OUTLINE OF A DEVELOPMENT PLAN FOR AN ADVANCED (SATELLITE) RECONNAISSANCE SYSTEM FOR UNITED STATES AIR FORCE (U)

RADIO CORP OF AMERICA CAMDEN NJ

29 FEB 1956

Redistribution Of DTIC-Supplied Information Notice

As a condition for obtaining DTIC services, all information received from DTIC that is not clearly marked for public release will be used only to bid or perform work under a U.S. Government contract or grant or for purposes specifically authorized by the U.S. Government agency that sponsored the access. Furthermore, the information will not be published for profit or in any manner offered for sale.

Reproduction Quality Notice

We use state-of-the-art, high-speed document scanning and reproduction equipment. In addition, we employ stringent quality control techniques at each stage of the scanning and reproduction process to ensure that our document reproduction is as true to the original as current scanning and reproduction technology allows. However, the following original document conditions may adversely affect Computer Output Microfiche (COM) and/or print reproduction:

- Pages smaller or larger than 8.5 inches x 11.0 inches.
- Pages with background color or light colored printing.
- Pages with smaller than 8 point type or poor printing.
- Pages with continuous tone material or color photographs.
- Very old material printed on poor quality or deteriorating paper.

If you are dissatisfied with the reproduction quality of any document that we provide, particularly those not exhibiting any of the above conditions, please feel free to contact our Directorate of User Services at (703) 767-9066/9068 or DSN 427-9066/9068 for refund or replacement.

Do Not Return This Document To DTIC

AD NUMBER

AD344348

CLASSIFICATION CHANGES

TO

confidential

FROM

secret

AUTHORITY

29 Feb 1968 per Group-3 document markings

NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

NOTICE:

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. THE TRANSMISSION OR THE REVELATION OF ITS CONTENTS IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.

OUTLINE OF A DEVELOPMENT PLAN
FOR AN
ADVANCED (SATELLITE) RECONNAISSANCE SYSTEM
FOR
UNITED STATES AIR FORCE

RADIO CORPORATION OF AMERICA
BELL AIRCRAFT CORPORATION

RCA BAC Satellite Reconnaissance System

NOTICE

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, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law.

~~SECRET~~

RCA SAC Satellite Reconnaissance System

Approved for release from WDTR

OUTLINE OF A DEVELOPMENT PLAN FOR AN ADVANCED (SATELLITE) RECONNAISSANCE SYSTEM FOR UNITED STATES AIR FORCE [U]

BY RADIO CORPORATION OF AMERICA

BELL Aircraft CORPORATION

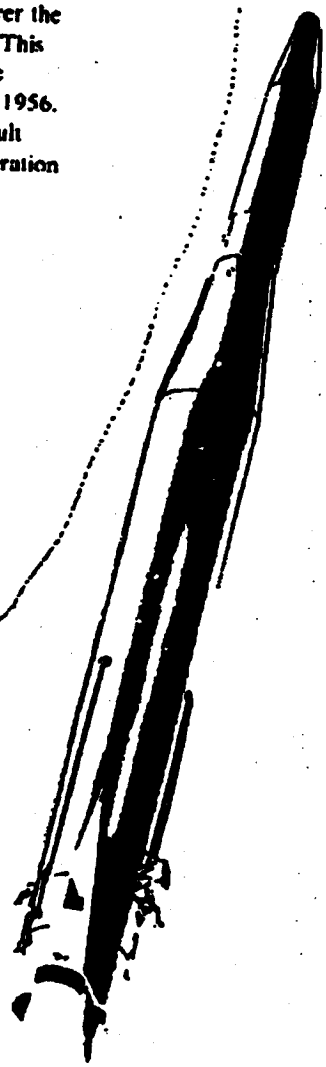
Contract AF33(616)-3104

February 29, 1956

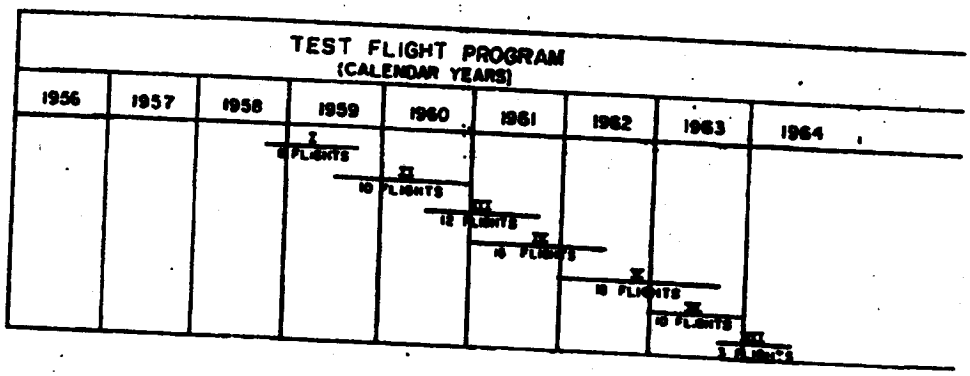
~~SECRET~~

Foreword

This Development Plan has been prepared as part of the Research and Design Study, Advanced Reconnaissance System—Contract AF33(616)-3104, Task No. 21010, Project No. 5-2-1115—to be conducted over the period June 15, 1955 to June 15, 1956. This document is a condensation of the complete Development Plan Report dated March 1, 1956. The studies of which this plan is the end result were conducted jointly by the Radio Corporation of America (RCA) and the Bell Aircraft Corporation (BAC). RCA's task was to examine the feasibility of a Satellite Reconnaissance System in the light of many years study by the Rand Corporation, RCA, and others, and to make specific recommendations as to the nature of the reconnaissance system required; BAC's task was to make a preliminary survey of the interim and eventual problems of placing the reconnaissance vehicle into the required orbit. The Development Plan here presented is the fruit of this joint study.



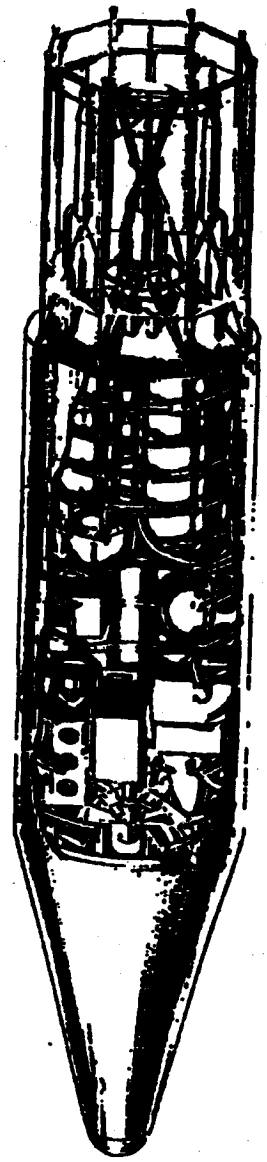
15 212



TEST FLIGHT PROGRAM

Phase I	Vehicle tests on orbit, and determination of environment.
Phase II	Confirmation of vehicle design with special attention to vehicle reliability.
Phase III	High altitude orbit mechanics, functional tests of a 75-watt solar supply. First visual and ferret reconnaissance.
Phase IV	Functional tests of reconnaissance payload components and equipments with 500-watt solar power supply.
Phase V	Functional tests of a nuclear power supply and of improved payloads with greater information capacity.
Phase VI	Systems tests of the operational prototype, including packaging and improved reliability.
Phase VII	Demonstration of military suitability of operational prototype.

4 RCA BAC Satellite Reconnaissance System



EXPOSED VIEW OF VISUAL RECONNAISSANCE VEHICLE

FEATURES OF THE DEVELOPMENT PLAN

Optimum Surveillance Weapon

Generates day-by-day assessment of unfriendly military activity.

Performance Objectives

Pictorial and ferret reconnaissance of all areas of earth's surface.
High speed handling of data.

Major Features of Ultimate System

High speed day-to-day reconnaissance coverage,
Launching from conventional ICBM sites,
400-mile swath across U.S.S.R. every 93 minutes,
10- to 25-foot objects detectable,
Position information accurate to 0.1 mile.
Ferret range 40 Mc to 40,000 Mc,
Proof against interception and enemy control,
Data handling system organized for speed and volume.

The Development Program

Phases I to VII—1956 to 1964. First flight test 1958; Ultimate system 1964.
Separate development programs for:
- Vehicle payload,
- Tracking and data collection,
- Data processing.

RCA's Project Organization
- Organization devoted specifically to development of Satellite Reconnaissance System.

A Satellite Reconnaissance System will provide maximum military surveillance of any portion of the earth's surface

Intelligent forecasting of future events requires a complete knowledge of present conditions and the manner and rapidity with which these conditions are changing. The present scarcity of information concerning the U.S.S.R. limits the accuracy of forecasting its possible hostile acts and necessitates the implementation of some novel means for obtaining this vital information.

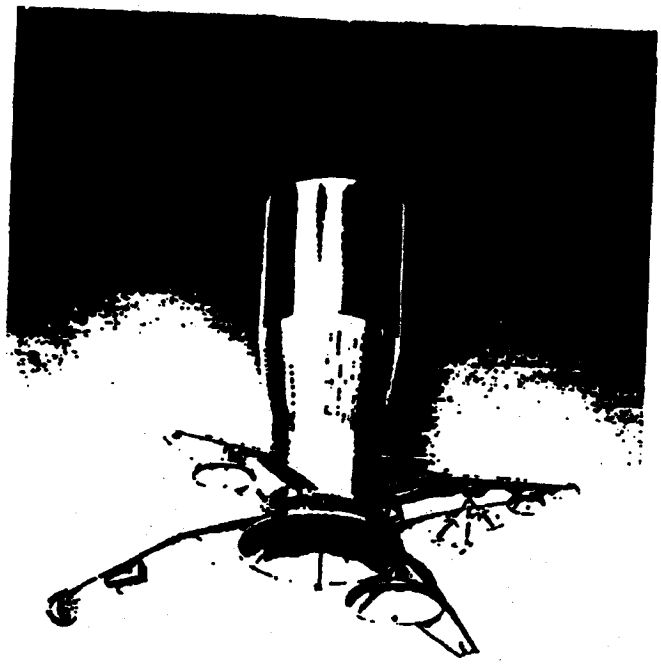
Studies conducted by various technical organizations, including RCA, indicate that the most economical and timely system for obtaining the intelligence needed for strategic warning is through satellite reconnaissance. Such a system will provide complete and frequent coverage of critical areas within the U.S.S.R. bloc. Both pictorial and ferret intelligence data will be the end result of this system.

The possible use of such a satellite reconnaissance system has been under consideration since the end of World War II. Improvements in the technical capabilities of rockets, electronics, nuclear physics, etc., during the past few years make this type of reconnaissance feasible.

The important features of the system herein proposed may be stated briefly:

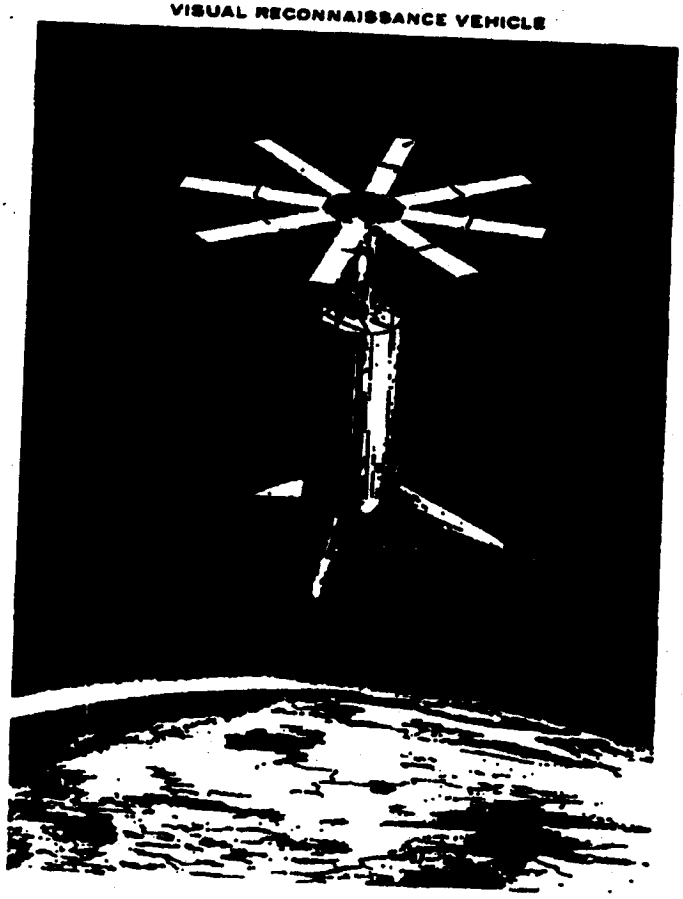
It will supply a continuous, high-rate flow of reconnaissance information with only a short time lapse between pickup and utilization, and will, if a sufficient number of vehicles are used, cover the whole of the U.S.S.R. bloc everyday. It will thus permit prediction of enemy buildups and accurate estimates by Intelligence of strategic and tactical operations. It can be stated with assurance that the technology of such a system is now feasible; its consummation requires only the implementation of a properly conducted and financed development program. With adequate and prompt support, first test flights can take place during 1958. A system which will begin to supply information with some reconnaissance value may be obtained in 1961; and a complete reconnaissance vehicle backed up by all the ground-based data handling systems required can be operating three years later.

The ultimate goal of the development program



FERRET RECONNAISSANCE VEHICLE

VISUAL RECONNAISSANCE VEHICLE



The ultimate goal of the development program:

The ultimate goal of the development program is a complete reconnaissance system consisting of both a globe-circling satellite carrying surveillance and transmitting equipment, and ground-based equipment capable of receiving great masses of information from the satellite, assimilating it, and rapidly presenting the end result in significant form.

The satellite vehicle will carry two types of surveillance equipment: pictorial pick-up equipment to survey the earth's surface, and ferret equipment to survey the electromagnetic radiation in the areas over which the satellite is passing. In addition, the vehicle will carry the equipment necessary to transmit its acquired data only at a time and place free from external security compromise.

The data transmitted from the vehicle will be received at the Data Handling and Processing Center where it will be analyzed and assessed. Tracking and orbital calculations, communications, and vehicle programming will be done at the Tracking and Control Center.

Strategic Warning Indications which will be supplied by the SRS:

1. *Identification of ICBM sites.*
2. *Identification of aircraft at potential launching and air defense bases.*
3. *Construction or improvement of new military bases in peripheral or suspicious areas.*
4. *Identification of vital military and industrial installations.*
5. *Stockpiling of weapons, ammunition, fuel, and aeronautical equipment at potential launching sites.*
6. *Construction of offensive or defensive missile installations.*
7. *Movements and concentrations of men and war materiel.*
8. *Changes and disposition of U.S.S.R. naval forces.*
9. *Concentrations and unusual patterns of movement of railroad rolling stock.*
10. *Development, improvement, and utilization of transportation services in suspect areas.*
11. *Indications of preparation for civil evacuations, civil defense drills, and preparation for dispersal.*
12. *Changeover in the output of selected industrial establishments.*

Major features of the ultimate system

Launching from conventional ICBM sites:

It is assumed that the reconnaissance vehicle can be launched by a conventional ICBM booster at an established ICBM launching site. However, to prevent premature disclosure of ICBM sites it is planned to launch all vehicles during the test period from a test base such as Patrick Air Force Base. In either case the major logistic and personnel support required for launching are the same as those required for the ICBM, except for the addition of a small special satellite crew.

Scope of surveillance coverage:

The satellite will follow, on its first operational orbit, a path approximately three hundred miles above the earth. As the earth rotates, the satellite will scan all of the earth's surface between 83° N. latitude and 83° S. latitude. The speed of the satellite vehicle will supply the force necessary to offset the effects of the earth's gravitational field, thus allowing it to remain in orbit, depending on the air density, for approximately a year. The plane of the satellite's orbit will be maintained at a fixed angle to the sun through the use of the 83° latitude orbit and approximately 300-mile altitude; that is, the selection of this orbit causes the satellite to be affected by the oblateness of the earth at the poles in such a manner that the orbit will have a precession of 1° per day in space, which is just sufficient (360° per year) to maintain the fixed relationship between it and the sun. The earth will in effect spin freely inside the orbital path.

The satellite will make one complete revolution around the earth in ninety-three minutes, with alternate ground tracks approximately 22.5° apart. The selection of one orbit pattern might afford a ground swath approximately 400 miles wide to be surveyed on each pass — complete coverage could thus be accomplished in approximately three days. The use of other orbits would result in an increased reconnaissance information rate for selective sensitive areas. Performance of the ultimate system will permit detection of objects with dimensions approximating 10 to 25 feet, and will provide position information to within 0.1 mile. Ferret collection devices will cover the range of 40 Mc to 40,000 Mc.

It is conceivable that the enemy will make maximum use of climatic conditions in choosing the most secure sites for his sensitive activities; that is, free from visual reconnaissance. It is estimated that favorable daytime photographic conditions in certain areas of the U.S.S.R. bloc may occur as seldom as 5 percent of the time and in other areas as high as 80 percent. In order to overcome this difficulty it will be necessary to launch a sufficient number of vehicles so that a useful reconnaissance transit coincides with opportune weather conditions. Because the nights are frequently clear in areas where the daytime conditions are an obstacle to visual reconnaissance, heat sensing instruments and techniques such as infrared detectors may be used. However, ultra-sensitive pictorial pick-up devices capable of viewing the ground with only the illumination from stars, is anticipated.

Information collection and processing:

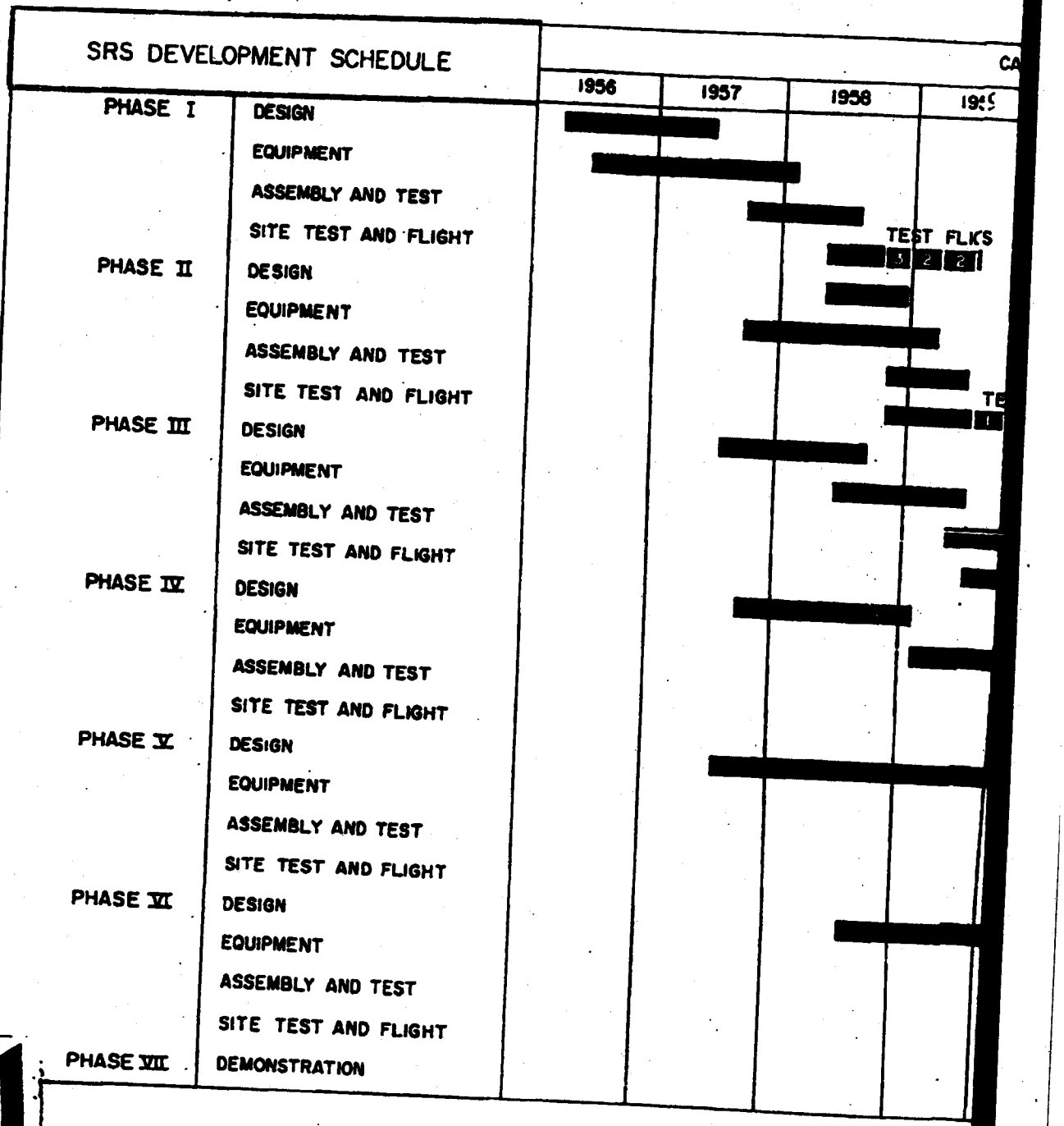
When performing reconnaissance over hostile areas the satellite is completely passive—a receptor only. It emits no information, but only absorbs and stores pictorial and ferret data for later transmission. When the vehicle comes within line-of-sight of a control station, the stored data is transmitted to the ground stations. All ground stations and the Data Handling and Processing Center can be located within the continental limits of the U.S.A. Both the ground and satellite trans-receivers can be made directional; in addition, an airborne clock will make the vehicle responsive to ground commands only when it is within line-of-sight of its own ground station. Thus the system will be free from the danger of transmitting information to the enemy, and will also be safe from enemy control and jamming. The problems associated with physically intercepting the satellite discount destruction as a countermeasure means.

The two major operations, launching and data handling, will require an extensive, land-based organization. The advantage of satellite surveillance is breadth and timeliness of its coverage. The latter advantage must be exploited to the limit by the establishment of communications lines that deliver information directly to the user in the shortest possible time. The data handling system would be operationally manned by an Air Force Operating Organization whose principle elements would be headquarters and command organizations, located at the Data Handling and Processing Center, and three or four Tracking and Communications Detachments located with their equipment within the U.S.A.

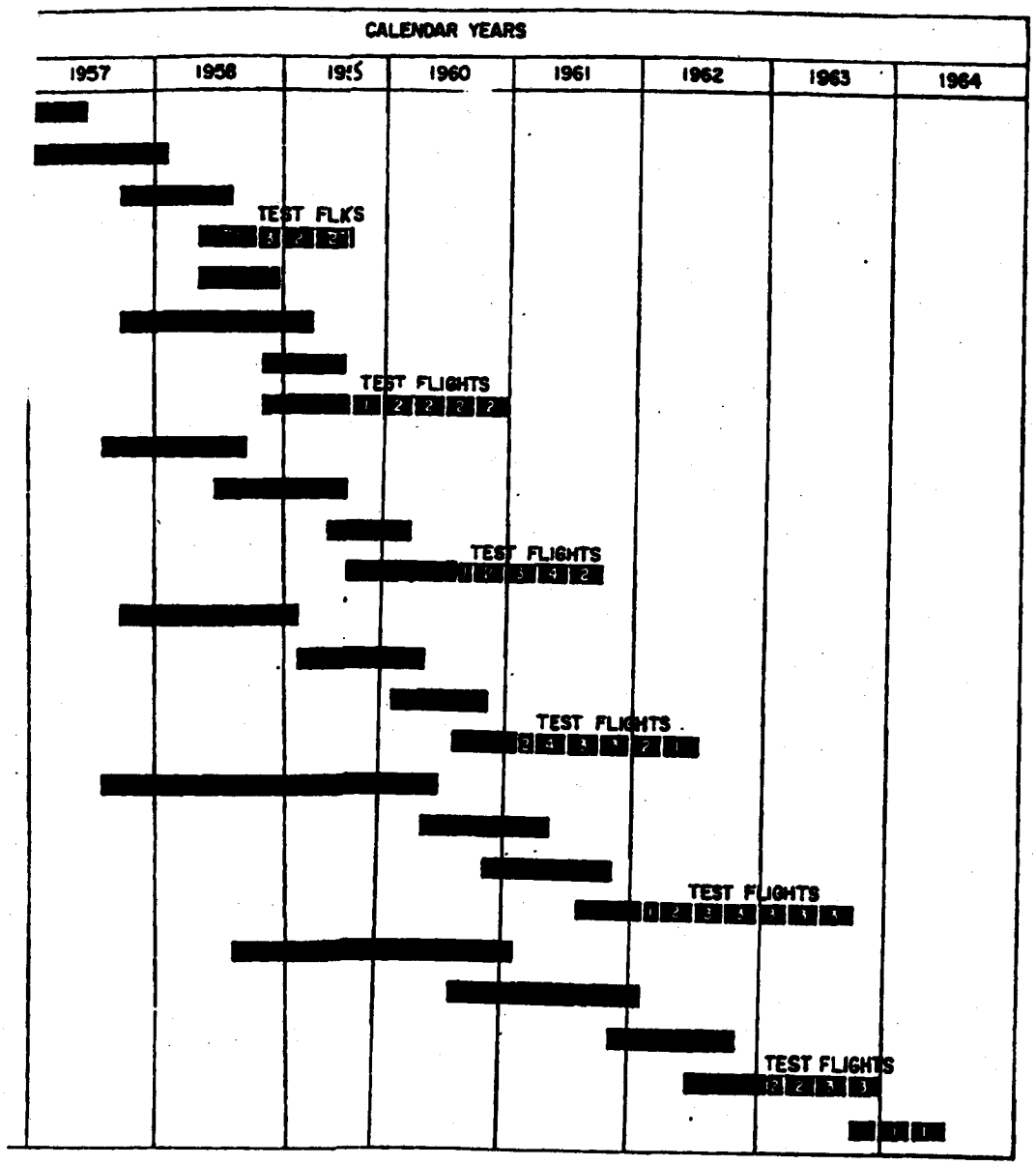
Data handling

Processing the vast quantity of visual and ferret data—some thirty million photographs a year when the information rate of SRS has been maximized—will require a Data Handling and Processing Center using automatic data handling techniques. The Center will be capable of obtaining weather, mapping, and target intelligence from the visual data and supplying desirable intelligence to the proper intelligence agencies. Data will be sorted by geographical divisions and thence by target type within each geographical category. During the target sorting operation, areas of relatively low intelligence interest will be diverted, thus removing about 90% of the load from the target sorter and the following target analysis equipment. The target analysis equipment will be used to provide the target data pertinent to dynamic intelligence indicators, that is, indicators which suggest a change or rate of change of aspect of the targets. Static intelligence indicators, concerned with items about whose existence no previous information has been available, are detected through target search facilities. The information on intelligence indicators and on ferret is then distributed through a distribution matrix to the proper intelligence agencies according to requirement.

SECRET



SECRET



Details of the development program

2

Basic Philosophy:

Satellite reconnaissance has been undergoing study for about ten years by the Air Force and by various scientific organizations. RCA has reviewed all past significant research and, in addition, has made substantial and important contributions to this subject. RCA's conclusions agree with other findings that:

(a) Military information of vital significance will be obtained by a Satellite Reconnaissance System;

(b) Satellite reconnaissance is technically feasible and is practical for development at this time.

However, the development of a Satellite Reconnaissance System cannot be undertaken without recognizing the difficulties that must be overcome. This project is unique in many respects:

(a) Reliability—*The reliability of available electronic equipment is completely inadequate for the requirement of a full year of unattended operation. The entire SRS development program must be aimed toward a reliability objective which is at least 100 times greater than anything now realizeable.*

(b) Environment—*No specifications of confirmed accuracy of the orbital environment are available since no detailed measurements have ever been made of the very high upper atmosphere, and expert opinion as to its nature varies significantly. A few of the unknowns which must be resolved are the following: air density, cosmic radiation, ionization behavior, and the effects of being suspended in a gravity-free field.*

(c) Volume of Information—*Successful exploitation of intelligence requires the orderly extraction of useful and pertinent information from the data available. Proper and timely handling of the immense volume of data to be obtained through satellite reconnaissance is a particularly challenging problem.*

In view of these factors it is believed that the success of this project is contingent upon the following principles:

(a) Singleness of Purpose Toward the Reconnaissance Objective—*Engineering compromises should be on the basis of cost per unit of information and information rate. The industrial organization responsible for this project should have exclusive responsibility and devotion to this objective.*

(b) System Integration—*An integral design based upon reasonable internal compromises is essential. Trade-off values must be continuously studied over a period of time to arrive at the most judicious compromise.*

(c) A Growth Program—*Simplicity and its concomitant, reliability, cannot be attained in any way other than through a growth program. In general, vehicle components must be simplified to the extreme, and the ground system must be designed to extract the maximum intelligence from the minimum of received data. Growth will be generally in the direction of increasing the quality, quantity, and rate of recorded data.*

Schedule of the development program:

The system development program may be described in terms of phases for the purpose of management and fiscal control. However, each succeeding phase depends upon the results of work on preceding phases. Moreover, each phase encompasses comprehensive continuous improvement of past equipments as well as their abandonment, and search for improved techniques, thus making the engineering of the system a continuous effort. The program proposed by RCA (See pages 14 and 15) consists of seven phases—six for the development of the system and one for final demonstration of the ultimate system. Within each phase there will be a series of flight tests which will, in effect, serve more clearly to define the limits of the phases. Phase I and II flight tests will be at latitudes and orbits affording maximum convenience and safety, and launching will be made from Patrick Air Force Base.

flight test schedule

Phase I Vehicle Tests on orbit, and determination of environment. Late 1958 through 1959 — 8 flights.

objectives

1. To obtain complete knowledge of the performance of the booster-satellite vehicle and ascent guidance system relative to the SRS application.
2. To collect data concerning upper-air environment and flight mechanics in orbit.
3. To test the tracking and communications systems.
4. To test payload parts and components in the flight environment.
5. To obtain a simple facsimile picture.

Phase II Confirmation of design, special attention to reliability. Mid-1959 through 1960 - - 10 flights.

objectives

1. To improve the satellite vehicle and demonstrate its reliability.
2. To develop a vehicle stabilization system.
3. To develop and test an inertial guidance system for the satellite vehicle.
4. To improve the communications and tracking operation.
5. To test reconnaissance payload components.

Phase III High-altitude orbit mechanics. Mid-1960 through 1961 - - 12 flights.

objectives

1. To investigate high latitude orbits.
2. To develop and prove a solar power supply.
3. To test visual equipment.
4. To test simple ferret mechanisms.

Phase IV Functional tests of reconnaissance payload components. 1961 to mid-1962 - - 15 flights.

objectives

1. To complete the development and test of a 500-watt solar power supply.
2. To develop complete visual and ferret payload packages and to put these packages through tests.
3. To phase-in the ground-based data processing equipment.
4. To test atomic-reactor components.
5. To develop and test the stellar monitor and other accessories.

Phase V Functional tests of a nuclear power supply. 1962 to late 1963 — 18 flights.

objectives

1. To test the atomic reactor.
2. To test final visual packages.
3. To test ferret models.

Phase VI Systems tests of operational prototype. 1963 — 10 flights.

objectives

1. To complete the visual and ferret systems test and evaluation.
2. To complete the packaging as required for a military prototype.
3. To evaluate for operational utility.

Phase VII 1964 - - 3 flights. Demonstration of three units of the final Satellite Reconnaissance System.

Primary design factors of development program:

Important design factors to be considered in the vehicle equipment development program are power starvation and reliability. It is estimated that no more than one-half to two kilowatts of power can be provided in the satellite — a very small fraction of that available in modern aircraft. Reliability must be improved by several orders of magnitude, as measured by present day equipments of similar functional complexity. In the equipment development program, therefore, it is of utmost importance that a growth philosophy be followed, and that there be successive stages of developing and testing in the laboratory and in test vehicles. Testing would begin with components and the simplest types of assemblies, and design would eventually grow to the simplest overall system that would satisfy military requirements.

development program for the vehicle:

The Convair ICBM booster has been selected to provide the primary (first stage) power supply for ascent; this will result in substantial economies in time and money. During the development program it is assumed that the booster and all necessary support, including launching crews, will be provided by the government.

Bell Aircraft Corporation will design the satellite vehicle to conform to the ICBM booster. For the second-stage propulsion, the Bell Aircraft Hustler (USAF XLR81BA1), modified to use the same propellants as the ICBM engine, will be used. A gross weight of the orbiting vehicle of approximately 4500 pounds will allow 1100 pounds for the payload. Small vernier rockets must be developed to place the satellite on orbit at the proper altitude. A nose-down attitude has been selected to assist in gravity stabilization and to provide the best accommodations for the payload. A stabilizing damping mechanism will be developed for this purpose.

During the early flight test program it is intended to use as much of the ICBM radio-inertial guidance and control equipment as is applicable. The equipment provided with the ICBM booster will be used as provided. In addition, ICBM equipment will also be used to guide the satellite into its orbit. In the final operational satellite it is planned to use an all-inertial system to place the satellite into orbit. However, the ICBM guidance will continue to be used during ascent to the point of booster separation.

development program for the payload

Several visual ground scanning systems show promise of being useful for the satellite. Conventional TV, modified for greater resolution and utilizing transistorized construction, is most straightforward, but the problem of information storage for delayed transmission poses problems. Film recording of optically viewed land areas has one inherent advantage in that it permits high information content per pound of weight, and another in that the film can be scanned by TV techniques for information transmission. However, difficulties would be encountered in development and re-use of the film. The most promising method appears to be the use of electrostatic tape. This has the information content advantages of film, it can be re-used, and can be scanned directly. Further experimental work must be done to determine its sensitivity and resolution and to develop simple handling mechanisms.

RCA has experimented with simplex, time-division multiplex, and frequency multiplex magnetic tape systems for a number of years and each of these methods has advantages and disadvantages. In every case, it would be necessary to resort to extensive miniaturization. Unbalanced torques due to rotating parts may cause vehicle stabilization difficulties. These factors have influenced the decision to exploit electrostatic tape if possible.

Ferret systems now under development for aircraft are much too complex, are heavy power consumers, and require antenna arrays that cannot be tolerated on a satellite. Two new methods for obtaining ferret information have been analyzed which show promise of reducing these problems. It is probable that separate vehicles will be required for ferret surveillance, and it may be necessary to be selective in the range of frequencies and data to be surveyed.

development program for tracking and data collection:

Tracking can be accomplished by the RCA Instrumentation Radar during the time that the satellite is on orbit. Minor modifications are required to permit the radar link to be used for the reception and transmission of information. Program data will be transmitted to the vehicle over this link, and a limited number of monitoring channels will be received. Display equipment must be added, and a device is required to acquire the orbiting vehicle. Precision tracking information is essential to compute the orbital mechanics, to analyze visual and ferret records, and to provide geographical indexing.

A transmission link must be provided between the Tracking Station and the Data Handling and Processing Center. Although the volume of data will be very large, provision is being made to slow down the transmission rate so that existing commercial type communications links may be used.

development program for data processing:

It is estimated that 30 million pictures per year will be available from one vehicle. Since the data from several vehicles will require handling, it can be seen that the data processing load is fantastic by any standards. Nevertheless, this problem must be solved or the satellite project will be useless. Most of the pictorial data will be of low interest, that is, clouds or wasteland, so automatic read-out will be provided to sort out weather information and areas of low interest. For the balance, which will total a few million pictures a year, detailed photo-interpretations will be required, compensations will be introduced to correct the altitude information for accurate position fixing and it will be necessary to sort in accordance with the needs of the user. There is a high probability that changes in data can be detected automatically which would further reduce the work load on the photo readers.

Both general purpose and specialized equipment are required to solve the above problems. The storage and sorting require magnetic tape and digital computer equipment such as is available in the RCA BIZMAC large volume commercial-data-handling-machine. Specialized optical and/or electronic devices must be developed for read-in, read-out, displays, orbital calculations, separation of low-interest data and similar functions.

RCA's plans for implementation of the development program:

industrial organization:

The Radio Corporation of America and its principal sub-contractor, Bell Aircraft Corporation, are well aware of the importance of the Satellite Reconnaissance System development to the Air Force and to national defense. If this contract is awarded to RCA an additional department with all personnel devoted exclusively to this project will be added to the four operating departments of the Defense Electronics Products Organization of RCA.

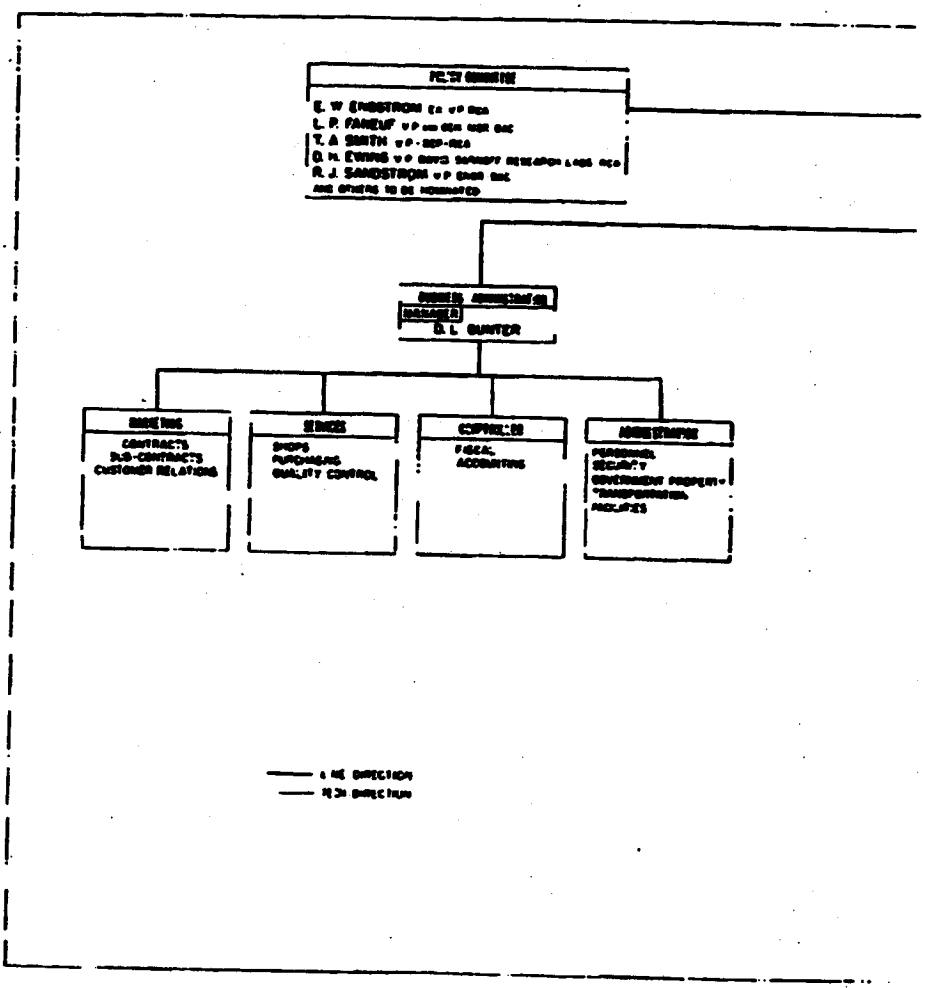
In recognition of the political implications of this project, and as an indication of the management support to be provided, a small policy committee is being formed of top executives of RCA and BAC. This committee will convene periodically to discuss progress and problems of a general management nature. This will assure a continuing dynamic interest in the program at the top level.

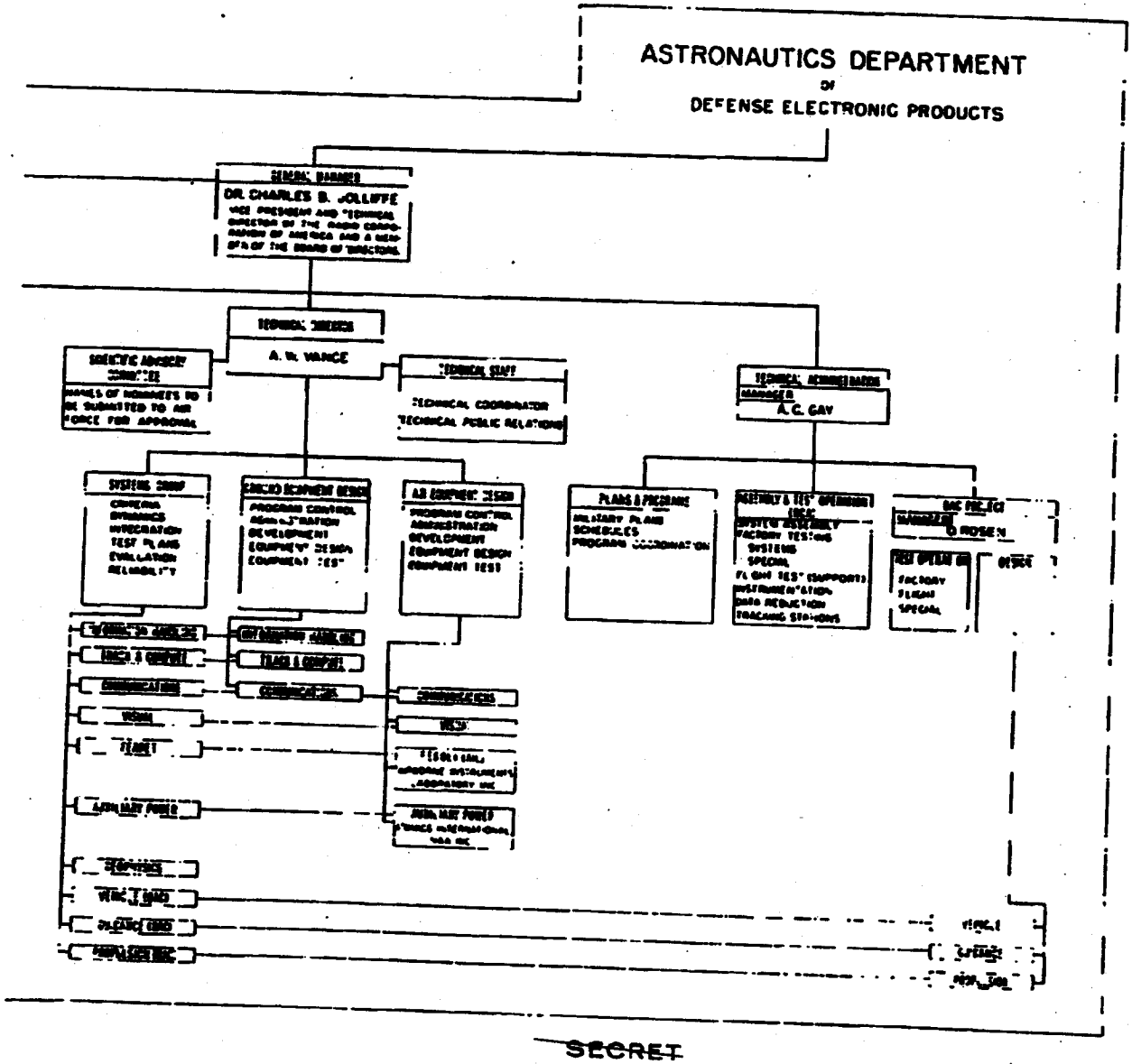
Technical areas would benefit materially from the services of a Scientific Advisory Committee to be formed from top scientific minds. This group would be limited in size since it is intended that the committee would actively participate in technical planning and in investigating areas of an unusual nature. No commitments will be made for specific members of this committee outside of RCA and BAC until a contract is awarded. This project is of sufficient interest to attract the interests of the best men of the scientific community.

A Systems Engineering Group will be established as a joint RCA-BAC organization responsible for the complete integration of the entire equipment design. The functional description of the duties of this group indicate the continuing interest expected of this organization and, in addition, indicate added duties of supporting in detail the technical management of the project. RCA expects to sub-contract work in those areas where other companies have developed considerable background of experience—for example, some phases of the project which might be sub-contracted are ferret, nuclear power components, some solar battery work, and other areas involving parts and components. It is felt that the integration process is of such importance that design groups and suppliers should be constrained to conduct engineering against very specific criteria. Further, the RCA growth program will permit the acceptance of the full responsibility for acceptance testing and verification of the suitability of design to meet the system requirements. The systems group is an important factor in obtaining flexibility without prejudice to the overall design.

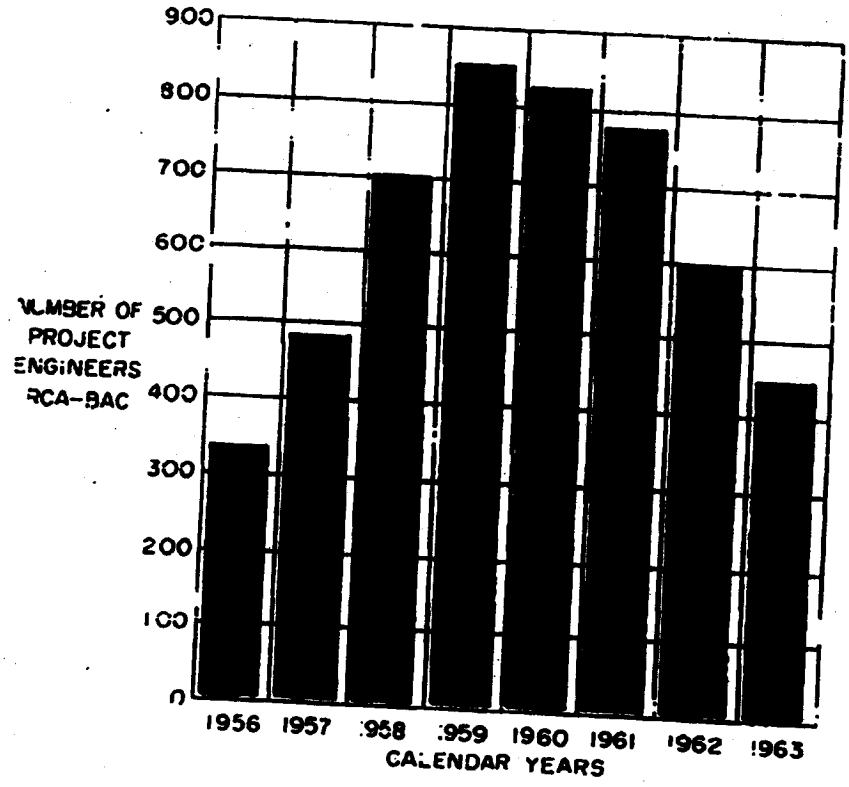
Manpower organization:

With regard to personnel, most of those now on the project have from ten to twenty-five years' engineering experience. Personnel have been drawn equally from the David Sarnoff Laboratories and from Defense Electronics Products. There has been a good balance of personnel with theoretical and practical design experience. It is intended to provide substantial additional personnel of the same caliber as soon as the intentions of the government are known definitely enough to justify this action. The shortage of qualified engineers and scientists is well known; and therefore no industrial concern can irrevocably commit a staff of the size and caliber for the SRS project without an assurance of the stability and continued adequate support of the program. However, management is planning a strong engineering organization for this project. Further, adequate time must be allowed to organize an expanded engineering staff. The very active interest of management at all levels of RCA and BAC during the study phase of this project is positive evidence of the enthusiastic support and attention which this team is prepared to give the Satellite Reconnaissance System development during the future.

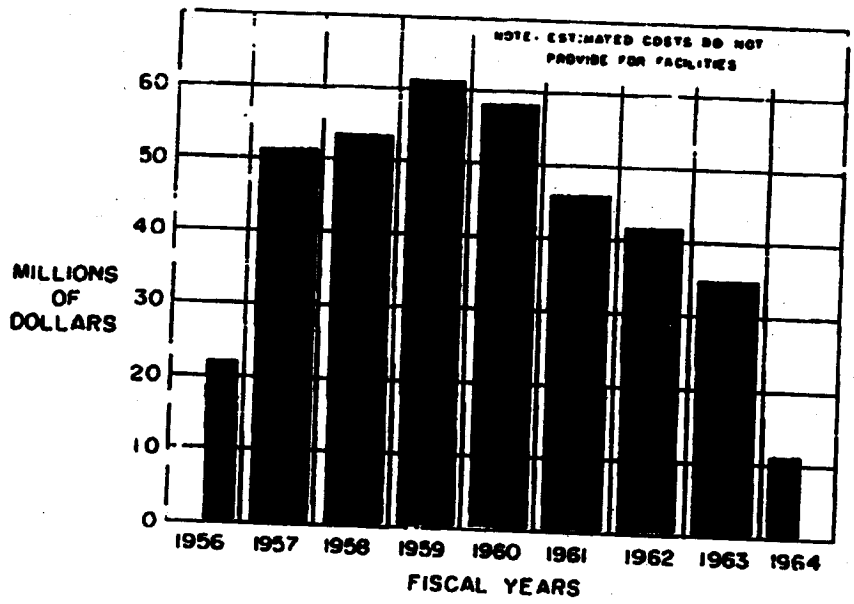



ASTRONAUTICS DEPARTMENT
OF
DEFENSE ELECTRONIC PRODUCTS
DR. CHARLES B. JOLLIFFE
A. W. VANCE
TECHNICAL COORDINATOR
TECHNICAL PUBLIC RELATIONS
A. C. GAY
PLANS & PROGRAMS
MILITARY PLANS
SCHEDULES
PROGRAM COORDINATION
D. ROSEN

Engineering manpower



program cost per year



~~CONFIDENTIAL~~ [redacted]

RESTRICTED DISTRIBUTION
Approval for release must be obtained from WDTR

[redacted]

[redacted]