

1 January 1942

NRL Report No. B-1830

NAVY DEPARTMENT

FR-1830

Report of Test

on

Tachometer, Type B, Class b,

Submitted by

The Corbin Screw Corporation  
New Britain, Connecticut

NAVAL RESEARCH LABORATORY  
ANACOSTIA STATION  
WASHINGTON, D. C.

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Authorization: BuShips ltr. S87-4(354) of 24 October 1941

Date of Test: November and December, 1941

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## AUTHORIZATION FOR TEST

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

References: (a) BuShips ltr. S87-4(354) of 24 October 1941  
(b) Specification 18T22 of 1 November 1940  
(c) Corbin Screw Corp. Drwg. X-3724<sup>3</sup> -- Outlined Assembly of Proposed Type C, Class a, Tachometer.  
(d) Manufacturer's Ltr. of 19 November, 1941, to NRL

## OBJECT OF TEST

2. The object of this test was to determine conformance of the sample type B, Class b, tachometer with the specification, reference (b), and its suitability for Naval use.

## ABSTRACT OF TEST

3. The sample tachometer was set up at this Laboratory in the usual test equipment where its performance was carefully observed for compliance with the specification. An inspection of the sample to determine compliance in the matter of materials, design, and workmanship, concluded the test.

## CONCLUSIONS

(a) The sample tachometer, manufactured by the Corbin Screw Corporation, New Britain, Connecticut, shows sturdy construction and good workmanship. It fails to meet the accuracy requirements ( $\pm 1\%$  of full scale linear distance) principally in the lower half of its range. It complies with specifications in all other respects.

(b) Plate 3, is a drawing of the manufacturer's proposed type C, class a, tachometer from which a sample could be manufactured and submitted for test if the Bureau considers it advisable. The manufacturer's inquiry concerning this type is given as Plate 4.

RECOMMENDATIONS

It is recommended:

(a) That the manufacturer make necessary changes to improve accuracy at low speeds and resubmit the tachometer for retest.

(b) That approval for Naval use be withheld pending such modifications.

(c) That the tachometer be considered suitable (waiver of accuracy requirement) for uses where close accuracy at low rpm is not required.

DESCRIPTION OF MATERIAL SUBMITTED FOR TEST

4. Reference (a) authorized the test of Type B, Class b, and type C, class a tachometers, but only the type B, class b, tachometer was submitted. This sample is shown by Photograph, Plate 1 and it is of the portable hand held centrifugal type and is designed for measuring speeds from 100 to 4000 rpm. The dial has a silver white background, with black graduations and pointer. A rubber tired wheel, 6 inches in circumference, is provided for measuring linear velocity and, when this is in use, the velocity in feet is equal to 1/2 the indicated revolutions per minute.

5. The tachometer is housed in a steel case finished in black. A nickel plated brass rim secures the dial window.

6. A wooden carrying case is provided for the tachometer and contains the following accessories:

- (1) Conical rubber tip, metal mounted
- (1) Rubber lined cone tip
- (1) Rubber tired wheel 6 inches in circumference
- (1) Nine-inch extension rod

METHOD OF TEST

7. The tests conducted, and the order in which they were made, were as follows:

- (a) Accuracy
- (b) Damping
- (c) Vibration
- (d) Magnetizing
- (e) Endurance
- (f) Accuracy

RESULTS OF TEST

8. The results obtained were as follows:

<u>Requirements</u>	<u>Test Values</u>
Accuracy: The error shall be within $\pm 1$ per cent of full scale linear distance at any point on the scale operated in the vertical or horizontal positions.	* Unsatisfactory See Table 1 and Plate 2
Damping: The pointer shall come to rest within 3 seconds when measuring any speed.	Complied.
Vibration: Shall withstand 30 vibrations per second at a double amplitude of 0.015 for a period of 3 hours.	Complied.

Requirements

Magnetization: The error of the tachometer shall be within  $\pm 10\%$  of full scale linear distance after placing it in a unidirectional magnetic field having a flux density of 1,000 lines per square inch in free air.

Endurance: The tachometer shall operate satisfactorily for 100 hours continuously at 75 per cent of full scale reading.

Accuracy at the end of all tests: The error shall be within  $\pm 1$  per cent of full scale linear distance.

Dimensions: Shall not exceed  
8"0 4"375 x 2"375

Weight: Shall not exceed 25 oz.

Test Values

Complied. No apparent change.

Complied.

\*Unsatisfactory.  
See Table 1 and Plate 2

5"0 x 3"25 x 2"4375

20-1/2 oz.

\* Denotes failure to comply with the specification.

## CONCLUSIONS

9. The sample tachometer, manufactured by the Corbin Screw Corporation, New Britain, Connecticut, shows sturdy construction and good workmanship. It fails to meet the accuracy requirements ( $\pm 1\%$  of full scale linear distance) principally in the lower half of its range. It complies with specifications in all other respects.

10. Plate 3 is a drawing of the manufacturer's proposed type C, class a, tachometer from which a sample could be manufactured and submitted for test if the Bureau considers it advisable. The manufacturer's inquiry concerning this type is given as Plate 4.

TABLE 1

Accuracy Test Results

As Received Driven Speed R.P.M.	<u>Horizontal</u>		<u>Vertical</u>	
	Indicated	<u>± % Error</u>	Indicated	<u>± % Error</u>
	R.P.M.		R.P.M.	
200	250	+ 1.28 *	250	+ 1.28 *
300	325	+ 0.64	350	+ 1.28 *
400	450	+ 1.28 *	450	+ 1.28 *
500	550	+ 1.28 *	550	+ 1.28 *
1000	998	- 0.05	1050	+ 1.28 *
1500	1501	+ 0.02	1505	+ 0.12
2000	1975	- 0.64	1998	- 0.05
3000	2950	- 1.28 *	2950	- 1.28 *
4000	3960	- 1.02	3960	- 1.02

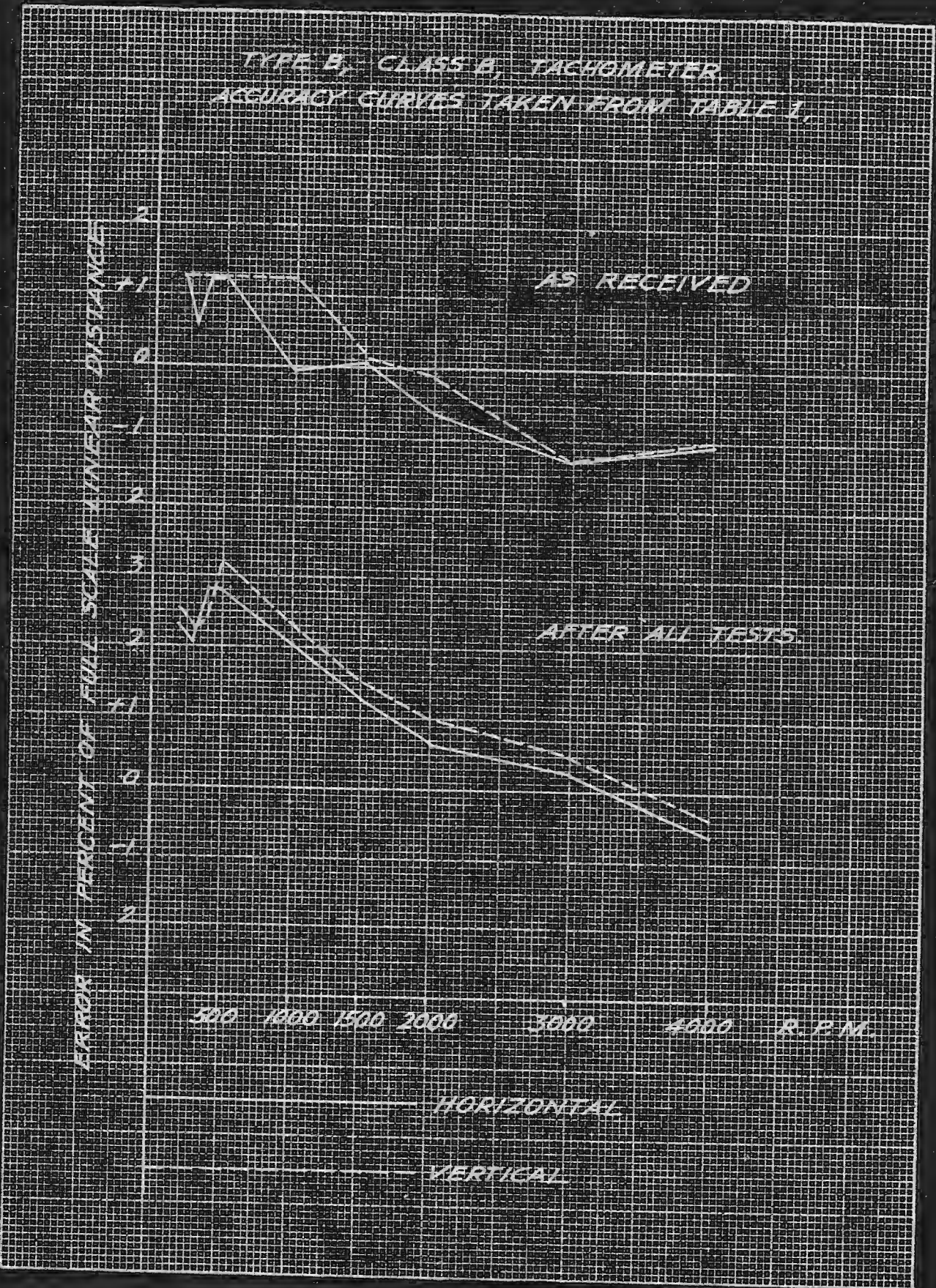
After All Tests Driven Speed R.P.M.	<u>Horizontal</u>		<u>Vertical</u>	
	Indicated	<u>± % Error</u>	Indicated	<u>± % Error</u>
	R.P.M.		R.P.M.	
200	290	+ 2.31 *	300	+ 2.51 *
300	380	+ 2.05 *	390	+ 2.31 *
400	510	+ 2.82 *	495	+ 2.44 *
500	610	+ 2.82 *	625	+ 3.20 *
1000	1080	+ 2.05 *	1090	+ 2.31 *
1500	1550	+ 1.28 *	1560	+ 1.54 *
2000	2025	+ 0.64	2040	+ 1.02
3000	3010	+ 0.26	3020	+ 0.51
4000	3975	- 0.64	3990	- 0.36

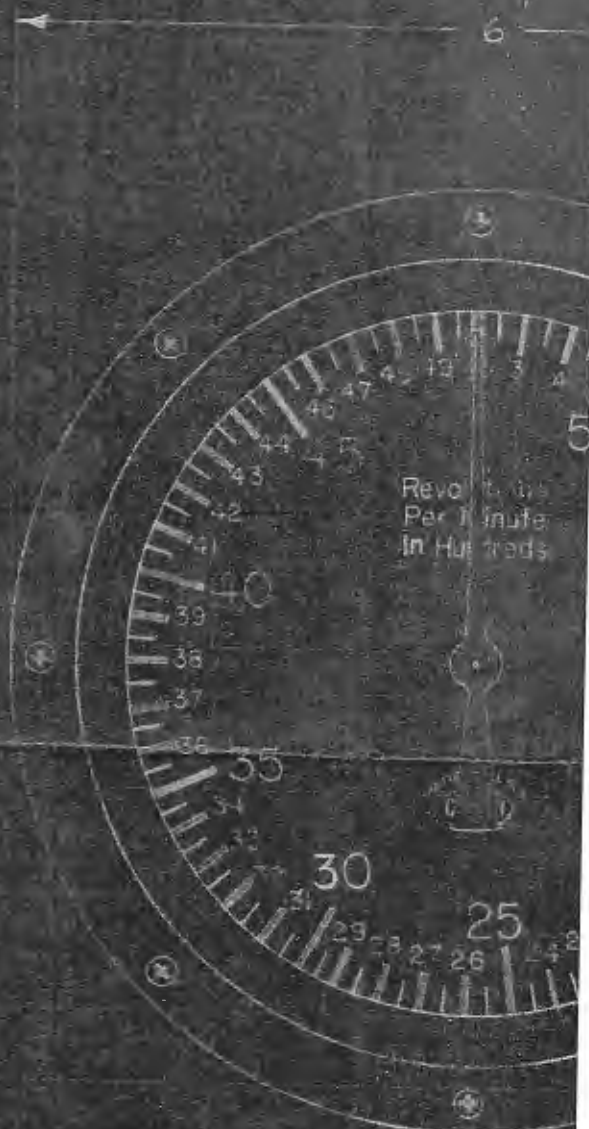
\* Denotes failure to comply with the specifications.

Ther allowable error is equal to  $\pm 1.0\%$  Full scale linear distance.



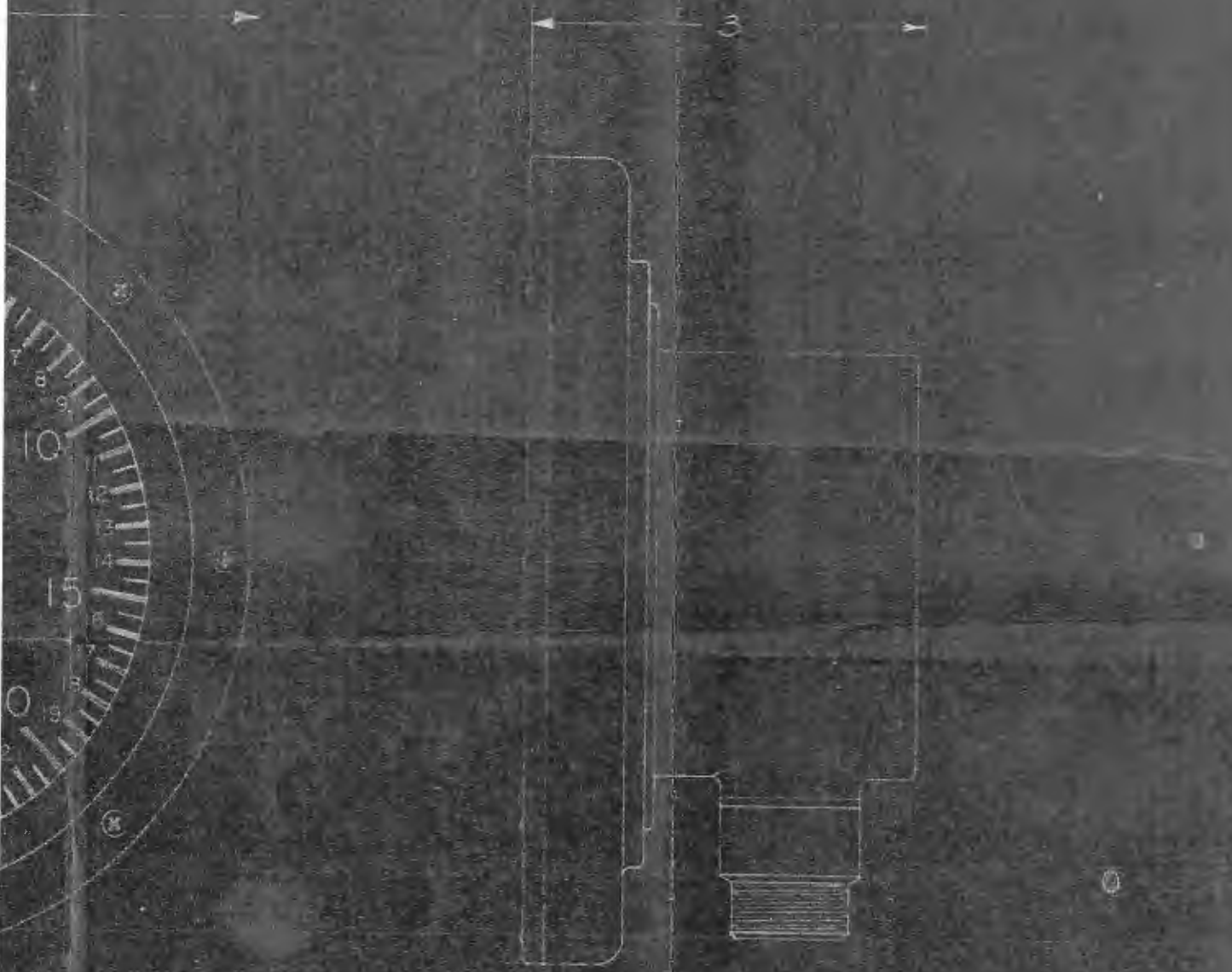
PLATE I





NOTE:-  
DIAL TO BE DEAD BLACK  
WITH WHITE GRADUATIONS, FIGURES  
AND HAND.

CHECK BY	DATE



5-380

ALTERATIONS

OUTLINE ASSEMBLY OF TACHOMETER

4-14-41 - G.A.P.

CORBIN SCREW CORPORATION  
 THE AMERICAN HARDWARE CORPORATION, SUCCESSOR  
 NEW BRITAIN, CONN.

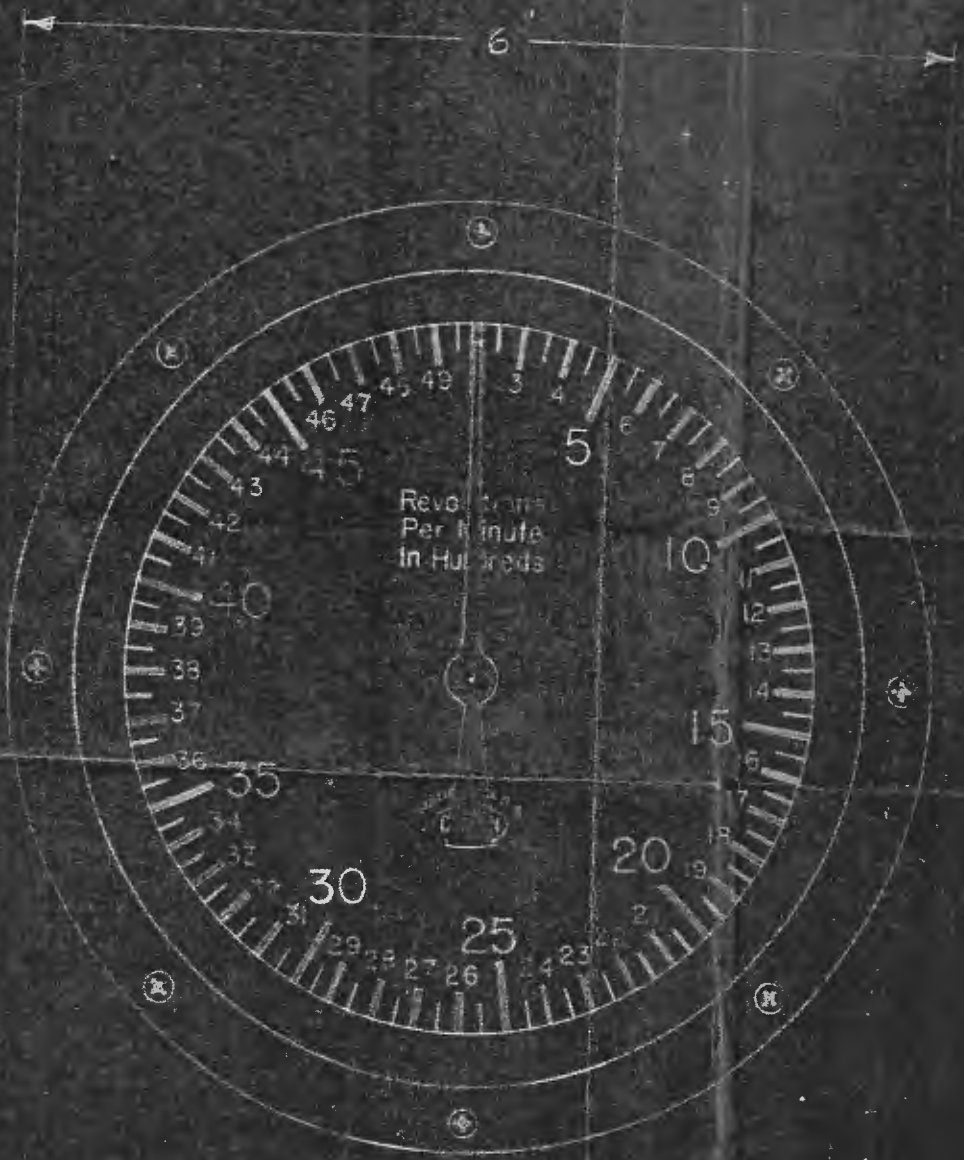
X-3724<sup>3</sup>

PLATE-3



NOTE :-  
DIAL TO BE DEAD BLACK  
WITH WHITE GRADUATIONS, FIGURES  
AND HAND.

CHECK BY	DATE



ALL TO BE DEAD BLACK  
 WHITE GRADUATIONS, FIGURES  
 ID.

CHECK BY	DATE	ALTERATIONS



5-380

ALTERATIONS

OUTLINE ASSEMBLY OF TACHOMETER

11-14-A1 - G.H.P.

CORBIN SCREW CORPORATION  
 THE AMERICAN HARDWARE CORPORATION, SUCCESSOR  
 NEW BRITAIN, CONN.

X-3724<sup>3</sup>

PLATE-3