No. 2139 25X1

[redacted]

R&D LAB PROJECT

TITLE CS-11 COLLECTION SYSTEM EVALUATION

CLASSIFICATION: 25X1

EQUIPMENT S-E-C-R-E-T [redacted] REPORT S-E-C-R-E-T [redacted] 25X1

QUANTITY:

EQUIPMENT One REPORT Five plus regular

DATE REQ'D 25 January 1961 LIAISON [redacted] 25X1

REQUESTED BY R&D (Form 1357 dated 29 November 1960)

DETAILS:

Determine suitability of design for fulfilling operational requirements as outlined in specifications and verify accuracy of contractor's final test data.

NOTE: Obtaining suitable power supplies may delay project.

Attachments:
Form 1357
Task Outline

DOCUMENT NO. 1
NO CHANGE IN CLASS. ☐
☒ DECLASSIFIED
CLASS. CHANGED TO: TS S (C) 2010
NEXT REVIEW DATE:
AUTH: HR 70-2
DATE: 9/12/10 REVIEWER: 037169

25X1

PRIORITY [redacted] /S/ [redacted] DATE 2 December 1960

DISTRIBUTION:

		TO BE FILLED IN BY UNIT CHIEFS: EST. STARTING DATE	ENGINEERS ASSIGNED
R&D	1		
DESIGN		22 Dec 1960	[redacted] 25X1
A&A ✓ w/attach.	2		
MECH FAB			
ELEC FAB			
DRAFTING	1		
LAB	1		

S-E-C-R-E-T

No. 2139 25X1

SECRET

REQUEST FOR EQUIPMENT EVALUATION

REQUEST NO.

PROJECT NO. 2139

PRIORITY CLASS

DATE 29 November 1960

NOMENCLATURE

CS-11 Collection System

MANUFACTURER

25X1

MODEL Engineering Model

PRICE

TYPE OF EVALUATION

X	CLASS A *(Complete A & A)*		CLASS C *(General)*
	CLASS B *(Partial A & A)*		CLASS D *(Operational)*

OTHER

X	REPORT NEEDED BY *(Date)* 25 January 1961	X	NO. OF COPIES REQUIRED 5 copies

SECURITY CLASSIFICATION

EQUIPMENT						REPORT					
X	SECRET		CONFIDENTIAL		UNCLASS.		SECRET		CONFIDENTIAL		UNCLASS.

25X1

PURPOSE OF EVALUATION

To determine suitability of design for fulfilling operational requirements as outlined in specifications, and to verify accuracy of contractor's final test data.

FOR CLASS B *(Specify tests required)*

GENERAL REQUIREMENTS

PROPOSED USE OR OPERATION

Remote collection of ELINT information.

GEOGRAPHIC AREA OF PROPOSED USAGE

Worldwide

SPECIFIC REQUIREMENTS

TEMPERATURE See specification (attached)	HUMAN
CLIMATE See specification (attached)	OTHER

REQUESTING DIVISION	PERFORMING DIVISION
DATE 11/30	DATE 11/30 APPROVED BY
DATE 11/29/60	DATE PROJECT OFFICER

25X1

25X1

FORM

TYPE OF EVALUATION EXPLANATION

CLASS A

(1) ANALYSIS OF SUITABILITY OF CIRCUITS SELECTED TO PERFORM VARIOUS FUNCTIONS
(2) RECOMMENDATIONS FOR IMPROVEMENT OF CIRCUIT DESIGN AND/OR INCORPORATION OF MORE SUITABLE COMPONENTS
(3) FLEXIBILITY OF SYSTEM FEATURES
(4) ANALYSIS OF PROBABLE RELIABILITY OF OPERATION
(5) ANALYSIS OF FORM FACTOR OF UNITS OF SYSTEM WHERE APPLICABLE
(6) EVALUATION OF RELATIVE EASE OF MAINTENANCE AND SERVICING
(7) EVALUATION OF POSSIBLE METHODS OF FURTHER SIZE AND WEIGHT REDUCTION WHERE THIS IS AN IMPORTANT FACTOR
(8) ANALYSIS OF IMMUNITY TO FUNGUS, CORROSION, DUST, WATER IMMERSION, ETC.
(9) ANALYSIS OF COMPLEXITY OF OPERATION AND RELATIVE DEGREE OF OPERATOR SKILL REQUIRED
(10) ANALYSIS OF OPERATIONAL SUITABILITY FOR KNOWN TYPES OF FIELD, STATION OR BASE STATION EMPLOYMENT
(11) COMPARISON WITH OTHER KNOWN SYSTEMS, DEVICES OR COMPONENTS OF SYSTEMS DESIGNED FOR SIMILIAR FUNCTIONS

CLASS B - THIS TYPE EVALUATION INCLUDES THE TEST AND EVALUATION OF ONLY THOSE CHARACTERISTICS OF A SYSTEM, DEVICE OR COMPONENT OF A SYSTEM WHICH ARE SPECIFIED BY THE REQUESTING INDIVIDUAL OR OFFICE. THE CONCLUSIONS AND RECOMMENDATIONS MAY INVOLVE ANY OF THE LISTED CATEGORIES UNDER THE CLASS "A" EVALUATION DESCRIBED ABOVE AND IS DEPENDENT UPON THE NATURE OF THE REQUEST.

CLASS C

(1) FLEXIBILITY OF SYSTEM FEATURES
(2) SUITABILITY OF FORM FACTOR OF UNITS
(3) ANALYSIS OF POSSIBLE APPLICATIONS OF ITEM UNDER CONSIDERATION
(4) ANALYSIS OF DEGREE OF OPERATOR SKILL REQUIRED
(5) COMMENTS ON UNUSUAL OR NOVEL CHARACTERISTICS WHICH MAY BE EVIDENT FROM TESTS, INSPECTION OR CLAIMED BY THE MANUFACTURER

CLASS D - THE OPERATIONAL EVALUATION PERFORMED INCLUDES THE FOLLOWING INFORMATION:

I. PHYSICAL
(1) DEFECTS, DAMAGES, OMISSIONS IN PACKING NOTED UPON DELIVERY
(2) COMPLEXITY OF ASSEMBLY OR DISASSEMBLY
(3) MECHANICAL RELIABILITY

II. OPERATIONAL
(1) COMPLEXITY OF TUNING OR FUNCTIONAL CHANGES
(2) ELECTRICAL RELIABILITY
(3) OMISSIONS OF FEATURES, I.E.: POOR STABILITY, RESETTABILITY, SELECTIVITY, ETC.

III. RECOMMENDATIONS
(1) RECOMMENDED OR NOT
(2) IF RECOMMENDED, FOR WHAT APPLICATIONS

SPECIFICATION No. 58-A-1070-A

TASK OUTLINE

FOR

THE DEVELOPMENT OF AN AUTOMATIC DATA COLLECTION

AND

READ-OUT SYSTEM (SHORT RANGE)

20 May 1958

SECRET

PROBLEM:

At certain locations in the country there exists pulse modulated electromagnetic radiation within a frequency band from 50 mc to 40 kmc which would be extremely valuable to detect, record, and analyze on a sampling basis. Unfortunately, these locations are normally inaccessible and not conducive to manned operation of conventional electronic collection equipment. It is necessary, therefore, to develop a portable automatic data collection system designed to circumvent the physical limitations thereby imposed.

OBJECTIVE:

It is the purpose of this task to develop the equipment needed to accomplish the automatic collection and temporary storage of data, as well as the equipment necessary to provide for remote interrogation of the system and retransmission of the collected data to the interrogating point. A special feature to be incorporated is a method for alerting the interrogator if failure of system operation occurs and also, if the installation has been disturbed by unauthorized examination. The need for maximum reliability of system operation can be readily appreciated.

DISCUSSION:

The planned system will be composed of a number of miniature equipments which can be easily connected by flexible cable into various package configurations. Foreseeing the need for such a system, several basic equipments have been developed, or are presently under development. Minor modification of these units may be necessary to adapt them to the system, but these changes should present little difficulty. To simplify an understanding of the following description of system operation, a block diagram is supplied on the attached fold-out sheet. The equipments represented by separate blocks within the space outlined in red pencil are those which will be furnished by the government. The remaining blocks do not necessarily represent individual equipments, but indicate the functions that the system must perform.

SIMPLIFIED EXPLANATION OF SYSTEM OPERATION:

a) On a pre-programmed basis the programmer (F) will close the power circuit to the following equipments: the crystal video receiver (C), the signal actuate device (D), the time code generator (E), and possibly the recorder electronics.

b) After power is supplied and upon signal presence the signal actuate device will close the power circuit to the tape transport and the incoming signal will be transferred to the recorder (G) channel No. 1 input. The output from a 1000 cycle oscillator built into the recorder will be recorded on the second track.

c) At the end of a pre-set "on-air" time (1-1/4 to 5 min.), the signal actuate device triggers the time code generator which then modulates the 1000 cycle reference tone with coded time pulses. At this point, two tracks of information have been recorded containing samples of signals in the area, and the time of day they were received. This information must now be transmitted to a remote point, 25 to 30 miles distant, upon demand.

d) Upon radio interrogation, the receiver (J) will trigger power to the transmitter (I) and rewind the recorded portion of tape at relatively high speed. On rewind, the recorder must, first, play back to modulate the transmitter (I) with the two data tracks; second, erase the two tracks; and third, reset the system to its original signal monitoring position.

e) When failure of some component equipment of the system occurs or when the installation has been disturbed, as explained above, a coded alerting signal will be transmitted by equipment (K). This equipment will answer the normal interrogation when trouble has been detected. The apparent complexity of the system, increased by the need for miniature equipment of low power consumption, lends itself to complete development in possibly four separate phases. The first, study and determination of approach; second, design and fabrication of an engineering model of the recorder, the interrogating equipment, and the data relay equipment; third, fabrication of a prototype model of the earlier engineering model, and design and fabrication of an engineering model of the alerting equipment; fourth, fabrication of a prototype alerting equipment and final system tests. Certain other aspects of the approach to this problem must be guided by special considerations.

SPECIAL CONSIDERATIONS:

1. The system described herein has been designation CS-11.

2. A most important consideration in the design of the system is its size and power consumption. The largest single item of equipment shall closely approximate outside dimensions of 5" x 3-1/2" x 3". Power consumption should be of a low enough magnitude to allow battery operation from reasonably sized storage batteries for a period of 60 days. All of the equipments to be supplied by the government meet these qualifications.

3. Temperature characteristics are set forth herein as a design goal; the state of the art will definitely limit certain units for low temperature operation. However, where possible, component units will be designed to operate reliably from -40°C to +40°C. Storage at temperatures from -60°C to +60°C shall not be detrimental to operation.

4. The CS-11 recorder shall be dual channel and record at a slow speed, preferably 1-7/8 ips. At this speed, a one-hour capacity and frequency response within 3 db from 250 cps to 10,000 cps appears reasonable. High speed playback is desired to compress the one-hour record time to a 5 minute reproduce time. Much of the electronic design required by this recorder will be supplied by the government.

5. The interrogation equipment will operate at a fixed frequency within a 200 to 300 mc frequency range. Operation on either of three specific frequencies, to be determined at a later date, shall be accomplished

by the simple insertion of crystals. The study phase is expected to determine the most practical type of transmission to effect communications. The distance between the collection site and the interrogating site will be approximately 30 miles. Antenna(s) at the collection site must possess omni-directional characteristics.

6. Normally, this system will operate from a storage battery chosen by the contractor to provide maximum ampere - hour capacity per unit volume, with special emphasis on size, weight, and temperature characteristics. To provide for those instances where line power will be available, an auxiliary power supply will be designed to operate from AC or DC sources ranging in voltage from 70 to 270 volts and AC frequencies from 50 to 400 cps. This supply must provide operating power since it is assumed that space will not permit use of both battery and line supply.

7. Of necessity, the interrogation receiver will remain on at all times, interrogation cannot be pre-programmed.

8. The interrogating equipment (L), less the recorder, will be designed for portable use. Permanent installation in automobiles, trucks, boats or aircraft shall be accomplished by appropriate shock mounted cabinets and adapting power supplies at a later date.

9. Standard miniature connectors will be used throughout the system. Mating connectors will be numbered and color coded for simplicity of system assembly.

10. The individual components and interconnecting cables will be waterproofed to the extent that exposure to heavy precipitation for periods up to 30 minutes will not be detrimental to operation.

11. Deliverable Items:

Phase I: Results of a study in the form of a technical specification for each component equipment and a final report containing an explanation of the conclusions evolved.

Phase II:

One engineering model of the basic CS-11 system including the remote interrogating equipment, but excluding the alerting equipment. This model shall represent the end item in performance, and approximate the end item in size and configuration.

Phase III:

One prototype model of equipment delivered under Phase II, plus one engineering model of the alerting receiver/transmitter. The prototype model shall fully represent the desired end item.

Phase IV:

One prototype of the alerting section of the system. Extensive final system tests will be conducted during this phase with active participation by the contracting organization.

12. Throughout the development program, five copies of a monthly letter type project status report will be submitted. In addition, comprehensive quarterly engineering reports describing all investigations performed will be supplied. These will include diagrams, sketches, and photographs as required for clarity of description and presentation; 10 copies of a final engineering report containing a summary of the quarterly reports and complete descriptive data on operation of the system; 1 reproducible master set and 2 copies of all final engineering drawings; 3 copies of a complete parts list with detailed descriptions of all component parts of the system.