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TECHNICAL INSPECTION REPORT.

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By Authority of JOINT CHIEFS OF STAFF JCS 1795/36 DATED 15 APRIL 1949
By John F. Hyatt Date 24 SEP 1953

(6) OPERATION CROSSROADS.

U.S.S. MAYRANT (DD402)

TEST ABLE (U.) (8)

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Director
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Washington, D. C. 20301

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OPERATION CROSSROADS

CONFIDENTIAL
Security Information

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TECHNICAL INSPECTION REPORT

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Director
Defense Atomic Support Agency
Washington, D. C. 20301

APPROVED:

F.X. Forest,
Captain, U.S.N.

SECRET

USS MAYRANT (DD402)

[redacted]

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TABLE OF CONTENTS

U.S.S. MAYRANT (DD 402)

SHIP CHARACTERISTICS

Building Yard: Boston Naval Shipyard.

Commissioned: 19 September 1939.

HULL

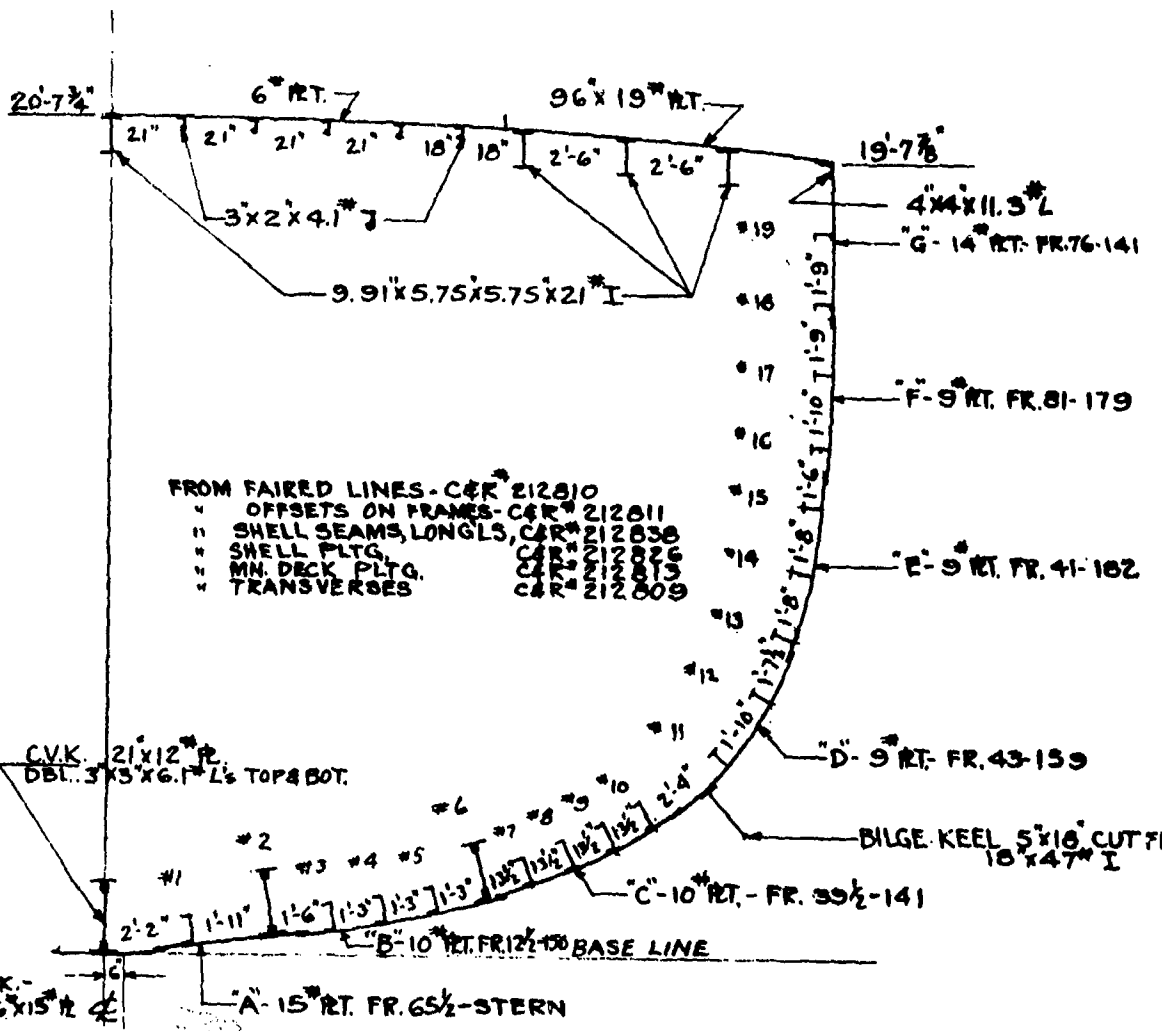
Length Overall: 340 feet 9 inches.
Length on Waterline: 334 feet 0 inches.
Beam (extreme): 35 feet 6 inches.
Depth (molded at side, to main deck, amidships): 19 feet 7 7/8 inches.
Drafts at time of test: Fwd. 12 feet 8 inches.
Aft. 12 feet 0 inches.
Standard Displacement: 1500 tons.
Displacement at time of test: 2120 tons.

MAIN PROPULSION PLANT;

Main Engines: Two sets of Westinghouse turbines are installed, one set per shaft.
Reduction Gears: Two sets of double reduction De-Laval are installed. One per turb. set.
Main Condensers: Two are installed in ship.
Boilers: Three Babcock and Wilcox boilers are installed. 565 psi gauge 705° F.
Propellers: Two are installed.
Main shafts: Two are installed.
Ships Service Generators: Four units are installed two 200 K.W. - A.C., and two 40 K.W. D.C sets.

LONGL" 1 - 9"x2 1/16"x13.4"[
" "2 - 19 1/4"x7" PLT. - 5"x2"x4.1"L
" "3-4-5- 8"x2 1/4"x11.5"[
" "6 - 17"x7" PLT & 3"x2"x4.1"L's
" " 7-8-9-10 - 8"x2 1/4"x11.5"[
" "11-12-13-14 - 6"x3.06"x5.87"T's
" "15-16-17 - 5"x2.69"x4.48"T's
" "18-19 - 5"x1 3/4"x1 3/4"x6.7"[

7.65" WEB SPCD. - 7'-0"
KEEL BKT. SPCD. - EVERY FRAME



FROM FAIRED LINES - C&R" 212810
" OFFSETS ON FRAMES - C&R" 212811
" SHELL SEAMS, LONGLS, C&R" 212838
" SHELL PLTG, C&R" 212826
" MN. DECK PLTG. C&R" 212813
" TRANSVERSES C&R" 212809

MIDSHIP SECTION

TEST A

SECRET

U.S.S. MAYRANT (DD 402)

8929

TECHNICAL INSPECTION REPORT

OVERALL SUMMARY

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.

HULL

None.

MACHINERY

No comment.

ELECTRICAL

None.

(c) Other damage.

HULL

No comment.

MACHINERY

None.

ELECTRICAL

This main generator plant, ship control, fire control and electrical equipment associated with gunnery were tested and operated satisfactory.

II. Forces Evidenced and Effects Noted.

(a) Heat.

HULL

The center of explosion bore approximately 310° relative. Blistering of paint occurred generally on surfaces facing to port. No scorching of manila or canvas occurred.

MACHINERY

No evidence.

ELECTRICAL

None other than slight blistering of paint in exposed areas.

(b) Fires and explosions.

HULL

None.

MACHINERY

No evidence.

ELECTRICAL

None.

(c) Shock.

HULL

None.

MACHINERY

No evidence.

ELECTRICAL

None evidenced.

(d) Pressure.

HULL

The only effects of pressure are the tearing of deteriorated canvas on top of No. 3-5'' mount, breakage of a glass port in the 5'' Mark 33 director shield, and slight bending of the sun shield on a 20mm ready service box.

MACHINERY

No evidence.

ELECTRICAL

Negligable.

(e) Effects apparently peculiar to the atom bomb.

HULL

None, except that effects of heat.

MACHINERY

None.

ELECTRICAL

None, other than radiant heat.

III. Effects of Damage.

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

HULL

None.

MACHINERY

None.

ELECTRICAL

None.

(b) Effect on gunnery and fire control.

HULL

Essentially no effect. There is a broken glass port in the 5'' Mark 33 director top, over the rangefinder operator's station.

MACHINERY

No comment.

ELECTRICAL

None.

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

HULL

None.

MACHINERY

No comment.

ELECTRICAL

Not observed.

(d) Effect on personnel and habitability.

HULL

Habitability was not affected. Personnel might have been affected by heat and by temporary blinding due to the intense light from the explosion.

MACHINERY

None.

ELECTRICAL

None except for radioactivity.

(e) Total effect on fighting efficiency.

HULL

The fighting efficiency was not affected, except that exposed topside personnel might have been affected by heat and light.

MACHINERY

None.

ELECTRICAL

None, other than wave phenomina.

IV. General Summary of Observers' Impressions and Conclusions.

HULL

No comment.

MACHINERY

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

ELECTRICAL

The location of this vessel was outside the effective range of the bomb.

V. Preliminary General or Specific Recommendations of Inspection Group.

HULL

No comment.

MACHINERY

None.

ELECTRICAL

None.

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.

None.

(c) Other damage.

No comment.

II. Forces Evidenced and Effects Noted.

(a) Heat.

The center of explosion bore approximately 310 degrees relative. Blistering of paint occurred generally on surfaces facing to port. No scorching of manila or canvas occurred.

(b) Fires and explosions.

None.

(c) Shock.

None.

(d) Pressure.

The only effects of pressure are the tearing of deteriorated canvas on top of No. 3-5" mount, breakage of a glass port in the 5" Mark 33 Director shield, and slight bending of the sun shield on a 20mm ready service box.

(e) Effects peculiar to the Atom Bomb.

None, except the effects of heat.

III. Results of Test on Target.

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

None.

(b) Effect on gunnery and fire control.

Essentially no effect. There is a broken glass port in the 5" Mark 33 director top, over the rangefinder operator's station.

(c) Effect on watertight integrity and stability.

None.

(d) Effect on personnel and habitability.

Habitability was not affected. Personnel might have been affected by heat and by temporary blinging due to the intense light from the explosion.

(e) Effect on fighting efficiency.

The fighting efficiency was not affected, except that exposed topside personnel might have been affected by heat and light.

IV. Summary of Observers Impressions and Conclusions.

No comment.

V. Recommendations.

No comment.

VI. Instructions for loading the vessel specified the following:

ITEM	LOADING
Fuel oil	95%
Diesel oil	95%
Ammunition	50%
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.

DETAILED DESCRIPTION OF HULL DAMAGE

A. General Description of Hull damage.

No structural damage of any significance occurred.

B. Superstructure.

The sun shield of a 20mm ready service box located on the forecastle deck at frame 60, port, is bent upward at the port forward corner. There is no other damage.

C. Guns and Directors.

There is a broken glass port in the 5'' Mark 33 director, in the forward sloping part of the director top over the visual range-finder operator's station. The director was trained on the centerline.

D. Torpedo Mounts, Depth Charge Gear.

No damage.

E. Weather Deck.

No damage.

F. Exterior Hull.

No damage. Considerable irregularity of shell plating existed prior to test "A" (Photos 1710-8, 227-87-7; pages 34 , and 32).

G. Interior Compartments (Above Waterline).

No damage.

H. Armor Decks and Miscellaneous Armor.

Not applicable.

I. Interior Compartments (Below Waterline).

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.

The hypocenter bore approximately 310 degrees relative.

Paint shows no discoloration. Darker paint is affected a little more than lighter paint. Paint blistered in the following locations:

1. Shell, frames 2 to 107, port.

2. Deckhouse port bulkheads at frames 69, 72, 81, 93, to 102, 134, 144, and 155.

3. Port bridge wing bulkhead.

4. Forecastle deck, port, frames 50 to 55, 43 to 47, 60, 70.

5. Port side of all 5" mounts.

6. Leather covering on bridge ladder handrails, port.

Typical paint damage is shown in photos 1710-7 and 227-87-7; pages 33 , and 32 .

No scorching of manila or canvas occurred.

The canvas cover over No. 3-5" mount was torn by blast. This canvas was in a deteriorated condition and the C.O. estimates that it would not have stood up under firing of the 5" gun in that mount.

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.

None.

II. Forces Evidenced and Effects Noted.

(a) Heat.

No evidence.

(b) Fires and explosions.

No evidence.

(c) Shock.

No evidence.

(d) Pressure.

No evidence.

(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.

(e) Total effect on fighting efficiency.

None.

IV. General Summary.

The MAYRANT was outside the effective range of the explosion during 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 on this vessel was not changed by Test A.

(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.

Test A had no effect on the operation of the machinery plant.

B. Boilers.

Undamaged. Boiler #2 was steamed after Test A and functioned normally. Boilers #1 and #3 were inoperable before Test A. Their condition was not changed by the test.

A hydrostatic test on #2 boiler after Test A indicates no appreciable change in the tightness of the boiler.

HYDROSTATIC TEST DATA

	Before Test A	After Test A
Initial pressure	740 lbs/sq in.	600 lbs/sq in.
Time required for pressure to drop		
100 lbs/sq in.	46 minutes	37 minutes
200 lbs/sq in.	1 hr. 49 minutes	1 hr. 29 minutes
Pressure after 12 hours	170 lbs/sq in.	40 lbs/sq in.

C. Blowers.

Undamaged. All forced draft blowers were tested after Test A and operated normally.

D. Fuel Oil Equipment.

Undamaged. The fuel oil equipment was tested and operated normally after Test A.

E. Boiler Feedwater Equipment.

Undamaged. The boiler feedwater equipment was operated normally after Test A.

F. Main Propulsion Machinery.

Undamaged. The port main turbine only was operated after Test A. Inspection of the starboard unit indicated no damage.

Leads were left in the starboard L. P. turbine (both bearings) during Test A. The results indicate slight movement of the rotor as a result of Test A.

BEARING LEAD DATA

STARBOARD L. P. TURBINE - FORWARD BEARING

Forward Lead	Before Test A	After Test A	Difference
Port	.011	.011	.000
Top	.015	.014	.001
Stb'd	.011	.009	.002
After lead			
Port	.0105	.011	+.0005
Top	.016	.015	.001
Stb'd	.012	.009	.003

STARBOARD L. P. TURBINE - AFTER BEARING

Forward lead			
Port	.013	.011	.002
Top	.014	.014	.000
Stb'd	.013	.010	.003
After lead			
Port	.013	.011	.002
Top	.014	.014	.000
Stb'd	.013	.011	.002

G. Reduction Gears.

Undamaged. Inspection of reduction gears while jacking over disclosed no defects. The port unit was operated subsequent to the test and functioned normally.

H. Shafting and Bearings.

The port shafting and bearings were inspected while the shaft was turning. No defects were noted. No damage to the starboard shaft was apparent from visual inspection.

I. Lubrication System.

Undamaged. The lubrication system was inspected and operated normally.

J. Condensers and Air Ejectors.

Undamaged. The condensers and air ejectors were inspected and operated satisfactorily.

K. Pumps.

Undamaged. All pumps were operated satisfactorily at rated pressure.

L. Auxiliary Generators (Turbines and Gears).

Undamaged. Both ship's service generators have been operated satisfactorily under load.

M. Propellers.

Undamaged. Visual examination of the propellers from above the waterline disclosed no defects.

N. Distilling Plant.

Undamaged. The quantity and quality of the water produced by the distilling plant was unaffected by Test A.

O. Refrigeration Plant.

Undamaged. Operation of the refrigeration plant since the test is satisfactory.

P. Winches, Windlasses, and Capstans.

Undamaged. The anchor windlass and deck winch were operated after Test A and functioned normally.

Q. Steering Engine.

Undamaged. The steering gear has been tested and operated satisfactorily while moving the rudder through full throw.

R. Elevators, Ammunition Hoists, etc.

Undamaged. The ammunition hoists have been operated satisfactorily since Test A.

S. Ventilation (Machinery).

Undamaged. The ventilation blowers have operated satisfactorily since Test A.

T. Compressed Air Plant.

Undamaged. The high pressure air compressor was inoperable before Test A. Its condition was not changed by the test. The low pressure compressor operated satisfactorily at rated pressure after the test.

U. Diesels (Generators and Boats).

Undamaged. The emergency diesel generator has operated satisfactorily at rated load.

V. Piping Systems.

Undamaged. All piping was checked at rated pressure and no defects were revealed.

W. Miscellaneous.

Miscellaneous machinery, i.e., laundry, galley, machine shop, whistle and siren were not affected by Test A. They were operated after the test and functioned normally.

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, not observed. Flooding, none.

(b) Structural damage.

None.

(c) Other damage.

The main generator plant, ship control, fire control and electrical equipment associated with gunnery were tested and operated satisfactory.

II. Forces Evidenced and Effects Noted.

(a) Heat.

None other than slight blistering of paint in exposed areas.

(b) Fires and explosions.

None.

(c) Shock.

None evidenced.

(d) Pressure.

Negligable.

(e) Any effects apparently peculiar to the atom bomb.

None other than radiant heat.

III. Effects of Damage.

(a) Effect on propulsion and ship control.

None.

(b) Effect on gunnery and fire control.

None.

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

Not observed.

(d) Effect on personnel and habitability.

None except for radioactivity.

(e) Total effect on fighting efficiency.

None, other than wave phenomina.

IV. General Summary of Observers' Impressions and Conclusions.

The location of this vessel was outside the effective range of the bomb.

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

None.

DETAILED DESCRIPTION OF ELECTRICAL DAMAGE

A. General Description of Electrical Damage.

(a) Overall condition.

The overall condition of the electrical equipment remained unchanged as a result of this test.

(b) Areas of major damage.

None.

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

No damage.

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

1. Ship's service generator plant - no effect.
2. Engine and boiler auxiliaries - no effect.
3. Electrical propulsion - not applicable.
4. Communications - no effect.
5. Fire control circuit - no effect.
6. Ventilation - no effect.
7. Lighting - no effect.

(e) Types of equipment most affected.

None.

B. Electric Propulsion Rotating Equipment.

Not Applicable.

C. Electric Propulsion Control Equipment.

Not Applicable.

D. Generators - Ships Service.

No damage.

E. Generators - Emergency.

No damage.

F. Switchboards, Distribution and Transfer Panels.

No damage.

G. Wiring, Wiring Equipment and Wireways.

No damage.

H. Transformers.

No damage.

I. Submarine Propelling Batteries.

Not Applicable.

J. Portable Batteries.

No damage.

K. Motors, Motor Generator Sets and Motor Controllers.

No damage.

L. Lighting Equipment-

No damage.

M. Searchlights.

No damage.

N. Degaussing Equipment.

No damage.

O. Gyro Compass Equipment.

No damage.

P. Sound Powered Telephones.

No damage.

Q. Ship's Service Telephones.

Not Applicable.

R. Announcing Systems.

No damage.

S. Telegraphs.

No damage.

T. Indicating Systems.

No damage.

U. I.C. and A.C.O. Switchboards.

No damage.

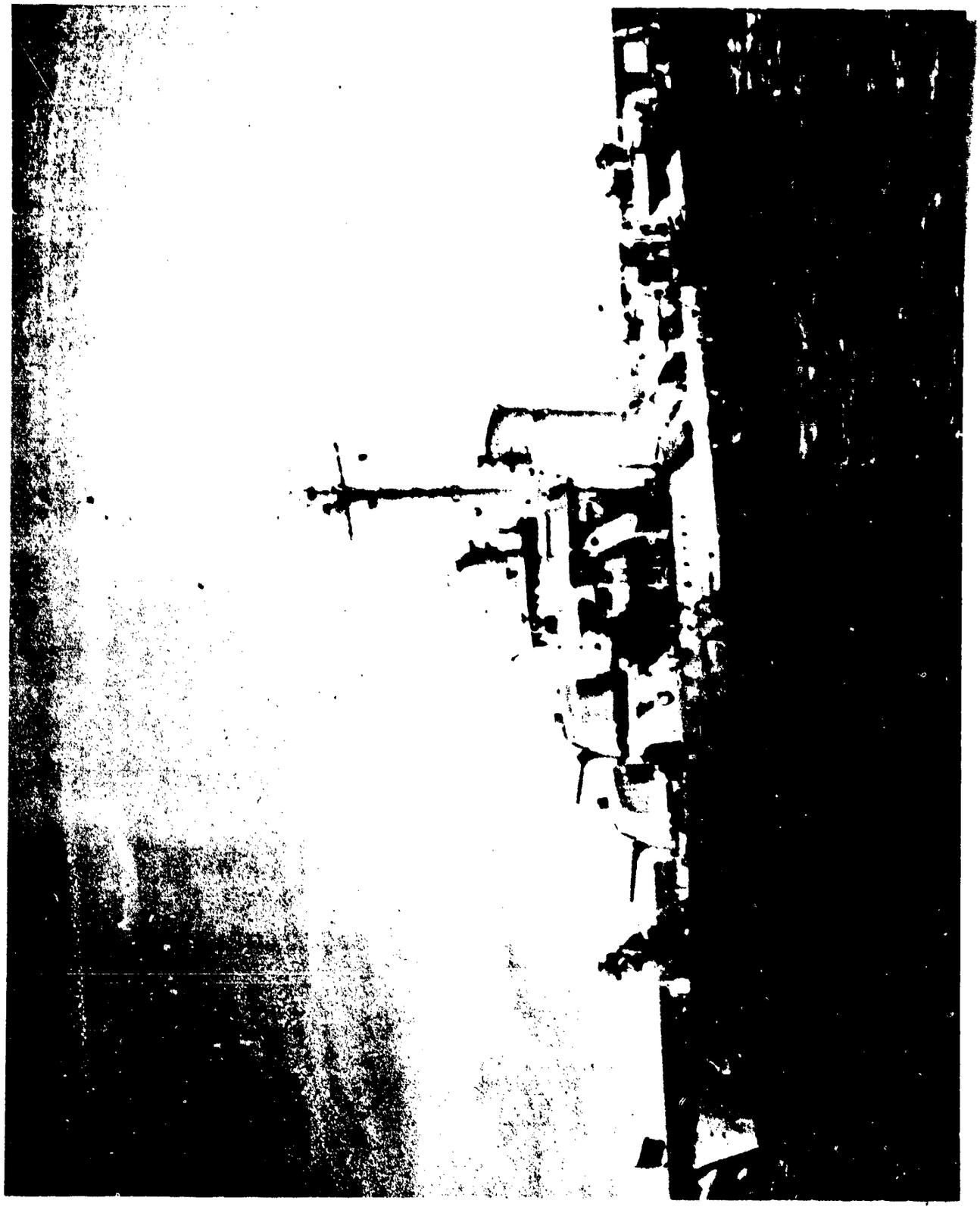
V. F.C. Switchboards.

No damage.

SECTION IV

PHOTOGRAPHS

TEST ABLE



AA-CR-227-87-7. View from off port bow.

AB-CR-60-1710-7. Paint damage on port shell near stern.

AB-CR-60-1710-8. Close-up from off port quarter showing torn canvas on No. 3 - 5" mount. (Irregularity of shell plating existed prior to Test A.)

APPENDIX

COMMANDING OFFICERS REPORT

TEST ABLE

REPORT #11

COMMANDING OFFICERS REPORT

SECTION I:

Location in array: Bearing - 047°T, Distance 3950 yards from center of target array for Test A.

The material condition of the U.S.S. MAYRANT will be discussed under the following sections: Hull and its fittings, Machinery, Electric and Ordnance Equipment, pre-test data.

HULL:

In general the material condition of the hull is good. The corrosion of the main and superstructure deck has begun to require extensive chipping, scrapping and wire brushing of the surfaces to prepare them for preservation paint. Pitting of the surface makes this a difficult job. However, the fittings and rigging of the superstructure, uptake and deckhouses have reached a point where a great deal of navy yard work, repairing and in some instances replacement of fittings is necessary. The salt water and fresh water piping systems need renewing.

MACHINERY:

The machinery installation has reached the point where a major overhaul is necessary. No. 3 boiler has been out of commission since October 1945. No. 1 boiler has been pronounced unsafe to steam without major overhaul or rebuilding, and the only other remaining boiler is considered safe to steam only at reduced pressures for auxiliary purposes. This trouble is traced back to the battle damage suffered at Palermo, Sicily, on 26 July 1943. All boilers were subject to full emersion in salt water while steaming. When the ship finally went for repairs to the Charleston Navy Yard, the true condition of the boilers was not determined and thus they were not properly repaired. The history of boiler derangement reports has been almost continuous from August 1945 until now.

Extensive work on the machinery and piping installation, valves, etc., in the main engineering plant is necessary.

The electric installation is in fair condition. The main generating plant functions well and meets all load requirements. However, the electric cable installation has begun to cause continuous trouble because of grounds.

ELECTRONICS EQUIPMENT:

The electronic installation is good with the exception of the DAS-1 loran equipment and the QC58 NM5 fathometer. This equipment, while it functions at times, is eratic in its performance.

ORDNANCE EQUIPMENT:

The ordnance equipment with the exception of depth charge and torpedo batteries is in a fair to poor material condition. The main battery fire control equipment is in a fair condition with the exception of the rangefinder which requires overhaul and adjustment. The main battery guns and mounts require entensive overhaul to place them in first class condition. This is a result of long periods of combat duty with little or no chance for up keep coupled with very little navy yard work.

Upon termination of hostilities no navy yard work was approved for this vessel because of its ultimate disposition. Upon assignment to Operation Crossroads only that work which was necessary to prepare the ship as a target was undertaken. For that purpose alone the ship is materially satisfactory. The ship suffered no material damage other than one broken glass port in the director mount, one sun shield on a 20MM ready service box slightly bent up at one corner, and a number of blistered paint spots.

SECTION II:

Detail inspection of this vessel has revealed only two items of damage not listed in Report #5, a copy of which is enclosed as part of this report. These additional items of damage have been added to the appropriate section in red and indicated that they were not included in the original report. They are as follows:

1. One broken glass port in 5"mk 33 director on the forward sloping part of director top, over visual rangefinders operators station. Director was trained on 000°.

2. Sun shield 20mm ready service portside forecastle deck, frame 60 slightly bent up at port forward corner.

The damage as noted above and in Report #5 would in no way have affected the fighting efficiency of this vessel.

SECTION III:

The material damage caused by the air burst of the atomic bomb at a distance as was that on 1 July 1946 from the U.S.S. MAYRANT, can be considered to be negligible to a destroyer. Its effect upon personnel and their ability to continue to fight this vessel can only be estimated by this Commanding Officer. No doubt that if no eye protection had been given, the exposed personnel would have been temporarily blinded. However, with the gun batteries in full automatic and fire control in full radar control with operators who had not been subject to the blinding light and with ship control from Combat Information Center the main battery could continue to fight the ship.

What the ultimate effect of radioactivity upon personnel aboard at the time would have been determined only by scientific study of the animals that were on board during the test. However, from the observation of the animals made by this Commanding Officer at the time they were removed from this vessel after the test, personnel would have been able to continue in action for at least three days following the initial exposure. What would happen after that he does not attempt to make the slightest estimate.

As for redesign of this type of vessel - The Commanding Officer recommends that, if not already in progress, a study be made to develop mounts for automatic weapons and their fire control systems which could be completely enclosed to protect personnel from flash burns - and provisions made for the radar operators to be completely separate from the optical system operators and lookouts and enclosed so that their eyes would not be temporarily blinded. Some study toward streamlining superstructure

to minimize blast effect should be made.

It is the opinion of this Commanding Officer that this ship could have been fought with the same efficiency as that if it were subject to night aircraft attack, conceding the temporary blindness of all topside personnel. If the topside personnel were protected against loss of vision, the ship could have fought with the same efficiency if it were subject to attack with conventional weapons.

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

TRC

4 April 1997

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

SUBJECT: Declassification of Documents

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

XRD-41, AD-366731
XRD-42, AD-366732
XRD-40, AD-366730
XRD-39, AD-366729
XRD-38, AD-366728
XRD-34, AD-366720
XRD-13, AD-366725
XRD-8, AD-366699
XRD-5, AD-366697
XRD-6, AD-366698
XRD-21, AD-366708
XRD-27, AD-366714
XRD-22, AD-366709
XRD-26, AD-366713
XRD-28, AD-366715
XRD-29, AD-366727
XRD-36, AD-366722

If you have any questions, please call me at 703-325-1034.

Ardith Jarrett

ARDITH JARRETT
Chief, Technical Resource Center