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14 September 1937

NRL Report No. B-1397

NAVY DEPARTMENT

BUREAU OF ENGINEERING

Report of Test
on

Spotlight, Incandescent

Submitted by

FR-1397

S. H. Thompson Mfg. Company
Fourth and Saint Clair Streets,
Dayton, Ohio

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D.C.

Number of Pages: Text - 5 Plates - 1

Authorization: BuEng. ltr. S-151(3-25-Ds) of 20 April 1937.

Date of Test: July, August and September, 1937.

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Distribution:
BuEng. (5)

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APPENDICES

AUTHORIZATION FOR TEST

1. This test was authorized by reference (a), and other references pertinent to this problem are listed as references (b) and (c).

Reference: (a) BuEng. ltr. S-151(3-25-Ds) of 20 April 1937.
(b) Specifications 17S14(INT) - Spotlights, Incandescent, Power-Boat, dated 15 July 1937.
(c) BuEng. ltr. JJ-17-S-14-(5-4-Ds) of 25 June 1937.

OBJECT OF TEST

2. The object of this test was to determine how closely the subject spotlight complied with the specifications, reference (b), and its suitability for Naval use as a power-boat light.

ABSTRACT OF TEST

3. The sample spotlight was tested for conformance with the specifications insofar as they were applicable. It was also subjected to the salt spray test, requested under reference (c), to determine its resistance to corrosion.

CONCLUSIONS

(a) Although this spotlight is not in compliance with the specifications in the matter of mechanical design, it may have advantages for Service use. Its outstanding feature is ease of control and, in addition, it is compact and light in weight.

(b) The nickel plated reflector does not appear suitable for Naval use, as it tarnished and lost reflectivity as a result of the immersion and heat tests. The specifications require a chromium plated reflector. It was noted that no damage occurred to the external chromium plated brass parts during the salt spray test, requested under reference (c).

(c) The computed diameter of the beam of light at 550 yards was considerably greater than that allowed. The intensity of the projected beam of light is believed to be of an acceptable value within the intent of the specifications. The spotlight was submitted and tested with a 32 C.P. 6-8 volt lamp (G.E. 1133), while the specifications allow the use of a 50 C.P. lamp.

(d) The sample spotlight and spare reflectors are being delivered to the Bureau for examination.

RECOMMENDATIONS

(a) In view of the sample spotlight having failed to comply with the specifications, as noted under "Test Results" and "Conclusions", its use, as at present constructed, cannot be recommended.

(b) It is recommended, that if the Bureau considers this type of spotlight worthy of further development, a modified sample, incorporating a chromium plated reflector and a 50 C.P. double contact lamp, be furnished for test. Such a sample should have no external steel parts, and should have a device for clamping the split ring which does not require the use of a tool. It is also desirable to substitute a less corrosive material for the gear housing.

DESCRIPTION OF MATERIAL UNDER TEST

4. The sample light is shown by Plate 1 and is manufactured by the S. H. Thompson Manufacturing Company, Fourth and Saint Claire Streets, Dayton, Ohio, as "Model 3000 Cruiser Mobilite," inner controlled spotlight, 6 inches diameter.

5. The light is designed principally for motor boat use and is suitable for mounting either vertically or horizontally. It is operated by a split ball from the inside; one half rotating the reflector housing 180° through the axis of the mounting column, the other half rotating the housing approximately 330° around an axis at right angles to the first.

6. The reflector and its housing are of formed brass and the flanged column is of cast brass. The gear housing is cast, presumably of a zinc alloy. The innermost control rod is of steel while the other is a concentric brass tube. These rods are enclosed by a flanged column and a projecting brass tube.

7. All metal parts of the spotlight are chromium plated, except the control rods which are not plated and the reflector which is nickel plated. All of the exposed surfaces are highly polished.

8. The light is of splashproof construction, a cork gasket being provided in a recess in the rim of the reflector. The glass window is clamped against this gasket by a split securing rim.

9. A single contact socket of the automotive type, having a central focusing screw in the reflector housing is employed. A single insulated flexible wire extends through the flanged column to the central contact of the lamp socket. The shell of the socket is connected to the reflector housing by the focusing screw. To operate the light, one side of the line must be grounded.

10. The total weight of the spotlight is 3 lbs. 5 oz. The dimensions are indicated on photograph, Plate 1.

METHOD OF TEST

11. The spotlight was first tested in a totally dark room for intensity and diameter of beam when energized at a potential of 6 volts.

12. Following this an additional test was made out of doors on a clear dark night, to determine the approximate distance at which an object could be observed.

13. One of the additional reflectors was then immersed in 20 percent saline solution at 40° C. for a period of 24 hours, after which it was washed and placed in a compartment where the temperature was raised from 40° C. to 80° C. then cooled to 40° C. each

hour for 5 consecutive hours. These tests were preceded and followed by dark room measurements for light intensity in order to determine their effect upon the reflecting surface.

14. The sample light was then subjected to a stream of water one inch in diameter, under a head of approximately 25 feet from a distance of 10 feet for a period of 5 minutes, in order to determine its splash-proofness.

15. Next followed the salt spray test, requested under reference (c). This test was made by placing the entire spotlight in a compartment where it was subjected, under ultra-violet light, to a 20 percent hot (57° C.) salt spray for a period of 3 minutes, followed by a hot (57° C.) air blast for a period of 3 minutes. This test was continued for 100 consecutive hours and the original reflector was used. The reduction in light intensity was determined from measurements made prior to and following this test.

16. The usual inspection of the sample spotlight, for compliance with the specifications in the matter of materials, design and workmanship, concluded the test.

RESULTS OF TEST

17. The beam of light projected by the spotlight when properly focused was 32 inches in diameter at a distance of 32 feet. The light intensity was 36.2 foot candles by a "Weston Photronic" illuminometer. This reading was the highest obtainable, using an instrument having two (2) photronic cells and is an average for the area occupied by the cells. Using these values, the beam diameter at 500 yards would be 137.5 feet and the maximum light intensity 0.0136 foot candles. The specifications allow a maximum beam spread of 45 feet at a distance of 550 yards.

18. An outdoor test, not required by the specifications, was made on a clear dark night, primarily to determine the greatest distance at which a person clothed in white could be easily observed. This distance was approximately 300 yards.

19. Prior to and following the immersion and heat tests, conducted as described in paragraph 13, a value of 40 foot candles was obtained. Following these tests, the foot candle reading dropped to 20, due to the tarnishing of the nickel plated reflector under the heat test.

20. During the test for splashproofness, described in paragraph 14, a small amount of water leaked into the reflector housing.

21. Following the salt spray test, described in paragraph 15, the light intensity was found to be 27.5 foot candles at 32 feet. After the window and reflector had been thoroughly cleansed, the value increased to 35 foot candles. Before the salt spray test, the

intensity was 36.2 foot candles, as given in paragraph 17.

22. An inspection, following the salt spray test, showed considerable pitting in the zinc alloy gear housing and but little other damage, except that the steel angles on the window securing ring were badly corroded.

23. A single contact socket is employed, while that required is double contact.

24. A nickel plated reflector is used instead of the chromium plated one required.

25. This spotlight, in addition to the effective beam of light, produces a wide secondary field of illumination.

CONCLUSIONS

26. Although this spotlight is not in compliance with the specifications in the matter of mechanical design, it may have advantages for Service use. Its outstanding feature is ease of control and, in addition, it is compact and light in weight.

27. The nickel plated reflector does not appear suitable for Naval use, as it tarnished and lost reflectivity, as a result of the immersion and heat tests. The specifications require a chromium plated reflector. It was noted that no damage occurred to the external chromium plated brass parts during the salt spray test, requested under reference (c).

28. The computed diameter of the beam of light at 550 yards was considerably greater than that allowed. The intensity of the projected beam of light is believed to be of an acceptable value within the intent of the specifications. The spotlight was submitted and tested with a 32 C.P., 6-8 volt lamp (G.E.1133), while the specifications allow the use of a 50 C.P. lamp.

29. The sample spotlight and spare reflectors are being delivered to the Bureau for examination.

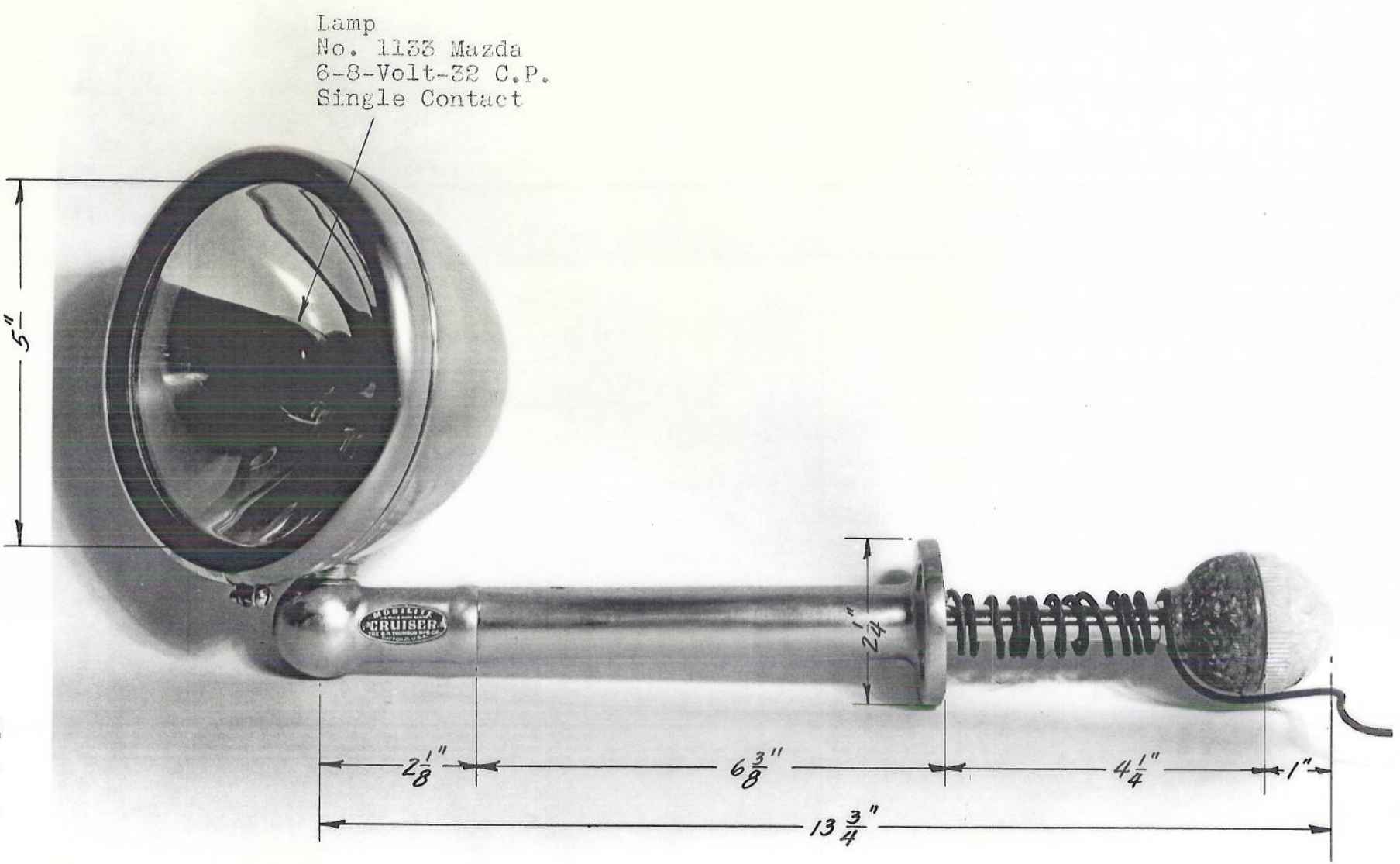
Lamp
No. 1133 Mazda
6-8-Volt-32 C.P.
Single Contact
5"
MOBILITE
CRUISER
THE S.A. THOMSON MFG. CO.
1 1/4"
2 1/8"
6 3/8"
4 1/4"
1"
13 3/4"

Plate 1