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⑨ BUREAU OF SHIPS GROUP TECHNICAL INSPECTION REPORT

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By Authority of JOINT CHIEFS OF STAFF JCS 1795/36 DATED 15 APRIL 1949
By John H. DeWette Date 22 SEP 1953

⑥ OPERATION CROSSROADS.
PRINZ EUGEN (Ex-German CA)

TEST ABLE U.S. ⑧

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Defense Atomic Support Agency
Washington, D. C. 20301

- ① 1947
- ② 100p.
- ③ XRD-27

OPERATION CROSSROADS

DIRECTOR OF SHIP MATERIAL

JOINT TASK FORCE ONE

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BUREAU OF SHIPS GROUP
TECHNICAL INSPECTION REPORT

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USS PRINZ EUGEN (D-300)

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USS PRINZ EUGEN (IX300)

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EX GERMAN CRUISER PRINZ EUGEN

SHIP CHARACTERISTICS

Completed: 1940.

HULL

Length Overall: 723 feet 0 inches.
Beam (extreme): 71 feet 0 inches.
Depth (to main deck): 26 feet 0 inches.
Drafts at time of test: Fwd. 19 feet 3 inches.
Aft. 23 feet 2 inches.
Standard displacement: 10,000 tons.
Displacement at time of test: 16,390 tons.

MAIN PROPULSION PLANT

Main Engines: Three complete sets of main turbines are installed, one complete set per shaft. Each set consists of a high, intermediate and low pressure turbine. Astern turbines are installed in the casings of the main I.P. and L.P. turbines. Mfg. by Krupp in Germany.

Main Reduction Gears: Single reduction, three complete sets.

Boilers: Twelve main units, and one auxiliary unit are installed in the ship. Type: Lamont forced circulation. Mfg. by F. Krupp, Germaniawerft, Germany.

Main Condensers: Three installed in ship. Mfg. by F. Krupp, Germaniawerft, Germany.

Shafting: Three main shafts are installed in ship. Line shaft O.D. = 18.2", I.D. = 12.2".

Propellers: Three installed in ship. 3 blades mfg. by F. Krupp, Germaniawerft, Germany.

Turbo Generators: Six turbo generators, and four diesel generators are installed in the ship. There are generator rooms.

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EX GERMAN CRUISER PRINZ EUGEN

TECHNICAL INSPECTION REPORT

OVERALL SUMMARY

I. Target Condition After Test.

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

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

(b) Structural Damage.

HULL

The superstructure deck longitudinals, two meters to port and starboard of the ship's centerline, have compression strains between frames 141.6 and 147.3. Their connections to the face of turret number 2 have partially failed. The transverse beams in this area are also strained in way of the longitudinals and joiner bulkheads are buckled.

The aluminum sliding cover of the hangar is wrecked.

The foremast, a hollow wooden cylinder, is split from the point where it is keyed in the UP position to nearly the topmast point, a distance of approximately 40 feet. The mainmast tip, approximately 14 feet, is broken off and hanging nearby.

There is some minor damage to joiner bulkheads subjected to blast pressure.

MACHINERY

No comment.

ELECTRICAL

The failure of the roller top of the hangar deck damaged a few lighting fixtures below. A gyro-repeater was knocked from its

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mounting due to the distortion of the shield on which it was mounted. Electrical equipment was otherwise unaffected by structural damage.

(c) Other damage.

HULL

No comment.

MACHINERY

There was no damage to machinery of this vessel during Test A. All that was operable before the test was operable after the test.

ELECTRICAL

The damage to electrical equipment on this vessel consisted of the following.

1. Filaments of approximately 100 German lamps were broken.
2. A few lighting fixtures in the airplane hangar were demolished by the caving in of the roller top to the hangar.
3. The lens on the 60 inch searchlight was broken.
4. Two gyro-compass repeaters were knocked from their mountings but were still operable.
5. One battery powered telephone handset was smashed and the mounting cabinets for two telephones were distorted.
6. Two rudder angle indicators and three signal control boxes experienced failure of their rubber shock mountings.

II. Forces Evidenced and Effects Noted.

(a) Heat.

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HULL

Radiant flash heat came from about 340 degrees relative.

Lines and cordage are superficially scorched. Paint is scorched and blistered. Heat radiation effects are on vertical surfaces only with the exception of a scorching of the weather deck at frame 168.

MACHINERY

No evidence except for scorched and blistered paint on exposed side of machinery.

ELECTRICAL

The heat from the blast was directed from a direction of approximately 10 degrees on the port bow. It slightly scorched the paint on exposed electrical equipment but did no damage to the equipment.

(b) Fires and Explosions.

HULL

There was no fires or explosions.

MACHINERY

No comment.

ELECTRICAL

There were no fires or explosions.

(c) Shock.

HULL

There is no evidence of shock.

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MACHINERY

No evidence.

ELECTRICAL

There was evidence that the vessel may have received shock since the filaments of approximately 100 german lamps, mostly in locations above the main deck, were broken. It is considered that the shock was not particularly severe since rough service lamps of U.S. manufacture located in similar locations were undamaged.

(d) Pressure.

HULL

The pressure wave approached the ship from about 340 degrees relative. Blast pressure has wrecked the sliding cover for the hangar, dished some light doors and sheet metal structures in exposed locations, and blown off or distorted 5 pound M.S. windshields on the bridge structure.

The critical plating weight appears to be about 7 1/2 pound M. S.

MACHINERY

No evidence.

ELECTRICAL

Air blast from the same general direction as the heat wave caused most of the damage to electrical equipment. This is indicated by the damage to the 60 inch searchlight and to the navigational and telephone equipment on the vessel. Although the lighting fixtures in the airplane hangar and the gyro-compass repeater on the 03 deck were damaged by hull distortion, the primary cause of this hull distortion was the air blast, the electrical damage being secondary in nature.

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(e) Effects peculiar to the Atom Bomb.

HULL

The effects peculiar to the Atom Bomb are the presence of radioactivity, range of the radiant flash heat, and the range and duration of the air blast.

MACHINERY

None.

ELECTRICAL

There were no effects noted that are considered peculiar to the Atomic Bomb other than radioactivity and the intense radiant heat from the bomb explosions.

III. Effects of Damage.

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

HULL

A section of 14 x 12 inch cable conduit has been blown off the starboard side of the forward uptake at the second superstructure deck level.

MACHINERY

None.

ELECTRICAL

The effects on electrical equipment and ship control were very slight. Spares were available for the lamps that were broken. The navigation instruments knocked from their mountings were still operable. The searchlight lens was the only item of electrical damage.

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that could not have been repaired by the ship's force.

(b) Effect on gunnery and fire control.

HULL

The main battery director is damage and inoperable.

MACHINERY

No comment.

ELECTRICAL

Electrically, there was no effect on gunnery or fire control.

(c) Effect on watertight integrity and stability.

HULL

None.

MACHINERY

No comment.

ELECTRICAL

None.

(d) Effect on personnel and habitability.

HULL

There probably would have been some casualties among exposed personnel from heat and radioactivity, if the ship had been manned. The habitability of the ship is unimpaired.

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MACHINERY

None below decks.

ELECTRICAL

Personnel might have suffered casualties due to the radiant heat and due to the air blast. These casualties would have been limited to those exposed directly to the blast. There might also have been personnel casualties as a result of radioactivity, however, the extent of such casualties is not known. The only effect on habitability would be radioactivity.

(e) Effect on fighting efficiency.

HULL

The failure of the masts has rendered certain electronic equipment inoperable by the destruction of their antennae. The fighting efficiency would also be impaired by the loss of the main battery director and by the injury of exposed personnel.

MACHINERY

None.

ELECTRICAL

Except for personnel casualties, it is considered that there would have been no effect, electrically, on the fighting efficiency of the vessel.

IV. General Summary of Observers' Impressions and Conclusions.

HULL

Structural damage is of a minor nature.

MACHINERY

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The PRINZ EUGEN was outside the effective range of the explosion during Test A.

ELECTRICAL

Due to the distance of the vessel from the center of the blast the damage to electrical equipment was slight.

V. Preliminary Recommendations.

HULL

The effects of the test on this ship emphasize the necessity for restudy of the design of masts and of closures over large hatches.

MACHINERY

None.

ELECTRICAL

It is recommended that the use of resilient mounting of electrical equipment be carefully re-studied since such mountings are considered to be more susceptible than rigid mountings to failures due to air blast.

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PRINZ EUGEN (IX300)

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 superstructure deck longitudinals, two meters to port and starboard of the ship's centerline, have compression strains between frames 141.6 and 147.3. Their connections to the face of turret number 2 have partially failed. The transverse beams in this area are also strained in way of the longitudinals and joiner bulkheads are buckled.

The aluminum sliding cover of the hangar is wrecked.

The foremast, a hollow wooden cylinder, is split from the point where it is keyed in the UP position to nearly the topmast point, a distance of approximately 40 feet. The mainmast tip, approximately 14 feet, is broken off and hanging nearby.

There is some minor damage to joiner bulkheads subjected to blast pressure.

- (c) Other damage.

No comment.

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II. Forces Evidenced and Effects Noted.

(a) Heat.

Radiant flash heat came from about 340 degrees relative.

Lines and cordage are superficially scorched. Paint is scorched and blistered. Heat radiation effects are on vertical surfaces only with the exception of a scorching of the weather deck at frame 166.

(b) Fires and explosions.

There was no fires or explosions.

(c) Shock.

There is no evidence of shock.

(d) Pressure.

The pressure wave approached the ship from about 340 degrees relative. Blast pressure has wrecked the sliding cover for the hangar, dished some light doors and sheet metal structures in exposed locations, and blown off or distorted 5 pound M. S. windshields on the bridge structure.

The critical plating weight appears to be about 7 1/2 pound M. S.

(e) Effects peculiar to the Atom Bomb.

The effects peculiar to the Atom Bomb are the presence of radioactivity, range of the radiant flash heat, and the range and duration of the air blast.

III. Effects of Damage.

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

A section of 14 x 12 inch cable conduit has been blown off the starboard side of the forward uptake at the second superstructure deck level.

(b) Effect on gunnery and fire control.

The main battery director is damaged and inoperable.

(c) Effect on watertight integrity and stability.

None.

(d) Effect on personnel and habitability.

There probably would have been some casualties among exposed personnel from heat and radioactivity, if the ship had been manned. The habitability of the ship is unimpaired.

(e) Effect on fighting efficiency.

The failure of the masts has rendered certain electronic equipment inoperable by the destruction of their antennae. The fighting efficiency would also be impaired by the loss of the main battery director and by the injury of exposed personnel.

IV. General Summary of Observers Impressions and Conclusions.

Structural damage is of a minor nature.

V. Preliminary Recommendations.

The effects of the test on this ship emphasize the necessity for restudy of the design of masts and of closure over large hatches.

VI. Instructions for Loading the Vessel Specified the Following:

ITEM	LOADING
Fuel oil	50%

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ITEM	LOADING
Diesel oil	50%
Ammunition	100%
Potable and reserve feed water	95%
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 Ships Material. This report is available for inspection in the Bureau of Ships Crossroads Files.

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DETAILED DESCRIPTION OF HULL DAMAGE

A. General Description of Hull Damage.

(a) Overall condition of vessel.

The overall condition of the ship is good. There is major damage. General views of the exterior are shown on pages 45 to 66, inclusive.

(b) Several areas of hull damage.

The general areas of hull damage are the foremast superstructure, mainmast superstructure, hangar deck, and sickbay.

(c) Apparent causes of hull damage in each area.

The apparent causes of damage are air blast and radiant heat.

(d) Principal areas of flooding with sources.

There is no flooding.

(e) Strength, buoyancy, operability.

Longitudinal strength, buoyancy and operability are unaffected.

B. Superstructure (Exclusive of Gun Mounts).

(a) Description of damage.

Navigational equipment on the 09 level is damaged.

The rangefinder equipment on the 07 level is damaged.

Unprotected glass windows in the Admirals Bridge (06 level) are broken.

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On the navigation bridge (04 level), the weather screens are torn from the hinges and rendered useless.

The foremast, a hollow wooden cylinder, is split from the point where it is keyed in the "UP" position to nearly the topmast point, a distance of approximately 40 feet, and is bent slightly aft. The split is such that the load apparently come from approximately ahead. (Photos 1773-8, 11, and 1774-5, pages 53 , 60 , and 64).

The mainmast tip, 14 1/2 feet long, has snapped off and is hanging loosely in the direction of the blast. (Photos 1773-8, 1893-12, pages 53 , and 54).

The sliding hangar cover on the second superstructure deck has been blown in and damaged beyond use. This cover is aluminum alloy with six inch "I" stiffeners. (Photos 2049-3, 1774-4, 2049-1, 5, 4, 2048-11 and 2049-2, pages 65 ; 66 , 67 , 68 , 69 , 70 , and 71).

The hangar hatch, constructed of 10 pound plate, is undamaged with the exception of slight misalignment on the starboard side where the hangar cover roller guides caught in the guide bar.

The athwart ships bulkhead at frame 62.3, on the second superstructure deck is slightly dished. (Photo. 1774-3, page 72).

The superstructure deck and supporting structure, aft of turret 2, frames 141.6 to 147.3, show evidence of compression. The two deck longitudinals, two meters to port and starboard of the ship's centerline are built up T's with a 10 x 1/2 inch web, 4 x 3/8 inch flange, and 3 x 1/2 inch face plate. In both cases the flange and face plate connection to brackets from turret 2 have failed. The longitudinals show strain where welded to deck beams at frame 141, 142, 143, 144, 145, and 146. Some of these beams are deflected slightly upwards and some slightly downward. This damage appears to have resulted from combined loading exerted by the blast pressure on the deck and forward face of the turret. (Photos 1850-12, 2049-6, 2049-7, 1850-11, 2049-9, 2049-11, pages 73 , 74 , 75 , 76 , 77 , and 78). Joiner bulkheads under the superstructure deck are buckled sharply.

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(Photos 2049-12, 10 pages 79 , and 80).

The five pound after and inboard bulkheads of state-room 0374, 03 level, frame 124, are deflected aft and inboard respectively about one inch.

The glass in the after 48 inch searchlight is shattered.

A section of a 14 x 12 inch cable conduit has been blown off the starboard side of the forward uptake at the second superstructure deck level.

Joiner bulkheads in the sickbay pantry on the main deck were dished about four inches when a ventilation duct in the space burst and allowed blast pressure to enter. The intake for this vent system is located on the forward bulkhead of the main deck superstructure, just aft of turret 2.

Paint where directly exposed to the blast is scorched and blistered. (Photo 1774-1, page 81).

(b) Causes of damage each area.

The damage has been caused by blast and heat.

(c) Evidence of fire in superstructure.

No evidence.

(d) Relative effectiveness of various types of structure.

No evidence.

(e) Constructive criticism.

Wood masts have proved unsuitable. The design of large hatch closures requires considerable restudy.

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C. Turrets, Guns and Directors.

(a) Protected mounts.

General condition, including operability, if known.

Paint on the outside surfaces of the turrets and barbets is slightly scorched. There is no other damage, and the operability is not affected.

Effectiveness of installed turrets or shields - satisfactory.

(b) Unprotected mounts.

General condition, including operability, if known - no damage.

Effectiveness and sufficiency of crew shelters - shields are unaffected but do not provide adequate protection for the crew from heat or blast.

(c) Directors and rangefinders (in 8" turrets).

General condition, including operability, if known - no damage.

Condition of instruments therein - satisfactory.

(d) Constructive criticism of design or construction of mounts, directors, foundations and shelters - no comment.

D. Torpedo Mounts, Depth Charge Gear.

(a) Torpedo mounts.

The only damage to the torpedo mounts is broken glass in the weather protection house.

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(b) Depth charge gear.

Not applicable.

E. Weather Deck.

The deck is undamaged and its usability is unaffected. However, there are indications that the weather deck at frames 2.1 and 38.5 had elastic downward deflection. Deck deflection gage readings are given in Appendix, page 84.

German type ersatz rubber life rafts have been torn from their supports which were in a weakened condition prior to the test. The cabin of the motor boat, stowed on the port side, has been damaged by the blast.

F. Exterior of Hull (Above Waterline).

No damage.

G. Interior Compartments (Above Waterline).

(a) Damage to structure.

None.

(b) Damage to joiner bulkheads.

A port was left open in stateroom 176, second deck, frame 75. The inboard bulkhead of the stateroom is dished inboard about 1/2 inch, by the blast which entered the open port.

(c) Damage to access closures and fittings.

None.

(d) Condition of equipment within compartments.

Some electric light bulbs are broken and three ports have broken lenses.

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(e) Evidence of fire.

None.

(f) A fresh water cooling line to ventilation blowers was broken at frame 78 on the second deck. Ventilation ducts are ruptured in the sick bay (B-101-2L, main deck, centerline, bulkhead 122 to 126 1/2), starboard galley (B-104-L, main deck, bulkhead 87 to 93), and transverse passageway B-204-4L (second deck, frame 78).

(g) Reduction of watertight subdivision.

None.

H. Armor Decks.

No damage.

I. Interior Compartments (Below Waterline).

No damage.

J. Underwater Hull.

No damage.

K. Tanks.

No damage.

L. Flooding.

There is no flooding.

M. Ventilation. (Exclusive of Blowers).

(a) Damage to ventilation systems and causes.

Ventilation ducts are ruptured by blast pressure in the sick bay (B-101-2L, main deck, centerline, bulkhead 122 to 126 1/2),

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starboard galley (B-104-L, main deck, bulkhead 87 to 93), transverse passageway B-204-4L (second deck, frame 78), and the sickbay pantry (A-1022L, main deck port frame 140).

(b) Evidence that ventilation system conducted blast.

Blast was apparently transmitted by the duct that ruptured in the sickbay pantry as two joiner bulkheads of the compartment are bulged about four inches. The other two bulkheads to the compartment are 10 pound M. S. and are undamaged.

(c) Evidence that ventilation systems allowed progressive flooding.

None.

(d) Constructive criticism.

None.

N. Ship Control.

(a) Damage to ship control stations.

Metal windshields in the bridge area have been blown off by blast and several gyro compass repeaters have been displaced from their stands. There is no other damage.

(b) Constructive criticism.

No comment.

O. Fire Control.

(a) Damage to fire control stations and causes.

Directors and elevated control positions - the main battery directory, located just forward of the foremast, is damaged from blast. The rotating portion was lifted up and after settling remained in a position tilting aft, with the front approximately 3 5/8 inches above normal.

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The director is mounted on a two row, radial thrust, angular contact type ball bearing assembly which also acts as the holding down medium for the rotating structure. The rotating structure bears on top and fits snugly inside the inner ball bearing race and is restrained from lifting by 1 1/8 inch diameter bolts spaced approximately 31 inches apart. The bolts are tapped into the rotating structure, the points of the bolts projecting beyond and into a 1 3/16 inch horizontal slot on the inside surface of the inner ball race (sketch, page 27). Forces acting upon the rotating structure of the director caused it to lift in the front. This sheared the points of the holding down bolts which are the only means of holding down the rotating structure to the ball bearing race.

As a result of this damage the director is wholly inoperable. In all other respects the director structure is not damaged. The paint on the outside has been badly scorched from heat, but there is no evidence that heat or flame reached the inside of the director.

All other control position have only superficial damage such as scorched paint, broken glass, etc.

Plot rooms and protected spaces - no damage.

- (b) List of stations having insufficient protection and estimated effect on fighting efficiency of the loss of each.

Personnel in exposed stations do not have sufficient protection from blast and heat.

- (c) Constructive criticism of location and arrangement of stations.

No comment.

P. Ammunition Behavior.

- (a) Ready service ammunition, location, protection, behavior under heat and blast.

Satisfactory.

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- (b) Magazines, location, protection, forces involved, behavior.

Satisfactory.

- (c) List of stowages which are insufficiently protected and effects on ship survival of explosion of each stowage.

None.

- (d) Behavior of gasoline stowage facilities.

No gasoline aboard.

Q. Ammunition Handling.

- (a) Condition and operability of ammunition handling devices.

No damage.

- (b) Evidences that any ammunition handling devices contributed to passing of heat, fire, blast or flooding water.

None.

- (c) Constructive criticism of design and construction of ammunition handling devices.

No comment.

R. Strength.

- (a) Permanent hog or sag.

None.

- (b) Shear strains in hull plating.

None.

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(c) Evidence of transverse or racking strains.

None.

(d) Local failures in way of discontinuities.

None.

(e) Evidence of panel deflection under blast.

The only panels deflected are a few joiner bulkheads and the sliding cover of the hangar. It is considered that the damage to the superstructure deck aft of turret 2 is the combined effect of pressure loading on the deck and on the face of the turret.

(f) Turret machinery, and gun foundations.

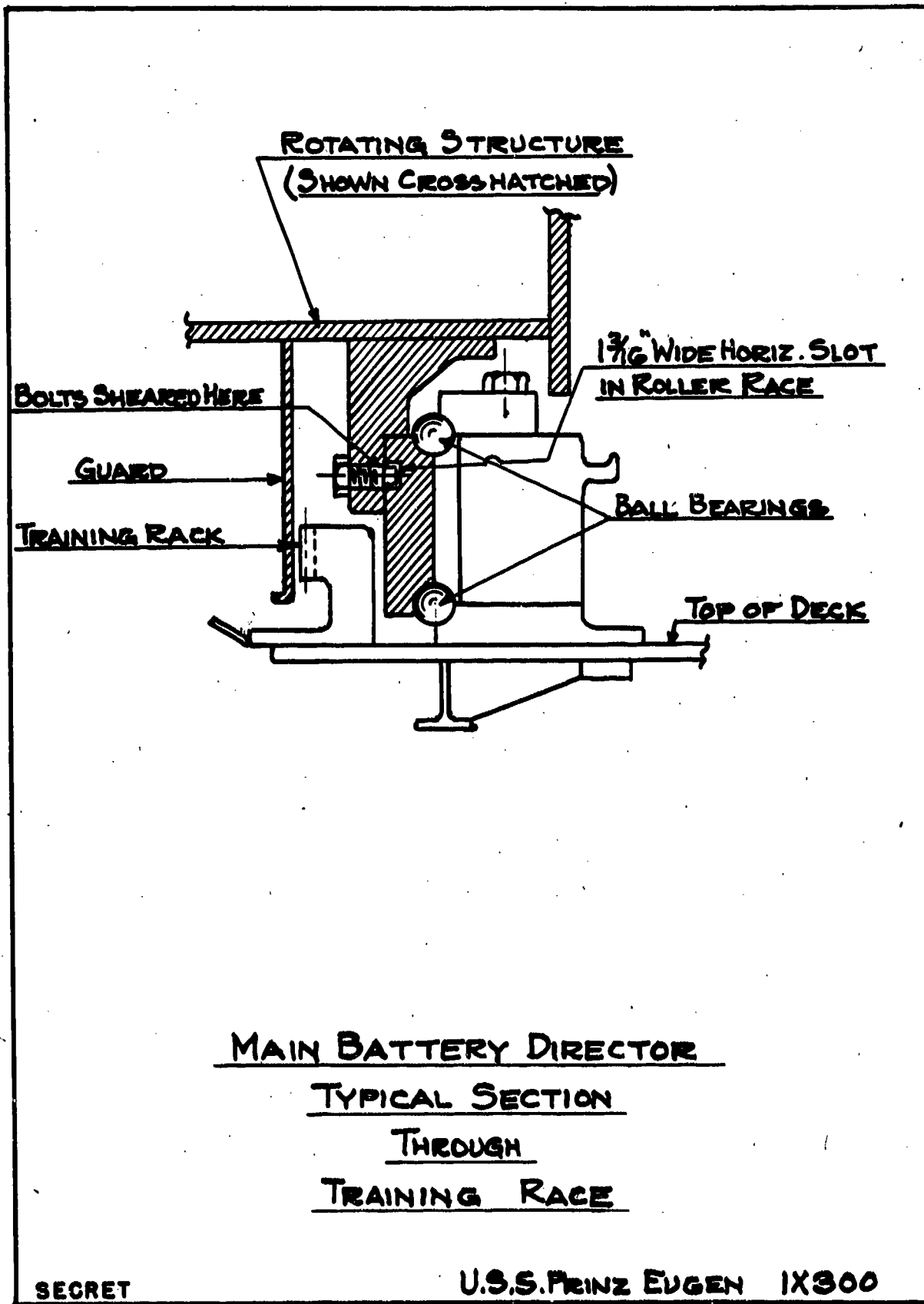
No damage.

S. Miscellaneous.

No comment.

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TECHNICAL INSPECTION REPORT

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.

No comment.

(c) Other damage.

There was no damage to machinery of this vessel during Test A. All that was operable before the test was operable after the test.

II. Forces evidenced and effects noted.

(a) Heat.

No evidence except for scorched and blistered paint on exposed side of machinery.

(b) Fires and explosions.

No comment.

(c) Shock.

No evidence.

(d) Pressure.

No evidence.

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USS PRINZ EUGEN (IX300)

(e) Effects apparently peculiar to the atom bomb.

None.

III. Effects of Damage.

(a) Effect on machinery and ship control.

None.

(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.

None below decks.

(e) Total effect on fighting efficiency.

None.

IV. General Summary.

The PRINZ EUGEN was outside the effective range of the explosion during Test A.

V. Preliminary Recommendations.

None.

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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.

(b) Areas of major damage.

None.

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

Not Applicable.

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

Test A had no affect on the overall operation of the machinery. All that was operable before Test A was operated after it and functioned normally.

B. Boilers.

Undamaged. No. 3 boiler room was inoperable before Test A.

Seven of the eight boilers in boiler rooms #1 and #2 are operable. All of these were tested hydrostatically at designed working pressure. Six boilers were steamed after Test A.

C. Blowers.

Undamaged. The forced draft blowers in boiler room #3 were visually inspected.

The blowers in rooms #1 and #2 were steam tested at rated load and speed after Test A. Performance was normal.

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D. Fuel Oil Equipment.

Undamaged. The equipment in boiler room #3 was visually inspected.

The equipment in boiler rooms #1 and #2 was tested at designed working pressure.

E. Boiler Feedwater Equipment.

Undamaged. All feed heaters have been by-passed since before Test A. A visual inspection of all connected piping, valves, fittings, etc., revealed no damage traceable to Test A. Most of it was tested at working pressures.

F. Main Propulsion Machinery.

The starboard main engine was inoperable before Test A. Its condition was not changed by the test. The center main engine was jacked over after Test A. The port main engine was turned over by steam, ahead and astern. Performance was normal.

G. Reduction Gears.

Undamaged. The port unit was turned over by steam. The center unit was jacked over. Both were inspected through the inspection plates. The starboard unit was not turned over due to turbine bearings having been burned out prior to Test A.

H. Shafting and Bearings.

Undamaged. The port shaft was turned over by steam and the center shaft was jacked over. The starboard shaft was not turned over. Inspection revealed no damage.

I. Lubrication System.

Undamaged. The lube oil systems of the port and center engines were tested at designed pressures and no damage was revealed. The starboard unit system was inspected visually.

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J. Condensers and Air Ejectors.

Undamaged. A vacuum of 28" was obtained on the port and center condensers. Their performance was satisfactory. The starboard unit had apparently not suffered damage but was not put under test.

K. Pumps.

Undamaged. All pumps located in the machinery spaces were tested except those in boiler room #3 (forward), which were visually inspected.

L. Auxiliary Generators, (Turbines and Gears).

Undamaged. Turbo-generator #1 and #3 were operated and revealed no damage. Units #2.1 and 2.2 were not operated but were turned over. No damage was revealed. The condensate pump motors for #2.1 and 2.2 generators were inoperable before Test A, making the generators inoperable.

M. Propellers.

Undamaged. The blades, caps, etc., of the outboard propellers were inspected from the water surface and no damage was revealed.

Satisfactory operation of the port unit indicates that no damage was sustained by the propellers.

N. Distilling Plant.

Undamaged. The plant has been operated and no damage revealed. Quality and quantity of water made was the same as before Test A.

O. Refrigeration Plant.

Undamaged. The refrigerating plant was put in operation after Test A and functioned normally.

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P. Winches, Windlasses and Capstans.

Undamaged. All units were tested satisfactorily after Test A.

Q. Steering Engine.

Undamaged. The entire steering system was tested at full throw left and right several times. Operation was satisfactory in all respects.

R. Elevators, Ammunition Hoists, Etc..

Undamaged. These components were visually inspected only. No operating tests were made.

S. Ventilation (Machinery)

Undamaged. All ventilation machinery was tested and operated satisfactorily.

T. Compressed Air Plant.

Undamaged. All air compressors were tested after Test A and operated satisfactorily.

U. Diesels (Generators and Boats).

Undamaged. All diesel engines were tested and functioned normally.

V. Piping Systems.

Undamaged. The piping systems in all machinery spaces except boiler room #3 were tested at designed pressures and were found in the same condition as before Test A. Boiler room #3 was inoperable before Test A. Visual inspection of the piping in this space indicates no damage traceable to Test A.

W. Miscellaneous.

Undamaged. The equipment in the machine shop,

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laundry, and galley was tested after Test A and found in the same condition as before.

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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.

Not observed.

- (b) Structural damage.

The failure of the roller top of the hangar deck damaged a few lighting fixtures below. A gyro-repeater was knocked from its mounting due to the distortion of the shield on which it was mounted. Electrical equipment was otherwise unaffected by structural damage.

- (c) Other damage.

The damage to electrical equipment on this vessel consisted of the following:

1. Filaments of approximately 100 German lamps were broken.
2. A few lighting fixtures in the airplane hangar were demolished by the caving in of the roller top to the hangar.
3. The lens on the 60 inch searchlight was broken.
4. Two gyro-compass repeaters were knocked from their mountings but were still operable.
5. One battery powered telephone handset was smashed and the mounting cabinets for two telephones were distorted.
6. Two rudder angle indicators and three signal control boxes experienced failure of their rubber shock mountings.

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II. Forces Evidenced and Effects Noted.

(a) Heat.

The heat from the blast was directed from a direction of approximately 10 degrees on the port bow. It slightly scorched the paint on exposed electrical equipment but did no damage to the equipment.

(b) Fires and explosions.

There were no fires or explosions.

(c) Shock.

There was evidence that the vessel may have received shock since the filaments of approximately 100 German lamps, mostly in locations above the main deck, were broken. It is considered that the shock was not particularly severe since rough service lamps of U. S. manufacture located in similar locations were undamaged.

(d) Pressure.

Air blast from the same general direction as the heat wave caused most of the damage to electrical equipment. This is indicated by damage to the 60 inch searchlight and to the navigational and telephone equipment on the vessel. Although the lighting fixtures in the airplane hangar and the gyro-compass repeater on the 03 deck were damaged by hull distortion, the primary cause of this hull distortion was the air blast, the electrical damage being secondary in nature.

(e) Any effects apparently peculiar to the Atom Bomb.

There were no effects noted that are considered peculiar to the Atomic Bomb other than radioactivity and the intense radiant heat from the bomb explosion.

III. Effects of Damage.

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(a) Effect on electrical equipment and ship control.

The effects on electrical equipment and ship control were very slight. Spares were available for the lamps that were broken. The navigation instruments knocked from their mountings were still operable. The searchlight lens was the only item of electrical damage that could not have been repaired by the ship's force.

(b) Effect on gunnery and fire control.

Electrically, there was no effect on gunnery or fire control.

(c) Effect on watertight integrity and stability.

None.

(d) Effect on personnel and habitability.

Personnel might have suffered casualties due to the radiant heat and due to the air blast. These casualties would have been limited to those exposed directly to the blast. There might also have been personnel casualties as a result of radioactivity, however, the extent of such casualties is not known. The only effect on habitability would be radioactivity.

(e) Total effect on the fighting efficiency.

Except for personnel casualties, it is considered that there would have been no effect, electrically, on the fighting efficiency of the vessel.

IV. General Summary of Observers Impressions and Conclusions.

Due to the distance of the vessel from the center of the blast the damage to electrical equipment was slight.

V. Any Preliminary General or Specific Recommendations of The Inspecting Group.

It is recommended that the use of resilient mount-

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ings of electrical equipment be carefully re-studied since such mount-ings are considered to be more susceptible than rigid mountings to failures due to air blast.

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DETAILED DESCRIPTION OF ELECTRICAL DAMAGE.

A. General Description of Electrical Damage.

(a) Overall condition.

The only electrical damage to this vessel as a result of test A was the breaking of the filaments of approximately 100 German lamps, the failure of rubber shock mounts on a few navigation instruments, the damaging of a few lighting fixtures by hull distortion, and the breaking of the lens of the 60 inch searchlight.

(b) Areas of major damage.

The area of major damage were exposed locations topside between frames 120 and 140 between the 03 and 05 decks. Damage also occurred at the hangar deck.

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

The primary cause of damage to this vessel was air blast. There was also damage as a result of shock as evidenced by the broken lamp filaments.

(d) The effects of the target test on the overall operation of the electric plant.

The effect on the overall operation of the electric plant was negligible. Spares were available for all the broken lamps. The navigation instruments knocked from their mountings were still operable. The searchlight lens was the only item of electrical damage that could not have been repaired by the ship's force.

(e) Types of equipment most affected.

The types of equipment most affected were lighting and exposed navigation equipment.

B. Electric Propulsion Rotating Equipment (S41).

Not applicable.

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C. Electric Propulsion Control Equipment (S41).

Not applicable.

D. Ship's Service Generators (S61).

No damage.

E. Emergency Generators (S61).

No damage.

F. Switchboards and Distribution Panels (S62).

No damage.

G. Wiring, Wiring Equipment and Wireways (S62).

No damage.

H. Transformers (S62).

No damage.

I. Submarine Propelling Batteries (S62).

Not applicable.

J. Portable Batteries (S62).

No damage.

K. Motors, Motor Generator Sets, and Motor Controllers (S63).

No damage.

L. Lighting Equipment (S64).

(a) The filaments of approximately 100 German lamps,

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scattered throughout the vessel but mostly above the main deck, were broken by shock. The U. S. manufactured lamps located in the same general areas had backed up slightly in the sockets but the lamps were undamaged. These sockets were of German manufacture and were provided with a ratchet device which held the German lamps securely. The U. S. lamps did not fit very snugly in the sockets and the ratchet device was not effective when used with these lamps. It is believed that U. S. sockets would have prevented the lamps from backing up since similar difficulties were not reported on U. S. vessels at comparable distances from the blast.

(b) In the airplane hangar, a few bulkhead lighting fixtures were torn from their mountings when the roller top of the hangar deck was blown in by the blast. Hull photograph AA-CR-66-2049-3 page shows how the hangar top appeared after the test.

M. Searchlights (S66).

The lens of the 60 inch searchlight was broken by the air blast. This lens consisted of several panes of approximately 3/8 inch thick glass. About three-quarters of the panes were broken. The searchlight appeared to be otherwise undamaged however, no attempt had been made to operate it since the vessel left the United States.

N. Degaussing Equipment (S81).

No damage.

O. Gyro-compass Equipment (S24).

(a) The gyro-compass repeater located at frame 139.4 at the centerline on the 03 deck was torn loose from the bridge shield on which it was mounted due to the distortion of the shield breaking the welds which held the mounting bolts. The repeater was still operable.

(b) The gyro-compass repeater located at frame 123.4 at the centerline on the 05 deck was torn loose from its mounting due to the 4 mounting studs shearing. This damage is attributed to air

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blast since there was no evidence of missiles striking the repeater. The repeater was still operable.

P. Sound Powered Telephones (S65).

No damage.

Q. Ship's Service Telephones (S65).

(a) A battery powered battle telephone set located at frame 123.4 at the centerline on the 05 deck had one of the three mounting studs sheared. At another stud the weld at the bulkhead failed. The set was being held by the one remaining stud. The hand-set was blown off its hook and the cable to the hand-set broken. This damage can be attributed to air blast. Since the hand-set smashed on striking the deck, the unit is inoperable.

(b) A telephone cabinet located at frame 75, centerline of 05 deck, was bent by the air blast. Its cover was blown open and the cabinet was sprung to such an extent that the door would not close. The equipment inside the cabinet was not damaged.

R. Announcing Systems (S65).

No damage.

S. Telegraphs (S65).

No damage.

T. Indicating Systems (S65).

(a) The rudder angle indicator located at frame 139.4, centerline, of the 03 deck, was torn from its rubber shock mountings by the air blast. It was mounted on two rubber blocks which gave way where the blocks were vulcanized to the securing bolt heads. There was previously no connection between the indicator and the bulkhead other than the rubber blocks. Another rudder angle indicator located at frame 123.4, centerline of the 05 deck, exper-

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perienced a similar casualty to that described above. In this instance only one of the shock mounts gave way. Both of these indicators were still operable.

(b) Three signal control boxes located at frame 122, port side of the 05 deck experienced failures of the rubber shock mounts due to air blast. Two of the three boxes had one rubber mounting torn loose and the other box had both mountings torn loose.

Recommendation: It is recommended that the use of resilient mountings of electrical equipment be avoided wherever possible since such mountings are considered to be more susceptible than rigid mountings to failures due to air blast.

U. I. C. and A. C. O. Switchboards (S65).

No damage.

V. F. C. Switchboards (S71).

No damage.

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SECTION IV

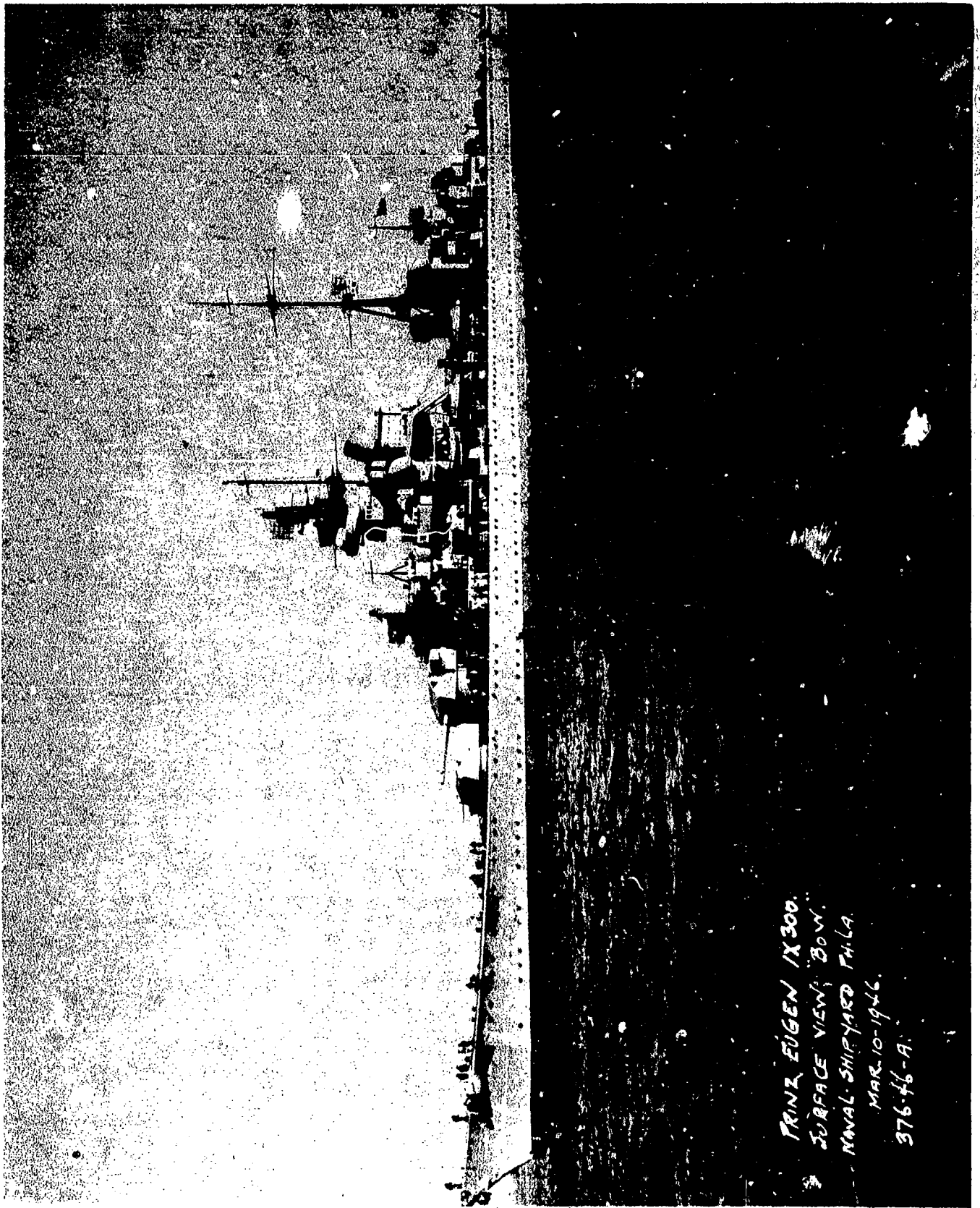
PHOTOGRAPHS

TEST ABLE

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PRINZ EUGEN IX 300.
SURFACE VIEW, BOW.
NAVAL SHIPYARD PHILA.
MAR. 10-1946.
376-46-A.

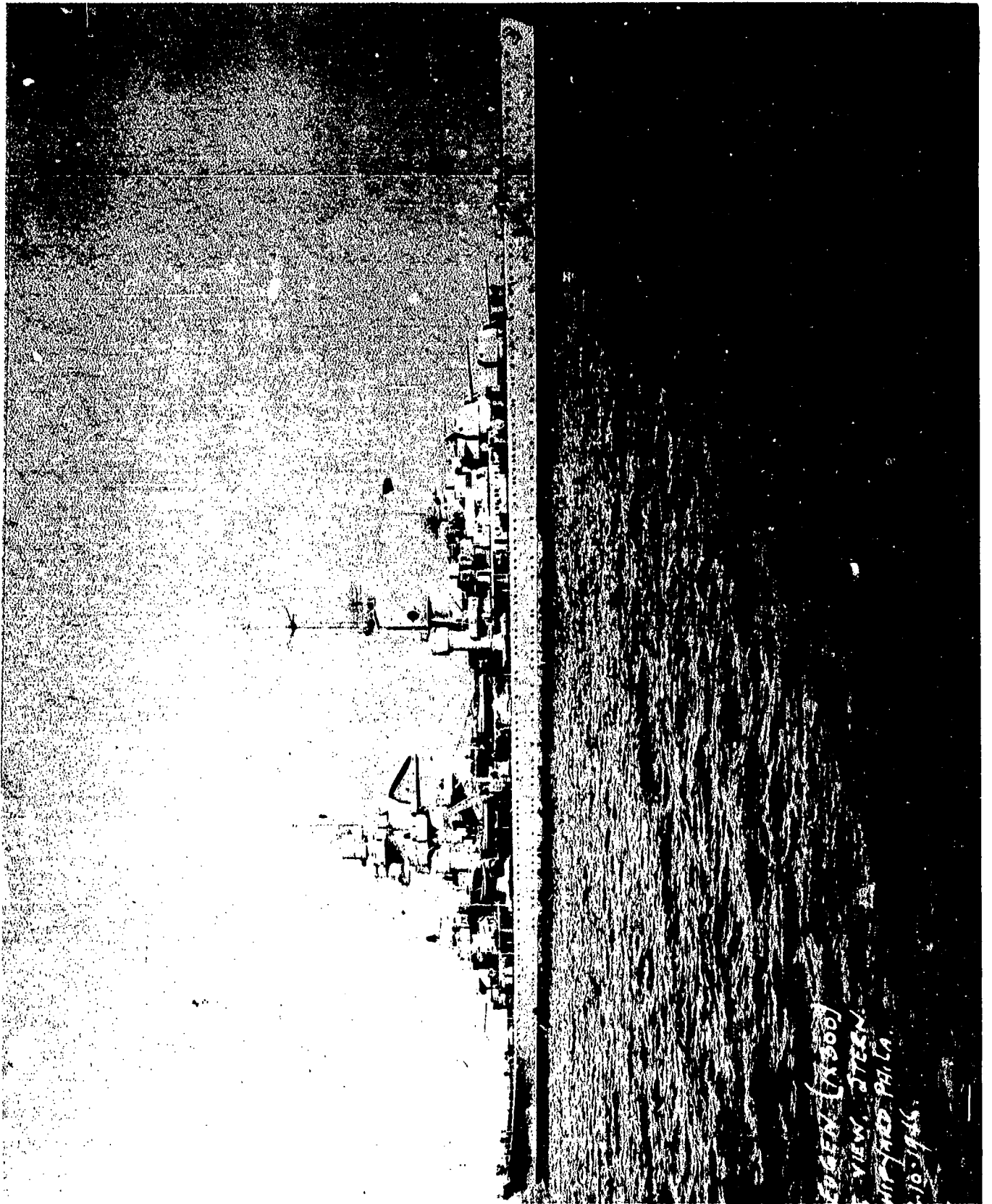
Bu Ships #114267. 376-46-A. View from off port bow before Test A.

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Bu Ships 114268. 376-46-B. View from off port beam before Test A.

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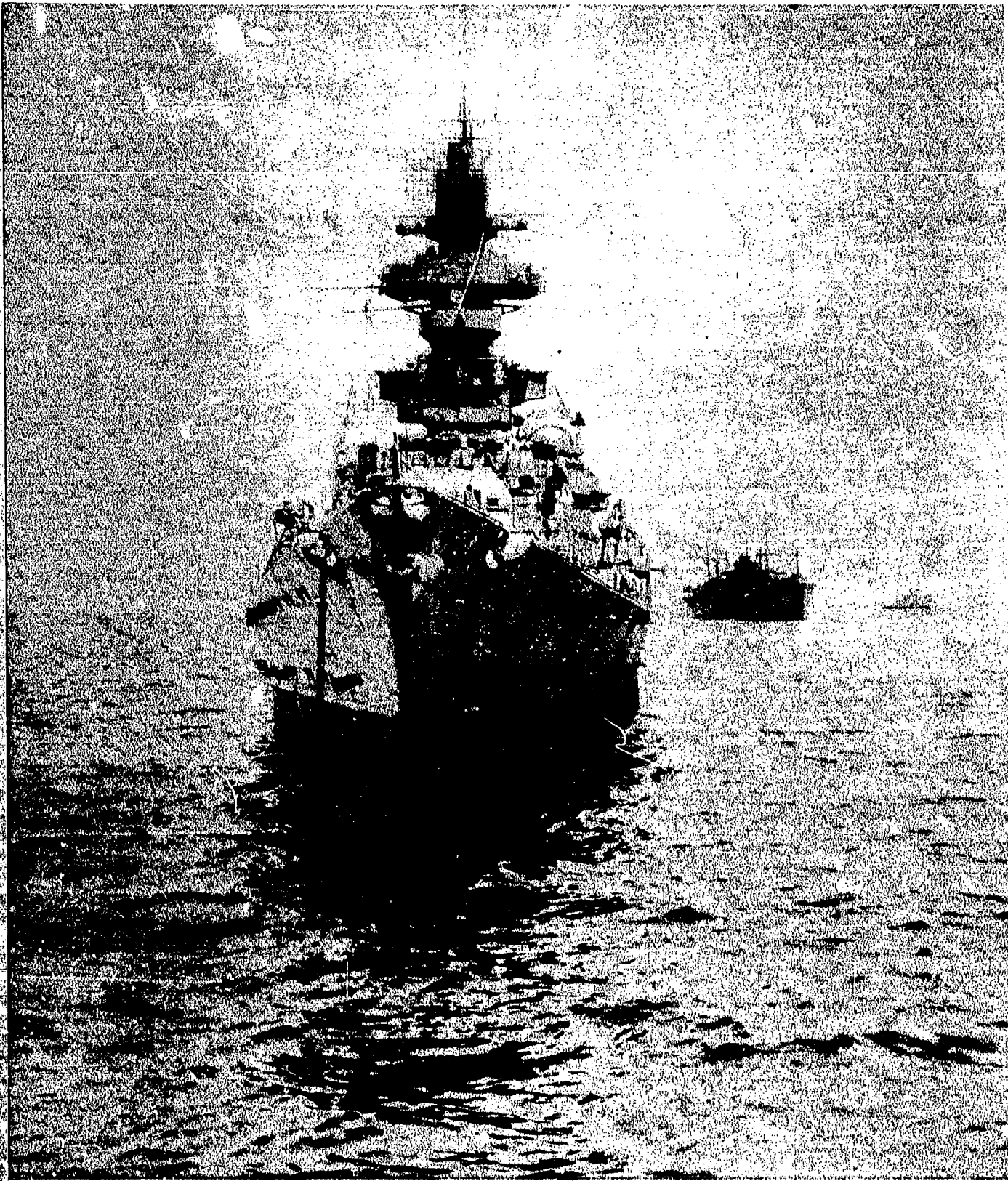
Bu Ships #114269. 376-46-C. View from off port quarter before Test A.

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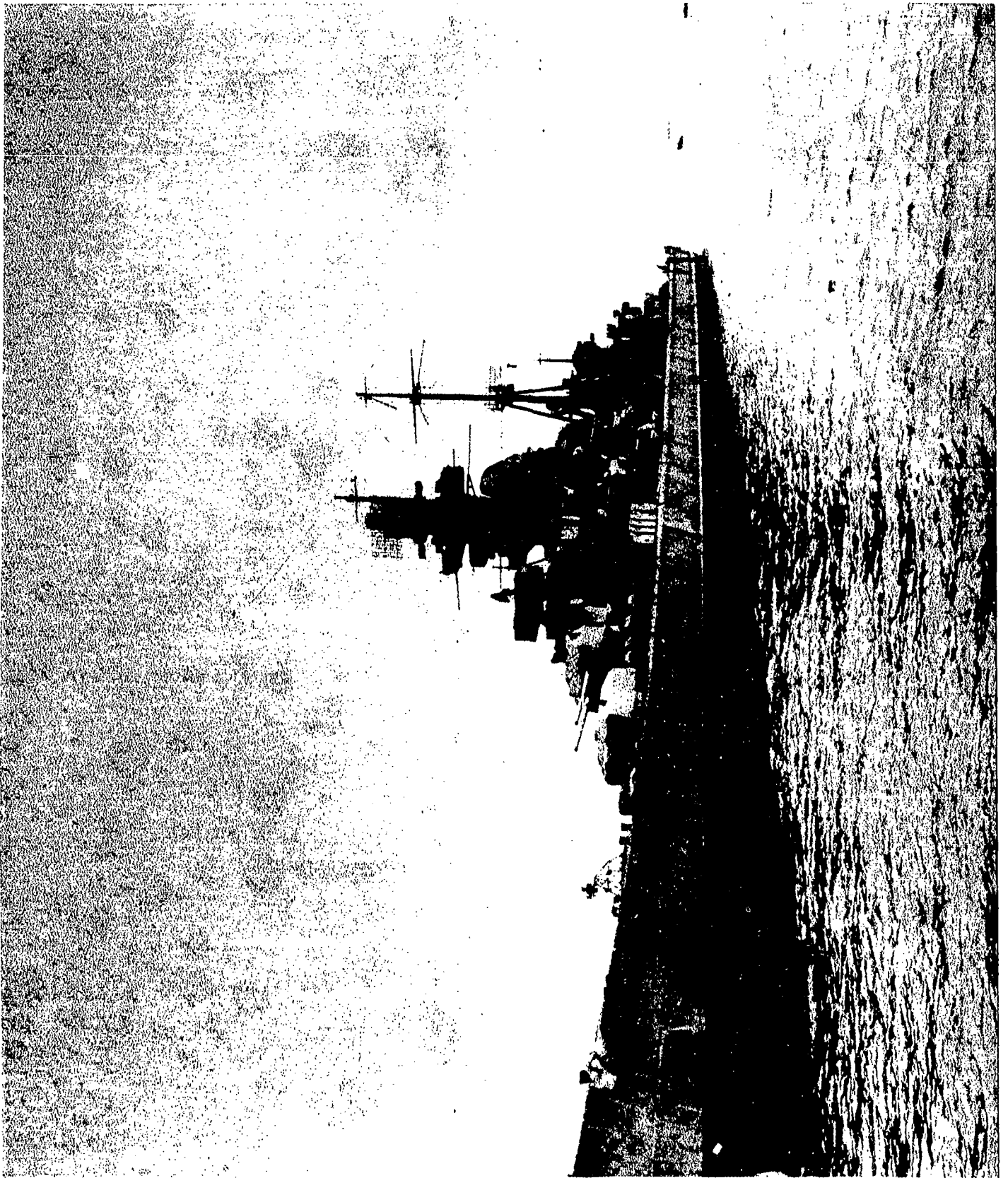
AA-CR-227-49-90. View from dead ahead after Test A.

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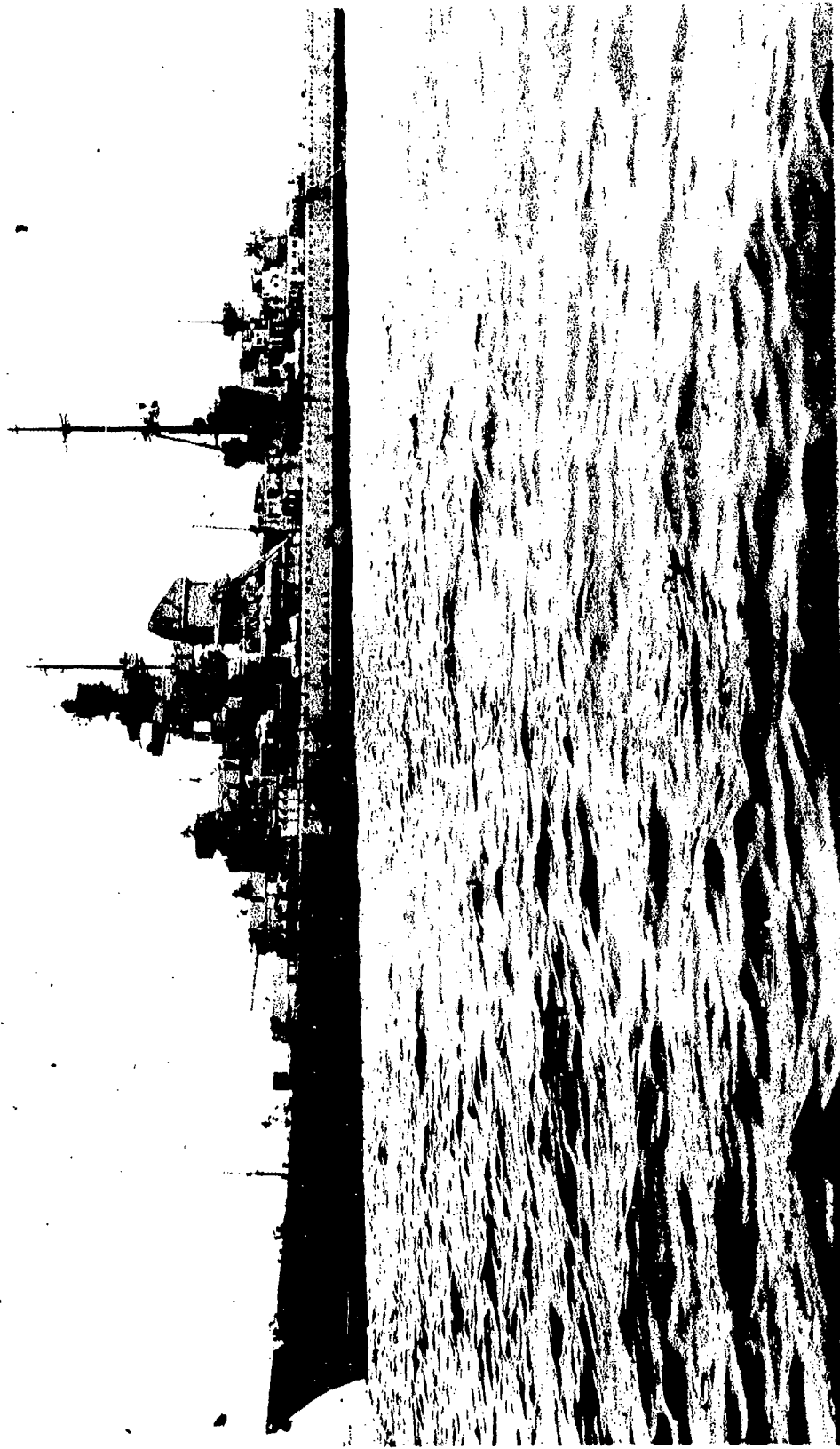
AA-CR-92-1773-9. View from off port bow.

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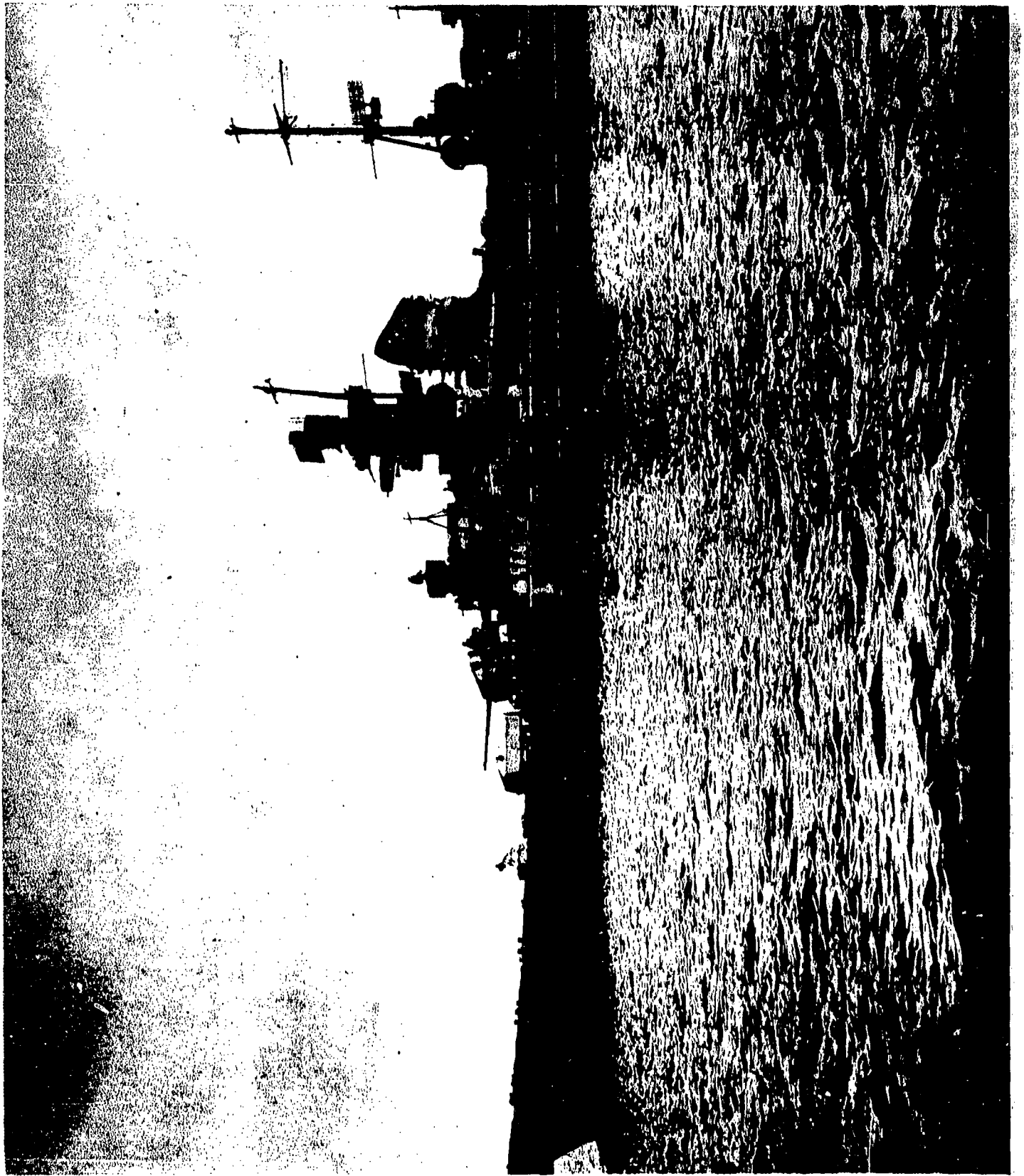
AA-CR-227-92-99. View from off port bow after Test A.

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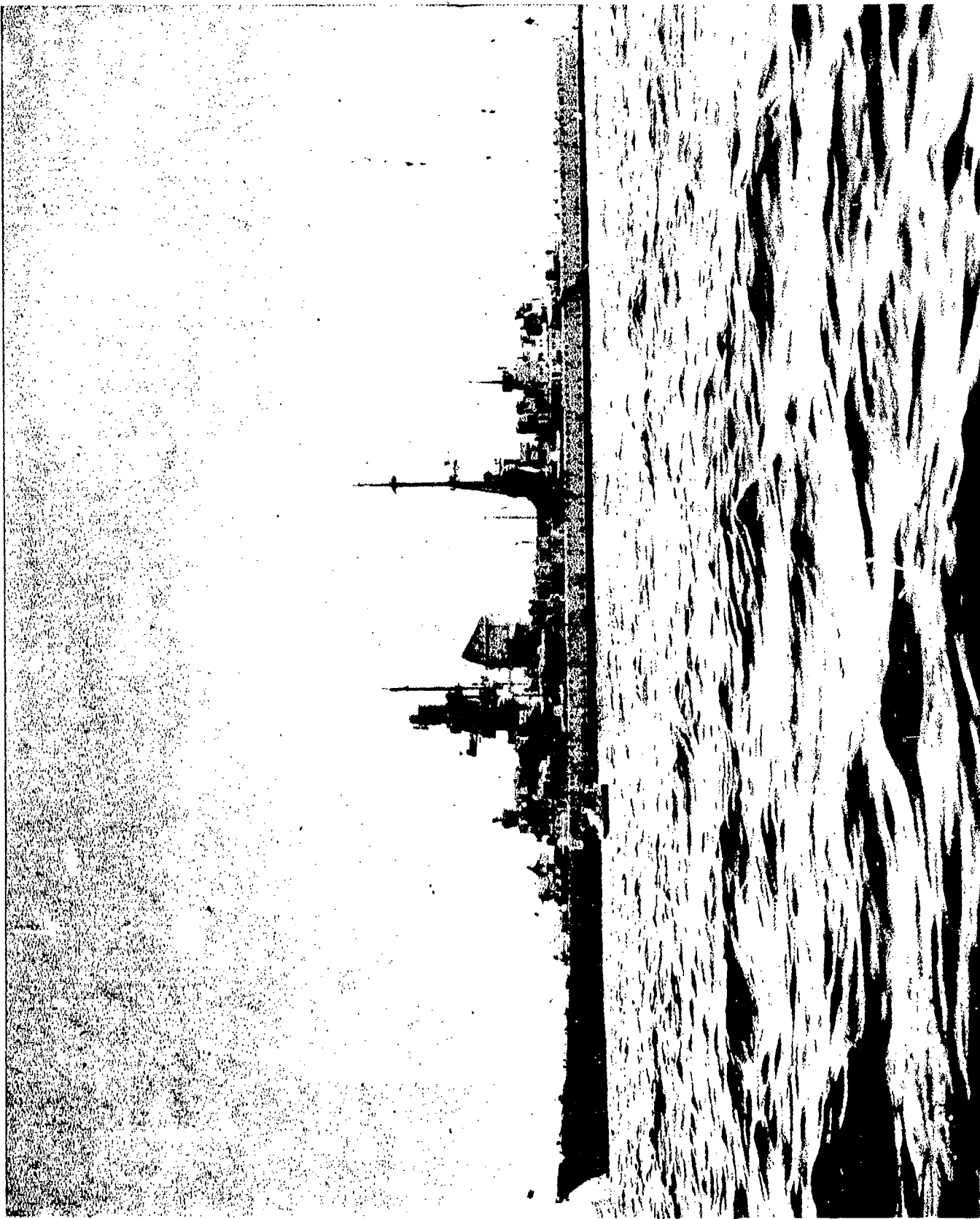
AA-CR-80-1896-1. View from off port bow.

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AA-CR-227-92-98. View from off port beam after Test A.

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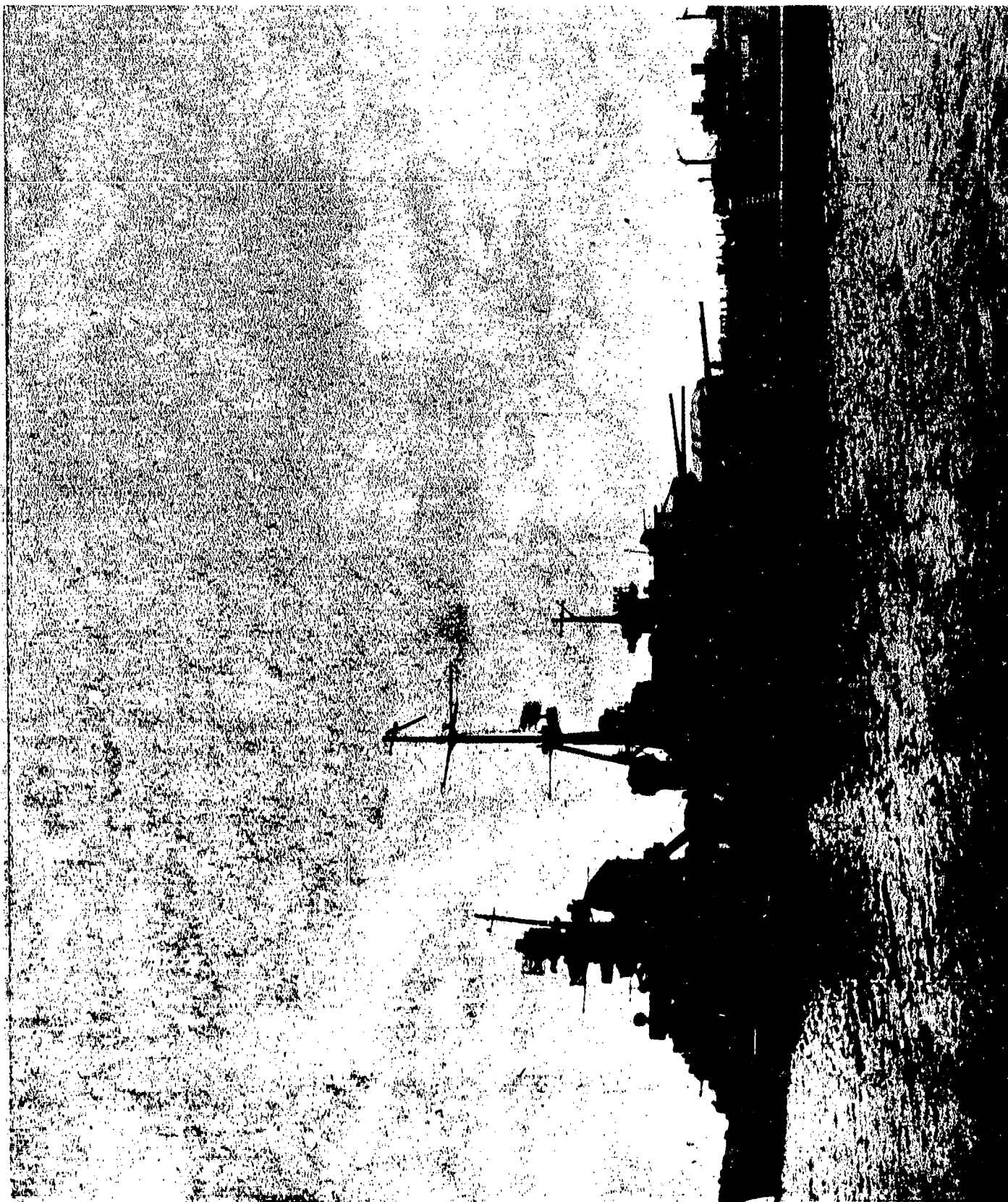
AA-CR-92-1773-8. Forward superstructure from off port beam.

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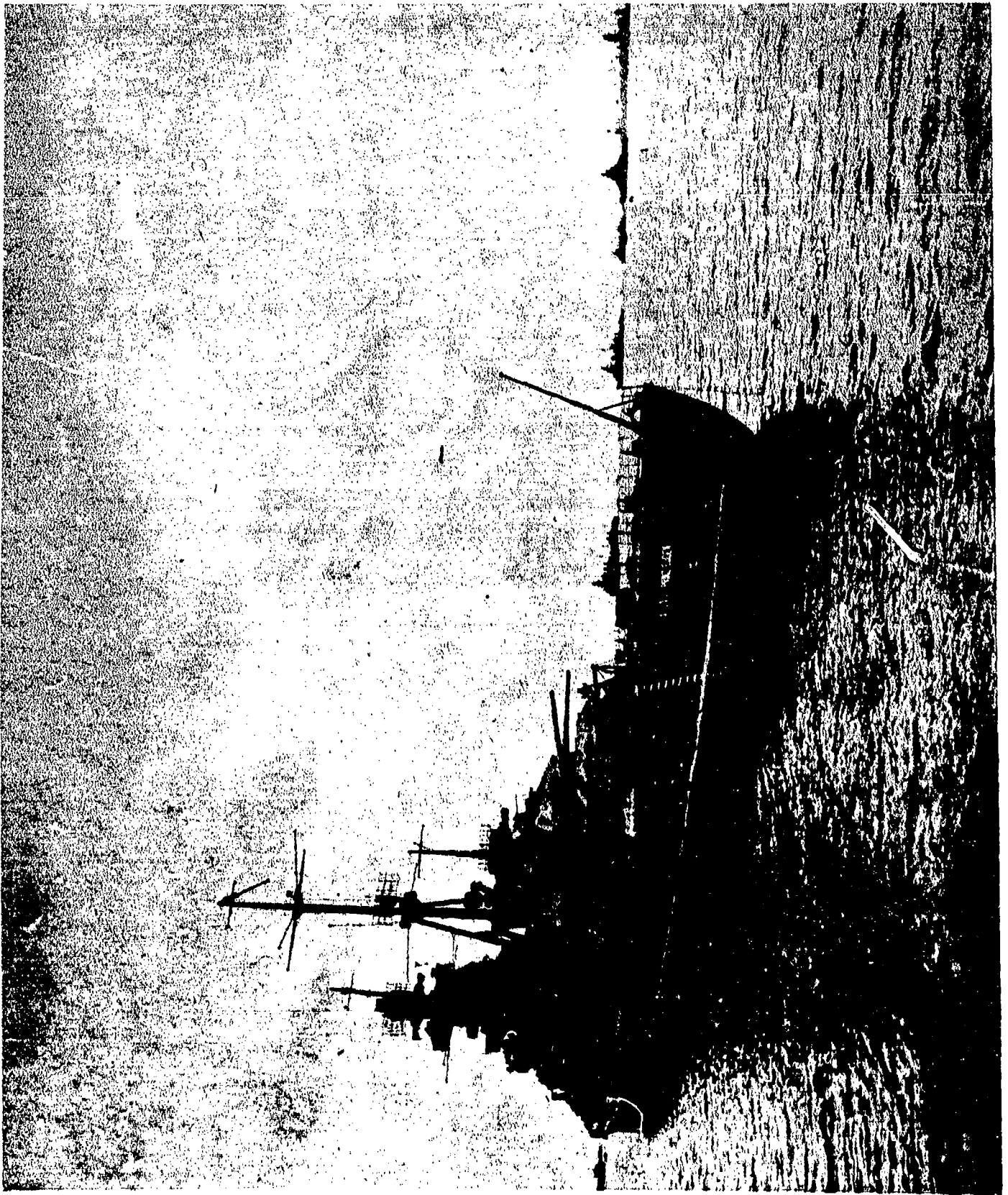
AA-CR-80-1893-12. View from off port quarter.

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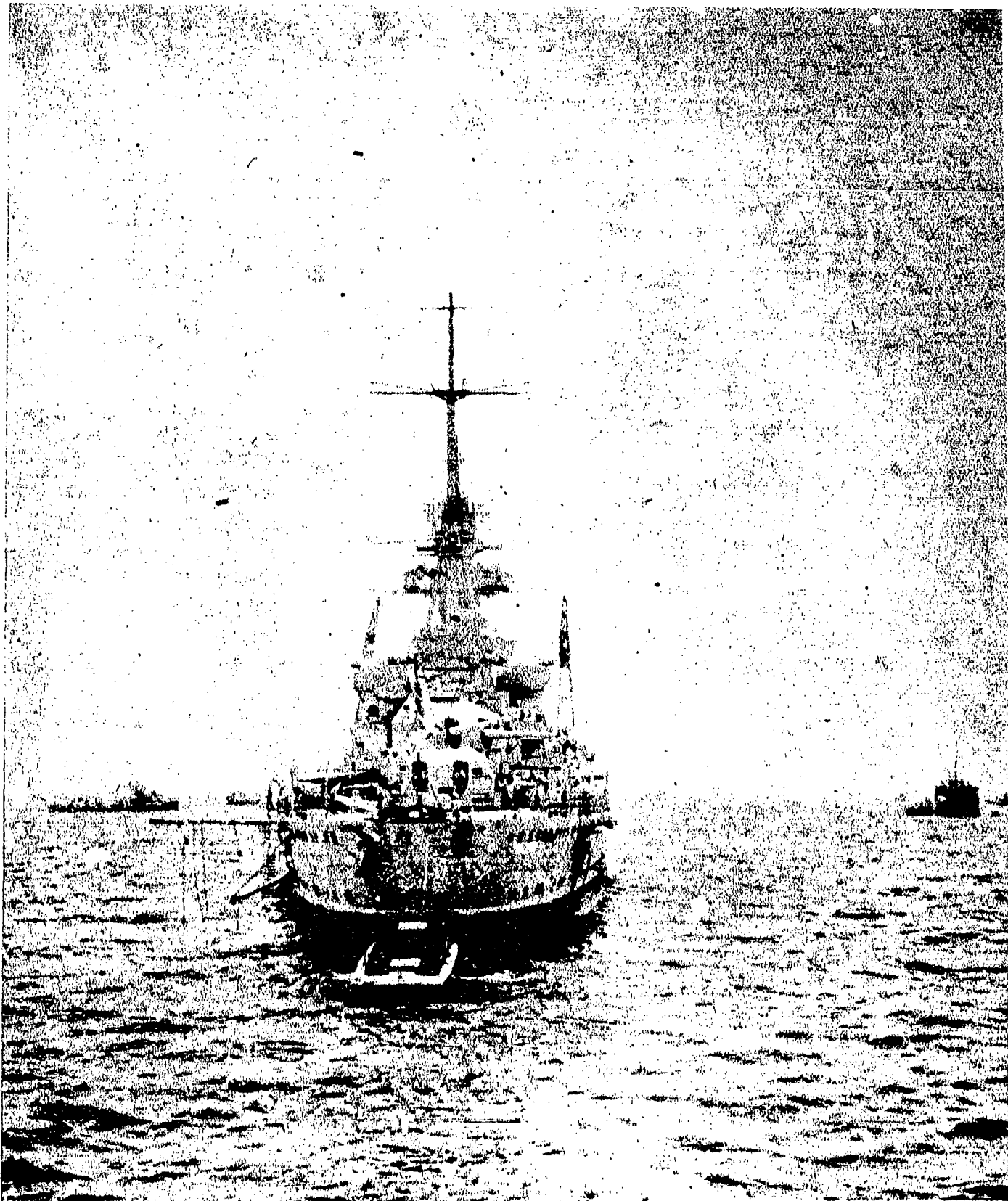
AA-CR-92-1773-7. View from off port quarter.

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AA-CR-227-49-88. View from astern after Test A.

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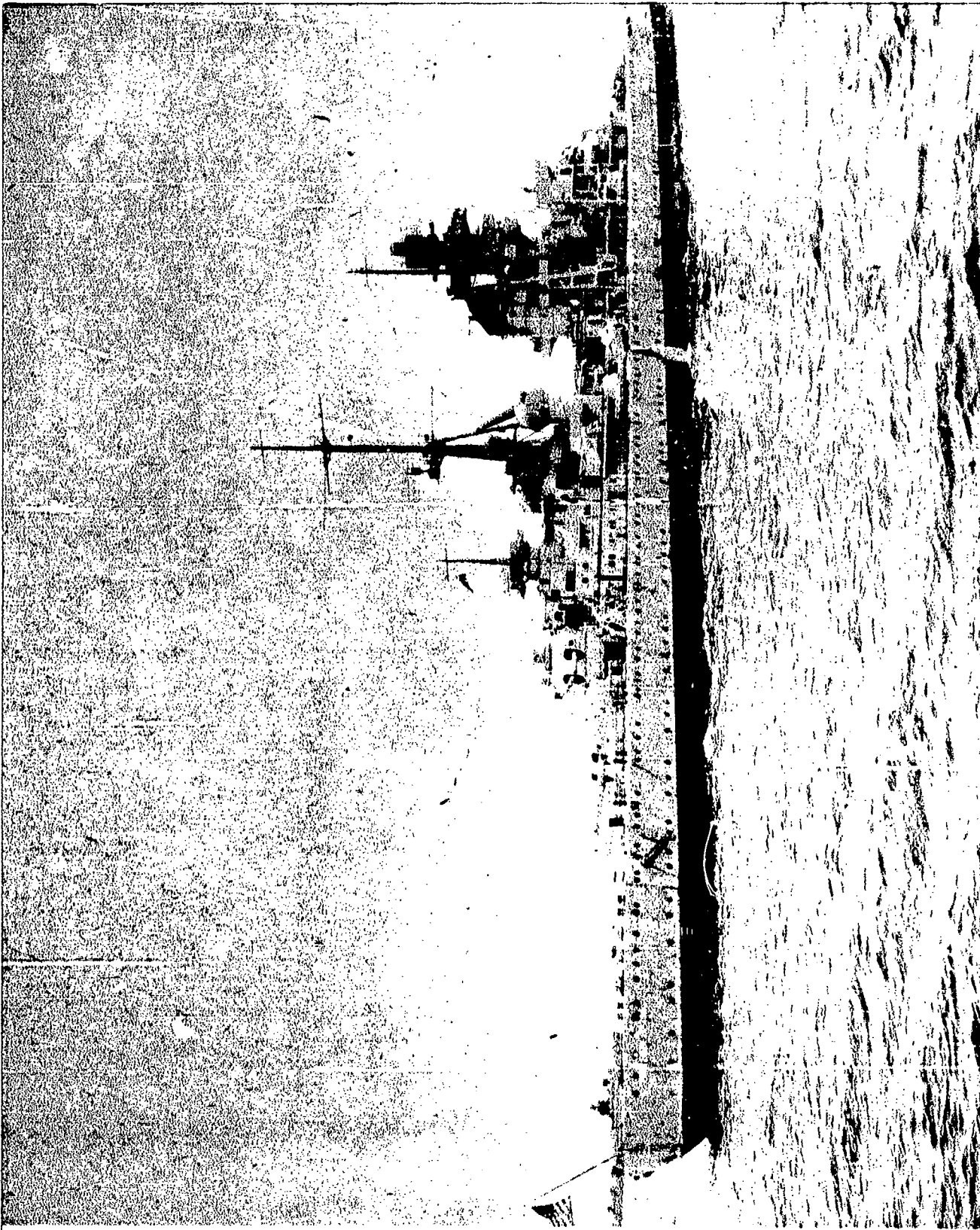
AA-CR-92-1773-6. View from off starboard quarter.

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AA-CR-227-49-89. View from off starboard quarter after Test A.

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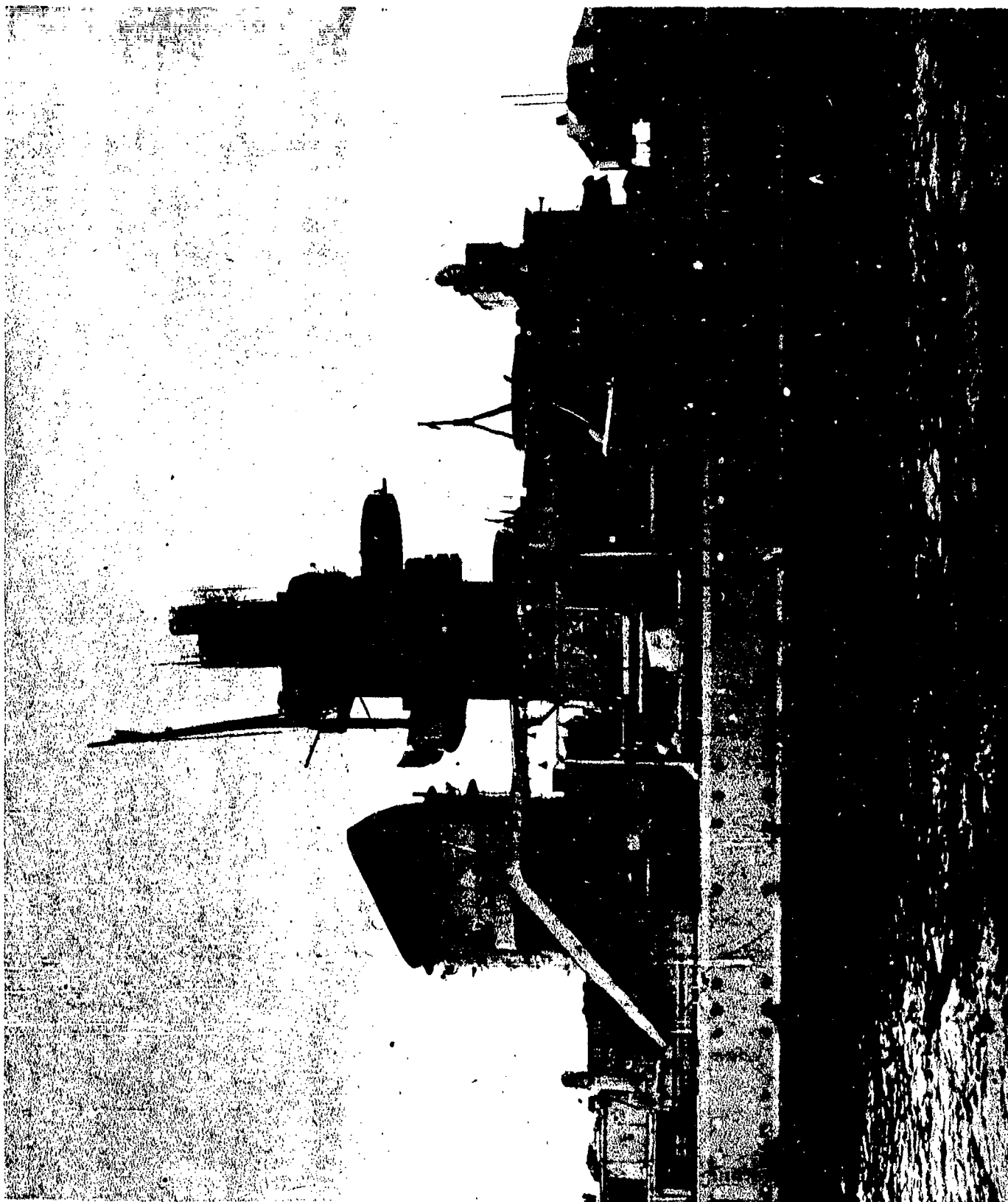
AA-CR-227-92-101. View from off starboard beam after Test A.

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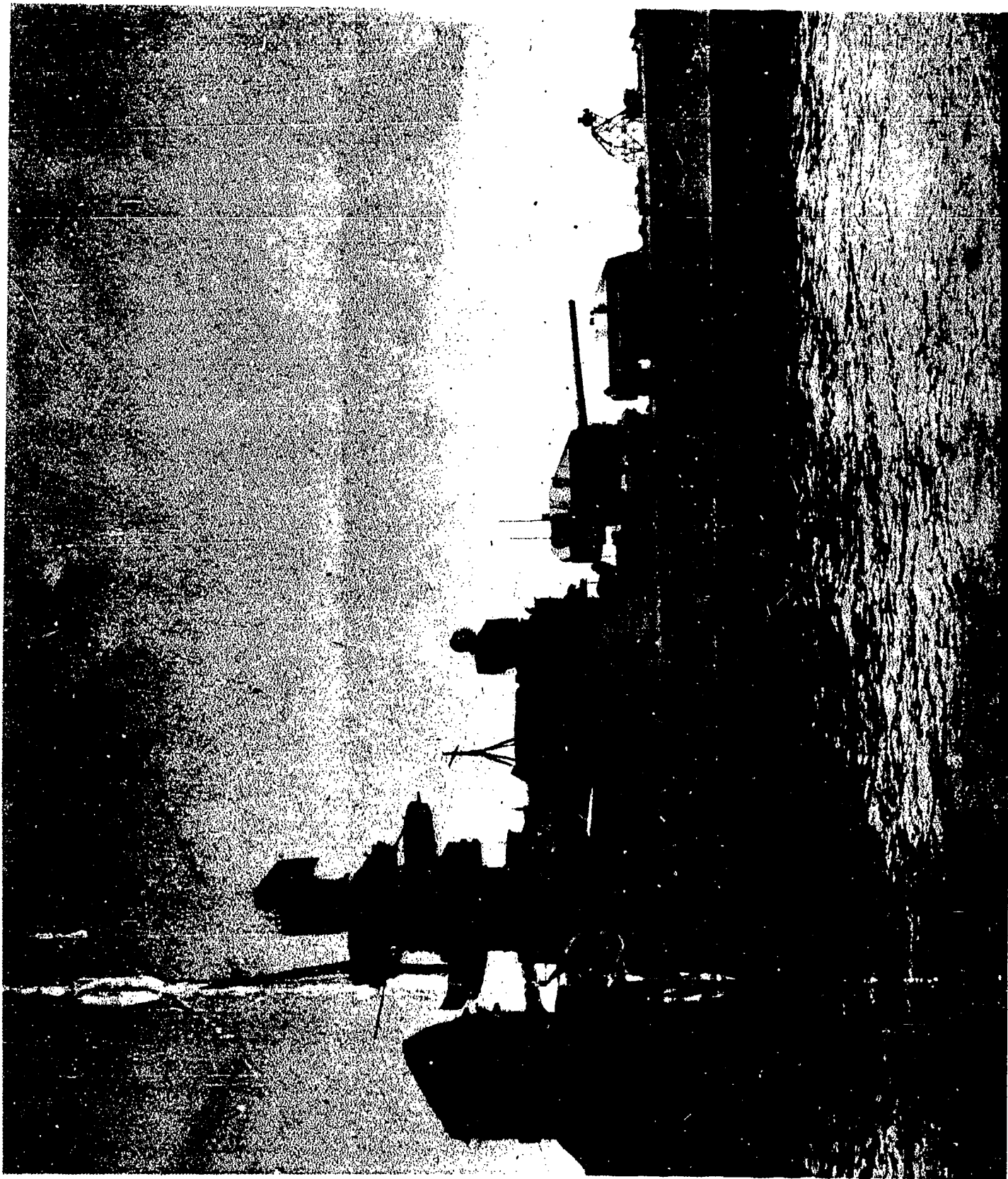
AA-CR-92-1773-11. Forward superstructure from off starboard beam.

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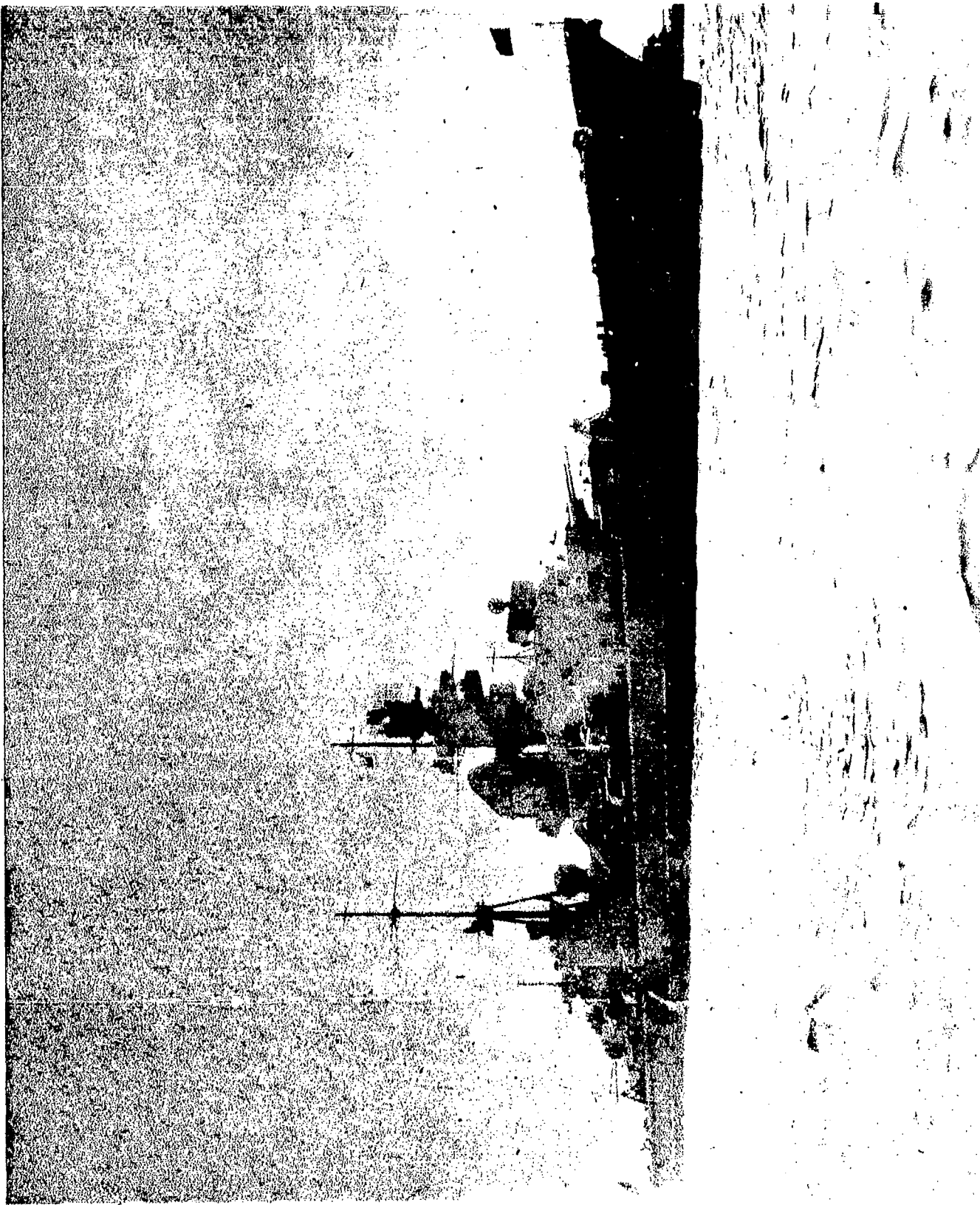
AA-CR-80-1893-11. Forward superstructure from off starboard bow.

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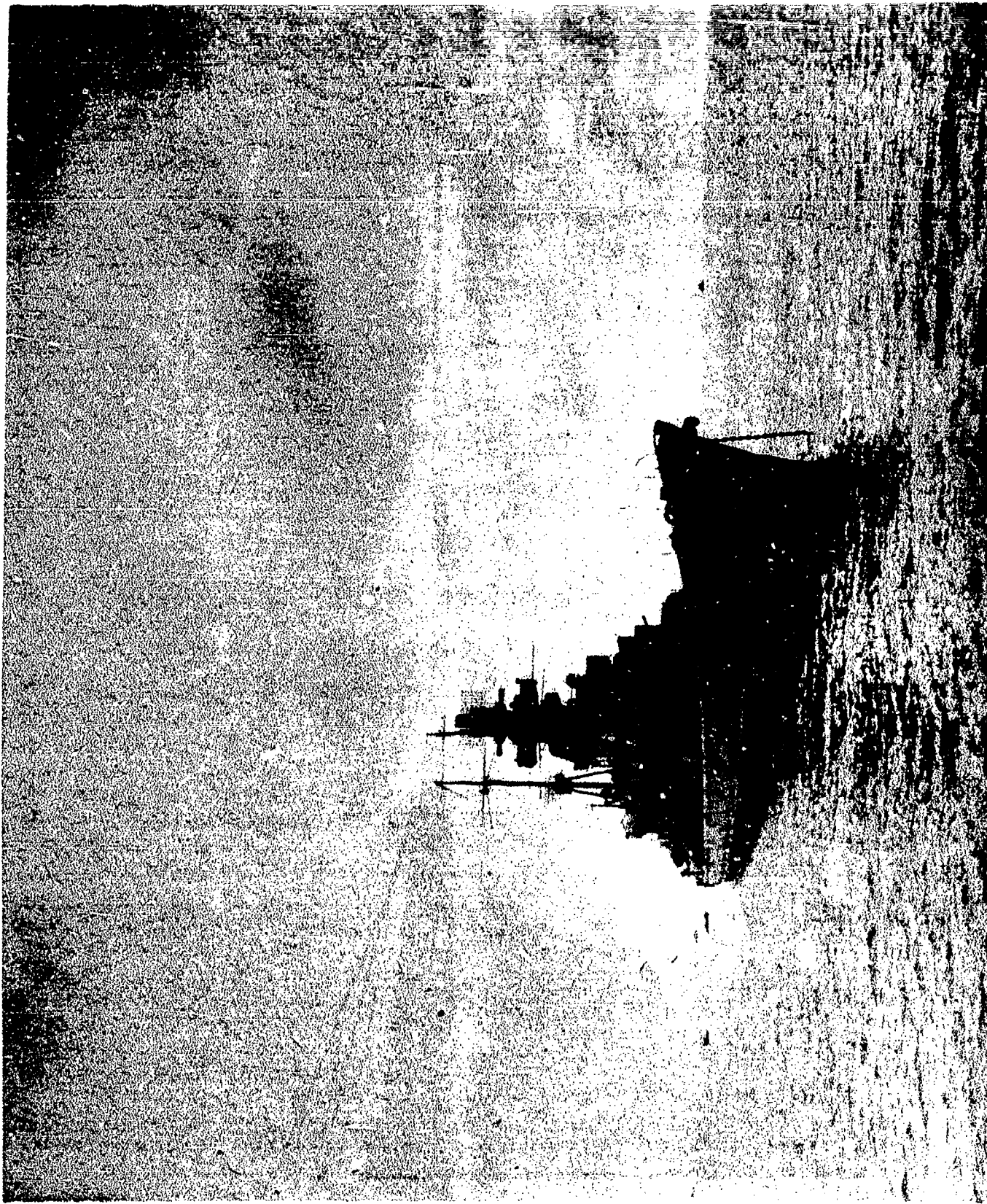
AA-CR-227-92-100. View from off starboard bow after Test A.

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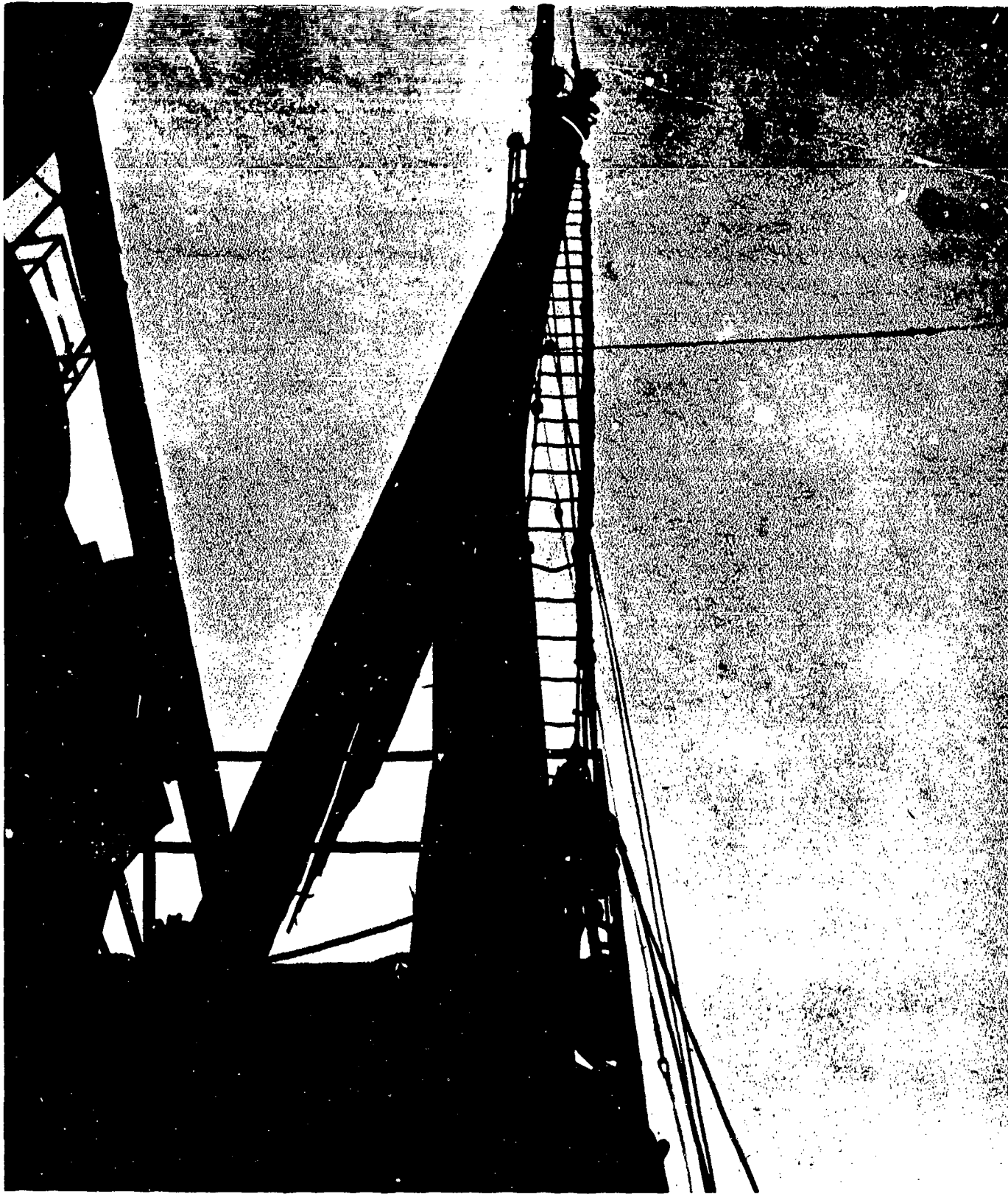
AA-CR-92-1773-10. View from off starboard bow.

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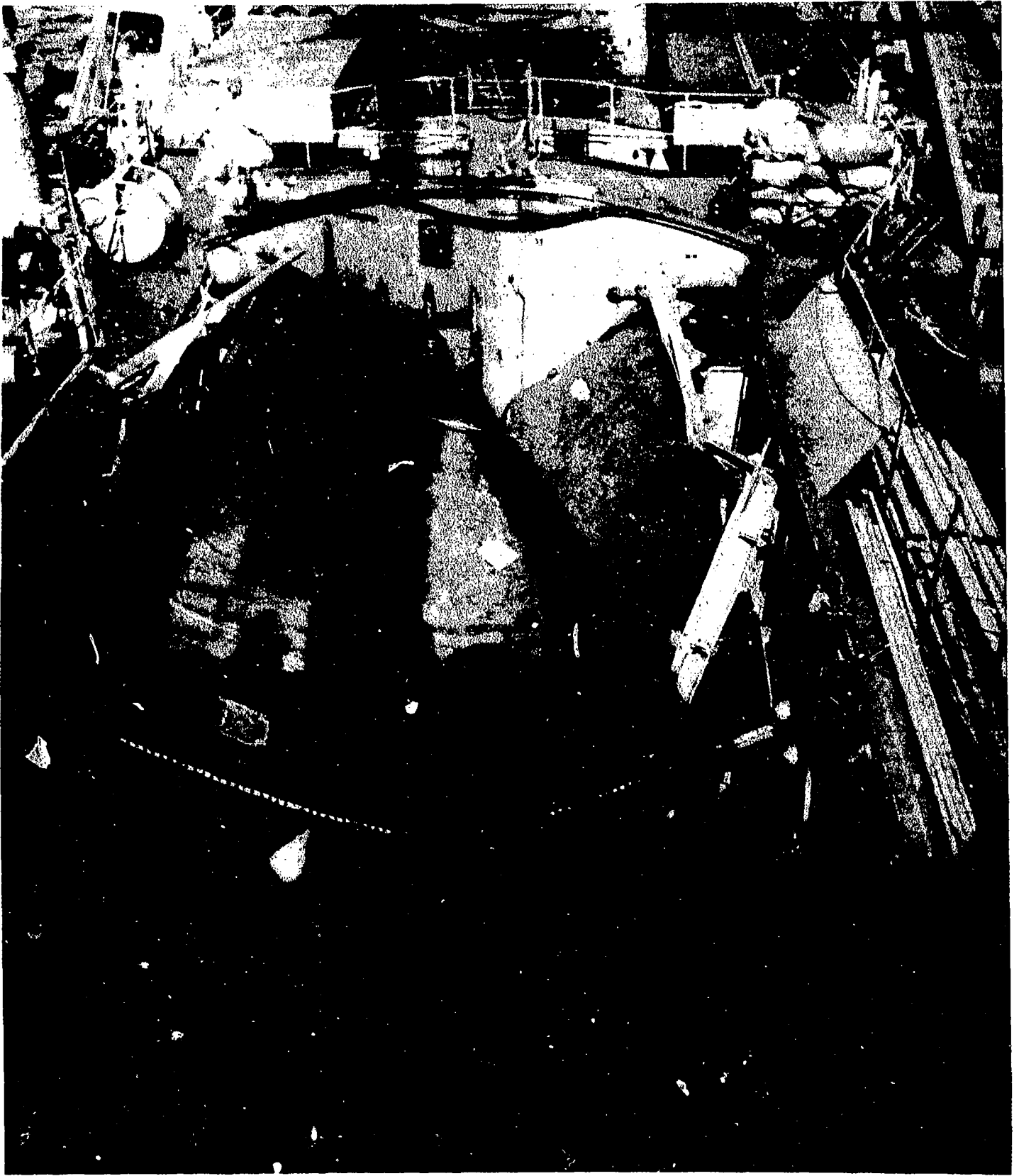
AA-CR-92-1774-5. Looking up and aft at fractured foremast.

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AA-CR-66-2049-3. Looking down and forward at wrecked hangar cover.

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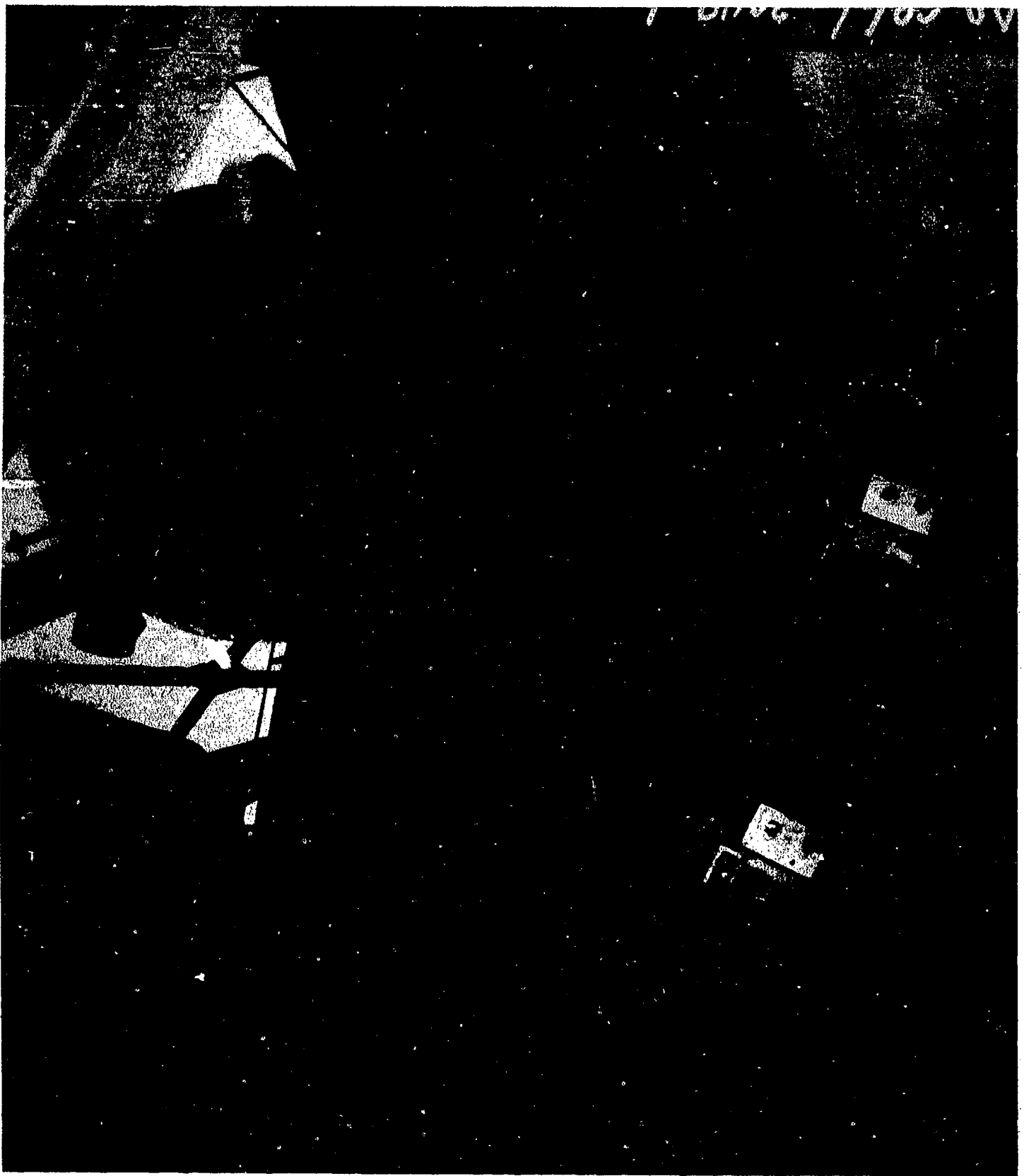
AA-CR-92-1774-4. Looking down, aft, and to port at wrecked hangar cover.

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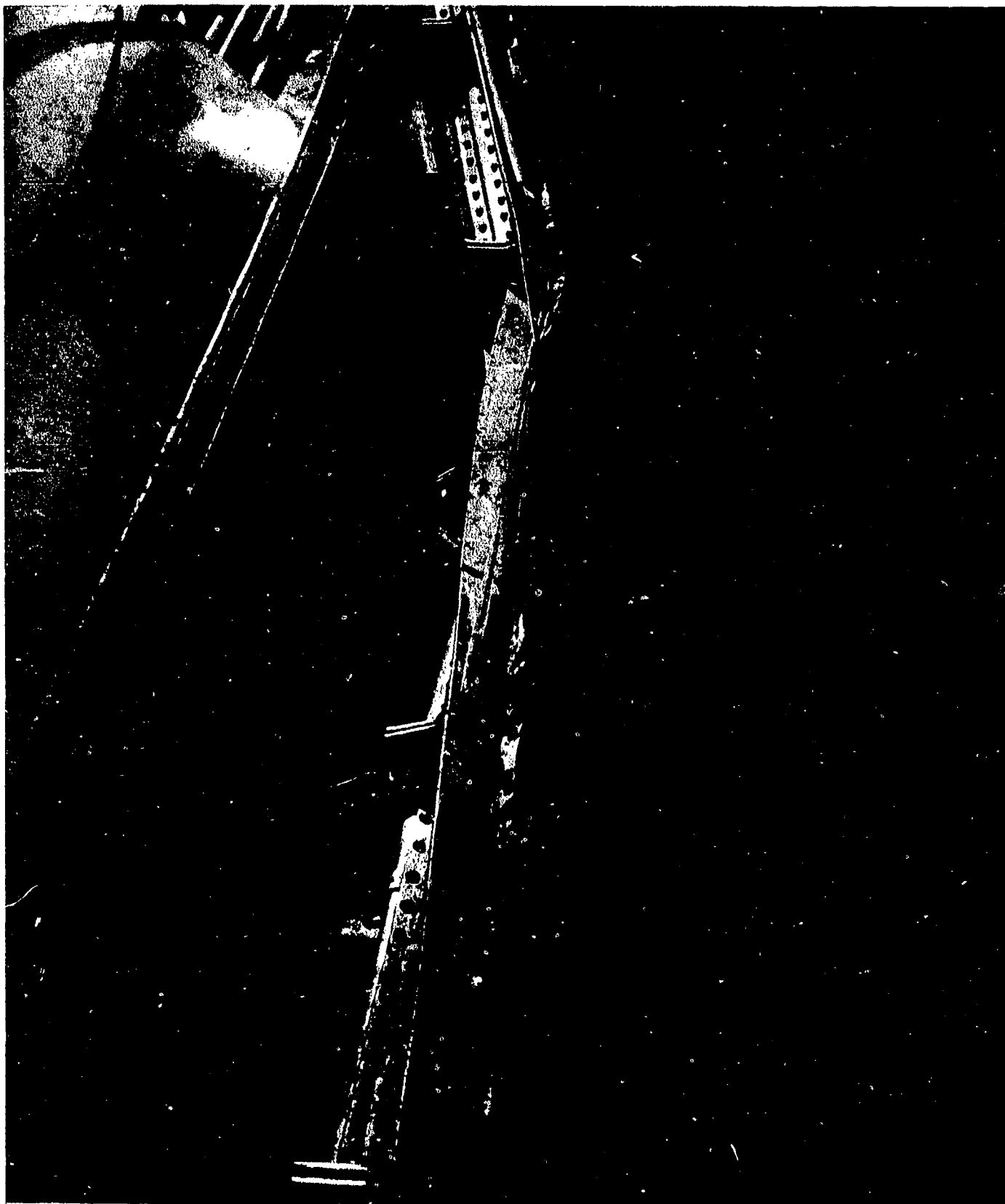
AA-CR-66-2049-1. After section of wrecked hangar cover. Note seam failures.

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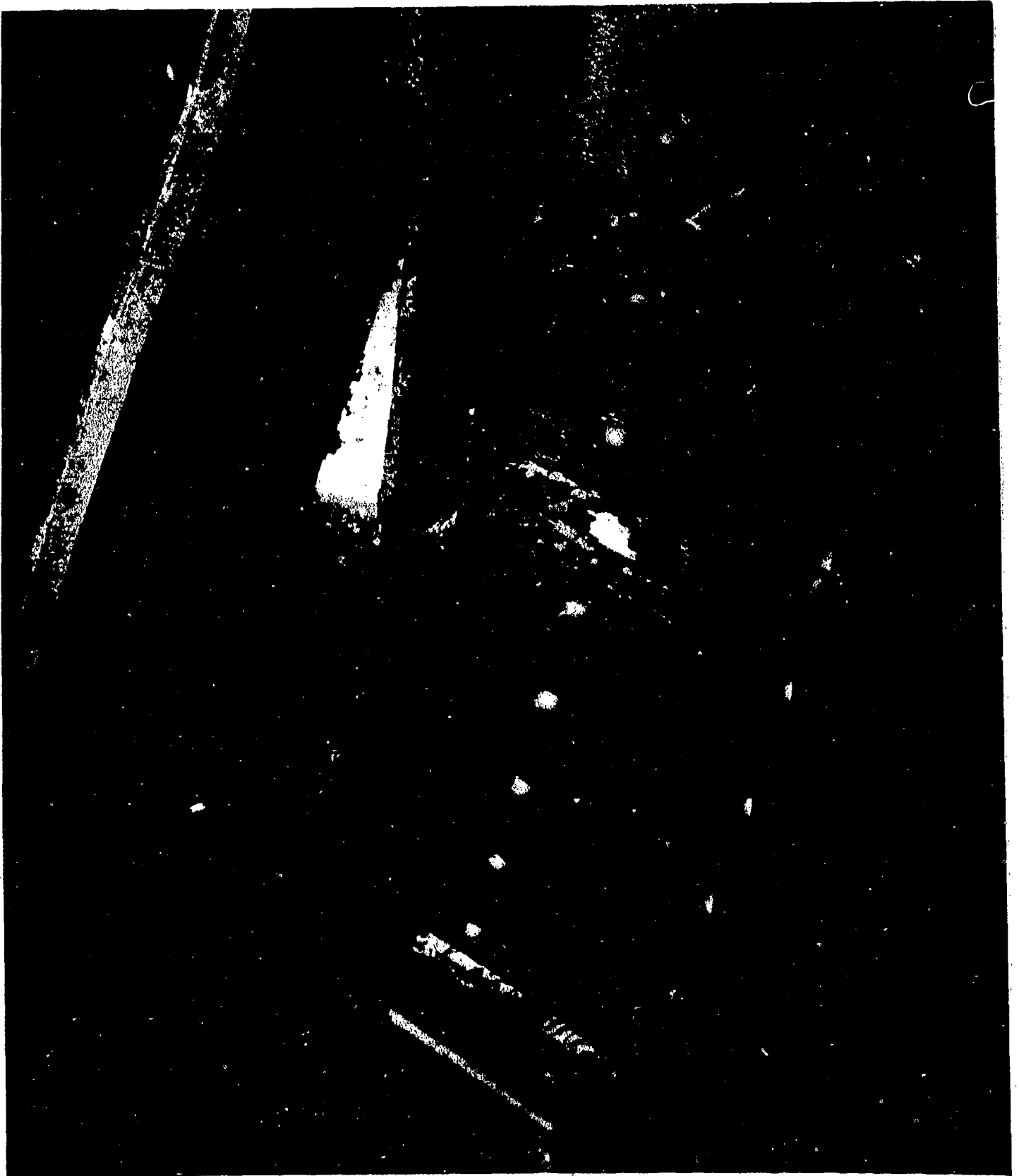
AA-CR-66-2049-5. Looking aft along starboard side of hangar showing deflection of boundary structure and failure of roller supports for sliding cover. Large roller normally hangs in a vertical plane.

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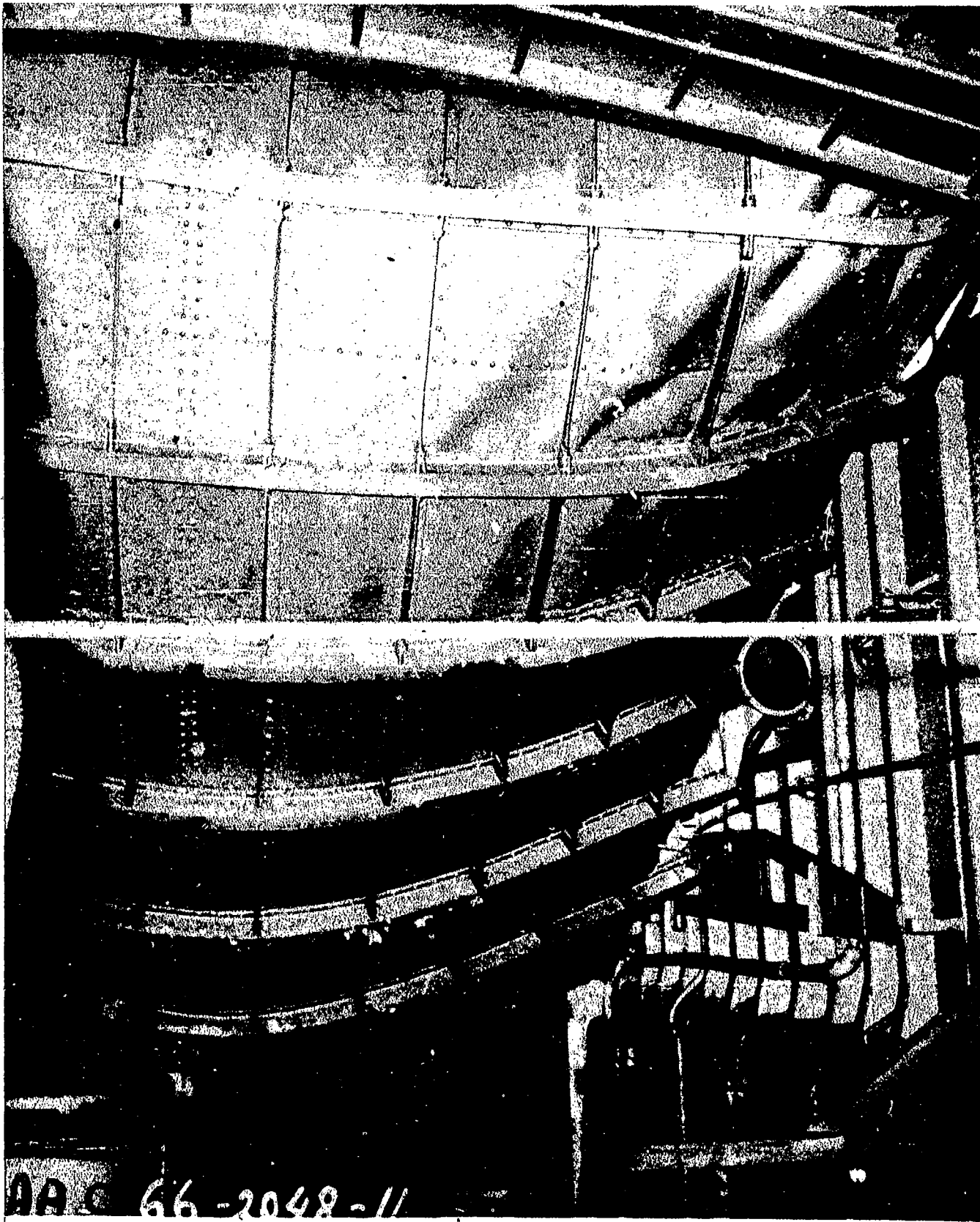
AA-CR-66-2049-4. Fracture in boundary angle of hangar cover.

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AA-CR-66-2048-11. Looking aft and up at wrecked hangar cover.

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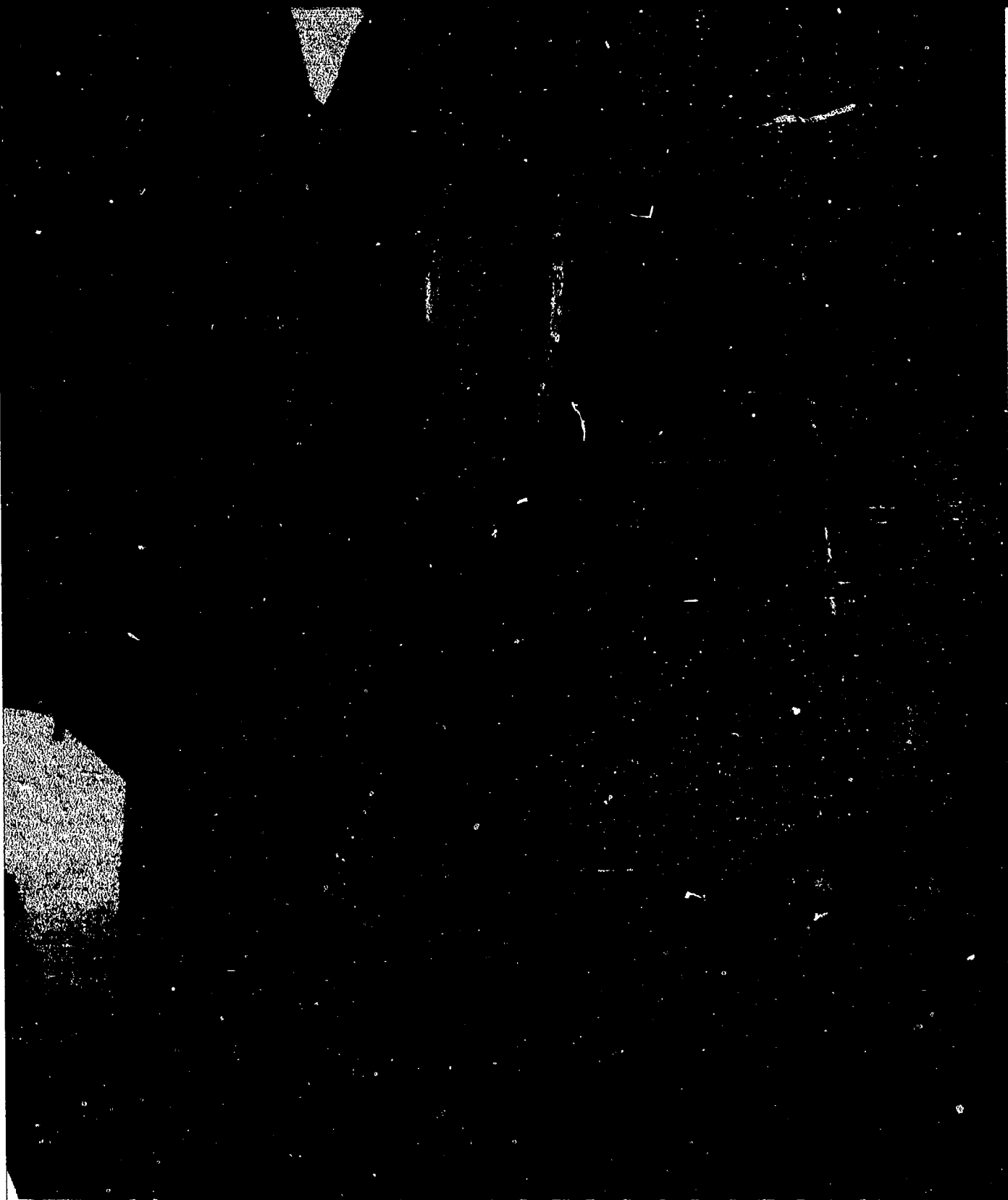
AA-CR-66-2049-2. Looking up at after section of wrecked hangar cover.

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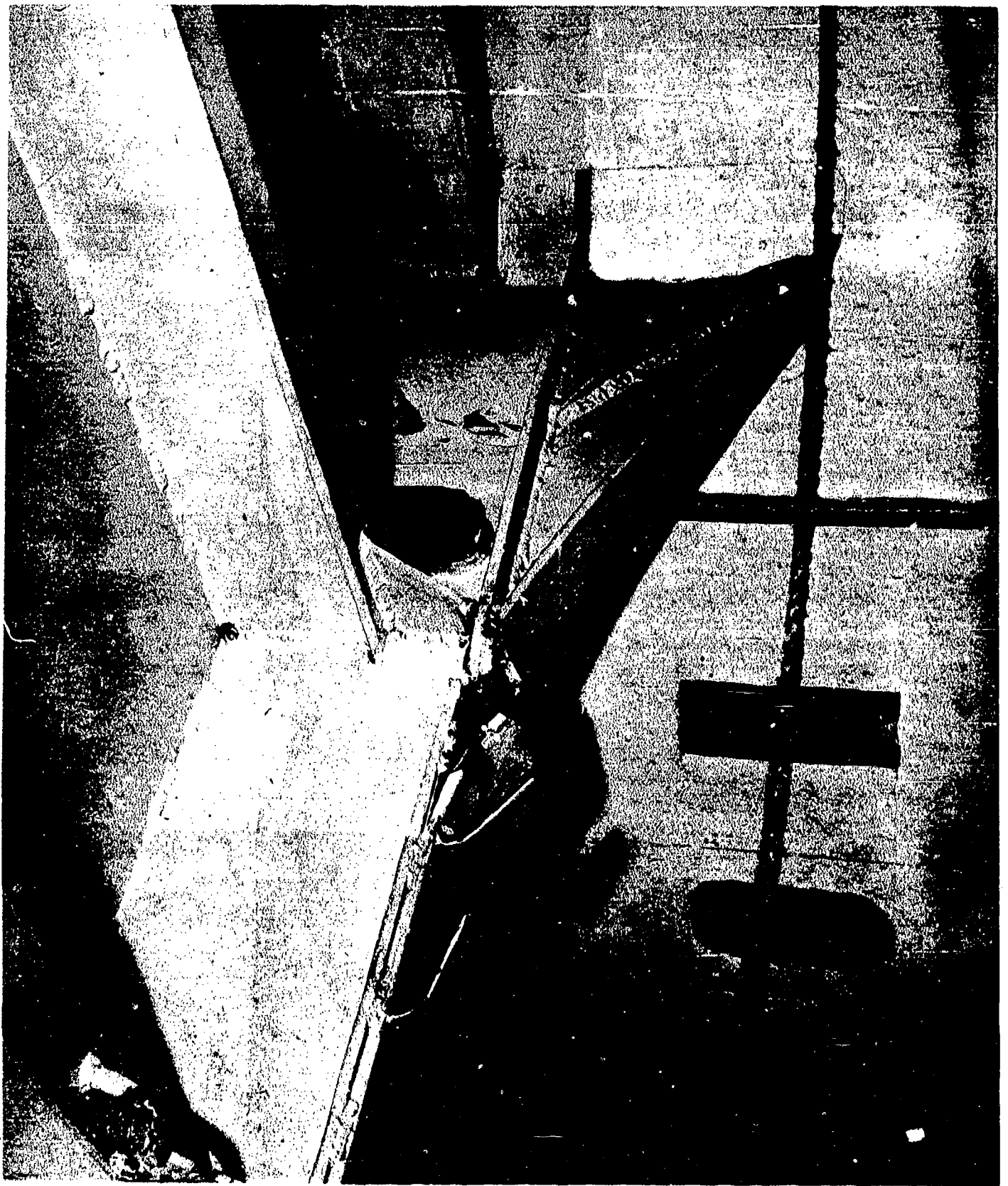
AA-CR-92-1774-3. Looking up and to port on second superstructure deck at after side of bulkhead 62.3. Note slight dish of bulkhead.

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AA-CR-65-1850-12. Connection of longitudinal under superstructure deck, 2 meters to starboard of ships centerline to the face of turret 2. Note buckling of web and failure of flange and face plate.

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AA-CR-66-2049-6. Close-up of failure of flange and face plate in connection of starboard longitudinal under superstructure deck to turret 2.

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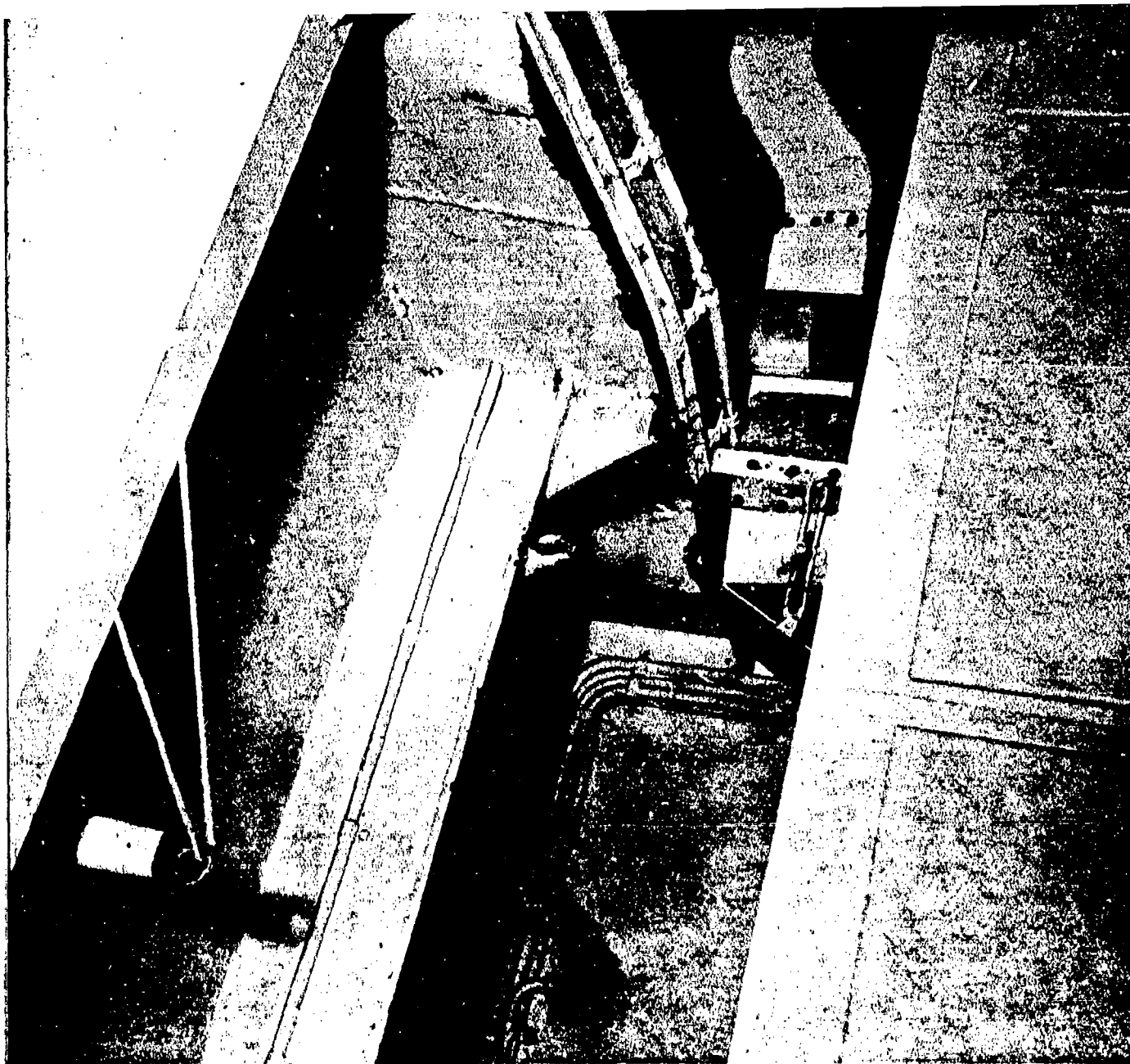
AA-CR-66-2049-7. Longitudinal under superstructure deck, 2 meters to starboard of ships centerline. View is at frame 142. Note failure of intermittent welding between web and flange.

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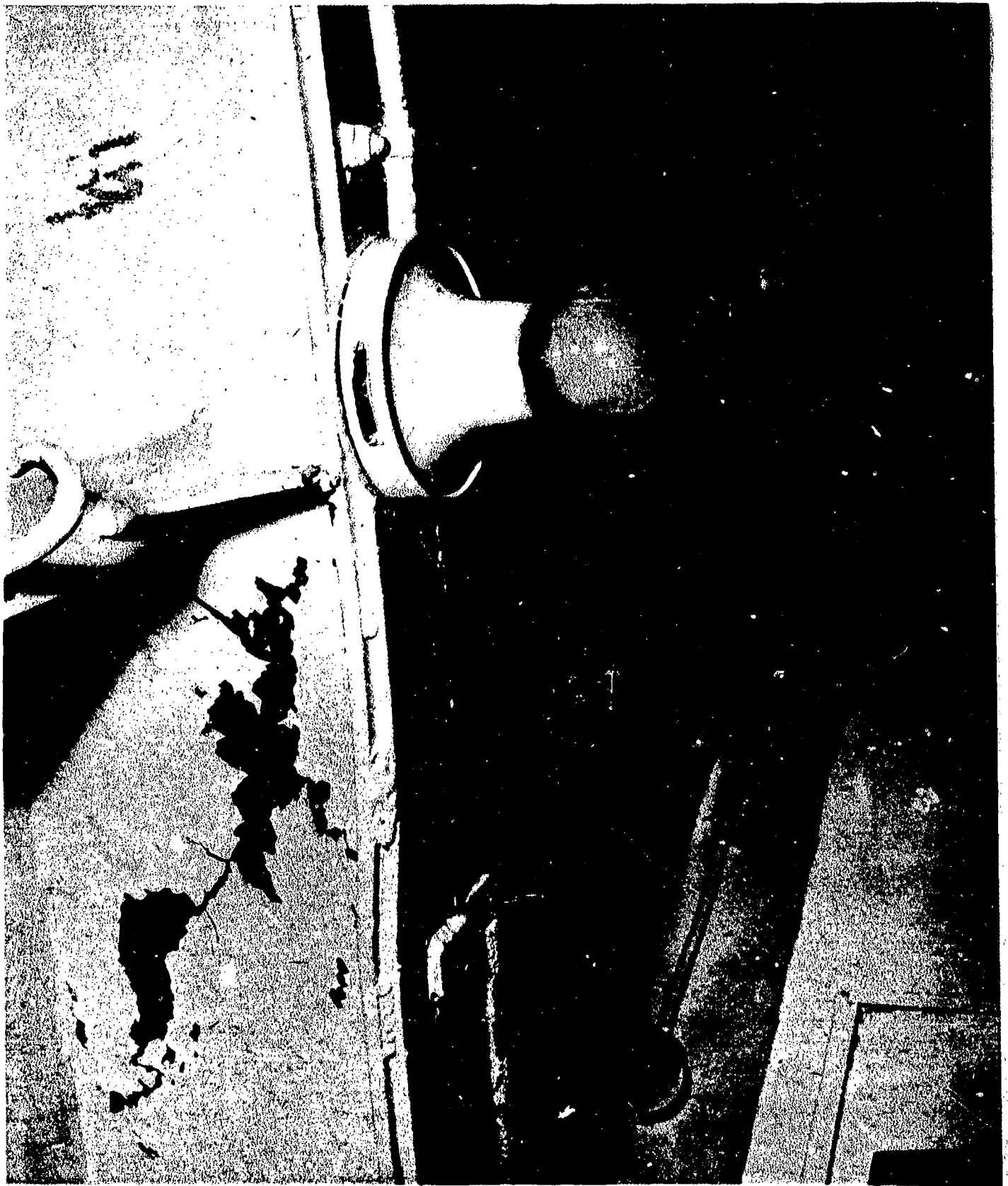
AA-CR-65-1850-11. Longitudinal under superstructure deck, 2 meters to starboard of centerline. View is at frame 42. Note buckled web and failure of intermittent welding between web and flange.

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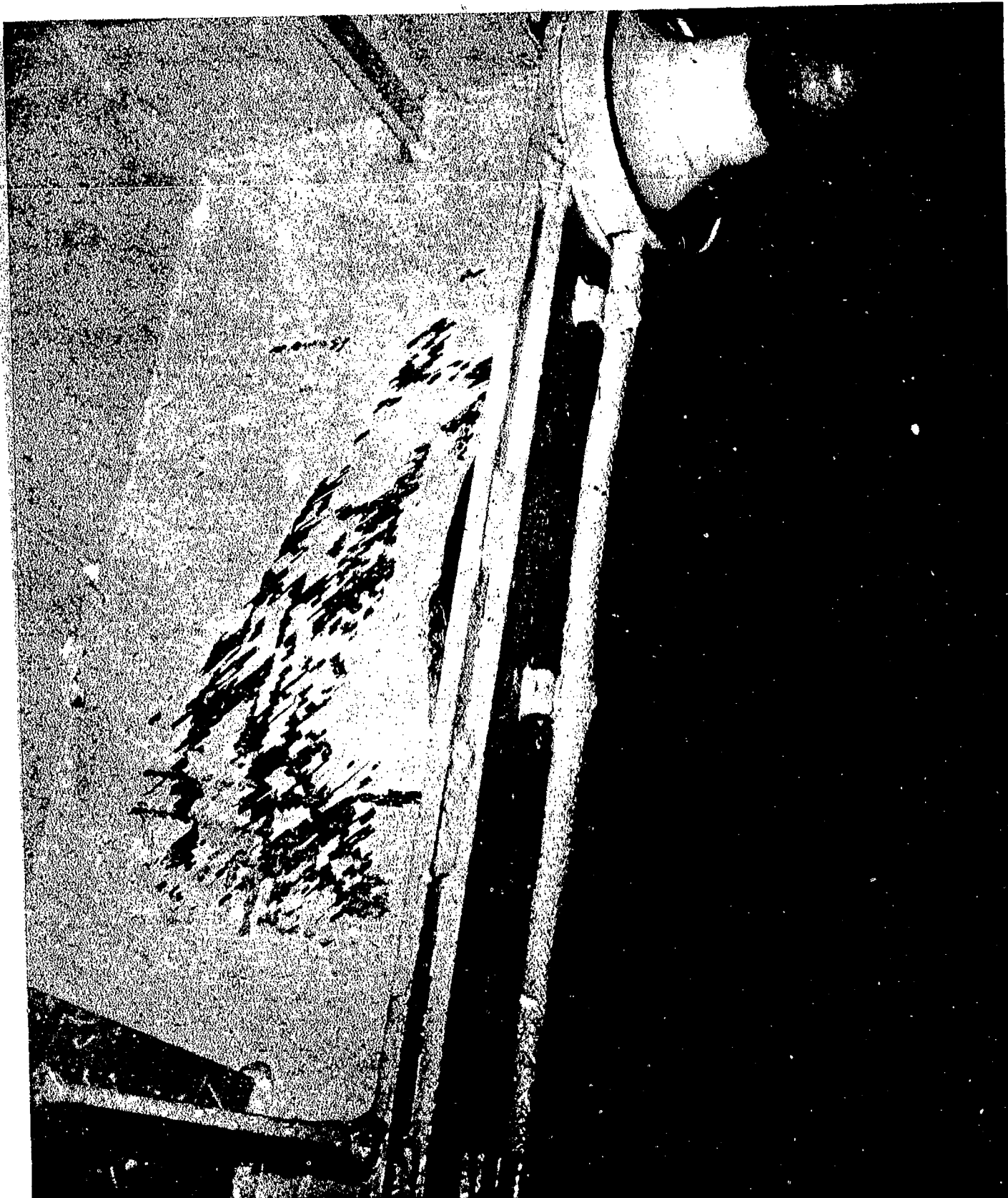
AA-CR-66-2049-9. Looking inboard at longitudinal under super-structure deck, 2 meters to port of centerline. View is at frame 146. Note buckle of web and flange.

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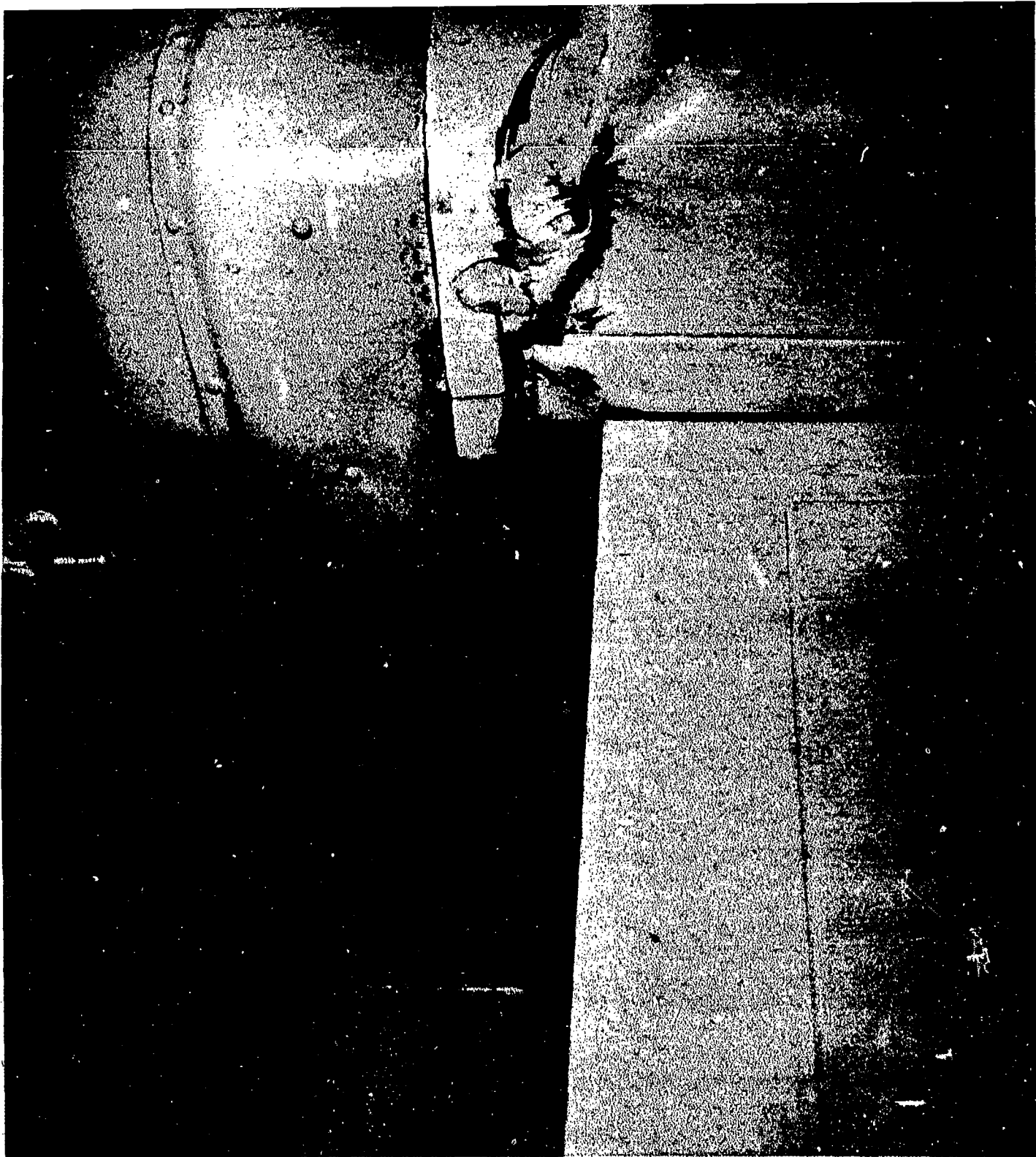
AA-CR-66-2049-11. Looking outboard at longitudinal under the super-structure deck, 2 meters to port of centerline. View is at frame 146. Note buckling of web and flange and failure of intermittent weld between them.

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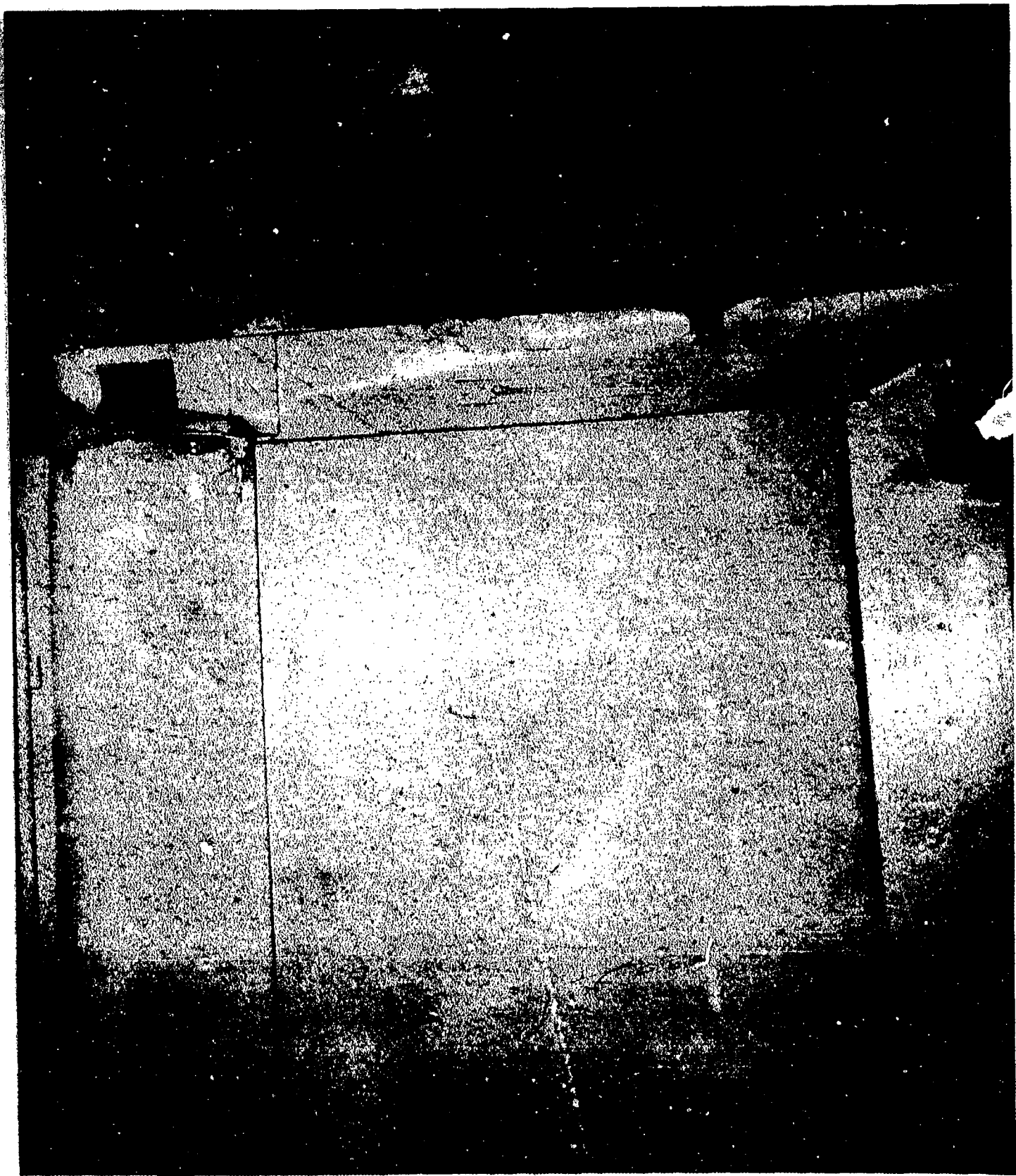
AA-CR-66-2049-12. Looking aft at athwartships jog in joiner bulkhead at frame 143. View is under superstructure deck. Note compression buckle and also indentation of wooden locker at left.

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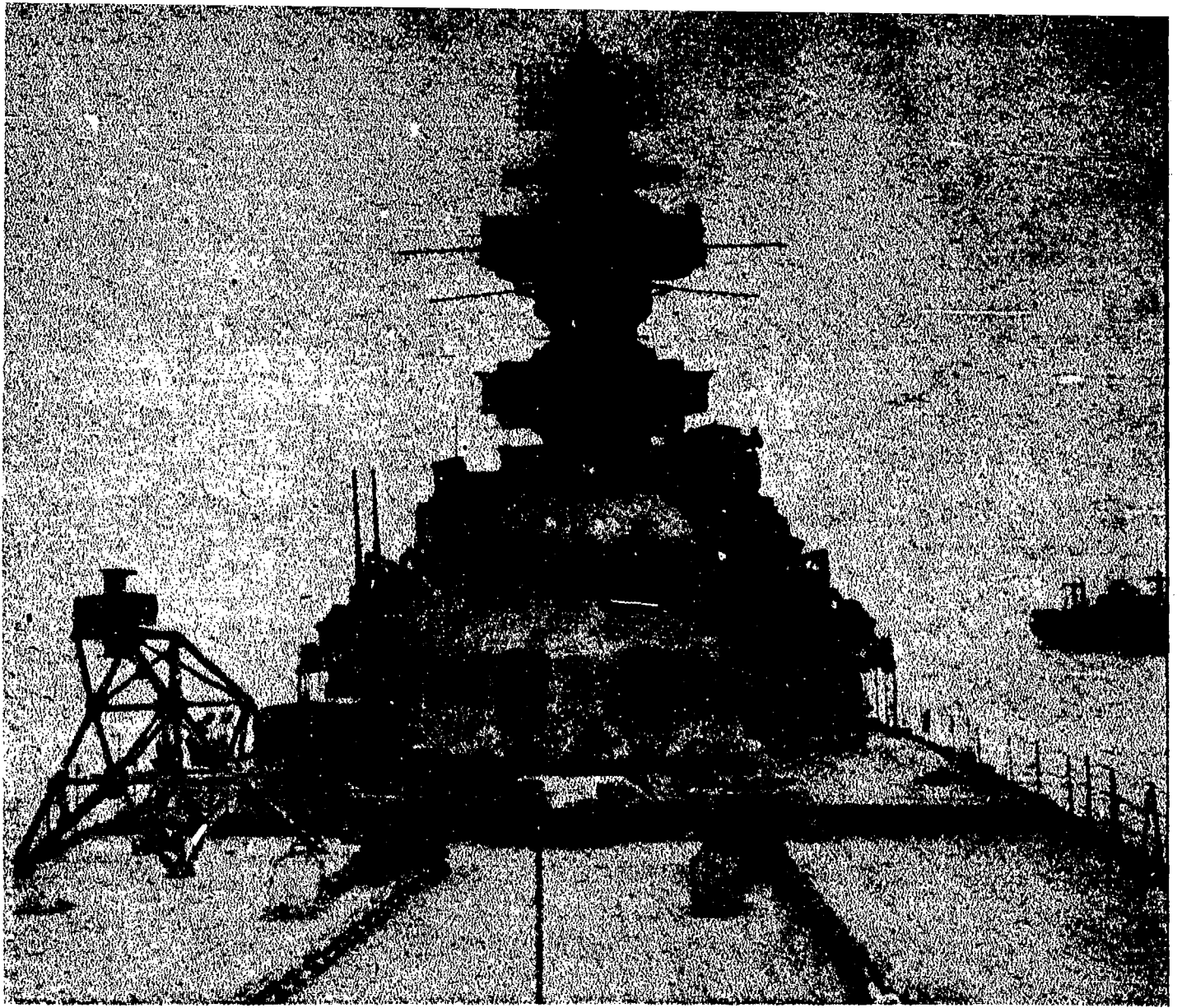
AA-CR-66-2049-10. Looking to starboard at joiner bulkhead 0.8 meters to port of ship's centerline frame 143. Note buckling.

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AA-CR-92-1774-1. Looking aft from the bow on the main deck.

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APPENDIX

SHIP MEASUREMENT DATA

TEST ABLE

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APPENDIX

SHIP MEASUREMENT DATA

Six scratch gages were installed to measure deflection of the weather deck. The locations and recordings of the gages are tabulated on page 84 .

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DECK DEFLECTION GAGES

TEST A

SHIP USS PRINZ EUGEN (IX300)

FR. NO.	LOCATION		MAXIMUM COMP.	MAXIMUM EXP.	PERMANENT DISTANCE	SET EXP. / COMP.	REMARKS
	DECK	DIST. OFF &					
2.1	2nd	Centerline	0-0-1/2	None	None	None	None
38.5	2nd	Stbd.	0-1-1/8	None	None	None	None
104.1	2nd	Stbd.	None	None	None	None	Marker arms were not touching
172.5	2nd	Centerline	None	None	None	None	None
153.4	2nd	Port	None	None	None	None	None
79.6	2nd	Port	None	None	None	None	None

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APPENDIX

COMMANDING OFFICERS REPORT

TEST ABLE

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REPORT #11

COMMANDING OFFICER'S REPORT

PART A - GENERAL SUMMARY

I. Target condition after test.

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

Draft after test - 19' forward 26' aft. No list.

Only area of flooding was at frame 78, centerline battery deck caused by breaking of the cooling water lines to vent blowers. The pressure was off at time of break. This area flooded only when pressure was restored following return to the ship.

(b) Structural damage: superstructure, hull, interior of hull, above and below armored deck (if fitted).

(1) Scorching of paint in line of blast forward and port sides of ship. This scorching was confined to the outer coat of paint giving an appearance similar to that caused by passing a hot torch quickly over the area.

(2) The weather aprons attached to the forward portion of the outer navigation bridge were torn loose at hinges and folded back onto bridge. The unprotected windows in the Admiral's Bridge were blown in causing no damage except for the hazard of broken glass.

(3) The foremast was split vertically from the top, a distance of approximately 40'. The mainmast top, about 15' was broken off.

(4) The radio antennae and radar antennae were rendered inoperable.

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(5) At 01 deck level abaft #2 turret the fore and after deck beams attached by weld to the barbette were damaged by compression giving an indication of either a bow "whip" or an inertia hammering force of great strength being transmitted through the barbette structure and damaging these strength members.

(6) The battle port in room 374 was not closed. The glass port was blown in and the joiner bulkheads bulged outward.

(7) German type light bulb filaments were broken and the bulbs completely inoperative, American bulbs unscrewed from sockets but did not break and could be readily used after tightening in sockets.

(8) Sliding overhead to hangar - demolished.

(9) Joiner bulkhead in pantry of sickbay bulged outward apparently caused by cracked vent leading into pantry from topside.

(10) Room 176 second deck at frame 174 - joiner bulkhead bulged outward.

(c) Operability: machinery, electrical, ship control, fire control, gunnery, electronics.

(1) Machinery, electrical, ship control, fire control and gunnery were operative, except for forward main battery exposed director which was knocked off its roller path.

(2) Electronics: Damage generally light with exception of radio antennae and exposed radar equipment. Portable SQ was blown from mounting. Army SCR 584, mounted on top of navigation bridge, was damaged as a result of side plating being dished in by blast. Several meters and dials were cracked or broken. No tubes were found defective.

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(d) Heat; fires; estimated personnel casualties.

No fires are indicated, see paragraph (b) above for scorch effect on paint. It is estimated that all exposed personnel in forward and port area of ship and in superstructure would have been casuals.

II. Forces evidenced and effects noted.

(a) Heat: apparent direction (if any); extent longitudinally, transversely, penetration, significant behavior of structure of equipment.

Heat: A rapid hot blast from about 10° on port bow. Scorched paint. Caused no fires. Scorching condition confined to forward and port surfaces.

(b) Fire and Explosions: situation; nature of combustible or explosive; normal stowage; cause of ignition; extended result.

None.

(c) Shock: apparent direction (if any); areas affected; critical scantlings; nature of joiner failures (general); effect on machinery and equipment; significant behavior of structure or equipment:

No apparent damage from shock except filaments of German bulbs broken, American bulbs unscrewed, and electronic dials and meters cracked.

(d) Pressure: apparent direction (if any) areas affected; critical scantlings; general nature of failures; significant behavior of structure and equipment.

Pressure appeared to have come from forward, port and above the ship causing damage to exposed surfaces forward and to port plus weak horizontal structure topside. There is indication of a circular down and up movement of air, or a vacuum in rear of blast.

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- (e) Any effects apparently peculiar to the Atom Bomb.

Two canvas hammocks which had been used to cover overboard discharge on starboard side amidships were blown clear and landed on port yardarm.

This ship is equipped with two large cranes on the main deck (port and starboard side) which were undamaged by the blast.

III. Results of Test on Target.

- (a) Effect on propulsion and ship control - None.
- (b) Effect on gunnery and fire control - None.
- (c) Effect on water-tight integrity and stability - No effect.
- (d) Effect on personnel and habitability.

No effect on personnel under cover in inside spaces. Exposed personnel in forward and port area and in superstructure would have been casualties. Habitability - No effect.

- (e) Total effect on fighting efficiency - None.

IV. General summary (not over 6-8 lines) of observations, impressions and conclusions.

It would appear that at the distance this ship was from the burst there is no danger to personnel or material if shielded by light metal. General effect would indicate that superstructures of the future vessels will in general have to conform to streamline tear-drop shapes with no masts, stacks or protrusions.

V. Any preliminary general or specific recommendations of the inspecting group.

None.

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INSPECTION REPORT

SECTION I - HULL

A. General Description of Hull Damage.

(a) The overall condition of vessel was good. There was no major damage. The blast came from the port bow generally. The blast was expected from the starboard bow, but the ship had apparently swung well to port thus accounting for the damage effecting the port side.

(b) The general areas of hull damage were the forward mast structure, foremast, mainmast, hangar deck, sickbay, and breakage of glass.

(c) Apparent causes of damage were from forces of great concussion resulting from pressures of hurricane force and heat.

(d) Principle and only area of flooding was at frame 78, centerline, battery deck, caused by the breaking of the cooling water lines to vent blowers. NOTE: Pressure was off at time of break. This area flooded only when pressure was restored following return to ship.

(e) There was no impairment in buoyancy or operability from hull damage.

B. Superstructure (exclusive of gun mounts).

(a) Description of damage.

(1) Bridge area: scorching of painted surfaces; navigational bridge weather aprons torn from hinges and rendered useless; room 374 bulkhead blasted outward; unprotected glass windows in admiral's bridge blown in; rangefinder equipment of 07 level damaged; wooden top section of foremast split vertically.

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(2) Midship deck house and stacks: Hangar deck sliding overhead (sliding type aluminum) destroyed. No damage to stack.

(3) After deckhouse and tower. Scorching of outer coat of paint; mainmast broken off, extreme top quarter only; after 48" searchlight glass shattered.

(b) Cause of damage in each area due to concussion of blast.

(c) No evidence of fire in superstructure other than blistering effect. (Similar to passing a blow torch across the paint work).

(d) Relative effectiveness against heat was complete. Against blast was complete where closure was adequate.

(e) Masts are unnecessary and not desirable for defense against this type of attack.

C. Turrets, Guns and Directors.

(a) Protected mounts.

(1) General condition good. Operability unknown. One main battery director lifted off it's track and tilted about 5" on O11 - O12 level.

(2) Installed turrets and shields uneffected.

(b) Unprotected.

(1) General condition good. Operability unknown.

(2) Same as (a) above.

(c) Directors and Rangefinders.

(1) General condition good. One director outer shell split port side frame 162 at O4 level.

(2) Instruments uneffected.

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(d) No comment on design or construction.

D. Torpedo Mounts, Depth Charge Gear.

(a) Torpedo mounts.

(1) Mounts and equipment condition good except for breakage of glass in weather protection house.

(2) Warheads and flasks unaffected.

(3) No comment on behavior of warheads and air flasks.

(4) No comment on location, design or construction.

(b) This ship is not equipped with depth charge gear.

E. Weather Deck.

(a) General condition of deck good. German type ersatz rubber life rafts torn from supports. (These supports were in weakened condition prior to "A" test). Motor boat #3 in port skids has cabin damaged from blast.

(b) Deck 100% usable.

(c) Equipment and fittings damage negligible except for life rafts mentioned above.

(1) Mooring and towing fittings undamaged.

(2) Boats, boat handling undamaged; life rafts as above in (a).

(3) Airplane handling gear. (Removed for test purposes in Philadelphia Navy Yard.)

(4) Barriers, arresting gear, catapults (not applicable).

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DISPATCH EUGEN (IX300)

F. Exterior Hull (above waterline).

- (a) Exterior hull plating not affected.
- (b) Exterior hull fittings not affected.
- (c) Sheer strakes not affected.
- (d) Side armor belt not affected.

G. Interior compartments (above waterline).

(a) Damage to I beam overhead, sickbay area, frame 141-149 port side main deck.

(b) Damage to joiner bulkheads consists of bellying of bulkheads in room 374 (port side 04 level); stack uptakes at battery deck level (frame 78 centerline); sick bay passageway at frame 137 - 140 port side main deck.

(c) No damage to access covers and fittings.

(d) Condition of equipment within compartments good. Some electric light bulbs smashed; three ports have broken glass.

(e) No evidence of fire.

(f) No cables broken; one cooling water line broken; three ventilation ducts ruptured (starboard galley - sick bay - passageway battery deck frame 78 centerline).

(g) No reduction of water-tight integrity, habitability or utility of compartments.

H. Armor Decks.

(a) No damage to armor decks.

(b) No damage to spaces below.

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(c) Conditions normal around openings.

(1) Hatches - no damage.

(2) Gratings - no damage.

(3) Uptake bulkheads ruptured at frame 78 battery deck.

(4) Barbettes - no damage.

(d) No damage to connections to vertical armor.

I. Interior Compartments (below waterline).

(a) No damage to structure.

(b) No damage to bulkheads.

(c) No damage to access closures.

(d) No damage to equipment within compartments.

(e) Flooding of passageway frame 78 centerline, battery deck caused by break in fresh water cooling line - damage negligible.

(f) No damage to piping, cables, ventilation ducts or shafts.

(g) No reduction in water-tight subdivisions, habitability or utility of spaces.

J. Underwater Hull.

(a) No underwater hull damage.

(b) No effect on buoyancy, operability. Maneuverability not tested.

(c) No suspected damage to shafts, propellers, struts, rudder, or external keel.

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(d) No impairment of keel structure.

K. Tanks.

(a) Tanks unaffected.

(b) Liquids tested and found without contamination.

(c) No known or suspected damage to torpedo defense system.

L. Flooding.

(a) Description of major flooded areas.

(b) Sources of flooding.

(1) Opened boundaries (not affected).

(2) Piping damaged by concussion. Cooling water lines to ventilation blowers broken. Damage negligible, frame 78, battery deck.

(c) List of compartments believed to have flooded slowly so as to be susceptible to damage control - none.

M. Ventilation (exclusive of blowers).

(a) Damage to ventilation system negligible. Back pressure through some parts of system caused by concussion by bomb blast.

(1) Ducts - negligible.

(2) Closures - none.

(3) No effect on habitability.

(b) No evidences that ventilation system conducted heat, blast fume or smoke below decks.

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(c) No evidence that ventilation system allowed progressive flooding.

(d) Ventilation exhaust system on this German ship designed for use in low temperatures. An inadequate system for the high temperatures of the tropics. Construction good.

N. Ship Control.

(a) damage to ship control stations and causes .

(1) Bridge area; Metal wind shields were blasted off by concussion.

(2) C. I. C. - None installed.

(3) Gyro-compass equipment; equipment not damaged though several repeaters were torn loose from their stands.

(4) Steering gear has no damage.

(5) Interior communication has no negligible damage.

(b) Constructive criticism of ship control - No comments.

O. Fire Control.

(a) Damage to fire control stations and causes.

(1) Directors and elevated control positions had negligible damage (paint blistering, broken glass and superficial-light damage).

(2) No damage to plot rooms and protected spaces.

(b) No stations have loss of fire fighting efficiency.

(c) No comment on location and arrangement.

P. Ammunition Behavior.

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(a) Ready service ammunition, location, protection, behavior under heat and blast.

(1) Main battery not affected.

(2) Secondary battery not affected.

(b) Magazines, locations, protection, forces involved, behavior.

(1) Main battery powder and projectiles - conditions normal.

(2) Secondary battery - conditions normal.

(3) 40MM, 20MM and others - conditions normal.

(4) Bomb, torpedo stowage - conditions normal.

(c) No stowage insufficiently protected.

(d) Gasoline stowage not affected. (No gasoline aboard.)

Q. Ammunition Handling.

(a) Condition and operability of ammunition handling devices.

(1) Main battery hoists - no damage.

(2) Secondary battery hoists - no damage.

(3) Passing scuttles - no damage.

(4) Bomb and torpedo elevators - no damage.

(b) No evidence of damage contributed by ammunition handling devices.

(c) No criticism of design and construction.

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R. Strength.

(a) Permanent hog or sag.

(1) No hull evidence.

(2) No superstructure expansion joint evidence.

(3) No evidence of local longitudinal stress.

(b) No shear strains in hull platings.

(c) No evidence of transverse or racking strains.

(d) No evidence of local failure in structural discontinuities.

(e) No evidence of panel deflection.

(f) No evidence of damage to turret, machinery or gun foundations.

S. Miscellaneous.

(a) Evidence of heat damage variations are exemplified by upward angle marking of blackened paint surfaces from apparent "fanning" of blast.

(b) The concussion results aboard this ship appeared similar to those caused by a huge "puff" at high velocity and pressure. The scorching of paint appeared as though a very hot torch had been rapidly passed over the surface. Many peculiar actions from air currents were evident; some rushed upward, others on a horizontal plane, and some indicated a downward path.

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INSPECTION REPORT

SECTION II - MACHINERY

SECTION III - ELECTRICAL

No damage to machinery and electrical installations as a result of Test A, except that hinge pins on damper in uptakes of boiler room No. 2 were sheared off.

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INSPECTION REPORT

SECTION IV - ELECTRONICS

Damage to electronic equipment is generally lighter than expected. With the exception of 75% radio antenna casualties; only equipments seriously damaged are the portable SQ and Army SCR-584 radars. Both were mounted in forward superstructure. Damage to other equipment light, consisting mainly of broken meters, cracked dials, etc. No defective tubes found.

Heaviest damage occurred topside where equipments were exposed to direct blast. Below deck, damage due entirely to shock and not confined to any given locality.

Operability of equipments:

Radar. Both German fire-control equipments essentially undamaged. Forward unit, however, incapable of slewing because director is partially lifted from roller track. Portable SQ radar severely damaged when blasted from mountings. Army SCR-584 radar atop pilot house inoperable due to secondary damage from dished radar van bulkhead.

Radio. Because of 75% antenna casualties, most transmitters and receivers inoperable. With antenna replaces, however, radio equipment is 90% perfect.

Sonar. Fathometer undamaged. All other sonar equipment previously removed.

To summarize, heaviest casualties occurred to those radar equipments and wire antenna exposed to direct blast. Equipments in a protected location are essentially undamaged.

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TRC

4 April 1997

MEMORANDUM TO DEFENSE TECHNICAL INFORMATION CENTER
ATTN: OMI/Mr Bill Bush

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The following is a list of documents that have been declassified and the distribution statement changed to Statement A, Approved for Public Release.

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XRD-5, AD-366697-
XRD-6, AD-366698-
XRD-21, AD-366708-
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