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ADVANCED RECONNAISSANCE SYSTEM  
WEAPON SYSTEM 117L

Presenting in summary form the development concepts and  
present status of the "New Horizon" Weapon System program

Lockheed Aircraft Corporation  
Missile Systems Division

1 March 1958

*Cy #10*  
*LMSD-2903*

DOWNGRADED AT 12 YEAR  
INTERVALS; NOT AUTOMATICALLY  
DECLASSIFIED. DOD DIR 5200.10 ~~SECRET~~

*WD58-01417*

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## ADVANCED RECONNAISSANCE SYSTEM

Short Titles                    ARS: WS-117L  
Official Nickname                "New Horizon"

The ultimate objective of the WS-117L program is to provide continuous surveillance (visual, electronic and infrared) coverage of the USSR and USSR-dominated countries. In keeping with this objective, the types of intelligence required in order of priority are: strategic warning, enemy military forces in being, enemy military stockpiles of thermonuclear-atomic weapons, enemy logistic capabilities, and enemy industrial war capabilities.

Key R&D action dates relating to this program were:

March 1955	GOR 80 (SA-2C) issued
October 1955	System Requirement established
March 1956	Evaluation of Design Study completed
August 1956	Hq USAF approval of Development Plan; Development Directive issued
October 1956	Letter Contract AF 04(647)-97 issued to Lockheed Aircraft Corp., Missile Systems Division, as Weapon System Contractor
September 1957	Air Staff, with DOD concurrence, decides to support WS-117L in a more substantial manner
January 1958	Contract -97 definitized; a new letter contract executed to provide program acceleration and augmentation

The WS-117L program development plan embodies the placement of a series of unmanned satellites in prescribed orbits about the earth. Two basic types of satellite vehicle reconnaissance systems will be employed. The first type provides for the operation of satellite vehicles utilizing a radio link which relays to ground stations all data gathered by the satellites. The SM65 Atlas will be used as a booster for these satellite vehicles with the first flight test scheduled to take place in June 1959. The second basic type, introduced into the development program in January 1958, is designed to permit physical recovery of photographic film or other payload components. Thor IRBM missiles will be used as boosters for these satellites with the first flight-test date scheduled for October 1958.

The program for the complete system, in each instance, encompasses the following: (1) research, design, development and fabrication of the satellite vehicles, their payloads, communications networks and ground support equipment; (2) site selection of launching and tracking stations, design and construction of support facilities, and the definition of operational manpower requirements; (3) the function of launching and tracking, data reception, processing, interpretation and dissemination.

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WEAPON SYSTEM 117L

LOCKHEED MISSILE SYSTEMS DIVISION KEY PERSONNEL

L. Eugene Root	Corporate Vice President and LMSD General Manager
Willis M. Hawkins	Assistant General Manager, Weapon Systems
Dr. L. N. Ridenour	Chief Scientist
J. H. Carter	Manager, New Horizon Weapon System Branch
R. M. Salter, Jr.	Assistant Manager, New Horizon Weapon System Branch
Dr. S. B. Batdorf	Scientific Adviser, New Horizon Project
Fred W. O'Green	Director, New Horizon Development Division
R. D. King	Director, New Horizon Test Management and Operations Division
W. C. Holmes	Director, New Horizon Program Administration Division
Subsystem Development Managers:	Subsystem
Ralph O. Youngberg	A- Airframe
Dr. W. C. Noeggerath	B- Propulsion
C. W. Burrell	C- Auxiliary Power
Dr. W. E. Frye	D- Guidance and Control
James W. Plummer	E- Visual Reconnaissance
P. D. Doersam	F- Ferret Reconnaissance
J. J. Knopow	G- Infrared Reconnaissance
Dr. J. Jenkins	H- Communications

(See Reverse Side for Key Personnel WS 117L Project Office)

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WS 117L PROJECT OFFICE

KEY PERSONNEL

AFBMD, Inglewood, California, Orchard 2-0171, X-2751

Colonel Frederic C. E. Oder

Assistant For WS 117L

Comdr. Robert C. Truax

Deputy Assistant For WS 117L

Lt. Colonel Quenten A. Riepe

Chief, Facilities & Test Division

Major Raymond E. Zelenka

Chief, Plans & Programs Division

Lt. Colonel C. Lee Battle, Jr.

Chief, System Engineering Division

Subsystem Project Officers:

Capt. J. A. Fiebelkorn

Airframe

Lt. Col. Edward F. Blum

Propulsion

Major George E. Austin

Auxiliary Power

Capt. John J. Schmitt

Guidance & Control

Major Edward J. Conway

Visual Reconnaissance

Capt. W. O. Troetschel

Ferret Reconnaissance

Major Thomas O. Wear

I-R Reconnaissance

Capt. John O. Copley, Jr.

Ground Space Communications

Major Harold F. Wienberg

Data Processing

Lt. Col. George P. Jones

Geophysical Environment

Capt. Ben F. Hicks

QPRI

BMO, Inglewood, California, Orchard 2-0171, X-2751

Lt. Colonel James S. Seay

Chief, WS 117L Branch, Deputy  
Director/Ballistic Missiles  
Directorate/Procurement &  
Production

Mr. Eugene S. Silberman

Deputy Chief, WS 117L Branch

Major Donald M. Billick

Project Officer, Logistics

Capt. Eugene V. Venezia

Project Officer, Production

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WEAPON SYSTEM 117L

PRINCIPAL SUBCONTRACTORS KEY PERSONNEL

**Propulsion**

Bell Aircraft Corporation  
P. O. Box 1  
Buffalo 5, N. Y.  
Telephone: Niagara Falls-7 851  
Mr. J. Magalhaes

**Ferret Reconnaissance**

Airborne Instruments Lab., Inc.  
160 Old Country Road  
Mineola, N. Y.  
Telephone: Pioneer 2-0600  
Mr. Winfield E. Fromm

**Visual Reconnaissance**

Eastman Kodak Co.  
Naval Ordnance Division  
25 Lincoln Avenue  
Rochester 11, N. Y.  
Telephone: Genessee 8-8889  
Mr. Donald Stevens

**Infrared Reconnaissance**

Aerojet-General Corp.  
6352 North Irwindale Avenue  
Covina, California  
Telephone: Edgewood 4-6211  
Dr. Raymond McFee

Columbia Broadcasting System, Inc.  
CBS Laboratories  
485 Madison Avenue  
New York 22, N. Y.  
Telephone: Plaza 1-2345  
Mr. A. Montalto

**Ground-Space Communications**

Philco Corp.  
806 Chestnut Street  
Redwood City, California  
Telephone: EM 9-2921  
Dr. W. B. LaBerge

General Electric Co.  
Special Projects Department  
3198 Chestnut Street  
Philadelphia 4, Pennsylvania  
Telephone: EV 2-7800  
Mr. L. L. Stahl

Fairchild Camera & Instrument Corp.  
Robbins Lane  
Syosset, Long Island, N. Y.  
Telephone: Hempstead, N. Y. WE 1-4500  
Mr. Richard Hodgson

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# ADVANCED RECONNAISSANCE VEHICLE

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### ADVANCED RECONNAISSANCE VEHICLE

An artist's conception of the WS-117L Advanced Reconnaissance System satellite vehicle -- Pioneer visual model -- on orbit, as viewed from outer space.

Line of flight is along axis of rods supporting the extended helium spheres. These spheres assist in maintaining stability of the vehicle in a nose-down position.

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# ADVANCED RECONNAISSANCE SYSTEM

## KEY CHARACTERISTICS

- COMPLETE TARGET AREA COVERAGE
- ACCURATE SPECIFIC TARGET LOCATION
- CONTINUOUS TARGET AREA SURVEILLANCE
- INSTANTANEOUS WARNING OF ICBM ATTACK
- NEARLY INVULNERABLE TO ATTACK OR COUNTER MEASURES
- NO AIRCREWS
- NO OVERSEAS BASES
- INVADES NO AIRSPACE
- HIGH DATA RATE
- ECONOMICAL PER UNIT OF DATA
- FAST RESPONSE
- GROWTH POTENTIAL



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**KEY CHARACTERISTICS OF THE ADVANCED RECONNAISSANCE SYSTEM**

**A listing of some of the unique characteristics of a reconnaissance system based on the use of satellite vehicles as a platform for data-gathering devices.**

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### WS-117L PROGRAMS AND OBJECTIVES

Presents the eight development programs and their principal objectives. These programs have been chosen and phased to meet two major development objectives:

1. Optimize the development of the operational Advanced Reconnaissance System in terms of the best balance between early availability, effectiveness, and overall economy in terms of manpower and funds
2. Provide a stepwise series of reconnaissance systems capable of collecting significant intelligence of high priority at the earliest dates.

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SCHEDULE DATA

Presents flight dates for both the pre-accelerated  
WS-117L program and the current program as deter-  
mined in January 1958.

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# WS 117L FLIGHT TEST BY LAUNCH SITE LOCATION

FIG CHART NO. WS-4  
REV. 1/56

OCT. 1958 - DEC. 1960

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		1957	1958	1959	1960	1961
1	AS MOBILE TEST CENTER					
2						
3	THOR BOOSTED FLIGHTS					
4	FLIGHT NO. 1					
5	" " 2					
6	" " 3					
7	" " 4					
8	" " 5					
9	" " 6					
10	ATLAS BOOSTED FLIGHTS					
11	FLIGHT NO. 1					
12	" " 2					
13	" " 3					
14	" " 4					
15	" " 5					
16	" " 6					
17	" " 7					
18	" " 8					
19	" " 9					
20	" " 10					
21	CORONA A.R. 5488					
22						
23	THOR BOOSTED FLIGHTS					
24	FLIGHT NO. 6					
25	" " 7					
26	" " 8					
27	" " 9					
28	" " 10					
29	ATLAS BOOSTED FLIGHTS					
30	FLIGHT NO. 10					
31	" " 11					
32	" " 12					
33	" " 13					
34	" " 14					
35	" " 15					
36	" " 16					
37	" " 17					
38	" " 18					
39	" " 19					

LOCKED AIRCRAFT CORPORATION  
2000 MARKET STREET

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#### FLIGHT TESTS BY LAUNCH SITE LOCATION

Presents the WS-117L accelerated schedule flight test dates according to launch site location. Early availability of a suitable launch complex at Cooke APB is imperative in order that the flight test program may be carried out on schedule.

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# WS117L PROGRAM SUMMARY THRU DEC 1960

## COMPARATIVE SCHEDULE REQUIREMENTS

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	PROGRAM PRIOR TO 1-22-58	ACCELERATED PROGRAM
1ST ORBIT FLIGHT TEST	JUNE '59	OCT. '58
1ST VISUAL RECONN. CAPABILITY	MARCH '61	MARCH '60
1ST ELECTRONIC RECONN. CAPABILITY	APRIL '61	APRIL '60
VEHICLE PRODUCTION REQUIREMENTS		
VEHICLE MOCKUP	1	1
STRUCTURAL TEST VEHICLE	1	1
PROPULSION TEST VEHICLE ASSEMBLIES	2	3
CAPTIVE TEST VEHICLES	1	1
SYSTEM TEST VEHICLES	0	1
FLIGHT TEST VEHICLES	9	30
NO. OF THOR BOOSTED SATELLITE LAUNCHINGS		
	0	10
NO. OF ATLAS BOOSTED SATELLITE LAUNCHINGS		
	9	19
TOTAL NO. OF SATELLITE LAUNCHINGS	9	29

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WD-58 00776

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LOCKHEED AIRCRAFT CORPORATION  
MISSILE SYSTEMS DIVISION

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**WS-117L PROGRAM SUMMARY THROUGH DECEMBER 1960**

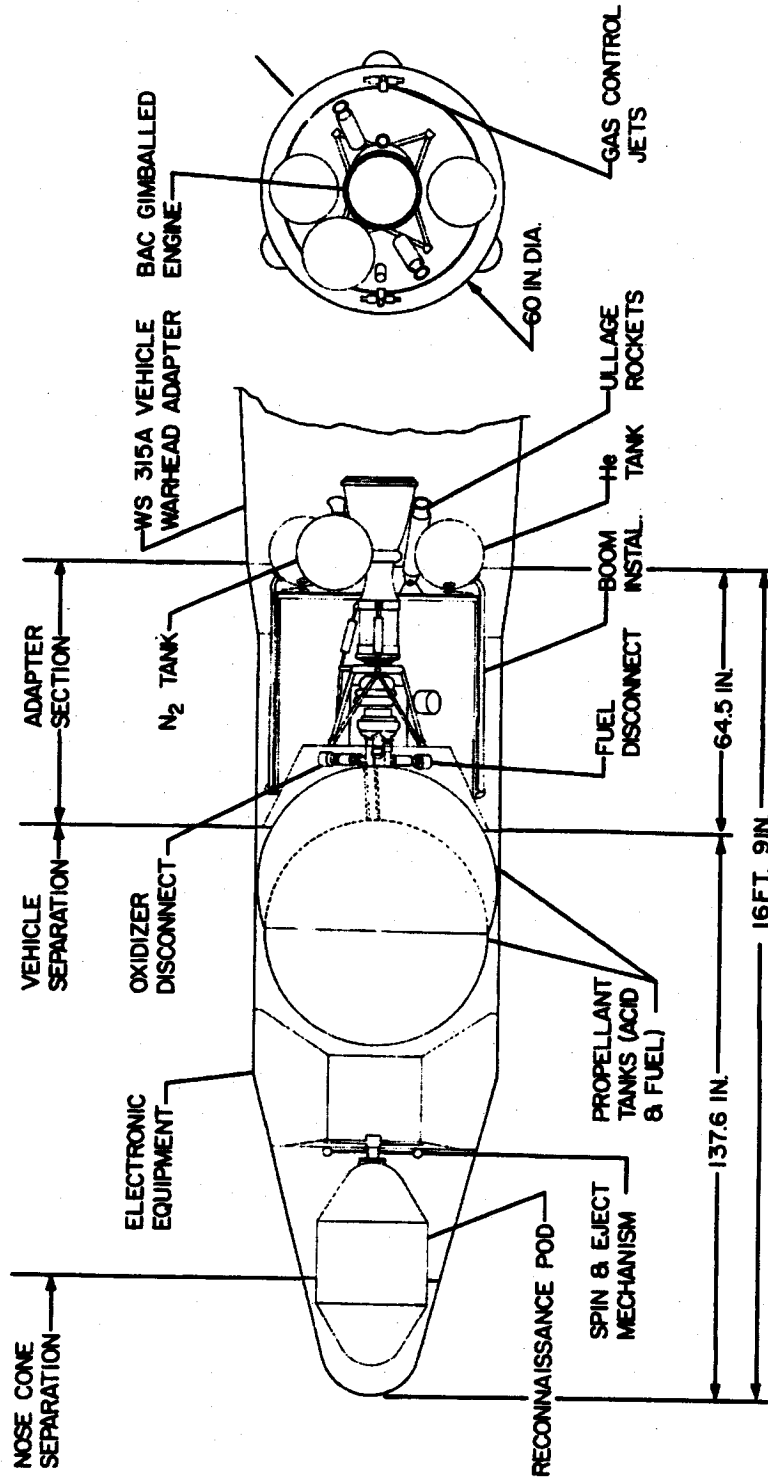
A summary of the significant schedule changes brought about by the decision (as of 22 January 1958) both to accelerate the program schedule and to augment it with a Thor-boosted satellite payload recovery program.

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# WS117L PAYLOAD RECOVERY SATELLITE VEHICLE

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W. PALM BEACH, FLORIDA

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#### WS-117L PAYLOAD RECOVERY SATELLITE VEHICLE

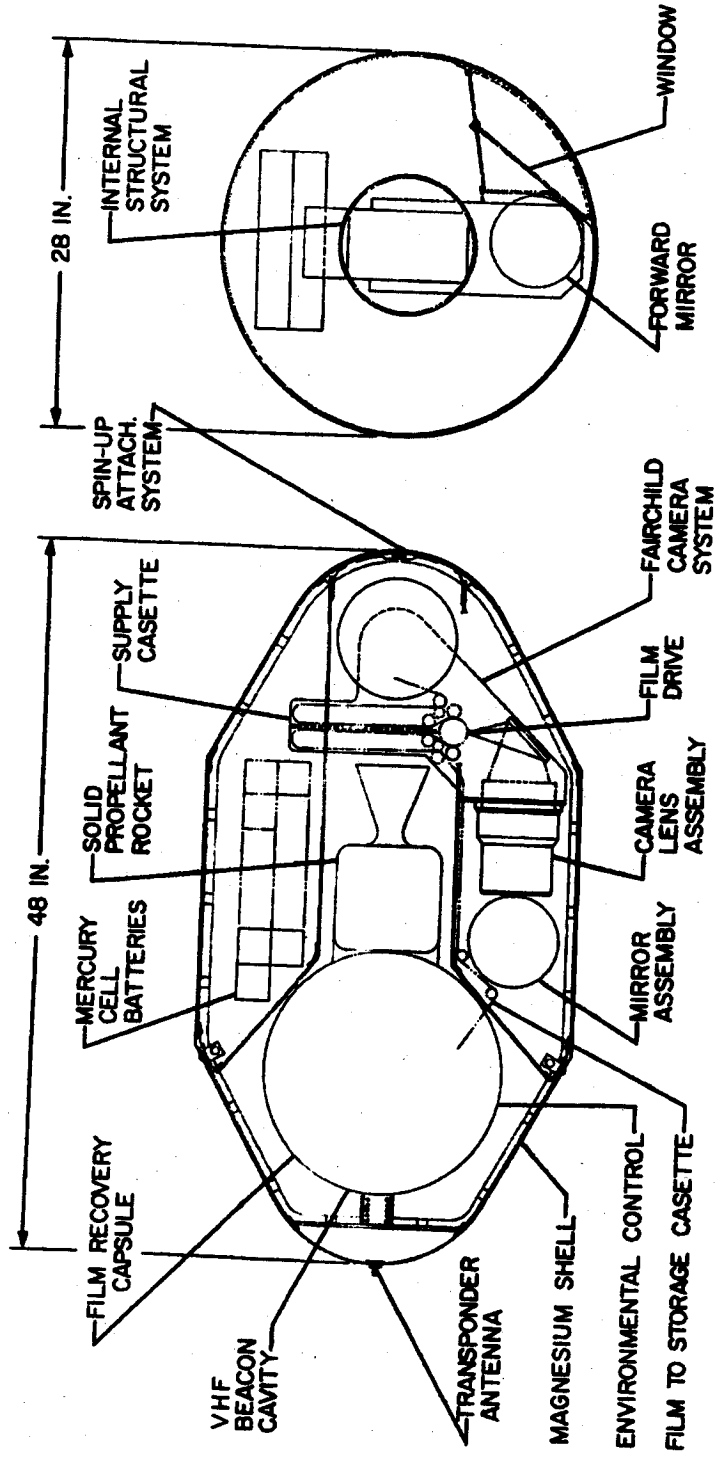
Shows the major components associated with the satellite vehicle designed to carry a reconnaissance pod into orbit. The components required to effect separation, ullage control, orbital boost propulsion, attitude control, and reconnaissance pod spin-up and eject are shown. After separation from the vehicle the spin of the reconnaissance pod serves to stabilize it in inertial space and also provides the means for panoramic scanning of the earth's surface by the enclosed camera.

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# WS 117L RECONNAISSANCE POD

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ANN ARBOR, MICHIGAN

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#### WS-117L RECONNAISSANCE POD

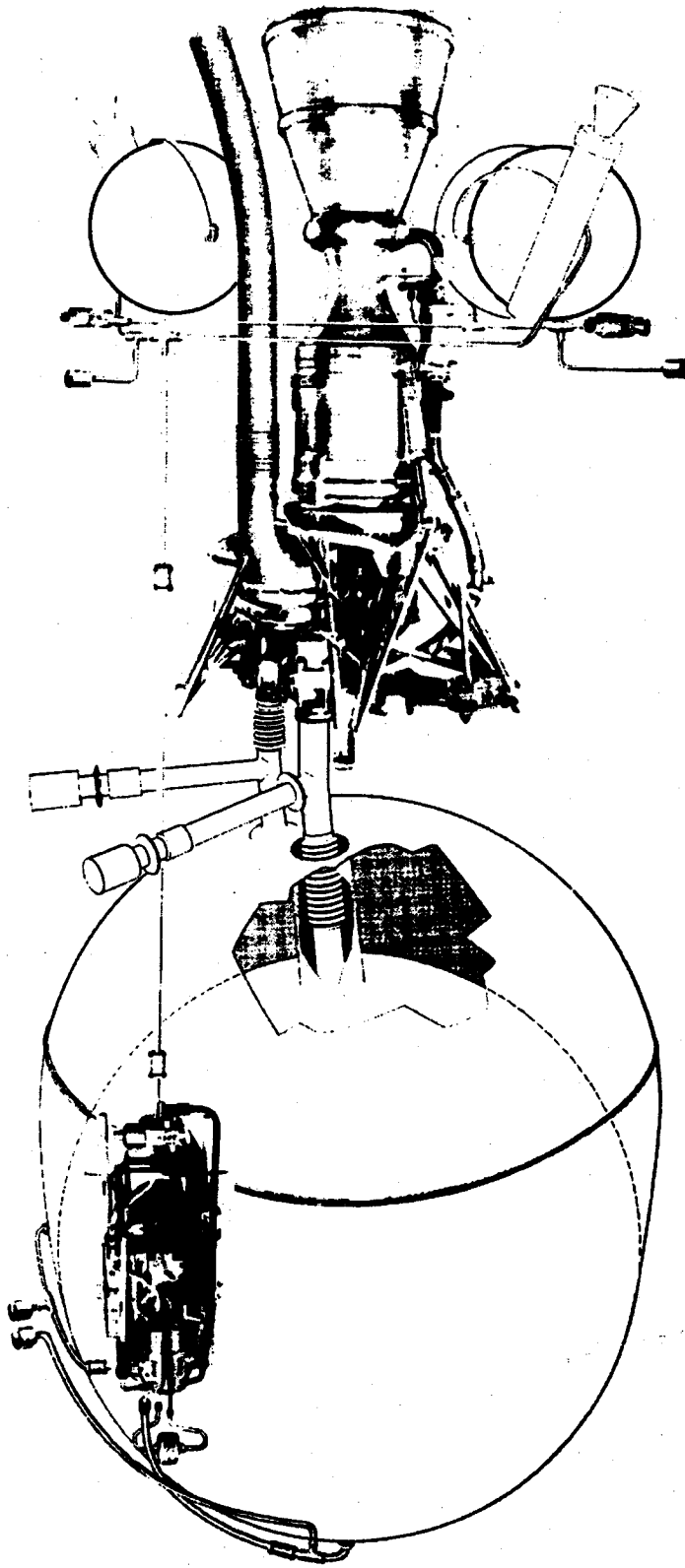
Shows the major components of the reconnaissance pod designed to obtain panoramic reconnaissance photographs from a satellite orbit and store the exposed film in a recoverable capsule. At the completion of the reconnaissance mission the solid propellant rocket propels the film recovery capsule into a recovery trajectory for return to the earth's surface.

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# WS 117L PROPULSION SYSTEM

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WB-99-00776

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CONTROL JETS  
NITROGEN SUPPLY

ULLAGE ROCKETS

LOCKHEED AIRCRAFT CORPORATION  
WHILE IN THE SERVICE

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### WS-117L VEHICLE PROPULSION SYSTEM

A photograph of the Bell Aircraft Corporation 'Hustler' engine in schematic relationship to other major propulsion system components. As indicated, the engine is gimbal-mounted in order that thrust direction may be controlled.

Engine performance specifications are:

Thrust in a vacuum	15,150 lbs
Minimum specific impulse	263 sec
Maximum specific impulse	269 sec

Nested spherical tanks contain the propellants which are pressure-fed to the combustion chamber; pressure is supplied by helium contained in the two spherical tanks shown on either side of the thrust chamber. The engine is started by the simultaneous ignition of a solid propellant charge in the gas generator and the opening of a connection between the two propellant tanks. Prior to engine start, propellants in the tanks are properly oriented and gas bubbles expelled by the firing of two solid ullage control rockets.

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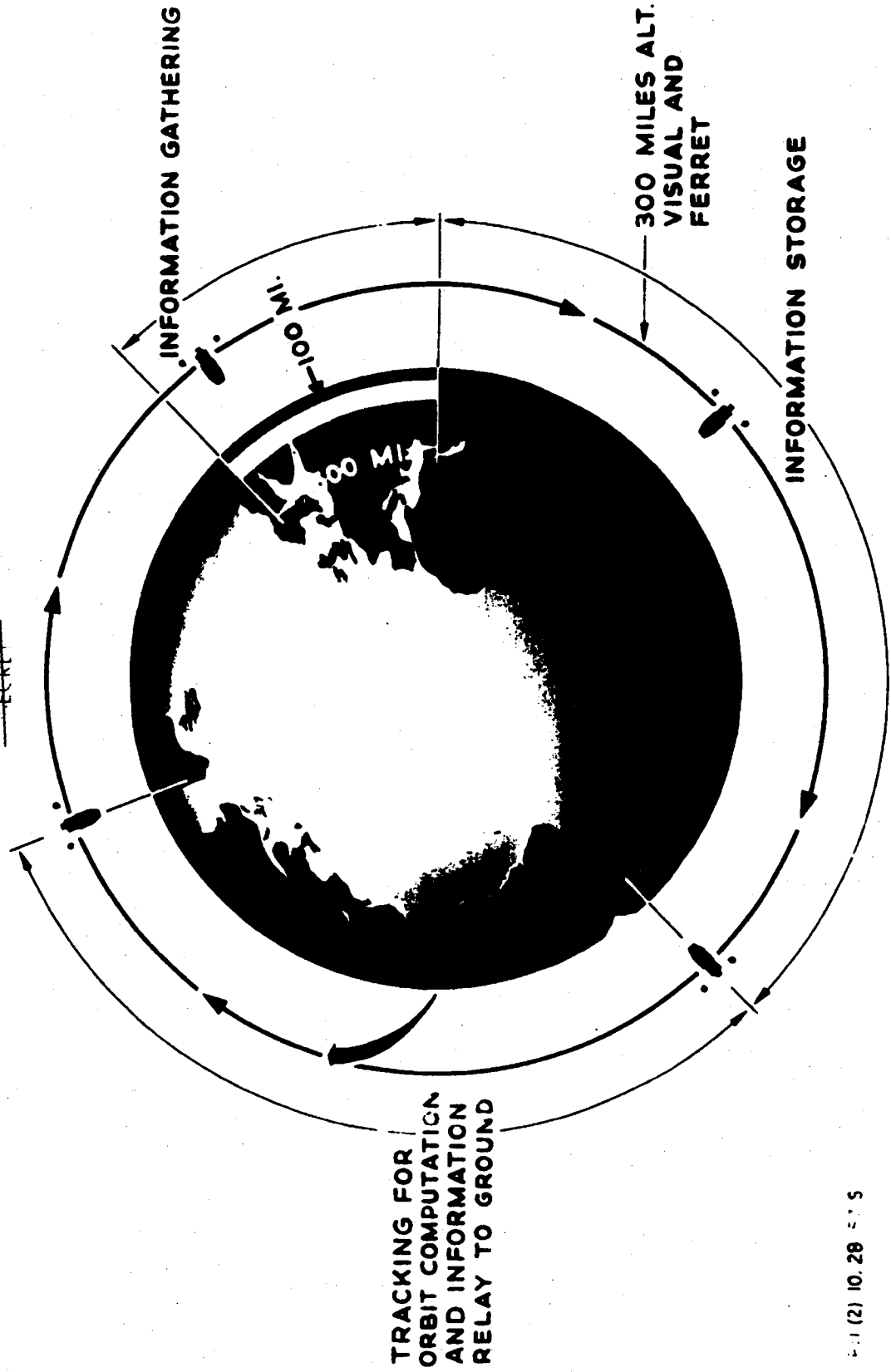
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#### ARS VEHICLE TRAJECTORY TO ORBIT

Presentation of flight launch phase of the Atlas-boosted Advanced Reconnaissance System satellite vehicle. Booster-satellite separation is accomplished by the use of retro-firing rockets attached to the Atlas. Satellite pitchover and stabilization in a nose-down position is achieved by nitrogen-fed gas jets as shown in the vehicle configuration drawing.

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# SATELLITE ORBIT SCHEMATIC



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**ADVANCED RECONNAISSANCE  
SATELLITE ORBIT SCHEMATIC**

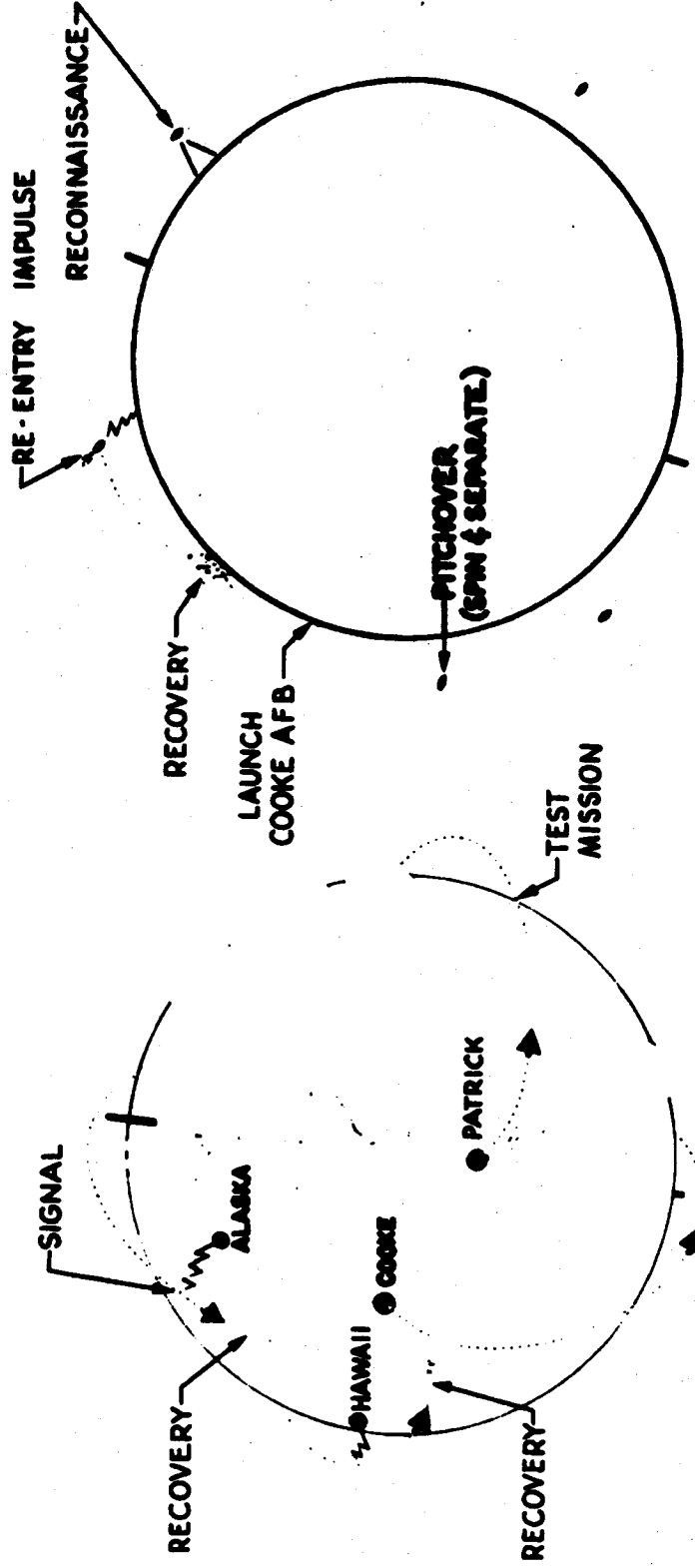
Illustrates how orbiting reconnaissance satellite gathers and stores intelligence data while passing over territory of interest, then relays ("reads out") the data while passing over ZI-located control stations.

As indicated, the pioneer visual system, utilizing a 6-inch focal length lens, photographs a swath 1500 miles long by 100 miles wide.

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OPERATIONAL MISSION

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WD-58 - 00776

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LOCKHEED AIRCRAFT CORPORATION  
MOUNTAIN VIEW, CALIF.



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#### WS-117L PAYLOAD RECOVERY MISSION PROFILE

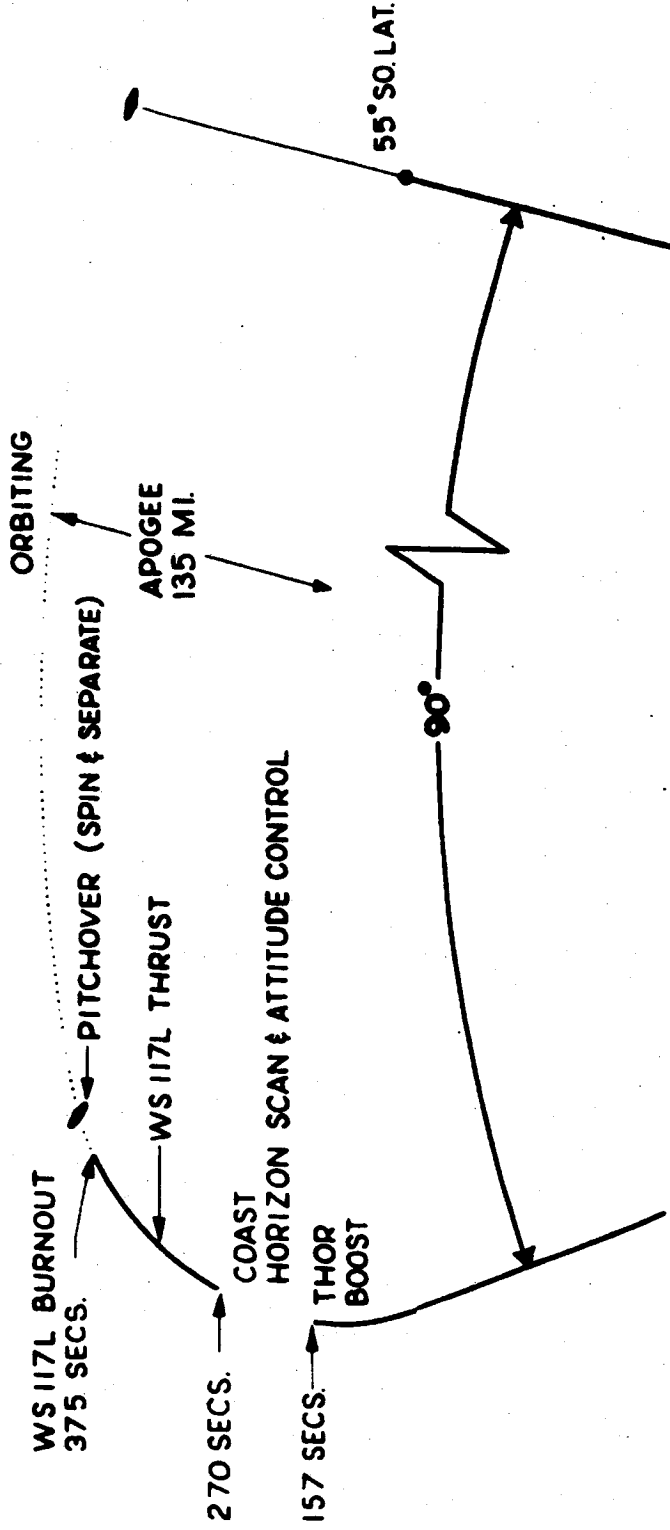
Indicates, by figure at the left, low-latitude test flights to be launched from AFMTC and operational (reconnaissance) missions to be launched in a southerly direction from Cooke AFB. In each instance, a re-entry impulse will be so timed as to cause the recoverable film package to impact at sea in the vicinity of the Hawaiian Islands.

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# RECOVERY MISSION PROFILE

## POLAR ORBIT

GUIDANCE:  
AC FOR THOR  
INTERIM GUIDANCE FOR WS 117L



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#### RECOVERY MISSION PROFILE

Presents sequence of events for launch of a Thor-boosted payload recovery satellite from Cooke AFB. As indicated, at burnout of the second (satellite vehicle) stage engine, the satellite is pitched over. The recovery pod containing the reconnaissance camera is made to spin and then is separated from the vehicle to continue on an independent orbit. The pod is stabilized in inertial space by its spin. The initial orientation is such that at 55 degrees south latitude, its longitudinal axis will be parallel to the surface of the earth. At this orientation the pod is also parallel to the surface of the earth as it passes over Soviet territory.

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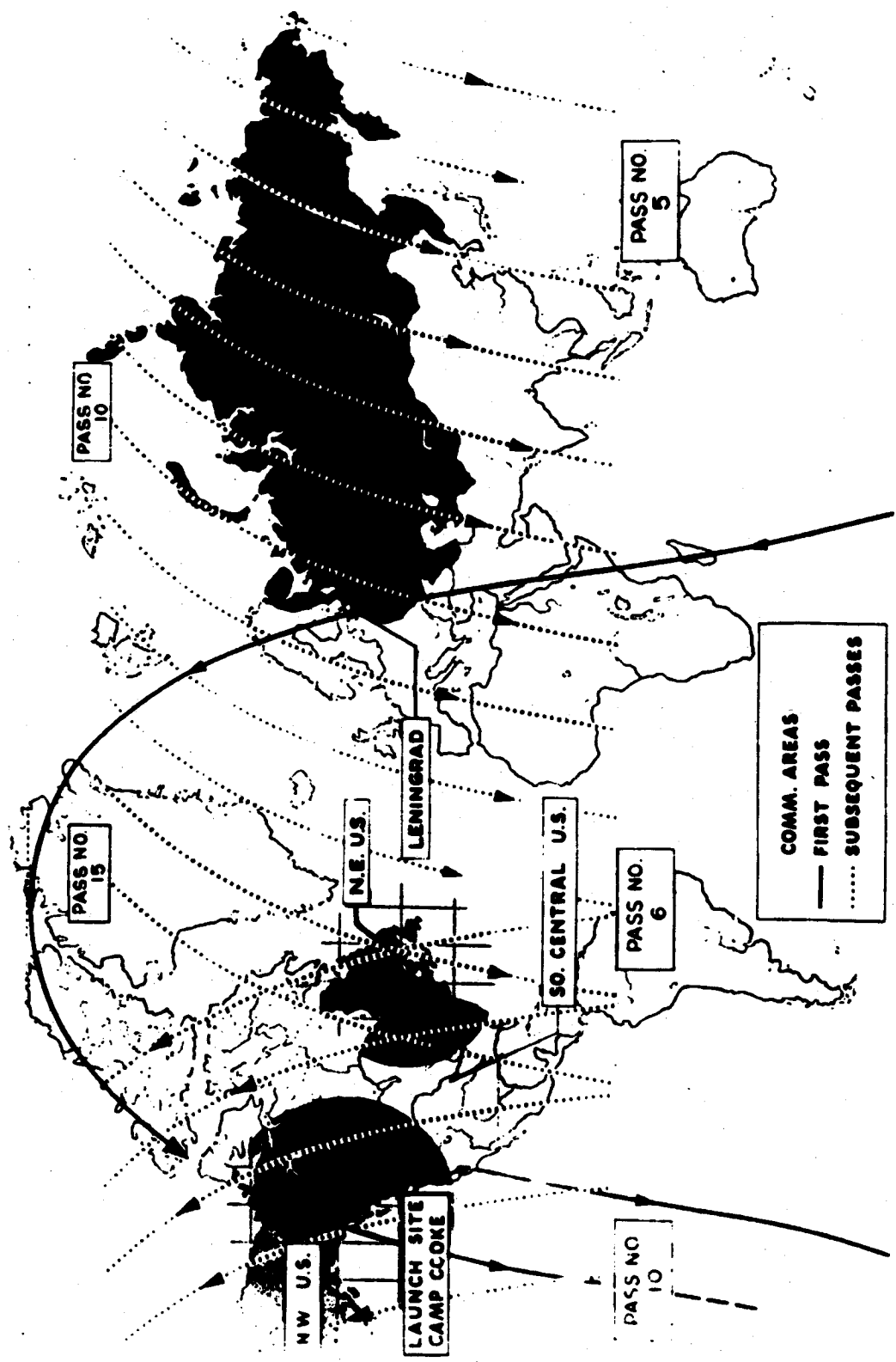
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**WS-117L INFRARED RECONNAISSANCE SYSTEM**

A statement of principal operational objectives of the Infrared Satellite Reconnaissance System, identified as Subsystem 'G'; Program VIII of the WS-117L Development Plan.

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# WS 117L GROUND TRACES OF 83° ORBITS



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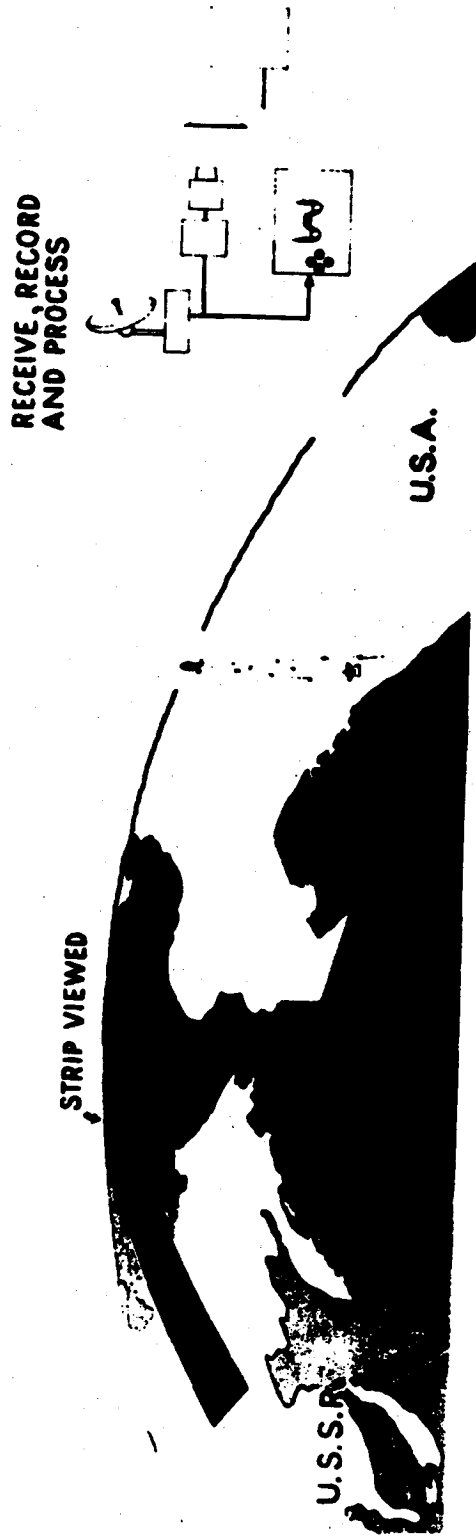
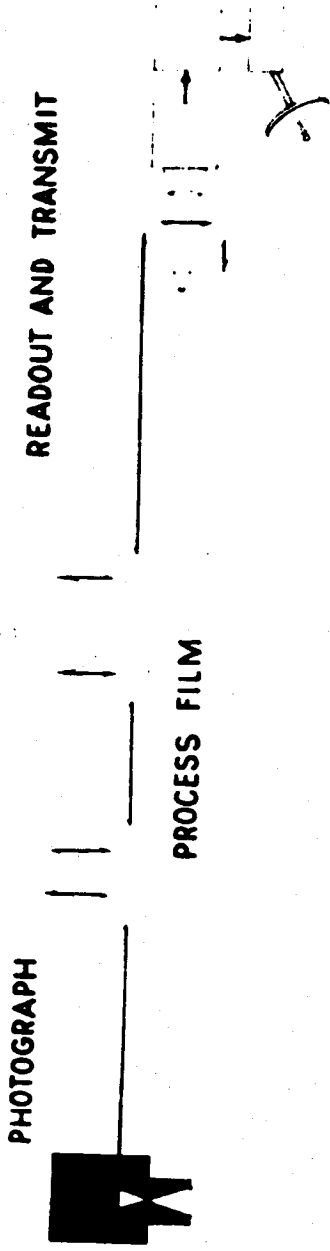
**WS-117L GROUND TRACES OF 83-DEGREE ORBITS**

Indicates ground traces of a satellite vehicle on an orbit inclined 83 degrees to the plane of the equator. This orbit has been selected for use in operational reconnaissance missions. Shaded areas on the North American continent indicate the range of ground control stations located in the central U.S. area, and northeast and northwest locations.

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# WS-117L VISUAL RECONNAISSANCE SYSTEM

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#### WS-117L ARS VISUAL RECONNAISSANCE SYSTEM

Illustrates the operation of the satellite vehicle visual reconnaissance system. The Pioneer system, utilizing a 6-inch focal length lens, will photograph a 100-mile-wide strip on each pass over the territory of interest. It is designed to provide 100-foot ground resolution and locate objects (targets) to an accuracy of one mile. Nine days of operations, with an average information gathering period of five minutes per revolution of the satellite, would provide photographic coverage of a ground area of not less than 54 million square miles.

The Advanced visual system, utilizing a 36-inch focal length lens, would cover a 20-mile-wide swath with 20-foot ground resolution and a location accuracy of one-half mile. Programmed coverage of selected targets would be feasible.

The ultimate, or Surveillance system, utilizing multiple satellites, would provide daily surveillance of all targets at 17-foot resolutions or better. Each satellite vehicle would have an operational (data-gathering) life of at least one year.

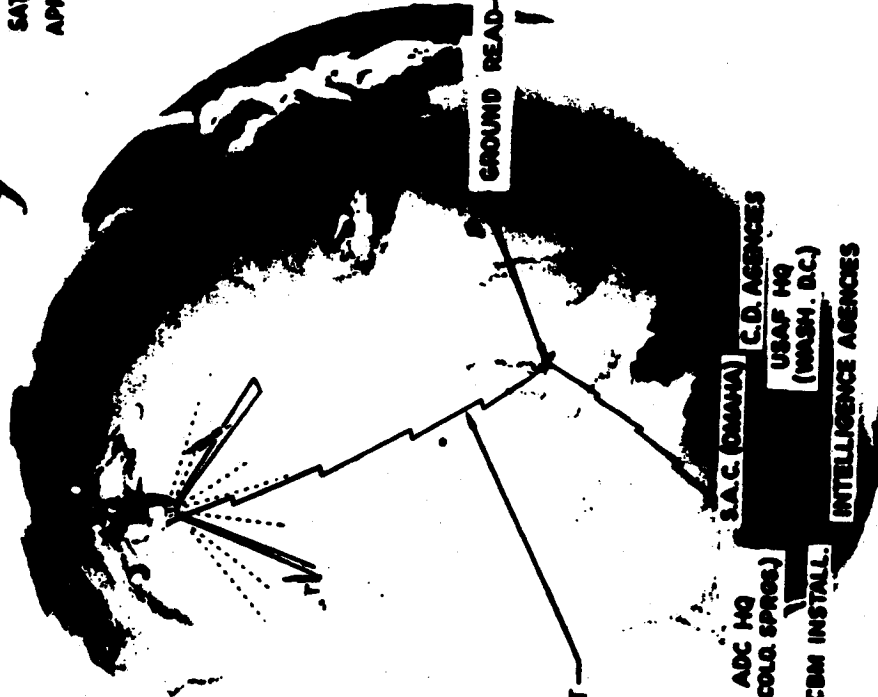
Serving as a subcontractor to Lockheed Missile Systems Division, the Eastman Kodak Company assisted by the Columbia Broadcasting System Laboratories is directing the research, development, fabrication and assembly of visual payload components.

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SATELLITE POLAR ORBIT ALT.  
APPROX. 1000 NAUTICAL MILES



INSTANTANEOUS DIRECT READ-OUT  
TO GROUND STATION

ADC HQ  
(COLG. SPRG)

S.A.C. (MAWA)

C.D. AGENCIES

USAF HQ  
(WASH. D.C.)

AICBM INSTALL.

INTELLIGENCE AGENCIES

GROUND READ-OUT STATION

P 204(2) 55°C 2/24/58  
WD-58-00776

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LOCKHEED AIRCRAFT CORPORATION



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WS-117L INFRARED RECONNAISSANCE SYSTEM  
ICBM ATTACK WARNING

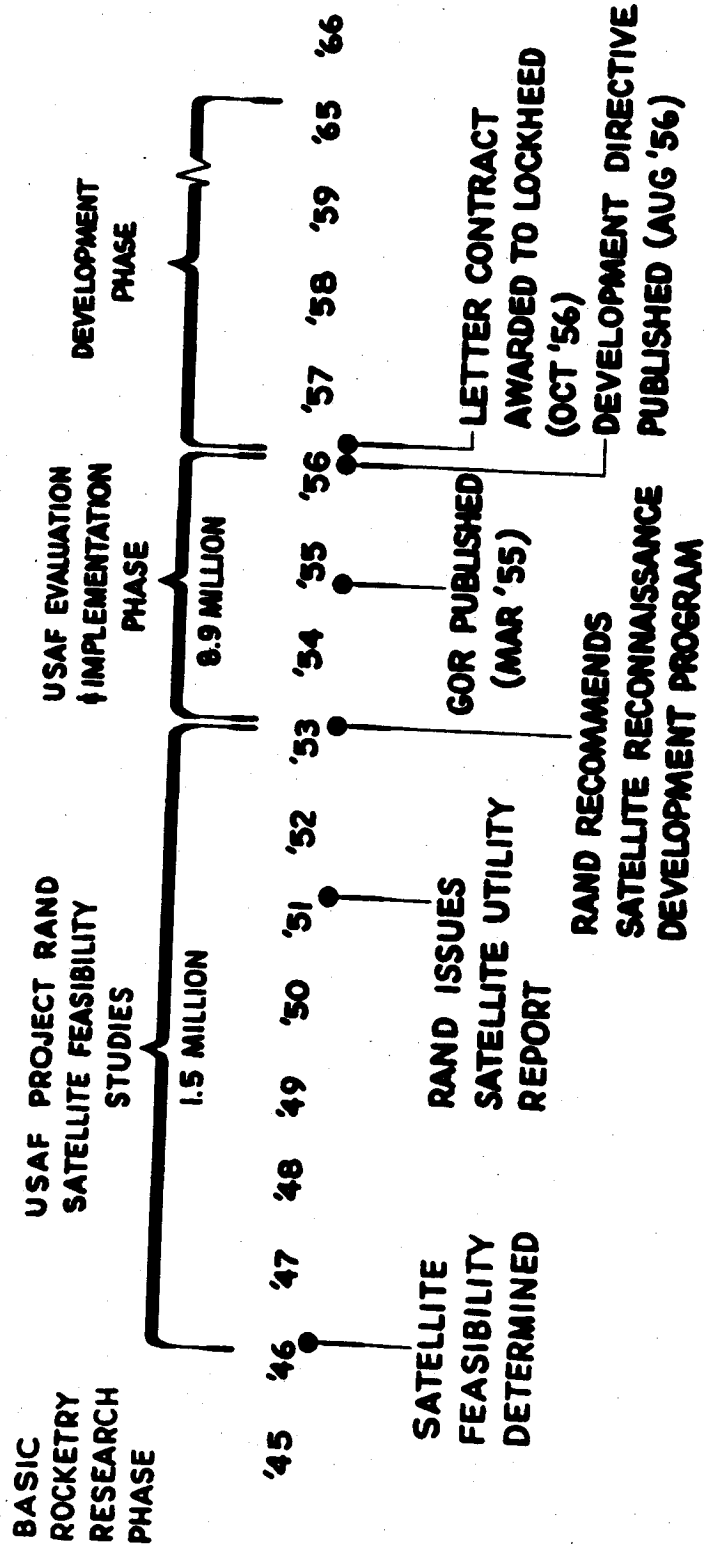
Illustrates how satellite vehicles equipped with infrared sensing devices could detect, and instantaneously report to a USAF-controlled ground station, the launching of ballistic missiles having an intercontinental range capability.

At a nominal altitude of 1000 nautical miles, infrared sensors would have a mean slant range of 2400 nautical miles; each IR-equipped satellite would scan an area of 12 million square miles every thirty seconds. The launching of an IRBM/ICBM missile within this area would be detected by the IR sensors, and be instantaneously reported to a ground-located monitoring station.

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# ADVANCED RECONNAISSANCE SYSTEM EVOLUTION

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#### ADVANCED RECONNAISSANCE SYSTEM EVOLUTION

Demonstrates that the WS-117L program represents the culmination of intensive studies and analyses dating from the immediate post-WWII period. Although it was determined as early as 1947 that the launching of satellite vehicles was technically feasible, studies were continued until it could be demonstrated that such satellites would have a significant military utility and be economically competitive with alternative systems. Concurrent development of ICBM/IRBM missiles permitted a great reduction in satellite development costs and left little doubt that the military worth of a satellite reconnaissance system would amply justify its costs.

As presently conceived, the development phase of the ARS program will continue through 1965.

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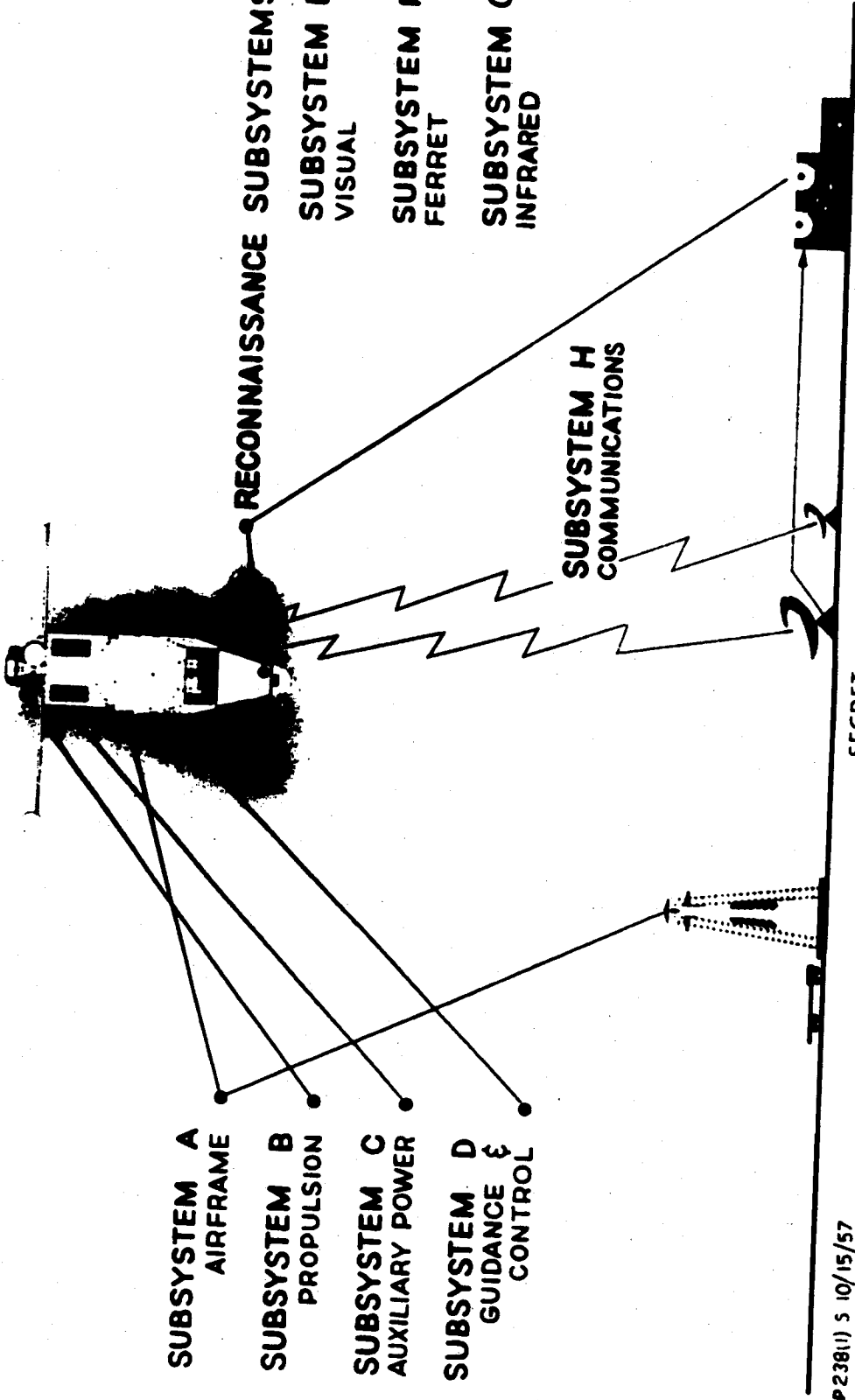
# THE WS-117L SUBSYSTEMS

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- SUBSYSTEM A  
AIRFRAME
- SUBSYSTEM B  
PROPULSION
- SUBSYSTEM C  
AUXILIARY POWER
- SUBSYSTEM D  
GUIDANCE &  
CONTROL

- RECONNAISSANCE SUBSYSTEMS
- SUBSYSTEM E  
VISUAL
- SUBSYSTEM F  
FERRET
- SUBSYSTEM G  
INFRARED

SUBSYSTEM H  
COMMUNICATIONS



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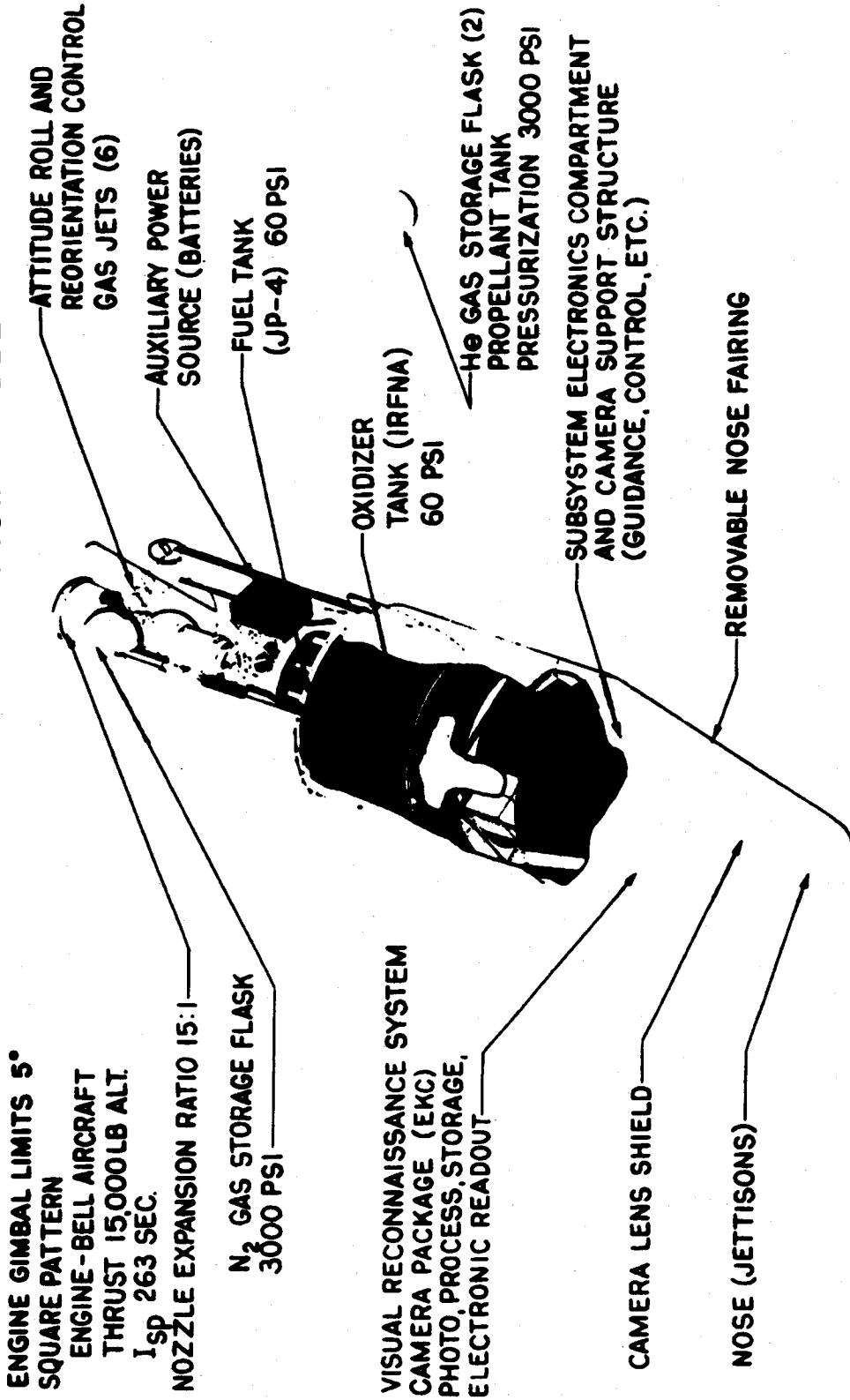
#### THE WS-117L SUBSYSTEMS

Indicates how the Weapon System Contractor, for management control purposes, has factored its broad area of responsibility into more readily manageable subsystems.

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# WS 117L VEHICLE SYSTEM

## VISUAL RECONNAISSANCE MODEL



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WD-58-00776

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### ARS SATELLITE VEHICLE

Inboard profile and general configuration of the ARS satellite vehicle, engineering prototype and pioneer model.

Overall length	19'0"
Width	5'0"
Weight:	
<u>    Payload</u>	<u>2,680 lbs</u>
Structure, propulsion units, guidance and control equipment	1,540 lbs
Weight empty	4,220 lbs
Propellants	<u>5,080 lbs</u>
Total weight at launch	9,300 lbs

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# WS117L ELECTRONIC RECONNAISSANCE

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## OBJECTIVE

THE OBJECTIVE OF ELECTRONIC RECONNAISSANCE IS TO DETECT AND OBTAIN INFORMATION ON ELECTRONIC EMITTERS IN AREAS WHERE SUCH INFORMATION DOES NOT NOW EXIST.

## ADVANTAGES OF SATELLITE

FERRET SYSTEM OVER CONVENTIONAL

## FERRET TECHNIQUES:

1. COMPLETE WORLD COVERAGE
2. CONTINUOUS UNATTENDED SURVEILLANCE
3. ALL WEATHER OPERATION
4. RELATIVE FREEDOM FROM CAMOUFLAGE
5. ABILITY TO IDENTIFY HIGH PRIORITY INSTALLATIONS BY ELECTRONIC SIGNATURES
6. RAPID RECOVERY AND DISSEMINATION OF ELINT INFORMATION



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**WS-117L ELECTRONIC RECONNAISSANCE SYSTEM**

**A statement of the operational objectives of the Electronic,  
or Ferret, Satellite Reconnaissance System.**

**Pioneer version: Program III of the WS-117L Development Plan  
Advanced version: Program V of the WS-117L Development Plan**

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# FILM IMAGE READOUT

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36 INCH LENS

17 FOOT RESOLUTION



ORIGINAL SCENE



FILM IMAGE  
IN SATELLITE

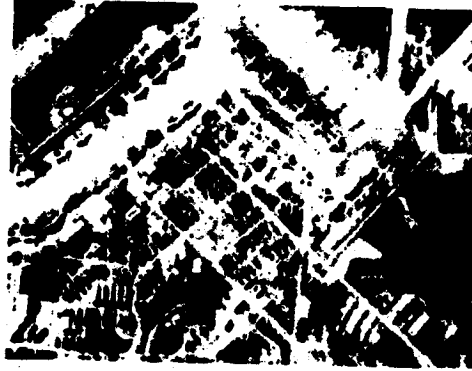


IMAGE RECORDED  
ON GROUND

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LOANED AIRTEL INFORMATION

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**ADVANCED VISUAL RECONNAISSANCE SYSTEM  
SIMULATED PHOTOGRAPHS--- 36-INCH LENS**

Laboratory-simulated photographs demonstrating the quality of data to be expected from the operation of an Advanced Visual Reconnaissance System (WS-117L Program IV) utilizing a 36-inch focal-length camera lens, 17-foot resolution.

The 36-inch lens is in an advanced state of development, with delivery of the first unit scheduled for January 1959.

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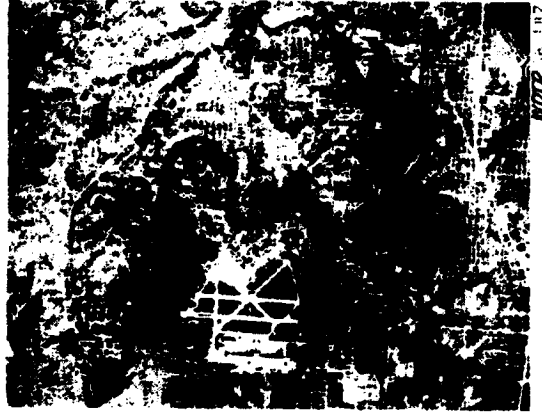
# FILM IMAGE READOUT

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6 INCH LENS



ORIGINAL SCENE



FILM IMAGE  
IN SATELLITE

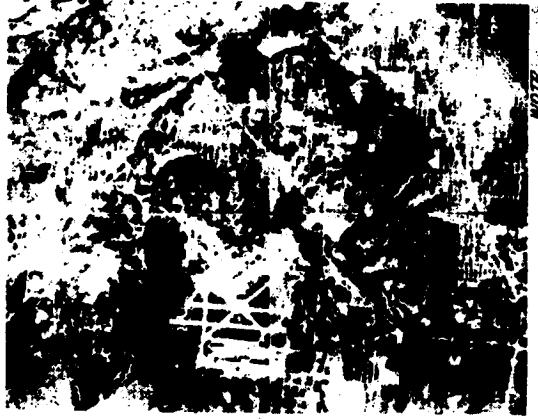


IMAGE RECORDED  
ON GROUND

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LOCKHEED AIRCRAFT CORPORATION  
MAY 1957

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**PIONEER VISUAL RECONNAISSANCE SYSTEM  
SIMULATED PHOTOGRAPHS - 6-INCH LENS**

Presents laboratory-simulated photographs demonstrating the quality of data to be expected from the operation of a Pioneer Visual Reconnaissance System utilizing a 6-inch focal-length camera lens, 100-foot resolution.

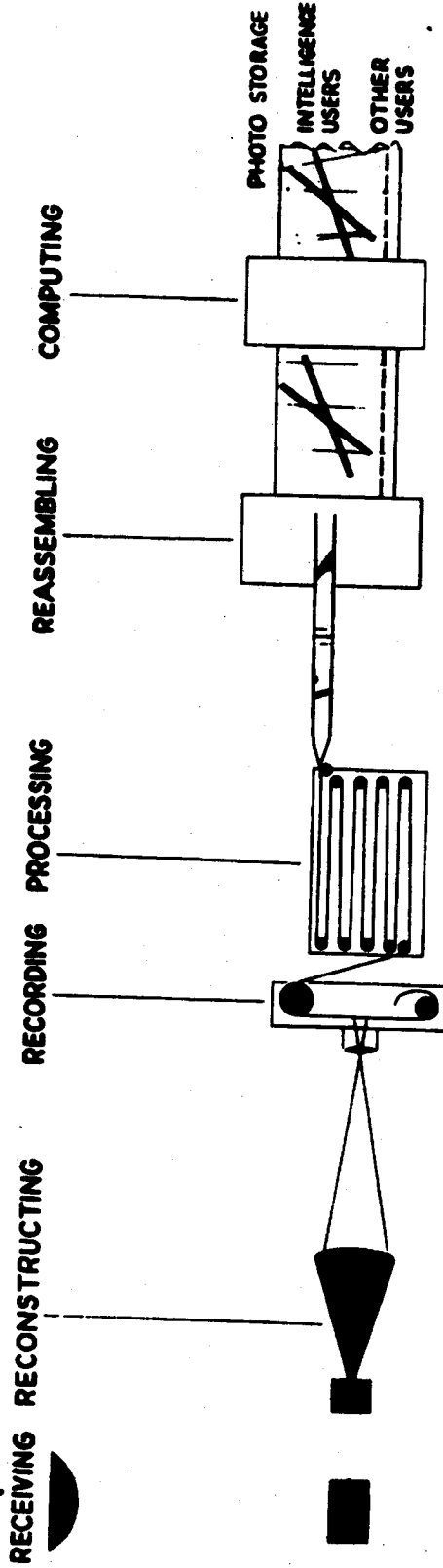
Balloon-borne high-altitude flight tests conducted in September 1957 confirm these laboratory simulations.

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# WS-117L VISUAL RECONNAISSANCE SYSTEM

## GROUND RECONSTRUCTION PROCESSES

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**WS-117L VISUAL RECONNAISSANCE SYSTEM  
GROUND RECONSTRUCTION PROCESSES**

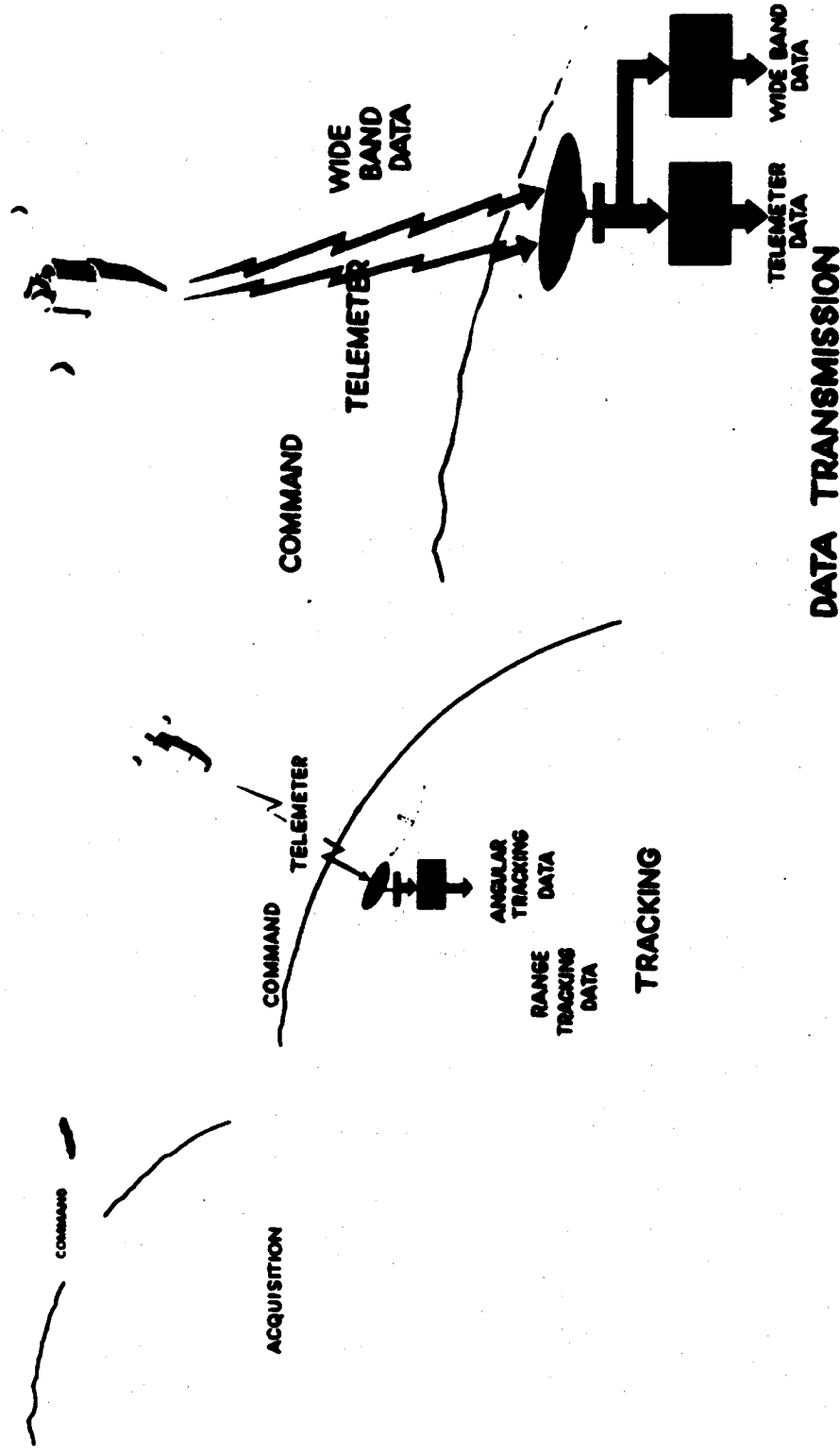
A schematic diagram of the ground processes required for the Pioneer Visual Reconnaissance System, including data recording, reconstruction, and geographic classification.

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# WS-117L COMMUNICATION SYSTEM

## TYPES OF OPERATION

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LOCKHEED AIR RESEARCH CORPORATION

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### WS-117L COMMUNICATION SYSTEM

Illustrates the principal areas encompassed by the WS-117L ground-space communication system:

Satellite acquisition (locating the vehicle in space)

Satellite tracking; orbit computation and prediction

Data transmission -- communications from satellite to ground, ground to satellite, and ground to ground.

The Philco Corporation is serving as the principal subcontractor for this subsystem of WS-117L

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# FEATURES FOR SCIENTIFIC APPLICATION

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PROVIDED BY WS-117L VEHICLE CAPABILITY

- PAYLOAD WEIGHT CAPACITY UP TO A TON (MORE FOR ADVANCED VERSIONS)
- POLAR ORBITS AVAILABLE THROUGH PERFORMANCE MARGIN AND IOC LAUNCHING SITE
- WIDE-BAND DATA LINK FOR TRANSMISSION OF INFORMATION
- PAYLOAD VOLUME CAPACITY UP TO 70 CUBIC FEET
- CAPACITY TO CARRY TWO OR MORE PAYLOADS FOR COINCIDENCE-TYPE EXPERIMENTS
- ATTITUDE ORIENTATION STABILIZATION TO  $\pm 1$  DEGREE
- GUIDANCE ACCURACY TO PLACE VEHICLE INTO ORBITS OF AS LITTLE AS 20-MILE ECCENTRICITY
- POSSIBILITY OF SETTING UP LINKS BETWEEN TWO SATELLITES
- LONG ORBITING DURATION AFFORDED BY 300-MILE ALTITUDES OR HIGHER
- HIGHER ALTITUDES INCLUDING POSSIBILITY OF 70-POUND PAYLOADS AT 2700 MILES
- NUMBER OF VEHICLES AVAILABLE, ESPECIALLY FOR SMALLER PAYLOADS (DUE TO WS-117L REQUIREMENTS AND USE OF OPERATIONAL MISSILE FOR BOOSTER)
- TRACKING SYSTEM MEASUREMENTS ANGULAR TO  $\pm 1$  MIL AND ALTITUDE TO .1 MILE
- LONG PAYLOAD OPERATION WITH MODEST POWER THROUGH SOLAR OR CHEMICAL BATTERIES; OR WITH NUCLEAR AUXILIARY POWER PLANTS FOR HIGH POWER

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LOCKHEED AIRCRAFT CORPORATION  
MISSILE SYSTEMS DIVISION

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**WS-117L SATELLITE VEHICLE  
SCIENTIFIC RESEARCH APPLICATIONS**

Although Weapon System 117L is being developed for military reconnaissance purposes, the satellites' large payload-carrying capacity makes it attractive as a medium for geophysical research purposes. The Air Force Cambridge Research Center maintains close liaison with the Weapon System Contractor on geophysical matters.

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# WS 117L FACILITIES

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NORTHWEST STATION ●

NORTHEAST STATION ●

CENTRAL STATION ●

COOKE AFB ●

● HAWAII

AFMTC - LAUNCH  
↓ TRACKING RANGE ●

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**WS-117L FACILITY REQUIREMENTS**

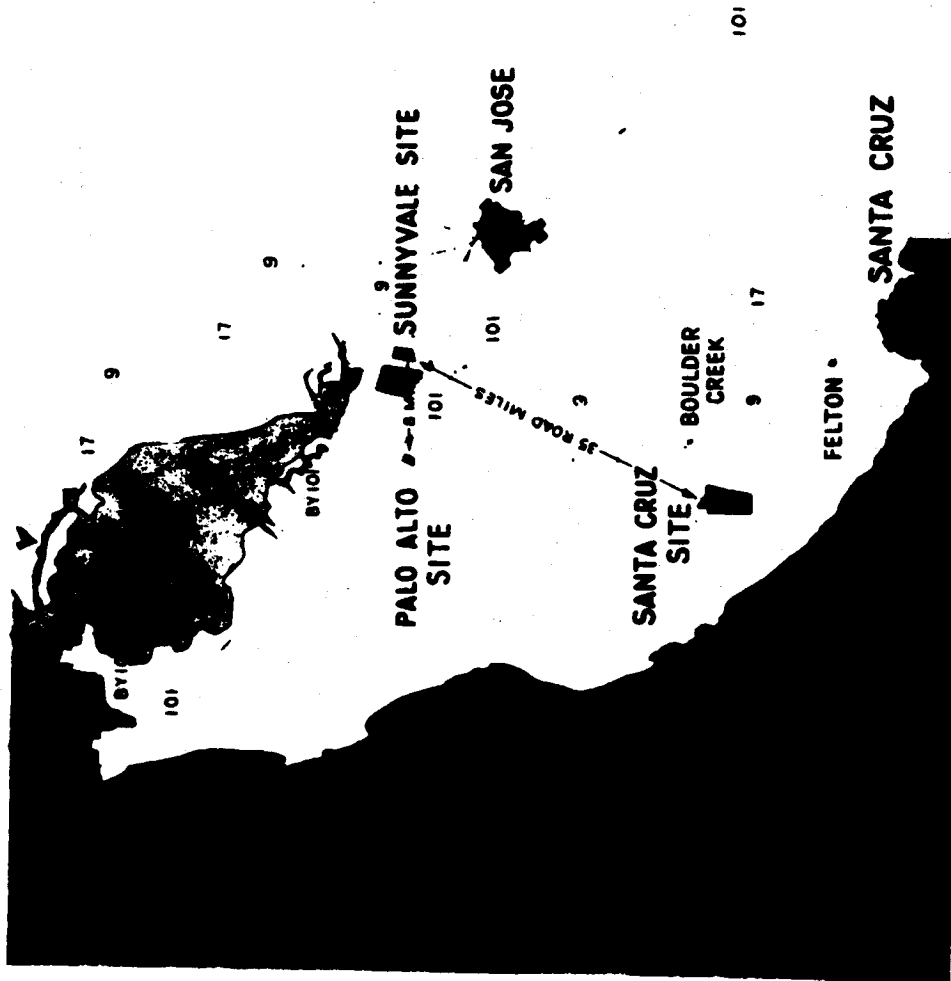
A plot of the principal facilities required for the flight testing and operation of the advanced reconnaissance system.

New Air Force facilities required solely for the ARS system are:

- Pacific (Hawaiian) Tracking Station
- Northeast and Northwest U.S. Tracking Stations
- Central U.S. Tracking and Control Station, and Intelligence Data-Processing center

The payload recovery program will require a minor "command" installation in Alaska, and the ICBM attack alarm system will require construction of a modest, semi-automatic communication station located at Thule, Greenland. In all other instances, existing facilities, suitably modified, will be utilized.

# LOCKHEED BAY AREA FACILITIES



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LOCKHEED AIRCRAFT CORPORATION

MISSILE SYSTEMS DIVISION

SAN FRANCISCO BAY AREA FACILITIES

A map of the San Francisco Bay Area showing the location of recently constructed Lockheed facilities for the exclusive use of the Missile Systems Division. These facilities, comprising approximately 600,000 square feet of shop and office space and a capital investment in excess of 28 million dollars are:

Palo Alto -

Research and Development Laboratories  
WS-117L Project Offices

Sunnyvale -

Division Headquarters  
Laboratories, In-plant Test Facilities; Prototype Fabrication

Santa Cruz Mountains -

An integrated facility for all types of hazardous tests.

Additional facilities are under construction, or in the advanced planning stage to provide total floor space in excess of one million square feet.

A complete manufacturing facility is also operated at Van Nuys, California.

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# WS-117L SYSTEM DEVELOPMENT MANAGEMENT

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WSPO AF BMD  
AF BMD  
w/s MANAGER

(BOOSTERS) ● DOUGLAS AIRCRAFT (THOR)  
● CONRAD ASTRONAUTICS (ATLAS)

## ASSOCIATE

CONTRACTORS ● INSTRUMENTATION LAB., MIT  
(GUIDANCE ● AC SPARK PLUS DIV., S.A.I.  
& CONTROL) ● GENERAL ELECTRIC CO.

LOCKHEED AIRCRAFT CORR  
MISSILE SYSTEMS DIV.  
w/s CONTRACTOR

## PRINCIPAL SUBCONTRACTORS

### PROPULSION

● BELL AIRCRAFT CORR  
● AEROMET - GENERAL CORR

### FERRET RECONNAISSANCE

● AIRBORNE INSTRUMENTS LAB. INC.  
● HALLER, RAYMOND & BROWN INC.

### AUXILIARY POWER

● SONOTONE CORR  
● EAGLE PITCHER CO.  
● ENGINEERED MAGNETICS

### INFRARED RECONNAISSANCE

● EASTMAN KODAK CO.  
● BAIRD ATOMIC INC.  
● AEROMET-GENERAL CORR  
● GENERAL MILLS INC.

### GUIDANCE & CONTROL

● DETROIT CONTROLS CORR  
● REEVES INSTRUMENT CORR

### GROUND-SPACE COMMUNICATIONS

● PHILCO CORR  
-REEVES  
-RADIATION INC.

### VISUAL RECONNAISSANCE

● EASTMAN KODAK CO.  
- COLUMBIA BROADCASTING SYR.  
- SPICA INC.

● AMPLEX CORR

● GENERAL ELECTRIC CO.  
● FAIRCHILD CAMERA & INSTRUM CORR

### OPERATIONS

● AEROMET-GENERAL CORR  
● RALPH M. PARSONS CO.  
● STANDARD MFG. CO.

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MISSILE SYSTEMS DIVISION

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### WS-117L SYSTEM DEVELOPMENT MANAGEMENT

Indicates the relationships between the Weapon System Project Office, the Weapon System Contractor, and associate contractors. Also shown are the principal subcontractors working under the technical direction of Lockheed Missile Systems Division, the Weapon System Contractor. Chief among these are:

Bell Aircraft Corporation

Satellite Rocket Engine  
Development

Eastman Kodak Company,  
Columbia Broadcasting System

Visual Reconnaissance System  
Research and Development

Philco Corporation

Ground-Space Communication  
System Research and Development

Airborne Instruments Laboratory,  
Haller, Raymond & Brown

Electronic (Ferret) Subsystem  
Development

General Electric Company

Payload Recovery Capsule

Aerojet-General Corporation,  
Eastman Kodak Company

Infrared Subsystem Development

Fairchild Camera & Instrument Corporation

Aerial Camera for Photo-physical  
Recovery Program

The following industrial concerns are working directly for the U.S. Atomic Energy Commission in the development of long-duration (radioisotope and small nuclear reactor) auxiliary power systems for use in the ARS satellite vehicles: North American Aviation; The Martin Co.; Thompson Products.

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**WS-117L WEAPON SYSTEM CONTRACTOR'S FUNDING PROGRAM**

Summarizes the principal financial aspects of Contract AF 04(647)-97, covering the period 1 October 1956 through 30 June 1959. As indicated, funds totaling \$31 million had been placed on contract through December 1957. An additional \$7 million were provided in January 1958 by Letter Contract AF 04(647)-181. Cumulative expenditures plus outstanding commitments as of 31 December 1957 totaled \$17.6 million. Projected expenditures are only indicative, as details of the accelerated program remain subject to negotiation.

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