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HEADQUARTERS
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Los Angeles 45, California

WDLPR-4

10 February 1961

UNCLASSIFIED

MILITARY SATELLITE PROGRAMS PROGRESS REPORT
Month Ending 31 January 1961
DD-DR&E(M) 397

FOREWORD

Attached are the reports covering progress during the month of January 1961 for the DISCOVERER and MIDAS Programs. These reports are directed by Secretary of Defense memorandum to the Secretary of the Air Force, dated 27 February 1960.

for Robert E. Hoffman Col
O. J. RITLAND
Major General, USAF
Commander

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1. (S) DISCOVERER Program
2. (S) MIDAS Program

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DISCOVERER PROGRAM

1. This report, covering progress during the month of January 1961, is submitted in accordance with Department of Defense memorandum to the Secretary of the Air Force, dated 27 February 1960.

2. FLIGHT TEST STATUS

a. DISCOVERER XIX Flight Investigation

(1) DISCOVERER XIX was launched on 20 December carrying a radiometric payload (non-recoverable) in support of the MIDAS Program. Because of a loss of control gas, the satellite was unstable in attitude on orbit. Despite the satellite oscillations, sufficient data were obtained for evaluation of the payload operation. Gas expenditure through ascent and orbital injection was normal. Telemetry data shows a rapid loss of gas from engine cutoff until the satellite passed out of range of the telemetry ship. By the time of acquisition at Kodiak on the first pass, all gas in the storage bottles was gone.

(2) The nature of the malfunction, as determined from telemetered data, pointed to a failure in some portion of the equipment which controls gas valves one and three. The most probable point of failure was ascertained to be the output stage of the gas valve amplifier. A dynamic simulation on an analog computer confirmed this analysis. Tests were conducted on an identical amplifier and these tests narrowed the failure to a particular transistor in the amplifier. Corrective action was taken.

b. Future Flights

(1) Two DISCOVERER launches were scheduled for January but both launches have been rescheduled for early in February. This resulted from the decision to delay the launch of SAMOS II from 20 January to 31 January. DISCOVERER XX was rescheduled to avoid possible interference during SAMOS orbital operations.

(2) DISCOVERER XX, scheduled for launch on 10 February, will carry a recoverable Advanced Engineering Test payload and will be used in the first attempt at a four-day recovery mission. One, two and three-day missions have been successfully accomplished on previous DISCOVERER flights.

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(3) The occasional speed fluctuations in the XLR-81Ba-9 engines have been corrected by installation of an acoustic damper in the gas generator. No speed fluctuations have occurred during acceptance testing of eight turbine pumps and six engines incorporating the acoustic damper. A 2 percent speed discrepancy between turbine pump acceptance tests and engine acceptance tests on production engines 323, 324 and reliability program engine 306 (all with acoustic dampers) has been attributed to servicing discrepancies.

(4) The causes for power level drop-offs occurring in Preliminary Flight Rating Tests on XLR-81Ba-9 engine serial number 306 have not been completely defined, but may be associated with the vertical firing position. Investigations of possible oxidizer pump housing etching and internal gas generator damage connected with vertical firing and an evaluation of the effect of these conditions on engine power level are being conducted.

b. Optical Tracking Light Experiments

A meeting was held at the Smithsonian Astrophysical Observatory (SAO) on 9 January to discuss results and future plans of the DISCOVERER Optical Tracking Light Experiment. Although the Observatory has successfully photographed the AGENA vehicle on all orbiting flights since DISCOVERER XI final data reduction has been insufficient to analyze the results completely. It was decided that the Observatory will complete the data reduction for DISCOVERER XVII and XVIII and forward it to Lockheed for comparison with other tracking systems (radar). Final plans for this experiment will be made following receipt of the Lockheed analysis.

c. Recovery Aircraft

The JC-130B recovery aircraft should begin arriving at the 6594th Recovery and Control Group early in May with the last aircraft due to arrive on 15 June. At present one aircraft is at Edwards Air Force Base being used for pilot checkout and one is at Wilmington, Delaware undergoing final tests of recovery equipment. Four other aircraft are being modified at Warner-Robins Air Force Base.

d. Biomedical Test Program

(1) Results of analysis of the biopack specimens carried in the recovered DISCOVERER XVIII capsule during its three days on orbit (7-10 December) have been released. This biopack was exposed to a normal space environment. It did not encounter the severe radiation from solar flare activity as DISCOVERER XVII did in November.

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(2) The biopack contained eight nuclear track plates, a neutron film pack, four chemical dosimeters, six analine (ionizing powder) packets, one quartz crystal, two protein samples with track plates, ampules of algae, human amion (embryonic membrane), human carcinoma (cancerous tissue), human conjunctiva (eyelid tissue), human lung tissue, human bone marrow, human synovial tissue (joint cartilage) and human leukemia moncytic cells.

(3) The total three-day radiation dose was well below 100 millirads of X-ray equivalent dosage. This dose is typical of what is expected in a normal DISCOVERER flight environment, as compared with the 30 to 35 rad exposure sustained by DISCOVERER XVII, which was on orbit during a high intensity solar flare.

(4) Substantial amounts of alpha and heavier particles were detected. The only dosimeter response was from the photographic type. Primary electrons were not detected. The effect of the orbital environment on the algae, spores and tissue appears negligible. Their condition, as compared with control specimens retained on the ground, is so little changed that it was extremely difficult to detect any difference.

e. Facilities

(1) Deliveries of AGENA launch control equipment for Vandenberg Air Force Base Complex 75-1, Pad 1, is approximately three weeks behind schedule. In an attempt to recover and adhere to the original modification completion date, AFBMD has directed Lockheed and Douglas to prepare an integrated revision to the installation and checkout plan which will permit AGENA Missile-On-Stand as presently scheduled. The revised schedule will result in earlier completion of items with available equipment and the simultaneous accomplishment of certain checkout functions. Review and approval of the revised installation and checkout plan is expected early in February. This revised plan provides for Pad 1 activation to support a mid-May launch.

(2) Plans and schedules for conversion of Complex 75-3, at Vandenberg Air Force Base, to permanent propellant transfer systems and launch control modernization have been formulated by Lockheed and Douglas and approved by AFBMD. Design of facilities modification has been completed and some preliminary facility work is being accomplished on a non-interference basis. The new propellant transfer systems are scheduled for delivery in February.

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MIDAS PROGRAM

1. This report, covering progress during the month of January 1961, is submitted in accordance with Department of Defense memorandum to the Secretary of the Air Force, dated 27 February 1960.

2. PROGRAM ADMINISTRATION

a. A Headquarters USAF team, composed of members of the Weapons Board and Air Defense panel, reviewed a revision of the MIDAS Development Plan at AFBMD on 20 January. The revised plan was prepared in response to the guidance received upon presentation of the 3 January Development Plan to the Air Force Ballistic Missile and Space Committee and Air Staff on 5-6 January. The Headquarters USAF team accepted the plan as modified and will present the new plan to the committee early in February.

b. Representatives of Lockheed Missiles and Space Division (LMSD) and AFBMD met on 26 January and developed a basis for a projected MIDAS Program costing for the next five years. This possible projection of the program will be used for the annual cost study currently compiled and scheduled for completion prior to the end of February. The cost study is formated and computed in such form that it may be utilized for inputs into the budget preparation of the actual program when finalized.

c. Representatives from several contractors, Headquarters AFMTC, the 6555th Test Wing, and AFBMD met on 24-25 January to discuss the scope, policies and implementation details of the infrared measurement programs utilizing the KC-135 aircraft. The Aerojet-General Corporation has been placed under a six-month contract to install, modify and operate the target measurement equipment.

3. FLIGHT TEST STATUS

a. Radiometric Measurement Flight (RM-1)

The successful RM-1 flight (DISCOVERER XIX) on 20 December carried a radiometer designed to gather background infrared radiation information. Preliminary evaluation of the information indicates agreement with earlier data obtained from balloon-borne radiometric equipment in the 2.7 micron region with respect to structural content and average level. The 4.3 micron region is somewhat higher than had been anticipated from theoretical studies. A report on this initial evaluation is being prepared.

b. Future Flights

(1) The second radiometric measurement flight (RM-2) is scheduled for late February. A radiometer identical to RM-1 will be carried aboard this DISCOVERER XXI flight.

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The nominal recovery pass will be number 63 on this flight. The orbital programmer, however, can be adjusted by Command from the ground to permit recovery on pass 15, 17, 30, 32, 46, 48 or 61.

(3) The DM-21 will carry a Bell Telephone Laboratories (BTL) guidance system for the first time on a DISCOVERER flight. It will be carried open loop (not guiding) and performance data will be telemetered back for system evaluation. If performance of the guidance system is satisfactory, future DISCOVERER vehicles will be guided by the BLT system. The BTL guidance system, developed for TITAN I, provides very precise guidance.

(4) The rescheduling of DISCOVERER XX has caused the launch of DISCOVERER XXI to be delayed until mid-February. This flight will carry the second non-recoverable radiometric payload for the MIDAS program, to measure the earth's infrared radiation background.

(5) The first satellite (AGENA) engine re-start experiment will be conducted on DISCOVERER XXI. This first on-orbit test will be a one-second firing initiated by the orbital programmer while the satellite is over Kodiak on its first pass. The effect of reburn on the orbit will be minor. The experiment will require that the yaw-around from a nose-first to a tail-first attitude be delayed until the restart is completed. This usually occurs immediately after orbital injection.

3. TECHNICAL PROGRESS

a. Second Stage Vehicles

(1) The Engine Reliability Program is on schedule at the Bell Aerosystems test facility. Twenty-six of forty scheduled firings have been completed. The phase involving evaluation of the effects of using fuels with high solid content was completed with no adverse affect.

(2) Ten starter assemblies were subjected to temperature and vacuum conditioning for thirty days and fired successfully. Two other assemblies were disassembled and one was found to have a cracked grain. Both units will be fired to determine the effect of the crack. These tests are part of the Thirty Day Coast Program which has the objective of developing the capability of restarting the engine after an extended coast period in space.

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basis. To date, three flights have been made and data gathered on horizon sensor sensitivity is presently being analyzed. The results of this analysis will determine the extent of future flight testing.

e. Facilities

(1) Modifications to accommodate either a SAMOS or MIDAS configuration AGENA "B" at Point Arguello Complex #1, Pad 2, are progressing satisfactorily and should satisfy program need dates. The checkout equipment modifications within the Vandenberg Air Force Base missile assembly building are proceeding on schedule and will meet the MIDAS satellite vehicle schedule.

(2) A preliminary integrated milestone schedule has been prepared regarding the acceleration in the construction and activation of Point Arguello Complex No. 2. This schedule will be adjusted and approved by the SAMOS and MIDAS Programs to indicate the degree to which they are prepared to support the increased costs. A proposed Lockheed work statement has been reviewed and a proposed Convair Astronautics work statement is under review at this time.

(3) Design of the Ottumwa, Iowa, MIDAS Tracking and Control Center was authorized by Headquarters USAF on 27 January. Design criteria will be available early in March. Rehabilitation of storm damaged buildings has been completed and the buildings were accepted on 20 January. The central heating plant will be operational early in February.

(4) An architect-engineer has been selected to design a technical support building at the New Boston, New Hampshire tracking station. Criteria for the facility has been received from the 6594th Test Wing (Satellite). Final inspection of the general purpose and dining hall buildings was completed on 12 January. Final acceptance was deferred pending correction of several construction deficiencies.

(5) The AFMTC Advance Working Group arrived in Pretoria, Union of South Africa, on 15 January to negotiate construction and installation contracts. The U. S. Navy Bureau of Yards and Docks is acting as construction agency. All equipment including the Eglin TLM-18 antenna has been shipped, with arrival on site expected no later than 4 March. Installation and checkout schedules are being established toward meeting an operational date of 1 May.

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