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Development, Testing, and Evaluation of Visual Landing Aids

Consolidated Progress Report

to the

Airborne Equipment Division
Bureau of Aeronautics
Department of the Navy

For the Period
April 1 to June 30, 1954

for
Bureau of Aeronautics Projects

TED No. NBS-AE-10002

TED No. NBS-AE-10006

TED No. NBS-AE-10007

TED No. NBS-AE-10008

TED No. NBS-AE-10011



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NATIONAL BUREAU OF STANDARDS**

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Development, Testing, and Evaluation of Visual Landing Aids

April 1 to June 30, 1954

I. REPORTS ISSUED

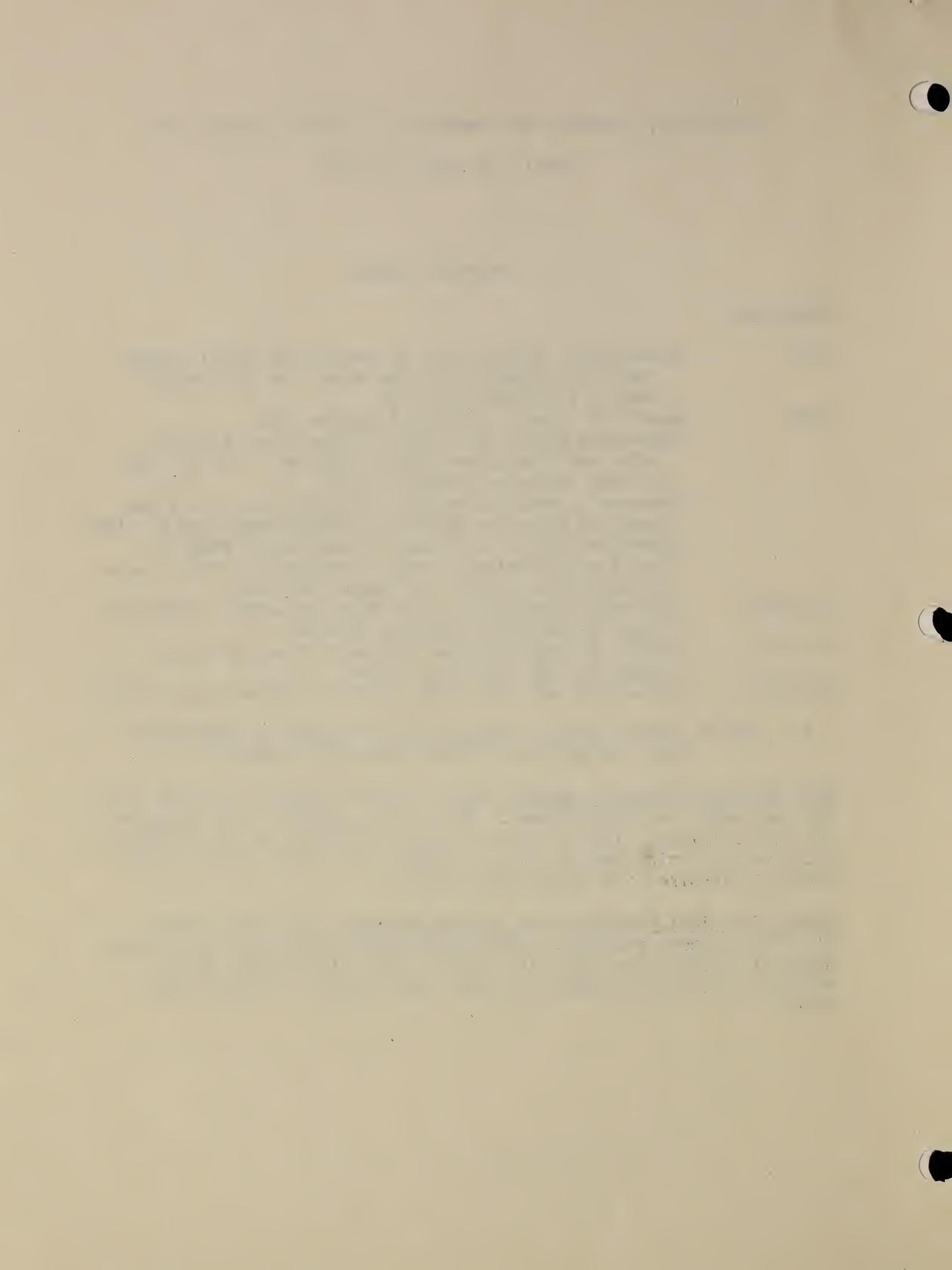
Report No.

3242	Development, Testing, and Evaluation of Visual Landing Aids, Consolidated Progress Report For the Period January 1 to March 31, 1954
3260	Report of a Survey of Visual Landing Aids
--	Memorandum Report of a Study of the Visual Range of Radio and Television Towers; Section I, Visual Range of Tower Structure and Guy Wires
--	Addendum to Memorandum Report of a Study of the Visual Range of Radio and Television Towers Dated May 20, 1954
--	Memorandum Report of a Study of the Visual Range of Radio and Television Towers; Section II, Visual Range of Obstruction Lights and Hazard Beacons
21P-4/54	Photometric and Battery-Life Tests of a Model Light for Night Field Carrier Landing Practice
21P-5/54	Effects of Lamp Position on Beam Setting and Visual Range of Type C-1 Runway Light
21P-6/54	Photometric and Life Tests of Eight Approach-Light Lamps

II. TED No. NBS-AE-10002. MISCELLANEOUS SERVICES IN CONNECTION WITH FOG MODIFICATION AND VISIBILITY STUDIES

Beam Setting of Type C-1 Runway Light. NBS Test Report 21P-5/54 covering this work has been released. This study indicates that changing the beam setting of Type C-1 runway lights will improve the coverage on wide runways during periods of low visibility but that a wider beam spread is required for extreme conditions.

Lights for Night Field Carrier Landing Practice. NBS Test Report 21P-4/54 has been released. This report contains photometric measurements of a light consisting of a small Fresnel lens using several different flashlight lamps as sources, and results of battery-life tests.



Photometric measurements of a breadboard unit using a precision die-cast 1 1/2-inch diameter parabolic reflector, a 100° horizontal spread lens and several vertical spread lenses, have been made and a report has been drafted. This unit appears to be much more satisfactory than the Fresnel unit. Several simple light units have been constructed and calibrated for use in a contemplated field test at the Naval Air Test Center to check our determination of the optimum intensity for lights for night field carrier landing practice. (NBS Test 21P-11/54)

Characteristics of Retroreflectors. Some additional data has been taken at large angles of divergence because of the application of retroreflectors to taxiway marking. The data obtained to date have been tabulated and the first draft of the report describing the work has been completed.

III. TED No. NBS-AE-10006. DEVELOPMENT OF TRANSMISSOMETER-CEILOMETER INTENSITY CONTROL SYSTEM

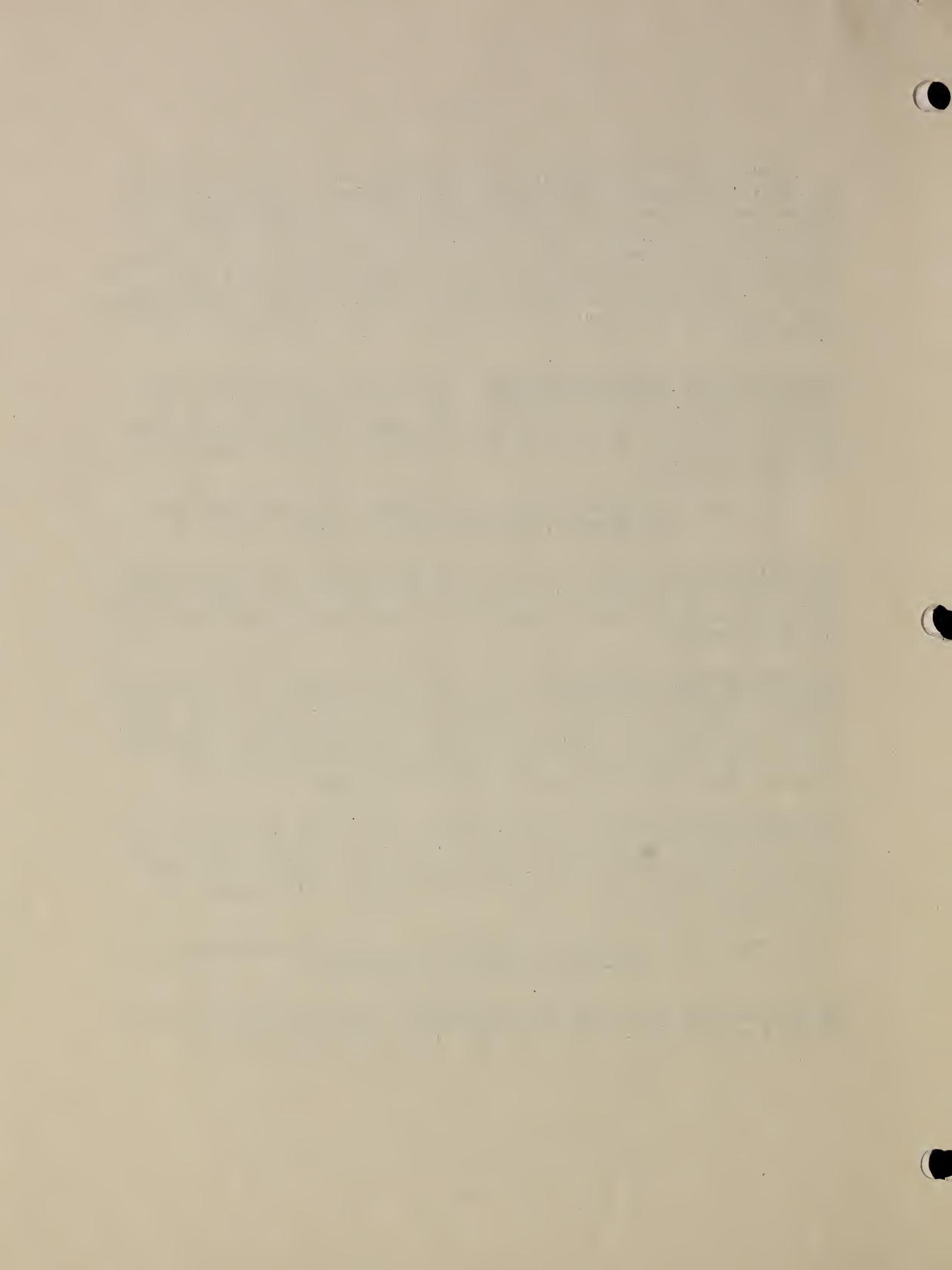
Specifications. Further assistance has been given the Aerology Section, Bureau of Aeronautics, in the preparation of an interim specification for transmissometer procurement. The completed specification has been checked.

Intensity-Setting Indicators. Following a study of the feasibility of using in the control tower at Patuxent River a meter specially calibrated to indicate the proper intensity of approach and runway lights, a search was made for a source of supply of a meter with a nonlinear (preferably a logarithmic) scale. A source of a suitable type of meter has been found and meters have been ordered.

100% Setting Calibrator. Laboratory and field tests of calibrators have continued. They indicate that there is sufficient accuracy and stability of the calibration of the unit for the purpose, provided that the operational procedure takes into account the vagaries of barrier-layer photocells.

IV. TED No. NBS-AE-10007. RESEARCH ON VISIBILITY AND INTENSITY CONTROL OF VISUAL LANDING AIDS

Marking of High Towers and Tall Structures. Three memorandum reports giving the results of a study of the visual range of radio and



television towers under day, twilight, and night conditions have been prepared, presented, and interpreted before the ACC/AGA Ad Hoc Group. These data were the basis for deciding if towers were adequately marked.

Special Ceilometer. Work on this task has been postponed for several months because of the pressure of qualification test and other work. It was possible to resume work late in the quarter. Work has been started on the electrical controls of the scanning drive. Suitable circuits have been developed; the necessary relays and switches have been ordered; limit, synchronizing, safety and reversing switches are now being installed and the scanning drive is being wired.

V. TED No. NBS-AE-10008. DEVELOPMENT AND TEST OF SEALED-REFLECTOR APPROACH-LIGHT LAMPS

NBS Test Report 21P-6/54 giving the results of tests of eight preproduction samples of 399-watt approach-light lamps manufactured by the Westinghouse Electric Corporation has been released. These lamps met the requirements of the procurement specification.

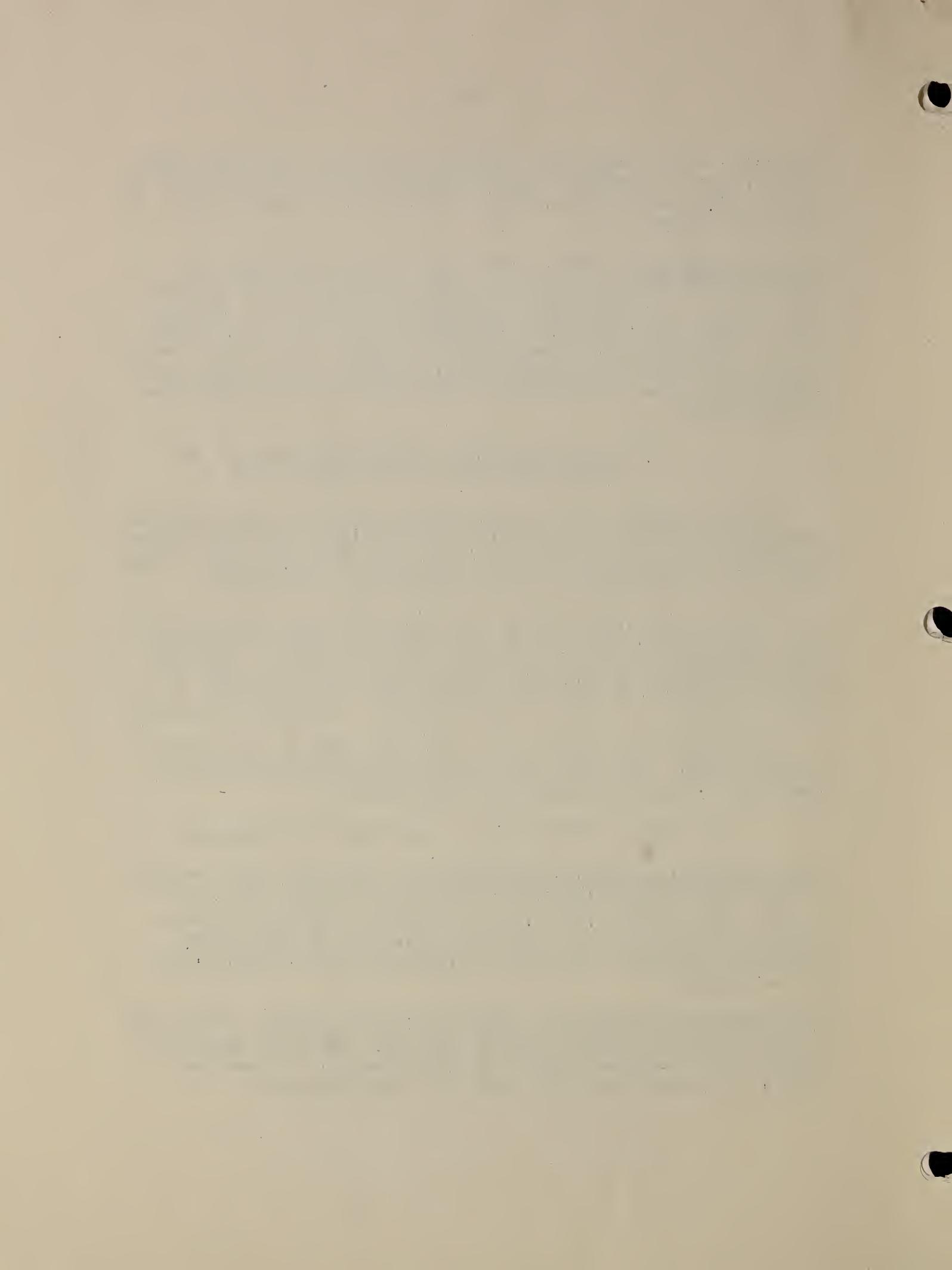
Tests of ten similar lamps from the production run have been made. These lamps failed by a small amount to meet the vertical beam spread requirements at horizontal angles of $\pm 15^\circ$. The lamp life was, however, considerably longer than that specified. A report covering this work is being prepared. (NBS Test 21P-12/54)

Photometric measurements have also been made on some 25-volt, 350-watt lamps. This data and that obtained using the 115-volt lamps will be used in preparing a specification.

VI. TED No. NBS-AE-10011. FIELD SERVICE OPERATION

Survey of Naval and Marine Air Stations. NBS Report 3260, "Report of a Survey of Visual Landing Aids" has been completed and released. This report presents the results of a survey of eleven Naval and Marine Corps Air Stations located on the East Coast. Particular attention was given to airfield lighting difficulties and maintenance.

Field Maintenance Manual for Airfield Lighting Systems. This task has been given priority during the quarter. The first draft of a complete step-by-step trouble-shooting procedure has been completed and trouble-shooting charts have been prepared.



Approach Beacon. High-intensity range lights have been installed at the runway threshold, completing this installation so that it is now ready for flight testing. 600-watt landing lights with green filters are being used for the range lights pending the receipt of course-light fixtures from the CAA.

Transmissometry and Visibility.

Comparative visual range measurements have been made in fog of two 25-candle lamps, one unshielded and one shielded so that only the light emitted in the direction of the observer is allowed to escape. There are times at night when the glow surrounding the bare lamp can be seen farther than the direct light from either lamp. The distances at which the direct light from the two lamps can be seen are essentially the same.

A calibration box has been constructed for use in checking the calibration of the 100% Setting Calibrator. When suitable operational precautions are taken, the instrument will have an accuracy of 2%.

Further data have been obtained on the effects of scattered light on transmission measurements. The amount of scattered light received in the system appears to increase as the transmission decreases, to reach a maximum, and then to decrease as the transmission becomes still lower.

An illuminometer obtained on loan from the Weather Bureau has been installed. This instrument provides a continuous record, during daylight, of the illumination on a horizontal plane. A brightness meter to provide a continuous record of the brightness of the north horizon sky has been installed. This instrument was assembled from spare NBS transmissometer components.

Tests in Fog. Several fogs of short duration have occurred during this period, during which tests of the types described previously were conducted.

Future Work. No changes in the course of the work are anticipated during the next quarter.

