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GENERAL DESCRIPTION OF TEST SHIPS
YAG-39, YAG-40, AND LST-611

Research and Development Technical Report USNRDL-TR-161

NS 086-002
NS 088-001

1 June 1957

FC

by

M. M. Bigger
H. B. Curtis

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Military Applications

Technical Objectives
AW-5c and SR-2

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San Francisco 24, California

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ABSTRACT

Former Liberty Ships YAG's 39 and 40 were modified for participation in weapons effects tests during Operations CASTLE and WIGWAM, and a third ship, the USS CROOK COUNTY (LST-611), was altered and joined the YAG's in Operation REDWING.

The ships were rigged for remote operation from below-deck control rooms shielded from gamma radiation. Navigational, communication and engineering functions were performed from these secondary conn spaces.

Instruments for the work of fallout collection, ship shielding data collection, water sampling, and ship washdown evaluation were installed so that all could be operated from the shielded spaces.

All of the project instrumentation and project communications equipment were removed from the ships after REDWING, and additional modifications were made to the YAG's for their participation in a subsequent BuShips operation.

Should these ships be used similarly in the future, of course, suitable project instrumentation would be necessary. Additionally, it is recommended that the radars be changed, at least on the YAG's, more air conditioning be installed, and the habitability of the shielded spaces be improved. The shielding factor of the LST control room should be further investigated and improved if necessary.

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SUMMARY

The Problem

It may be that in the instrumentation of future nuclear weapon effects tests, the use of remote controlled ships would be desirable. In order to plan for the utilization of such existing ships, knowledge of their capabilities is necessary.

Findings

Presented in this paper is a description of the facilities and operational capabilities of those ships, the YAG's 39 and 40, and the LST-611, which have been used successfully during nuclear weapon effects tests in the past. The navigational and engineering remote control systems are described as well as the spaces provided for the protection of operating personnel from nuclear radiations. The fact that all project instruments have been removed and would have to be provided for future tests is emphasized.

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ADMINISTRATIVE INFORMATION

The work reported was done under Bureau of Ships Project No. NS 086-002, Technical Objective AW-5c, and NS 088-001, Technical Objective SR-2.

Its relation to these projects is described in U.S. Naval Radiological Defense Laboratory's "Preliminary Presentation of USNRDL Technical Program for FY 1957", dated February 1956 (CLASSIFIED), where it is identified under Program 6, Problem 1. and Program 10, Problem 6.

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1. INTRODUCTION

Three ships were utilized as test platforms by various Program 2 projects during Operation REDWING. Shielded spaces were provided allowing operation in intense radiation fields while manned by small crews and project personnel. The ships were fitted for complete closure except for combustion air intakes and exhausts.

Two of the three ships, the YAG-39 (George Eastman), Fig. 1 and 4, and the YAG-40 (Granville S. Hall), Fig. 2 and 4, were Liberty Ships previously modified and then operated during Operations CASTLE (Ref. 1), WIGWAM (Ref. 2), and REDWING (Ref. 3 and 4). The third, the USS CROOK COUNTY (LST-611), Fig. 3, is a standard ship of her type which was modified and operated as a project ship at Operation REDWING.

The YAG's are powered by simple and rugged reciprocating main engines and auxiliaries. Their steam generating plant produces steam at a pressure of 250 psig. This boiler and machinery combination is well suited for remote operation. The large cargo holds and open deck spaces provide areas and spaces adaptable to project needs.

These ships have excellent sea-keeping qualities but have a maximum of but 11 knots and are slow to maneuver.

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Fig. 1 YAG-39 as Modified for REDWING.



Fig. 2 YAG-40 as Modified for REDWING.

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Fig. 3 USS Crook County (LST-611) as Modified for REDWING.

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The LST is a diesel ship, suited for conversion for remote operation and has a large main deck and a large below deck space available for project uses. It does not have the sea-keeping qualities of the YAG's, being slowed more by heavy weather and requiring more speed to maintain steerageway.

The purpose of this paper is to indicate the scope of the ship modifications and the complexity of experimental equipment required for operations of the REDWING type.

An effort will be made, insofar as is possible, to describe the present condition of these ships and to recommend changes and additions for any future operations based on REDWING experience.

The modifications described hereafter are given in two sections, one for the two YAG's, which are quite similar, and one for the LST.

The general arrangement of the YAG's is shown in Figure 4 and the general arrangement of the LST is shown in Figure 5.

2. YAG-39 AND YAG-40 MODIFICATIONS

2.1 Principal Structural Modifications. A helicopter flight deck, approximately 50 feet square, was built above the rail over the No. 1 cargo hatch with hold-down channels and a fir deck, the No. 1 Kingpost being removed to provide adequate clearance. The space beneath was enclosed.

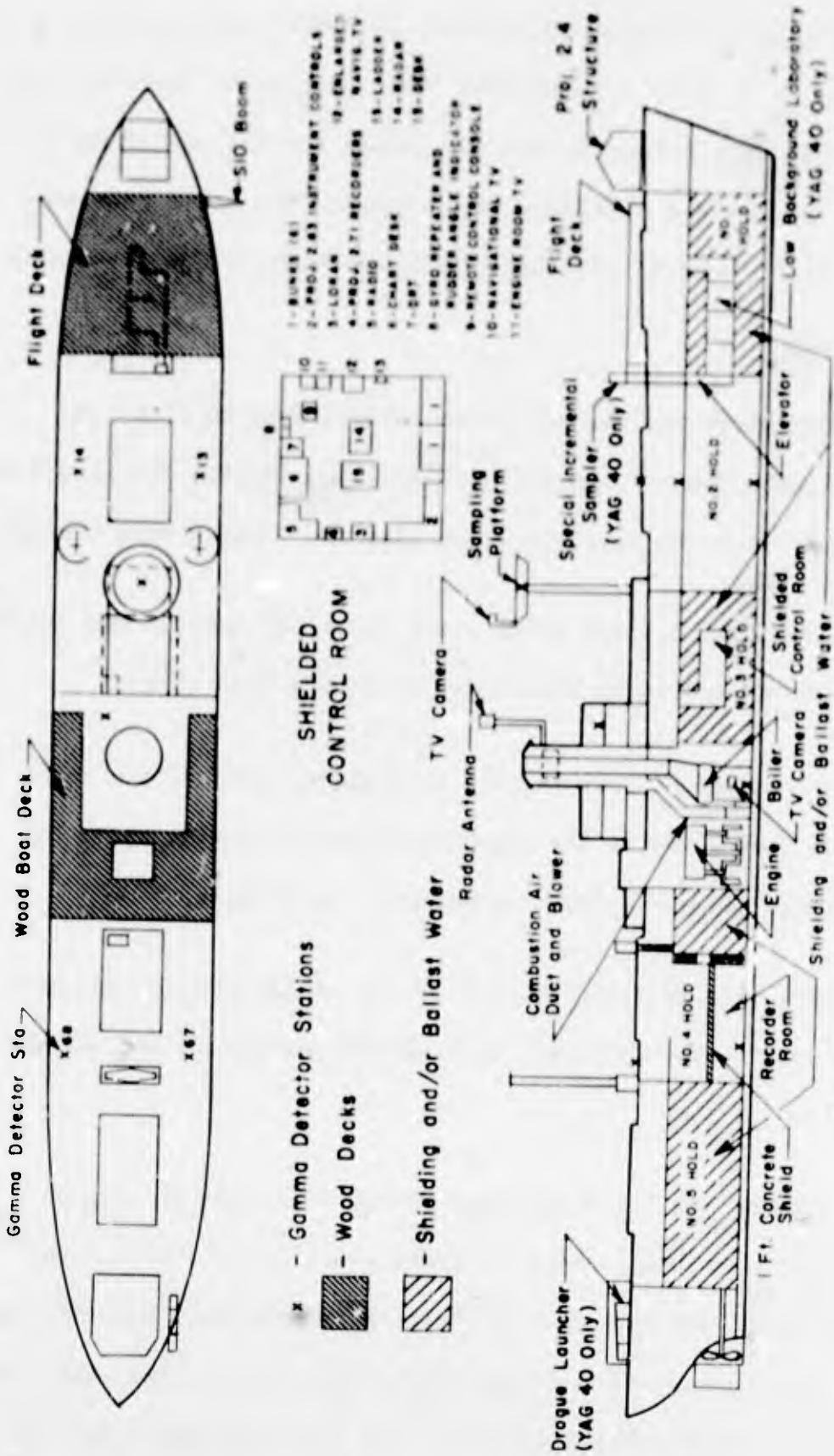


Fig. 4 General Arrangement of YAG-39 and YAG-40.

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The main deck cargo hatches were decked over with steel plating as were the Nos. 1, 2, 3 and 5 between-deck cargo hatches to increase the weatherdeck water tight integrity and to provide for the use of Holds 1, 3, and 5 as ballast and shielding water tanks. The No. 2 between-deck cargo hatch was covered because of ship shielding project requirements.

The fore deck cargo winches and booms were removed to clear an area for the flight deck. A ten-ton boom replaced the two five-ton booms over No. 5 hatch. The two five-ton booms over No. 4 hatch were retained.

Since Nos. 1, 3 and 5 cargo holds carry water for ballast and shielding, suitable piping and vents were added to handle this water.

A deck house was added over the No. 3 hold the width of the mast house, from the mast house to the superstructure to provide space for equipment for ventilation system contaminability studies.

The starboard side of lower No. 4 hold was utilized as an auxiliary machinery space for washdown pumps, A.C. diesel generators and switch boards.

The port side of the No. 4 hold was decked over from the top of the shaft alley to the hull, and a concrete slab, 1 foot thick, was poured on this deck, covering the shaft alley and the room beneath this new deck. A booby hatch and inclined ladders give access from the main deck to the No. 4 between-decks space and the new room, which was called the Recorder Room. The estimated gamma radiation attenuation (shielding) factor afforded in this room is 10^{-3} .

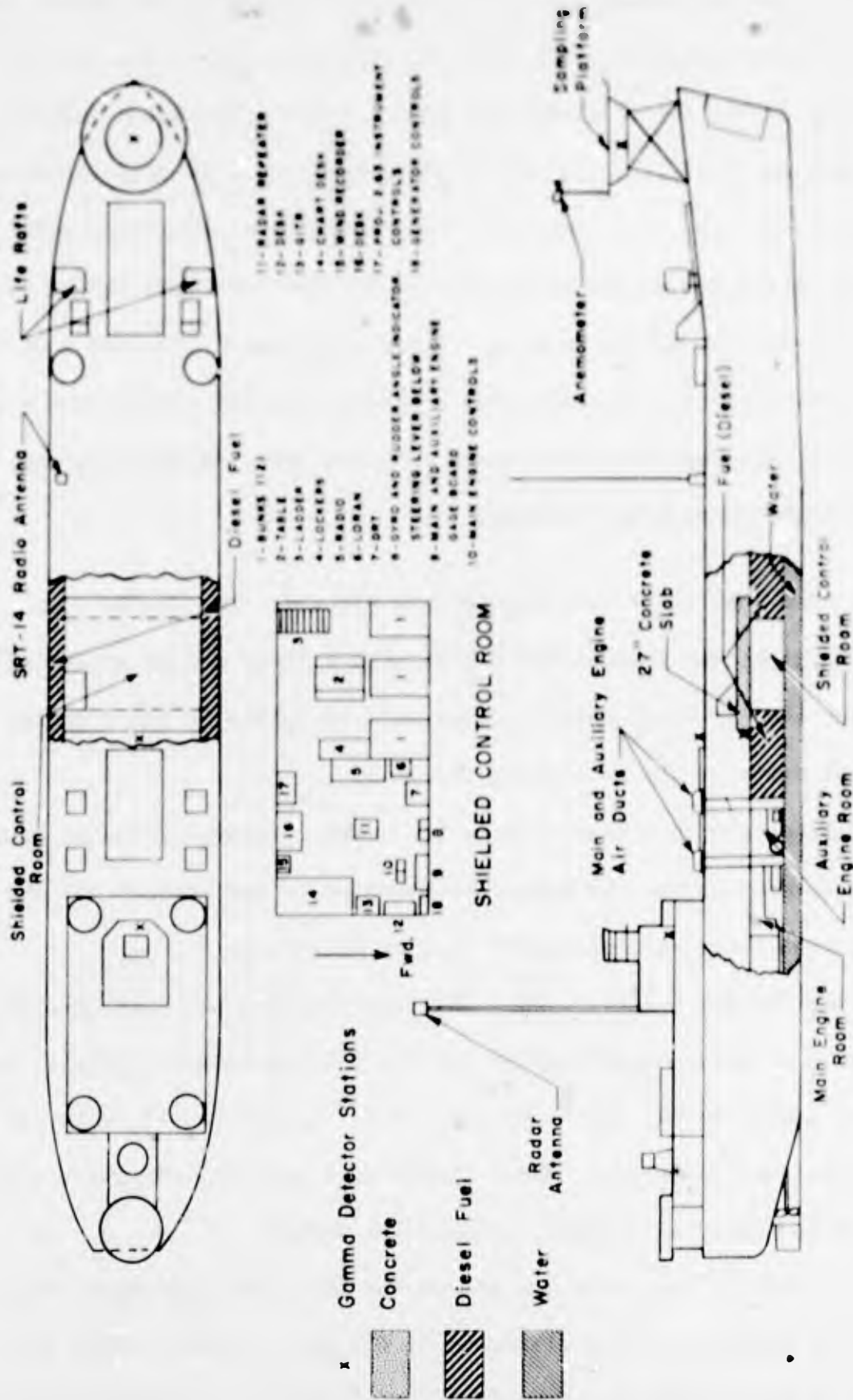


Fig. 5 General Arrangement of LST-611.

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The boiler air intake system was altered to prevent contamination of the boiler and engine rooms from the combustion air. The opening at the top of the stack between the hood and the outer stack was closed and a deck was installed over the boilers (main deck at base of inner stack). Large air inlets were cut into the port and starboard sides of the outer stack and a duct built through the new deck over the boilers to a new forced draft blower housing. These alterations provided a ducted boiler combustion air intake system replacing the old arrangement which drew boiler air down the outer stack into the fire and engine rooms, thence to the blowers and boilers.

All hold cowl vents were removed and blanked. The engine room fidley skylight was removed and a deck with a large dogged watertight hatch was substituted. Dogged covers were installed in the 6 engine room cowl vents to aid in closing the ship.

A machine shop was installed on the between decks, port side, of No. 4 hold and shelves for machinery spare parts and benches for an electrician's shop were also installed on this deck.

On the YAG-40, bulkheads were installed to form six test compartments with a center passageway in the No. 3 between deck hold with an inclined ladder to the new deckhouse above. On the YAG-39, only one compartment was installed. These spaces were used in connection with ventilation hazard assessment at Operation CASTLE.

An obsolete 3" gun with gun shield was installed near each rail, port and starboard, at the after end of the No. 2 hatch so that the effectiveness of washdown on typical gun and gun tub arrangements could be evaluated at Operation CASTLE. These have since been removed.

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A wood deck of fir was installed on the boat deck as an experimental surface.

A control room was built in the No. 3 lower hold shielded on all sides by at least 6 feet of water, providing a shielding factor of 10^{-3} under the access, and 10^{-5} at the forward end. Both ship operation and project work was accomplished from this "Secondary Conn."

On the YAG-40, a shielded laboratory was constructed in the No. 1 hold on top of the forward deep tanks. This room is also completely surrounded by ballast water and has a shielding factor of 10^{-5} . It was built for Operation WIGWAM and was enlarged and modified for Operation REDWING.

Numerous other modifications were accomplished for BuShips operations subsequent to CASTLE. Those pertinent to Operation REDWING are described below, and for a description of more recent changes, see BuShips Confidential plan Nos. YAG-39, S0101 C 1052853 Rev. C. and YAG-40, S0101 C 1052854, Rev. C.

A cargo door was installed in the side of the ship on the port side of the No. 3 between-decks hold. It is a very useful clean access to the ship's interior when the weather decks are contaminated. Personnel decontamination facilities which were installed in the No. 3 between-decks were also extensively used since the contaminated entrance to the ship's interior was through the No. 3 deck house and the facilities were also adjacent to the entrance to the shielded Control Room. One of the compartments in this area served as a RadSafe clothing storage and issue room.

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2.2 Machinery Additions. Numerous automatic machinery controls were added or replaced, including provision for automatic oiling of all machinery for an extended period. Of interest were the addition of the Hagan Automatic Combustion Control Board which maintains constant steam pressure and the Hagan Automatic Throttle Control which maintains constant shaft speed at any of 10 settings. This gear operates in conjunction with the Remote Control System discussed below. Boiler burners were replaced with wide range steam atomizing burners. Diesel fuel is burned instead of black oil resulting in cleaner boilers and up to 100 hours of operation without cleaning burner tips and eliminated the need for fuel oil heaters. This change was made to insure reliable remote operation. An emergency fuel shut off cord was led to the Secondary Control Room.

A television camera was installed to view the gauge board. This serves a closed circuit with a receiver in the Secondary Control Room. Pan and tilt controls permit a full size picture of each gauge.

Two A.C. Diesel Generators of 60 kw capacity, each with associated switchboards for 440, 220 and 110 volts, were installed. They furnish power to project, navigational and control equipment and to ventilation and air conditioning equipment. A.C. lighting is also provided in all of the new spaces.

Three diesel driven pumps of 1000 gal/min capacity each at 150 psig were installed. The discharge is overboard or to the washdown main according to the setting of a remote controlled motor driven valve on the YAG-39. On the YAG-40, a simpler installation was made requiring personnel to briefly attend the pumps and valves to activate the washdown system.

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2.3 Installed Washdown System. A washdown system was installed with nozzles located to wash all weather surfaces except kingposts, Fig. 6. The location of nozzles on the two ships is different but surface coverage is essentially the same with the wind on the bow. The new installation on the YAG-40 appears to give more complete distribution to the main decks when the wind is on the beam. Nozzles are of an open throat type discharging against a deflector giving a 125° cone angle. The spray consists of large drops and relative winds of an appreciable velocity enhance water distribution with a minimum loss of fine spray. The nozzles are located to give the best distribution with the wind on the bow with a secondary consideration of washing as much of the weather surface as possible with the wind from other quarters.

Steering the ship on a base course into the wind and frequently maneuvering to alter the relative wind direction is considered the best method to ensure washing of all surfaces. This also improves drainage permitting overtaxed drains to intermittently free themselves.

Valves with remote operating gear below the main deck can be secured to cut off the washdown forward of the No. 3 deck house on both ships, Fig. 7. This was done to meet the requirements of REDWING projects 2.71, (Ref. 4), 2.72, 2.4 (Ref. 5) and 2.63 (Ref. 3). To provide the best operating conditions, additional nozzles served by the fire main were installed as necessary to improve the washing of the #3 deck house and adjacent main deck area and the forecastle where 1 nozzles were turned down to wash the deck and bulwarks without getting water on Project 2.63 or 2.4 equipment.

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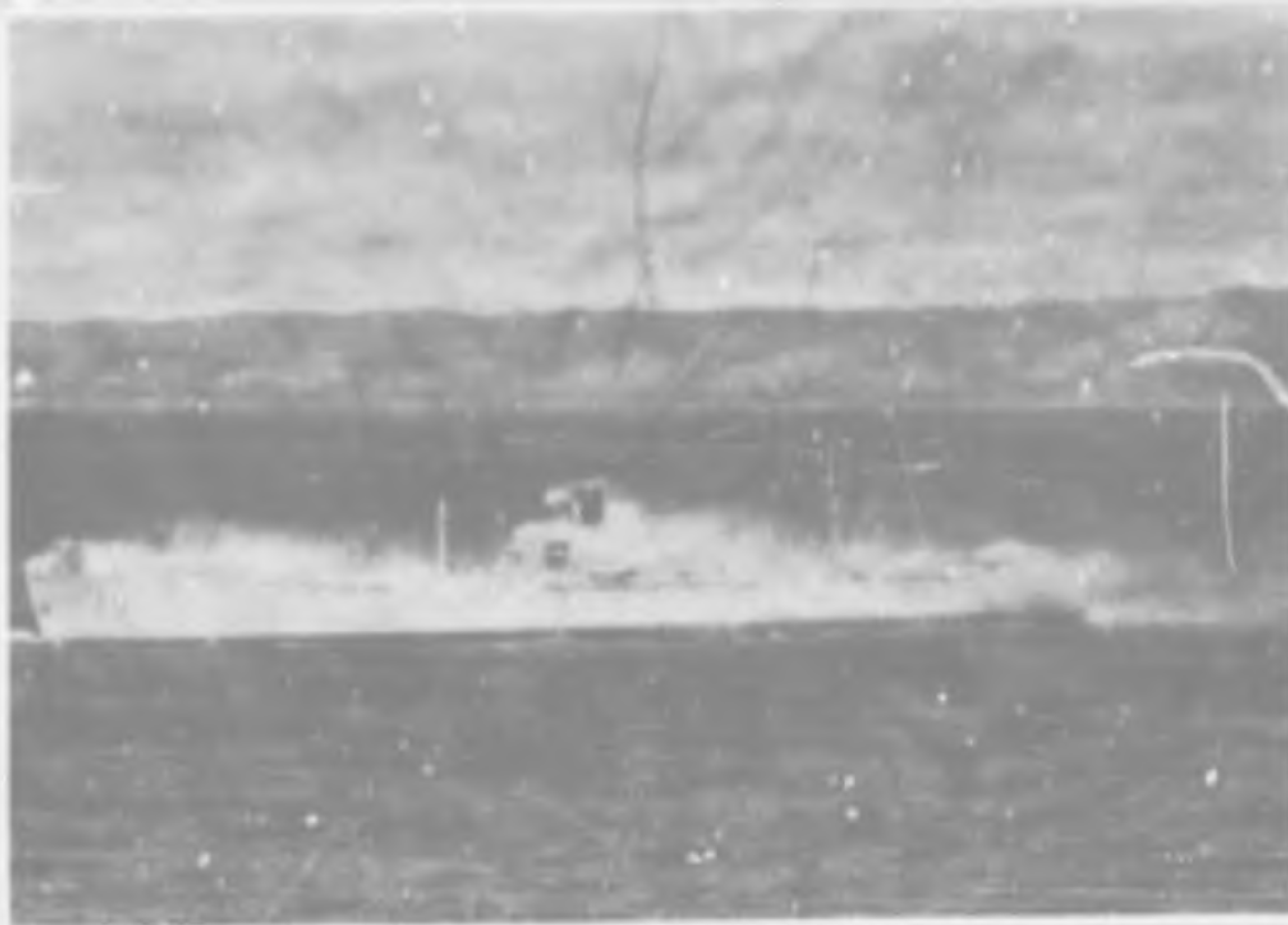


Fig. 6 YAG-40 as Modified for REDWING With Full Washdown.



Fig. 7 YAG-39, as Modified for REDWING
With Only After-Washdown Activated.

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Additional valves control each nozzle or small groups of nozzles in case it is necessary to secure particular nozzles for experimental purposes.

A large overboard drain was installed in the main deck at each of the four corners of the superstructure to handle the volume of water from the washdown and decontamination work.

2.4 Ventilation and Air Conditioning Additions. Freon Air Conditioning equipment was installed in the Recorder Room, the Secondary Control Room on both ships, and in the Low Background Laboratory on the YAG-40. Replenishment air is drawn from and exhausted to the between-deck holds above each room and in the case of the Low Background Room the supply air is drawn through a high efficiency filter.

A recirculating ventilation system was installed on the bridge deck and in the lower No. 4 hold. Cooling is accomplished by the use of sea water heat exchangers. On the bridge deck, this system serves the Radio Rooms, the Bridge and Gyro Room. The system in No. 4 hold provides some cooling for the auxiliary machinery located there. Under closed ship conditions without this cooling, the ambient temperatures would be too high to obtain reliable operation of the equipment installed in these spaces. Extensions to this sea water cooling system also serve cooling coils installed in the combustion control, throttle control and TV camera enclosures in the engine room. These enclosures are insulated.

2.5 Interior Communications. A sound-powered phone circuit with call bells has been extended for each operation to provide phones at project and ship operating stations. A general announcing system was installed prior to Operation REDWING.

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2.6 Ship Control and Navigational Equipment. The following equipment has been installed:

- (1) Radar with repeater in Secondary Control Room
- (2) Gyro compass and repeaters
- (3) Gyro Pilot (Iron Mike)
- (4) Rudder Angle indicator
- (5) Loran (in Secondary Control Room)
- (6) Dead Reckoning Tracer (DRT) with dummy pit log
- (7) Closed Circuit Television System (Navigational)
- (8) Remote Control System.

In addition to the engine room secondary conn television circuit, a camera is mounted on top of the stub mast on the after edge of the sampling platform. A remote control on the receiver in the Secondary Control Room provides pan and tilt movement so that the decks and sea to the horizon can be viewed. An azimuth indicator is provided at the receiver so that bearings can be taken.

Equipment which permits operation of the ship from a distance by radio (CASTLE) or from the Secondary Control Room (WIGWAM and REDWING) was installed in the Secondary Control Room (Item 8 above). By means of switches and a dial, various functions can be controlled. Speed may be adjusted in 10 steps, 15 to 66 shaft rpm equivalent to 2 to 11 knots, including shut down. This control adjusts the Hagen Throttle Control Board in the engine room which thereafter holds a constant shaft rpm at the new setting. Course may be adjusted in increments of 5° to any total change desired, and thereafter the automatic gyro steering on the

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bridge maintains a constant heading on the new setting. Other functions which can be accomplished from the control console in Secondary Control are washdown activation (YAG-39 only) and automatic sinuous course steering. The full capacity of the console has not been utilized and other functions can be added.

The principal limitations of this system are that the engine cannot be reversed nor can it be stopped and restarted from a remote location.

2.7 Ship Communications Equipment. Communications capabilities have been gradually increased in scope and reliability in the three operations in which the ships have participated to provide for long and short range voice and cw on a wide range of frequencies.

A summary of the equipment on board for REDWING is shown in Table 1.

2.8 Experimental Equipment. Brief descriptions of REDWING experimental installations are given below. For a complete description of the various project installations reference should be made to their respective reports.

2.8.1 Modifications for Project 2.63, Fallout Collection (NRDL). Further modifications and installations were made for Project 2.63, and under their cognizance for Projects 2.62, Ocean Water Sampling and Monitoring (Scripps Institute of Oceanography), 2.65, Fallout Collection (Chemical Research Laboratory), and 2.64, Gamma Radiation Measurement (New York Operations Office - AEC), for Operation REDWING.

The modification for these projects included a sampling platform approximately 20 feet in diameter on the top of the forward kingpost with the stub mast supported on the aft side of the shield. (Since the removal of the No. 1 Kingpost, the No. 2 Kingpost has been generally referred

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TABLE 1 - SUMMARY OF COMMUNICATIONS EQUIPMENT
AND CAPABILITIES ON BOARD YAG 39/40 AND LST-611

<u>Use and Location</u>	<u>Type of Equipment</u>	<u>Frequency Range</u>	<u>Nominal Power</u>	<u>Voice</u>	<u>CW</u>
Normal Ship Communication (long range)	TDE Transmitter	.3 to 18 MC	125 watts 30 watts	- X	X -
	IBM Receiver	.015 to .6 MC		X	X
	IBM Receiver	2 to 20 MC		X	X
<u>Radio Room--remote to Secondary Control Room</u>					

Normal Ship Communication (short range) Radio Room	TCS Transceiver	2 to 12 MC	10 watts	X	-
			40 watts	-	X

Project Comm. (long range) At entrance to Secondary Control Room	SRT-14 Transm.	.3 to 26 MC	100 watts	X	-
			150 watts	-	X
<u>Remote to Secondary Control Room and Radio Room</u>					
	IBM Receiver	2 to 20 MC		X	X
<u>Secondary Control Room--remote to Radio Room</u>					

Project Comm. (short range) Radio Remote Control Room	AN/SRC-15 Transc. (VRC 18)	38 to 54.9 MC	16 watts	X	-
<u>Remote to Bridge and Secondary Control Room</u>					

Project Comm. (aircraft to ship) UHF Radio Room--remote to Bridge and Secondary Control Room	TED Transmitter	225 to 400 MC	10 watts	X	-
	AN/URR-13 Rec.	225 to 400 MC		X	-

Task Group 7.3 Commun. (short range) Radio Remote Control Room	AN/FRC-27 2 Transceivers	152 to 174 MC	50 watts	X	-
<u>Remote to Bridge and Secondary Control Room</u>					

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to as the forward Kingpost.) Project 2.63 instruments were installed at this platform. An air compressor was installed in the No. 3 Deck House to provide power for operating these instruments and their controls and recorders were located in the Secondary Control Room. A suction unit serving one of the platform instruments was also installed in the No. 3 Deck House.

A 25 foot boom was installed at the main deck edge on the starboard side just forward of the flight deck. It is rotated from stowed position (alongside the flight deck) by means of a hand winch. A special winch provided by Project 2.62 (SIO) was installed under the flight deck to raise and lower a probe at the end of the boom. Remote controls and recorders were located in the Secondary Control Room. On the outer end of the boom a Project 2.64 (NYOO-AEC) detector was mounted with a recorder located in the Secondary Control Room.

A special incremental sampler was installed on the YAG-40 only. Sampling equipment was installed on the vent trunk atop the mast house just aft of the flight deck. A sample elevator transported samples to the Low Background Laboratory below.

A shielded entrance was installed at the forward end of this Laboratory.

A drum launching rack on the starboard quarter of the YAG-40 held 5 oil drums. These drums contained ocean current drogues. The drums were launched by a depth charge releasing gear, which was actuated by controls located in the Secondary Control Room.

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On the YAG-39, a large collecting tank was installed just aft of the flight deck with an electrically driven agitator in the bottom of the tank. A probe was suspended in the center of this tank with a remote recorder located in the Secondary Control Room.

2.8.2 Modifications for Project 2.4, Contaminability and Decontaminability of Construction Materials (CKL). A foundation, the top of which was above the rail, was constructed forward of the anchor windlass. Bolted to this foundation was the Project 2.4 panel structure. Attached to the front, side and top of the structure were removable panels of construction materials.

2.8.3 Modifications for Project 2.71, Ship Shielding (NRDL), Gamma-Time Intensity Detectors were located on No. 2 hatch and at other locations throughout the ships. Recorders and control assemblies were located in the Recorder Room with additional recorders for key ship operation stations remoted to the Secondary Control Room. These stations were located on the fore decks, after decks, bridge and engine room and served to keep the operating group informed of the radiation levels at these key points. A station on the sampling platform was also remoted to the Secondary Control Room for Project 2.63 operations.

2.8.4 Modifications for Projects 2.72 Dosimetry (BuShips) and 2.8 Basic Contaminability, Decontaminability (NRDL).

Project 2.72 and Project 2.8 had stations and samples at various topside locations and Project 2.8 also had a minor facility on the YAG-39 between-decks No. 3 hold.

2.9 REDWING Ship Operation and Project Personnel Requirements. On in-service status, the normal crew of the YAG's has been approximately 45 men and 4 officers. The small complement has necessitated shipyard performance of some maintenance and repair work normally done in the Navy by the ship's force.

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During RISEMING, the ships were operated for periods of three to four days by crews of 15 to 18 men with 10 project personnel aboard YAG 39 and 16 project people on YAG 40. These numbers approach the maximum capacity of the shielded spaces, and far exceed the shielded berthing space available.

3. LST-611 MODIFICATIONS

The modifications to the LST-611 consisted, in general, of providing a shielded control room with appropriate navigational and control equipment, installing Project 2.63 sampling, control and recording equipment, installation of a washdown system and making necessary modifications for closed ship operations.

For details of instrumentation reference should be made to Project 2.63 reports.

3.1 Principal Structural Modifications. Topside gear superfluous to planned operations was removed. This included all guns and gun directors. In addition, the foundations and tubs in the bow were removed.

A sampling platform approximately 20 feet in diameter was installed on the bow 15 feet above the main deck.

A fuel tank (24 X 48 feet) in the center of the ship was converted to a control room. Shielded by wing tanks on the sides and fuel tanks forward and aft. The bottom was shielded by 3 feet of water in the bilges and the top by 27 inches of concrete poured on the tank deck. A booby hatch pierces this shield to provide access from the tank deck or from one of the compartments on the port side at tank deck level. An estimated shielding factor varying from 1 under the booby hatch to 10^{-3} on the opposite side is provided.

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The access trunks to the main and auxiliary engine rooms on the starboard side were converted to combustion air intakes and ducts were installed from these trunks to the engine blowers.

Machinery Modifications. Remote control stands, duplicates of those in the main engine room, were installed in the Secondary Control Room as was remote control gear for parallel operation of two auxiliary generators. Gauge boards and alarms were also installed.

A BuShips interim LBT washdown system was provided. Washdown water was supplied from the fire main by short hose jumpers to pipe manifolds in which were installed nozzles of the same type as used on the YAG's. No additional pumping capacity was required.

A.C. power requirements were met by installation of additional motor generator sets.

3.3 Ventilation and Cooling. A recirculating ventilation system was installed in the Secondary Control Room. Cooling is supplied by a sea water heat exchanger. A jury rigged replenishment system with a high efficiency filter was used to supply and exhaust air to the tank deck.

Interior doors were left open to permit the escape of heat from the auxiliary engine room, main engine room and from the Radio Room and Bridge.

3.4 Ship Control and Navigation Equipment. The following installations were made in the Secondary Control Room:

- (1) Loran
- (2) Dead Reckoning Tracer (DRT) with dummy pit log
- (3) Radar Repeater
- (4) Gyro Repeater
- (5) Rudder Angle Indicator
- (6) Lever Steering Control (duplicate of emergency steering control on the Bridge).

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3.5 Interior Communications. The existing sound-powered phone system was extended to the sampling platform and Secondary Control Room.

3.6 Communications. The LST-611 had the same capabilities as the YAG's though a few of the instruments were of different nomenclature. This is shown in Table 1.

3.7 Experimental Equipment. Project 2.63 had equipment placed aboard the LST-611 consisting primarily of Sampling Platform instruments with their controls and recorders in the Secondary Control Room. Air to power the instruments was furnished by the ship's service air compressors. One of the bow compartments housed a suction unit for some of the platform instruments and a 24 volt motor generator set.

Four Gamma-Time Intensity Units of the type utilized by Project 2.71 were installed. Three were located as follows for operational purposes: one on the bridge, one on the main deck and one on the tank deck.

A fourth was installed in the sampling platform as a part of the Project 2.63 instrument array. Control units and recorders were located in the Secondary Control Room and served to keep the operating group informed of the radiation levels at these key locations.

3.8 REDWING Ship Operation and Project Personnel Requirements. During REDWING, the LST-611 operated as a commissioned ship and so had a crew of approximately 85 men and 5 officers. Were she placed on in-service status similar to the YAG's, a crew of about 50 would be sufficient.

On the sorties made, the LST was run for periods of three to four days by a crew of 18 to 21 men with five project personnel aboard. This number represented the maximum allowable in the shielded space.

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4. PRESSENT STATE

Upon completion of Operation REDWING all experimental equipment and some instrumentation foundations were removed. Special equipments supporting project operations that also were removed include the SKT-14, VRC-18 and FRC-27 radios and the YAG's engine room-secondary conn closed circuit television units.

For BuShips operation further extensive structural modifications were made in the YAG-40 between-deck spaces and lower No. 2 and No. 4 holds. In the YAG-39 extensive ventilation and air conditioning installations were made in the superstructure. On both ships the Loran installation was moved from the secondary conn to the chart room. A description of these alterations are contained in reference 3.

5. RECOMMENDATIONS

During Operation REDWING, certain of the facilities and equipment on the three ships were inadequate.

5.1 YAG's Ship Facilities and Equipment

5.1.1 Radar. The radar presently aboard lacks reliability for project requirements. If the YAG's are to be used again, a survey of radar requirements such as surface search, air search, etc should be made and proper equipment selected and installed.

5.1.2 Cooling. The sea water heat exchangers which cool the bridge deck spaces when the ships are closed were of insufficient capacity in the tropics. Should it be planned to use these ships under similar conditions, freon air conditioning is advised for these spaces on the YAG-40.

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5.1.3 Habitability of Secondary Conn

If it is expected that the shielded spaces will be manned for extended periods (24 hours or more), head facilities, a small range, refrigerator, freezer, scuttlebutt and additional bunks should be installed. Condensate drains in the ventilation system are also required.

5.2 YAG's Project Facilities and Equipment

5.2.1 Project 2.4 Panel Structures

Placement and removal of the Project 2.4 panel structures on the bows of the YAG's in the field was extremely difficult due to their size and weight.

The design of these structures interfered with use of the anchor windlasses and prevented use of the helicopter flight decks.

If similar objectives are to be satisfied in the future, it is recommended that these structures be re-designed and/or relocated to eliminate such interference with ship's operation.

5.2.2 Project 2.62 - Water Sampling System

Malfunction of the water sampling remote controls and limit switch systems and the hazardous manhandling of the probe seriously complicated ship operations on both YAG's. Again, a more complete design of test equipment will be necessary should such an undertaking be re-attempted.

5.3 LST-611 - Ship Equipment and Facilities

5.3.1 Radar. The surface search Mod. SO-8 radar should be replaced with a type more suited to project requirements.

5.3.2 Steering Controls (remote). A gyro pilot similar to those on the YAG's is recommended for the LST. This would eliminate three of the watch-standers necessary in secondary conn.

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5.3.3 Additional Shielding. The booby hatch access to the secondary conn is not shielded itself and creates a hazardous area in the control room. This condition should be explored and remedied.

5.3.4 Air Conditioning. Freon air conditioning is recommended for secondary conn radio room and motor generator spaces. The sea-water heat exchangers which cool these spaces when the ship is closed are inadequate in the tropics.

5.3.5 Habitability of Secondary Conn. A head, small range, refrigerator, freezer and scuttlebutt, should be installed if secondary conn is to be used for more than 24 hours.

5.4 Sources of Further Information. The San Francisco Naval Shipyard; the Personnel Protection Section of the Damage Control Branch, Bureau of Ships (Code 538); the Bureau of Ships Auxiliary Type Desk (Code 527); and the Technical Developments Branch, U.S. Naval Radiological Defense Laboratory (Code 933) are sources of more complete information concerning these test ships.

Approved by:

E. R. Tompkins

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Head, Chemical Technology Division

For the Scientific Director

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