SECRET

[redacted] 25X1

Reference No.
ENG-7-105

PLEASE RETURN TO
ENGINEERING DIVISION

Director of Logistics

Director of Communications

Request for Task Order 9, Contract RD-79, [redacted] 25X1
Incorporated

1. In order to fulfill an operational requirement, the Office of Communications desires to publish an antenna manual. This publication will be used for the instruction of radio operators in the erection and use of [redacted] antennas. 25X1

2. In accordance with our request, [redacted], Incorporated, 25X1
has submitted a proposal dated 19 January 1957 for the preparation of the material for this manual. The proposal has been reviewed by the Engineering Division and is considered satisfactory.

3. It is requested that Task Order 9, Contract RD-79, be negotiated in accordance with the attached proposal. Requisition No. MSB 57-247 in the amount of $15,755 indicating the availability of funds under Allotment No. 7-7995-50 is attached. The work to be performed under this task is UNCLASSIFIED, but the association of this Agency with the task is classified SECRET. The project engineer for this project will be Mr. [redacted] 25X1

[redacted] 25X1

COORDINATION:

Attachments:
Proposal from [redacted] 25X1
Task Outline for Antenna Manual
Requisition No. MSB 57-247

OC-A | OC-P | DD/CO

OC-E/R&D-EP/TGNiwlj (29 Jan. 1957)

CC: R&D Subject File
Reading
OC-E
OC-A
[redacted]
MSB
R&D Vital Files
R&D Obligation File
Chrono
Dev-ep

OC-OST 25X1

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ANTENNA MANUAL PROPOSAL (T.O.9)

WASHINGTON, D. C. 25X1

RESTATEMENT OF THE PROBLEM AND OBJECTIVE

The end product of the proposed project is a manual for use by instructors to train non-technical people in the field of antennas and radiation. The manual will include a brief discussion of the theory of simple antennas as related to propagation, a discussion of non-directional and directional antennas, makeshift antennas, direction finding, concealment, and construction information. The handbook will be practical as opposed to theoretical and will be written at the level of personnel with only a minimum knowledge of communications.

While primary emphasis in the manual will be on construction and orientation, the contractor believes that a very limited discussion of antenna and propagation background will be necessary as introduction to the material on types of antennas and construction thereof.

ORGANIZATION

The project will be broken into three basic phases. Phase A will be a study and planning phase. The antenna review and investigation will be conducted in conjunction with the planning for work under Phases B and C. [redacted] will be in general supervision of the work called for under this phase. Frank T. [redacted] Jr. will assist [redacted] in the planning of Phase B. 25X1 25X1

Phase B will involve ascertaining data on makeshift antennas and measurement of radiation efficiencies of simple directional and non-directional antennas under adverse use conditions. [redacted] will assume general supervision and coordination of work, 25X1

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under this phase. [redacted] will supervise the laboratory work. 25X1

Phase C will involve the correlation and editing of material and data from Phases A and B, culminating in the writing of the antenna manual and preparation of exhibits.

Close liaison will be maintained with the contracting agency throughout the project. It will be necessary to make use of the background material available at the congracting agency for particular problems such as operational techniques, [redacted] 25X1 methods, DF methods, etc. This information will be required either for inclusion in the book or as reference material for making decisions regarding types of antennas to be used and methods for their use.

METHOD OF APPROACH

The basic requirement called for in contracting agency's specification number 56-A-1055-A is a simplified manual describing antenna construction. Paralleling this basic requirement is the need for an investigation of numerous antennas culminating in a choice of a few to be included in the manual. Also required is material in the manual discussing the use of the particular antennas to permit instruction in the choice of and location of antennas under varied conditions.

A preliminary outline of sections to the manual follows.

I Basic Propagation Discussion

A. Ground Wave

B. Sky Wave

C. Skip Distance

D. Day and Night Conditions

E. Effect of Frequency

F. Polarization of Wave

II Fundamental Antenna Discussion

A. Definition

B. Matching

C. Grounding

D. Effect of Obstructions

III Simple or Non-Directional Antennas

A. Types

B. Use

IV Directional Antennas

A. Types

B. Use

C. Direction Finding

V Makeshift Antennas

A. Types

B. Use

VI Grounding

A. Height of Antenna Above Ground

B. Types of Grounding

C. Grounding Within Building

VII Concealment of Antennas

A. Temporary

B. Long-term

VIII Antenna Impedance Matching

A. Methods

IX Construction of Antennas

A. Use of Kit Materials

B. Use of Makeshift Parts

The above is intended only as a general outline. Rearrangement, editing and revision will be made during Phase A and refined during Phase C.

Within the manual several factors not shown in the general outline will be covered. The radiation efficiency of antennas of improper length will be illustrated. Antenna patterns showing major lobe angles will be included. Two or three basic transmitting situations will be discussed such as transmitting from a house, barn, apartment building, wooded areas, and open fields. In this discussion, information will also be given on the best type of antenna for location within an 8 x 8 x 8 room; i. e., whether it should be close to the wall or the middle of the room, etc.

GENERAL

In the preparation of the manual, the contractor will make use of available antenna information, particularly as regards choosing antennas to be discussed. Laboratory work will be limited to ascertaining impedance data on makeshift antennas radiation characteristics, and matching techniques.

The contents of the instructors part of the manual will be written at a level that may be absorbed by a person with a very limited technical background. Numerous illustrations will be included. In general, there will be a repetitive style used; that is, subjects will be introduced in very broad terms followed later by more detailed discussions.

The appendix represents the most challenging portion of the manual. It will show construction of antennas with possible illustrations of length versus frequency, height above ground and other parameters without the use of written material (i.e., length shown by man heights, etc.). The ways and means of preparing the appendix will require considerable study. However, we feel that a very good job can be done by our engineering group working with the illustration department.

2109A

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CONFIDENTIAL

SPECIFICATION NO. 56-A-1055-A

TASK OUTLINE

FOR

[redacted] ANTENNA MANUAL

25X1

17 October 1956

CONFIDENTIAL

S-E-C-R-E-T

SPECIFICATION NO. 56-A-1055-A

TASK OUTLINE
FOR
[redacted] ANTENNA MANUAL 25X1

THE PROBLEM:

A simplified manual describing construction of antennas for [redacted] 25X1 radio stations is required for use by instructors possessing only a slight communications background. It should illustrate antennas suitable for erection by persons with no technical knowledge in what will generally be limited space, both indoors and outdoors. The antennas should be designed for maximum efficiency consistent with ease of construction and the requirement that they be compact and inconspicuous.

DISCUSSION:

1. The information contained in the manual should be based largely on current antenna knowledge applied to the particular requirements outlined below. It is anticipated that only a limited amount of experimental work will be performed by the contractor.

2. As an aid to the training of a [redacted] radio operator the 25X1 manual should cover:

A. Simple directional antennas.

B. Radiation efficiency of "short" (i.e., less than half wave) horizontal Marconi antennas.

C. Graphical illustration of major lobe angles of antennas between 0.1 and 4.0 wavelengths long.

D. Methods of improving radiation efficiency of a fixed-length antenna over a range of 3 to 30 megacycles.

E. Antennas suitable for construction within a limited space, e.g. a 3-30 mc antenna in an 8'x8'x8' room.

F. Relation between height of antenna above ground and optimum transmitting distance.

G. Use of conventional and jumbled-wire counterpoise.

H. Efficiency, directional characteristics and methods of feed of such makeshift antennas as window screens, tin roofs, metal fences, drain and water pipes, etc.

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SPECIAL CONSIDERATIONS:

1. The manual must contain no mathematics more complex than simple algebra. Graphs and illustrations should be used liberally. The handbook should be essentially practical, presenting detailed instructions for construction and orientation rather than discussions of propagation or antenna theory.

2. It should be remembered that the antennas under discussion are usually temporary and that ease of construction and adaptability to existing supports are major considerations.

3. An appendix will be included with detailed instruction sheets, one for each antenna, presenting in very simple terms and drawings all of the information necessary for a non-technical person to cut, erect and orient a particular antenna.

4. An original and two carbon copies of the proposed manual will be submitted for review and correction before preparation of the final draft.

5. The manual will be delivered on 8"x10½" white bond, with ½" top, bottom and right-hand margins and a 1" left-hand margin. Since the pages furnished by the contractor will be photographed for direct reproduction they should be prepared on an electric typewriter, preferably one equipped with a one-time carbon ribbon. The text should be single spaced and an effort should be made to keep right-hand margins as straight as possible. Line illustrations and graphs may be furnished in any convenient size.

6. Printing will be performed by the contracting agency.