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

for
Charles H. Schriever

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**

WEAPON SYSTEM 1171 PROGRAM STATUS REPORT

As of 15 April 1958

WDS AF-58-42

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.

Siting of the Oahu Air Force Base and Kaneohe 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.

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 an 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

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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. OTHER RELEVANT ITEMS OF INTEREST

A preliminary report on the status of the program is being prepared as a revision of the program. This report will be submitted to the program manager.

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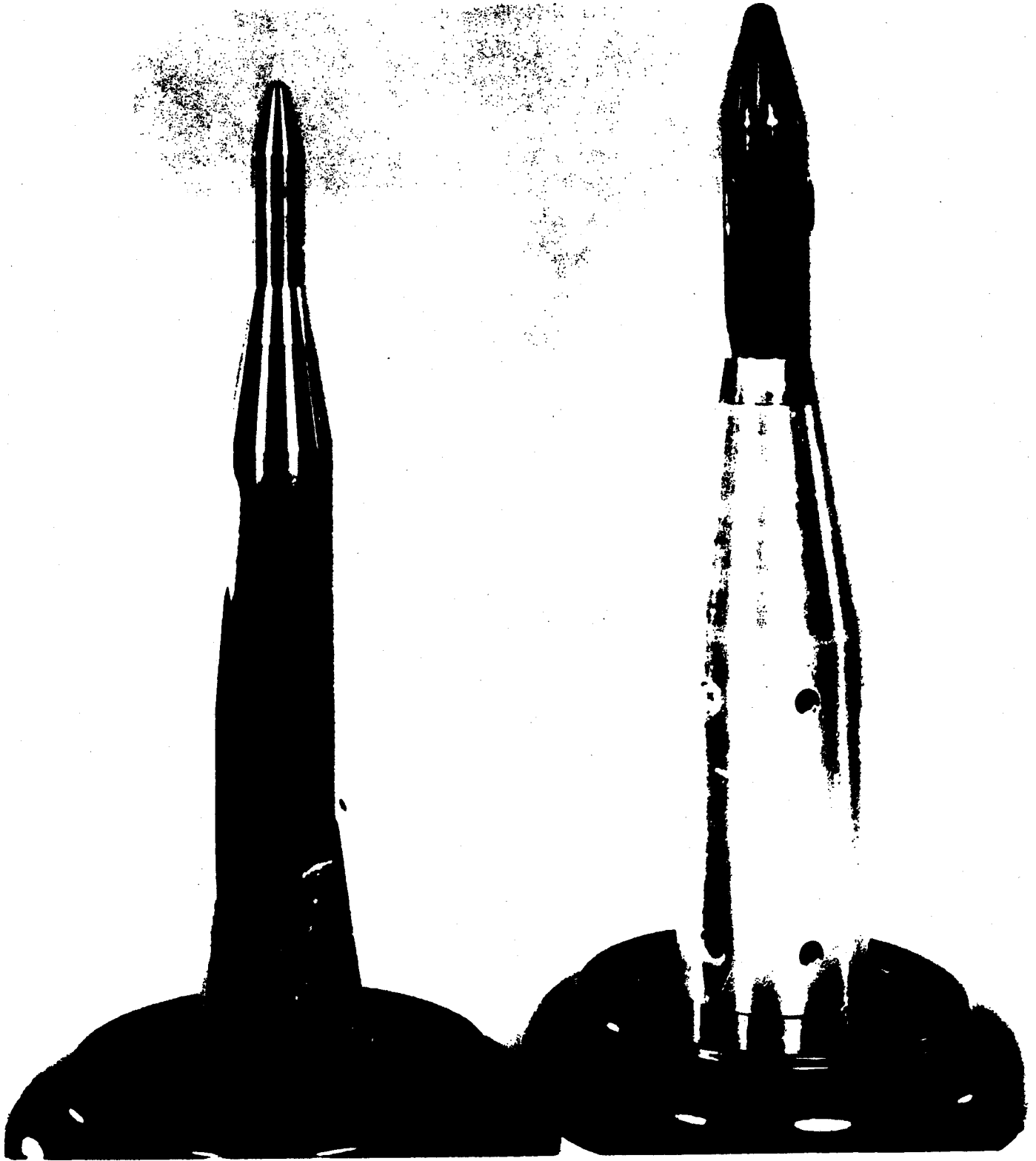
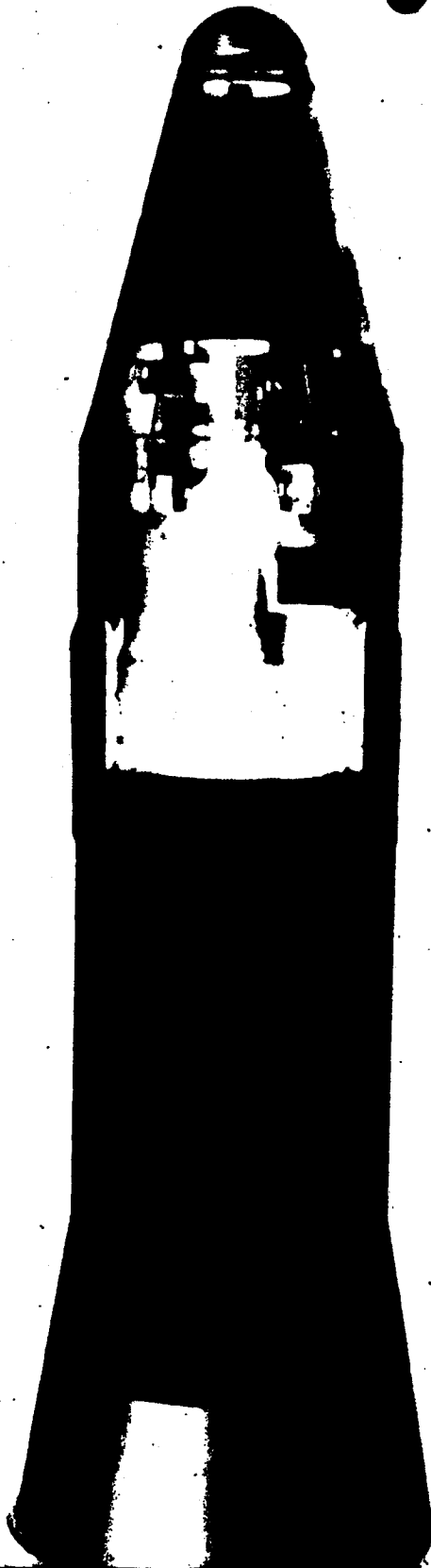


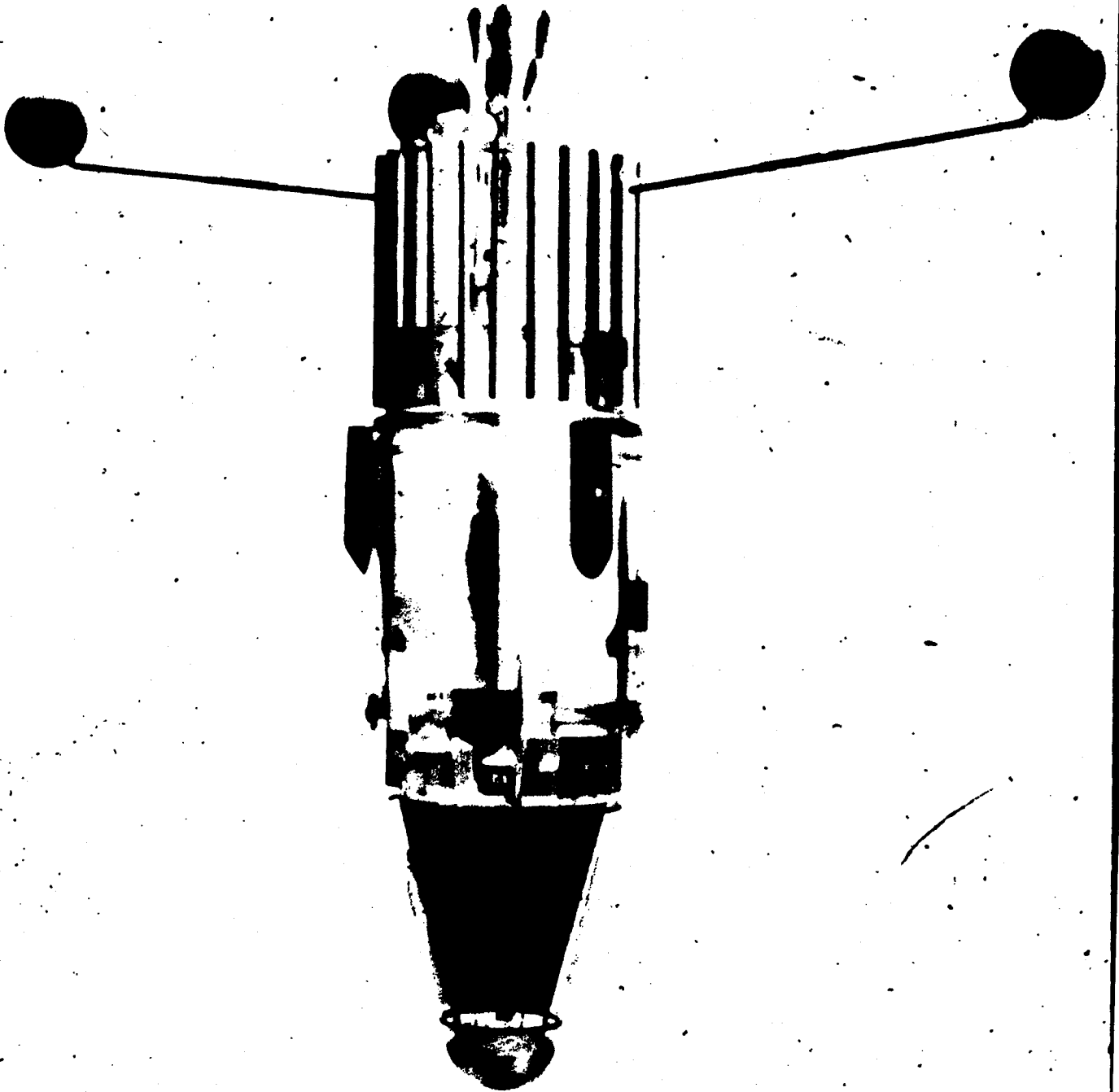
Figure 1. 1/75th scale wind tunnel model of WS 117L vehicle mounted on ATLAS booster and 1/48th scale of vehicle and ATLAS mating adapter mounted on wind tunnel stinger shield.

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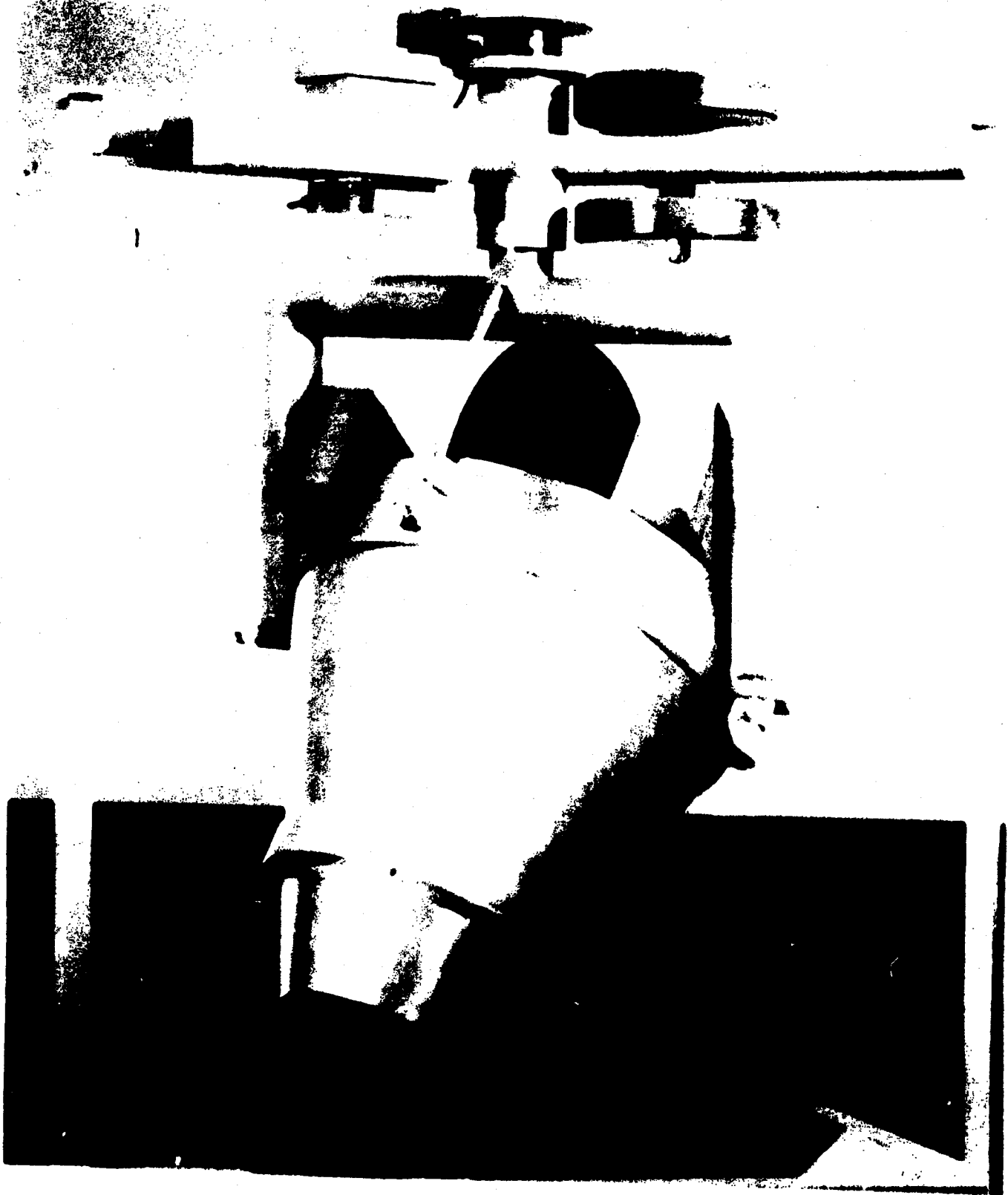


Figure 4. Mockup of infrared reconnaissance system scanner as developed by Aerojet-General Corporation. Under subcontract to Lockheed Missile System Division. Weight: 109 lbs.

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(WDPC-58-11)



Figure 1. April. View of the site of the test facility at the Lockheed System Test Facility, 1000 S. Miraloma Ave., Miraloma, CA.



Figure 6. Aerial view of static firing test stands and blockhouse control center, taken 18 March 1953.

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

AFCG:

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

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AFCG Cont. #

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WEAPON SYSTEM 117L PROGRAM STATUS REPORT

For Period 15 April to 31 May 1958

RCS AF-XDD-42

Prepared by
AIR FORCE BALLISTIC MISSILE DIVISION
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10 June 1958

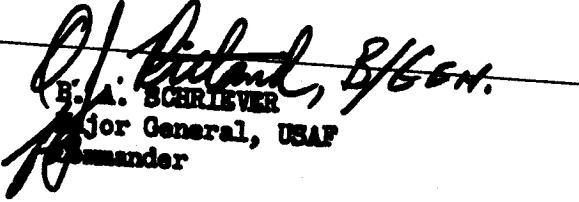
WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Period 15 April to 31 May 1958
RCS AF-XDD-A2

FOREWORD

This is the second of the monthly Weapon System 117L Program Status Reports which were established by Headquarters USAF TX, AFDD-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

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**WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Period 15 April to 31 May 1958
RCS AF-XDD-42**

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-Wooldrige 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-boosted 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 bio-satellite 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.

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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 mode 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.