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25 April 1955

MEMORANDUM FOR: THE RECORD

**SUBJECT: Project Monitor at [redacted]
P-101B, C, Communication System, I. R.**

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1. Time and Place of Meeting: The meeting was held 19-22 April at the [redacted]

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2. Attendance: [redacted]

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3. Purpose of Meeting: The purpose of the meeting was to discuss the following points:

a. Improvements to be made in the IR Communications System prior to construction of the final 20 prototypes.

b. Environmental test procedures for testing of the above units.

c. A discussion leading to a proposal for the design and construction of P-101C, Communication System, I. R., Miniature. Hereafter, the P-101B units will be referred to as Model B and the P-101C units will be referred to as Model C.

4. Discussion:

a. A general discussion of the various improvements to be made was held. The list of improvements contained in the field test report was discussed. Several additional suggestions were mentioned. Among them were:

(1) The diagonal braces underneath the bellows will be made automatic except for a clamping screw.

(2) The battery filler caps will be modified to prevent the spillage which presently occurs when the battery is inverted.

(3) Both battery terminals and the power input leads to the equipment will be marked with their polarity.

(4) An adapter

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(4) An adapter for the headphone plug will be provided to allow the use of a standard phone plug input to a recorder.

(5) A standard phone jack will be provided to allow the use of a key when in the transmit-find position.

b. Environmental tests will be performed on the two Model B equipments in [redacted] possession. The tests will follow the procedure of Appendix I. The purpose of the tests shall be to locate any weak points or undesirable features in the equipment. Any undesirable features which are found shall be corrected, if possible, without a major equipment redesign.

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c. The features of the proposed Model C equipments were discussed. [redacted] had built two prototypes which were demonstrated on the vacuum range at 1.5 miles ACW.

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Prototype I was about 4" x 5" x 6" overall with a battery box of similar size. It employed a galvanometer modulated tungsten source of about 0.8 watt input in refractive optics. A separate 3 inch diameter reflective optical system was employed for the detector. The modulator amplifier was transistorized. Considerable further miniaturization is possible, perhaps to the extent of eliminating the battery box.

Prototype II was about 2" x 4" x 6" overall, complete with batteries. It employed a common transmitter-receiver refractive optical system similar to that of the Model B. A PbS detector was used with a subminiature tube amplifier. The modulator was the same as in Prototype I. In Prototype II, however, no source was employed. Instead, light from the opposite transmitter was used.

Previous experience with the vacuum range calibrations shows that an indicated ACW range of 1.5 miles is likely to be considerably greater in practice. Considerable reduction in size of both prototypes can therefore be expected if a target range of 1 mile is selected.

The following tentative general specifications were decided upon:

- (1) Size: 2" x 4" x 6" maximum complete
- (2) Weight: No limit set other than that of size
- (3) Operating Life: 2 hours transmit at 70°F
- (4) Beamwidths:

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(4) Beamwidths:

[Redacted]

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(5) Range: 1 mile ACW when used in conjunction with Model B

(6) Source: Model C will be active if possible within the above limits. Otherwise, a passive unit will be built. Tungsten filaments will be used.

(7) Detector: FbS cell

(8) Alignment: Alignment will be achieved through the use of an expandable receiver beam, separate transmitter and receiver optics, an optical sight for both day and night use, and a tripod type miniature ball and socket swivel mount which will be supplied as an accessory.

5. Actions:

a. [Redacted] will write a proposal for the design and construction of a Model C unit. The proposal will follow the phasing of the present contract and will cover Phases I and II in a period of 8 months. Twenty-four units will be built as under the present contract so that 24 unbalanced systems will be available.

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b. APD will supply [Redacted] with 2 Navy 7X50 binoculars as GPE to assist in testing of the Model B equipments.

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[Redacted]

TSS/APD

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Attachment:
Appendix I

Distribution:

- Orig. - P-101B
- 1 - P-101C ✓
- 1 - [Redacted] Commo
- 1 - chrono

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APPENDIX I

Model B, Environmental Tests

I. Vibration

A. The equipment shall be tested for resonant frequencies below 55 cps.

1. The equipment shall be fastened in its normal mounting position on a vibration table that can be controlled within 10 per cent of the specified amplitude. The vibration table shall provide approximately sinusoidal vibration.
2. The equipment shall be vibrated successively in three mutually perpendicular directions that are parallel respectively to the edges of the equipment, over a frequency range of 10 to 55 cps, in 1 cps steps. The total excursion shall be constant at 1/64 inch.
3. Mechanical resonance, if any, of the complete structure, of sub-assemblies, and of component parts shall be determined visually by means of a Strobotac, as made by or equal, or by energizing the equipment and detecting mechanical vibration through electrical output indications.

B. Following the above tests:

1. Any resonances detected shall be corrected.
2. An operating test of the equipment shall be made to determine if any failures or changes in adjustment have occurred.

II. Temperature

A. Tests, Operating

1. The equipment shall be brought to equilibrium at temperatures of 70°F, -20°F and +130°F successively.
2. At each temperature an operational check of the equipment shall be made to determine:

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- a. The range to be expected
- b. The limiting components at each extreme temperature.
(The temperature extremes shall be changed if necessary to achieve marginal operation.)

B. Tests, Non-operating

1. The equipment shall be brought to equilibrium at -65°F and 160°F .
2. It shall be determined whether permanent damage will result from extended storage at either temperature.

C. Tests, Shock

1. The equipment shall be brought to equilibrium at -20°F .
2. The equipment will be transferred immediately to a compartment heated to $+90^{\circ}\text{F}$.
3. It shall be determined whether damage will result from a rapid change of temperature. Special attention shall be paid to the optical system.
4. The test shall be repeated starting with the high temperature.

III. Humidity (Tentative)

- A. The equipment shall be subjected to two cycles as shown on SC-D-15914 except that all times shall be cut 50%.
- B. The equipment shall be tested in the operating condition with the front cover on and the rear cover off except during the high temperature position of the cycle when both covers shall be off.
- C. Electrical and mechanical examinations of the equipment shall be made as shown on SC-D-15914 to determine any failures of parts, etc. Operating tests shall be conducted to determine the range and any decrease therein.

IV. Immersion

- A. The equipment shall be submerged for 2 hours under 2 feet of fresh water when closed as for transportation.
- B. The equipment shall be removed from the water and wiped dry externally. No trace of moisture shall be found inside the equipment.

V. Altitude

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V. Altitude

- A. The equipment when closed for transportation shall be placed in a vacuum chamber and maintained at an altitude of 10,000 feet for 10 minutes.
- B. The equipment shall be returned to sea level within 5 minutes and shall be checked for mechanical damage.

VI. Shock Test; Bench Handling and Charging of Batteries

- A. The equipment shall be set up as if the batteries were to be charged. The equipment shall be placed on a 2" fir bench top.
- B. The test shall be performed as follows:
 - 1. Tilt up the assembly through an angle of 30 degrees, using one edge of the assembly as an axis, and permit the assembly to drop back freely to the horizontal. Repeat, using other practicable edges of the same horizontal face as axes, for total of four drops.
 - 2. Repeat (1.) with the assembly resting on other faces, until it has been dropped for a total of four times on each face on which the assembly could be placed practicably during servicing.
- C. Tests shall be performed to determine what, if any, damage has resulted. Special emphasis shall be placed on changes in optical alignment.

VII. Drop Test

- A. The equipment when closed for transportation shall be dropped from normal carrying height onto 2" boards backed by concrete. The equipment shall be dropped once each on the bottom, ends and top.
- B. The equipment shall be examined for damage and changes in optical alignment. Improvements shall be made where possible.

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