8 November 1934 Report No. B-1092

NAVY DEPARTMENT
BUREAU OF ENGINEERING

Report of

Test on Controller and Pulsators for Truck and Screened Speed Lights.

Manufactured by

Navy Yard
Portsmouth, N.H.

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D.C.

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Date of Test: October 1934.

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Distribution:
Bu.Eng. (5)

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CONCLUSIONS

(a) The truck light controller and pulsators for D.C. and A.C. operation, as manufactured by the Navy Yard, Portsmouth, N.H., and covered by this report, are not entirely satisfactory. This equipment, if modified in accordance with comments, would be suitable for the Naval Service.

RECOMMENDATIONS

(a) Due to the satisfactory operation of the pulsators, it is recommended that they be approved for the Naval Service, subject to compliance with comment, paragraph 23.

(b) Due to several undesirable features of the truck light controller, it is recommended that it be not approved for the Naval Service.

(c) It is recommended that the truck light controller be modified in accordance with comments, paragraphs 20, 21, 22, 24, 25 and 26, and resubmitted to this Laboratory for further tests.

AUTHORIZATION FOR TEST

1. This problem was authorized by Bureau of Engineering letter, reference (a), and other additional correspondence pertinent to this problem are listed as references (b) to (g).

Reference: (a) Bu.Eng. ltr. S65-1/L5(9-20-Ds) of 24 Sept. 1934.

(b) Naval Research Laboratory Test Report No. 537 of 24 November 1934 on Controller and Pulsators for Truck and Speed Lights.

(c) Naval Research Laboratory Test Report No. 553 of 21 May 1934 on Development of Truck Light Relay for Operation of Neon Pilot Lights.

(d) Naval Research Laboratory Test Report No. 553-A of 30 July 1934 on Modification of Truck Light Relay.

(e) Bu.Eng. dwg. 9-S-4670-L-Alt. 1 of Controller for Truck and Screened Speed Lights.

(f) Bu.Eng. Dwg. 9-S-4671-L of Type D, A.C. Pulsator.

(g) Bu.Eng. Dwg. 9-S-4709-L of Type E, D.C. Pulsator.

OBJECT OF TEST

2. The object of this test is to determine the suitability of the subject material, as modified by the Navy Yard, Portsmouth, N.H., for installation in Truck and Screened speed light circuits in the Naval Service.

ABSTRACT OF TEST

3. The subject material was set up in this Laboratory and connected in circuits simulating truck and speed light circuits, and closely observed for accuracy while operating under simulated service conditions.

4. Since previous tests under reference (b), this material has been modified to incorporate relays for operation of neon Navy type VG-2 lamps. During the test particular attention was given to the operation of these parts when one, two, three and four standard truck lamps were burning in the truck light.

DESCRIPTION OF MATERIAL

5. This material was manufactured by the Navy Yard, Portsmouth, N.H., and consists of the following:

One (1) Type D controller for truck and screened speed lights, designed for operation on either direct or alternating current.

One (1) Pulsator designed for direct current operation.

One (1) Pulsator designed for 60 cycle alternating current operation.

6. A description of this material is given by Bureau of Engineering Drawing 9-S-4670-L. Alt. 1 modified by Navy Yard, Portsmouth, N.H.

METHOD OF TEST

7. The controller and direct current pulsator were connected in a circuit, as shown on Dwg. 9-S-4670-L, Alt. 1, and tested for operating characteristics in all controller positions with and without external dimmer resistance. They were then operated for endurance, with controller set at "Ahead flank speed" for 24 continuous hours, and "Back full speed" for 24 continuous hours, with maximum lamps operating in the truck light.

8. To determine the operating characteristics of the controller and alternating current pulsator, they were connected in a circuit, as shown on Dwg. 9-S-4670-L, Alt. 1, and subjected to the same tests, given for direct current operation.

9. Tests were made with one, two, three and four standard lamps burning in the truck light, with and without external dimmer resistance, in order to determine the functioning of the relays at minimum and maximum currents.

10. The temperature rise of the pulsator motors was obtained by the thermometer method after an endurance run of 48 continuous hours.

11. The usual inclination, insulation resistance, and dielectric strength tests were made.

12. The test was concluded by subjecting each piece of apparatus to twenty shocks of one hundred fifty (150) foot pounds, for shock integrity.

RESULTS OF TEST

13. Direct current tests (115 V. Battery supply).

Lamps in Truck Light	With dimmer resistance (540 ohms ahead and 693 ohms back): Amperes through Relay winding	Volts across Truck Lamps	Without dimmer resistance: Amperes through relay winding	Volts across truck lamps
Ahead				
1	0.088	70.0	0.120	113.0
2	0.130	43.0	0.240	112.5
3	0.160	30.0	0.353	112.0
Back				
1	0.082	60.0	0.123	113.0
2	0.120	33.5	0.248	112.5
3	0.130	22.0	0.365	112.0
4	0.142	15.5	0.490	111.0

14. Alternating current tests (115 v. 60 cycle).

Lamps in Truck Light	With dimmer resistance (540 ohms ahead and 693 ohms back): Amperes through relay winding	Volts across truck lamps	Without dimmer resistance: Amperes through relay winding	Volts across truck lamps
Ahead				
1	0.085	64.0	0.120	110.0
2	0.115	41.5	0.243	109.0
3	0.132	27.4	0.350	108.5
Back				
1	0.085	56.0	0.123	110.3
2	0.118	32.5	0.245	109.5
3	0.136	20.5	0.365	109.0
4	0.143	14.2	0.480	107.5

15. The temperature rise of each pulsator motor, at duration of 48 continuous hours of operation, was 29° C for D.C. and 39.7° C for A.C. at an average ambient temperature of 25°C. The allowable temperature rise for these motors is 40°C.

16. All parts of the apparatus, with the exception of the relays, were unaffected when subjected to shock and inclination tests.

17. The insulation resistance, as determined by a 1000 volt megger, was 200 megohms for all instruments. The minimum allowable resistance is 1 megohm.

18. All instruments withstood a dielectric test of 1240 volts, A.C., 60 cycle applied for one minute between all current carrying parts and case.

19. Both pulsators operated satisfactorily on all tests.

COMMENTS ON RESULTS OF TEST

20. During the endurance test, both relays, when operating on either D.C. or A.C., were unreliable and frequently failed to operate the pilot lamps. This condition is due to the failure of the armatures to return to their normal positions at the time the current is interrupted by the pulsator. Although there is a brass insert provided for each armature for the residual air gap, the spring, if given sufficient tension to overcome the residual magnetism produced by maximum current, will prevent the armature from operating at minimum current. Relays having sufficient torque for positive operation at minimum current should be substituted. The pilot lights are the only means of indicating that the truck light circuit is functioning correctly, and for that reason, this Laboratory cannot over-stress the importance of providing dependable relays.

21. The pilot light relays, in their present location, are inaccessible and some method should be provided whereby the relays could be reached for making adjustments without necessitating the removal of the controller case cover and panel. A cover of sufficient size, located on the under side of the controller case, would allow better access to the relays and their removal, if necessary, providing the relays were equipped with flexible lead wires of sufficient length. A better method would be to remove the relays from the controller case and install them in a water-tight case, with removal cover attached to the controller pedestal.

22. With the controller connected to alternating current and in the "off" position, both of the neon pilot lamps glow continuously. This is due to the relays opening only one side of the pilot light circuit and capacitive coupling between that circuit and the other side of the line. This is characteristic of Navy Type VG-2 lamps, and past experience has shown, that for proper operation, both sides of the line should be broken.

23. The locking device, for contact adjusting screws on pulsators, should be modified so as to firmly hold the screw after the adjustment is made.

24. The present controller handle is difficult to grasp and operate and should be modified.

25. The controller dial is now illuminated with Navy Type VG-2 neon lamps. For proper illumination the dial should be painted with radium luminous paint of the 20 micro-lambert grade, using the proper coverage, and activated with Navy type VG-2A lamps.

26. In order to conserve the life of the radium luminous paint on the controller dial, the activating Navy Type VG2-A lamps should be cut off with double pole switches when the instrument is not in use.

CONCLUSIONS

27. The truck light controller and pulsators for D.C. and A.C. operation, as manufactured by the Navy Yard, Portsmouth, N.H., and covered by this report, are not entirely satisfactory. This equipment, if modified in accordance with comments, would be suitable for the Naval Service.

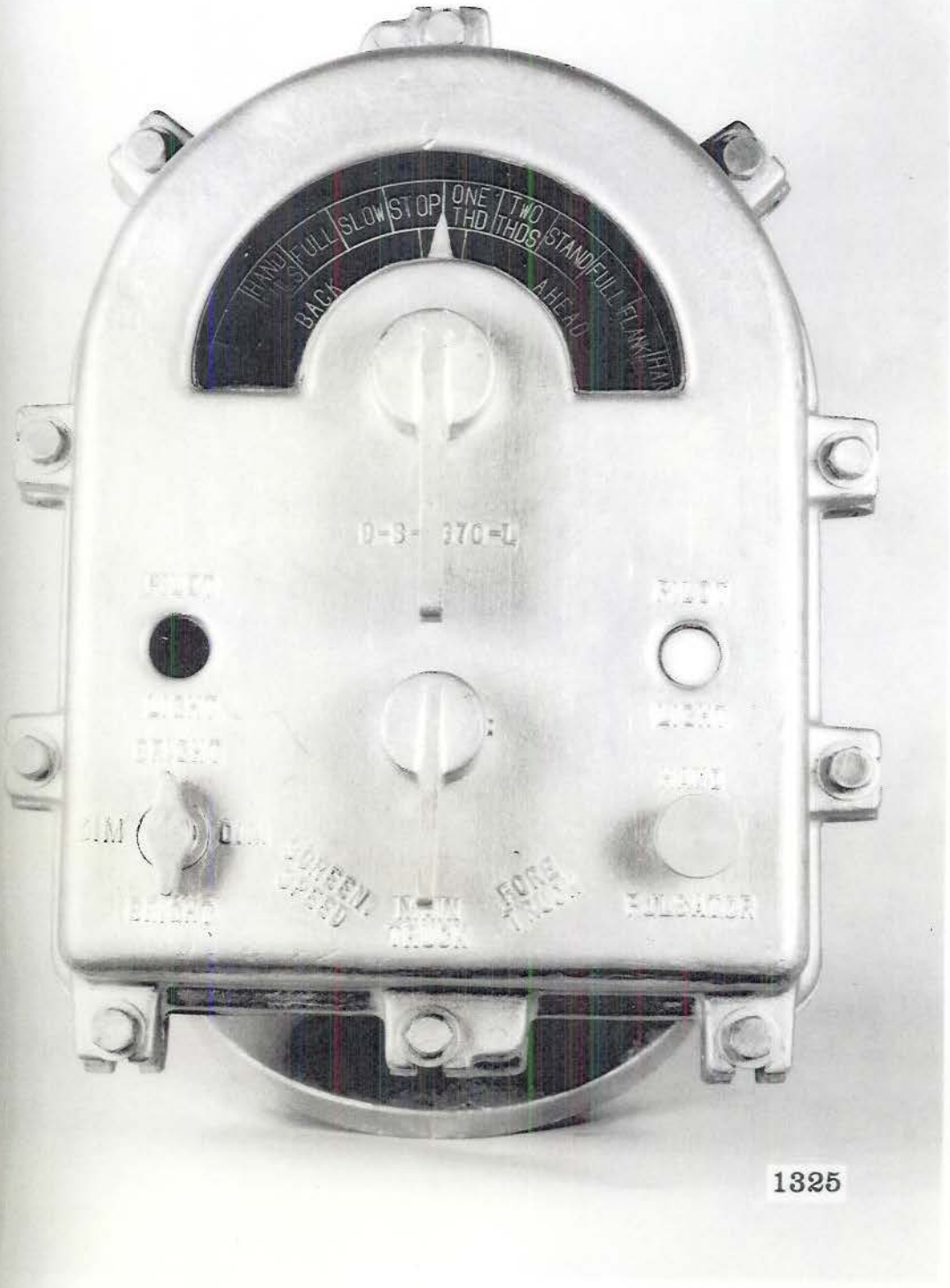
HAND
FULL
SLOW
STOP
ONE THD
TWO THDS
STAND
FULL
HAND
BACK
AHEAD
D-3-370-L
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PLATE 1

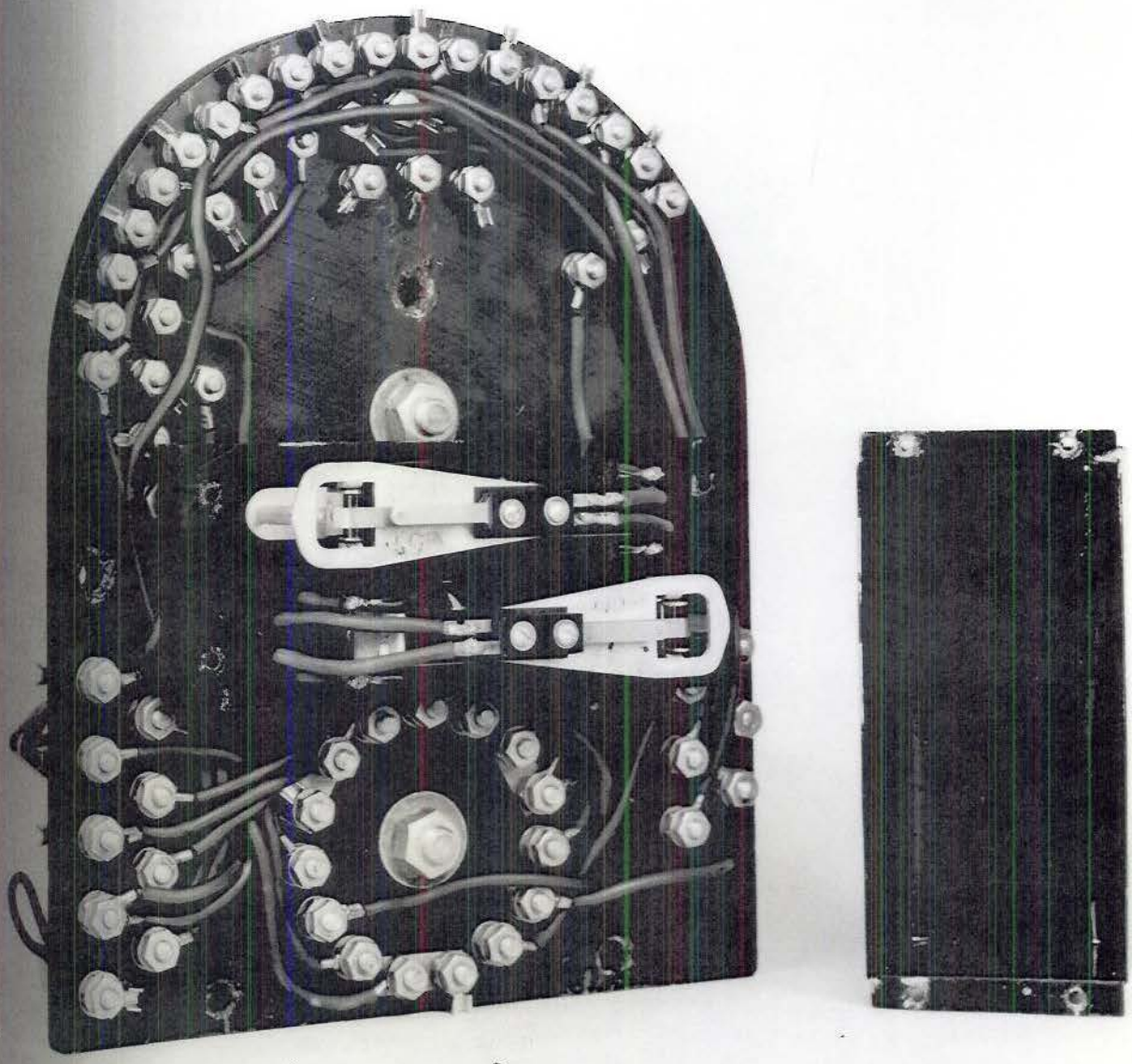

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PLATE 2

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PLATE 3

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PLATE 4