

B-2090

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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) to (e) inclusive.

Reference: (a) BuShips Ltr. S62-2(350) of 17 December 1942.
(b) Specification 17C16a of 2 March 1942 and Amendments of 15 March and 1 August 1942.
(c) Memorandum from 665 to 357 via 355 of 26 June 1943.
(d) Specification 17E11(INT) of 15 May 1943.
(e) Betts and Betts Drwg. No. 454SH.1-Alt. 3.

OBJECT OF TEST

2. The object of this test was to determine conformance of the sample contact maker with specifications, references (b) and (d), as modified by reference (c), and its suitability for Naval use.

ABSTRACT OF TEST

3. The sample contact maker was set up at this Laboratory in suitable test circuits where its performance was carefully observed for compliance with specifications. An inspection to determine compliance in the matter of materials, design, and workmanship, concluded the test.

CONCLUSIONS

(a) The subject contact maker complied with the specifications except in the following respects:

- (1) The millivolt drop of the contacts exceeded that allowed by 25 millivolts following the endurance test.
- (2) The rate of operation was 100 impulses in lieu of 90 per minute.
- (3) The temperature rise of the motor exceeded that allowed by 12.4^o F.
- (4) The drawing should be brought into agreement with the nameplate marking in regard to the H.P. rating of the motor.

(b) During the endurance test, the current consumption increased. An examination following the test disclosed that the lubricant in the bearings and gear reduction compartment had hardened, increasing the load on the motor.

(c) The screws securing the motor housing to the motor base plate loosened during the shock test.

RECOMMENDATIONS

(a) That the subject contact maker be APPROVED subject to the desires of the Bureau relative to the deficiencies noted under "Conclusions".

DESCRIPTION OF MATERIAL

4. The subject contact maker, submitted by Betts and Betts Corporation, New York, New York, as a Navy type K-2, is designed to operate from a supply of 115 volts, 60 cycles.

5. It consists of a contact mechanism operated by a phenolic cam secured to a Bodine speed reducer motor, type NS1-12R. The assembly is mounted on a steel plate, provided with two mounting straps extending past its ends. It is enclosed in a sheet steel cover, secured to two steel posts by knurled nuts. A phenolic nameplate is secured to the cover by two brass machine screws. Further details in the design and construction of the sample are shown by photographs, Plates 1 and 2, and drawing, reference (e).

METHOD OF TEST

6. The subject contact maker, following tests to determine its electrical characteristics at rated voltage, was subjected to further tests in the following order:

- (a) Voltage drop of contacts
- (b) Rate of operation
- (c) Inclination
- (d) Endurance
- (e) Temperature rise
- (f) Shock
- (g) Vibration
- (h) Dielectric
- (i) Insulation resistance
- (j) Material inspection and drawing check

RESULTS OF TEST

7. The test results obtained were as follows:

Requirements

Test Values

Volts: Para. D-3 of reference (b).

Tested at 115 volts, 60 cycles.
Operated satisfactorily at ± 7 volts and 5 cycles.

Amperes: Not specified.

0.223 ampere at start of test.
0.68 ampere following the endurance test. (Nameplate rating 0.68 ampere).

Watts: Not specified.

10.6 watts at start of test.
21.2 watts following the endurance test.

Voltage drop of contacts: Para. E-5e of reference (b).

Complied before the endurance test.
3 millivolts.
*35 millivolts after the test.
(Values obtained when carrying 5 ampere load).

RESULTS OF TEST (Cont'd)

Requirements

Test Values

Rate of operation: Para. E-2b of reference (b).	*100 operations per minute. (Approximately 1/3 sec. on and 1/3 sec. off).
Inclination: Para. E-2g of reference (b).	Complied.
Endurance: Para. (g) and (i) of reference (c).	Satisfactory except that the current consumption increased due to hardening of the lubricant.
Temperature rise: Para. (d) of reference (c).	*102.4° F. above 122° F. ambient temperature. (90° F. allowed).
Shock test: Para. F-2e(2) of reference (b).	Satisfactory except that the screws securing the motor housing to the motor base plate loosened.
Vibration test: Para. F-2e(3) and (4) of reference (b).	Complied.
Dielectric test: Para. E-5c(1) of reference (b).	Complied.
Insulation resistance: Para. E-5c(2) of reference (b).	Greater than 100 megohms by 500 volt megger.
Drip-proof test: Para. D-1g of reference (d).	It is evident from examination that the case provides adequate protection from falling solid or liquid material.
Agreement with test plans: Para. H-3b of reference (b).	Complied, except that the motor is identified on the drawing as 1/50 H.P. and on the nameplate as 1/70 H.P.

* Denotes failure to comply with the specification.

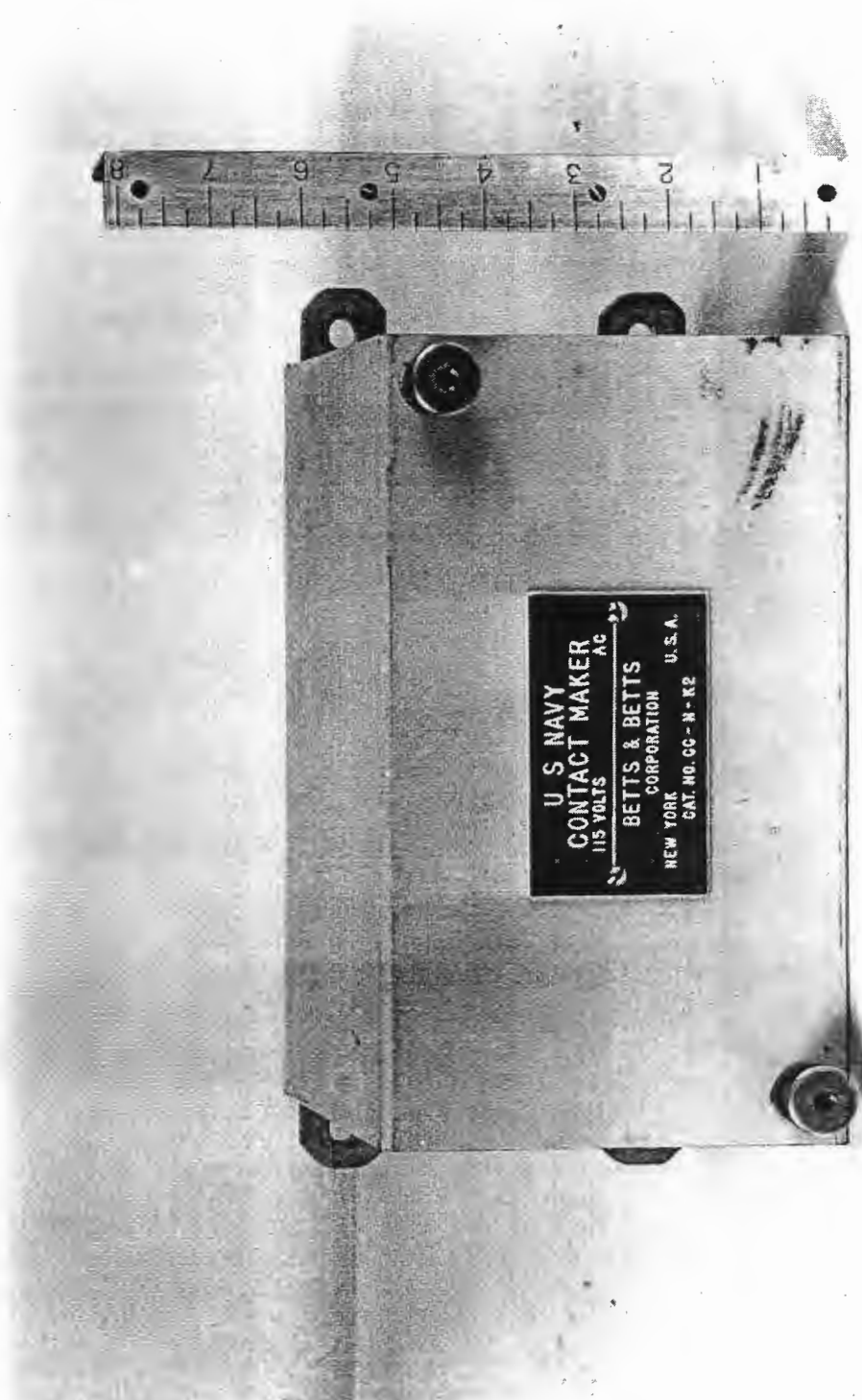
CONCLUSIONS

8. The subject contact maker complied with the specifications **except** in the following respects:

- (a) The millivolt drop of the contacts exceeded that allowed by 25 millivolts following the endurance test.
- (b) The rate of operation was 100 impulses in lieu of 90 per minute.
- (c) The temperature rise of the motor exceeded that allowed by 12.4° F.
- (d) The drawing should be brought into agreement with the nameplate marking in regard to the H.P. rating of the motor.

9. During the endurance test, the current consumption increased. An examination following the test disclosed that the lubricant in the bearings and gear reduction compartment had hardened, increasing the load on the motor.

10. The screws securing the motor housing to the motor base plate loosened during the shock test.



U S NAVY
CONTACT MAKER
115 VOLTS AC
BETTS & BETTS CORPORATION U.S.A.
NEW YORK CAT. NO. GG-N-K2