

Machine Gun Barrel Research Records, 1941-1945



**Carnegie Institution of Washington
Geophysical Laboratory Archives
Washington, DC**

Finding aid written by:
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Machine Gun Barrel Research Records, 1941-1945

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Machine Gun Barrel Research at the Geophysical Laboratory, 1941-1945
GL-2008-03

Introduction

Abstract: This collection documents the research undertaken by the Geophysical Laboratory during World War II, on behalf of the United States Government, into the erosion of machine gun barrels during firing. It consists of laboratory notebooks, prints, and a summary report.

Extent: 4 records center cartons.

Acquisition: The records have been in the possession of the Geophysical Laboratory since their creation.

Access Restrictions: There are no access restrictions to this collection.

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Processing: Processing completed by Joseph Neumann in 2008.

Historical Note

The Roosevelt Administration, building upon lessons learned during World War I, initiated a system of government sponsored and directed war-related R&D when it constituted the National Defense Research Committee (NDRC) in 1940. While the NDRC was soon superseded by a larger, more comprehensive entity, the Office of Scientific Research and Development (OSRD), the NDRC continued to direct some scientific war work, including the activities undertaken at the Geophysical Laboratory. Dr. Vannevar Bush, director of the Carnegie Institution of Washington, was made director of the OSRD.

The research work of many universities, institutions, and corporate laboratories began to be coordinated across a broad front of topics. A division of labor among institutions allowed a variety of military problems to be confronted simultaneously. The Geophysical Laboratory's share of this work, under contract to the NDRC and in parallel with teams at the National Bureau of Standards, the Crane Company of Chicago, and the Research and Development Division of Army Ordnance, concerned the erosion of machine gun barrels by the gases produced during firing, and the identification of alloys and the development of barrel linings to mitigate the damage caused by those gases. Experiments focused on the .50 caliber aircraft machine gun, whose barrel suffered from a high failure rate during periods of heavy fire. Different linings, claddings, alloys, and bore designs were repeatedly test-fired, and the results analyzed, between 1941 and 1945. According to Dr. E. F. Osborn's summary report, work was stopped on the

project on September 15, 1945; however, some notebooks are dated through December of that year, indicating that some wrap-up work was done after the official suspension of the project.

The work was carried out at the Geophysical Laboratory's former location on Upton Street NW in Washington, DC, as well as at Naval testing sites at Carderock and Indian Head, Maryland. The collection is housed in 4 records center cartons.

Scope and Content

This collection consists of lab notebooks, photomicrographs, and a summary report produced by Geophysical Laboratory staff members in the course of carrying out research on various topics related to machine gun barrels during World War II.

Arrangement

This collection is arranged into three series.

Series 1: Summary Report, 1945

Series 2: Laboratory Notebooks, 1941-1945

Series 3: Photomicrographs, n.d.

Series Descriptions

Series 1: Summary Report, 1945

This series is a single folder containing a manuscript copy of a report by Dr. E. F. Osborn, entitled *Machine Gun Barrel Development Research at the Geophysical Laboratory, Carnegie Institution of Washington*, dated November 17, 1945. Dr. Osborn describes the general contours of the research undertaken at the Geophysical Laboratory, identifies participants, and summarizes results of investigations.

Series 2: Laboratory Notebooks, 1941-1945

Series 2 consists of lab notebooks documenting the experiments conducted by Geophysical Laboratory staff on machine gun barrels between 1941 and 1945. The notebooks were designed to be formal reporting mechanisms for the experiments: each notebook would provide a narrative summary of an investigation, with dated descriptions of each test or trial, a chronology, a clear statement of results, names of participants, and other information. The notebooks were sequentially numbered.

In practice, however, Geophysical Laboratory staff did not always follow these instructions. Some notebooks were used as scratch pads, while others incompletely capture the required information. Since the precise relationship between a particular notebook and a particular experiment can no longer be easily reconstructed, the notebooks have been arranged chronologically by starting date. However, the chronological arrangement does not always coincide with the assigned numbering. Some notebooks may have been started out of sequence,

or the lack of correlation between date and number may be an artifact of poor dating by Geophysical Laboratory staff. Gaps in sequencing also occur, but it is unclear if these missing notebooks were lost or merely left unused (notebooks 95 and 98, left blank, were discarded during processing but this cannot account for the much larger gaps which occur, especially in the later numbers). Despite this ambiguity, the notebooks are identified by their number in the folder list, because many were not given titles. When notebooks do have titles, these are provided in the folder list.

Series 3: Photomicrographs, n.d.

This series contains a sampling of 39 prints from the approximately 1,000 photomicrographic prints and 5,000 negatives taken in the course of machine gun barrel testing. The photomicrographs retained in the collection depict damage to the barrels at varying levels of magnification. Several other prints were also selected for retention.

Folder Listing

| Folder Title | Box | Folder |
|--|------------|---------------|
| Series 1: Summary Report, 1945 | | |
| <i>Machine Gun Barrel Development Research at the Geophysical Laboratory, Carnegie Institution of Washington by Dr. E. F. Osborn, 1945</i> | 1 | 1 |
| Series 2: Laboratory Notebooks, 1941-1945 | | |
| No. 5, [1941?] | | 2 |
| No. 11, August 1941-December 1942 | | 3 |
| No. 7, "Spectro I", December 1941-June 1942 | | 4 |
| No. 3, January 1942-February 1943 | | 5 |
| No. 6, "Bore Microscope and Indentations 1", January 1942-August 1942 | | 6 |
| No. 8, January 1942-July 1942 | | 7 |
| No. 10, January 1942-May 1943 | | 8 |
| No. 12, January 1942-November 1942 | | 9 |
| No. 4, February 1942-March 1942 | | 10 |
| No. 14, "Sulphur", February 1942-August 1942 | | 11 |
| No. 15, March 1942-January 1943 | | 12 |
| No. 16, March 1942-January 1945 | | 13 |
| No. 19, February 1942-December 1942 | | 14 |
| No. 20, March 1942-January 1944 | | 15 |
| No. 22, April 1942-August 1942 | | 16 |
| No. 21, "Temperature Measurements by Means of Finely Divided Metals", May 1942-July 1942 | | 17 |
| No. 24, May 1942-December 1942 | | 18 |
| No. 28, June 1942-August 1944 | | 19 |
| No. 29, "Spectro II", June 1942-September 1945 | | 20 |
| No. 31, July 1942-February 1943 | | 21 |
| No. 32, July 1942-February 1944 | 2 | 1 |
| No. 33, "Bore Microscope and Indentations 2", August 1942 | | 2 |
| No. 27, August 1942-November 1943 | | 3 |

| Folder Title | Box | Folder |
|--|------------|---------------|
| No. 35, "Heat Checking", August 1942-November 1942 | | 4 |
| No. 39, "Sulphur", August 1942-February 1943 | | 5 |
| No. 23, September 1942-June 1943 | 2 | 6 |
| No. 36, September 1942-August 1943 | | 7 |
| No. 37, October 1942-March 1943 | | 8 |
| No. 38, October 1942-November 1942 | | 9 |
| No. 40, October 1942-July 1943 | | 10 |
| No. 43, "Black Powder, Sulphur, etc, Effect on Steel", October 1942-March 1944 | | 11 |
| No. 34, November 1942-January 1944 | | 12 |
| No. 41, November 1942-May 1945 | | 13 |
| No. 42, November 1942-November 1944 | | 14 |
| No. 44, "Heat Checking 3", November 1942-April 1943 | | 15 |
| No. 45, December 1942-July 1943 | | 16 |
| No. 46, December 1942-October 1943 | | 17 |
| No. 48, January 1943-October 1943 | | 18 |
| No. 49, February 1943-August 1943 | | 19 |
| No. 51, March 1943-August 1943 | | 20 |
| No. 52, March 1943-May 1944 | 3 | 1 |
| No. 53, March 1943-December 1943 | | 2 |
| No. 54, April 1943 | | 3 |
| No. 55, April 1943-July 1945 | | 4 |
| No. 56, "Radiocarbon", April 1943-August 1943 | | 5 |
| No. 57, "Carderock Project VI", May 1943-May 1944 | | 6 |
| No. 58, June 1943-May 1944 | | 7 |
| No. 60, June 1943-August 1943 | | 8 |
| No. 61, July 1943-April 1944 | | 9 |
| No. 64, August 1943-January 1944 | | 10 |
| No. 65, August 1943-September 1943 | | 11 |
| No. 66, "Radiocarbon", August 1943-February 1944 | | 12 |
| No. 68, September 1943-April 1944 | | 13 |
| No. 69, September 1943-June 1944 | | 14 |
| No. 67, October 1943-June 1944 | | 15 |
| No. 70, October 1943-March 1945 | | 16 |
| No. 73, November 1943-May 1944 | | 17 |
| No. 74, "Indian Head Project VI", December 1943-January 1944 | | 18 |
| No. 81, December 1943-April 1945 | 4 | 1 |
| No. 80, January 1944-June 1945 | | 2 |
| No. 18, January 1944-April 1944 | | 3 |
| No. 2, April 1944-August 1944 | | 4 |
| No. 86, April 1944-January 1945 | | 5 |
| No. 88, "Radiocarbon", April 1944-December 1944 | | 6 |
| No. 89, April 1944 | | 7 |
| No. 93, May 1944-April 1945 | | 8 |
| No. 94, "Carderock II Project VI", May 1944-September 1945 | | 9 |

| Folder Title | Box | Folder |
|---|------------|---------------|
| No. 99, July 1944-September 1945 | | 10 |
| No. 100, July 1944-February 1945 | | 11 |
| No. 101, "X-Ray and Electron Diffraction Results", August 1944-October 1944 | 4 | 12 |
| No. 124, "Radiocarbon", November 1944-September 1945 | | 13 |
| No. 121, December 1944-September 1945 | | 14 |
| No. 138, January 1945-December 1945 | | 15 |
| No. 134, February 1945-May 1945 | | 16 |
| No. 135, February 1945-April 1945 | | 17 |
| No. 143, April 1945-August 1945 | | 18 |
| No. 160, May 1945-July 1945 | | 19 |
| No. 161, June 1945-September 1945 | | 20 |
| No. 181, September 1945-December 1945 | | 21 |
| Series 3: Photomicrographs, n.d. | | |
| Photomicrographic prints of gun barrels, n.d. | 4 | 22 |

Subject Terms

Topics: World War, 1939-1945
Machine guns--Testing
Machine guns--History

Occupations: Metallurgists
Physicists
Chemists

Personal Names: Osborn, Elburt Franklin

Corporate Names: Carnegie Institution of Washington. Geophysical Laboratory

Forms: Laboratory notebooks
Laboratory notes
Photographs

Bibliography

Osborn, E. F. *Machine Gun Barrel Development Research at the Geophysical Laboratory, Carnegie Institution of Washington* (Unpublished Manuscript, 1945).

Yoder, H. S., Jr. *Centennial History of the Carnegie Institution of Washington. Volume II: The Geophysical Laboratory* (Cambridge, UK: Cambridge University Press, 2004).

Related Collections

Geophysical Laboratory Financial Records, 1905-[1961], Series 2: World War II Files
Geophysical Laboratory, Carnegie Institution of Washington, Washington, DC

Geophysical Laboratory General Files, 1900-Present
Geophysical Laboratory, Carnegie Institution of Washington, Washington, DC

See the following folder titles in this collection for related material:

War Activities—CIW

World War II—Machine Gun Barrel Research