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WB-117L WORK STATEMENT
AFBM Exhibit 58-25
10 DECEMBER 1958

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AFBM Exhibit 58-25
10 December 1958

Supersedes WDT 57-18
14 May 1957

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WS-117L WORK STATEMENT

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WS-117L WORK STATEMENT

0. INTRODUCTION TO STATEMENT OF WORK

Lockheed Aircraft Corporation, Missile Systems Division, shall plan and conduct a program of research and development leading toward the ultimate attainment of a reconnaissance system which uses a satellite vehicle as the data gathering medium.

Subject to the overall management of the BMD/BMO team, the Lockheed Missile Systems Division shall fulfill responsible technical direction of the WS-117L in the role of Weapon System Contractor.

In that capacity, approval of the technical decisions of the Contractor by the Government shall not be required prior to implementation, except as specifically set forth elsewhere in this contract. This provision should not, however, be construed as in any way limiting the right of the Government to direct or redirect the technical aspects of the Contractor's efforts at any time. Where such direction affects costs or schedules, or is contradictory to the provisions of this contract, normal contract change procedures will apply.

0.1 MANAGEMENT

Contractor management of the WS-117L program shall be established to satisfy the requirements of paragraphs 0 (Introduction to Statement of Work), 2.3.1.6 (Technical Direction) and 2.4.1 (Research and Development Program). The management activities are defined as follows:

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0.1.1 Weapon System Management. This activity centralizes program direction in the Weapon System Contractor. The Contractor is supported in this effort by representatives of major associate contractors; technical consultants as appropriate; and immediate staff. The Contractor is responsible for the following endeavors and close coordination with associated contractors as well as Government agencies involved with the program.

0.1.2 Planning. This activity includes responsibility for developing, establishing, and maintaining the Weapon System Development Plan in accordance with Air Force Management Procedures ARDC 80-4; for revised program objectives; for investigation of new systems and applications related to the Sentry Program; for interpretation of Air Force requirements into WS-117L design criteria; and for the evaluation of developmental solutions to problems posed by the basic requirements.

0.1.3 Development. This activity includes the responsibility for providing overall technical direction (both inplant and subcontractor) for the program with regard to system and subsystem requirements. This technical direction encompasses all design, development, testing (except system testing), and producibility with respect to the indicated requirements.

0.1.4 Test and Operations. This activity includes the responsibility for the development and accomplishment of systems testing and the flight test program at government launch and tracking installations. This responsibility encompasses the operation, maintenance, and calibration of captive and flight test vehicles and ground support equipment; the training of personnel; site activation when required; planning and designing of facilities at these installations; and planning for logistic support.

0.1.5 Program Administration. This activity includes the responsibility for general administration and coordination of the project in accordance with the Weapon Systems Development Plan. This responsibility encompasses proposal preparation, the preparation of task statements, contract changes, work authorizations, schedules, budget determination and review, technical reports, coordination of scale models, evaluation of technical progress, maintenance of a program information center, and performance of liaison with WSPO and service areas outside the project. Also included is the responsibility for establishment of technical data submittal requirements.

0.1.6 Reliability. This activity includes the responsibility of establishing, coordinating and disseminating reliability programs of the Sentry Weapon System, both inplant and subcontract. This responsibility will provide that all parts, components, and subsystems within the Sentry Weapon System are designed, tested, evaluated, and applied within the limits of reliable performance, provide methods for establishing definitive reliability goals for the Sentry Weapon System, subsystems, and major components, and provide management with a method for monitoring reliability progress and demonstration.

1.0 SUMMARY OF ITEMS TO BE FURNISHED

Item	Description
I	Conduct a program of research and development directed toward the ultimate attainment of a satellite-borne reconnaissance system.
II	Complete fabrication and testing and make constructive delivery of the following satellite vehicles* to the extent herein specified:

* Satellite vehicles are defined herein to be inclusive of all vehicle airframe elements, all vehicle-borne equipment elements, and spare parts therefore, deemed necessary by the Contractor to be required in the attainment of the various flight objectives constituting paragraph 2.2.2.10 of this document or in attainment of non-flight objectives of the developmental test programs.

1. Program IIA
   a. Mockup
   b. Propulsion Test Vehicle Assemblies (PTVA).
      (1) Two (2) Test Vehicle Assemblies configured for testing JP-4/IRFNA propulsion system
      (2) One (1) Propulsion Test Vehicle Assembly configured for testing UDMH/IRFNA propulsion system.
   c. Captive and Flight Test Vehicles
      (1) One (1) Static Test Vehicle
      (2) One (1) Facilities Check Vehicle
      (3) Thirteen (13) Flight Test Vehicles, ten (10) of which have been expended in flight test operations, delivered to Vandenberg Air Force Base; launch readiness operations eighty percent (80%) complete on FTV 11, fifty percent (50%) complete on FTV 12, and one percent (1%) complete on FTV 13.
      (4) Two (2) Flight Test Vehicles; dynamic systems test operations in Contractor's facility at Santa Cruz Test Base ninety percent (90%) complete on FTV 14, and twenty-five percent (25%) complete on FTV 15.
      (5) Three (3) Flight Test Vehicles; modification and checkout operations in Contractor's facility at Palo Alto ninety-five percent (95%) complete on FTV 16, sixty-three percent (63%) complete on FTV 17, and nine percent (9%) complete on FTV 18.
      (6) One (1) Flight Test Vehicle; final assembly operations in Contractor's facility at Sunnyvale eighty-three percent (83%) complete on FTV 19.
2. Program I
   a. Mockup
   b. Captive and Flight Test Vehicles

(1) One (1) Static Test Vehicle

(2) One (1) Captive Test Vehicle

(3) Two (2) Flight Test Vehicles, one (1) of which has been expended in flight test operations, delivered to Air Force Missile Test Center; launch readiness operations not in process on FTV 2.

(4) One (1) Flight Test Vehicle; modification and checkout operations in Contractor's facility at Palo Alto twenty-nine percent (29%) complete on FTV 3.

(5) Two (2) Flight Test Vehicles; in Contractor's facility at Sunnyvale, final assembly operations thrity-three percent (33%) complete on FTV 4, continuous production assembly operations thirty-eight (38%) complete on FTV 5.

3. Program II

a. Flight Test Vehicles

(1) One (1) Flight Test Vehicle; detail fabrication operations in facilities of Contractors, subcontractors, vendors, and other outside sources seven percent (7%) complete.

III Prepare and submit data as defined in the following:

1. LMSD 6246, "Specification Submittal Requirements for the WS-117L Sentry Program".

2. WDT 57-19, "Report Requirements for the WS-117L Sentry Program".

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2.0 DESCRIPTION OF ITEMS AND SPECIFICATIONS

2.1 GENERAL OBJECTIVES

2.1.1 All work done under this contract shall be directed toward the ultimate attainment of a reconnaissance system which uses a satellite vehicle as the data gathering medium. The goal shall be to sense and locate, with a high degree of resolution, all electromagnetic radiation emitted by or reflected from the territory, installations, and equipment of potential enemies; to transmit this information back to our own forces in a form useful to the processing subsystem; and to record and produce these data, in a form of maximum utility, to intelligence agencies.

2.1.2 The system should possess the following characteristics as defined by approved specifications:

a. Sensitivity
b. Resolution
c. Location accuracy
d. Speed
e. Discrimination between useful and unusable information
f. Economy
g. Invulnerability to countermeasures
h. Reliability
i. Longevity
j. Maintainability
k. Producibility
l. Capability of assuming and maintaining desired orientation with respect to the earth's surface.

2.2 SYSTEM DESIGN OBJECTIVES

2.2.1 Orbital Capability Program. The objective of this phase of the program is the achievement of orbital capability on an accelerated time scale. Under this phase, the design, development, and test of a basic WS-117L airframe will be conducted. Scheduled flights, utilizing SM-75 and SM-65 missiles as boosters, have been programmed for orbital capability objective. These flights will, in specified instances, carry payloads as described in the following paragraphs.

2.2.1.1 A system for recovering capsules from WS-117L orbit will be designed and tested. Specified WS-117L vehicle flights shall be arranged for recovery of biomedical data through the utilization of a suitable re-entry capsule.

2.2.2 Operational Capabilities. A series of operational capabilities shall be attained as defined below. These shall be considered the minimum design objectives for operationally acceptable systems. The order of listing will not be construed as the chronological sequence of attainment.

2.2.2.1 Pioneer Visual Reconnaissance Program

2.2.2.1.1 The Pioneer Visual Program shall provide the ability to secure photographs of areas of potential military interest. These photographs, as initially reconstructed on the ground primary record, shall be of such quality as to permit the resolution of the standard Air Force medium contrast test pattern as defined in MIL-STD-150 with dimension W equal to 50 feet. Adequate exposure will be obtained at sun angles above 5 degrees and 100-foot ground resolution with medium contrast target will be achieved at all sun angles above 30 degrees. The medium-contrast target is specified to provide for atmospheric contrast reduction. The stated resolution is desired with a resultant object contrast of 2 to 1 at the vehicle altitude and to demonstrate this capability, all laboratory and ground tests shall be conducted using a low-contrast target with a density difference of 0.3.

2.2.2.1.2 The location of any point on any photograph shall be readily determinable with an error no greater than one mile. This accuracy will be based upon refinement and smoothing of orbital information with repetitive collection of data. Maximum use should be made of the Data Processing Subsystem refinement of location accuracy by ground checkpoint positioning. The film supply shall be sufficient to permit photographic coverage of 1.2×10^6 square miles per day. Total coverage required will be dependent upon the operational life (or for a period of 30 days, whichever is shorter), bandwidth of readout and the photographic installation, but it will be a maximum for the conditions existing in each flight.

2.2.2.1.3

2.2.2.1.4 The Pioneer Visual System shall include reconstruction and processing functions of visual information to the extent necessary to satisfy two requirements:

a. Production of usable data as an input to the Data Processing Subsystem

b. Sufficient provision for processing of data to allow evaluation of the output to perform quality control, design/re-design, and programming.

2.2.2.1.5 The Pioneer Visual System shall make available, at a central location, sufficient photographic records and auxiliary data in a form required by the Data Processing Subsystem. The time between data acquisition and receipt by the Data Processing Subsystem will be kept to a minimum.

2.2.2.2 Electronic Reconnaissance Program

2.2.2.2.1 Programs

a. The Interim Atlas Ferret Reconnaissance Program shall provide the ability to intercept high priority electromagnetic emissions from the equipment of potential enemies, to index and store the data, and upon command supply the stored data to Subsystem H for retransmission to an appropriate location in the Continental U.S.

b. The Pioneer Ferret Reconnaissance Program shall provide the ability to intercept electromagnetic emissions in the 50 to 18,000 mc/s spectrum from the equipment of potential enemies, to return the intercepted information to an appropriate location in the Continental U.S. or U.S. territories, and to record and index this information into a form suitable for further processing. The ferret intercept equipment shall be capable of receiving signals, locating the emitter and measuring signal parameters as specified by the intelligence requirements for ferret mission. The sensitivity of the receiving equipment will be such as to permit reception of signal levels from -90 to -34 dbm, subject to further evaluation of intelligence requirements and receiver design limitations.

2.2.2.2.2 All of the ferret information obtained shall be available at a central location as rapidly as technically feasible after receipt at any intercept station located in Continental U.S.

2.2.2.3 The Advanced Visual Reconnaissance Program

2.2.2.3.1 The Advanced Visual Reconnaissance Program shall provide a capability similar to the Pioneer Visual Program except that the maximum dimensions of the pattern to be resolved and the minimum ground lineal coverage to be obtained are reduced by a factor of six. The location accuracy will be increased to maximum error of $\frac{1}{2}$ mile. Since the area covered by the camera is reduced from that of the Pioneer Reconnaissance Program and since resolution will be improved to the extent to probably allow observation of aircraft and other movements of military importance, it may be necessary to incorporate features to allow the programming of the camera to point to areas of special interest which are removed from the nadir in order to most usefully apply and conserve limited area coverages afforded by this system.

2.2.2.4 Advanced Ferret Reconnaissance Program

2.2.2.4.1 This program will endeavor to extend the operational capability of the Pioneer Ferret Program and to include the 50 to 40,000 mc/s spectrum.

2.2.2.5 Infrared Reconnaissance Program

2.2.2.5.1 The objective of the Infrared Reconnaissance Program is a system of satellites on orbit placing unfriendly territory under continuous and complete surveillance. Such a system will have the capability to detect ICBM launchings whenever and wherever they occur and to immediately transmit this information to the ground to provide unambiguous warning of ICBM attack.

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2.2.2.6 Visual Surveillance Program

2.2.2.6.1 The Visual Surveillance Program consists of the development of a continuous surveillance system at ground resolutions equal to or better than that obtained with the Advanced Visual Reconnaissance Program.

2.2.2.7 Ferret Surveillance Program

2.2.2.7.1 The Ferret Surveillance Program consists of the development of a surveillance type ferret as well as a Quick Reaction Capability (QRC). It will be an integrated ferret system that provides the capability of varying the frequency bands and other signal parameters of interest by command through the ground-space communications link.

2.2.2.8 Biomedical Recoverable Capsule Program

2.2.2.8.1 The Biomedical Recoverable Capsule Program shall have the dual objectives of gathering biomedical data and establishing successful re-entry and recovery from orbit of selected living specimens.

2.2.2.10 FLIGHT OBJECTIVES [redacted]

FLIGHT NO.	FLIGHT OBJECTIVES
No. 1 (Prog. IIA) (December 1958 VAFB - Thor Booster)	(1) Demonstration of Orbit Capability (2) Test and evaluation of the operations and interactions of Sentry systems noted below during the coast, orbital boost, reorientation, and orbit phases, as applicable: (a) Propulsion, (b) Guidance and Control, (c) Auxiliary Power, (d) Communications, and (e) Airframe.
No. 2 (Prog. IIA) (January 1959 VAFB - Thor Booster)	Same as Flight No. 1 (Prog. IIA)
No. 3 (Prog. IIA (February 1959 VAFB - Thor Booster)	Same as Flight No. 1 (Prog. IIA) Items (1) and (2), plus, (3) Demonstration of ability to recover a biomedical capsule ejected from the orbiting vehicle (4) Determination of orbit parameters and evaluation of ability of guidance and control system to insure operation within parameters. (5) Evaluation of Thor Booster System (6) Evaluation of Thor Guidance System
No. 4 (Prog. IIA) (March 1959 VAFB - Thor Booster)	Same as Flight No. 3 (Prog. IIA)
No. 5 (Prog. IIA) (April 1959 VAFB - Thor Booster)	Same as Flight No. 3 (Prog. IIA), plus, (7) Test and evaluation of the Telemetry System (8) Advanced Engineering Tests.
No. 6 (Prog. IIA) (April 1959 VAFB - Thor Booster)	Same as Flight No. 5 (Prog. IIA)

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2.2.2.10 (continued)

FLIGHT NO.	FLIGHT OBJECTIVES
No. 7 (Prog. IIA) (May 1959 VAFB - Thor Booster)	Same as Flight No. 3 (Prog. IIA), plus, (7) Collection and compilation of Aeromedical Data and GRD Data. (8) Evaluation of the capsule design effectiveness in providing a suitable environment for the biomedical specimens.
No. 8 (Prog. IIA) (May 1959 VAFB - Thor Booster)	Same as Flight No. 5 (Prog. IIA)
No. 9 (Prog. IIA) (June 1959 VAFB - Thor Booster)	Same as Flight No. 5 (Prog. IIA)
No. 10 (Prog. IIA) (June 1959 VAFB - Thor Booster)	Same as Flight No. 7 (Prog. IIA)
No. 11 (Prog. IIA) (July 1959 VAFB - Thor Booster)	Same as Flight No. 5 (Prog. IIA)
No. 12 (Prog. IIA) (July 1959 VAFB - Thor Booster)	Same as Flight No. 5 (Prog. IIA)
No. 13 (Prog. IIA) (August 1959 VAFB - Thor Booster)	Same as Flight No. 5 (Prog. IIA)
No. 14 (Prog. IIA) (August 1959 VAFB - Thor Booster)	Same as Flight No. 7 (Prog. IIA)
No. 15 (Prog. IIA) (Sept. 1959 VAFB - Thor Booster)	Same as Flight No. 5 (Prog. IIA)

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2.2.2.10 (continued)

FLIGHT NO.	FLIGHT OBJECTIVES
No. 16 (Prog. IIA) (September 1959 VAFB - Thor Booster)	Same as Flight No. 5 (Prog. IIA)
No. 17 (Prog. IIA) (October 1959 VAFB - Thor Booster)	Same as Flight No. 5 (Prog. IIA)
No. 18 (Prog. IIA) (October 1959 VAFB - Thor Booster)	Same as Flight No. 5 (Prog. IIA)
No. 19 (Prog. IIA) (November 1959 VAFB - Thor Booster)	Same as Flight No. 5 (Prog. IIA)
No. 1 (Prog. I) (June 1959 AFMTC - Atlas Booster)	(1) Demonstration of Orbit Capability (2) Demonstration of the ability to achieve and maintain stabilized nose-down orientation (3) Test and evaluation of the operations and interactions of Sentry systems noted below during the coast, orbital boost, reorientation, and orbit phases, as applicable: (a) Propulsion (b) Guidance and Control (c) Auxiliary Power (d) Communications (e) Airframe (4) Evaluation of Atlas Booster System (5) Evaluation of the Telemetry System. (6) Test and evaluation on components of interim system/systems equipment.
No. 2 (Prog. I) (August 1959 AFMTC - Atlas Booster	Same as Flight No. 1 (Prog. I), Items (1) through (5), plus, (6) Test and evaluation of infrared thermal mockup.

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2.2.2.10 (continued)

FLIGHT NO.	FLIGHT OBJECTIVES
No. 3 (Prog. I) (October 1959 AFMTC - Atlas Booster)	Same as Flight No. 1 (Prog. I), Items (1) through (5), plus, (6) Test and evaluation of interim Ferret Reconnaissance System components and heat transfer performance (7) Test of VHF Narrow-band Data Link for interim Ferret Reconnaissance System.
No. 4 (Prog. I) (December 1959 AFMTC - Atlas Booster)	Same as Flight No. 1 (Prog. I), Items (1) through (5), plus, (6) Test and evaluation of interim Ferret Reconnaissance system. (7) Test and evaluation of: (a) Ultimate Guidance System Inertial Platform components (b) Orbital Attitude Damping System (c) VHF Narrow-band Data Link for interim Ferret Reconnaissance System.
No. 5 (Prog. I) (February 1960 AFMTC - Atlas Booster)	Same as Flight No. 1 (Prog. I), Items (1) through (5), plus, (6) Test and evaluation of interim Pioneer Infrared Reconnaissance System (7) Test and evaluation of VHF Narrow-band Data Link for interim Pioneer Infrared Reconnaissance System.
No. 1 (Prog. II) (February 1960 VAFB - Atlas Booster)	(1) Demonstration of Orbit Capability (2) Demonstration of the ability to achieve and maintain a stabilized nose-down orientation. (3) Test and evaluation of the operations and interactions of Sentry systems noted below during the coast, orbital boost, reorientation, and orbit phases, as applicable:

[redacted]

2.2.2.10 (continued)

FLIGHT NO.	FLIGHT OBJECTIVES
	(a) Propulsion (b) Guidance and Control (c) Auxiliary Power (d) Communications (e) Airframe (4) Evaluation of Atlas Booster System (5) Evaluation of the Telemetry System (6) Test and evaluation of components of interim Pioneer Visual Reconnaissance System.

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2.2.3 Subsystem Definitions The capabilities of the systems are obtained by different combinations of equipment. The overall system is broken down into a number of subsystems as defined below:

2.2.3.1 Airframe (Subsystem A)

2.2.3.1.1 The Airframe Subsystem will consist of the propellant and pressurization tankage, aerodynamic fairings, structural supports, brackets and fittings for the satellite, a destruct system, and all mechanical and electrical installations in the satellite not specifically included in the definition of other subsystems. It will include any systems for overall environmental control within the satellite.

2.2.3.2 Propulsion (Subsystem B)

2.2.3.2.1 The Propulsion Subsystem will consist of the rocket engine, pressurization, feed and loading systems (other than propellant and gas tanks), the engine gimbals (but not gimbal actuators) and the equipment required to start, stop, and control thrust magnitude in response to an electrical signal from the ground or from the guidance subsystem, and the equipment required to control the propellant flow mixture ratio. It will also include any auxiliary devices required to establish proper ullage orientation in the fluid system prior to and during start of the main rocket engine, including the equipment required to operate these devices.

2.2.3.3 Auxiliary Power (Subsystem C)

2.2.3.3.1 The Auxiliary Power Subsystem consists of that equipment required to supply electrical power to all subsystems within the satellite vehicle, from a time just prior to launch until the end of the vehicle's reconnaissance lifetime.

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2.2.3.4 Guidance and Control (Subsystem D)

2.2.3.4.1 The Guidance and Control Subsystem will be comprised of those items of equipment required to sense and direct vehicle attitude and velocity so as to establish a satisfactory orbit. In addition it will:

a. Provide self-contained means for the initial alignment and maintenance of the desired vehicle attitude during orbital operation.

b. Provide an indication of attitude, and rate of change of attitude, to other subsystems in the vehicle as necessary.

2.2.3.5 Visual Reconnaissance (Subsystem E)

2.2.3.5.1 The Visual Reconnaissance Subsystem consists of the satellite-borne equipment required to acquire visual information, to process and store this information and, at the proper time, to convert the stored information to a video signal for transmission to the ground by the Ground-Space Communications Subsystem. This subsystem also consists of the ground-based equipment required to take the output of the data link and reconstruct the video signal into photographic form, to reassemble the primary record photographs and handle the auxiliary data plus tracking data, and to perform the functions necessary to ensure adequate quality control of the operation.

2.2.3.6 Electronic Reconnaissance (Subsystem F)

2.2.3.6.1 The Electronic Reconnaissance Subsystem consists of the satellite-borne equipment required to collect intelligence information from radiation in the region of the electromagnetic spectrum between 50 to 40,000 mc/s, to store this information, to filter or index it as may be necessary, and, at the proper time, to reconvert the stored information into an appropriate electrical signal for transmission to the

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ground by the Ground-Space Communication Subsystem. The subsystem also includes the ground-based equipment required to decode the indexed information; i. e., reconnaissance data, time and vehicle position, to a form required by the Data Processing Subsystem.

2.2.3.7 Infrared Reconnaissance (Subsystem G)

2.2.3.7.1 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 wavelength, 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. The subsystem also includes the ground-based equipment required to decode the indexed information; i. e., reconnaissance data, time and vehicle position, into a form required by the Data Processing Subsystem.

2.2.3.8 Ground-Space Communication (Subsystem H)

2.2.3.8.1 The Ground-Space Communication Subsystem is comprised of 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 a process of observation and computation.

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

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

d. Provide communication facilities and reconnaissance data terminal magnetic tape recording equipment ground installations for efficient and reliable recording and transmission of received information.

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e. Provide a common time reference for the vehicle and ground complex and a reference date-time index for the orbital passes.

f. Provide vehicle-to-vehicle communications in advanced Infrared Surveillance Systems.

2.2.3.9 Data Processing

2.2.3.9.1 The Data Processing Subsystem includes the design, development, and implementation of the system, equipment, techniques and procedures to transform the recorded raw photographic, ferret, and infrared data into useful intelligence and to disseminate this intelligence to using agencies. It will receive input and provide feedback to applicable subsystems, primarily E, F, G, and H and is conceived to ensure the efficient production and availability of WS-117L derived intelligence of the type, form, frequency, and quality required by the various users.

2.2.3.10 Ground Support Equipment (GSE)

2.2.3.10.1 Ground Support Equipment (GSE). The term "Ground Support Equipment" refers to any or all non-airborne implements or devices which are required at the launch complex(es) to inspect, test, adjust, calibrate, appraise, gauge, measure, repair, overhaul, assemble, disassemble, service, transport, safeguard, record, store, actuate, or otherwise perform a function in support of the WS-117L airborne vehicle prior to launch.

2.2.3.11 Subsystem Ground Equipment at T/A Sites. Subsystem Ground Equipment at T/A Sites includes all non-airborne specialized equipment required to transmit, receive, checkout and test, record, process, store, reconstruct a video signal into photographic form, decode indexed information (reconnaissance data, time and vehicle position), safeguard, or otherwise perform functions at the T/A Sites immediately subsequent to launch and throughout its orbiting life. Any reference herein to Subsystem Ground Based Equipment shall be deemed to be within the scope of this definition.

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2.2.3.12 Biomedical Capsule (Subsystem L) [redacted]

2.2.3.12.1 The Biomedical Program consists of a satellite-borne capsule, suitable vertebrate specimens and equipment that will collect and transmit biomedical data by telemetering and ensure successful specimen survival after re-entry and recovery from orbit.

2.2.3.13 Personnel Subsystems. By definition, a personnel subsystem exists whenever any of the above subsystems, or the booster subsystem, requires the interaction of personnel. A properly designed personnel subsystem consists of the following components: (a) Human engineering to insure optimum man-machine compatibility. (b) Determination of the kinds and numbers of personnel required to operate and maintain the associated hardware subsystem. (c) Training and training equipment required to obtain suitably trained personnel. (d) Appropriate personnel supports in the form of technical manuals and other job aids.

To distinguish between personnel subsystems developed for Contractor personnel in contrast to Air Force personnel, the terms "Contractor Personnel Subsystems" and "Air Force Personnel Subsystems" are used.

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2.3 GENERAL REQUIREMENTS

2.3.1 Item I - Research and Development Program

2.3.1.1 Milestones. The program of research and development is to be conducted as part of the continuing effort. It is expected that this contract period will include the design, fabrication and test of the vehicles making use of the SM-65 and SM-75 as test vehicle boosters.

2.3.1.2 In order to ensure that a gage of progress will be available, the Contractor will provide a detailed schedule of milestones extending through calendar year 1960. Progress toward, and the attainment of, these milestones will be reported monthly.

2.3.1.3

2.3.1.4 Long Lead Time Items. The Contractor shall take further procurement action as required, and, consistent with funds made available, ensure that long lead time items will be available as required in the period following this contract. This action shall be guided by the future schedules listed under para. 3.1 beyond the cut-off date for this contract and, after approval by the Government, the schedules required by paragraph 2.3.1.2.

2.3.1.5

2.3.1.6

2.3.1.7 Report Requirements. The report requirements are covered in WDT Exhibit 57-19.

2.3.2 Item II - Specification Program. Specifications and specification trees shall be written and submitted to the Air Force in accordance with the following paragraphs:

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2.3.2.1 Levels of Specifications. The Contractor shall prepare four levels of specifications, i.e., Program Capability Specifications, Vehicle Specifications, Subsystem and GSE Specifications and Component Level Specifications.

2.3.2.1.1 Specifications for the following WS-117L Programs, i.e.:

I	The Orbital Capability Program (Atlas-Boosted)
IIA	The Orbital Capability Program (Thor-Boosted)
II	The Pioneer Visual Program
III	The Pioneer Ferret Program
IV	The Advanced Visual Program
V	The Advanced Ferret Program
VI	The Visual Surveillance Program
VII	The Infrared Reconnaissance
VIII	The Ferret Surveillance Program.

2.3.2.1.2 Specifications for the following WS-117L Subsystems, i.e.:

A.	Airframe
B.	Propulsion
C.	Auxiliary Power
D.	Guidance and Control
E.	Visual
F.	Ferret
G.	Infrared
H.	Ground-Space Communications
L.	Biomedical.

2.3.2.1.3 Specifications for Components, Assemblies and Subassemblies.

2.3.2.1.4 Specifications for the individual WS-117L vehicles and the Ground Station Complex(es).

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