

REPORT NO. B-1158

DATE 15 May 1935

FR-1158

SUBJECT

Report of
Test on General Alarm Contact Maker
Chas. Cory Corporation
Exhibitor

by

J. S. Bryant
W. B. Roberts

Naval Research Laboratory
Office of Naval Research
Navy Department
Washington 25, D. C.

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S65/a

NAVY DEPARTMENT
BUREAU OF ENGINEERING

Report
of
Test on General Alarm Contact Maker
Chas. Cory Corporation
Exhibitor

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D.C.

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Date of Test: April - May 1935.

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Photograph of General Alarm Motor-Operated Contact Maker as submitted for test	Plate 1
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MAY 27 1935

AUTHORIZATION

1. This test was authorized by reference (a) and another additional reference pertinent to this problem is listed as reference (b).

Reference: (a) BuEng. ltr. S65-4/L5 (3-27-Ds) of 29 March 1935.
(b) Chas. Cory Dwg. No. CAL-923, BuEng. File No. CV5-S65-423.

OBJECT OF TEST

2. The object of this test was to determine whether the contact maker, as manufactured and submitted by the Chas. Cory Corporation of Brooklyn, New York, is a type suitable for operation of the general alarm gong systems on the USS YORKTOWN and the USS ENTERPRISE.

ABSTRACT OF TEST

3. The subject contact maker was set up at this Laboratory in a circuit simulating service conditions, and its performance carefully observed while under test for compliance with the usual requirements for Interior Communication electrical equipment. Particular attention was given the contact maker in order to note its operating characteristics when subjected to ambient temperatures of 40°C and 55°C for periods of eight hours each.

(a) Conclusions

The subject contact maker complied with the major requirements of the specifications and would be satisfactory for use in the Naval Service provided the manufacturer modifies his equipment in accordance with "Comments," paragraphs 19 to 24, inclusive.

(b) Recommendations

It is recommended that the contact maker be approved for the Naval Service, subject to "Comments," covered by this report.

DESCRIPTION OF MATERIAL UNDER TEST

4. The contact maker is designed for 115 volts, a.c., 60 cycle operation. Its mechanism is mounted on an ebonite asbestos panel, dimensions 1" x 12-1/2" x 15-1/16" and housed by a hinged steel cover, provided with a hasp for a padlock.

5. It consists of one single pole contactor and a motor-driven interrupter.

6. The contactor is rated 125 amperes at 115 volts, a.c., 60 cycle, and is operated by an electro-magnet, designed for the same voltage and frequency. A magnetic blow-out coil is provided to reduce the arcing.

7. The motor is manufactured by the Bodine Electric Company and is of the self-starting synchronous type, designed for 115 volts, a.c., 60 cycle, single phase, and rated 1/20 horse power, 1800 r.p.m. A built-in worm gear reduction unit reduces the speed to 30 r.p.m.

8. Mounted on the motor shaft is a plate cam which lifts its ball bearing follower three times each revolution. The lever arm to which the follower is attached carries a spring mounted contact which, with its associated stationary contact, is in series with the operating coil of the contactor.

9. Another plate cam, driven by the motor through an external worm and worm wheel, at a speed of one r.p.m., operates two spring mounted contacts by means of a ball bearing follower and lever. This cam is so shaped that, once the motor is started, the follower rises and closes two sets of contacts which remain closed until the cam has completed one revolution.

10. Neither cam is secured to its driving shaft but receives its motion through a pin on an adjacent disc which engages a slot in the cam. The size and shape of the slot are such that, when the follower reaches a depression in the cam, the cam will advance faster than its driving shaft, due to the pressure of the follower spring, and allow a quick break at the contacts.

11. The operation of the unit is as follows: When a single pole external momentary contactor is closed, the motor circuit is completed and the motor begins to rotate. After several seconds the follower of the minute cam closes two sets of contacts which remain closed for one minute. One set shunts the external momentary contactor so that the motor will continue to run after the external momentary contactor is released. The other set of contacts completes the circuit between the operating coil of the gong contactor and the 90 impulse per minute interrupter.

12. When the motor starts to rotate, the 30 r.p.m. cam causes its contacts to close at the rate of 90 interruptions per minute, but the gong contactor does not operate until the one r.p.m. cam, previously described, closes its contacts. The purpose of this feature is that the

gong contactor cannot remain closed even though the 90 per minute contacts remain closed at the end of the one minute period.

METHOD OF TEST

13. First, the subject contact maker was installed in a compartment having an ambient temperature of 40°C and connected in a circuit, simulating shipboard installations.

14. It was then tested for endurance with the contactor breaking a load equivalent to that required for 150 approved type, 12" single stroke bells. During this test the contact maker was operated one minute, every alternate minute, and the temperature rise of the motor and the electro-magnet was obtained.

15. Next, the unit was placed on a Bureau of Engineering shock machine and given twenty 250 foot pound blows to test its shock integrity. While so mounted, it was tested for operating characteristics when supplied with over and under voltage and frequency and when inclined at various angles.

16. Following this, it was tested for insulation resistance, dielectric strength and current consumption.

17. In conclusion, the contact maker was subjected to ambient temperatures of 40°C and 55°C for periods of eight hours each and again tested for operating characteristics.

RESULTS OF TEST

<u>18. Specification Requirements</u>	<u>Test Values</u>
Voltage - 115 volts	115 volts
Frequency - 60 cycles	60 cycles
Current consumption of motor	2.3 amperes
Current consumption of electro-magnet	0.6 amperes
Load interrupted by gong contactor, 45 amperes, 33% P.F.	45 amperes, 33% P.F.
Endurance - one minute of operation, every alternate minute, for a period of 48 hours at ambient temperature of 40°C.	One minute of operation, every alternate minute, for a period of 48 hours at 40°C.
Shock test of twenty 250 foot pound blows.	Unsatisfactory, see "Comments," par. 20.
Over and under voltage and frequency: 126.5 volts at 65 cycles. 92.0 volts at 55 cycles.	Satisfactory under the required conditions.

Specification RequirementsTest Values

Satisfactory operation when inclined 30° from the vertical plane in all directions.	Operated satisfactorily.
Temperature rise of motor: Maximum 50 at 40°C ambient.	49.0°C at 40°C ambient (thermometer method).
Temperature rise of electro-magnet: Maximum 30°C at 40°C ambient.	16.7°C at 40°C ambient (resistance method).
Insulation resistance: Not less than 1 megohm.	200 megohms by 1000 volt megger.
Dielectric: 1240 volts, a.c., 60 cycle, applied for one minute.	Satisfactory, no break-downs occurred.
Weight	48 lbs. 2 oz.
Height	12-1/2 inches
Width	15-11/16 inches
Depth	7-5/16 inches

COMMENTS ON RESULTS OF TEST

19. Under the required endurance test at an ambient temperature of 26°C, the contactor was satisfactory. However, when placed in a compartment having an ambient temperature of 40°C for a period of eight hours, it failed to operate satisfactorily. This failure was due to the drifting of the motor after the minute cam had opened the motor circuit, thereby repeating the minute of operation, although the external contact maker had not been re-closed. This was attributed to the higher temperature softening the gear lubricant and allowing the motor to drift far enough to re-close the minute contacts, starting a new cycle. This defect has been corrected by substituting a cam which allows greater rotation before the ball bearing follower rises and closes the minute contacts. The sample cam has been installed on the contact maker for the manufacturer's guidance.

20. The present brackets supporting both sets of stationary contacts are too flimsy and closed the gong circuit momentarily when subjected to shock. Castings should be substituted.

21. It was also noted that the 125 ampere contactor occasionally failed to return to its normal position when de-energized. This may be corrected by installing a stronger spring. It is also necessary that provision be made for adjusting the spring tension from the front of the panel.

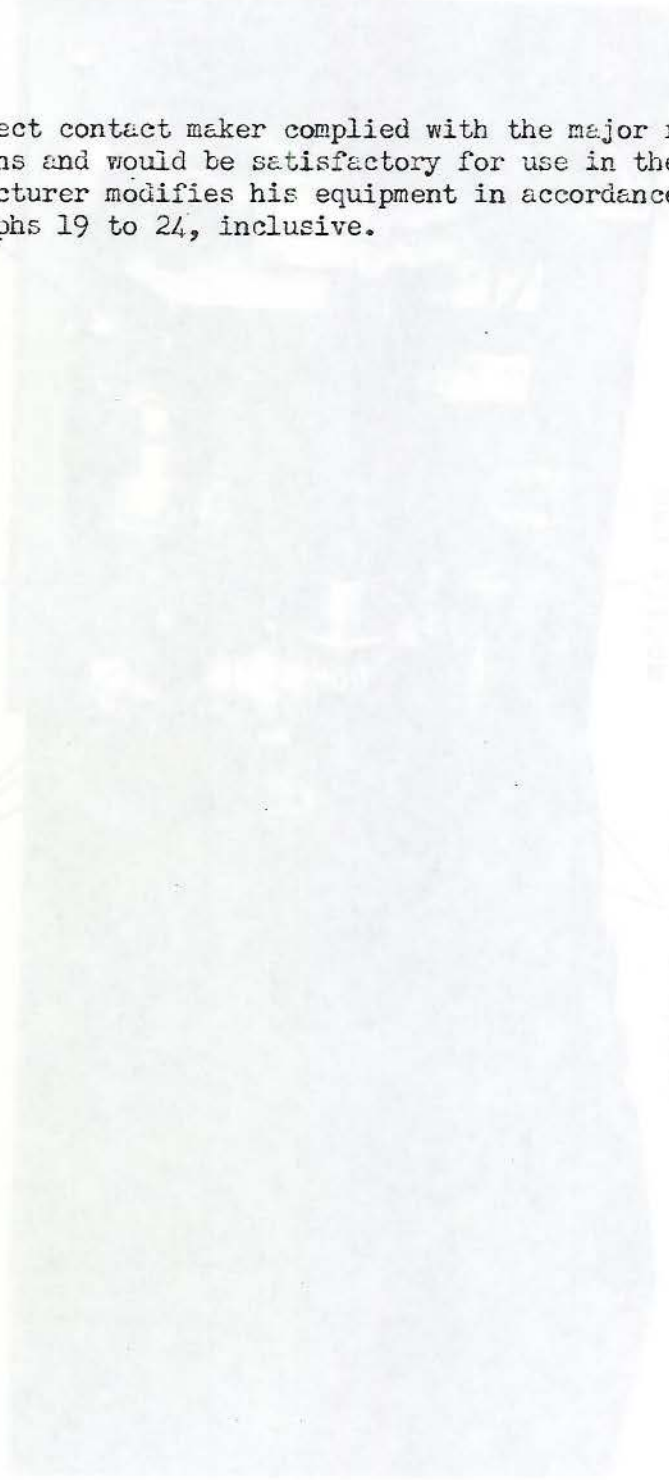
22. The oil cups are installed for horizontal mounting of the panel. As the panel will be installed in the vertical position, it is necessary that they be changed as shown on Plate 1.

23. No provision is made for oiling the shaft of the minute cam. Oil holes, also shown on Plate 1, would be satisfactory.

24. The arrangement of the terminals should be changed, as shown on Plate 2, in order that both sides of the line may be brought to the contactor panel.

CONCLUSIONS

25. The subject contact maker complied with the major requirements of the specifications and would be satisfactory for use in the Naval Service, provided the manufacturer modifies his equipment in accordance with "Comments," paragraphs 19 to 24, inclusive.



Provide oil hole
Date set to
Special marking

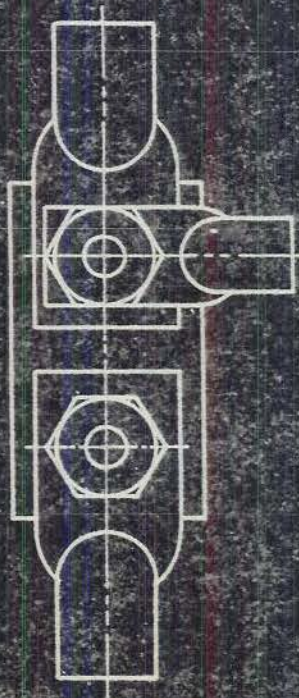
Use right angle
all over

Marking
to be
made

Marking
to be
made



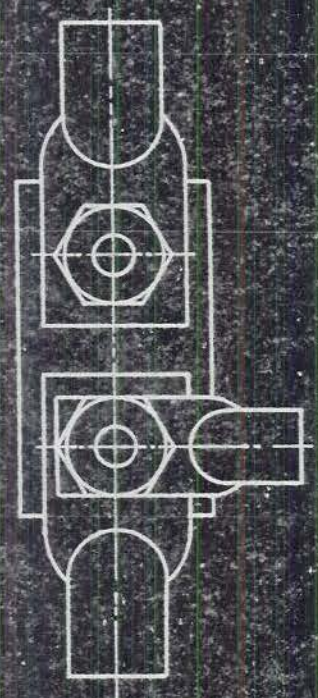
G1



GG



G2



G

TERMINAL MODIFICATION