



RIF

HEADQUARTERS  
SPACE SYSTEMS DIVISION (AFSC)  
UNITED STATES AIR FORCE  
Air Force Unit Post Office  
Los Angeles 45, California

DCLPS

10 January 1962

MILITARY SATELLITE PROGRAMS PROGRESS REPORT  
Month Ending 31 December 1961  
AF-D28

FOREWORD

Attached are the reports covering progress during the month of December 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 William B. ...*  
O. J. RITLAND *CR USAF*  
Major General, USAF  
Commander

- 2 Atch
- 1. (C) DISCOVERER Program
- 2. (S) MIDAS Program

DOWNGRADED AT 12 YEAR  
INTERVALS NOT AUTOMATICALLY  
DECLASSIFIED. DOD, DIR 530.10

CLASSIFICATION OF THIS DOCUMENT  
WILL BE DOWNGRADED TO *Unclass*  
UPON REMOVAL OF ENCLOSURES

DCLPS-23



[REDACTED]

DISCOVERER PROGRAM

1. This report, covering progress during the month of December 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 36 Flight

(1) DISCOVERER 36 was launched from Complex 75-3, Pad 4, Vandenberg Air Force Base at 1240 PST on 12 December. All events occurred as programmed and a near perfect orbit was attained. Only one hold occurred during the countdown; the presence of a train in the area delayed the launch for seventy minutes. Satellite orbital parameters are given in Table I. (S)

Event	Programmed	Actual
Apogee, nautical miles	223.0	271.0
Perigee, nautical miles	130.0	133.0
Period, minutes	91.0	91.77
Eccentricity	.013	.0189

TABLE I. DISCOVERER 36 PROGRAMMED AND ACTUAL ORBITAL PARAMETERS

(2) Recovery was initiated on the 64th pass. The capsule was ejected, re-entered the atmosphere approximately as predicted, and was sighted by the JC-130 recovery aircraft shortly before impact in the ocean. The aerial recovery force marked the impact area with flares and a team of three Air Force pararescue men jumped into the Pacific to recover the capsule. This represented achievement of a new milestone for extended orbital operation prior to recovery (four days on orbit). (S)

(3) An ample supply of control gas remained throughout the flight; the pneumatic tanks in the satellite registered 900 psi during the 105th pass. Although link 2 telemetry ceased functioning on the ninth pass, the primary electrical bus registered 23 volts through the 105th pass. This is sufficient power for continued operation of telemetry and beacon equipment. (S)

DCLPS-23

[REDACTED]

b. DISCOVERER 36 Experiments

DISCOVERER 36 carried several experiments of international interest. These experiments and special progress utilized the increased AGENA weight carrying capability and included the following:

(1) The University of Illinois experiment to study the effect of the ionospheric-tropospheric layers of radio transmission. This experiment will assist in determining the southern boundary of an ionospheric disturbance which causes attenuation of r-f signals of satellites in the northern hemisphere. A 20 and 40 megacycle radio transmitter (mounted on the satellite) transmitted a continuous, unmodulated signal which was recorded by ground stations throughout the world. The results are currently being analyzed. (U)

(2) The Sequential Collation of Range (SECOR) transponder system for measurement of distances between points (radio transmitters) on earth was also carried. The transponder was interrogated and the results recorded following pass eight. This experiment was conducted in cooperation with the U. S. Army Signal Corps, and is part of a program to more accurately determine the distances between points on the earth's surface for precision mapping. (U)

(3) DISCOVERER 36 also carried a VELA HOTEL payload. This was the fourth consecutive successful launch in a planned six-shot sequence. The last two payloads are tentatively scheduled for late in 1962. These instruments, furnished by Lawrence Radiation Laboratories, include x-ray detectors, solid state spectrometers, neutron-gamma detectors, and a 180 minute capacity tape recorder which when interrogated will readout its entire tape in five minutes. These experiments will provide a basis for detection of nuclear explosions in space. (c)

(4) For the first time in the history of the space industry, a portion of a DISCOVERER satellite was used for a purely "civilian" project. By special arrangement with the Air Force, the radio amateurs of the world were permitted to design and fabricate a satellite to be carried aloft "piggyback" on DISCOVERER 36. OSCAR (Orbital Satellite Carrying Amateur Radio), a ten pound, battery-powered, 145 mc radio transmitter, was designed, constructed, and financed by interested amateurs and companies. When the AGENA satellite achieved orbit, OSCAR was ejected into its own orbit by a spring mechanism. A completely self-contained modular package, OSCAR's battery is expected to permit the transmitter to broadcast the Morse code letters "H-I" (four dots followed by two dots) for approximately three weeks. (U)



3. SIGNIFICANT DISCOVERER PROGRAM ACHIEVEMENTS FOR 1961

a. First time in the free world that satellites were successfully placed into orbit on successive days (DISCOVERER 20 and 21). These two launches demonstrated a considerable advance in DISCOVERER launch and orbit operations capability. (U)

b. The replacement of C-119 recovery aircraft by JC-130B turbo-prop planes. The JC-130's are faster, have longer range, and can be used to recover heavier capsules. (C)

c. The change over to the Bell Telephone Laboratories (BTL) guidance system was accomplished during 1961. Results indicate that performance of the BTL Series 400 guidance system, developed for TITAN II, has been excellent. (S)

d. The first restart of an AGENA vehicle on orbit was accomplished this year. This restart was a significant step in the program to provide in-space maneuverability to the AGENA. (C)

e. Vandenberg Air Force Base Complex 75-1, Pad 1, was converted from a THOR IREM stand to a DISCOVERER launch facility. Complex 75-3, Pads 4 and 5, were modified to include new propellant transfer systems and new launch control equipment. These changes alleviated the previous launch problems by reducing countdown time and increasing reliability. (S)

f. The successful recovery of a capsule after four days on orbit. Optimum performance by all satellite-borne components and ground support station equipment make this major milestone possible. (U)

4. COMPARISON OF THREE YEARS DISCOVERER FLIGHTS

The following table permits a comparison of the success in achieving orbit and recovering capsules from DISCOVERER satellites for the three year existence of the program:

	1959	1960	1961
Number Launched	9	11	17
Number/Percentage Attaining Orbit	6/67%	7/64%	12/71%
Number/Percentage Recovered	0/0%	4/67%*	7/64%*
By Air	0	3	4
By Sea	0	1	3

\* On one flight recovery was not an objective.

(S)



**MIDAS PROGRAM**

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

2. PROGRAM ADMINISTRATION

During the last week of November, the Space Systems Division directed Lockheed to proceed with development of an initial (Series IV) MIDAS system based on random rather than controlled orbits. This change permits the use of a simplified MIDAS vehicle with the resultant probability of increased reliability. The program was also reoriented to the use of the AGENA D (standard AGENA) for future flights (Series IV and subsequent). At the time of the reorientation, manufacturing had not begun on this series of vehicles although considerable design work had been completed. Authority was reaffirmed to proceed with initial efforts in the development of an advanced payload capable of detecting low thrust, short burn, solid propellant type missiles. (S)

3. TECHNICAL PROGRESS

a. Second Stage Vehicles

(1) MIDAS V (AGENA 1203) is at the Vandenberg Air Force Base missile assembly building where it will undergo a systems check beginning on 22 January 1962. On the present schedule, the vehicle will move to Point Arguello Launch Complex 1, Pad 2, on 22 February 1962 for a launch during the last week in March 1962. Checkout of the MIDAS V payload (last Baird-Atomic Series II payload) was completed at Lockheed, Sunnyvale, and the payload was shipped to Vandenberg Air Force Base on 27 December. (C)

(2) A project West Ford experiment, which was flown on MIDAS IV, will be repeated on MIDAS V. This 90-pound "piggyback" payload will be ejected from the MIDAS satellite on orbit and will distribute several hundred million tiny copper dipoles in a band around the earth. This is a Lincoln Laboratory experiment in propagation of short wave radio signals. (S)

(3) MIDAS VI (AGENA 1204) is currently undergoing telemetry checks and clean-up modifications in the systems test area. It is scheduled for installation in Complex 1A on 19 February for integrated systems testing. The vehicle will be transferred to Santa Cruz Test Base in late April and hot firings will begin on 19 June. The payload for this vehicle, the first Aerojet-General Series III payload, was received at Lockheed, Sunnyvale, on 21 December. It is scheduled for compatibility tests prior to checkout in the Subsystem G (infrared payload) laboratory. (C)

[REDACTED]

b. Reliability Program

(1) The MIDAS Reliability Program is divided into seven elements: Program Direction and Special Studies, Materials Research and Application, Parts Application and Evaluation, Subsystems Reliability, Product Analyses, Systems Life Tests, and Education and Training. (U)

(2) Materials Research and Application - The objective of this element is to determine the effect of the space environment on MIDAS equipment. This is accomplished by literature searches into the area of investigation, environmental test programs on basic materials and selected mechanisms, and development of new materials, techniques or processes. Investigations are being conducted in the following areas with significant results as indicated:

(a) Thermal Control Paints and Finishes - Tests of the silicate thermal control paint to be used on the MIDAS Series II payload radiator has indicated that it is superior to any other tested for this purpose. This paint was developed through the MIDAS reliability materials research and application program and is a major step toward achieving a one year orbital working life for MIDAS. (S)

(b) Lubrication of Mechanisms - Operation time on lubricated bearings in a simulated space environment has now exceeded 9,500 hours. The tests were conducted under  $1 \times 10^{-6}$  pounds per square inch vacuum conditions and have involved 16 different lubricants, three different methods of application, and seven different types of ball bearings. (U)

(c) Electrical Contacts in Space Environment - Tests for noise in sliding contacts has shown that when molybdenum disulphide ( $\text{MoS}_2$ ) is used as a surface boundary lubricant, electrical noise is greatly reduced under vacuum conditions. Tests of simulated applications are continuing. (S)

(d) Infrared Detectors and Optical Filters - Present test data has failed to show any detector cell types to be preferable for performance characteristics under MIDAS environments. Tests of optical material does, however, indicate that cerium-protected glass, sapphire, and Corning fused silica are capable of resisting radiation-induced coloration. (U)

(3) Parts Application and Evaluation - This element consists of a continuing program of upgrading procurement specifications to take advantage of new technological advances. High reliability procurement specifications are being prepared and implemented as rapidly as possible to insure obtaining components that represent the highest state-of-the-art at the present time. To date, eleven of 29 high-reliability

[REDACTED]

specifications have been completed for various high density parts. A program is being implemented for packaging and handling these high-reliability items to protect them during shipment and stocking. This program is keeping ahead of the procurement program to insure adequate protection of the components during handling. Steps are also being taken to make manufacturing process specifications enforceable by Quality Assurance. This will insure that high-reliability processes are properly carried out. Since each testing operation increases the possibility of component damage and since it is virtually impossible to measure the "high-reliability" required, it is anticipated that Quality Assurance will do more monitoring of processes than testing for compliance after completion of assembly. Quality cannot be checked into a product. (U)

c. HIVOS Chamber Acceptance Tests Begin

(1) The High Vacuum Orbital Simulator (HIVOS) at Lockheed, Sunnyvale, is nearly completed and acceptance tests have begun. Acceptance tests of the HIVOS special equipment, including the low speed data system and automatic programming and test system, are complete. Following acceptance of HIVOS, test vehicle and facility compatibility will be checked. Then a series of compatibility and life tests of the MIDAS system under simulated orbital conditions will be initiated. These tests are expected to continue into mid-1963. The test specimen will be a MIDAS orbital vehicle shortened to fit the test chamber. Thermal simulation will be used to compensate for the shorter length and the ascent equipment not needed for the test. A Series III payload will be used during the tests. (U)

(2) The HIVOS chamber is similar to the High Altitude Test Simulator (HATS) chamber which is also located at Lockheed, Sunnyvale. The HATS chamber has been used extensively for component orbital simulation tests. The HIVOS, however, can accommodate a larger specimen and can produce a harder vacuum. In addition, heat flux and solar shadow conditions expected on orbit can be accurately simulated and automatically programmed in the HIVOS. (U)

d. Facilities

(1) All construction at Point Arguello Launch Complex No. 2 is progressing satisfactorily with overall completion estimated at 28%. The Technical Support Building structure is essentially finished, with interior finishing work continuing. Concrete for the Launch Operations Building roof deck and supporting columns has been placed. The No. 3 Launch Stand and Service Building roof slab forming is proceeding and concrete was placed for the track beams between the missile service tower footings on 15 December. Concrete for No. 4 Launch Stand and

[REDACTED]

[REDACTED]

Service Building columns and walls and for the missile service tower footings has been placed. Forming and placing of steel continues in the general area. The sewage treatment plant has been installed and back-filled. The base course has been laid for the parking lot and portions of the main road into the complex. (U)

(2) Modification work on 18 of the 20 buildings in the second increment of the Vandenberg Air Force Base Technical Support Building package which was started on 7 August is approximately 80% complete. Construction completion is scheduled for January 1962. The remaining portion of the second increment package will be awarded if FY 62 funds are made available. (U)

(3) A construction contract has been awarded and work has begun on additions and modifications to the Vandenberg Tracking and Telemetry Station Data Acquisition and Processing Building. Modifications to the existing air conditioning system are to be prepared as a separate bid package which should be ready for contract action in about one month. (U)

(4) The Control and Identification Building for the New Boston Tracking and Telemetry Station has been released for design and construction to the New England Division Corps of Engineers. Construction of the Technical Support Building is scheduled for completion in March 1962. (U)

(5) A design backcheck review of the final plans and specifications for the first increment of the support facilities at the Ottumwa, Iowa, Tracking and Control Center is scheduled for 5 January 1962. Design of the technical facilities is complete but advertising for construction is deferred pending release of funds. (U)

(6) Modifications to technical room areas at the Donnelly Flats, Alaska, tracking station have been completed. Installation of supplementary air conditioning is scheduled for completion on 15 February 1962. The barge which was carrying the air conditioning equipment became icebound and caused a delay in completion. (U)

(7) Design of the [REDACTED] facilities is continuing. (U)

(8) Final design review of the administrative addition to the Satellite Test Annex, Sunnyvale, California, was held on 21 December. Backcheck review for correction of discrepancies during final review is scheduled for 8 January 1962. (U)





*B*

**HEADQUARTERS  
SPACE SYSTEMS DIVISION (AFSC)  
UNITED STATES AIR FORCE  
Air Force Unit Post Office  
Los Angeles 45, California**

**DCLPS**

**11 December 1961**

**MILITARY SATELLITE PROGRAMS PROGRESS REPORT  
Month Ending 30 November 1961  
AF-D28**

**FOREWORD**

Attached are the reports covering progress during the month of November 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.

*William B. ...*  
*for* **O. J. RITLAND** *Col USAF*  
Major General, USAF  
Commander

- 2 Atch  
1. (6) DISCOVERER Program  
2. (5) MIDAS Program

**CLASSIFICATION OF THIS DOCUMENT  
WILL BE DOWNGRADED TO *Unclass*  
UPON REMOVAL OF ENCLOSURES**

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

**DCLPS-21**



**DISCOVERER PROGRAM**

1. This report, covering progress during the month of November 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 XXXIV Flight**

(1) DISCOVERER XXXIV was launched from Complex 75-1, Pad 1, Vandenberg Air Force Base, on 5 November. A launch attempt on 1 November was aborted due to a DM-21 malfunction. The launch and flight occurred as programmed through AGENA engine ignition. AGENA engine cutoff did not occur as planned and the engine continued to burn until propellant depletion occurred, resulting in a highly elliptical orbit. The orbit resulted in an abnormal control gas expenditure rate. This rate would have made a recovery after one days operation necessary. However, a malfunction of a control gas valve between orbits 8 and 9 depleted the remaining supply. Depletion of control gas prevented attempting capsule recovery. The gas valve malfunction has not yet been diagnosed. (C)

(2) Investigations have shown that the failure of the AGENA engine to shutdown when the correct velocity was reached resulted from unusually high performance by the AGENA engine. This increased performance permitted the vehicle to achieve the correct orbital velocity prior to the disabling of the AGENA vehicle safety switch and prevented the accelerometer signal for the engine shutdown from being received. The safety switch is activated by a preset timing device and prevents premature shutdown should the accelerometer run away and attempt to shutdown the engine prior to attaining minimum orbital velocity. (C)

b. **DISCOVERER XXXV Flight**

(1) The DISCOVERER XXXV launch was postponed to 15 November because of a DM-21 guidance package malfunction. Launch occurred from Complex 75-4, Pad 4, Vandenberg Air Force Base, at 1322 PST on 15 November. The orbit was confirmed by the Kodiak tracking station at 1447 PST. Satellite orbital parameters are given in Table I. (U)

Event	Programmed	Actual
Apogee, statute miles	258.0	190.1
Perigee, statute miles	150.0	156.7
Period, minutes	91.0	89.84
Eccentricity	0.013	0.0043

TABLE I. DISCOVERER XXXV PROGRAMMED AND ACTUAL ORBITAL PARAMETERS

[REDACTED]

(2) Based on satellite operation, the decision was made to recover the capsule on the 18th pass. Capsule re-entry occurred close to Tern Island, the predicted impact area. The descending capsule was sighted by the crew of the C-130 aircraft at 18,000 feet and aerial recovery was accomplished on the first pass at 1644 PST on 16 November. The capsule was taken to Hickam Field and then flown to the mainland for disassembly and study. Following capsule ejection, the vehicle was stabilized and tracking operations continued for five days. Electrical power and control gas systems were functioning properly on the 77th pass. (C)

(3) This recovery was the seventh successful air-recovery of a DISCOVERER satellite capsule (three others were recovered from the ocean) and the 24th DISCOVERER satellite vehicle to attain orbit. (U)

c. DISCOVERER XXXV Experiments

For the first time a Time History Canister (a device for measuring radiation as a function of time) was recovered from orbit. The canister provides an indication of the amount of radiation encountered at any given time on the orbital track. The DISCOVERER XXXV vehicle also carried an Air Force School of Aviation Medicine canister, a nuclear block to measure space particle characteristics and energy levels, and Geophysical Research Directorate devices. (U)

d. Future Flights

DISCOVERER XXXVI will carry several experiments of international interest. These experiments and special programs use the increased AGENA weight carrying capability and include the following:

(1) Orbital Satellite Carrying Amateur Radio (OSCAR) - A ten pound, 145 megacycle, radio transmitter will be carried aloft and ejected into its own orbit for use by radio amateurs throughout the world. The transmitter will broadcast in Morse code the letters "H-I" (four dots followed by two dots) to be monitored and tracked by interested observers during the lifetime of its self-contained batteries (approximately three weeks). The payload has been designed, constructed, and financed by interested amateurs and companies. (U)

(2) Sequential Collation of Range (SECOR) - SECOR is a transponder system which can be interrogated by ground stations and is used to measure accurately the distance between the various stations. The SECOR Program will permit precision mapping of the world and is being conducted in cooperation with the U.S. Army Signal Corps. (U)

(3) University of Illinois Experiment - Conducted under the direction of the University of Illinois, this experiment for investigating the composition of the Ionospheric-Tropospheric layers will be included in the DISCOVERER XXXVI payload. A small 20 and 40 megacycle

[REDACTED]

transmitter will transmit a continuous, unmodulated signal; the signal will be recorded by stations throughout the world and the results analyzed. (U)

(4) GED and V-H Experiments - DISCOVERER XXXVI will carry two Geophysical Research Directorate cosmic ray monitors, and an r-f impedance probe. A VELA HOTEL package for measuring neutron and x-ray radiation will also be carried. (U)

### 3. TECHNICAL PROGRESS

Extensive studies are underway at Lockheed Missiles and Space Company, Lear, and the Santa Cruz Test Base facilities to determine the cause of the hydraulic failure in the DISCOVERER XXXIII AGENA vehicle. These studies include component and system-level tests under simulated environmental and operational conditions, and review of flight and test data. Failures resulting in similar erratic engine control system operation also occurred on DISCOVERER XXII and DISCOVERER XXVIII flights. As a safety factor, the two AGENA vehicles launched during November were modified by derating the hydraulic pumps from 3500 to 3350 psig until further studies are completed and any redesign incorporated. (G)

[REDACTED]

## MIDAS PROGRAM

1. This report, covering progress during the month of November 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. In view of anticipated funding limitations and possible program directive restrictions, an extensive and exhaustive study of objectives vs capabilities under various programming parameters is being conducted. This study is being accomplished with the concurrent coordination and/or participation of the prime contractor, AFSSD, AFLC, SAC, ADC, and representatives from AFSC and the Hq USAF Systems Staff Office. The results, conclusions, and recommendations of this comprehensive planning effort are scheduled to be presented to the Air Council prior to the Christmas holidays. (S)

b. The MIDAS IV Payload Data Analysis and Evaluation Report will be distributed on 8 December. (U)

### 3. FLIGHT TEST STATUS

Launched on 21 October, the MIDAS IV telemetry channels provided a large quantity of high quality data throughout its active lifetime. Analysis of the data received from the satellite was continued during November. Particular emphasis was placed on establishing the satellite's motion on orbit and on determining whether IR signals were detected from either the DISCOVERER or the TITAN vehicles launched during its active life. Thorough analysis of the infrared detection payload data and other telemetry data has permitted analysis of the satellite motion with sufficient accuracy to predict the scan area of the payload at any moment during its active life. Based on this analysis, it was determined that the DM-21 boosted DISCOVERER XXXIII vehicle, launched from Vandenberg Air Force Base on 23 October, was never within the field of view of the MIDAS IV scanner. TITAN J21, which was launched from the Atlantic Missile Range on 24 October, was momentarily within the scan area forty seconds after launch (approximately 12,000 feet). This is considerably below the altitude at which the MIDAS payload is expected to detect an intercontinental ballistic missile launch. (S)

### 4. TECHNICAL PROGRESS

#### a. Second Stage Vehicles

(1) Because of limited launch stand availability and launch capabilities, and the higher priority of other programs the MIDAS V vehicle was removed from the launch schedule late in October. The MIDAS V AGENA satellite vehicle was returned to the Lockheed Sunnyvale facility

4

[REDACTED]

DCLPS-21

[REDACTED]

from Vandenberg Air Force Base on 23 October for storage. On 23 November the satellite was returned to Vandenberg Air Force Base to prepare for possible launch in December. It is currently undergoing systems checks in the missile assembly building, with transfer to Point Arguello launch stand scheduled for 1 December. (S)

(2) The MIDAS VI satellite vehicle completed guidance and control (subsystem D) checks in the systems test area and was sent to manufacturing for necessary modifications on 27 November. It is scheduled to be returned to systems test on 14 December. (U)

b. Infrared Scanners

Two Aerojet-General Corporation payloads, one for MIDAS VI and one HIVOS life test are scheduled for delivery to Lockheed Missiles and Space Company in mid-December. The third unit, the MIDAS VII payload, is scheduled for delivery late in January 1962. (C)

c. Facilities

(1) All construction at Point Arguello Launch Complex No. 2 is progressing satisfactorily with completion estimated at 18%. The Technical Support Building structure is essentially finished, with interior utility work in process. The Launch Operations Building ground floor and areaway slabs have been poured. The No. 2 Launch Stand and Service Building walls have been poured and the placing of girders at the launch stand and steel for the service building deck is in progress. The No. 4 Launch Stand and Service Building columns and walls have been poured. Cable tunnels are more than half erected, with some imbedded conduit already placed. (U)

(2) Modification of the Point Arguello Launch Stand No. 1 bridge crane has been completed, but the remaining modifications to Launch Stands No. 1 and No. 2 have been delayed pending stand availability and the release of FY 62 Military Construction Program funds. Construction of the Vehicle Support Building is proceeding on schedule, with completion scheduled for 15 February 1962. (U)

(3) Modification work on 18 of the 20 buildings in the second increment of the Vandenberg Air Force Base Technical Support Building package is approximately 60% complete, with construction completion scheduled for January 1962. The remaining portion of the second increment package will be awarded if FY 62 funds are released. (U)

(4) A construction contract has been awarded and work has begun on the additions and modifications to the Vandenberg Tracking and Telemetry Station Data Acquisition and Processing Building and associated warehouse. Modifications to the existing air conditioning system are being advertised as a separate bid package. (U)

[REDACTED]

(5) Approval has been received for the design and construction of a Pass and Identification Building for the New Boston Tracking and Telemetry Station. Construction of the Technical Support Building is scheduled for completion in March 1962. (U)

(6) A recheck for correction of discrepancies discovered during review of the final plans and specifications for the first increment of the support facilities at the Ottumwa, Iowa, Tracking and Control Center is scheduled for 11 December. (U)

(7) Design of the administrative addition to the Satellite Test Annex, Sunnyvale, California, is continuing. The preliminary design review was held on 17 November. Only minor discrepancies were discovered; no major effort will be required for correction. Final design is now in progress. (U)



*B*

HEADQUARTERS  
SPACE SYSTEMS DIVISION (AFSC)  
UNITED STATES AIR FORCE  
Air Force Unit Post Office  
Los Angeles 45, California

DCLPS

13 November 1961

MILITARY SATELLITE PROGRAMS PROGRESS REPORT  
Month Ending 31 October 1961  
AF-D28

FOREWORD

Attached are the reports covering progress during the month of October 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.

*Henry B. Kuchera*  
*Cal V. A. R.*  
O. J. BUTLAND  
Major General, USAF  
Commander

- Atch  
1. (c) DISCOVERER Program  
2. (s) MIDAS Program

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

DCLPS-19





**DISCOVERER PROGRAM**

1. This report, covering progress during the month of October 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 XXXII Flight**

(1) DISCOVERER XXXII was launched from Complex 75-3, Pac 4, at Vandenberg Air Force Base at 1053 PST on 13 October. All events during launch, boost, separation, coast, AGENA burn, and orbital injection occurred as planned. The orbit attained was almost exactly as programmed as shown in Table I. (U)

Event	Programmed	Actual
Apogee, statute miles	259.02	251.15
Perigee, statute miles	146.20	144.01
Period, minutes	91.0	90.85
Eccentricity	0.0135	0.0128

TABLE I. PROGRAMMED AND ACTUAL ORBITAL PARAMETER FOR DISCOVERER XXXII.

(2) Based on satellite operation, the decision was made to recover the capsule on the 18th pass. Capsule separation occurred at 1437 PST on 14 October over Alaska and re-entry occurred over the impact area near Hawaii. The descending capsule was located by radar and DISCOVERER direction finder equipment on board the aircraft and ships in the recovery force. The capsule was first sighted at 28,000 feet by the crew of one of the C-130 recovery aircraft. This aircraft snagged the parachute canopy on its second pass and reeled the capsule aboard. This was the second successive aerial recovery by a C-130 aircraft. Five of these planes have recently been assigned to the recovery force to replace the C-119's previously used. The C-130's are faster, have longer range, and can be used to recover the heavier capsules under development in other programs. (U)

b. **DISCOVERER XXXII Experiments**

(1) Samples of various materials were carried in and recovered with the DISCOVERER XXXII recovery capsule. These included solar cells, dosimetry packs, and a pack containing shielding material, nuclear blocks and metallic discs. These were returned to various Air Force organizations for analysis of space radiation effects. A canister containing

[REDACTED]

approximately 500 kernels of corn was also in the capsule and was returned to the Air Force. This corn will be planted to determine the mutations resulting from exposure to space radiation. (U)

(2) A University of Illinois experiment was conducted in an attempt to determine the southern boundary of an ionospheric disturbance which causes attenuation of RF signals from satellites in the northern hemisphere. A small 20 megacycle transmitter was mounted on DISCOVERER XXXII and it transmitted a continuous, unmodulated signal. Stations located throughout the world recorded the signal and the results are currently being analyzed. (U)

(3) In cooperation with the Army Signal Corps, a Sequential Collation of Range (SECOR) experiment package was carried aboard DISCOVERER XXXII. The package contains a transponder which can be interrogated from ground stations and is used as a means of determining the precise distances between the various stations. The SECOR program will permit precision mapping of the world. (U)

(4) DISCOVERER XXXII also carried Air Force Geophysical Research Directorate equipment consisting of an erosion detector, an electron density gauge, and a charged particle energy analyzer. Data from these instruments were transmitted to ground stations by the DISCOVERER telemetry system and sent to the Geophysical Research Directorate for analysis. (U)

c. DISCOVERER XXXIII Flight

(1) DISCOVERER XXXIII was launched from Complex 75-3, Pad 5, at Vandenberg Air Force Base on 23 October. DM-21 boost, separation, coast, and AGENA ignition occurred as planned. However, operation of the hydraulic system which provides the motive power for engine gimbaling was erratic. The violent maneuvers of the satellite during this period resulted in disturbance of the gyro references and the satellite started on an extremely high trajectory. About 162 seconds after AGENA ignition, the hydraulic pressure dropped abruptly to zero and control of engine position was lost. Approximately ten seconds later, the XLR-81Ba-9 engine shut down. It is assumed that this premature cutoff resulted from the high acceleration forces imposed on the uncontrolled vehicle. The AGENA impacted in the south Pacific. (G)

(2) Because of the hydraulic system difficulties on this and two previous flights (DISCOVERER XXVIII on 3 August and DISCOVERER XXII on 30 March), an extensive analysis and test program was started immediately. Hot firing tests at the Santa Cruz Test Base have been conducted and laboratory tests at both the Lockheed and Bell facilities were initiated. Areas of investigation include mechanical weakness, contamination in the hydraulic system, and contamination resulting from UDMH chemical action or foreign material in the UDMH (UDMH contamination could affect the hydraulic control system because the hydraulic pressure pump is driven by a hydraulic motor which gets its

[REDACTED]

power from UDMI pressure and flow). Each system must be thoroughly rechecked before launch to be certain there is no contamination. No rescheduling will be necessary. (c)

[REDACTED]

## MIDAS PROGRAM

1. This report, covering progress during the month of October 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. The DDR&E special task group, established to evaluate MIDAS feasibility and capability, convened at Stanford Research Institute (SRI), Palo Alto, California on 25-28 October. Findings of the subcommittees, established during the initial session in late September, were reported and discussed preparatory to reporting the Task Group findings. (C)

b. Representatives from Space Systems Division (AFSSD) and Lockheed Missiles and Space Company (LMSC) met on 3 October to review overall plans and costs. The failure to make schedules, the slippages and associated increased costs make it impossible to meet all Fiscal Year 1962 program objectives. This necessitates an adjustment of phasing and scope of the MIDAS Program including a reduction in the effort to develop a nitrogen tetroxide (N<sub>2</sub>O<sub>4</sub>) engine and secondary propulsion system (orbit adjust) for the AGENA satellite vehicle. Redirection of Aerojet-General and Baird-Atomic MIDAS Series III and IV payload development effort was accomplished during September to keep within budget allocations. (S)

c. The MIDAS III Payload Data Analysis and Evaluation Report was distributed on 15 October. This report describes the major payload elements used on the mission and their function. It also discusses the methods used in gathering and processing the readout data. An analysis and evaluation of payload performance and the data processed is presented. Included in the report are analyses of the payload thermal design and weather conditions while the satellite was on orbit. (U)

### 3. FLIGHT TEST STATUS

#### a. MIDAS III

(1) MIDAS III HEPDEX data have been reduced and a report issued on the proton flux levels experienced at the MIDAS orbital altitude. At 180 MEV the proton flux density is about equal to that predicted from other experimental data. However, at 60 MEV the proton flux density was one to two orders of magnitude above the predicted level. (U)

(2) Due to the erratic motion of the vehicle (MIDAS III) the solar panel data, although reduced showed time varying discrepancies and therefore is not conclusive. (S)

b. MIDAS IV

(1) MIDAS IV, delayed because of an AGENA engine fuel pump seal drain line problem, was successfully launched from Point Arguello at 0553 PST on 21 October. Despite a loss of roll control during the ATLAS boost phase, the satellite vehicle was placed into a near circular 2000 nautical mile orbit. Table I shows the predicted and attained orbital parameters. (C)

Event	Programmed	Actual
Apogee, nautical miles	2100	2025
Perigee, nautical miles	2100	1898
Period, minutes	172.6	166
Eccentricity	0.00046	0.0125
Inclination, degrees	90.02	95.87

TABLE I. COMPARISON OF PROGRAMMED AND ACTUAL ORBITAL PARAMETERS FOR MIDAS IV

(2) Telemetry channels (e.g., status and performance of vehicle and payload, SAPUT, HEPDEX) provided considerable high quality data. Pertinent items that have been extracted from the data are as follows:

(a) Acquisition, tracking, and response to commands from the ground were near perfect. (U)

(b) During sustainer operation, the ATLAS booster rolled several times at a rate which reached a minimum of  $72^{\circ}/\text{sec}$  and was  $44^{\circ}/\text{sec}$  at AGENA separation. The total ATLAS/AGENA roll was 8.7 revolutions. The AGENA reduced the roll rate to zero after approximately one additional revolution. To accomplish this, twenty percent of the attitude control gas was expended. (C)

(c) Successful ejection of the West Ford package following AGENA second burn and continued operation of the High Energy Proton Density Experiment (HEPDEX) equipment has been confirmed by telemetry data. (U)

(d) All operating subsystems, including the solar power arrays and payload, functioned satisfactorily except that the control gasses were depleted on pass 1. On pass 34, one solar array turned away from the sun with the result that insufficient power was generated to maintain system operations beyond pass 54. (C)

(e) Analysis of the telemetry data shows:

[REDACTED]

1. The vehicle is rotating about the pitch axis in a direction opposite to the direction of vehicle travel at a rate of approximately one revolution per 92 sec. (C)

2. The vehicle is stable about its yaw axis within five degrees. (C)

3. The vehicle roll axis is displaced twelve degrees from vertical in a direction away from the sun. (C)

#### 4. TECHNICAL PROGRESS

##### a. Second Stage Vehicles

(1) MIDAS V completed systems tests early in October and was placed in bonded storage pending insertion into the launch schedule. Prior to commencing the final systems test, the Space Systems Division decided to install a new Baird-Atomic, Inc. payload. The new payload is much more sensitive than the one originally installed in the satellite. This payload has the improved optical system that was initially flown in MIDAS IV and is expected to provide more precise infrared radiation data. Because of launch stand availability problems, the MIDAS V booster vehicle has been removed from the stand and is being held for launch in the near future. The completion of Point Arguello Launch Complex No. 2 construction will alleviate the present stand loading problem. (C)

(2) MIDAS VI commenced guidance and control and communications compatibility tests on 24 October. The integrated systems test of this vehicle is scheduled to begin on 10 December. (C)

##### b. Facilities

(1) Lockheed representatives have briefed Space Systems Division personnel on an operational concept for a MIDAS Tracking and Control Center. A configuration description report of this facility will be published in December 1961. (U)

(2) A review of final plans and specifications for the first increment of the support facilities at the Ottumwa, Iowa, Tracking and Control Center was held on 31 October. Advertising for construction contract award for the technical facilities and support facilities at this station is delayed pending release of funds. (U)

(3) All construction at Point Arguello Launch Complex No. 2 is progressing satisfactorily. Construction completion is estimated at 9%. Walls and foundations of Launch Stand No. 3 and the foundations for the Technical Support and Launch Operations Buildings have been completed. The cable vault and footings for Launch Stand No. 4 have been

[REDACTED]

poared. The Technical Support Building is being erected and utilities are being installed. (U)

(4) Modification of Building 6007, one of the Vandenberg Air Force Base technical support buildings, has been completed. Modification work on 18 of the 20 buildings in the second increment of this package is approximately 40% complete, with completion scheduled for January 1962. The remaining portion of the second increment package will be awarded if FY-62 Military Construction Program funds are released. (U)

(5) Bid documents for the addition and modifications to the Data Acquisition and Processing Building at the Vandenberg Tracking and Telemetry Station were revised to reduce the scope of the project within available funding. The Corps of Engineers has been requested to advertise this project for bids on a 150-day construction schedule to allow beneficial occupancy by 15 March 1962. Except for minor deficiencies, construction of the auxiliary power system at this station has been completed. (U)

(6) Design concepts for the administrative addition to the Satellite Test Annex, Sunnyvale, California, were approved on 11 October and design has been initiated. The preliminary design review is scheduled for 17 November. (U)

[REDACTED]

HEADQUARTERS  
SPACE SYSTEMS DIVISION (AFSC)  
UNITED STATES AIR FORCE  
Air Force Unit Post Office  
Los Angeles 45, California

DCLPS

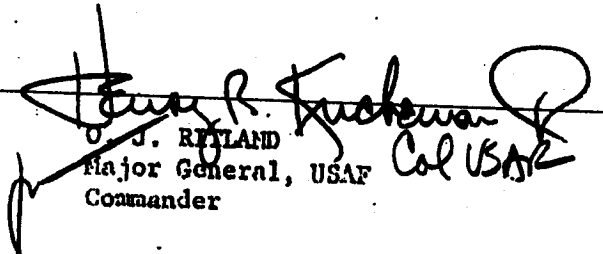
12 October 1961

MILITARY SATELLITE PROGRAMS PROGRESS REPORT  
Month Ending 30 September 1961  
DD-DR&E (M) 397

FOREWORD

Attached are the reports covering progress during the month of September 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.

The Military Satellite Programs Progress Report has been determined to be a Group 3 document in accordance with paragraph 6, AFR 205-2. This categorization applies to all previous issues. Holders of these documents are responsible for acting promptly to place the correct notation on the document in accordance with this regulation.

  
J. R. RYLAND  
Major General, USAF  
Commander

2 Atch

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

DOWNGRADED AT 12 YEAR  
INTERVALS; NO. AUTOMATICALLY  
DECLASSIFIED. DOD DIR 5200.10

DCLPS-17



**DISCOVERER PROGRAM**

1. This report, covering progress during the month of September 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 XXX Flight

(1) DISCOVERER XXX was launched into a near-polar orbit from Vandenberg Air Force Base at 1259 PDT on 12 September. All events during launch, boost, separation, coast, AGENA burn and orbital injection occurred as planned. Table I shows the predicted and attained parameters. (C)

(2) As planned, capsule ejection was initiated on the 33rd pass, with ETPD at 1555 PDT on 14 September. Capsule re-entry occurred close to Tern Island, the predicted impact area. The recovery aircraft sighted the descending capsule at approximately 12,000 feet altitude. One of the C-130 aircraft of the mixed recovery force (composed of C-119's and C-130's) snagged the parachute canopy on its first pass and reeled the capsule aboard. It was just slightly over one year ago that a C-119 aircraft accomplished the first aerial recovery of an object that had orbited in space. This was the eighth recovery in the DISCOVERER series. (U)

(3) The DISCOVERER XXX capsule carried biomedical test samples. The contents of the capsule are currently undergoing analysis. (U)

(4) A special module to test both the Barnes and the General Electric horizon sensors under actual operating conditions was fabricated and installed on DISCOVERER XXX. These systems are being developed for future AGENA vehicles. The effects of clouds and cold land masses on the outputs of these units were determined. (U)

Event	DISCOVERER XXX		DISCOVERER XXXI	
	Programmed	Actual	Programmed	Actual
Apogee, statute miles	256.9	360	256.7	255.5
Perigee, statute miles	148.7	144	149.6	150.5
Period, minutes	91.0	92.41	91.0	90.56
Eccentricity	0.0130	0.0257	0.0130	0.0126

Table I. COMPARISON OF PROGRAMMED AND ACTUAL ORBITAL PARAMETERS FOR DISCOVERER XXX AND DISCOVERER XXXI.

[REDACTED]

b. DISCOVERER XXXI Flight

(1) DISCOVERER XXXI was launched into orbit from Vandenberg Air Force Base at 1400 PDT on 17 September. All ascent functions appeared normal and orbital status was verified. The predicted and attained parameters are given in Table I. Orbital tracking and telemetry data indicated nominal performance through pass 32 except for an intermittent operation of the orbital timer switches controlling the S-band beacon and the telemetry. Recovery was planned for nominal pass 33 but ejection did not occur. On subsequent passes, operation of the beacon and telemetry was erratic. ~~(S)~~

(2) Telemetry contact with the satellite was again established on the 41st pass. At that time there was no report of 400 cycle power (single- or three-phase) control gas depletion was indicated, and the vehicle was unstable. Preliminary investigations have indicated a 400 cycle power failure sometime after the 26th pass was the cause of the capsule ejection failure. ~~(S)~~

(3) VELA HOTEL instruments were flown on DISCOVERER XXXI. These instruments, mounted on the engines access door module, consisted of scintillator X-ray detectors. Useful data was obtained throughout the active life of the satellite, including the period of tumbling. These data are being processed and preliminary analysis indicates that valid and useful background radiation data have been obtained. (U)

(4) In addition to the VELA HOTEL instruments, DISCOVERER XXXI carried cosmic ray monitors and galactic radio frequency detectors provided by the Air Force Geophysical Research Directorate. The cosmic ray monitor is similar to those carried on earlier DISCOVERER flights; the galactic detector is a radio frequency receiver for detecting background noise emanating from celestial galaxies. Both are part of a continuing series of experiments designed to measure the environment of space. Useful data were received from both the cosmic ray monitor and the galactic detector throughout the active life of DISCOVERER XXXI. The data is being processed and will be furnished to the Geophysical Research Directorate for analysis. (U)

[REDACTED]

MIDAS PROGRAM

1. This report, covering progress during the month of September 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 Task Group, established by the Director of Defense, Research and Engineering, to study ballistic missile defense, reviewed the MIDAS Program on 27-29 September 1961. The objective of the group was to investigate: (1) MIDAS technical feasibility and capability, (2) system reliability, and (3) use and value of MIDAS warning data. An ADC/SAC presentation to the group was accomplished on 5 October relative to threat analyses requirements and planned utilization of MIDAS warning capability. Six subcommittees have been established to evaluate specific technical areas in more detail. The Task Group plans to reconvene during 26-29 October and to publish a report of its findings by 1 November 1961. (e)

3. FLIGHT TEST STATUS

a. MIDAS II

MIDAS II, vehicle 1007, was tracked for approximately eleven (11) minutes on pass 6764 by the Hawaiian Tracking Station. This Solar Auxiliary Power Unit Telemetry (SAPUT) signal track was accomplished on 10 August 1961. Continued efforts to acquire this vehicle have been unsuccessful and the SAPUT is considered inoperative after nearly 15 months known operation. (Launch date: 24 May 1961) (U)

b. MIDAS III

(1) MIDAS III, HEPDEX (High Energy Proton Density Experiment) telemetry was last obtained on the 59th day. This was as anticipated due to nominal 56 day battery life of the power source. Due to apparent vehicle orientation during the latter two days, additional data was obtained of importance to the experiment. The data is currently under analysis. (U)

(2) A draft of a report analyzing the data obtained from the MIDAS III payload has been completed. The report will be released for distribution early in October. This report describes the major payload elements used on the mission and their function. It also discusses the methods used in gathering and processing the readout data. An analysis and evaluation of the payload performance and the data processed is presented. Included in the report are analyses of the payload thermal design and weather conditions while the satellite was on orbit. (U)

(3) On the MIDAS III flight some degradation of payload performance resulted from a solar array system malfunction. This failure limited the

[REDACTED]

satellite payload data readout capability and usable information was received during only two passes over the tracking station. The analysis of this data demonstrates that when scanning is done in a narrow filter mode, background IR sources are greatly suppressed. The fact that no change in system noise was detected when the payload IR scanner passed from darkness into sunlight led to the conclusion that background contributes less toward degrading system performance than system noise does. The sensitivity of the IR detector cells was also in agreement with the values expected for the recorded temperatures. (S)

#### 4. TECHNICAL PROGRESS

##### a. Second Stage Vehicles

(1) Changes have been made in the High Energy Proton Density Experiment (HEPDIX) installation on MIDAS IV. Data from the solar damage portion of the experiment on MIDAS III indicated that the proton count in the higher ranges was less than predicted, while the count in the lower ranges was higher than predicted. The proton radiation measurements were extended into lower energy ranges for better definition of the low energy levels. Minor AGENA discrepancies have been corrected and solar array fit checks have been satisfactorily completed. A Barnes Horizon Sensor has been installed to replace the General Electric unit. The MIDAS IV vehicle entered the simulated flight phase of prelaunch testing on 25 September. (C)

(2) After progressing through the early portions of system test on schedule, MIDAS V encountered difficulties during the communications and control tests and in the guidance and flight control response test. Many of the C and C components have been reworked and/or replaced. The roll and yaw control moment gyros were found to be out alignment. Correction of these difficulties and re-run of the response test was accomplished before the end of the report period. (U)

(3) Difficulty in mounting Geophysical Research Directorate experiments caused a delay during final assembly of the MIDAS VI satellite vehicle. Discrepancies in equipment drawings for several units resulted in mounting rework. Two units were returned to the manufacturer for rework because mounting provision changes were not feasible. (U)

##### b. Infrared Scanners

The Aerojet-General MIDAS payload development effort was redirected this month to provide increased efficiency and keep within budget allocations. Among the actions that resulted were:

- (1) Deletion of one Series III payload
- (2) Redirection of Series III reliability program

4

[REDACTED]

DCLPS-17

- [REDACTED]
- (3) Deletion of two Series IV payloads (one test and one spare)
  - (4) Reduction in test equipment quantity

Recap of payloads being procured:

SERIES III - Aerojet General  
4 Flight test  
2 Reliability ground tests  
6 TOTAL

SERIES IV - Aerojet General  
5 Flight test  
3 Reliability ground tests  
8 TOTAL

SERIES IV - Alternate Design (Baird Atomics)

- 1 Engineering test model

(c)

c. Facilities

- (1) Facility design plans have been completed for the Ottumwa, Iowa, Tracking and Control Center technical facilities. Advertising for construction contract award is delayed pending release of funds. (U)
- (2) Construction of Point Arguello Launch Complex No. 2 is progressing satisfactorily. Earthwork is approximately 70% complete. Foundations and walls are being poured for Launch Stand No. 3, the Technical Support Building and the Launch Operations Building. (U)
- (3) Modification of Building 6007, one of the Vandenberg Air Force Base technical support buildings, is approximately 80% complete. Completion is scheduled for October. Modification work on 18 of the 20 buildings in the second increment of this package is approximately 15% complete, with completion scheduled for January 1962. The remaining portion of the second increment package will be awarded if FY-62 Military Construction Program funds can be made available. (U)
- (4) Modification to technical equipment room areas at Donnelly Flats, Alaska, were essentially completed on 15 September. Installation of supplementary air conditioning equipment is scheduled for completion by 31 December. (U)
- (5) Construction of the Technical Support Building at the New Hampshire Tracking and Telemetry Station has been started and satisfactory progress is being made. (U)
- (6) Design concepts for the Satellite Text Annex Administration Building are scheduled for review on 11 October. (U)

DCI/PS-17

[REDACTED]

HEADQUARTERS  
SPACE SYSTEMS DIVISION (AFSC)  
UNITED STATES AIR FORCE  
Air Force Unit Post Office  
Los Angeles 45, California

WEG  
RFB

DCLPS-11

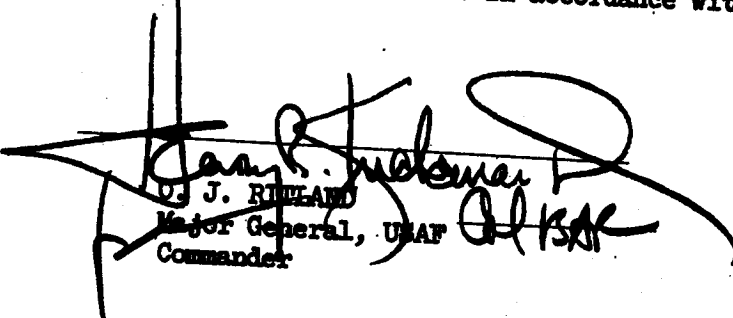
12 September 1961

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

FOREWORD

Attached are the reports covering progress during the month of August 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.

The Military Satellite Programs Progress Report has been determined to be a Group 3 document in accordance with paragraph 6, AFR 205-2. This categorization applies to all previous issues. Holders of these documents are responsible for acting promptly to place the correct notation on the document in accordance with this regulation.

  
U. J. RINEHART  
Major General, USAF  
Commander

- 2 Atch  
1. (c) DISCOVERER Program  
2. (s) MIDAS Program

DOWNGRADED AT 12 YEAR  
INTERVALS; NO. AUTOMATICALLY  
DECLASSIFIED. DOD DIR 5200.10

DCLPS-11

[REDACTED]

~~SECRET~~

DISCOVERER PROGRAM

1. This report, covering progress during the month of August 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 XXVIII Flight

(1) DISCOVERER XXVIII was launched from Vandenberg Air Force Base at 1701 PDT on 3 August. The launch was scheduled for 2 August but a malfunction of the horizon scanner caused a one-day postponement. Booster performance, separation, coast and AGENA ignition occurred as planned. Approximately 188 seconds after AGENA ignition the hydraulic pressure for operating the actuators which position the rocket engine dropped to zero. A decrease in hydraulic fluid temperature and a slight decrease in engine turbine speed were coincident with the hydraulic pressure drop. (c)

(2) Bearing friction held the satellite engine in position for a few seconds, but the actuators could not respond to correction signals from the inertial reference package. The vehicle started to tumble. The high acceleration forces caused the vehicle to break up. Impact was in the South Pacific. Analysis of the flight data revealed that only two types of failure could account for all of the observed effects: failure of tubing or fittings on the high pressure side of the system or failure of a high pressure transducer. Subsequent bench tests on a hydraulic system package supported the analytical findings. As a result of these tests some AGENA plumbing will be re-routed to reduce the possibility of vibration effects, some fittings will be changed, and a "fail-safe" type transducer will be substituted. (c)

b. DISCOVERER XXIX Flight

(1) DISCOVERER XXIX was launched into orbit from Vandenberg Air Force Base at 1300 PDT on 30 August. The satellite was launched at the earliest possible moment allowed by the established 1300-1600 launch window. All events during launch, boost, separation, coast, AGENA burn and orbital injection occurred as planned. One and one-half hours after lift-off orbital status was verified by tracking and telemetry contact over Kodiak, Alaska. The orbit, based on calculations made after pass ten, was satisfactory although slightly different than originally programmed. Table I shows the predicted and attained parameters. The variation is attributed to a slightly positive (AGENA vehicle in a pitch up position) flight path angle at orbital injection. Vehicle operation on orbit was satisfactory. (c)



noise emanating from celestial galaxies. Data obtained from these instruments by the DISCOVERER tracking stations is being furnished to the Geophysical Research Directorate for analysis. (U)



[REDACTED]

MIDAS PROGRAM

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

2. PROGRAM ADMINISTRATION

[REDACTED]

3. FLIGHT TEST STATUS

a. The 6594th Test Wing reported on a series of tracks of MIDAS II, vehicle 1007, launched in May 1960. The tracks were recorded during the period 18 through 21 July 1961 on several passes, pass No. 6414 and No. 6450 on the dates noted. The Solar Auxiliary Power Unit Telemeter (SAPUT) continues to transmit and operation appears satisfactory. (U)

b. MIDAS III launched on 12 July 1961 continued to transmit data throughout this reporting period. Data analyses from the payload established that Venus and vehicle reflections of the sun were among radiating sources detected by the satellite. The data transmitted subsequent to pass five were all from the High Energy Proton Detection Experiment (HEPDEX). This experiment is providing Van Allen radiation measurement data. (S)

4. TECHNICAL PROGRESS

a. Second Stage Vehicles

(1) The MIDAS IV vehicle underwent numerous modifications during this report period. Early in August the changes involving the West Ford Project (needle dispenser) were completed. These changes included removing the vacuum bearing tester, all Geophysical Research Directorate equipment, the APL doppler equipment and its power supply, the Speidel tape recorder and the R&D radiometer. Changes to the SAPUT, solar array, and vehicle command system resulting from the MIDAS III flight experience were also completed. The command system modification permits real time ground commands to override stored program commands for the operation of the vehicle telemetry (FM/FM) and the "G" band beacon. This modification will provide greater utility and control in vehicle tracking and in obtaining vehicle status data. (S)

(2) At the end of the reporting period the MIDAS IV AGEMA vehicle was undergoing prelaunch testing in the Vandenberg Air Force Base Missile

[REDACTED]

(7) The Lockheed High Vacuum Orbital Simulator (HIVOS) presently under construction at the Sunnyvale facility was 85 percent complete at the end of the report period. Data handling and instrumentation installations together with system calibration have not yet been completed. Testing of a satellite within the simulator is scheduled to start on 15 January 1962. (U)

[REDACTED]

DISTRIBUTION

Headquarters USAF	20
Headquarters AFSC	5
Strategic Air Command	1
Air Defense Command	13
6555th Test Wing	2
6594th Test Wing	5
Sacramento Air Material Area	1
Electronics System Division	1
Aeronautical Chart and Information Center	1
Space Systems Division (AFSC)	9
Deputy Commander for Aerospace Systems	5

**HEADQUARTERS  
SPACE SYSTEMS DIVISION (AFSC)  
UNITED STATES AIR FORCE  
Air Force Unit Post Office  
Los Angeles 45, California**

*[Handwritten signature]*  
*[Handwritten initials]*

DCLPS-9

11 June 1961

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

**FOREWORD**

Attached are the reports covering progress during the month of July 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.

The Military Satellite Programs Progress Report has been determined to be a Group 3 document in accordance with paragraph 6, AFR 205-2. This categorization applies to all previous issues. Holders of these documents are responsible for acting promptly to place the correct notation on the document in accordance with this regulation.

*[Handwritten signature: O. J. Etland]*

O. J. ETLAND  
Major General, USAF  
Commander

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

DCLPS-9

**DOWNGRADED AT 12 YEAR  
INTERVALS; NOT AUTOMATICALLY  
DECLASSIFIED. DOD DIR 62.10**



[REDACTED]

DISCOVERER PROGRAM

1. This report, covering progress during the month of July 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 XXVI Flight

(1) DISCOVERER XXVI was launched from Vandenberg Air Force Base at 1629 PDT on 7 July and was injected into a near-nominal orbit. All events during launch, boost, separation, coast, AGENA burn and orbital injection occurred as planned except for a longer than normal AGENA burn time. This is attributed to an error in the accelerometer-integrator system. Table I shows the predicted and attained orbital parameters. (C)

Event	Programmed	Actual
Apogee, statute miles	293.6	505.5
Perigee, statute miles	147.4	142.8
Period, minutes	91.6	95.02
Eccentricity	0.0175	0.0421
Inclination Angle, degrees	81.5°	82.9°

TABLE I. COMPARISON OF PROGRAMMED AND ACTUAL ORBITAL PARAMETERS FOR DISCOVERER XXVI

(2) All subsystems operated satisfactorily throughout the orbital flight. The thermostatically controlled electric heaters installed on the control valves performed successfully. As planned, capsule recovery was initiated on the 32nd pass (two days on orbit) at

[REDACTED]

1905 PDT on 9 July. All events occurred as programmed and the capsule followed the predicted descent trajectory. The capsule was sighted northwest of Hawaii and aerial recovery was accomplished. This was the fourth DISCOVERER capsule recovered by the airborne forces, two other capsules have been recovered from the sea. Following capsule ejection, the AGENA satellite reoriented to its normal "on-orbit" attitude and operated satisfactorily for the remainder of its battery life. (C)

b. DISCOVERER XXVI Experiments

(1) As part of the continuing program designed to measure the space environment and determine radiation effects on various materials, nearly 45 pounds of instruments and specimens were carried on the DISCOVERER XXVI satellite vehicle and its capsule. The capsule carried "poker chip" samples of iron, nickel, ytterium, titanium, magnesium, lead and bismuth. Some of the samples were returned to the Air Force Geophysical Research Directorate for evaluation and the remainder are being analyzed by Lockheed scientists. Three canisters were also recovered with the DISCOVERER XXVI capsule. One contained various dosimeters and was returned to the Air Force Special Weapons Center. Another contained inert biological materials (cellulose products) and was transmitted to the Space Systems Division for analysis. Various metal and film samples were included in the third canister to provide information on the effects of space radiation on photographic materials. Analysis of the specimens is in process. (S)

(2) The non-recoverable Geophysical Research Directorate equipment which was mounted on the module that replaces the engine access door, included two atmospheric density gages, two micrometeorite detectors, a cosmic ray monitor and temperature probes. During the flight, data from these instruments was telemetered to tracking stations via the AGENA telemetry system. The information was sent to the Geophysical Research Directorate for reduction and analysis. Inspection of the raw data indicated that all instruments operated satisfactorily and the data obtained appeared to be valid. (U)

c. DISCOVERER XXVII Launch

DISCOVERER XXVII was launched from Vandenberg Air Force Base at 1535 PDT on 21 July. A IM-21 booster pitch oscillation, evident immediately after launch, became severe after approximately one minute of flight. The vehicle apparently broke up at this time. A destruct command was sent at T + 95.1 seconds. Three minutes after launch the

[REDACTED]

DISCOVERER satellite S-band beacon signal was lost and approximately two and one-quarter minutes later, booster telemetry was lost. The DISCOVERER satellite reached an altitude of only 35,000 feet and impacted twelve to fifteen miles downrange. Ships from the Pacific Missile Range located main parts of the DM-21 booster, but were unable to recover the parts connected with the failure. (c)

d. Future Flights

The launch of DISCOVERER XXVIII is scheduled for 2 August. DISCOVERER XXIX and DISCOVERER XXX will be launched late in August. All three of these satellites will carry recoverable capsules with recovery planned after between one to four days in orbit. (c)

[REDACTED]

## MIDAS PROGRAM

1. This report, covering progress during the month of July 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. Lockheed Missiles and Space Company is continuing preliminary design of their proposal for a "simplified" MIDAS satellite configuration. Fundamental to the "simplified" MIDAS concept is the use of an orbital network of randomly distributed satellites as opposed to the controlled distribution previously proposed. System analyses are being conducted by IMSC, Aerospace Corporation, and Lincoln Labs to determine the coverage capability of the random network which will be evaluated in the light of operational requirements to be established by the Air Defense Command. (S)

b. During July, Air Defense Command personnel were briefed on MIDAS coverage for various satellite network configurations. The purpose of these briefings was to acquaint ADC personnel with the fundamentals involved to facilitate their analysis which will result in determination of MIDAS operational requirements. (S)

c. The schedule reflected in this month's issue incorporates the adjustments made necessary by the delayed launch of MIDAS III, the modifications (see Second Stage Vehicles) being accomplished on MIDAS IV, and Missile Assembly Building and launch compatibility with other programs. To preclude compromise of the downstream schedule, the Series III Development Test Vehicle (DTV) was redirected to be a flight test article and one flight test vehicle was deleted from the end of that series. This was caused by the lack of launch pad time available to the DTV. (S)

### 3. FLIGHT TEST STATUS

a. On 2 July the countdown of MIDAS III went to T-6 seconds when an ATLAS booster malfunction caused the launch to be rescheduled to 10 July. The second countdown proceeded to T-0 when a malfunction of the ATLAS umbilical caused the booster engines to shut down immediately after ignition. The malfunctions were corrected and MIDAS III was successfully launched into orbit from Point Arguello Complex 1, Pad No. 2 at  
5  
DCLPS-9



[REDACTED]

e. Vehicle "real time" command control was successfully accomplished on pass number one and pass number five, activating payload operation and telemetry. However, deficiencies were revealed in the design of ground equipment and ground "command and control" operating procedures by the inability to resolve the emergency created by receiving only partial power from the solar array. The inability to formulate and load the required "stored program" commands into the vehicle contributed to the indicated early depletion of vehicle power and subsequent loss of payload data link and vehicle status telemetry. Vehicle status telemetry was received on pass one as programmed through stored commands loaded prior to launch. (S)

f. The payload data received were still undergoing analysis at the close of the report period. Analysis thus far indicates no observed background, normal sensitivity and verification of thermal and mechanical design. (S)

g. Van Allen radiation measurement data required as a mission objective for MIDAS III were still being provided by the High Energy Proton Density Experiment (HEPDEX equipment power supply is independent of the solar array system and the data transmissions were still being received by all tracking stations on the satellite's 205th pass. (S)

#### 4. TECHNICAL PROGRESS

##### a. Boosters

ATLAS 105D is presently "on stand" at Point Arguello and is being readied for MIDAS IV. (S)

##### b. Second Stage Vehicles

(1) The MIDAS IV vehicle (1202) completed operations at the Systems Test Complex, was shipped to Santa Cruz Test Base for flushing, and arrived at the Vandenberg Air Force Base Missile Assembly Building. During the inspection at the Missile Assembly Building, pin hole leaks were detected in an oxidizer fill line weld. The part was x-rayed and weld porosity was determined to be the cause. The defect was corrected. (S)

(2) During July the Air Force Space Systems Division initiated action to effect equipment changes to MIDAS IV, which will allow a higher orbital altitude (2050 n.m.) for participation in the Westford experiment.

[REDACTED]

These changes include the deletion of the vacuum bearing tester, all Geophysical Research Directorate equipment, the APL doppler equipment and its power supply, the Speidel tape recorder and the R&D radiometer. Modifications are also being made to:

- (a) Increase the reliability of the solar array extension mechanism.
- (b) Provide "real time" commands for operation of the "g" band tracking beacon and vehicle status telemetry (FM/FM) readout.
- (c) Provide for transmission of selected, critical, vehicle status telemetry data over the SAPUT telemetry system.
- (d) Provide additional instrumentation of the solar array. Vehicle changes are currently being implemented at the Vandenberg Air Force Base Missile Assembly Building. Satellite control procedures are being changed to provide more positive control and to improve backup procedures for operation if primary operational modes fail. MIDAS IV is scheduled for delivery to the launch pad on 3 September. (S)

(3) After completing the flushing operation at the Santa Cruz Test Base, the MIDAS V vehicle was returned to the Lockheed Sunnyvale facilities and started integrated systems tests on 19 July. Systems tests will be conducted in a manner to comply with a pad ready concept that is expected to reduce the vehicle time in the Missile Assembly Building from 28 days to 6 days. (S)

c. Infrared Scanners

MIDAS Series III payload subassemblies completed acceptance tests at the Aerojet-General facility and data from these tests are being analyzed. The complete systems test of this payload is currently being accomplished. The first MIDAS Series III payload is scheduled for flight on MIDAS VI in early 1962. (S)

d. Facilities

(1) Construction on Point Arguello Launch Complex No. 2 was started on 1 July. All major items required during construction have been ordered by the contractor. Excavation for launch stand No. 3 is now underway and construction of the complex main access road and the

[REDACTED]

access road to Stand No. 3 is progressing satisfactorily. Trailers to be used as "on site" offices by Navy, Air Force and contractor supervisory personnel have arrived. Initiation of a Critical Path Scheduling (CPS) program as a management tool for construction of this complex is believed to be the first use of this technique within the Air Force during facility construction. (U)

(2) Modification of the Vandenberg Air Force Base Technical Support facilities is in progress with beneficial occupancy scheduled for 30 August. The second increment of this package is now scheduled for contract award on 7 August, within limitations of FY 61 fund availability. The final increment of the modification effort will be awarded upon receipt of FY 62 Military Construction Program funds. (U)

(3) A shortage of funds has delayed award of the construction contract for modifications to the North Pacific, Donnelly Flats, readout station. Temporary deferral of a portion of the modifications will be required to allow award of contract for the most critical requirements. A joint USAF, Alaskan Air Command, and Space Systems Division effort is in progress to resolve this problem. (U)

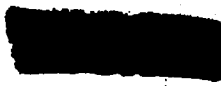
[REDACTED]

(5) Submission of final plans for the construction of the Ottumwa, Iowa, MIDAS Tracking and Control Center technical facilities is scheduled for 21 August. (U)

**[REDACTED]**

DISTRIBUTION

Headquarters USAF	20
Headquarters AFSC	5
Strategic Air Command	1
Air Defense Command	13
6555th Test Wing	2
6594th Test Wing	5
Sacramento Air Materiel Area	1
Electronics System Division	1
Aeronautical Chart and Information Center	1
Space Systems Division (AFSC)	11
Deputy Commander for Aerospace Systems	4



*AM*

**HEADQUARTERS  
SPACE SYSTEMS DIVISION (AFSC)  
UNITED STATES AIR FORCE  
Air Force Unit Post Office  
Los Angeles 45, California**

DCLPS-6

12 June 1961

*W 58*

**MILITARY SATELLITE PROGRAMS PROGRESS REPORT  
Month Ending 30 June 1961  
DD-DR&E (M) 397**

**FOREWORD**

Attached are the reports covering progress during the month of June 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.

The Military Satellite Programs Progress Report has been determined to be a Group 3 document in accordance with paragraph 6, AFR 205-2. This categorization applies to all previous issues. Holders of these documents are responsible for acting promptly to place the correct notation on the document in accordance with this regulation.

*✓*  
*Search*  
*Wife*  
*+ Pipe*  
*do*

*[Signature]*  
**OT J. RITLAND**  
Major General, USAF  
Commander

- 2 Atch
- 1. (c) DISCOVERER Program
- 2. (s) MIDAS Program

**DOWNGRADED AT 12 YEAR  
INTERVALS; NO, AUTOMATICALLY  
DECLASSIFIED. DOD DIR 5200.10**

DCLPS-6



**DISCOVERER PROGRAM**

1. This report, covering progress during the month of June 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 XXIV Flight

(1) DISCOVERER XXIV was launched from Vandenberg Air Force Base at 1416 PDT on 8 June. THOR performance was nominal throughout the boost phase. However, telemetry results indicate a small fire may have started in the AGENA aft equipment area at or shortly after lift-off. This was indicated by a constant increase in the aft equipment area temperature from liftoff until a loss of telemetry occurred at T plus 147 seconds. At T plus 77 seconds a sharp rise in battery current occurred and all voltages showed disturbances of approximately ten seconds duration. Other data indicates that separation did occur but that the AGENA vehicle did not develop sufficient thrust for orbital boost. Failure to orbit is attributed to damage resulting from the fire. (c)

(2) The source of the DISCOVERER XXIV fire is unknown but seepage of unsymmetrical di-methyl hydrazine (fuel) from a plumbing leak or quick-disconnect spillage is suspected. More stringent checks for propellant leaks will be incorporated for future flights. These will include a manual AGENA vehicle fuel leak test during countdown and addition of a "scupper" near the propellant quick-disconnect to catch spillage when the line is pulled away. A purge system to replace the atmosphere in the aft equipment area is currently under consideration for early incorporation. (c)

b. DISCOVERER XXV Flight

(1) DISCOVERER XXV was launched from Vandenberg Air Force Base at 1603 PDT on 16 June and was successfully injected into a near-polar orbit. The ascent was normal with all events occurring essentially as planned. On orbit the satellite was oriented and stabilized as programmed. The thermostatically controlled electric heaters installed to correct the sticky attitude control valve malfunction due to low temperature operation encountered on DISCOVERER XXIII performed successfully. Since this system requires electrical power, investigations are being conducted in an attempt to find a passive method of solving this low temperature valve operation problem. Table I shows the predicted and attained orbital parameters. (c)

DCLPS-6

	Programmed	Actual
Apogee, statute miles	292	256
Perigee, statute miles	147	140
Period, minutes	91.6	90.9
Eccentricity	0.017	0.0138
Inclination Angle, degrees	81.8	82.1

Table I. Comparison of Programmed and Actual Orbital Parameters for DISCOVERER XXV

(2) As planned, capsule recovery was initiated on the 33rd pass (two days on orbit) at 1800 PDT on 18 June. All events occurred as programmed and the capsule descent followed a nominal trajectory. However, the impact area was incorrectly calculated which positioned the recovery aircraft out of range to effect an aerial recovery. The capsule was located electronically and ultimately sighted by a recovery aircraft at 1845 PST. An Air Force para-rescue team was deployed and by 2046 PST the capsule was safely aboard their raft. The capsule and the rescue team were picked up by a Navy destroyer the next morning. The capsule was taken to Hawaii by the destroyer and flown to the mainland for evaluation. (S)

(3) A number of space environment experiments were conducted successfully during the DISCOVERER XXV operation. An emulsion block, desimeters, and discs of gold, nickel, titanium, cadmium, magnesium, bismuth, iron, and yttrium were recovered with the capsule and are currently being compared with identical samples retained on earth to determine the effects of space radiation on these elements. (U)

(4) Two atmospheric density gages, two micrometeorite detectors, a cosmic ray monitor and twelve temperature probes were carried on DISCOVERER XXV and telemetered data from these instruments are being analyzed. Temperatures in the 25 degree Fahrenheit range were recorded and the detectors recorded evidence of micrometeorite impacts. No satisfactory data were received from the atmospheric density gages. (S)

c. Future Flights

The launch of DISCOVERER XXVI is scheduled for early July. It will also carry samples and instruments for further space environment research. DISCOVERER XXVII will be launched later in July. (S)

[REDACTED]

## MIDAS PROGRAM

1. This report, covering progress during the month of June 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

Tests consisting of compatibility checks of the payload and communication and control equipment simulated flight, radio-frequency interference tests and system checks have been performed on the MIDAS III vehicle at Pt Arguello Complex 1, Pad No. 2. Three delays have been encountered. The first delay was caused by an AGENA vehicle problem. Analysis of DISCOVERER XXIII flight data indicated that attitude control valve temperatures lower than valve design operating temperatures were a possible cause of erratic operation of the attitude control valves which resulted in a rapid expenditure of control gas. To eliminate a possible cause of the low valve temperatures, a modification was incorporated to provide thermal insulation between the valve attachment belts and the vehicle structure. The second delay was caused by the necessity to replace the defective liquid oxygen pressure regulator on the ATLAS booster. A third delay was caused by an intermittent electrical short in the infrared detection system. The present launch schedule is 2 July. (C)

### 3. TECHNICAL PROGRESS

#### a. Boosters

A decision has been made by the Space Systems Division that the guidance systems on the ATLAS boosters for the MIDAS launches should be modified to incorporate an improved model gyro. Since the improved gyro has not been produced in sufficient quantity to supply all ATLAS modification requirements, a potential problem is apparent. (S)

#### b. Second Stage Vehicles

The AGENA vehicle for the MIDAS IV launch is scheduled for acceptance by the Space Systems Division at the Systems Test Complex on 5 July. This vehicle is scheduled for shipment to Vandenberg Air Force Base after completing a flushing operation at Santa Cruz Test Base. The launch of MIDAS IV is presently scheduled for late August. (C)

#### c. Infrared Scanners

Acceptance testing of the Series III service test model payload

DCLPS-6



[REDACTED]

was completed in June at Aerojet-General Corporation. The test data are currently being evaluated. Acceptance testing of subassemblies for the first Series III flyable payload has also been completed. Fabrication and assembly of this flight payload is in progress with delivery to Lockheed scheduled for mid-August. A Series III payload will be flown on MIDAS VI. (U)

d. Background Radiometer Flights

Data from the U-2 infrared background measurement flights is being reduced by Baird-Atomic and the results will be published following completion of the data reduction. This infrared background data will be used to refine the design of the payload scanner unit. (U)

e. System Development

A conceptual description of a data processing configuration for MIDAS has been published as a result of a study performed by Lincoln Laboratory. Lockheed Missiles and Space Company is examining the Lincoln Laboratory report and will direct formal comments to the Air Force Space Systems Division. (U)

f. Facilities



(2) Information has been received from the Alaskan Air Command that modifications to the MIDAS technical facilities at Donnelly Flats will begin on 15 July. Completion for occupancy is scheduled for 15 September, with final completion of the air conditioning system scheduled for 15 November. However, an interim air conditioning system will function until the final completion date. (U)

(3) Final design plans and specifications for the MIDAS Technical Support Building at the New Hampshire Tracking and Telemetry Station were turned over to the Corps of Engineers for construction contract action on 23 June. (U)

(4) A review conference on preliminary design plans for the Ottawa, Iowa tracking and control center facilities was held on 27 and 28 June. The architect/engineer is proceeding on preparation of final design plans. On 14 June a pre-design conference was held at Omaha,

[REDACTED]

Nebraska, to discuss the rehabilitation of the base support facilities at Ottumwa. A review of preliminary design plans is scheduled for 30 August. (U)

(5) Construction contract bids for Point Arguello Launch Complex No. 2 were opened on 26 June and the contract awarded to Paul Hardeman, Inc, on 27 June. This complex will accommodate launchings of Series IV MIDAS. This complex will be similar to Launch Complex No. 1, but will have AGE consoles incorporating the latest improvements. At present the complex will consist of two launch stands with a third stand to be constructed upon approval and receipt of funds from Hq USAF. (U)

[REDACTED]

DISTRIBUTION

Headquarters USAF	20
Headquarters AFSC	5
Strategic Air Command	1
Air Defense Command	13
6555th Test Wing	2
6594th Test Wing	5
Sacramento Air Materiel Area	1
Electronics System Division	1
Aeronautical Chart and Information Center	1
Space Systems Division (AFSC)	10
Deputy Commander for Aerospace Systems	4

DCLPS-6

[REDACTED]

[REDACTED]

*ADJ*

HEADQUARTERS  
SPACE SYSTEMS DIVISION  
AIR FORCE SYSTEMS COMMAND  
UNITED STATES AIR FORCE  
Air Force Unit Post Office  
Los Angeles 45, California

DCLPS

12 June 1961

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

FOREWORD

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

*[Handwritten signature]*  
O. J. MITLAND  
Major General, USAF  
Commander

1 Atch  
~~(S)~~ Military Satellite Report

NOTE: Prior issues of this document are designated as Group 1 documents as defined in paragraph 4, AFR 205-2, and are excluded from automatic downgrading.

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

DCLPS-1

[REDACTED]

[REDACTED]

DISCOVERER PROGRAM

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

2. FLIGHT TEST STATUS

a. DISCOVERER XXIV will be launched from Pad 4, Complex 75-3, Vandenberg Air Force Base early in June. (S)

b. DISCOVERER XXV will be the first vehicle launched from the newly converted Pad 1, Complex 75-1, at Vandenberg Air Force Base. This pad has been converted from a THOR IRBM to a DISCOVERER launch facility. Required modifications include extending the missile shelter to accommodate the DM-21/AGENA combination and adding the DISCOVERER fuel transfer, ground support and launch control systems. The launch of DISCOVERER XXV is scheduled for mid-June. (S)

c. Both DISCOVERER XXIV and XXV will carry recoverable payloads with recovery planned after four days in orbit. Programmed orbital parameters for the two flights are given in Table I. (S)

<u>PARAMETER</u>	<u>DISCOVERER XXIV</u>	<u>DISCOVERER XXV</u>
Apogee, statute miles	382	290
Perigee, statute miles	190	150
Eccentricity	0.023	0.017
Period, minutes	93.8	91.6
Inclination Angle, degrees	81.7	81.75
Recovery Pass (nominal)	63	64

TABLE I. DISCOVERER XXIV and XXV  
Programmed Orbital Parameters

3. TECHNICAL PROGRESS

Space Research Experiments

Extensive equipment for space research will be carried on DISCOVERER XXV. Equipment furnished by the Geophysical Research Directorate will include a cosmic ray monitor, a micrometeorite

Atch 1

DCLPS-1

[REDACTED]

detector, two atmospheric density gages and associated electronics. This module and its instruments will replace an AGENA vehicle engine access door on DISCOVERER XXV. Data from this equipment will be telemetered to tracking stations during the flight. Several devices for measuring and determining the effects of space radiation will be carried in the capsule and will be recovered for later study after four days in orbit. Small discs of gold, nickel, titanium, magnesium, iron and lead will be attached to the capsule and will be analyzed after exposure to space radiation. Dosimeters and film packs will also be included in the capsule. (S)

[REDACTED]

MIDAS PROGRAM

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

2. PROGRAM ADMINISTRATION

a. The MIDAS Operational system concept is being reviewed to define in greater detail, based on present knowledge, the operational philosophy and requirements for each system element. (U)

b. The Space Systems Division is presently analyzing and evaluating a Lockheed Missiles and Space Division proposal for simplification of the MIDAS Series IV prototype system. Primary emphasis is placed on vehicle simplification with ancillary reduction of complexity in the design and manufacture of support, checkout, and launch control equipment. Substantial increases in reliability and life expectancy are proposed benefits of this simplified system. Some of the concepts of the proposed simplified system are:

(1) Twelve satellites randomly spaced in orbit, four in each of three orbital planes. Two satellites in each plane would orbit in one direction and the other two would orbit in the opposite direction.

(2) All satellite equipment would operate on a continuous duty cycle.

(3) Provisions for orbital adjustment would not be required.

(4) The solar auxiliary power array would be static following its initial extension - no constant adjustment to provide maximum sun exposure.

(5) The attitude control requirements would be reduced.

(6) All data transmission would be accomplished on UHF.

(7) No command system would be required, eliminating the need for the orbital programmer and the power control unit.

(8) Reduced tracking accuracy requirement of 20 nautical miles would allow tracking to be accomplished with the 60-foot tracking and data acquisition antenna by angle tracking only. (6)

[REDACTED]

c. While the proposal has many desirable and attractive possibilities, it must be carefully analyzed as to impact on mission capability, vulnerability; cost, schedules, productability and logistic support, etc., to positively assure that this approach is optimum for this time period. (S)

3. TECHNICAL PROGRESS

a. Booster

ATLAS 97D is installed on Point Arguello Pad No. 2 and checkout is on schedule. This booster originally went "on stand" on 9 December and successfully completed its flight readiness firing on 9 March. (C)

b. Second Stage Vehicles

(1) The AGENA vehicle for the MIDAS III flight completed systems test in the Vandenberg Air Force Base Missile Assembly Building (MAB). Changes incorporated during or subsequent to the tests included the following:

(a) The horizon sensors were modified to avoid possible sun saturation. New sensor harnesses and heads were installed permitting the vehicle to be satisfactorily stabilized in pitch even though one sensor was scanning the sun.

(b) A propellant tank venting problem required that a propellant tank vent and engine drain line nullifiers be installed.

(c) A power control unit access door was installed that permits the emergency reset timer to be set without removing the power control unit. (S)

(2) On 12 May, the satellite vehicle completed a successful simulated countdown and flight, and on 24 May following a series of final alignments, was delivered to Pad 2 of Point Arguello Launch Complex No. 1. The launch is now scheduled for 20 June. (S)

(3) The AGENA vehicle for the MIDAS IV flight is completing the integrated systems tests at the Lockheed manufacturing facilities. Upon the completion of system tests, the vehicle will be transported to the Santa Cruz Test Base for flushing only. Since MIDAS vehicles are being produced under the "block" concept, every modification made to MIDAS III is being made to MIDAS IV and V vehicles. The MIDAS IV launch could be delayed because of possible conflict with a SAMOS vehicle in the Vandenberg Air Force Base missile assembly building. (C)



[REDACTED]

c. Infrared Scanners

A contract is being negotiated with the Electronics Corporation of America, Cambridge, Massachusetts, for the development and improvement of reliability of lead-sulfide detectors. It is anticipated that negotiations will be completed and a contract awarded early in June. (U)

d. Aerospace Ground Equipment

(1) The required ground equipment to support the MIDAS III test has been installed and checkout has been completed at the Hawaii tracking station, the Southeast Africa station, and the telemetry and control facilities. The shipboard equipment has been installed aboard the downrange tracking ships and is currently being checked out. (C)

(2) Noise has been encountered during daytime transmission over the New Hampshire tracking station's data circuit and is being investigated. The MIDAS Intercept Assembly Register (MIAR) is being modified; as soon as these modifications are completed, checks will be made with the GP-1 PAM/FM ground station. Validation and acceptance of the computer program awaits resolution of the equipment and programming problems. (U)

(3) Acceptance of the computer program at the Satellite Test Center by operation and integration of the GP-1 PAM/FM ground station has not been completed. Because of the existence of many computer programming problems, acceptance is forecast for mid-June. Problems associated with the data line translators will be corrected early in June. (U)

e. Facilities

(1) Plans and specifications for modifications to the MIDAS technical facilities at the Donnelly Flats, Alaska tracking station were released for construction to the Alaskan Air Command on 24 May with a requested beneficial occupancy date of 1 September. (U)

(2) Final design plans for the MIDAS Technical Support Building at the New Hampshire tracking station were completed on 19 May. Contract documents will be turned over to the construction agency on or about 9 June with contract award scheduled for 30 June. (U)

(3) Preliminary design of the Ottumwa, Iowa, tracking and control center technical facilities was completed on 26 May. The preliminary design review will be held on 9 June. Authorization to proceed with the design of the Ottumwa base support facilities rehabilitation was given to the AFRCE at Omaha, Nebraska, on 7 May. (C)

[REDACTED]

DISTRIBUTION

Headquarters USAF . . . . . 20

Headquarters AFSC . . . . . 5

Strategic Air Command . . . . . 1

6555 Test Wing (Development) . . . . . 2

6594 Test Wing (Satellite) . . . . . 5

Air Defense Command . . . . . 13

Sacramento Air Material Area . . . . . 1

Aeronautical Chart and Information Center . . . . . 1

Electronics System Division . . . . . 1

Space Systems Division . . . . . 9

Deputy Commander for Aerospace Systems . . . . . 5

DCLPS-1



*adli*

HEADQUARTERS  
SPACE SYSTEMS DIVISION (AFSC)  
UNITED STATES AIR FORCE  
Air Force Unit Post Office  
Los Angeles 45, California

WDLPR-4

11 May 1961

MILITARY SATELLITE PROGRAMS PROGRESS REPORT  
Month Ending 30 April 1961  
DD-DR&E(M) 397

FOREWORD

Attached are the reports covering progress during the month of April 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.

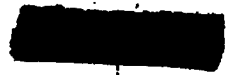
The Military Satellite Programs Progress Report has been determined to be a Group 3 document in accordance with paragraph 6, AFR 205-2. This categorization applies to all previous issues. Holders of these documents are responsible for acting promptly to place the correct notation on the document in accordance with this regulation.

*Henry S. Ryeland*  
J. RYELAND  
Major General, USAF  
Commander  
*Col BAF*

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

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

WDLPR-4-288



[REDACTED]

orbit has an apogee of 850 nautical miles, a perigee of 120 nautical miles and a period of 101 minutes. (S)

b. DISCOVERER XXIII Flight Analysis

(1) As a result of the continuing effort to improve reliability, a modified horizon scanner will be flown on future DISCOVERER satellites. The major change is the replacing of the aluminum gear box with one constructed of steel. One of the improved units completed 210 hours of bench tests and was then placed in a vacuum chamber to be operated until it fails. At the end of April the gear box was still operating after being in the chamber over 800 hours. (S)

(2) The problem with the radar beacon, which resulted in the satellite receiving two commands when only one was sent, is attributed to the difficulty of commanding an unstable satellite where radar lock cannot be held. The characteristics of the command signal tones and the rotation rate of the radar antenna operating on an unstable satellite can produce the results recorded on DISCOVERER XXIII. Although this explains the command problem, an intensive investigation has resulted in proposed changes to the command beacon circuitry and operating procedures which will minimize this kind of problem. (S)

(3) Analysis of data indicates that sub-normal temperatures caused erratic operation of the gas jet control valves and resulted in the rapid expenditure of control gas. Temperature pickups located near some of the valves recorded below zero temperatures. This is considerably colder than temperatures recorded on previous DISCOVERER flights and probably resulted from the screening of the earth and solar radiation by the new flame shield. An analog simulation of the conditions demonstrated that the observed satellite behavior could have been caused by sluggish, sticky operation of the control valves. To prevent a recurrence of this difficulty on subsequent DISCOVERER satellites, control valves will be coated with a heat absorbent material and will be wrapped with thermostatically controlled electric blankets. (S)

3. TECHNICAL PROGRESS

a. Second Stage Vehicles

(1) Production of XLR-81 BA-9 engines at the Bell Aerosystems Company has been practically halted because of a substantial stretch-out in engine delivery requirements by Lockheed Missile and Space Division. (S)

(2) All firings of the XLR-81 Ba-9 rocket engine reliability test program have been completed. Forty tests were conducted at Bell Aerosystems Company, ten of which were restart and thirty were full-duration firings. Twenty-five restart firings were made in an Arnold Engineering Development Center altitude chamber. The tests were satisfactory and demonstrated a major component life far in excess of specification requirements. (S)

[REDACTED]

DISTRIBUTION

Headquarters USAF	20
Headquarters AFSC	5
Strategic Air Command	1
Air Defense Command	13
6555 Test Wing	2
6594 Test Wing	5
Sacramento Air Materiel Area	1
Electronics System Division	1
Aeronautical Chart and Information Center	1
Space Systems Division (AFSC)	17

[REDACTED]

DISCOVERER PROGRAM

1. This report, covering progress during the month of March 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 XXIII Flight

(1) DISCOVERER XXIII was launched from Vandenberg Air Force Base Pad 5, Complex 75-3 at 1121 PST on 8 April. Recovery of the vehicle's capsule was scheduled after four days on orbit. All ascent operation: boost, separation, coast, and orbital boost were accomplished as planned and the DISCOVERER satellite was injected into a near nominal orbit. Table I shows the predicted and attained parameters. The AGENA operation proved the effectiveness of the hydraulic modification resulting from the malfunction recorded on DISCOVERER XXII. (S)

	Programmed	Actual
Apogee, nautical miles	366	351
Perigee, nautical miles	165	162
Eccentricity	0.0274	0.0257
Period, minutes	94.40	94.074

Table I. Comparison of Programmed and Actual Orbital Parameters for DISCOVERER XXIII

(2) Tracking and telemetry data received on the first and second passes showed that the satellite had satisfactorily reoriented to an engine first attitude and was stable. On the next contact with the vehicle (pass seven) abnormalities in horizon scanner operation were noted. This was the eighth and ninth passes. Between pass nine and ten, all control gas was expended and the satellite became unstable. This resulted in intermittent radar lock-on and cyclical fluctuations in signal strength from satellite RF transmissions although ground stations were able to command the satellite and received usable telemetry data. (S)

(3) The decision was made to attempt recovery of the capsule on pass 32 instead of the nominal pass 63. The New Hampshire Station transmitted the command for ejection on the alternate pass (command five) but the satellite verified receipt of two commands (five and six). Command six causes the orbital timer to skip a subcycle. As a result, the capsule was ejected on pass 31. The capsule retro-sequence operated satisfactorily, but since the satellite was not in the proper attitude at separation, the capsule was ejected into a new orbit. The capsule's

WDLPR-4-288

[REDACTED]

b. Geophysical Research Directorate (GRD) Experiments

(1) The first of the new modules to be used for carrying Geophysical Research Directorate instruments for measuring the space environment is at Vandenberg Air Force Base awaiting launch on DISCOVERER XXIV. This module includes a cosmic ray monitor, micro-meteorite detector, two atmospheric density gages and associated electronics. The equipment is powered by the satellite vehicle power supply and data is transmitted by the vehicle's telemetry system. (c)

(2) This is the first of several modules scheduled for flight on DISCOVERER satellites in a program designed to utilize the weight carrying capability available on some flights for space research purposes. The modules replace the engine access door and are designed with universal mounting rails upon which a variety of instruments can be mounted. Nearly all units and wiring are mounted on the modules so that installation and removal can be accomplished with minimum interference to prelaunch operation. (c)

c. Facilities

(1) Conversion of Vandenberg Air Force Base Complex 75-1 is proceeding according to the recently revised activation schedule. All facility-type modifications have been completed. Leak checks, single propellant flow tests, and simultaneous liquid oxygen and fuel flow checks have been successfully accomplished. The pad should be activated in time to permit the launch of DISCOVERER XXIV in late May. This pad has been converted from a THOR IREM facility to a DM-21/AGENA facility. The equipment being installed is of an improved design which will permit faster, more reliable launch operations. (c)

(2) Modernization of DISCOVERER launch pads 4 and 5 of Complex 75-3, including installation of new propellant transfer sets and updated launch control system equipment, has been started. No launches are scheduled from these pads until June. (c)

(4) Additional accelerometers installed on DISCOVERER XXIII isolated the particular point on the vehicle where maximum oscillations occur. The magnitude on this flight, however, was less than experienced on previous MB-3 Block 2 flights. (S)

[REDACTED]

MIDAS PROGRAM

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

2. PROGRAM ADMINISTRATION

On 24 April, representatives from the Space Systems Division (SSD) briefed the Air Force Systems Command on the MIDAS R&D Development Plan, dated 31 March. The plan received Command approval and the following day a briefing on its background, content, and objectives was presented to members of the Department of Defense and to the Defense Panel of the Weapons Board, Hq USAF. Authority has been given to SSD to proceed against the plan pending final detailed approval by the Air Force Ballistic Missiles and Space Committee. (U)

3. TECHNICAL PROGRESS

a. Boosters

ATLAS 97D is installed on Pt. Arguella Pad No. 2 and is being used to complete stand and Automatic Programmed Checkout Equipment (APCHE) validation checks. The booster is also being prepared for final validation for flight which begins on the AGENA on stand date. Booster progress is satisfactory to support the launch schedule of MIDAS III. (U)

b. Second Stage Vehicle

(1) MIDAS II, launched from the Atlantic Missile Range on 24 May 1960, was tracked by the Hawaiian Tracking Station on pass 5054, 20 April 1961, and pass 5070, 21 April, for a total of 21 minutes and 43 seconds of auto-track with a TIM-18 antenna. The SAPUT (Solar Auxiliary Power Unit Telemeter) was still operating normally with a signal strength of four microvolts. (U)

(2) The AGENA vehicle for MIDAS III is at Vandenberg Air Force Base undergoing prelaunch operations in the Missile Assembly Building. System testing, which was delayed because the vehicle could not satisfy the requirements for low data-link noise, was resumed on 27 April and should be completed early in May. During the delay, the vehicle was removed from Complex 2A while validation checks were completed on the guidance system. The vehicle is scheduled to be delivered to the launch pad in mid-May with the launch scheduled for early June. The launch delay of over two months since the first of the year has been caused by vehicle subsystem checkout problems. Delays in construction and installation and checkout of ground station equipment have also



caused slippages. ~~(S)~~

(3) The AGENA vehicle for MIDAS IV is nearing completion in the systems test at Lockheed Missiles and Space Division, Sunnyvale. Technical problems delayed completion of the final integrated systems check. This vehicle is scheduled for shipment to Santa Cruz Test Base in early May for vehicle flushing and then to Vandenberg Air Force Base for a scheduled mid-July launch. This launch could be delayed because of conflict with SAMOS vehicle 2120 in Complex 2A in the Vandenberg Air Force Base missile assembly building. ~~(S)~~

c. Infrared Scanners

(1) The payload for MIDAS III is now at Vandenberg Air Force Base undergoing final testing prior to mating to the vehicle. The payload for MIDAS IV is also at Vandenberg and will be checked for use in the field tests to prove compatibility between the payload and the ground presentation units prior to being tested and maintained as a spare for MIDAS III. ~~(C)~~

(2) The design and development of an infrared detection payload as a backup to the Series IV payload design has been awarded to Baird-Atomic, Inc. The basic Series IV payload is being developed by the Aerojet-General Corporation. ~~(C)~~

(3) A contract was awarded to Infrared Industries, Waltham, Massachusetts, for the development and product engineering of lead-sulfide detectors for the MIDAS Program. (U)

d. Background Radiometer Flights

A series of high-altitude U-2 flights were completed from Eielson Air Force Base, Alaska, to obtain terrestrial radiation and horizon measurements under Arctic conditions. Similar flights to gather data under tropical conditions are underway at Patrick Air Force Base, Florida. The first of the background radiometer flights, which were conducted from Edwards Air Force Base, were completed in March. ~~(C)~~

e. System Development

A system design emphasizing data processing for the MIDAS operational system is being prepared for the Space Systems Division by the MIT Lincoln Laboratory. During a coordination trip of 20-21 April, Lockheed representatives briefed Lincoln Laboratory personnel on: launch considerations, recent results of orbital radiometric measurements, and a simplified MIDAS system configuration. Simplification is being investigated to facilitate manufacture, operations and launch. A proposal is being prepared on this system. Analyses and descriptions of the Series III MIDAS system are also being prepared for inclusion in an

[REDACTED]

engineering analyses report which will be published shortly. (U)

f. Aerospace Ground Equipment

(1) Installation and checkout of Aerospace ground equipment in launch complex and tracking facilities, which will support the MIDAS III flight is scheduled for completion late in May. By mid-May the computer program at the Vandenberg Tracking Station will be fully operational and technical integration of the PICE at the New Hampshire Station will be complete. ~~(c)~~

(2) Space Systems Division has submitted the MIDAS AGE requirements for Pt. Arguello Launch Complex No. 2 to IMSD. These requirements covered the aspects of the MIDAS Program requisite to accomplishment of the Category II (AFR 80-14) Systems Test. The contractor was requested to report immediately whether this would have a significant effect on either the costs or schedules previously planned for the complex. ~~(c)~~

(3) The T-29 fly-by aircraft which is supporting the New Hampshire Tracking Station activation has had the equipment installed and is supporting the checkout. The T-29 aircraft from Edwards Air Force Base had been supporting the New Hampshire activity until the second T-29 arrived at Hanscom Air Force Base. (U)

g. Facilities

(1) Plans and specifications for the Vandenberg Air Force Base technical support facilities will be forwarded to the construction agency on or about 11 May. A construction directive for the headquarters building for the 6565th Test Wing has been issued to the construction agency with beneficial occupancy scheduled for late in July. (U)

(2) A preliminary review (in progress) of the New Hampshire MIDAS technical support building plans was conducted on 18 April. The architect-engineer was authorized to proceed with the final design. (U)

(3) Preliminary concept plans of the Ottumwa Tracking and Control Center were reviewed on 27 April and comments furnished the architect-engineer. In-progress preliminary design plans are scheduled for review on 5 June. (U)

[REDACTED]

HEADQUARTERS  
SPACE SYSTEMS DIVISION (AFSC)  
UNITED STATES AIR FORCE  
Air Force Unit Post Office  
Los Angeles 45, California

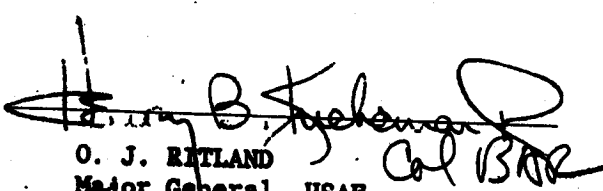
WDLPR-4

12 April 1961

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

FOREWORD

Attached are the reports covering progress during the month of March 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.

  
O. J. RUTLAND  
Major General, USAF  
Commander

2 Atchs

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

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

WDLPR-4-283

[REDACTED]

DISTRIBUTION

Headquarters USAF	21
Headquarters AFSC	5
Strategic Air Command	1
Air Defense Command	13
6555 Test Wing	2
6594 Test Wing	5
Sacramento Air Materiel Area	1
AF Command and Control Development Division	1
Aeronautical Chart and Information Center	1
Space Systems Division (AFSC)	13

[REDACTED]

## DISCOVERER PROGRAM

1. This report, covering progress during the month of March 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 XXII Flight

(1) DISCOVERER XXII was launched from Vandenberg Air Force Base Pad 4, Complex 75-3, at 12:34 PST on 30 March. Recovery of the vehicle's capsule was scheduled after four days on orbit. Booster operational was nominal. The 20 cycles per second longitudinal oscillation appeared as on previous flights but on a slightly lower level. AGENA ignition occurred as planned; however, approximately 20 seconds prior to engine shut down a rapid drop in hydraulic pressure caused a loss of engine control. This resulted in a total velocity less than that required to attempt orbit. Investigation into the cause of the hydraulic failure is proceeding rapidly so that corrective action can be taken prior to the scheduled launch of DISCOVERER XXIII.

(2) The Bell Telephone Laboratory (BTL) guidance system was used to guide the DM-21 booster for the first time. This system also commands AGENA ignition, vehicle correction and operations. Preliminary results indicate that the BTL guidance performance was excellent.

(3) The recovery capsule contained a Biopack and a Geophysical Research Directorate emulsion block for further studies into effects of space radiation on biomedical experiments. These were similar to the Biopack and emulsion blocks carried on several previous DISCOVERER flights.

(4) Several important modifications were made on this satellite. Instrumentation was added to the interim programmer to permit tracking stations to better determine the conditions of the programmer before sending commands. This was done to preclude a recurrence of the malfunction that resulted in the failure to eject the capsule on DISCOVERER XX.

(5) A different model single phase, 400-cycle power amplifier was installed in DISCOVERER XXII to increase the reliability of this satellite guidance system power supply. The loss of satellite stability on DISCOVERER XXI was attributed to a failure of the previous amplifier.

WDLPR-4-283

**SECRET**

b. Future Flights

(1) DISCOVERER XXIII is scheduled for launch on 8 April from Vandenberg Air Force Base. This satellite is almost identical to DISCOVERER XXII but is programmed for slightly different orbit. The injection altitude will be 190 statute miles which is 40 miles higher than DISCOVERER XXII. A dosimeter capable of measuring total dosimeter radiation (5 millirad to 600 rad range) will be included in the payload.

(2) DISCOVERER XXIII, XXIV, and XXV will be instrumented to provide data on the 20 cycle per second longitudinal oscillation. This oscillation has been apparent immediately prior to booster burnout on several recent DISCOVERER flights. Data indicate that the oscillations are induced by the MB-3 rocket engine and the reduction or elimination of the oscillator is being pursued by an analysis and test program conducted by Rocketdyne, Douglas Aircraft and Lockheed Missile and Space Division. Instrumentation added to these vehicles will provide data indicating the distribution of loads imposed by the oscillation. This data could serve as a basis for strengthening the spacecraft in areas where the loads approach the design limits.

3. TECHNICAL PROGRESS

a. Second Stage Vehicle

(1) The Engine Reliability Test Program is nearing completion at the Bell Aerosystems test facilities. Thirty-seven of the 40 firings scheduled have been completed. These tests are now scheduled for completion in mid-April.

(2) Seventeen of the 25 Arnold Engineering Development Center reliability test firings have been completed.

b. Space Research Program

(1) Programs utilizing the increased DISCOVERER weight carrying capability for scientific experiments in the space environment are being greatly expanded. The success of earlier experiments (flashing lights, Biopacks and Geophysical Research Directorate equipment) indicates a major contribution to scientific knowledge can be made by carrying this type of equipment. About half of the remaining DISCOVERER satellites to be flown will each be capable of carrying approximately 100 pounds of scientific instruments and recorders.

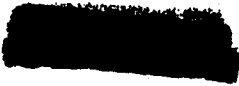
[REDACTED]

(2) To facilitate the installation of this equipment, a new access door to the engine compartment has been designed and fabricated. The new door is designed with universal type mounting rails on the under side for mounting components. The Geophysical Research Directorate module is pre-wired to permit installation in the satellite with a minimum delay of prelaunch operations. Starting in June, each satellite will have the capability of carrying such modules.

c. Geophysical Research Directorate (GRD) Experiments

The Geophysical Research Directorate is furnishing equipment for a number of DISCOVERER flights aimed primarily at determining environment in space:

- (1) Atmospheric Density: This will include measurements of atmospheric density and determination of the existence of atmospheric waves at altitudes of 100 to 400 miles as a function of latitude, time of day and season. Calculations based on these data will be valuable in determining vehicle drag and lifetime.
- (2) Cosmic Radiation: These measurements will be made to assess the radiation hazard to components above 130 miles, in the Van Allen and Auroral regions.
- (3) Thermal Radiation: Infrared radiation from the earth and atmosphere, scattered solar radiation will be measured to obtain data for calculating proper vehicle equilibrium temperatures.
- (4) Micrometeorites: Rates of penetration of vehicle skin, mass, density and energy of micrometeorites, and skin erosion will be measured to obtain data on thermodynamic effects.
- (5) Solar Ultra Violet Radiation: Solar radiation in the ultra violet and X-ray regions will be measured to determine aging effects on plastic and organic materials.
- (6) Atmospheric Composition: Data on the kinds and states of atmospheric particles, since organic and plastic materials show aging, corroding or chemical effects when exposed to free radicals such as atomic oxygen. Data on ion concentrations are needed.
- (7) Magnetic Field: Results from more complete studies of the earth's magnetic field are of interest for possible use in attitude stabilization systems. Magnitude and direction at various altitudes will be determined. Long term variations will also be determined.

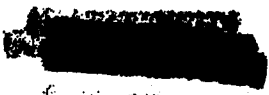


d. Facilities

(1) Pad 1 of Complex 75-1 is currently being modified and will be activated in time to support late May DISCOVERER launch. This pad is being converted from ~~TRW IGM~~ to a DISCOVERER launch facility. Modifications required include extending the missile shelter to accommodate the DM-21/AGENA combination, adding the DISCOVERER fuel transfer, ground support and launch control systems ~~because of this~~ deficiencies in delivering the launch control system equipment. activation of the pad is approximately thirty days ~~before the~~ schedule.

(2) Rework of Complex 75-3 Pad 4 ~~will begin~~ ~~immediately~~ after the launch of DISCOVERER XXII. A new propellant transfer system and launch control system equipment are required as part of this modification. This pad is scheduled to support an early June DISCOVERER launch. A similar rework of Pad 5 will begin after the launch of DISCOVERER XXIII on 8 April. This pad will be available to support a mid-June launch.

(2) Rework of Complex 75-3 Pad 4 ~~will begin~~ ~~immediately~~ after the launch of DISCOVERER XXII. A new propellant transfer system and launch control system equipment are required as part of this modification. This pad is scheduled to support an early June DISCOVERER launch. A similar rework of Pad 5 will begin after the launch of DISCOVERER XXIII on 8 April. This pad will be available to support a mid-June launch.





[REDACTED]

## MIDAS PROGRAM

1. This report, covering progress during the month of March 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. During the past month the MIDAS Program has undergone several major changes in program concept and management. The technical activity relative to the launch preparation for Series II has also increased.

b. Program adjustments resulting from the guidance received from the Air Force Ballistic Missile and Space Committee have been resolved with the major contractors and local governmental agencies. Coordination of the adjusted program plan is currently being accomplished with the range facility, Pacific Missile Range. This plan, dated 31 March, will be printed early in April. It reflects the increased scope and program acceleration approved by the Air Force Ballistic Missile and Space Committee, adjusted to the funding guidance received. The launch scheduled in this issue does not reflect the augmented launch program but has been time adjusted for compatibility with the 31 March plan.

c. Concurrently with the preparation of the development plan, a vigorous program to document a "system package program" in response to the 375 series of Air Force regulations has been under way. Initial documentation and formulation of management organization and concepts are in progress. Analysis of these initial efforts reveal that there remains a considerable amount of data to be generated and inter and intra-command coordination to be accomplished. The internal organization and management realignment resulting from the new structure of the Air Force Systems Command and the Air Force Logistics Command has had considerable impact on this effort. Results of this command structure and functional realignment will be incorporated into the documentation as they are identified and finalized.

### 3. FLIGHT TEST STATUS

#### a. Radiometric Measurement Flight (RM-2)

(1) Analysis of data from the second radiometric flight conducted in February has provided valuable information despite vehicle tumbling and frequent signal loss. Limited data were obtained on all 2.7 and 4.3 micron channels and are in substantial agreement with the data received on the December radiometer flight. All payload, telemetry and reference channels performed satisfactorily.

[REDACTED]

(2) Signal dropout was more severe than during the RM-1 flight and the satellite tumbling seriously limited the amount of usable data received. However, during the second pass the Kaena Point, Hawaii, station received particularly good data in the 4.3 micron range. This data was of better quality than that obtained on the RM-1 flight. At this time the vehicle was stable and pitched downward at approximately 15 degrees. Data obtained

[REDACTED] On the 13th the satellite, the New Hampshire station acquired some valuable data. A final report on these data and an analysis of them will be published in late April. The final report on the RM-1 data analysis will also be published at that time.

#### 4. TECHNICAL PROGRESS

##### a. Boosters

On 9 March, ATLAS booster 97D (MIDAS III) successfully completed a flight readiness firing at the Point Arguello launch complex.

##### b. Second Stage Vehicle

(1) On 1 March, the AGENA vehicle for MIDAS III was successfully hot-fired on the Santa Cruz Test Base. On 21 March, the vehicle was shipped to Vandenberg Air Force Base. The vehicle is presently in the missile assembly building undergoing a preliminary checkout in preparation for the 19 May launch.

(2) The hot firing at Santa Cruz included a complete simulation of the AGENA boost and orbiting operation. The vehicle in the stand, with the payload installed, was subjected to simulated AGENA vibration followed by the program coast phase and then first burn of the engine cutoff, and second coast phase with simulated orbital timing. This was followed by second burn, cutoff and a simulated 2,000 nautical mile orbit. The payload was operated during the simulated orbit and the scanner was rotated throughout its entire travel. Checkout of the payload was accomplished through the regular command and data links. Performance was satisfactory throughout.

(3) During the hot firing tests at Santa Cruz several problems developed. A pressure transducer on the engine acid liner ruptured spraying acid into the aft equipment rack. The damage to the wire and equipment was repaired and system verification was accomplished. A guidance problem involving operation of the horizon sensor during periods of intense vibration was encountered during the tests. The guidance problem was solved and satisfactory performance by all systems was achieved.

[REDACTED]

(4) The AGENA vehicle for MIDAS IV is currently in the systems test phase. No problems are apparent at this time. The AGENA is scheduled for delivery to Santa Cruz Test Base on 28 April for flushing only. A mid-July launch date is forecast.

c. Infrared Scanners

(1) The Baird-Atomic, Inc. infrared detection payload for MIDAS IV has been shipped to Lockheed Missiles and Space Division (LMSD). This payload will be used in the payload-ground station compatibility tests to be conducted at Vandenberg Air Force Base in preparation for the MIDAS III flight.

(2) The Baird-Atomic, Inc. payload for MIDAS V (Series II configuration) is scheduled for delivery on 2 May.

d. Background Radiometer Flights

A series of U-2 airplane high altitude measurement flights conducted from Edwards Air Force Base has been successfully completed. Terrestrial infrared radiation and horizon measurements were taken. The U-2 aircraft will presently be transferred to Alaska where a similar series of flights will be conducted to obtain measurements under Arctic conditions. A third series, designed to gather data under tropical conditions, will be conducted from Patrick Air Force Base, Florida.

e. Payload-Ground Systems Compatibility Tests

Compatibility tests of the Baird-Atomic payload and the newly installed ground station equipment at Vandenberg Air Force Base will be conducted in April. For these tests an actual payload will be installed in the range safety station six miles from the ground readout installation.

f. Cathode Ray Tube Studies

Investigations conducted by Lincoln Laboratories on TV-type image tubes have evolved a design for a potential application to MIDAS. Exploration of the design will be made in order to determine the operating hardware potential for advanced MIDAS concepts.

g. Data Flow Analysis Subcontract Signed

Negotiations with International Business Machines (IBM) were completed for analysis of anticipated data flow in the MIDAS Operational Center (MOC) and the Tracking and Control Center (TCC). Work on this subcontract will begin soon.

[REDACTED]

h. Facilities

(1) All launch complex facilities required to support MIDAS III will be ready for this flight. The Vandenberg Air Force Base missile assembly building was completed on 29 March. The launch site, Point Arguello Pad 2, is scheduled for completion on 7 April.

(2) Orbital tracking, telemetry, and control station installations are scheduled for completion by 7 May, with the exception of the Southeast Africa station (Atlantic Missile Range station 13). This station will be ready on 17 May and will record ACENA second-burn data.

(3) LMSD has initiated design of facilities modification for the North Pacific readout station. These changes were caused by the revised equipment configuration.

[REDACTED]

(5) Preliminary concept plans for the New Boston, New Hampshire MIDAS technical support buildings have been approved and the design effort was started on 20 March. The criteria review conference on the design of the Ottumwa, Iowa, tracking and control center was held on 15 March. Comments were forwarded to the architect-engineers for incorporation into the design plans.