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REPORT NO. B-1587

DATE 18 January 1940

SUBJECT

Report of Test

on

Transmitter-Generators, Navy Types "A" and "B"

Indicator-Motors, Navy Types "A" and "A"

Henschel Corporation, Manufacturer

and Exhibitor

FR-1587

by

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NAVAL RESEARCH LABORATORY
BELLEVUE, D. C.

18 January 1940 NRL Report No. B-1587

NAVY DEPARTMENT

Report of Test

on

Transmitter-Generators, Navy Types "A" and "B"

Indicator-Motors, Navy Types "M" and "N"

Henschel Corporation, Manufacturer

and Exhibitor

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D. C.

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Authorization: BuEng. ltr. S63-1/L5 (7-21-Ds) of 4 August 1939.

Date of Test: September 1939 to January 1940.

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Distribution:
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AUTHORIZATION FOR TEST

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

Reference: (a) BuEng. ltr. S63-1/L5 (7-21-Ds) of 4 August 1939.
(b) Specifications SGS(65)-42a of 15 February 1937.
(c) Henschel Corporation Drawings 15-021 of 11 September 1939, 15-022 of 13 September 1939, and 15-023 of 8 September 1939.
(d) Henschel Corporation ltr. of 18 September 1939 to NRL, cc to BuEng.
(e) BuEng. ltr. S63-1/L5 (4-3-Ds) of 15 April 1939 to Bendix Aviation Corporation.

OBJECT OF TEST

2. The object of this test was to determine the conformity of the sample transmitter-generators and indicator-motors with the specifications, reference (b), and their suitability for Naval use in electrical telegraphs and indicating equipment.

ABSTRACT OF TEST

3. The sample transmitter-generators and indicator-motors were set up in suitable circuits and tested for compliance with the specifications regarding accuracy, torque gradient, and oscillation. The supply requirements for several typical circuits were then determined and the equipment was placed under the specified 500-hour endurance test.

4. Following the endurance test, the samples were again tested for accuracy and a representative sample of each type was subjected to shock and vibration. All were disassembled and examined and then subjected to a dielectric test.

Conclusions

Type "M" Motor

(a) After being given a slight allowance for errors in zero settings, all but one of the six type "M" motors observed complied with the specifications for accuracy before and after the endurance test. Following the endurance test, all of the motors complied.

(b) All six motors tested for torque gradient and maximum torque were satisfactory.

(c) The oscillation period was satisfactory when using a pointer furnished by the manufacturer.

(d) There were dielectric breakdowns in four of the twenty type "M" motors submitted. One of these occurred in a rotor, another in a field, and two at the points where the leads extend from the field windings to the terminals.

(e) The temperature rises of the windings are considered satisfactory. In connection with this, the several erratic values given for the rotor windings (Tables 12 and 13) were considered errors introduced by changes in brush resistance, and disregarded.

(f) All other test results were satisfactory.

(g) The motors check with manufacturer's drawing 15-023, except that they do not include the proposed modification to the device for adjusting end play.

(h) The shaft diameter is 0".3125 instead of 0".250 as required by the specifications.

Type "N" Motor

(i) The torque gradient is less than the specification value but above the minimum established by reference (e).

(j) The shell diameter exceeds the allowable value by 0".080.

(k) The field leads do not connect to the terminal block.

(l) The rotor and stator are wound with enameled instead of double silk enameled wire as required.

(m) Under the dielectric test, a breakdown occurred between the rotor winding and ground.

(n) All other test results were satisfactory except that maximum secondary potentials of 107-108 volts were measured. Drawing 15-023 gives a value of 90 volts.

Type "A" Generator

(o) The two type "A" generators were satisfactory when tested in conjunction with the type "M" motors. However, one rotor broke down under the dielectric test. The shafts of these generators are the same size as those of a type "M" motor.

Type "B" Generator

(p) The type "B" generator was satisfactory when tested in conjunction with the type "M" motors. This generator proved capable of positioning twenty type "M" motors and, except for its smaller physical dimensions, would meet the requirements for a type "C" generator.

General

(q) The damping devices of all types of motors tested were gummy when examined following the endurance test. The lubricant in the bearing chambers of the motors and generators was badly deteriorated and hardened as a result of this test. None of the bearings are dustproof as required by sub-paragraph E-3e. The stator windings of the types "A," "M," and "B" are wound with single silk enameled instead of double silk enameled wire as required in sub-paragraph E-3h.

Recommendations

(a) It is recommended that the type "A" generator and type "M" motor be approved subject to the use of double silk enameled wire, improvement in the insulation to prevent dielectric breakdowns at 1500 volts, a.c., 60 cycles, and the use of a lubricant which will not deteriorate under test conditions. The Bureau's attention is invited to the increased shaft diameter which allows the use of a keyway and a tapped hole without greatly weakening the shaft.

(b) The type "B" generator is recommended for approval subject to the use of double silk enameled wire and the use of a lubricant which will not deteriorate under test conditions. It is also recommended that if the smaller physical dimensions are acceptable, the type "B" be approved as a type "C" generator.

(c) It is recommended that the type "N" motor be not approved in view of its several deficiencies as noted under "Conclusions." It is suggested that the manufacturer be required to submit six samples for any future tests in order that the results may be more nearly representative of the design.

(d) It is recommended that, as it appears that dustproof bearings are impractical for this type of equipment, the requirement be waived.

DESCRIPTION OF MATERIAL UNDER TEST

5. The following material was submitted for test.

2 Type "A" transmitter-generators - Drawing 15-021
2 Type "B" transmitter-generators - Drawing 15-022
20 Type "M" indicator-motors - Drawing 15-021
1 Type "N" indicator-motor - Drawing 15-023

6. Plates 1 and 2 show a type "B" transmitter-generator, a type "M" indicator-motor, and a type "N" indicator-motor. The type "A" transmitter-generator and the type "M" indicator-motor are identical except that no damping mechanism is provided for the transmitter-generator. In the remainder of this report, the shorter terms "motor" and "generator" are used.

7. Plate 1 also shows one of the indexing plates furnished with the generators and one of the dials and reference line devices used during the tests. The reference line device consisted of two parallel threads separated by about one-quarter of an inch to enable an observer to sight across them and minimize parallax.

8. All of the samples submitted are of the stationary field type. The terminals R_1, R_2, and R_3 connect to the rotor windings through slip rings and brushes. The terminals for all external connections are on the insulating blocks which support the brushes, except in the case of the type "N" motor which has the field leads (S_1, S_2) extending directly from the winding.

9. Each rotor is mounted on ball bearings which are removable with the rotor, after the brush assemblies and the front end bell are removed. In the samples submitted, the rotor end play may be adjusted by a threaded insert in the front end bell. However, according to drawings, reference (c), and information received from the manufacturer under reference (d), it is proposed to replace the threaded insert with brass shims of sufficient number to properly limit the end play.

10. Further details of construction and design are given by drawings, reference (c), and photographs, Plates 1 and 2. Plate 1 also shows the pointers furnished for use during the oscillation test.

METHOD OF TEST

11. A type "A" generator and six type "M" motors were each set to electrical zero before being inter-connected for accuracy tests. This reference point was determined with the aid of an oscillograph. The generator index plate was then adjusted to the zero mark and the motor dials were similarly adjusted. It was found that by means of an illuminated magnifier, errors could be estimated to one-tenth degree.

12. The circuit was then energized from a source that could be maintained at 115 volts-60 cycles, 103.5 volts-65 cycles, or 126.5 volts-55 cycles. The system was tested for accuracy at each of these combinations of voltage and frequency by rotating the generator 360 degrees cw

and ccw in 3-degree steps and recording the errors in motor indications. The results are given as Table 1 and Plates 3 to 8, inclusive.

13. The torque test was then conducted in the manner described by the specifications. In addition, the maximum torque of each of the six motors was determined. The results are given as Table 7.

14. The oscillation characteristics of the motors were ascertained by tests conducted in the manner described by the specifications, but using an oscillographic method of timing. Only one motor was connected to the generator at one time in accordance with instructions received from Bureau of Engineering personnel. The pointer used during this test is shown in photograph, Plate 1, and was furnished by the manufacturer. The results of the test, made with motor shafts horizontal, are given by Table 11.

15. Information from the manufacturer indicated that the type "B" generator would be more than able to position twelve type "M" motors as required. At the request of the manufacturer, the type "B" generator was tested in connection with twenty motors to demonstrate its ability to meet an anticipated service application and to exceed the requirements for a type "C" generator. The type "C" is defined as a generator capable of positioning eighteen type "M" motors.

16. The type "B" generator was therefore connected to twenty type "M" motors and, to shorten the test, the errors of only two were recorded. These motors had been used under the test described in paragraph 12 and were consequently of known accuracy. The tests were otherwise similar to those described in paragraph 12 and the results are given in Table 2 and Plates 9 and 10. As these results were generally satisfactory, it was decided that no test with a smaller number of motors was desirable.

17. The torque tests were then conducted using the type "B" generator and six type "M" motors. The maximum torque was also measured. Table 8 gives the results of these tests.

18. Using the type "B" generator, the oscillation characteristics of six type "M" motors were determined in the manner outlined in paragraph 14. The results are given by Table 11.

19. Two type "B" generators were then inter-connected and their torque characteristics determined. The results are given as Table 9.

20. The one sample type "N" motor submitted was connected to a type "A" generator and tested for accuracy, torque, and oscillation characteristics in the manner outlined for the other types of motors. The results of the accuracy tests are given as Table 3 and Plate 11. The results of the torque tests are given as Table 10 and the oscillation values are given by Table 11.

21. The several types of generators and motors were connected in typical indicating circuits and their supply requirements measured. These values are given by Table 16. The maximum induced voltages were also measured with a vacuum tube voltmeter. These values are given under test results.

22. The equipment was then subjected to an endurance test during which the motors and generators were placed in a compartment having an ambient temperature of 65 degrees centigrade. The generators were rotated for 500 hours at 100 r.p.m., the direction of rotation being reversed every 24 hours.

23. As only twenty type "M" motors were available, the test was started with fourteen motors connected to the type "B" generator and six connected to a type "A" generator. Later, all twenty motors were shifted to the type "B" generator. The type "N" motor was continuously connected to a type "A" generator.

24. Temperature rises of the windings were determined from resistance measurements made during the endurance test.

25. Following this, the equipment was again tested for accuracy at a supply of 115 volts, 60 cycles. The results are given in Tables 4, 5, and 6, and Plates 12 to 20, both inclusive.

26. A type "B" generator, a type "M" motor, and a type "N" motor were then subjected to the required shock and vibration tests while interconnected and energized. Following this, they were checked at rated voltage and frequency to determine whether any injury had developed.

27. All generators and motors were then disassembled and examined. After reassembly, they were tested for insulation resistance with a 1000 volt "megger" and subjected for one minute to a potential of 1500 volts, 60 cycles applied between all windings and the case.

28. An examination to determine compliance with the specifications in the matter of materials, design, dimensions, and workmanship, concluded the test.

RESULTS OF TEST

29. The following test results were obtained when the sample motors were tested in the manner outlined by the specifications. More complete data are given by the appended tables and curves.

30. The summary of the accuracy test, Table 15, shows that two of the six type "M" motors tested in connection with a type "A" generator had errors slightly in excess of the one degree allowed. One of these would have complied had the zero reference point been shifted to the center of error. There appears to be no significant change in error under the several test combinations of supply voltages and frequencies. Following the endurance test, the errors of all of these six motors were within one degree.

31. Table 15 also gives a summary of the results of an accuracy test conducted with a type "B" generator connected to twenty type "M" motors. The two motors observed had smaller errors than when they were used on the previous test. One was within the one degree tolerance; the other could have been brought within it by shifting the reference point. There appears

to be no significant change in error as a result of the supply voltage and frequency variations used. Following the endurance test, the errors of both motors were less.

32. The type "N" motor complied with the accuracy requirements before the endurance test when positioned by a type "A" generator. The specified voltage and frequency variations had no apparent effect on its accuracy. Following the endurance test, the errors were greater but complied with the one degree tolerance of the specifications.

33. As shown by Table 7, the type "M" motors have torque characteristics which comply with the specification requirements of 0.25 inch-ounce per degree for the first 10 degrees displacement and 15 inch-ounces for maximum torque.

34. Tables 8 and 9 give additional torque values not required by the specifications. Maximum torque values for all types were obtained at about 95 degrees displacement.

35. When positioned by a type "A" generator, the torque gradient of the type "N" motor exceeded the minimum value of 0.05 inch-ounce established by reference (e). The maximum torque value complied with the specified minimum of 4.0 inch-ounces. Table 10 gives further details.

36. Under the oscillation test, the pointers on all types of motors came to rest within the 3 seconds specified. As shown by Table 11, varying values were obtained after the endurance test. These values were smaller and show that some change had taken place in the action of the damping mechanism as a result of the endurance test.

37. The results of the temperature rise tests, given by Tables 12, 13, and 14, are satisfactory except in three cases. Two of the high temperatures given for secondary windings are believed to be errors arising from changes in brush resistance during the tests and should be disregarded.

38. The following gives the maximum voltages induced in the secondary windings of each type as measured with a vacuum tube voltmeter.

	Winding		
Type	R_1-R_2	R_2-R_3	R_3-R_1
A	90.5	90.0	90.5
B	91.0	91.0	91.0
N	108.0	108.0	107.0

39. The samples subjected to the shock and vibration tests showed no additional error. The slip rings of the type "N" showed some burning as a result of the lifting of the brushes during the shock or vibration tests.

40. During the 1500 volt dielectric strength test, failures occurred between the ground and armature of number 6 and between the ground and field

of numbers 2, 3, and 11 type "M" motors. The failures of numbers 2 and 3 were due to breakdown of the lead wires where they extend from the case to reach the terminal block.

41. The armatures of a type "A" generator and the type "N" motor also broke down. All other samples withstood the dielectric test and had satisfactory insulation resistance.

42. Except for the method of adjusting rotor end play, described in paragraph 9, the samples check with the drawings, reference (c). However, the shaft diameter of the types "A" and "M" is 0.3125 instead of 0.25 as required by reference (b). The shell diameter of the type "N" exceeds the maximum value of 2.188 by 0.080. The leads for the field of the type "N" extend directly from the windings.

43. When disassembled following the endurance test, the bearings and bearing chambers of all types were found to contain a quantity of gummy deteriorated lubricant. Apparently, this lubricant had been forced from the path of the moving bearing parts during the early part of the endurance test. Later it dried and shrunk, allowing the bearings to run dry but unobstructed.

44. It was also noted that most of the damping devices of the motors were gummy and had a tendency to stick. It appears that this is also the result of a deteriorated lubricant.

CONCLUSIONS

Type "M" Motor

45. After being given a slight allowance for errors in zero settings, all but one of the six type "M" motors observed complied with the specifications for accuracy before and after the endurance test. Following the endurance test, all of the motors complied.

46. All six motors tested for torque gradient and maximum torque were satisfactory.

47. The oscillation period was satisfactory when using a pointer furnished by the manufacturer.

48. There were dielectric breakdowns in four of the twenty type "M" motors submitted. One of these occurred in a rotor, another in a field, and two at the points where the leads extend from the field windings to the terminals.

49. The temperature rises of the windings are considered satisfactory. In connection with this, the several erratic values given for the rotor windings (Tables 12 and 13) were considered errors introduced by changes in brush resistance, and disregarded.

50. All other test results were satisfactory.

51. The motors check with manufacturer's drawing 15-023, except that they do not include the proposed modification to the device for adjusting end play.

52. The shaft diameter is 0".3125 instead of 0".250 as required by the specifications.

Type "N" Motor

53. The torque gradient is less than the specification value but above the minimum established by reference (e).

54. The shell diameter exceeds the allowable value by 0".080.

55. The field leads do not connect to the terminal block.

56. The rotor and stator are wound with enameled instead of double silk enameled wire as required.

57. Under the dielectric test, a breakdown occurred between the rotor winding and ground.

58. All other test results were satisfactory except that maximum secondary potentials of 107-108 volts were measured. Drawing 15-023 gives a value of 90 volts.

Type "A" Generator

59. The two type "A" generators were satisfactory when tested in conjunction with the type "M" motors. However, one rotor broke down under the dielectric test. The shafts of these generators are the same size as those of a type "M" motor.

Type "B" Generator

60. The type "B" generator was satisfactory when tested in conjunction with the type "M" motors. This generator proved capable of positioning twenty type "M" motors and, except for its smaller physical dimensions, would meet the requirements for a type "C" generator.

General

61. The damping devices of all types of motors tested were gummy when examined following the endurance test. The lubricant in the bearing chambers of the motors and generators was badly deteriorated and hardened as a result of this test. None of the bearings are dustproof as required by sub-paragraph E-3e. The stator windings of the types "A," "M," and "B" are wound with single silk enameled instead of double silk enameled wire as required in sub-paragraph E-3h.

TABLE 1

Results of Accuracy Tests before Endurance Test

Errors in Degrees

Type "A" transmitter-generator connected to 6 type "M" indicator-motors. Motors and generator set to electrical zero before test. Errors given as (+) lead the direction of rotation, those marked (-) lag. Thus a (+) error in the cw direction indicates the same geometrical position as a corresponding (-) error in the ccw direction.

Generator Setting in Degrees	Motor No. 15						Motor No. 1					
	115Volts 60Cycles		103.5Volts 65Cycles		126.5Volts 55 Cycles		115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
3	-.1	0	+.1	-.3	-.1	0	+.7	-1.0	+.6	-1.0	+.6	-.6
6	+.1	-.2	0	-.3	-.1	-.1	+.9	-1.1	+.6	-1.2	+.7	-.7
9	+.1	-.1	0	-.3	+.1	-.2	+.9	-1.1	+.9	-1.3	+.9	-.9
12	0	-.1	-.1	-.1	+.1	-.3	+1.0	-1.0	+.9	-1.1	+.9	-.9
15	0	-.2	-.1	-.1	+.2	-.4	+1.0	-1.2	+.9	-1.0	+1.0	-1.0
18	+.2	-.3	0	-.1	+.3	-.4	+1.0	-1.2	+1.0	-1.1	+1.0	-1.0
21	+.1	-.2	0	-.3	+.1	-.4	+1.0	-1.2	+1.0	-1.3	+.9	-1.0
24	0	-.1	-.1	-.2	0	-.1	+1.0	-1.1	+1.0	-1.1	+.8	-.8
27	-.1	0	-.3	-.1	-.1	-.1	+.9	-1.0	+.8	-1.3	+.7	-.6
30	-.2	+.1	-.4	0	-.2	0	+.8	-.9	+.6	-1.0	+.7	-.6
33	-.3	+.3	-.6	+.1	-.3	+.1	+.6	-.8	+.6	-.9	+.6	-.6
36	-.5	+.4	-.5	+.3	-.4	+.3	+.6	-.8	+.6	-.8	+.6	-.5
39	-.5	+.4	-.5	+.4	-.4	+.3	+.6	-.7	+.6	-.7	+.6	-.5
42	-.4	+.3	-.5	+.4	-.4	+.2	+.7	-.8	+.6	-.7	+.5	-.5
45	-.4	+.4	-.5	+.3	-.5	+.3	+.6	-.4	+.5	-.7	+.5	-.5
48	-.4	+.4	-.5	+.3	-.4	+.3	+.6	-.5	+.6	-.7	+.5	-.4
51	-.5	+.4	-.6	+.5	-.4	+.4	+.6	-.4	+.5	-.6	+.6	-.5
54	-.4	-.3	-.5	+.3	-.3	+.1	+.7	-.6	+.5	-.7	+.7	-.5
57	-.5	+.4	-.6	+.3	-.4	+.3	+.5	-.3	+.4	-.6	+.6	-.4
60	-.3	+.2	-.4	+.5	-.3	+.2	+.6	-.4	+.5	-.5	+.6	-.4
63	-.4	+.3	-.5	+.4	-.24	+.4	+.4	-.3	+.5	-.5	+.5	-.2
66	-.6	+.4	-.7	+.5	-.5	+.5	+.4	-.2	+.3	-.4	+.4	-.1
69	-.7	+.5	-.7	+.6	-.6	+.5	+.4	-.1	+.3	-.4	+.4	-.1
72	-.8	+.7	-.9	+.6	-.7	+.7	+.2	+.1	+.1	-.1	+.2	0
75	-.9	+.7	-.9	+.8	-.8	+.7	+.2	+.1	0	0	+.2	0
78	-1.0	+.7	-1.0	+.7	-.9	+.7	+.1	+.1	-.1	-.1	+.1	+.1
81	-.9	+.7	-.9	+.7	-.9	+.7	+.1	+.1	0	0	+.1	+.1
84	-.9	+.8	-.9	+.8	-.9	+.7	+.2	+.1	0	-.1	0	+.1
87	-.8	+.7	-1.0	+.7	-.9	+.7	+.2	+.1	0	-.1	+.1	+.1
90	-.9	+.7	-1.1	+.8	-.8	+.7	0	+.1	-.1	+.1	+.1	+.1
93	-.8	+.7	-1.1	+.9	-.7	+.5	+.1	+.4	-.2	+.1	+.1	+.1
96	-.9	+.7	-1.0	+.9	-.6	+.5	0	+.3	-.2	+.2	+.2	0
99	-.7	+.5	-1.0	+.6	-.5	+.5	+.2	+.1	-.1	+.1	+.3	0
102	-.7	+.6	-.9	+.7	-.7	+.6	+.3	+.1	-.1	+.2	+.1	+.1
105	-.7	+.6	-.9	+.6	-.8	+.6	0	+.4	0	+.3	0	+.3

TABLE 1 (CONTINUED)

Results of Accuracy Tests before Endurance Test

Errors in Degrees

Generator Setting in Degrees	Motor No. 15						Motor No. 1					
	115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles		115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
108	-.7	+.6	-1.0	+.7	-.8	+.6	+.1	+.4	-.1	+.4	0	+.6
111	-.8	+.7	-1.0	+.8	-.7	+.7	-.1	+.5	-.4	+.6	0	+.6
114	-.8	+.7	-1.1	+.9	-.8	+.7	-.2	+.4	-.4	+.6	0	+.4
117	-.8	+.7	-1.0	+.8	-.8	+.7	-.2	+.5	-.4	+.6	-.1	+.4
120	-.8	+.6	-1.0	+.7	-.6	+.6	-.1	+.4	-.4	+.4	0	+.4
123	-.6	+.6	-.8	+.6	-.6	+.4	-.2	+.4	-.1	+.4	-.4	+.3
126	-.7	+.6	-.8	+.7	-.6	+.5	-.2	+.3	-.2	+.5	-.2	+.3
129	-.5	+.4	-.8	+.6	-.4	0	-.1	+.3	-.1	+.4	0	0
132	-.6	+.4	-.7	+.6	-.3	+.1	-.3	+.3	-.3	+.4	0	0
135	-.4	+.4	-.7	+.5	-.1	0	0	+.1	-.1	+.4	0	0
138	-.3	+.2	-.6	+.4	0	-.2	0	0	0	+.3	+.2	-.3
141	-.2	0	-.5	+.3	+.1	0	0	-.1	0	0	+.1	-.1
144	-.1	-.1	-.4	+.3	-.1	-.2	+.1	-.1	-.1	0	0	-.3
147	-.2	0	-.4	+.1	-.1	-.3	+.1	-.1	0	0	+.1	-.1
150	-.2	0	-.4	+.2	0	-.1	0	0	-.1	+.1	+.1	-.2
153	-.3	+.3	-.6	+.4	-.2	0	0	0	-.3	+.3	+.1	-.1
156	-.4	+.2	-.6	+.3	-.1	0	0	+.1	-.4	+.2	+.1	-.1
159	-.2	+.1	-.4	+.1	0	-.1	+.1	0	-.1	0	+.2	-.2
162	+.2	-.1	-.3	0	0	-.1	+.3	-.2	0	-.1	+.2	-.3
165	0	-.1	-.1	0	0	-.1	+.2	-.1	0	-.1	+.1	-.2
168	+.1	-.1	-.2	0	+.2	-.2	+.1	-.2	0	-.1	+.3	-.3
171	+.1	-.1	-.3	0	+.2	-.4	+.1	-.2	-.1	0	+.3	-.4
174	+.2	-.3	-.3	0	+.4	-.4	+.1	-.2	0	0	+.4	-.5
177	+.2	-.3	0	-.1	+.4	-.4	+.2	-.3	0	-.1	+.4	-.6
180	+.2	-.4	0	-.1	+.4	-.5	+.3	-.4	+.1	-.1	+.4	-.6
183	+.2	-.4	0	-.2	+.3	-.4	+.2	-.3	+.1	-.2	+.3	-.3
186	+.3	-.2	0	-.1	+.1	-.3	+.2	-.3	+.1	-.2	+.2	-.3
189	+.1	-.1	-.1	-.1	+.3	-.3	+.1	-.2	0	-.1	+.4	-.4
192	0	0	-.3	+.1	+.1	-.3	0	-.1	-.1	0	+.3	-.4
195	-.1	0	-.3	+.1	+.1	-.2	0	-.1	-.1	0	+.3	-.2
198	-.1	-.1	-.4	+.2	+.1	-.2	0	0	-.2	0	+.2	-.3
201	-.1	0	-.3	+.1	-.1	-.1	0	-.1	-.1	0	+.1	-.2
204	0	-.1	-.3	0	0	-.3	+.1	-.1	-.2	-.1	+.1	-.1
207	-.1	0	-.3	+.1	0	-.2	0	-.1	0	0	+.1	-.2
210	-.1	-.1	-.4	+.1	+.2	-.2	0	0	+.1	+.1	+.1	-.1
213	-.1	+.1	-.3	+.2	+.2	-.3	0	0	-.3	+.1	+.2	-.3
216	-.1	0	-.4	+.2	+.3	-.3	0	-.1	-.3	+.1	+.1	-.3
219	0	0	-.3	0	+.1	-.3	0	-.1	-.2	0	+.1	-.2
222	-.1	0	-.3	+.2	0	-.1	0	-.1	-.1	0	0	-.1
225	-.1	0	-.4	+.2	0	0	0	-.1	-.3	+.1	0	0

TABLE 1 (CONTINUED)

Results of Accuracy Tests before Endurance Test

Errors in Degrees

Generator Setting in Degrees	Motor No. 15						Motor No. 1					
	115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles		115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
228	-.4	+.3	-.5	+.4	-.2	+.1	-.2	+.1	-.4	+.1	-.1	0
231	-.4	+.3	-.6	+.5	-.3	+.3	-.3	+.2	-.5	+.4	-.1	+.1
234	-.5	+.4	-.7	+.6	-.3	+.4	-.4	+.3	-.6	+.4	-.2	+.1
237	-.6	+.5	-.7	+.6	-.4	+.4	-.4	+.4	-.6	+.4	-.3	+.2
240	-.6	+.5	-.6	+.6	-.4	+.4	-.4	+.2	-.4	+.4	-.3	+.3
243	-.6	+.4	-.6	+.4	-.5	+.4	-.3	+.1	-.5	0	-.4	+.3
246	-.5	+.4	-.6	+.5	-.6	+.5	-.4	+.1	-.5	0	-.4	+.3
249	-.5	+.4	-.6	+.5	-.5	+.4	-.4	+.1	-.5	0	-.4	+.1
252	-.7	+.6	-.7	+.5	-.4	+.4	-.5	+.3	-.6	+.1	-.3	0
255	-.6	+.5	-.7	+.6	-.4	+.3	-.4	0	-.6	+.1	-.3	0
258	-.5	+.5	-.6	+.6	-.3	+.2	-.4	0	-.5	0	-.1	0
261	-.5	+.4	-.7	+.5	-.4	+.4	-.4	0	-.6	0	-.3	0
264	-.7	+.6	-.6	+.5	-.6	+.5	-.4	+.1	-.5	-.1	-.4	+.1
267	-.7	+.5	-.6	+.6	-.6	+.6	-.4	+.1	-.6	0	-.5	+.1
270	-.8	+.5	-.7	+.7	-.8	+.6	-.5	+.2	-.6	+.1	-.4	+.1
273	-.9	+.8	-.9	+.8	-.7	+.7	-.6	+.4	-.7	+.3	-.5	0
276	-.9	+.8	-.9	+.9	-.7	+.7	-.7	+.3	-.8	+.3	-.6	0
279	-.9	+.9	-.9	+.8	-.8	+.7	-.8	+.4	-.7	+.2	-.6	0
282	-.6	+.7	-.7	+.6	-.7	+.6	-.3	+.1	-.6	-.1	-.6	0
285	-.6	+.6	-.6	+.6	-.7	+.6	-.4	0	-.5	-.1	-.6	0
288	-.5	-.5	-.6	+.6	-.6	+.5	-.1	0	-.5	-.1	-.4	-.1
291	-.8	+.6	-.8	+.7	-.6	+.5	-.4	0	-.6	0	-.4	-.2
294	-.6	+.4	-.6	+.5	-.4	+.3	0	-.1	-.5	-.1	-.2	-.5
297	-.4	+.4	-.6	+.6	-.4	+.3	0	-.1	-.4	-.3	-.1	-.5
300	-.4	+.3	-.5	+.4	-.2	0	0	-.3	-.2	-.4	+.1	-.5
303	-.4	+.3	-.4	+.3	-.3	+.3	0	-.4	-.3	-.4	+.4	-.5
306	-.4	+.4	-.4	+.4	-.4	+.4	-.1	-.3	-.1	-.4	+.3	-.4
309	-.4	+.3	-.5	+.4	-.4	+.4	-.1	-.3	-.2	-.4	+.1	-.5
312	-.5	+.4	-.5	+.4	-.4	+.4	-.1	-.2	-.2	-.5	+.2	-.5
315	-.4	+.4	-.5	+.4	-.4	+.1	-.2	-.3	-.3	-.4	+.3	-.6
318	-.5	+.4	-.5	+.4	-.4	+.3	-.1	-.4	-.2	-.5	+.2	-.6
321	-.4	+.3	-.4	+.2	-.4	+.3	+.1	-.5	0	-.6	+.2	-.6
324	-.3	+.2	-.3	+.1	-.4	+.2	+.2	-.6	+.1	-.8	+.4	-.6
327	-.1	0	-.1	-.1	-.3	0	+.3	-.8	+.2	-.9	+.3	-.8
330	-.1	0	-.1	0	-.1	0	+.2	-.7	+.2	-.9	+.4	-.9
333	0	-.1	-.2	0	0	-.3	+.4	-.9	+.1	-.9	+.5	-1.1
336	+.1	-.1	-.1	-.1	+.1	-.3	+.4	-1.0	+.2	-1.0	+.6	-1.1
339	+.2	-.3	+.1	-.4	+.3	-.4	+.5	-1.1	+.4	-1.3	+.7	-1.2
342	+.2	-.2	+.2	-.3	+.3	-.3	+.5	-1.0	+.5	-1.2	+.9	-1.1
345	+.2	-.3	+.2	-.4	+.1	-.2	+.5	-1.1	+.4	-1.2	+.6	-1.1
348	+.1	-.2	+.1	-.3	+.1	-.1	+.4	-1.1	+.4	-1.1	+.6	-1.0
351	-.1	-.1	0	-.2	0	-.1	+.4	-.9	+.3	-1.0	+.7	-.9
354	-.1	+.1	-.1	-.1	-.1	-.1	+.2	+.9	+.1	-1.0	+.6	-.9
357	-.1	+.1	-.2	-.1	0	-.1	+.2	-.1	+.1	-.9	-.2	-.9
360	0	-.2	0	-.2	0	-.1	+.3	-.9	+.3	-1.0	+.7	-.9

TABLE 1 (CONTINUED)

Results of Accuracy Tests before Endurance Test

Errors in Degrees

Type "A" transmitter-generator connected to 6 type "M" indicator-motors. Motors and generator set to electrical zero before test. Errors given as (+) lead the direction of rotation, those marked (-) lag. Thus a (+) error in the cw direction indicates the same geometrical position as a corresponding (-) error in the ccw direction.

Generator Setting in Degrees	Motor No. 9						Motor No. 5					
	115 Volts 60 Cycles		103.5 Volts 65 Cycles		126.5 Volts 55 Cycles		115 Volts 60 Cycles		103.5 Volts 65 Cycles		126.5 Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
3	+.2	-.4	+.3	-.5	+.1	-.3	+.2	-.3	+.3	-.4	+.1	-.2
6	+.3	-.4	+.3	-.5	+.2	-.3	+.2	-.3	+.2	-.4	+.2	-.3
9	+.2	-.4	+.4	-.6	+.4	-.4	+.2	-.4	+.3	-.4	+.3	-.4
12	+.2	-.4	+.4	-.6	+.4	-.5	+.2	-.4	+.3	-.4	+.4	-.5
15	+.2	-.5	+.3	-.4	+.4	-.6	+.2	-.4	+.1	-.3	+.5	-.6
18	+.3	-.5	+.4	-.5	+.5	-.6	+.3	-.5	+.3	-.4	+.6	-.7
21	+.3	-.5	+.4	-.6	+.4	-.6	+.3	-.4	+.3	-.5	+.4	-.6
24	+.2	-.4	+.4	-.5	+.3	-.4	+.1	-.4	+.2	-.4	+.3	-.4
27	+.1	-.3	+.3	+.5	+.1	-.4	+.2	-.4	+.1	+.6	+.3	-.4
30	0	-.2	0	-.4	0	-.2	0	-.2	0	-.3	+.2	-.3
33	-.1	-.1	-.1	-.2	-.1	-.1	-.1	-.1	0	-.2	+.1	-.1
36	-.1	0	-.1	-.2	-.2	0	-.1	0	-.1	-.1	0	-.1
39	-.2	0	-.1	-.1	-.2	0	-.2	0	-.2	-.1	-.1	0
42	-.2	-.1	0	0	-.2	-.1	-.2	-.1	-.1	0	0	0
45	-.2	0	-.1	-.3	-.2	+.1	-.2	0	-.1	-.1	-.1	0
48	-.2	0	-.1	0	-.2	0	-.2	-.1	-.1	0	-.1	-.1
51	-.3	-.1	-.2	0	-.1	0	-.3	0	-.3	0	0	-.1
54	-.1	+.1	-.1	0	0	-.1	-.1	+.1	-.1	0	+.1	-.3
57	-.2	0	-.2	-.1	0	0	-.3	-.1	-.3	0	+.1	-.2
60	-.1	-.1	-.1	+.1	-.1	0	-.1	-.1	-.1	+.1	+.1	-.1
63	-.3	0	-.2	0	-.3	+.1	-.2	0	-.2	0	0	0
66	-.4	0	-.4	0	-.4	+.3	-.3	0	-.3	0	-.1	+.1
69	-.4	+.1	-.3	+.3	-.4	+.3	-.4	+.1	-.4	+.2	-.3	-.1
72	-.5	+.4	-.5	+.4	+.5	+.4	-.4	+.3	-.6	+.4	-.4	+.4
75	-.6	+.4	-.6	+.4	-.5	+.4	-.5	+.4	-.6	+.4	-.4	+.3
78	-.7	+.4	-.6	+.5	-.6	+.5	-.7	+.3	-.6	+.4	-.5	+.4
81	-.6	+.4	-.6	+.5	-.6	+.5	-.7	+.4	-.6	+.4	-.4	+.4
84	-.6	+.4	-.5	+.4	-.6	+.5	-.5	+.4	-.6	+.4	-.5	+.4
87	-.4	+.3	-.6	+.4	-.6	+.5	-.4	+.3	-.6	+.4	-.5	+.4
90	-.6	+.4	-.6	+.5	-.5	+.5	-.4	+.3	-.6	+.4	-.3	+.2
93	-.5	+.4	-.7	+.5	-.4	+.4	-.5	+.3	-.6	+.5	-.3	+.1
96	-.5	+.4	-.7	+.4	-.4	+.3	-.4	+.3	-.7	+.4	-.2	+.1
99	-.4	+.3	-.5	+.4	-.3	+.2	-.3	+.2	-.6	+.4	-.1	0
102	-.5	+.3	-.6	+.4	-.4	+.4	-.4	+.3	-.6	+.4	-.3	+.2
105	-.5	+.4	-.6	+.4	-.5	+.4	-.5	+.4	-.6	+.4	-.4	+.4
108	-.5	+.4	-.6	+.4	-.6	+.6	-.5	+.4	-.7	+.5	-.5	+.7
111	-.7	+.5	-.7	+.5	-.5	+.6	-.7	+.5	-.7	+.5	-.5	+.6

TABLE 1 (CONTINUED)

Results of Accuracy Tests before Endurance Test

Errors in Degrees

Generator Setting in Degrees	Motor No. 9						Motor No. 5					
	115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles		115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
114	-.7	+.5	-.8	+.6	-.6	+.6	-.7	+.5	-.8	+.6	-.5	+.6
117	-.7	+.5	-.7	+.6	-.6	+.4	-.6	+.4	-.7	+.5	-.5	+.4
120	-.5	+.4	-.6	+.4	-.4	+.4	-.5	+.4	-.7	+.3	-.4	+.4
123	-.4	+.3	-.5	+.4	-.4	+.3	-.4	+.3	-.6	+.4	-.4	+.2
126	-.4	+.4	-.5	+.4	-.4	+.3	-.4	+.3	-.6	+.4	-.3	+.2
129	-.4	+.3	-.4	+.3	-.1	+.1	-.3	+.1	-.4	+.2	-.1	-.1
132	-.4	+.2	-.5	+.4	-.1	-.1	-.4	+.2	-.5	+.3	0	-.2
135	-.2	+.1	-.4	+.3	0	0	-.2	0	-.4	+.2	+.3	-.3
138	-.1	-.1	-.4	+.2	+.2	-.3	-.1	-.1	-.4	+.1	+.3	-.4
141	0	-.1	-.3	0	+.1	-.1	0	-.1	-.2	0	+.2	-.2
144	-.1	-.2	-.1	0	0	-.2	0	-.3	-.2	0	+.1	-.3
147	0	-.2	-.1	-.1	+.1	-.1	0	-.2	-.1	-.1	+.1	-.3
150	-.1	0	-.1	0	0	-.1	0	-.1	-.1	0	+.1	-.3
153	-.1	0	-.3	+.1	0	-.1	-.1	0	-.3	+.1	+.1	-.2
156	-.2	-.1	-.4	0	0	-.1	-.1	-.1	-.3	0	0	-.3
159	0	-.2	-.1	-.1	+.1	-.2	0	-.1	-.1	0	+.2	-.2
162	+.3	-.3	+.1	-.3	+.2	-.2	+.2	-.3	+.1	-.2	+.3	-.4
165	+.2	-.1	0	-.3	0	-.1	+.1	-.2	0	-.2	+.1	-.2
168	+.1	-.3	+.1	-.1	+.2	-.3	+.2	-.4	+.1	-.3	+.4	-.4
171	+.2	-.3	0	-.2	+.3	-.5	+.2	-.4	+.1	-.3	+.4	-.5
174	+.2	-.4	0	-.3	+.4	-.5	+.2	-.4	0	-.3	+.5	-.6
177	+.3	-.4	+.1	-.3	+.4	-.6	+.3	-.4	+.1	-.2	+.6	-.6
180	+.3	-.5	+.2	-.3	+.4	-.5	+.4	-.5	+.2	-.4	+.5	-.4
183	+.4	-.4	+.3	-.4	+.3	-.5	+.4	-.5	+.2	-.4	+.4	-.5
186	+.3	-.4	+.2	-.3	+.3	-.3	+.3	-.4	+.2	-.4	+.4	-.5
189	+.2	-.3	-.1	-.4	+.4	-.4	+.2	-.4	-.2	-.3	+.5	-.5
192	+.1	-.2	0	-.2	+.3	-.4	+.1	-.2	-.1	-.1	+.4	-.4
195	+.1	-.1	-.1	0	+.3	-.3	+.1	-.2	0	-.2	+.4	-.4
198	+.1	-.2	0	-.1	+.2	-.3	+.1	-.3	0	-.1	+.4	-.4
201	-.1	-.2	0	-.2	+.1	-.2	-.1	-.2	+.1	-.3	+.3	-.4
204	+.2	-.3	0	-.3	+.2	-.3	+.2	-.3	0	-.3	+.3	-.4
207	+.1	-.3	+.1	-.2	+.2	-.3	+.2	-.3	+.1	-.3	+.3	-.4
210	0	-.2	-.1	-.1	+.3	-.3	+.1	-.4	0	-.2	+.4	-.4
213	+.1	-.2	-.1	0	+.3	-.4	+.1	-.2	0	-.1	+.4	-.5
216	+.2	-.2	0	-.1	+.4	-.4	+.1	-.3	0	-.2	+.4	-.6
219	+.2	-.3	0	-.2	+.3	-.5	+.2	+.4	0	-.2	+.4	-.6
222	0	-.3	0	-.1	+.3	-.3	0	-.3	0	-.1	+.3	-.4
225	0	-.2	-.1	0	0	0	0	-.2	0	0	+.1	-.2
228	-.1	-.1	-.2	0	0	-.1	-.1	-.1	-.2	0	0	-.2
231	-.1	0	-.3	+.2	-.1	0	-.1	0	-.3	+.2	0	0
234	-.3	+.2	-.4	+.3	-.2	0	-.3	+.1	-.4	+.3	-.1	-.1
237	-.3	+.2	-.4	+.2	-.2	+.1	-.3	+.2	-.4	+.1	0	0

TABLE 1 (CONTINUED)

Results of Accuracy Tests before Endurance Test

Errors in Degrees

Generator Setting in Degrees	Motor No. 9						Motor No. 5					
	115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles		115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
240	-.2	+.2	-.3	+.2	-.2	+.2	-.3	+.2	-.3	+.1	-.2	+.1
243	-.2	+.1	-.3	+.1	-.3	+.2	-.2	+.1	-.3	+.2	-.2	+.1
246	-.2	+.1	-.3	+.1	-.4	+.2	-.2	0	-.3	+.2	-.3	+.1
249	-.3	+.1	-.3	+.1	-.3	+.1	-.3	0	-.3	+.2	-.1	0
252	-.4	+.2	-.4	+.3	-.2	+.1	-.3	+.2	-.4	+.4	-.1	0
255	-.4	+.1	-.4	+.3	-.2	+.1	-.4	0	-.4	+.3	0	-.1
258	-.2	+.1	-.4	+.3	-.1	0	-.2	+.1	-.4	+.3	+.1	-.1
261	-.3	+.1	-.4	+.3	-.2	+.1	-.2	0	-.4	+.2	0	-.1
264	-.4	+.2	-.4	+.3	-.4	+.3	-.4	+.2	-.4	+.2	-.3	+.1
267	-.3	+.2	-.4	+.3	-.4	+.4	-.4	+.2	-.4	+.4	-.4	+.3
270	-.5	+.3	-.5	+.4	-.4	+.3	-.4	+.3	-.5	+.4	-.4	+.3
273	-.5	+.5	-.6	+.5	-.5	+.4	-.6	+.4	-.6	+.6	-.5	+.4
276	-.6	+.6	-.6	+.5	-.5	+.4	-.7	+.5	-.6	+.7	-.5	+.4
279	-.6	+.5	-.6	+.4	-.5	+.6	-.7	+.6	-.6	+.6	-.5	+.4
282	-.5	+.4	-.5	+.3	-.6	+.5	-.4	+.4	-.5	+.4	-.6	+.5
285	-.5	+.3	-.5	+.3	-.5	+.4	-.5	+.4	-.5	+.4	-.6	+.5
288	-.3	+.3	-.4	+.4	-.4	+.4	-.3	+.3	-.4	+.4	-.4	+.4
291	-.6	+.4	-.5	+.4	-.4	+.2	-.5	+.4	-.5	+.5	-.4	+.3
294	-.4	-.1	-.4	+.3	-.2	0	-.3	-.2	-.4	+.4	-.2	0
297	-.2	+.2	-.4	+.1	-.1	0	-.1	+.1	-.4	+.3	0	-.1
300	-.1	0	-.2	+.1	0	0	0	0	-.3	+.2	0	-.1
303	0	-.1	-.2	0	0	0	-.1	0	-.4	+.2	0	0
306	-.2	0	-.2	0	-.1	+.1	-.1	+.1	-.3	+.3	-.1	+.1
309	-.2	0	-.1	0	-.2	+.1	-.2	+.1	-.4	+.3	-.2	+.1
312	-.2	-.1	-.1	0	-.2	0	-.3	-.2	-.4	+.3	-.2	+.1
315	-.3	+.2	-.3	+.1	-.2	+.1	-.3	+.2	-.4	+.2	-.2	+.1
318	-.2	-.1	-.1	-.1	-.2	+.1	-.3	-.2	-.2	+.1	-.3	-.1
321	-.1	0	0	-.1	-.1	0	0	0	-.1	0	-.2	0
324	0	+.1	0	-.3	-.1	0	0	0	0	-.1	-.2	0
327	+.1	-.3	+.1	-.4	-.1	-.2	+.1	-.3	0	-.2	-.1	-.1
330	+.1	-.3	0	-.4	+.1	-.2	+.1	-.1	0	-.3	0	-.3
333	+.2	-.3	+.1	-.4	+.1	-.4	+.2	-.3	0	-.3	+.1	-.5
336	+.3	-.4	+.3	-.5	+.3	-.5	+.3	-.4	+.1	-.3	+.3	-.5
339	+.5	-.6	+.3	-.6	+.4	-.6	+.5	-.5	+.2	-.4	+.4	-.6
342	+.4	-.5	+.4	-.6	+.6	-.5	+.3	-.4	+.3	-.4	+.5	-.5
345	+.4	-.5	+.3	-.6	+.4	-.4	+.3	-.4	+.2	-.5	+.4	-.4
348	+.3	-.5	+.3	-.5	+.3	-.3	+.3	-.4	+.2	-.4	+.3	-.3
351	+.3	-.3	+.3	-.4	+.3	-.3	+.2	-.3	+.2	-.3	+.3	-.4
354	+.1	+.2	+.2	-.3	+.2	-.3	+.1	+.1	+.2	-.3	+.2	-.2
357	+.1	-.4	+.2	-.4	+.1	-.3	+.1	-.3	0	-.3	+.2	-.3
360	+.1	-.3	+.3	-.5	0	-.3	+.2	-.2	+.1	-.3	+.2	-.2

TABLE 1 (CONTINUED)

Results of Accuracy Tests before Endurance Test

Errors in Degrees

Type "A" transmitter-generator connected to 6 type "M" indicator-motors. Motors and generator set to electrical zero before test. Errors given as (+) lead the direction of rotation, those marked (-) lag. Thus a (+) error in the cw direction indicates the same geometrical position as a corresponding (-) error in the ccw direction.

Generator Setting in Degrees	Motor No. 10						Motor No. 20					
	115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles		115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
3	+.2	-.3	+.2	-.4	+.1	-.2	+.3	-.4	+.3	-.5	0	-.2
6	+.2	-.4	+.3	-.4	+.2	-.3	+.3	-.5	+.4	-.5	+.3	-.3
9	+.3	-.3	+.2	-.4	+.2	-.4	+.4	-.4	+.4	-.6	+.3	-.4
12	+.2	-.3	+.2	-.4	+.4	-.6	+.3	-.3	+.3	-.5	+.4	-.4
15	+.2	-.4	+.2	-.4	+.4	-.6	+.3	-.4	+.4	-.4	+.4	-.6
18	+.4	-.5	+.4	-.4	+.5	-.6	+.4	-.5	+.4	-.5	+.5	-.6
21	+.4	-.5	+.3	-.5	+.4	-.6	+.3	-.5	+.3	-.6	+.4	-.4
24	+.3	-.4	+.2	-.5	+.3	-.4	+.3	-.4	+.4	-.5	+.3	-.3
27	+.2	-.3	+.2	+.5	+.1	-.4	+.1	-.3	+.1	+.6	+.1	-.2
30	+.1	-.1	0	-.4	+.1	-.3	0	-.2	0	-.4	0	-.1
33	0	-.1	-.1	-.2	+.1	-.1	0	-.1	0	-.3	0	0
36	-.1	0	-.1	-.1	+.1	-.1	-.1	0	-.1	-.1	-.1	0
39	-.1	0	-.2	0	-.1	0	0	0	-.1	-.1	-.1	0
42	0	-.1	-.1	0	0	-.1	0	-.1	0	-.1	-.1	0
45	-.1	0	-.1	-.1	-.1	0	0	0	-.1	-.1	-.1	0
48	-.1	-.1	-.1	-.1	-.1	0	-.1	0	-.1	0	-.1	0
51	-.1	0	-.2	0	0	0	-.2	0	-.3	0	-.1	+.1
54	0	+.1	-.1	0	+.1	-.3	0	0	-.2	0	0	0
57	-.1	0	-.2	0	+.1	-.1	-.2	0	-.3	0	0	0
60	+.1	-.1	-.1	0	0	0	0	0	0	+.1	0	0
63	0	0	0	0	-.1	0	-.2	0	-.1	0	-.2	+.2
66	-.2	0	-.3	+.1	-.2	+.1	-.3	0	-.4	+.1	-.4	+.4
69	-.3	+.1	-.3	+.1	-.3	-.1	-.3	+.3	-.4	+.2	-.4	-.4
72	-.4	+.2	-.6	+.4	-.4	+.3	-.4	+.4	-.6	+.4	-.5	+.5
75	-.6	+.4	-.6	+.4	-.5	+.3	-.6	+.5	-.6	+.5	-.5	+.4
78	-.6	+.4	-.6	+.4	-.6	+.4	-.6	+.5	-.6	+.4	-.6	+.5
81	-.6	+.5	-.6	+.4	-.6	+.4	-.6	+.5	-.6	+.5	-.6	+.6
84	-.5	+.4	-.5	+.4	-.6	+.4	-.6	+.5	-.5	+.5	-.6	+.5
87	-.5	+.4	-.5	+.3	-.6	+.4	-.6	+.5	-.6	+.5	-.6	+.6
90	-.5	+.4	-.6	+.4	-.5	+.4	-.5	+.5	-.7	+.6	-.6	+.5
93	-.5	+.4	-.6	+.4	-.4	+.1	-.6	+.5	-.7	+.6	-.5	+.4
96	-.4	+.4	-.7	+.4	-.3	+.1	-.6	+.5	-.7	+.6	-.4	+.4
99	-.3	+.3	-.5	+.3	-.2	0	-.4	+.4	-.6	+.5	-.4	+.4
102	-.4	+.3	-.5	+.4	-.4	+.1	-.4	+.4	-.6	+.5	-.5	+.5
105	-.5	+.4	-.5	+.4	-.4	+.2	-.6	+.5	-.6	+.5	-.6	+.5
108	-.5	+.3	-.6	+.4	-.5	+.8	-.6	+.6	-.7	+.6	-.7	+.5
111	-.7	+.5	-.7	+.4	-.5	+.7	-.7	+.6	-.8	+.6	-.7	+.4

TABLE 1 (CONTINUED)

Results of Accuracy Tests before Endurance Test

Errors in Degrees

Generator Setting in Degrees	Motor No. 10						Motor No. 20					
	115 Volts 60 Cycles		103.5 Volts 65 Cycles		126.5 Volts 55 Cycles		115 Volts 60 Cycles		103.5 Volts 65 Cycles		126.5 Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
114	-.6	+.4	-.7	+.5	-.5	+.7	-.7	+.6	-.9	+.7	-.6	+.5
117	-.7	+.3	-.7	+.4	-.5	+.3	-.7	+.6	-.8	+.6	-.7	+.5
120	-.6	+.4	-.6	+.4	-.4	+.4	-.6	+.4	-.7	+.5	-.4	+.3
123	-.4	+.4	-.5	+.3	-.5	+.1	-.5	+.4	-.6	+.4	-.6	+.3
126	-.3	+.1	-.6	+.3	-.4	+.1	-.4	+.4	-.6	+.5	-.5	+.3
129	-.3	+.1	-.4	+.1	-.1	-.1	-.4	+.2	-.6	+.4	-.4	+.1
132	-.4	+.1	-.4	+.2	-.1	-.2	-.5	+.1	-.6	+.4	-.2	0
135	-.2	0	-.4	+.1	0	-.3	-.3	+.2	-.6	+.4	-.1	-.1
138	0	-.2	-.4	0	+.2	-.4	-.1	0	-.5	+.2	0	-.2
141	0	-.2	-.2	-.1	+.1	-.2	-.1	-.1	-.4	+.1	0	0
144	0	-.3	-.1	-.1	+.1	-.4	-.1	-.1	-.3	+.1	-.1	-.1
147	+.1	-.2	-.1	-.3	+.1	-.3	0	-.1	-.2	0	-.1	-.1
150	0	-.2	-.1	-.1	0	-.3	-.1	-.1	-.2	0	-.9	-.2
153	0	0	-.2	0	+.1	-.3	-.2	0	-.4	+.2	0	-.1
156	0	-.1	-.3	0	0	-.3	-.1	0	-.4	+.1	-.2	0
159	0	-.2	-.1	-.1	+.1	-.3	0	-.1	-.2	0	0	-.1
162	+.2	-.4	+.1	-.3	+.1	-.4	+.1	-.3	0	-.2	0	-.2
165	+.2	-.2	0	-.3	0	-.3	+.2	-.1	0	-.1	0	-.2
168	+.2	-.4	+.1	-.3	+.2	-.4	+.2	-.3	0	-.2	+.1	-.3
171	+.2	-.4	+.1	-.3	+.4	-.6	+.1	-.2	-.1	-.1	+.2	-.4
174	+.2	-.5	+.1	-.3	+.4	-.6	+.2	-.3	-.1	-.1	+.3	-.5
177	+.3	-.4	+.2	-.3	+.4	-.6	+.3	-.3	0	-.1	+.4	-.5
180	+.3	-.5	+.3	-.4	+.4	-.5	+.3	-.4	+.2	-.3	+.4	-.5
183	+.3	-.5	+.2	-.4	+.3	-.5	+.3	-.4	+.1	-.3	+.3	-.4
186	+.3	-.3	+.2	-.4	+.3	-.5	+.2	-.3	+.1	-.3	+.1	-.4
189	+.2	-.4	+.1	-.4	+.4	-.5	+.2	-.1	+.1	-.2	+.4	-.4
192	+.1	-.3	0	-.2	+.3	-.5	+.2	-.2	0	-.1	+.2	-.4
195	0	-.2	-.1	-.1	+.3	-.5	+.1	-.2	0	-.1	+.3	-.3
198	+.1	-.2	0	-.2	+.4	-.4	+.1	-.1	0	0	+.3	-.4
201	-.2	-.2	0	-.3	+.1	-.3	-.2	-.2	0	-.1	0	-.3
204	+.2	-.4	0	-.3	+.2	-.4	+.2	-.1	-.1	-.3	+.1	-.3
207	+.1	-.3	0	-.3	+.2	-.4	+.1	0	0	0	+.1	-.3
209	+.1	-.2	-.1	0	+.3	-.3	0	0	0	-.1	+.2	-.3
210	+.1	-.2	-.1	0	+.3	-.3	0	0	0	-.1	+.2	-.3
213	+.1	-.2	0	0	+.4	-.5	0	0	-.1	-.1	+.3	-.4
216	+.2	-.2	0	-.1	+.4	-.6	+.1	0	0	-.1	+.2	-.4
219	+.2	-.3	0	-.2	+.4	-.5	+.2	0	0	-.3	+.2	-.4
222	+.1	-.3	0	-.1	+.3	-.4	+.1	0	0	-.1	+.2	-.3
225	0	-.2	-.1	-.1	+.1	-.2	0	0	-.1	-.1	0	-.1
228	0	-.1	-.1	0	0	-.2	0	+.2	-.1	0	-.1	0
231	0	0	-.4	+.1	0	0	-.1	+.2	-.3	+.2	-.1	+.1
234	-.3	+.1	-.4	+.1	-.1	-.1	-.2	+.4	-.4	+.2	-.1	+.1
237	-.3	+.2	-.4	+.1	-.1	0	-.3	+.4	-.4	+.2	-.2	+.1

TABLE 1 (CONTINUED)

Results of Accuracy Tests before Endurance Test

Errors in Degrees

Generator Setting in Degrees	Motor No. 10						Motor No. 20					
	115 Volts 60 Cycles		103.5 Volts 65 Cycles		126.5 Volts 55 Cycles		115 Volts 60 Cycles		103.5 Volts 65 Cycles		126.5 Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
240	-.3	+.1	-.3	+.2	-.3	+.1	-.2	+.2	-.3	+.1	-.3	+.1
243	-.2	0	-.3	+.1	-.3	+.2	-.1	+.1	-.2	+.1	-.3	+.1
246	-.3	+.1	-.4	+.2	-.4	+.2	-.1	+.1	-.3	+.1	-.4	+.2
249	-.2	+.1	-.4	+.2	-.3	+.1	-.2	+.1	-.3	+.1	-.3	+.1
252	-.3	+.1	-.4	+.3	-.1	+.1	-.3	+.2	-.4	+.3	-.2	+.1
255	-.4	+.1	-.4	+.3	-.1	0	-.3	+.1	-.4	+.3	-.1	0
258	-.3	+.1	-.4	+.3	0	0	-.2	+.1	-;3	+.1	-.1	0
261	-.3	0	-.4	+.3	-.1	0	-.2	0	-.4	+.2	-.1	+.1
264	-.3	+.2	-.4	+.3	-.4	+.4	-.3	+.1	-.3	+.1	-.4	+.4
267	-.4	+.2	-.4	+.4	-.4	+.4	-.3	+.2	-.3	+.3	-.4	+.3
270	-.4	+.3	-.6	+.4	-.4	+.5	-.4	+.4	-.5	+.4	-.4	+.4
273	-.6	+.5	-.7	+.6	-.6	+.4	-.6	+.5	-.6	+.4	-.5	+.4
276	-.6	+.5	-.7	+.6	-.6	+.5	-.5	+.4	-.6	+.5	-.5	+.4
279	-.6	+.5	-.6	+.6	-.6	+.5	-.5	+.6	-.5	+.4	-.6	+.4
282	-.5	+.4	-.5	+.4	-.7	+.5	-.4	+.3	-.4	+.3	-.5	+.5
285	-.6	+.4	-.6	+.4	-.6	+.4	-.4	+.3	-.4	+.3	-.5	+.4
288	-.4	+.4	-.5	+.4	-.5	+.4	-.1	+.1	-.2	+.1	-.4	+.3
291	-.7	+.4	-.5	+.4	-.4	+.4	-.6	+.3	-.4	+.4	-.4	+.4
294	-.4	-.2	-.5	+.4	-.4	+.1	-.1	-.1	-.3	+.3	-.3	+.1
297	-.2	+.1	-.4	+.3	-.2	0	0	+.1	-.3	+.1	0	0
300	-.1	+.3	-.3	+.1	-.1	0	0	0	-.1	0	0	-.1
303	-.1	0	-.3	0	0	+.1	0	0	0	0	0	+.1
306	-.1	+.1	-.1	+.1	-.2	+.1	-.1	0	0	0	-.2	+.1
309	-.2	+.1	-.4	+.1	-.2	+.1	-.1	0	-.1	0	-.2	+.1
312	-.3	+.2	-.3	+.2	-.3	+.1	0	+.1	-.1	0	-.2	0
315	-.2	+.2	-.3	+.1	-.2	0	-.1	+.2	-.2	0	-.2	+.1
318	-.3	-.1	-.2	0	-.1	0	-.2	+.1	0	-.1	-.1	0
321	-.1	+.1	-.1	0	-.1	-.1	0	0	0	-.2	-.2	0
324	0	0	0	-.1	-.1	0	0	0	+.1	-.3	-.1	0
327	+.1	-.1	0	-.3	-.1	-.1	+.2	-.2	+.2	-.4	-.1	-.1
330	0	-.1	0	-.1	0	-.2	+.1	-.2	+.1	-.4	0	-.3
333	+.2	-.3	0	-.2	0	-.5	+.2	-.3	+.1	-.4	+.1	-.4
336	+.2	-.3	+.1	-.4	+.3	-.4	+.3	-.4	+.3	-.5	+.3	-.5
339	+.4	-.4	+.3	-.5	+.4	-.6	+.5	-.6	+.4	-.6	+.4	-.6
342	+.3	-.4	+.4	-.5	+.4	-.4	+.4	-.5	+.5	-.6	+.5	-.4
345	+.3	-.4	+.4	-.5	+.3	-.3	+.4	-.5	+.4	-.7	+.4	-.4
348	+.2	-.3	+.3	-.4	+.3	-.2	+.3	-.4	+.4	-.4	+.3	-.3
351	+.2	-.2	+.3	-.3	+.3	-.4	+.2	-.3	+.3	-.4	+.2	-.3
354	+.1	+.1	+.1	-.2	+.2	-.3	+.1	+.2	+.2	-.3	+.1	-.2
357	+.1	-.2	0	-.3	+.2	-.3	+.1	-.4	+.2	-.4	+.2	-.3
360	+.1	-.2	+.1	-.3	+.1	-.3	+.2	-.3	+.3	-.4	+.1	-.3

TABLE 2

Results of Accuracy Tests before Endurance

Errors in Degrees

Type "B" transmitter-generator connected to 20 type "M" indicator-motors. Errors of only 2 motors recorded. Motors and generators set to electrical zero before test. Errors marked (+) lead the direction of rotation, those marked (-) lag. Thus a (+) error in the cw direction indicates the same geometrical position as a corresponding (-) error in the ccw direction.

Generator Setting in Degrees	Motor No. 15						Motor No. 1					
	115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles		115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
3	-.2	0	0	-.5	-.1	0	+.5	-.7	+.8	-1.2	+.5	-.7
6	-.3	0	+.1	-.4	-.2	+.1	+.4	-.6	+.8	-1.1	+.5	-.6
9	-.2	0	0	-.4	-.1	0	+.6	-.6	+.8	-1.1	+.6	-.8
12	-.2	0	0	-.3	0	-.1	+.6	-.6	+.8	-1.0	+.7	-.9
15	-.1	0	0	-.3	0	-.1	+.7	-.6	+.8	-1.0	+.7	-.9
18	-.3	+.1	0	-.3	-.1	-.1	+.6	-.6	+.8	-1.0	+.6	-.9
21	-.3	+.1	0	-.3	-.1	0	+.6	-.7	+.8	-1.1	+.6	-.8
24	-.3	0	0	-.4	-.2	0	+.6	-.6	+.9	-1.1	+.5	-.7
27	-.4	+.1	-.1	-.3	-.2	0	+.6	-.7	+.7	-1.1	+.5	-.7
30	-.4	+.1	-.1	-.3	-.1	0	+.5	-.6	+.7	-1.0	+.6	-.9
33	-.5	+.3	-.3	-.1	-.3	0	+.5	-.6	+.7	-1.0	+.6	-.8
36	-.5	+.2	-.4	-.1	-.3	+.1	+.5	-.6	+.6	-.9	+.6	-.7
39	-.5	+.1	-.3	-.2	-.3	+.1	+.5	-.6	+.6	-1.0	+.6	-.7
42	-.4	+.3	-.2	-.1	-.4	+.2	+.5	-.6	+.7	-1.0	+.5	-.6
45	-.5	+.2	-.3	-.1	-.4	+.3	+.5	-.5	+.6	-1.0	+.4	-.5
48	-.4	+.2	-.3	-.1	-.4	+.2	+.5	-.5	+.7	-1.0	+.5	-.6
51	-.4	+.2	-.4	0	-.4	+.1	+.5	-.6	+.6	-.9	+.6	-.7
54	-.5	+.2	-.3	0	-.3	+.1	+.5	-.5	+.6	-.8	+.6	-.7
57	-.4	+.2	-.4	0	-.3	+.1	+.5	-.5	+.5	-.8	+.6	-.7
60	-.4	+.1	-.2	+.1	-.3	+.1	+.5	-.5	+.6	-.8	+.5	-.6
63	-.4	+.2	-.3	+.1	-.4	+.3	+.4	-.4	+.5	-.8	+.4	-.5
66	-.5	+.3	-.3	+.1	-.4	+.4	+.4	-.4	+.6	-.7	+.4	-.5
69	-.5	+.3	-.4	+.1	-.4	+.3	+.5	-.4	+.5	-.7	+.5	-.6
72	-.6	+.4	-.5	+.1	-.4	+.2	+.4	-.3	+.4	-.7	+.5	-.6
75	-.4	+.4	-.5	+.1	-.4	+.1	+.5	-.4	+.4	-.6	+.6	-.6
78	-.5	+.3	-.4	+.1	-.4	+.3	+.5	-.4	+.4	-.6	+.5	-.2
81	-.5	+.3	-.4	0	-.5	+.4	+.4	-.3	+.4	-.6	+.4	-.1
84	-.4	+.2	-.5	0	-.5	+.4	+.5	-.3	+.4	-.6	+.4	0
87	-.4	+.2	-.4	-.1	-.4	+.3	+.5	-.4	+.5	-.8	+.4	-.2
90	-.4	+.3	-.4	0	-.4	+.2	+.4	-.3	+.4	-.6	+.4	-.3
93	-.4	+.2	-.4	0	-.2	+.1	+.4	-.3	+.4	-.6	+.4	-.3
96	-.4	+.2	-.4	-.1	-.2	+.1	+.4	-.3	+.4	-.6	+.4	-.3
99	-.4	+.1	-.3	-.1	-.2	+.1	+.4	-.4	+.4	-.6	+.4	-.2
102	-.3	+.1	-.2	-.1	-.2	+.1	+.4	-.4	+.4	-.6	+.3	-.1
105	-.3	0	-.1	-.1	-.3	+.1	+.4	-.3	+.5	-.6	+.2	0
108	-.4	+.1	-.3	-.1	-.3	+.1	+.4	-.2	+.5	-.5	+.3	0
111	-.4	+.1	-.3	-.1	-.1	0	+.3	-.2	+.4	-.4	+.3	-.1

TABLE 2 (CONTINUED)

Results of Accuracy Tests before Endurance

Errors in Degrees

Generator Setting in Degrees	Motor No. 15						Motor No. 1					
	115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles		115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
114	-.4	+.1	-.4	0	-.1	0	+.4	-.2	+.3	-.4	+.3	-.1
117	-.4	+.1	-.4	0	-.2	0	+.2	-.1	+.2	-.4	+.3	-.1
120	-.3	+.1	-.1	-.1	-.1	0	+.3	-.2	+.4	-.4	+.1	0
123	-.3	+.1	-.1	-.1	-.1	-.1	+.2	-.2	+.4	-.4	+.1	-.1
126	-.3	+.1	-.1	-.2	-.2	0	+.1	-.1	+.4	-.4	0	-.1
129	-.4	0	-.2	-.1	0	-.1	0	-.5	+.3	-.3	0	0
132	-.2	0	-.3	-.1	+.1	-.3	+.1	-.5	+.3	-.2	+.1	-.1
135	-.1	0	-.2	0	+.1	-.2	0	-.4	+.3	-.2	+.1	-.1
138	-.1	-.1	-.1	-.4	+.2	-.3	+.1	-.6	+.4	-.4	+.2	-.1
141	0	-.1	0	-.4	+.1	-.3	+.2	-.5	+.4	-.4	+.1	-.1
144	-.1	-.1	0	-.4	0	-.1	+.1	-.3	+.4	-.4	0	0
147	-.1	-.1	0	-.3	+.1	-.2	+.1	-.4	0	-.4	0	0
150	-.1	-.1	0	-.1	+.1	-.2	0	-.4	-.1	-.3	+.1	0
153	-.3	0	-.1	-.1	0	-.2	0	-.4	-.1	-.3	+.1	-.1
156	-.2	0	-.1	-.1	0	-.1	0	-.4	-.1	-.3	+.1	-.2
159	-.2	0	-.1	-.4	0	-.1	0	-.4	-.2	-.4	0	-.1
162	-.2	0	0	-.4	-.1	0	0	-.3	-.1	-.4	-.1	0
165	0	-.1	+.1	-.5	0	-.1	0	-.3	+.1	-.5	-.1	0
168	-.1	-.1	+.1	-.4	0	-.1	0	-.4	+.1	-.4	-.1	-.1
171	-.1	-.1	0	-.3	+.1	-.2	0	-.3	-.1	-.3	-.1	0
174	-.1	-.1	0	-.4	+.3	-.4	-.1	-.3	-.1	-.4	0	-.2
177	0	-.2	+.1	-.4	+.3	-.4	0	-.4	0	-.4	0	-.2
180	+.1	-.3	+.1	-.4	+.2	-.4	0	-.4	0	-.4	0	-.2
183	0	-.1	+.1	-.4	+.1	-.3	-.1	-.4	0	-.4	-.1	-.1
186	-.1	-.1	0	-.4	0	-.2	0	-.3	-.1	-.4	-.1	-.1
189	-.1	0	-.1	-.4	+.1	-.3	-.1	-.3	-.3	-.3	0	-.3
192	-.1	-.1	-.1	-.3	+.3	-.4	-.1	-.4	-.3	-.3	+.1	-.4
195	-.1	-.1	-.1	-.3	+.3	-.3	0	-.4	-.3	-.3	+.1	-.4
198	-.1	0	-.2	-.1	+.1	-.2	-.1	-.4	-.4	-.3	-.1	-.4
201	-.2	-.1	0	-.3	+.1	-.2	-.1	-.5	-.2	-.4	-.1	-.3
204	-.2	-.1	0	-.4	+.1	-.2	-.1	-.4	-.2	-.4	-.1	-.3
207	-.1	-.1	0	-.4	+.1	-.3	0	-.4	-.1	-.4	-.1	-.4
210	0	-.1	0	-.3	+.2	-.3	0	-.4	-.2	-.4	0	-.4
213	-.1	-.1	0	-.3	+.3	-.5	-.1	-.5	-.2	-.4	+.1	-.6
216	0	-.1	0	-.3	+.3	-.4	0	-.5	-.2	-.4	+.1	-.4
219	+.1	-.3	0	-.3	+.2	-.4	0	-.6	-.2	-.3	0	-.6
222	0	-.3	+.3	-.4	+.2	-.3	0	-.5	-.1	-.4	-.1	-.5
225	0	-.2	0	-.4	0	0	0	-.5	-.1	-.4	-.1	-.4
228	-.1	-.2	+.1	-.4	+.1	-.2	0	-.6	0	-.4	-.1	-.6
231	-.1	-.1	0	-.2	+.1	-.3	0	-.5	-.2	-.2	0	-.6
234	0	-.1	-.1	-.1	+.1	-.3	0	-.5	-.3	-.2	0	-.6
237	-.2	-.1	-.1	-.2	0	-.2	-.1	-.5	-.3	-.2	0	-.5

TABLE 2 (CONTINUED)

Results of Accuracy Tests before Endurance

Errors in Degrees

Generator Setting in Degrees	Motor No. 15						Motor No. 1					
	115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles		115Volts 60Cycles		103.5Volts 65 Cycles		126.5Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
240	-.1	-.1	0	-.4	+.1	-.1	0	-.5	-.1	-.4	0	-.4
243	-.1	-.1	0	-.4	-.1	0	0	-.5	-.1	-.4	-.3	-.4
246	-.1	-.1	+.1	-.4	0	-.1	0	-.5	0	-.4	-.1	-.4
249	-.1	-.1	0	-.4	+.1	-.2	0	-.6	-.1	-.4	0	-.5
252	-.2	-.1	-.1	-.2	+.2	-.3	0	-.6	-.2	-.3	+.1	-.6
255	0	-.1	0	-.3	+.2	-.3	+.1	-.6	-.1	-.3	+.1	-.6
258	0	-.1	-.1	-.3	+.1	-.3	+.1	-.6	-.2	-.3	+.1	-.6
261	-.1	-.1	0	-.3	+.1	-.2	0	-.6	-.1	-.4	0	-.5
264	-.1	-.1	+.1	-.4	0	-.1	+.1	-.6	0	-.4	-.1	-.5
267	-.1	-.1	+.1	-.4	-.1	-.1	+.1	-.7	0	-.4	-.1	-.6
270	-.2	0	-.1	-.2	0	0	0	-.6	-.1	-.7	0	-.6
273	-.3	0	-.1	-.1	0	-.1	0	-.6	-.2	-.6	+.1	-.6
276	-.2	0	-.1	-.2	0	-.1	0	-.6	-.1	-.6	0	-.6
279	-.2	0	-.1	-.3	-.1	0	0	-.6	-.1	-.8	-.1	-.6
282	-.1	-.1	-.1	-.4	-.1	0	0	-.7	+.1	-.8	-.1	-.5
285	-.1	-.1	+.1	-.4	-.1	0	+.1	-.7	+.1	-.9	-.1	-.5
288	0	-.1	+.2	-.4	0	-.1	+.1	-.8	+.2	-.9	0	-.6
291	-.1	-.2	0	-.3	-.1	-.2	+.1	-.9	0	-.7	0	-.7
294	-.1	-.2	+.1	-.4	-.1	-.3	+.1	-.9	+.1	-.9	-.2	-.9
297	-.1	-.1	+.1	-.4	+.1	-.3	+.1	-.8	+.1	-1.0	+.1	-.8
300	0	-.3	+.2	-.4	+.1	-.3	+.2	-.9	+.2	-1.0	+.1	-.7
303	-.1	-.1	+.1	-.4	0	-.1	+.1	-.8	+.2	-.9	0	-.7
306	-.1	-.1	0	-.4	0	-.1	+.1	-.8	+.1	-.9	0	-.7
309	-.1	0	0	-.3	0	-.1	+.1	-.9	-.1	-.9	+.1	-.9
312	-.1	0	-.1	-.2	+.1	-.2	+.2	-.8	0	-.8	+.2	-.8
315	-.1	0	-.1	-.3	+.1	-.2	+.1	-.7	-.1	-.7	+.1	-.8
318	-.3	0	0	-.3	0	-.1	0	-.7	0	-.9	0	-.8
321	-.1	-.1	0	-.4	0	0	+.1	-.9	+.2	-.9	0	-.6
324	-.1	-.1	0	-.4	-.1	0	+.1	-.9	+.1	-1.1	-.2	-.6
327	0	-.2	+.2	-.5	0	-.1	+.2	-.9	+.3	-1.3	0	-.7
330	0	-.1	+.1	-.4	0	-.1	+.2	-.8	+.2	-1.1	+.1	-.7
333	-.2	-.1	0	-.3	0	-.1	+.1	-.9	+.2	-1.0	+.1	-.7
336	-.2	0	0	-.4	0	-.1	+.2	-1.0	+.5	-1.1	0	-.8
339	-.1	0	+.2	-.5	0	-.1	+.1	-1.0	+.7	-1.2	0	-.8
342	-.2	0	+.1	-.5	-.2	0	+.1	-.9	+.6	-1.1	-.2	-.5
345	-.1	-.1	+.2	-.5	-.1	0	+.1	-.9	+.6	-1.3	-.2	-.5
348	-.2	0	+.2	-.4	-.1	0	0	-.9	+.6	-1.1	-.1	-.6
351	-.3	+.1	0	-.3	-.1	0	0	-.9	+.5	-1.0	-.1	-.6
354	-.4	0	-.1	-.3	0	-.1	-.1	-.9	+.5	-1.0	0	-.6
357	-.4	+.1	-.1	-.2	0	-.1	-.1	-.8	+.6	-.9	-.1	-.5
360	-.3	0	+.1	-.4	0	-.1	-.1	-.8	+.9	-1.2	-.1	-.4

TABLE 3

Results of Accuracy Tests before Endurance

Errors in Degrees

One type "N" indicator-motor connected to a type "A" transmitter-generator. Motor and generator set to electrical zero before test. Errors marked (+) lead the direction of rotation, those marked (-) lag. Thus a (+) error in the cw direction indicates the same geometrical position as a corresponding (-) error in the ccw direction.

Generator Setting in Degrees	Type N Motor					
	115 Volts 60 Cycles		103.5 Volts 65 Cycles		126.5 Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw
3	+.2	0	+.1	-.3	-.1	0
6	+.2	-.3	+.1	-.4	0	0
9	+.2	-.2	+.3	-.3	0	-.1
12	+.3	-.3	+.3	-.3	+.2	-.2
15	+.3	-.2	+.2	-.3	+.3	-.3
18	+.3	-.3	+.1	-.2	+.3	-.4
21	+.3	-.3	+.3	-.1	+.4	-.4
24	+.4	-.3	+.2	-.4	+.4	-.3
27	+.3	-.2	+.3	-.3	+.2	-.4
30	0	0	+.2	0	0	-.2
33	0	0	0	0	0	0
36	-.1	+.1	0	0	-.2	0
39	-.4	+.3	-.1	+.1	-.4	+.2
42	-.5	+.5	-.2	+.3	-.5	+.4
45	-.5	+.7	-.4	0	-.6	+.4
48	-.4	+.6	0	+.3	-.6	+.3
51	-.3	+.4	-.4	0	-.6	+.2
54	-.3	+.3	-.4	+.1	-.4	0
57	-.3	+.2	-.4	+.3	-.2	0
60	-.3	+.1	-.4	0	0	0
63	-.1	+.2	-.3	+.1	0	0
66	0	+.1	-.2	+.1	-.2	0
69	-.4	+.4	-.1	+.4	-.3	-.1
72	-.4	+.5	-.4	+.4	-.4	+.4
75	-.5	+.5	-.4	+.5	-.4	+.4
78	-.5	+.6	-.4	+.6	-.6	+.4
81	-.6	+.6	-.6	+.6	-.6	+.6
84	-.6	+.6	-.6	+.6	-.6	+.6
87	-.5	+.5	-.6	+.5	-.6	+.6
90	-.5	+.6	-.6	+.6	-.6	+.6
93	-.6	+.6	-.6	+.6	-.6	+.6
96	-.5	+.6	-.6	+.6	-.5	+.6
99	-.5	+.6	-.5	+.5	-.5	+.5
102	-.4	+.4	-.4	+.4	-.4	+.5
105	-.3	+.3	-.2	+.1	-.2	+.5
108	-.3	+.3	-.3	+.3	-.4	+.2
111	-.4	+.4	-.4	+.4	-.5	+.4

TABLE 3 (CONTINUED)

Results of Accuracy Tests before Endurance

Errors in Degrees

Generator Setting in Degrees	Type N Motor					
	115 Volts 60 Cycles		103.5 Volts 65 Cycles		126.5 Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw
114	-.4	+.4	-.4	+.3	-.4	+.4
117	-.4	+.4	-.4	+.4	-.5	+.4
120	-.4	+.4	-.4	+.4	-.5	+.4
123	-.5	+.5	-.4	+.4	-.6	+.6
126	-.4	+.4	-.4	+.4	-.5	+.5
129	-.4	+.4	-.4	+.3	-.5	+.4
132	-.4	+.3	-.3	+.3	-.3	+.3
135	-.3	+.2	-.2	+.1	-.1	+.2
138	-.2	+.2	-.2	+.1	0	0
141	-.1	+.1	-.2	0	0	0
144	0	-.1	0	-.1	0	-.1
147	0	-.1	0	-.1	+.1	0
150	0	0	0	-.1	0	0
153	0	-.1	0	-.1	0	0
156	0	0	0	-.1	0	0
159	0	+.1	+.1	-.1	-.2	+.1
162	0	0	0	-.1	-.3	+.3
165	+.1	-.1	+.4	-.4	-.1	0
168	0	-.1	+.3	-.3	0	0
171	0	0	+.2	-.1	0	0
174	+.2	-.1	+.3	-.3	+.2	0
177	+.2	-.3	+.4	-.4	+.2	-.3
180	+.3	-.4	+.4	-.3	+.3	-.4
183	+.3	-.4	+.3	-.4	+.4	-.4
186	+.3	-.4	+.4	-.4	+.3	-.4
189	+.3	-.3	+.4	-.4	+.3	-.2
192	+.3	-.3	+.4	-.3	+.3	-.3
195	+.3	-.3	+.3	-.3	+.3	-.1
198	0	0	0	-.1	0	0
201	-.1	+.1	0	0	-.2	+.2
204	0	0	+.1	-.1	0	+.2
207	0	0	0	0	-.1	+.1
210	-.1	+.1	0	0	-.1	+.2
213	0	+.1	0	0	-.2	+.2
216	0	0	0	0	0	0
219	0	0	0	0	0	0
222	0	-.1	+.1	-.3	0	0
225	+.1	-.2	+.4	-.4	0	0
228	0	0	+.3	-.1	0	0
231	-.1	+.1	+.1	-.1	-.1	+.1
234	-.1	+.1	0	0	-.1	+.2
237	-.3	+.3	-.2	+.1	-.4	+.3

TABLE 3 (CONTINUED)

Results of Accuracy Tests before Endurance

Errors in Degrees

Generator Setting in Degrees	Type N Motor					
	115 Volts 60 Cycles		103.5 Volts 65 Cycles		126.5 Volts 55 Cycles	
	cw	ccw	cw	ccw	cw	ccw
240	-.3	+.4	-.3	+.3	-.4	+.4
243	-.4	+.4	-.2	+.2	-.4	+.5
246	-.3	+.3	-.3	+.1	-.4	+.4
249	-.3	+.4	-.3	+.3	-.4	+.4
252	-.3	+.4	-.4	+.4	-.4	+.3
255	-.3	+.3	-.4	+.4	-.2	+.3
258	-.4	+.4	-.4	+.4	-.4	+.3
261	-.3	+.4	-.3	+.3	-.2	+.2
264	-.2	+.3	-.1	+.1	-.2	+.1
267	-.2	+.3	-.2	+.2	-.1	+.1
270	-.3	+.3	-.4	+.3	-.4	+.3
273	-.3	+.3	-.4	+.2	-.4	+.4
276	-.4	+.4	-.4	+.2	-.5	+.4
279	-.4	+.5	-.4	+.3	-.5	+.6
282	-.4	+.4	-.3	+.3	-.6	+.6
285	-.3	+.3	-.1	+.1	-.5	+.5
288	-.3	+.3	-.1	0	-.4	+.4
291	-.3	+.3	-.3	+.2	-.4	+.4
294	-.3	+.3	-.2	+.1	-.3	+.3
297	-.2	+.3	-.1	0	-.3	+.3
300	-.2	+.2	0	0	-.2	+.2
303	-.1	+.1	0	0	-.1	+.2
306	-.1	0	+.1	-.1	0	0
309	-.2	+.1	0	0	-.1	+.3
312	0	+.1	+.1	0	-.2	+.2
315	-.2	+.2	0	0	-.2	+.3
318	-.3	+.3	-.2	+.1	-.4	+.4
321	-.3	+.3	-.2	+.1	-.4	+.4
324	-.1	+.2	0	0	-.4	+.4
327	0	+.1	0	-.2	-.2	+.3
330	0	+.1	0	0	-.2	+.3
333	0	0	+.1	-.1	-.1	+.1
336	+.1	-.1	+.1	-.3	0	0
339	+.3	-.4	+.4	-.4	+.2	-.2
342	+.3	-.3	+.4	-.4	+.4	-.3
345	+.4	-.4	+.5	-.4	+.4	-.4
348	+.3	-.4	+.4	-.4	+.3	-.3
351	+.2	-.3	+.4	-.4	+.1	-.2
354	+.4	-.3	+.4	-.4	+.2	-.2
357	+.3	-.2	+.3	-.3	0	-.2
360	+.1	-.1	+.2	-.1	0	0

TABLE 4

Results of Accuracy Tests After Endurance

Errors in Degrees

Type "A" transmitter-generator connected to 6 type "M" indicator-motors. Motors and generator set to electrical zero before test. Errors marked (+) lead the direction, those marked (-) lag. Thus a (+) error in the cw direction indicates the same geometrical position as a corresponding (-) error in the ccw direction. (115 volts, a.c., 60 cycle supply).

Generator Setting in Degrees	MOTORS											
	No. 15		No. 1		No. 9		No. 5		No. 10		No. 20	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
3	0	+.1	+.1	-.1	-.3	+.3	-.5	+.4	-.3	+.4	-.2	+.3
6	0	+.1	+.2	0	-.2	+.3	-.4	+.6	-.3	+.4	-.1	+.2
9	-.1	+.1	+.1	0	-.2	+.4	-.4	+.5	-.3	+.4	-.1	+.2
12	-.1	+.1	0	-.1	-.4	+.2	-.5	+.5	-.4	+.4	-.2	+.2
15	-.1	0	0	-.1	-.4	+.2	-.5	+.4	-.4	+.4	-.3	+.1
18	-.2	0	-.1	0	-.4	+.3	-.5	+.6	-.5	+.4	-.3	+.3
21	-.1	0	0	0	-.4	+.2	-.6	+.4	-.5	+.3	-.4	+.1
24	0	0	0	-.1	-.3	+.1	-.5	+.4	-.4	+.3	-.3	+.1
27	0	-.1	0	-.2	-.2	0	-.4	+.4	-.4	+.2	-.2	0
30	0	-.1	+.1	-.3	-.3	0	-.4	+.2	-.4	+.1	-.2	0
33	0	-.3	0	-.4	-.3	0	-.4	+.2	-.4	+.1	-.2	-.1
36	0	-.3	+.1	-.5	-.2	-.1	-.3	+.1	-.4	0	-.1	-.1
39	+.2	-.3	+.3	-.4	-.1	-.1	-.2	+.2	-.2	+.1	0	-.1
42	+.3	-.3	+.4	-.4	0	0	-.1	+.2	-.1	+.2	0	0
45	+.4	-.1	+.5	-.1	0	+.1	0	+.3	-.1	+.3	0	0
48	+.4	-.3	+.5	-.4	0	-.1	0	+.1	0	+.1	+.1	-.1
51	+.4	-.4	+.5	-.5	0	-.1	0	+.1	0	+.1	+.1	-.1
54	+.4	-.4	+.4	-.5	0	-.1	0	+.1	0	0	0	-.1
57	+.4	-.5	+.5	-.6	0	-.2	0	+.1	0	0	0	-.2
60	+.4	-.4	+.4	-.6	0	-.3	0	+.1	+.1	0	0	-.2
63	+.5	-.5	+.5	-.6	+.1	-.4	+.3	0	+.3	-.1	+.1	-.3
66	+.6	-.6	+.6	-.7	+.1	-.4	+.3	-.1	+.3	-.1	+.2	-.4
69	+.5	-.6	+.6	-.7	+.1	-.4	+.4	-.2	+.4	-.2	+.2	-.4
72	+.4	-.7	+.5	-.9	0	-.6	+.3	-.3	+.3	-.4	+.1	-.5
75	+.4	-.8	+.5	-1.0	+.1	-.6	+.4	-.3	+.1	-.4	+.1	-.5
78	+.5	-.8	+.5	-.9	0	-.6	+.4	-.3	+.4	-.4	+.1	-.6
81	+.6	-.7	+.6	-1.0	+.2	-.6	+.4	-.3	+.4	-.4	+.2	-.5
84	+.6	-.7	+.7	-.9	+.3	-.6	+.5	-.4	+.5	-.4	+.4	-.5
87	+.6	-.6	+.7	-.8	+.2	-.5	+.5	-.1	+.5	-.4	+.3	-.4
90	+.5	-.6	+.6	-.9	+.1	-.5	+.4	-.1	+.4	-.4	+.2	-.4
93	+.5	-.6	+.5	-.9	+.1	-.5	+.4	-.1	+.4	-.6	+.1	-.5
96	+.4	-.7	+.5	-.9	0	-.6	+.4	-.1	+.4	-.6	+.1	-.5
99	+.4	-.6	+.4	-.9	0	-.6	+.2	-.1	+.2	-.6	0	-.5
102	+.4	-.6	+.4	-.8	0	-.5	+.1	-.1	+.1	-.6	0	-.4
105	+.4	-.6	+.4	-.9	0	-.5	+.1	-.1	+.1	-.7	0	-.4
108	+.3	-.6	+.3	-.9	0	-.6	+.1	-.3	+.1	-.7	0	-.6
111	+.1	-.7	+.1	-1.0	-.1	-.6	0	-.4	0	-.8	-.1	-.6

TABLE 4 (CONTINUED)

Results of Accuracy Tests After Endurance

Errors in Degrees

Generator Setting in Degrees	MOTORS											
	No. 15		No. 1		No. 9		No. 5		No. 10		No. 20	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
114	0	-.7	+.1	-1.0	-.2	-.6	0	-.4	0	-.8	-.2	-.5
117	+.1	-.7	+.2	-.9	-.1	-.6	+.1	-.3	0	-.8	-.1	-.5
120	0	-.5	+.2	-.7	0	-.4	0	-.1	0	-.6	-.1	-.4
123	+.2	-.4	+.3	-.6	-.1	-.2	+.1	0	-.1	-.5	0	-.1
126	+.2	-.3	+.3	-.6	-.1	-.2	+.1	0	+.2	-.5	0	-.1
129	+.1	-.2	+.1	-.4	-.1	-.1	+.1	+.1	+.1	-.3	-.1	0
132	0	-.3	0	-.5	-.2	-.1	0	+.1	0	-.4	-.2	-.1
135	0	-.2	0	-.5	-.2	-.1	0	+.1	-.1	-.3	-.3	-.1
138	-.1	-.1	0	-.4	-.4	-.1	-.2	+.2	-.1	-.3	-.4	0
141	-.2	0	0	-.3	-.4	0	-.3	+.3	-.1	-.2	-.5	+.1
144	-.3	+.1	-.2	-.1	-.4	+.1	-.3	+.4	-.2	0	-.4	+.3
147	-.3	0	-.1	-.1	-.4	0	-.3	+.3	-.2	-.1	-.4	+.1
150	-.3	0	-.2	-.3	-.5	0	-.3	+.4	-.3	0	-.5	+.1
153	-.4	0	-.4	-.3	-.5	0	-.5	+.2	-.4	-.1	-.5	+.1
156	-.4	0	-.4	-.3	-.6	0	-.5	+.3	-.4	-.1	-.6	+.1
159	-.4	+.1	-.2	0	-.5	+.2	-.4	+.3	-.4	0	-.5	+.3
162	-.4	+.3	-.3	0	-.5	+.3	-.4	+.4	-.4	+.1	-.5	+.4
165	-.2	+.3	0	0	-.5	+.4	-.3	+.2	-.2	+.3	-.5	+.4
168	-.3	+.3	-.1	0	-.4	+.3	-.3	+.4	-.2	+.1	-.5	+.4
171	-.4	+.3	-.2	0	-.5	+.3	-.4	+.4	-.3	+.1	-.5	+.4
174	-.4	+.3	-.3	0	-.5	+.3	-.4	+.3	-.3	+.1	-.5	+.3
177	-.5	+.4	-.3	0	-.6	+.4	-.4	+.4	-.3	+.1	-.6	+.4
180	-.6	+.3	-.3	0	-.6	+.4	-.5	+.4	-.4	+.3	-.6	+.4
183	-.4	+.3	-.1	0	-.5	+.3	-.4	+.3	-.3	+.1	-.5	+.4
186	-.4	+.1	-.2	-.3	-.5	0	-.4	+.1	-.2	-.1	-.5	+.3
189	-.4	+.2	-.2	0	-.5	+.4	-.4	+.2	-.4	+.1	-.5	+.4
192	-.4	+.1	-.2	0	-.5	+.3	-.5	+.1	-.4	+.1	-.6	+.4
195	-.4	+.1	0	-.1	-.4	+.2	-.3	+.1	-.2	+.1	-.5	+.4
198	-.4	+.1	-.2	0	-.5	+.4	-.4	+.3	-.3	+.1	-.6	+.4
201	-.3	+.2	-.1	+.1	-.4	+.5	-.4	+.3	-.1	+.1	-.4	+.5
204	-.1	+.4	+.1	+.1	-.1	+.5	-.1	+.4	0	+.3	-.2	+.4
207	0	+.3	+.1	+.1	-.1	+.5	-.3	+.4	0	+.2	-.3	+.5
210	-.1	+.1	+.1	0	-.1	+.3	-.4	+.2	-.1	+.1	-.3	+.4
213	-.1	0	+.1	0	-.1	+.4	-.4	+.1	0	0	-.3	+.3
216	-.1	0	+.1	0	-.1	+.3	-.3	+.1	0	+.1	-.1	+.4
219	-.1	0	+.1	0	-.1	+.2	-.3	+.1	0	0	-.2	+.3
222	0	0	+.3	0	0	+.2	-.1	+.1	+.1	0	-.1	+.3
225	0	0	+.3	-.1	0	+.1	-.1	-.1	+.1	0	0	+.2
228	+.2	-.1	+.4	-.2	0	+.1	0	-.1	+.1	-.1	0	+.1
231	+.1	-.3	+.2	-.3	0	0	-.1	-.2	+.1	-.3	-.1	+.1
234	+.1	-.3	+.4	-.4	+.1	0	0	-.3	+.2	-.3	0	0
237	+.3	-.3	+.5	-.4	+.1	0	0	-.3	+.3	-.2	+.1	0

TABLE 4 (CONTINUED)

Results of Accuracy Tests After Endurance

Errors in Degrees

Generator Setting in Degrees	MOTORS											
	No. 15		No. 1		No. 9		No. 5		No. 10		No. 20	
	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw	cw	ccw
240	+.4	-.3	+.6	-.3	+.3	0	+.2	-.1	+.4	-.1	+.1	+.1
243	+.6	-.2	+.7	-.3	+.4	0	+.4	-.1	+.5	-.1	+.4	0
246	+.6	-.3	+.8	-.4	+.5	0	+.4	-.1	+.5	-.2	+.4	0
249	+.6	-.4	+.9	-.4	+.5	0	+.4	-.1	+.6	-.3	+.4	0
252	+.5	-.4	+.7	-.4	+.4	0	+.4	-.3	+.5	-.4	+.4	-.1
255	+.5	-.5	+.7	-.5	+.4	-.1	+.2	-.3	+.3	-.3	+.3	-.1
258	+.4	-.5	+.6	-.6	+.4	-.1	+.2	-.4	+.4	-.4	+.4	-.1
261	+.6	-.5	+.7	-.6	+.4	-.2	+.2	-.4	+.4	-.5	+.4	-.2
264	+.6	-.6	+.7	-.6	+.5	-.3	+.2	-.5	+.5	-.6	+.4	-.3
267	+.6	-.6	+.7	-.7	+.4	-.2	+.2	-.5	+.4	-.6	+.4	-.3
270	+.6	-.7	+.7	-.8	+.4	-.4	+.2	-.6	+.4	-.6	+.4	-.4
273	+.6	-.8	+.7	-.9	+.4	-.5	+.1	-.6	+.4	-.7	+.4	-.4
276	+.6	-.8	+.7	-.9	+.4	-.4	+.2	-.7	+.4	-.6	+.4	-.4
279	+.6	-.7	+.9	-.8	+.4	-.4	+.2	-.6	+.4	-.6	+.4	-.4
282	+.7	-.7	+.9	-.8	+.5	-.3	+.3	-.6	+.4	-.6	+.4	-.4
285	+.6	-.6	+.8	-.7	+.5	-.3	+.3	-.5	+.4	-.6	+.5	-.4
288	+.6	-.6	+.7	-.7	+.5	-.2	+.3	-.5	+.4	-.5	+.5	-.4
291	+.5	-.6	+.6	-.7	+.4	-.4	+.1	-.5	+.3	-.6	+.4	-.4
294	+.4	-.6	+.6	-.6	+.4	-.4	+.1	-.5	+.2	-.5	+.3	-.4
297	+.3	-.6	+.5	-.6	+.3	-.4	0	-.5	+.1	-.5	+.2	-.4
300	+.3	-.6	+.5	-.6	+.1	-.3	-.1	-.4	0	-.4	-.1	-.2
303	+.4	-.4	+.5	-.6	+.2	-.1	-.1	-.3	0	-.4	+.1	-.1
306	+.3	-.4	+.4	-.6	0	-.1	-.1	-.3	-.1	-.3	+.1	-.3
309	+.3	-.5	+.4	-.6	0	-.1	-.1	-.4	-.1	-.4	+.1	-.2
312	+.1	-.5	+.3	-.6	0	-.1	-.2	-.4	-.1	-.5	0	-.3
315	+.1	-.5	+.3	-.6	0	-.2	-.1	-.3	-.2	-.4	0	-.1
318	+.1	-.4	+.2	-.6	0	-.1	-.3	-.1	-.3	-.4	0	-.1
321	+.1	-.3	+.2	-.4	0	0	-.3	-.1	-.2	-.1	0	0
324	+.2	-.1	+.4	-.2	0	0	-.2	+.5	-.1	0	0	0
327	+.2	0	+.3	-.1	0	+.2	-.2	+.5	-.2	+.1	0	+.1
330	+.1	0	+.3	-.1	0	+.1	-.3	+.5	-.3	+.3	0	+.1
333	0	-.1	+.1	-.1	-.1	+.1	-.4	+.6	-.3	+.3	-.1	+.1
336	-.1	0	0	-.1	-.3	+.2	-.5	+.6	-.5	+.3	-.3	+.1
339	-.1	0	0	0	-.4	+.3	-.5	+.7	-.5	+.4	-.3	+.3
342	-.1	0	-.1	-.1	-.4	+.3	-.6	+.6	-.5	+.4	-.4	+.2
345	-.1	+.1	0	-.1	-.4	+.3	-.6	+.6	-.5	+.4	-.3	+.2
348	-.1	0	-.1	+.1	-.4	+.2	-.5	+.5	-.5	+.3	-.4	+.1
351	-.2	0	-.1	-.2	-.4	+.1	-.6	+.5	-.6	+.1	-.4	0
354	-.1	-.1	0	-.3	-.4	0	-.6	+.6	-.5	+.1	-.4	0
357	-.1	0	0	-.2	-.4	+.1	-.5	+.6	-.5	+.2	-.4	0
360	-.1	+.1	+.1	-.1	-.3	+.2	-.5	+.6	-.4	+.4	-.4	+.2

TABLE 5

Results of Accuracy Tests After Endurance

Errors in Degrees

Type "B" transmitter-generator connected to 20 type "M" indicator-motors. Error of only 2 motors recorded. Motors and generators set to electrical zero before test. Errors marked (+) lead the direction of rotation, those marked (-) lag. Thus a (+) error in the cw direction indicates the same geometrical position as a corresponding (-) error in the ccw direction. (115 volts, a.c., 60 cycle supply).

Generator Setting in Degrees	Motor No. 15		Motor No. 1	
	cw	ccw	cw	ccw
3	-.2	0	0	-.2
6	-.2	0	0	-.2
9	-.3	0	-.1	-.1
12	-.3	0	-.1	-.1
15	-.3	0	-.1	0
18	-.4	0	-.2	0
21	-.2	+.1	-.2	0
24	-.4	+.1	-.3	0
27	-.4	+.1	-.3	+.1
30	-.4	+.1	-.3	0
33	-.5	+.3	-.4	+.1
36	-.4	+.1	-.3	0
39	-.4	+.1	-.3	0
42	-.4	0	-.3	0
45	-.3	0	-.1	0
48	-.2	0	-.1	-.1
51	-.4	0	-.3	0
54	-.4	+.1	-.4	0
57	-.5	+.1	-.4	0
60	-.4	+.1	-.4	0
63	-.4	+.1	-.3	0
66	-.4	+.1	-.3	0
69	-.3	+.1	-.3	0
72	-.4	+.1	-.3	+.1
75	-.4	+.1	-.3	0
78	-.4	0	-.3	0
81	-.4	+.1	-.3	0
84	-.3	0	-.1	-.1
87	-.2	0	0	-.1
90	-.3	0	-.2	0
93	-.3	0	-.2	0
96	-.4	0	-.3	0
99	-.4	0	-.3	0
102	-.3	0	-.2	0
105	-.2	0	-.3	-.1
108	-.2	0	-.2	0
111	-.2	0	-.1	-.1
114	-.2	0	-.1	-.1
117	-.1	-.1	-.1	-.1
120	0	-.1	0	-.1
123	0	-.3	0	-.2
126	0	-.2	0	-.2
129	0	-.2	0	-.2
132	0	-.2	0	-.2
135	0	-.1	0	-.3
138	-.1	-.1	0	-.2
141	-.1	-.1	0	-.2
144	0	-.3	0	-.3
147	0	-.3	0	-.3
150	0	-.2	0	-.4
153	0	-.3	0	-.3
156	0	-.3	+.1	-.4
159	+.1	-.4	+.2	-.4
162	+.1	-.4	+.2	-.4
165	0	-.4	+.3	-.5
168	+.1	-.4	+.3	-.5
171	0	-.4	+.2	-.5
174	0	-.4	+.2	-.5
177	0	-.3	+.2	-.5
180	0	-.2	+.2	-.5
183	0	-.3	+.2	-.5
186	0	-.2	+.2	-.5
189	0	-.3	+.1	-.5
192	0	-.3	+.1	-.4
195	0	-.2	+.2	-.4
198	0	-.3	+.1	-.5
201	+.1	-.4	+.2	-.5
204	0	-.3	+.3	-.5
207	0	-.3	+.2	-.5
210	-.1	-.1	+.2	-.4
213	-.1	-.1	+.1	-.4
216	-.2	-.1	+.1	-.4
219	-.2	-.1	+.1	-.3
222	-.2	-.1	+.1	-.4

TABLE 5 (CONTINUED)

Results of Accuracy Tests After Endurance

Errors in Degrees

Generator Setting in Degrees	Motor No. 15		Motor No. 1	
	cw	ccw	cw	ccw
225	-.2	0	+.1	-.4
228	-.1	-.1	+.1	-.4
231	-.1	-.1	+.1	-.3
234	-.2	0	0	-.1
237	-.1	-.1	0	-.3
240	-.1	-.1	+.1	-.4
243	-.1	-.1	+.1	-.3
246	-.1	-.1	0	-.3
249	-.2	-.1	0	-.3
252	-.2	0	0	-.1
255	-.2	0	0	-.1
258	-.3	0	0	-.1
261	-.4	+.1	-.1	-.1
264	-.2	0	0	-.1
267	-.2	0	0	-.1
270	-.3	0	0	-.1
273	-.4	0	-.1	0
276	-.4	0	-.1	-.1
279	-.3	0	-.1	-.1
282	-.2	0	0	-.1
285	-.2	0	0	-.2
288	-.3	0	-.1	-.1
291	-.3	0	-.1	0
294	-.4	+.1	-.1	0
297	-.4	+.1	-.1	0
300	-.4	+.1	-.1	0
303	-.4	+.1	-.1	0
306	-.4	+.2	-.2	0
309	-.4	+.2	-.3	0
312	-.4	+.2	-.3	0
315	-.4	+.1	-.3	0
318	-.4	+.1	-.1	0
321	-.4	+.1	-.1	-.1
324	-.3	+.1	-.1	-.1
327	-.2	0	0	-.1
330	-.3	+.1	0	-.1
333	-.4	+.2	-.2	0
336	-.4	0	-.1	0
339	-.4	+.2	-.2	0
342	-.4	+.1	-.2	0
345	-.3	+.1	-.1	0
348	-.3	+.1	-.1	0
351	-.3	+.1	-.1	0
354	-.4	+.1	-.1	0
357	-.3	0	0	-.1
360	-.3	+.1	0	-.1

TABLE 6

Results of Accuracy Tests After Endurance

Errors in Degrees

One type "N" indicator-motor connected to a type "A" transmitter-generator. Motor and generator set to electrical zero before test. Errors marked (+) lead the direction of rotation, those marked (-) lag. Thus a (+) error in the cw direction indicates the same geometrical position as a corresponding (-) error in the ccw direction. (115 volts, a.c., 60 cycle supply).

Generator Setting in Degrees	Type N Motor cw	Type N Motor ccw	Generator Setting in Degrees	Type N Motor cw	Type N Motor ccw
3	-.1	-.3	114	-.9	+.5
6	+.1	-.4	117	-1.0	+.6
9	0	-.4	120	-1.1	+.6
12	0	-.4	123	-1.0	+.6
15	+.1	-.4	126	-.9	+.5
18	+.2	-.5	129	-.8	+.4
21	+.1	-.4	132	-.6	+.2
24	+.3	-.5	135	-.5	+.2
27	0	-.3	138	-.5	+.2
30	-.2	-.2	141	-.3	0
33	-.3	-.1	144	0	-.3
36	-.4	0	147	0	-.2
39	-.4	+.1	150	0	-.3
42	-.6	+.2	153	+.1	-.3
45	-.5	+.2	156	+.1	-.2
48	-.6	+.2	159	+.1	-.3
51	-.6	+.3	162	+.3	-.4
54	-.4	+.2	165	+.2	-.5
57	-.5	+.3	168	+.3	-.5
60	-.6	+.3	171	+.4	-.6
63	-.6	+.3	174	+.4	-.6
66	-.5	+.4	177	+.6	-.9
69	-.7	+.4	180	+.5	-.8
72	-.8	+.6	183	+.6	-.9
75	-.9	+.7	186	+.5	-.9
78	-1.0	+.9	189	+.6	-.8
81	-1.1	+1.0	192	+.5	-.7
84	-1.0	+.9	195	+.4	-.7
87	-1.0	+.9	198	+.4	-.6
90	-1.1	+1.0	201	+.2	-.4
93	-1.1	+.9	204	+.2	-.6
96	-1.0	+.9	207	+.1	-.4
99	-1.0	+.8	210	0	-.4
102	-1.0	+.6	213	0	-.4
105	-.9	+.5	216	0	-.3
108	-.9	+.5	219	0	-.4
111	-1.0	+.6	222	0	-.4

TABLE 6 (CONTINUED)

Results of Accuracy Tests After Endurance

Errors in Degrees

Generator Setting in Degrees	Type N Motor cw	Type N Motor ccw	Generator Setting in Degrees	Type N Motor cw	Type N Motor ccw
225	+.1	-.4	294	-1.0	+.7
228	-.1	-.2	297	-.9	+.6
231	-.2	-.1	300	-.9	+.5
234	-.3	0	303	-.8	+.4
237	-.4	+.2	306	-.7	+.4
240	-.6	+.4	309	-.7	+.9
243	-.6	+.3	312	-.6	+.5
246	-.6	+.3	315	-.6	+.4
249	-.7	+.4	318	-.8	+.4
252	-.7	+.4	321	-.7	+.5
255	-.7	+.4	324	-.6	+.4
258	-.8	+.5	327	-.5	+.3
261	-.8	+.4	330	-.5	+.3
264	-.8	+.3	333	-.4	+.2
267	-.8	+.4	336	-.3	0
270	-1.0	+.4	339	0	-.3
273	-1.0	+.4	342	0	-.4
276	-1.1	+.7	345	+.1	-.5
279	-1.1	+.8	348	0	-.4
282	-1.1	+.8	351	+.2	-.5
285	-1.0	+.7	354	+.1	-.4
288	-1.0	+.7	357	0	-.2
291	-1.0	+.7	360	-.1	-.1

TABLE 7

Torque, Torque Gradient, and Maximum Torque in Inch-Ounces - Single Type "M" Motors Connected to a Type "A" Generator - 115 Volt, 60 Cycle Supply

Displacement in Degrees from Electrical Zero	Motor Numbers					
	15	1	9	5	10	20
CW						
1	.30	.30	.29	.27	.28	.30
2	.59	.58	.59	.55	.57	.58
3	.89	.90	.88	.83	.86	.89
4	1.21	1.17	1.15	1.10	1.15	1.19
5	1.50	1.45	1.45	1.38	1.45	1.49
6	1.80	1.74	1.73	1.65	1.73	1.78
7	2.08	2.03	2.00	2.01	2.01	2.05
8	2.40	2.32	2.29	2.35	2.34	2.37
9	2.69	2.61	2.58	2.60	2.60	2.66
10	2.98	2.87	2.87	2.90	2.91	2.96
CCW						
1	.30	.27	.27	.29	.31	.29
2	.60	.58	.57	.60	.58	.59
3	.89	.86	.84	.88	.88	.88
4	1.22	1.17	1.12	1.18	1.17	1.19
5	1.50	1.46	1.40	1.48	1.48	1.48
6	1.80	1.77	1.70	1.76	1.79	1.79
7	2.11	2.07	2.00	2.07	2.06	2.12
8	2.41	2.36	2.27	2.37	2.37	2.42
9	2.72	2.64	2.58	2.67	2.65	2.73
10	3.02	2.95	2.85	2.97	2.95	3.02
Torque Gradient	.30	.29	.28	.29	.29	.30
Max. Torque CW	20.45	21.50	23.76	21.48	21.30	21.05
Max. Torque CCW	23.45	23.38	22.85	23.25	24.10	23.28

TABLE 8

Torque, Torque Gradient, and Maximum Torque in Inch-Ounces - Single Type "M" Motors Connected to a Type "B" Generator - 115 Volt, 60 Cycle Supply

Displacement in Degrees from Electrical Zero	Motor Numbers					
	15	1	9	5	10	20
CW						
1	.44	.43	.42	.40	.39	.42
2	.88	.86	.88	.84	.84	.87
3	1.34	1.28	1.28	1.27	1.31	1.32
4	1.78	1.70	1.68	1.69	1.72	1.75
5	2.26	2.13	2.10	2.16	2.17	2.17
6	2.68	2.55	2.52	2.52	2.60	2.60
7	3.10	3.01	2.95	2.95	3.06	3.06
8	3.49	3.45	3.35	3.35	3.50	3.50
9	3.90	3.85	3.78	3.75	3.95	3.92
10	4.33	4.24	4.31	4.18	4.38	4.37
CCW						
1	.43	.43	.43	.43	.45	.44
2	.87	.85	.86	.84	.88	.86
3	1.30	1.28	1.30	1.28	1.33	1.32
4	1.74	1.71	1.70	1.69	1.76	1.78
5	2.22	2.20	2.14	2.11	2.16	2.18
6	2.66	2.58	2.56	2.52	2.62	2.62
7	3.11	3.00	2.99	2.96	3.05	3.05
8	3.56	3.44	3.41	3.36	3.50	3.47
9	3.99	3.88	3.83	3.82	3.91	3.91
10	4.39	4.31	4.23	4.27	4.36	4.35
Torque Gradient	.44	.43	.43	.42	.44	.44
Max. Torque CW	33.9	34.6	36.3	36.3	36.4	39.7
Max. Torque CCW	38.6	36.8	39,8	40.0	39.9	41.1

TABLE 9

Torque, Torque Gradient, and Maximum Torque in Inch-Ounces - Type "B" Generator Connected to Type "B" Generator - 115 Volt, 60 Cycle Supply

Displacement in Degrees from Electrical Zero	CW Torque in Inch-Ounces	CCW Torque in Inch-Ounces
1	.74	.76
2	1.48	1.49
3	2.19	2.24
4	2.89	2.96
5	3.61	3.72
6	4.34	4.44
7	5.05	5.15
8	5.76	5.87
9	6.50	6.60
10	7.16	7.36
Torque Gradient	.726	
Maximum Torque	86.3	90.0

TABLE 10

Torque, Torque Gradient, and Maximum Torque in Inch-Ounces - Type "N" Motor Connected to a Type "A" Generator - 115 Volt, 60 Cycle Supply

Displacement in Degrees from Electrical Zero	CW Torque in Inch-Ounces	CCW Torque in Inch-Ounces
1	.064	.111
2	.152	.196
3	.243	.291
4	.350	.376
5	.425	.461
6	.506	.547
7	.600	.629
8	.687	.723
9	.778	.799
10	.862	.887
Torque Gradient	.0875	
Maximum Torque	5.43	4.97

TABLE 11

Oscillation test - time (in seconds) required for pointer to come to rest as determined by oscillographic timing using pointers furnished by manufacturer. Results marked (*) were obtained after the endurance test. All others were obtained before the endurance test. 115 volt, 60 cycle supply - Motor shafts horizontal.

Type of Generator	Motor No.	Degrees Displacement	Seconds for Pointer to Come to Rest
A	1	180	1.71
A	9	180	*1.63
A	5	180	2.01
A	10	180	1.93
A	20	180	1.76
A	15	180	1.88
A	15	90	1.73
A	15	20	1.18
A	15	10	.46
A	15	5	.31
B	1	180	1.60
B	9	180	1.31
B	5	180	* .66
B	10	180	1.95
B	20	180	1.95
B	15	180	1.78
B	15	90	*1.03
B	15	20	1.0
B	15	10	.60
B	15	5	.12
A	N	180	2.30
A	N	90	1.46
A	N	20	.73
A	N	10	.63
A	N	5	.45

TABLE 12

Maximum Temperature Rise of Windings During Endurance Test at 65°C. Results given in °C. One type "A" transmitter-generator connected to 6 type "M" indicator-motors. 115 volt, 60 cycle supply.

Indicator Motor No.	Windings Measured			
	S_1-S_2	R_1-R_2	R_2-R_3	R_1-R_3
2	21.0	18.0	16.7	17.5
8	20.7	14.7	15.0	14.5
11	24.0	36.7	18.0	26.5
14	22.0	17.5	14.5	16.5
15	27.0	16.2	16.5	15.7
17	22.2	16.0	16.0	19.5
Type "A" generator	20.25	12.75	12.75	13.25

TABLE 13

Maximum temperature rise of windings during endurance test at 65°C. Results given in °C. One type "B" transmitter-generator connected to 20 type "M" indicator-motors. 115 volt, 60 cycle supply.

Indicator-Motor No.	Windings Measured			
	S_1-S_2	R_1-R_2	R_2-R_3	R_1-R_3
1	34.7	19.2	19.2	27.0
2	19.2	16.2	17.5	18.3
3	18.0	11.7	11.5	9.7
4	19.2	13.5	12.0	12.7
5	18.0	8.2	12.0	9.0
6	25.2	17.5	19.5	21.0
7	21.0	11.5	6.75	10.5
8	19.5	15.0	12.7	17.5
9	21.7	43.5	13.5	13.5
10	18.0	18.0	16.7	15.0
11	25.2	24.7	19.2	22.2
12	25.2	18.0	17.2	18.7
13	17.5	11.2	14.5	15.0
14	40.25	18.7	13.5	12.0
15	25.0	20.5	16.5	19.2
16	15.0	8.7	7.2	10.2
17	21.2	18.0	15.2	16.2
18	18.0	16.0	12.0	21.0
19	17.7	13.5	27.0	27.0
20	23.5	12.0	15.0	17.5
Type "B" generator	31.2	19.2	19.5	20.2

TABLE 14

Maximum temperature rise of windings during endurance test at 65°C. Results given in °C. One type "A" transmitter-generator connected to one type "N" indicator-motor. 115 volt, 60 cycle supply.

	Windings Measured			
	S_1-S_2	R_1-R_2	R_2-R_3	R_1-R_3
Type "N" motor	31.2	27.0	26.5	27.0
Type "A" generator	34.2	30.0	27.2	26.5

TABLE 15

SUMMARY OF ACCURACY TESTS FROM TABLES 1 to 6, INCLUSIVE

Condition	Range of errors and maximum errors - in degrees											
	Motor No. 15		Motor No. 1		Motor No. 9		Motor No. 5		Motor No. 10		Motor No. 20	
(Table 1) Before endurance	CW	CCW	CW	CCW	CW	CCW	CW	CCW	CW	CCW	CW	CCW
115 volts, 60 cycles	+.3-1.0	+.9-.4	+1.0-.8	+.9-1.2	+.5-.7	+.6-.6	+.5-.7	+.6-.5	+.4-.7	+.5-.5	+.5-.7	+.6-.6
103.5 volts, 65 cycles	+.2-1.1	+.9-.4	+1.0-.8	+.6-1.3	+.4-.8	+.6-.6	+.3-.8	+.7-.5	+.4-.7	+.6-.5	+.5-.9	+.7-.9
126.5 volts, 55 cycles	+.4-.9	+.7-.5	+1.0-.6	+.6-1.2	+.6-.6	+.6-.6	+.6-.6	+.7-.7	+.5-.7	+.8-.6	+.5-.7	+.6-.6
Maximum error	-1.1		-1.3		-.8		-.8		+.8		-.9	
Total variation in indications	1.6		2.2		1.4		1.5		1.4		1.8	
(Table 4) After endurance	CW	CCW	CW	CCW	CW	CCW	CW	CCW	CW	CCW	CW	CCW
115 volts, 60 cycles	+.7-.6	+.4-.8	+.9-.4	+.1-1.0	+.5-.6	+.5-.6	+.5-.6	+.7-.7	+.6-.6	+.4-.8	+.5-.6	+.5-.6
Maximum error	-.8		-1.0		-.6		-.7		-.8		-.6	
Total variation in indications	1.4		1.4		1.2		1.4		1.4		1.2	

TABLE 15 (CONTINUED)

SUMMARY OF ACCURACY TESTS FROM TABLES 1 TO 6, INCLUSIVE

	Range of errors and maximum errors - in degrees			
	Motor No. 15		Motor No. 1	
(Table 2) Before endurance	CW	CCW	CW	CCW
115 volts, 60 cycles	+.1-.6	+.4-.3	+.7-.1	0-1.0
103.5 volts, 65 cycles	+.3-.5	+.1-.5	+.9-.4	-.2-1.3
126.5 volts, 55 cycles	+.3-.5	+.4-.5	+.7-.3	0-.9
Maximum error	-.6		-1.3	
Total variation in indications	1.1		1.7	
(Table 5) After endurance	CW	CCW	CW	CCW
115 volts, 60 cycles	+.1-.5	+.4-.4	+.3-.4	+.1-.5
Maximum error	-.5		-.5	
Total variations in indications	.9		.9	

TABLE 15 (CONTINUED)

SUMMARY OF ACCURACY TESTS FROM TABLES 1 TO 6, INCLUSIVE

Range of errors and maximum errors - in degrees

	Motor Type "N"	
(Table 3) Before endurance	CW	CCW
115 volts, 60 cycles	+.4-.6	+.7-.4
103.5 volts, 65 cycles	+.5-.6	+.6-.4
126.5 volts, 55 cycles	+.4-.6	+.6-.4
Maximum error	+.7	
Total variation in indications	1.2	
(Table 6) After endurance	CW	CCW
115 volts, 60 cycles	+.6-1.1	+1.0-.9
Maximum error	-1.1	
Total variation in indications	2.0	

Plate 1

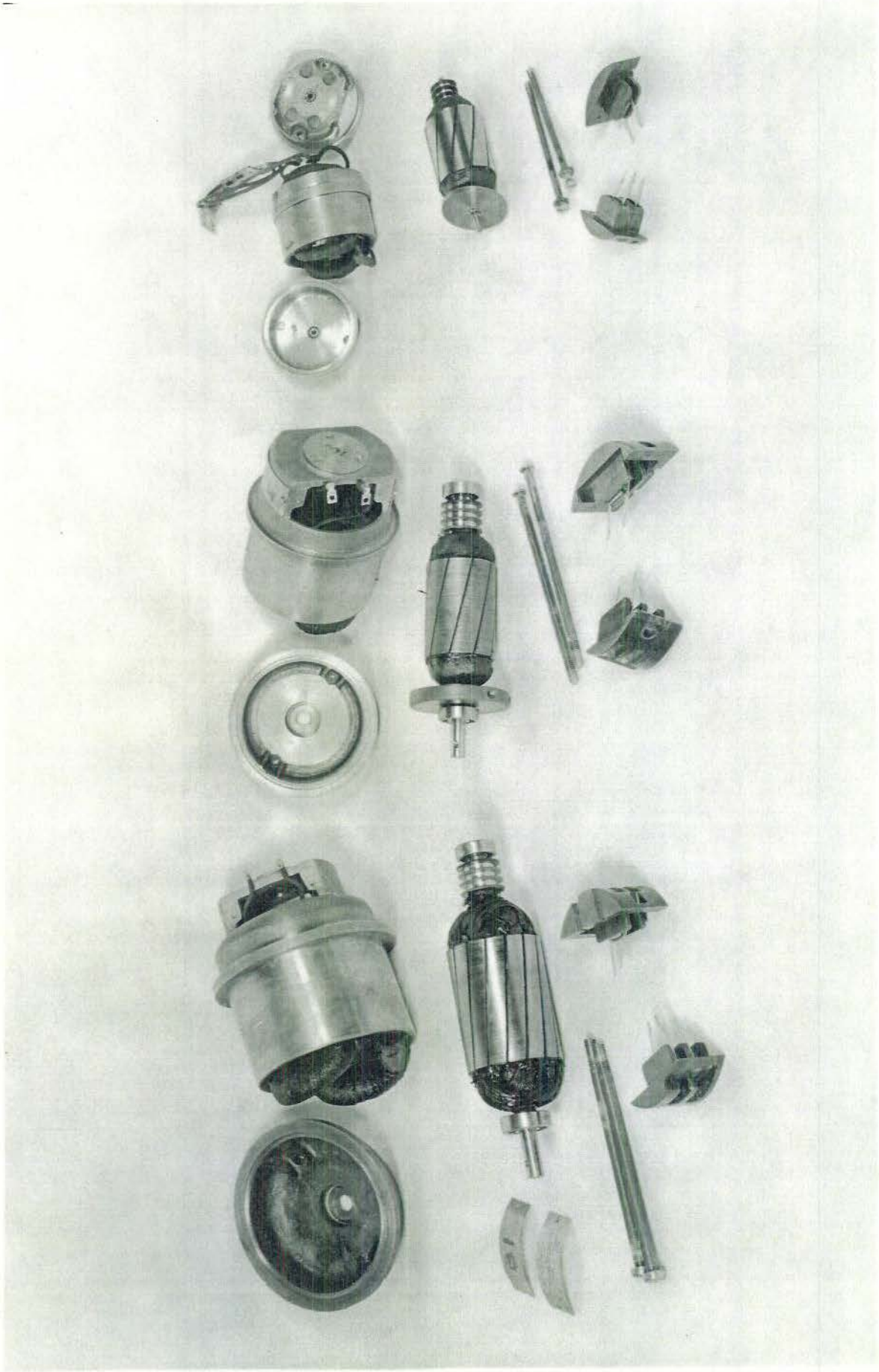


Plate 2

ACCURACY, TYPE "M" MOTOR NO. 15 – ERROR IN DEGREES BEFORE ENDURANCE – DATA FROM TABLE 1

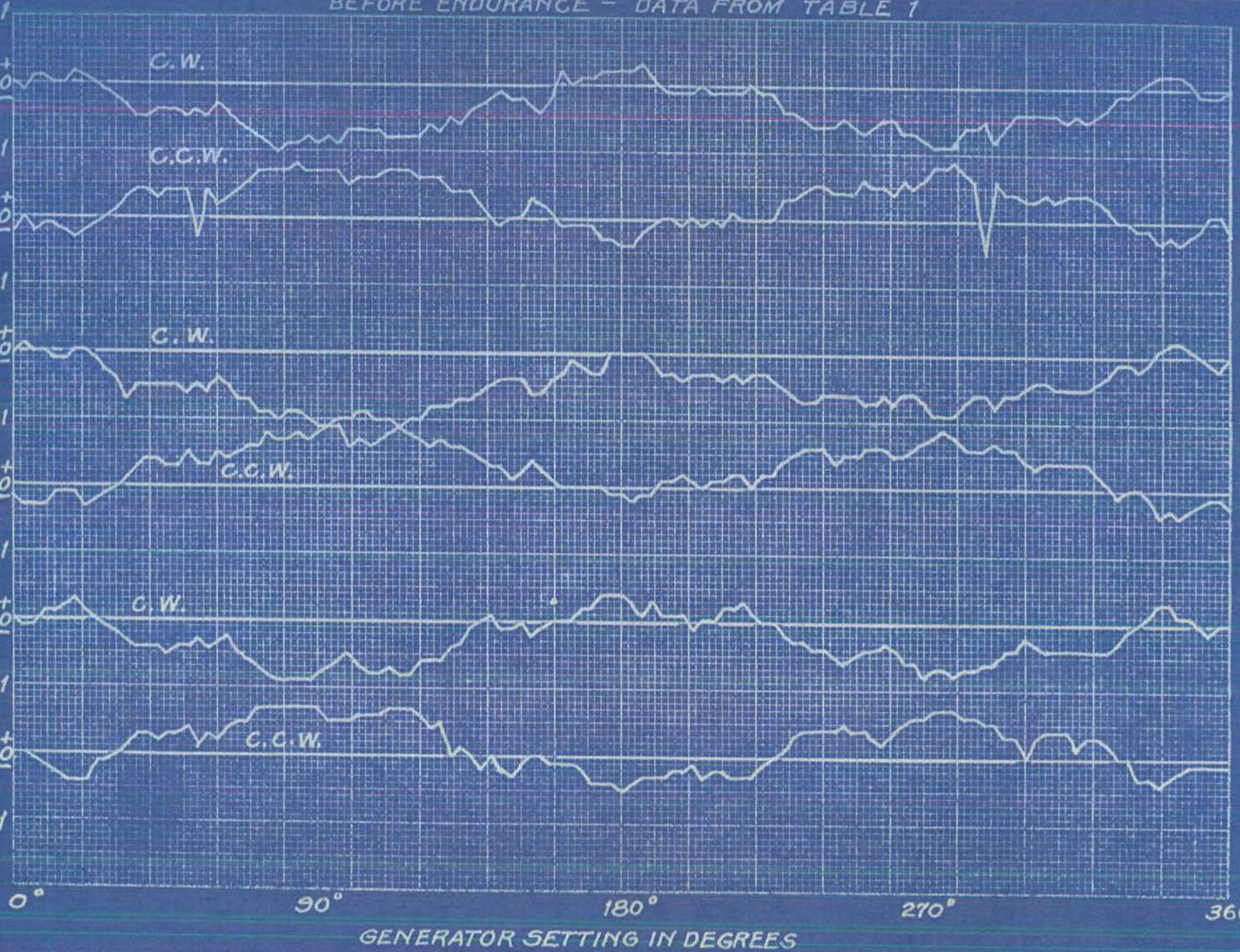
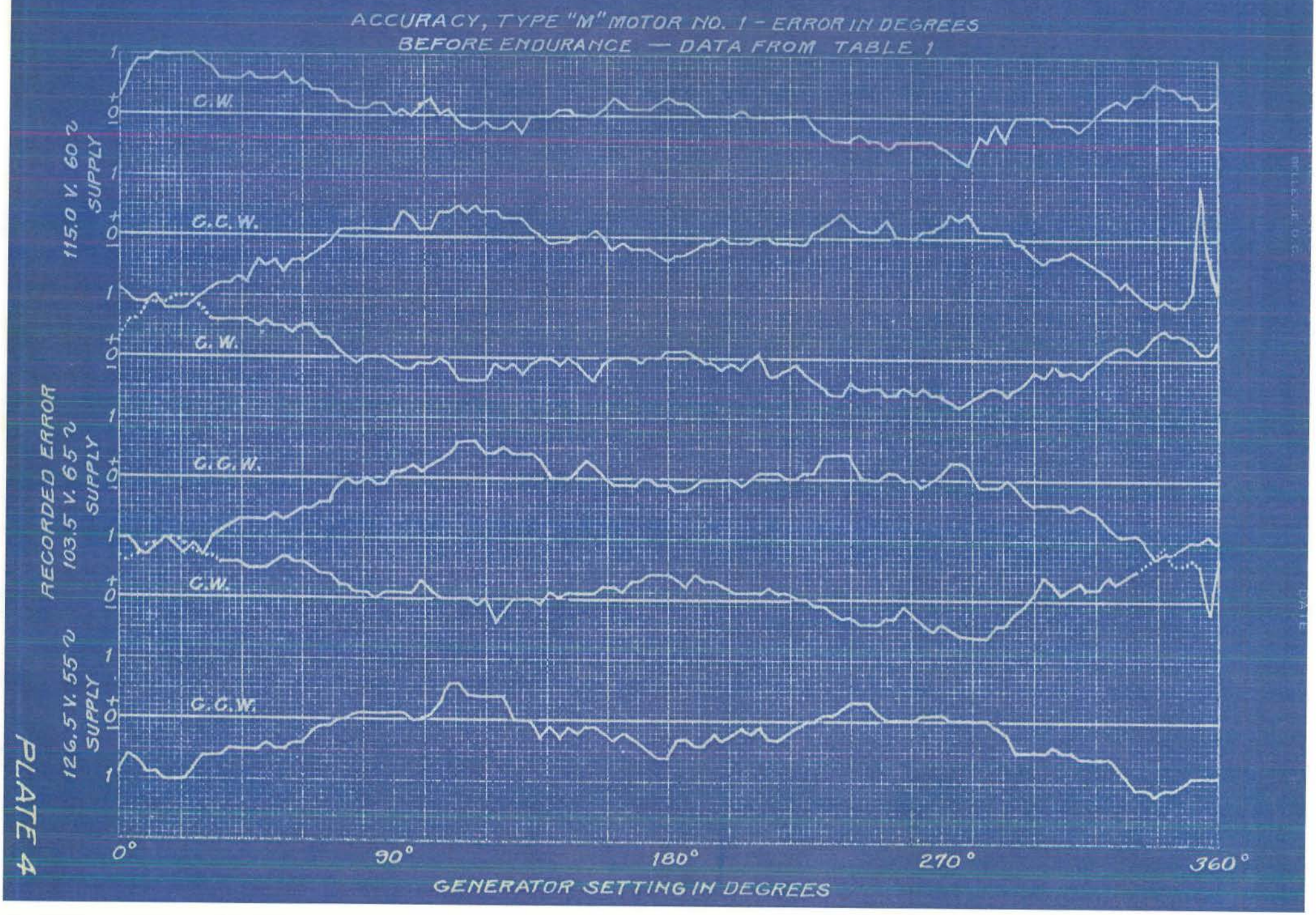


PLATE 3


ACCURACY, TYPE "M" MOTOR NO. 1 - ERROR IN DEGREES
BEFORE ENDURANCE — DATA FROM TABLE 1
RECORDED ERROR
115.0 V. 60 ~ SUPPLY
C.W.
C.C.W.
103.5 V. 65 ~ SUPPLY
C.W.
C.C.W.
126.5 V. 55 ~ SUPPLY
C.W.
C.C.W.
1
10+
1
10+
1
10+
1
10+
1
10+
1
0°
90°
180°
270°
360°
GENERATOR SETTING IN DEGREES
PLATE 4

ACCURACY, TYPE "M" MOTOR NO. 9 - ERROR IN DEGREES
BEFORE ENDURANCE — DATA FROM TABLE 1

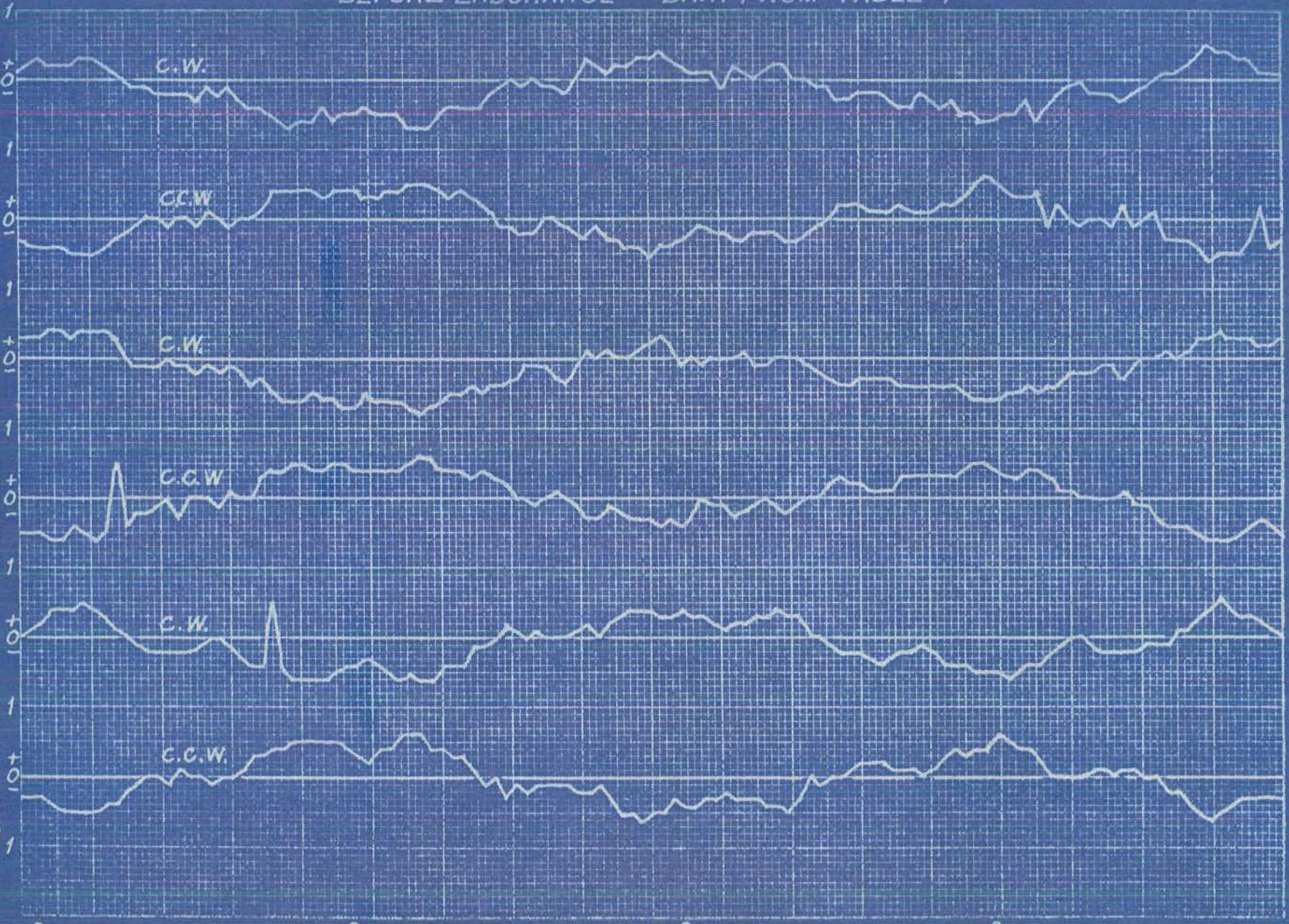


PLATE 5

DATE

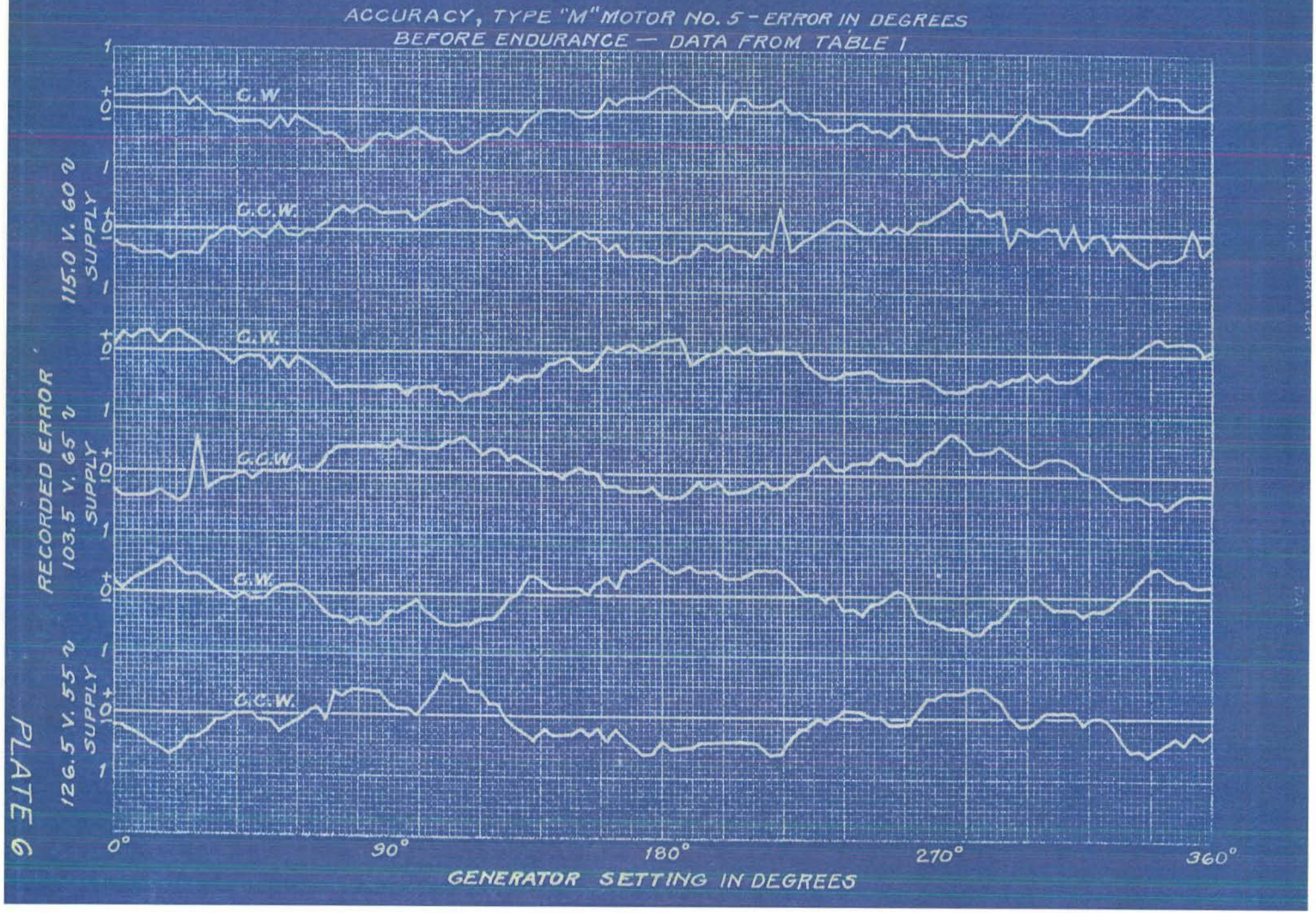


PLATE 6

ACCURACY, TYPE "M" MOTOR NO. 10 - ERROR IN DEGREES
BEFORE ENDURANCE - DATA FROM TABLE I

PLATE 7

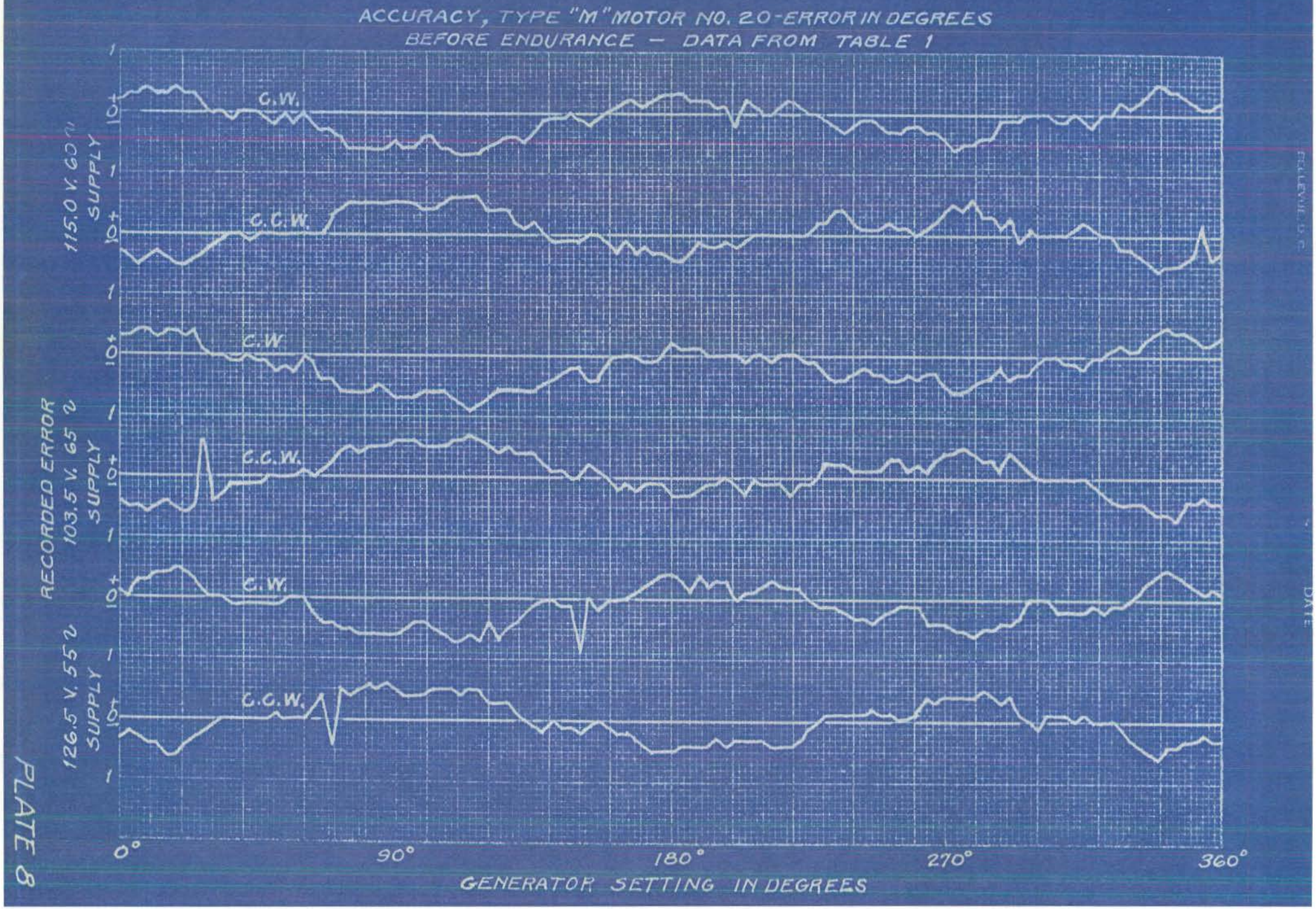

ACCURACY, TYPE "M" MOTOR NO. 20-ERROR IN DEGREES
BEFORE ENDURANCE — DATA FROM TABLE 1
RECORDED ERROR
126.5 V. 55 ~ SUPPLY
103.5 V. 65 ~ SUPPLY
115.0 V. 60 ~ SUPPLY
C.W.
C.C.W.
C.W.
C.C.W.
C.W.
C.C.W.
10+
1
0°
90°
180°
270°
360°
GENERATOR SETTING IN DEGREES

PLATE 8

ACCURACY, TYPE "M" MOTOR NO. 15 - ERROR IN DEGREES BEFORE ENDURANCE — DATA FROM TABLE 2

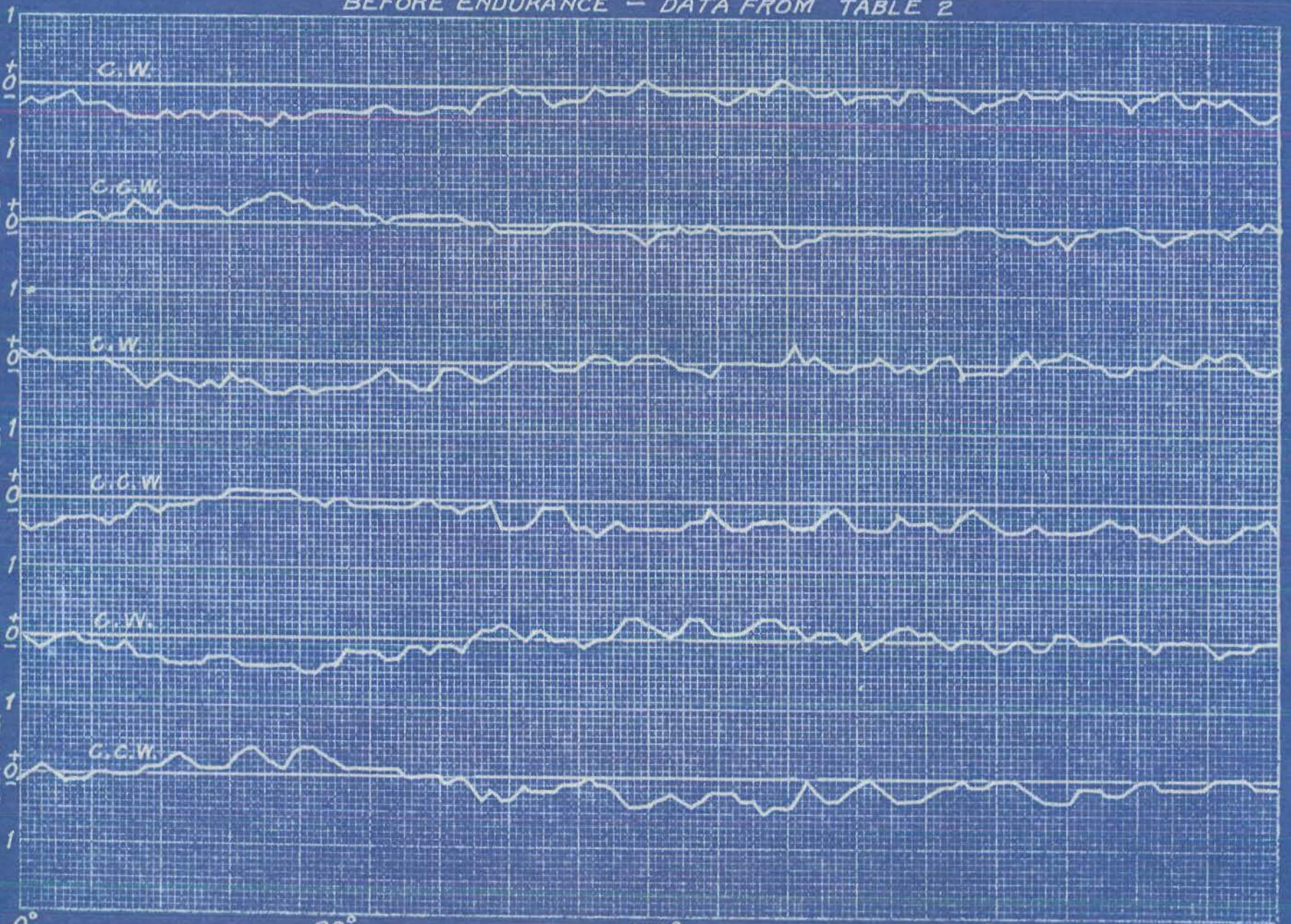


PLATE 9

PLATE 10

ACCURACY, TYPE "M" MOTOR NO. 1 - ERROR IN DEGREES
BEFORE ENDURANCE — DATA FROM TABLE 2

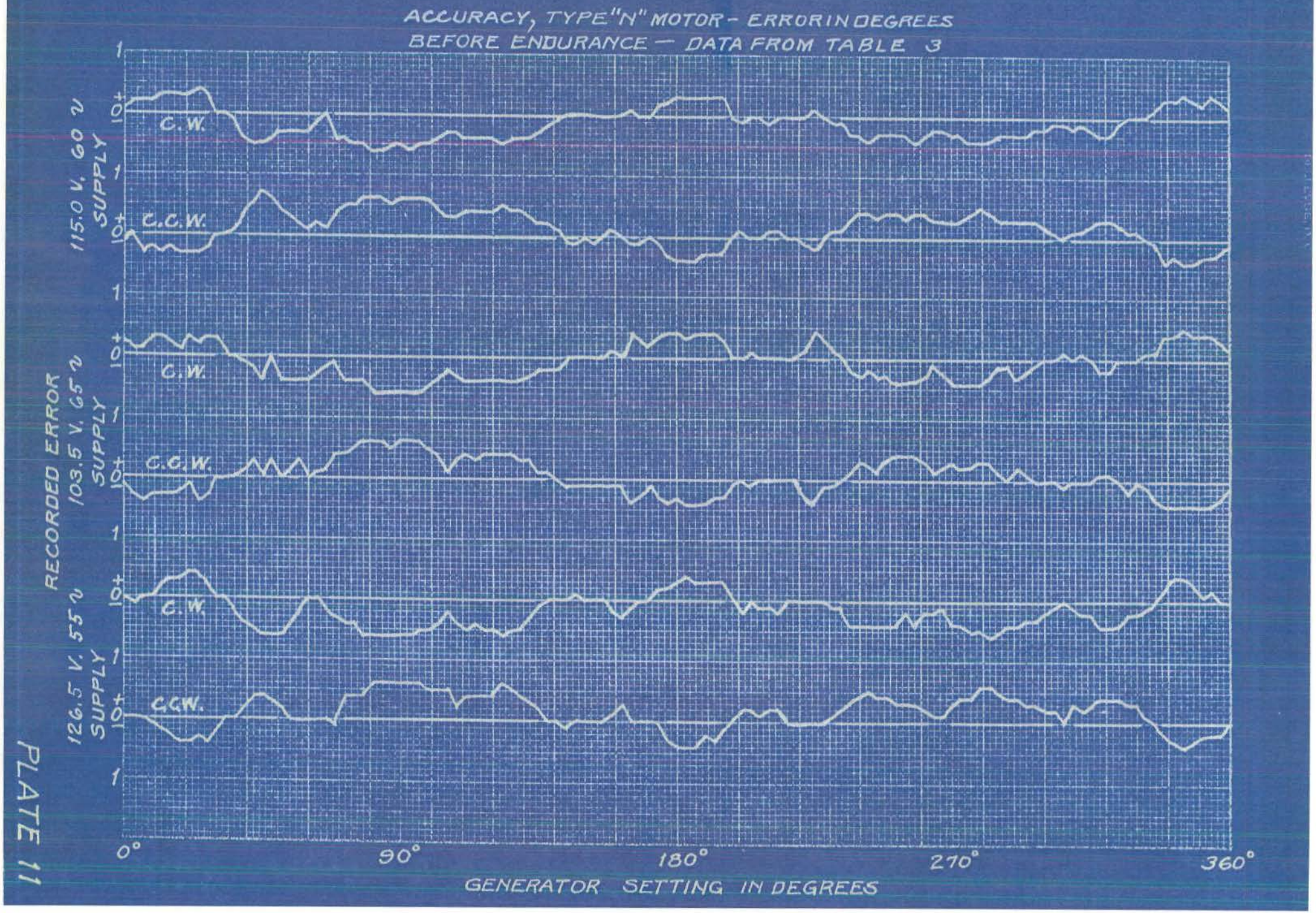
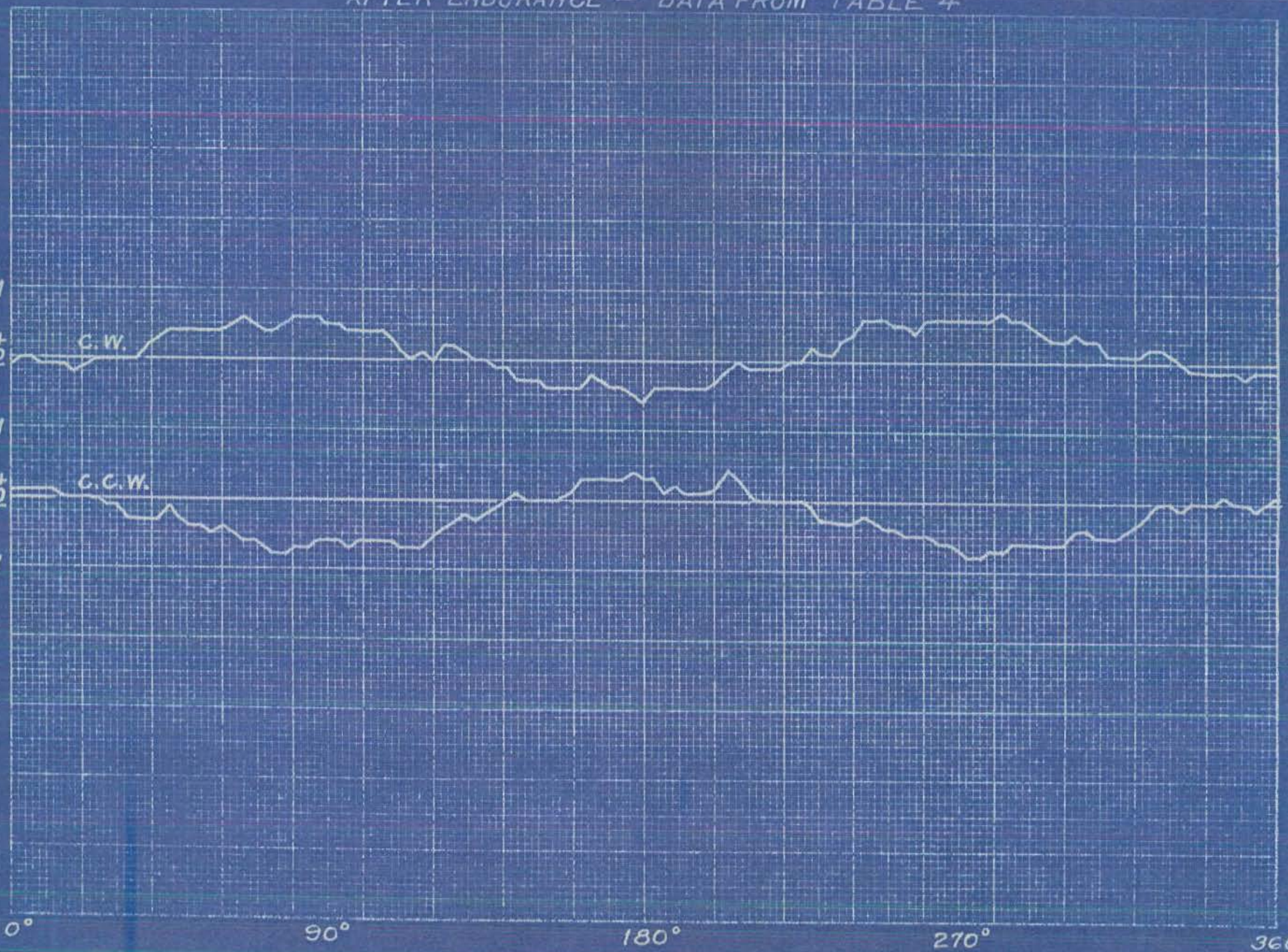

ACCURACY, TYPE "N" MOTOR - ERROR IN DEGREES
BEFORE ENDURANCE — DATA FROM TABLE 3
RECORDED ERROR
126.5 V. 55 ~ SUPPLY
C.W.
C.C.W.
103.5 V. 65 ~ SUPPLY
C.W.
C.C.W.
115.0 V. 60 ~ SUPPLY
C.W.
C.C.W.
1
0
+
1
0°
90°
180°
270°
360°
GENERATOR SETTING IN DEGREES

PLATE 11

ACCURACY, TYPE "M" MOTOR NO. 15 - ERROR IN DEGREES
AFTER ENDURANCE — DATA FROM TABLE 4



RECORDED ERROR
115.0 V.-60 ~
SUPPLY

GENERATOR SETTING IN DEGREES

PLATE 12

ACCURACY, TYPE "M" MOTOR NO. 1 - ERROR IN DEGREES
AFTER ENDURANCE — DATA FROM TABLE 4

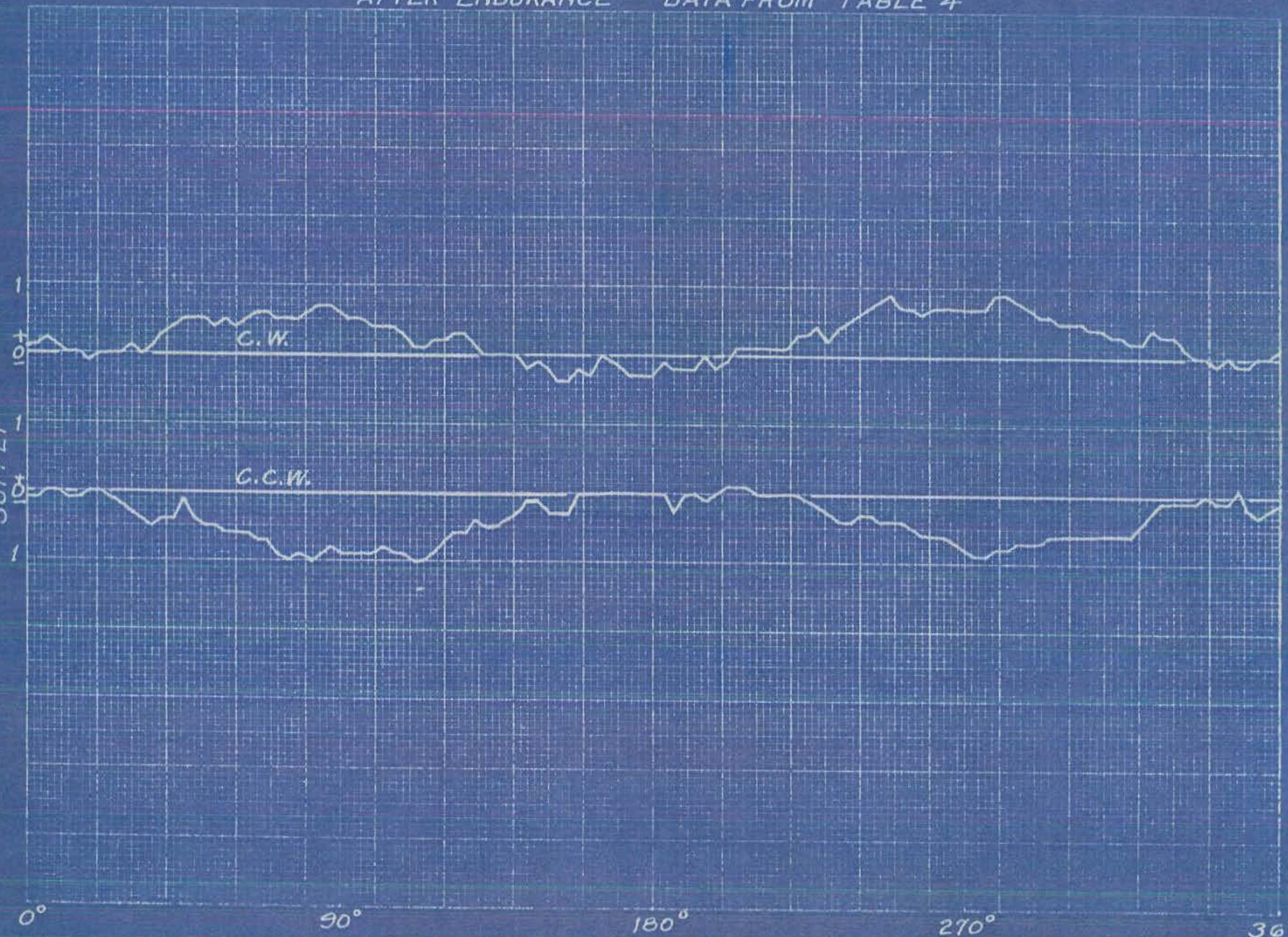


PLATE 13

ACCURACY, TYPE "M" MOTOR NO. 9 - ERROR IN DEGREES
AFTER ENDURANCE — DATA FROM TABLE 4

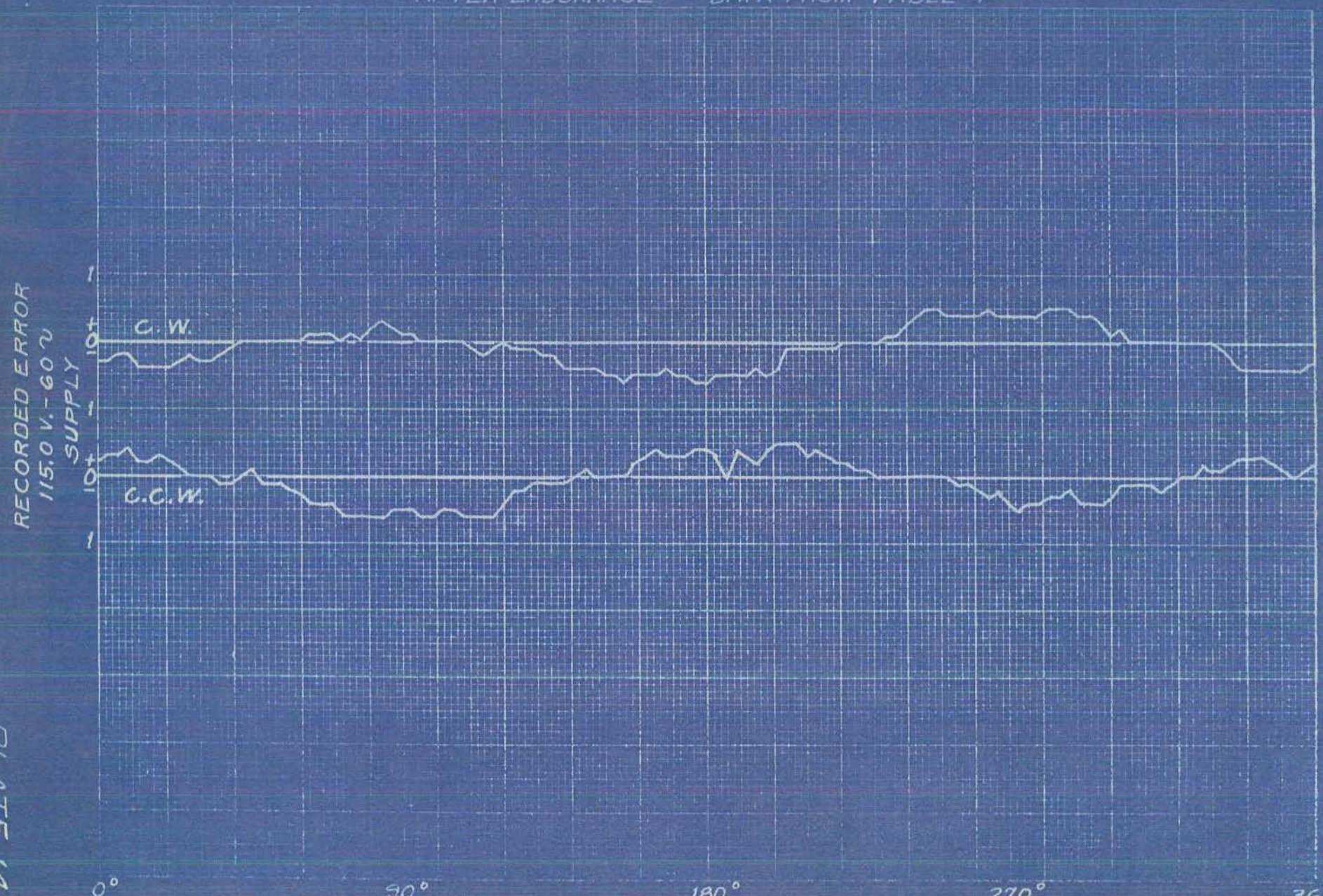


PLATE 14

ACCURACY, TYPE "M" MOTOR NO. 5 - ERROR IN DEGREES
AFTER ENDURANCE — DATA FROM TABLE 4

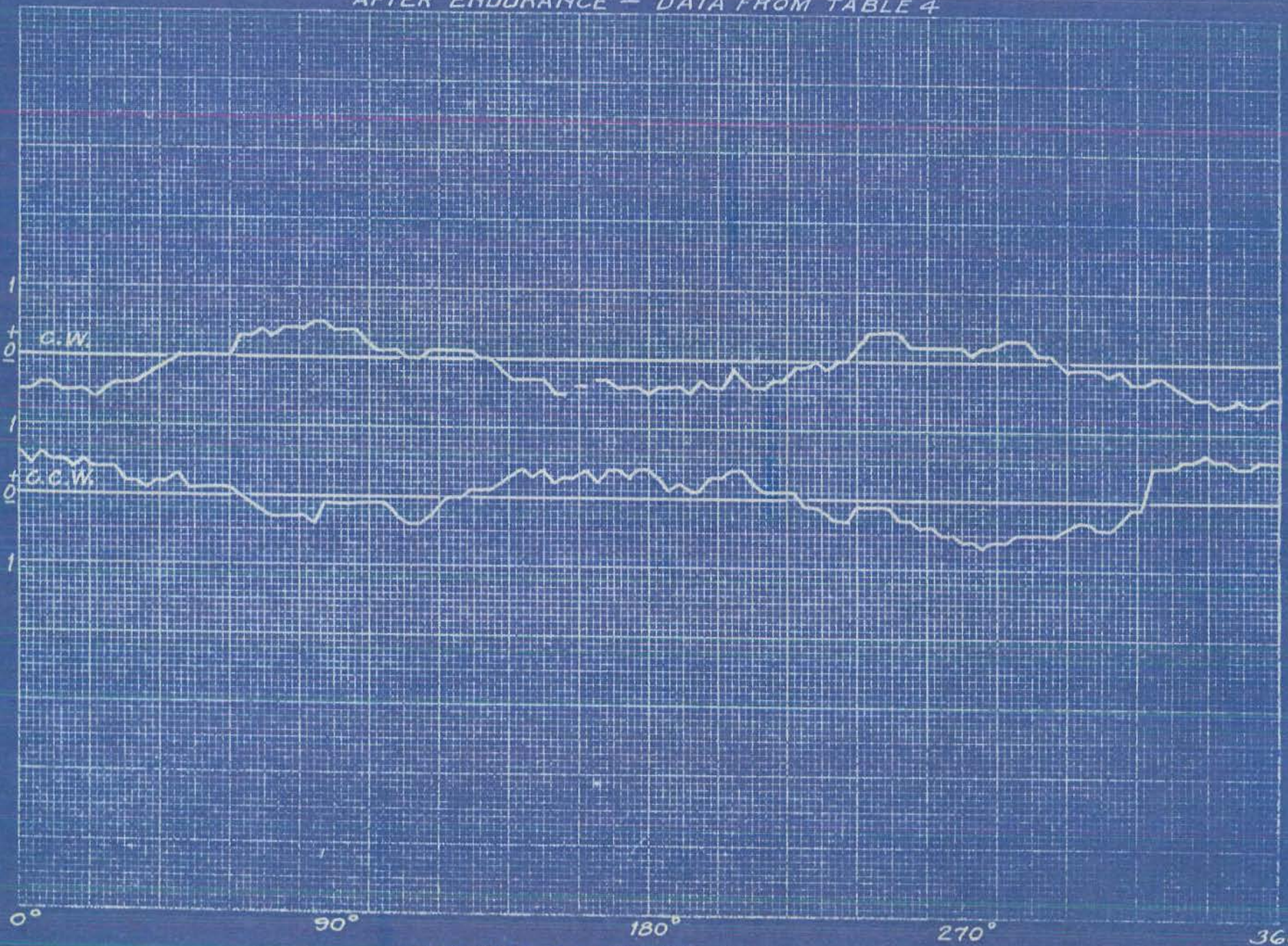


PLATE 15

ACCURACY, TYPE "M" MOTOR NO. 10 - ERROR IN DEGREES
AFTER ENDURANCE - DATA FROM TABLE 4

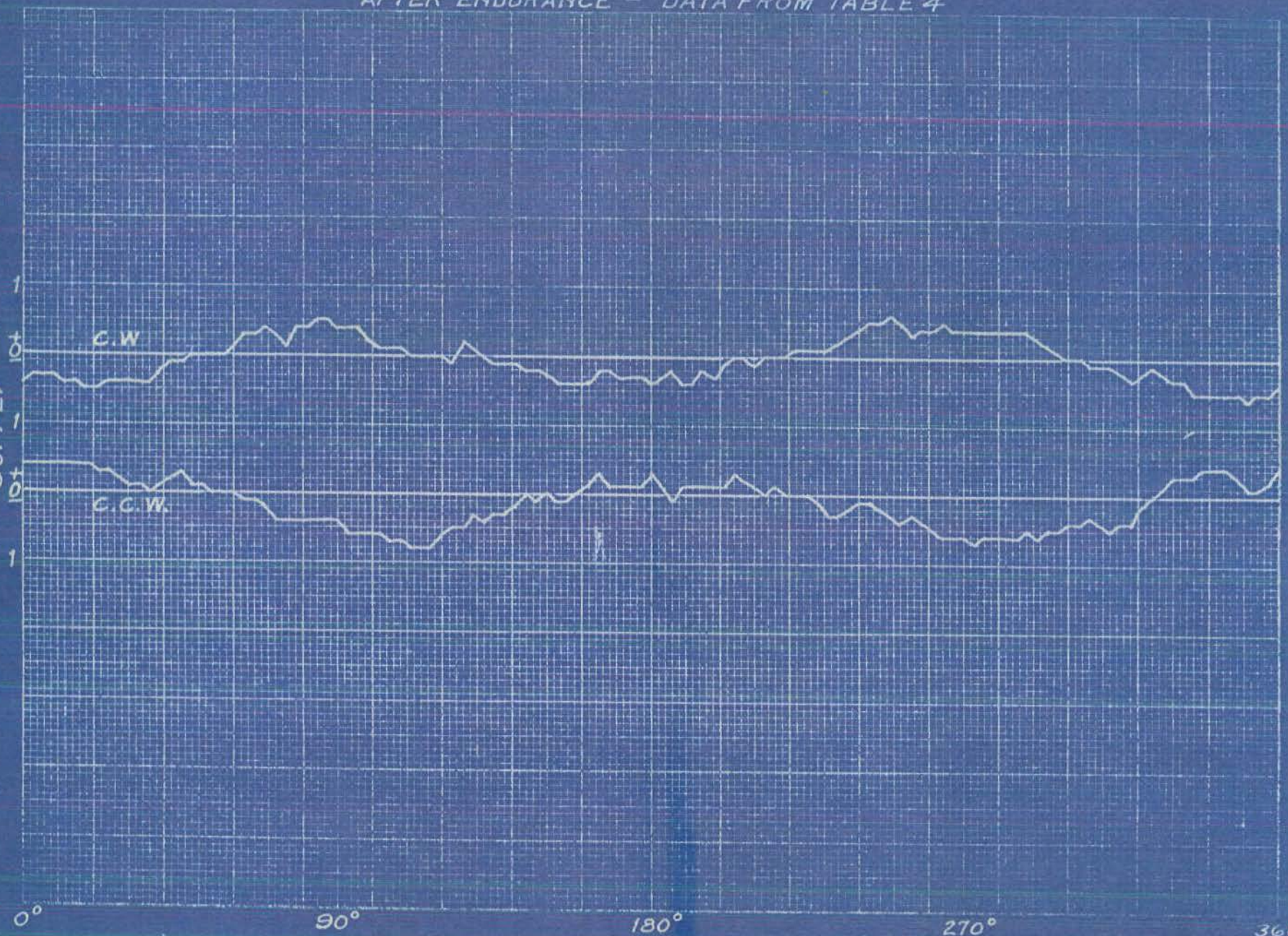


PLATE 16

ACCURACY, TYPE "M" MOTOR NO. 20 - ERROR IN DEGREES
AFTER ENDURANCE — DATA FROM TABLE 4

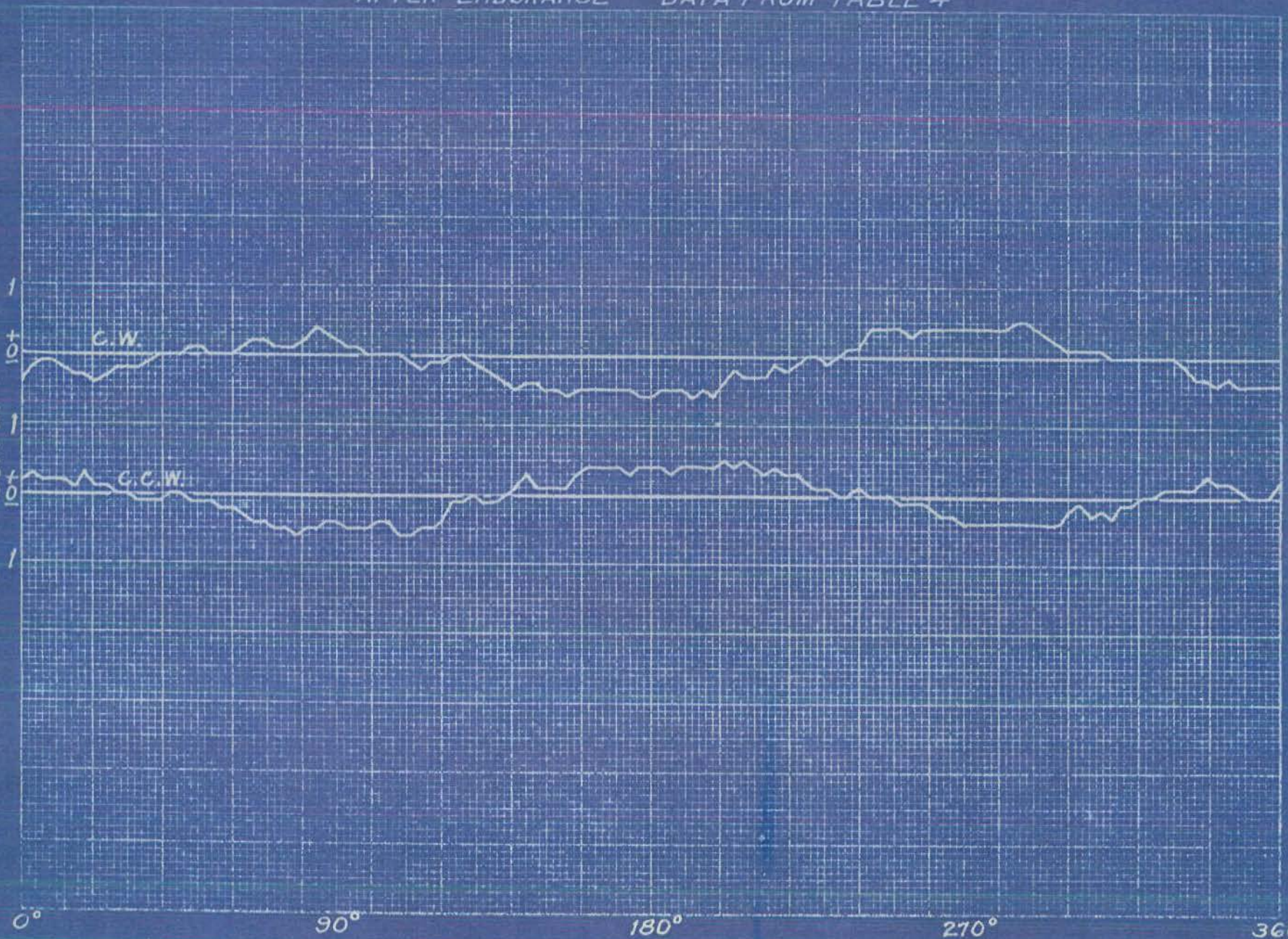
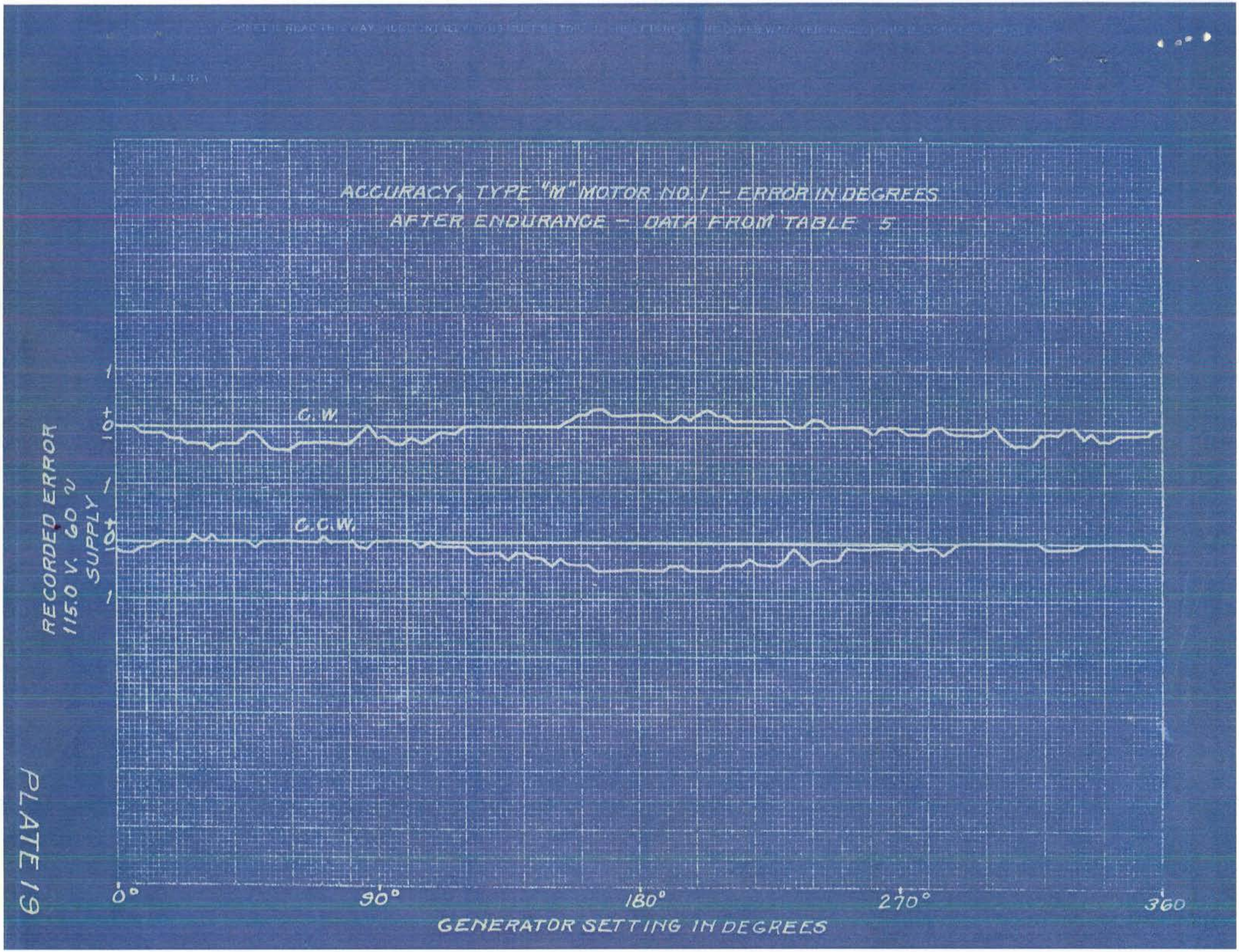


PLATE 17


ACCURACY, TYPE "M" MOTOR NO. 1 - ERROR IN DEGREES
AFTER ENDURANCE - DATA FROM TABLE 5
RECORDED ERROR
115.0 V. 60 ~
SUPPLY
1
10+
C.W.
1
10+
C.C.W.
1
0°
90°
180°
270°
360
GENERATOR SETTING IN DEGREES
PLATE 19

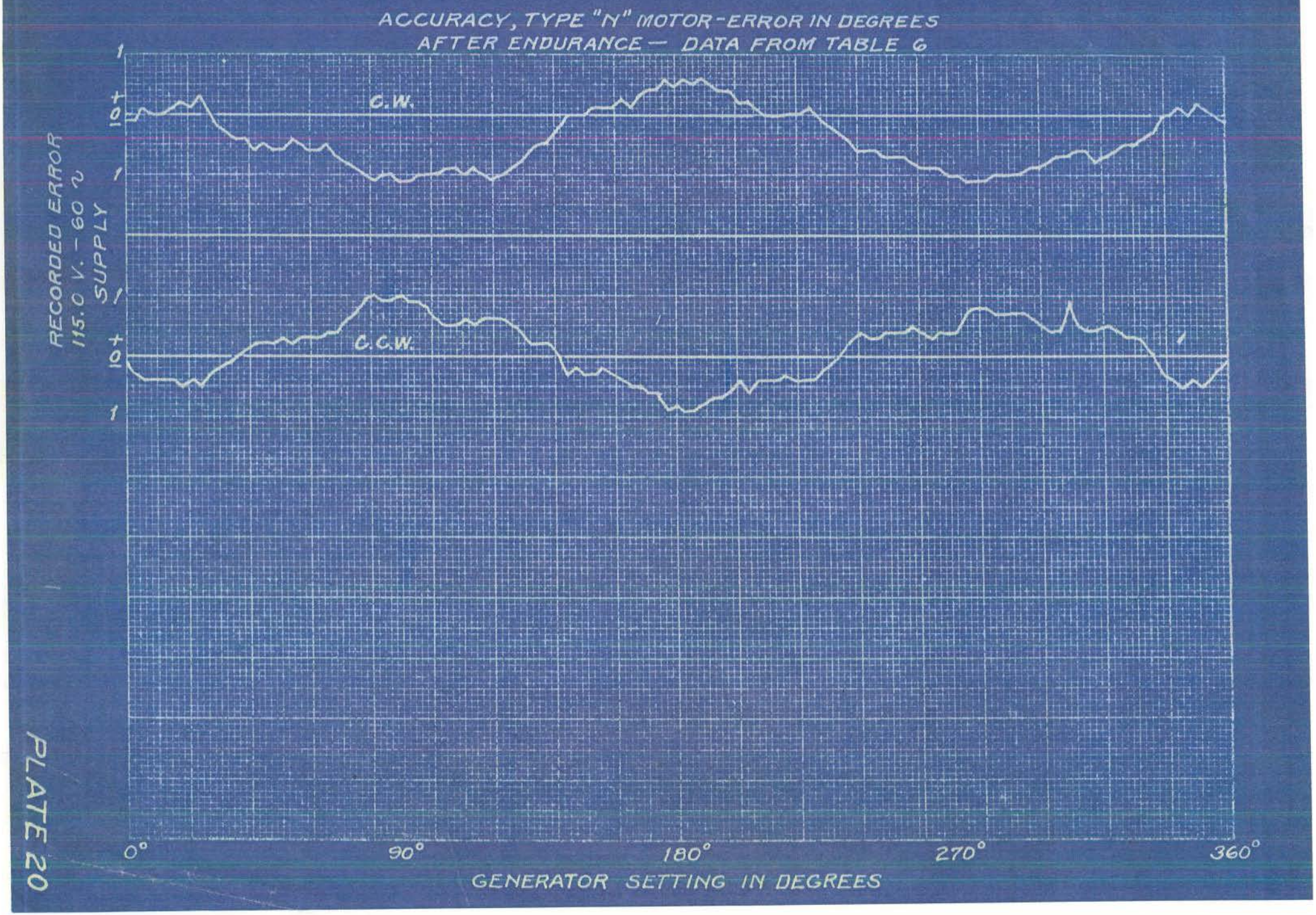

ACCURACY, TYPE "N" MOTOR-ERROR IN DEGREES
AFTER ENDURANCE — DATA FROM TABLE 6
RECORDED ERROR
115.0 V. - 60 ~
SUPPLY
1
10+
1
C.W.
1
10+
1
C.C.W.
0°
90°
180°
270°
360°
GENERATOR SETTING IN DEGREES

PLATE 20