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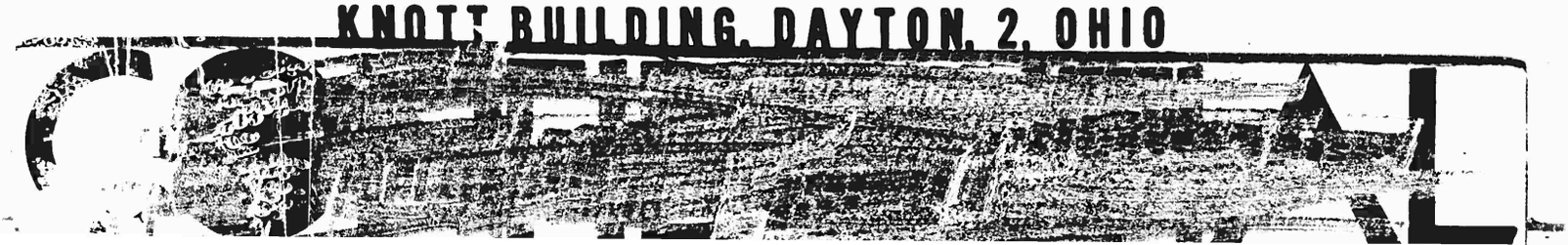

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Report No. L800-82

Aerojet-General CORPORATION

AZUSA, CALIFORNIA

INFORMAL REPORT OF PROGRESS

Copy No. 5

15 July 1953

TO: Office of Naval Research
Department of the Navy
Washington 25, D. C.

VIA: Bureau of Aeronautics Representative
Aerojet-General Corporation
6352 N. Irwindale
Azusa, California

SUBJECT: Research, Development, and Testing of Underwater Propulsion Devices

CONTRACT: N6ori-10, Task Order I
Project NR 097 003

PERIOD COVERED: 1 June through 30 June 1953

This informal monthly progress report is submitted in partial fulfillment of the contract.

AEROJET-GENERAL CORPORATION

C. A. Gongwer, Manager
Underwater Engine Division

NOTE: The information contained herein is regarded as preliminary and subject to further checking, verification, and analysis.

NOTICE: THIS DOCUMENT CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS, TITLE 18, U.S.C., SECTIONS 793 and 794. THE TRANSMISSION OR THE REVELATION OF ITS CONTENTS IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.

I. TEST VEHICLE MOTOR USING 3.75-IN.-DIA GRAIN

A. A basic turbulator configuration for the combustion chamber with a low L* has been found and tried successfully. It consists of a cruciform piece of carbon placed in the patn of the hot exhaust products. The material is well able to withstand the high temperatures and produces enough turbulence to make the results comparable to standard motor runs.

B. The hydroductor is now being static-tested with the latest configuration of the cruciform turbulator. The program to find the best over-all configuration is continuing.

C. Preparatory to free-running tests, a self-condensing hydroduct has been pit-run to test the feasibility of the configuration. Results are good.

D. Checking of missile and production grains for quality control continues. At least one of every four grains is tested in a standard motor.

E. A series of special tests has been run to learn more about the Alclo grain. Two more drop-tested grains were tried. These grains had been subjected to accelerations of 300 g twice and 150 g ten times. The runs were normal. Two grains that had been stored at 180°F for 9-1/2 months were tested. The burning rate was 7% lower than expected, but the specific impulse was normal. One grain which had been stored at normal temperature (40 to 90°F) for ten months was tested. The results were normal in every respect. Two additional grains were burned at low chamber pressures for better definition of the burning-rate curve.

F. A total of 52 static runs were made in June.

II. ALCLO-FIRED TEST STEAM GENERATOR

A. Short-run firings of the closed, recirculating gas cycle have been continued to determine the effects of ash accumulations on the boiler surfaces.

B. A grain feeder permitting extended periods of operation of the steam generator is being completed and will be in operation soon.

III. ALCLO STUDIES

A. Thirty-three 3.75-in.-dia grains were produced during May. Twelve short grains were pressed for the hydroduct missile. These grains averaged about 6.87 in. long and weighed approximately 7.5 lb each. Twenty-one standard grains were pressed. These grains averaged approximately 9 lb each.

B. The press was out of operation for about 13 days while a new billet, die, and die handling equipment were being installed.

IV. GASOLINE AND COMPRESSED-AIR HYDROPULSE

A. Examination of the pressure records indicatesthat the air valve is remaining open too long and is closing too slowly. This type of motion is believed to be an inherent characteristic of the electrically operated solenoid valve controlling the actuating oil for the air valve.

B. Two methods have been devised for eliminating the solenoid valve. One method modifies the hydraulic actuating system by replacing the solenoid valve with a rotary valve. The other method eliminates the entire hydraulic system by actuating the air valve by means of a cam. Both of these methods will be ready for testing in July.