

# NATIONAL BUREAU OF STANDARDS REPORT

4783

STATIC LOADING TESTS OF AN  
A. G. A. EXPENDABLE TOP RUNWAY LIGHT HEAD  
ASSEMBLY WITH A GLASS COVER

by

L. K. Irwin

To

Equipment Laboratory  
Wright Air Development Center  
Department of the Air Force



U. S. DEPARTMENT OF COMMERCE  
NATIONAL BUREAU OF STANDARDS

# U. S. DEPARTMENT OF COMMERCE

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## NATIONAL BUREAU OF STANDARDS

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The scope of activities of the National Bureau of Standards at its headquarters in Washington, D. C., and its major field laboratories in Boulder, Colorado, is suggested in the following listing of the divisions and sections engaged in technical work. In general, each section carries out specialized research, development, and engineering in the field indicated by its title. A brief description of the activities, and of the resultant reports and publications, appears on the inside back cover of this report.

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● Office of Weights and Measures

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**Radio Propagation Physics.** Upper Atmosphere Research. Ionospheric Research. Regular Propagation Services.

**Radio Propagation Engineering.** Frequency Utilization Research. Tropospheric Propagation Research.

**Radio Standards.** High Frequency Standards Branch: High Frequency Electrical Standards. Radio Broadcast Service. High Frequency Impedance Standards. Microwave Standards Branch: Extreme High Frequency and Noise. Microwave Frequency and Spectroscopy. Microwave Circuit Standards.

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by

L. K. Irwin  
Engineering Mechanics Section  
Mechanics Division

To

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NBS Lab. No. 6.4/2-4-3



**U. S. DEPARTMENT OF COMMERCE  
NATIONAL BUREAU OF STANDARDS**

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STATIC LOADING TESTS OF AN  
A. G. A. EXPENDABLE TOP RUNWAY LIGHT HEAD  
ASSEMBLY WITH A GLASS COVER PLATE

by

L. K. Irwin

1. SAMPLE

An expendable top runway light head assembly with a 3/4-inch thick glass cover plate, manufactured by the American Gas Accumulator Division, Elastic Stop Nut Corporation, was submitted for static load tests. The light head assembly represented parts of a prototype runway marker light. The steel ring in which the 7-inch diameter glass plate was mounted was fabricated by the "Hydraform" process. The various components submitted for test were disassembled after the tests and are shown in figure 1.

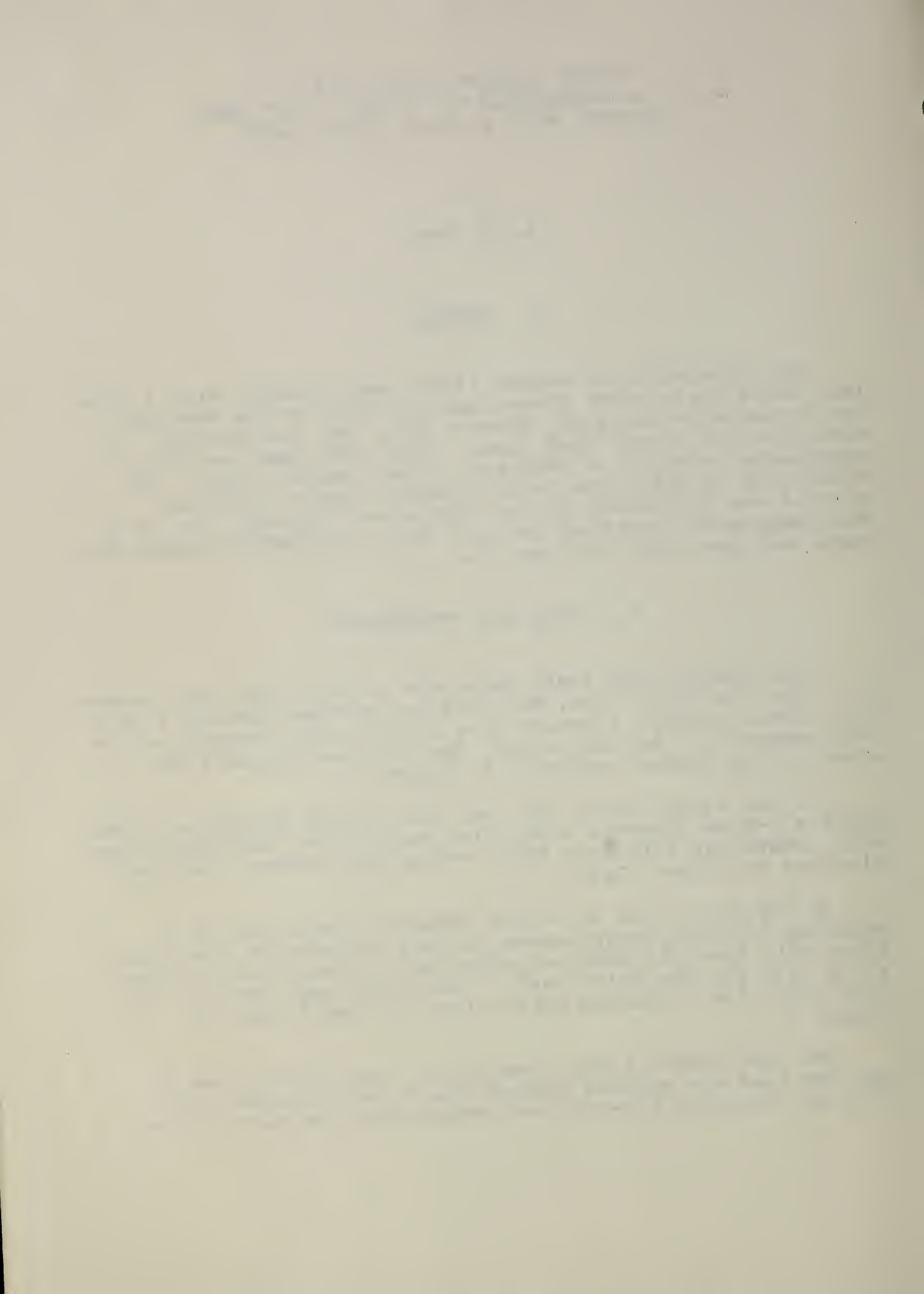
2. TESTS AND PROCEDURES

Four static load tests were made on the light head assembly. For the first test, the load was applied through a 20 x 4.4, 10-ply rating, aircraft tire with the air pressure at no load measured to be 155 lb/in<sup>2</sup>. The tire and assembly are shown in the loaded condition in figure 2.

In the second test, the load was applied through a 1-inch thick x 6-inch diameter steel disc centered on the glass plate with a matching 3/16-inch thick rubber pad between the steel disc and the glass plate.

A 3/4-inch thick by 7-inch diameter steel disc on a matching 1/4-inch thick rubber pad was centered on the glass plate with the 3/16-inch pad retained in place from the previous test for the third test. The rubber pads were in contact with item I and the glass plate in item K shown in figure 1.

For the fourth test, items G, H, I and J were removed and the load was applied through the 7-inch diameter steel disc and matching 1/4-inch pad centered on the glass plate.



Continuously increasing compressive loads were applied in tests 1 and 2 until the predetermined loads were reached, then the loads were removed quickly. For tests 3 and 4, the loads were applied as for the previous tests but loading was stopped after failure of components was indicated by pronounced decreases in the loading rates.

### 3. RESULTS

Four static load tests were made on an A. G. A. expendable top light head assembly. The results of these tests are given in table 1.

Table 1 - Static Load Tests of an A. G. A. Expendable Top Light Head Assembly.

Test No.	Loading medium	Maximum load lb	Unit load* lb/in. <sup>2</sup>	Remarks
1	20 x 4.4 tire	9,100	-	Snapping sound at 5600 lb, probably from the plastic ring, item H in figure 1
2	6-in. diameter steel disc and rubber pad	14,800	524	No visible damage
3	7-in. diameter steel disc and rubber pads	15,000	390	Top gasket, item J in figure 1, extruded toward center of glass plate
4	7-in. diameter steel disc and rubber pad	25,500	663	Bottom gasket under glass plate, item K in figure 1, extended toward center of glass plate

\* Ratio of maximum load to area of loading disc

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The damaged top gasket is shown in figure 3 immediately after test 3. There was a marked decrease in the rate of loading at 14,600 lb without a corresponding change in the rate of motion of the testing machine head. Loading was continued to a maximum load of 15,000 lb and then removed quickly.

The bottom gasket on which the glass plate was seated is shown in figure 4 extruded toward the center of the plate after sustaining a compressive load of 25,500 lb after which there was a pronounced drop in the indicated load. No additional load was applied.

For the Director,

*B. L. Wilson*

B. L. Wilson, Chief,  
Engineering Mechanics Section,  
Division of Mechanics.

Washington, D. C.

July 1956





Figure 1. The components of an A.G.A. expendable top runway light head assembly after completion of the static load tests.

25 689 4



Figure 2. The light head assembly sustaining a load of 9,100 lb applied through a 20x4.4 aircraft tire.

25689 2

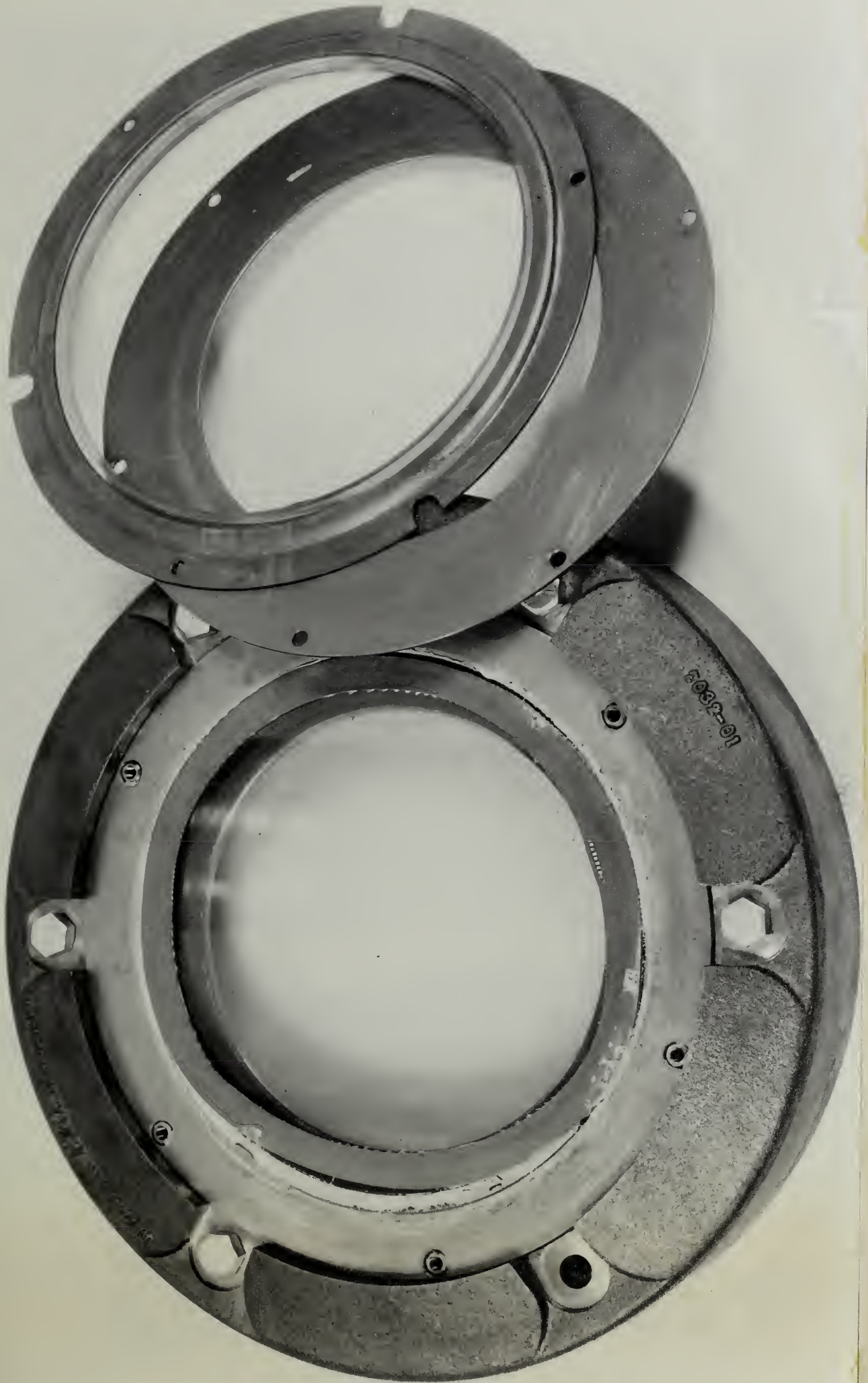


Figure 3. The partially disassembled light head components after test 3. The top gasket was extruded toward the center of the glass plate.





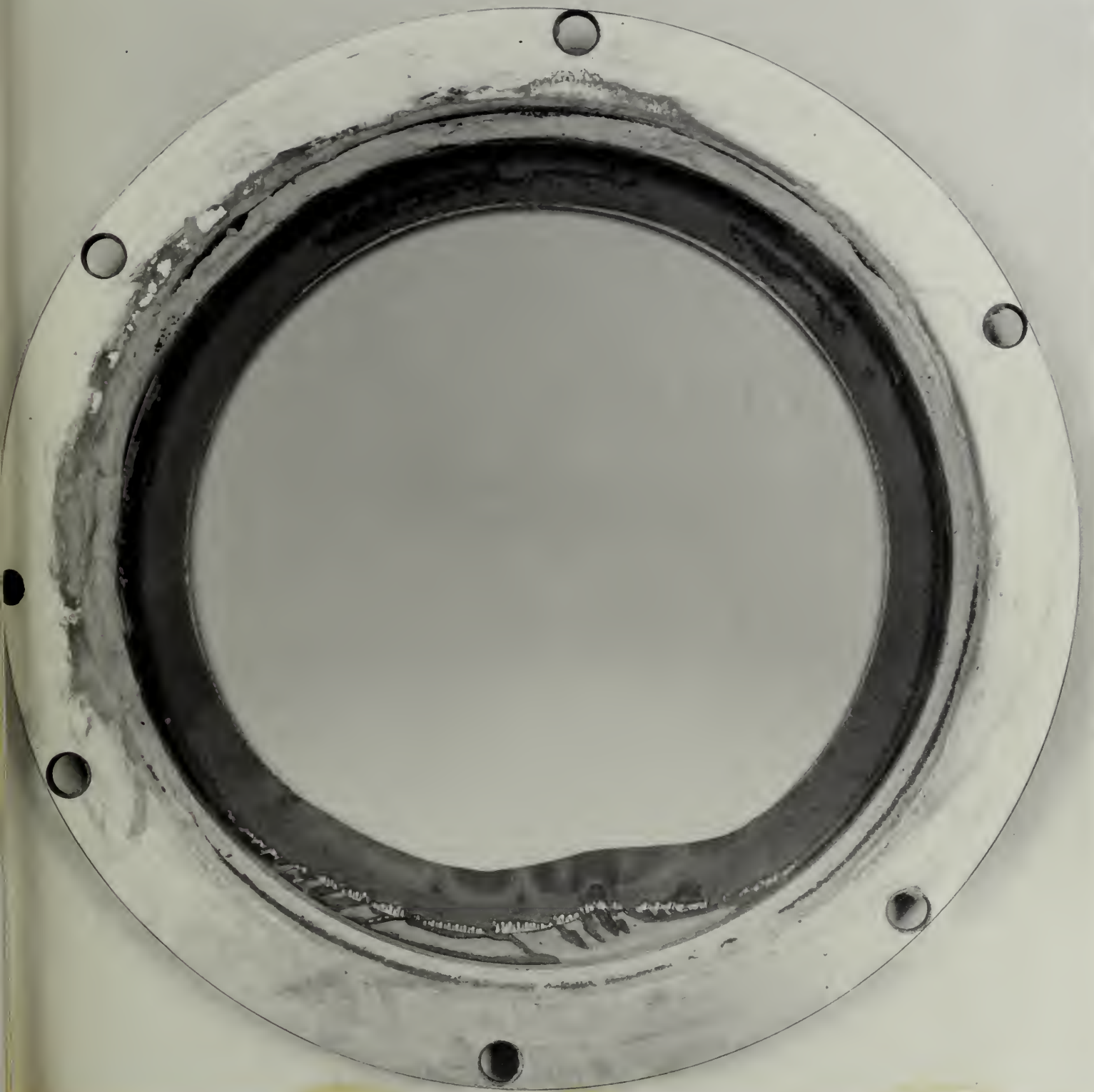


Figure 4. The glass plate and mounting ring assembly after test 4. The bottom gasket extruded toward the center of the glass plate after sustaining a maximum load of 25,500 lb.



## THE NATIONAL BUREAU OF STANDARDS

### Functions and Activities

The functions of the National Bureau of Standards are set forth in the Act of Congress, March 3, 1901, as amended by Congress in Public Law 619, 1950. These include the development and maintenance of the national standards of measurement and the provision of means and methods for making measurements consistent with these standards; the determination of physical constants and properties of materials; the development of methods and instruments for testing materials, devices, and structures; advisory services to Government Agencies on scientific and technical problems; invention and development of devices to serve special needs of the Government; and the development of standard practices, codes, and specifications. The work includes basic and applied research, development, engineering, instrumentation, testing, evaluation, calibration services, and various consultation and information services. A major portion of the Bureau's work is performed for other Government Agencies, particularly the Department of Defense and the Atomic Energy Commission. The scope of activities is suggested by the listing of divisions and sections on the inside of the front cover.

### Reports and Publications

The results of the Bureau's work take the form of either actual equipment and devices or published papers and reports. Reports are issued to the sponsoring agency of a particular project or program. Published papers appear either in the Bureau's own series of publications or in the journals of professional and scientific societies. The Bureau itself publishes three monthly periodicals, available from the Government Printing Office: The Journal of Research, which presents complete papers reporting technical investigations; the Technical News Bulletin, which presents summary and preliminary reports on work in progress; and Basic Radio Propagation Predictions, which provides data for determining the best frequencies to use for radio communications throughout the world. There are also five series of nonperiodical publications: The Applied Mathematics Series, Circulars, Handbooks, Building Materials and Structures Reports, and Miscellaneous Publications.

Information on the Bureau's publications can be found in NBS Circular 460, Publications of the National Bureau of Standards (\$1.25) and its Supplement (\$0.75), available from the Superintendent of Documents, Government Printing Office. Inquiries regarding the Bureau's reports and publications should be addressed to the Office of Scientific Publications, National Bureau of Standards, Washington 25, D. C.

