

REPORT NO. B-2044

DATE 4 May 1943

SUBJECT

Test on Horns, Type H-4

by

D. T. Scuderi

FR-2044

NAVAL RESEARCH LABORATORY

BELLEVUE, D. C.

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4 May 1943

NRL Report No. B-2044

NAVY DEPARTMENT

Report of Test

on

Horns, Type H-4

Submitted by

The Sparks-Withington Company
Jackson, Michigan

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D. C.

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Authorization: BuShips Ltr. S65-4(350) of 27 February 1943.

Date of Test: March - April 1943

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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 (d).

References: (a) BuShips Ltr. S65-4(350) of 27 February 1943.
(b) Specification 17S11(INT) of 1 October 1941 and Amendment 2 of 1 March 1942.
(c) Specification 17E13(INT) of 1 March 1942.
(d) Sparks-Withington Drwg. No. D-1394.

OBJECT OF TEST

2. The object of this test was to determine conformance of the sample horns with specification, reference (b) and their suitability for Naval use.

ABSTRACT OF TEST

3. The sample horns were set up at this Laboratory in suitable test circuits where their performance was carefully observed for compliance with the specification. An inspection, to determine compliance in the matter of materials, design, and workmanship, concluded the test. For additional information, Sample No. 1 was subjected to HI shock tests as specified in reference (c).

CONCLUSIONS

(a) The subject horns are in general of good design and first class workmanship. However, they failed to comply with specification, reference (b), in the following respects:

- (1) The diaphragms are of steel in lieu of nickel-chromium alloy.
- (2) The diaphragm of sample No. 2 fractured after 5 hours operation at 60° C. ambient temperature.
- (3) Nameplates were not provided.
- (4) Two flats were provided in the sides of each case in lieu of bosses.
- (5) Contact spring, piece 38, is of steel.
- (6) The samples are designed for two in lieu of three point mounting.
- (7) As noted under "Results of Test", the samples are not in agreement with drawing, reference (d).

(b) The results of the HI shock test indicate that the strength of the samples is not sufficient to withstand high impact shock.

RECOMMENDATIONS

(a) That approval of the subject horns be withheld pending the re-submission of samples for a satisfactory endurance test and the desires of the Bureau in regard to the constructional violations given in "Conclusions".

(b) That the subject horns be NOT APPROVED from the standpoint of high impact shock resistance as defined by reference (c).

DESCRIPTION OF MATERIAL

4. The sample horns, submitted by Sparks - Withington Company, Jackson, Michigan, as Navy Type H-4, are of the resonated type, designed to operate from a supply of 115 volts, 60 cycles, and employ contacts for interrupting the circuit. The two horns are identical except for a difference in diaphragm thickness. For identification purposes, they are referred to in this report as Samples No. 1 and No. 2.

5. The mechanism is secured to a cast aluminum alloy cover and is enclosed in a fabricated sheet steel case. A square rubber gasket of 1/4-inch cross section is recessed in a channel in the rim of the case and contacts the cover when secured by six 1/4-20 fillister headed steel machine screws used as through bolts. The case and cover are finished with gray paint applied over zinc chromate paint.

6. The cover is provided with a snail type projector, secured by eight No. 8-32 fillister headed steel machine screws, passing through the projector and threading into the cover. The case is provided with two flats for the installation of the terminal tubes. A mounting strap, drilled for 3/8-inch mounting screws, is welded to the side of the case.

7. The mechanism is mounted on a cast composition BE chassis. It consists of a winding mounted on a "W"-shaped laminated magnet, a laminated armature, mechanically coupled to a steel diaphragm, a contact assembly, and a phenolic terminal block. A phenolic bushing located on the armature stud actuates the contact spring.

8. The acoustical analyses of the sample horns are given by Plate 1. Further details in the design and construction of the horn are shown in photographs, Plates 2 and 3. Drawing, reference (d), shows details of the case and cover correctly, but covers a different type of mechanism.

METHOD OF TEST

9. The sample horns, following tests to determine their electrical and acoustical characteristics at rated voltage and frequency, were subjected to further tests in the following order:

- (a) Inclination
- (b) Endurance and temperature rise
- (c) Sound pressure output
- (d) Shock
- (e) Vibration
- (f) Dielectric
- (g) Insulation resistance
- (h) Splashproof
- (i) HI shock

10. Due to its failure during the endurance test, Sample No. 2 was not subjected to any further tests.

11. The tests were concluded with a careful examination of the samples to determine compliance with the specification, pertaining to design, quality of workmanship and materials, and any defects resulting from the tests.

RESULTS OF TEST

11. The test results obtained were as follows:

<u>Requirements</u>	<u>Test Values</u>	
	<u>Sample No. 1</u>	<u>Sample No. 2</u>
Voltage: Para. E-1.	Tested at 115 volts, 60 cycles.	Tested at 115 volts, 60 cycles.
Amperes: Not specified.	0.35 ampere.	0.38 ampere.
Watts: Para. E-1.	Complied. 34.75 watts.	Complied. 38.0 watts.
Diaphragm: Para. E-4c(3).	*Steel diaphragm. 0.019 thick.	*Steel diaphragm. 0.0215 thick.
Sound pressure output: Para. E-1.	Complied. 103 db. (See Plate 1).	Complied. 99.5 db. (See Plate 1).
Inclination: Para. D-11h.	Complied.	Complied.
Endurance: Para. F-2m(1).	Complied.	*Failed after 5 hours due to fractured dia- phragm.
Temperature rise: Para. F-2m(4).	Complied. 41.3° C. above 60° C. ambient temperature.	- - - - -
Sound pressure output follow- ing endurance: Para. F-2n.	Complied. 90 db.	- - - - -
Shock test: Para. F-2g.	Complied.	- - - - -
Vibration test: Para. F-2h.	Complied.	- - - - -
Dielectric: Para. D-4a.	Complied.	- - - - -
Insulation resistance: Para. D-4b.	Complied. Greater than 200 megohms with 1000 volt megger.	- - - - -
Splashproof: Para. D-12d.	Complied.	- - - - -
Salt spray: Para. F-2p.	Not conducted due to previous satisfactory test of type H-3 which is of similar case and finish.	- - - - -

RESULTS OF TEST (Cont'd)

<u>Requirements.</u>	<u>Test Values</u>	
	<u>Sample No. 1</u>	<u>Sample No. 2</u>
Weight: Para. E-1.	Complied. 6 pounds, 7 ounces.	Complied. 6 pounds, 7 ounces.
Nameplate: Para. D-13c.	*None provided.	*None provided.
Protection of exterior surfaces: Para. C-5d.	Complied.	Complied.
Clearances: Para. D-5.	Complied.	Complied.
Wiring: Para. D-6a.	Complied.	Complied.
Coil windings: Para. D-6b.	Complied. Silk-covered enameled copper wire.	Complied. Silk-covered enamel- ed copper wire.
Protective covering for coils: Para. D-9a.	Complied.	Complied.
Waterproofing of coils: Para. D-9e.	Complied.	Complied.
Magnetic circuit: Para. D-9c.	Complied.	Complied.
Terminal block: Para. D-10a.	Complied.	Complied.
Terminal lugs: Para. D-10b.	Complied.	Complied.
Supply leads: Para. D-10c.	Complied.	Complied.
Terminal wiring: Para. D-10d.	*Two flats provided in lieu of bosses.	*Two flats provided in lieu of bosses.
Springs: Para. D-11d.	*Spring, pc. 38, is of steel.	*Spring, pc. 38, is of steel.
Contacts: Para. D-11e.	Complied.	Complied.
Mounting lugs: Para. D-11i.	*Designed for 2 point in lieu of 3 point bulkhead mounting.	*Designed for 2 point in lieu of 3 point bulkhead mounting.
Agreement with test plans: Para. H-3b.	*Drawings submitted show a mechanism of a different type than that furnished in samples	

*Denotes failure to comply with the specification.

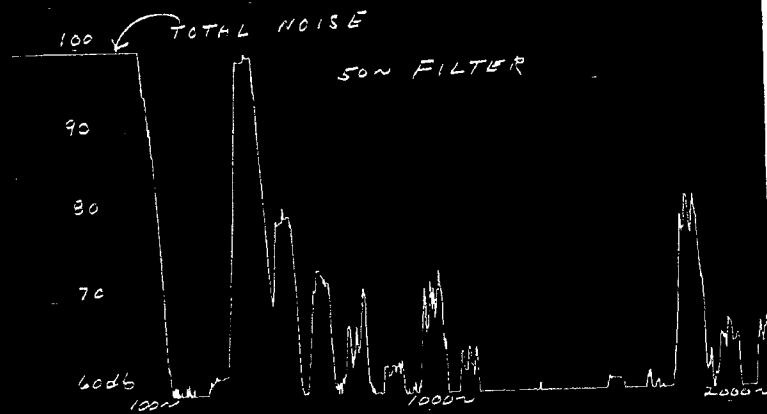
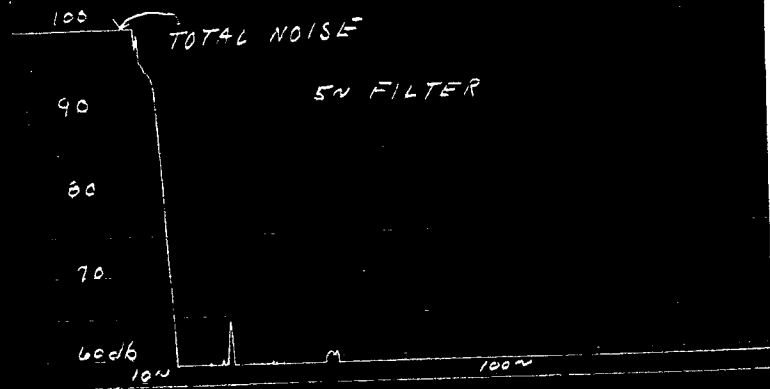
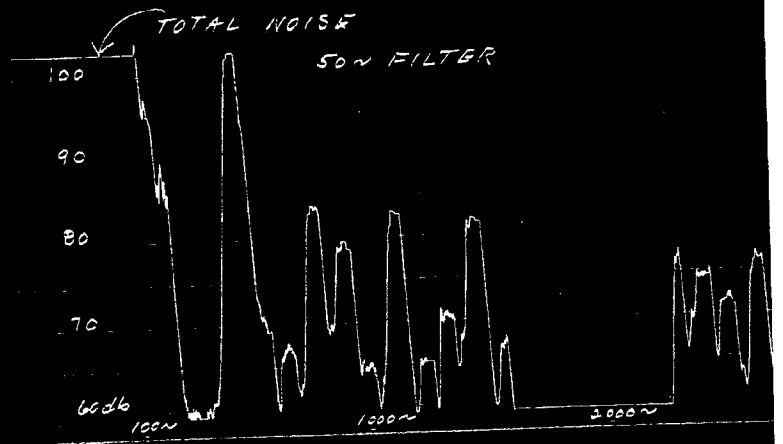
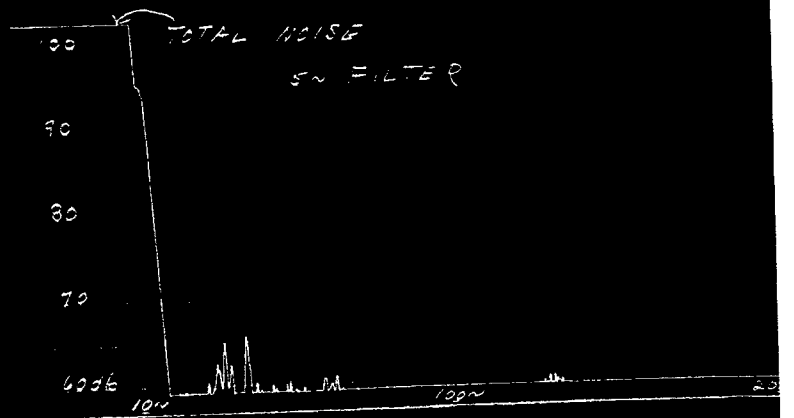
13. The third blow (back) of the HI shock test resulted in the contacts becoming out of adjustment and the case was slightly torn at the mounting strap welds. Following adjustment of the contacts, the remaining three blows resulted in no change except increased tearing of the case.

CONCLUSIONS

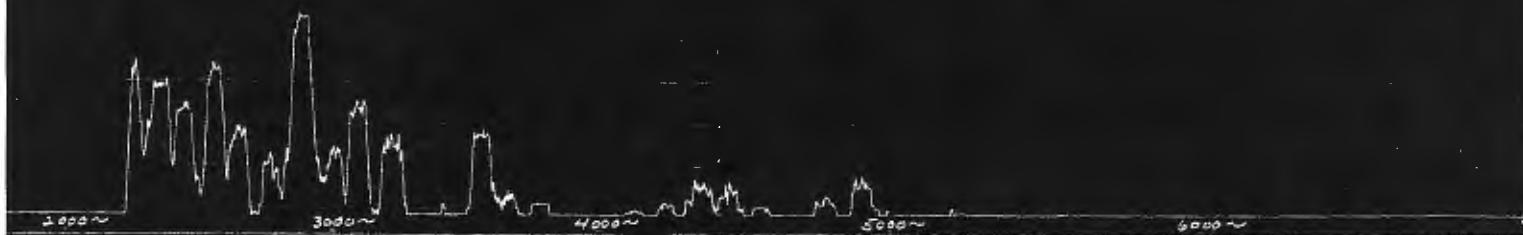
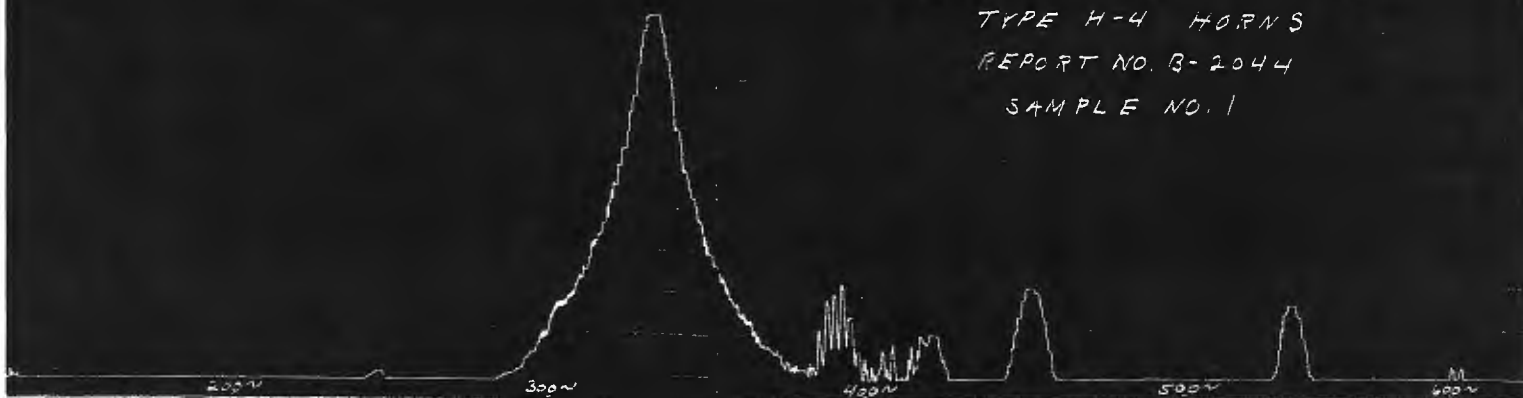
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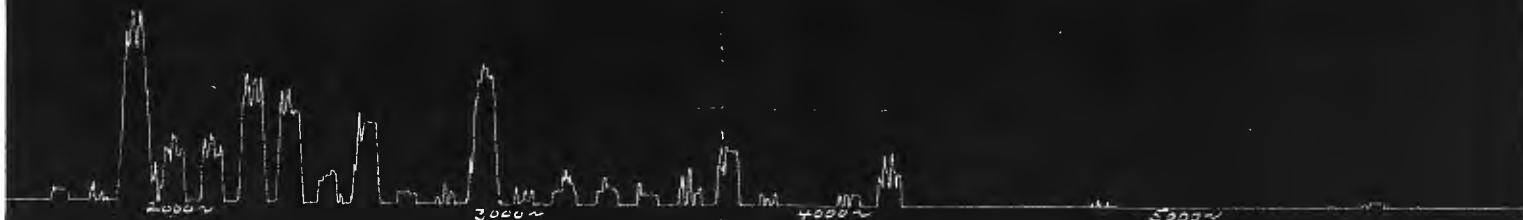
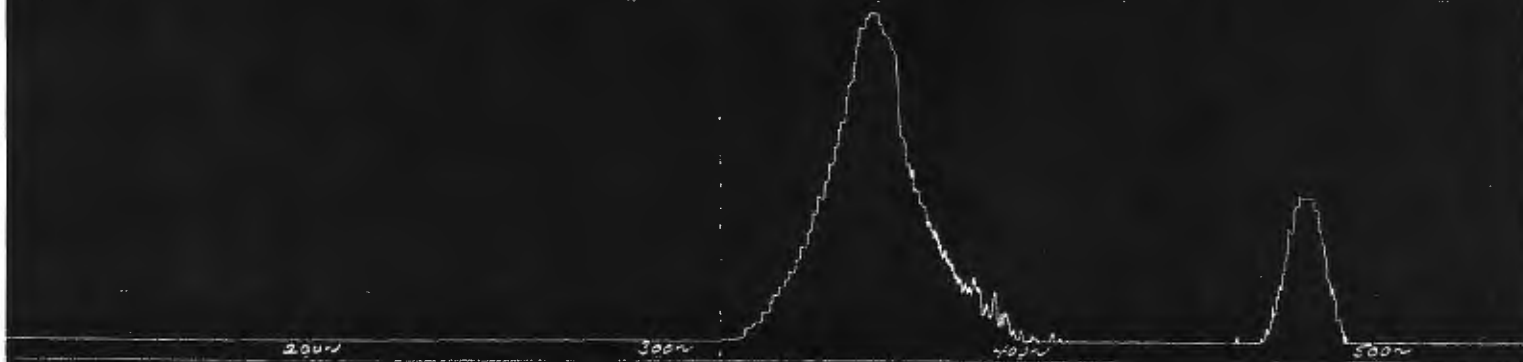
15. The results of the HI shock test indicate that the strength of the samples is not sufficient to withstand high impact shock.

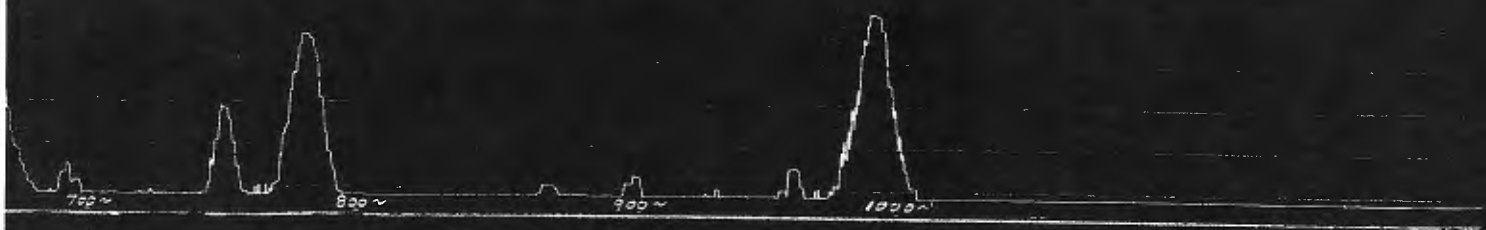


SARFYS-WITHINGTON COMPANY
TYPE H-4 HORNS
REPORT NO. B-2044
SAMPLE NO. 1



SAMPLE NO. 2.





2



3

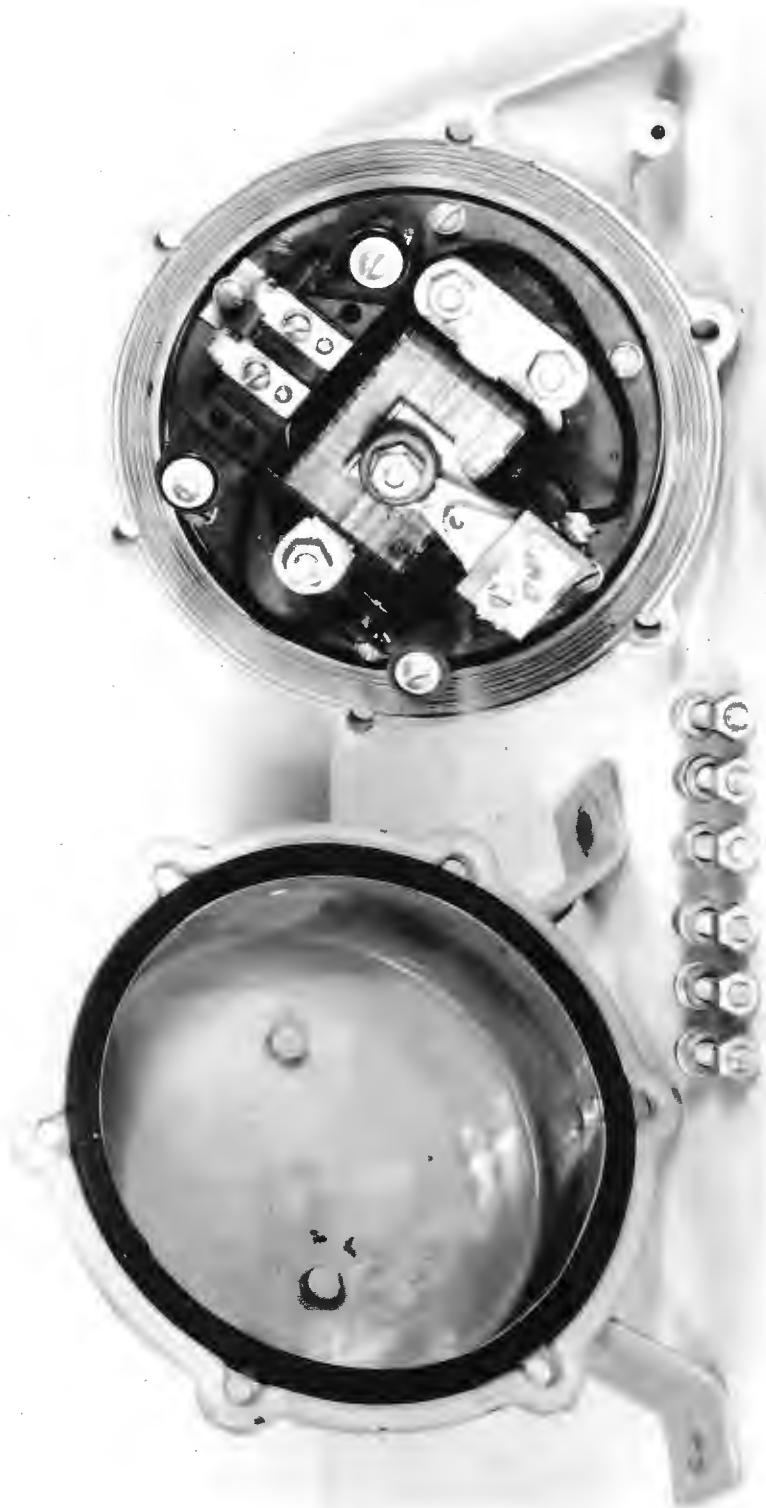


4

PLATE 1







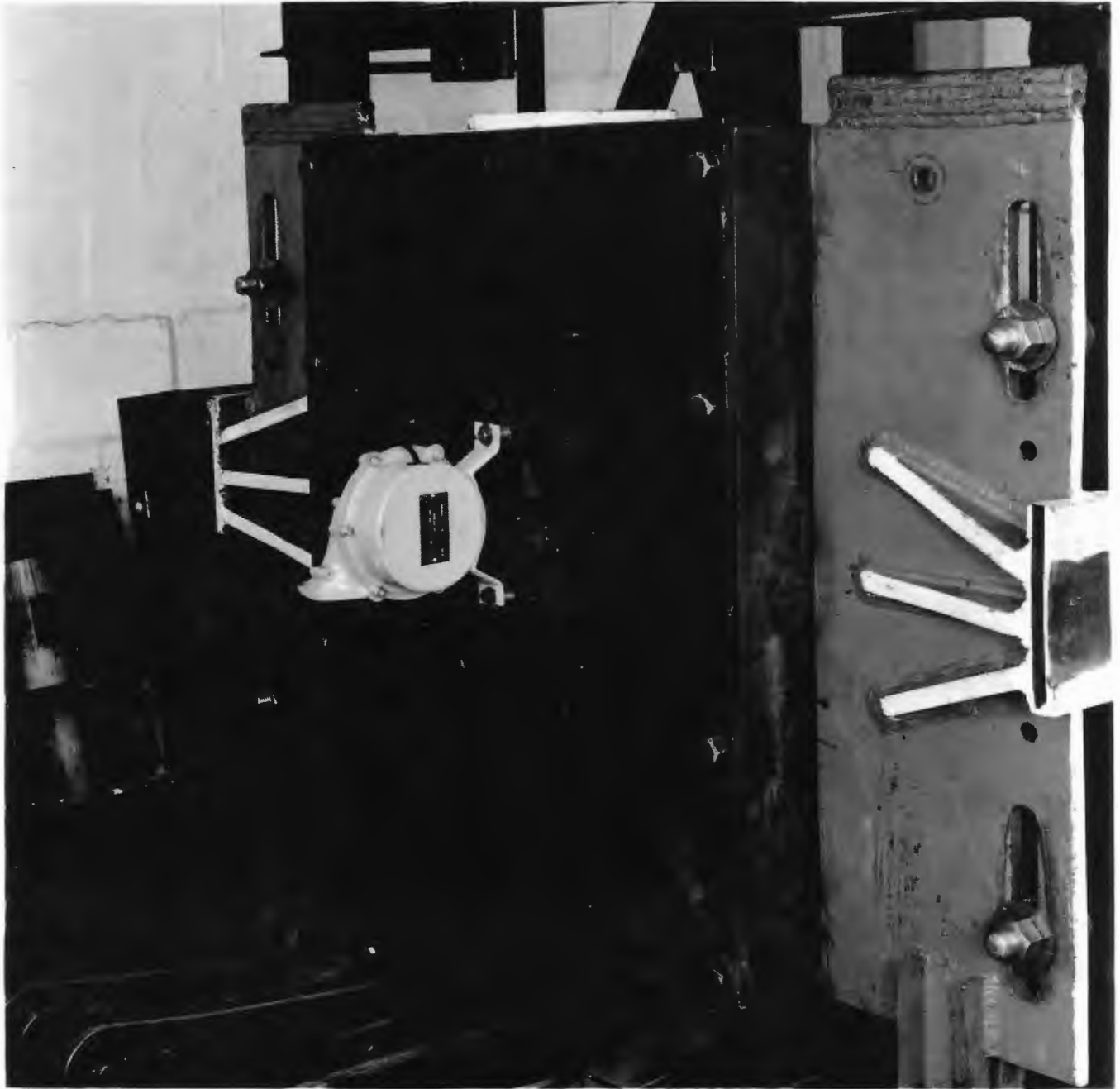


PLATE 4