NATIONAL BUREAU OF STANDARDS REPORT

NBS PROJECT		NBS REPORT
0201-30-2303 0201-30-2328	March 31, 1954	3185

IMPROVEMENT OF VISUAL AIDS FOR AIR NAVIGATION

Progress Report
July 1, 1953 to February 28, 1954

Prepared by
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To
Airways Engineering Division
Civil Aeronautics Administration

NBS

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

IMPROVEMENT OF VISUAL AIDS FOR AIR NAVIGATION
PROGRESS REPORT

1. OBJECTIVES

It is the purpose of this project to carry on research and testing, develop specialized equipment and provide consultation services for the Airways Engineering Division of the Office of Federal Airways, Civil Aeronautics Administration.

2. STATUS

At the beginning of the period covered by this report, all of the research activities and three of the tests covered by this report were in progress. At the close of the period two of the research activities were nearing completion, and there was only one uncompleted test pending. The work covered by this report is financed by two separate funds, and hence two N.B.S. project numbers appear on the title page. A separate financial summary is attached covering the charges against each of these funds.

3. GOVERNMENT TESTS

The tests reported in this division of the report were made by personnel other than those regularly assigned to the C.A.A. projects. With one exception they are standard tests which could be covered by simple reports. A brief summary of these tests follows:

Test No.	Requested	Reported	Estimate	Cost
G13593	6-18-53	7-21-53	$100.	$100.

A fuel oil additive carrying the trade name "GO-Sludge" was analyzed and found to be essentially a mixture of soluble oil of petroleum origin and alcohols. As the result of this analysis it was agreed that it would not be worth the expense to test the material further.

G13887 Test Canceled

This number was assigned to a propeller test which was canceled after preliminary conferences because there were no funds available to cover the work.

G14096	9-11-53	10-6-53	$200/$400*	$386.

A field intensity meter was submitted for calibration at 118 megacycles. Later, it was decided that the meter should be calibrated at 109 and 333 megacycles also. Still later, it was requested that the meter be calibrated at 30 megacycles which required special arrangements. Difficulty was experienced in checking the linearity of the meter, but a satisfactory calibration was finally obtained.

*Increased to cover additional work.

Test No.	Requested	Reported	Estimate	Cost
c1b47	1-6-54	3-1-54 A 3-2-54	--	-- *

Nineteen parts from a [illegible] 56 lamp holder were examined spectrographically to determine if they complied with C.I.A. specifications. Some of the parts did not comply, notably the principal casting. Additional tests were made on successive samples until satisfactory parts were tested.

* Charged to a separate account but included because no separate report will be made for that account.

C1b468	1-6-54	1-29-54	$100.	$29.

A connector assembly for a [illegible] 56 lamp holder was tested to determine if it could withstand the required voltages. The results were satisfactory.

C1b470	1-15-54	2-12-54	$50.	$46.

A radio-frequency cavity meter was calibrated at six frequencies and the meter setting at resonance was recorded and reported.

C1b952	1-27-54	2-15-54	--	-- *

A cable clamp was tested by spectrochemical analysis to determine if it conformed with the requirements of the specification. The clamp was in three parts, two of which met the requirements completely but the third part was considerably low in magnesium.

* Charged to a separate account but included because no separate report will be made for that account.

4. [illegible] TESTS

In general the project tests were carried out within the Division to which the C.I.A. projects have been assigned. They frequently involve unusual aspects which place them outside the category of standard tests.

Test No.	Requested	Reported	Estimate	Cost
22-1/54	12-24-53	1-22-54	$200.	$155.

One pair of binoculars of Japanese manufacture were tested for compliance with C.I.A. specifications. The free aperture of the right barrel was 2% below the specified value and the resolution in both barrels was somewhat outside the specification limit. The binoculars, however, appeared to be satisfactory for ordinary use.

Test No.	Requested	Reported	Estimate	Cost
21A-5/53	4-3-53	8-6-53	$175.	fy 53 - $144. fy 54 - $116.

This test, which was carried over from the previous year, covers three lots of neon approach-light lamps. The first two lots were unsatisfactory for operating voltage and the third lot was considerably below the specified limit for light output.

21A-6/53	5-14-53	8-17-53	$175.	$165.

Three sample transformers for approach-light units were tested for compliance with the requirements of the C.A.A. specification. The inspection revealed five deficiencies with respect to the specifications, but only one of these, a low power-factor, was considered serious.

21A-10/53	11-3-53	(in progress)	$175.	$210.

Fifteen approach-light photometers were inspected and calibrated. These instruments were found to have incorrect test-plate orifices which had to be returned to the manufacturer for enlargement. Upon being returned they were reinstalled in the instruments before calibration could be made. Some difficulties were also experienced in checking additional photometers which were returned to this bureau from the C.A.A. and the National Airport. In one case a new calibration lamp had to be installed in the calibrator. After these difficulties had been overcome the tests proceeded satisfactorily. The units were calibrated, calibration cards were prepared, the cards were sealed into plastic covers and installed in the instrument cases and the instruments were packed and shipped on bills of lading furnished by the C.A.A.

21-6-54	1-6-54	2-9-54	—	$275.

Two transformers designed for direct earth burial were tested for compliance with the requirements of the C.A.A. specification. One was taken apart and inspected for construction and found satisfactory. The other transformer was tested for electrical characteristics before and after being dropped to simulate the effects of rough handling. All previous tests were then repeated. The transformers were found to be in accordance with specifications.

5. [illegible]

5.1 Study of exposure characteristics of metal protective paints

This study embraces the characteristics of 15 coating sequences applied to corroded steel panels, used to simulate old structures, and 10 sequences applied to galvanized steel panels, simulating new work, to determine the relative corrosion protective value of the different treatments. The corroded panels were brushed to remove loose rust. The galvanized steel panels were given priming coats comprised of zinc dust and zinc oxide and two coats of orange exterior enamel followed by 2000 hours in an accelerated weathering equipment before being treated with the other coatings. Both natural and accelerated weathering is being used on the completed panels. In December, a progress report was submitted covering the loss of gloss and color changes for the different specimens. At the time the progress report was prepared only one of the coating systems had proven inferior to the others in protective value, although there was considerable difference in the loss of gloss. Up to that time, the study had not revealed a satisfactory correlation between the results obtained from the outdoor exposures and those resulting from the use of the accelerated weathering equipment. The test is being continued.

Cost: $650. *

5.2 Study of green plastic for beacon covers

During the previous year, various samples of green plastic were tested for chromaticity until a satisfactory sample was found. On the basis of this sample, some experimental green plastic covers for 24" beacons were purchased by the C.A.A. and one of these was sent to this Bureau. In order to obtain information on the exposure characteristics to be expected from this plastic, a 3" disc was cut from the center of this cover and the resulting hole was filled with a piece of clear plastic. This beacon cover was returned to the C.A.A. for service tests and the small sample was spectrophotometered to determine its chromaticity. Subsequently, this disc was given four 120-hour exposures to spray and ultraviolet radiation. After each exposure the sample was again spectrophotometered and its chromaticity has been computed for each stage. The results appear very stable but the report has not as yet been prepared.

Cost: $115.

5.3 Study of optical system for traffic control projectors

In the previous fiscal year an experimental traffic signal projector was submitted for candlepower distribution measurements. After making these measurements, it was found that the device could be improved by rotating the lamp to make a more satisfactory use of the filament form. Upon completion of this work the results were discussed with the C.A.A.

* Costs stated are for the report period.

engineers and it was decided to make a more thorough study of the possibilities of improving the optical system and measurements were made on a plastic lens which had been obtained from Eastman Kodak Co. The candlepower distribution obtained was so satisfactory that an additional lens of the same type was obtained, but this lens taken from new production did not give equally good results. When this fact was brought to the attention of the Eastman Kodak Co., they voluntarily submitted two additional samples of both old and new production and these were also tested with results confirming those previously obtained. This study has also included tests on the variations to be expected in substituting one lens for another in the original experimental projector. A report of the work has been submitted and further study is being deferred until the Eastman Kodak Co. has been informed of the latest results and policy decisions can be made by them and the Airways Engineering Division.

Cost: $137.

5.4 Standard for signal-light colors

During the previous fiscal year a first draft of a joint specification to cover the requirements of civil and defense agencies for some means of controlling the color of aviation ground lights was prepared and submitted to the Lighting and Marking Panel. After considering the draft and a report on the status of the relationship between this proposed specification and the specifications for aircraft lighting colors, the Panel requested that the draft be revised for the purpose of including the aircraft lighting requirements. The draft was submitted to Dr. K. G. Fisher of the Bureau of Aeronautics as one familiar with the requirement for signal colors for military aircraft and comprehensive comments have been received from Dr. Fisher. The preliminary portions of the first section of this standard have now been revised and the work on the basic chromaticity definitions and diagrams necessary for illustrating them is going forward. This work is being handled as a joint project with the Bureau of Aeronautics, the major part of the expense being carried by that Bureau.

Cost: $110.

5.5 Consultation and liaison activities

This item includes correspondence, conferences, administrative reports and other general activities incident to the conduct of this project.

Cost: $105.

add to subsets

Financial Summary, July 1, 1953 to February 28, 1954
C.A.A. Fund No. 134133.001

C.A.I. Project CAI-30-232

Transfer by C.A.A. Order 11-54-274 Misc.

Cost of tests performed

C.A.I. No.	Date of request	Item Tested *	Tests to date
		"Covernment Tests"	
CA3593	6-16-53	"Co-Chaps"	$ 106
CA3887	?	Propeller	Cancelled
CA4096	9-11-53	Field Intensity Meter	306
CA4807	1-6-54	Lamp holders for approach lights	--- **
CA4868	1-6-54	[illegible] lamp connectors	39 **
CA4950	1-15-54	Frequency meter	64
CA4952	1-27-54	Cable clamp	--- **
		"Project Tests"	
22-1-54	12-24-53	Binoculars	155
21A-5/53	4-3-53	Neon Lamps for approach lights	116
21-3/53	5-14-53	Transformers for approach lights	146
21A-10/53	11-3-53	Approach-light photometers (report pending)	310
		Total for tests	$ 1154

Research, Consultation and Liaison Services

Study of endurance characteristics of metal protective paints	680
Study of green plastic for lenses covers	115
Study of optical system for traffic control projectors	1370
Standardization of specifications for signal colors	160
Consultation and Liaison	1515
Total	$ 3820
Total Expended	4974.
Balance available 3-1-54	[illegible]606.

* For scope of test see previous section of report.
** Separate funds.

Financial Summary, July 1, 1953 to February 20, 1954
C.E.E. Fund No. 13x1306.001

U.S.A. Projects 0201-30-2303
and 33-8

Carry over from fiscal year 1953 (1453-733 Amendment 2) (Reduced from balance stated in last report by accruals of obligations of prior year in the amount of $1.58)	$2995.37

Cost of Test Performed

Number	Date of request	Item Tested	Cost
M13-6-54	1-6-54	Direct burial transformers	$270

Research, Consultation and Liaison Services

Liaison activities	66
	336
Balance Available 3-1-54	$2659.