

Section 6.4

NATIONAL BUREAU OF STANDARDS REPORT

4565

STATIC LOADING TESTS OF
A. G. A. EXPENDABLE TOP RUNWAY LIGHT HEAD ASSEMBLIES
WITH GLASS COVERS

by

L. K. Irwin

Report to
Wright Air Development Center
Department of the Air Force



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

U. S. DEPARTMENT OF COMMERCE

Sinclair Weeks, *Secretary*

NATIONAL BUREAU OF STANDARDS

A. V. Astin, *Director*



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Radio Standards. High Frequency Standards. Microwave Standards.

● Office of Basic Instrumentation

● Office of Weights and Measures

NATIONAL BUREAU OF STANDARDS REPORT

NBS PROJECT

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Engineering Mechanics Section
Mechanics Division

To

Equipment Laboratory
Wright Air Development Center
Department of the Air Force

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



U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

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1. SAMPLES

Four expendable top runway light head assemblies with glass covers, manufactured by the American Gas Accumulator Division, Elastic Stop Nut Corporation, were submitted for static load tests. The light head assemblies represented parts of a prototype runway marker light. Glass covers were furnished $3/4$ inch thick for two assemblies and 1 inch thick for two assemblies. The 7 inch diameter glass plate in each assembly, seated on a silicone rubber and fiber glass gasket, was retained in the mounting ring by flexible waterproof adhesive.

2. TESTS AND PROCEDURES

For two tests, the light head assemblies were placed in the center of the lower platen of a testing machine and compression loads were applied through a 20x4.4, 10-ply rating, aircraft tire. The laboratory set-up of sample A- $3/4$ " and the aircraft tire is shown in figure 1. The air pressure in the tire at no load was measured to be 155 lb/in².

Three tests were made with the aircraft tire replaced with 7 inch diameter hardwood or steel discs. A pad of $3/16$ inch thick rubber was placed between the discs and the glass plates to provide more even load distribution.

3. RESULTS

Five static load tests were made on three A. G. A. expendable top light head assemblies. The results of these tests are given in table 1.

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

| Sample and test No. | Loading medium | Maximum load(L) lb | $\frac{L}{A^*}$ lb/in. ² | Remarks |
|---------------------|-------------------------------|-----------------------|--|--|
| A-3/4"-1 | 20x4.4 tire | 9,000 | - | No visible damage |
| -2 | hardwood disc and rubber pad | 21,000 | 546 | No visible damage |
| -3 | steel disc and rubber pad | 31,700 | 824 | Gasket extruded toward center of glass plate |
| B-3/4"-1 | steel disc and rubber pad | 32,900 | 855 | Gasket extruded toward center of glass plate |
| A-1"-1 | 20x4.4 tire | 9,000 | - | No visible damage |
| B-1" | No mechanical tests performed | | | |

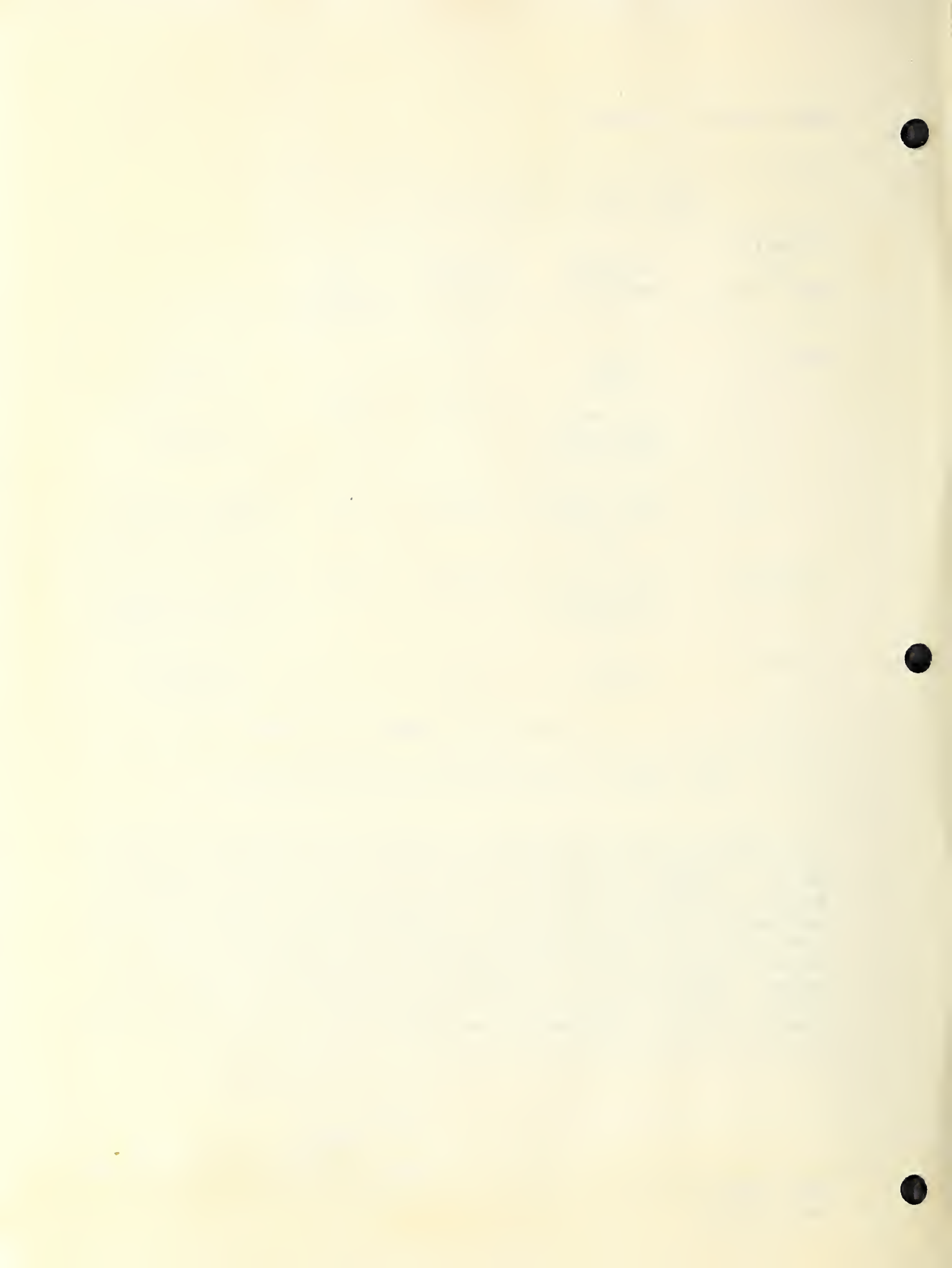
*A = area of upper surface of glass plate

Sample A-3/4" is shown in figure 2 sustaining a load of 9,000 lb applied through the 20x4.4 tire. Visual examination of the assembly during and after this test did not indicate damage. Compressive loads of 31,700 lb and 32,900 lb applied to samples A-3/4" and B-3/4", respectively, caused the silicone rubber and fiber glass gaskets to be extruded toward the centers of the glass plates and simultaneously there were marked decreases in the loads being sustained by the assemblies. No additional loads were applied. The glass plates, mounting rings and damaged gaskets are shown in figures 3 and 4 after tests A-3/4"-3 and B-3/4"-1, respectively.

For the Director,

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

Washington, D. C.
March 1956





Laboratory set-up for compression test of
sample A-3/4" with a 20x4.4 aircraft tire.

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Figure 1

2 v 430 2

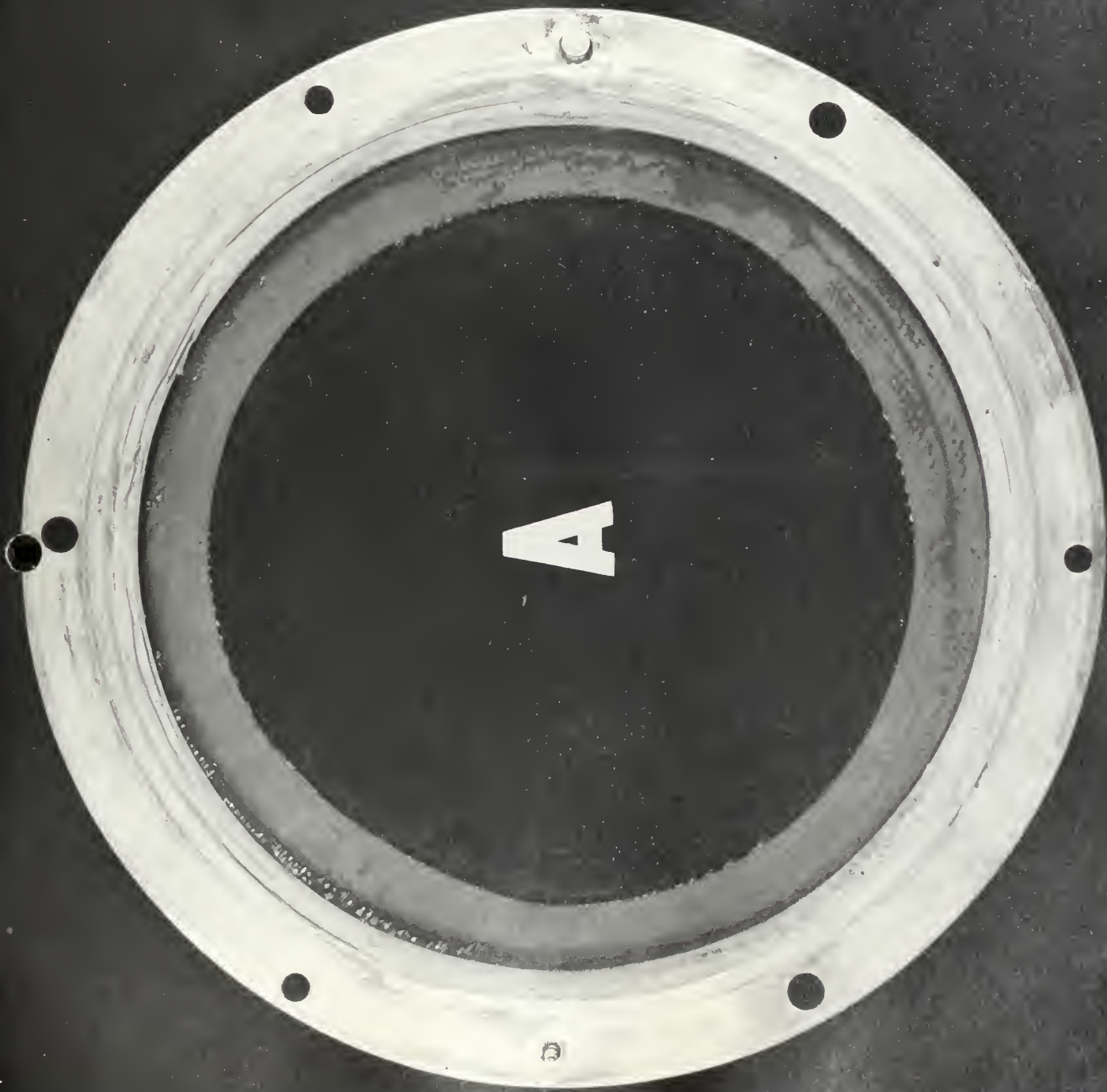


Sample A-3/4" with a load of 9,000 lb
applied through the 20x4.4 tire.

6.4/2-4-2

Figure 2

1. 2. 3. 4.

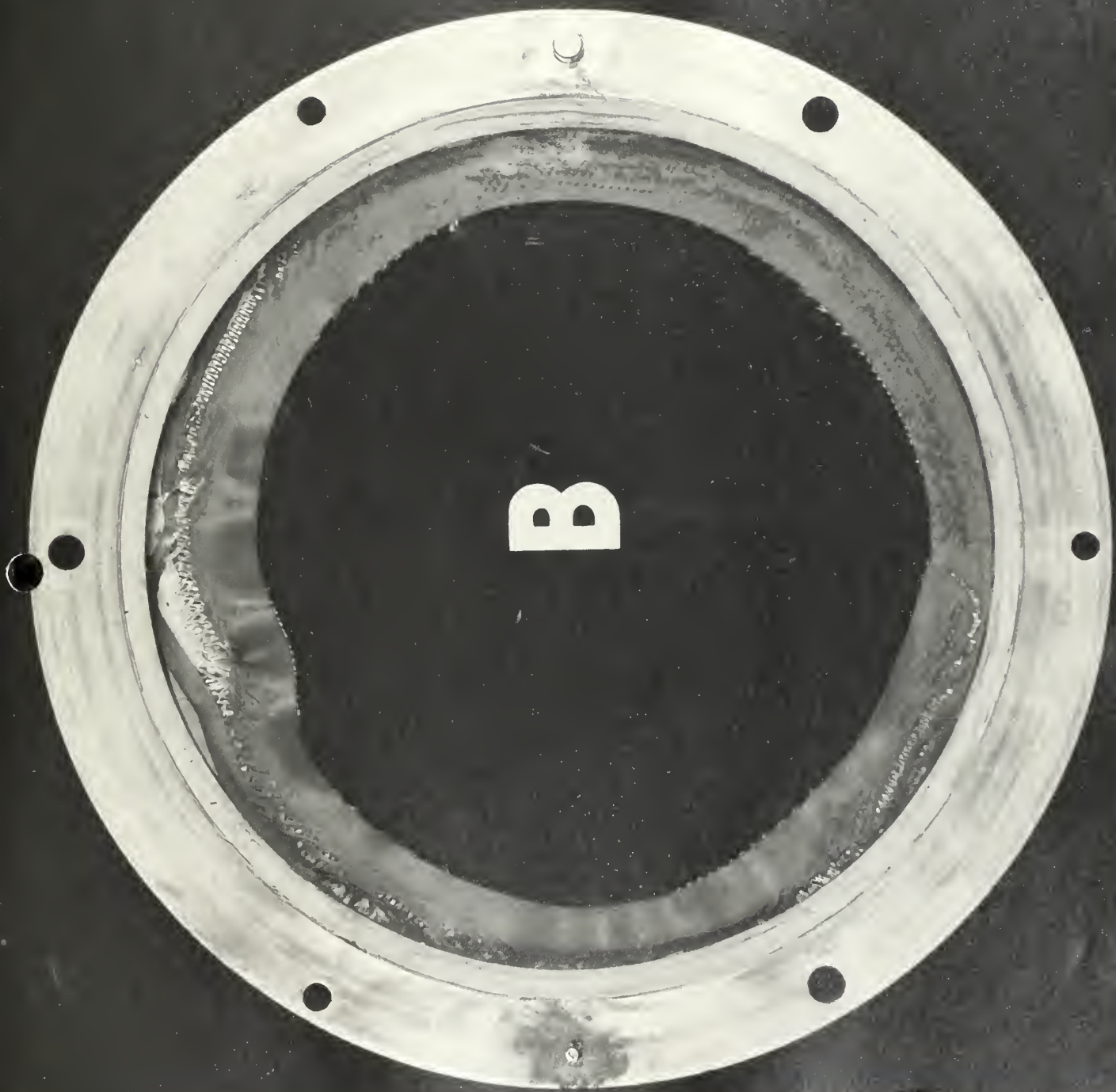


Sample A-3/4" after a maximum load of 31,700 lb.
Note the broken threads of the gasket in the
lower left quadrant.

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Figure 3

2024 4 28



Sample B-3/4" after a maximum load of 32,900 lb.
The gasket appears to be damaged around approx-
imately one-half the circumference of the glass
plate.

6.4/2-4-2

Figure 4

THE NATIONAL BUREAU OF STANDARDS

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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.

