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TECHNICAL REPORT

Dear Sir:

File: Delay Actuator, Silicone

This is the first letter report under Task Order No. LL, and it summarizes the work done from October 14 to November 14, 1959.

On March 27, 1959, an effort under Work Order No. IX, Task Order No. CC, was undertaken to conduct research directed toward the development of an experimental time-delay unit utilizing silicone fluid. This unit was to operate in deep water; be inexpensive, reliable, and relatively small; and actuate a firing pin after one year had elapsed. This effort resulted in an experimental unit which has shown satisfactory operating characteristics over a period of 3 months at an ambient temperature of approximately 75 F. Because a major problem in the development of any time-delay device is reproducibility, Task Order No. LL was set up with the objective of making minor modifications to the unit developed under Work Order No. IX, Task Order No. CC; preparing four units; and evaluating them for approximately 2 months at 75 F and 40 F.

During the current report period, the time-delay-unit design was modified, the time-delay-unit evaluation equipment was completed, and the flow-evaluation program was started on eight metering tubes.

The time-delay-unit design was modified to incorporate an O-ring seal in the flange, a filler plug in the cap, a threaded end cap for attachment of the neutral buoyancy unit, and a threaded body for attachment



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to the device to be operated. In consideration of the time-delay device as a production item, the major components were designed to be cast from Type 356 aluminum alloy and then heat treated to the T6 condition; Type 356 cast aluminum alloy was selected because of its good resistance to salt-water corrosion.

A test stand was fabricated to hold four time-delay units. Four dial indicators were mounted on the stand to measure the travel of each bellofram plunger over a 2-month period of evaluation. A refrigerator was modified to maintain a temperature of about 75 or 40 F, which temperatures are representative of the two operating temperature ranges of interest. A manifold was designed and built to hold eight metering tubes, which are described below.

Eight metering tubes, each 0.075-inch OD x 0.010-inch ID x 2 inches long, were cut from a common piece of Type 321 stainless steel seamless capillary tubing. These tubes have been installed on the above-mentioned manifold, and the flow of silicone fluid under 70-psi pressure is being measured. Subsequently, these flow data for the eight tubes will be compared; on the basis of these measurements, four metering tubes will be selected and installed in the modified time-delay units, which are to be prepared with springs individually designed to provide the proper time delay with each metering tube.

During the next month, it is expected that the four modified time-delay units will be fabricated and assembled, and filled with silicone fluid. Then, the time-delay-unit evaluation program will be initiated.

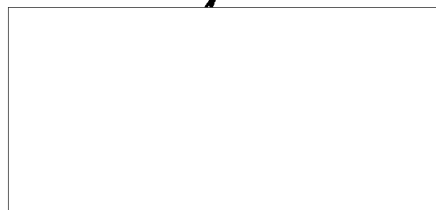
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The original appropriation on this Task Order was \$7,950. As of November 1, 1959, the unexpended balance was approximately \$6,400.

Sincerely,



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