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BI-MONTHLY STATUS REPORT NO. 2

September - October 1957

TETHFRED VERTICAL LIFT DEVICE

CONTRACT NO. NOnr 1691(00)

Placed by

Office Of Naval Research

Department Of the Navy

ALTOSCAN REPORT NO. 116

ALTOSCAN COMPANY

45 W. Scottdale Road

Lansdowne, Pennsylvania

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I. PURPOSE OF PROJECT

This is an engineering investigation incorporating the use of flying models to determine the optimum means of sustaining radar reflecting targets at altitude under a rather wide range of wind velocities. The specific requirements for the device are as follows:

(1) capable of hovering with full control while being tethered to a small surface craft;
(2) capable of attaining a maximum altitude of 500 feet above sea level while supporting a target weight of 25 pounds;
(3) capable of supporting a target weight of 25 pounds at 500 feet altitude with a wind of (30) knots and a ship speed of 25 knots;
(4) capable of hovering and forward speeds up to 55 knots;
(5) capable of continuous operation for a 24 hour period; and
(6) capable of being launched from a limited deck space.

Inasmuch as control and stability of the tethered lifting device are considered to present the major problems in this investigation and development project, a relatively high percentage of the contractors effort has been concentrated in these fields.

II STATUS OF CONTRACTUAL NEGOTIATIONS

As reported previously in Status Report No. 1, the contractor was operating on a restricted basis within the funds remaining under Amendment No. 2 pending receipt of Amendment No. 3 and the availability of additional funds which were to be authorized by Amendment No. 3.

Copies of Amendment No. 3 for the contractor's review and signature were received on September 12, 1957 and were completed and returned to the Contracting Officer on September 16, 1957. An executed copy of the Amendment was received by the contractor on October 25, 1957.

During the month of September, the costs (not including outstanding committments) against the contract passed the total amount that was available under Amendment No. 2 and the overrun for September was disallowed by the local Navy Audit Office. The contractor, however, proceeded on a restricted basis during October in anticipation of the receipt of the new Amendment.

III STATUS OF DESIGN AND FABRICATION ACTIVITIES

A. General

The shroud, circular motor cowl, fuselage and tail unit have been assembled and are shown in Figures 1 and 2 of this report. Figure 1 shows the assembled model (less motor and propellers) with the cruciform tail surfaces as it will initially be static tested to check thrust, drag, control moments and servo response. Figure 2 shows the installation of the deflector wing which will be used during static tests to determine slip stream turning angles, effect of slip stream on control surfaces, and vector relationships. In this model, the control transmission and electrical clutches are in the tail portion of the fuselage immediately adjacant to the tail control surfaces. When completed, the stabilizing gyro assembly will be installed in the streamlined tail cone.

B. Electrical Motor Components

The wiring of the motor to the slip rings is completed and all parts of the slip rings and pick-off brushes have been made into sub-assemblies ready for installation in the model.

III STATUS OF DESIGN AND FABRICATION ACTIVITIES continued -

C. Propeller Blades

Considerable difficulty is still being experenced by the casting fabricator in securing a full complement of blades which are satisfactory for the model. Several blades, of both the aluminum alloy and magnesium type, have been rejected at source due to defects apparent in X-ray examination. At present, three (3) aluminum alloy blades, out of a full order of eight, have been accepted and are having the mounting pads machined prior to final polishing. The remaining aluminum alloy blades and the six magnesium blades are expected shortly and every effort is being made to expedite early delivery.

D. Control Transmission

The transmission assembly has been partially completed for some time and was illustrated in Figure 3 of Status Report No. 1. Final assembly is waiting on the two (2) high pitch lead screws and follower nuts which will actuate the control surfaces. These parts are being fabricated by the Atlas Precision Products Company who have been having detail fabrication problems with the special multiple thread taps to fabricate the nuts. Delivery has been promised during the first week of November.

III STATUS OF DESIGN AND FABRICATION ACTIVITIES continued -

E. Control Surfaces

Control surface assemblies have been completed and are shown in Figures 1 and 2. Two sizes of rudders have been fabricated, one set for test without the deflector wing and a single large rudder for use in tests with the deflector wing.

F. Stabilizing Gyro

Detail components of the TARD Gyro and associated electronic and electrical parts are in manufacture. Upon completion, these items will require bench testing along with the assembled control transmission to permit checking and adjustments of the overall servo system and its response time. The gyro will be flight tested initially in the Phase I B portion of the test program.

IV WORK SCHEDULED FOR NEXT PERIOD

With the availability of the additional funds under Amendment No. 3, it is planned to concentrate on the following activities which will cover Phase I A tests and the possibility of starting Phase I B tests.

a. Complete the fabrication of the propeller blades.
b. Dynamic balancing of the rotor and stator assemblies with blades attached.
c. Fabrication of test rigging for Phase I A static test.
d. Start Phase I A tests
e. Complete the fabrication of gyro parts
f. Bench test of the gyro and servo system.

Figure No. 1
Flight Model With Cruciform Tail

Figure No. 2
Flight Model With Deflector Wing