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AIR FORCE BALLISTIC MISSILE DIVISION (AFDC)
UNITED STATES AIR FORCE
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Los Angeles 45, California



WDLPM-4

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FINAL ARPA MILITARY SATELLITE PROGRESS REPORT

FOREWORD

Attached are the reports for the DISCOVERER, SANDS, and MIDAS Programs covering the period that Air Research and Development Command managed these programs for the Advanced Research Projects Agency. These reports are submitted in accordance with ARPA Order No. 41-60, Amendment No. 3. Financial status as of 31 July 1960 is included in these reports.

O. J. MITLAND
O. J. MITLAND
Major General, USAF
Commander



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DISCOVERER PROGRAM

1. This report, covering the period that Air Research and Development Command managed this program for the Advanced Research Projects Agency, is submitted in accordance with ARPA Order No. 41-60, Amendment No. 3, dated 10 June 1960.

2. PROGRAM HISTORY

a. ARPA Orders

The original fifteen ARPA funded flights for Weapon System 117L were established under ARPA Order 17-59, dated 4 September 1958. The THOR-boosted (DISCOVERER) portion of Weapon System 117L was separated from that program by ARPA Order No. 48-59, dated 16 December 1958. The DISCOVERER Development Plan for a thirteen flight program was approved by Amendment No. 2 to ARPA Order No. 48-59, dated 24 March 1959. April Development Plan calling for a twenty-five vehicle program was authorized by Amendment No. 4 to ARPA Order No. 48-59, dated 25 May 1959. The program was expanded to include twenty-nine vehicles by Amendment No. 6 to ARPA Order No. 48-60, dated 20 July 1959. Program responsibility for DISCOVERER was transferred from ARPA to the Department of the Air Force by Amendment No. 8 to ARPA Order No. 48-60, dated 3 December 1959.

b. Contracts

(1) Work on the DISCOVERER Program was conducted at Lockheed Missile and Space Division under Letter Contract AF04(647)-181 issued on 16 January 1958. This contract was definitized by Supplemental Agreement No. 10 to AF04(647)-97 on 6 January 1959 and covered the period through 30 June 1959. Letter Contract AF04(647)-347 issued 1 July 1959 was definitized by AF04(647)-558 on 3 May 1960 and covered the period from 1 July 1959 to 31 March 1961.

(2) Douglas Aircraft Company modified ten SM-75 missiles to WS-117L boosters under Letter Contract (designated supplemental agreement No. 15) to Contract AF04(645)-65 issued 2 April 1958. This contract was definitized by Supplemental Agreement No. 52 on 29 October 1959. Amendment No. 2 to Letter Contract AF04(645)-65 called for the modification of nine additional missiles.

(3) Rocketdyne Division of North American Aviation produced booster engines under Supplemental Agreement No. 10 to Contract AF04(645)-2 and under Letter Contract AF04(647)-167 dated 22 March 1959. Contract AF04(647)-167 was definitized in Contract AF04(647)-287 on 29 June 1959.

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c. Progress

(1) Nine DISCOVERER vehicles were prepared for flight during the period of ARPA responsibility, eight of which were successfully launched. One vehicle was damaged during countdown because of premature firing of AGENA pyrotechnics. Orbital capability was satisfactorily demonstrated on six flights. THOR booster performance was excellent on all eight flights. Approximately 78 percent of the primary and all of the secondary and tertiary objectives were achieved.

(2) The recovery rehearsal conducted in conjunction with the DISCOVERER I operation satisfactorily culminated training operations. Although not required to attempt recovery on four DISCOVERER flights, the recovery force was operationally ready for the recovery operation. Recovery operations for DISCOVERER V, VI and VIII flights were conducted satisfactorily with the exception of capsule recovery. During the DISCOVERER VIII operation, capsule beacon signal contact was made by all C-119 pickup aircraft.

(3) The system of tracking and control stations, including the Palo Alto computer, Interim Development Control Center, and the communications network have demonstrated over-all satisfactory performance. Procedural changes, including more thorough R-F frequency protection, have improved the coverage and quality of tracking data as well as command reliability.

3. PROGRAM STATUS

The DISCOVERER Program under ARPA's direction went through numerous changes in program objectives and funding. During this same period a great deal of progress was made. The reliability of the DISCOVERER vehicle was established, ground support capability was developed, and other program objectives, except recovery of the capsule were met.

4. FUNDING

a. The following funds were provided by ARPA during its period of responsibility for the DISCOVERER Program:

<u>ARPA Order</u>	<u>Amendment No.</u>	<u>Date</u>	<u>Cumulative Funding (Millions of Dollars)</u>
48-59	1	16 Feb 59	104.3
	4	20 May 59	121.9
	5	23 Jun 59	132.3
	6	20 Jul 59	132.55
	7	8 Oct 59	147.55
	8	3 Dec 59	132.30*


* 15.25 reduction in funds

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<u>Status:</u>	<u>31 December 1959</u>	<u>31 July 1960</u>
Program	132,300,000	
Initiations	130,931,987	
Commitments	130,931,987	
Expenditures	124,435,989	

b. ARPA Order No. 60-59, dated 17 February 1959, provides \$1.1 million for the DISCOVERER telemetry ship.

<u>Status:</u>	<u>31 December 1959</u>	<u>31 July 1960</u>
Program	1,100,000	
Initiations	998,122	
Commitments	998,122	
Obligations	998,122	
Expenditures	484,417	

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SAMOS PROGRAM

1. This report, covering the period that Air Research and Development Command managed this program for the Advanced Research Projects Agency, is submitted in accordance with ARPA Order No. 41-60, Amendment No. 3, dated 10 June 1960.

2. PROGRAM HISTORY

a. ARPA Orders

ARPA Order No. 9-58, dated 30 June 1958, announced that direction of the Weapon System 117L Program had been assigned to ARPA. ARPA Order No. 38-59, dated 5 November 1958, separated the Infrared Reconnaissance Development (MIDAS) from the basic program. On 1 December 1958, ARPA proposed a reorientation of the Weapon System 117L Program as a result of the ARPA being provided with the consolidated SENTRY intelligence requirements by the Air Force. Amendment No. 11 to ARPA Order No. 9-58, dated 14 April 1959, gave qualified approval of the 30 January SENTRY Development Plan. In June, under ARPA direction, the development of mapping and charting capabilities was deleted from the SENTRY Program. Work on the SENTRY recovery program was deferred because of funding limitations. On 7 August instructions were received from ARPA to change the program name from SENTRY to SAMOS. Program responsibility for SAMOS was transferred from ARPA to the Department of the Air Force on 17 November 1959.

b. Contracts

(1) Lockheed Missile and Space Division has performed work under Contract AF04(647)-97, dated 22 January 1958 (complete as of 1 July 1959); Contract AF04(647)-347, dated 1 March 1959; and Amendment No. 1 to that contract dated 1 July 1959.

(2) Rome-Woldridge is working on portions of the Data Processing Subsystem under Contract AF30(602)-1814.

(3) Massachusetts Institute of Technology has completed development work on the guidance system under Contract AF30(647)-183.

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3. PROGRAM STATUS

The SAMOS Program under ARPA's direction went through several reorientations. Limitations of funding also hampered the program. However, development of the payloads, design and assembly of ground support equipment, and construction of facilities continued.

4. FUNDING

a. The following funds were provided by ARPA for the R&D SAMOS Program during its period of responsibility:

<u>ARPA Order</u>	<u>Amendment No.</u>	<u>DATE</u>	<u>Cumulative Funding (Millions of Dollars)</u>
9-58		30 Jun 58	22.7
	1	17 Jul 58	30.7
	2	4 Aug 58	50.7
	3	25 Aug 58	70.7
	4	25 Sep 58	136.2
	7	19 Jan 59	148.2
	8	16 Feb 59	96.6*
	12	1 Jul 59	118.2
	13	30 Jul 59	135.6
	14	27 Aug 59	147.6
	15	8 Oct 59	167.6
	16	3 Dec 59	96.6**

* 51.6 reduction in funds

** 71.0 reduction in funds

Status:

	<u>31 December 1959</u>	<u>31 July 1960</u>
Program	96,600,000	
Initiations	95,841,662	
Commitments	95,841,662	
Obligations	92,819,864	
Expenditures	90,482,426	

b. The following funds were provided by ARPA for SAMOS facility construction:

<u>ARPA Order</u>	<u>Amendment No.</u>	<u>DATE</u>	<u>Cumulative Funding (Millions of Dollars)</u>
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Status:

31 December 1959

31 July 1960

Program	9,000,000
Initiations	9,000,000
Commitments	9,000,000
Obligations	8,800,900
Expenditures	2,666,748



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MIDAS PROGRAM

1. This report, covering the period that Air Research and Development Command managed this program for the Advanced Research Projects Agency, is submitted in accordance with ARPA Order No. 41-60, Amendment No. 3, dated 10 June 1960.

2. PROGRAM HISTORY

a. ARPA Orders

AFRD on 17 September 1958 recommended that Subsystem G of Weapon System 117L be accelerated and published an Attack Alarm Development Plan. ARPA Order No. 38-59 dated 5 November 1958 directed that the study and development being conducted as Subsystem G of Weapon System 117L be established as a separate development program and identified as the Missile Defense Alarm Satellite (MIDAS). In response to ARPA Order No. 38-59, a Missile Defense Alarm Development Plan was presented by AFRD in January 1959. Amendment No. 7 dated 26 August 1959 to ARPA Order No. 38-59 directed reprogramming to accommodate launches 3 and 4 from Vandenberg Air Force Base beginning July 1960. Program responsibility for MIDAS was transferred from ARPA to the Department of the Air Force on 17 November 1959, by memorandum from the Secretary of Defense.

b. Contracts

(1) Lockheed Missiles and Space Division has performed work under Contract AF04(647)-97, dated 22 January 1959; Letter Contract AF04(647)-347, dated 1 July 1959; Contract AF04(647)-364, dated 3 May 1960 which defined the MIDAS portion of the -347 contract; and Contract AF04(647)-395, dated 1 August 1960 covering the communications and control portion of the -347 contract.

(2) The program (communications and control) of Contract AF04(647)-347 was subcontracted by Lockheed Missiles and Space Division under Letter Contract AF04(647)-395, dated 1 January 1960.

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but efforts were limited by ARPA to the support of Phase I launches only. Lack of full approval and firm financial status resulted in inability of AFSSD to maintain the schedule presented in the Development Plan.

3. PROGRAM STATUS

The NASA/ARPA agreement on the use of AMR stand 14 for Project MERCURY launches resulted in revised scheduling for MIDAS Phase I launches 3 and 4. Insufficient funding and consequent program stretch-out, resulted in rescheduling MIDAS launches 3 and 4 to October 1960 and February 1961, respectively. At the time of transfer the program was proceeding on a limited basis with the first launch scheduled in January 1960.

4. FUNDING


The following funds were provided by ARPA during its period of responsibility for the MIDAS Program:

<u>ARPA Order</u>	<u>Amendment No.</u>	<u>Date</u>	<u>Cumulative Funding (Millions of Dollars)</u>
38-59		5 Nov 58	.750
	1	2 Mar 59	8.0
	3	16 Apr 59	10.80
	4	20 May 59	22.80
	5	1 Jul 59	27.05
	6	30 Jul 59	31.05
	7	26 Aug 59	35.05
	8	8 Oct 59	42.55
	9	20 Oct 59	40.80*
	10	3 Dec 59	22.80**

* 1.75 reduction in funds

**18.00 reduction in funds

Of the above funding, expenditures were limited by ARPA to efforts supporting Phase I R&D, except for \$2,600,000 which was authorized for urgent lead time procurement of boosters, vehicles, and engines under Phase II of the R&D program.

<u>Status</u>	<u>31 December 1959</u>	<u>31 July 1960</u>
Program	22,800,000	
Initiations	22,719,265	
Commitments	22,719,265	
Obligations	22,700,957	
Expenditures	19,822,904	

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