

DEPARTMENT OF THE NAVY
Bureau of Aeronautics
Washington 25, D. C.

Aer-EL-4511

021361

3 NOVEMBER, 52

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From: Chief, Bureau of Aeronautics
To: Commander, Naval Air Test Center

3010 Subj: TED Project Directive No. PTR-EL-45017
Title: Evaluation of Wide Open Airborne Direction
Finder, NL-ALD-A(XB-1)

Encl: (1) Problem Details
Rec'd C.L.

1. Priority A; Allotment E; Bureau Control No. 40240; Account No. 46846.
Desired Completion Date: 1 May 1953.

2. Operational Objective: An experimental four-channel 360° instantaneous direction finder has been developed for airborne use in the microwave region to provide both wide open coverage in azimuth as well as wide open coverage in frequency. Existing systems scan the azimuth by means of a rotating antenna and thus are able to look in only one direction at any given instant. Similarly present receivers are capable of being tuned to only one frequency or a relatively narrow band of frequencies at a given instant thereby being insensitive to signals in any other part of the RF spectrum. Operationally the limiting characteristics of existing DF equipment reduces the probability of intercepting an enemy radar signal because the scanning DF antenna may not be looking in the direction of the signal when the signal is on, or the receiver may not be tuned to the frequency of the signal. The newly developed four-channel instantaneous DF will overcome the above limitations because the system is looking in all directions simultaneously and at all frequencies in the range of the equipment simultaneously. Its use will also include early warning and homing functions.

3. Abstract of Project: This project is to be conducted in two phases as follows:

Phase I - Installation of equipment in plane by NATESTCEN. (NRL with NATESTCEN assistance will determine a suitable location for installation of the equipment and will make necessary flight checks to determine the operational feasibility, and whether any design changes should be made by NRL prior to continuing Phase II of this test)

Phase II - Following completion of Phase I, NATESTCEN with NRL's assistance shall conduct thorough test and evaluation as specified in enclosure (1).

4. Source of Aircraft: To be provided by NATESTCEN.

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Subj: TED Project Directive No. PTR-EL-45017

Title: Evaluation of Wide Open Airborne Direction Finder

5. Source of Equipment: To be provided by NRL approximately 15 November 1952.

6. Cognizant Engineer: Mr. J. A. Solga, BuAer, Electronics Division (EL-4511), Telephone Liberty 5-6700, Extension 63146.

7. Participating Engineers:  and Mr. R. Mayo of NRL.

8. Reports: Final report shall be required on Phase II only and distributed in accordance with standard distribution list for experimental ECM equipment. No report on Phase I by NATESTCEN will be required.

9. If the desired completion date cannot be met, it is requested that the Bureau of Aeronautics (EL-4511) be so notified.

Copy to: (with encl (1))

Addressee (25)

CNO (Op-341D)

CNO (Op-421)

CNO (Op-20X)

CNO (Op-551)

ONR

NRL

BUSHIPS (Code 810)

NAESU

NADEVCEM (AEEEL Programs Control)


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~~SECRET~~PROBLEM DETAILS

1. Purpose - The purpose of these tests is to determine the engineering feasibility, approach and performance of a newly developed NRL wide open direction finder system.
2. Sufficient space should be provided to house the antenna assembly which consists of a cylinder approximately 16 inches in diameter by 12 inches in length.
3. The equipment will be set up in an operator's position with provisions for ICS between operators and pilot so as to coordinate data in flights and to compare either information from an AN/APA-69 or AN/APA-17 if this equipment can be made available.
4. The project is to be conducted in two phases as follows:

Phase I

- a. NATESTCEN will provide a suitable aircraft in which the wide open direction finder system is installed.
- b. NRL shall check the basic principles of the system for its soundness of performance and accuracy. Any modifications and refinements, considered necessary during and after conclusion of Phase I of the test, will be made by NRL before Phase II is started.

Phase II

- a. The purpose of Phase II is to evaluate the capabilities of the wide open direction finder system under a variety of operational conditions. NATESTCEN shall conduct these tests. The following types of information are desired:
 - (1) Ease of operation.
 - (2) Convenience of interpreting signal display when many signals are received simultaneously.
 - (3) Bearing accuracy calibration data at several frequencies within the frequency range of the equipment.
 - (4) Stability of calibration with time. (Record calibration for comparison during tests)
 - (5) Maximum intercept range at 200, 1500, 7000 and 10,000 feet against ground based radars.
 - (6) Convenience for homing against ground based or shipboard radars.

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ENCLOSURE (1)
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(7) Usefulness of the system as a 360-degree warning device against airborne fire control radars.

5. The system consists of an antenna assembly, control unit, and three cases 5" X 8" X 19" and weighs 70 pounds.

Power Requirements - 115 volts, 400 cycles, 250 watts
28 volts DC, 100 watts

6. Flights

- a. To check out equipment.
- b. Range tests at 200, 1500, 7000 and 10,000 feet.
- c. Direction finder calibration at frequency number 1.
- d. Direction finder calibration at frequency number 2.
- e. Recalibration at frequency number 1 to check stability.
- f. Recalibration at frequency number 2 to check stability.

7. Remarks:

a. Collaboration between engineers of both NRL and NATESTCEN shall be made on each phase of the project.

b. The frequency range of the antenna system to be supplied for original test is approximately 2300-5000 mc. It is expected that the antenna system operating through 1000-11,000 mc will be available for inclusion in the system before completion of these tests.

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