FOREWORD

a foreword to...

SPACE

WDAT 60-1495

[redacted] ~~CONFIDENTIAL~~

HEADQUARTERS
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)
UNITED STATES AIR FORCE
Air Force Unit Post Office, Los Angeles 45, California

WDLPM-4

25 March 1960

FOREWORD

Activities summarized in this report include the major space systems, projects and studies for which the Air Force Ballistic Missile Division is wholly or partially responsible. Each space system and project is preceded by a concise history of administration, concept and objectives, making the monthly progress more meaningful in terms of total program objectives. The programs will be revised monthly to reflect major technical and administrative changes. These programs must be sufficiently flexible to permit continuous and effective integration of rapidly occurring advances in the state-of-the-art.

for O. J. RITLAND
Maj. Gen., USAF
Commander

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SPACE

systems

- DISCOVERER
- SAMOS
- MIDAS
- COMMUNICATIONS SATELLITE

SPACE SYSTEMS

Discoverer

SECOND STAGE	AGENA "A"	AGENA "B"
Weight—Inert	1,370	1,600
Impulse Propellants	6,550	13,100
Fuel (UDMH)		
Oxidizer (IRFNA)		
Pyrotechnics	67	100
GROSS WEIGHT (lbs.)	7,987	14,800
Engine	YLR81-Ba-5	XLR81-Ba-7
Thrust, lbs. (vac.)	15,000	15,000
Spec. Imp., sec. (vac.)	277	277
Burn Time, sec.	120	240
Restart Provisions	No	Yes
THOR BOOSTER	SM-65	DM-21
Weight—Dry	6,950	5,950
Fuel	33,750	33,750
Oxidizer (LOX)	68,300	68,300
GROSS WEIGHT (lbs.)	109,000	108,000
Engine	MB-3 Block 1	MB-3 Block 2
Thrust, lbs. (S.L.)	152,000	167,000
Spec. Imp., sec. (S.L.)	247.8	247.8
Burn Time, sec.	163	163

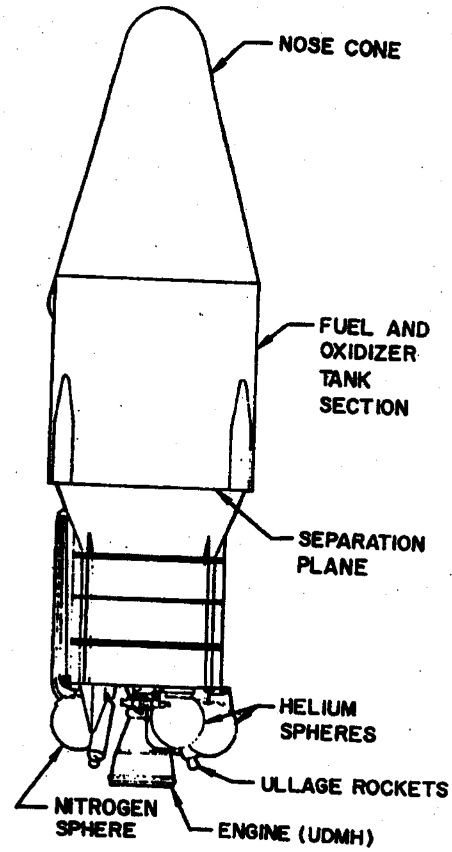


Figure 1. Photograph of two-stage DISCOVERER vehicle (left) and detailed drawing of AGENA, second stage (right).

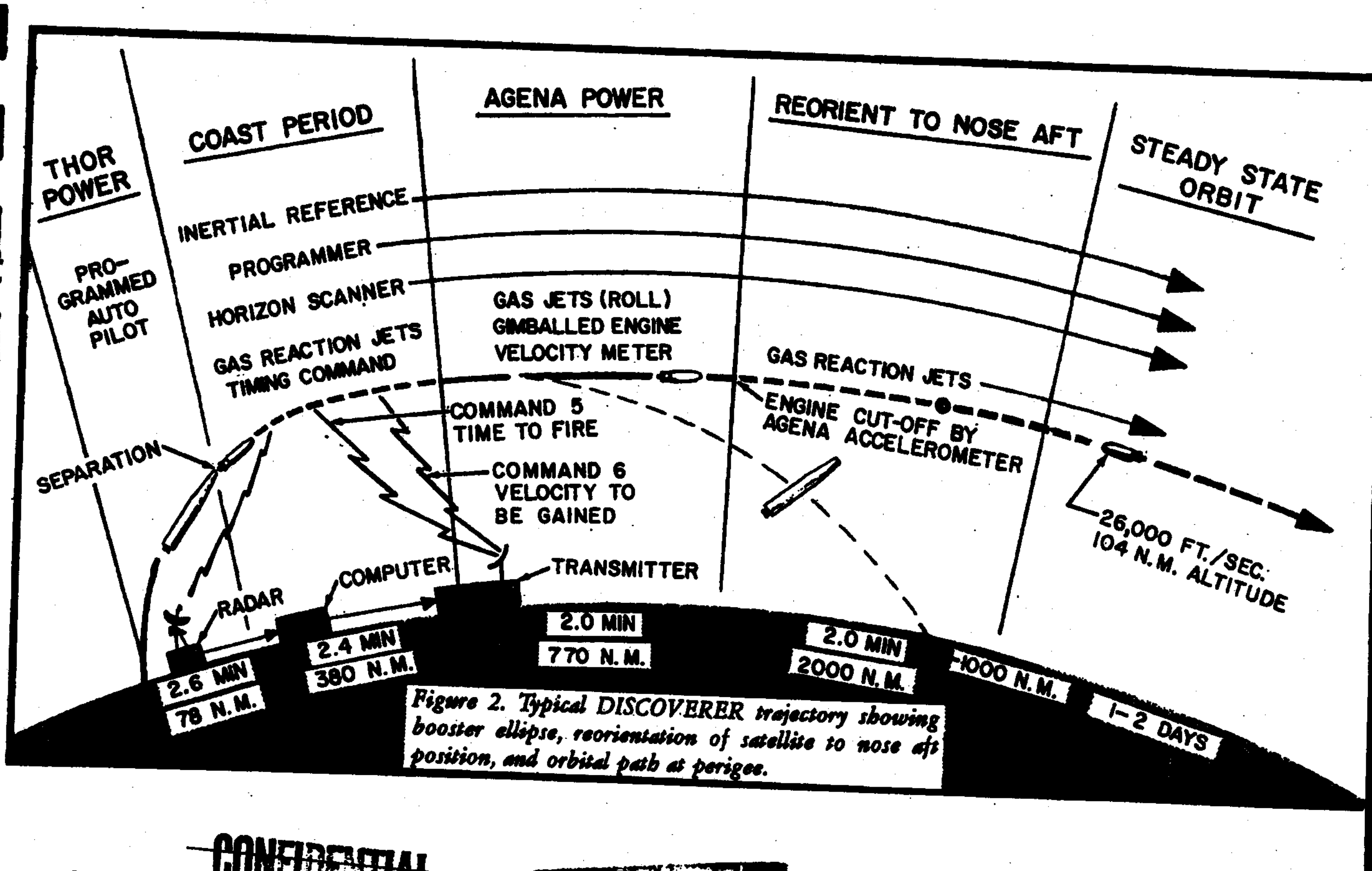


Figure 2. Typical DISCOVERER trajectory showing booster ellipse, reorientation of satellite to nose aft position, and orbital path at perigee.

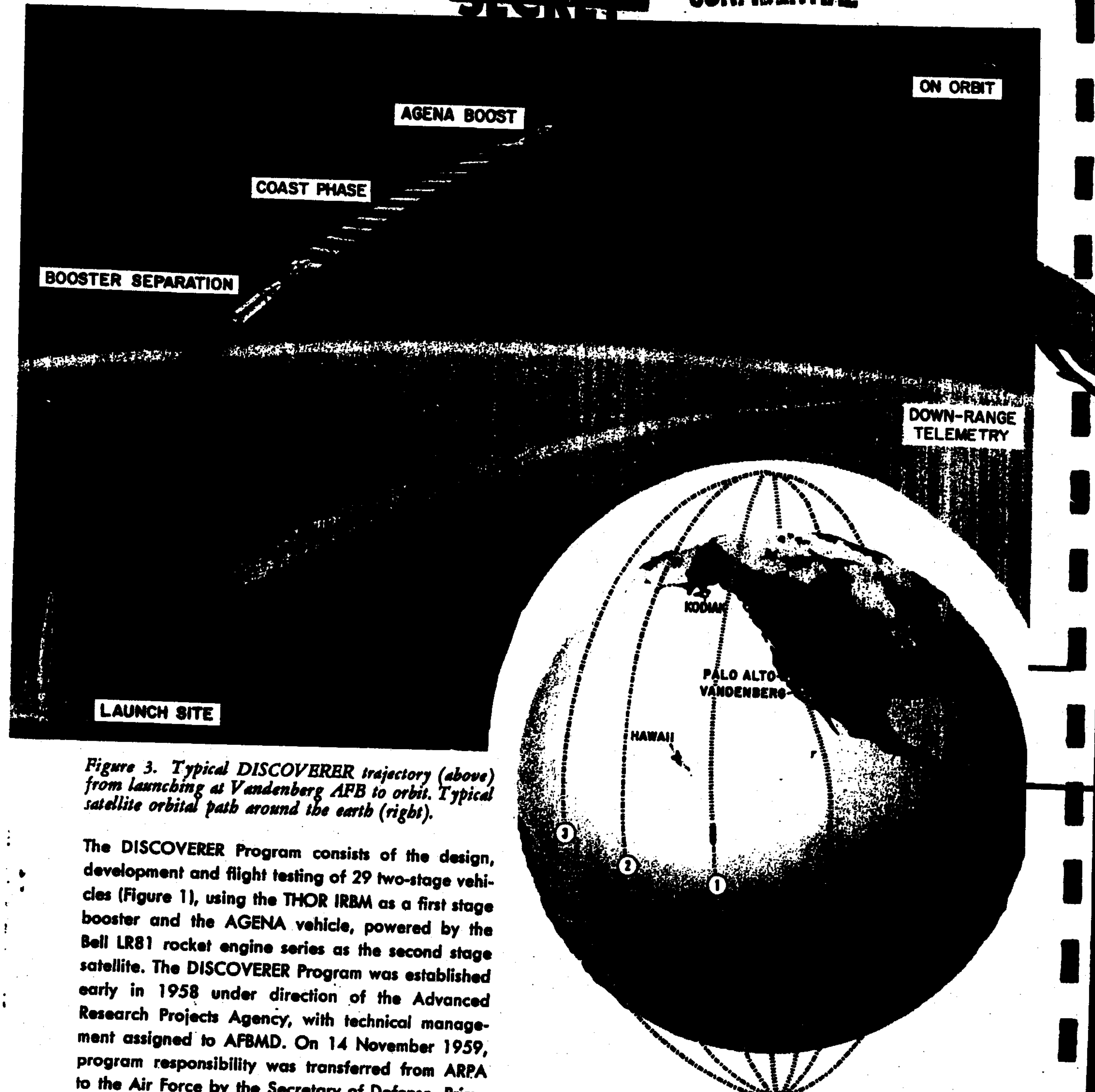


Figure 3. Typical DISCOVERER trajectory (above) from launching at Vandenberg AFB to orbit. Typical satellite orbital path around the earth (right).

The DISCOVERER Program consists of the design, development and flight testing of 29 two-stage vehicles (Figure 1), using the THOR IRBM as a first stage booster and the AGENA vehicle, powered by the Bell LR81 rocket engine series as the second stage satellite. The DISCOVERER 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 provide: (a) space research in support of the advanced military reconnaissance satellite systems programs, (b) test of the ground communications and tracking network for these programs, and (c) flight testing of the AGENA second stage vehicle.

Primary objectives include:

(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.

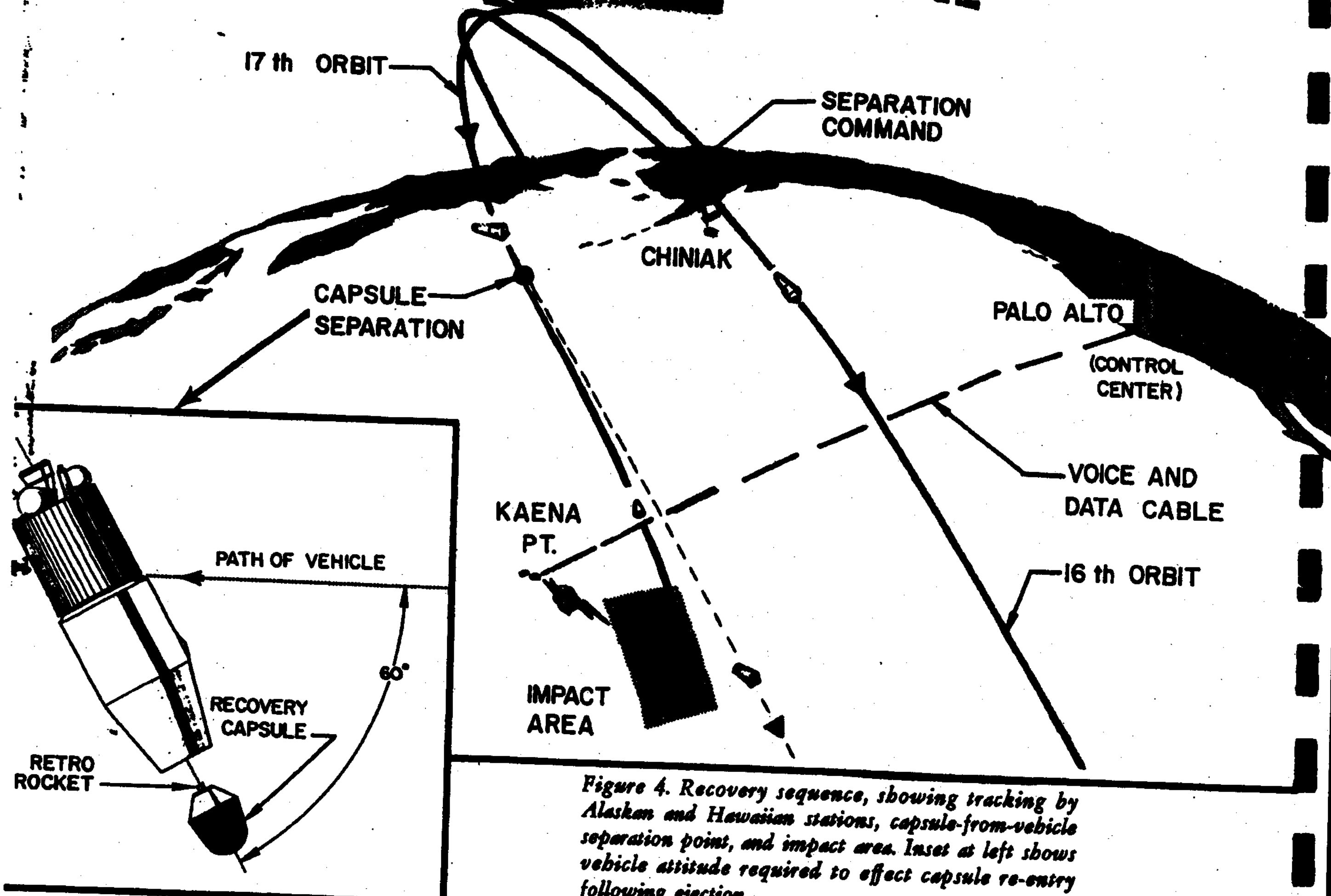


Figure 4. Recovery sequence, showing tracking by Alaskan and Hawaiian stations, capsule-from-vehicle separation point, and impact area. Inset at left shows vehicle attitude required to effect capsule re-entry following ejection.

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

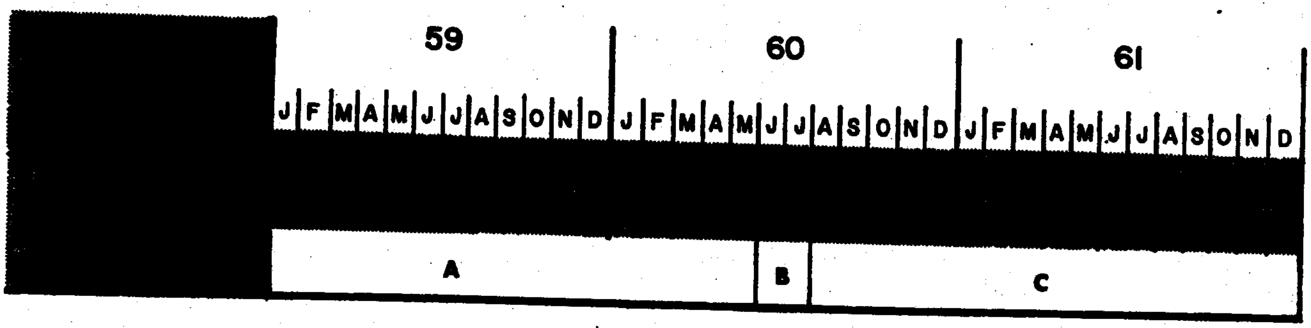
(e) Testing of ground support equipment and development of personnel proficiency.

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

Early tests confirmed vehicle flight and satellite orbit capabilities, developed system reliability and predictability, and established ground support, tracking, and data acquisition requirements. Subsequent flights are planned to acquire scientific data for design of advanced military reconnaissance payload components. Typical data gathering objectives include: cosmic and atomic radiation, magnetic field, total electron density, auroral radiation, micrometeorite measurement, Lyman alpha from space (or stars), solar radiation, and atmosphere density (drag) and composition.

A world-wide network of control, tracking, and data acquisition stations has been established. Overall operational control is exercised by the Control Center in Palo Alto, California. Blockhouse and launch operations are performed at the Vandenberg Air Force Base Control Center.

Telemetry ships are positioned as required by the specific mission of each flight. Figures 2 and 3 show a typical launch trajectory from Vandenberg Air Force Base, and figure 3 shows schematically a typical orbit. An additional objective of this program is the development of a controlled re-entry and recovery capability for the payload capsule (Figure 4). 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 aircraft and for sea recovery by Navy surface vessels. The recovery phase of the program has provided advances in re-entry vehicle technology. This information will be used in support of more advanced projects, including the return of a manned satellite from orbit.



A. THOR—SM-75 / AGENA "A"

B. THOR—DM-21 / AGENA "B" MB-3 Block 1 XLR81-Ba-7

C. THOR—DM-21 / AGENA "B" MB-3 Block 2 XLR81-Ba-9

Flight History

DISCOVERER No.	AGENA No.	THOR No.	Flight Date	Remarks
0	1019	160	21 January	*AGENA destroyed by malfunction on pad. THOR refurbished for use on flight XII.*
I	1022	163	28 Feb 1959	*Attained orbit successfully. Telemetry received for 514 seconds after lift-off.*
II	1018	170	13 April	*Attained orbit successfully. Recovery capsule ejected on 17th orbit was not recovered. All objectives except recovery successfully achieved.*
III	1020	174	3 June	*Launch, ascent, separation, coast and orbital boost successful. Failed to achieve orbit because of low performance of satellite engine.*
IV	1023	179	25 June	*Same as DISCOVERER III.*
V	1029	192	13 August	*All objectives successfully achieved except capsule recovery after ejection on 17th orbit.*
VI	1028	200	19 August	*Same as DISCOVERER V.*
VII	1051	206	7 November	*Attained orbit successfully. Lack of 400-cycle power prevented stabilization on orbit and recovery.*
VIII	1050	212	20 November	*Attained orbit successfully. Malfunction prevented AGENA engine shutdown at desired orbital velocity. Recovery capsule ejected but not recovered.*
IX	1052	218	4 February	*THOR shut down prematurely. Umbilical cord mast did not retract. Quick disconnect failed, causing loss of helium pressure.*
X	1054	223	19 February	*THOR destroyed at T plus 56 sec. by Range Safety Officer.*

MONTHLY PROGRESS—DISCOVERER Program

Flight Test Progress

DISCOVERER IX

● DISCOVERER IX was launched from Vandenberg AFB pad 4 at 1051 PST on 4 February. No problems were encountered during the final countdown. Liftoff was normal except for a malfunction of the helium quick disconnect. Although the initial ascent portion of the flight appeared normal, instrumentation indicated early termination of both THOR and AGENA burn periods. Data analysis revealed that the THOR engine shut down approximately 19 seconds early, resulting in a velocity loss of about 4,000 feet per second. Premature shut down of the AGENA engine resulted from the loss of propellant tank pressurization caused by the helium quick disconnect malfunction at liftoff. AGENA impact occurred in the ocean about 400 miles south of the launch site.

Quick Disconnect Problem

● At the time of DISCOVERER IX liftoff, the helium quick disconnect coupling released 1.1 second late. During this delay, the release lanyard was broken, resulting in a pull on the coupling. The vehicle mounting bracket broke, allowing the airborne half of the coupling to be pulled out of the vehicle. The coupling was recovered and has been subjected since to over 200 assorted release tests with no failures experienced. Failure of the coupling at launch is attributed to an accumulation of water inside the coupling which blocked the release action. Drain holes have been incorporated to prevent a recurrence of the problem.

DISCOVERER X

● DISCOVERER X was launched from Vandenberg AFB pad 5 at 1215 PST on 19 February. The countdown proceeded smoothly and launch was accomplished on the first attempt. Immediately after liftoff, THOR booster pitch oscillations began and, at T plus 56.4 seconds the vehicle was destroyed at 20,900 feet by the Range Safety Officer. Both the THOR and AGENA destruct systems operated satisfactorily. Many major components were recovered and are being examined and analyzed. No personnel injury or property damage was sustained. Preliminary analysis indicated that a THOR autopilot malfunction caused the main and vernier engines to oscillate between hardover stop positions, starting at liftoff. Extensive studies are underway to ascertain and correct the responsible conditions.

Flight Schedule

● DISCOVERER XI is scheduled for launch from Vandenberg AFB in late March. This vehicle will carry an advanced engineering test payload and an instrumented recovery capsule.

Technical Progress

Second Stage Vehicles

● All of the remaining AGENA "A" vehicles (DISCOVERER flights XI through XVI) are at Vandenberg AFB in various stages of launch preparation. Three of the first four AGENA "B" vehicles are in various stages of completion at the Modification and Checkout Center. The fourth vehicle (first AGENA "B" flight article) is at the Santa Cruz Test Base.

AGENA Propulsion System

See AGENA Monthly Progress section.

Guidance and Control

● A hydraulic control system driven by fuel pressure is being developed to save weight and electrical power. The system replaces the electric motor driven hydraulic pump used on AGENA "A" vehicles and is being tested currently at Santa Cruz Test Base. A weight saving of approximately 20 pounds will be realized. The system is planned for incorporation on DISCOVERER 21. This flight will be the first to use the improved configuration of the AGENA "B" (XLR81-Ba-9 engine and thrust chamber extension).

Figure 5. Optical tracking lights installed on aft equipment rack of DISCOVERER IX AGENA vehicle.

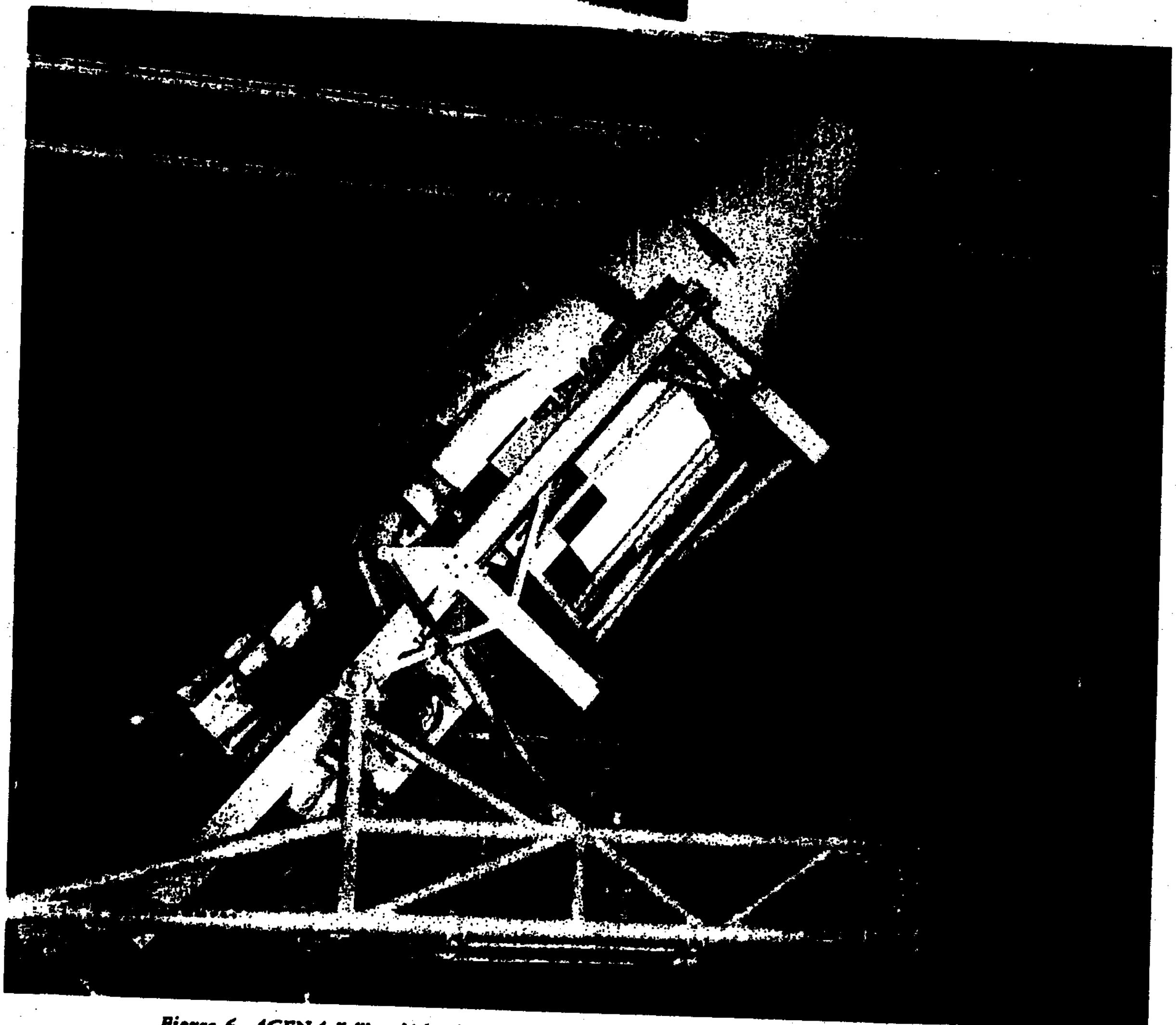


Figure 6. AGENA "A" vehicle shown mounted in transporter-erector at Modification and Checkout Center. This is the final AGENA "A" vehicle scheduled for this program (DISCOVERER XVI).

Biomedical Recovery Capsule

- Tests of the biomedical capsule designed for a small primate were resumed in the Lockheed high altitude temperature simulation chamber on 8 February. The General Electric capsule tested utilized several modifications and techniques derived from thermal profile tests in November and proof tests by the School of Aviation Medicine in December. These include increased cooling capacity, refinement of sensor-to-animal attachment methods for telemetry readout, relocation of life chamber components, and reprogramming of psychomotor response stimuli. The first full-duration test of the capsule containing a live primate was completed on February 12. This 55-hour test simulating a complete flight was initiated at Vandenberg AFB with the primate sealed in the capsule. A countdown was performed, and after 22 hours the capsule was flown to the Sunnyvale Development Center (with passenger). It was placed in the High Altitude Temperature Simulator for the simulated orbital phase, then sequenced through simulated re-entry-recovery phases. It was then placed in temperature-regulated water for five hours to simulate the final five-hour recovery phase. During these tests the primate responded to stimuli properly and was able to perform all programmed tasks. A new feeder, designed by the School of Aviation Medicine, proved excellent. Electrocardiogram readouts were excellent and all components of the air regeneration system functioned well.

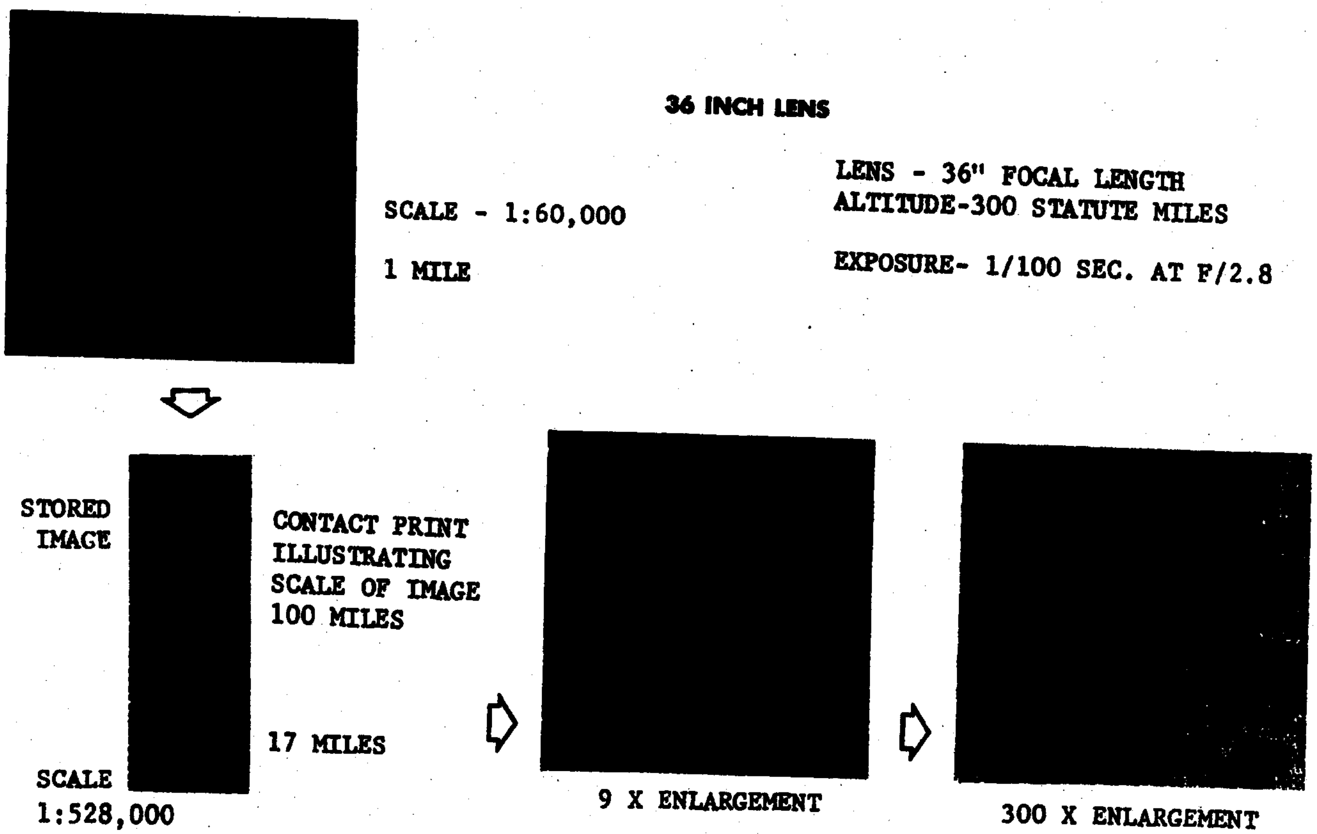


Figure 7. Simulated photography from satellite vehicle.

MONTHLY PROGRESS—SAMOS Program

Program Administration

● As a result of program reorientation announced during December 1959 and made necessary by restricted funding levels, the flight test plan for ferret payloads has been revised as follows:

Ferret Payload	*Number of Flights*	
	Old Schedule	*New Schedule*
F-1	2	3
F-2	2(1—F-2A) (1—F-2B)	4
F-3	4(2—F-3A) (2—F-3B)	1

● A combined visual/ferret payload will be tested on the first 3 flights. The first seven ferret payloads (F-1 and F-2) will include progressively more complete installations of receivers and antennas to provide increasingly greater electronic measurement capability. The major portion of the hardware components developed for the original program are usable in the reoriented program.

Technical Progress

Second Stage Vehicles

● Work on the second stage (AGENA) vehicle for the first SAMOS flight is 70 percent complete in the Modification and Checkout Center. This vehicle will be the first of three to carry a combination visual and ferret (E-1 and F-1) payload. Assembly of the other two vehicles is proceeding on schedule. Interior design of the AGENA vehicles for flights 4 and subsequent is proceeding on schedule. A common airframe design from the forward equipment compartment aft is being used for these vehicles and for MIDAS vehicles (flights 3 and subsequent). Equipment installations need not be interchangeable. Substantial progress has been made on the design of the AGENA vehicle to be used for E-5 (recoverable) SAMOS payloads.

Visual Reconnaissance System

Visual Reconnaissance System payloads are being developed in a minimum number of configurations to attain readout and recovery objectives. The designation and purpose of each configuration is as follows:

Readout:

E-1 — Component Test Payloads

E-2 — Steerable Reconnaissance Payloads (with 20-foot ground resolution)

Recovery:

E-5 — High Resolution, Recoverable Payload (with 5-foot ground resolution)

Payloads

● **E-1 Payloads**—The first E-1 flight article payload was delivered to LMSD on 8 February. Functional tests were performed on all components. During a preliminary functional test, with the payload mounted in the collimator, a system resolution of greater than 94 lines per millimeter was obtained. The payload was subjected to a series of three 19-hour tests under simulated orbital conditions, with satisfactory results being obtained. The second E-1 payload is undergoing quality evaluation testing at Eastman Kodak. This is a spare payload for component replacement only and will be delivered to LMSD unassembled before 15 March.

● **E-2 Payloads**—Delivery of the first E-2 payload is scheduled for July. Environmental tests of the thermal model E-2 payload were completed on 28 January in the high altitude temperature simulation chamber. Test objectives were achieved. Changes in the payload housing surface and heater power requirements are being made as a result of testing data obtained.

● **E-5 Payloads**—Design of the high acuity panoramic camera system is proceeding satisfactorily. The special optical glass for the lens elements, which has been ordered from West Germany, will be deliverd to the Itek Corporation in mid-April. The Development Test Plan for the recovery capsule has been published, including payload test requirements from checkout through post-launch operations. Avco Corporation is conducting wind tunnel tests on various capsule configurations as a parallel effort with LMSD aerodynamics studies.

Ground Support Equipment

● The complete visual reconnaissance system ground support equipment complex was operated with the E-1 payload during February. All equipment operated satisfactorily.

Ferret Reconnaissance System

Ferret Reconnaissance System payloads are being developed in a minimum number of configurations. The designation and purpose of each configuration is as follows:

F-1 — R&D Test Payloads

F-2 — Digital General Coverage Payloads

F-3 — Specific Mission Payloads

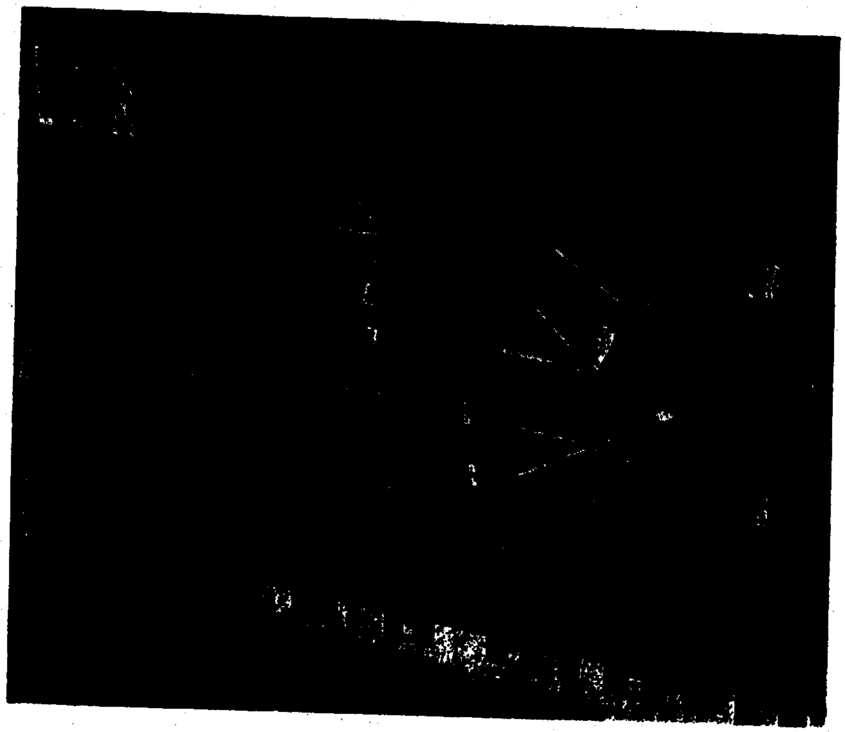


Figure 8. F-1 payload separation test set-up. Satisfactory payload separation was demonstrated in tests conducted by LMSD in February. Payload-vehicle attachments were simulated in test set-up. The zero gravity condition of the payload in orbit was effected by suspending it from a 60-foot cable (center of photo).

Payloads

● **F-1 Payloads** — The first two F-1 payloads are being prepared for installation in their respective AGENA vehicles at the Modification and Checkout Center. During payload evalution tests conducted in January a discrepancy was indicated in the pulse width measurement circuits. The circuit design is being studied in an effort to solve this problem. Efforts to solve the intermittent time counter errors encountered during systems testing of the third F-1 payload are progressing satisfactorily. Desensitizing the counter stages appears to be the most feasible solution. A breadboard of the desensitized time counter has been installed in an F-1 service test model payload and has been operated satisfactorily for 48 cycles of life testing (equip to approximately three days of orbital operation). The use of line filters is being studied as an additional effort. Separation tests of the vehicle nose cone were completed satisfactorily during January. Separation tests simulating vehicle-payload attachments were completed satisfactorily during February.

● **F-2 and F-3 Payloads** — In accordance with the program reorientation reported in paragraph B.1, the concepts and basic characteristics for the new F-2 and F-3 payloads were defined in an LMSD Technical Letter Report for January. Work statements in accordance with the new requirements are being prepared for Airborne Instruments Laboratory. Design and modification of some of the payload components affected by the change (i.e. payload structure and antenna assemblies) have been initiated.

Ground Support Equipment

● Delivery of the F-1 data conversion equipment to the Satellite Test Center is scheduled for 25 March. Negotiations are underway for the changes to the F-2 and F-3 ground data handling equipment resulting from program reorientation.

Program Communications and Control Equipment

● Design of the exit VHF antenna for the satellite vehicle has been refined, using a honeycomb dielectric to support the cavity. A weight reduction of 60 percent was realized and laboratory tests indicate satisfactory performance.

● Systems and acceptance tests are being conducted on the UHF ground equipment for the Vandenberg AFB tracking and data acquisition station.

Ground Support Program

● **Ground Handling and Service Equipment** — Equipment for Point Arguello launch pad #1 has been delivered and is scheduled to be completely installed and checked out by the middle of May.

● **Launch Control Equipment** — Manufacturing of launch control systems equipment for Point Arguello launch pad 2 is 80 percent complete. The equipment for launch pad 1 was shipped to Vandenberg AFB on 18 February.

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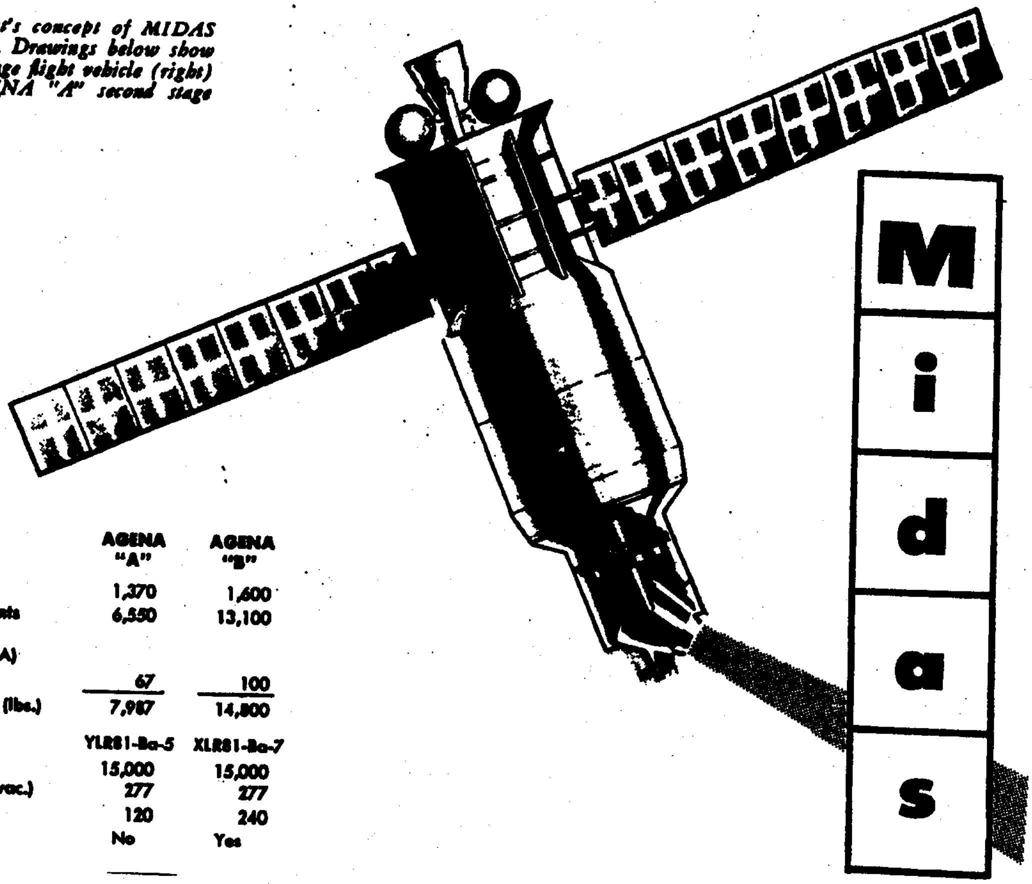
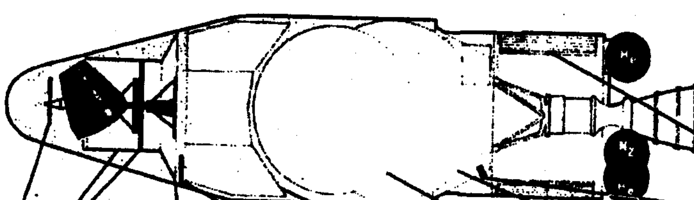
Figure 1. Artist's concept of MIDAS satellite (right). Drawings below show complete two-stage flight vehicle (right) and basic AGENA "A" second stage vehicle (left).



SECOND STAGE	AGENA "A"	AGENA "B"
Weight—Inert	1,370	1,600
Impulse Propellants	6,550	13,100
Fuel (UDMH)		
Oxidizer (IRFNA)		
Pyrotechnics	67	100
GROSS WEIGHT (lbs.)	7,987	14,800
Engine	YLR81-Ba-5	XLR81-Ba-7
Thrust, lbs. (vac.)	15,000	15,000
Spec. Imp., sec. (vac.)	277	277
Burn Time, sec.	120	240
Restart Provisions	No	Yes



NOTE: AGENA "A" configuration except for solar paddles (AGENA "B" only).

BOOSTER—ATLAS ICBM		
Weight—Wet		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

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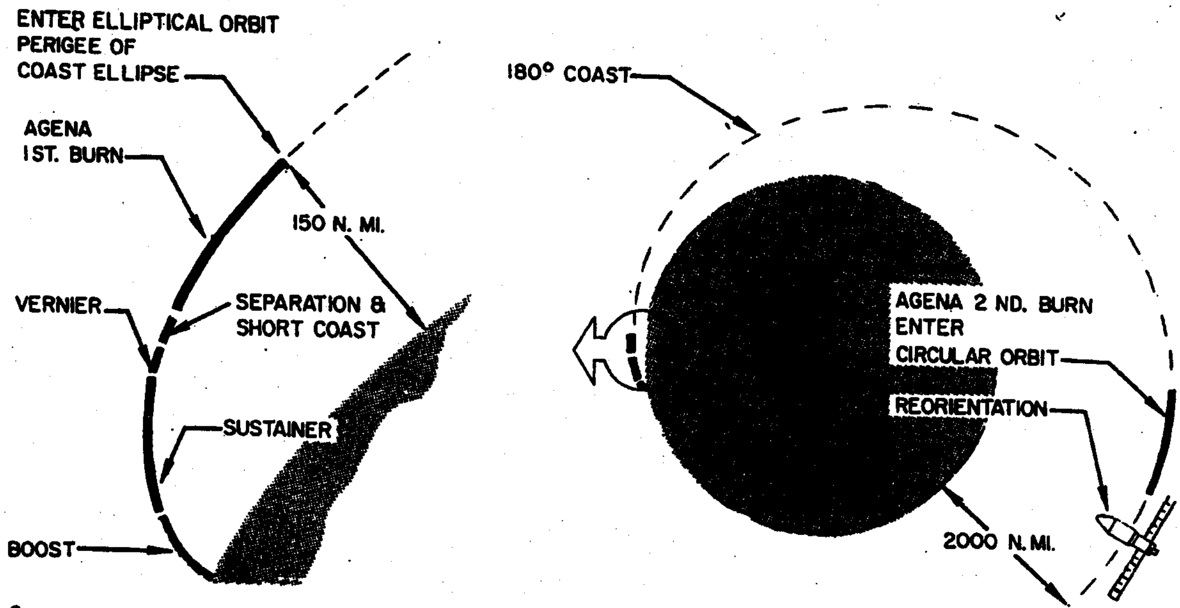


Figure 2.
Launch-to-orbit trajectory for flights 3 and subsequent. Optimum ATLAS boost, guided by radio-inertial system. AGENA ascent (coast, burn, coast, second burn) provides attitude reference. Also governs velocity magnitude and direction by inertial guidance system monitored by horizon scanner. Orbital attitude maintained by reaction wheel and gas jets.

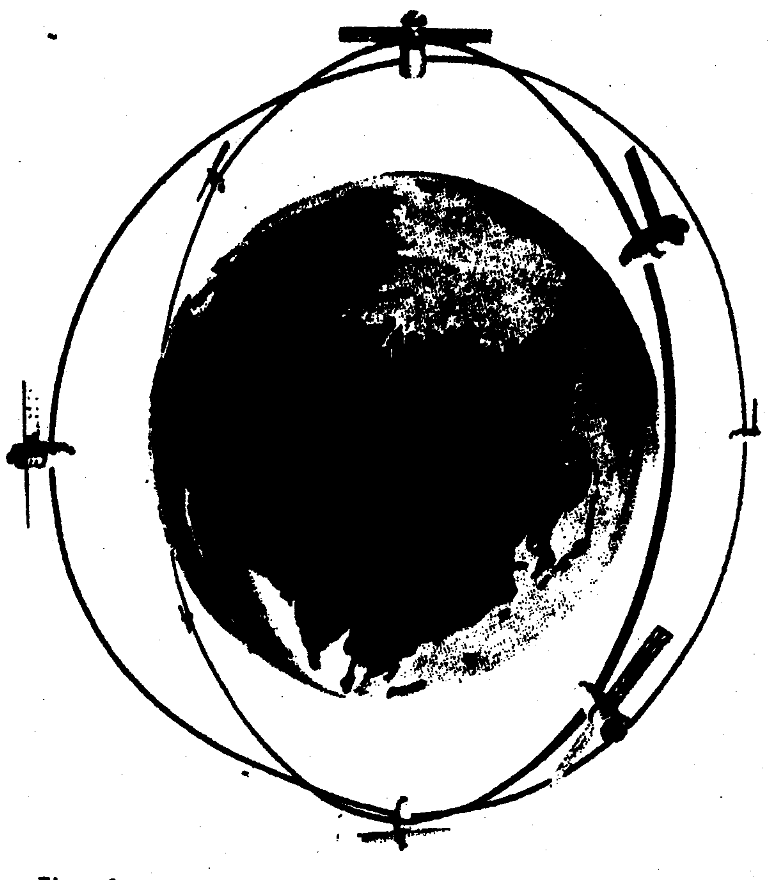


Figure 3.
Proposed MIDAS system. Four satellites spaced equidistant in each of two orthogonal planes at 2,000 n.m. altitude. Provides maximum coverage of USSR with minimum number of satellites.

PROGRAM HISTORY

The MIDAS Program was included in Weapon System 117L when WS 117L was transferred to the Advanced Research Projects Agency early in 1959. ARPA subsequently separated WS 117L into the DISCOVERER, SAMOS and MIDAS Programs, with the MIDAS objectives based on an infrared reconnaissance 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. Development activities will lead to the first of a ten flight R&D program in February 1960, with a reliable operational system achievable by 1962-1963.

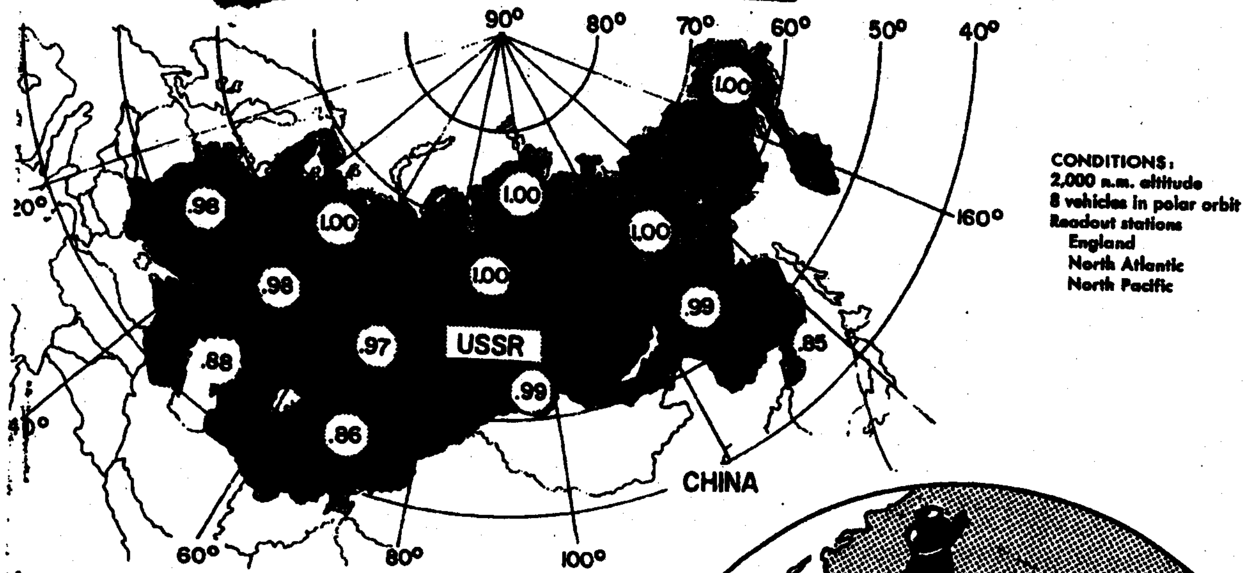
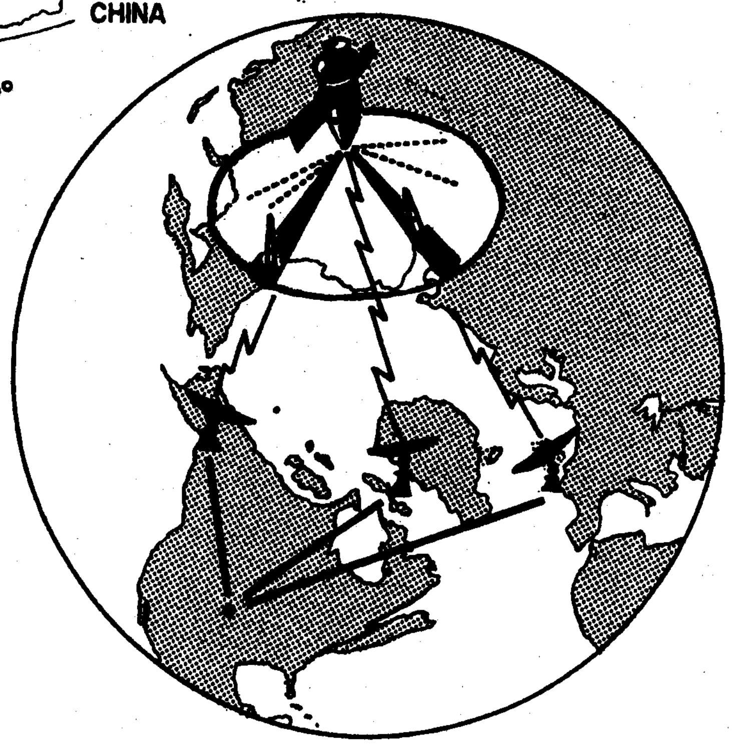


Figure 4.
Orbiting satellites detect infrared radiations emitted by Soviet ICBM's in powered flight. Data telemetered instantaneously to MIDAS Control Center via far north readout stations. Decoded data reveals approximately the number of missiles launched and launch location, direction of travel and burning characteristics. Map above shows percentage of detection probabilities over USSR.



TECHNICAL HISTORY

The MIDAS infrared reconnaissance payload will be engineered to use a standard booster-satellite launch vehicle configuration. This configuration consists of a "D" Series ATLAS missile as the first stage, and the AGENA vehicle, powered by a Bell-Aircraft rocket engine, as the second, orbiting stage (Figure 1). Refinements to the AGENA vehicle will be made as a result of the DISCOVERER flight test program. The first flight article infrared payload has been assembled and installed on an AGENA vehicle, and checkout operations initiated. A solar auxiliary power unit has been developed and fabricated for installation on the third flight. The third major component of the payload, the communications package, also has been designed, fabricated, and tested. The total payload weight is approximately 1,000 pounds. The ATLAS/AGENA configuration with single restart capability and large propellant tanks can place a payload of 1,500 pounds on 2,000 nautical mile altitude polar orbit (see Figure 2). Only the first two R&D flight tests will use the single capacity AGENA vehicle.

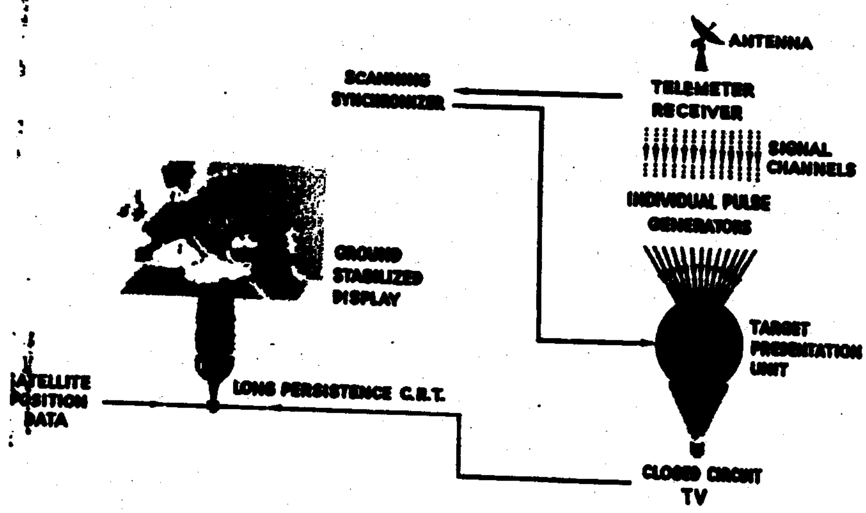
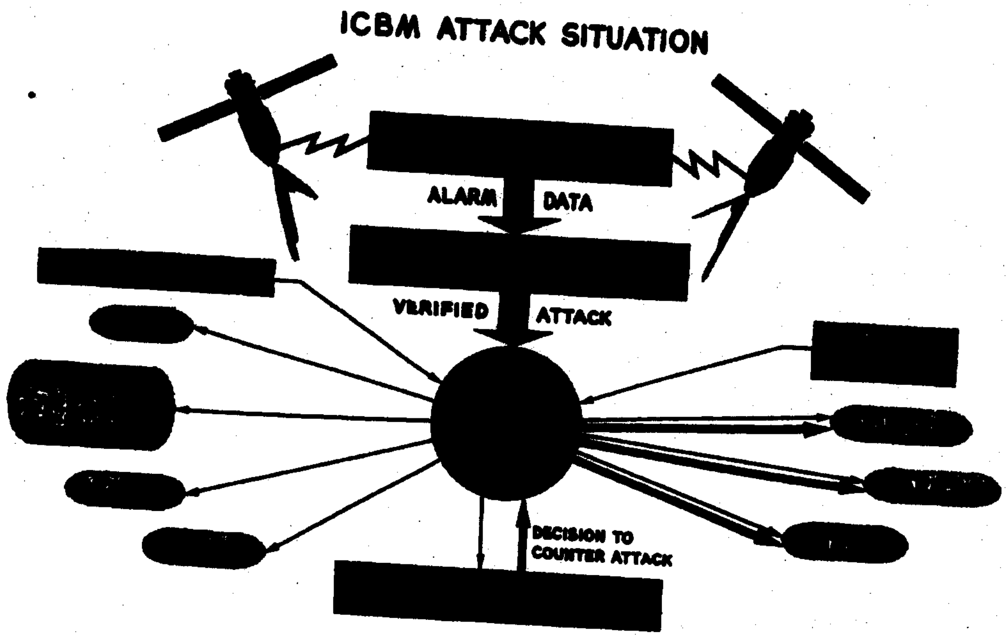


Figure 5.
Simplified version of ground presentation system (left) for display of infrared reconnaissance data. The data is displayed on a TV monitor with a map overlay. The chart below shows data flow from the readout stations to decision-making agencies. The MIDAS Control Center, or other using agencies having a correlated ground stabilized display, can determine when an actual attack has been launched. The decision to counterattack is made by the President, with all affected agencies reacting as preplanned.



CONCEPT

The MIDAS system is designed to provide continuous infrared reconnaissance of the Soviet Union. Surveillance will be conducted by eight satellite vehicles in accurately positioned orbits (Figure 3). The area under surveillance must be in line-of-sight view of the scanning satellite. Mission capabilities are shown in Figure 4. 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 Control Center where it is processed, displayed, and evaluated (Figure 5.) 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 all national retaliatory and defense agencies.

MONTHLY PROGRESS—MIDAS Program

Flight Test Progress

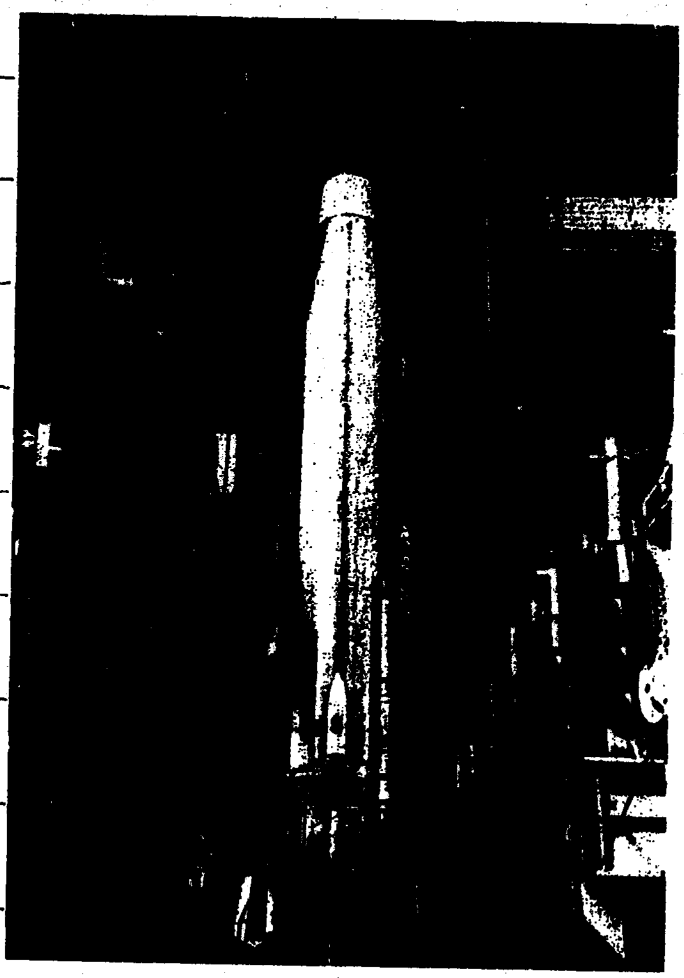
● The first MIDAS flight test vehicle was launched from Atlantic Missile Range launch pad 14 on 25 February. Satellite orbit was not attained. A detailed analysis of the flight and of the problems encountered will be included in next month's report.

Flight Parameters

● The first MIDAS flight test was programmed to place the satellite vehicle into a 261 nautical mile circular orbit, with a maximum eccentricity of 0.007 and an inclination angle (to the equator) of 32.5 degrees. A useful orbital lifetime of 29 days was anticipated. A launch azimuth of 107 degrees was used, with orbital injection planned to occur at T plus 655 seconds at a velocity of 25,024 feet per second.

Launch Preparations

● The electrical rewiring of launch pad 14 required for the MIDAS vehicle, and launch pad umbilical drop tests, were completed on schedule. Additional redundant electrical circuits were installed in the umbilical mast to provide increased launch reliability.



● Systems checkout of the ground support equipment was conducted successfully with no problems becoming apparaent. Checkout of the ATLAS booster also was conducted with completely satisfactory results.

● MIDAS vehicle simulators were delivered to AMR, Kaena Point (Hawaii) and Vandenberg AFB early in February. These units were used to train and familiarize operating personnel in vehicle handling, checkout, tracking and readout; and for electrical checkout of associated ground equipment. Each unit consists of two equipment racks. The simulators are capable of receiving telemetry, transmitting commands, and simulating the characteristics of the infrared payload and communications subsystem of the orbiting MIDAS satellite.

Satellite Readout Plans

● AMR, Kaena Point and Vandenberg AFB were scheduled to perform payload-to-ground data link readout. All three stations were to have tape recorded the satellite system-time data for analysis and processing for presentation on the command console of the ground presentation unit at the Satellite Test Center, Sunnyvale, California. In addition, real-time readout was to have been performed on the ground presentation unit at Vandenberg AFB. Motion pictures were to have been made of the real-time ground presentation, with comparable system-time indicated on each frame.

● A series of targets had been planned to test the infrared readout capability of the orbiting MIDAS satellite. These included the launchings of an ATLAS and a TITAN missile from the Atlantic Missile Range, and the SAC launch of an ATLAS missile from Vandenberg AFB. All launches were to have been timed to coordinate with passes of the MIDAS satellite. In addition, ten pyrotechnic targets were to have been ignited at Vandenberg AFB and Edwards AFB during night time orbital passes.

Technical Progress

Second Stage Vehicles

● Preparation of AGENA vehicle 1007 for installation on the second MIDAS flight vehicle is proceeding on schedule in AMR Hangar E. X-ray exam-

Figure 6. View of ATLAS booster for first MIDAS flight, as seen from gantry. ATLAS is installed in transporter prior to erection.

Figure 7. View of launch pad 14 gantry and umbilical tower during erection of ATLAS booster for first MIDAS flight.

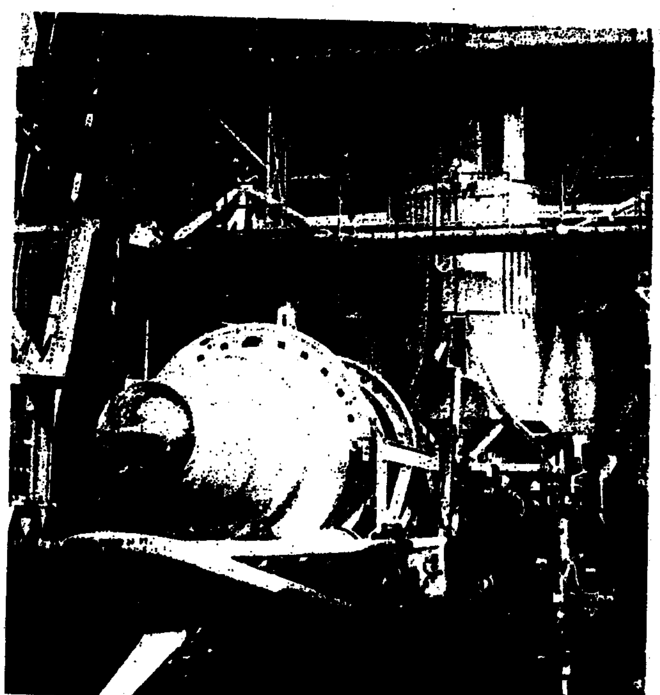


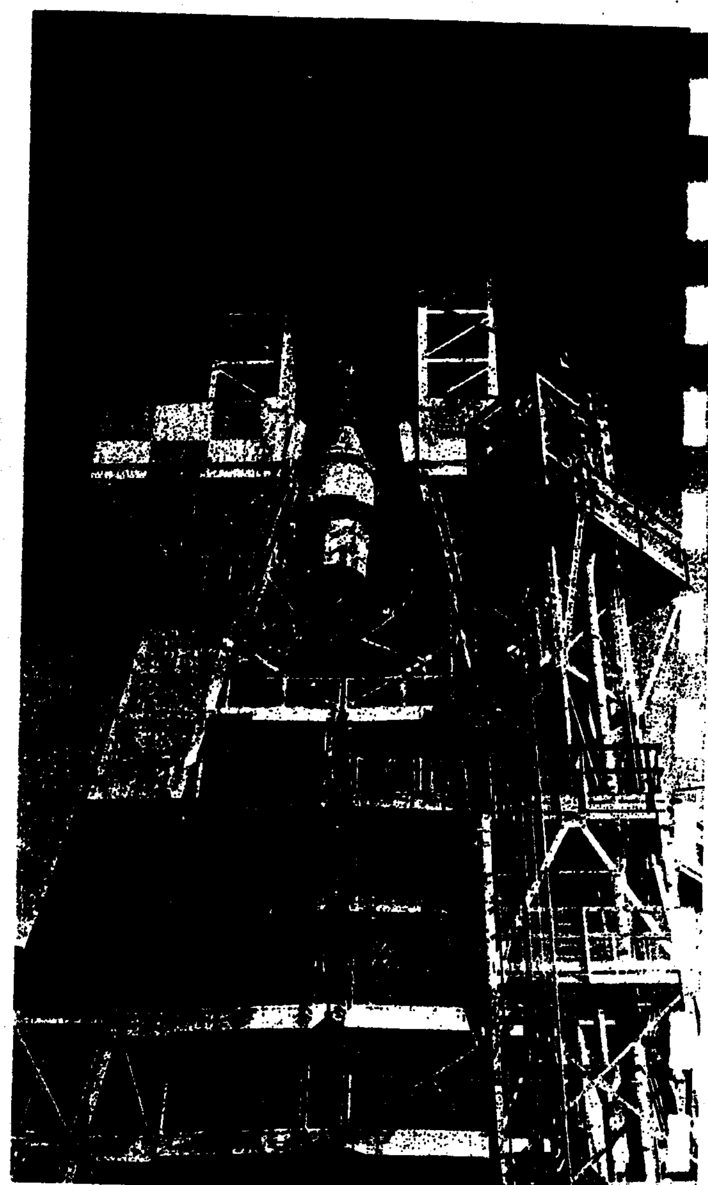
Figure 8. AGENA vehicle (above) mounted in transporter shown at base of gantry and (right) being lifted into gantry for mating with ATLAS booster.

ination of the thrust chamber revealed the presence of a foreign particle in the oxidizer inlet manifold. A new thrust chamber was installed on 8 February.

- Design of the AGENA vehicle for the third MIDAS flight test is proceeding on schedule. Structures are being fabricated and release of equipment and installation bracketry designs to manufacturing is anticipated early in April.

Infrared Scanner Units

- Three of the infrared scanner units for the first two MIDAS flights were shipped to AMR during February, and the fourth is in the Modification and Checkout Center. One of the units at AMR is the flight article for the second MIDAS flight.



Infrared Payload Tracking Tests

● An operational test of the complete MIDAS system was conducted successfully on 29 January. The test target was an ATLAS missile launched from Vandenberg AFB. The infrared payload and satellite data link were mounted outside the telemetry building to permit missile tracking during ascent. The ground data link system transmitted the data to the tracking station where it was tape recorded. Analysis of the tapes on which the tracking information was recorded revealed that the target information obtained was highly satisfactory. The capability of the space and ground presentation equipment, as installed at Vandenberg AFB, was established. The test also provided a valuable personnel training function. On 4 February, the launch and flight of the DISCOVERER IX vehicle was tracked in a similar manner for 110 seconds.

● **Advanced Presentation Unit** — Negotiations between LMSD and General Electric Co. on the contract for this unit are essentially complete.

● **Solar Auxiliary Power** — Fabrication of the solar array panels was started on 8 February. The mockup of the entire array is nearly complete. A functioning 1/10 scale model of the array mechanism was completed during February.

● **Reliability Negotiations** — LMSD and Bell Aircraft have completed a work statement for an AGENA engine reliability program.

Figure 9. Infrared scanner unit and associated equipment shown in test set-up at Vandenberg AFB. Infrared tracking of ATLAS and DISCOVERER flights were performed with highly successful results. Note the filter-out position of the scanner. Satellite borne communications system circuitry is shown at right side of photographs.