CONFIDENTIAL

[redacted]

NOFORN

ADVANCE
RECONNAISSANCE
DEVELOPMENT PLA

P/ 26-[illegible]

ENTRY PROGRAM

AIR FORCE BALLISTIC MISS[illegible]
HEADQUARTERS AIR RESEARCH
DEVELOPMENT COMMAND

CONFIDENTIAL

SPECIAL HANDLING REQUIRED
NOT RELEASABLE TO FOREIGN NATIONALS

[redacted]

3-63006

[redacted]

~~CONFIDENTIAL~~

NOFORN

HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND

30 OCT 1989

(UNCLASSIFIED TITLE)
AIR FORCE BALLISTIC MISSILE DIVISION
ADVANCED RECONNAISSANCE SYSTEM (WS 117L)

15 September 1958

4243 8636-43
15 Sep 1958
V.T.

REVIEW ON 31 Dec 2008

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

SPECIAL HANDLING REQUIRED
NOT RELEASABLE TO FOREIGN
NATIONALS

MICROFILMED BY ADM

NOFORN

[redacted]

COPY NO. 139 OF 200 COPIES

WDPP-58-30

~~CONFIDENTIAL~~

3-6806-28
0092038

RECORD OF CHANGES

ADVANCED RECONNAISSANCE SYSTEM (WS 117L)
DEVELOPMENT PLAN

Change No.	Description of Change	Date Entered	Entered by

AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)

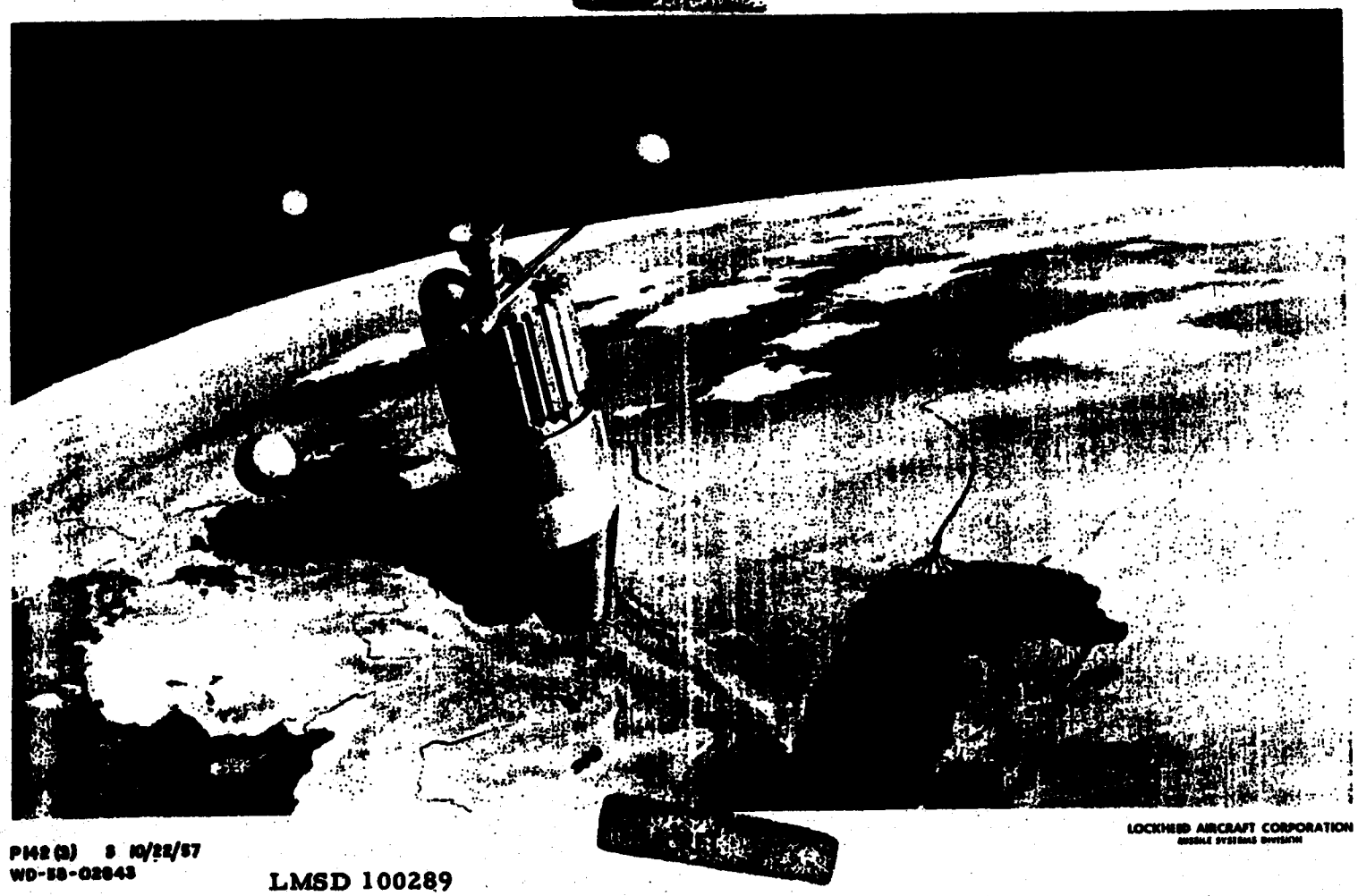
ADVANCED RECONNAISSANCE SYSTEM (WS 117L)
DEVELOPMENT PLAN

TABLE OF CONTENTS

WDPP-58-30

ADVANCED RECONNAISSANCE VEHICLE

[redacted]



LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

P142 (S) 8 10/22/57
WD-58-02843

LMSD 100289

WDEP-58-30

[redacted]

[redacted]

CONFIDENTIAL

[redacted] CONFIDENTIAL

ADVANCED RECONNAISSANCE SYSTEM
DEVELOPMENT PLAN

Background of Air Force Advanced Reconnaissance System Program

The concept for using a satellite as a platform for reconnaissance equipment can be considered as the natural outgrowth of the requirement for obtaining intelligence information of a potential enemy whose area and security preclude its effective collection by ordinary aerial reconnaissance or other means. The need for timely and continuous intelligence information to assess a potential enemy's capabilities and probable intent has become more critical as the advancement of technology has given them offensive weapons with intercontinental range and greater destructive powers. The impetus which motivated the military establishment to foster work on new methods for collection of intelligence information came from the realization that current, reliable, pre-hostilities intelligence information is required to insure proper direction of National Planning in development of effective counterforce weapons and counterforce strategy.

The results of the numerous studies conducted since 1946 at the direction of the Department of Defense concluded that a Satellite Intelligence System was feasible and would satisfy to a great extent the requirements for intelligence information to aid the national planners in making decisions.

The concept of the Advanced Reconnaissance System is a result of studies conducted at the Rand Corporation. A study completed in 1947 together with similar investigations by other contractors concluded that a satellite vehicle was feasible as a reconnaissance vehicle but not as a weapon carrier. In 1950, the Research and Development Board vested satellite custody in the Air Force, and Rand was directed to explore its possible military utility.

Recommendations for an expanded study of reconnaissance applications were made to the Air Staff in the late 1950 and a formal report (Rand-217) followed in April 1951. Feasibility studies for critical subsystems initiated at that time were television (RCA), attitude control(North American Aviation), nuclear auxiliary power units (Bendix Aviation, Frederick Flader, Allis Chalmers, and Vitro Corporation).

Recommendations for the ARS development were made by Rand in November 1953, and these were followed by the final report(Rand-262) in February 1954.

[redacted] CONFIDENTIAL

System Requirement No. 5 was dated 27 November 1954 and revised 17 October 1955. The GOR No. 80(SA-2C) was issued 16 March 1955. 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 phase. WS 117L is a reconnaissance system involving the launching of a vehicle into orbit for the ultimate purpose of collection and dissemination of intelligence information. Therefore, the problem of providing an airframe and engines did not need to be the sole guide to the type of contractors solicited. Those solicited were the Lockheed Aircraft Corporation, the Radio Corporation of America, Glenn L. Martin Company, and Bell Telephone Laboratories. Bell Telephone Laboratories declined to submit a proposal,

The three contractors conducted the Design Studies between June 1955 and March 1956. These design studies culminated in three separate and distinct development plans. The Lockheed proposal was considered to meet the requirements most satisfactorily.

An ARDC System Development Directive No. 117L was issued on 17 August 1956. The development and test of WS 117L was awarded the Lockheed Aircraft Corporation on Contract AF 04(647)-97 in October 1956. The Massachusetts Institute of Technology was awarded the contract for R&D of the WS 117L Guidance and Orbital Attitude Control Equipment on Contract AF 04(647)-103 in November 1956.

Formal establishment of a Joint ARDC-AMC Weapon System Project Office occurred in July 1957. Executive management responsibility rests with the AFBMD.

By decision of the Secretary of Defense, 1 November 1957, the directive was issued to proceed with the WS 117L at the maximum rate consistent with good management.

The Preliminary Operational Concept for WS 117L was published by Hq USAF under the date of 23 December 1957.

In order to accelerate the program, it was decided to augment the WS 117L program by making an interim use of the Thor booster for ten (10) flights. This will provide an early achievement of orbital capability. The decision to augment the program by use of the Thor missile occurred in January 1958. In July 1958 a total of nine (9) additional Thor-boosted satellites were approved to conduct biomedical experiments to carry special payloads designed to investigate and measure certain suspected space phenomena which may greatly influence future military space activities.

During January-February 1958, SAC-AFBMD-BMO participated in the preparation of the Preliminary Operation Plan for WS 117L. The SAC published this plan in March 1958.

DESIGN CHARACTERISTICS

I. INTRODUCTION

A. Program Objectives

The Advanced Reconnaissance System described in this development plan is designed to fulfill the military requirement outlined in GOR No. 80 (SA-2C), 16 March 1955, ARDC SR No. 5, 17 October 1955, USAF DD No. 85, 3 August 1956 and ARDC SDD No. 117L, 17 August 1956.

A vital requirement for the defense of the United States is the earliest possible warning of a Soviet intention to attack. This system, employing an orbiting satellite, will provide at a reasonably early date, surveillance of the whole Soviet complex. The use of varied sensing devices in the satellite system will reveal Soviet preparations for a possible attack well in advance of the event.

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 will be from the lesser to the greater resolution.

Information from surveillance satellites will be integrated into the USAF Intelligence Data Handling System and disseminated to operational military agencies. Wide band, high speed transmission will be used.

It is expected that equipment will permit the following:

Terrain and mapping coverage

Detection of new and hitherto unknown targets and verification of known targets.

Determination of electronic signal characteristics.

Location of targets and defenses.

Collection of data on technological improvements.

Evaluation of military and industrial strength.

Monitoring of electronic emissions.

Surveillance of enemy build-up indications.

Warning of attacks under way or pending.

Assessment of high-yield weapons' damage.

Reconnoitering of military movements.

Location of Naval forces throughout the world.

Collection of world-wide weather date.(Primarily Cloud Cover)

II. OVERALL OPERATIONAL CHARACTERISTICS

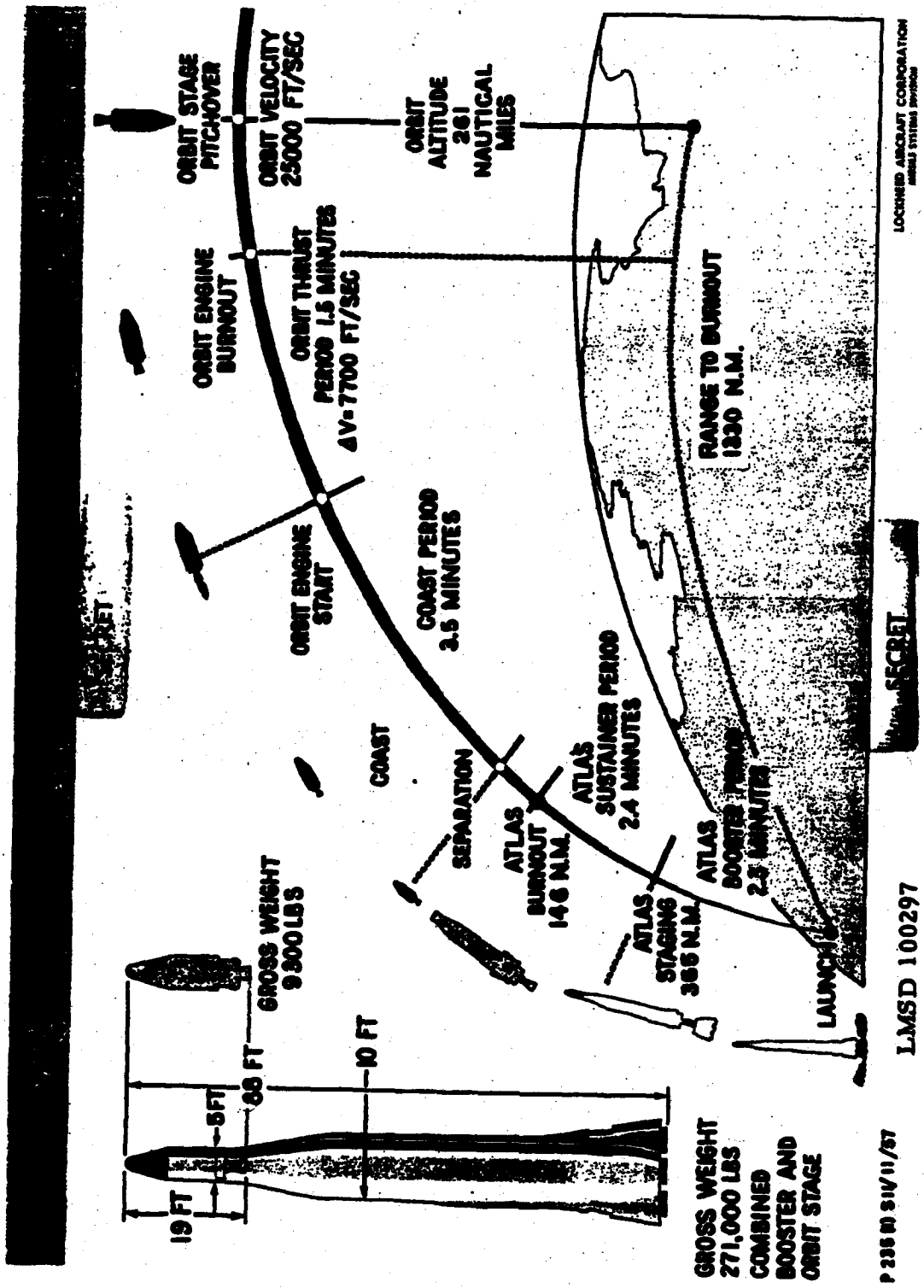
A. Weapon System 117L

WS 117L is composed of the satellite vehicle, the ICBM booster, launch facilities, tracking facilities, and a complex communication and data processing network with related facilities. The ICBM booster provides the primary propulsive power to the WS 117L satellite vehicle. Separation occurs on attaining the proper altitude and attitude. As the booster falls away the satellite vehicle continues in a self stabilized predetermined coast to an altitude of approximately 300 statute miles. At the termination of the coast phase the internal satellite power plant activates, supplying the orbital velocity increment required (3-10,000 ft/sec.) to establish a substantially circular orbit. Subsequent platform motion and the internal controls will then erect the vehicle to the proper attitude. The most common reconnaissance orbits will pass within a few degrees of the poles. When the vehicle approaches an area of interest, an internal timer will start the sensing equipment. In the case of Visual Reconnaissance, signals will be received and stored on photographic film. In the case of Electronic Reconnaissance and Infrared Reconnaissance signals will be received and stored on magnetic tape.

The vehicle will continue around the earth, and when within range of a ground receiving station, upon command, will begin to transmit the recorded data. The data will be received, processed, and transmitted to the using agencies.

The vehicle will then begin its next cycle. These revolutions will be repeated at approximately 90 minute intervals. Because the orbit is essentially fixed in space, while the earth rotates inside it, successive passes over the earth's surface will be displaced approximately 22-1/2 degrees at the equator. This offsetting will permit a single vehicle to view the entire earth in a total time period which depends on the width of swath observed. Useful operation will be terminated either when air drag slows the vehicle to where it plunges into dense atmosphere, when the electrical power supply is exhausted or when a failure of equipment takes place. Expected useful life for early versions of the system is in the order of 10 to 30 days. Expected useful life for later versions of the system is in excess of a year.

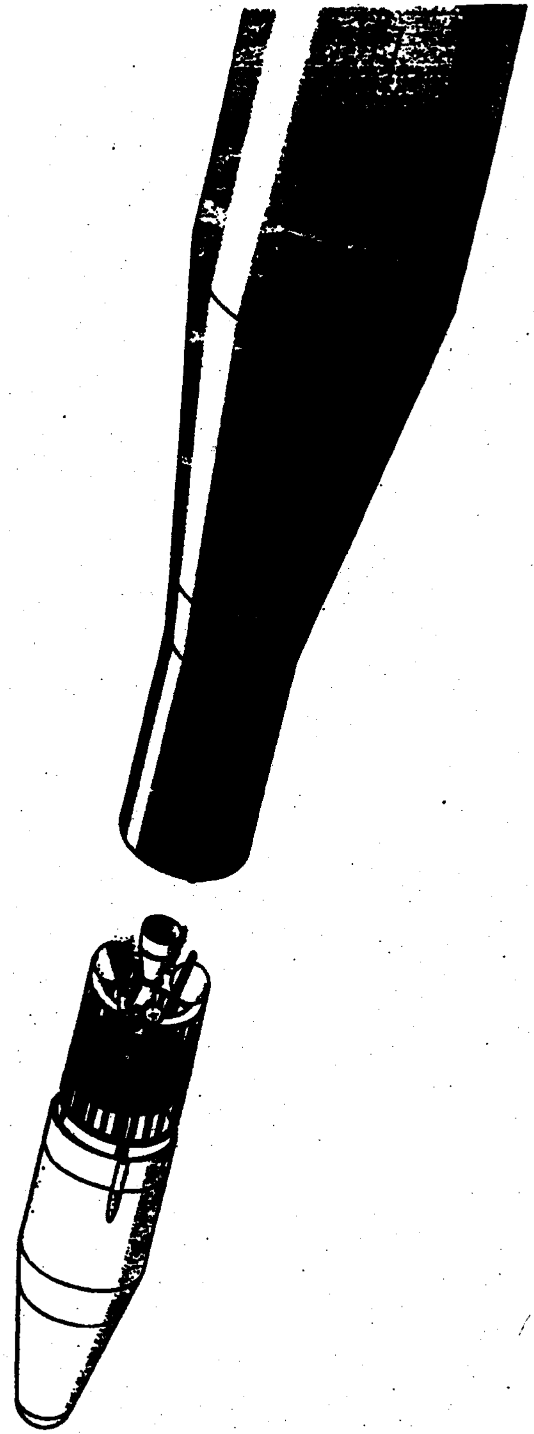
The orbiting satellite vehicles of WS 117L will be equipped with devices for sensing and relaying to the ground, reconnaissance information in the radio, infrared, and visible regions of the electromagnetic spectrum.



[redacted]

BOOSTER SEPARATION

CONFIDENTIAL



LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

CONFIDENTIAL

P233(I) SSA 7/30/57

The data will be received at a rate that will permit coverage of the entire Soviet Bloc by a single vehicle as frequently as once every eight days.

The weapon system will provide a reconnaissance capability for three environments. These are: visual, ferret, and infrared.

The visual capability will, for the first time, provide the ability to secure, at will, complete photographic coverage of areas of potential military interest. These photographs, as reconstituted on the ground, will initially be of such quality as to permit at least 100 foot visual resolution with positional information accurate to one mile. Subsequent development will improve visual resolution to 20 feet with a positional accuracy of 1/2 mile. The area of ground coverage provided by any one vehicle is a function of (a) the focal length of the camera lens system, (b) power supply life, (c) an average information gathering period of five minutes per revolution of the satellite, and (d) the use of three information receiving stations, all located within the continental U. S. or U. S. Territorial Possessions.

The ferret version of the electronic reconnaissance satellite will provide the ability to intercept electromagnetic emissions from the equipment of potential enemies to return the intercepted information to an appropriate location in the continental U. S., and to record this information in a form suitable for further processing (i.e., magnetic tape). The system will be designed with sufficient flexibility to permit reception of signals in the desired portions of the electromagnetic spectrum.

The time phasing of the development of the infrared reconnaissance satellite makes it available during the time period when the system as a whole achieves surveillance capability. The infrared reconnaissance satellite has, as an ultimate objective, a system of satellites on orbit, placing unfriendly territory under continuous and complete surveillance. It will have the capability to:

1. Detect ICBM launchings whenever and wherever they occur and to transmit this information to the ground immediately, and to provide unambiguous warning of ICBM attack.

2. Track ballistic missiles during their burning stage with sufficient accuracy for trajectory and impact prediction in AICBM applications.

3. Detect exhaust plumes of large air breathing missiles and aircraft to provide early warning of attack by such vehicles and for surveillance of air traffic patterns as an indicator of the imminence of hostilities.

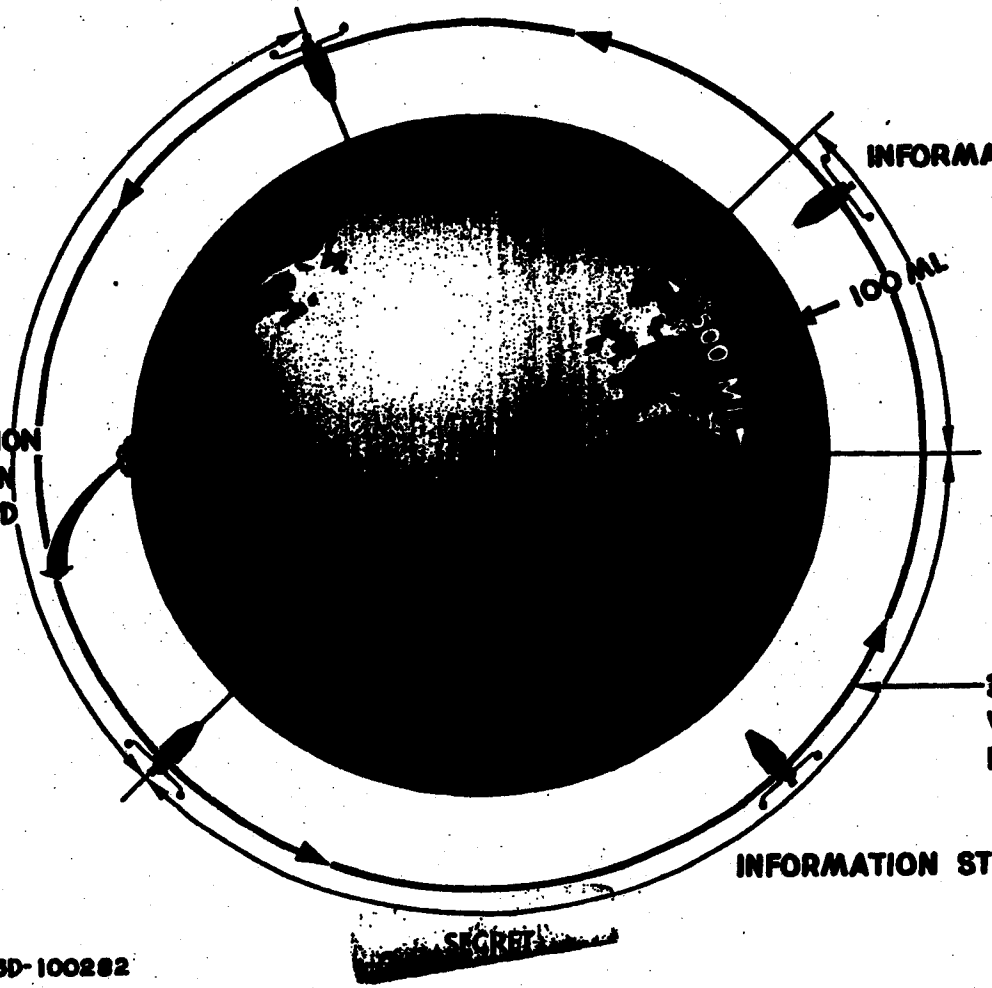
III. DESIGN SPECIFICATIONS AND GENERAL OPERATING DATA

A. WS 117L

The development plan for WS 117L is predicated on the following factors:

SECRET

SATELLITE [illegible] SCHEMATIC



P11 (3) "S" 8/12/58
WD-58-05188 LMSD-100282

LOCKHEED MISSILE SYSTEMS DIVISION

SECRET

I-2-6

WDPR-58-30

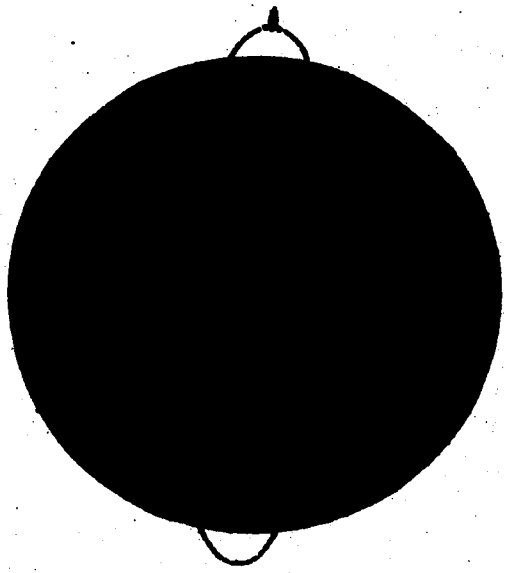
CONFIDENTIAL

CONFIDENTIAL

[redacted]

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



LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

[redacted]

I-2-7

[redacted]

WDPP-58-30

CONFIDENTIAL

[redacted]

CONFIDENTIAL

1. The WS 117L is being developed over a period of years and will include a variety of configurations, capabilities, and useful satellite life spans. Development of the system will proceed from a simple design of limited capability to a refined version capable of meeting the requirements of SR No. 5. An important trade-off of sophistication for availability is necessitated, if useful, and presently non-existent intelligence data are to be gathered at an early date. It is realized that the flights scheduled within the R&D effort will produce intelligence information of considerable interest and use to a number of national agencies. Therefore principal design objectives for the data processing subsystem will be to grow with and match the increased detail, volume and data rate of the collection systems.

2. As the result of technical considerations and the requirement for an early orbital capability, the development has been planned so as to utilize two booster systems. The Thor booster will be used in the achievement of an early orbital capability, testing of WS 117L system components, biomedical experiments. Atlas boosters will be used to achieve full WS 117L reconnaissance capability.

a. Thor Boosted Program

The Thor boosted program is composed of the following:

(1) Engineering Prototype Tests. The purpose of this program is to develop a prototype vehicle suitable for demonstrating early orbital capability. Utilization of the Thor booster was deemed necessary as Atlas boosters will not be available in time to achieve the earliest possible orbital capability. Ground tests will be conducted with system components and subsystems, the vehicle structure, and vehicle separation methods. Dynamic testing will be performed at contractor facilities, in wind tunnel tests and rocket sled. Experimental and development tests will be made to achieve satisfactory subsystem environmental control, heat rejection, radiation shielding and reliability estimates by simulating atmospheric, temperature, and radiation environment expected on orbit. Contractor facilities will be used for functional and operational tests of these subsystems prior to flight test.

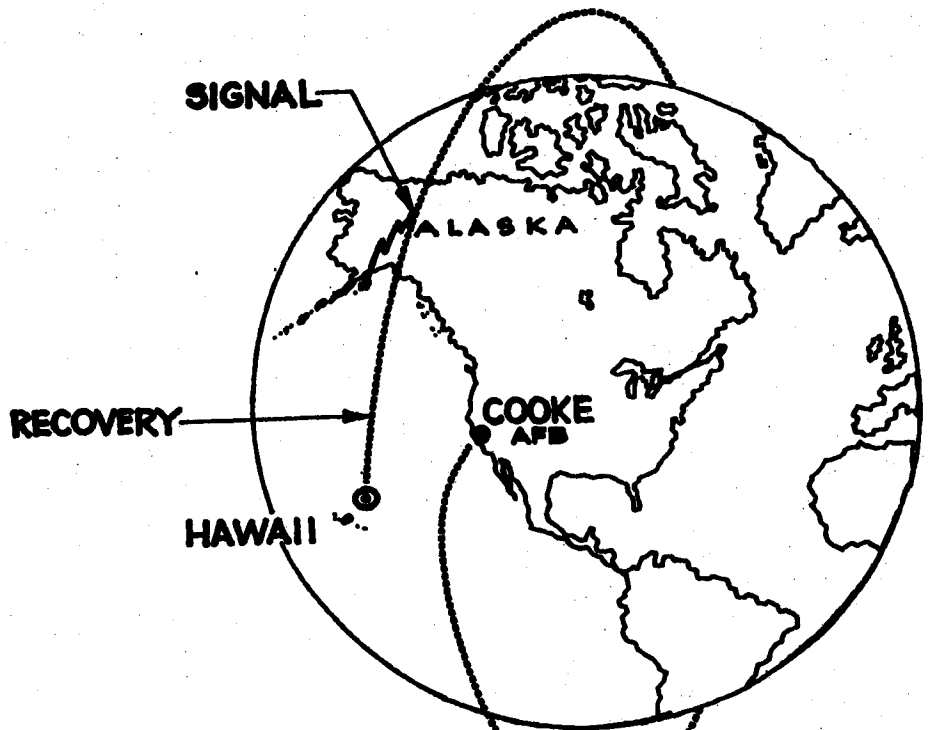
The flight test program is designed to yield actual environmental information as well as system performance characteristics, and will serve to check-out the tracking and acquisition instrumentation. Specific objectives of the flight tests are the performance evaluation of major components and subsystems as they become available. They progress from flight dynamics investigation through separation tests, vehicle propulsion, guidance and stabilization during coast and transition to orbit, tracking, telemeter, and data link development, and to the preliminary testing of reconnaissance payload components.

(2) Biomedical Recovery Capsule. The Biomedical Recovery Capsule program has three primary objectives. These are:

(a) To recover living specimens from orbital flight.

(b) To study the psycho-physiologic response of specimens to conditions of launch, orbit and recovery.

SENTRY CAPSULE ORBITAL PLAN



P 429 (1)
WD-58-03455
SS "L" 7/2/58
LMSD 100302

(c) To build experience and confidence in recovery techniques. These objectives will be achieved by the launching biomedical recovery capsules into orbit on WS 117L flights. The capsules will be separated from the parent vehicle on either the 18th or 32nd pass and will be recovered southwest of Hawaii. The biopackage will be tracked by radar, by RC-121 aircraft, and by Navy surface vessels. Recovery will be accomplished either by airsnatch, by C-119 aircraft, or by surface vessel.

b. Atlas Boosted Program

The Atlas boosted program is composed of the following:

(1) Visual Functional Development. The purpose of this program is to develop a reconnaissance satellite using 6 and 36 inch focal length camera configurations capable of resolving 100 and 20 foot ground objects, respectively. Location accuracy will be one mile of true location improving to 1/2 mile as the work progresses.

The visual reconnaissance satellite will consist of a stabilized vehicle and a visual reconnaissance payload operating with three data acquisition stations and an intelligence data processing center. The visual photographic payload will be employed with an electronic readout and transmission over the ZI. Auxiliary power will be supplied by batteries initially and later by solar or nuclear power supplies.

The 6 inch focal length camera will be used in the vertical position and will photograph a 100 mile wide strip of ground with an average length of 2000 miles per pass. The 36 inch system will cover a 17 mile width in the vertical position but will be programmed across the line of flight to intercept areas of definite interest. This camera can also be aimed fore and aft to provide stero photography when desired.

The major activity of this program is concerned with the design, fabrication, and laboratory evaluation of experimental and prototype models of photographic visual payloads. Such work includes extensive environmental testing of the prototype, determining compatibility with the data link and command links, and flight testing. An important part of this program will be the achievement of sufficient reliability of the visual subsystem on orbit. Extensive testing on the ground and on orbit will have to be performed to obtain the reliability required for long life unattended operation.

(2) Ferret Functional Development. The purpose of the ferret program is to develop an electronic reconnaissance satellite which will be capable of locating known electronic signals and detecting new electronic signals in the band of 50 mc/s to 18,000 mc/s. Emitting sources operating above 1000 mc/s will be located within 60 miles of their true geographic position.

The early version of the electronic reconnaissance satellite will consist of essentially the same vehicle, data intercept sites and Intelligence Center as used in the visual development program. The ferret payload will consist of antennas, high sensitivity receivers, narrow-band magnetic tape recording, and directional data transmission. The auxiliary power will be provided by

[redacted]

silver-zinc primary batteries.

The major task is concerned with the design, fabrication, and testing of the electronic components and complete subsystem models of the ferret payload equipment. The test program includes laboratory environmental tests and flight tests.

As development progresses equipment will be developed that allows for accurate determination of signal characteristics such as CW and unique modulations. It will also provide more accurate location of electronic emitters than the early version especially at frequencies below 1000 mc/s. Less than 50 miles uncertainty can be anticipated in the location of an isolated signal. More complex ferret equipment and antennas will be used.

(3) Surveillance Development

(a) Visual Reconnaissance Surveillance Development. This portion of the Atlas booster program leads to the development of a continuous visual surveillance satellite capable of ground resolutions of about 10 feet with location accuracy (1/10) of a mile of true location or better. For the visual surveillance version parallel effort will be initiated in several promising areas:

1. High resolution television with reuseable storage medium or the use of instantaneous transmission.

2. Film cameras with protection from nuclear radiation.

3. Mapping cameras for precise geodetic work.

4. Electrostatic photography utilizing a temporary, reuseable, image storage medium.

5. Very long focal length photographic systems with possible multiple camera installations.

The developments presently being conducted can be considered as part of the surveillance system. Many different equipment configurations will be available for installation in a particular vehicle when the demand exists.

(b) Ferret Surveillance Development. The purpose of this portion of the Atlas boosted program is to develop an advanced ferret capability incorporating many new features. For example, by the use of ground generated command signals it will be possible to change the frequency band and other signal parameter to be monitored by the satellite ferret equipment.

(c) IR Attack-alarm Development. The purpose of this portion of the Atlas boosted program is to develop an infrared surveillance satellite capable of providing early warning and tracking data against manned bombers (as well as other airbreathing vehicles), and an unequivocal warning of an ICBM attack. Functioning as a manned bomber tracking system, the satellites will operate at a 300 mile altitude.

The major current activity of this program is concerned with basic infrared measurements as well as the design and fabrication of experimental models of the infrared detection system. After the experimental equipment has been given extensive laboratory tests and tests in aircraft and balloons, prototypes suitable for orbital testing will be designed, fabricated and tested. It appears to be technically feasible to accelerate the development of the IR capability. The Development Plan outlining the proposed acceleration will be submitted separately.

The Data Processing Subsystem is associated and phased with the R&D programs described in the Atlas Boosted Program. It is realized that the flights scheduled within the R&D effort will produce intelligence information of considerable interest and use to a number of national agencies. Therefore the four noted principal design objectives for the data processing subsystem will be adhered to throughout the evolutionary development of the system which will grow with and match the increased detail, volume and data rate of the collection systems. The service of furnishing data received during the R&D phases to all interested agencies will be coincidental with the fulfillment of its development purpose.

a. Be prepared to process the resultant reconnaissance records at each stage in the evolution of the 117L collection systems.

b. Undergo evolutionary development without disruption to that portion of the system already in being.

c. Provide a sequence of products in a timely manner.

d. Provide maximum exploitation of WS 117L records compatible with the timeliness requirements of the various reports.

B. SUBSYSTEMS

1. The over-all system development has been divided into twelve (12) subsystems which are identified as follows:

Subsystem "A" - Airframe
Subsystem "B" - Propulsion
Subsystem "C" - Auxiliary Power
Subsystem "D" - Guidance and Control
Subsystem "E" - Visual Reconnaissance
Subsystem "F" - Ferret Reconnaissance
Subsystem "G" - Infrared Reconnaissance
Subsystem "H" - Ground-Space Communication
Subsystem "I" - Data Processing
Subsystem "J" - Geophysical Environment
Subsystem "K" - Qualitative Personnel Requirements Information(QPRI)
Subsystem "L" - Biomedical Recovery Capsule

a. Subsystem "A" - Airframe

(1) The airframe subsystem will consist of the propellant and pressurization tankage, aerodynamic fairings, structural supports, brackets, and fittings for the satellite; all mechanical and electrical installations in the satellite not specifically included in the definition of other subsystems, and all contractor-furnished modification items for the SM-65 booster. It will include equipment for over-all environmental control within the satellite. It will also include all items of ground equipment required for testing and launching of the vehicle.

(a) Airframe design must meet the following requirements:

1. Provide for the effects of environmental factors, such as drag and gust loading, meteorite bombardment, and thermal and nuclear radiation.

2. Accommodate the different payloads as new items of equipment are developed.

3. Accommodate boosters for first-stage propulsion and furnish additional thrust and guidance to achieve the orbit.

4. Provide for proper mating and separation of booster and vehicle stages.

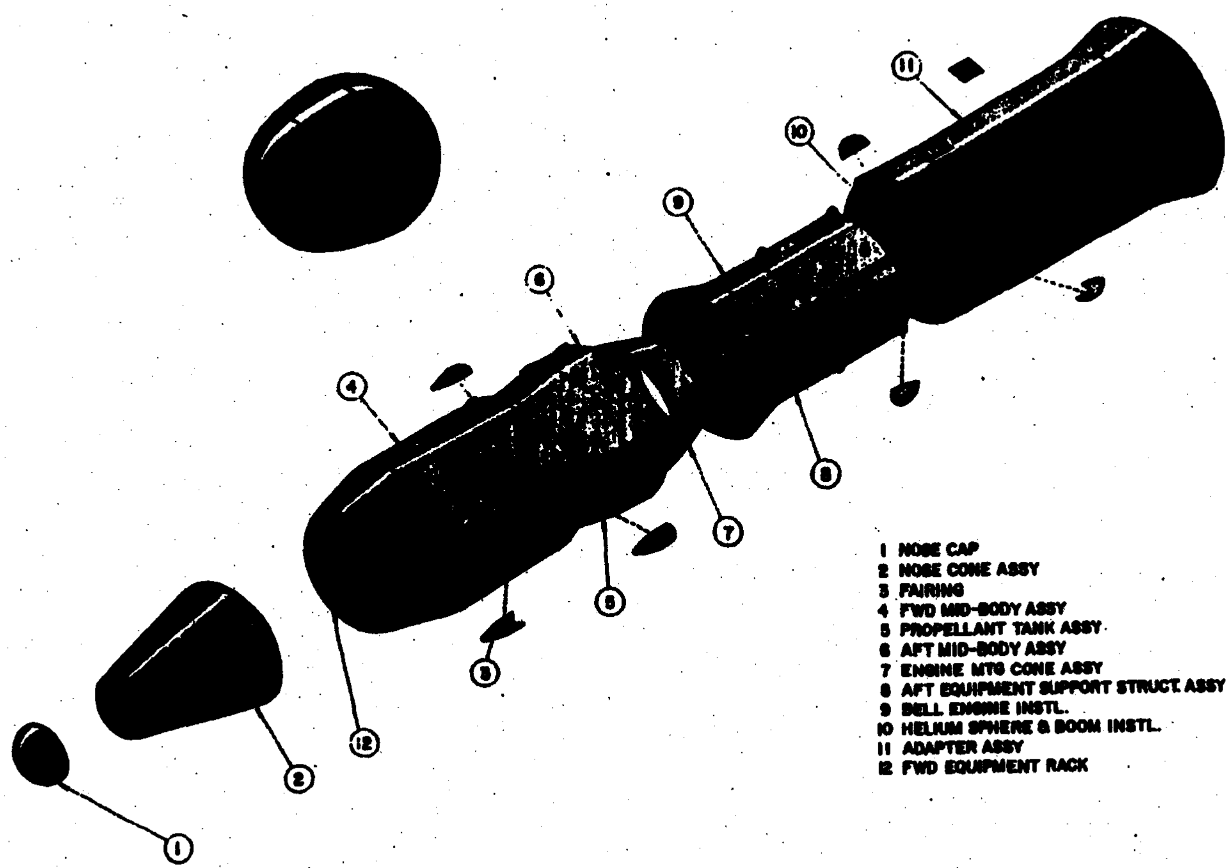
5. Accommodate several different auxiliary power units.

6. Optimize equipment packaging to minimize attitude control power requirements.

(2) The Airframe presently being designed and fabricated is based on the maximum weight capability as defined by the SM-65 total impulse

CONFIDENTIAL

SENTRY STRUCTURAL BREAKDOWN



1 NOSE CAP
2 NOSE CONE ASSY
3 FAIRING
4 FWD MID-BODY ASSY
5 PROPELLANT TANK ASSY
6 AFT MID-BODY ASSY
7 ENGINE MTG CONE ASSY
8 AFT EQUIPMENT SUPPORT STRUCT. ASSY
9 BELL ENGINE INSTL.
10 HELIUM SPHERE & BOOM INSTL.
11 ADAPTER ASSY
12 FWD EQUIPMENT RACK

P468 (2) SS"A" 8/19/58
WD-56-08183

CONFIDENTIAL

LOCKHEED MISSILE SYSTEMS DIVISION

[redacted] CONFIDENTIAL

WDPP-58-30

I-2-14

SECRET

CONFIDENTIAL

and the impulse available in the WS 117L vehicle as built for the SM-75 boosted program. This weight is considered to be 11,600 lbs.

(3) The Airframe will consist of a 60 inch diameter cylinder adapter, (which will be attached to the booster and remain with it after separation), and the orbiting vehicle. The vehicle will be a 60 inch diameter load carrying cylinder about 14 ft. long containing or supporting all other subsystems. This cylinder will be inclosed for about half its length in the adapter. The payload and structure on the front of the vehicle will be protected from aerodynamic effects by a conical nose section. The engine and pressurized gas storage will be carried at the rear of the vehicle making an over-all length of about 18 feet. Maximum utilization of structural material will assure the highest possible ratio of payload weight to gross weight.

b. Subsystem "B" - Propulsion

(1) The propulsion subsystem will consist of the rocket engines (main liquid rocket engine and two ullage solid propellant rockets), the propellant expulsion and feed systems (other than structural, loadcarrying fluid and gas tanks), engine gimbals (but not gimbal actuators) and the equipment required to start and stop the rocket engines in response to an electrical signal from the ground or from the guidance subsystem. In addition, the propulsion subsystem will include all ground-based items used for testing, calibrating, checkout and servicing of the propulsion subsystem.

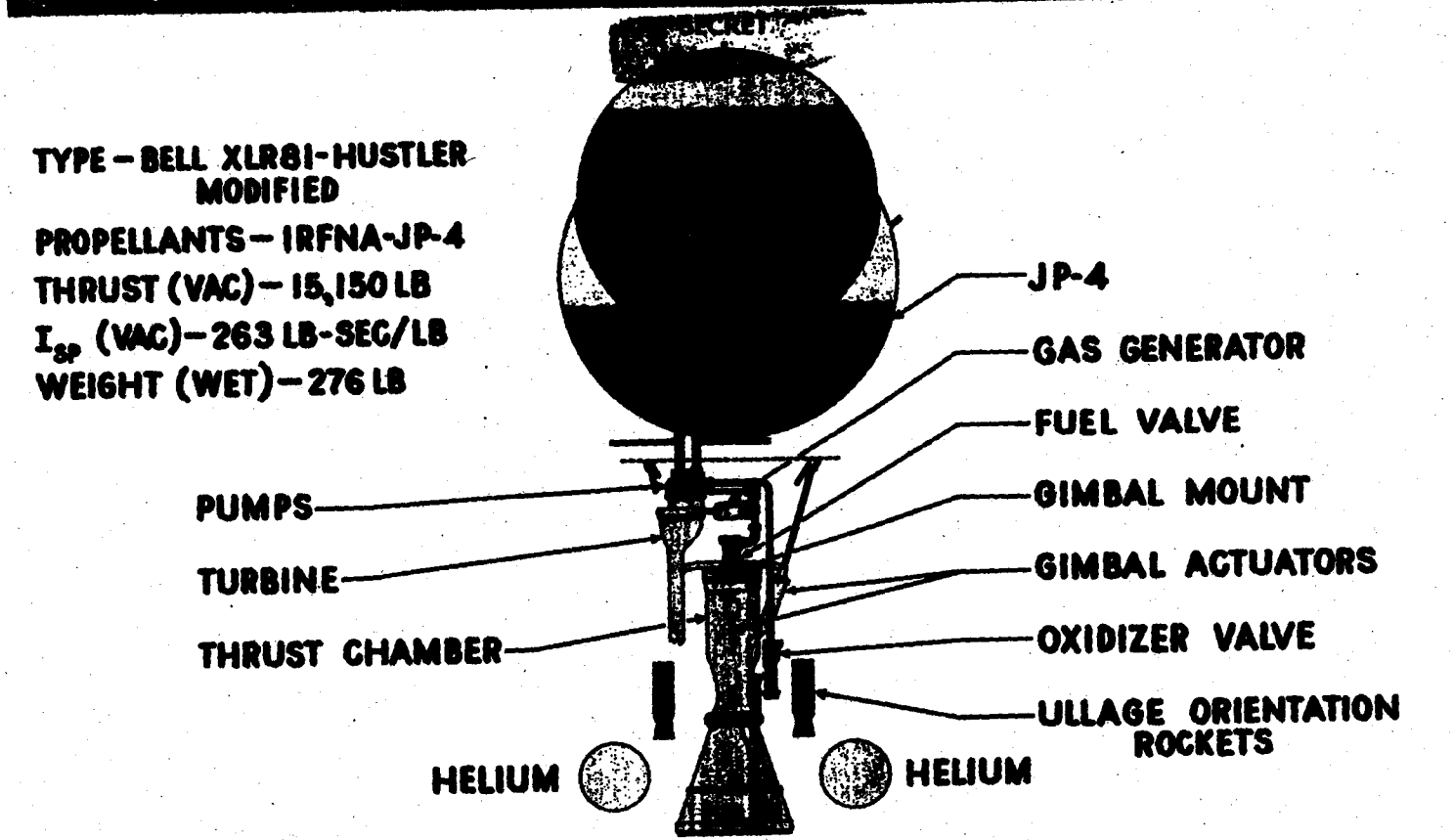
(2) The Project Hustler XLR81, 15,150 pound thrust, pump fed engine will be used for the main satellite rocket power plant. The XLR81-Be-3, using IRFNA (Inhibited red fuming nitric acid) and JP-4 propellants, having a 263 sec vacuum specific impulse, will be used in the first four Thor boosted flights. This engine modified to use IRFNA and UDMH (unsymmetrical dimethyl hydrazine) as propellants with a 277 sec vacuum specific impulse will be used on subsequent flights. Forces required to provide proper fuel orientation prior to firing the main rocket engine at the completion of the coast phase will be provided by small 20 sec-120 pound thrust solid propellant rockets (ullage rockets).

c. Subsystem "C" - Auxiliary Power

(1) The auxiliary power subsystem furnishes all electrical power required within the WS 117L vehicle from a time just prior to launch until the end of the vehicle's reconnaissance lifetime. The complete subsystem includes ground equipment necessary to utilize available ground power during warm-up, testing, and checkout on the launch stand, and for switching from external to internal power at the appropriate time before launch. It also include service, test, and handling equipment, which may be elaborate where nuclear supplies are used.

(2) The APU must furnish 28 volts DC, both regulated and unregulated, and alternating current at 400 cps and 2000 cps. Drain on the primary energy source will vary from 3 kilowatt hours per day upwards depending upon the nature of the source, vehicle mission, and power conversion efficiencies.

[redacted]



P259 SSB 6/2/57

LMSD 100298

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

[redacted]

I-2-17

WDTP-58-30

[redacted]

CONFIDENTIAL

CONFIDENTIAL

SECRET

CONFIDENTIAL

SENTRY AUXILIARY POWER SUPPLY

DEVELOPMENT PROGRAM

- CONVENTIONAL PRIMARY BATTERIES
  SILVER PEROXIDE
- HIGH ENERGY BATTERY
  HYDROGEN-OXYGEN
- SOLAR VOLTAIC CONVERTER
  SILICON BORON DIFFUSED p-n JUNCTION
- NUCLEAR THERMOMECHANICAL
  RADIOISOTOPE HEAT SOURCE

  REACTOR HEAT SOURCE

[illegible]	[illegible]	[illegible] YIELD
[illegible] WATT [illegible] PER LB.	HIGH ENERGY YIELD	NOT DEVELOPED
[illegible] WATT CONT. [illegible] LB.	OPERATES INDEFINITELY	REQ'S DEVELOPMENT TEMP. CONTROL METEORITE DAMAGE
[illegible] WATT	LONG LIFE	HEAVY SHIELD REQUIRED

P 315 (2) SS"C" 3/13/58

LMSD 100301

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

I-2-18

WDPP-58-30

SECRET

CONFIDENTIAL

(3) A battery energized power supply has been selected to meet the requirements of early vehicles, for which operating duration is more likely to be limited by system reliability than by the energy capacity of the power supply, and for which proof testing and redesign data are the primary objectives. Beyond that stage, however, very long duration power supplies will become increasingly desirable. Systems requiring simultaneous functioning of multiple satellites dictate lifetimes of one year or more. Solar and nuclear power supplies are therefore being developed. Advanced electro-chemical sources to back up battery systems are also being considered in the event that solar and nuclear developments are not completely successful or are prolonged.

(4) The battery supply will employ silver-zinc modules providing 75 watt-hours per pound. Individual modules weighing 110 pounds may be on or off loaded for payload flexibility during development. A lifetime of 23 days is expected for early operational vehicles with 10 modules nominally allocated. Increased payload capability realized with the UBMH engine may permit loading of 16 modules, and a corresponding lifetime of 36 days, again for the earliest reconnaissance systems.

(5) Solar power units will adapt silicon photovoltaic converters into a complete subsystem meeting WS 117L requirements. Environmental degradation of silicon cells and secondary battery cycle life are important questions in evaluating the performance of conceptual solar designs. Orbital tests planned for Atlas boosted flights will be necessary before designs can be completed. Large collector-converter panels mounted on the vehicle skin, or mounted for heliotropic action, will require some redesign of the present vehicle.

(6) Two nuclear secondary power units for WS 117L are under development by the AEC in a program known as SNAP (Subsystems for Nuclear Auxiliary Power). Requirements and vehicle integration problems are worked out through a Joint AFBMD-AEC SNAP Committee. SNAP I is a radioisotope fueled, 500 electrical watt, 60 day supply with inherent capability to provide 250 watts for 230 days. SNAP II will utilize a 45 kilowatt reactor heat source and produce 3 kilowatts electrical output with a one year operating lifetime.

d. Subsystem "D" - Guidance and Control

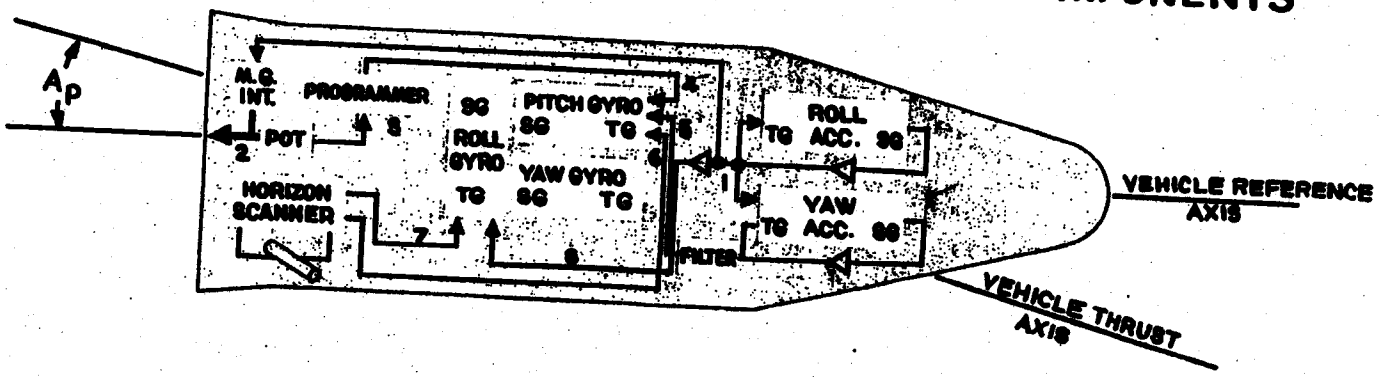
(1) The guidance and control subsystem for the Thor boosted WS 117L vehicles will be comprised of all those items of equipment required to perform the following functions:

(a) Provide a programmed trajectory during the Thor boost phase and a signal for separation of the orbiting vehicle from the booster and the end of the boost phase.

(b) Provide programmed pitch of the satellite vehicle during the coast period to establish and maintain the required orientation of the vehicle for orbital boost.

ORBITAL BOOST PHASE

GUIDANCE & CONTROL FUNCTIONING COMPONENTS



1. ROLL ACCELERATION a_R
2. CHANGE IN LONGITUDINAL VELOCITY ΔV (SHAFT POSITION SHUTS DOWN BOOST MOTOR)
3. CHANGE IN VEH. GEOCENTRIC ANGULAR VEL. $\Delta V/R$
4. TOTAL VEH. GEOCENTRIC ANGULAR VEL. V/R
5. $\frac{a_Y}{a_R} \cong$ THRUST MISALIGNMENT ANGLE A_p
6. HORIZON SCANNER PITCH ERROR SIGNAL
7. " " ROLL " "
8. ROLL GYRO MASS BALANCE COMPENSATION (ACCELERATION DRIFT)

NOTE: PITCH & YAW GYROS CONTROL GIMBALED BOOST MOTOR–ROLL GYRO CONTROLS REACTION JETS

P-706 35"D" 7/22/59
WD-58-04445

LMSD 100305

(c) Provide attitude and stabilization control during coast.

(d) Determine trajectory during coast and calculate the necessary information for proper initiation and termination of orbital boost.

(e) Provide a signal to initiate orbital boost.

(f) Position the thrust vector of the orbiting vehicle propulsion system so as to give the proper direction for the orbit boost.

(g) Provide attitude control and stabilization during orbital boost.

(h) Provide a signal for final termination of thrust.

(i) Provide self contained means for initially aligning and maintaining the desired vehicle attitude during orbital operation.

(j) Provide an indication of attitude and/or rate of change of attitude to other subsystems in the vehicle as necessary.

(2) The guidance and control subsystem for the Atlas boosted WS 117L vehicles will be comprised of all those items of equipment required to perform the following functions:

(a) Determine the position, velocity, and/or acceleration and attitude of the orbiting vehicle/booster as necessary from launch to final termination of thrust.

(b) Compare these values with those required to attain a preselected orbit.

(c) During operation of the sustainer engine of the booster, provide proper steering signals to the booster autopilot and thrust termination signals for sustainer and vernier engine cut-off.

(d) During coast phase, if any, provide attitude and stabilizing control.

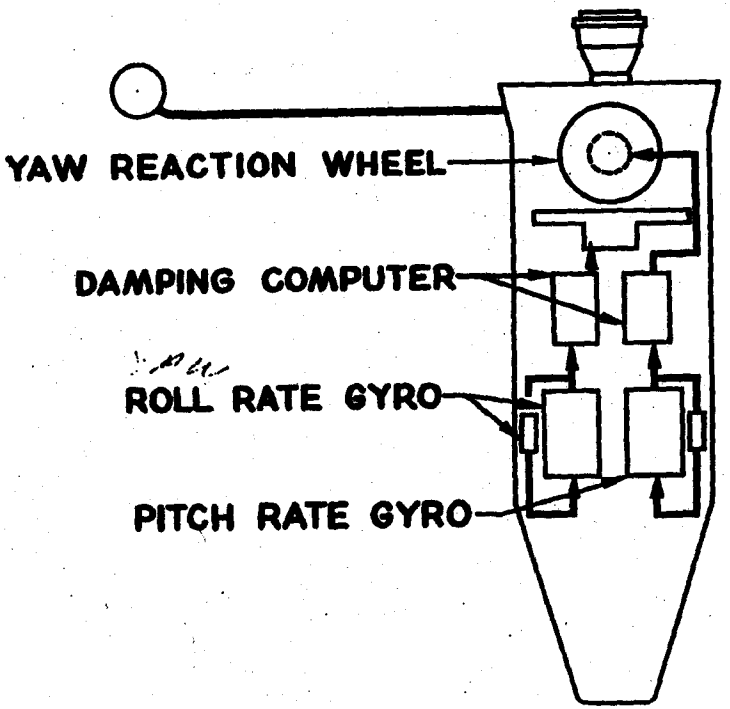
(e) Provide a signal for separation of the orbiting vehicle from the booster, and for starting the orbiting vehicle engine.

(f) Position the thrust vector of the orbiting vehicle propulsion system so as to give the proper direction for the orbit boost.

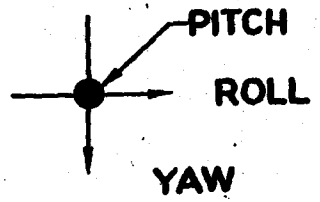
(g) Provide attitude control and stabilization during orbital boost.

[redacted]

GUIDANCE & CONTROL FUNCTIONING COMPONENTS



DUE TO THE REORIENTATION, THE YAW GYRO BECOMES A ROLL GYRO



LOCKHEED MISSILE SYSTEMS DIVISION

[redacted]

P-705 SS"D" 7/22/58
WD-58-04448

LMSD 100304

[redacted]

[redacted]

I-2-22

WDPP-58-30

CONFIDENTIAL

CONFIDENTIAL

(h) Provide a signal for final termination of thrust.

(i) Provide self contained means for initially aligning and maintaining the desired vehicle attitude during orbital operation.

(j) Provide an indication of attitude and/or rate of change of attitude to other subsystems in the vehicle as necessary.

(3) Specifically, the guidance and control subsystem will include the following:

(a) The actuating mechanisms and power supply used to control the direction of the orbital thrust rocket engine.

(b) Any thrust producing devices (gas jets) and associated plumbing used for attitude and roll control including the electro-mechanical valves used to start, stop or regulate thrust of these devices.

(4) The guidance and control subsystem also includes those items of equipment required to service test and calibrate the elements of the subsystem defined above.

e. Subsystem "E" - Visual Reconnaissance

(1) The visual reconnaissance subsystem consists of the satellite-borne equipment required to collect intelligence information in the visual spectrum, to process and store this information and at the proper time to reconvert the stored information to an appropriate video signal for transmission to the ground by the Ground-Space Communications Subsystem Data Link. This system also consists of the ground-based equipment required to take the output of the data link and reconstitute the signal into photographic form for further processing and intelligence use.

(2) Visual data acquisition will employ conventional aerial photography techniques with special features of automatic chemical processing and television type data read-out in the early vehicles. Within limitations imposed by the state-of-the-art, future consideration will be given to the development and use of electro-static sensors and high resolution television in conjunction with magnetic tape storage.

(a) The major difficulties to be overcome include:

1. The hazards of high level radiation when nuclear power sources are used.

2. The operation in a gravity free environment.

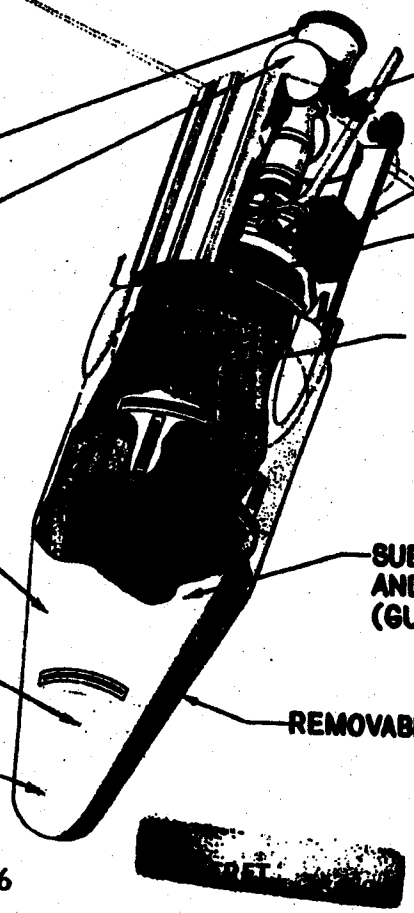
3. The lack of actual environmental information at the operating altitude.

4. The development of reliable components capable of operating unattended for long periods of time.

5. Long term unattended processing of photographic film.

[redacted]

VISUAL RECONNAISSANCE MODEL



ENGINE GIMBAL LIMITS 5°
SQUARE PATTERN
ENGINE-BELL AIRCRAFT
THRUST 15,000 LB ALT
I_{sp} 263 SEC.
NOZZLE EXPANSION RATIO 15:1

N_2 GAS STORAGE FLASK
3000 PSI

VISUAL RECONNAISSANCE SYSTEM
CAMERA PACKAGE (EKC)
PHOTO, PROCESS, STORAGE,
ELECTRONIC READOUT

CAMERA LENS SHIELD

NOSE (JETTISONS)

ATTITUDE ROLL AND
REORIENTATION CONTROL
GAS JETS (6)

AUXILIARY POWER
SOURCE (BATTERIES)

FUEL TANK
JP-4 60 PSI

OXIDIZER
TANK (IRFNA)
60 PSI

He GAS STORAGE FLASK (2)
PROPELLANT TANK
PRESSURIZATION 3000 PSI

SUBSYSTEM ELECTRONICS COMPARTMENT
AND CAMERA SUPPORT STRUCTURE
(GUIDANCE, CONTROL, ETC.)

REMOVABLE NOSE FAIRING

[redacted]

P232 (2) SSA 5/20/58
WD-58-00776

LMSD 100296

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

[redacted]

I-2-24

CONFIDENTIAL

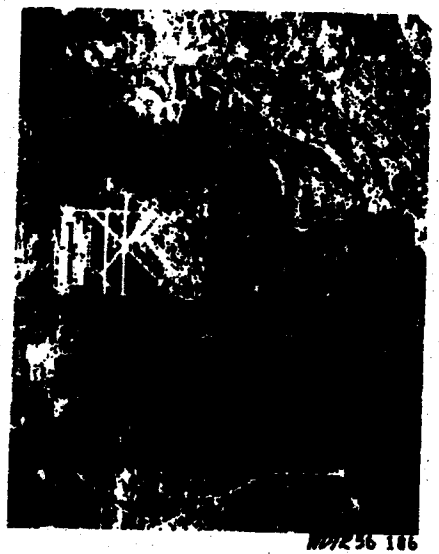
WDPR-58-30

[redacted]

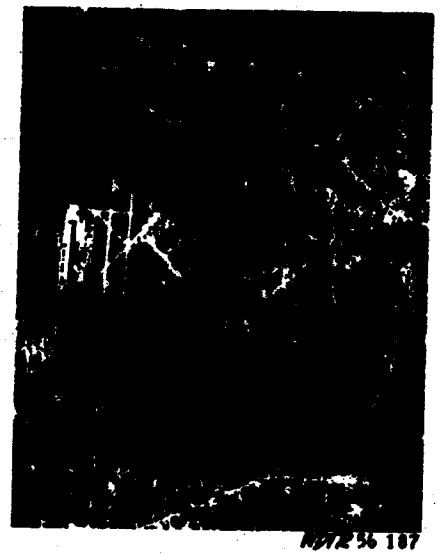
CONFIDENTIAL

FILM

6 INCH LENS



ORIGINAL SCENE



FILM IMAGE IN SATELLITE

IMAGE RECORDED ON GROUND

FILM IMAGE RECOVERY

36 INCH LENS

17 FOOT RESOLUTION

ORIGINAL SCENE

FILM IMAGE IN SATELLITE

IMAGE RECORDED ON GROUND

P5 E 8/14/57

LMSD 100287

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

6. Development of a very accurate slow speed film drive mechanisms which can be corrected from the ground by command signals.

(3) The cameras will have 6 and 36 inch focal length lenses. The lens speeds will be F/2.8 or faster and the lenses will resolve over 100 lines per millimeter at a 2 to 1 target contrast ratio. Automatic exposure control will be included in order to provide optimum exposure for maximum resolution.

(4) The subsystem will function at an orbiting altitude of approximately 300 miles. Initial versions will resolve objects of approximately 100 foot dimensions with a location accuracy of one mile; later versions will resolve objects of approximately 20 feet dimensions with a location accuracy of 1/2 mile; in its surveillance version it will resolve objects smaller than 20 feet dimensions with a location accuracy of 1/10 mile.

(5) In evaluating the significant military information in pictures, it is basically assumed that dimensions associated with the various targets are directly related to the optical resolution of the pictures. Actually, there are many additional factors that enter into the problem and affect the information content. Therefore, an experimental photographic simulation program was initiated. A series of military scenes was selected, and simulated satellite pictures were made at scale factors corresponding to ground optical resolutions of 17, 33 and 100 feet. In some cases stereoscopic pairs were available. These pictures were then analyzed by photo interpretation personnel in the Directorate of Intelligence, Headquarters, USAF.

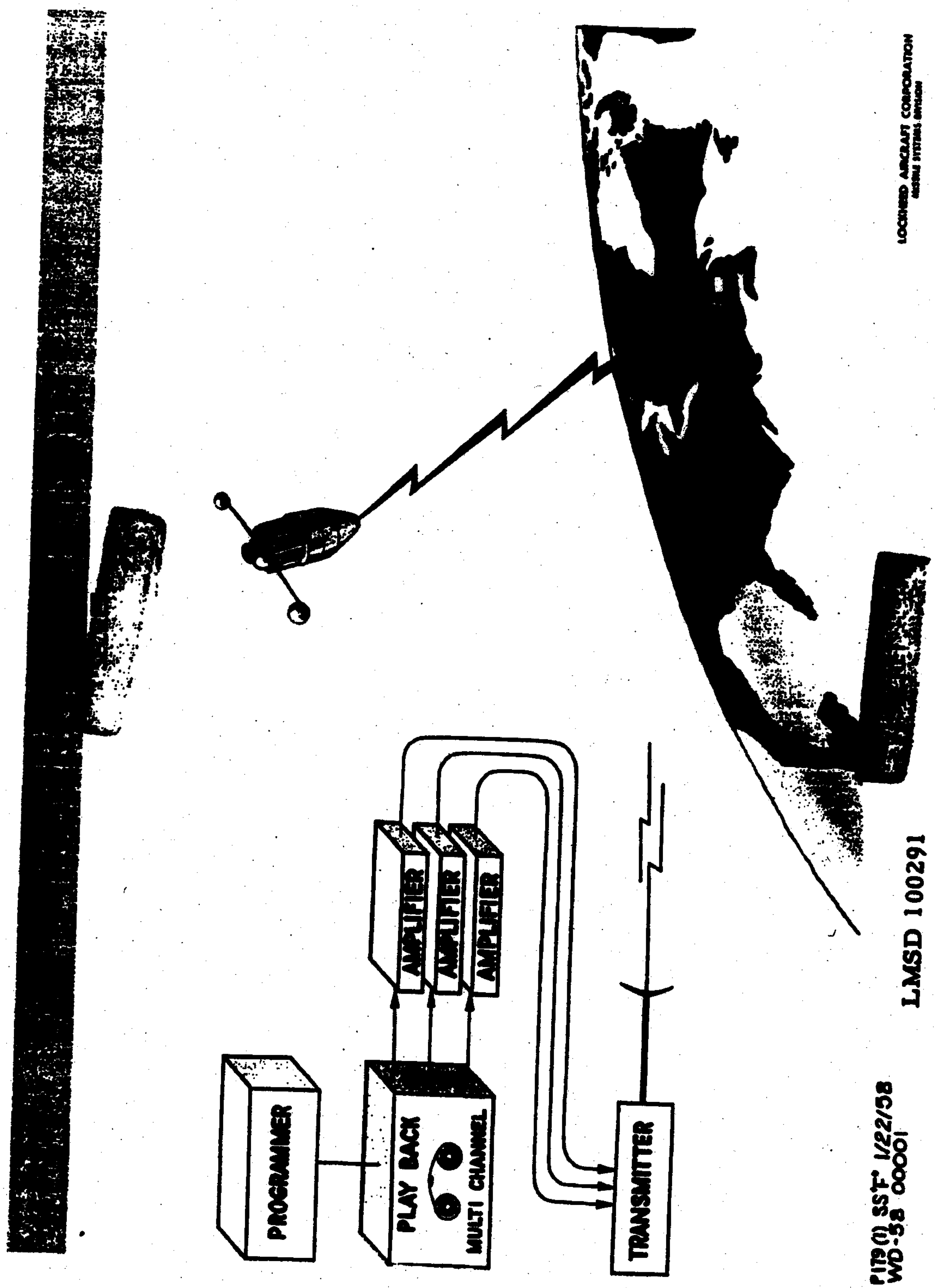
(6) The photographic simulation program will play a fundamental role in the definition of the intelligence-user value and processing requirements of the visual data. A major effort is being made to increase the realism of the program through the use of more pictures and the introduction of degradations in picture quality due to haze and to electronic read-out processing.

f. Subsystem "F" - Ferret Reconnaissance

(1) The ferret reconnaissance subsystem consists of the satellite-borne equipment required to collect intelligence information from electronic emissions in the region of the electromagnetic spectrum between 50 and 40,000 megacycles per second. The subsystem equipment will store, filter or process this information as may be necessary. At the proper time, the stored information will be reconverted into an appropriate electrical signal for transmission to the ground by the Ground-Space Communications Subsystem. The subsystem also includes the ground equipment required to service the above described satellite-borne elements of the Electronic Reconnaissance Subsystem.

(2) The development of a ferret reconnaissance subsystem is necessary because existing systems are not capable of operating unattended in the environmental conditions which will prevail in the satellite nor are they capable of performing the desired functions for the volume of traffic anticipated.

[redacted] ~~CONFIDENTIAL~~



~~CONFIDENTIAL~~

T-2-28

SECRET

WDPP-58-30

(3) The subsystem will be capable of detecting, measuring, and processing electromagnetic signals emanating from areas of interest. The equipment will gather information describing the signal parameters and location of previously unknown emitters. Each flight will attempt to accomplish a predetermined intelligence mission.

(4) Initial configurations of the equipment will gather data of primary intelligence importance. The equipment will be capable of identifying the location of known signals and unknown signals within each of several frequency bands. Accuracy of information concerning frequency and ground location may be sacrificed to optimize intercept probability. Later configurations will be tailor-made to perform specific intelligence missions.

(5) The initial versions will be capable of receiving pulsed signals in the 50-18,000 mcs band with the following priority:

PRIORITY	BAND	SPATIAL ACCURACY
1	2,500 - 3,200 mc/sec	± 50 mi
2	9,000 - 10,000 mc/sec	± 50 mi
3 (a)	59 - 100 mc/sec	± 100 mi
(b)	100 - 200 mc/sec	± 100 mi
(c)	200 - 400 mc/sec	± 100 mi
(d)	400 - 650 mc/sec	± 100 mi

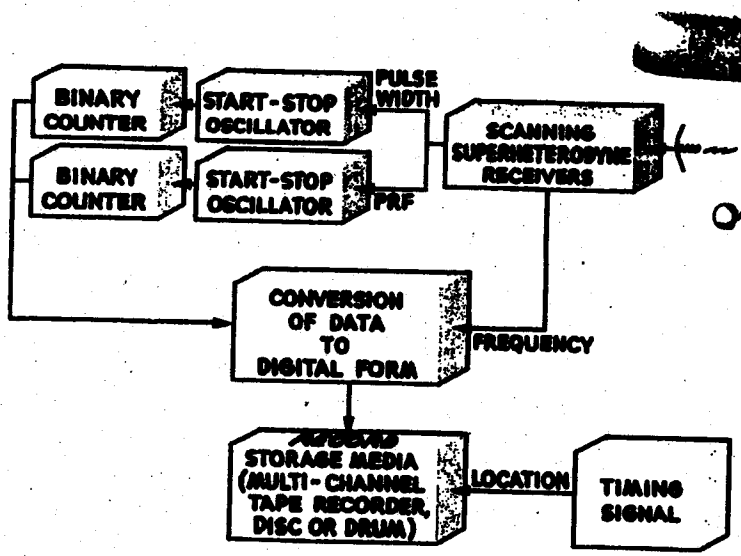
Priority assignments are subject to change as the changing intelligence requirements may dictate.

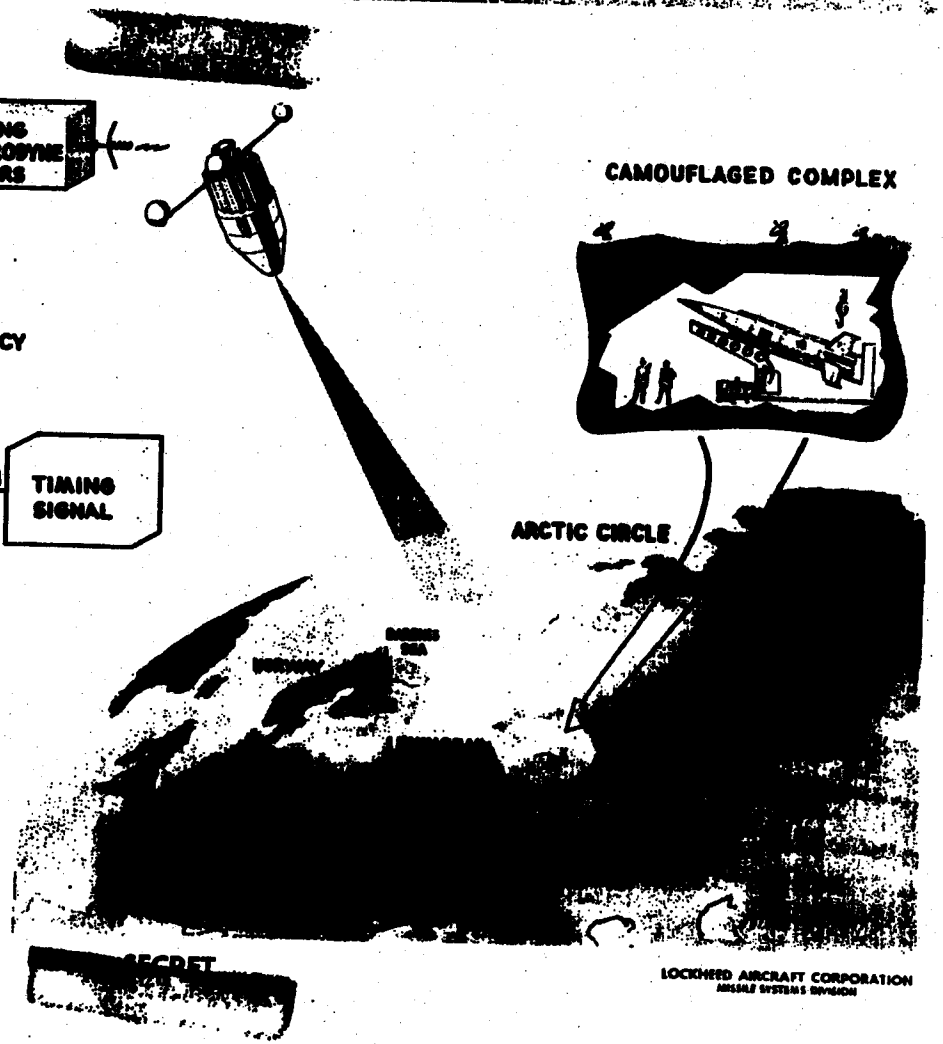
(6) The equipment having priorities 1 and 2 will intercept two large classes of known enemy radar. The other equipment will have high intercept probability in order to detect the existence of new signals or known signals in new locations.

(a) Measurements will be made of the following parameters:

1. Radio frequency
2. Ground location
3. Pulse repetition frequency: 50-5000 pps ± 10%
4. Signal pulse width 0-3 microseconds to the nearest 15 microsecond ± .25 microseconds.

AIRBORNE RECONNAISSANCE





PRIORITY BANDS

1. 2,500-3,200 MC/SEC
2. 9,000-10,000 MC/SEC
3. (a) 59-100 MC/SEC
   (b) 100-200 MC/SEC
   (c) 200-400 MC/SEC
   (d) 400-650 MC/SEC

MONITORING OF ALL BANDS IN THE 50-10000 MC/SEC SPECTRUM

P182(3) SST 1/22/59
WD-58 00001

LMSD 100292

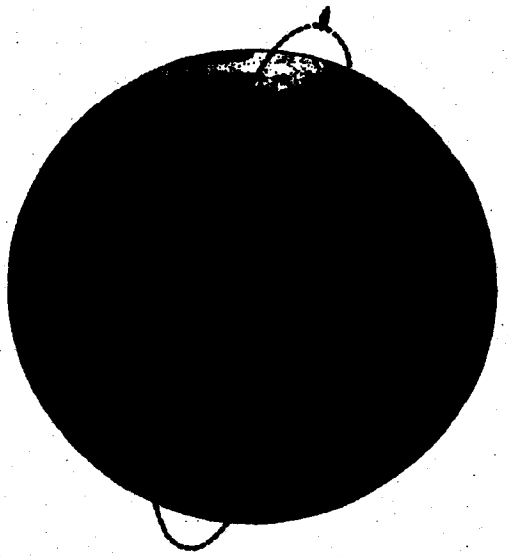
[redacted]

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



[redacted]

[redacted]

[redacted]

[redacted]

(7) Playback and transmission of the data to the ground will be accomplished by a telemeter link. The telemetry output on the ground will be stored on magnetic tape for subsequent analysis and reduction.

(8) Functional control will be provided by an interval-indicating programmer which will be re-set by command from the ground after each transmission period.

(9) Later versions will be composed basically of two types of receiving equipment. The first type will accomplish the purpose of obtaining more accurately the radio frequency and other electrical characteristics of the signals. It will consist of a frequency scanning receiver capable of permitting this analysis to within a few percent. The second type will accomplish improved locational accuracy. It will consist of receivers of limited bandwidth capable of utilizing more sophisticated direction-finding techniques.

(10) The surveillance version of the subsystem will utilize previously developed ferret equipment and techniques where applicable to the mission to be performed. Equipment could also be made available with a capability of identifying VHF and UHF communications, such as may be used in long distance scatter propagation links. Parameters and accuracies of measurement will be determined by intelligence requirements and the current state-of-the-are in electronic techniques.

g. Subsystem "G" - Infrared Reconnaissance Subsystem

(1) The infrared reconnaissance subsystem consists of the satellite-borne equipment required to collect intelligence information from that region of the electromagnetic spectrum from 1 to 12 microns wave length, to process and store this information, and, at the proper time, to reconvert this stored information to an appropriate electrical signal for transmission to the ground by the Ground-Space Communication Subsystem. This subsystem also includes the ground equipment required to service the above described satellite-borne components.

(2) The infrared subsystem in a satellite at 1000 miles altitude will detect and locate ICBM launchings to a slant range of approximately 2600 miles. The information is relayed directly to a ground receiving station within 2400 miles range. With one such station located at high latitude and with fifteen satellites in operation simultaneously, the entire region above latitude 55° north can be kept under continuous surveillance. When a data link is developed which will permit information to be relayed between satellites for transmission to the ground, greater coverage with half as many vehicles can be achieved.

(3) From an orbit of 300 miles altitude, the infrared subsystem equipment will locate large jet aircraft and missiles to slant ranges of approximately 420 miles. Since immediate transmission is not essential when air breathing vehicles are detected, the data may be stored and read out later during the 90 minute orbital cycle.

h. Subsystem "H" - Ground-Space Communication

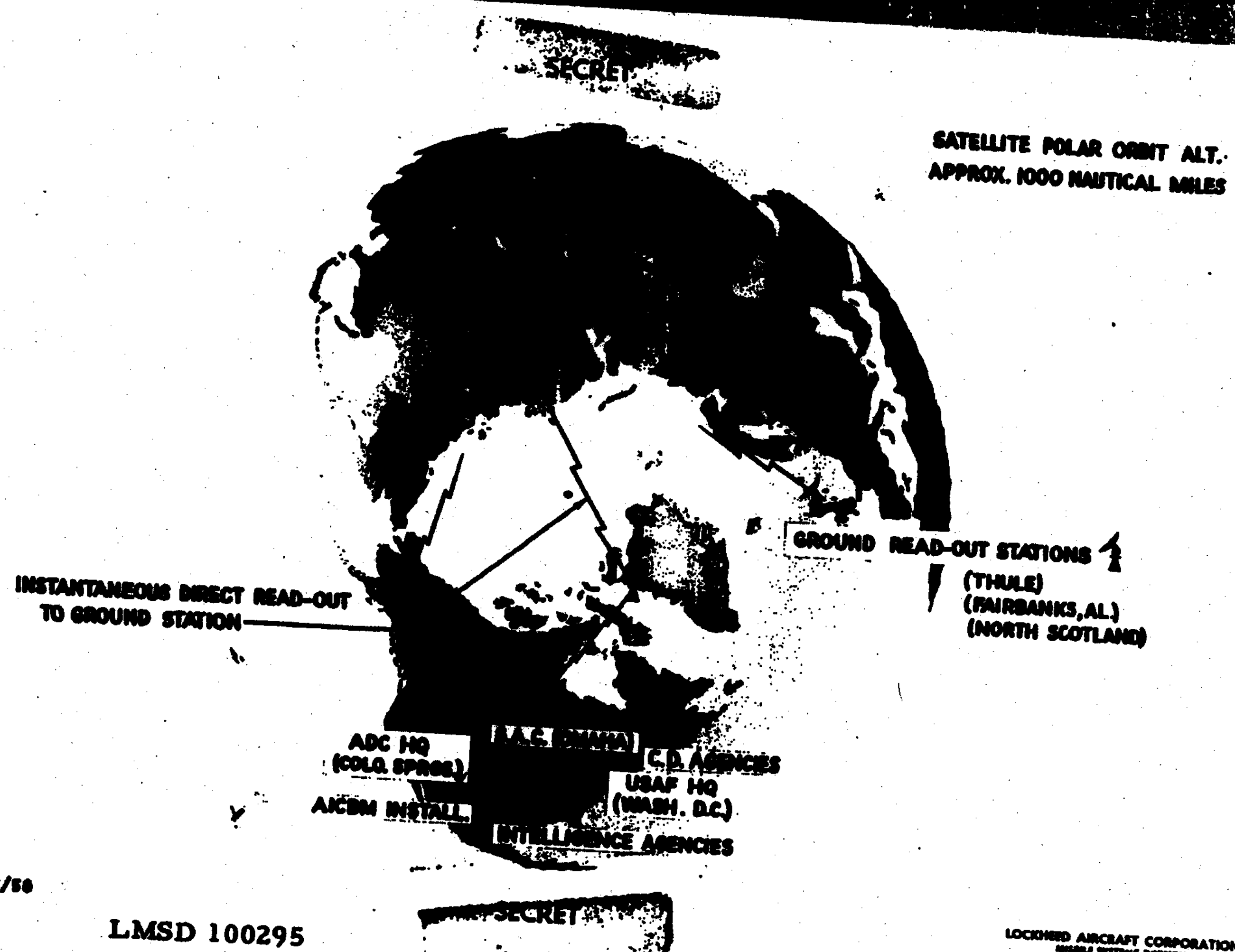
(1) The ground-space communication subsystem is comprised of all those items of equipment required to perform the following functions:

(a) Determine the position of a satellite vehicle relative to the earth as a function of time by process of observation and prediction.

(b) Command and program the functioning of the vehicle payload and auxiliary devices on a time sequence basis or in real time.

SECRET

CONFIDENTIAL



LMSD 100295

WD-58-02843

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

CONFIDENTIAL

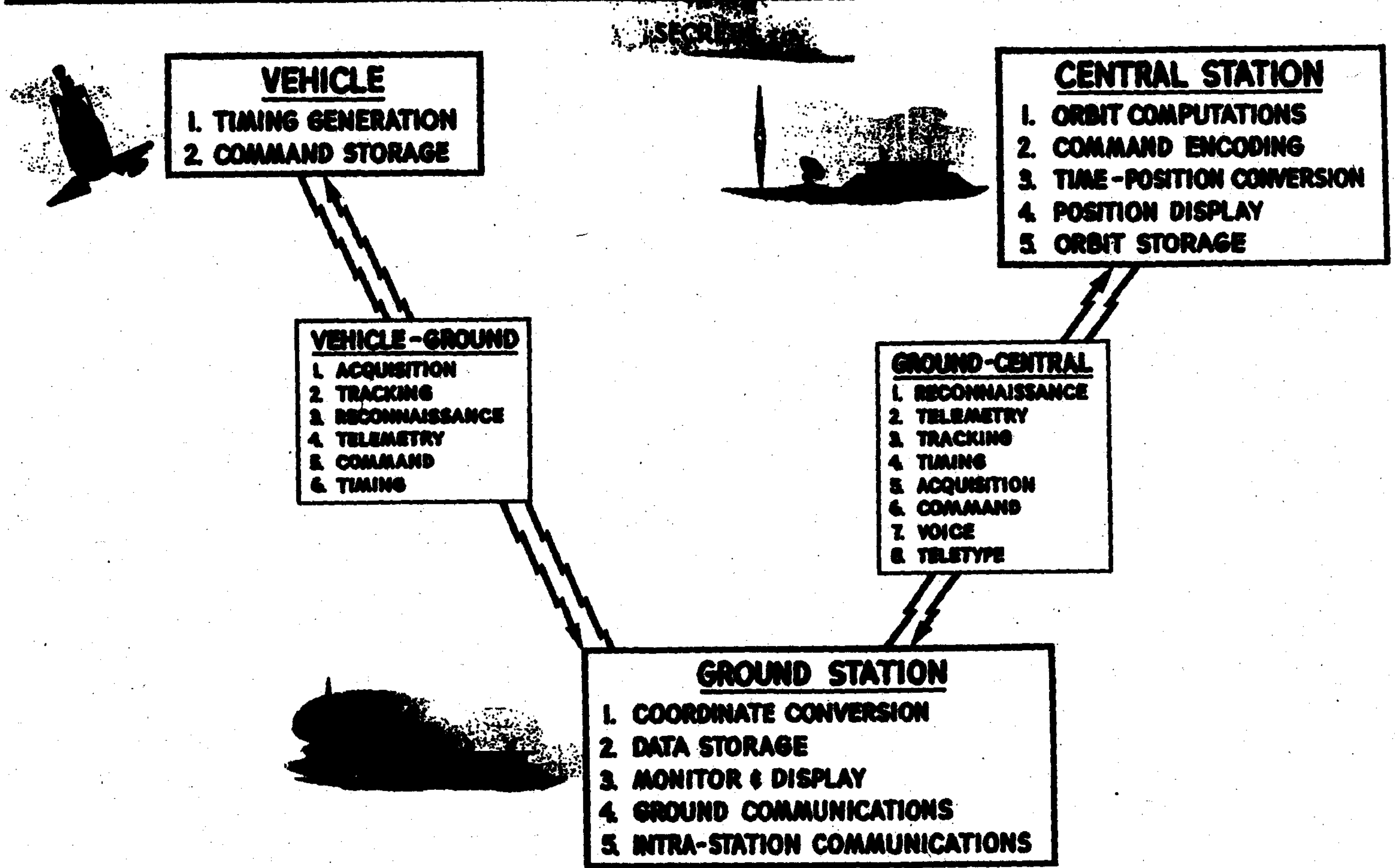
I-2-34

SECRET

WDPP-58-30

SECRET
~~CONFIDENTIAL~~

[redacted]



P193 8/17/57 LMSD 100294

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

~~CONFIDENTIAL~~

SECRET

(c) Provide means for communicating with the vehicle from ground stations and for receiving, monitoring and encoding environmental, vehicle functional and all reconnaissance data from other vehicle subsystems.

(2) The "end product" of the ground space communications subsystem will be a magnetic tape recording and a "hot-line" wherein all of the properly indexed reconnaissance data will be available.

(3) In addition to a. through c. above, the ground-space subsystem will be responsible for the generation and proper indexing on the reconnaissance data signal the following:

(a) Unique date-time signals which relate vehicle time to real ground time and, in addition provide a time "zero" for the reconnaissance data.

(b) Vehicle position data.

(4) Within the satellite vehicle, the ground-space communications subsystem will be responsible for the following indexing signals:

(a) To accept from the attitude stabilization equipment a signal which will be encoded into the proper form and provided to the particular sensing subsystem(s) concerned for their recording on reconnaissance data.

(b) To generate and provide the vehicle sensing subsystem(s) with time signals.

(5) The ground-space communication subsystem shall also include all those equipments required to service, test, monitor and calibrate the elements of the subsystem defined above.

(6) The ground-space communications ground equipment will provide for acquisition and tracking, reception of data, and transmission of specific commands to a satellite vehicle moving on an orbit at approximately 300 miles altitude. This capability will be provided to accommodate a maximum radio range from the ground stations. The ground equipment will provide for:

(a) Interstation ground communications, including transmission of reconnaissance data.

(b) Computation necessary for acquisition, programming and for geographic registration of the vehicle position.

(c) Telemetry reception and recording.

(d) A synchronized timing system.

(7) The vehicle electronics to be contained in the vehicle and which are to be developed under this subsystem will provide the means for:

(a) Transmission of the reconnaissance data to the ground receivers.

(b) Control and programming of the vehicle payload functions.

(c) Telemeter encoding and transmitting.

(d) Vehicle function timing.

(8) The system of ground stations will be strategically located to provide efficient control and intercept of the satellite and its reconnaissance data. When the vehicle is within radio range from a station, an acquisition and tracking system will determine the position of the vehicle and transmit the position data to the orbit computer. Orbit position will determine the discrete program commands which are to be transmitted to the satellite. The high-gain telemetry and reconnaissance data receiving antennas will be slaved to the tracking system. The video output from the data link receivers will be available for monitoring. The directional data link antenna on the vehicle will be scanned so that the ground receiver can detect errors in its direction. Antenna orientation in the vehicle will be corrected over the command link.

(9) The station locations are to be determined on the basis of maximizing the readout cycle and reducing the storage time in the vehicle. Other considerations affecting choice of location are the need to preserve security and reduce the complexity of logistic support. Interstation communications systems to be used will rely on wire and radio nets.

i. Subsystem "I" Intelligence Data Processing Subsystem:

(1) The data processing subsystem includes the system design, equipment, installation, techniques and procedures to accept recorded raw photographic, ferret and infrared data from WS 117L, to rapidly process these data to provide:

(a) Interpretation Reports on those areas, subjects and activities which are of a rapid reaction critical nature, and on the over-all mission operation of the system.

(b) Transcription of reconnaissance data properly indexed, positioned and titled in varying media and formats for further exploitation by the many different intelligence users.

(c) Feedback of applicable information to the rest of the system for optimum system operation. This subsystem will provide convenient and

rapid facilities for comparing previous cover and background intelligence with recent take to maximize the information which can be obtained in a short period of time from the reconnaissance records, and for collating the date of the various mixed sensors to provide for mutually supportable and corroborative results. Included also are all those items of equipment, and instructions required to service, test, monitor and calibrate the elements of the defined subsystem, in addition to the QPRI and manning estimates for the operational system.

(2) Data will be acquired from the satellite through radio transmission channels and reception at the Tracking and Acquisition (T & A) stations. The T & A stations will record and re-transmit this information to a central point called the WS 117L Center. The data processing subsystem located primarily within the Center will be capable of all functions necessary to receive, handle, index, locate, store and retrieve the reconnaissance data collected; to provide maximum exploitation of reconnaissance records from WS 117L compatible with the timeliness requirements on the interpretation reports, and to prepare both the derived information and the processed take for dissemination in the forms, frequencies and quantities required by the various users for further exploitation. The R & D Test Facility at which the data processing subsystem will undergo evolutionary development and testing will be prepared to provide timely and expeditious processing of the resultant reconnaissance records at each stage in the evolution of the WS 117L collection systems to insure maximum beneficial use of the data collected throughout the development period.

j. Subsystem "J" Geophysical Environment

(1) This subsystem consists of the studies, equipments, both rocket-borne and satellite borne, required to provide environmental data considered essential to insure and simplify the design of a successful Advanced Reconnaissance System. This subsystem also includes the ground equipment required to maintain, service, calibrate and checkout prior to flight, those equipments described above.

(2) Insufficient data exists on geophysical environment to insure successful design and test of the satellite vehicles. The four so considered are:

(a) Meteor Physics

(b) Density at Orbital Altitudes

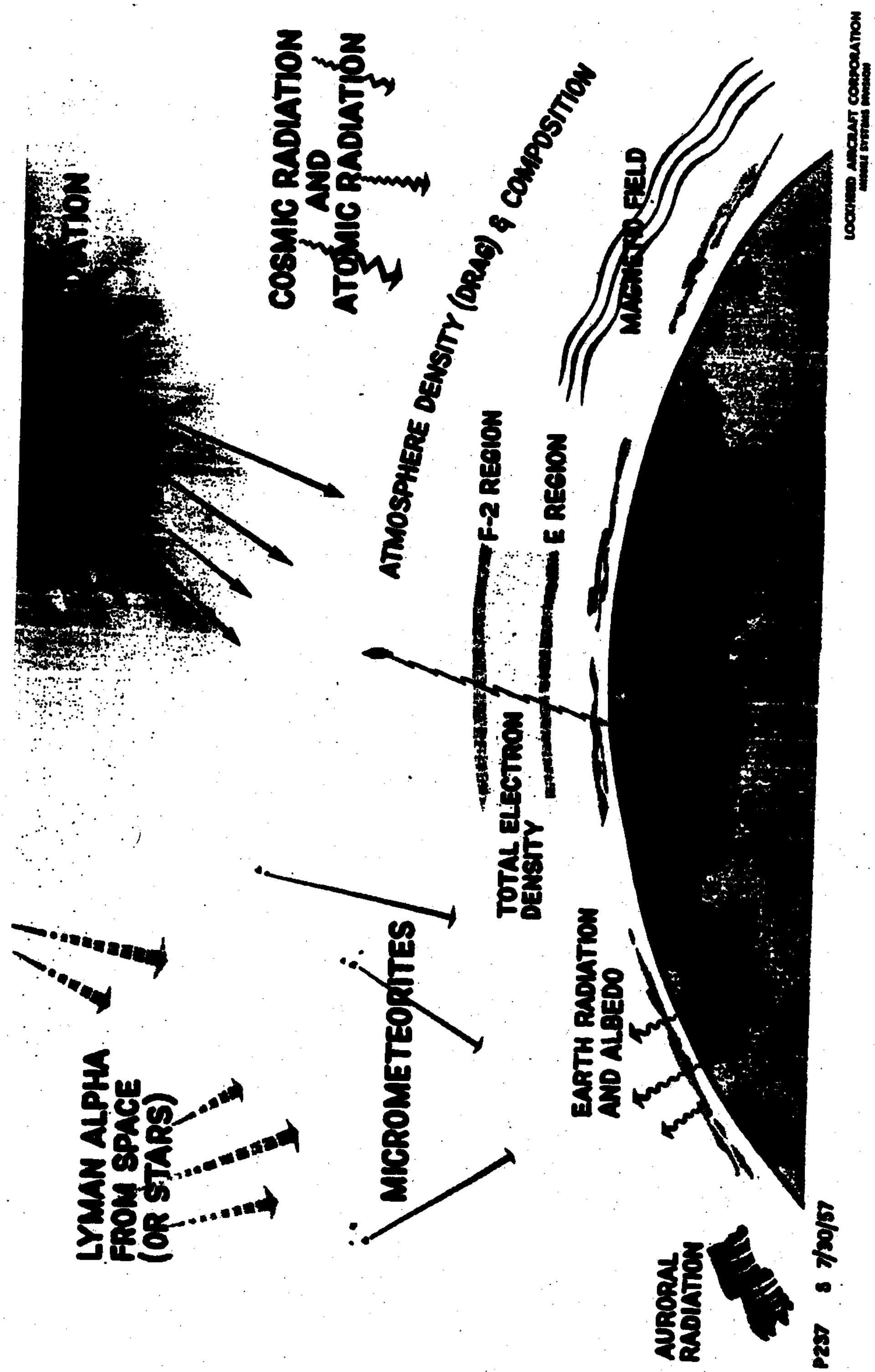
(c) Solar Radiation in the Ultra-Violet and X-Ray Region

(d) Thermal Radiation

k. Subsystem "K" Qualitative Personnel Requirements Information (QPRI)

(1) This subsystem is designed to provide qualitative

[redacted]



personnel requirements information on the personnel required to operate and maintain the system, subsystems, and supporting equipment components.

(a) Included in this information are:

(1) System description including the purpose, a narrative description of operation and maintenance requirements, and pictorial flow diagrams of operations and maintenance.

(2) Manning estimates including a list of components, probable associated position and time required to perform each task.

(3) Definition of new positions including the duties and tasks of the position.

(4) Identification of the major component involved in each task and the major test equipment required.

(5) Time estimates for performance of tasks and identification of required areas of skill.

(6) Task equipment analysis including detailed illustrative statements of human activities in the operation and maintenance of equipment.

(7) Training equipment characteristics

1. Subsystem "L" Biomedical Recovery Capsule:

(1) The Biomedical Recovery Capsule program has three primary objectives. These are:

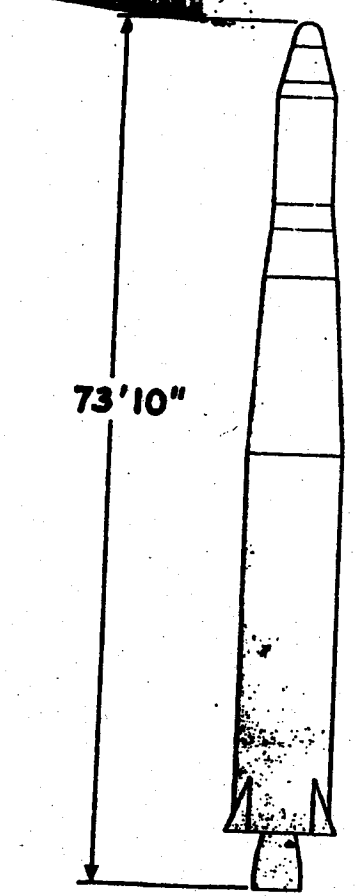
(a) To recover living specimens from orbital flight.

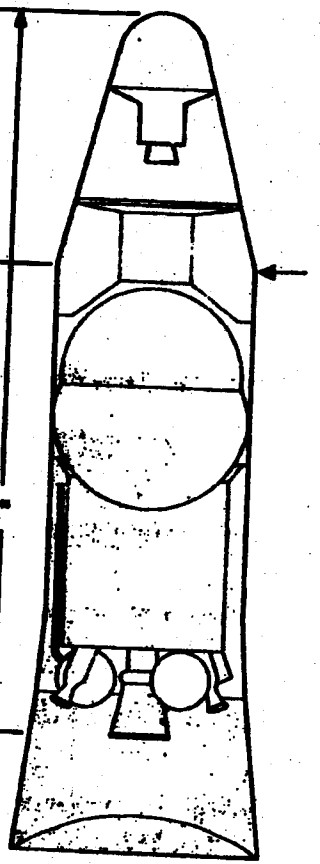
(b) To study the psycho-physiologic response of specimens to conditions of launch, orbit and recovery.

(c) To build experience and confidence in recovery techniques. These objectives will be achieved by the launching of five biomedical recovery capsules into orbit on MS-117L flights. The capsules will be seperated from the parent vehicle and be recovered on either the 18th or 32nd pass and will be recovered south west of Hawaii. The biopackage will be airsnatched by C119-L aircraft assisted by RC 121 aircraft and Navy surface vessels.

(2) Two basic configurations will be used. These are:

(a) Mark I Biomedical Recovery Capsule. The Mark I capsule weighs 195 pounds at launch including the 15 lb. biopackage. The

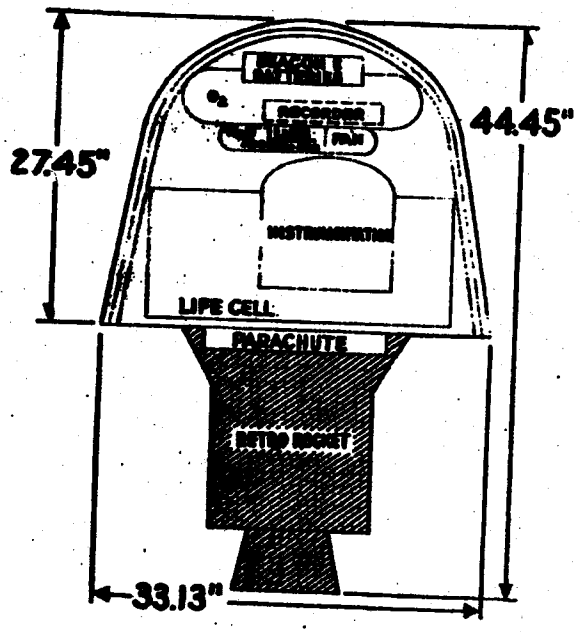




1429 LB.- EMPTY

7309 LB.- THOR-PAYLOAD

195 LB.- JP4
279 LB.- UDMH



P544(0)SS "L" 6/3/58
WD-58-03455

LMSD 100303

LOCKHEED AIRCRAFT CORPORATION

WDPP-58-30

biopackage itself includes the animals (four mice), their cage, pressure shell, food, water and oxygen supplies, environment control devices, sensors, amplifiers, batteries and recorders. The remaining weight of the Mark I is made up of structure, ablation material, retro-rocket, parachute, beacon and other recovery aids.

(b) The information gained from the Mark I experiments include acceleration, noise, vibration, cosmic radiation effects, total pressure and gas storage measurements, temperature and animal viability.

(c) The Mark I capsule will be on orbit for 18 passes (24 hrs) and will be recovered on the 18th pass.

(3) Mark II Biomedical Recovery Capsule. The Mark II capsule will weigh approximately 279 lbs at launch, including the 57 lb. biomedical package. The biopackage itself includes the animal (a small primate) the restraint devices, psycho-operant devices, pressure shell, food, water and oxygen supplies, environment control devices, sensors, amplifiers, camera, batteries and recorder. The remaining 222 lbs. is composed of structure, ablation, retro-rocket, parachutes and other recovery aids.

(a) The information gained from the Mark II experiments include all those mentioned for the Mark I, plus camera coverage, additional environmental measurements, several physiological measurements such as pulse, temperature, electro-cardiograph, etc. and a reasonably sophisticated psycho-operant device. The telemetered records of animal performance in conjunction with pre- and post flight testing should provide considerable information regarding the effects of prolonged weightlessness.

(b) The Mark II capsule will be in orbit for 32 passes (48 hrs) and will be recovered on the 32nd pass.

C. Ground Support Equipment (GSE)

1. Management concepts developed for use by the Air Force Ballistic Missile GSE programs are being applied to WS 117L. Lockheed Aircraft Corporation as system integrator will be required to specify the ground support equipment and technical data required for operational use. Applicable general specifications and exhibits will be utilized by AFBMD as management tools to insure development of a useable, integrated GSE system and availability of equipment and data in a timely fashion. System development plans and schedules for the complete operational GSE system of WS 117L will be established and monitored in a manner similar to that utilized for the remainder of the Weapon System.

2. The test program will use R&D type support equipment. Since the operational Atlas GSE has been developed and will become an integral part of the operational WS 117L GSE, every effort will be made to adapt Atlas

GSE to the support requirements of the 117L vehicle. In addition to the GSE normally required by the Atlas missile WS 117L GSE will consist of five to seven vans and trailers for servicing and handling. In addition, mast feeding liquid, pneumatic, control and instrumentation lines to the 117L vehicle are required. Equipment racks will be added to the blockhouse for 117L vehicle checkout and control.

3. The demands placed upon the designer of WS 117L operational support equipment stem from the need to have the system operated by the Air Force rather than contractor personnel. Rapid reaction and hardening are not requirements, rather the need to achieve maximum quality of reconnaissance data and consequent perfection of ground calibration and checkout procedures is primary. Simplification of equipment, economy in personnel requirements, and reliability, are features that will be stressed.

4. Equipment categorized by the title "WS 117L Ground Support Equipment" refers to that needed for support of the 117L vehicle from factory to launch. It includes equipments used for launch monitoring and control, system and subsystem checkout, servicing, and handling. That support equipment required for the booster stage, is not included in this basic definition.

5. The checkout and launch preparation philosophy for WS 117L is predicated on achieving a maximum assurance of launch readiness prior to mating with the booster and requiring only a minimum of go-no go type checks on the launcher. Quantitative indications, the use of colored lights, and maximum practical automation will be design features of operational checkout equipment.

[redacted] CONF...

SUMMARY DESCRIPTION OF CONTRACTS BY WEAPON SYSTEM

A. AF 04(647)-97 and AF 04(647)-181 Lockheed Aircraft Corporation

1. Management

LMSD: The central direction and control of concepts, studies, analyses, expenditures, programming, scheduling and reporting; the administrative support required to provide manning, funding and coordination of all activities of the Weapon System; the source of evaluation and progress information to the customer.

2. Systems

LMSD: Perform analyses, design studies and flight tests (and basic development tests not applicable to a particular subsystem) in determining compatibility of systems, establishing system concepts, design criteria and constraints to ensure: compliance of space bound system components with the concept for each successive system and complete systems integration. This includes design, development and/or provision and operation of ground equipment systems, ground-space tracking, communications, command systems and related test, servicing, calibration and logistical support equipment (both contractor and/or government furnished) embracing human engineering and Q.P.R.I. studies as well as engineering research and required manufacturing.

Subcontract: Conduct a program of analytical study and system simulation and conduct A&E studies.

3. Airframe Subsystem

LMSD: Develop and produce satellite airframe. Provide: propellant and pressurization tankage; aerodynamic fairings; structural supports, brackets and fittings; mechanical and electrical fittings not included in other systems; environmental controls; and ground equipment required for transporting, servicing, erecting and launching.

4. Propulsion Subsystem

LMSD: Obtain and integrate the orbital thrust rocket engine. Develop and provide propulsion subsystem including: feed and loading systems, engine gimbals, and equipment required to start and stop rocket engine in response to command (or program) ullage orientation requirements, and ground based items for testing, calibrating and servicing.

Subcontract: Bell Aircraft Corporation: Modification and development of XLR-81 rocket to YLR81-Be-3 (IRFNA and JP-4 propellants)

[redacted] CONF...

engine; performance of PFRT and delivery of ground and flight engines, including spares, engine rework, engine repair and handbooks. Modification and development of YLR 81-Be-3 to IRFNA and UDMH propellant configuration, perform PFRT and delivery of ground and flight engines including spares, engine rework, engine repair and handbooks.

Aerojet-General: Design, develop and manufacture of solid propellant ullage orientation rockets.

5. Auxiliary Power Subsystem

LMSD: Develop and/or provide and integrate: energy source and power conversion equipment required to furnish electrical power for all subsystems within satellite from time just prior to launch to mission's ending and equipment required for testing and servicing.

Subcontract: Design, development and production of prime energy sources and power conversion equipment, including power inverters, voltage regulators, photovoltaic collectors, control relays and design, development and production of primary and secondary batteries.

6. Guidance and Control Subsystem

LMSD: Develop and/or provide and integrate: ground based and on board guidance and control (command) equipment required to stabilize, direct, separate and boost orbiting vehicle and equipment required for servicing, testing and calibration.

Subcontract: Design, development and production of horizon scanners, inertial reference package, control valves and nozzles, and MIT inertial guidance system.

7. Visual Reconnaissance Subsystem

LMSD: Develop and/or provide and integrate: photographic system(s) required to collect, store, filter (or process), convert into video signal for transmission to ground, reconvert video signal to photographic form for use and the equipment required for servicing, testing, and calibration.

Subcontract: Eastman Kodak: Research, development and fabrication of visual reconnaissance equipment and photo simulation studies.
Other: Development of wide-band video recorder and TV feasibility study.

8. Ferret Reconnaissance Subsystem

LMSD: Develop and/or provide and integrate: an electronic system(s) required to collect, store, filter (or process), reconvert

(as required) and decode electromagnetic intelligence information and the equipment required for servicing, testing and calibration.

Subcontract: Airborne Instruments Lab: Conduct a program to develop an electronic reconnaissance system for use in a satellite vehicle.
Other: Conduct a study of operational requirements for the electronic reconnaissance system.

9. Infrared Reconnaissance Subsystem

IMSD: Develop and/or provide and integrate: an infrared reconnaissance system required to collect, store, filter (or process), reconvert (as required) and decode electromagnetic intelligence information and the equipment required for servicing, testing, and calibrating.

Subcontract: Investigate infrared techniques applicable to precision tracking of point targets such as burning ICBM rockets; establish preliminary design characteristics of infrared reconnaissance surveillance equipment; instrumentation for balloon flights, balloon services; infrared detection and cooling technique development program; infrared target characteristic measurement program.

10. Ground-Space Communications Subsystem

LMSD: Develop and/or provide and integrate and operate: space-ground and ground communication and tracking equipment required by contractor to coordinate and monitor all flights and assist the government in determining, equipping and manning facilities required for service controlled activities. This includes all ground support equipment required for servicing, testing and calibrating.

Subcontract:

Philco Corporation: Conduct a program for research, design, development and fabrication effort for the ground space communication subsystem and early operation of subsystem; manning and planning of ground stations; and installation of Subsystem H ground equipment.

11. Biomedical Subsystem

LMSD: Develop a recoverable capsule to accommodate an aero-medical package for use with the Thor-boosted vehicles.

B. AF 04(647)-103 - Massachusetts Institute of Technology

Responsible for research and development of ascent guidance, transition computer, vernier boost guidance and all-inertial guidance equipment for WS 117L.

C. AF 04(647)-165 - Space Technology Laboratories, Ramo-Wooldridge Corp.

Since Lockheed Aircraft Corporation has the prime contract for WS 117L under the direction of AFBMD, contribution of the Space Technology Laboratory lie primarily in the area of consulting services and technical studies. These services are performed for, and at the specific request of AFBMD.

The STL studies are general in nature and indicate trends rather than highly detailed final results. STL is not responsible for technical direction, quality of design, contractor performance, or contractor evaluation.

D. Letter Contract Designated as Supplemental Agreement #13, Contract AF 04(645)-4 Convair Astronautics Division, General Dynamics Corp.

Responsible for providing such services as are required to adapt the SM 65 booster, its facilities, ground support equipment, etc., to the WS 117L and launch the combined SM 65 - WS 117L vehicle into orbit.

E. Letter Contract Designated as Supplemental Agreement #15, Contract AF 04(645)-65, Douglas Aircraft Company

Responsible for providing such services as are required to adapt the SM 75 booster, its facilities, ground support equipment, etc., to the WS 117L and launch the combined SM 75 - WS 117L vehicle into orbit.

F. OA 58 - 25, Rome Air Development Center
OA-59-1

Responsible for conduct of a program of research and development on equipments, techniques and methods for processing of photographic, ferret, and infrared data returned from the satellite, into meaningful intelligence information. RADC is delegated the responsibility for the conduct of the program for the Data Processing Subsystem. The Ramo-Wooldridge Corporation has contractual responsibility for this subsystem under Contract AF 30(602)-1814.

G. OA 58 - 10, Air Force Cambridge Research Center

Responsible for conduct of a program of research and development on equipments, techniques and methods for the collection of geophysical environmental data. AFCRC has been delegated the responsibility for the conduct of the program for the Geophysical Environment Subsystem.

H. OA 58 - 9, Wright Air Development Center

Continuation of studies on infrared detector materials for WS 117L.

I. MIPR 58 - 54, Naval Air Station, Moffett Field, California.
Helium for Lockheed.

J. CSO 58 -33, Ballistic Research Laboratory, Aberdeen, Indiana.
Wind Tunnel Tests, WS 117L Models.

CSO 58 - 39, Army Ordnance Command, Joliet, Illinois.
Munitions for Lockheed.

K. MIPR 72, Bureau of Ordnance Model Tests, Pressurized Ballistics Range, Naval Ordnance Laboratories, White Oak Maryland.

L. CSO 59-54, Transonic Free Flight Tests, Ballistic Research Laboratories, Aberdeen Proving Grounds, Aberdeen Maryland

M. MIPR 59-58, Naval Ordnance Test Station, Chincotegue, Virginia
High Altitude Nose Cone Flight Tests

N. MIPR 59-73, Navy, For Restoration and Modification of USNS Pvt. Joe E. Mann

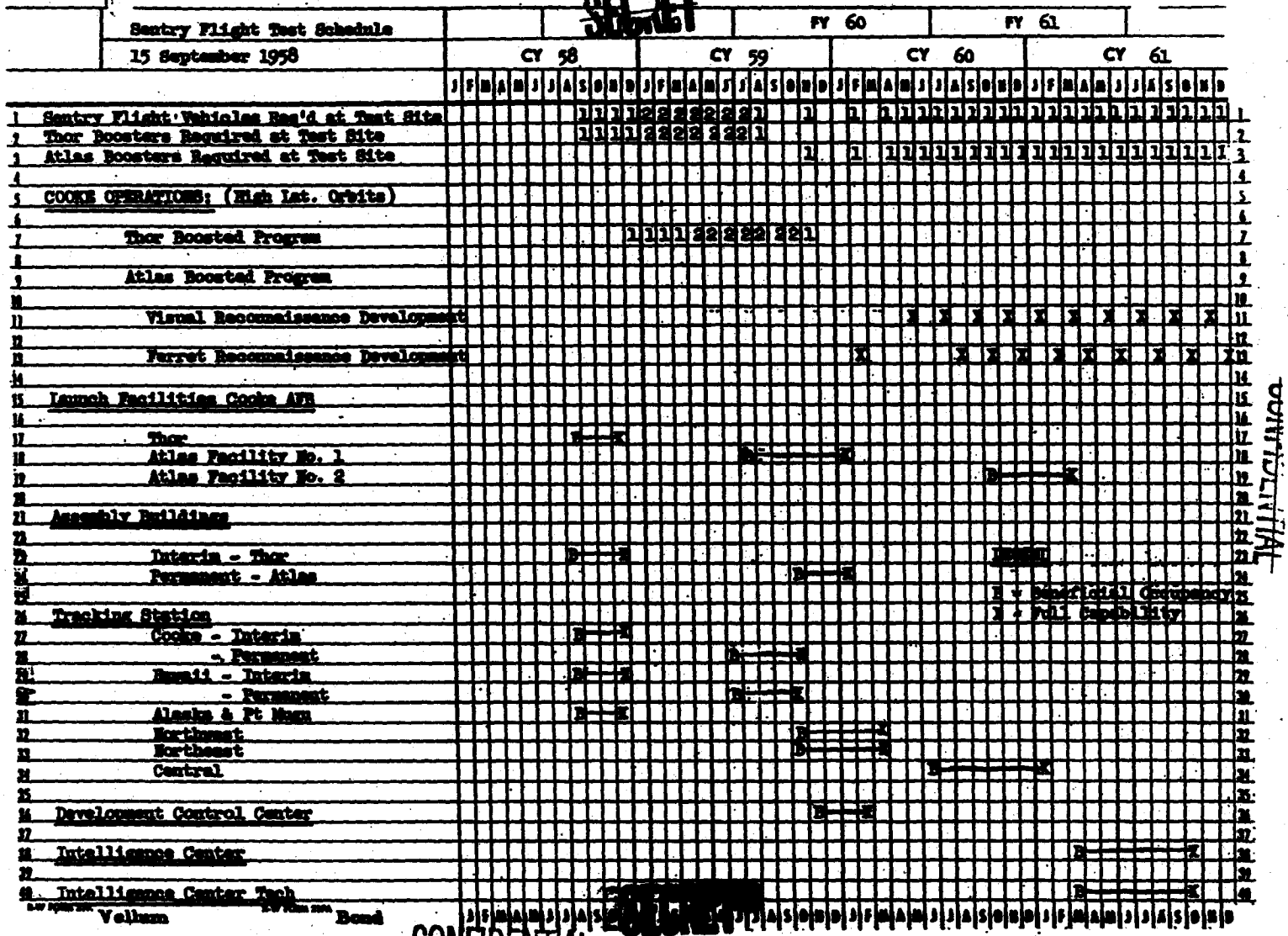
O. OA 58-62, To Kirtland Air Force Base, Mexico, Propellant Tank Tests for Advanced Study

PROGRAM SCH[illegible]

~~SECRET~~

Sentry Flight Test Schedule

15 September 1958



~~CONFIDENTIAL~~

CONFIDENTIAL

TEST ANNEX

TABLE OF CONTENTS

I. General

A. Test Philosophy

This annex will outline the philosophy that is being used to direct the WS 117L contractors in testing the subsystems individually and in combination, and the system as a whole. This philosophy draws on experience of other USAF programs, especially the ballistic missiles which serve as boosters on WS 117L. These objectives and missions require the launching of a large ballistic missile, and an equally, if not more, complex second stage, the acquisition of reconnaissance data, sustained communication with three, or more, ground stations, and the reduction, processing and dissemination of great volumes of data, daily. To the aforementioned end, the test program plan is predicated on pyramidal-support, from each lower-order test, as to data, for the logical next order, and finally full order system test.

The flight tests will, even early in the program, result in the acquisition of data that can be used to exercise many major system elements. Therefore the in-plant and laboratory test plan is extremely condensed, to insure early availability of major ground-station-prototype equipment.

Forthcoming vehicle configurations will require early flight test of open-loop assemblies, thus the priority of flight test objectives will also, of necessity, require careful scrutinisation as to material benefits to be derived.

The WS 117L will utilise the Thor and Atlas missiles for boosters for the WS 117L orbiting vehicle. It is assumed that the boosters are essentially proved GFP items, however significant data will be acquired on the booster performance, during WS 117L flights, that will supplement statistics acquired on the respective missile development programs.

The philosophy set forth in a March, 1955 letter of General Power (Commander of ARDC) for the testing of guided missiles is being directly applied to WS 117L.

B. System Testing Responsibilities

1. Flight Testing

a. General

In consonance with ARDC Regulation 80-9 "Technical Test Direction", the responsibility for system testing of the WS 117L is assigned to the Weapon System Contractor. The Air Force Ballistic Missile Division exerts Technical Test Control and has established system, launch, and tracking station test control offices, Palo Alto and Cooke AFB respectively, to aid in exercising this responsibility. Technical Test Control is the specialized or professional guidance and direction exercised with respect to

the conduct of tests by the Air Force or Air Force contractors. Included in technical test control is the authority to schedule, conduct, alter, stop, and evaluate individual tests in accordance with the dictates of accomplishment of objectives, safety, interference to other tests, technical feasibility of any, compliance with contractual specifications concerning the test, undue expenditures of funds or property, and limitations imposed by available test resources.

b. Weapon System Contractor

(1) The Weapon System Contractor is responsible for the direction and conduct of WS 117L Tests that involve injecting the orbiting vehicle into space, and ground acquisition of information sensed on orbit. Since the pre-launch countdown involves, for the greater part, booster readiness operations, the booster airframe contractor directs his pre-launch activities according to a schedule agreed to prior to test initiation. Unusual circumstances that arise during the countdown will be resolved by AFBMD and the Weapon System Contractor, with reference to test objective priorities. The over-all progress of the countdown is directed by the WS 117L Weapon System Contractor, who constantly coordinates all down-range, cross-country and Hawaiian or Alaskan station readiness.

(2) The WS 117L Weapon System Contractor is assisted in his role as Test Director by the various Subsystem Operations Controllers. The subsystems are the WS 117L Airframe, Propulsion, Ground-Space-Communications, Guidance, APU, Visual, Ferret, or I-R Payload and Data Processing. The Thor, or Atlas Booster is considered a WS 117L subsystem but is the separate responsibility of either Douglas or Convair. Each of these subsystems, some of which are the responsibility of the Weapon System Contractor himself, is controlled in operation and readiness by an Operations Controller who reports status directly to the Weapons System Contractor, and continues, or holds, according to the latter's direction.

2. Captive Test

a. The captive tests will be conducted at the Weapon System Contractor's backyard facilities. He is responsible that all components to be tested are available and installed on the various subsystem and system tests. He is also responsible for scheduling captive tests so that data derived from such tests are applicable to subsequent flight tests. Subsequent flight hardware shall reflect the design and engineering improvements that are derived from captive tests.

C. Ground Handling and Test Equipment for the Test Program

The GSE is composed of the necessary equipment to support a vehicle consisting of a liquid propellant engine, guidance and control systems, various power supplies, telemetry, a five-foot diameter by twenty-

foot vehicle, pressurized-tank systems, and second-stage type handling and mating characteristics, plus photographic, electronic, tape recording, ferret, exotic APU, and infrared payload checkout equipment. (A list of WS 117L GSE and associated performance can be found in Lockheed MSD Report 2842, dated 28 February, 1958, Title: WS 117L GSE Performance Specification.)

The total GSE scheme involves the use of that GSE associated with the booster (Atlas or Thor) in combination with that of the WS 117L Vehicle.

With knowledge of the GSE associated with the Atlas or Thor boosters, an image of launch pad GSE for a WS 117L Flight can be formed by adding five or seven truck vans and trailers grouped about the base of the launcher, an umbilical mast feeding liquid, pneumatic, control, and instrumentation lines up along the erected and mated booster and WS 117L vehicle, terminating at the WS 117L Vehicle at the end of a retractable boom. Presently the blockhouse equipment consists of five standard racks, with direct conduit-to-rack cable connections.

The checkout and launch preparation philosophy is centered on achieving a maximum assurance, "in the hangar", that the WS 117L Vehicle is ready for launch, prior to mating with the Booster (Thor or Atlas). Thus, a minimum of go-no-go checks are actually performed after mating with the Booster on the launcher.

II. Data Utilization Plan

1. Introduction

The currently approved program for WS 117L is primarily developmental in context. Both the airborne and ground components of this system will be in a research and development phase in varying degrees until 1965. However, flights scheduled within most of the later phases of the R&D effort will produce intelligence information of interest and use to a number of national agencies. Intelligence information, moreover, is not the only benefit which may be derived from this type of system. Other payloads under consideration may generate anti-ICBM information of interest to the Air Defense Command; some may generate weather information; while still others might be used to investigate space systems intended primarily for communication purposes. The variety of purposes for which these large satellites can be used and their consequent national importance demands that the R&D field organization required to develop the system also be equipped, supported, and prepared to collect and disseminate this data during the development period.

The Air Force Ballistic Missile Division of the Air Research and Development Command is charged with the development of WS 117L. In order that the development of this system be pursued with maximum effectiveness, development considerations (in contrast to payload by-products) must be kept paramount. The initial flights do not finalize development. On the contrary, it is necessary to incrementally improve the satellite, its payload, and

supporting ground systems throughout all presently scheduled flights in order that required system characteristics be met.

AFBMD planning is directed toward a balanced developmental program and system test program during the time period 1960 to 1965 with the following characteristics:

1. Maximum priority and effort on achieving a well-developed and workable system.

2. Maximum use of existing ballistic missile boosters, facilities and test equipment.

3. Maximum use of existing communication nets and command channels for the collection, receipt, and transmission of data.

4. Maximum beneficial use of the data collected.

METHOD OF ACHIEVEMENT

Launchers and supporting launch equipment will be positioned at Cooke Air Force Base. Launching of all satellites capable of collecting intelligence information will be made at this location. In the interest of economy, the Atlas GE Mod II tracking radar and associated computer now being installed at Cooke Air Force Base will be used. Atlas support facilities and equipments required to assemble and check out the boosters and added R&D second stage support facilities and equipments will be in position and checked out prior to the receipt of the first WS 117L vehicles.

The task of placing a satellite in orbit is relatively simple as compared to the development of the required payloads and ground system necessary to support the total system. Thus, the key to the satisfactory attainment of a completely operational system lies in the quality of the development effort applied to create an Air Force capability to gather, process, and handle the raw data obtainable.

The tracking and acquisition stations and the technical operations and data processing facilities required to support the WS 117L development effort must be sited and under construction in 1959, and completed in 1960. This portion of the program is the first step involving data receipt and handling required to attain the goals established by General Operational Requirement documents.

The fact that the program will be essentially developmental in nature through 1964 makes it desirable that many technical evaluation functions and data processing functions be located at development facilities.

The logical location for such facilities is adjacent to or within

the plants of contractors responsible for the development of prime system equipment. The development of the total system is in its early phases and follow-on development of the various system elements will continue for some time . Therefore, such a capability will be permanently useful and will enable proper program augmentation. Maximum benefit will be derived from this close association since equipment and system malfunctions and unsatisfactory performance can be readily detected and corrected with minimum loss of time and minimum expenditures of resources both manpower and material.

Initially, information received by this integrated facility will be relatively meager and sporadic and will not represent the amount or flow which will later be characteristic of the ultimate weapon system. The use, therefore, of this research and development collection point and existing communication systems for handling and disseminating intelligence data will be only an economical developmental step towards the attainment of a fast reacting reconnaissance system capable of handling massive quantities of data.

As the development program progressed throughout its planned evolution, there will be constant modification and rapid improvement of not only the vehicle itself but of the equipment which assimilates and handles the data received at the R&D data collection point.

The physical size of these facilities and early equipments have in most cases already been established and have been tailored to the research and development system test effort which they are designed to support. Due to the acceleration of this program combined with fund limitations, the systems and subsystems contractors will be hard-pressed to meet the changes required in going from phase to phase of the development program now visualized. It is most important, if development objectives are to be met, that there be no substantial non-R&D requirements levied against R&D facilities and equipments during the development period. The collection point, however, will be prepared to furnish data received during this time period to all interested agencies. This service will be coincidental with the fulfillment of its development purpose.

Maximum economy of personnel and natural resources may be affected through the use of this R&D facility for data dissemination purposes and will permit the Air Force to defer the construction of the operational intelligence or data processing center until a time when the WS 117L program has reached a state of development where more valid equipment, facility, support and communication requirements can be established.

PERSONNEL AND TRAINING

During the early phase of this program it will be necessary to use a large number of civilian contractor personnel for field operations. In order to accelerate the exploitation of space by this country, it is necessary

that a nucleus of Air Force operational personnel be placed in the R&D program and trained in the operation of the total system so as to permit rapid Air Force expansion in this field.

Military personnel selected in the early phases of the development program must be carefully screened and trained for this type of operation. In order to facilitate personnel acquisition for introduction into the development program and to acquire skills needed, all Air Force commands should be prepared to support this program on a priority basis.

LOGISTICS

During the research and development program, primary support will be furnished from the civilian contractors involved. It is planned that military support including tie-in to AMC electronic data processing will be phased into the development effort when equipment development progress and program development will permit and use-rates are established. Due to the fact that the advanced reconnaissance system is attained in distinct phases, it is expected that a truly military support effort cannot be effected until the latter stages of R&D.

FACILITIES

In order to provide facilities required to meet the exacting research and development schedules, site selection, design and construction has been governed primarily by technical requirements. For major facilities intended for post-1965 use, AFBMD will coordinate technical and facility designs to insure operational compatibility.

III. WS 117L FLIGHT TEST PROGRAM

The first phase of the WS 117L Flight Test Program involves the use of Thor missiles as boosters, and Cooke AFB launch sites. The objectives for this first phase are divided into two broad categories, namely WS 117L Vehicle Operation Testing, WS 117L/Thor compatibility testing, and Aeromedical payload orbital operation and recovery.

A. THOR BOOSTED PROGRAM

The first two Thor boosted flights will be primarily Phase A engineering tests to establish orbital capability and determine Thor-WS 117L vehicle compatibility. Initially the empty weight of the WS 117L vehicle on orbit will be approximately 1276 pounds increasing to about 1759 pounds by the tenth flight. The increased payloads will be possible commencing with the fifth vehicle as the result of conversion to UDMH from JP-4.

Following the first two flights, plans call for the gradual increase in test complexity by the addition of biomedical experimental capsules; geophysical instrumentation for measurement of cosmic rays, atmospheric density and albedo, and Phase B engineering tests. It is planned that this latter work be completed by the end of the tenth flight.

Test objectives for Flights 11 through 19 will be governed in large part by the results of previous experience and flight results, primarily refinement of recovery of unique payloads from orbit.

B. ATLAS BOOSTED PROGRAM

The second phase of the WS 117L Flight Test Program involves the use of Atlas missiles as boosters, and as before, launch sites at Cooke AFB. This phase will be introduced with flights whose objectives are focused on orbiting component and assembly combinations of future payload subsystems. Significant equipment and instrumentation loads will be orbited for the purpose of gathering operation data; prior to combining such equipment into full subsystems for orbital operation.

In conjunction with such Engineering Tests, the early Atlas-boosted flights will serve to check compatibility of the WS 117L/Atlas combination. This phase will begin with essentially proven WS 117L and Atlas vehicles, in view of previous operation histories, however, compatibility must be demonstrated, and combined ground operations must be refined. Considerable advantage is realized from the self-sustained character of the WS 117L vehicle, therefore, the changing of boosters should present only minor in-flight operation changes, providing the individual vehicles perform as designed.

The major portion of the Flight Test Program for WS 117L, as projected through 1965, depends on the use of the Atlas as a booster. Beginning early in 1959, at a rate of one per month, and in the latter years at a rate of two per month. These Atlas flights will be accomplished from a two-pad launch complex on the Pacific Missile Range - Point Arguello Facility.

The Atlas-boosted series of the WS 117L Program will be aimed at progressively developing Photographic, Ferret, and IR Payload Operations on orbit. Each of the payloads cited will follow the normal pattern of development, wherein sophistication and reliability of design progresses with respect to data derivation techniques, flexibility of operations to suit specific applications, refinement of ground pre-launch operations, and data handling, reduction, and dissemination operations.

The status of development and availability of flight hardware for each particular payload, at any given time, will determine the objectives of future flights, therefore, at this time no accurate prediction can be made as to flight-by-flight objectives. However, in general, the Photographic and Ferret Payloads will be developed in parallel, while the IR-Attack Alarm System will phase into full operation in the latter years of the program (1962-3-4).

IV. RESPONSIBILITIES, PROCEDURES AND ORGANIZATION FOR AFBMD ACTIVITIES AT COOKE AIR FORCE BASE, WS 117L PROGRAM

A. INTRODUCTION

The scope of this section is limited to the operation and direct support of the 117L launch phase at Cooke Air Force Base. Responsibilities for other phases of the 117L weapon system operation remote from Cooke Air Force Base will be covered at a later date.

B. DESIGNATION OF KEY PERSONNEL FOR TEST OPERATIONS

1. Key personnel are designated to fulfill a specific duty for a particular test.

2. Launch Controller - AFBMD officer designated by Chief, AFBMD Field Office.

3. Launch Conductor/117L - Lockheed representative.

4. Launch Conductor/Booster - Douglas representative(117L/SM-75)
Convair representative(117L/SM-65)

5. Senior Launch Engineers - 117L Subsystem and Booster Associate Contractors Representatives.

C. FUNCTIONS AND RESPONSIBILITIES DURING TEST PREPARATIONS AND TEST OPERATIONS

1. In general, Technical Test Control, defined in ARDC Reg. 80-9, will be exercised by AFBMD. Technical Test Direction, defined in ARDC Reg. 80-9, will be exercised by BMSD and subsystem contractors in accordance with direction or contractual authority of the Air Force.

2. Launch Controller has over-all supervision of the launch phases of the test operation. He is direct contact between all members of the AFBMD/contractor launching team, Cooke Air Force Base and the 117L operations remote from Cooke Air Force Base. During a launch operation he receives recommendations from the Launch Conductor/Booster regarding the Booster and from the Launch Conductor/117L regarding the 117L vehicle. He weighs these recommendations against the status of the local range and makes decisions accordingly. For coordination of the launch phase with other phases of the 117L Test operation he is subject to direction by higher AFBMD operating authority.

3. Launch Conductor/117L has both technical and operational supervision of the 117L portion of the launch operation.

a. He is responsible to the Launch Controller for technical readiness of the 117L Vehicle System and accomplishment of 117L Vehicle Test objectives. He makes technical recommendations relating to 117L vehicle readiness and test objectives.

b. He is responsible for preparation and checkout of the 117L vehicle during test and countdown operations. He conducts the 117L countdown, monitors activities of the 117L Senior Launch Engineers, makes operational decisions relative to the 117L vehicle, and reports progress periodically to the Launch Controller.

4. 117L Senior Launch Engineers are responsible for proper completion of all items in their assigned portions of the 117L countdown. They report completion of work to the Launch Conductor/117L.

5. Launch Conductor/Booster has both technical and operational supervision of the booster portion of the launch operation.

a. He is responsible to the Launch Controller for technical readiness of the booster system and accomplishment of booster test objectives. He makes technical recommendations relating to booster readiness and test objectives.

b. He is responsible for preparation and checkout of the booster and launch complex during test and countdown operations. He conducts the booster countdown, monitors activities of Booster Senior Launch Engineers, makes operational decisions relative to the booster and reports progress periodically to the Launch Controller.

6. Booster Senior Launch Engineers are responsible for proper completion of all items in their assigned portions of the booster countdown. They report completion of work to the Launch Conductor/Booster.

7. Flight Test Working Group is composed of personnel from AFBMD, LMSD, and subsystem contractors, DAC and associate contractors. It is chaired by a representative of the AFBMD Field Office and is concerned with operation of the booster and 117L vehicle and with solution of interface problems for complete system functioning during launch operations. It is responsible for detailed test planning and preliminary test evaluation relative to the launch operation. The Flight Test Directive, separate but coordinated countdowns for the booster and 117L vehicle and technical instructions concerning test activity are the responsibility of the Flight Test Working Group.

D. MISSILE SYSTEM AND LAUNCH COMPLEX READINESS

1. Prior to missile delivery to the launch stand, systems checkouts are performed simultaneously on the booster and 117L vehicle. The Flight Test Working Group reviews results of the checkouts. As chairman of the FTWG, the AFBMD representative makes final determination of the technical readiness of the missile system.

2. Prior to Flight Readiness or Launch Operation, checkouts are performed on the missile system and launch complex, including blockhouse, launch stand and support facilities. The Launch Controller, Launch Conductors and appropriate Senior Launch Engineers review results of the checkouts. The Launch Controller makes final determination of the technical readiness of the missile system and launch complex.

E. Range Readiness - Prior to flight readiness or launch operations, checkouts are performed on supporting systems remote from [redacted] Cooke, Air Force Base. The Launch Controller is kept advised of the status of checkouts of these supporting systems.

F. Final Decision on Test Operation - The final decision for transporting the missile system to the launch stand and for initiating or cancelling a countdown for any AFBMD test at [redacted] Cooke AFB rests with the Launch Controller. Under certain circumstances tests may be cancelled during countdown by higher AFBMD operating authority.

G. Conduct of Countdown for Test Operations - The 117L countdown and the booster countdown are conducted by the respective Launch Conductors and are coordinated by mandatory cross checks. The Launch Conductor/Booster is bound by the mandatory requirements of these cross checks, 117L test objectives, range conditions and other criteria imposed by the Launch Controller.

H. Preparation and Utilization of Countdown Documents

1. The countdown documents are prepared jointly by LMSD and DAC with assistance from the subsystem and associate contractors. The documents are reviewed and coordinated by the Flight Test Working Group and submitted to the AFBMD Field Office for approval. The documents are published at least ten days prior to the scheduled test.

2. Changes in countdown procedures which will not compromise test objectives may be approved by the appropriate Launch Conductor. Changes which may compromise test objectives will be referred to the Launch Controller. Countdown changes made during an actual count must not jeopardize test success and should be properly coordinated with all working agencies.

I. Test Termination - The decision of whether to terminate a test will be made by the Launch Controller after considering the specific situation and recommendations from the Launch Conductors, or as may be directed by higher AFBMD operating authority.

V. Captive Test Procedures at the Contractor's Backyard Facilities

A. Location

The Weapon System Contractor will perform captive tests at the Santa Cruz Test Base (SCTB), California

B. Purpose

The basic concept in the SCTB program is a complete systems check-out of each vehicle during a static firing prior to flight. During this period, specific subsystems will be instrumented as required to determine individual operating characteristics and their influence on system performance. Emphasis will be placed upon observation of such items as subsystem interactions, matching between subsystems, and combined system response to vibration and noise. The program will provide a prelaunch checkout of essentially all missile components and subsystems, operating under conditions as near their expected environment as can be simulated. Exceptions to the inclusion of all flight hardware in these tests will be considered only if it develops that equipment in question will surely be degraded in performance or reliability by such a static firing. Upon completion of static firings, the propellant feed system will be purged, the vehicle rechecked, and shipped to the launch site. The test program at the SCTB also will be essential to, and designed for, establishing countdown procedures to be used at the flight base, accomplishing the required training of personnel, and checking out the ground support equipment.

C. Responsibilities

1. Project Office

At SCTB, a local AFBMD Field Office will be established to exercise technical test control as defined in ARDC Regulation 80-9. Since airborne equipment to be flown in the missile will first go through captive test, it will be necessary for the contractor and subcontractors to prepare the captive test plan, defining problem areas and detailing tests to be run in each area. These plans will be approved by AFBMD, insuring that the

various tests apply to a specific missile and test firing. In pursuing the test to successful conclusions, the AFBMD Field Office will exercise the following responsibilities:

a. Provide an information channel between AFBMD and the Test Base concerning all aspects of the operation.

b. Perform the coordination function between the contractor and AFBMD for acceptance procedures.

c. Approve proposed test directives.

d. Provide an evaluation of the effectiveness of the contractor's performance in the assembly, checkout, and firing of the missile.

e. Exercise management control and technical direction of development contractor engaged in the test program. This will include modification, realignment or redirection of the contractor's test efforts and programs.

f. Review evaluation of the post-firing data with test personnel and revise data reduction and distribution specified in the test directives as required.

g. Prepare documentation necessary for reporting of tests.

2. Contractor

The test contractor will prepare the Test Directive in coordination with the subcontractors, and the AFBMD Field Office. The test contractor will have the responsibility of conducting the specific test as outlined in the Test Directive.

Prior to tests, the contractor will prepare the General Test Plan, a Data and Support Requirements Plan, and a Detailed Test Plan which will be forwarded for coordination to the appropriate offices. Upon test approval, he will be responsible for:

a. Readying all subsystems and the associated hardware.

b. Providing the necessary support for testing the subsystems and the associated hardware.

c. Checking out and operating the test equipment needed for operations in accordance with the Test Directive.

d. Analyzing results and incorporating significant data in further system and subsystem development.

VI. WS 117L Support Testing

A. Purpose

In the development of the multitude of components required for the WS 117L System, numerous tests will be performed by contractors, supported when needed by the various ARDC centers and other Department of Defense Installations and agencies. Maximum effort will be made to insure that all component testing is completed and components are satisfactory before any such components are released for use in the major systems. The tests will be performed to insure the maximum performance and reliability of components for use in the missile flight test programs. Many of the support equipment and component tests will be conducted to insure the capability of gaining the maximum of test data from the missile test program.

B. Responsibilities

The contractor will have direct responsibility and control for all development and testing subject to review and approval by AFBMD, in a properly designated office, which reserves the right to stop, amend, or postpone any tests as they deem necessary in order to insure that it provides the desired support to the development programs. AFBMD will have the additional responsibility of assisting the contractor in gaining access to and insuring that proper support is given by any ARDC test center or any Army, Navy or other Air Force facility. Technical test control will be exercised by AFBMD/WS 117L. The contractor will have primary responsibility for the acquisition and reduction of all data obtained.

C. Test Programs

The following test programs are being, or will be, executed to establish system and subsystem design criteria:

1. Wind Tunnel Tests
   a. WS 117L/Thor combination.
   b. WS 117L/Atlas combination.
   c. Bio-Medical Capsule.
2. Environmental Tests
   a. Component
   b. Subsystem
   c. Entire Vehicle
   d. Bio-Medical Capsule

3. Horizon Scanner Tests (Balloon)

4. Nuclear APU Tests

   a. Shielding

   b. Installation

   c. Safety

5. Infrared Target Characteristics Tests

6. Ferret Tests

   a. Aircraft

   b. Balloon

7. Data Processing Equipment (Large Volume)

8. Propellant Tank Tests

   a. Acceleration

   b. Corrosion

   c. Destruct

9. TLM/18 Telemetry System Tests

   a. Tracking Capability

   b. Error Analyses

   c. UHF Conversion

10. GSE Tests

   a. Umbilical Mast and Disconnects

   b. Propellant Loading

   c. Emergency Dumping

11. Roll Control Tests (Simulation)

   a. Response

   b. Environmental Operation

12. Photographic Systems Tests

    a. Balloon-borne

    b. Degradation Simulation

13. Solar APU Tests

14. Propulsion System Altitude Start Tests

15. Aircraft Drop Tests

    a. Capsule Operation - Development

    b. Capsule Operation - Target Acquisition Tests (Air and Sea)

    c. Parachute/capsule Airsnatch Tests

    d. Parachute/capsule Airsnatch Training (crews)

16. Aircraft/Ship Data Package Snatch Test

~~SECRET~~

~~CONFIDENTIAL~~

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

SUMMARY BY APPROPRIATION

APPROPRIATION	AMOUNT
FISCAL YEAR 1959	
100 - Aircraft and Related Procurement	111,031,000
200 - Major Procurement Other Than Aircraft	51,878,000
300 - Military Construction	23,387,000
400 - Operation and Maintenance	880,000
600 - Research and Development	44,047,000
GRAND TOTAL FOR FY 1959	231,223,000
FISCAL YEAR 1960	
100 - Aircraft and Related Procurement	170,534,000
200 - Major Procurement Other than Aircraft	59,971,000
300 - Military Construction	10,770,000
400 - Operation and Maintenance	3,685,000
600 - Research and Development	52,016,000
GRAND TOTAL FOR FY 1960	296,976,000

~~CONFIDENTIAL~~

WDPP-58-30

~~SECRET~~

~~CONFIDENTIAL~~

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

SUMMARY OF APPROPRIATION BY PROJECT

APPROPRIATION AND PROJECT	FY 1959	FY 1960
100 - TOTAL	111,031,000	170,534,000
131	105,631,000	162,695,000
141	0	1,650,000
142	0	446,000
143	0	50,000
151	5,400,000	5,693,000
200 - TOTAL	51,878,000	59,971,000
220	0	445,000
233	2,200,000	2,875,000
244	49,478,000	55,304,000
250	0	30,000
260	0	567,000
273	200,000	750,000

[redacted]

~~SECRET~~

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

~~CONFIDENTIAL~~

SUMMARY OF APPROPRIATION BY PROJECT
(Continued)

APPROPRIATION AND PROJECT	FY 1959	FY 1960
300 - TOTAL	23,387,000	10,770,000
313	1,200,000	650,000
321	22,187,000	10,120,000
331	0	0
400 - TOTAL	880,000	3,685,000
431	0	1,200,000
432	0	450,000
433	205,000	205,000
457	375,000	1,500,000
458	0	30,000
481	300,000	300,000
600 - TOTAL	44,047,000	52,016,000
620	35,715,000	43,094,000
690	8,332,000	8,922,000
GRAND TOTAL	831,223,000	296,976,000

~~CONFIDENTIAL~~

[redacted]

WDPP-58-30

SECRET

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 100
PROGRAM: 130
PROJECT: 131

FY 1958 and Prior 45,400,000 FY 1959 105,631,000 FY 1960 162,695,000

DESCRIPTION

Funds requested under this Budget Project will be used for the WS 117L vehicles and for the central project direction and control, analysis, and administrative support required in the production of the weapon system. Requirements are stated on an incremental funding basis. Testing and operation of the above equipment during FY 59 is included in the cost estimates. The major cost items are as follows:

a. WS 117L airframes. (Lockheed)

b. XLR-81 rocket engines. (Ball Corporation, subcontract to Lockheed.)

c. Guidance and control systems and auxiliary power supply equipment. (Various subcontractors to Lockheed.)

d. Visual reconnaissance satellite-borne equipment, including automatic photo-processing and read-out components. (Eastman Kodak Company subcontract to Lockheed.)

e. Developmental and production electronic reconnaissance equipment (AIL subcontract to Lockheed.)

f. Communications equipment (satellite-borne) including telemetry and tracking channels. (Philco Corporation, subcontract to Lockheed.)

g. Atlas and Thor boosters (less nose cone) are included, together with the following associated costs:

(1) All expendables, including propellants and gases for the Cocke Flight Test Program.

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 100 (Cont'd)
PROGRAM: 130
PROJECT: 131

(2) Douglas checkout and launch crews at Cooke Air Force Base.

(3) Engineering services for facilities modification.

(4) Engineering services related to interface problems between Atlas and Thor boosters and WS 117L (including Atlas and Thor subsystems modifications as required).

[redacted]

DEPARTMENT OF THE AIR FORCE

WEAPON SYSTEM 117L PROGRAM

FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 100
PROGRAM: 140

	FY 1958 and Prior	FY 1959	FY 1960
Total P-140	0	0	2,146,000
P-141	0	0	1,650,000
P-142	0	0	446,000
P-143	0	0	50,000

DESCRIPTION:

Funds requested under this program represent costs for Atlas spare parts based on factors developed for that program.

[redacted]

[redacted]

[redacted]

[redacted]

SECRET

AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 100
PROGRAM: 150
PROJECT: 151

CONTRACTOR: Lockheed
LOCATION: Sunnyvale, Calif.
CONTRACT NO: Unassigned

FY 1958 and Prior Years 70,000 FY 1959 5,400,000 FY 1960 5,693,000

1. ITEM NO's 59-151-1 and 60-151-1

2. DEVELOPMENT PLAN REFERENCE: Not applicable

3. LEAD TIME REQUIRED FOR COMPLETION: Lead time varies by individual item of equipment. The amounts programmed have taken into consideration the need dates of individual items plus their procurement lead times.

4. PROGRAM REQUIREMENT FOR FACILITIES: Development, fabrication, test and checkout of WS 117L. The original contract with Lockheed provided that the contractor would provide all facilities except for several items that could be located in the Industrial Reserve. Recent program augmentation and acceleration, however, superimposes a production type program on the originally envisioned R&D program. Consequently, facilities required to support the current program are required not only earlier than originally contemplated, but also in substantially greater quantities. The contractor states that it is unable to provide the additional facilities.

5. DESCRIPTION OF FACILITIES: Facilities to be provided consist of a small quantity of general purpose machine tools and production equipment; and laboratory and test equipment. The predominant requirement in this case, as is generally true in other Ballistic Missile facilities expansions, is that for laboratory and test equipment. The FY 1958 requirement of $70,000 for a flow turning machine for fabrication of component equipments. About $4,900,000 of the total FY 1959 and $4,490,000 of the FY 1960 amount is for laboratory and testing equipment. Types and quantities of laboratory and test equipment required for this program are not available in industry, nor are such items generally available in the industrial reserve.

6. OTHER SOURCES CONSIDERED AND REASON FOR SELECTION OF THIS SOURCE. Not applicable

SECRET

CONFIDENTIAL

CONFIDENTIAL

[redacted]

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

APPROPRIATION: 100
PROGRAM: 150
PROJECT: 151 (CONT)

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

ITEM NO's 58-151-1 and 59-151-1 (Cont'd)

7. BASIS OF COST ESTIMATES: Cost estimates are based on contractor estimates reviewed and modified by AFPRO/BMD. It is pertinent to note that the contractor requested that the government provide a plant in which to conduct this work, at an estimated cost in excess of $9 million, in addition to the severable facilities programmed. Contractor's request has also been reduced by the estimated dollar amount of facilities available in the industrial reserve.

8. BREAKDOWN OF COSTS:

SCHEDULES:	FY-59	FY-60
I. Land and Land Improvements	-0-	-0-
II. Buildings, etc.	-0-	-0-
III. Machinery and Equipment	5,100,000	5,278,000
IV. Portable Tools and MHE	-0-	255,000
V. Installation Costs	300,000	160,000
TOTAL R-151	5,400,000	5,693,000

9. PRIOR FUNDING: 70,000

10. ADDITIONAL BACKGROUND INFORMATION: None

[redacted]

~~SECRET~~

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROGRAM

APPROPRIATION: 200
PROGRAM: 220
PROJECT:

FY 1958 and Prior 0 FY 1959 0 FY 1960 445,000

DESCRIPTION:

The funds requested in this budget program are to cover the cost of support trucks, trailers, tractors, and centrally procured items of GSE in support thereof.

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

~~SECRET~~

TT-0

SECRET

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 Budget Estimate
and
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 200
PROGRAM: 230
PROJECT: 233

FY 1958 and Prior 0 FY 1959 2,200,000 FY 1960 3,875,000

DESCRIPTION: The funds requested in this budget are for the design, fabrication and testing of telephone system components and associated items of the WS 117L communications system. Also included are miscellaneous items of communications and electronics equipment. The functions of this system are to provide command and administrative communications facilities between the launch site and the tracking stations for countdown, satellite control, operation and maintenance. The operational sites are Palo Alto, California, Cooke AFB, California, Pt Mugu, California, Hawaii, Alaska, telemetry ship, and the Northeast tracking site. The beneficial occupancy date of all of these locations is not later than August 1958 except for the Northeast tracking site which has a BOD of September 1959. The types of equipment required include 200 line PABX switchboard, telephone instruments, 50 station intercom, tape recorders for telemetry receivers, spares, etc. A consideration of this budget plan is that the contractor (IMED) will provide all ground communications-electronics equipment other than the ground to ground equipment and miscellaneous electronics items described herein.

SECRET

WDPP-58-30

[redacted]

DEPARTMENT OF THE AIR FORCE

WEAPON SYSTEM 117L PROGRAM

FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 200
PROGRAM: 240
PROJECT: 244

FY 1958 and Prior 7,600,000 FY 1959 49,476,000 FY 1960 55,304,000

DESCRIPTION:

Funds requested in this budget project are to cover costs of the detailed design and design coordination, integration of components, fabrication, testing of ground support equipment for the various flight subsystems as well as the ground-based portions of the WS 117L system as a whole, and necessary spares. The major cost items are the ground equipment for: overall system GSE; airframe-identified GSE; propulsion and propulsion control servicing checkout and test equipment for the XLR-81 engine. Servicing and checkout equipment for the auxiliary power supply; alignment, servicing, and checkout equipment for the guidance and control subsystem; ground-based photo reconstruction equipment; ferret ground-based equipment; extensive ground communications required for tracking, commanding, receiving information from the satellite. (All the above are Lockheed and/or subcontractor items.) Normal GSE for the Atlas boosters is included along with GSE for two launchers, one blockhouse and maintenance facilities at Cooke AFB. Also included are funds for the fabrication and testing of production models of equipment for the data processing subsystem.

WDPP 58-30

[redacted]

[redacted] CONFIDENTIAL

[redacted] CONFIDENTIAL

[redacted]

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 200
PROGRAM: 259
PROJECT:

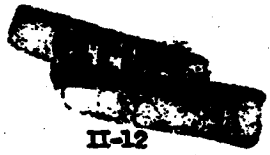
FY 1958 and Prior 0 FY 1959 0 FY 1960 30,000

DESCRIPTION:

The funds requested in this budget project are for the procurement of training aids needed to train personnel in depot maintenance of the SM 65 booster.

[redacted]

[redacted]



WDPP-58-30

~~SECRET~~

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 200
PROGRAM: 260
PROJECT:

FY 1958 and Prior 0 FY 1959 0 FY 1960 567,000

DESCRIPTION:

The funds requested in this budget program are to cover the cost of squadron maintenance items of standard equipment, shop tools, etc., to support SM 65 at launch site.

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

~~SECRET~~

SECRET

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 Budget Estimate
and
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 200
PROGRAM: 270
PROJECT: 273

FY 1958 and Prior 0 FY 1959 200,000 FY 1960 750,000

DESCRIPTION: The funds requested in this budget are to provide for cable at the launch and tracking stations. These cables will be used between the transmitter and receiver areas and for intrasite cabling for the receiver areas at Cooke AFB, California and the Northeast tracking site. BCD are August 1958 and September 1959 respectively. The types of cables required are 19 gauge, multi-pair cable with an average price of $3.00 per foot.

CONFIDENTIAL

CONFIDENTIAL

SECRET

WDPP-58-30

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 300
PROGRAM: 310
PROJECT: 313

FY 1958 AND PRIOR: 390,000 FY 1959: 1,200,000 FY 1960: 650,000

ITEM NO.	LOCATION		MISSILE PROGRAM	FY 1959 TOTAL	FY 1960 TOTAL
58-313-1	Various		WS 117L	1,200,000	650,000
		TOTAL	WS 117L	1,200,000	650,000

SECRET

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 300
PROGRAM: 320
PROJECT: 321

FY 1958 AND PRIOR: 5,767,000 FY 1959: 22,187,000 FY 1960: 10,120,000

ITEM NO.	LOCATION	MISSILE PROGRAM	FY 1959 TOTAL	FY 1960 TOTAL
58-321-2	COOKE AIR FORCE BASE	WS 117L	9,300,000	
59-321-1	COOKE AIR FORCE BASE	WS 117L		6,000,000
59-321-2	NORTHWEST UNITED STATES	WS 117L	3,369,000	
59-321-3	NORTHEAST UNITED STATES	WS 117L	3,369,000	
59-321-4	CENTRAL UNITED STATES	WS 117L	3,369,000	
59-321-5	VARIOUS	WS 117L	2,780,000	
59-321-6	VARIOUS	WS 117L		4,120,000
	TOTAL	WS 117L	22,187,000	10,120,000

SECRET

CONFIDENTIAL

CONFIDENTIAL

WDPP-58-30

SECRET

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

ITEM

Item No. 59-321-1 COOKE AIR FORCE BASE	QUAN	CONST AWARD DATE	BOD	MRED DATE	MISSILE PROGRAM	BMD INDEX NUMBER	CATEGORY CODE	TOTAL FY 59	TOTAL FY 60
O/M Launch Facility	LS	10/58	10/59	03/60	WS 117L		390-531	6,300,000	
O/M Launch Facility	LS	11/59	10/60	03/61	WS 117L		390-531		6,000,000
O/M Assembly Fac	LS	12/58	10/59	01/60	WS 117L		310-461	3,000,000	
Item No. 59-321-2 NORTHWEST UNITED STATES									
Intercept & Data-Acquisition Sta	LS	12/58	10/59	03/60	WS 117L		300-000	3,369,000	
Item No. 59-321-3 NORTHEAST UNITED STATES									
Intercept & Data-Acquisition Sta	LS	1/59	10/59	03/60	WS 117L		300-000	3,369,000	
Item No. 59-321-4 CENTRAL UNITED STATES									
Intercept & Data-Acquisition Sta	LS	04/59	06/60	01/61	WS 117L		300-000	3,369,000	
Item No. 59-321-5 VARIOUS LOCATIONS									
Control & Intelligence Centers	LS	04/59 04/60	11/59 03/61	02/60 10/61	WS 117L		300-000	2,780,000	4,120,000

FY-17

SECRET

CONFIDENTIAL

CONFIDENTIAL

SECRET

SECRET

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 300
PROGRAM: 330
PROJECT: 331

FY 1958 AND PRIOR: 3,968,000 FY 1959: -0-0 FY 1960: -0-

ITEM NO.	LOCATION	MISSILE PROGRAM	FY 1959 TOTAL	FY 1960 TOTAL
58-331-1	HAWAIIAN ISLANDS	WS 117L	-0-	-0-
58-331-2	ALASKA	WS 117L	-0-	-0-
	TOTAL:	WS 117L	-0-	-0-

CONFIDENTIAL

SECRET

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 400
PROGRAM: 430
PROJECT: 431

FY 1958 AND PRIOR 0 FY 1959 0 FY 1960 1,200,000

DESCRIPTION:

These requirements are for depot level maintenance support for contractors furnished peculiar items on this weapon system. This type of depot support will be accomplished initially by contractor personnel. Fund requirements identified above are necessary for depot level repair and modification services and operation of a maintenance depot. This estimate includes the depot maintenance requirements pertinent to the booster, maintenance assembly facility, block house and associated GSE.

CONFIDENTIAL

CONFIDENTIAL

SECRET

~~SECRET~~

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 400
PROGRAM: 430
PROJECT: 432

DESCRIPTION: FY 1958 and Prior 0 FY 1959 0 FY 1960 450,000

These requirements are for depot level supply support for contractors furnished peculiar items on this weapon system. This type of depot support will be accomplished initially by contractor personnel. Funds requirements identified above are necessary for depot level supply and related services normally accomplished by an Air Force Supply Depot. This estimate includes the depot supply requirements pertinent to the booster, maintenance assembly facility, block house and associated peculiar GSE.

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

[redacted]

WDFP-58-30

SECRET

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 400
PROGRAM: 430
PROJECT: 433

FY 1958 and Prior 0 FY 1959 205,000 FY 1960 205,000

DESCRIPTION:

This requirement is for other than first destination distribution of material. It is estimated that a total of forty-eight trips, average distance of 2,000 miles per trip, average of 12 tons per trip, will be required to fulfill this requirement.

This computation is based upon the budgeting factor of $.18 per ton mile.

CONFIDENTIAL

CONFIDENTIAL

SECRET

SECRET

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 Budget Estimate
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 400
PROGRAM: 430
PROJECT: 437

FY 1958 and Prior 0 FY 1959 375,000 FY 1960 1,500,000

DESCRIPTION: The funds requested in this budget are for the engineering and installation of wire and utility equipment associated with the WS 117L communications system. These funds are essential to accomplish beneficial occupancy dates between August 1958 and September 1959 at Cooke AFB and the Northeast tracking site. Included are such items as engineering and installation of command transmitter tape recorder, telephone switchboards, intercom facilities and miscellaneous intrastation cabling.

SECRET

SECRET

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 400
PROGRAM: 450
PROJECT: 458

FY 1958 AND PRIOR 0 FY 1959 0 FY 1960 30,000

DESCRIPTION:

This requirement is for local purchase of direct mission support equipment pertaining to the booster, maintenance assembly facility, block house, and associated GSE.

CONFIDENTIAL

CONFIDENTIAL

SECRET

T-29

WDPP-KR-30

[redacted]

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROJECT

APPROPRIATION: 400
PROGRAM: 480
PROJECT: 481

FY 1958 and Prior 0 FY 1959 300,000 FY 1960 300,000

DESCRIPTION:

TDY: Funds requested in this category are to cover the costs of 1,437 trips, the minimum number required for proper administration and surveillance of the 117L Program. This includes trips to contractor plants, surveillance of military construction programs, site selection, and overseas trips to Alaska and Hawaii. The average miles per trip was arrived at by the computation of estimates submitted by staff agencies of this Headquarters. The cost per mile and average per diem per day is based on the current activity of TDY funding.

COMMUNICATIONS: To cover cost of long distance telephone calls emanating from AFBMD and from the AFBMD liaison offices in Alaska, Hawaii, and Palo Alto.

[redacted]

SECRET

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM 117L PROGRAM
FY 1960 BUDGET ESTIMATE
AND
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROGRAM

APPROPRIATION: 600
PROGRAM: 620

FY 1958 AND PRIOR YEARS 20,381,245 FY 1959 35,715,000 FY 1960 43,094,000

DESCRIPTION:

Included in this requirement are studies and analyses to determine feasibility of design concepts, establish design criteria, and accomplish the detailed design, fabrication, and testing of experimental versions of the subsystem and system components. The major cost items are: Facilities criteria studies; airframe preliminary design; refinement and modification of XLR-81 engine; study, design, and fabrication of experimental long-life auxiliary power supplies; photo simulation studies; design, fabrication and testing of experimental visual reconnaissance equipment; continuing study and analysis of ferret requirements; design, fabrication and test of experimental ferret equipment; continuing study and refinement of orbital computation and prediction methods; studies, measurements of geophysical phenomena (under AFCRC); studies, design, fabrication, and testing of experimental/developmental data processing equipment (Ramo-Wooldridge and others under RADC); design, fabrication, and testing of experimental guidance and control equipment, (MIT Instrumentation Laboratories).

Also included are requirements for engineering assistants and consultants to be furnished by Space Technology Laboratories and a proportionate share of the Ramo-Wooldridge housekeeping support furnished AFBMD.

Unless otherwise noted, the above work will be accomplished by Lockheed Aircraft Corporation and subcontractors to Lockheed.

DEPARTMENT OF THE AIR FORCE
WEAPON SYSTEM PROGRAM
FY 1960 BUDGET ESTIMATE
and
REVISED FY 1959 FINANCIAL PLAN

JUSTIFICATION OF REQUIREMENTS BY BUDGET PROGRAM

APPROPRIATION: 600
PROGRAM: 690

FY 1958 and Prior Years 0 FY 1959 8,332,000 FY 1960 8,922,000

DESCRIPTION: Included in this requirement are funds for the tracking sites and field office support. Also included are funds for the restoration, modification, and operation by MSTS of a telemetry ship to be utilized for the Thor boosted flights.

The costs associated with the equipping, training and operation of the aerial recovery force are also included. The costs of the surface recovery force was based on the estimated costs of operating five ships.

The requirement for ground communications systems in support of WS 117L is included in this Development Plan. The ground communications system in support of the Research, Development, and Test Phase of the 117L Advanced Reconnaissance System consists of two types of communications facilities and services, i.e., command and administrative communications net and ground communications data handling net.

The operational requirements for the command and administrative net are those facilities and services utilized between the launch site and the tracking stations for countdown, satellite control, operation, and maintenance. The data handling requirements are those facilities and services utilized as an integral part of the Research and Development and Test effort to channel the flow of digital data between the computer working sites of the project and the satellite vehicle. The reliability of both nets is critical and essential.

Leased land lines and equipment are required to tie all 117L working sites to the command post at Cooke AFB. These working sites are: Palo Alto, California; Hawaii; and Alaska. Leased land lines and equipment are also required to tie all 117L working sites above to the project computer located at Palo Alto, California.

SECRET

SECRET

CONFIDENTIAL

CONFIDENTIAL

SECRET

PREFACE

This section covers the facilities required in support of the WS 117L program. The Program Summary is divided into two sections by type of funds, Industrial Facilities (P-151) and Military Construction (P-300). Within the Industrial Facilities (P-151) area, a line-item summary of the detailed program shown in Section II of the Development Plan is presented.

In the Military Construction Program area, a summation, by location, of the items programmed in Section II is shown in detail. These facilities are required to support the following important aspects of the program: system and flight testing; tracking, control, and telemetry; intercept, control, and data-acquisition; development control; and data interpretation and dissemination. The initial development flight test program will be supported by modified Cooke AFB and AFMTC launch facilities, and the continuing development flight test program will be supported by new Cooke AFB launch facilities. Tracking and telemetry stations at Cooke AFB and the Hawaiian Islands will provide accurate trajectory and vehicle performance data during the developmental and operational flights. Two tracking and vehicle recovery command stations in Alaska will track the vehicle, receive telemetry data, and will transmit the signal that will eject the recoverable-type capsule from the orbiting vehicles. A tracking and control station located at Point Mugu, California, will accurately track the vehicle from launch to second stage burnout, and transmit ignition command. Vehicle intercept, control, and data-acquisition stations in the northwest (Ft. Stevens, Ore.), northeast, (New Boston, N.H.) and central United States will provide data on vehicle trajectory and performance, program vehicle functions, acquire reconnaissance data from the orbiting vehicle and transmit the data to Intelligence Centers where intelligence data is processed, evaluated, and disseminated to intelligence agencies. A command and administrative facility located at Palo Alto, California, will serve as a control center throughout the development phase of the flight test program.

Budget estimates are based on latest available CWEs for those facilities already under construction, and for those for which design is complete. Budget estimates for other facilities are based on the most reliable information presently available. All estimates will be revised as more accurate information becomes available. Support facilities are not included in any of the estimates as all technical facilities have been sited to take advantage of support available at existing military or contractor bases. Funding under FY 1958 is based on a five quarter year.

Construction BOD (Beneficial Occupancy Date) as indicated in this volume is the date when buildings and/or structures will be completed to a point that will permit occupancy by the using agency for the purpose of installing unit equipment, special and/or fixed equipment that is not included as construction contractor-installed property.

Construction Completion indicates that date when the construction contractor (brick and mortar) has completed to the satisfaction of the contracting agency and the Air Force that work which he was obligated to accomplish under terms of his contract.

Need Date is the date when the facility is capable of performing the function for which it is intended.

PROGRAM SUMMARY FOR WS 117L Facilities

(FIGURES ARE IN MILLIONS OF $)

	P-151					P-300				
	PRIOR YRS	FY 59	FY 60	FY 61	TOTAL	PRIOR YRS	FY 59	FY 60	FY 61	TOTAL
WS 117L										
Patrick AFB						.049				.049
Cooke AFB						3.418	9.300	6.000		18.718
Hawaiian Islands						2.200				2.200
Alaska						.080				.080
N.A.M.T.C., Pt Mugu, Cal.						.020				.020
Northwest USA (Ft. Stevens, Ore.)							3.369			3.369
Northeast USA (New Boston, N.H.)							3.369			3.369
Central USA							3.369			3.369
Various							2.780	4.120		6.900
Advanced Planning						.390	1.200	.650		2.240
GRAND TOTAL P-151 and P-300						6.157	23.387	10.770		40.314

CONFIDENTIAL

CONFIDENTIAL

[redacted]

SECRET
(When Filled In)

LOCATION: [redacted] AFB

TYPE FUNDS: P-300 MCP

BUDGET ESTIMATES

ITEM CATEGORY VARIOUS ITEMS

PRIOR YEARS	FY 59	FY 60	FY 61	TOTAL
[redacted]				
TOTAL				

(FIGURES ARE IN MILLIONS OF $)

BMD INDEX	ITEM DESCRIPTION	BUDGET ESTIMATE, FY				DESIGN		CONSTRUCTION			NEED DATE
		PRIOR	FY [redacted]	FY [redacted]	FY [redacted]	START	COMPL.	AWARD	BOD	COMPL.	
	[redacted] (Prior) A F	[redacted]									

CONFIDENTIAL

CONFIDENTIAL

SECRET

WDPP-58-30

SECRET
(When Filled In)

LOCATION: COOKE AFB

ITEM CATEGORY: LAUNCH

DESCRIPTION AND UTILIZATION:

A complete launch facility will consist of two launch stands, with flame deflectors, underpad instrumentation and equipment space, service towers, umbilical masts, fuel storage and transfer facilities, water and electrical power transmission and distribution lines, hardstands, a blockhouse which contains controls and instrumentation and is designed to protect personnel from blast or direct fall-back of a missile. Detailed description may be found in the applicable Form 161. Guidance will be effected through the use of the G. E. Mod II Guidance System built as a part of the SM 65-1 Launch Complex.

These launch facilities will provide for all R&D Atlas-boosted launchings subsequent to completion of flight tests from Patrick AFB.

CONFIDENTIAL

CONFIDENTIAL

SECRET
(When Filled In)

WDPP-58-30

SECRET
(When Filled In)

TYPE FUNDS: P-300 MCP

BUDGET ESTIMATES

LOCATION: COOKE AFB

		PRIOR YEARS	FY 59	FY 60	FY 61	TOTAL
ITEM CATEGORY MISSILE SUPPORT	WS 117L	.225	3.000			3.225
(FIGURES ARE IN MILLIONS OF $)	TOTAL	.225	3.000			3.225

BMD INDEX	ITEM DESCRIPTION	BUDGET ESTIMATE, FY				DESIGN		CONSTRUCTION			NEED DATE
		PRIOR	FY 59	FY 60	FY 61	START	COMPL.	AWARD	BOD	COMPL.	
	O/M Assembly-Command and Administration Facility		3.000			05/58	10/58	12/58	10/59	11/59	4/60
	O/M Assembly Fac (Interim)	.225				04/58	05/58	06/58	08/58	09/58	11/58

INITIAL

Deferred

SECRET

SECRET
(When Filled In)

LOCATION: COOKE AFB

ITEM CATEGORY: MISSILE SUPPORT

DESCRIPTION AND UTILIZATION: This facility will provide space for the receiving, assembly, check-out, and maintenance of the WS 117L vehicle, its Atlas booster components and subsystems, and office space for operating personnel. It will provide office space also for administrative and command personnel directing the overall WS 117L test operation at Cooke AFB. It will be of metal frame with masonry and metal siding, and metal roof, on a concrete slab on grade. It will have a total of approximately 109,000 SF of floor space, divided essentially as follows:

Vehicle Unit	- 69,000 SF
Booster Unit	- 40,000 SF
Total	109,000 SF

Special purpose areas will be air-conditioned. Other areas will be provided with filtered ventilation air to prevent dust infiltration to a reasonable extent.

This facility will support the WS 117L Launch Complex at Cooke AFB.

An interim missile assembly facility will be provided to support the interim launch program. Existing buildings will be rehabilitated to provide an assembly and shop building for the vehicles and its Thor booster, office space, and subsystem laboratories and shops. Utilities, security fencing, and parking areas will be provided.

CONFIDENTIAL

CONFIDENTIAL

~~SECRET~~
(When Filled In)

LOCATION: COOKE AFB

TYPE FUNDS: P-300 MCP

BUDGET ESTIMATES

ITEM CATEGORY TRACKING & TELEMETRY (TRST)

	PRIOR YEARS	FY 59	FY 60	FY 61	TOTAL
BE 1171	3.193				3.193
TOTAL	3.193				3.193

(FIGURES ARE IN MILLIONS OF $)

BMD INDEX	ITEM DESCRIPTION	BUDGET ESTIMATE, FY				DESIGN		CONSTRUCTION			NEED DATE
		PRIOR	FY 59	FY 60	FY 61	START	COMPL.	AWARD	BOD	COMPL.	
	TRACKING AND TELEMETRY STA	3.193									
	Interim Station					03/58	04/58	05/58	08/58	11/58	11/58
	Permanent Station					05/58	08/58	09/58	06/59	06/59	10/59

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

~~SECRET~~

WDPP-58-30

LOCATION: COOKE AFB

ITEM CATEGORY: TRACKING & TELEMETRY

DESCRIPTION AND UTILIZATION:

Interim Station

The interim portion of the tracking and telemetry station consists of one 60 Ft diameter TLM-18 Telemetry Antenna, a Telemetry Receiver Building (approximately 2500 SF) a Tri-Helix Telemetry Antenna, a Mod II Radar Antenna with van-mounted equipment, three boresight towers, access roads approximately two miles in length, utilities, security fencing, and minor appurtenances. This portion of the complete station must be completed in time to support the early phase launchings from Cooke AFB.

Permanent Station - the permanent station will consist of the following, in addition to the interim facility:

a. UHF Telemetry Antenna, 60 ft diameter dish with radome.
b. UHF Telemetry Receiver Bldg., approximately 2100 SF.
c. Vehicle-Command Transmitter Building, approximately 1400, with roof-mounted, 6 ft diameter antenna.
d. Angle Tracker Antenna, 10 ft diameter dish, with radome.
e. Angle Tracker Building, approximately 1100 SF.
f. Administration, Data-Acquisition and Processing Bldg, approximately 38,500 SF.
g. Interconnecting roads and instrumentation ducts, utilities, security fencing, etc. All buildings will be of permanent type construction and will be fully air conditioned as required to maintain electronic equipment reliability.

The interim tracking and telemetry station will provide an initial ground terminal point at which the performance of the WS 117L orbiting vehicle is monitored during the early test flights. The permanent station is required for later programs. Its function is to intercept and track the orbiting vehicle; transmit program commands and time signals to the vehicle; receive, index, record [illegible] data; exchange telemetry data with other stations; and provide for training of personnel for the manning of this or other WS 117L stations.

SECRET
(When Filled In)

LOCATION: HAWAIIAN ISLANDS

TYPE FUNDS: P-300 MCP

BUDGET ESTIMATES

ITEM CATEGORY TRACKING & TELEMETRY (TRTF)

	PRIOR YEARS	FY 59	FY 60	FY 61	TOTAL
WELTL	2.200				2.200
TOTAL	2.200				2.200

(FIGURES ARE IN MILLIONS OF $)

BMD INDEX	ITEM DESCRIPTION	BUDGET ESTIMATE, FY				DESIGN		CONSTRUCTION			NEED DATE
		PRIOR	FY 59	FY 60	FY 61	START	COMPL.	AWARD	BOD	COMPL.	
	TRACKING & TELEMETRY STA	2.200									
	Interim Station					03/58	04/58	05/58	08/58	11/58	11/58
	Permanent Station					05/58	08/58	09/58	06/59	06/59	10/59

CONFIDENTIAL

CONFIDENTIAL

III-11

SECRET

MDPP-58-30

SECRET
(When Filled In)

LOCATION: HAWAIIAN ISLANDS

ITEM CATEGORY: TRACKING & TELEMETRY STATION

DESCRIPTION AND UTILIZATION:

Interim Station - The interim portion of the tracking and telemetry station consists of one 60 ft diameter TLM 18 Telemetry Antenna, an Administration and Telemetry Receiver Building (Approximately 6400 SF), a Tri-Helix Telemetry Antenna, a Mod II Radar with van-mounted equipment, three boresight towers, interconnecting instrumentation ducts, an access road approximately two miles in length, approximately two miles of interconnecting roads, security fencing, and utilities. This portion of the complete station must be completed in time to support the early phase launchings from Cooke AFB.

Permanent Station - The permanent station will consist of the following, in addition to the interim facility:

a. Angle Tracker and UHF Telemetry Receiver Bldg, approximately 1800 SF, with roof-mounted, 10 ft diameter Angle Tracker Antenna.
b. Vehicle-Command Transmitter Bldg., approximately 1300 SF. Security fencing, utilities, etc. All buildings will be constructed of locally-available materials where acceptable. They will be fully air conditioned as required to maintain electronic equipment reliability.

The Interim Station will provide an initial ground terminal point at which the performance of the WS 117L orbiting vehicle is monitored during the early test flights. The Permanent Station is required for later programs. Its function is to intercept and track the orbiting vehicle; transmit program commands and time signals to the vehicle; receive, index, record, and exchange trajectory data with other stations.

INITIAL

INITIAL

SECRET
(When Filled In)

LOCATION: ALASKA

TYPE FUNDS: P-300 MCP

BUDGET ESTIMATES

ITEM CATEGORY TRACKING AND TELEMETRY (RECOVERY)

	PRIOR YEARS	FY 59	FY 60	FY 61	TOTAL
WS 1171	.080				.080
TOTAL	.080				.080

(FIGURES ARE IN MILLIONS OF $)

BMD INDEX	ITEM DESCRIPTION	BUDGET ESTIMATE, FY				DESIGN		CONSTRUCTION			NEED DATE
		PRIOR	FY 59	FY 60	FY 61	START	COMPL.	AWARD	BOD	COMPL.	
	Tracking & Veh. Recovery Command Station	.080				05/58	06/58	06/58	08/58	08/58	11/58

INITIAL

INITIAL

SECRET

LOCATION: ALASKA

ITEM CATEGORY: TRACKING AND TELEMETRY (RECOVERY)

DESCRIPTION AND UTILIZATION: The Alaskan Tracking and Telemetry Facility will consist of two installations. The first is an existing AGAN site at Chiniak Bay, Kodiak Island,. No new construction will be required. The second is a new facility at Annette Island. It will consist of a Tri-Helix Telemetry Antenna, a Mod II Radar Antenna, two boresight towers, a W. W. V. Antenna Support Pole, van-mounted receiver, transmitter, and power-generating equipment on gravel hardstands, access road and parking area, perimeter fencing, and minor appurtenances. All construction will be the minimum required to provide a temporary facility for use during the interim launch program. Personnel housing and messing will be provided by the contractor in existing FAA facilities.

The Alaskan facility will insure the acquisition of the vehicle on the first orbital pass, and on subsequent passes, and will command the vehicle to release the recoverable package at the instant required for impact within the desired pick-up zone.

~~SECRET~~
(When Filled In)

LOCATION: NAVAL AIR MISSILE TEST CENTER, PT. MUGU, CALIF.

TYPE FUNDS: P-300 MCP

ITEM CATEGORY TRACKING & TELEMETRY (TEST)

BUDGET ESTIMATES

	PRIOR YEARS	FY 59	FY 60	FY 61	TOTAL
WS 117L	.080				.020
TOTAL	.080				.020

(FIGURES ARE IN MILLIONS OF $)

BMD INDEX	ITEM DESCRIPTION	BUDGET ESTIMATE, FY				DESIGN		CONSTRUCTION			NEED DATE
		PRIOR	FY 59	FY 60	FY 61	START	COMPL.	AWARD	BOD	COMPL.	
	Tracking and Control Station	.080				07/58	07/58	07/58	08/58	10/58	11/58

CONFIDENTIAL

CONFIDENTIAL

~~SECRET~~

LOCATION: NAVAL AIR MISSILE TEST CENTER, PT MUGU, CALIF.

ITEM CATEGORY: TRACKING AND TELEMETRY (TRST)

DESCRIPTION AND UTILIZATION: This facility will provide a down-range tracking and control station for high-latitude launchings from Cooke AFB during the interim Thor-booster program. From this station, accurate tracking of the vehicle from launch to second stage burn-out, and ignition command, will be effected.

The facility consists of the following:

a. Tri-Helix Telemetry Antenna
b. Mod II Radar Antenna
c. Two boresight towers
d. Van-mounted receiver, transmitter, and power-generating equipment.
e. Minor appurtenances.

SECRET
(When Filled In)

LOCATION: NORTHWEST UNITED STATES

TYPE FUNDS: P-300 MCP

BUDGET ESTIMATES

ITEM CATEGORY TRACKING & TELEMETRY (DATA-ACQUISITION)

	PRIOR YEARS	FY 59	FY 60	FY 61	TOTAL
WS 117L		3.369			3.369
TOTAL		3.369			3.369

(FIGURES ARE IN MILLIONS OF $)

BMD INDEX	ITEM DESCRIPTION	BUDGET ESTIMATE, FY				DESIGN		CONSTRUCTION			NEED DATE
		PRIOR	FY 59	FY 60	FY 61	START	COMPL.	AWARD	BOD	COMPL.	
	Intercept and Data-Acquisition Station		3.369			07/58	10/58	12/58	10/59	12/59	03/60

SECRET

III-17

SECRET

WDPP-58-30

LOCATION: NORTHWEST UNITED STATES
(FORT STEVENS, OREGON)

ITEM CATEGORY: TRACKING AND TELEMETRY (DATA-ACQUISITION)

DESCRIPTION AND UTILIZATION:

This station will be utilized in support of the WS 117L MRD and Operational programs subsequent to completion of Program I. It will provide the following functions:

a. Intercept and track the vehicle.
b. Transmit vehicle program commands and time signals to the vehicle.
c. Receive, index, record, and process, reconnaissance data into its reassembled form.
d. Transmit reconnaissance data to the data analysis center.
e. Receive, process, and record, vehicle instrumentation and environmental data.
f. Exchange trajectory and vehicle data with other stations.
g. Receive general operational and command information from other stations and the data analysis center.

This station will be located at Fort Stevens, Oregon in order to utilize government-owned real estate, and support facilities available at Tongue Point Naval Station. The station will consist of the following:

a. Vehicle Command Transmitter Bldg., approximately 1300 SF, with roof-mounted, 6 ft antenna, with radome.
b. Vehicle Command Transmitter Antenna, 6 ft diameter with radome, on concrete support structure.
c. Data Acquisition and Process Bldg., 33,500 SF.
d. VHF Telemetry Antenna, 60 ft diameter, with radome.
e. VHF Telemetry Receiver Bldg, 1500 SF.
f. (2) UHF Telemetry Antennas, 60 ft diameter, with radomes.
g. (2) UHF Telemetry Receiver Bldgs., approximately 2100 SF each.
h. Angle Tracker Bldg., 1600 SF.
i. Angle Tracker Antenna, 10 ft diameter, (2), with radomes,
j. Interstation Receiver Transmitter Bldg., 3900 SF.
k. Security Control & Identification Bldg., 150 SF.
l. Security Fencing and Control Bldgs with utilities, roads, etc.
m. (4) Boresight Towers
n. Utilities, roads, minor appurtenances.

All buildings will be of permanent type construction and will be air conditioned to maintain electronic equipment reliability.

CONFIDENTIAL

CONFIDENTIAL

SECRET
(When Filled In)

TYPE FUNDS: P-300 MCP

BUDGET ESTIMATES

LOCATION: NORTHEAST UNITED STATES
(NEW BOSTON RANGE, NEW HAMPSHIRE)

		PRIOR YEARS	FY 59	FY 60	FY 61	TOTAL
ITEM CATEGORY TRACKING & TELEMETRY (DATA ACQUISITION)	MI 1171	[illegible]	3.369			3.369
	TOTAL	[illegible]	3.369			3.369

(FIGURES ARE IN MILLIONS OF $)

BMD INDEX	ITEM DESCRIPTION	BUDGET ESTIMATE, FY				DESIGN		CONSTRUCTION			NEED DATE
		PRIOR	FY 59	FY 60	FY 61	START	COMPL.	AWARD	BOD	COMPL.	
	Intercept and Data-Acquisition Station	[illegible]	3.369			08/58	12/58	01/59	10/59	12/59	03/60

CONFIDENTIAL

SECRET

SECRET

LOCATION: NORTHEAST UNITED STATES

ITEM CATEGORY: TRACKING & TELEMETRY (DATA-ACQUISITION)

DESCRIPTION AND UTILIZATION:

This station will be utilized in support of the WS 117L R&D and Operational programs subsequent to completion of Program I. It will provide the following functions:

a. Intercept and track the vehicle.
b. Transmit vehicle program commands and time signals to the vehicle.
c. Receive, index, record and process, reconnaissance data into its reassembled form.
d. Transmit reconnaissance data to the data analysis center.
e. Receive, process and record, vehicle instrumentation and environmental data.
f. Exchange trajectory and vehicle data with other stations.
g. Receive general operational and command information from other stations and the data analysis center.

It is assumed that the station will be located on or near an existing military installation in order to utilize its support capability. The station will consist of the following:

a. Vehicle Command Transmitter Bldg., approximately 1300 SF, with roof-mounted, 6 ft antenna, with radome.
b. Vehicle Command Transmitter Antenna, 6 ft diameter with radome, on concrete support structure.
c. Data Acquisition and Process Bldg., 33,500 SF.
d. VHF Telemetry Antenna, 60 ft diameter, with radome.
e. VHF Telemetry Receiver Bldg. 1500 SF.
f. (2) UHF Telemetry Antennas, 60 ft diameter, with radomes
g. (2) UHF Telemetry Receiver Bldgs., approximately 2100 SF each.
h. Angle Tracker Bldg., 1600 SF.
i. Angle Tracker Antennas, 28 ft diameter, (2), with radomes.
j. Interstation Receiver Transmitter Bldg., 3000 SF.
k. Security Control & Identification Bldg., 150 SF.
l. Security Fencing and Control Bldgs with utilities, roads, etc.
m. (4) Boresight Towers
n. Utilities, roads, minor appurtenances.

All buildings will be of permanent type construction and will be air conditioned to maintain electronic equipment reliability.

SECRET
(When Filled In)

LOCATION: GENERAL UNITED STATES

TYPE FUNDS: P-300 MCP

ITEM CATEGORY TRACKING & TELEMETRY (DATA ACQUISITION)

BUDGET ESTIMATES

	PRIOR YEARS	FY 59	FY 60	FY 61	TOTAL
WE 1171	[illegible]	3.369			3.369
TOTAL	[illegible]	3.369			3.369

(FIGURES ARE IN MILLIONS OF $)

BMD INDEX	ITEM DESCRIPTION	BUDGET ESTIMATE, FY				DESIGN		CONSTRUCTION			NEED DATE
		PRIOR	FY 59	FY 60	FY 61	START	COMPL.	AWARD	BOD	COMPL.	
	Intercept and Data-Acquisition Station	[illegible]	3.369			10/58	02/59	04/59	06/60	09/60	01/61

CONFIDENTIAL

CONFIDENTIAL

SECRET

LOCATION: CENTRAL UNITED STATES

ITEM CATEGORY: TRACKING & TELEMETRY (DATA ACQUISITION)

DESCRIPTION AND UTILIZATION:

This station will be utilized in support of the WS 117L R&D and Operational program subsequent to completion of Program III. It will provide the following functions:

a. Intercept and track the vehicle.
b. Transmit vehicle program commands and time signals to the vehicle.
c. Receive, index, record and process, reconnaissance data into its reassembled form.
d. Transmit reconnaissance data to the data analysis center.
e. Receive, process and record, vehicle instrumentation and environmental data.
f. Exchange trajectory and vehicle data with other stations.
g. Receive general operational and command information from other stations and the data analysis center.

It is assumed that the station will be located on or near an existing military installation in order to utilize its support capability. The station will consist of the following:

a. Vehicle Command Transmitter Bldg., approximately 1300 SF, with roof-mounted, 6 ft antenna, with radome.
b. Vehicle Command Transmitter Antenna, 6 ft diameter with radome, on concrete support structure.
c. Data Acquisition and Process Bldg., 33,500 SF.
d. VHF Telemetry Antenna, 60 Ft diameter, with radome.
e. VHF Telemetry Receiver Bldg. 1500 SF.
f. (2) UHF Telemetry Antennas, 60 ft diameter, with radomes.
g. (2) UHF Telemetry Receiver Bldgs., approximately 2100 SF each.
h. Angle Tracker Bldg., 1600 SF.
i. Angle Tracker Antennas, 10 ft diameter, (2), with radomes.
j. Interstation Receiver Transmitter Bldg., 3000 SF.
k. Security Control & Identification Bldg., 150 SF.
l. Security Fencing and Control Bldgs with utilities, roads, etc.
m. (4) Boresight Towers
n. Utilities, roads, minor appurtenances.

All buildings will be of permanent type construction and will be air conditioned to maintain electronic equipment reliability.

CONFIDENTIAL

SECRET
(When Filled In)

LOCATION: VARIOUS

TYPE FUNDS: P-300 MCP

BUDGET ESTIMATES

ITEM CATEGORY DEVELOPMENT CONTROL & INTELLIGENCE CENTERS

WS 117L

PRIOR YEARS	FY 59	FY 60	FY 61	TOTAL
	2.780	4.120		6.900

(FIGURES ARE IN MILLIONS OF $)

BMD INDEX	ITEM DESCRIPTION	BUDGET ESTIMATE, FY				DESIGN		CONSTRUCTION			NEED DATE
		PRIOR	FY 59	FY 60	FY 61	START	COMPL.	AWARD	BOD	COMPL.	
	Control & Intell. Centers		2.780	4.120							
	Development Control Ctr					11/58	08/59	04/59	11/59	01/60	02/60
	Data Process.Fac.(Intell.)					10/59	08/60	04/60	03/61	08/61	10/61
	Data Process.Fac.(Tech.)					10/59	08/60	04/60	03/61	08/61	10/61

CONFIDENTIAL

CONFIDENTIAL

FY-23

SECRET

HDPP-58-30

LOCATION: VARIOUS

ITEM CATEGORY: DEVELOPMENT CONTROL & INTELLIGENCE CENTERS

DESCRIPTION AND UTILIZATION:

One Development Control and two Intelligence Centers are required.

The two intelligence centers are required to receive raw reconnaissance data from data-acquisition and processing stations, evaluate the data, and disseminate them to using intelligence agencies in the form best suited to their needs.

The main center will consist of a building, or buildings, having approximately 150,000 SF of floor space. This area will be divided into subsystem areas that will serve the following functions: Input photo processing, computing center, library, communications center, analysis, photo interpretation, ferret data reduction, warning center, command administration, and miscellaneous areas.

A second center, consisting of approximately 12,000 SF of floor area, will house equipment to process and evaluate technical intelligence data.

These facilities will be of permanent-type construction, of modular design to permit expansion of the facilities to accommodate new functions and workload as the system reaches its ultimate capability. Year-round air conditioning and dust control will be provided to dissipate heat generated by the electronic equipment and to maintain equipment reliability.

The Development Control Center will provide space for the AEDC Development Control Manager, Development Flight Test Control organization, contractor managerial, technical and administrative personnel conducting the operation of the entire WS 117L system during the R&D phase of the program. It will be a permanent-type construction. Special purpose areas will be dust-controlled and some other areas will be air-conditioned to maintain electronic equipment reliability.

CONFIDENTIAL

CONFIDENTIAL

TYPE FUNDS: P-300 MCP

BUDGET ESTIMATES

LOCATION: VARIOUS

		PRIOR YEARS	FY 59	FY 60	FY 61	TOTAL
ITEM CATEGORY ADVANCED PROJECT PLANNING	WS 117L	.390	1.200	.690		2.240
(FIGURES ARE IN MILLIONS OF $)	TOTAL	.390	1.200	.650		2.240

BMD INDEX	ITEM DESCRIPTION	BUDGET ESTIMATE, FY				DESIGN		CONSTRUCTION			NEED DATE
		PRIOR	FY 59	FY 60	FY 61	START	COMPL.	AWARD	BOD	COMPL.	
	Advanced Project Planning	.390	1.200	.690							

CONFIDENTIAL

CONFIDENTIAL

LOCATION: VARIOUS

ITEM CATEGORY: ADVANCED PROJECT PLANNING

DESCRIPTION AND UTILIZATION:

This item will provide for the investigation of construction sites, Title 1 Architect-Engineer services for the development of design criteria and for final design and preparation of construction drawings and specifications for all WS 117L facilities.