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U.S. NAVAL SUBMARINE MEDICAL CENTER

Submarine Base, Groton, Conn.

MEMORANDUM REPORT NO. 65-14

LIGHTING SURVEY OF THE U.S.S. DOGFISH (SS-350)

by

S. M. Luria

and

Donald O. Weitzman

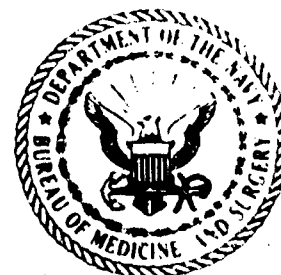
Bureau of Medicine and Surgery, Navy Department
Work Unit MF022.03.03-9012.17

Released by:

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26 November 1965

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U. S. NAVAL SUBMARINE BASE NEW LONDON
GROTON, CONNECTICUT

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Summary Page

THE PROBLEM

To survey the lighting aboard the USS DOGFISH (SS350) to determine the adequacy of existing illumination.

FINDINGS

The findings of this lighting survey indicate that the level of illumination in many areas fails to meet suggested standards. Specific recommendations are made for improvement.

APPLICATION

This information is presented for the benefit of the officers and men of the USS DOGFISH to indicate areas where lighting is adequate or could be improved.

Administrative Information

This investigation was undertaken as a part of Bureau of Medicine and Surgery Work Unit MF022.03.03-9012 (formerly MRO05.14-1100) Submarine Photometric Surveys. The present report is No. 17 on this work unit.

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LIGHTING SURVEY OF THE USS DOGFISH (SS350)

NATURE OF REQUEST: That personnel of the U. S. Naval Submarine Medical Center, Submarine Medical Research Laboratory, Vision Division, assess the lighting aboard the USS DOGFISH (SS350).

SURVEY REQUESTED BY: Commander Submarine Squadron EIGHT, FCSS8/br 9600 Ser: 70/883 of 16 November 1965.

DATE OF SURVEY: 18 November 1965*

GENERAL FINDINGS: Suggested white light levels for submarines are 5-10 footcandles for general illumination, 10-20 for work areas where fine visual detail is required, and 10 ft-c for reading by berth light (Ref. 1,2). The results of the survey show that the illumination is generally unsatisfactory, particularly in areas critical to the performance of the vessel. The illumination of many panels, dials, gauges, and control devices is inadequate in the conning tower, control room, maneuvering room, engine rooms, and torpedo rooms. In many cases the light sources were poorly positioned resulting in substantial reduction of illumination or in glare on panels and dials. Particular areas where improvement is indicated are considered under specific recommendations. The readings made on the USS DOGFISH are found in the Appendix.

GENERAL RECOMMENDATIONS:

1. Many spaces in the vessel are lighted by unshielded incandescent sources. This causes glare and uneven illumination, and the only well lighted space is directly under the bulb. It is suggested that incandescent fixtures be replaced by fluorescent fixtures where possible.
2. Self lighting is the most acceptable method of illuminating dials and gauges. Where this is not possible, there should be adequate direct lighting on the instruments; care should be taken to position the bulb to reduce glare and to shield the bulb if it lies in the operator's line of sight.
3. Berth lights should be installed to provide all bunks with 10 ft-c of illumination.

*Note: A preliminary copy of this report was furnished to Commander Submarine Squadron EIGHT and to Commanding Officer, USS DOGFISH on 23 November 1965.

4. Where necessary bulbs should be so repositioned that the crew members will not come between the light and the work surface.

SPECIFIC RECOMMENDATIONS:

1. Torpedo rooms: The general illumination barely reaches minimum recommended levels in certain locations; in addition the position of the fixtures is poor and the light does not reach where needed. The uneven distribution of light makes it difficult to work on the torpedoes. Illumination on many of the gauges is unsatisfactory. Bunk lighting is adequate only on the top bunks. Illumination levels in all these locations should be raised.

2. Galley and Pantry: Illumination of work areas should be increased to 10 ft-c. Position of lights should be directly over work areas. Light over sink is poorly positioned and another light over grill is needed.

3. Radio Shack: General illumination is inadequate, as is illumination on the typewriter, desk tops, and instruments nearest the entryway.

4. Control room: General illumination and lighting on dials is grossly inadequate. It is necessary to use flashlights to read many of the dials. General illumination (white) should be 10 ft-c on these dials.

5. Crew's berthing: General illumination should be increased. All bunks should be provided with individual lights providing 10 ft-c. The first-aid station is inadequately lighted. Illumination here should be raised to 10 ft-c.

6. Engine rooms: Since most of these spaces can be considered work spaces, general illumination should be increased to 10 ft-c.

7. Maneuvering room: General illumination should be increased to 5 ft-c. Illumination on dials and gauges is low. Lights should be repositioned to eliminate glare on dial surfaces.

8. Conning tower: Illumination on the work table is acceptable, but general illumination and lighting of most dials is low; it should be raised to suggested minimum.

9. Red lighting: The use of red lighting was originally suggested as a compromise between the darkness needed for dark adaptation and the bright light needed for normal acuity. While the ambient red lighting in the conning tower falls short of the recommended levels (Ref. 3), it is suggested that, instead of raising the levels of red lighting, some consideration be given to the use of black eye patches over the dark adapted eye. (Ref. 4,5).

References

1. Assignment of lighting units and footcandle requirements for vessel's compartments. BuShips No. 9-S-4953-L Rev. 24 of 22 May 1951.
2. Bureau of Ships Shipboard Lighting Manual, NAVSHIPS 250-560-4 of 15 May 1962.
3. Recommendations for minimal red light levels on board submarines, Naval Medical Research Laboratory Memorandum Report No. 60-2 of 14 Jan 1960.
4. ~~Effect of differential~~ binocular adaptation on scotopic acuity, Naval Medical Research Laboratory Report No. 337 of 18 May 1960.
5. Operational evaluation of the various methods of visual dark adaptation aboard FRM submarines, Naval Submarine Medical Center Memorandum Report No. 65-7 of 11 Feb 1965.

Appendix

ft-c reading

Wardroom	
Table top	25
Forward Torpedo room	
General illumination	1-5
Main gauges	less than 1
Pantry	
Work table near sink	8
Grill	3
3-Man Stateroom	
General illumination	15
Desk	15
Wash stand	15-18
Bunks	3-10
6-Man Stateroom	
General illumination	5-8
Bunks	10
Captain's stateroom	
General illumination	15
Desk	19
Wash stand	10
Control room	
General illumination	2
Gyro stand	less than 1
Air manifold	2
Diving stand depth gauge	1
Hydraulic manifold	2
Auxiliary steering	1.5
Trim manifold	2
Low pressure blower	0.5
Radio shack	
General illumination	2
Typewriter	6
Desk	2
Galley	
General illumination	5
Table	5
Sink	10
Grill	4

Appendix cont'd

	<u>ft-c reading</u>
Crew's mess	
General illumination	12
Tables	17
Crew's berthing	
General illumination (stbd)	2-5
" " (port)	10
Bunks with light	5
First-aid station, general	6
Engine rooms	
General illumination	0.5- 5
Maneuvering room	
General illumination	2-4
Gauges and dials	2-4
After Torpedo room	
General illumination	2
Impulse pressure gauge	2-5
Conning tower	
General illumination	3
Work table	12
TDC console	0.5
SS-2 Radar	0.5
Statimeter	0.5
(red light)	0.1