KEY OM OPREQ + TECH APPROACH FOR WS 117L [redacted] USUAL FERRET SUBSYSTEMS

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AIR FORCE
BALLISTIC
MISSILE
DIVISION

1677 OPERATIONAL REQUIREMENTS
AND
TECHNICAL APPROACH
FOR
WS 117L VISUAL AND FERRET SUBSYSTE
(SECRET TITLE)

19 September 1958



HEADQUARTERS
AIR
RESEARCH
AND
DEVELOPMENT
COMMAND

Excluded from GDS

[redacted]

Tab B

Tab C

Tab D

Tab E

[redacted]

UNCLASSIFIED

add file WS 117L
* Reference filed in WS 117L file

AIR FORCE BALLISTIC MISSILE DIVISION
POST OFFICE BOX 262
INGLEWOOD, CALIFORNIA

1679

# REPORT ON OPERATIONAL REQUIREMENTS AND TECHNICAL APPROACH WS 117L VISUAL AND FERRET SUBSYSTEMS (SECRET TITLE)

UNCLASSIFIED

19 September 1958

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WDTSR-58-464

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## I. HISTORY OF FORMULATION OF REQUIREMENTS FOR WS 117L

In 1946 the Air Force directed Project RAND to study the feasibility of artificial earth-circling satellites. A study was completed in May 1946 which concluded that a large rocket would have sufficient performance to place several hundred pounds of payload in orbit.[1] The following year, 1947, additional studies were conducted by RAND, which refined rocket performance estimates and gave further insight into operational aspects.

In 1948, the DOD Research and Development Board approved Air Force sponsorship of effort in the satellite field. At that time, RAND was requested by the Air Force to continue investigating satellites, with emphasis on possible uses of such a vehicle, and recommended appropriate satellite development programs.

During 1949 and 1950 RAND carried out comprehensive studies concerned with satellite reconnaissance by means of television. These investigations culminated in a detailed report published by RAND in April, 1951, "Utility of a Satellite Vehicle for Reconnaissance".[2]

This report, which was principally concerned with a television reconnaissance vehicle, discussed among other things the requirements for pictorial reconnaissance. Conclusions were that resolutions of 50 to 500 feet were acceptable depending on the type of observations to be made, and that such resolutions were possible within the state of the art. Further, it was concluded that bomb damage assessment would require resolving power as low as 10 feet, which would probably be beyond the scope of the system.

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From mid-1951 to March 1954, RAND continued intensive investigations of certain critical elements of a reconnaissance satellite. Other contractors and sub-contractors participated in this phase of the RAND program as follows:

1. Suitability of television for satellite reconnaissance -- Radio Corporation of America.

2. Auxiliary power plants for vehicle-borne equipment -- Allis-Chalmers Manufacturing Company, Bendix Aviation Corporation, Frederic Flader, Inc., and Vitro Corporation, all conducted for AEC at Air Force request.

3. Attitude-sensing and control for an orbiting vehicle; take-off guidance system to place a vehicle in orbit -- North American Aviation.

In March, 1954, the results of eight years of effort on the part of RAND were presented in a final report on "Project Feed Back", as the program was then called.[3] RAND stepped out of the picture after presenting the final report, which included the recommendation that the Air Force continue the program on a full-scale basis.

Meanwhile, in the latter part of 1953, the Air Force established a research and development project at Wright Air Development Center for an advanced reconnaissance system. The project was assigned various numbers: Project 409-40, Project MX-2226 and, finally, Project 1115. Under this project, numerous studies were initiated to advance the state of the art in areas of importance to a satellite. Various contractors and ARDC centers actively participated in the project. Critical technical areas which were intensively studied included: nuclear, solar and chemical energy sources for auxiliary power to operate satellite equipment; component reliability required for long-life satellite equipment; acquisition and tracking of the orbiting vehicle; and data acquisition, storage, transmission and interpretation. Also, extensive and continuing investigation of military requirements for the type reconnaissance

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data obtainable from satellites was undertaken as part of the project effort. Comprehensive studies were conducted and advice was solicited from all knowledgable branches of the Armed Forces and the Central Intelligence Agency regarding the accuracies required for satellite reconnaissance data to be militarily useful.

The satellite reconnaissance program had not at this time entered the Air Force administrative channels for establishing specific, formalized requirements for and undertaking an integrated development program leading to an operational weapon system. During the life of the program, effort had ranged from the mere study of a feasibility concept in the very early days, through progressively more detailed state-of-the-art studies of critical technical areas and engineering analyses. However, by 1955, work conducted in the program had resulted in sufficient information to insure:

1. That military requirements could be met for satellite obtained reconnaissance data, and

2. That technical problems concerned with developing a militarily useful reconnaissance satellite were not insurmountable.

Accordingly, USAF General Operational Requirement No. 80 (SA-2c) for a Strategic Reconnaissance Satellite Weapon System was published on 16 March 1955, (TAB B). A GOR is a formal Air Force document which states an Air Force operational need for a specific weapon system. It is prepared and issued to the ARDC by the Director of Requirements, Headquarters USAF. Prior to issuance a GOR is coordinated throughout the Air Staff and with appropriate major air commands. The GOR established as the operational objective of the system the continuous surveillance of preselected areas of the earth to determine the status of a potential enemy's warmaking capability. It called for:

1. Pictorial resolution sufficient to detect airfield runways and ICBM launching sites with an ultimate capability to detect objects no more than 20 feet on a side;



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2. Pictorial data such that creation of accurate topographic maps is possible;

3. A capability to detect and locate electronic sources, initially in the UHF, L and S frequency bands;

4. A capability to view cloud coverage over a sufficiently broad area to aid weather forecasting.

The GOR was followed by the issuance of an ARDC System Requirement No. 5 dated 17 October 1955 (TAB C). By this time responsibility for the program had been transferred internally within ARDC to the Western Development Division (WDD). Consequently, the System Requirement directed the WDD to prepare a System Development Plan for System No. 117L, "Advanced Reconnaissance System".

A Development Plan for WS 117L was prepared on 2 April 1956 and forwarded to Headquarters USAF where it was approved on 24 July 1956. Approval was followed by issuance of USAF Development Directive No. 85 for WS 117L dated 3 August 1956 (TAB D). The development of WS 117L proceeded under these directives until responsibility for the system was transferred to ARPA by the Secretary of Defense, and ARPA Order No. 9-58 was issued for the program on 30 June 1958.

In recent years, the program has undergone increasingly frequent reviews by both military groups and scientific review groups. Generally these groups were keenly interested in both reconnaissance requirements and the capability of WS 117L to meet these requirements.

The program was presented to the Reconnaissance Panel of the USAF Scientific Advisory Board which published a report on 28 May 1956 (TAB E). This report made two recommendations:

1. Vigorous support and expansion of the Rome Air Development Center experimental evaluation of the intelligence parameters of the reconnaissance satellite.



[redacted]

[redacted] [redacted]

2. Immediate concentration of the reconnaissance satellite effort on high resolution image systems aimed at the recognition of ground objects with characteristic dimensions of 20 feet or less.

In 1957 the National Academy of Sciences - ARDC Study Group on Research and Development Objectives for the USAF established a Joint Committee on Reconnaissance which had the following membership:

Joseph V. Charyk, Chairman
Samuel Batdorf
Richard S. Cesaro
W. J. Harris, Jr.
E. Rechtin

The report of the study group[4] discusses, among other things, the reconnaissance mission and reconnaissance capabilities of satellites. Excerpts from that portion of the report are included under TAB F. The committee report makes this recommendation with respect to satellite reconnaissance:

> "The reconnaissance satellite is the only system that is capable of accomplishing the complete reconnaissance job. The system appears to be within or close to the present state-of-the-art and can utilize booster units from the 107A program. It is recommended that the earliest possible development of a reconnaissance satellite be pursued with vigor".

[redacted]



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[redacted] [redacted]

II. Considerations and decisions leading to the current approach.

There are two underlying considerations to the WS 117L R&D program which should be kept foremost in mind in examining how well the system will satisfy the intelligence needs of the country:

1. The WS 117L will complement and supplement, but not replace, other intelligence collection systems and techniques. It must be considered as a very productive and timely adjunct to all other sources.

2. The WS 117L has two major unique characteristics which sets it apart from all other collection systems and specifies its value:

a. It is capable of unlimited geographic access.

b. It is capable of unlimited time access.

These two features are fundamental and unique to all satellite systems, and provide the two ingredients which are basic to the requirements for surveillance.

The operational requirements and goals stated in the various official documentation which established the program and which have provided program guidance to date have been interpreted in the light of the above to mean that these important unique features should be exploited in a way which will contribute most to the overall satisfaction of the national intelligence objectives within the context of all sources of intelligence collection.

A third very important factor which should also be kept in mind is that the WS 117L program is in the very early stages of development, and the primary effort is directed toward developing in an orderly and timely way the capabilities which will eventually accomplish the operational goals of surveillance through a

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system of multi-satellites having mixed sensors. The R&D program required to achieve this surveillance capability covers a period of years during which time the sensing techniques will be gradually evolved to collect data in finer and finer detail. Ordinarily, such development would be accomplished completely within the ARDC framework and would result in a first operational system a number of years after initiation. It is recognized however, that WS 117L R&D effort can produce as a by-product of its development testing, intelligence information of great value to a number of national agencies. Therefore, the development program has been planned to make maximum beneficial use of the reconnaissance data collected during the R&D phase. The point here is a cautionary one of not judging the worth of the surveillance system being developed on the basis of the early intelligence by-products derived from testing. This is a completely new medium and, at least initially, requires carefully controlled experimentation with incremental improvements which will eventually result in the more complex, higher resolution systems required for surveillance. Development considerations must be kept paramount during the development program if we are to achieve a true surveillance capability in the shortest over-all period of time.

In the spring of 1955, design study proposals were solicited from selected contractors from industry. The number of sources solicited was limited by the desire to maintain a secure program throughout the design and development program. Since the ultimate purpose of WS 117L is to collect and disseminate intelligence information, the capability of the prime contractor to provide an air frame and engines did not need to be the sole guide as to the type of contractors solicited. Therefore, those solicited were Lockheed Aircraft Corporation, Radio Corporation of America, Glenn L. Martin Company and Bell Telephone Laboratories. Bell Telephone Laboratories

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declined to submit a proposal.

The three contractors conducted Design Studies between June 1955 and March 1956 and submitted these to the WDD. By special order no. 6 dated 5 March 1956, WDD appointed an Evaluation Board to review the design studies. Board members were:

| | | |
|---|---|---|
| Colonel W. H. Baynes | - | Hq. ARDC |
| Lt/Col R. C. Helub | - | Hq. AMC |
| Commander R. C. Truax(USN) | | WDD |
| Lt/Col W. G. King | - | WADC |
| Lt/Col V. M. Genez | - | Hq. ARDC |
| 1st Lt R. S. Washburn | - | Hq. AMC |
| Mr. R. S. Blocker | - | Hq. AMC |

The evaluation board completed the review and published a report on 20 March 1956.[5] The board was aided by a Technical Advisory Group, composed of scientists from WADC, RADC and AFCRC, and by an Air Materiel Command Special Evaluation Group.

Proposals were rated by the board on a basis of 500 points for Technical Evaluation, 300 points for Development and Production Aspects and 200 points for System Management Potential. All proposals were found by the board to be acceptable but the degree of acceptability varied considerable. In the opinion of the board, the Lockheed proposal received the highest overall evaluation rating, as well as the highest Technical Evaluation rating. It was on this basis that Lockheed Aircraft Corporation was chosen as prime contractor.

The following factors were considered in selecting the camera design for the first engineering test photo system:

1. There are serious weight, space and auxiliary power limitations in the early flight testing phases due to the power sources that are available, i.e., silver zinc batteries. Battery power will eventually be replaced by either solar or nuclear powered sources as they become available. These sources will greatly relax the



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stringent weight limitations imposed on the early photo system design.

2. The development time schedule is very short to achieve a reliable, light weight, automatic camera processing and readout system with proper ground resolution.

3. The following major characteristics led to the selection of the strip over the shutter type camera for the first series of tests:

a. Field of view: A strip camera covers the same ground swath as a frame camera with a lens covering a narrowed angle. This simplifies lens design, particularly at the high resolution values required.

b. Depth of Focus: The 100 lines/mm resolving power of the system requires that the depth of focus be accurate to .001 inches. It is much easier and simpler to maintain this tolerance along the line of the slit than over an entire square format.

c. Shutter vibration: The vibration introduced into a camera system by a shutter is a degrading factor upon the resolution.

d. Simplicity of Operation: The continuous film drive of a strip camera has inherently more reliability than the step and repeat process of a frame camera. Since image motion compensation is necessary the film must be moved at one speed during exposure and another speed for re-cycle of a frame camera. This would introduce complexity and lower reliability.

The undesirable characteristics of shutter cameras can probably be coped with in the progressively advanced camera versions where more development time is available and the weight of the package can be increased.

Simulated photographic interpretation analyses have been conducted periodically throughout the life of the development. Trained photo interpreters

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participated in these studies. The results of the studies are summarized in Figure 2 for 17-foot, 33-foot and 100-foot resolution.

The Ferret Subsystem is also being designed toward the long range goal of surveillance. The early phases of the system provide the basic framework for all of the future improvements and will do some things which no other present ferret system does, i.e., intercept and record vast numbers of intercepts, rapidly process these data and relay information to the ground, all automatically. Initially, the sensitivity and coverage of the system limits its over-all by-product use, however, modifications already underway, give promise of considerable improvements.

The major objectives of the ferret subsystem, as they relate to national electronic intelligence objectives, are shown in Figures 3 through 7.

III. Current Status of Visual and Ferret Subsystems.

Visual subsystem equipment in developmental model configuration will be the six inch system capable of resolving 100-foot objects on the ground. A study concerning locational accuracies of data from the initial visual subsystem has just been completed by Fairchild Camera and Instrument Corporation under Contract No. AF 30(602)-1755. Conclusions of the study are based on the assumption that presently expected accuracies will be met in the vehicle altitude and location in space as well as in system design. Equations have been formulated which make it possible, with a single picture, to locate any discrete point on the received film to a CEP of 1500 feet, with reference to the North American datum. This accuracy can be further improved by statistical treatment of multiple looks by the satellite at the same point and by reference to collateral geodetic data.

Lockheed has been asked to investigate the inclusion of longer focal length lenses, possibly 18 inch or 24 inch focal length, in the early vehicles.

[redacted]

| | 17-FOOT RESOLUTION | 33-FOOT RESOLUTION | 100-FOOT RESOLUTION |
|---|---|---|---|
| AIRFIELDS | B-36<br>COVER SHEDS OVER B-36 WINGS<br>SMALLER AIRCRAFT, (75 FEET)<br>FIGHTERS GENERALLY RECOGNIZABLE | MEASURE MEDIUM SIZE AIRCRAFT<br>WING SPREAD AND LENGTH<br>OF LARGE AIRCRAFT | RUNWAYS<br>HANGARS |
| RAILROADS | RAIL FACILITIES<br>COUNT NO. OF TRACKS AND<br>R.R. CARS<br>TYPE OF R.R. BRIDGE | DIFFERENTIATE RAILS AND<br>HIGHWAY<br>ESTIMATE NO. OF TRACKS IN R.R. YARD<br>ROUND HOUSE | RAIL NETWORKS<br>R.R. YARDS<br>FACILITIES<br>BRIDGES |
| SEA HARBOR | MEASURE DRY DOCK AREAS<br>SMALL PLEASURE BOATS<br>SHIPYARD BUILDING & SMALL DOCKS<br>GANTRY CRANE | DISTINGUISH SMALL BOATS BERTHED<br>TOGETHER<br>SHIPYARD<br>DETAILS OF TRANSIT SHEDS | WHARFS<br>MEASURE NO. OF SHIPBERTHS |
| MISCELLANEOUS | PARKED AUTOS<br>OIL DERRICKS - STEREO<br>VENTS & SMOKE STACK - STEREO<br>DISTINGUISH SINGLE & MULTISTORY BLDG<br>GRASS, TREES & SHRUB AREAS | BASEBALL DIAMOND | POL STORAGE<br>MEASURE POL STORAGE<br>MAIN HIGHWAYS AND BRIDGES<br>DIFFERENTIATE INDUSTRIAL<br>COMMERCIAL, & RESIDENTIAL<br>AREAS |

LMSD/102199

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FIGURE 2

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WD-58 00001 LMSD/101228

LOCKHEED AIRCRAFT CORPORATION

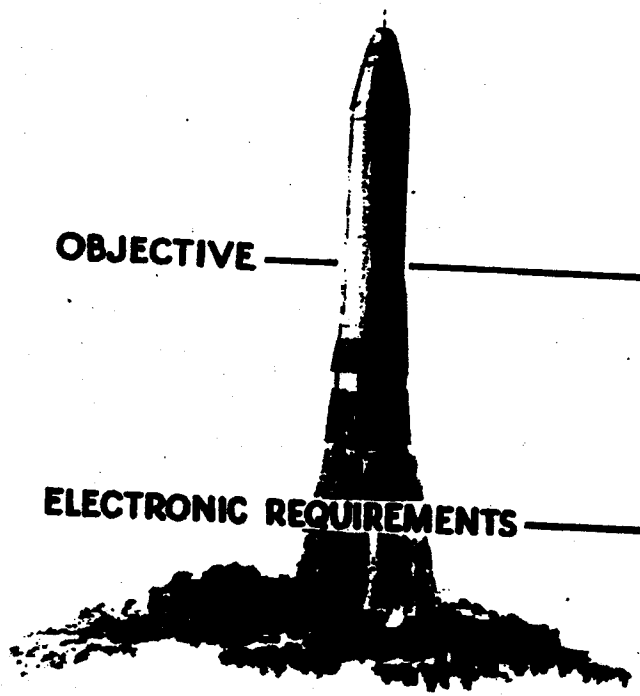
[redacted]

FIGURE 3

WDTER-58-464

[redacted]

SECRET



OBJECTIVE — [redacted]

ELECTRONIC REQUIREMENTS — [redacted]

USAF PRIORITIES — [redacted]

P408 SSF 1/22/58
WD-58 00001

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

DASD/102195

SECRET

FIGURE 4

WDTSR-58-464

[redacted]

SECRET

OBJECTIVE

ELECTRONIC REQUIREMENTS

U S A F PRIORITIES

P409 SSF 1/22/58
WD-58 00001

LOCKHEED AIRCRAFT CORPORATION

DESD/102196

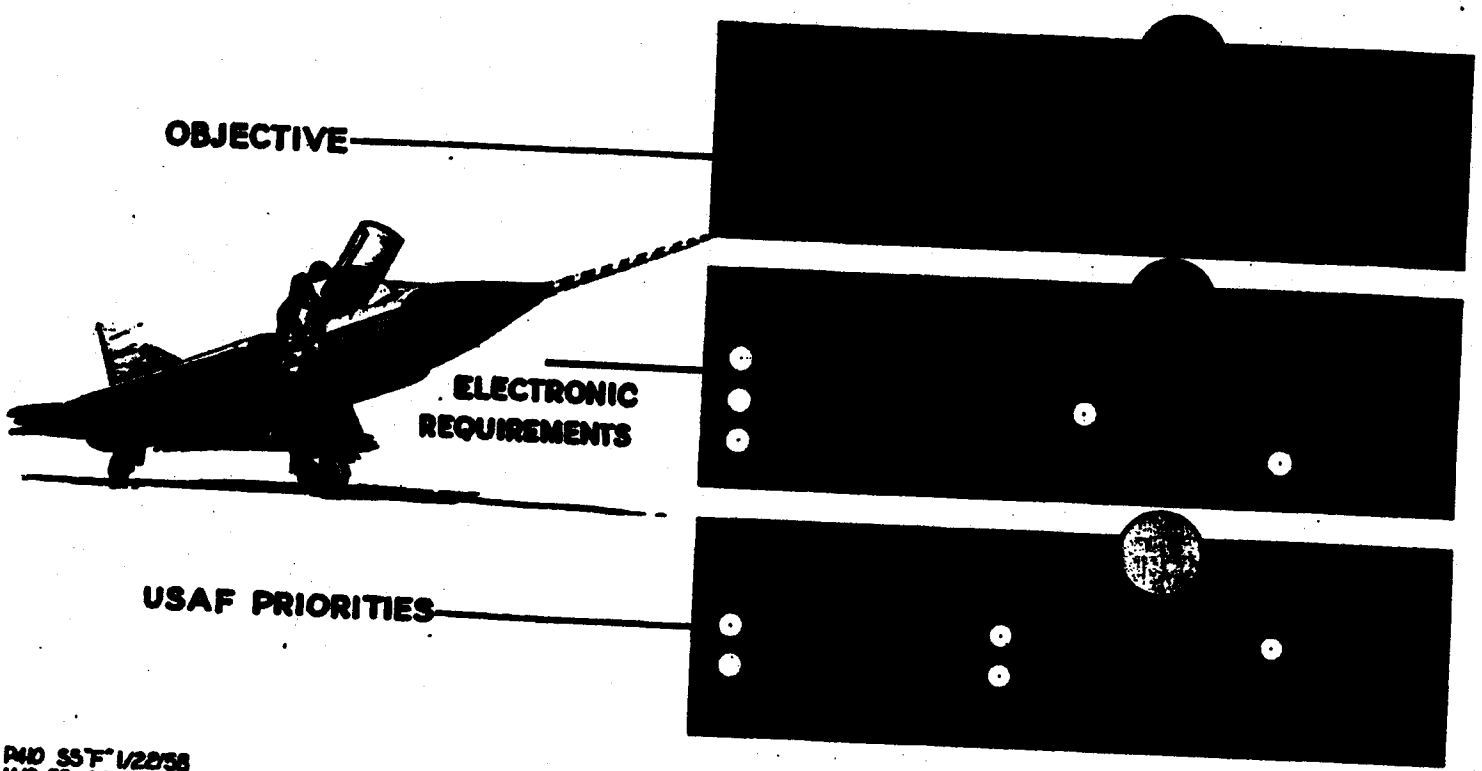
[redacted]

FIGURE 5

WDTSR-58-464

[redacted]

SECRET




P40 SSF 1/2858
WD-58 00001

LOCKHEED AIRCRAFT CORPORATION
[redacted]

LMSD/102197

[redacted] This document contains information affecting the National Defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C., Sections 793 and 794. Its transmission or revelation of its contents in any manner to an unauthorized person is prohibited by law.

FIGURE 6

WDTSR-58-464

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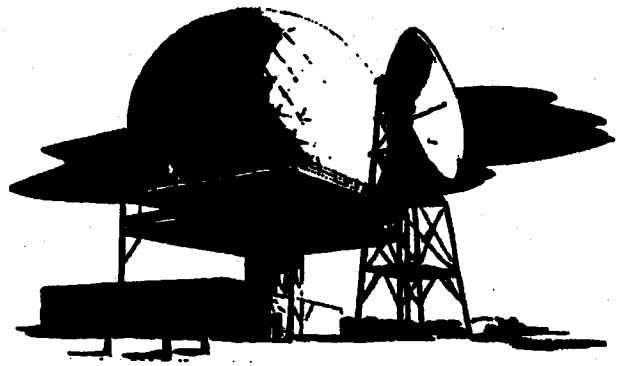
SECRET

OBJECTIVE



[redacted]

ELECTRONIC REQUIREMENTS

[redacted]

USAF PRIORITIES

[redacted]

P411 SSF 1/22/58
WD-58 00001

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

LMSD/102198

[redacted]

FIGURE 7

WDTSR-58-464

[redacted] [redacted]

The longer lenses would provide more R&D information as well as supply a closer look at areas of interest which have already been covered by 6-inch photography. In addition, studies have been underway to sort out the problems and design a 6-inch cartographic camera system. To do precise mapping, however, some major changes to the system, such as optical tracking and/or non-electrical readout (film recovery), might be required. These are presently being looked at. TV techniques are also being explored for applicability. (TAB G)

Modifications presently planned for improving the first ferret test system include efforts to do the items listed below, not necessarily in order of priority:

1. Include CW indication.
2. Increase frequency coverage above 18,000 mcs.
3. Increase accuracy of pulse width (PW) and pulse recurrence frequency (PRF).
4. Include a low frequency analogue recording capability.
5. Provide a technical intelligence capability by discerning modulated PW and PRF.
6. Instrument for signal alarms of a pre-set combination of selected frequency, PW and PRF.
7. Provide for stop-start scans.
8. Improve technical intelligence capability.

In addition, new systems will be evolved to sense and record activity indications, provide H. F. video analogue systems, and provide better location schemes. Many of the modifications will be streamlined to be responsive to specific requirements and short development time demands are part of what is commonly referred to in the Air Force as the Quick Reaction Capability (QRC) technique.



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[redacted] [redacted]

## IV. Recommendations for Program Redirection.

There are no recommendations for redirection of the technical approach to the program. It is believed that the development philosophy applied to this program is one which will give this country a satellite surveillance capability in the shortest possible time and which will, at the same time, provide presently unavailable intelligence information to national agencies early in the development program.

In the course of arriving at the current technical approaches for the visual and ferret subsystems, many promising improvements or more sophisticated approaches, to sensing functions have become apparent. However, such improvements would require additional state-of-the-art work which can only be supported with limited effort in the present program because of funding restrictions. If it is considered desirable to increase the effort devoted to obtaining improved sensors, additional funding would be required in the program.

[redacted]



[redacted] WDTSR-58-464

[redacted]

## REFERENCES


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2. Lipp, J. E., R. M. Salter and R. S. Wehner, Utility of a Satellite Vehicle for Reconnaissance, The RAND Corporation, Report R-217, April 1951 (SECRET)

3. Lipp, J. E. and R. M. Salter, Editors, Project Feed-Back — Summary Report, The RAND Corporation, Report R-262, March 1, 1954, 2 volumes (SECRET)

4. Hill, J. W., Editor, Committee Reports, NAS-ARDC Study Group on Research and Development Objectives for the United States Air Force, National Academy of Sciences, National Research Council, 1957 (SECRET)

5. Report of Contractor Evaluation Board, WS 117L, Hq., ARDC, Western Development Division, 20 March 1956 (SECRET)


[redacted]



[redacted]

[redacted] [redacted]

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
DIRECTORATE OF REQUIREMENTS



GOR NO. 80 (SA-2s)

DATE: 16 March 1955

# GENERAL OPERATIONAL REQUIREMENT FOR A STRATEGIC RECONNAISSANCE SATELLITE WEAPON SYSTEM ~~(SECRET)~~

## I. PURPOSE

This General Operational Requirement is in support of the Strategic Systems Development Planning Objective 1955-1970. It is desired that development action following this requirement result in a satellite weapon system capable of providing continuous reconnaissance of the earth. ~~(SECRET)~~

## II. OPERATIONAL OBJECTIVE

The operational objective of this reconnaissance system is continuous surveillance of preselected areas of the earth to determine the status of a potential enemy's war-making capability. (SECRET)

## III. ENEMY EFFECTIVENESS ESTIMATES

Pertinent Soviet capabilities will be covered in detail in the GOR Intelligence Summary, when published. Until that time the interim references are Air Intelligence Studies FAIS 2-1, FAIS 2-2 and FAIS 2-3. ~~(CONF)~~

## IV. FRIENDLY ENVIRONMENT

### A. General

It is desired that the satellite be launched from the continental limits of the United States and monitored from stations within the Western Hemisphere. ~~(SECRET)~~

### B. Ground Based Facilities

1. Facilities for launching this system will be fixed, semipermanent type installations. ~~(SECRET)~~

[redacted]



[redacted] [redacted]

[redacted]

3. An intelligence center is required for selecting, analyzing and storing all reconnaissance information received from monitoring stations. ~~(SECRET)~~

V. OPERATIONAL EMPLOYMENT

A. Satellites will be employed singly or in numbers to insure desired coverage of a selected area within a given period of time. ~~(SECRET)~~

B. The satellite will be optimized for daylight visual coverage operations over enemy territory; however, there is a requirement for obtaining this type of information at night and through weather. Additionally, or on an alternate lead basis it will have a round the clock electronic intercept capability.

C. This system will be used to obtain visual data of various scales and therefore the time required for complete coverage of an area will vary. Weather veiling of surveillance areas may prolong this time period. ~~(SECRET)~~

VI. LIMITATIONS OF PRESENT SYSTEMS

Present piloted aircraft reconnaissance systems are limited as follows:

A. Inability to provide continuous surveillance. ~~(CONF)~~

B. Vulnerability to detection. ~~(CONF)~~

C. Vulnerability to countermeasures. ~~(CONF)~~

VII. OPERATIONAL PERFORMANCE (AIRBORNE COMPONENT)

A. General

The following design aspects are of prime importance and must be given special consideration if the final product is to be operationally suitable:

1. Reliability and longevity of all orbiting components.

2. A means of storing intelligence data until the vehicle is within secure communications range of monitoring sites.

3. The capability for alternate payload substitution prior to launching. ~~(SECRET)~~

B. Choice of Orbit and Inclination Angle

1. The altitude and inclination angle of the satellite will depend on the intelligence requirements of the specific mission. ~~(SECRET)~~

2. The inclination angle should be selective through 90 degrees. An angle providing the most adequate daylight coverage of the USSR is desirable. ~~(SECRET)~~

[redacted]



[redacted]

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C. Guidance and Altitude Control

Guidance and altitude control equipment must be designed so that the orbit shape and this vehicle's vertical plane are sufficiently stable to provide acceptable pictorial intelligence. ~~(SECRET)~~

D. Resolution

The necessity for high resolution target portrayal requires that equipment utilized for this purpose be capable of resolving detail to detect airfield runways and intercontinental missile launching sites. An ultimate capability to detect objects no more than 20' on a side is desired. ~~(SECRET)~~

E. Mapping and Charting

Pictorial data collected should be such that creation of accurate topographic maps is possible. ~~(CONF)~~

F. Electronic Intelligence

A capability of automatically detecting, recording and transmitting electromagnetic data of selected frequencies must be provided. Initially, coverage on the UHF, L and S frequency bands will be acceptable. Sufficient data should be transmitted to permit location of source. (Reference VII A.3.) ~~(SECRET)~~

G. Weather Observation

A capability will be incorporated into this system to view cloud coverage on a sufficiently broad basis to aid weather forecasting. (Reference VII A.3.) ~~(CONF)~~

H. Self Destruction

Provisions for self destruction will be incorporated into the satellite. ~~(CONF)~~

VIII. AVAILABILITY

This system should be available to operational units in 1965. ~~(SECRET)~~

/s/ George E. Price

/s/ Gabe C. Hawkins

GABE C. HAWKINS

GEORGE E. PRICE
Maj. Gen. USAF
Director of Requirements

[redacted]



[redacted]

[redacted] [redacted]

HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
Post Office Box 1395
Baltimore 3, Maryland

SR No. 5

17 October 1955

ARDC SYSTEM REQUIREMENT

1. DIRECTED ACTION

Submission, upon request, to Headquarters ARDC ( Western Development Division) of information necessary for the preparation of a System Development Plan by the following participating centers is directed:

a. Wright Air Development Center.

b. Air Force Cambridge Research Center.

c. Holloman Air Development Center.

d. Rome Air Development Center

e. Arnold Engineering Development Center.

f. Air Force Missile Test Center.

g. Air Force Personnel and Training Research Center.



(UNCLASSIFIED)

2. GENERAL INFORMATION

a. Title: (UNCLASSIFIED) Advanced Reconnaissance System.

b. System No: 117L

c. Responsible Agency: Headquarters ARDC (Western Development Division) is responsible for preparation of a System Development Plan based on the requirements contained herein in accordance with ARDCM 80-4, dated 1 July 1955.

d. Target Dates:

(1) Submission of System Development Plan to Headquarters USAF: 1 April 1956.

This SR supersedes SR No. 5, dated 29 November 1954, title, "Advanced Reconnaissance System."



[redacted] [redacted]

(2) Operational time period of this system: Prior to 1965 through 1970 (See par 5a).

e. Participation, Coordination, or Interest:

(1) Air Materiel Command - (P).

(2) Air Proving Ground Command - (P).

(3) Air Training Command - (P).

(4) Strategic Air Command - (C).

(5) Air Defense Command - (C).

(6) CNO, USN - (I).

(7) C/S, USA - (I).

(8) CIA - (I).

f. Funding Information: Funds for this program are carried for FY 1956 under BPSN 2-1115.

g. References:

(1) GOR No: 80 (SA-2c), dated 16 March 1955.

(2) DD Form 613, title, "Advanced Reconnaissance System", Project No. 1115, dated 19 April 1955, RCS: DD-R&D/A/119.

(SECRET)

3. REQUIREMENT:

a. General Philosophy

In order to permit selection of the most effective approach to an Advanced Reconnaissance System concept which utilizes an earth satellite as a system platform, it is essential that the existing and projected state-of-the-art in this field be adequately surveyed, and a determination made through system design studies by selected contractors, of the technical and economical magnitude of full system development effort. From these studies there will be prepared a Development Plan which will be used as a basis for choice of the Advanced Reconnaissance System to be developed for the Air Force inventory. It has been generally accepted that, with the advent of the very high yield super weapon, strategic target intelligence requirements for efficient use of such a weapon have become far less detailed than heretofore; but at the same time, the requirement for routine surveillance of an enemy's territory becomes all the more necessary to anticipate and circumvent his effective use of the same caliber weapon. In concept at least, the technical approach

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to this type of Advanced Reconnaissance System leads one to the artificial earth satellite which, with its inherent capability for routine, long duration flight and its apparent capabilities for the collection of reasonably detailed information from the surface of the earth, seems to make a satellite system attractive for strategic and national reconnaissance. ~~(SECRET)~~

b. Objectives of the Advanced Reconnaissance System

As a matter of general guidance, the following may be considered the intelligence objectives for the Advanced Reconnaissance System:

(1) Continuous reconnaissance (visual, electronic, or other) coverage of the USSR and satellite nations, for surveillance purposes. Timeliness of receipt of the intelligence information is essential, with daily reconnaissance coverage at high resolution the ideal. In consideration of the requirement for earliest availability of the Advanced Reconnaissance System, the engineering progression and Air Force acceptance should be from the lesser to the greater resolution.

(2) The resolvable surface dimension detail should be of the order of 100 feet or smaller. A capability of resolving detail to the degree that objects approximately 20 ft on the side can be positively identified is the optimum in order to positively identify enemy weapon launching sites and associated activity. If this objective can be met, the many other intelligence requirements of larger surface dimension would automatically be satisfied.

(3) The volume of intelligence delivered by this Advanced Reconnaissance System will be staggering. Therefore, the system, in order to be considered complete, must include a suitable associated data handling, recording, reduction, and filing system. The earliest acceptable system must have provisions for automatic data indexing, filing and storage. Final objective will be for completely automatic data processing, interpretation, presentation, and dissemination. All data handling systems conceived for the Advanced Reconnaissance System will be compatible with data handling equipment in contemporary use within the intelligence community.

(4) The accuracy with which points on the earth's surface can be located by the Advanced Reconnaissance System should be studied. While grosser accuracies can be accepted as interim solutions, the finer accuracies should be considered as the optimum and the goal for ultimate complete development.

(5) Thorough investigation of all possible means of improving the intelligence collection capability of the Advanced Reconnaissance System; such as the application of stereo techniques to the analysis and interpretation of television images.

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