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THE SECRETARY OF DEFENSE
WASHINGTON

Dear Mr. President:

I am forwarding herewith the Military Space Projects Report for the quarter ended June 30, 1959.

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The first two of the eight engines for the SATURN (clustered booster) project have been successfully tested at the Army Ballistic Missile Agency. Development of the navigation and communication satellites is in the hardware stage and continues on schedule.

As indicated in my letter transmitting the previous quarterly report, project TIROS (meteorological satellite) was transferred

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to the National Aeronautics and Space Administration effective April 13, 1959. In addition, project CENTAUR, the high energy upper stage, was transferred to the National Aeronautics and Space Administration at the close of this quarter.

With great respect, I am

Faithfully yours,

[redacted]
THOMAS D. WHITE

1 Incl:
Report

The President

The White House

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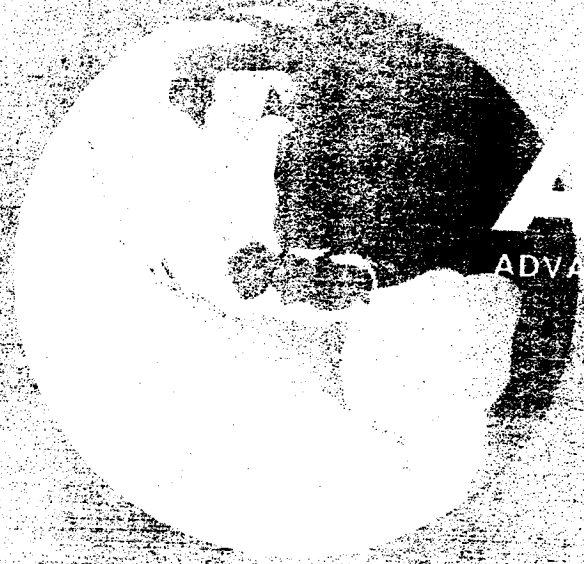
MILITARY SPACE PROJECTS

REPORT OF PROGRESS
FOR
QUARTER ENDED 30 JUNE 1959



ADVANCED RESEARCH PROJECTS AGENCY

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With great respect, I am

Faithfully yours,

/s/ Thomas S. Gates
Deputy

1 Incl.:
Report

cc: Members of the National Aeronautics and Space Council

The President
The White House

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CONTENTS

ILLUSTRATIONS

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PROGRESS HIGHLIGHTS

During the Quarter Ended June 30, 1959

(Project code names were assigned to all major ARPA projects during the quarter and are evident throughout this document.)

On April 13, 1959, DISCOVERER II was successfully launched into orbit from the Pacific Missile Range. The recoverable capsule was not ejected in the planned recovery area, however, and an intensive search was unsuccessful. Although DISCOVERER III and DISCOVERER IV, launched June 3 and June 25 respectively, experienced successful ascent, separation and orbit boost, these vehicles failed to achieve orbit.

Launch of the initial SAMOS reconnaissance satellite, formerly designated SENTRY, is scheduled for April 1960 and will contain both visual and ferret payloads.

The first flyable infra-red scanner for Phase I of the MIDAS infra-red reconnaissance satellite program was delivered in June, and the first satellite launch is scheduled for January 1960. Delay of approximately two months is due to conflict in pad schedules and to difficulty in the ATLAS-D program.

Transfer to NASA of the meteorological satellite project (TIROS) was made in April 1959.

Launching of the first navigation satellite (TRANSIT I) is now scheduled for mid-September. The satellite equipment is in final assembly and test.

Communications satellite project (NOTUS) calls for development of a delayed repeater satellite system (COURIER) and an instantaneous repeater satellite system comprised of three sub-projects, STEER, TACKLE and DECREE. The first COURIER satellite is scheduled in February 1960. Launchings of instantaneous repeater satellites are scheduled to begin in late 1960.

The combined MINITRACK-DOPLOC fence, a portion of Project SHEPHERD, continues to successfully track satellites in space.

Under TRIBE, the project for development of a continuing family of military space vehicles, the first two engines of the 1.5 million pound thrust cluster engine SATURN were successfully fired at ABMA.

SAMOS PROJECT

(FORMERLY SENTRY)

INTRODUCTION

Project Renamed

This project was formerly known as the WS-117L or SENTRY Program prior to the establishment of DISCOVERER and MIDAS as separate projects. It was recently named SAMOS to remove the earlier all-inclusive connotation associated with the SENTRY title.

SAMOS to provide both Visual (Photographic) and Ferret (Electronic) data.

The objective of the SAMOS project is the development of a reconnaissance system utilizing polar orbiting satellites to collect and process visual or photographic data and ferret or electromagnetic data. Specifically, the SAMOS system is expected to acquire a great amount of technical intelligence, resulting in a more precise knowledge and evaluation of enemy military and industrial strength and their deployment. The data obtained should enable the United States to do a better target analysis job and to detect and identify unknown targets. Information obtained will provide evidence of build-up and consequently relatively long-lead warning of attack.

Ground acquisition of data by capsule recovery and by readout.

Two approaches are being developed for acquisition of intelligence data: (1) the recovery system in which a data capsule is ejected from the satellite upon command and physically recovered, and (2) the electronic data readout system in which all data is transmitted upon command to ground stations. The recovery system is used for photography and the data readout system for both photography and ferret. The recovery system will be used when rapid time response is not necessary, thus permitting collection of data over a large geographic area at a rate which would exceed the limits of a readout link capability. The

photographic readout system will be used for surveillance of specific targets when time response is an important factor.

Flight Program

The program initially included 22 launchings. Current program reviews of payloads planned may reduce this to 18 launchings. The first launching is scheduled for April, 1960.

SAMOS PAYLOADS

GENERAL

Initial flights to have both visual and ferret capabilities.

A dual payload, consisting of components of both visual and ferret systems, will be used on the initial development flights to test equipment. When in orbit, both the visual and ferret equipment will be checked out for satisfactory operation, prior to jettisoning of the ferret payload. The visual payload will then be permitted to operate without interference and will have a useful life of 10 to 15 days, depending upon the power supply used. Later satellites will carry only the visual or the ferret payload.

Visual payload to utilize wideband data link.

A wideband data link will be used for the visual payload ground-space communications. This link includes a payload camera, using strip film which is automatically developed while in orbit. On ground station command, readout of the developed negative is accomplished by electronic scanning (in the satellite) and conversion of the image to a video signal for transmission to a ground station over the wide-band link. The video signal is then converted into modulated lines and displayed on a kinescope. The kinescope lines are photographed by a 35 mm continuous-strip camera which records the images as a series of positive frames.

Recovery Payload

Bids for development of recovery payloads have been received and are being evaluated. The design objective for the recovery camera is to

obtain resolution sufficient to identify objects on the ground as small as five feet on a side.

VISUAL

Flights of first visual payloads (E-1) to be used for component testing.

Photo payloads, employing the readout technique, to be used in the initial vehicles, have been designated "E-1" and include some components of a more advanced design payload, designated "E-2." The E-1 payload will test in orbit the film storage transport unit, experiemental control devices, command control system and the E-2 payload processor and readout system.

E-1 dummy payload complete; ground equipment progress is substantial.

The E-1 dummy payload is available and will be used to provide mechanical fit and electrical harness compatibility with the satellite vehicle. Fabrication and assembly of the E-1 ground handling equipment is complete.

Assembly of E-1 package is underway.

The first flyable visual reconnaissance (E-1) package, now being assembled, contains component refinements, particularly in readout, instrumentation and control.

E-2 payload goal is to achieve 20-foot ground resolution.

The design objective of the E-2 version is to achieve ground resolution of 20 feet. This payload will be controllable to permit photographing of ground objects 150 miles on either side of the flight path and 17 degrees fore or aft along the flight path. Control for a given mission will be entered into a vehicle programmer by ground station command.

E-2 payload in advanced design stage; some fabrication started.

All detail and assembly drawings for the E-2 payload camera are finished. Hardware packaging of the optical system for the 36-inch focal-length lens was accomplished and collimator testing indicates performance exceeds design specifications. (See Figure 3)

FERRET

Ferret payload provides for three progressively more sophisticated versions.

The reoriented ferret reconnaissance program provides for the development of three payloads attaining progressively advanced design consistent with maintenance of program scheduling. These payloads are designated F-1, F-2, and F-3 and will be used to intercept electronic emissions, measure and store the signal parameters, and transmit the data to ground receiving stations on command.

Ferret payload work proceeding on schedule.

All ferret payload work is proceeding on schedule. The second article of the F-1 prototype vehicle equipment was checked out completely. Qualification testing of the F-1 payload will be conducted in July. Two antenna assemblies have been completed for the F-2 payload. Assembly drawings for the F-2 payload data handling unit and ground data handling equipment have been released for fabrication.

FACILITIES AND SITES

TRACKING

Program requires extensive ground data handling network.

The SAMOS Program requires an extensive ground data handling network, including several tracking and acquisition stations and a central data processing and control facility to be located at Sunnyvale, California. Tracking stations are planned for the eastern, western, and central regions of the United States. In addition, use will be made of DISCOVERER facilities as applicable.

Control equipment being developed for tracking stations.

A study of the requirements for data obtained and required by tracking stations has resulted in the start of development of the Programmable Integrated Control Equipment (PICE) system. This equipment, installed at tracking stations, will accept and store all incoming data and make portions of the data available instantaneously. Specifications for this equipment are complete.

Construction of control center nearing completion.

Construction of the first increment of the Develppment Control Center at LMSD, Sunnyvale, California, will be completed in December 1959. Design of the second increment is scheduled for completion in July. Construction of the Data Acquisition Building is on schedule at Vandenberg Air Force Base with completion of various facilities scheduled on an incremental basis from October to December, 1959. This facility will be used to provide the readout function until the three operational stations are complete.

LAUNCH

Launch pad to be completed in September.

Construction of the SAMOS launch pad at Point Arguello, California, will be completed in September 1959.

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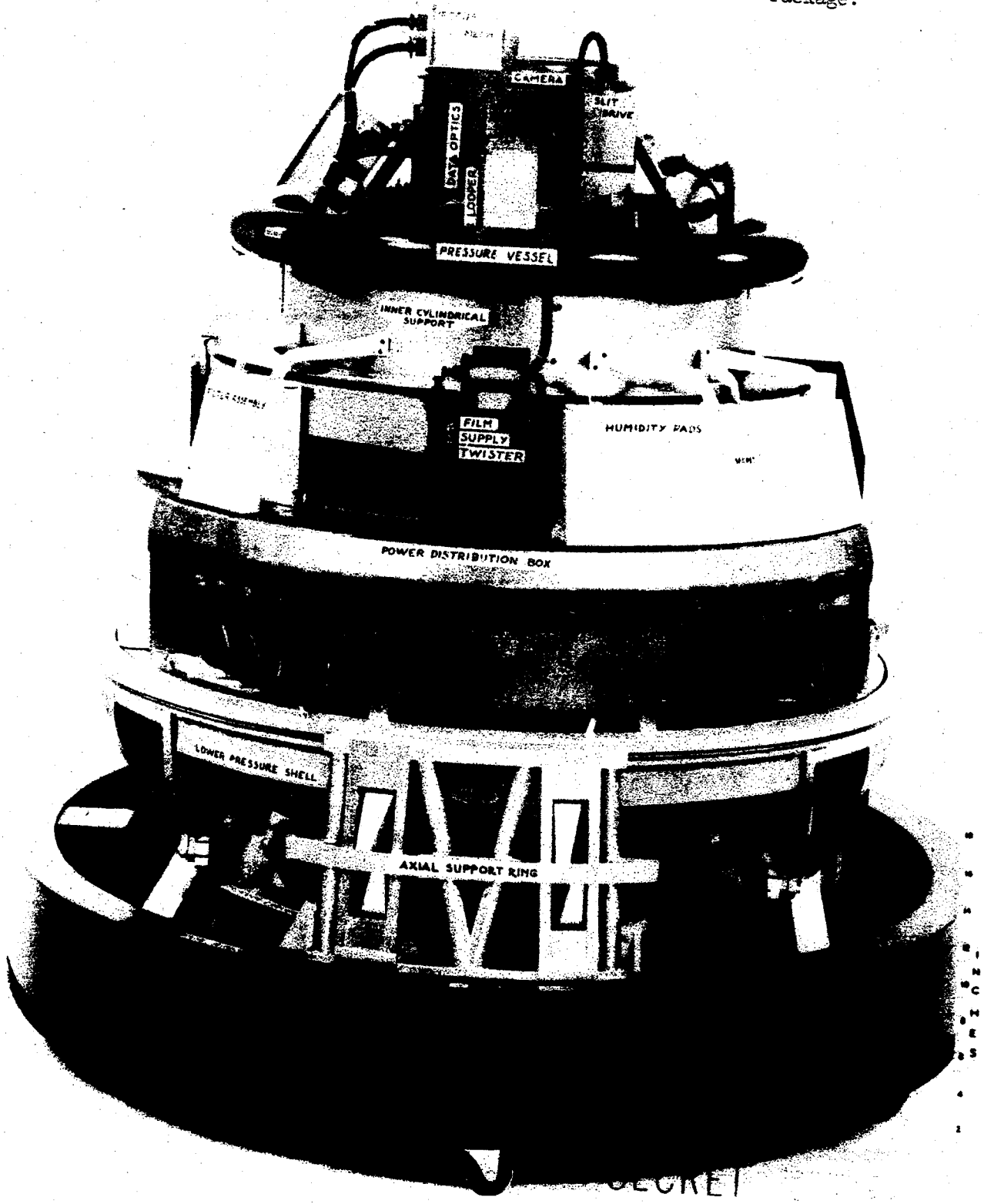
Figure 3 - Mockup of SAMOS (E-2) Visual Reconnaissance Package.



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MIDAS PROJECT

(VERY EARLY WARNING SATELLITE)

INTRODUCTION

MIDAS will provide early warning of Ballistic Missile attack.

Phase I, and a more advanced Phase II series of flights expected to follow it, are aimed toward establishing a reliable operational satellite-borne missile-alarm capability in the 1962 time period. The MIDAS (Missile Defense Alarm Satellite) Project, when operational, will place a series of satellites around the earth in polar orbits. These will carry payloads consisting of infra-red detection scanners capable of keeping watch over large areas of the upper atmosphere. Infra-red emanations from ballistic missiles being launched will be detected as the missiles rise above the atmosphere, and the alarm so given will be transmitted instantaneously to far north readout stations on the ground. Warning will then be relayed directly to the Zone of Interior intelligence and operations centers, providing maximum alert time for retaliatory forces.

FLIGHT SCHEDULE

First flight scheduled for January 1960.

The MIDAS Phase I program involves four ATLAS boosted, low-latitude, low-altitude (300 to 700 mile) flights from the Atlantic Missile Range (AMR). Hardware will be available in time to meet the originally scheduled November 1959 flight date. However, limited launching facilities to accommodate both MERCURY and MIDAS at AMR, together with delays encountered in the ATLAS D program, indicate that January 1960 is the earliest date for the first MIDAS launch.

MIDAS COMPONENT STATUS

GENERAL

First MIDAS satellite shipped to Modification Center.

All aspects of the MIDAS satellite vehicle remain on schedule. The first MIDAS satellite was shipped from Sunnyvale to the Modification and Checkout Center at Palo Alto on June 25.

PROPULSION

Development of restart engine initiated.

A simulated altitude testing program with a modified Bell XLR81-Ba-5 rocket engine was successfully completed in April 1959. (See AGENA modification, under Project TRIBE.) Authorization was then given to proceed with the design and development of a restart engine. This capability must be provided to meet the high altitude orbital requirement of the MIDAS system.

INFRA-RED SCANNERS

The first flyable infra-red undergoing test.

The first flyable infra-red scanner for use in the first Phase I flight, shown in Figure 4, was delivered early in June. The unit is undergoing tests at Lockheed prior to being installed in the satellite. A test to check for possible pick-up of S-band beacon signal by the scanner unit was successfully completed.

TRACKING AND READOUT FACILITIES

PHASE I FLIGHT

Facilities for Phase I include AMR, Palo Alto, PMR and Hawaii.

Initial Phase I flights will use the following facilities:

1. Atlantic Missile Range - Launch and readout of data from satellite in orbit.

2. AMR Down-Range Stations - Tracking during ascent and through orbit injection; readout of exit telemetry data.

3. Development Control Center (Palo Alto/Sunnyvale) - Operations control; ground presentation in real time and analysis of infra-red data.

4. Vandenberg Air Force Base - Tracking; ground presentation of infra-red data in real time, satellite interim timer command, infra-red scanner command.

5. Kaena Point, Hawaii - Tracking; infra-red data readout, satellite interim timer command, infra-red scanner command.

Targets, launched from AMR, White Sands Proving Ground, Point Mugu and Vandenberg Air Force Base, will be observed by the orbiting satellites.

ADDITIONAL READOUT SITES

Churchill and Frobisher, Canada, being considered for Northeast Atlantic readout sites.

Churchill and Frobisher, Canada, are being studied as possible sites for a readout station between those in the North Pacific and the United Kingdom.

Donnelly Flats, Alaska, selected as North Pacific readout site.

Donnelly Flats, Alaska, was selected as the site of the North Pacific readout station. Design of this facility has been completed and construction will be started during July with an expected occupancy date of June 1960.

United Kingdom site selection initiated.

Site selection for the East Atlantic station has been initiated, and it is anticipated that siting teams will visit potential areas in the United Kingdom during July.

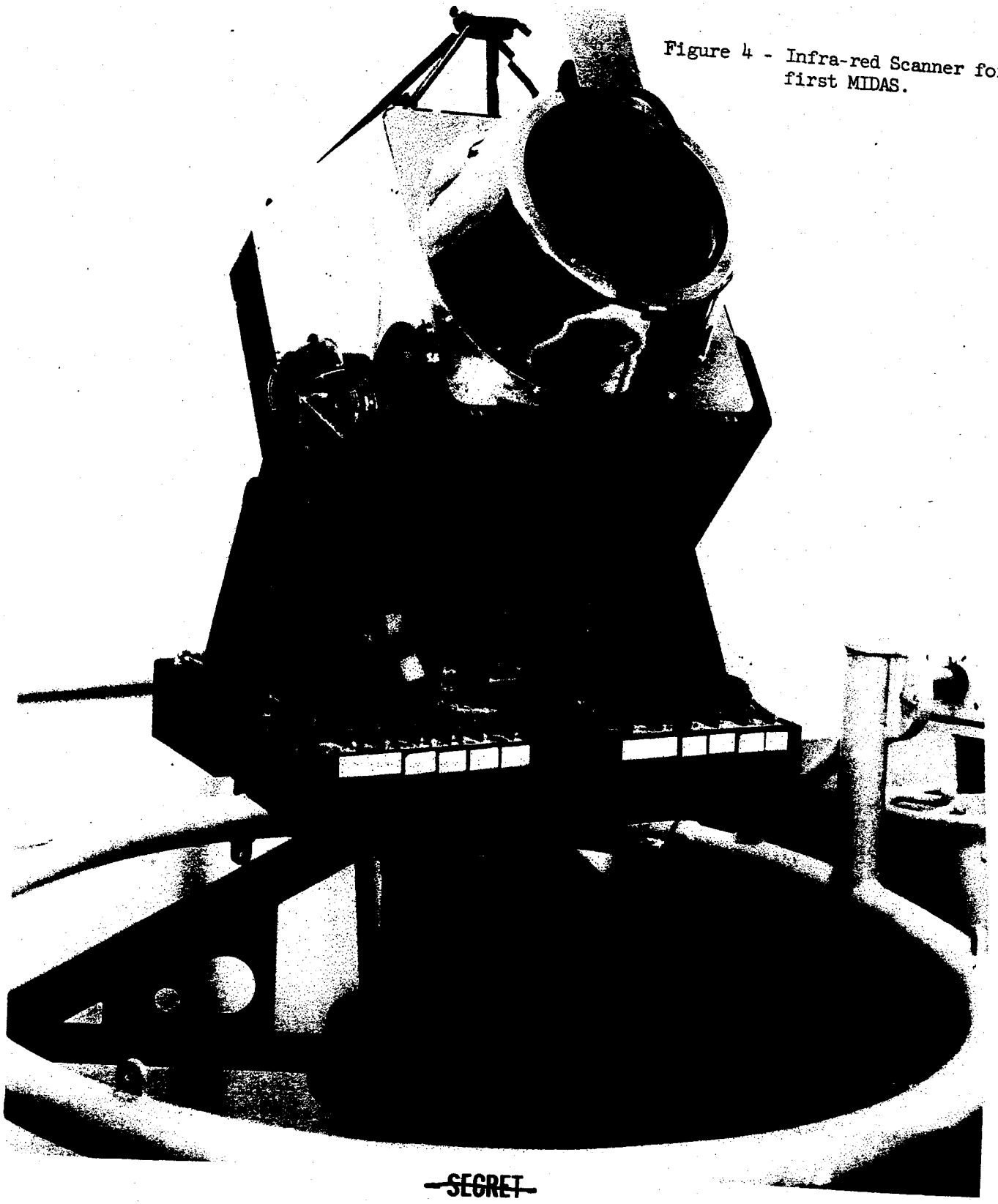

Figure 4 - Infra-red Scanner for first MIDAS.

STATUS OF FUNDS

(In Millions)

Project	Programmed FY 1959 & Prior Years Projects	FY 1959 Commitments (ARPA Orders Issued) June 30, 1959	FY 1959 Obligations As Of May 31, 1959	FY 1959 Expenditures As Of May 31, 1959
DISCOVERER	$ 136.5 1/	$ 136.5	$ 101.8	$ 61.0
SENTRY	105.6 1/	105.6	90.9	65.2
MIDAS	22.8 1/	22.8	13.6	8.2
Meteorological Satellite	12.8	12.8	7.4	5.0
Navigation Satellite	10.7	10.7	3.0	.4
Communications Satellite	16.7	16.7	2.2	1.0
Tracking	31.9	27.6	22.0	7.6
Feasibility Studies	11.5	10.5	11.3	6.7
Vehicle Development and Modification				
Clustered Engine	34.0	34.0	19.8	6.5
CENTAUR	21.5	21.5	15.8	6.5
Upper Stage Modification	2.6	2.6	.5	.1
Large Thrust Test Stand	.7	.7	.2	—
TOTAL	$ 491.4 1/	$ 402.0	$ 288.5	$ 168.2

1/ $84.1 programmed during Fiscal Year 1958 and prior years for WS 117L Program. DISCOVERER, SENTRY and MIDAS projects are an outgrowth of WS 117L.

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DOD SATELLITE LAUNCH SCHEDULE

Program	Vehicle	Launch Site	FY 1960 1959 Quarters 1 2 3 4	FY 1961 1960 Quarters 1 2 3 4	FY 1962 1961 Quarters 1 2 3 4
1. DISCOVERER	Thor-Agena	PMR	2 3 4 5	4 5 4 2	
2. Reconnaissance (SAMOS)	Atlas-Agena	PMR		2 2 2	2 2 1 2
3. Communications (NOTUS)					
a. Delayed Repeater (COURIER)	Thor-Agena	AMR		1 1	1 1
b. SAC Polar (STEER)	Atlas-Agena	PMR		1 1	2
c. Adv. Polar (TACKLE)	Atlas-Agena	PMR			1 2
4. Navigation (TRANSIT)					
Transit I	Thor-Delta 1/	AMR	1	1	
Transit II	Thor-104	AMR		1 1	
Transit III	—	PMR			2/
Transit IV	—	PMR			2/
5. Early Warning (MIDAS)					
Phase I	Atlas-Agena	AMR		2 1 1	
Phase II	Atlas-Agena	PMR			1 1
6. SATURN	SATURN	AMR	3/	1 4/	1 4/

1/ Launch scheduled first quarter 1960 will use Thor-104.
2/ Payloads planned to be launched with some other programmed payload.
3/ Static test firing at ABMA.
4/ Launch of vehicle with dummy upper stage but without payload.

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