ADVANCED RECONNAISSANCE SYSTEM

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

The primary 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
Enemy industrial war capabilities.

The WS-117L program development plan embodies the placement of a series of unmanned satellites in prescribed orbits about the earth. The satellites will possess a capability for transmitting acquired information to supporting ground stations in a form which permits subsequent data processing and analyses for operational and scientific uses. The complete system incorporates the launching, tracking, data gathering, data processing, interpretation and dissemination functions of the ground support complex.

Operational vehicles will be launched from within United States territory. The ICBM Atlas will supply the primary propulsion for ascent to an altitude of approximately 300 statute miles, where a substantially circular orbit will be established by means of the satellite vehicle rocket engine.

Key R&D actions leading to initiation of the program were:

- March 1955: GOR 80 (SA-2C) issued
- October 1955: System Requirement established
- March 1956: Evaluation of Design Study completed
- April 1956: Development Plan prepared
- 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.
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
KEY CHARACTERISTICS OF 117L

A LISTING OF 12 OUTSTANDING FEATURES OF WEAPON SYSTEM 117L, AS PREPARED BY THE AIR FORCE BALLISTIC MISSILES DIVISION, HQ., AIR RESEARCH AND DEVELOPMENT COMMAND.
LOCKHEED AIRCRAFT CORPORATION MISSILE SYSTEMS DIVISION SELECTED AS WEAPON SYSTEM CONTRACTOR

AFBM ASSUMES SYSTEM RESPONSIBILITY FOR WS-117L

RAND RECOMMENDS AND USAF ESTABLISHES A SATELLITE DEVELOPMENT PROGRAM

WAIC CONTRACTS WITH NAA FOR ASCENT GUIDANCE AND CONTROL STUDIES

RAND SUB-CONTRACTS WITH RCA FOR TELEVISION STUDIES

RAND SUB-CONTRACTS WITH NAA FOR ORBITAL ATTITUDE CONTROL STUDIES

AEC INITIATES STUDIES NUCLEAR APU FEASIBILITY

RAND ISSUES SATELLITE UTILITY REPORT

RAND RECOMMENDS CRITICAL SATELLITE COMPONENT DEVELOPMENT

USAF REQUESTS RAND TO STUDY SATELLITE DEVELOPMENT

SATELLITE TECHNICAL FEASIBILITY DETERMINED

ROCKETRY STUDIES BY UNITED STATES, GERMANY, USSR AND OTHERS

TOTAL COST TO DATE: $8,300

- DEVELOPMENT PHASE
- CONTRACT PROPOSAL PHASE
- USAF EVALUATION STUDIES
- USAF PROJECT R & D STUDIES

R & D COSTS PER PHASE (000's)

$8,300

1,500

7,400

1,500

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ADVANCED RECONNAISSANCE SYSTEM
— HISTORICAL EVOLUTION —

TRACES EVOLUTION OF THE ADVANCED RECONNAISSANCE SYSTEM FROM THE FEASIBILITY STUDY PHASE BEGINNING IN 1944, THROUGH SEPT., 1957, INDICATING TOTAL AIR FORCE EXPENDITURES FOR THIS PURPOSE TO THE LATTER DATE.
WS-117L ORBITAL THRUST ENGINE

HOTOGRAPH OF MOCKUP OF BELL AIRCRAFT CORPORATION'S "HUSTLER" ENGINE WHICH WILL BE USED TO ACCELERATE THE WS-117L SATELLITE VEHICLE TO ORBITAL VELOCITY.

PERFORMANCE SPECIFICATIONS:

15,150 LBS. THRUST IN A VACUUM

MINIMUM SPECIFIC IMPULSE -- 263 sec

MAXIMUM SPECIFIC IMPULSE -- 269 sec
TAKE OFF CONDITION

OVERALL LENGTH 87.4 FT.
ROCKET DIAMETER 10 FT.
 Satellites DIAMETER 5 FT.
 Satellites LENGTH 21.0 FT.

1. LAUNCH
2. END POWERED ROCKET
3. SEPARATE STAGE 1
4. DEPLOY NAV STAGE
5. ORBIT INSERTION
6. FINAL ORBIT ALTITUDE
7. POST IN DISSOLVED
PE-117L VEHICLE TRACKING SYSTEM

PRESENTS TAKE-OFF DIMENSIONS OF VEHICLE ATTACHED TO
ATLAS BOOSTER, AND INDICATES KEYS DISTANCE BETWEEN FLIGHT
LAUNCH TO ATTAINMENT OF ORBITAL ALTITUDE AND ALTITUDE.
WS-117L TRAJECTORY TO ORBIT

A more detailed presentation of flight launch phase, indicating guidance and control problems which must be resolved in order to achieve orbital capability.
A 1976 SATELLITE IN FREE ORBIT DEMONSTRATES THE NAISSANCE COVERAGE OF THE U.S. AND ENABLING SECURE "READ-OUT" OF SIGNALS FROM STATIONS LOCATED WITHIN THE CONTINENTAL UNITED STATES TERRITORIES.
A schematic diagram of the satellite vehicle-borne operating processes required for visual (photographic) reconnaissance.

Serving as a subcontractor to Lockheed Missile Systems Division, The Eastman Kodak Company assisted by the Columbia Broad-casting System Laboratories is directing the research, development, fabrication and assembly of visual payload components.
PIONEER VISUAL RECONNAISSANCE SYSTEM

SIMULATED PHOTOGRAPHS — 6-INCH LENS

FILM 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.
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:

- Complete world coverage
- Continuous unattended surveillance
- All weather operation
- Relative freedom from camouflage
- Ability to identify high priority installations by electronic signatures
- Rapid recovery and dissemination of ELINT information
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.
ENHANCED BY WS-17L VEHICLE CAPABILITY

- Payload weight capacity up to 1 ton (more for advanced versions)
- Payload volume capacity up to 1 cubic feet
- Attitude orientation stabilization to ±1 degree
- Number of vehicles available, especially for smaller payloads (due to WS-17L requirements and use of operational missile for booster)
- Long orbiting duration afforded by 300-mile altitudes or higher
- Long payload operation with modest power through solar or chemical batteries; or with nuclear auxiliary power plants for high power

- Polar orbits available through performance margin and I&O launch site
- Wide-band data link for transmission of information
- Capacity to carry two or more payloads for coincidence-type experiments
- Guidance accuracy to place vehicle into orbits of as little as 20-mile eccentricity
- Possibility of setting up links between two satellites
- Higher altitudes including possibility of 70-pound payloads at 2700 miles
- Tracking system measurements angular to ±1 mil and altitude to .1 mile
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
INTELLIGENCE DATA-PROCESSING CENTER.

AN ICBM ATTACK ALARM SYSTEM WOULD REQUIRE CONSTRUCTION OF A MODIFIED, WILL BE UTILIZED.
LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

SAN FRANCISCO BAY AREA FACILITIES

AREA SHOWING THE LOCATION OF RECENTLY COMPLETED
STRUCTURES IN AREA FOR THE EXCLUSIVE USE OF THE MISSLE SYSTEMS DIVISION.

TOTAL PROJECT IN扩AL OF $60,000,000.00
CAPITAL INVESTMENT IN EXCESS OF $60 MILLION

PAULO 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.
A COMPLETE MANUFACTURING FACILITY IS ALSO OPERATED AT VAN NUYS, CALIFORNIA.