AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

WDPC

23 April 1958

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
As of 15 April 1958
RCS AF-XDD-A2

FOREWORD

This is the first monthly status report for the Advanced Reconnaissance System, Weapon System 117L. The report covers the period from 15 March to 15 April 1958. The WS 117L Development Plan, submitted to Headquarters USAF in late March, was dated as of 15 March. Since the Development Plan contains the details of the ARS program, this report assumes general knowledge of the system on the part of all recipients.

B. A. SCHRIEVER
Major General, USAF
Commander

WEAPON SYSTEM 117L PROGRAM STATUS REPORT

As of 15 April 1958

RCS AF-XDD-A2

Prepared by
AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

WDPC-58-11

[redacted]

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
As of 15 April 1958
BMS AF-BMD-A2

I. SUMMARY

The first flight test of the Air Force Air Reconnaissance System (ARS) vehicle will be conducted from Cooke Air Force Base, California in late 1958 with a THOR-boosted ARS vehicle.

The first flight test of an ATLAS-boosted ARS vehicle is scheduled for mid-1959 from the Air Force Missile Test Center (AFMTC), Florida. The first ATLAS-boosted flight from Cooke Air Force Base is tentatively scheduled for March 1960.

A captive test ARS vehicle, for use in the ATLAS-booster test program, is scheduled for completion in February 1959. It will undergo testing at the Lockheed Missile Systems Division test base at Santa Cruz, California. The test facility was completed during April.

A functional mockup of the airframe of the ARS vehicle is nearing completion at Lockheed Aircraft Corporation.

The Eagle Picher Company has been awarded a contract for supplying non-chargeable storage batteries for use with ARS THOR-boosted guided flights.

The Hoffman Company has been awarded a contract for development, fabrication, and testing of prototype photovoltaic solar arrays. The arrays will use solar energy to charge the storage batteries of the vehicle.

A light-weight, all-inertial guidance subsystem is being developed by the Massachusetts Institute of Technology. Present plans call for the first flight of the subsystem in early 1961.

Successful measurements of infrared radiation from an intercontinental ballistic missile were made during the flight of ATLAS missile 15A. The measurements were taken to determine how an ICBM appears to a satellite-borne infrared scanner during the power and altitude stages of the missile trajectory.

Five tracking and acquisition stations for data collection from ARS launchings will be required. These stations probably will be located in the vicinities of Cooke Air Force Base; Oxnard, California; Kaena Point, Hawaii; Anchorage, Alaska; and Sitka, Alaska.

Design modifications to launch complex 75-3 at Cooke Air Force Base are completed. This complex will be used for launching THOR-boosted vehicles. Siting and design of a launch complex for ARS ATLAS-boosted vehicles at AFMTC are in progress. Design criteria have been established for modifications of the ATLAS launch complex #14 service tower.

[redacted]

[redacted]

Siting of the Cooke Air Force Base and Kaena Point, Hawaii, test tracking stations is complete. Siting of tracking and reconnaissance data acquisition stations in northeast, northwest, and central areas of the United States is in progress.

An intelligence interpretation and dissemination facility will be established at Headquarters, Strategic Air Command, Offutt Air Force Base, to serve as the program control center, data collection center, and training center.

A facility to house equipment for the analysis of technical information will be constructed at Wright-Patterson Air Force Base, Ohio, for use by March 1960.

A teletype from Headquarters USAF requested a revision of the Financial Annex (Section III) of the ARS Development Plan, dated 15 March 1958, from 214 million to 152 million dollars. It also requested that the program remain flexible. Major revisions of program objectives will have to be made if a reduction of this magnitude takes place in the fund program.

[redacted]

II. TEST PROGRAM STATUS

A. FLIGHT TESTS

1. Both ATLAS and THOR missiles will be used in support of the Air Force Advanced Reconnaissance System (ARS) program. THOR-boosted ARS vehicles will be primarily for engineering tests of the orbital capability of the vehicle. Early ATLAS-boosted ARS vehicles will also be used for engineering purposes but, unlike the THOR-boosted vehicles, will contain developmental reconnaissance equipment. These latter vehicles will evolve into the operationally configured ARS.

2. The first THOR-boosted ARS vehicle is scheduled for completion in June 1958 and will be launched from Cooke Air Force Base, California in late 1958. Following this initial flight, one THOR-boosted flight per month is tentatively scheduled through August 1959.

3. The first ATLAS-boosted flight test of the ARS is scheduled for mid-1959 from the Air Force Missile Test Center (AFMTC), Florida. The launchings of subsequent ATLAS-boosted flights will be transferred to Cooke Air Force Base. The first ATLAS-boosted flight from Cooke is tentatively scheduled for March 1960.

B. CAPTIVE TESTS

1. A captive test ARS vehicle for use in the ATLAS-booster test program is scheduled for completion in February 1959. This vehicle will be used for testing at the Lockheed captive test facility at Santa Cruz, California.

2. THOR-boosted ARS engineering vehicles will not require captive testing.

III. SUBSYSTEMS

A. AIRFRAME (Lockheed - System Prime Contractor)

A functional mockup of the airframe of the advanced reconnaissance vehicle is nearing completion at the prime contractor's plant. Wind tunnel models of the ARS vehicle and the ATLAS booster are shown in Figure 1. Figures 2 and 3 are model representations of the ARS vehicle.

B. PROPULSION (Bell Aircraft Corporation - Sub-Contractor to Lockheed)

Development has been started on an improved engine for the ARS vehicle. The fuel will be changed from JP-4 to unsymmetrical di-methyl hydrazine (UDMH). This higher energy fuel will permit larger payloads in the ARS vehicle. The point at which this engine will be available for the ARS flight test schedule has not yet been determined. The new fuel will probably not be used until after the first few ARS flights have been made.

C. AUXILIARY POWER

1. Contracts related to the auxiliary power subsystem for the ARS vehicle have been awarded to the Eagle Picher Company and the Hoffman Company. The Eagle Picher Company will supply non-chargeable storage batteries for use with THOR-boosted, guided flights. The Hoffman contract is for development, fabrication, and testing of prototype photovoltaic solar arrays. These arrays will provide solar energy to charge storage batteries used to power various vehicle components.

2. Negotiations are underway with Engineered Magnetics Company for a supply of ARS vehicle inverters and voltage regulators to be used on THOR-boosted flights. Modifications have been made to similar components for use on ATLAS-boosted flights.

D. GUIDANCE

A light-weight all-inertial guidance subsystem is being developed by the Massachusetts Institute of Technology to guide the ARS vehicle into orbit and to stabilize its position with reference to the earth while in orbit. Plans call for the first test flight of the subsystem using at ATLAS booster in early 1961.

E. INFRARED

The first successful measurements of infrared radiation from intercontinental ballistic missiles were made from a B-47 during the flight of ATLAS missile 15A. These measurements were the first in a series to determine what an ICBM would look like to a satellite borne infrared scanner during the power and altitude stages of the missile trajectory. This subsystem is being designed to give early warning of an enemy ICBM attack as well as other data. A mockup of the infrared reconnaissance scanner is shown in Figure 4.

F. GROUND-SPACE COMMUNICATIONS (Philco Corporation - Sub-Contractor to Lockheed)

1. The requirements for tracking and acquisition sites necessary for obtaining data from the THOR-boosted ARS vehicle launchings from Cooke Air Force Base have been established. A total of five tracking and acquisition stations will be required. One station will be provided at Cooke, and a down-range tracking station probably will be located in the vicinity of Oxnard, California. Of the remaining three stations, one will be in Hawaii and two in Alaska. One Alaska station will be located in the Anchorage area; the other will be in the Sitka area.

2. Radio frequency allocations have been requested for data transmission for the THOR and ATLAS-boosted ARS programs.

IV. FACILITIES

A. INDUSTRIAL

1. During April, construction of the test base of the Lockheed Missile System Division at Santa Cruz, California was completed. Installation of the test instrumentation in the components test laboratory at this base was also completed during the month. The first tests on the ARS propulsion system components have been conducted at the test facility. The status of the construction underway at this facility as of 18 March is shown in Figure 5.

2. The foundations of the static test stands and blockhouse for the ARS program at Santa Cruz have been poured. Installation of the test stand superstructure and instrumentation has begun. Construction contracts have been rescheduled to permit hot firings on the test stand by 15 June 1958. The status of the test stand and blockhouse construction as of 18 March is shown in Figure 6.

B. MILITARY CONSTRUCTION PROGRAM

1. Design criteria modifications to launch complex 75-3, Sites 4 and 5, at Cooke Air Force Base have been established. This complex will be used for launching THOR-boosted ARS test vehicles. The complex will consist of two launch stands, one blockhouse, and one missile support center. This facility is now under construction. The foundation for the blockhouse has been poured, and the support center is being designed. Construction and instrumentation of the launcher are scheduled for completion by October 1958 in preparation for an ARS launching in late 1958.

2. Siting and design of an ATLAS-boosted ARS launch complex in the Cooke Air Force Base area is in progress. A site in the south Cooke Air Force Base area has been found that will satisfy the site criteria. Headquarters USAF has been requested to obtain approval of the site in this tri-service controlled area. Criteria for the launch complex will be completed in 25 April, and the design will be completed in October. The complex will consist of two launch stands, one blockhouse, and one missile support center. It is anticipated that construction of the complex will be completed by October 1959 in preparation for an ARS launching in March 1960.

3. The design criteria for the modification of the service tower on the ATLAS launch complex #14 at AFMTC are ready. This complex will be modified during fiscal year 1959 by Convair and Lockheed for use in the ARS program in June 1959.

4. Siting of test tracking stations for the ARS program at Cooke Air Force Base and Kaena Point on the Island of Oahu, Hawaii, have been completed. The construction of an access road to the Kaena Point site is in progress. A tracking, control, and telemetry station will be built at each of these two locations. At each station, a portion has been designed for use during the first year of operation. Construction of these portions will start in May 1958. These interim facilities will consist of one 60-foot

diameter TLM-18 telemetry antenna and receiver building, a tracking radar, and associated structures. The interim facilities will be needed by 1 November 1958. The complete station will have, in addition to the interim facility, one 60-foot diameter ultra high frequency (UHF) telemetry antenna and receiver building (Cooke only), an administration and data processing building (Cooke only), a 10-foot diameter angle tracker, a 6-foot diameter vehicle command transmitting antenna, and associated structures. The complete facilities will be needed by October 1959.

5. Van-mounted tracking and transmitting facilities will be provided for use in Alaska by 1 November 1958.

6. Siting of ARS tracking and reconnaissance data acquisition stations in the northeast, northwest, and central areas of the United States is in progress. The criteria for the intercept, control, and data acquisition stations for each of these three locations will be completed in June 1958, and the design will be started in June and July. The sites will be selected in May and June. Each of these stations will consist of one VHF and two UHF telemetry antennas 60 feet in diameter, three telemetry receiver buildings, a 10-foot diameter angle tracker, a 6-foot diameter vehicle command transmitter, interstation communications buildings, and associated structures. The facilities in the northeast and northwest areas will be needed by March 1960, and the station in the Central United States will be needed in January 1961.

7. An intelligence interpretation and dissemination facility will be located at Headquarters, Strategic Air Command, Offutt Air Force Base. This facility will serve as the program control center, as collection center for all reconnaissance data obtained from the data acquisition stations, and as the training center. Criteria for the facility are being developed, and design will begin in June 1958. Construction is scheduled to start in December 1958, and the facility will be ready for use by the time it is needed in March 1960.

8. A facility to house laboratory equipment and instrumentation for the analysis of technical information will be built at Wright-Patterson Air Force Base. The criteria have been developed. The facility will be needed by March 1960.

V. GENERAL STATUS

A. FUNDS

The status of funds is appended separately as is the practice with the monthly AIR FORCE BALLISTIC MISSILES PROGRAM STATUS REPORT.

B. [redacted]

[redacted]

revision of the [redacted]

System [illegible] dollars. [illegible] reduction of [illegible] in the [illegible] time of [illegible] achievement of [illegible] of the program without any reduction in the eventual cost of the overall program.

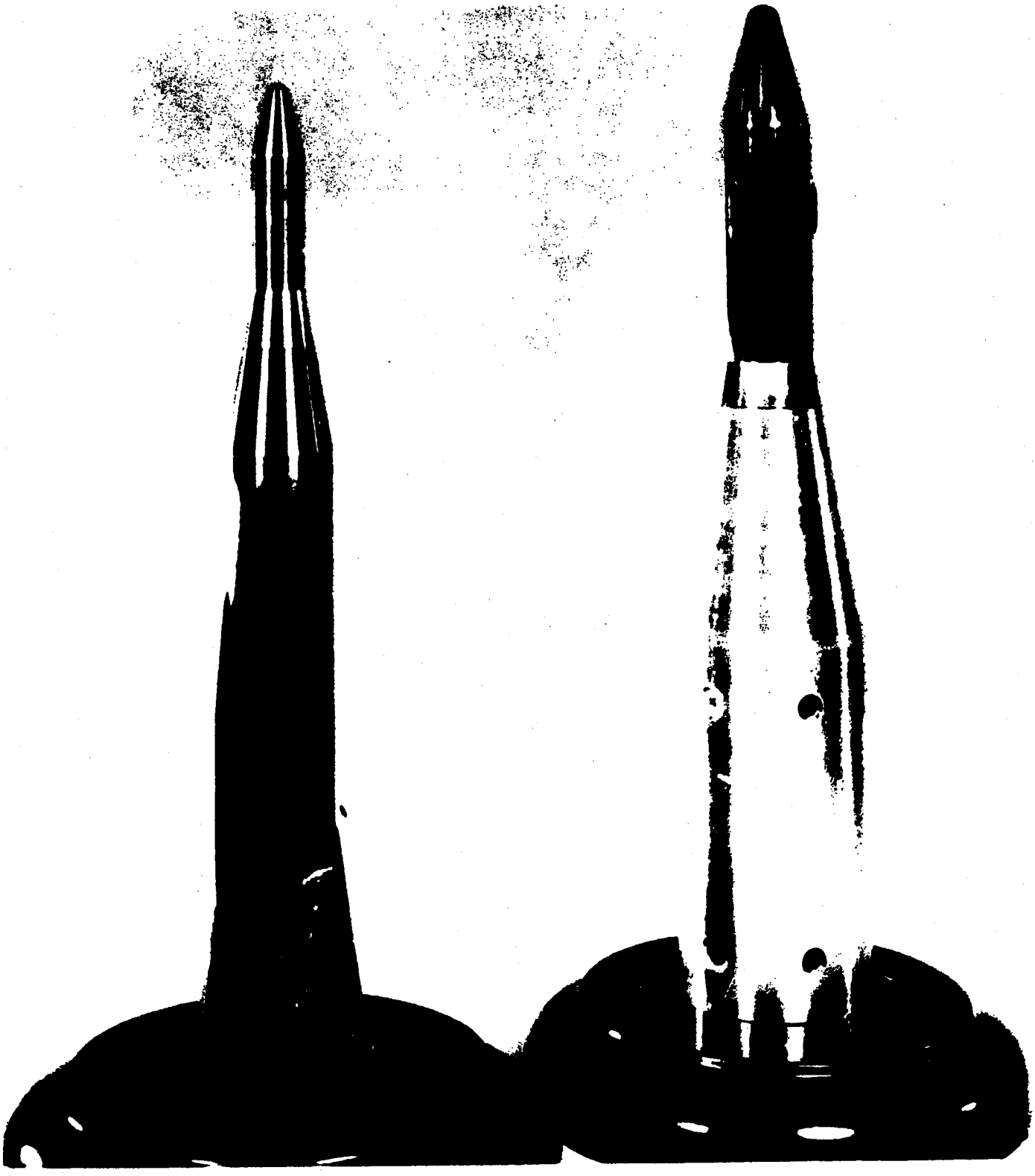
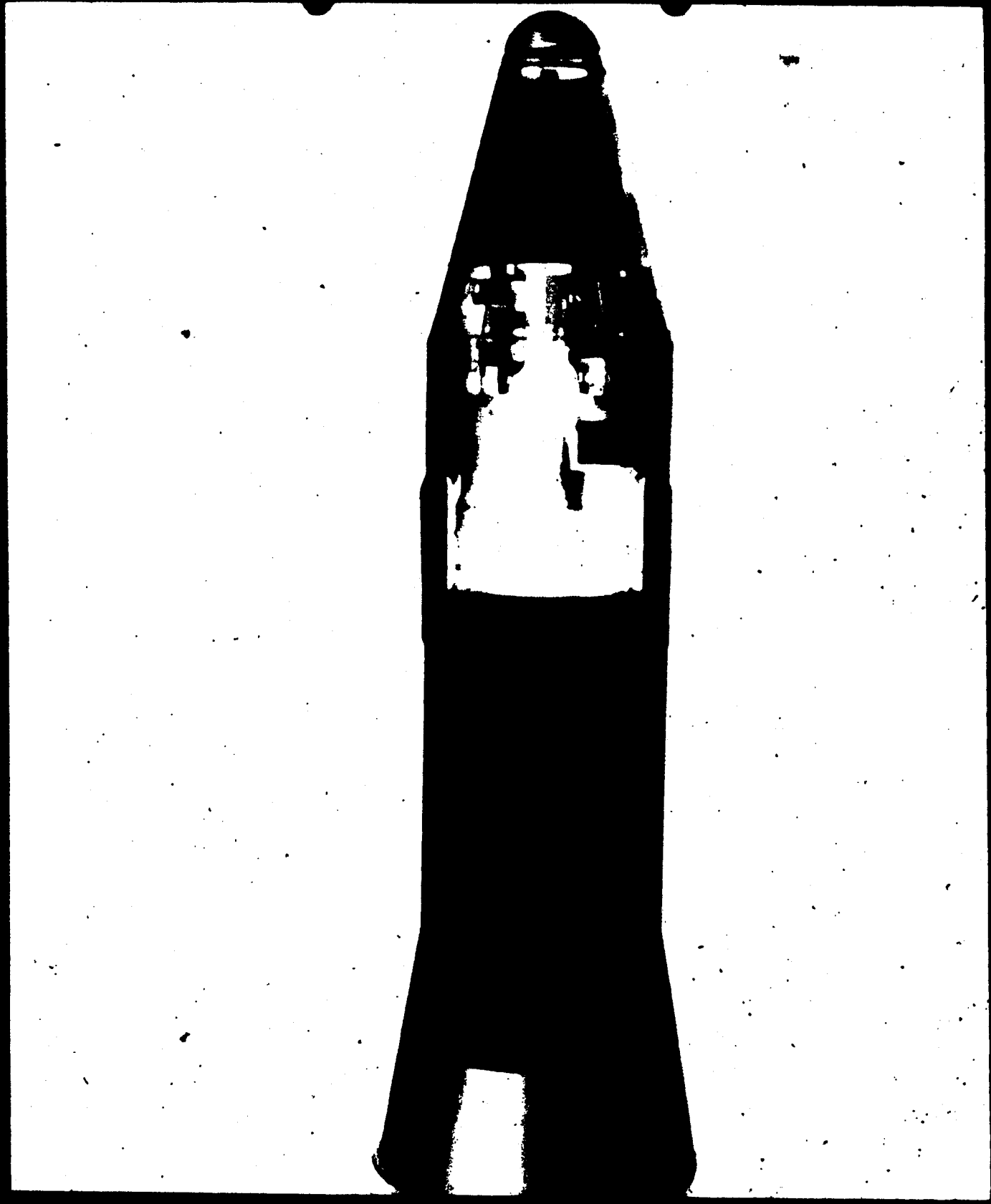


Figure 1. 1/75th scale wind tunnel model of WS 117L vehicle mounted on ATLAS booster and 1/48th scale of vehicle and ATLAS mating adapter mounted on wind tunnel stinger shield.



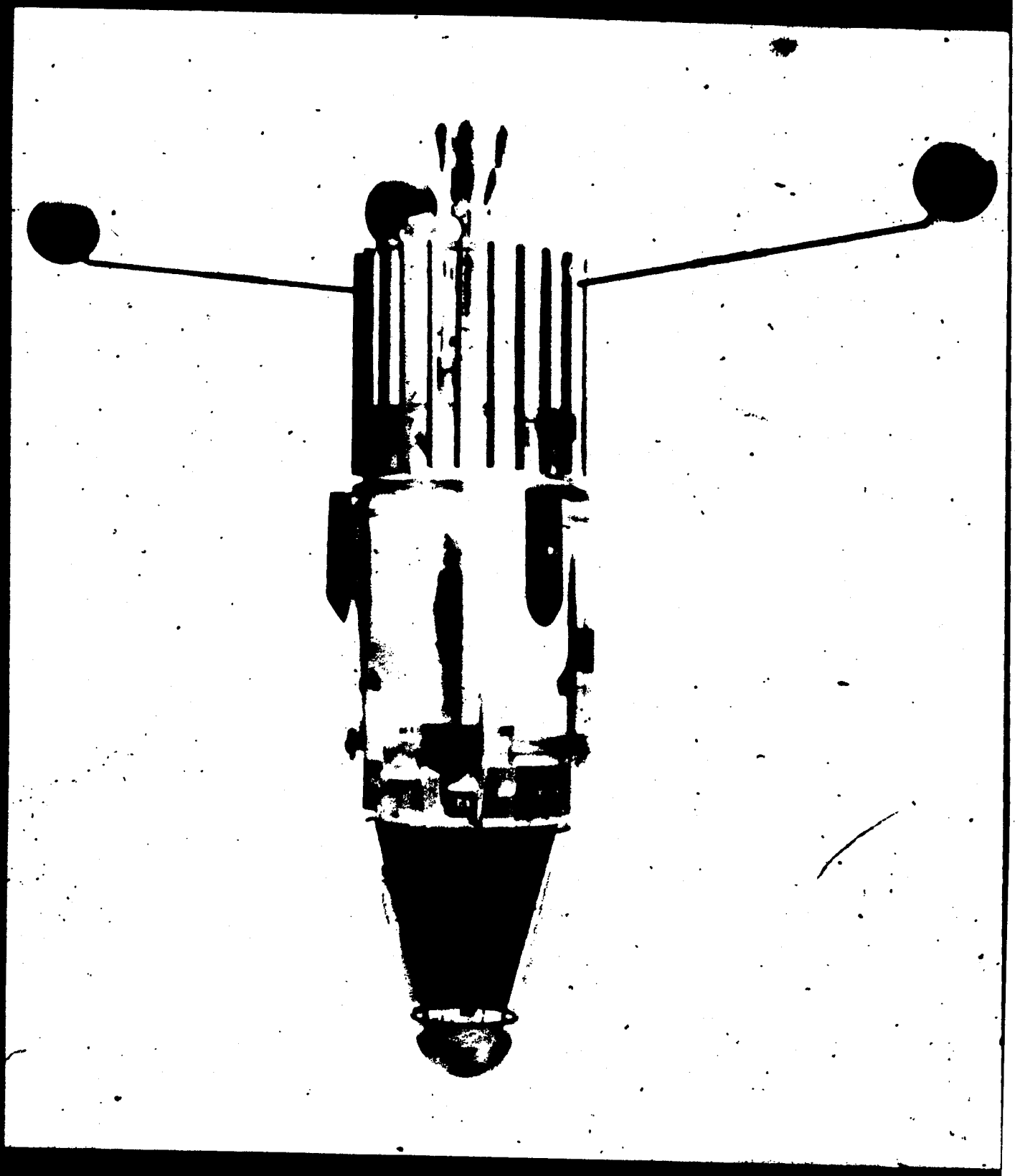


Figure 4. Mockup of infrared reconnaissance system scanner as developed by Aerojet-General Corporation. Under subcontract to Lockheed Missile System Division. Weight: 109 lbs.

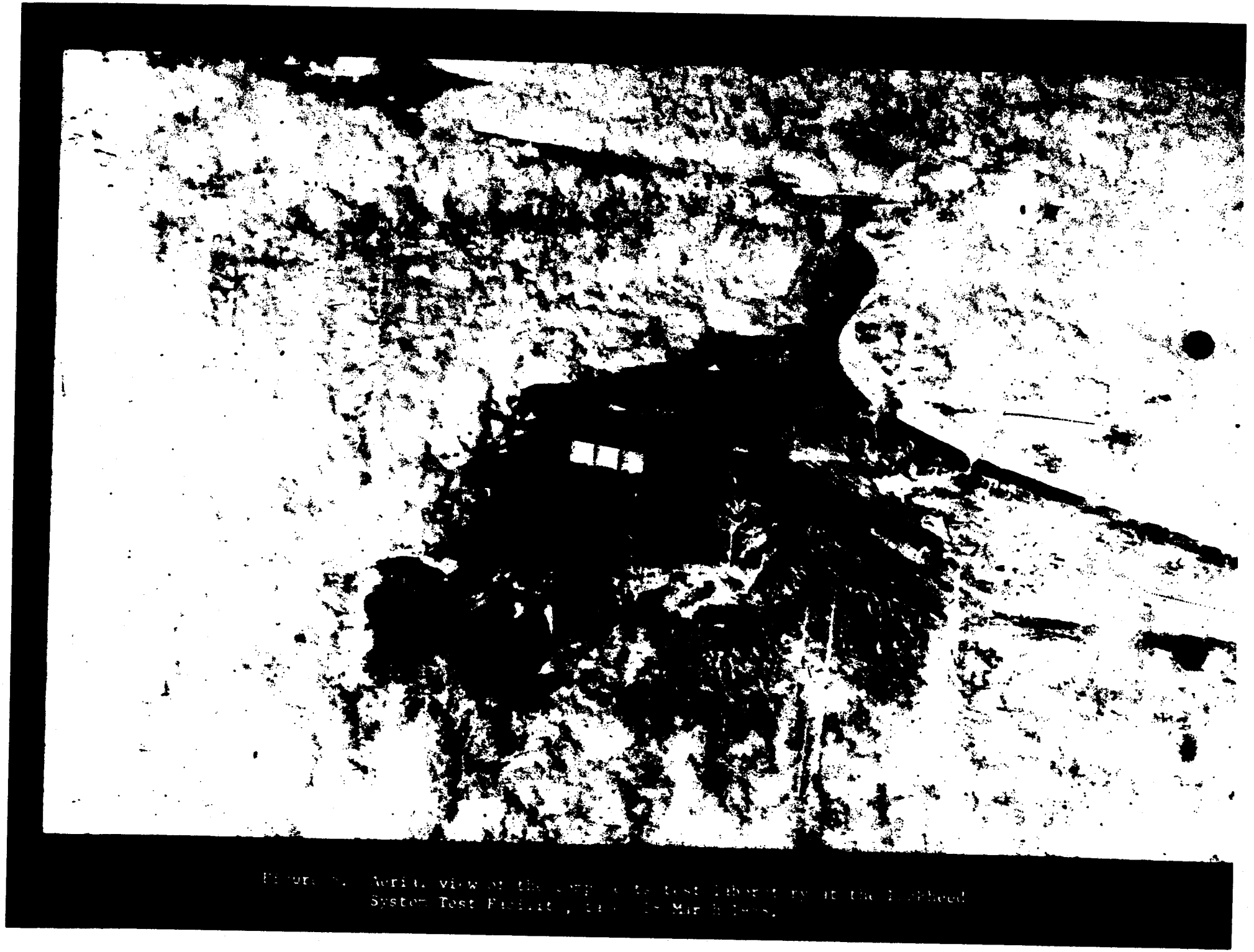


Figure 6. Aerial view of static firing test stands and blockhouse control center, taken 18 March 1958.

CONFIDENTIAL

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

AFCGM

18 June 1958

MEMORANDUM FOR DISTRIBUTION:

SUBJECT: Textual Error, WS-117L Program Status Report For Period 15 April to 31 May 1958 (U)

Your attention is called to an error occurring in subject report, on Page 5, paragraph 2. The words "at Offutt Air Force Base" should be deleted, inasmuch as the Site Survey Board has not completed its work nor made its report, and also the SAC Preliminary Operations Plan, which suggested said site, has not been approved by Headquarters USAF.

A. E. KRIEGER
Colonel, USAF
Chief, Special Projects Division
Office, Assistant Chief of Staff
for Guided Missiles

CONFIDENTIAL AFCGM Cont. # 582722

806 18 ONS

DISTRIBUTION LIST

Advanced Research Projects Agency (Mr. Gise)

Assistant Chief of Staff, Intelligence (L/C Kemp)

Directorate of Research & Development, DCS/D
(Brig Gen Boushey)

Directorate of Budget (Mr. Lew Meyer)

Assistant for Development Programming, DCS/D
(Col J. T. Stewart)

Directorate of Procurement & Production, DCS/M
(Col Cavnar)

Directorate of Communications-Electronics, DCS/O
(Maj White)

Directorate of Programs, DCS/P&P (Maj Kincaid)

Directorate of Operations, DCS/O (Maj R. C. Brown)

SECRET

582695

AFCGM Cont. # [redacted]

WEAPON SYSTEM 117L PROGRAM STATUS REPORT

For Period 15 April to 31 May 1958

RCS AF-XDD-A2

Prepared by
AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

Copy 6 of 50

WDPC-58-17

SECRET

806 10 052

SECRET

AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

WDPC

10 June 1958

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Period 15 April to 31 May 1958
RCS AF-XDD-A2

FOREWORD

This is the second of the monthly Weapon System 117L Program Status Reports which were established by Headquarters USAF TWX, AFDRD-EX 58935, dated 2 April 1958.

The Advanced Reconnaissance System vehicle has recently been renamed the "Sentry".

Permission was granted in May to change the as of date of this report from the 15th of each month to the end of each month. This date is more compatible with the reporting system established for the Weapon System 117L program.

B. A. SCHRIEVER
Major General, USAF
Commander

WDPC-58-17

SECRET

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Period 15 April to 31 May 1958
RCS AF-XDD-A2

I. SUMMARY

Work on the first THOR-boosted Advanced Reconnaissance System (ARS) vehicle is on schedule. System installation design is proceeding satisfactorily.

A breadboard model of the visual reconnaissance subsystem for the ARS program was demonstrated at Eastman Kodak Laboratories on 24 April.

Because B-47 aircraft are being used to obtain measurements of infrared (IR) radiation from ICBMs, the emergency grounding of all B-47 type aircraft has temporarily halted the Infrared Measurements program.

A contract with the Ramo-Wooldridge Corporation provides for design and implementation of the intelligence data handling system for the ARS. Subcontracts have been negotiated with ITEK Corporation, Broadview Research Corporation, Systems Laboratories Corporation, and Planning Research Corporation. A project and program control procedure has been established.

Construction drawings and specifications for the interim tracking and telemetry stations at Cooke Air Force Base, California and at Kaena Point, Hawaii were released for construction. The stations are scheduled for completion 1 September.

Construction of launch stands and blockhouses for the THOR-booster complex in the south Cooke area is on schedule.

Fort Stevens, Oregon was approved as the site of the northwest United States tracking and data acquisition station. A final selection for the northeast United States station is scheduled for the week of 9 June. Locations for a central site are being reviewed.

The Preliminary Operations Plan for the ARS was published in April and will be forwarded to Headquarters USAF for approval.

A newly formed Air Force Bioastronautics Division at Inglewood, California, will function as a consultant and liaison group for all ARS biomedical activity. This Division worked with Lockheed to prepare a work statement covering productions of five biosatellite recovery capsules. The capsules will permit the launch, orbit, and recovery of animal subjects. The first launch of four mice is programmed for January 1959.

II. TEST PROGRAM STATUS

FLIGHT TESTS

Work on the first THOR-boosted Advanced Reconnaissance System (ARS) vehicle continued on schedule. The vehicle is scheduled for completion in June. Although no major milestones in the flight test program were scheduled for this reporting period, system installation design milestones were successfully achieved. See Figures 1 through 4.

III. SUBSYSTEMS

A. AIRFRAME (Lockheed - System Prime Contractor)

1. Four segmented steel tanks were completed. These tanks will be used as back-up for the aluminum tanks which are planned for flight test use. Three tanks failed when subjected to pressure tests. The fourth tank was modified and successfully passed pressure tests but is slightly heavier than the desired weight.

2. With the cooperation of the Sandia Centrifuge Section, inertial loading tests were performed on the first spun aluminum flight tank and one segmented steel tank. Both passed the tests successfully. The aluminum tank, completed on 24 May, was pressure tested to 85 psi and then flown to Sandia. The cooperation of the Atomic Energy Commission and Sandia on these tests was exceptional.

3. A welding machine for assembling spun aluminum tanks was received, and training in its use is underway. Efforts are being made to reduce the number of manufacturing processes involved in producing the aluminum tanks. One result of these efforts is the elimination of the chem-mill process.

4. Problems previously encountered in the welding of magnesium thorium alloys used for structure and skin are being eliminated as experience is gained. The elimination of these problems removes one of the possible delaying factors in the flight schedule.

5. An early test on the helium regulator used for pressurizing propellant tanks indicated a technical problem area. However, tests on a second helium regulator produced by Robert Shaw Fulton Company were satisfactory. Failure on the early test was attributed to faulty test procedure and metal chips found in the regulator assembly.

6. It has been determined that a single helium boom extension would assure proper vehicle aerodynamic stabilization at the lower orbital altitudes assumed for early Program IIA flights. Redesign work is in progress. However, engineering effort to increase the functional reliability of the twin-boom extension mechanism is continuing. Program IIA flights will be THOR-boosted for early orbital capability.

7. Small vanes, or fins, are being added to the aft end of the ARS vehicle for vertical stabilization. The additions will permit better alignment of the center of pressure and the center of the gravity in the vehicle.

B. AUXILIARY POWER

In addition to battery power, the use of solar power for the tracking beacons is being considered for Program 11A flights. Design effort is being coordinated with temperature, efficiency, and power requirement studies to determine how the solar power collectors can be incorporated into the Program 11A flight vehicles as soon as possible.

C. VISUAL RECONNAISSANCE

The breadboard model of the visual reconnaissance subsystem for the ARS program was demonstrated at Eastman Kodak Laboratories on 24 April. Included were airborne equipment and equipment for recording data at the ground station. The airborne portion consisted of the camera, the processor, and the readout scanning mechanism operating in series. The ground portion was a separate unit with a complete readout device scanning simulated photography which was displayed on the ground reconstruction device.

D. INFRARED

Because B-47 aircraft are being used to obtain measurements of infrared (IR) radiation from ICBMs, the emergency grounding of all B-47 type aircraft has halted the Infrared Measurements program through May.. The program will measure radiation from all ICBMs to be launched at the Air Force Missile Test Center. Additional detailed information is being acquired from a similar measurement program which has already produced very successful results. These results indicate that IR radiation from ICBMs may be much greater than previously estimated. Data from one ATLAS flight and one VANGUARD flight indicated that sensing equipment was saturated with IR radiation at a range of 600 miles.

E. INTELLIGENCE DATA HANDLING

A contract with the Ramo-Wooldridge Corporation provides for the design and implementation of the intelligence data handling system for the advanced reconnaissance satellite. Major subcontracts were negotiated by R-W in this period with ITEK Corporation for the major optical assemblies and devices; Broadview Research Corporation for photo interpretation keys and equipment requirements; Systems Laboratories Corporation for geodetic calculations and applications; and Planning Research Corporation for application of their intelligence parameter work. A mutually agreeable working relationship with Lockheed has been achieved to insure the coordination of effort and the timely and orderly exchange of information required for the most expeditious development of the total system. To fulfill the Air Force responsibility of overall management control of these two parts of the system, a project and program control procedure identical to the one established for the ballistic missiles programs is being followed.

IV. FACILITIES

MILITARY CONSTRUCTION PROGRAM

1. Construction drawings and specifications for the interim tracking and telemetry station at Cooke Air Force Base have been completed and released for construction. Construction will be completed by 15 August and equipment will be installed by 1 November. Design of the complete station has been initiated and is scheduled for completion by 1 September.

2. Design criteria for the ARS intelligence center ~~at Offutt Air Force Base~~ are scheduled to be completed and available for review by 15 June.

3. Construction of launch stands and blockhouses for the THOR booster launch complex at Cooke Air Force Base is progressing on schedule. Modification of existing buildings for an interim missile assembly facility will begin early in June.

4. Air Staff approval was obtained to site two launchers and a blockhouse for the ARS program in the south Cooke Air Force Base area. Since the Air Staff approval stated that the siting must conform to the Navy master plan, the proposed site location was forwarded through Navy channels for further Navy approval. Local Navy authorities at Point Mugu agreed to site the facility as presented by the Air Force. Launch facility design criteria review is scheduled for the first week in June.

5. Construction drawings and specifications have been completed and released for construction of the interim tracking and data acquisition station at Kaena Point on the island of Oahu, Hawaii. Bids were opened on 9 May, and a construction contract was awarded during the week of 12 May. Beneficial occupancy date is 15 August, and installation of equipment will begin at that time. The need date is 1 November. Design of the complete station has been started and will be completed by 1 September. Construction of the access road has been completed.

6. The site survey team recommended Fort Stevens, Oregon, for the site of the northwest United States tracking and data acquisition station. Electronic surveys of the site indicate that it is satisfactory for ARS operations. Because this site was the first priority choice of the Site Selection Board, it was decided to obtain Board approval by message instead of convening the Board. All Board members approved the location for the northwest station at Fort Stevens. After finalization, recommendations will be submitted to [redacted] for approval.

7. [redacted]

8. A meeting was held with the Corps of Engineers and the Air Force Installation Representative at Omaha, Nebraska, to consider the location of a central United States tracking and data acquisition site. The site selection team started survey activities on 26 May. The Selection Board will meet on 9 June to select central locations for electronic surveys. It is tentatively planned to convene the Site Selection Board on 15 July to make a final decision on the central site location.

9. Review of plans and specifications and award of construction contract for the interim test tracking station at Annette Island, Alaska, will be accomplished during June. Completion is scheduled for mid August.

10. An existing aircraft control and warning station at Cape Chiniak, Kodiak Island, Alaska, is to be occupied as an interim test tracking station. This arrangement will eliminate the need for construction of any new facilities.

V. PRODUCTION STATUS

The first ARS vehicle is scheduled for shop completion late in June. The present plan for manufacture and checkout provides for component fabrication at Lockheed (LMSD), Van Nuys, California; vehicle assembly at LMSD, Sunnyvale, California; subsystem installation, modification and checkout at LMSD, Palo Alto, California; engine firing and system checkout at LMSD, Santa Cruz, California; and final checkout at Cooke Air Force Base and the Air Force Missile Test Center.

VI. OPERATIONAL CAPABILITY STATUS

A. OPERATIONAL PLANNING

1. The Preliminary Operational Plan for the ARS was published in April and will be forwarded to Headquarters USAF for approval.

2. An ARS Weapon Phasing Group charter was published.

3. The first meeting of the ARS Weapon System Phasing Group was held 21 and 22 May. Briefings were presented on the background and status of the system, the various subsystems, and the content of the ARS Preliminary Operational Plan. A Communications and Electronics Subcommittee was established. The Subcommittee was specifically directed to investigate problems concerning frequency allocations to the ARS program and system requirements that dictate the extreme bandwidth in the ground point-to-point communication system. The Communications and Electronics Subcommittee will also investigate any communication and electronic problem which could have bearing on the ARS program.

B. OPERATIONAL SITES AND FACILITIES

The south Cooke Air Force Base area was selected as the optimum location for conducting ARS launches. An agreement between the Navy and the Air Force provided for the Air Force to make soil borings for the ARS complex in the south Cooke area if the borings would not interfere with either present or projected Navy plans for that area. Action was taken immediately to have the architect-engineer proceed with the soil borings.

VII. GENERAL STATUS

A. STATUS OF FUNDS

Appended separately.

B. OTHER SIGNIFICANT ITEMS OF INTEREST

1. Formation of an Air Force Bioastronautics Division at Inglewood, California, was directed on 23 April. The Bioastronautics Division will function as a subsystem consultant and liaison group for all biomedical activity in ARS. In conjunction with Lockheed, Bioastronautics Division prepared a work statement dated 14 May which will result in a contract to produce five Biosatellite Recovery Capsules (BRC) for ARS vehicles. These BRC will permit the launch, orbit, and recovery of animal subjects. The animals will suffer no irreversible biological damage. Collection of biological and environmental data such as temperature, humidity, pressures, acceleration, cosmic radiation, weightlessness, psychological responses, etc., will be assured. Mice, rats, and small primates will be used. The first launch of four mice is programmed for January 1959.

2. During May the Qualitative Personnel Requirements Information (QPRI) program for ARS progressed satisfactorily. A list of assumptions were formulated, approved, and forwarded to LMSD for inclusion in a QPRI report due on 30 June. Coordination, review, and approval of the report for publication will be accomplished during the first week in June. This report will be time-phased for an operational date of early 1961 for the Pioneer visual and Pioneer Ferret subsystems. The northeast and northwest operational tracking and acquisition stations will be operated by military personnel by 1961.

Figure 1. Full scale functional mockup of WS-117L vehicle and ATLAS adapter.

WDFC-58-17

Figure 2. Exploded view of the SS-117L vehicle mockup and ATLAS adapter showing from front to rear: (A) Nose cone with detachable nose cap (B) Midbody with forward and aft equipment racks (C) ATLAS adapter section (D) Bi-laminated, spherically domed fuel and acid tanks for the vehicle.

DIC-58-17

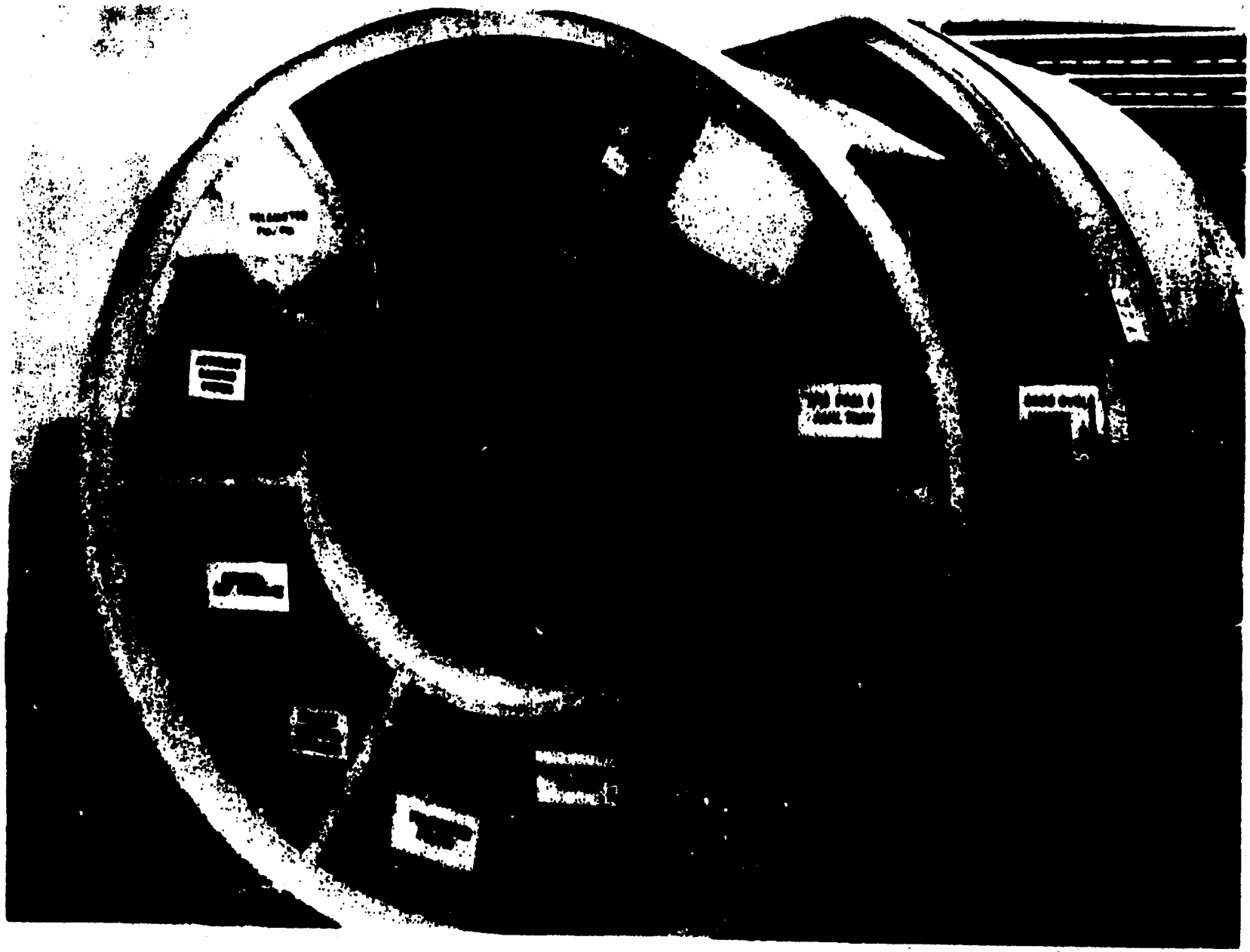


Figure 3. WS-117L vehicle functional mockup, midbody forward equipment rack with partial equipment installed.

Figure 4. WS-117L vehicle (non-flyable mockup) with equipment racks which surrounds the vehicle on the installation.

DRC-60-17

DISTRIBUTION

Headquarters, United States Air Force	10
Commander, Air Research and Development Command	10
Commander-in-Chief, Strategic Air Command	5
Army Ballistic Missile Agency	2
Ballistic Missiles Office (Hq AMC)	3
Assistant CINCSAC (SAC MIKE)	3
Air Force Ballistic Missile Division (Hq ARDC)	14

SECRET

CGM Cont. # 583044

Copy 5 of 60

WEAPON SYSTEM 117L PROGRAM STATUS REPORT

For Quarter Ending 30 June 1958

RCS AF-XDD-A2

Prepared by
AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

801 as C48

WDPC-58-21

SECRET

WDGEU 241-58

AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

WDPC

8 July 1958

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
Quarter Ending 30 June 1958
RCS AF-XDD-A2

FOREWORD

This report summarizes the progress made in the Advanced Reconnaissance System program during the period 1 April through 30 June 1958.

B. A. SCHRIEVER
Major General, USAF
Commander

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Quarter Ending 30 June 1958
RCS AF-XDD-A2

I. BRIEF OF PROGRESS

Development of the THOR-boosted advanced reconnaissance system (ARS) vehicle scheduled for launch from Cooke Air Force Base late in 1958 was on schedule. System installation design milestones were achieved.

Reprogramming directives for THOR-boosted flights placed emphasis as a secondary objective upon collection of geophysical research data and development testing of a recoverable biosatellite capsule. The primary objective of flight testing the ARS vehicle and the ground-space communication network was unchanged. To obtain the new secondary objectives, the ARS vehicle was redesigned for lighter weight. A decision to change the fuel used for the main engines of the ARS vehicle to an unsymmetrical di-methyl hydrazine/inhibited red fuming nitric acid combination (UDMH/IRFNA), a higher energy fuel, permitted planning for use of larger payloads in the ARS vehicle. It is planned to phase in the UDMH engine in the #5 flight test vehicle.

Twenty-two significant propulstion test assembly cold flow tests were performed at the Santa Cruz Test Base of the Lockheed Missile Systems Division. Design of the auxiliary power subsystem for the first ARS flight was completed and drawings were released. Detailed integration designs were started for installation of subsystems for [redacted] into the ARS vehicle.

A breadboard model of the visual reconnaissance subsystem for the ARS program was demonstrated at the Eastman Kodak Laboratories on 24 April. Significant progress was made on both the interim Pioneer and the Pioneer Ferret equipment programs. A program to provide infrared radiation measurements was undertaken. High-altitude balloon flights to obtain infrared power ground measurements in the 2.7 micron region were successfully completed.

A contract was awarded to provide for design and implementation of the intelligence data handling subsystem for the ARS.

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Quarter Ending 30 June 1958
RCS AF-XDD-A2

II. TOPICAL SUMMARY

A. GENERAL

1. Both ATLAS and THOR missiles will be used in support of the Advanced Reconnaissance System (ARS) program. THOR-boosted ARS vehicles will be used in the early phase of the program primarily for engineering tests of the orbital capability of the vehicle. Early ATLAS-boosted ARS vehicles will also be used for engineering purposes but, unlike the THOR-boosted vehicles, will contain developmental reconnaissance equipment. The ATLAS-boosted vehicles will evolve into the operationally configured ARS.

2. Work on the first THOR-boosted ARS vehicle continued generally on schedule throughout this quarterly reporting period, and system installation design milestones were successfully achieved. This vehicle, due for completion in June, will be completed early in July. It will be launched from Cooke Air Force Base late in 1958. Following this initial flight, one THOR-boosted flight per month is tentatively scheduled through August 1959.

3. The first ATLAS-boosted flight test of the ARS is scheduled for June 1959 from the Air Force Missile Test Center (AFMTC), Florida. After initial launchings from AFMTC, subsequent ATLAS-boosted flights will be transferred to Cooke Air Force Base. The first ATLAS-boosted flight from Cooke is tentatively scheduled for March 1960.

4. A captive test ARS vehicle for use in the ATLAS-booster test program is scheduled for completion in February 1959. This vehicle will be used for testing at the Lockheed captive test facilities, Santa Cruz, California.

5. Instructions issued in March redirected the secondary objective of THOR-boosted ARS flights. The secondary objective of these flights, which comprise the early Program IIA phase of the overall ARS program, originally emphasized Pioneer visual reconnaissance. The new directives shifted the emphasis as a secondary objective from a visual reconnaissance application employing a recoverable film capsule to the collection of geophysical research data and the development testing of a recoverable biosatellite capsule. Flight testing of the ARS basic vehicle system and the ground-space communication network remained the primary objective of the redirected program. Ten launches have been scheduled for this program. The first flight is planned for November 1958. All launches will be made from Cooke Air Force Base, with the objectives of achieving a Polar orbit at 160 to 225 statute miles altitude, depending on payload and mission objective.

6. Formation of an Air Force Bioastronautics Division at Inglewood, California, was directed on 23 April. The Bioastronautics Division will function as a subsystem consultant and liaison group for all biomedical activity in the ARS program. In conjunction with Lockheed, Bioastronautics Division prepared a work statement dated 14 May which will result in a contract to produce five biosatellite recovery capsules for ARS vehicles. These recovery capsules will permit the launch, orbit, and recovery of animal subjects. The animals will suffer no irreversible biological damage. Collection of biological and environmental data such as temperature, humidity, pressures, acceleration, cosmic radiation, weightlessness, psychological responses, etc., is planned. Mice, rats, and small primates will be used. The first launch of four mice is programmed for January 1959.

7. Two types of biosatellite payloads are contemplated for ARS flight tests; a recovery capsule to demonstrate the feasibility of the system by returning a living animal from orbit to earth, and a recovery capsule which will return a sub-human primate from orbit. Only environmental data will be collected in the early type capsule. Physiological data are also desired from the sub-human primate capsule.

8. All five of the contemplated biosatellite flights will be launched south from Cooke Air Force Base. With the ground stations planned for the primary flight objectives of the program, it would be impractical to recover anywhere except over the Pacific Ocean. It is planned that all biosatellites will make eighteen orbits with approximately a ninety-minute period prior to recovery. Re-entry trajectories will be initiated over Alaska, and recovery after re-entry will take place in the vicinity of Hawaii.

9. Studies have been conducted to establish the feasibility of "drag only" re-entry trajectory using ablation techniques to protect the basic structure and contents. Preliminary calculations have shown that this method is feasible for re-entry. After re-entry is completed, the capsule should decelerate to its subsonic terminal velocity at about 50,000 feet altitude. Below this altitude a reefed parachute will be used to accomplish further decelerations with low shock loadings, and touchdown on earth will be at about 20 feet per second.

10. Studies were initiated to determine the relative advantages of aerial, sea, or land recovery of biosatellites. Currently, indications favor aerial recovery at approximately 10,000 feet altitude by using a system already fully developed for the C-119. Over 1500 successful recoveries with the C-119 system indicate its serviceability for this application. To pinpoint the descending parachute capsule, silvering of the chute, ejection of chaff charges from the capsule, and a capsule Sarah beacon can be employed in conjunction with radar aircraft (RC-121 equipped with APS-20 search radars and Sarah beacon receivers).

11. A study of system reliability has been underway. The system reliability analysis includes reliability models for the system and for each of the subsystems. Reliability allocations have been calculated for each of the subsystems. This information is being prepared for distribution in a technical report. A malfunction reporting procedure has been formulated and is being reviewed.

12. The first meeting of the ARS Weapon System Phasing Group was held in May. Briefings were presented on the background and status of the over-all system, the various subsystems, and the content of the ARS preliminary Operational Plan. A Communications and Electronics Subcommittee was established. This subcommittee was directed to investigate problems concerning frequency allocations to the ARS program, system requirements dictating the extreme bandwidth in the ground point-to-point communication system, and any communication and electronic problem which could have bearing upon the ARS program.

13. The engineering analysis report for the Program III Pioneer Reconnaissance satellite has been completed and will be published by the Lockheed Aircraft Corporation as a formal engineering report.

B. SATELLITE AIRFRAME

1. To obtain Program IIA objectives of geophysical and biomedical research data, the ARS vehicle was redesigned for lighter weight. ARS vehicle and THOR-interface problems (such as booster payload capabilities, allowable loadings, separation dynamics, guidance and control) were mainly resolved. Extensive performance studies were conducted and nominal trajectories were calculated. Small scale (1/15) wind tunnel tests were completed with an ARS/THOR configuration and design for a substantial balance of the instrumentation required for the IIA program was accomplished.

2. Design of a facility checkout vehicle, formerly identified as propulsion test vehicle assembly #3, was completed. Structural design was completed for flight test vehicles numbers five through ten, and installation design is well underway.

3. A decision to change the fuel used for the main engines of the ARS vehicle from JP4/IRFNA to UDMH, a higher energy fuel, permits use of larger payloads in the ARS vehicle.

4. The decision to change to UDMH fuel early in Program IIA flights necessitated some redesign of the vehicle and propellant tanks, in addition to changes in the rocket engine itself. Changes include a lengthened and modified forward mid-body for the vehicle; and a redesigned conical shell, connected fuel and oxidizer tanks, and rearrangement of plumbing for the propellant tanks. Design effort was initiated for a recoverable capsule under development by the General Electric Company.

It has been determined that a single helium boom extension would insure proper vehicle aerodynamic stabilization at the lower orbital altitudes assumed for early Program IIA flights. However, engineering effort continued on the twin-boom extension mechanism for the purpose of increasing the functional reliability of this mechanism. Small vanes or fins are being added to the aft of the vehicle for vertical stabilization. These additions will permit better alignment of the vehicle's center of pressure and center of gravity.

5. Problems previously encountered in the welding of magnesium thorium alloys used for structure and skin are being eliminated as experience is gained. The elimination of these problems removes one of the possible delaying factors in the flight schedule.

6. Four segmented steel tanks were completed, and will be used as back-up for the aluminum tanks planned for flight test use. Three of these tanks failed when subjected to pressure tests. The fourth was modified and successfully passed pressure tests, but is slightly heavier than the desired weight.

7. With the cooperation of the Sandia Centrifuge Section, inertial loading tests were performed on the first spun aluminum flight tank and one segmented steel tank. Both passed the tests successfully. The aluminum tank, completed on 24 May, was pressure tested to 85 psi and then flown to Sandia. Exceptional cooperation was received from the Atomic Energy Commission and Sandia on these tests.

8. A welding machine for assembling spun aluminum tanks was received by Lockheed, and training in its use is underway. Efforts are being made to reduce the number of manufacturing processes involved in producing the aluminum tanks. One result of these efforts is the elimination of the chem-mill process.

9. An early test on the helium regulator used for pressurizing propellant tanks indicated a technical problem area. However, tests on a second helium regulator produced by Robert-Shaw Fulton Company were satisfactory. Failure on the early test was attributed to faulty test procedure and metal chips found in the regulator assembly.

10. Despite the introduction of accelerated schedules and changes in Program IIA objectives from recovery of visual reconnaissance to the geophysical and biomedical programs, the airframe subsystem maintained satisfactory design progress on Program I throughout the quarterly reporting period. An exploded view of the ARS vehicle mockup and the ATLAS adapter is shown in Figure 1.

C. SATELLITE PROPULSION SYSTEM

1. The two ARS rocket engines delivered by Bell Aircraft during the first quarter of 1958 were assigned to the Santa Cruz Test Base of the Lockheed Missile Systems Division. The first ground test engine was mounted

in the newly completed propulsion test assembly. The entire propulsion system (composed of prototype components, except for boiler plate tanks) underwent hot firing tests. The second engine was assigned for installation in propulsion test vehicle assembly #1. Three hot firings were conducted on the prototype system. The first firing was cut off by the ground safety equipment because of gas generator flame-out due to faulty installation procedures. The second was successful and was shut down, by command, after seven seconds. Engine performance was satisfactory. A third hot-firing of 12 seconds duration also was successful. However, pump inlet pressures were greater than specified, and the cause is being investigated. Analysis of data from these firings is still in progress. Preliminary results indicate that objectives were obtained. The gimbal-mounted engine is shown in Figure 2. The static firing test stands and the instrumentation blockhouse at the Santa Cruz Test Base are shown in Figure 3.

2. Twenty-two significant propulsion test assembly (PTA) cold-flow tests were performed to date at the Santa Cruz Test Base. Testing revealed no difficulty with suction pressure during the starting transients. It was found that helium line pressure drops were higher than the calculated design figure and additional test instrumentation was installed to determine the cause of this discrepancy.

3. To increase satellite-vehicle rocket-engine performance, an unsymmetrical di-methyl hydrazine/inhibited red fuming nitric acid (UDMH/IRFNA) propellant combination will be introduced early in the flight test program to replace the JP-4/IRFNA combination planned for use in the initial THOR-boosted ARS flights. The first UDMH engine, a modified JP-4 engine, has been tested. A satisfactory run of 17 seconds has been completed.

D. AUXILIARY POWER SUBSYSTEM

1. The design of the auxiliary power subsystem (APS) for the first ARS flight vehicle has been completed and all drawings have been released. An analysis of the electrical load requirements has been completed. Because of the number of battery units to be carried in Flight 1, the severly limited total life of the APS is estimated at 20 hours. The total Flight 1 battery capacity is limited to two silver peroxide zinc batteries (Type II) for a total weight of 52 pounds. The total installed auxiliary power subsystem weight for Flight 1 is 124 pounds.

[redacted]

3. Negotiations were underway with Engineered Magnetics Company for a supply of ARS vehicle inverters and voltage regulators to be used on THOR-boosted flights. Modifications have been made to similar components for use on ATLAS-boosted flights.

4. In addition to battery power, the use of solar power for the tracking beacons is being considered for Program IIA flights. Design effort is being coordinated with temperature, efficiency, and power requirement studies to determine how the solar power collectors can be incorporated into the Program IIA flight vehicles as soon as possible.

E. SATELLITE GUIDANCE AND CONTROL SYSTEM

1. A procurement plan for the production of a light-weight all-inertial guidance system for the ARS vehicle has been completed. The guidance system is being developed by the Massachusetts Institute of Technology to guide the ARS vehicle into orbit and to stabilize its position with reference to the earth while in orbit. The plan calls for the first test flight of the production system using an ATLAS booster early in 1961.

2. Arrangements have been completed to provide the initial units of the essential guidance and control hardware for the ARS/THOR combination. The equipment will include both the planned and the back-up inertial reference package.

F. SATELLITE RECONNAISSANCE DEVICES

VISUAL RECONNAISSANCE

1. Activity in the interim visual reconnaissance program, the original objective of Program IIA, was terminated.

2. A significant milestone was met with the successful demonstration, on schedule, of the breadboard model of the Pioneer Visual reconnaissance subsystem at the Eastman Kodak Company. The model included airborne equipment and equipment for recording data at the ground station. The airborne portion consisted of the camera, the processor, and the read-out scanning mechanism operating in series. The ground portion was a separate unit with a complete readout device scanning simulated photography which was displayed on the ground reconstruction device.

3. The experimental model of the 36-inch focal length lens and collimator for testing were delivered in May to the Eastman Kodak Company. This lens is planned for the advanced visual program. Preliminary tests indicate that design requirements of 100 lines/mm resolution have been met.

4. The visual reconnaissance payload mockup is illustrated in Figure 4.

ELECTRONIC RECONNAISSANCE

1. During June, the Soviet radar catalogue was revised to include the latest inputs from the intelligence community. A study on Soviet block telemetry was completed. The study incorporates a tabulation of currently available characteristics of Soviet telemetry systems.

2. Significant progress was made by the Airborne Instruments Laboratory, the electronic reconnaissance subsystem contractor, on both the interim Pioneer and Pioneer Ferret equipment programs. Major subassemblies were designed and design criteria on the interim Pioneer subsystem were completed.

INFRARED RECONNAISSANCE

1. The first successful measurements of infrared radiation from intercontinental ballistic missiles were made from B-47 aircraft during the flight of ATLAS 15A. These measurements were the first in a series to determine how an ICBM appears to a satellite-borne infrared scanner during the power and altitude stages of the missile trajectory. The infrared scanning system is being designed to give early warning of an enemy ICBM attack as well as other data.

2. Efforts to obtain infrared radiation measurements, halted temporarily by the emergency grounding of all B-47 aircraft, were resumed late in June. The program provides for measuring radiation from all ICBMs to be launched at the Air Force Missile Test Center. Additional detailed information is being acquired from a similar measurement program which has already produced very successful results. This information indicates that infrared radiation from ICBMs may be much greater than previously estimated. Data from one ATLAS flight and one VANGUARD flight indicated that sensing equipment was saturated with infrared radiation at a range of 600 miles.

3. The series of high-altitude balloon flights planned for obtaining infrared-power ground measurements in the 2.7 micron region has been successfully completed, and a final report has been submitted. Preparations are underway for making additional flights to take measurements in the 3 to 5 micron regions of the spectrum. The infrared detector in these measurements will be the Eastman Kodak lead-selenide cell, cooled to dry-ice temperature. In carrying out the comprehensive program of evaluating all possible detectors for use in the ARS infrared subsystem, measurements have been completed on 12 unimmersed lead sulphide cells supplied by Electronic Corporation of America and 12 lead sulphide cells supplied by Infrared Industries Incorporated.

G. COMMUNICATIONS SYSTEM

1. Development of ground-space communications progressed throughout this quarterly reporting period. Preliminary tests were completed on the S-band beacon and a preliminary communication plan for Program IIA was drawn up. Design for orbit antennas to be used for

telemetry and beacon in a vehicle with nose-down attitude were completed. Exit antennas were reduced in weight and voltage breakdown tests were conducted on different antennas.

2. Modifications of the SCR MOD II radars progressed rapidly. The sequence programmer breadboard for Program II, the Pioneer Visual reconnaissance program, was completed and preliminary testing was started. A slippage of approximately six weeks resulted from changes in the command telemetry ranging system; however, no difficulty is anticipated in getting back on schedule. Ground command equipment is rapidly approaching the pre-prototype stage. Satisfactory progress continues in the area of the wide band data link. A pre-prototype ground UHF receiver has been completed and tested. The use of printed circuitry techniques has resulted in considerable progress in development of the data link antenna switch. Computations were conducted to obtain data for predicting orbital paths of the vehicle in anticipation of the ground tracking operation, and for commanding initial call-down of the biosatellite recovery capsule operation. A report on the "Preliminary Estimates of Reliability on the Ground-Spaced Communication System" has been published.

3. Requirements for tracking and acquisition sites necessary for obtaining data from the THOR-boosted ARS vehicle launchings from Cooke Air Force Base have been established. A total of five tracking and acquisition stations will be required. One station will be provided at Cooke, and a down-range tracking station will be located in the vicinity of Oxnard, California. One of the remaining three stations will be located in Hawaii, and two will be in Alaska. One Alaska station will be in the Anchorage area; the other will be in the Sitka area.

4. Radio frequency allocations for data transmission have been granted for the THOR and ATLAS-boosted ARS programs.

H. DATA PROCESSING SUBSYSTEM

A contract with The Ramo-Wooldridge Corporation provides for the design and implementation of the intelligence data handling subsystem (Subsystem I). Major subcontracts were negotiated by R-W in this period with ITEK Corporation for the major optical assemblies and devices; Broad-view Research Corporation for photo interpretation keys and equipment requirements; Systems Laboratories Corporation for geodetic calculations and applications; and Planning Research Corporation for application of their intelligence parameter work.

I. QUALITATIVE PERSONNEL REQUIREMENTS INFORMATION

The Qualitative Personnel Requirements Information (QPRI) program for ARS progressed satisfactorily. The initial QPRI Conference for the program was held at Palo Alto, California, on 3 June 1958. A QPRI report was published on 30 June by the Air Force and the Lockheed Missile Systems Division. The report is time-phased for an operational date of early 1961 for the Pioneer Visual and Pioneer Ferret subsystems, and is

concerned primarily with satellite requirements which can be defined at this time. A complete QPRI report will be distributed about 1 January 1959.

J. FACILITIES DATA

1. The south Cooke Air Force Base area was selected as the optimum location for conducting ARS launches. Air Staff approval was obtained to site two launchers and a blockhouse for the ARS program in that area, subject to conformance with the Navy master plan. Naval authorities at Point Mugu agreed to site the facility as presented by the Air Force. Launch facility design criteria were reviewed in June.

2. Design criteria for the ATLAS-booster launch complex at Cooke Air Force Base have been submitted. Architect-engineer contract award is scheduled for early in July 1958. An architect-engineer contract for design of the missile assembly building will be awarded in July. Modification of existing buildings to provide an interim assembly facility started on 3 June and is scheduled for completion in mid-August 1958. Construction of launch stands and blockhouses for the THOR-booster launch complex at Cooke progressed on schedule. Modification of existing buildings for an interim missile assembly facility began in June. Modifications to assembly building E at the Air Force Missile Test Center, Florida, are scheduled for completion in September 1958.

3. Construction drawings and specifications for an interim tracking and telemetry station at Cooke have been completed. Construction will be completed by 15 August and equipment will be installed by 1 November. Design of the entire station has been initiated and is scheduled for completion in September 1958.

4. Design criteria for the ARS intelligence interpretation and dissemination facility were completed and made available for review during June. This facility will serve as the program control center, as the collection center for all reconnaissance data obtained from the data acquisition stations, and as the training center. Construction is scheduled to start in December 1958. The facility is expected to be ready for use by the need date, March 1960. The location for the Central Intelligence Center is unresolved.

5. The site survey team recommended Fort Stevens, Oregon, for the site of the northwest United States tracking and data acquisition station. Electronic surveys indicated the suitability of the area for ARS operations. Site Selection Board approval was obtained and recommendations for the area have been approved by Headquarters, USAF. Design criteria for this station is being reviewed and a contract for architect-engineer services for the design will be awarded early in July.

6. Electronic surveys of proposed locations for the northeast U. S. tracking and data acquisition site were completed on 31 May. At the meeting of the Site Selection Board on 9 June Sampson Air Force Base, New York, was selected as the first choice for the northeast site. Permission

to survey Sampson Air Force Base was denied, however, and an electronic survey team was directed to make additional surveys of possible sites. It was decided to electronically survey the Veterans Administration property at Togus, Maine, and the New Boston Range, New Hampshire, as possible locations. The Board is scheduled to meet again on 7 July to decide upon a firm site. Ottumwa, Iowa, and Fort Crowder, Missouri, were selected for possible use as the Central U. S. tracking and data acquisition station. These surveys will start on 7 July.

7. Construction drawings and specifications have been completed and released for construction of the interim tracking and data acquisition station at Kaena Point on the Island of Oahu, Hawaii. A construction contract was awarded in May. Beneficial occupancy date is 15 August, and installation of equipment will begin at that time. The need date is November 1958. Design of the complete station will be completed by 1 September. Access road construction is complete. Need date for the complete station is 1 October 1959.

8. An existing aircraft control and warning station at Cape Chiniak, Kodiak Island, Alaska will be used as an auxiliary test tracking station. This arrangement will eliminate the need for construction of new facilities in that area.

9. A construction contract for the auxiliary test tracking station at Annette Island, Alaska, will be awarded in July. Completion is scheduled for mid-August. Need date for this facility is 1 November 1958.

10. A facility to house laboratory equipment and instrumentation for analysis of technical information will be built at Wright-Patterson Air Force Base. Criteria for the facility, which will be needed by March 1960, has been developed.

ADVANCED RECONNAISSANCE SYSTEM

GLOSSARY

PROGRAMS

Program I	ATLAS-boosted Engineering Prototype Test
Program IIA	Engineering Test and Biomedical Program
Program II	Pioneer Visual Reconnaissance Program
Program III	Pioneer Electronic Reconnaissance Program
Program IV	Advanced Visual Reconnaissance Program
Program V	Advanced Electronic Reconnaissance Program
Program VI	Visual Surveillance Program
Program VII	Infrared Surveillance Program
Program VIII	Electronic Surveillance Program

PROPULSION

Booster	ATLAS and THOR Missiles	
ARS	XLR81-Be-3	15,150-lb thrust engine; pump-fed; 263 lb sec/lb vacuum specific impulse; JP-4/IRFNA
	XLR81-Be-5	15,150-lb thrust engine; pump-fed; 277 lb sec/lb vacuum specific impulse; UDMH/IRFNA

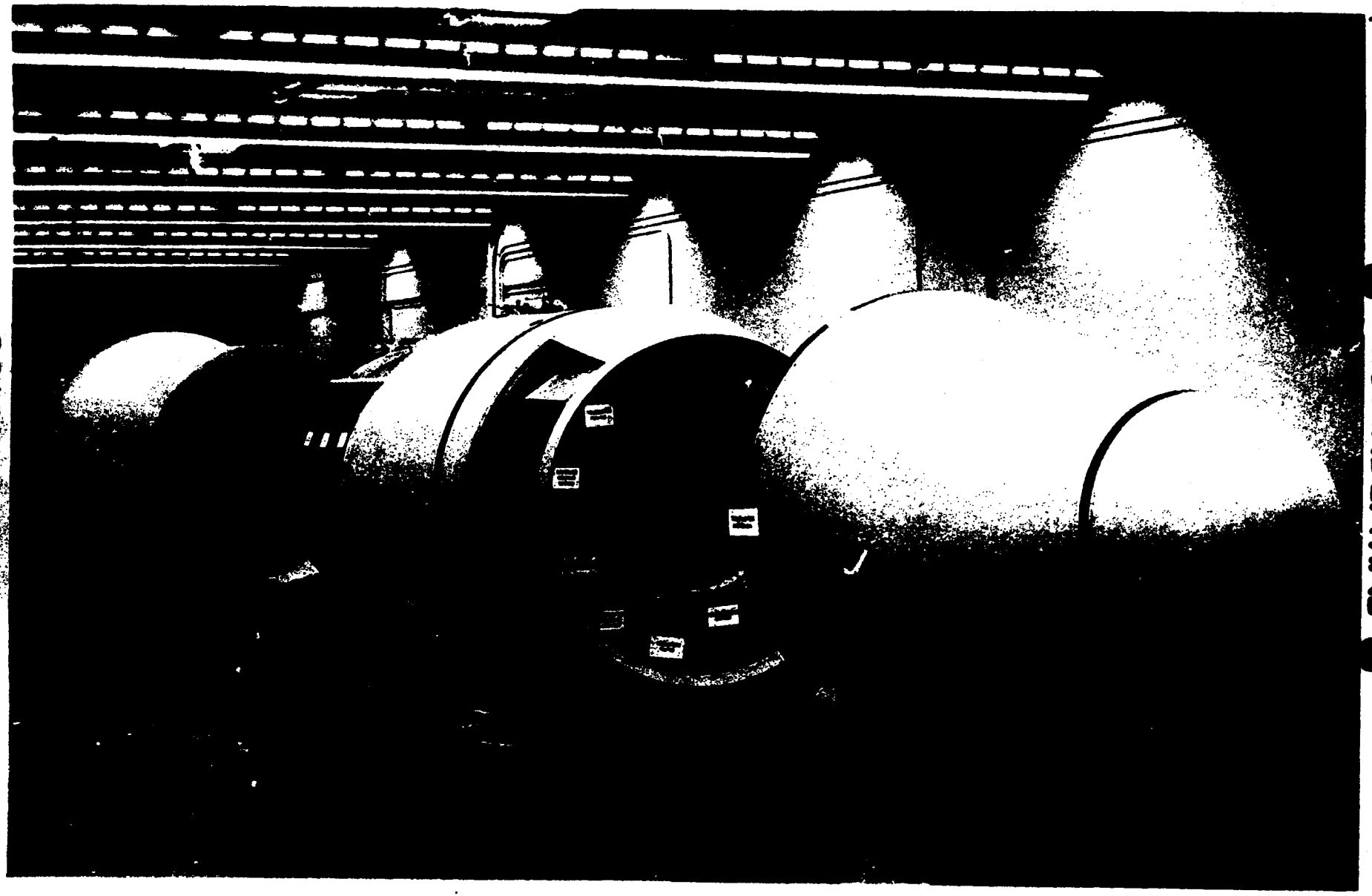


Figure 1. Exploded view of the WS-117L vehicle mockup and ATLAS adapter showing from front to rear: (A) Nose cone with detachable nose cap (B) Midbody with forward and aft equipment racks (C) ATLAS adapter section (D) Un-installed, spherically nested fuel and acid tanks for the vehicle.

(WDPC-58-21)

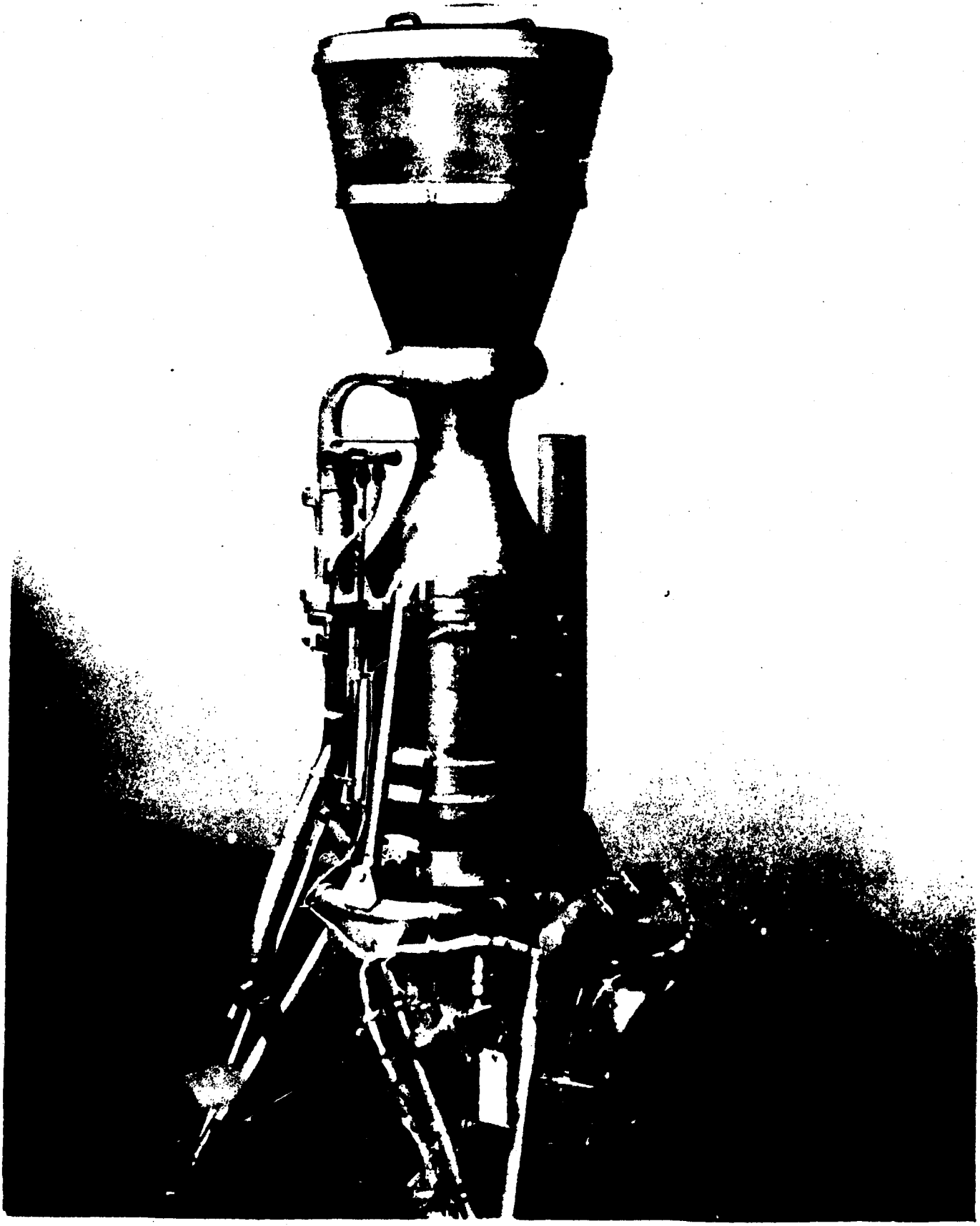


Figure 2. Final stage, gimbal-mounted engine.

(WDPC-58-21)

Figure 1. Static firing test stands and instrumentation blockhouse at the Lockheed Missile Systems Division, Santa Cruz Test Base.

(WDPC-58-21)

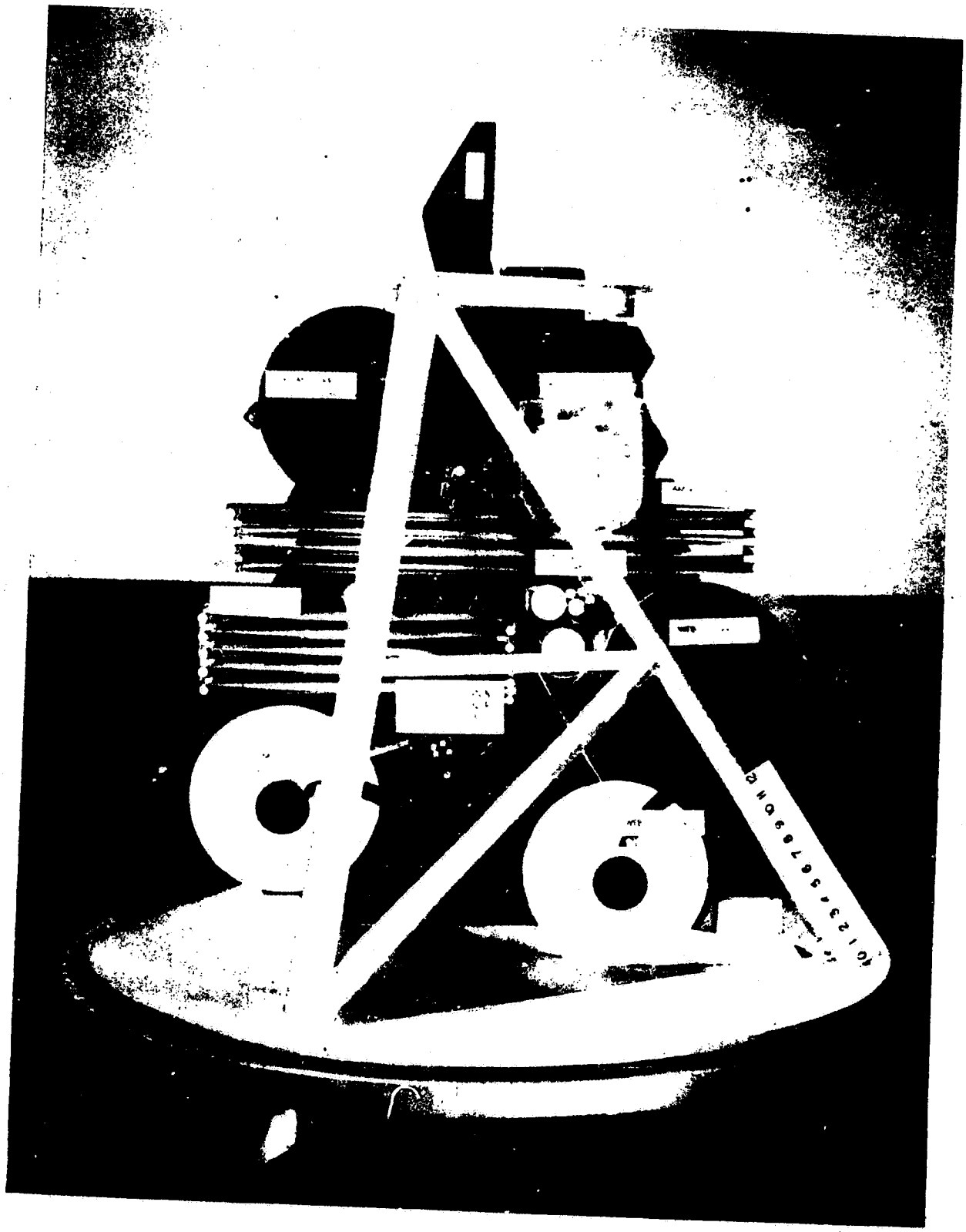


Figure 4. Visual reconnaissance payload mockup.

(WDPC-58-21)

~~SECRET~~

DISTRIBUTION

Headquarters, United States Air Force	10
Commander, Air Research and Development Command	15
Commander-in-Chief, Strategic Air Command	5
Commander, Air Training Command	1
Army Ballistic Missile Agency	2
Ballistic Missiles Office (Hq AMC)	3
Assistant CINCSAC (SAC MIKE)	3
Air Force Ballistic Missile Division (Hq ARDC)	17

SECRET

AFCGM Cont. # 583637

WEAPON SYSTEM 117L PROGRAM STATUS REPORT

For Month Ending 31 July 1958

RCS DD-SD(M) 242

Prepared by
AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

SECRET

AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

WDPC

8 August 1958

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Month Ending 31 July 1958
RCS DD-SD(M) 242

FOREWORD

This is the fourth report to ARPA on the activities in the Weapon System 117L program. The report summarizes program progress during the month of July and will be consolidated with August and September information for inclusion in a formal quarterly report as of 30 September.

The SENTRY program has progressed satisfactorily and is on schedule.

B. A. SCHRIEVER
Major General, USAF
Commander

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Month Ending 31 July 1958
RCS DD-SD(M) 242

I. BRIEF OF PROGRESS

Flight test objectives have been determined for each of the ten engineering and biomedical test vehicles which comprise Program IIA. There are presently nine different programs planned in the SENTRY development. The ten SENTRY vehicles of Program IIA will have orbits between 160 and 240 statute miles.

The first THOR-boosted SENTRY test vehicle was moved from manufacturing to checkout and modification at Lockheed Missile Systems Division. It is to be moved to the Santa Cruz, California test site on 27 August on schedule.

Development of all subsystems is proceeding on schedule.

Construction is proceeding as planned on the tracking and telemetry stations at Cooke Air Force Base, California; Kaena Point, Oahu, Hawaii; and Annette Island, Alaska. Initial occupancy at these sites is scheduled for 15 August.

Fort Stevens, Tongue Point, Oregon, has been approved as the Northwest tracking site. Recommendations have been made to use a bombing range near Grenier Air Force Base, New Hampshire, for the Northeast site and the deactivated Naval Air Station at Ottumwa, Iowa, for the Central site.

) SECRET)

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Month Ending 31 July 1958
RCS DD-SD(M) 242

II. TOPICAL SUMMARY

A. FLIGHT TEST PROGRAM

1. Flight test objectives for Program IIA flights (see Glossary) have been determined as follows:

Flight No.	Orbit Altitude (Statute Miles)	Flight Objectives
1	225	Engineering Tests
2	190	Engineering Tests
3-4	145	Biomedical Experiments
5-7-9	240	Engineering Tests
6-8-10	160	Biomedical Experiments

2. The detailed test plan for the first SENTRY flight vehicle is being prepared. Flight test objectives for Program I (see Glossary) have been published. System test objectives for Program II are being developed.

3. The first THOR-boosted flight test vehicle entered the modification and checkout division of Lockheed Missile Systems Division on 14 July. This was 5 days later than scheduled; however, the modification and checkout schedule has been stepped-up to allow shipment of the vehicle to the Santa Cruz, California test base on 27 August as originally planned.

B. SATELLITE AIRFRAME SUBSYSTEM

1. Final design of the first two flight SENTRY vehicles has been completed.

2. The completion of the flight test objectives plan for Program IIA, noted above, permits equipment installation design to proceed on the remaining SENTRY/THOR vehicles.

3. In the propellant tank program, the spun aluminum tanks were successfully pressure tested. They were then installed in propulsion test vehicle assemblies #1 and #2 and in flight test vehicles #1 and #2. See Figures 1 through 6.

C. SATELLITE PROPULSION SYSTEM

The engines for flight test vehicles 1 and 2 have been delivered by Bell Aircraft to the Lockheed Missile Systems Division. One of these engines has successfully undergone five hot firings since delivery.

D. AUXILIARY POWER SUBSYSTEM

1. All components for the auxiliary power subsystem of the first SENTRY/THOR flight vehicle have been received by Lockheed. Acceptance testing is in progress.

2. Program IIA flights with THOR boosters will include test of a small solar battery. The battery will have an output of 1.10 watts. It is expected to be available for THOR-boosted flight #3, scheduled in June, 1959. Until this system is available for use, the payload equipment installed in the SENTRY will be powered by a nine pound mercuric oxide-zinc battery. The battery will give the equipment an operating life of about 30 days.

3. Development of the SENTRY/ATLAS primary battery package is now completed, and qualification testing has begun.

4. Plans for the SENTRY/ATLAS solar battery tests in Program I are proceeding satisfactorily.

E. BIOMEDICAL SUBSYSTEM

1. During July a contract was let for ground support animal vans to support the biomedical tests planned in Program IIA.

2. Plans were completed for the bio-package assembly for SENTRY flights #3 and #4. Larger bio-packs for small animals are planned for SENTRY flights #6, #8, and #10 on which the engine using a higher energy fuel (UDMH) will be available.

F. FACILITIES AND SITES

1. Launch Facilities

a. Ralph M. Parsons Company has been selected as architect-engineer for design of the Cooke Air Force Base launch complex. Welton Becket and Associates have been selected for design of the assembly building.

b. Formal approval has been given for siting the SENTRY launch facility in the Point Arguello portion of the Pacific Missile Test Range located south of Cooke Air Force Base.

2. Tracking, Control Telemetry and Data Acquisition Facilities

a. Construction of interim tracking and telemetry facilities at Cooke Air Force Base is on schedule. Initial occupancy is planned for 15 August. Design of the permanent tracking facility, except for the data acquisition and processing building, has been completed. Design of the latter will be completed by 15 September.

b. Construction of interim tracking and telemetry facilities at the Hawaii site is on schedule, and initial occupancy is programmed for 15 August. Design of permanent facilities has been completed, and construction will begin in August. See Figures 7 and 8.

c. Construction of the tracking station on Annette Island, Alaska, began in July. The contract was let on 3 July. Initial occupancy is scheduled for 15 August.

d. Use of Fort Stevens, Tongue Point, Oregon, for the Northwest tracking and acquisition station has been approved by Headquarters USAF. Design criteria have been approved, and the architect-engineer selected. Design will commence in August.

e. The New Boston Bombing Range near Grenier Air Force Base, New Hampshire, has been recommended as the site for the Northeast development and operational tracking station. Request for approval of this site will be forwarded by the Air Force Ballistic Missile Division to Headquarters USAF in August.

f. The deactivated Naval Air Station at Ottumwa, Iowa, has been recommended by the Site Selection Board as the site for the Central development and operational tracking station. Approval will be requested in August.

3. Communications and Logistic Support

a. The administrative and data communications system interconnecting the seven SENTRY R&D sites is being installed by commercial communication contractors.

b. The Chiniak, Alaska, AC&W station has been reactivated by the Alaskan Air Command to support the SENTRY program. Logistic support for the other SENTRY stations is a combined Air Force-contractor effort.

c. At present, all communication and logistic support schedules are in consonance with the SENTRY flight test schedule.

G. OPERATIONS AND PLANS

Publication of a SENTRY Development/Operational Data Summary is expected by about 15 August. The purpose of this document is to furnish Lockheed Missile Systems Division with operational concepts to assist them in preparing qualitative personnel requirements information (QPRI). The QPRI will assist the Strategic Air Command in determining specific manpower for SENTRY operations.

H. MANPOWER AND ORGANIZATION

Initial estimates of manpower and organization requirements for the SENTRY program have been submitted to the Strategic Air Command with the recommendation they be included in appropriate program documents. The estimates are based upon Lockheed submissions and requirements outlined in the SENTRY Preliminary Operational Plan (SACOP 5-58).

ADVANCED RECONNAISSANCE SYSTEM

GLOSSARY

PROGRAMS

Program I	ATLAS-boosted Engineering Prototype Test
Program IIA	Engineering Test and Biomedical Program
Program II	Pioneer Visual Reconnaissance Program
Program III	Pioneer Electronic Reconnaissance Program
Program IV	Advanced Visual Reconnaissance Program
Program V	Advanced Electronic Reconnaissance Program
Program VI	Visual Surveillance Program
Program VII	Infrared Surveillance Program
Program VIII	Electronic Surveillance Program

PROPULSION

Booster	ATLAS and THOR Missiles	
ARS	XLR81-Be-3	15,150-lb thrust engine; pump-fed; 263 lb sec/lb vacuum specific impulse; JP-4/IRFNA
	XLR81-Be-5	15,150-lb thrust engine; pump-fed; 277 lb sec/lb vacuum specific impulse; UDMH/IRFNA

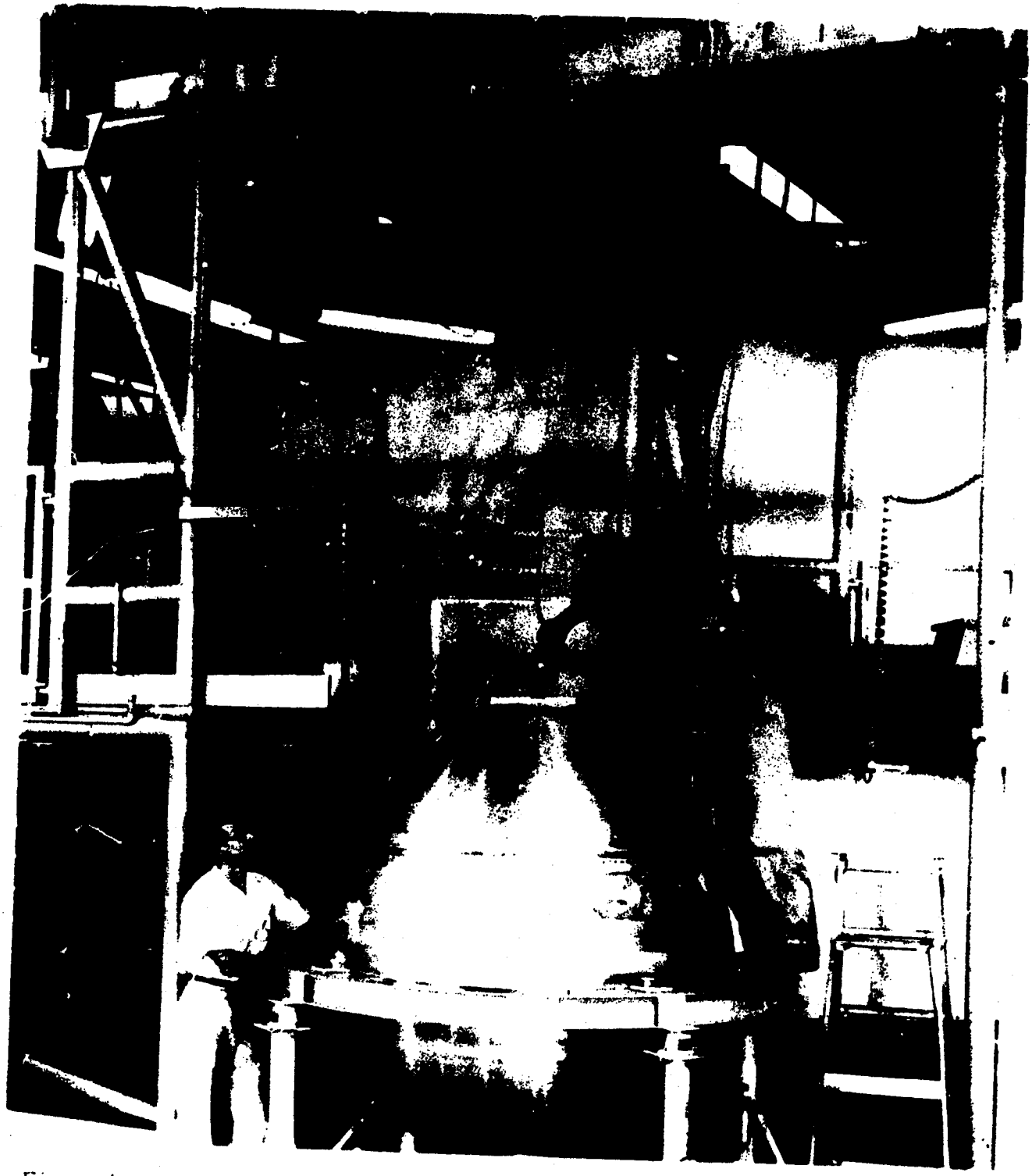


Figure 1. Propellant tank installation, mating of mid-body sections and alignment of vehicle airframe sections of the Sentry Vehicle are depicted in Figures 1 through 6. The spun aluminum fuel tank is shown here being prepared for installation in the aft-body section.

(WDPC-58-24)

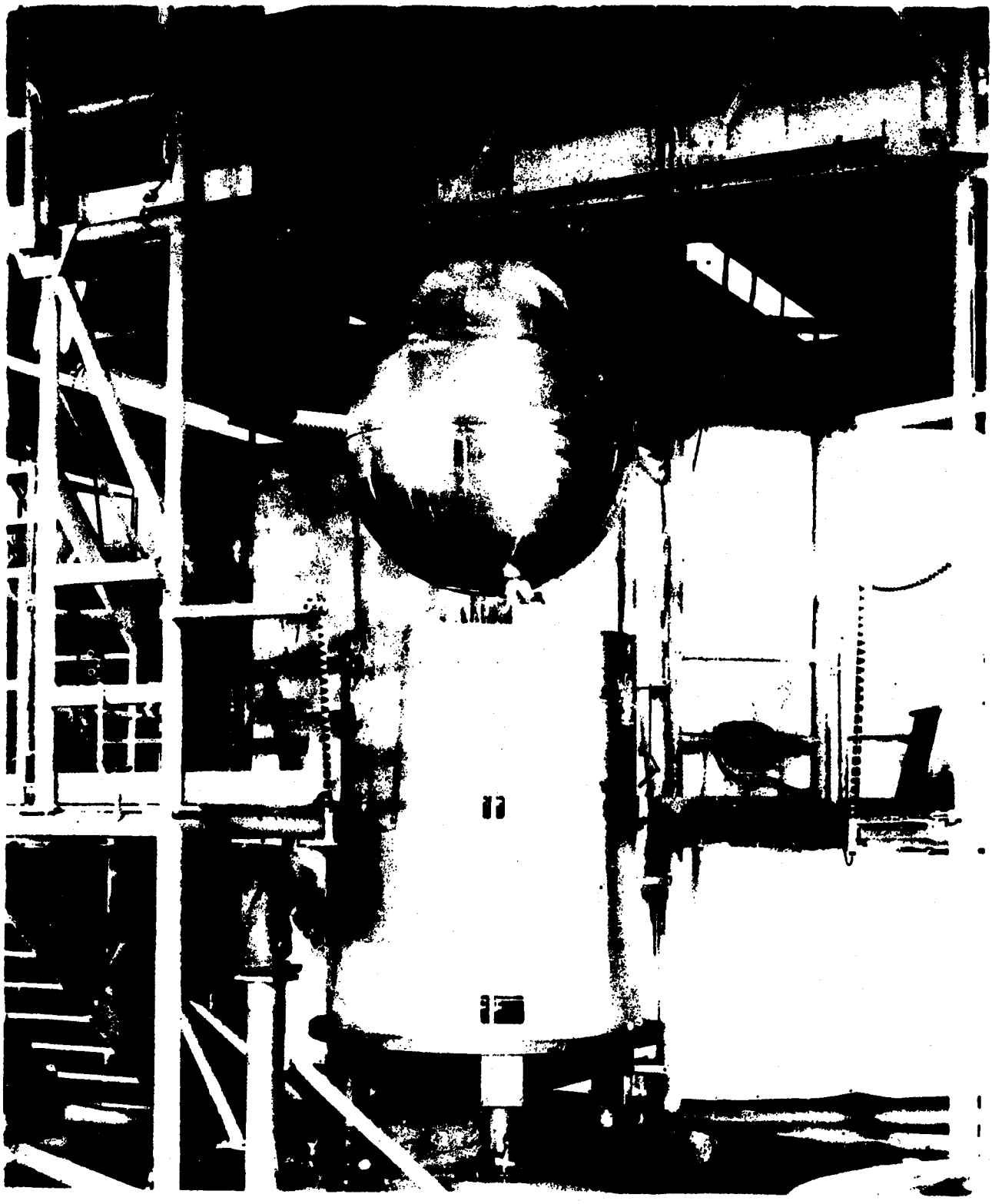


Figure 2. Installation of the spun aluminum propellant tanks in the aft-body section of the Sentry.

(WDPC-58-24)

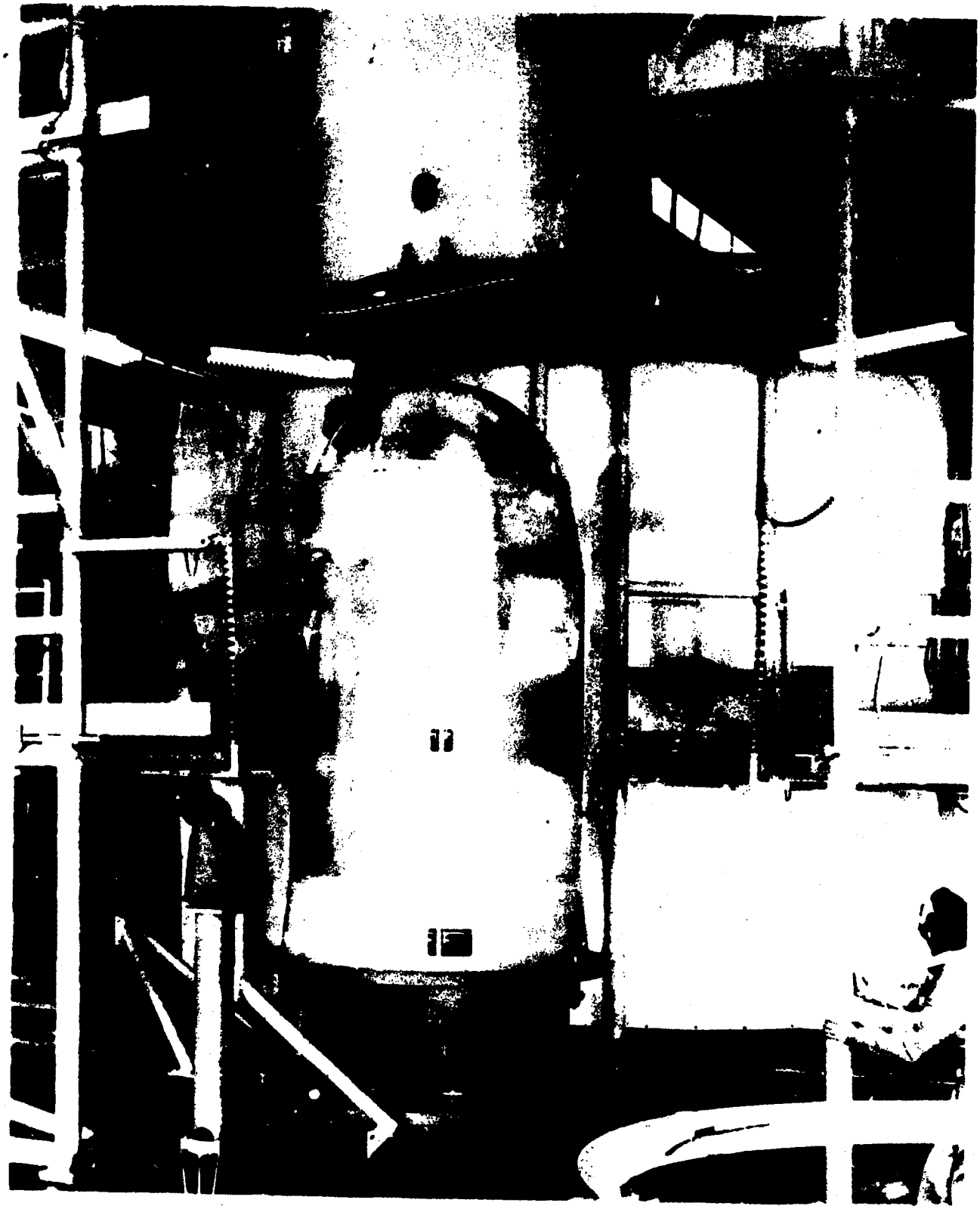


Figure 3. Stacking of forward mid-body sections, prior to mating with the aft-body section. (WDPC-58-24)

Figure 4. Mating of the forward mid-body sections with the aft-body section. (WDPC-58-24)

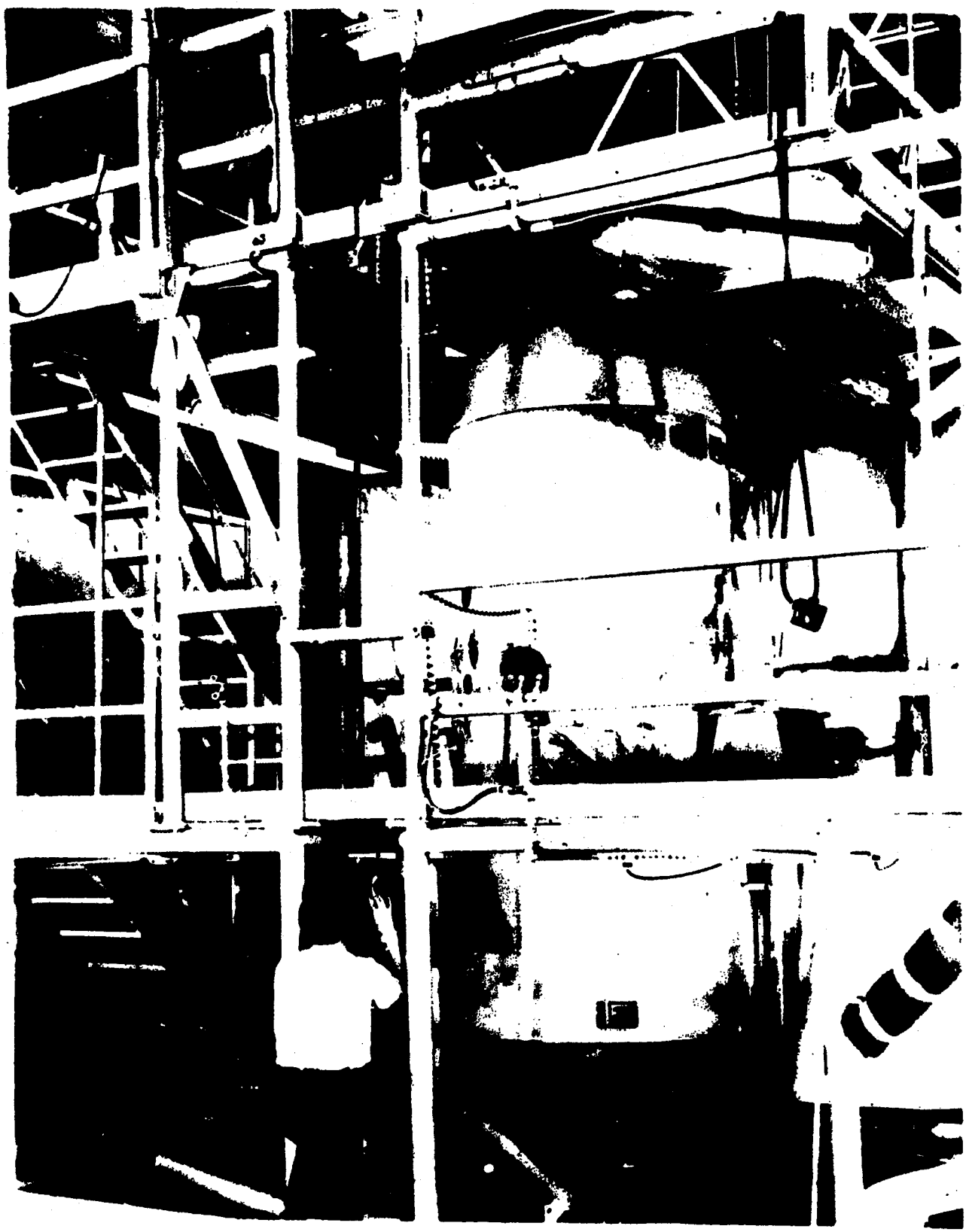


Figure 5. Aligning vehicle airframe sections. (WDPC-58-24)

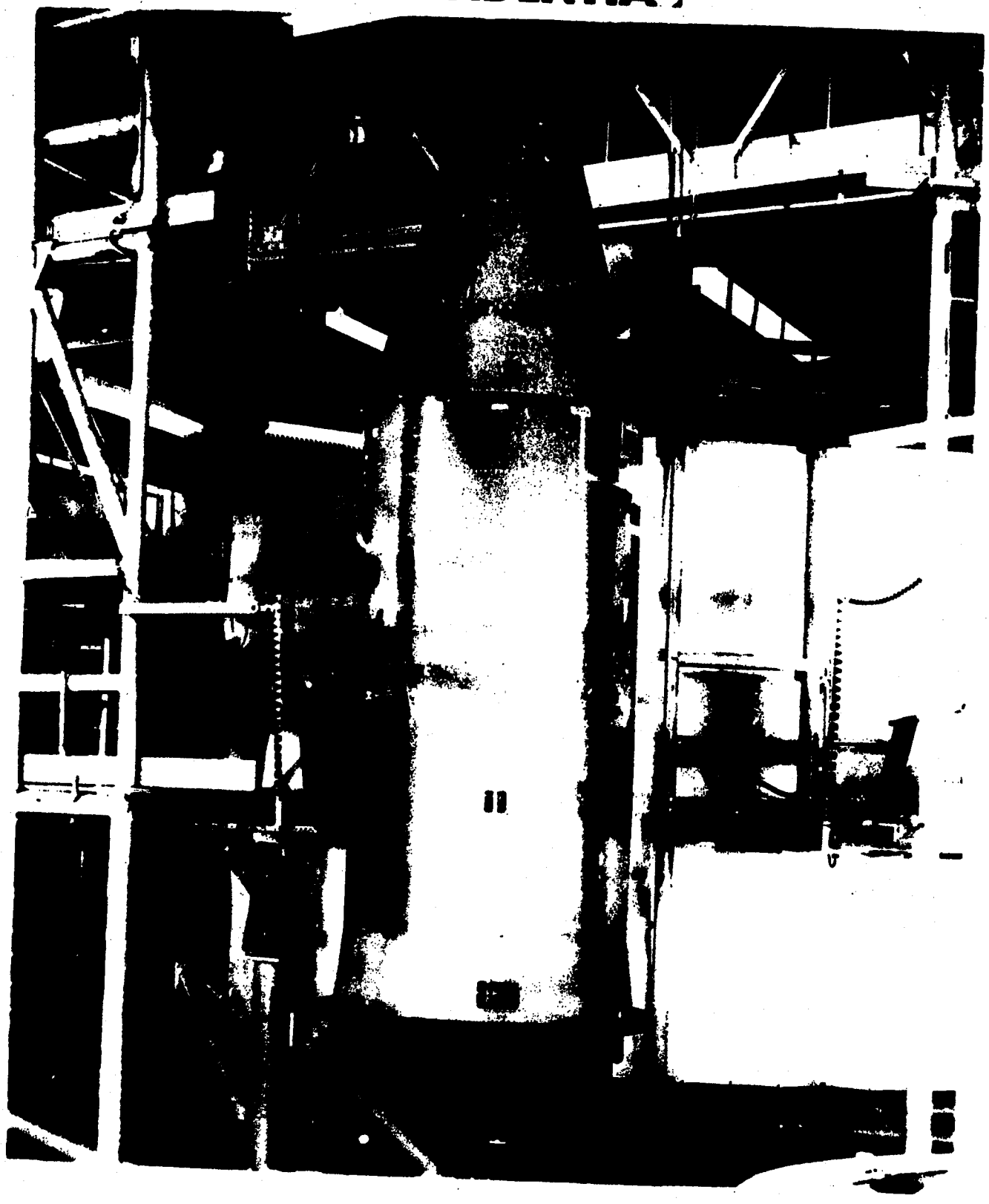


Figure 6. Airframe sections of the first flight article assembled.
(WDPC-58-24)

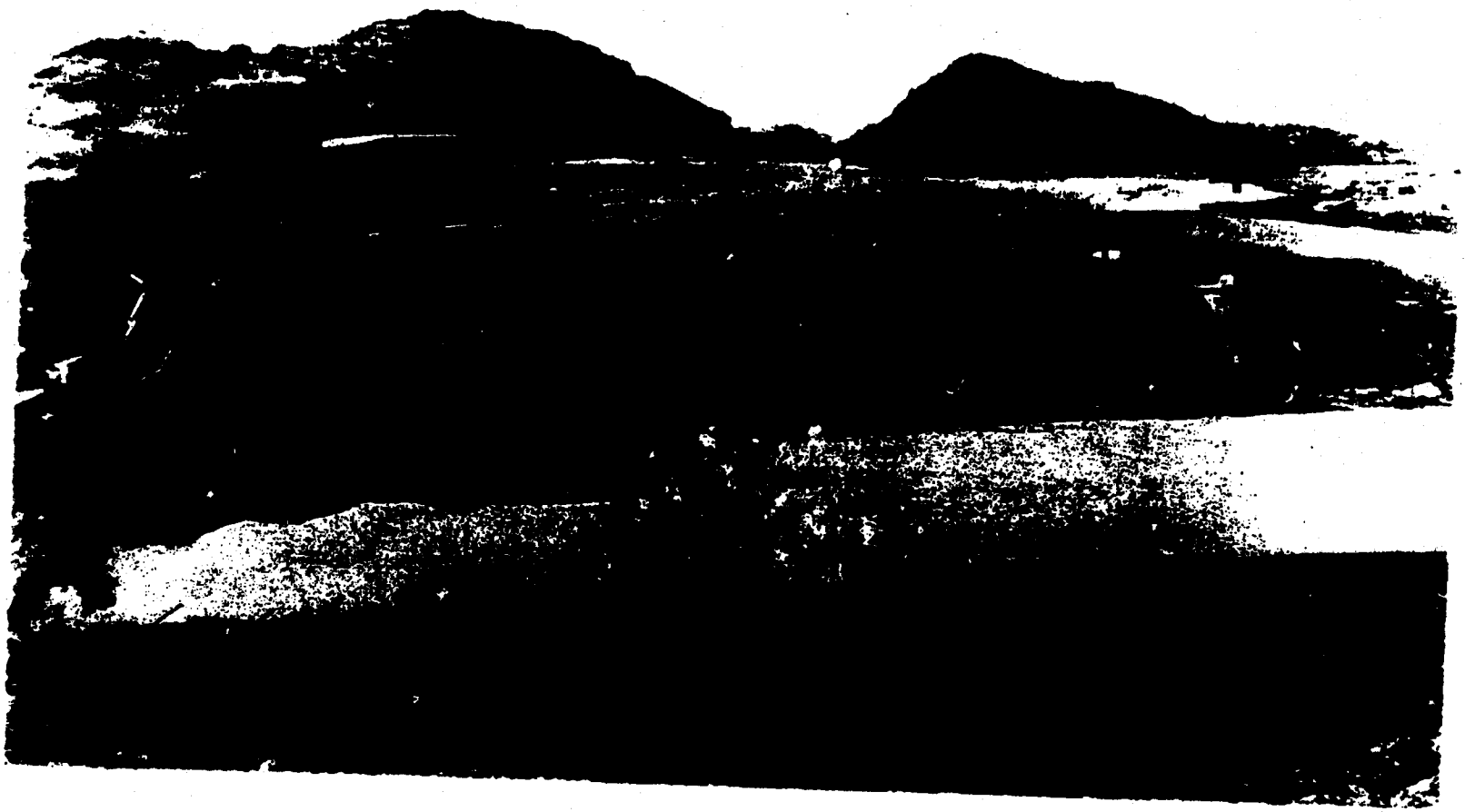


Figure 7. Construction progress at the Sentry tracking station Kaena Point, Oahu, Hawaii. (WDPC-58-24)

Figure 8. Overall view of administration building construction at Kaena Point, Oahu, Hawaii. This facility will be part of the instrumented tracking station that will monitor the flight of the Sentry advanced reconnaissance system. (WDPC-58-24)