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MONTHLY SUMMARY OF

# SPACE

## Systems Div

# ACTIVITIES



SSLPR-59

## *a foreword to...*

# SPACE

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

SSLPR

20 October 1961

# Monthly Summary of SPACE SYSTEMS DIVISION ACTIVITIES

## SEPTEMBER 1961

## FOREWORD

The SNAPSHOT Program is included for the first time in this month's report. This program will provide on-orbit testing of the SNAP 10A and SNAP 2 nuclear auxiliary power systems (reactors which will provide electrical power). During the month, the capsule for DISCOVERER XXX was recovered after two days orbit by one of the C-130 aircraft of the Aerial Recovery Force. This was the fifth capsule to be recovered during descent, three others have been retrieved from the ocean. Photographic coverage of the booster and glider at the DYNA SOAR 620A Mock-up held at Boeing, Seattle, during September, is included. MERCURY MA-4 was successfully placed in orbit on 13 September. Booster and capsule performance were nominal throughout the flight. Although capsule impact occurred approximately 70 n.m. west of the planned area, recovery was effected. The mission is considered extremely successful. As a result of the data obtained from the first RANGER flight, several changes have been made in procedures and to the AGENA vehicle. The next launch is scheduled late in October.

for Lt Gen USAF

O. J. RITLAND
Major General, USAF
Commander

# SATELLITE
## SYSTEMS

DISCOVERER
MIDAS
BIOASTRONAUTICS
BLUE SCOUT
SAINT
VELA HOTEL

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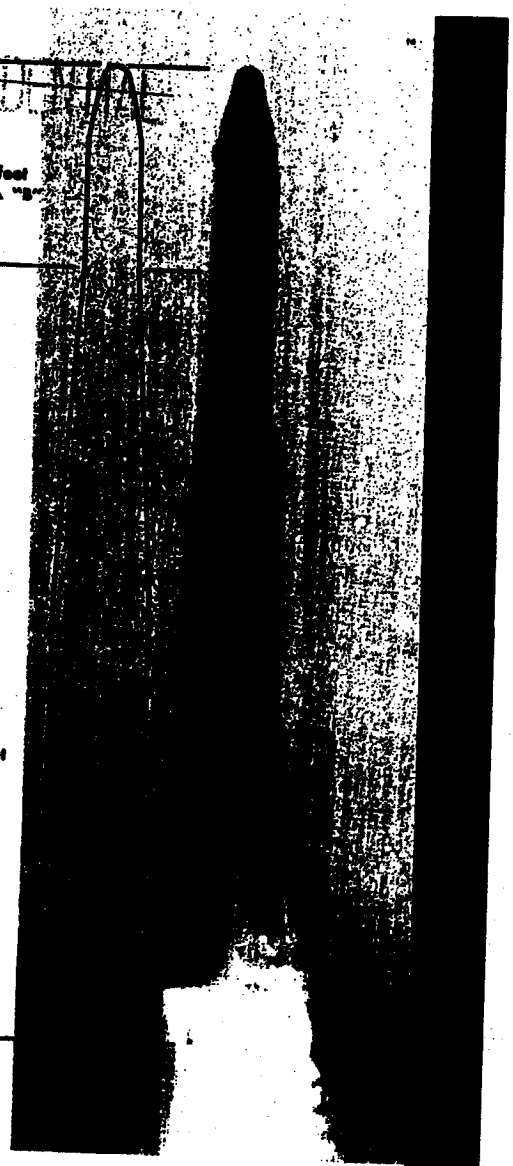
THOR

# Discoverer




The DISCOVERER Program consists of the design, development and flight testing of two-stage vehicles, using the Douglas DM-21 Space Booster as the first stage booster and the AGENA as the second stage, satellite vehicle. The program was established early in 1958 under direction of the Advanced Research Projects Agency, with technical management assigned to AFBMD. On 14 November 1959, program responsibility was transferred from ARPA to the Air Force by the Secretary of Defense. Prime contractor for the program is Lockheed Missile and Space Division. The DISCOVERER Program will perform space research in support of advanced satellite programs.

## PROGRAM OBJECTIVES

(a) Flight test of the satellite vehicle airframe, propulsion, guidance and control systems, auxiliary power supply, and telemetry, tracking and command equipment.

(b) Attaining satellite stabilization in orbit.

(c) Obtaining satellite internal thermal environment data.

(d) Testing of techniques for recovery of a capsule ejected from the orbiting satellite.

(e) Testing of ground support equipment and development of personnel proficiency.

(f) Conducting bio-medical experiments, including injection into orbit, re-entry and recovery.

## PROGRAM SUMMARY

Early launches confirmed vehicle flight and satellite orbit capabilities, developed system reliability, and established ground support, tracking and data acquisition requirements. DISCOVERER vehicles are launched from Vandenberg Air Force Base, with orbital operational control exercised by the Satellite Test Center, Sunnyvale, California, and recovery operational control by the 6594th Recovery Control Group, Hickam AFB, Hawaii.

Tracking and command functions are performed by the stations listed in the Table on Page A-4. A history of DISCOVERER flights to date is given on Pages A-5 and A-6.

| SECOND STAGE | AGENA "B" |
|---|---|
| Weight— | |
| Orbital | 2,261 |
| Impulse propellants | 12,950 |
| Other | 511 |
| TOTAL WEIGHT | 15,722 |
| Engine Model | XLR81-Ba-9 |
| Thrust-lbs., vac. | 16,000 |
| Spec. Imp.-sec., vac. | 290 |
| Burn time-sec. | 240 |
| BOOSTER | DM-21 |
| Weight—Dry | 6,500 |
| Fuel | 33,700 |
| Oxidizer (LOX) | 68,200 |
| GROSS WEIGHT (lbs.) | 108,400 |
| Engine | MB-3 Block 2 |
| Thrust, lbs. (S.L.) | 169,000 |
| Spec. Imp., sec. (S.L.) | 248.3 |
| Burn Time, sec. | 148 |

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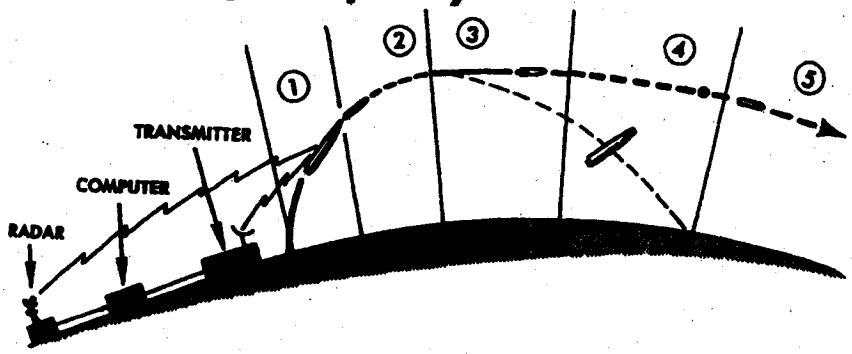
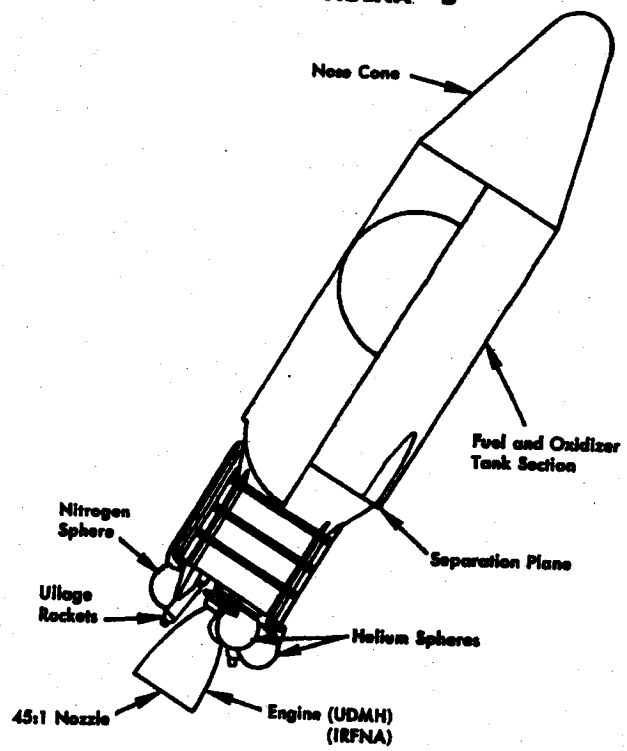
## Powered Flight Trajectory



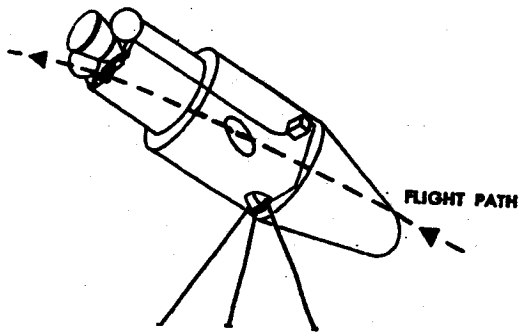

1. **First Stage Powered Flight** — 2.5 minutes duration, 78 n.m. downrange, guided by BTL guidance.
2. **Coast Period** — 2.4 minutes duration, to 380 n.m. downrange, attitude controlled by inertial reference package, horizon scanner, gas reaction jets. Receives AGENA time to fire and velocity to be gained commands thru the BTL system.
3. **Second Stage Powered Flight** — Approximately four minutes or until injection velocity is attained. Pitch and yaw stabilization achieved by gimballing the engine and roll by gas reaction jets. Engine shutdown achieved by integrator accelerometer cutoff command.
4. **Vehicle Reorients to Nose Aft** — 2 minutes duration. Guided and attitude controlled by inertial reference package, horizon scanner and gas reaction jets.
5. **In Orbit** — Controlled (same as 4).

Telemetry ships are positioned as required by the specific mission of each flight. Illustrations on the opposite page show a typical launch trajectory from Vandenberg Air Force Base and a typical orbit. An additional objective of this program is the development of a controlled re-entry and recovery capability for the payload capsule. The recovery operation is also shown on the opposite page. An impact area has been established near the Hawaiian Islands and a recovery force activated. Techniques have been developed for aerial recovery by C-119 and JC-130 aircraft and for sea recovery by Air Force pararescue men and Navy surface vessels. The recovery phase of the program has provided advances in re-entry technology. This information will be used in support of more advanced projects.

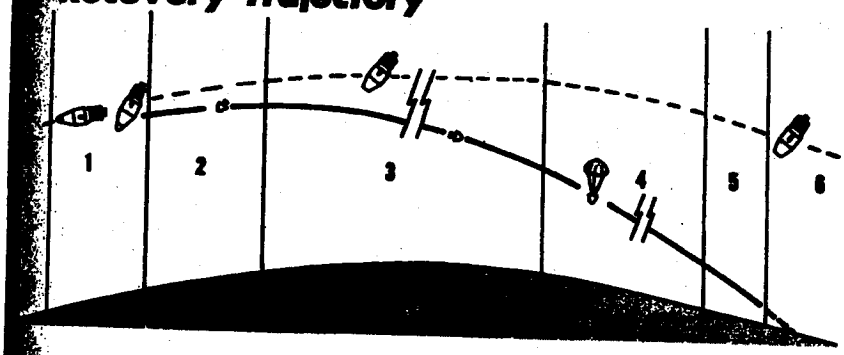
### AGENA "B"



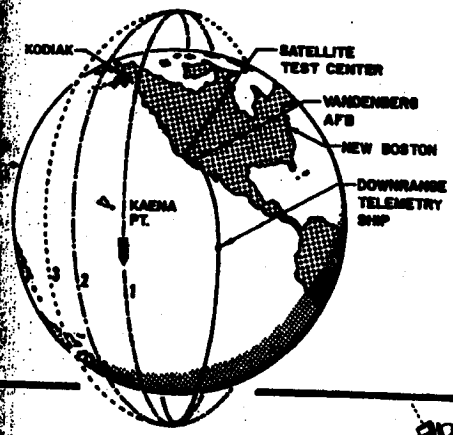

### DISCOVERER/AGENA



## Recovery Trajectory

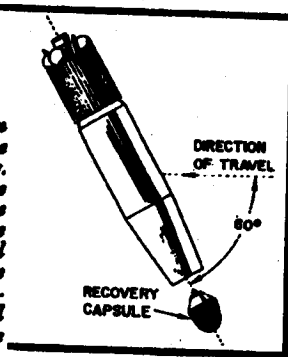



1. **Vehicle Reorients to Separation Attitude**—83.5 seconds duration, 2,000 nautical miles north of impact point. Pitch reorientation starts and vehicle assumes separation attitude.
2. **Capsule Separation**—18 seconds duration, capsule separates, spin gas jets fire, retro rocket fires and de-spin gas jets fire. Retro rocket and thrust cone separate from re-entry capsule.
3. **Re-entry**—8 minutes duration, recovery capsule re-enters the earth's atmosphere. Parachute cover is ejected and ablation shell separated from capsule.
4. **Descent to Recovery Altitude**—18 minutes duration. Reefed parachute is deployed and chaff (to aid in radar tracking) is ejected. Capsule descends from 55,000 feet to 14,000 feet.
5. **Air Recovery**—6 minutes duration, capsule descends from 14,000 feet to 1,500 feet during which time air recovery is attempted.
6. **Sea Recovery**—Capsule impacts in the sea, surface forces attempt recovery.




## Orbital Trajectory

*Schematic presentation of orbital trajectory following launch from Vandenberg Air Force Base. Functions performed by each station and a listing of equipment used by each station, is given on page A-4.*

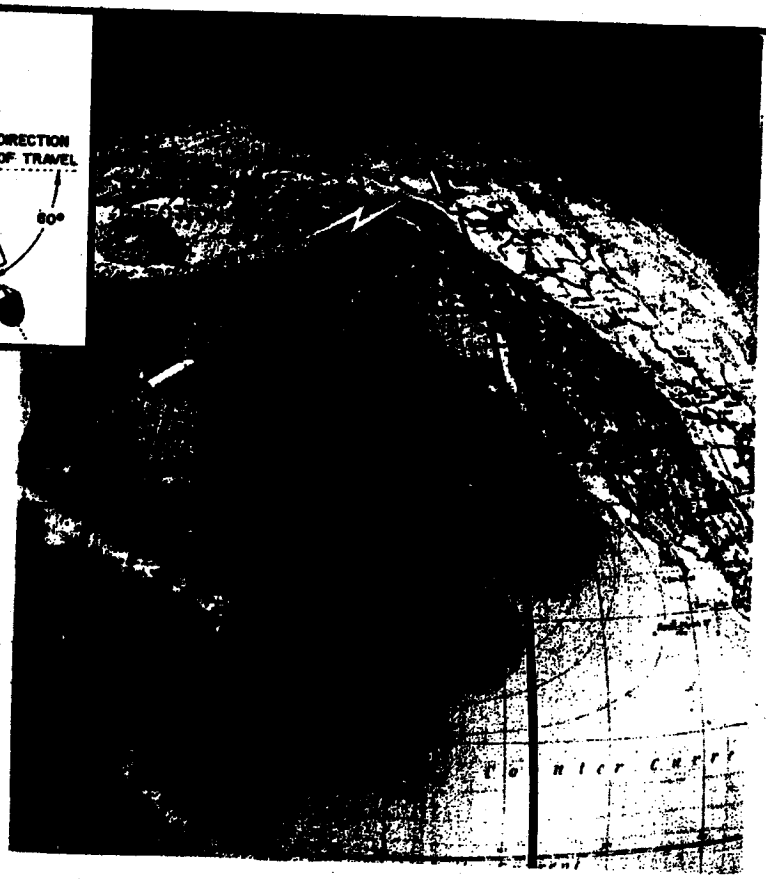



### RECOVERY CAPABILITY

*This objective was added to the program after the first launch achieved vehicle flight and orbit objectives successfully. It includes the orientation of the satellite vehicle to permit a recoverable capsule to be ejected from the nose section of the AGENA vehicle. Ejection is programmed to occur on a selected orbit, for capsule impact within the predetermined recovery area near Hawaii. Aircraft and surface vessels are deployed within the area as a recovery force.*

### CAPSULE RECOVERY SEQUENCE

- *The desired orbit for capsule ejection is selected after the vehicle is on orbit based on satellite performance, longitudinal location of the orbits, recovery force status, and weather in the potential recovery area. A command is sent to the vehicle prior to the selected recovery pass which initiates the recovery sequence. This command may be sent from any of the primary tracking stations listed on page A-4.*
- *The ejection sequence includes a pitch down maneuver, capsule separation, spin-up, retro-rocket firing, de-spin and reentry. Following parachute deployment the aerial recovery force converges on the descending capsule and snags the parachute. The capsule contains a radio beacon and reflective chaff which is dispersed to aid in tracking.*
- *The recovery force consists of C-119, RC-121, C-130, WVII and JC-54 aircraft supplemented by 2 or 3 surface recovery vessels. A USAF Air Rescue Service para-rescue team aboard a JC-54 aircraft in the recovery area can be deployed to retrieve the capsule in the event of water impact. The team and the capsule are then picked up by surface vessel.*



# GROUND SUPPORT FACILITIES

| Facility | Equipment* | Flight Function |
|---|---|---|
| Satellite Test Center | ABCD | Orbital control, orbit computations and predictions, acquisition data for tracking stations, prediction of recovery area. |
| †Vandenberg AFB Tracking Station | BDEFGHI | Ascent and orbital tracking, telemetry reception, trajectory measurements, command transmission. |
| Downrange Telemetry Ship | BFHI | Telemetry reception and tracking during ascent and orbit injection. |
| †New Hampshire Tracking Station | BDEFGHI | Orbit tracking, telemetry reception, commands to satellite. |
| †Kodiak Tracking Station | BDEFGHI | Orbit tracking, telemetry reception, initial acquisition on pass 1, monitor events in recovery sequence. |
| †Hawaiian Tracking Station | BDEFGHI | Orbit tracking, telemetry reception and transmission of commands to satellite. |
| Hickam AFB Oahu, Hawaii | D | Over-all direction of capsule recovery operations. |
| Tern Island | BFGI | Recovery capsule tracking. |

†Primary Tracking Stations (have command capability)

*Equipment

A. General Purpose Computer(s) and Support Equipment
B. Data Conversion Equipment
C. Master Timing Equipment
D. Control and Display Equipment
E. VERLORT
F. VHF FM/FM Telemetry Station
G. VHF Direction Finding Equipment
H. Doppler Equipment
I. VHF Telemetry Antenna

NOTE: In addition to equipment listed, all stations have inter- and intra-station communications equipment and checkout equipment.

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## Flight History

| DISCOVERER No. | DM-21 No. | AGENA No. | Flight Date | Remarks |
|---|---|---|---|---|
| | | | | **DISCOVERER FLIGHTS 0 THRU XX ARE ON PAGE A-6** |
| XXI | 261 | 1102 | 18 February | *Attained orbit successfully. Non-recoverable, radiometric data gathering. MIDAS support flight.* |
| XXII | 300 | 1105 | 30 March | *Launch, ascent, separation, coast and orbital stage ignition normal. Orbital velocity was not attained because of an AGENA hydraulic malfunction.* |
| XXIII | 307 | 1106 | 8 April | *Attained orbit successfully. Loss of control gas prevented proper positioning of the satellite for capsule re-entry. Capsule was ejected into new orbit on re-entry pass.* |
| XXIV | 302 | 1108 | 8 June | *Failed to attain orbit because of a second stage malfunction.* |
| XXV | 303 | 1107 | 16 June | *Attained orbit successfully. Capsule recovered from the ocean after two days on orbit. All objectives achieved.* |
| XXVI | 308 | 1109 | 7 July | *Attained orbit successfully. Capsule was ejected on the 32nd orbit and aerial recovery was accomplished. All objectives achieved.* |
| XXVII | 322 | 1110 | 21 July | *Failed to attain orbit because of severe booster pitch oscillation.* |
| XXVIII | 309 | 1111 | 3 August | *Failed to attain orbit because of a hydraulic failure in the satellite engine control system.* |
| XXIX | 323 | 1112 | 30 August | *Attained orbit successfully. Capsule recovered from the ocean after two days on orbit. All objectives achieved.* |
| XXX | 310 | 1113 | 12 September | *Attained orbit successfully. Capsule was ejected on the 33rd orbit and aerial recovery was accomplished by a C-130. This was the first C-130 air retrieval. All objectives achieved.* |
| XXXI | 324 | 1114 | 17 September | *Attained orbit successfully. Recovery was not achieved because of an on orbit AGENA electrical power malfunction.* |

## Flight History (continued)

| DISCOVERER No. | DM-21 No. | AGENA No. | Flight Date | Remarks |
|---|---|---|---|---|
| 0 | 160 | 1019 | 21 January 1959 | *AGENA destroyed by malfunction on pad. THOR refurbished for use on flight XII.* |
| I | 163 | 1022 | 28 February | *Attained orbit successfully. Telemetry received for 514 seconds after lift-off.* |
| II | 170 | 1018 | 13 April | *Attained orbit successfully. Recovery capsule ejected on 17th orbit was not recovered. All objectives except recovery successfully achieved.* |
| III | 174 | 1020 | 3 June | *Launch, ascent, separation, coast and orbital boost successful. Failed to achieve orbit because of low performance of satellite engine.* |
| IV | 179 | 1023 | 25 June | *Same as DISCOVERER III.* |
| V | 192 | 1029 | 13 August | *All objectives successfully achieved except capsule recovery after ejection on 17th orbit.* |
| VI | 200 | 1028 | 19 August | *Same as DISCOVERER V.* |
| VII | 206 | 1051 | 7 November | *Attained orbit successfully. Lack of 400-cycle power prevented stabilization on orbit and recovery.* |
| VIII | 212 | 1050 | 20 November | *Attained orbit successfully. Malfunction prevented AGENA engine shutdown at desired orbital velocity. Recovery capsule ejected but not recovered.* |
| IX | 218 | 1052 | 4 February 1960 | *THOR shut down prematurely. Umbilical cord mast did not retract. Quick disconnect failed, causing loss of helium pressure.* |
| X | 223 | 1054 | 19 February | *THOR destroyed at T plus 56 sec. by Range Safety Officer. Severe pitch oscillations caused by booster autopilot malfunction.* |
| XI | 234 | 1055 | 15 April | *Attained orbit successfully. Recovery capsule ejected on 17th orbit was not recovered. All objectives except recovery successfully achieved.* |
| XII | 160 | 1053 | 29 June | *Launch, ascent, separation, coast and orbital stage ignition were successful. Failed to achieve orbit because of AGENA attitude during orbital stage boost.* |
| XIII | 231 | 1057 | 10 August | *Attained orbit successfully. Recovery capsule ejected on 17th orbit. Capsule was recovered after a water impact with negligible damage. All objectives except the airborne recovery were successfully achieved.* |
| XIV | 237 | 1056 | 18 August | *Attained orbit successfully. Recovery capsule ejected on 17th orbit and was successfully recovered by the airborne force. All objectives successfully achieved.* |
| XV | 246 | 1058 | 13 September | *Attained orbit successfully. Ejection and recovery sequence completed. Capsule impact occurred south of the recovery forces; located but lost prior to being retrieved.* |
| XVI | 253 | 1061 | 26 October | *Launch and ascent normal. AGENA failed to separate from booster and failed to attain orbit.* |
| XVII | 297 | 1062 | 12 November | *Attained orbit successfully. Recovery capsule ejected on 31st orbit and aerial recovery was accomplished. All objectives were successfully achieved.* |
| XVIII | 296 | 1103 | 7 December | *Attained orbit successfully. Recovery capsule ejected on 48th orbit and aerial recovery was accomplished. All objectives were successfully achieved.* |
| XIX | 258 | 1101 | 20 December | *Attained orbit successfully. Non-recoverable, radiometric data gathering MIDAS support flight.* |
| XX | 298 | 1104 | 17 February | *Attained orbit successfully. Capsule did not re-enter due to on-orbit malfunction.* |

## Monthly Progress — DISCOVERER

### *Flight Test Progress*

### DISCOVERER XXX

• 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)~~

• 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)

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

• 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 was determined. (U)

### DISCOVERER XXXI

• 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. ~~(C)~~

• 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. ~~(C)~~

• VELA HOTEL instruments were flown on DISCOVERER XXXI. These instruments, mounted on the engines access door module, consisted of scintillator X-ray detectors and solid state spectrometer electron detectors. Useful data were 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)

• In addition to the VELA HOTEL instruments, DISCOVERER XXXI carried cosmic ray monitors and galactic radio frequency detectors provided by the

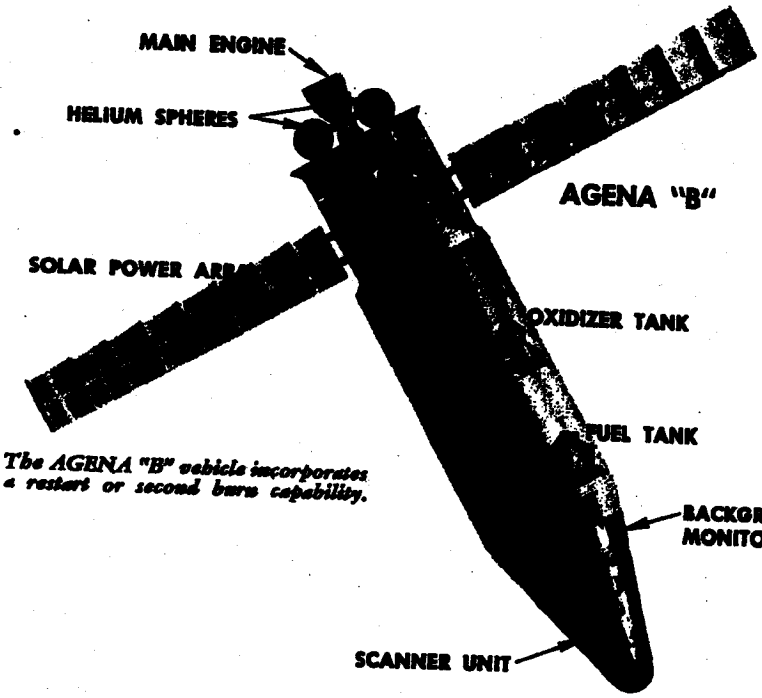
| Event | DISCOVERER XXX | | DISCOVERER XXXI | |
|---|---|---|---|---|
| | Programmed | Actual | Programmed | Actual |
| Apogee, statute miles | 256.9 | 360 | 256.7 | 255.5 |
| Perigee, statute miles | 148.7 | 144 | 149.6 | 150.5 |
| Period, minutes | 91.0 | 92.41 | 91.0 | 90.56 |
| Eccentricity | 0.0130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

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

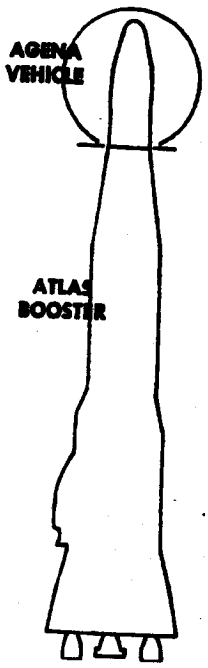
Air Force Geophysical Research Directorate. The cosmic ray monitor is similar to those carried on earlier DISCOVERER flights; the galactic detector is a radio frequency receiver for detecting background noise emanating from celestial galaxies. Both are part of a continuing series of experiments designed 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 are being processed and will be furnished to the Geophysical Research Directorate for analysis. (U)

# MIDAS

| SECOND STAGE | AGENA "B" |
|---|---|
| Weight— | |
| Inert | 1,763 |
| Payload equipment | 1,641 |
| Orbital | 3,404 |
| Impulse Propellants | 12,950 |
| Fuel (UDMH) | |
| Oxidizer (IRFNA) | |
| Other | 758 |
| GROSS WEIGHT (lbs.) | 17,112 |
| Engine | XLR81-Ba-9 |
| Thrust, lbs. (vac.) | 16,000 |
| Spec. Imp., sec. (vac.) | 290 |
| Burn Time, sec. | 240 |
| Restart Provisions | Yes |




*The AGENA "B" vehicle incorporates a restart or second burn capability.*




| BOOSTER—ATLAS ICBM | | |
|---|---|---|
| Weight—Dry | | 15,100 |
| Fuel, RP-1 | | 74,900 |
| Oxidizer (LOX) | | 172,300 |
| GROSS WEIGHT (lbs.) | | 262,300 |
| Engine—MA-2 | | |
| Thrust (lbs. vac.) | Boost | 356,000 |
| | Sustainer | 82,100 |
| Spec. Imp. (sec. vac.) | Boost | 286 |
| | Sustainer | 310 |

## PROGRAM HISTORY

The MIDAS Program was included in Weapon System 117L when WS 117L was transferred to the Advanced Research Projects Agency. ARPA subsequently separated WS 117L into the DISCOVERER, SAMOS and MIDAS Programs, with the MIDAS objectives based on an infrared early warning system. The MIDAS (Missile Defense Alarm System) Program was directed by ARPA Order No. 38, dated 5 November 1958 until transferred to the Air Force on 17 November 1959. The Air Force directed that the program be continued under the technical guidance of the ARPA Order and approved the MIDAS R&D Development plan dated 15 January 1960. This plan was a "minimum essential" program directed toward the satellite vehicle and proof of the feasibility of infrared detection capabilities. It provided for ten test launches, two from the Atlantic Missile Range and eight from the Pacific Missile Range. Subsequent authorization was obtained to utilize two DISCOVERER flights (designated RM-1 and RM-2) to carry background radiometers in support of MIDAS.

A program of complete system development, including the ground environment of MIDAS, has been submitted to the Department of the Air Force and has been approved in principle and objective. Authorization has been received to initiate action implementing the plan with reconsideration for approval to be accomplished subsequent to a successful test launch in 1961.

## TECHNICAL HISTORY

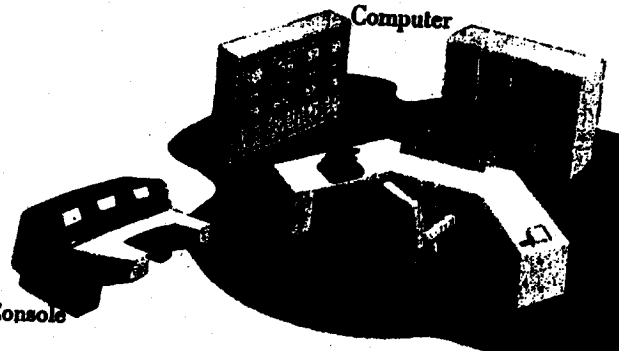
The MIDAS infrared early warning payload is engineered to use a standard launch vehicle configuration. This consists of an ATLAS missile as the first stage and the AGENA vehicle, powered by a Bell Aircraft rocket engine as the second, orbiting stage. The final configuration payload weight will be approximately 1,000 pounds.

The first two R&D flights used the AGENA "A" and ATLAS "D" vehicle programmed to place the payload in a circular 261 nautical mile orbit. Subsequent R&D flights utilize the ATLAS "D"/AGENA "B" configuration programmed to place the payload in a circular 2,000 nautical mile polar orbit.

CONTROL AND DISPLAY FACILITY

Operational Displays

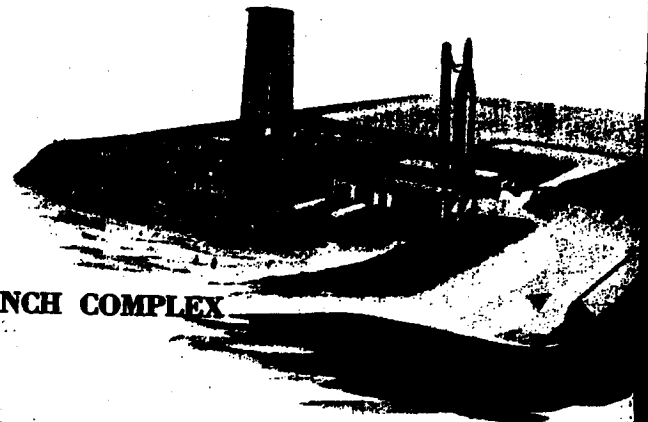
*Orbiting satellites detect infrared radiation emitted by ICBM's in powered flight. Data is telemetered instantaneously to Midas Tracking and Control Center via far north Readout Stations. Decoded data reveal approximately the number of missiles launched and launch location, direction of travel and burning characteristics. This data is displayed in near real time on the control consoles and operational displays at the Control and Display Facility. The Tracking and Control Center monitors and controls the status of the orbital network and the ground environment. The Point Arguello Stands are used to launch the MIDAS R&D satellites into polar orbits.*



Computer

Control Console

TRACKING AND CONTROL C



LAUNCH COMPLEX

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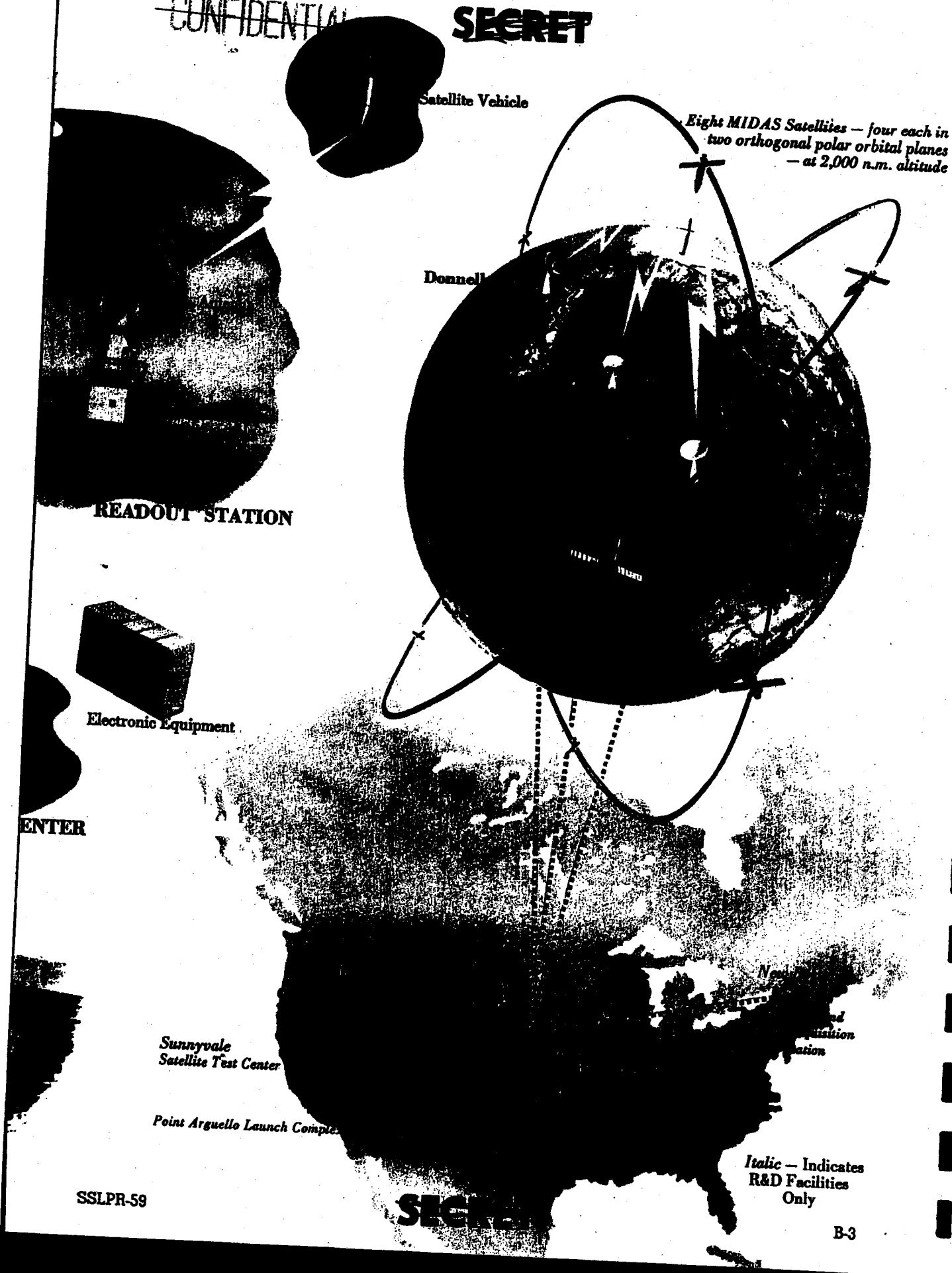




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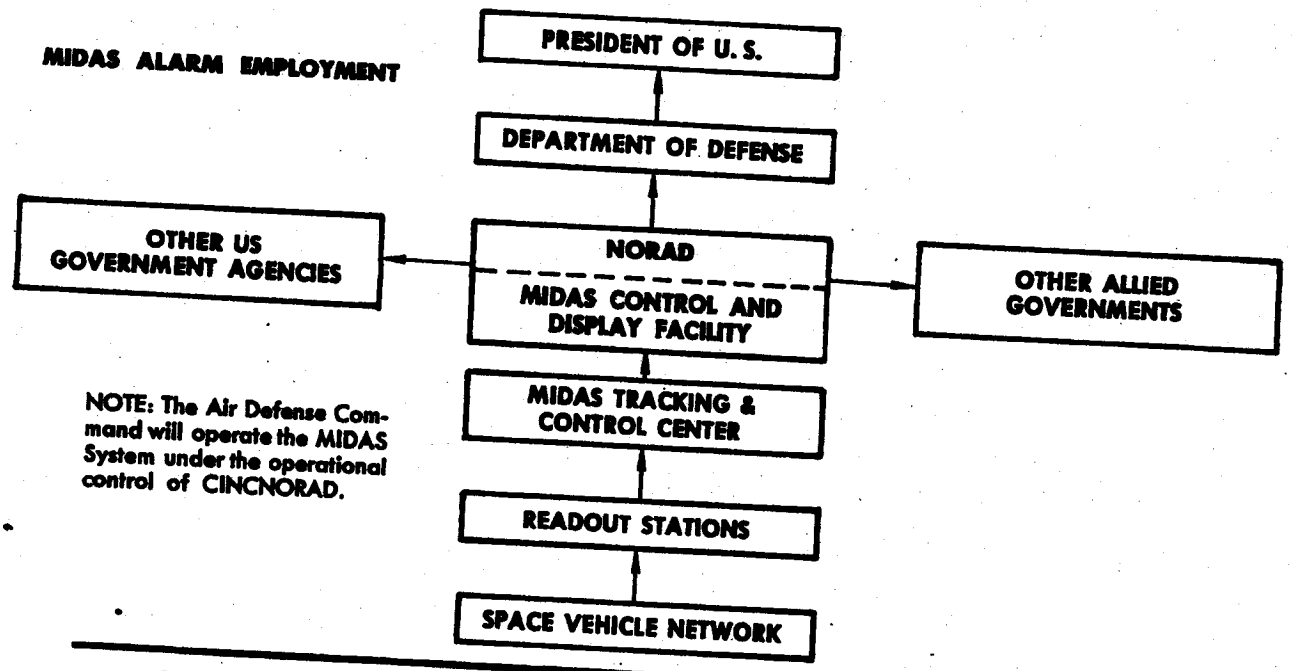
## MIDAS ALARM EMPLOYMENT




NOTE: The Air Defense Command will operate the MIDAS System under the operational control of CINCNORAD.

### CONCEPT

The MIDAS system is designed to provide continuous infrared coverage of the Soviet Union. Surveillance will be conducted by eight satellite vehicles in accurately positioned orbits. The area under surveillance must be in line-of-sight view of the scanning satellite. The system is designed to accomplish instantaneous readout of acquired data by at least one of three strategically located readout stations. The readout stations transmit the data directly to the MIDAS Tracking and Control Center where it is processed. It is then displayed and evaluated in the MIDAS Control and Display Facility. If an attack is determined to be underway, the intelligence is communicated to a central Department of Defense Command Post for relay to the President and national retaliatory and defense agencies.

## Flight History

| MIDAS No. | Launch Date | ATLAS No. | AGENA No. | Remarks |
|---|---|---|---|---|
| I | 26 February | 29D | 1008 | *Did not attain orbit because of a failure during ATLAS/AGENA separation.* |
| II | 24 May | 45D | 1007 | *Highly successful. Performance with respect to programmed orbital parameters was outstanding. Useful infrared data were observed and recorded.* |
| RM-1 | 20 December | DISCOVERER Vehicle | | *Despite satellite oscillations, sufficient data were obtained for evaluation of payload operation. Information obtained in the 2.7- micron region agrees with data obtained from balloon-borne radiometric equipment. Intensities in the 4.3- micron region were somewhat higher than had been anticipated from theoretical studies.* |
| RM-2 | 18 February | DISCOVERER Vehicle | | *All channels functioned properly and valid data were obtained on six stable orbits. Data confirmed previous radiometric measurements.* |
| III | 12 July | 97D | 1201 | *Extremely successful. Second firing of the second stage occurred as programmed. AGENA B vehicle was stabilized in an 1850 nautical mile circular orbit with an eccentricity of 0.0039. Operation of the payload and data link was excellent. Because of an electrical power loss, apparently caused by the failure of one solar array panel to extend, data acquired subsequent to pass five was limited to Van Allen belt radiation information. Inability to properly control power consumption by appropriate and timely vehicle command programming resulted in nearly complete power deterioration within the succeeding several orbits. Van Allen radiation measurements will be obtained during the anticipated 60-90 day battery life of the High Energy Proton Damage Experiment (HEPDEX) package.* |

# MIDAS GROUND SUPPORT FACILITIES

| Facility | Equipment* | Flight Function |
|---|---|---|
| Satellite Test Center | ABCDEP | Operations control, orbit computations and predictions, initiation of commands to satellite (via tracking stations), process payload data. |
| Vandenberg AFB Tracking Station | ABCEFGHIJKLMP | Ascent and orbital tracking; telemetry reception; trajectory computations; command transmission; reception recording and processing of payload data. |
| Downrange Telemetry Ships | GHIJNO | Tracking and data reception during ascent. (Three ships are available for this function. Equipment is typical.) |
| Hawaiian Tracking Station | BEFGHJ | Orbital tracking, telemetry reception, payload data reception. |
| AMR | HJ | Orbital data reception. |
| New Hampshire Station | ABCEFGHIJKLM | Orbital tracking; telemetry reception; command transmission; reception, recording and transmission of payload data. |
| African Tracking Station | BEGJ | Telemetry reception and recording during second burn. |
| North Pacific Station | BCEHKP | Satellite and payload data reception. |
| Kodiak Tracking Station | FJ | Orbital tracking. |
| Mugu Tracking Station | BEFGJ | Tracking and telemetry reception. |

**NOTES:** (1) In addition to equipment listed, all stations have inter- and intra-station communications equipment and checkout equipment.

(2) Equipment listed is either presently available or planned and approved for procurement.

*Equipment

A. General Purpose Computer(s) and Support Equipment
B. Data Conversion Equipment
C. PICE
D. Master Timing Equipment
E. Control and Display Equipment
F. VERLORT
G. VHF FM/FM Telemetry Station
H. PAM FM Ground Station
I. Doppler Equipment
J. VHF Telemetry Antenna
K. UHF Tracking and Data Acquisition Equipment (60 foot F&D Antenna)
L. UHF Angle Tracker
M. UHF Command Transmitter
N. APL Doppler Equipment
O. SPQ-2 Radar
P. Midas Payload Evaluation and Command Equipment

## Monthly Progress—MIDAS

### *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. (C)

### *Flight Test Progress*

- 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 1960) (U)

- 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 are currently under analysis. (U)

- 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 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)

- On the MIDAS III flight some degradation of payload performance resulted from a solar array system malfunction. This failure limited the 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. The sensitivity of the IR detector cells was also in agreement with the values expected for the recorded temperatures. (S)

*Figure 1. ATLAS 105D, the booster for MIDAS IV on Point Arguello Launch Stand No. 12*