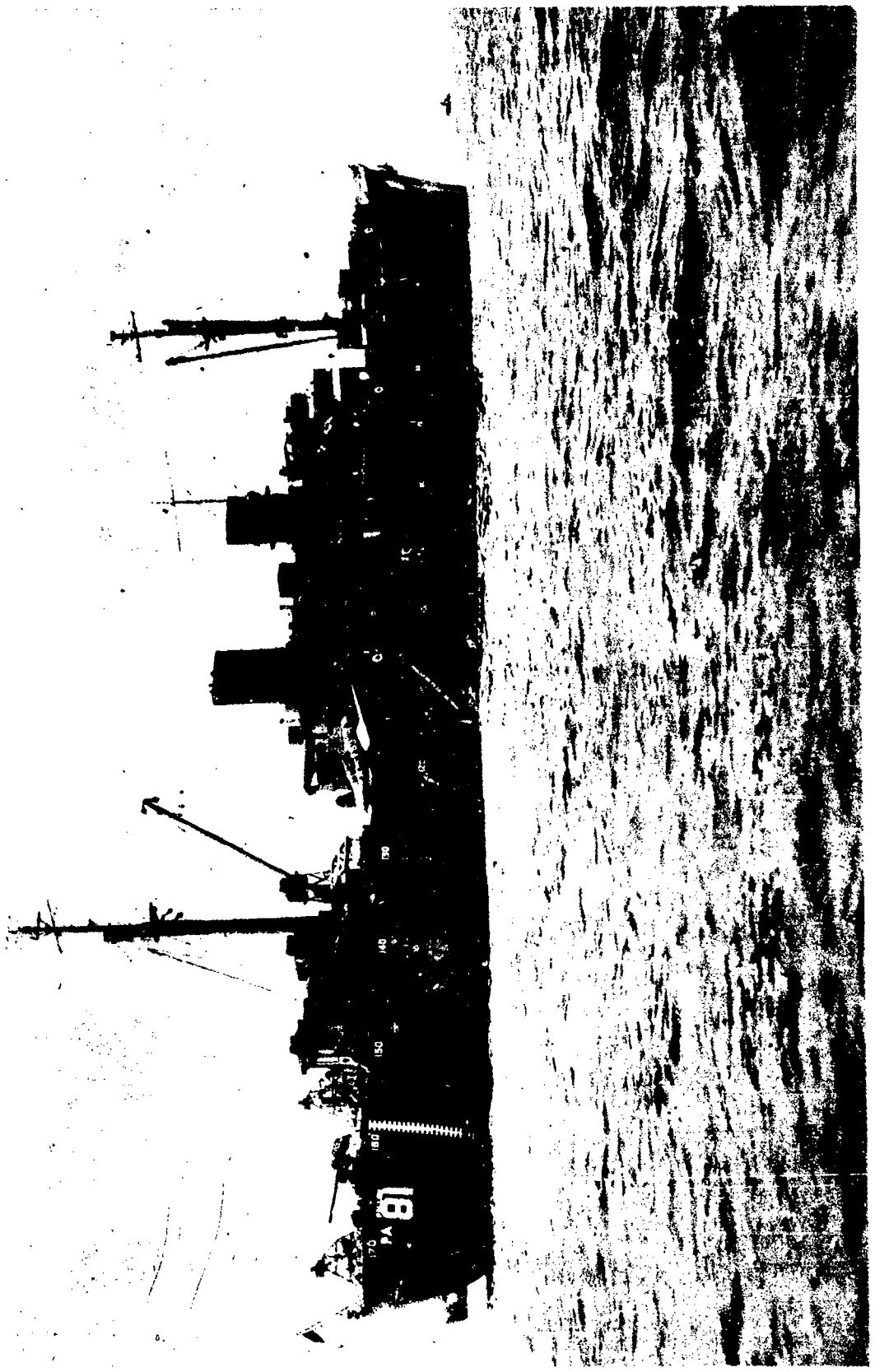
AA-CR-227-50-77. Exterior view on port quarter after Test A.



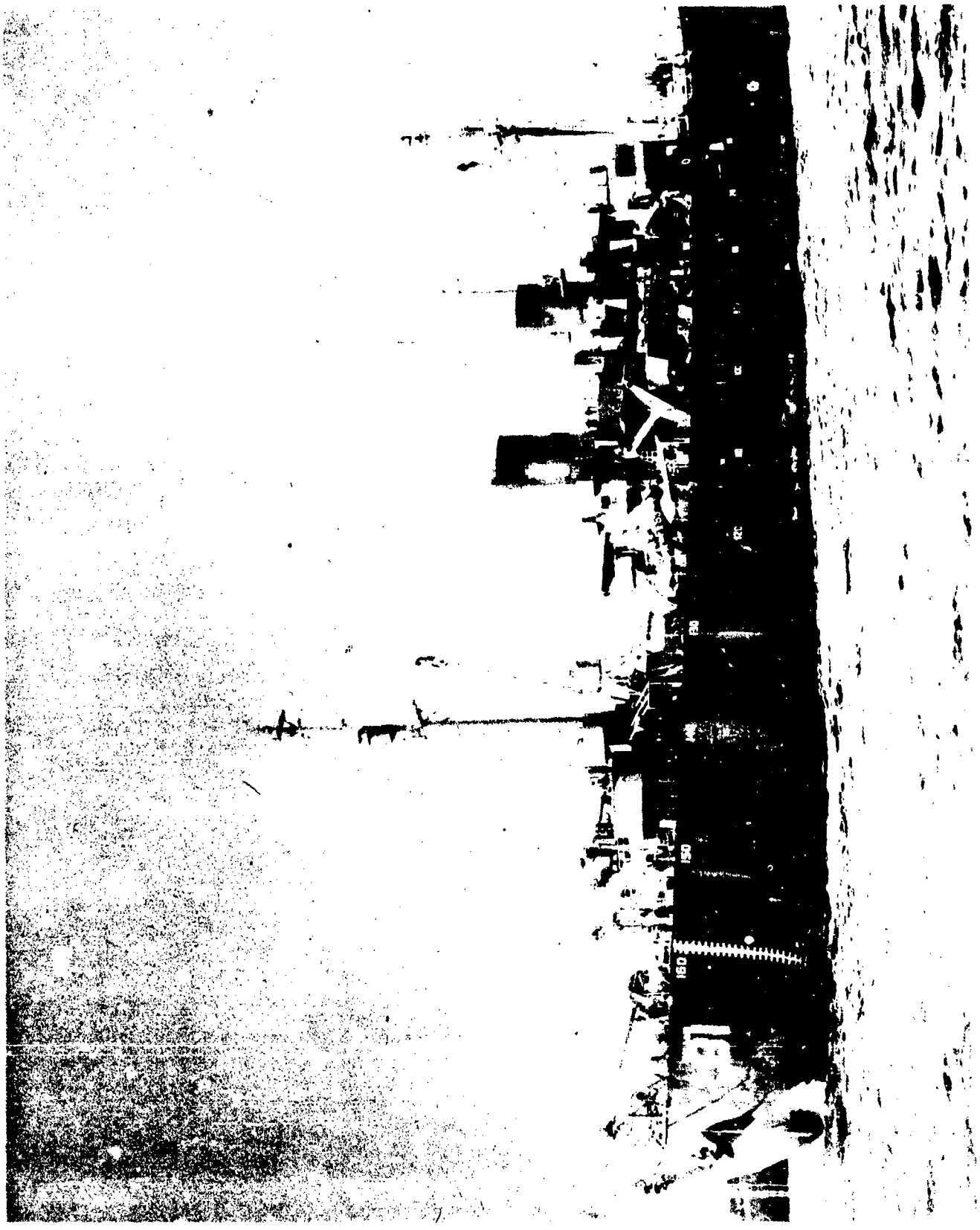
BA-CR-196-159-31. Exterior view from dead astern before Test A.



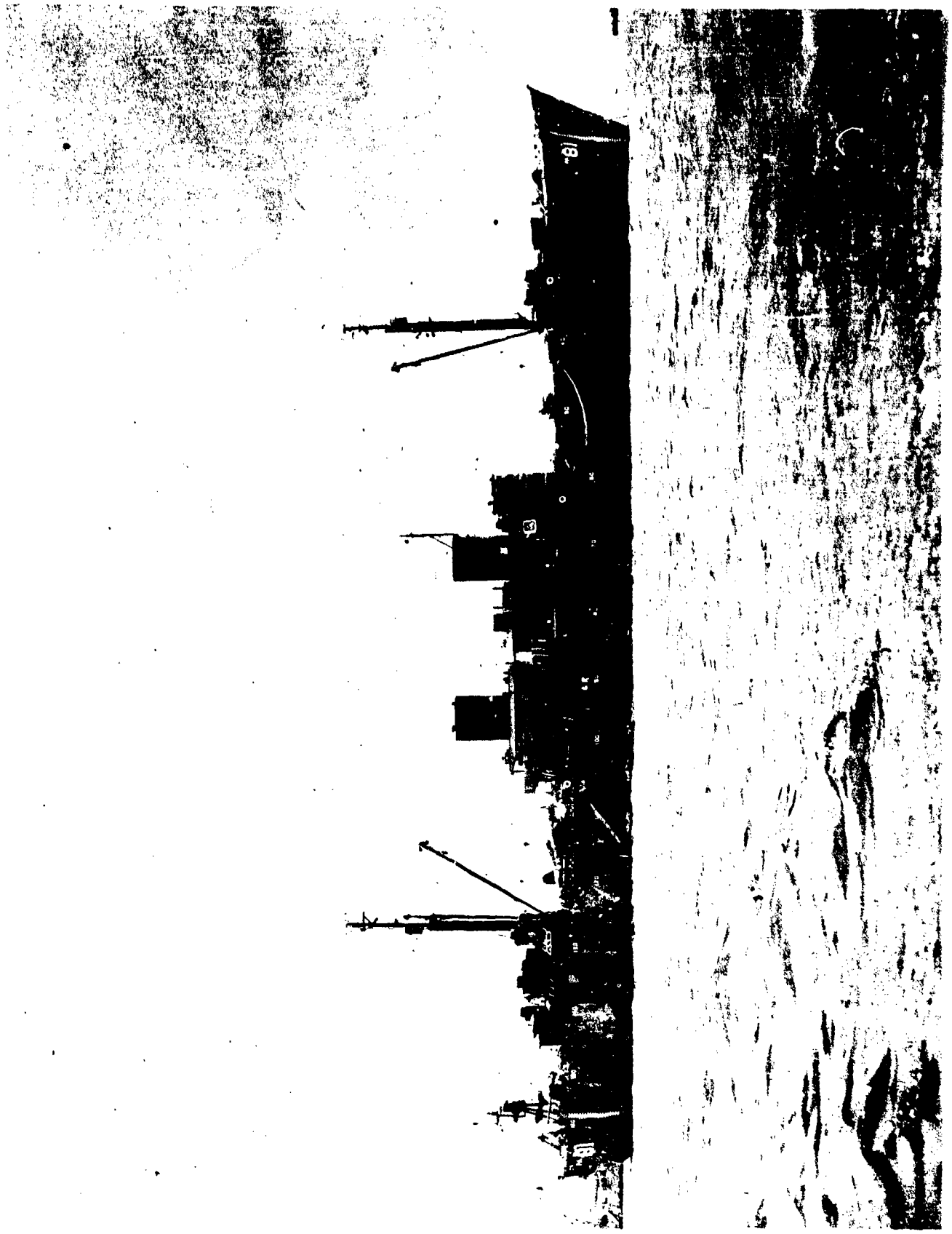
AA-CR-227-50-76. Exterior view from stern after Test A.



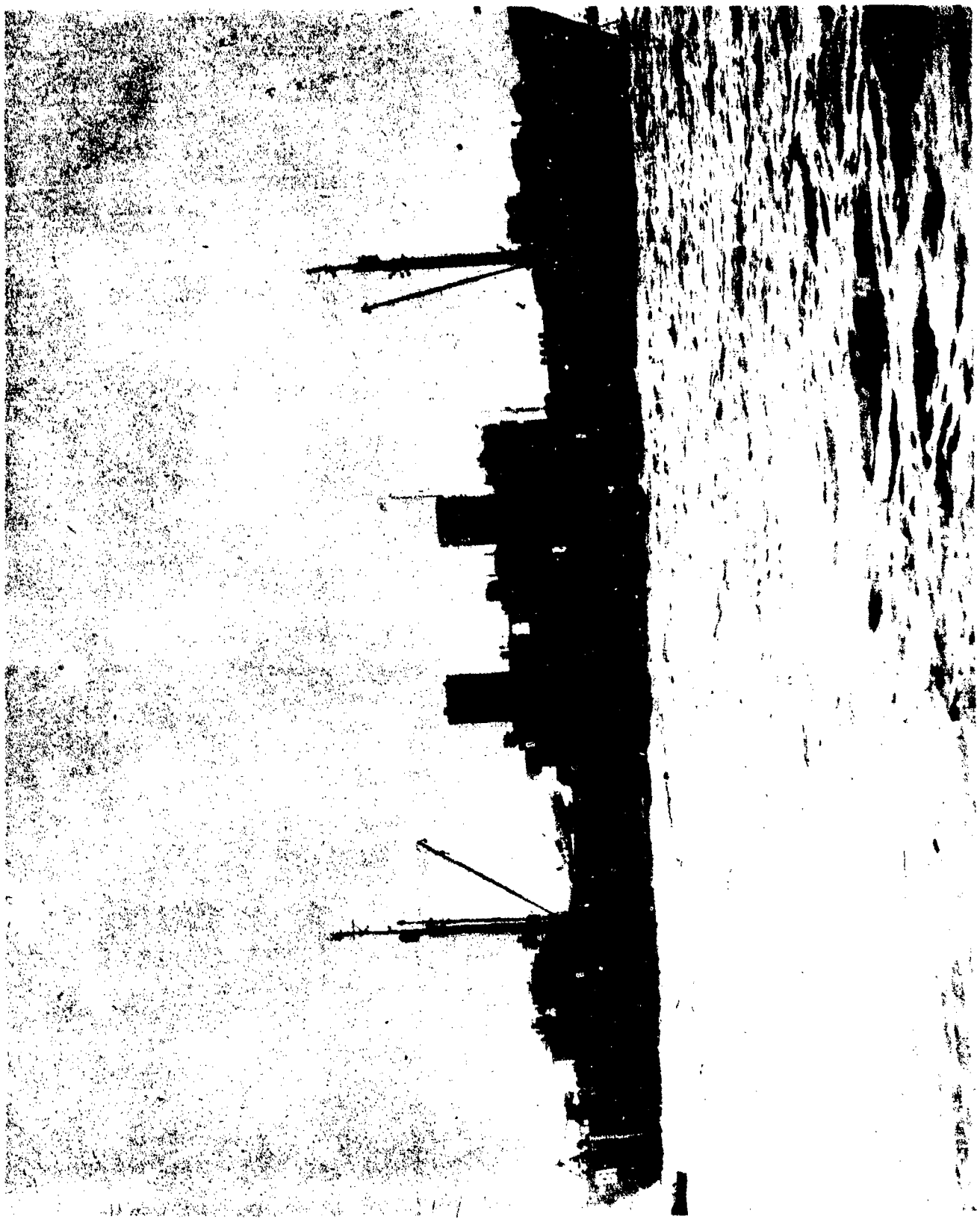
BA-CR-196-159-30. Exterior view on starboard quarter before Test A.



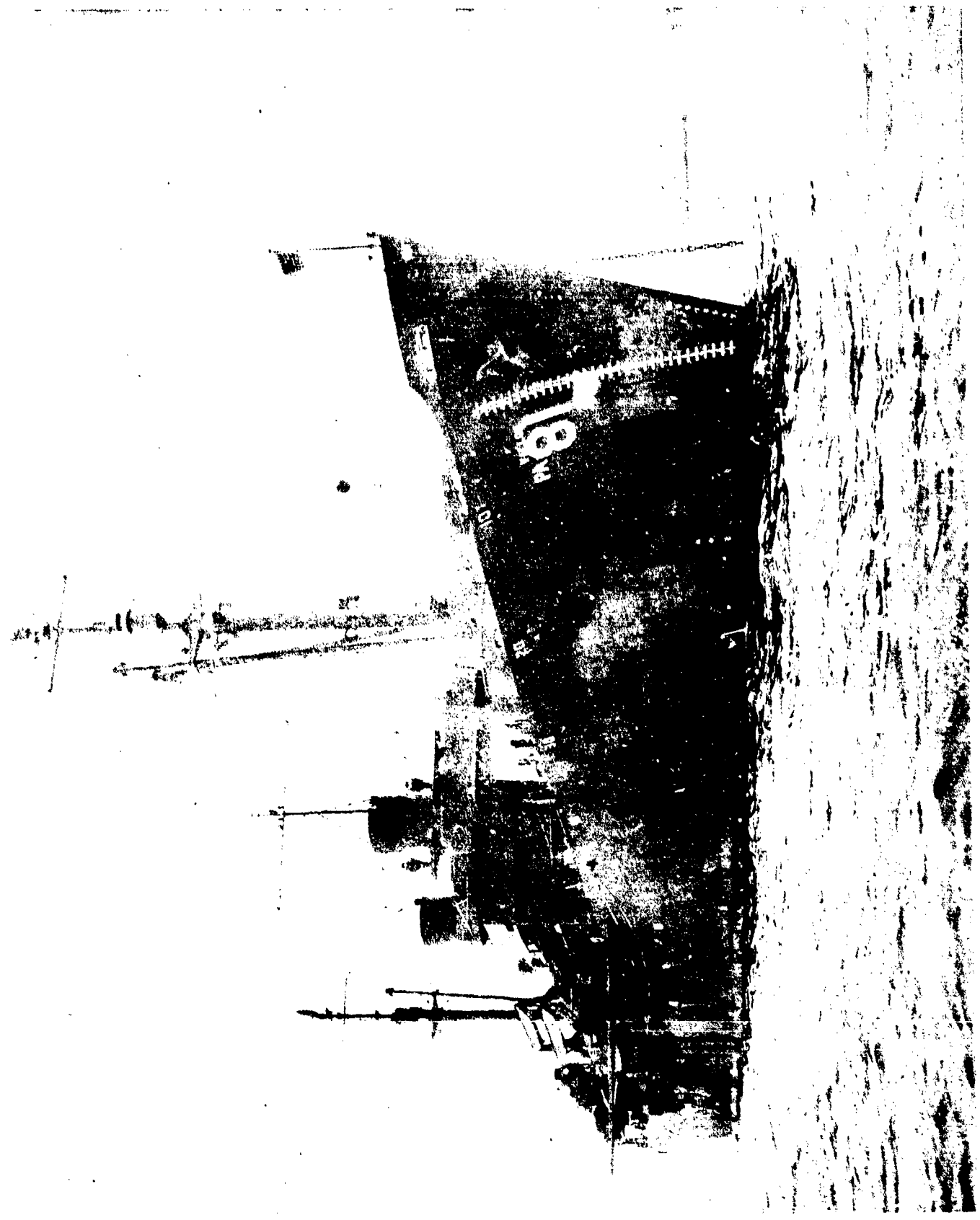
AA-CR-227-50-75. Exterior view on starboard quarter after Test A.



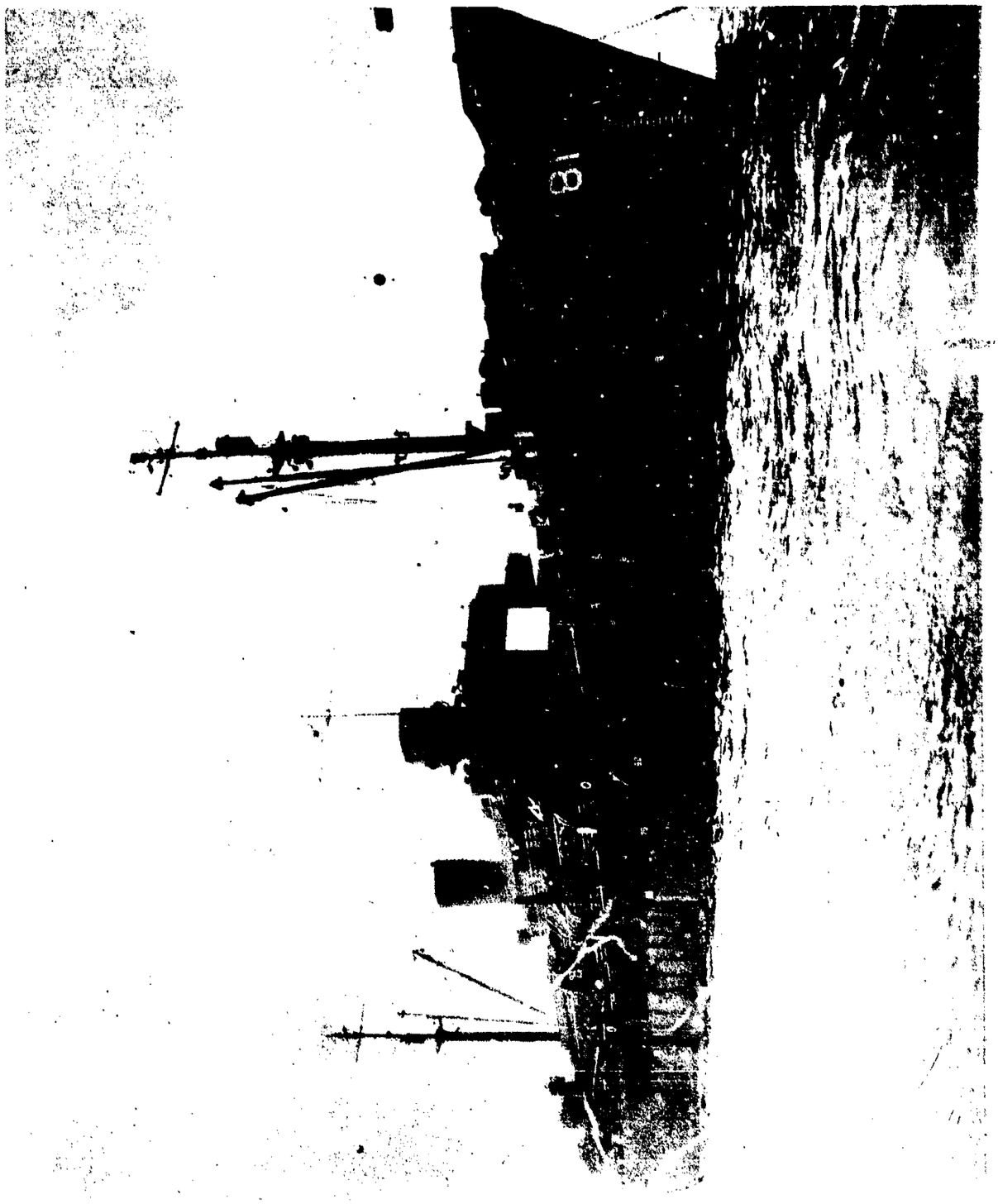
BA-CR-196-159-29. Exterior view on starboard beam before Test A.



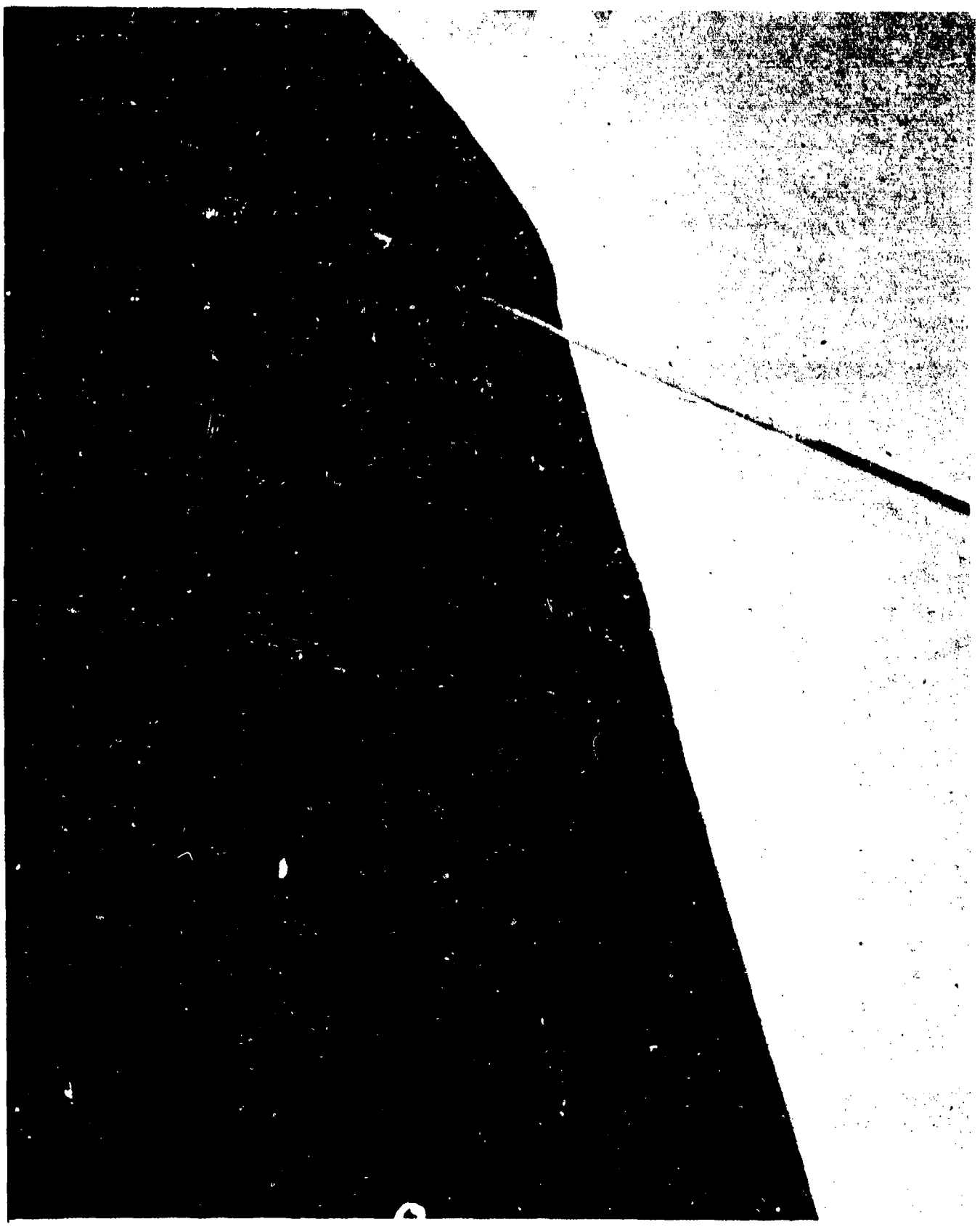
AA-CR-227-50-74. Exterior view on starboard beam after Test A.



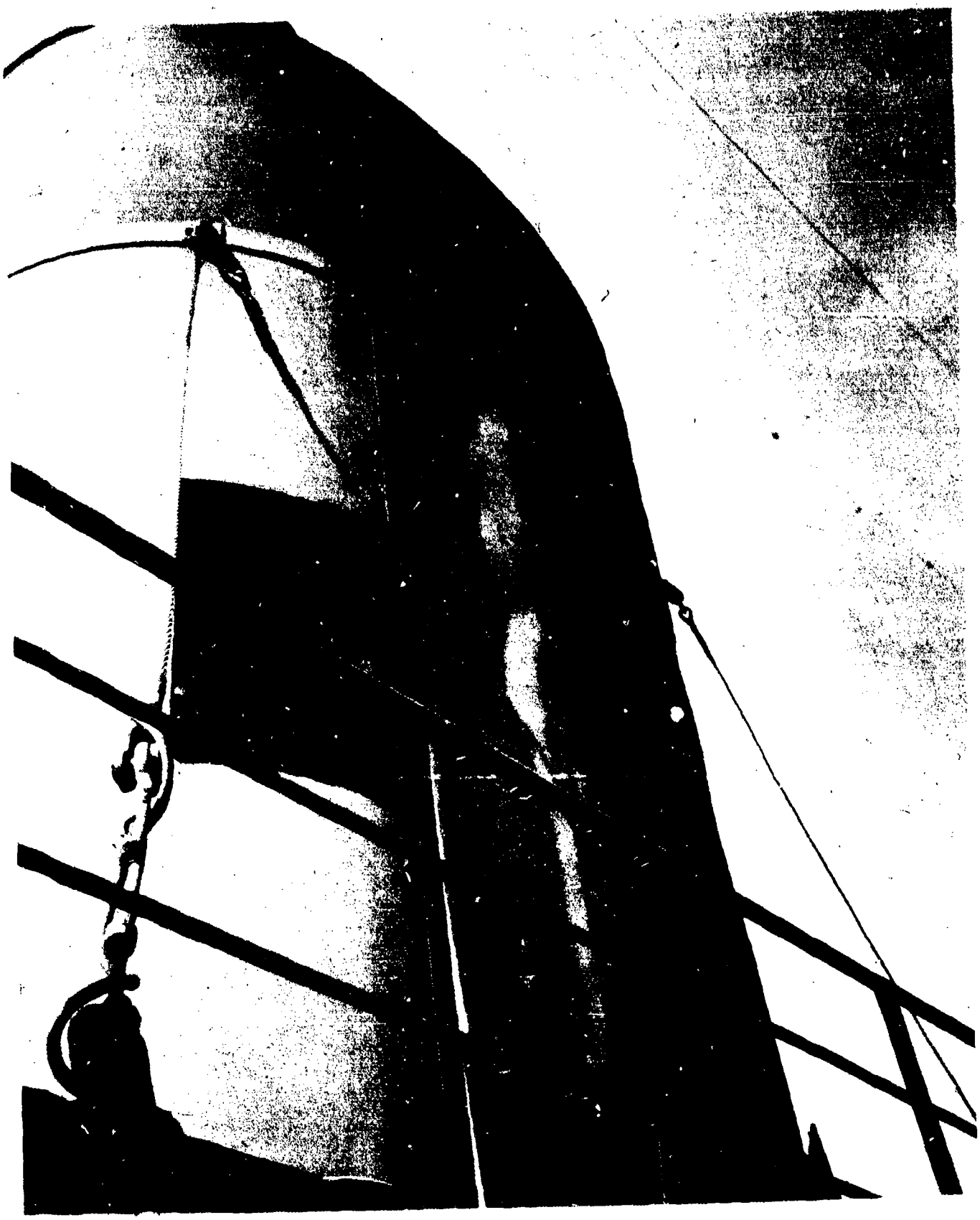
BA-CR-196-159-28. Exterior view on starboard bow before Test A.



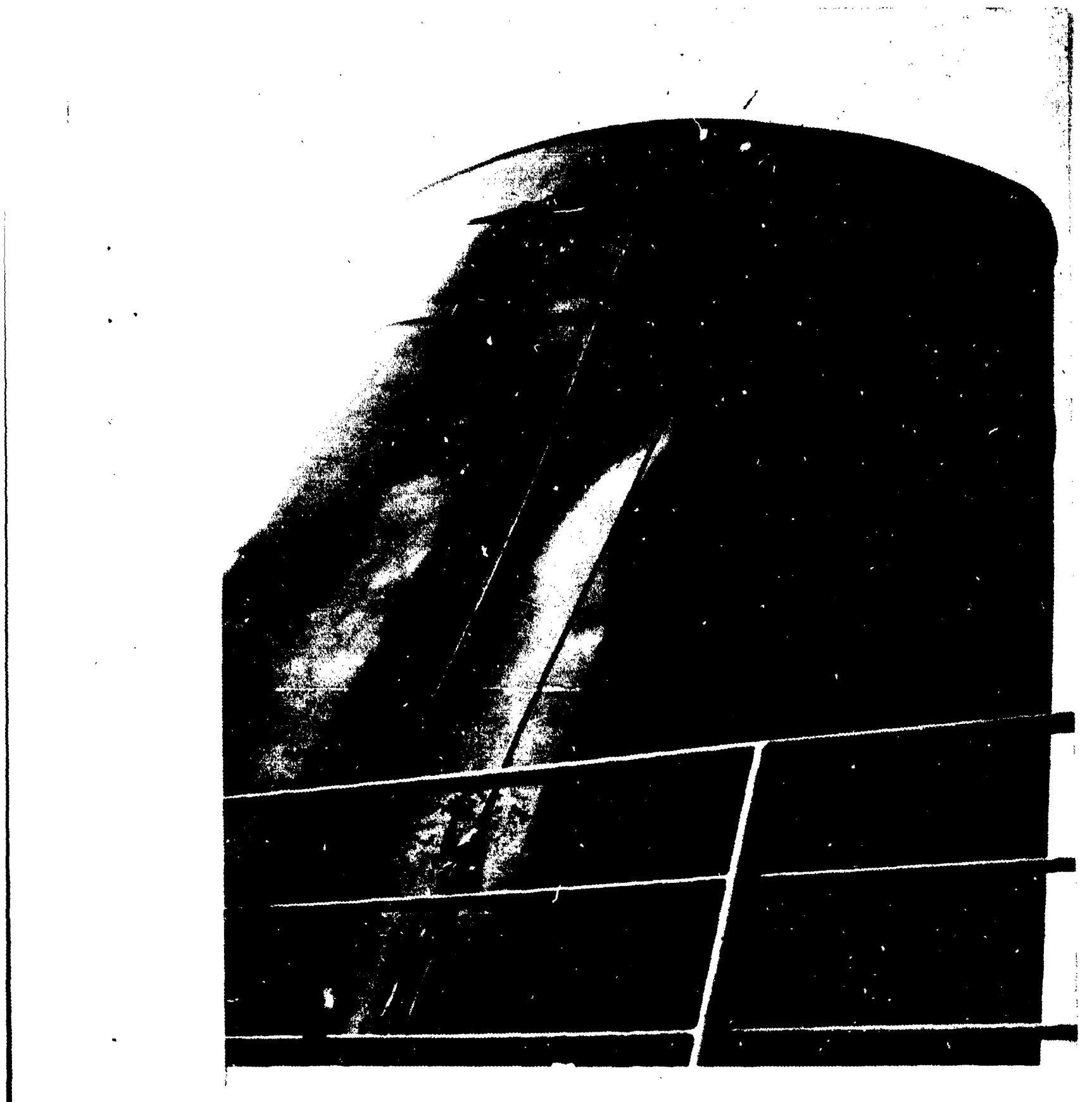
AA-CR-227 -50-73. Exterior view on starboard bow after Test A.



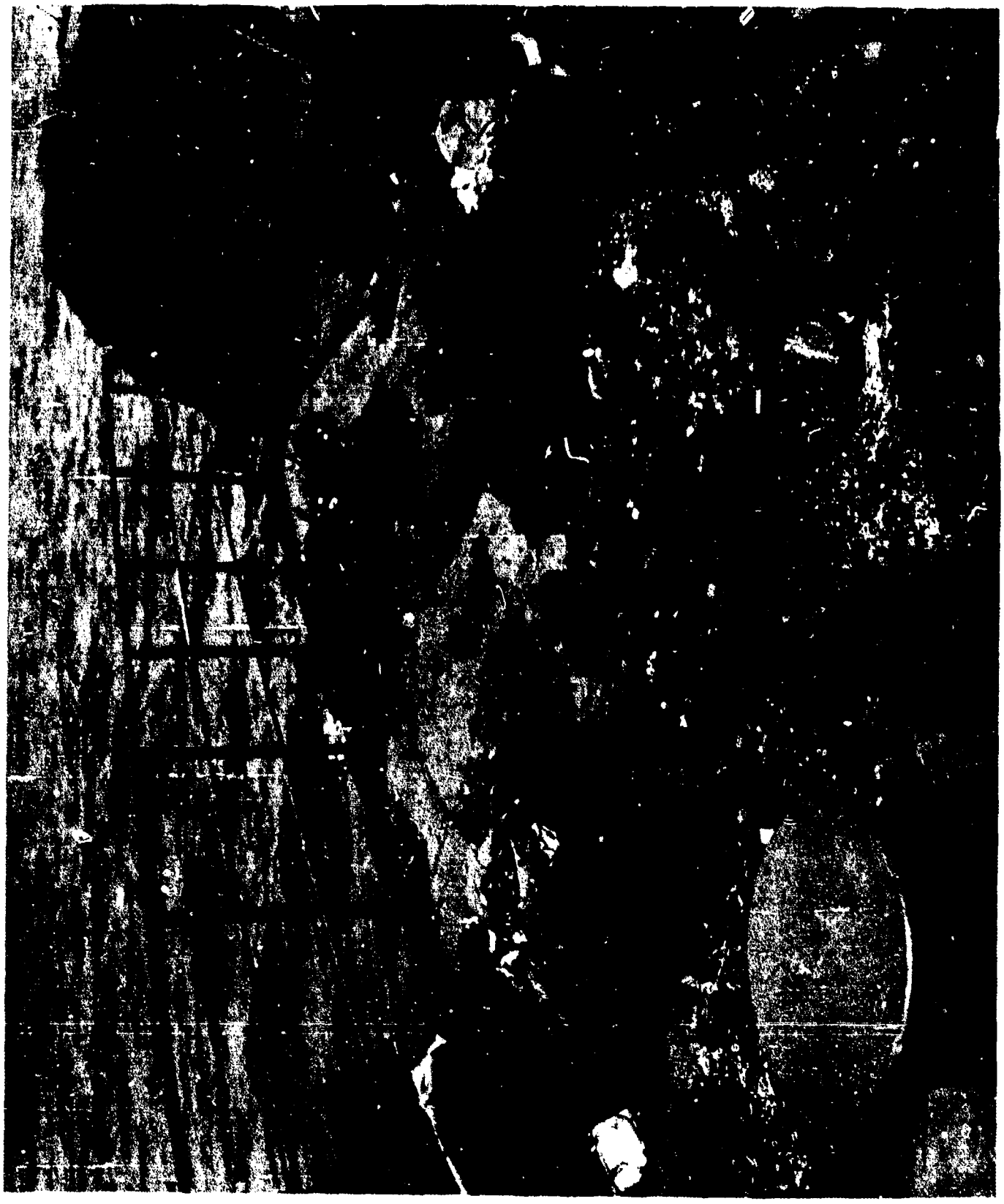
AA-CR-62-2168-8. Forward stack, blast damage to port side.



AA-CR-62-2168-6. After stack, blast damage to port side.

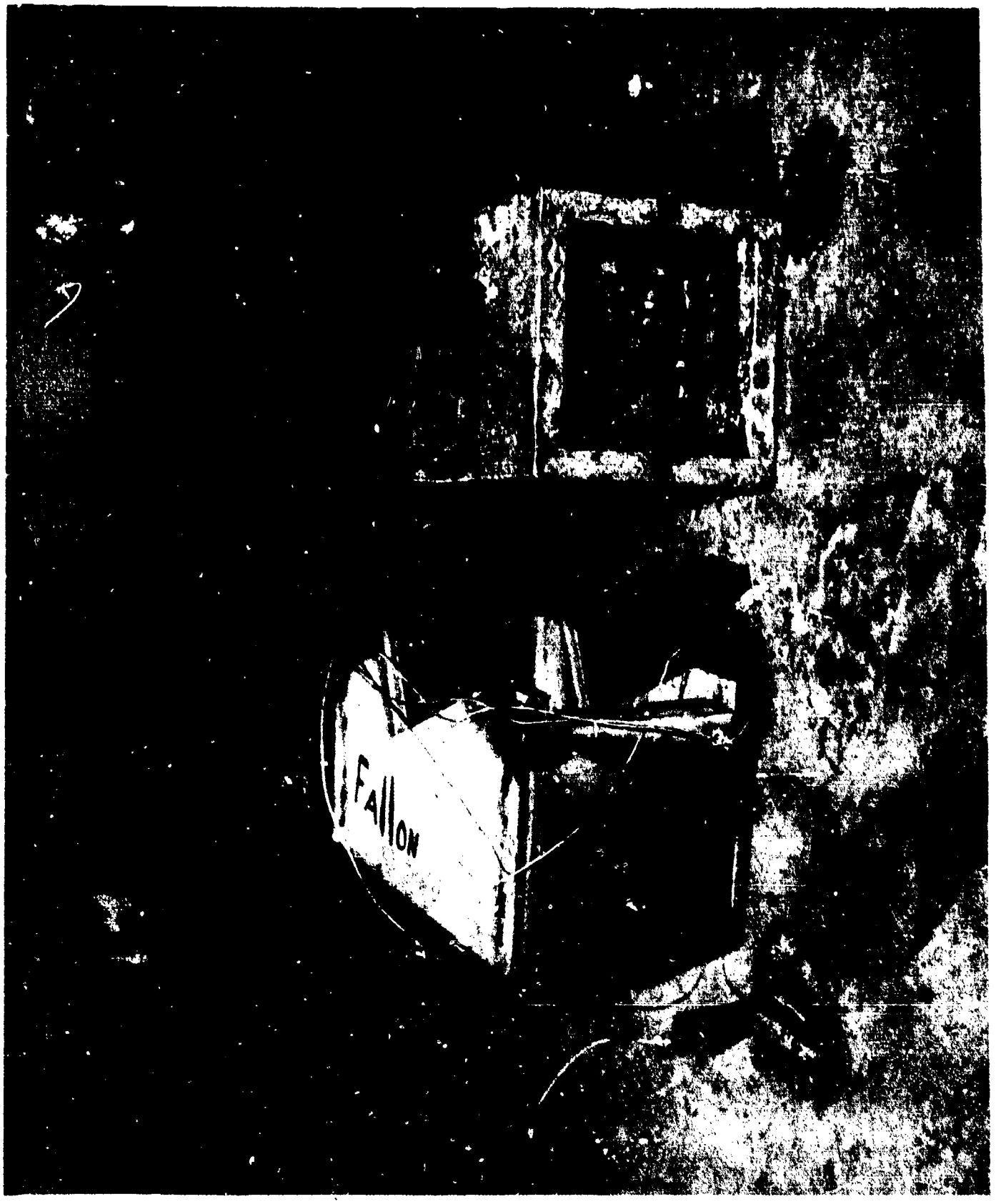


AA-CR-62-2168-7. After stack, blast damage to port side.

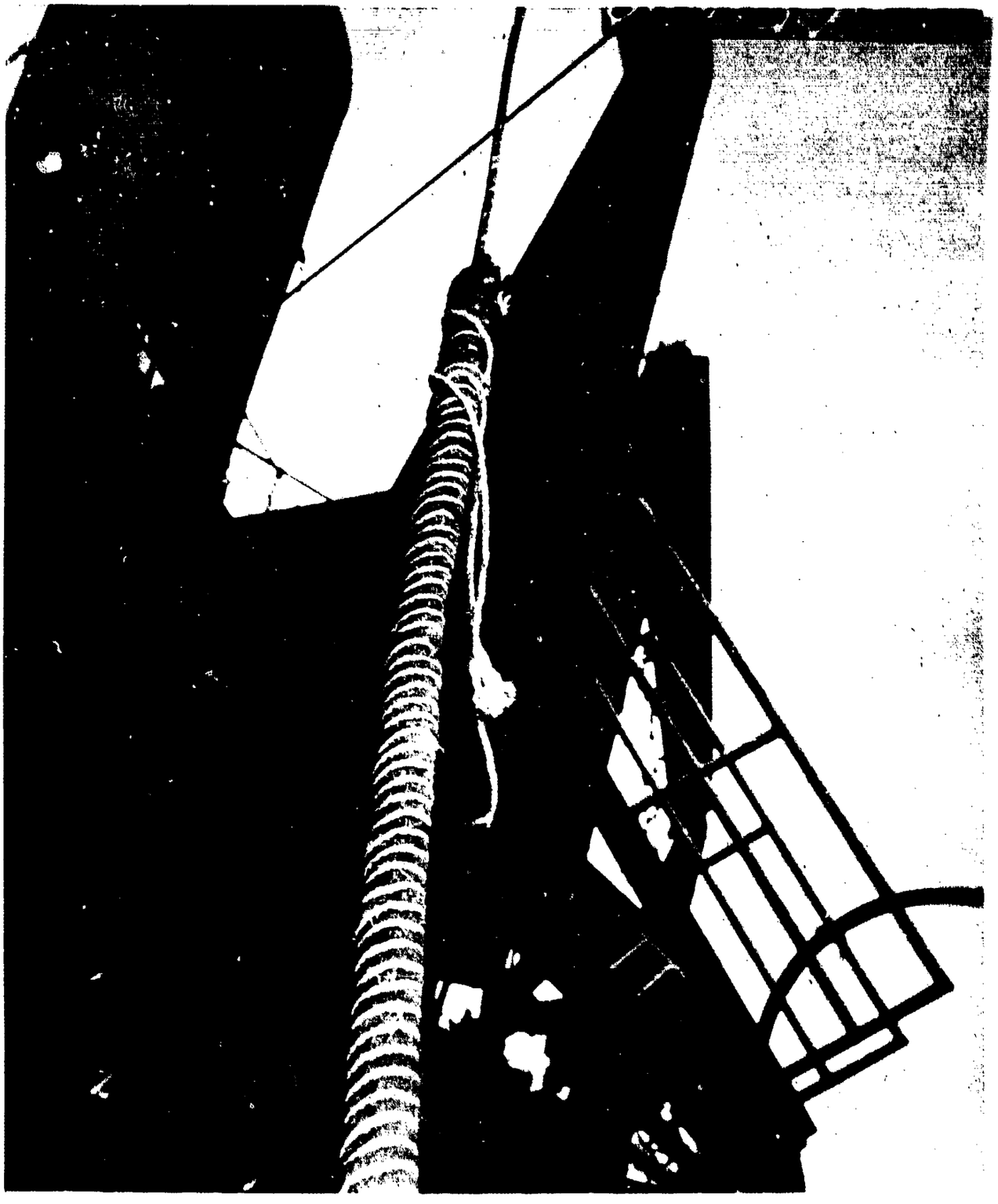


AA-CR-65-1848-2. Upper deck frame 10, starboard, showing burned and charred U.S. Army Quartermaster test equipment.

AA-CR-65-1848-4. Upper deck, frame 41, port, showing lead box and wood stand, rearranged to show position before Test A.



AA-CR-65-1848-5. Upper deck, frame 41, port showing lead box and wood stand, after Test A.

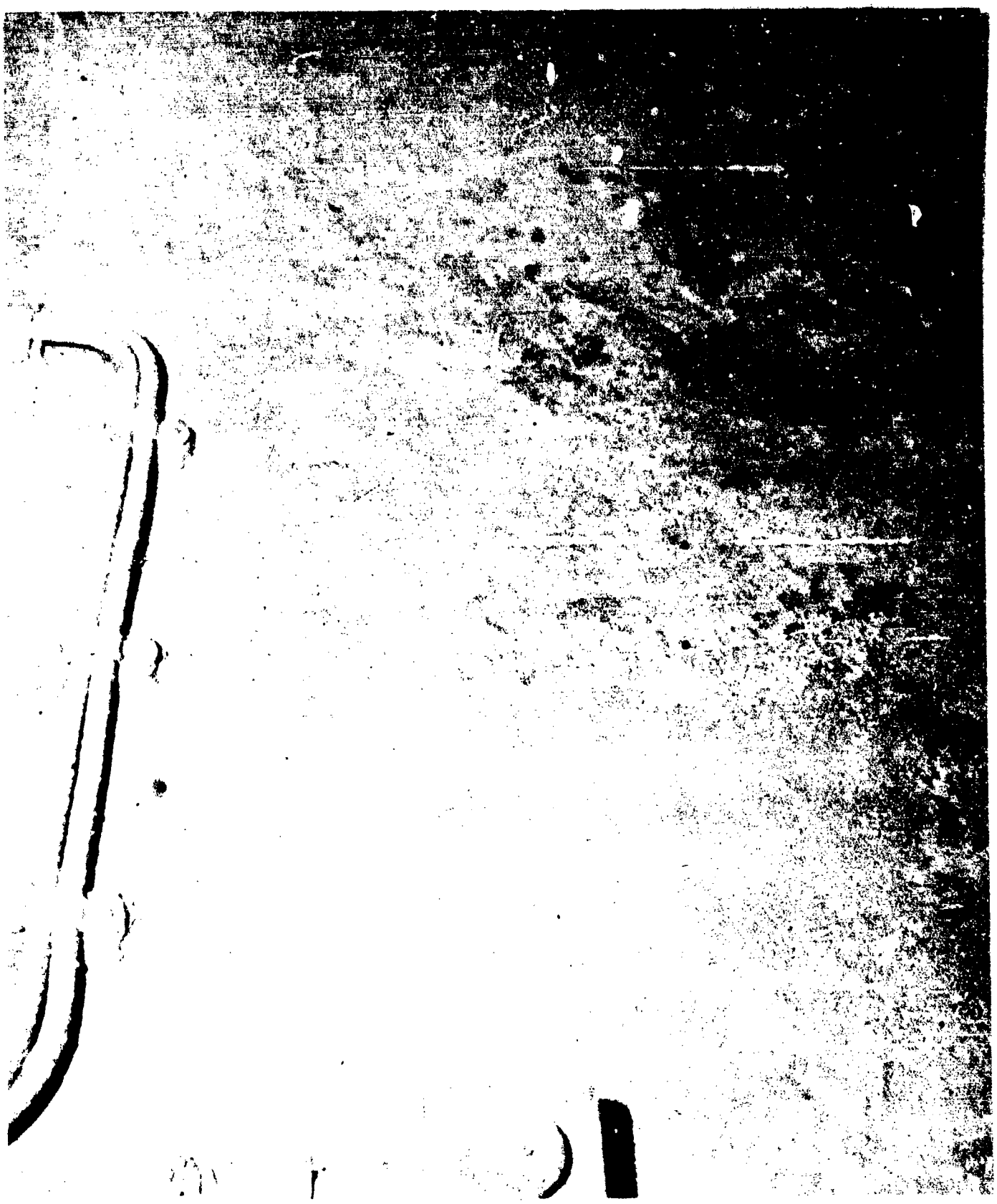


AA-CR-65-1848-6. Forward port boat davit showing burned gripe, upper end of wrapping secured with wire, lower end with marline.

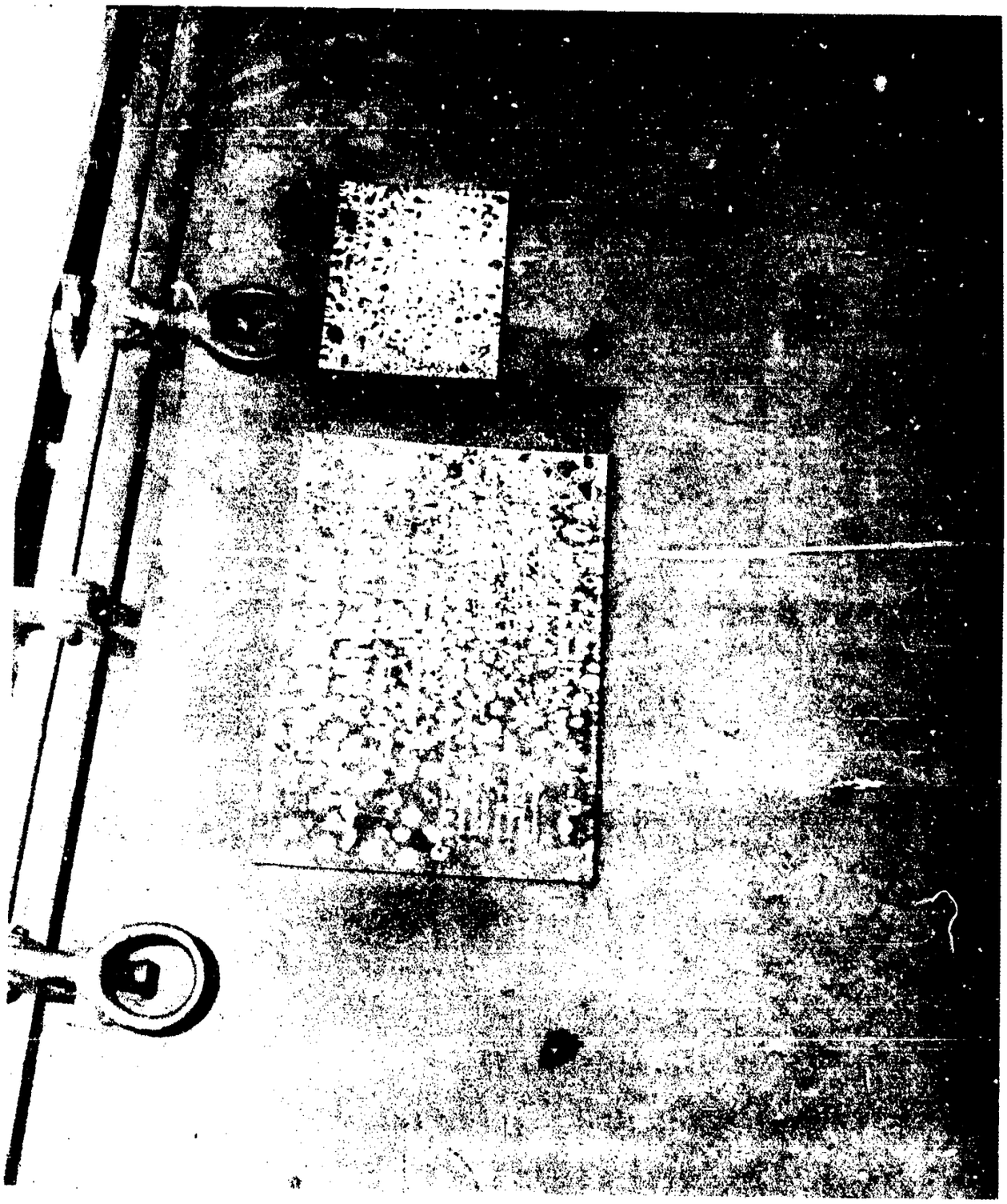
AA-CR-65-1848-8. Top of house, starboard, showing deck area burned by rat cage which fell from signal halyard.

AA-CR-82-1914-2. Scorched paint on after stack, port side.

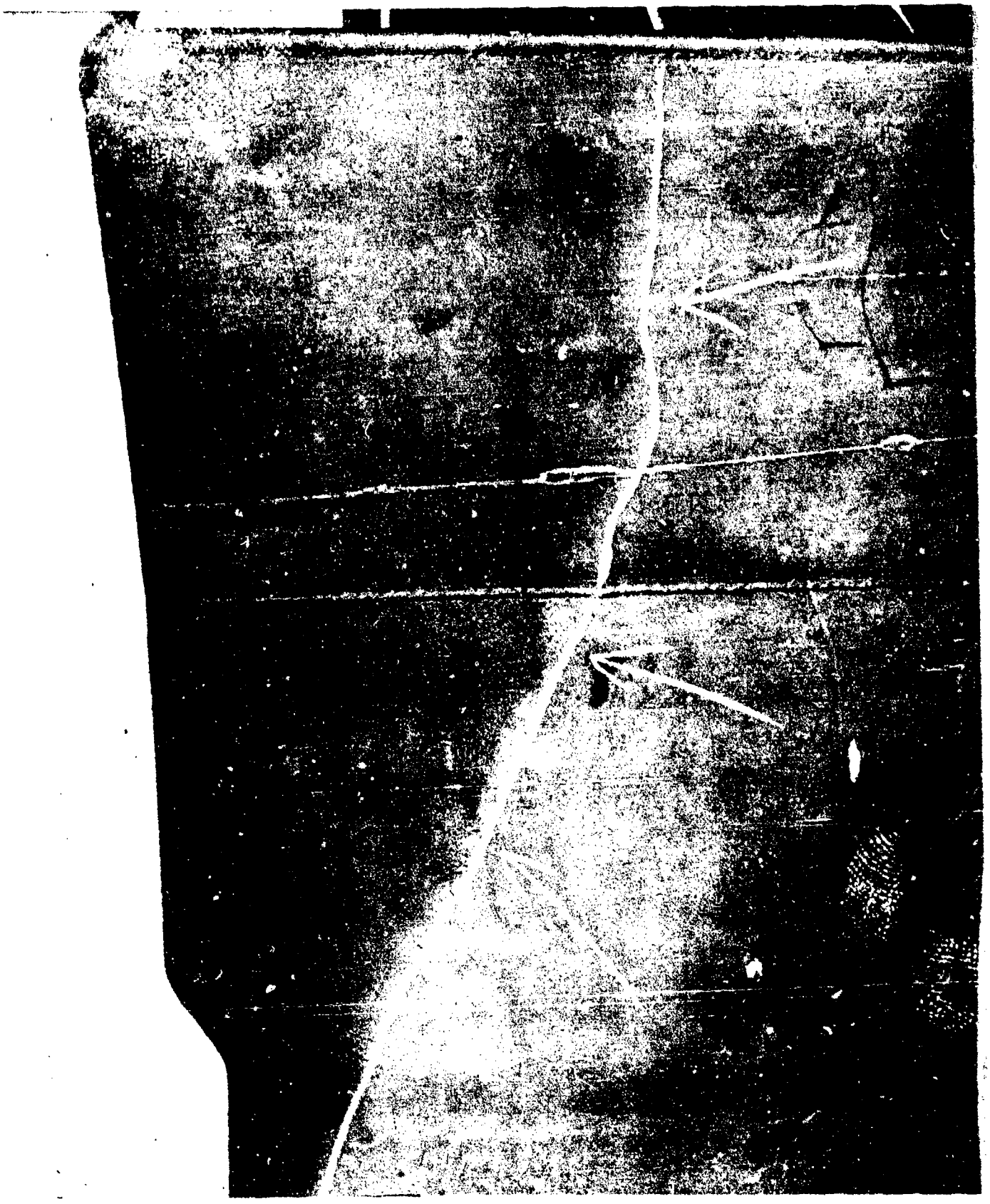
AA-CR-65-1819-11. Blistered paint on forward stack, port side aft.



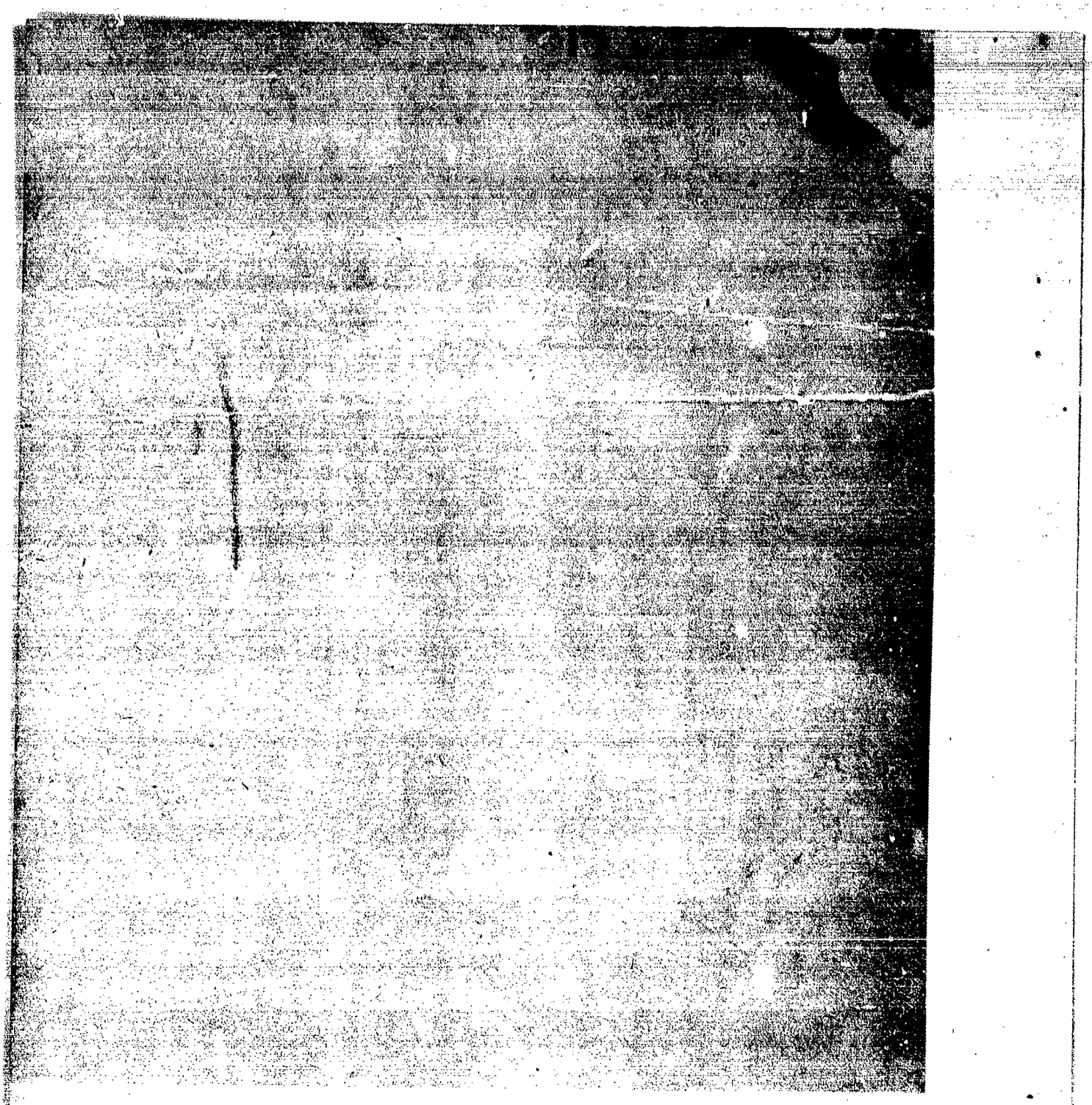
AA-CR-65-1848-1. Blistered paint on bulkhead, port side, aft.



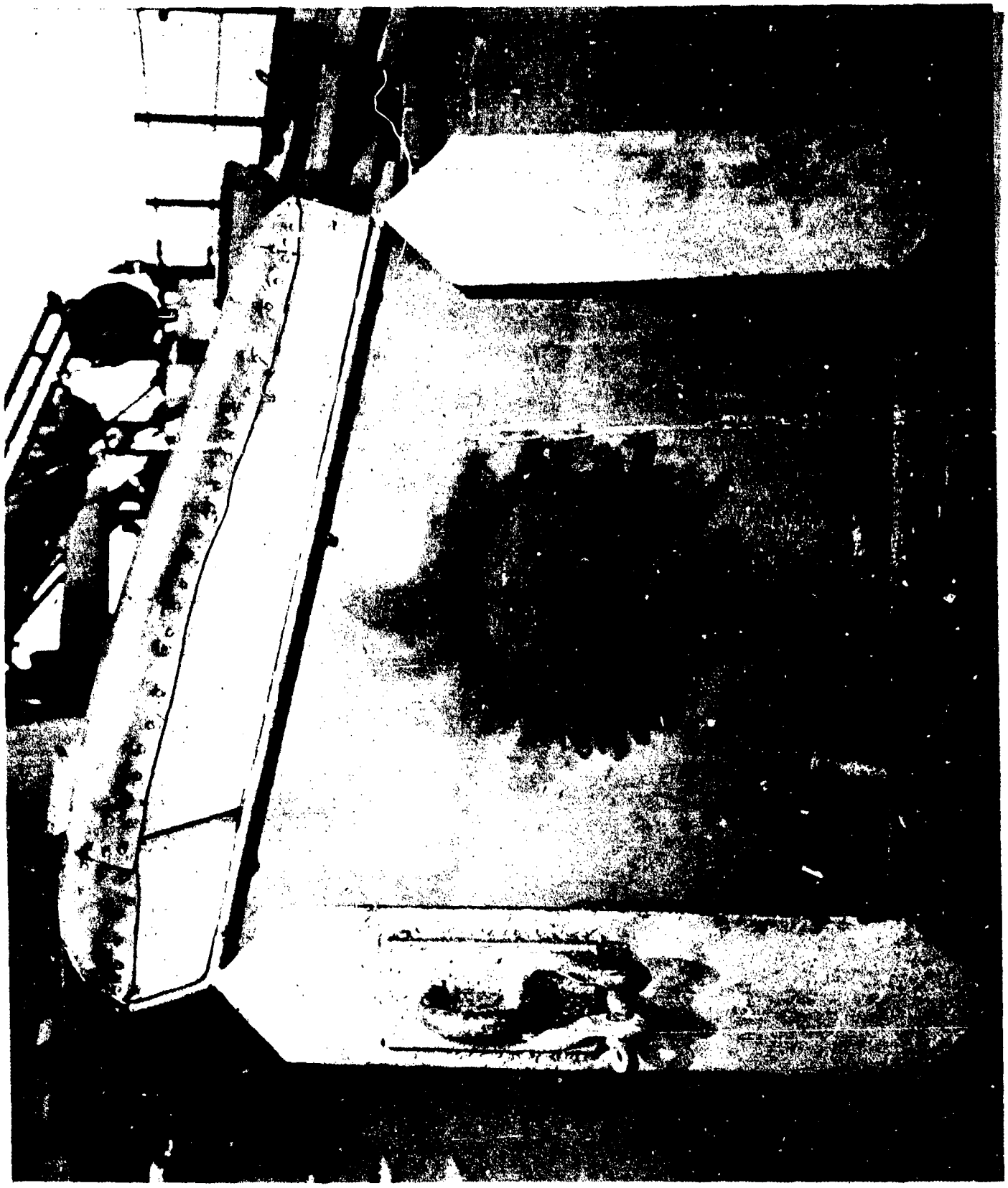
AA-CR-65-1848-7. Effect of heat on data plates on ready service box on top of house, starboard side.



AA-CR-65-1819-12. Scorched paint on inside of gun bulwark, top of house, port.



AA-CR-65-1848-10. Imprint of type-written sheet on deck house bulkhead, on upper deck, frame 99, port.



AA-CR-65-1848-9. Scorched area around lightening hole, on upper deck, frame 114, port.

APPENDIX

SHIP MEASUREMENT DIAGRAM

TEST ABLE

APPENDIX

SHIP MEASUREMENT DATA

Six scratch gages were installed to record deflection between the upper and main decks. Locations and readings of these gages are tabulated on page 73 .

SECRET

DECK DEFLECTION GAGES

SHIP U.S.S. FALLON APA 81 TEST A

LOCATION			MAXIMUM COMP.	MAXIMUM EXP.	PERMANENT SET		REMARKS
FR. NO.	DECK	DIST. OFF ℄			DISTANCE	EXP. / COMP.	
71	MAIN	25' PORT	5/16"	NONE	NONE	NONE	NONE
71	"	25' STBD	NONE	"	"	"	"
85	"	25' PORT	3/16"	"	"	"	"
85	"	25' STBD	NONE				MARKER ARM NOT TOUCHING
102	"	25' PORT	1/8"	3/16"	3/16"	EXP	NONE
102	"	25' STBD	3/16"	NONE	NONE	NONE	"

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APPENDIX

COMMANDING OFFICERS REPORT

TEST ABLE

REPORT #11

COMMANDING OFFICERS REPORT

SECTION I

The USS FALLON (APA-81) is an APA of the GILLIAM class and in this operation has been denominated a merchant type. The vessel was 1000 yards and approximately abeam to starboard of the USS NEVADA. The stern had apparently swung considerably to port prior to the detonation. The blast appears to have come from 195° relative and the indications are that the drop was to port and astern of the target point of aim which would increase the distance from detonation to this vessel. Also the estimated position angle of the blast was 15°. The vessel was in an operable and good material condition including its equipment. The vessel had about 90% fuel at the time of the test and had a full allowance of ammunition distributed in ready boxes, ready room, and magazines but not in gun tubs.

The damage to the ship was superficial ranging from none to moderate bending, buckling, dishing and blistering and small fires and carrying away of some deck equipment. The inclinometer showed 15° to starboard and 22° to port. There was no evidence of persisting radio activity, as determined by the monitor, on our return to the ship. There was no delay in starting emergency machinery and the boiler and steam auxiliaries were put in operation expeditiously. The deck and main machinery have been found to be in operating condition and the vessel could go to sea as soon as provisioned.

It is believed that this vessel was shielded by other target vessels and damage indicates highly directional forces. Part of the animals were alive. It is, therefore, my lay opinion that shielded personnel below decks would survive and be able to fight fires and do necessary damage control work. The deterimental effect of no personnel aboard was, of course, alleviated by the salvage groups. The after hatch was torn open by a down-

ward blast and hatch boards bent and one deck beam bent near coaming. Two maindeck hatch covers were dislodged to the deck below. Light bulkheads and joiner doors were carried away. Forward hatch covers and boards disarranged due to upward force. This hatch was in the lee of the bridge and suffered no direct damage. There is a possibility that there is induced energy from the bomb that manifests itself in heating of ungrounded metallic parts, with a large surface compared to mass. This was evidenced by the burning of paper boxes containing steel helmets and were in a direct line with the explosion. This was somewhat like an electrical condenser. There were two examples of this with surrounging material comparatively undamaged. Should the above be substantiated it would suggest that helmets should be non-metallic and other deck material of like nature should be grounded. It is further believed that obvious advantages of streamlining would also greatly enhance the resistance of a vessel to this kind of damage.

Classification (~~Cancelled~~) (Changed to CONFIDENTIAL)
By Authority of Joint Chiefs of Staff Action of 15 April 1949
By [signature] Date 2 Apr 51
1st Lt. AFSWP

[redacted]

CONFIDENTIAL

[redacted]

Defense Special Weapons Agency
6801 Telegraph Road
Alexandria, Virginia 22310-3398

TRC

10 April 1997

MEMORANDUM FOR DEFENSE TECHNICAL INFORMATION CENTER
ATTENTION: OMI/Mr. William Bush

SUBJECT: Declassification of Reports

The Defense Special Weapons Agency (formerly Defense Nuclear Agency) Security Office has reviewed and declassified the following reports:

AD-366718	XRD-32-Volume 3
AD-366726	XRD-12-Volume 2
AD-366703	XRD-16-Volume 1
AD-366702	XRD-14-Volume 2
AD-376819L	XRD-17-Volume 2
AD-366704	XRD-18
AD-367451	XRD-19-Volume 1
AD-366705	XRD-20-Volume 2
AD-376028L	XRD-4
AD-366694	XRD-1
AD-473912	XRD-193
AD-473891	XRD-171
AD-473899	XRD-163
AD-473887	XRD-166
AD-473888	XRD-167
AD-473889	XRD-168

AD-366705

ST-A 28 JAN 80 made target

TRC 10 April 1997

SUBJECT: Declassification of Reports

AD-B197749	XRD-174
AD-473905	XRD-182
AD-366719	XRD-33 Volume 4
AD-366700	XRD-10
AD-366712	XRD-25 Volume 1
AD-376827L	XRD-75
AD-366756	XRD-73
AD-366757	XRD-74
AD-366755	XRD-72
AD-366754	XRD-71
AD-366710	XRD-23 Volume 1
AD-366711	XRD-24 Volume 2
AD-366753	XRD-70
AD-366749	XRD-66
AD-366701	XRD-11
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Ardith Jarrett

ARDITH JARRETT
Chief, Technical Resource Center

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