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State of California
Department of Public Works
Division of Highways
Materials and Research Department

February 1966

Section W. O. 39560

Mr. Neal Andersen
Equipment Engineer
Equipment Departme
Division of Highwa
Sacramento, Califo

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erials & Research Dept.

Dear Sir:

Submitte

TEST 3

Study made by . . . . . Structural Materials Section
Under direction of . . . . . E. F. Nordlin
Work supervised by . . . . . J. E. Barton and R. L. Donner
Report prepared by . . . . . K. S. Sedrakian

Very truly yours,

JOHN L. BEATON
Materials and Research Engineer

KSS:mw
Attach.

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# INTRODUCTION

A memorandum was sent on September 23, 1965, from Mr. Neal Andersen to Mr. John L. Beaton to confirm Nelson-Sherman and Nelson-Barton telephone conversations of September 22, 1965, and September 23, 1965, regarding testing of revolving warning lamps. Attached to the memorandum was Local Request No. 1864 of Equipment Department requesting that the revolving lamps be tested in accordance with instructions discussed between Mr. B. Nelson and Mr. J. E. Barton.

On September 28, 1965, Section Work Order No. 39560 was set up by the Materials and Research Department. On October 26, 1965, the revolving lamps to be tested were received from the Equipment Department.

On November 18, 1965, Messrs. Berndt Nelson and R. L. Woolf of the Equipment Department visited the Materials and Research Department to examine the test setup. As a result of this visit, a memorandum was sent on November 19, 1965, from Mr. Neal Andersen to Mr. J. L. Beaton, Attention Mr. J. E. Barton, and the following test procedure was confirmed:

The lamps were to be operated:

1. For 24 hours under zero degree air temperature conditions.

2. For 24 hours under 140 degree air temperature conditions.

3. Continuously 24 hours a day for a week under vibrating conditions of 12.5 cycles per second and 0.10 inch amplitude.

No maintenance is to be done on the lamps other than replacing the bulbs as they burn out.

A log is to be kept of the replacement bulbs to each type of lamp tested. A check is desired on the rotation (revolutions per minute of each lamp tested).

At the end of the continuous 7-day test, the results were to be reviewed and decided whether or not to continue the tests.

Note: After the review, it was decided to continue the test until every unit became unoperative.

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## TEST PROCEDURE AND RESULTS

The following are some of the physical and electrical characteristics of each unit:

| | Dietz | Grote | Tripp-Lite |
|---|---|---|---|
| Model No. | 211A | SB114 | RF6 |
| Nominal volts | 12V | 12V | 12V |
| Number of lamps | 4 | 4 | 3 |
| Type of drive | Gear | Gear | Belt |
| Weight of unit | 9.7 lbs. | 11.1 lbs. | 6.0 lbs. |
| Current drawn (at 15 V.D.C.) | 9.5 amp. | 10.2 amp. | 8.1 amp. |
| Voltage drop at switch (at 15 V.D.C.) | .21V | .05V | No switch |
| Flash rate | 140 fpm | 120 fpm | 150 fpm |
| Revolving speed | 35 rpm | 30 rpm | 50 rpm |

### Test Procedure

1. The three revolving warning lamps were connected to a 15 volt D.C. source and operated for 24 hours under zero degree Fahrenheit air temperature with no adverse results.

2. The air temperature was raised to 140 degree Fahrenheit and lamps were operated for another 24 hours. Again there was no adverse effect to any of the revolving warning lamp units.

3. The three revolving warning lamps were secured to the vibration table Model 150-VP-T. The units were vibrated at a vertical displacement of 0.10 inch at 12.5 cycles per second continously, while operating from a 15 volt D.C. source. No maintenance was done on the units except to replace the lamps as they burned out.

4. After 137 hours of operation the dome covers were removed and the test was resumed as before. (Dietz and Tripp-Lite covers were warped from heat generated by the lamps due to the close proximity of the units and lack of sufficient air movement around the covers. Warping appeared to be due to the test setup and not the design of the units.)

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5. After 522 hours of operation, the frequency of vibration was changed from 12.5 to 14 cycles per second. All other test conditions were kept as before. The test was continued until each unit went to a complete failure.

Test Results

1. At 674 hours of operation:

   The Tripp-Lite and Grote were revolving slower than they did initially as indicated below:

| | Initial | 674 Hours |
|---|---|---|
| Dietz | 35 rpm | 35 rpm |
| Grote | 30 rpm | 29 rpm |
| Tripp-Lite | 50 rpm | 43 rpm |

2. At 745 hours of operation:

   Lamp burnouts were as follows:

| | |
|---|---|
| Dietz | 23 lamps |
| Grote | 48 lamps |
| Tripp-Lite | 18 lamps |

3. Grote #SB114 Revolving Warning Lamp:

   After 745 hours of continuous operation, the bearings and the gears were worn out; the revolving head stopped turning.

4. Dietz #211A Revolving Warning Lamp:

   a. After 798 hours of operation, the lamps were blinking slightly because the revolving head assembly was wobbling and at certain points the contact brush would not make good contact.

   b. After 899 hours of operation, in addition to blinking and wobbling, the revolving head assembly was binding, and its revolving speed had slowed down from the initial 35 rpm to 24 rpm.

   c. After 918 hours of operation, the revolving head stopped turning; the bearings were worn out.

5. Tripp-Lite #RF6 Revolving Warning Lamp:

   a. After 674 hours of operation, the revolving head slowed down from the initial 50 rpm to 43 rpm.

   b. After 899 hours of operation, the revolving head started to bind and revolve even slower at 34 rpm.

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c. After 942 hours of operation, the revolving head binding became more severe, and it started to revolve at 10 rpm.

d. After 951 hours of operation, the revolving head stopped turning; the bearings were worn out. Also, the soldered lead to the contact brush had come loose but was making enough contact for the unit to operate.

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