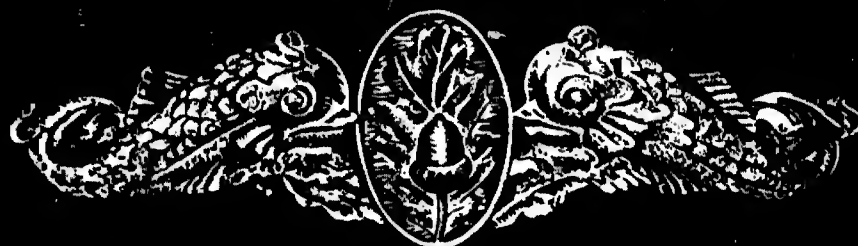


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Submarine Base, New London, Conn.

MEMORANDUM REPORT 60-6

Red Lighting Survey Aboard the USS RANDOLPH (CVS-15)

MR005.14-1100.01.07

6 April 1960

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Investigators:

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RED LIGHTING SURVEY ABOARD THE USS RANDOLPH (CVS-15)

Subject: Red Lighting Survey Aboard the USS RANDOLPH (CVS-15)

Conducted by: Forrest L. Dimmick, S. M. Luria, and Ira Schwartz

Date of Survey: 15 - 16 February 1960

Spaces Studied: Ready rooms, Passageways, Hangar deck, Flight deck, Ward rooms, Living spaces, Lookout station, Bridge, Chart room, Radar room, and Captain's office.

Personnel Interviewed: Captain, Flight officer, Medical officer, Officer of the Day, Night pilots, and Plane handlers

Summary:

A survey of the red lighting installations aboard the USS RANDOLPH was conducted to determine the functions of red illumination and the efficiency of the illumination to carry out the desired functions. It is evident, at once, that there are two kinds of night operations for which red lighting is required. These are (a) aircraft handling and flying, and (b) navigation of the ship. In both operations, the functions of red light are to expedite dark adaptation and to protect it against deterioration by white light.

(a) In night air operations, it is fully recognized that pilots must have the best possible dark adaptation before take off. It is regular practice for the pilot to spend, before flight, no less than 30 minutes around and in his plane under conditions that approach total darkness. Prior to coming on deck, the pilot remains at least a half hour in the red-lighted "ready room," red-lighted "passages," and red-lighted "hangar deck." The red lighting along this route is of great importance to the pilot, since it produces and maintains enough dark adaptation to enable him to make his way with the best possible facility to his plane on the flight deck which for operational purposes is unlighted. Since the effectiveness of the red illumination in providing sufficient night vision for this purpose depends upon its intensity being kept at the lowest practicable level, steps should be taken to eliminate ambient red illumination in the corridors as well as white light from adjoining rooms, and to place the red light fixtures in such a way that they will act most effectively. Since the "ready room," even when red lighted, is the scene of some visual acuity tasks, some compromise between acuity and dark adaptation is required.

The function of red illumination is essentially the same for plane handlers, deck men, etc., as for the pilots, and the same low level red illumination should be maintained throughout the crew's "ready rooms" and "passages". In addition, it must be expected that, though personnel have been in low level red illumination for some minutes, they will not be fully adapted and cannot perform with full efficiency until they have been on deck in darkness for 5-10 minutes. Again, the greatest efficiency will be attained by keeping the red illumination at the lowest level consistent with adequate seeing in the particular spaces, and by reducing the amount of ambient red illumination.

(b) For the night navigation of the ship, every effort is made to have the lookouts fully dark-adapted, when they go on station and throughout their watch. Not even red lighting is permitted on the lookout station. On the "bridge," the lighting is kept red and at a minimum, so that the officers who are on duty there are fairly well dark adapted, though not at a maximum sensitivity, since they must read compass and dials necessary to maintain the ship's course. Access to the bridge is by red-lighted passages, for which the comments on red lighting in other passages holds as well. The "radar room" is dimly lit, mostly by spill from back-lighted instruments. Since good acuity is required for the functions performed in this room, no reduction of illumination would be permissible.

RECOMMENDATIONS:

The following recommendations are made on the basis of the information obtained in the survey.

(a) Air operation:

(1) Wherever red lighting is used in passageways or on decks to mark obstacles, its brightness level should be .001 to .003 foot-lamberts and its efficiency would be improved by using step lamps and shaded fixtures as close to the deck as possible which will put the light where it is needed and not allow it to shine in the eyes of personnel.

(2) In "ready rooms" the transition from normal white light to low level red light should be made in two steps. The high level white light should be gradually reduced and switched to a red light of equal brightness with enough intensity for the pilots to complete the

visual tasks upon which they were working. Thereafter, the red illumination should be further reduced until the level approaches that of the passageways, i.e. .001 to .003 foot-lamberts.

(3) The number of obstacle lights of the indirect and low level type should be increased to mitigate the hazards of getting about the "hangar deck" and "flight deck."

(b) Ship navigation:

For passageways in and around the bridge the same recommendations are made as for passageways in the air crew's compartments.

In the course of the survey a number of points were raised by flight personnel dealing with aspects of the landing lights and other flight signals. For example, all pilots agreed that the outline of the deck in red is excellent. They would like, however, in addition a pencil light to mark the center of the runway to assist in take-offs. The use of electro-luminescent panels set flush in the deck is suggested for marking helicopter landing sites and other special areas. All of these are suggestions that should be transmitted to the people who are studying the improvement of deck runway lights.

ACKNOWLEDGMENT:

We wish to express our appreciation for the courtesy and assistance afforded by Captain R. E. Harmer and all the personnel of the USS RANDOLPH and VS-36 with whom we had contact.