REPORT NO. B-1156

DATE 6 May 1935

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SUBJECT

Report of

Test on

Double Shaft Revolution Indicator

Pitometer Log Corporation

Exhibitor

by

J. S. Bryant
W. B. Roberts

Distribution Unlimited

Approved for
Public Release

Naval Research Laboratory
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NAVY DEPARTMENT

BUREAU OF ENGINEERING

Report

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NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D.C.

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Authorization: Bu.Eng.let. S65-5/L5 (4-25-Ds) of 30 April 1935.

Date of Test: May 1935.

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Distribution:
Bu.Eng. (5)

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Appendices

AUTHORIZATION FOR TEST

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

Reference: (a) Bu.Eng.ltr. S65-5/L5 (4-25-Ds) of 30 April 1935.
(b) NRL Report No. B-1082 of 10 October 1934.
(c) Navy Department Specifications SGS-(65)-10a.

OBJECT OF TEST

2. The object of this test was to determine the suitability of the Double Shaft R.P.M. Indicator as a substitute for two (2) Single Shaft R.P.M. Indicators, used in connection with Pitometer Log Corporation's "Instantaneous Shaft Revolution Indicator System", reference (b), and its conformance with the requirements of reference (c) with respect to shock integrity and accuracy.

ABSTRACT OF TEST

3. The subject material was set up at this laboratory and closely observed, while under test for accuracy, before and after application of the required shock test, reference (c). Observations were also made in a dark room for determining the suitability of the lettering on the dial when activated by VG2-A Navy type lamps.

CONCLUSIONS

(a) The Double Shaft R.P.M. Indicator, as manufactured and submitted by the Pitometer Log Corporation, New York, N. Y., complied with the shock integrity and accuracy requirements of the specifications, reference (c), and is considered satisfactory for installation in the manufacturer's system covered by reference (b) subject to modifications given under "Comments".

RECOMMENDATIONS

(b) It is recommended that the subject indicator be approved for the Naval Service, subject to modifications in accordance with "Comments", covered by this report.

DESCRIPTION OF MATERIAL UNDER TEST

4. The Double Shaft R.P.M. Indicator unit, as submitted, is enclosed in a cast aluminum alloy watertight case having two 1-1/4" and one 3/4" tapped holes for standard Navy terminal tubes and a removable cover for gaining access to the terminal blocks. Four mounting lugs are provided. The unit consists of the following:

(a) Two Type M Synchro-Motors, designed for 115 volt, 60 cycle input, manufactured by the Arma Engineering Company, Dwg. No. 20549.
(b) One backing target and electromagnet assembly.
(c) Two pointers, one port and one starboard.
(d) One dial, graduated from 0 to 400 R.P.M. in steps of 1 R.P.M.
(e) Six (6) Navy Type VG2-A lamps and sockets and two (2) Navy standard terminal strips.

5. The port and starboard indicator motors, when used on a Pitometer Log Instantaneous Shaft R.P.M. Indicator System, reference (c), are connected to their respective "Master Transmitter and Indicator Instruments" and indicate the R.P.M. of their respective shafts. Each motor drives its pointer through two (2) gears, having a ratio of 1:1.

6. A backing signal target, for shaft No. 1, marked with the letter "B" and painted with radium luminous material, is provided. The target is actuated by contacts located in No. 1 shaft transmitter.

7. The port pointer is red, with the exception of the arrow, which is painted with radium luminous material. The numeral "2", located adjacent to the arrow, is also painted with radium luminous material. The starboard pointer is similarly marked, differing only by being of green color and carrying the numeral "1".

8. The dial is graduated from 0 to 400 R.P.M. in steps of 1 R.P.M., with every fifth graduation painted with radium luminous material. Half of the dial carries the numerals 0, 50, 100, 150 and 200 in luminous paint, while the remainder of the dial carries numerals, from 200 to 400 in steps of 10, in luminous paint. This non-uniform marking was submitted for demonstrative purposes.

9. The radium luminous material on the dial and pointers is activated by six (6) Navy Type VG2-A lamps, distributed equally around the periphery of the dial.

10. The entire unit is mounted on a 3/16" steel plate which is provided with 3 studs of 5/16" diameter steel to support the unit, face up, when it is removed from the case.

11. To aid in conducting the accuracy tests on the indicator, a transmitter motor, equipped with a graduated dial, was furnished by the manufacturer. See Plate 1.

METHOD OF TEST

12. The Double Shaft R.P.M. Indicator, as received, was first tested for accuracy by connecting it to the "Synchro-Motor", Type M, furnished, and

noting the difference between the transmitted R.P.M. and the indicated R.P.M.

13. Next, the indicator was placed on a Navy standard shock stand and given the required 20-250 foot pound blows while energized, after which the accuracy test was repeated.

14. Finally, the indicator was placed in a dark room and observations were made to determine the suitability of the dial and pointers while activated by Navy Type VG2-A lamps.

COMMENTS ON RESULTS OF TESTS

15. The double indicator satisfactorily withstood the required 20-250 foot pound blows. However, the position of the starboard pointer, in relation to its shaft, shifted. This defect can be corrected by pinning the starboard pointer to its hub.

16. The average error, in R.P.M., of both motors was less than 0.5.

17. The half of the sample dial on which only the numerals in steps of fifty (50) are painted with radium luminous material is more satisfactory than the other portion. For greater clarity, the lines identifying the steps of ten (10) should be lengthened in order to distinguish them from the steps five (5). The numerals on the left side of the dial are too close and appear blurred. Neither side of the dial can be read from the required distance of ten (10) feet, when illuminated with the six (6) VG2-A lamps contained in the instrument. However, both sides of the dial can be read from a distance of ten (10) feet in the daylight.

18. The present pointers are unsatisfactory as they cannot be distinguished when viewed from a distance of four (4) feet in a dark room. This defect is primarily due to the failure of the light emitted from the VG2-A lamps to reach the radium luminous material on the pointers. However, it is recommended that luminous paint be applied on pointers for more of their length, rather than just on the tips.

19. The distance between the upper pointer and the dial is too great, making possible an error in the reading.

20. When pointers are on the same reading, the numeral "2" on lower pointer is covered by the enlarged portion, provided for the numeral "1", on the upper pointer. If these enlarged parts of the pointers were at different radial distances, it would facilitate reading when they were in coincidence. The size of the numerals should be such that a portion of the "2" will always be visible when upper pointer is over it.

21. The manufacturer did not furnish a backing target on the indicator for No. 2 shaft, as would be required on a finished product.

22. No clearance is provided between the bottom of the indicator motors and the case.

23. The location of the holes in the indicator case, tapped for Navy terminal tubes, is such that it would be difficult to install the necessary cables. This condition can be corrected by the use of external bosses in

place of the present internal ones.

24. No steel inserts are provided for the screws which secure the instrument chassis into the case.

CONCLUSIONS

25. The Double Shaft R.P.M. Indicator, as manufactured and submitted by the Pitometer Log Corporation, New York, N. Y., complied with the shock integrity and accuracy requirements of the specifications, reference (c), and is considered satisfactory for installation in the manufacturer's system covered by reference (b) subject to modifications given under "Comments".

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Plate 1

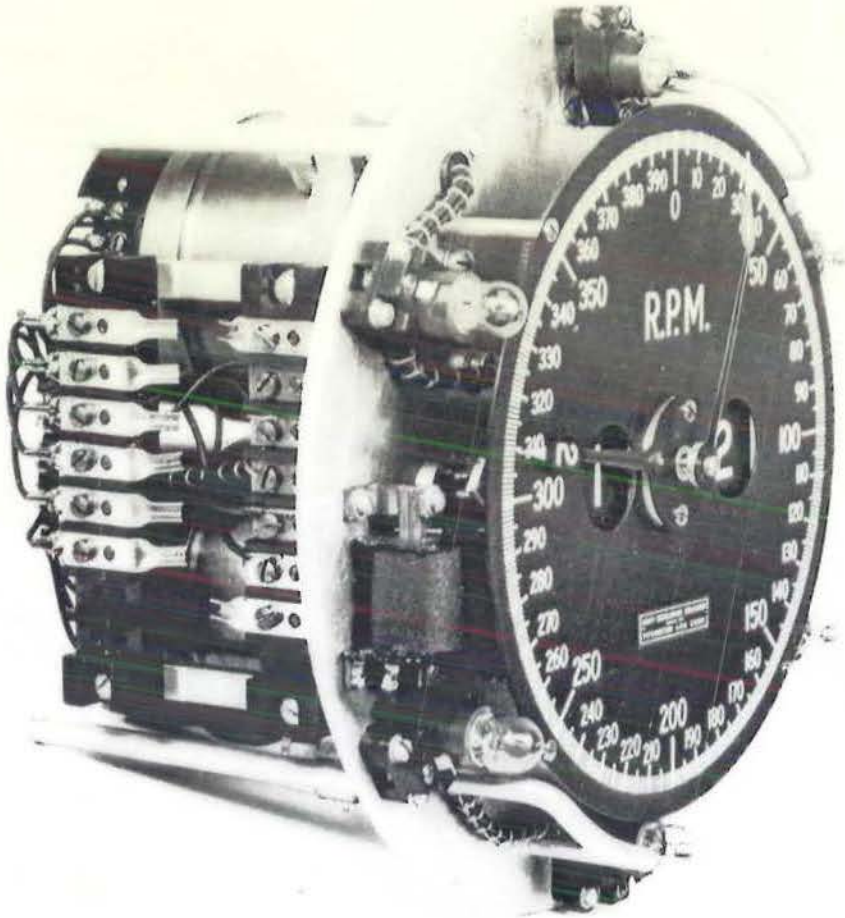

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Plate 3