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VOLUME ONE

~~CONFIDENTIAL~~

AGENA FLIGHT HISTORY

DRAFT

AS OF
31 DECEMBER 1967

1149

JUNE 1969

HISTORICAL DIVISION
OFFICE OF INFORMATION
SPACE AND MISSILE SYSTEMS ORGANIZATION
AIR FORCE SYSTEMS COMMAND

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DRAFT

AGENA FLIGHT HISTORY

as of

31 December 1967

Volume 1

Prepared
by

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June 1969

SAMSO

OFFICE OF INFORMATION

HISTORICAL DIVISION

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FLIGHT SUMMARY OF THE AGENA VEHICLE

INTRODUCTION

This Agena Flight History was originally prepared as an Appendix to the Agena History. Inasmuch as the publication date of the Agena History remains uncertain, it was decided that a consolidated record of all Agena flights, along with appropriate technical data, would, as a published document, constitute a useful source of Agena technical history and flight information.

The Agena satellite vehicle program, stimulated, in part, by captured German technical data which the military forces unearthed in the fall of 1945, led to a 1946 study titled, "Project RAND, Satellite Vehicle." The Air Force continued the study as an interesting area of research but, for a number of years the project was either quiescent or without substantial support.

The door to Air Force exploration of this whole new frontier of technology was opened wider by General H. H. Arnold who was among the first to clearly see the need for an Army Air Force long range research and development planning program. General Arnold was the first to propose a way to finance the program, and the Douglas Aircraft Company, Santa Monica, California, gave a home to the operation during its early years. Finally, in 1948, with financial support from the Ford Foundation, The RAND (for research and development) Corporation was

formed as an independent nonprofit research organization.

The Douglas Aircraft Company, Inc., had published a series of Project RAND reports on 1 February 1947, and on 1 March 1954, the RAND Corporation, after studying the project for several years, released a report under the nickname "Feed Back." On 14 September 1954, the Air Research and Development Command (established in January 1950) issued Project Development Directive No. 1115, which directed that Wright Air Development Center (WADC), Dayton, Ohio, assume primary responsibility for development of an advanced reconnaissance system.

The project received the unclassified title of an "Advanced Reconnaissance System" (ARS) on 8 January 1954 and, as well, the name of Project MX-2226 which was designated Weapon System No. 117L as set forth in Air Research and Development Command (ARDC) System Requirement (SR) No. 5, 29 November 1954. SR No. 5 also directed ARDC Centers support industry in the conduct of System design studies on the ARS.

In the meantime, ARDC established Western Development Division at Los Angeles, California, effective 1 July 1954, with Brigadier General Bernard A. Schriever, in command. The Air Force had assigned to ARDC the Atlas

(WS 107A) development and test, which in turn ARDC assigned to the Western Development Division. Before June 1952, a requirement had been "established for the concurrent availability of a reconnaissance system to satisfy pre-strike, strike and post-strike intelligence needs for the Atlas program."

Three contractors, selected by higher headquarters on basis of their technical competence and other factors which would tend to qualify them for follow-on procurement, submitted 117L proposals and in June 1955 were awarded contracts to conduct design studies and submit technical reports and a system development plan. The three contractors were:

Glen L. Martin Company - Contract AF 33(616)-3106
Lockheed Aircraft Corporation, MSD - Contraft AF 33(616)-3105
Radio Corporation of America - Contract AF 33(616)-3104

A fourth contractor selected, Bell Telephone Labs, declined a contract.

On 16 March 1955 the Department of the Air Force issued General Operating Requirement for a Strategic Reconnaissance Satellite Weapon System. Based on the new requirement, ARDC reissued System Requirement No. 5 on 17 October 1955, in which the seven ARDC Centers were directed to participate in preparation of a system development plan with WDD as the responsible agent for preparation of the plan by 1 April 1956.

WDD established an office of Assistant for Weapon System 117L on 6 February 1956 with Colonel Otto J. Glasser as Acting Assistant and Navy Commander Robert C. Truax as the Acting Deputy Assistant. On 5 March 1956 WDD issued Special Order No. 6 appointing a joint ARDC/WDD/WADC/Air Materiel Command Contractor Evaluation Board to review, before 20 March 1956, the various design studies and proposals relating to research and development of WS 117L.

Air Force headquarters approved WS 117L development plan, submitted on 2 April 1956, and advised ARDC to announce selection of the contractor but to withhold contractual action for system development until Fiscal Year 1957 funding questions had been resolved.

WDD notified the winner and losing contractors on 25 May 1956, and on 12 June issued a Contract Change Notice (CCN), financed with $322,245 of Project 1115 funds to extend Lockheed Aircraft Corportion's (the winning contractor) contract to 1 October. The Air Force awarded a WS 117L letter contract, AF 04(647)-95 to Lockheed on 29 October 1956.

The serious intent of the Department of Defense and the Air Force to advance the ARS concept to a developed system was also reflected in the action of the Secretary of Defense Scientific Advisory Committee on Ballistic Missiles. In its fourth meeting, 16-18 July 1956, at WDD, the committee recommended approval of the WS 117L program. The approval did not include the system's booster because its development would interfere, at that point in time, with the ICBM development program.

As the satellite surveillance concept gained support Air Force headquarters issued documentary directives defining program objectives and assigning responsibilities. On 3 August 1956 Air Force headquarters issued Development Directive No. 85 for a Weapon System 117L Advanced Reconnaissance System possessing those qualities defined in General Operational Requirement (GOR) No. 80 (SA-2c), 16 March 1955. In addition, the directive assigned a 1A priority to the program. On 17 August 1956, ARDC issued Systems Development Directive, assigning primary responsibility for implementation and execution of the 117L Development Plan to WDD with the seven ARDC Centers responsible for technical and/or test support.

Despite approvals and a 1A priority rating, lack of adequate funding remained a problem. Even after Russia orbited its Sputnik on 4 October 1957, and program acceleration had been directed, the program was constantly beset by shortages of funds.

(G/Gp-3) The Secretary of Defense established the Advanced Research Projects Agency (ARPA) within his department on 7 February 1958. Effective 19 May 1958, the Secretary of Defense transferred responsibility for WS 117L to ARPA, after which ARPA changed the name of the program from WS 117L to "Sentry" and specified that "neither the name or the project is to receive any publicity without clearance through ARPA." ARPA issued Order No. 9-58 on 30 June 1958, assuming responsibility for the Advanced Reconnaissance System. The fund situation did not improve, and the Air Force did not regain responsibility for the program until 1959, more than one year after ARPA redefined the program into three different projects: (1) Discoverer-Thor, (2) MIDAS and (3) SAMOS.

(C/Gp-3) The original WS 117L satellite vehicle system included the following subsystems:

A. Vehicle
B. Propulsion
C. Auxiliary Power
D. Guidance and Control
E. Visual Reconnaissance
F. Electronic Reconnaissance
G. Infrared Reconnaissance
H. Ground-Space Communications (Described in Design Study as Subsystem H, Vehicle Electronics and Subsystem J, Vehicle Intercept and Control Ground Station)
I. Data Processing
J. Geophysical Environment Data
K. Personnel Operations

Subsystem L, Biomedical Recovery Capsule, was added for the early Discoverer launches.

The upper stage or orbital vehicle stage of the system, composed of Subsystems A, B, C, D, and H, and the Thor booster (modified to function as the first stage thrust device for the upper stage), was designated as a program to use a large satellite vehicle capable of carrying diverse payloads in either satellite or space probe operations.

The Agena propulsion unit was derived from an engine developed to power a pod attachment originally conceived as an addition to the Air Force B-58 Hustler bomber. The Air Force dropped the powered pod attachment idea and design and fabrication of the engine, designated XLR-81, covered

by subcontract, AF 33(038)-21250, between Convair and Bell Aircraft Corporation, was partially terminated in 1957. It was found that most of the termination inventory that had become surplus to the needs of the government, was useable under the WS 117L contract. Consequently the Air Force turned its XLR-81 engine inventory over to Lockheed Aircraft Corporation as Government Furnished Property under terms amendment No. 6 to Letter Contract AF 04(647)-*

The Agena acquired its name in June 1959 when ARPA announced that name designations such as Discoverer Vehicle or Bell Hustler for the upper stage or orbital vehicle designed around the XLR-81 engine were inappropriate. Therefore ". . . the Lockheed developed orbital stages built around the Bell engine will be designated AGENA, repeat, AGENA. Agena comprises the basic vehicle configuration and the Bell engine in its single or dual burn versions."

At about the same time ARPA requested the Commander, Air Force Ballistic Missile Division (AFBMD)--Western Development Division had been renamed effective 1 May 1957--to modify the Bell-Hustler engine as Task No. 3, ARPA Order No. 17. The task was later deleted from ARPA Order No. 17 and continued as a separate project under ARPA Order No. 96, dated 1 July 1959.

* See Agena Document No. 5

AFBMD then established a separate satellite directorate to manage the Agena program.

The Discoverer-Thor Project was the continuation of the accelerated and augmented Bio-Medical/Thor boosted portion of the redefined WS 117L Program designed to support manned space exploration that had been approved early in 1958 after the Sputnik achievement.

Three live mice were launched and lost in a biomedical recoverable capsule, referred to as a "Life Support System," but a scheduled and rescheduled launch of a primate was finally abandoned inasmuch as the Man-In-Space program had been transferred to the civilian agency, National Astronautics and Space Administration (NASA) that had been established on 10 October 1958. Any remaining bioastronautical aspects of the program were eventually transferred to the Manned Orbiting Laboratory program that was canceled on 10 June 1969.

ARPA issued Order No. 48-59 on 16 December 1958 that directed that "The study, development, and launch operations associated with the Thor program, heretofore included in AR A Order No. 9-58 for the Sentry Program" be continued as an independent project identified as the unclassified Discoverer-Thor Project.

After 78 launches, including the biomedical launches, Under Secretary of the Air Force directed the Discoverer program (by that time identified as Program 162, in accordance with Special Security Procedures for Military Space Programs and Projects) be terminated effective 30 April 1964. All remaining resources were transferred either to Space Systems Division (AFBMD had become SSD on 1 April 1961) or Secretary of the Air Force Special Projects organization.

Program 162 was the second of the three programs that were transferred.

(C/Gp-3) SAMOS, composed of the Agena Vehicle, Subsystems E, F and I and an Atlas booster was the first of two of the redefined projects to be transferred from Air Force Ballistic Missile (ARDC) management. The original WS 117L after being renamed Sentry, later became SAMOS (Satellite and Missile Observation System). ARPA retained responsibility for SAMOS and provided its direction by amendments to ARPA Order No. 9-58 until the Secretary of Defense transferred the SAMOS development Program to the Secretary of the Air Force on 17 November 1959. ARPA released responsibility by Amendment 16 to the Order.

Before there had been one SAMOS launch, Secretary of the Air Force Dudley C. Sharp established the Office of Missile and Satellite Systems in the Office of the Secretary of the Air Force. Effective the same date, Secretary Sharp designated Brigadier General Robert E. Greer, Assistant Chief for Guided Missiles, Director of the SAMOS Project, with additional duty as Vice Commander for Satellite Systems, Air Force Ballistic Missile Division, ARDC, with duty station at 2400 East El Segundo Boulevard, El Segundo, California, the present location of Space and Missiles Systems Organization, and the present designation for the organization that was once Western Development Division, ARDC.

The security policy on release of public information pertaining to SAMOS became very strict. However the the first three SAMOS launches were unclassified launches, and for that reason (even though SAMOS acquired a program number though not generally known) all SAMOS launches have been shown without the program number.

(C/Gp-3) The third of the three programs was MIDAS (Missile Defense Alarm System). On 5 November 1958, ARPA issued ARPA Prder No. 38-59 which Separated the Infrared Reconnaissance (Subsystem G) from the basic WS 117L.

(C/Gp-3) In accordance with Special Security Procedures for Military Space Programs and Projects, MIDAS became Program 461. In addition to the twelve Atlas boosted flights, there were piggy-back experiments carried on Discoverer flights.

Two other programs evolved under Space Systems Division management.

One was Snap Shot, an Atomic Energy Commission Program, the aftermath of Nuclear Auxiliary Power considered in 1956 for Project 1115. One Snap Shot payload was launched on an Agena boosted by an Atlas on 3 April 1965.

The other, a joint AEC/DOD effort, the Vela Hotel Program managed under provision of ARPA Order No. 102-60 and amendments, was designed to develop satellites to detect atmospheric nuclear events. Six spacecrafts, were launched two at a time aboard Atlas/Agena vehicles.

On 18 October 1967, the Assistant Secretary of the Air Force, Research and Development, directed all Agena activities at Space and Missiles Systems Organization (SSD became SAMSO effective 1 July 1967) be transferred from SAMSO to Secretary of the Air Force Special Projects Office.

Except for the programs noted above all other Agena launches were either NASA or Secretary of the Air Force Special Projects Office flights.

Part I, with the exception of minor changes was prepared by combining Lockheed Missile and Space Company Flight Summary Reports, LMSC-B001085-9, 15 September 1967, and LMSC-B001085-10, 15 March 1958.

Part II, with the exception of minor changes was prepared by combining and rearranging pages from Lockheed Missile and Space Company Agena Flight Summary Reports, LMSC-B111995-1, 15 December 1956, LMSC-B001085-8, 15 March 1967, and LMSC-B001085-10, 15 March 1968.

The appendices, with the exception of C, D, and F, which are much the same as three tables contained in Lockheed Missile and Space Company Agena Flight Summary Report, LMSC-B001085-10, were accomplished by Mrs. Sarah A. Grassly.

SAG
June 1969

PART I

AGENA FLIGHT PERFORMANCE

FLIGHT RESULTS, SUBSYSTEM AND EQUIPMENT FAILURES

Part I lists Agena flight performance for all launching through 31 December 1967. The five subsystems have been used for summarizing catastrophic and minor failures and for describing the equipment malfunctions. These subsystems consist of the following major elements:

a. Subsystem A: Spaceframe
   - Main body
   - Booster adapter
   - Destruct
   - Pyrotechnics

b. Subsystem B: Propulsion
   - Propellant feed and load
   - Propellant pressurization equipment
   - Main rocket engine
   - Ullage rockets
   - Retarding rockets
   - Secondary propulsion system

c. Subsystem C: Electrical Power
   - Power components
   - Primary power equipment
   - Electrical distribution
   - Solar power equipment

d. Subsystem D: Guidance and Control
   - Flight control electronics
   - Hydraulic equipment
   - Pneumatic attitude control equipment
   - Inertial reference package
   - Horizon sensor

Velocity meter
Primary J-box
Secondary J-box

e. Subsystem C and C: Communications and Control (Formerly Sybsystem H)
Tracking and command control
Special telemetry
Status telemetry
Data links
Antennas and RF equipment

The subsystem associated in Part I with each ascent or orbit failure is either the one which was responsible for, or the one which was most affected by, the catastrophic failure. This Part also indicates the Agena subsystems affected by degradation failures. Catastrophic failures have been defined as events which result in either ascent-phase or orbit-phase failure (indicated by an "F" in Part I). Degradation failures are events which do not prevent a successful ascent-phase or orbit-phase operation. The shorter terms "Electrical" (for Electrical Power), "Guidance" (for Guidance and Control), and "Communications" (for Communications and Control) have been used in Part I.

AGENA FLIGHT PERFORMANCE

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No.	Agena Vehicle Type	First-Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
1	2-28-59	1022	A	SLV-2	S	(*)		Orbit life was very short due to low injection angle. No radar or telemetry signals were received.	Guidance; Communications
2	4-13-59	1018	A	SLV-2	S	S		Success because major objectives were met. Performance degradation due to engine cut-off prior to integrator command.	Propulsion; Communications
3	6-3-59	1020	A	SLV-2	F	NT	Propulsion	Ascent failure--engine performance deficient.	
4	6-25-59	1023	A	SLV-2	F	NT	Propulsion	Ascent failure--engine performance deficient.	
5	8-13-59	1029	A	SLV-2	S	S		Success because major objectives were met. Improper satellite attitude. Low engine impulse.	Propulsion; Guidance
6	8-19-59	1028	A	SLV-2	S	F	Guidance	Orbit failure--horizon scanner malfunction.	
7	11-7-59	1051	A	SLV-2	S	F	Electrical	Orbit failure-400-cps 3-phase inverter failed.	

(*) Considered a "no try" because mission objective did not include orbital functions or recovery. Data indicate orbit attained.

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No.	Agena Vehicle Type	First-Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
8	11-20-59	1050	A	SLV-2	S	F	Guidance	Orbit failure--control gas exhaustion and integrator-accelerometer malfunction.	
9	2-4-60	1052	A	SLV-2	NT	NT		SLV-2 booster failed; Agena had no opportunity to operate.	
10	2-19-60	1054	A	SLV-2	NT	NT		SLV-2 destructed by Range Safety	
11	2-26-60	1008	A	LV-3A	F	NT	Electrical	Ascent failure--destruct electrical system malfunction.	
12	4-15-60	1055	A	SLV-2	S	S			
13	5-24-60	1007	A	LV-3A	S	S		Success because major objectives were met. Satellite unstable in orbit; lost communications.	Guidance; Communications
14	6-29-60	1053	A	SLV-2	F	NT	Guidance	Ascent failure--horizon scanner put satellite at incorrect flight path for injection.	
15	8-10-60	1057	A	SLV-2	S	S			
16	8-18-60	1056	A	SLV-2	S	S		Unstable attitude.	Guidance
17	9-13-60	1058	A	SLV-2	S	F	Guidance	Orbit failure--control gas depletion.	

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No.	Agena Vehicle Type	First-Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
18	10-11-60	2101	A	LV-3A	F	NT	Guidance	Ascent failure--control gas loss at launch.	
19	10-26-60	1061	S-01	SLV-2	F	NT	Guidance	28 VDC transient caused D-timer switch-off.	
20	11-12-60	1062	S-01	SLV-2	S	S			
21	12-7-60	1103	S-01	SLV-2	S	S			
22	12-20-60	1101	S-01	SLV-2	S	F	Guidance	Orbit failure--loss of control gas on first orbit.	
23	1-31-61	2102	A	LV-3A	S	S		Success because major objectives were met. Inverters and wide-band data link malfunctions.	Electrical; Communi-cations
24	2-17-61	1104	S-01	SLV-2	S	F	Communi-cations	Orbit failure--H-timer malfunction.	
25	2-18-61	1102	S-01	SLV-2	S**	S			
26	3-30-61	1105	S-01	SLV-2	F	NT	Guidance	Ascent failure--hydraulic system failure.	
27	4-8-61	1106	S-01	SLV-2	S	F	Guidance	Orbit failure--control gas loss.	
28	6-8-61	1108	S-01	SLV-2	F	NT	Propulsion	Ascent failure--fuel line leak.	
29	6-16-61	1107	S-01	SLV-2	S	S			

** Dual Burn

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No.	Agena Vehicle Type	First-Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
30	7-7-61	1109	S-01	SLV-2	S	S			
31	7-12-61	1201	S-01	LV-3A	S**	F	Electrical	Orbit failure--solar array malfunction.	
32	7-21-61	1110	S-01	SLV-2	NT	NT		Severe booster oscillations, resulting in automatic destruct of the S-01.	
33	8-3-61	1111	S-01	SLV-2	F	NT	Guidance	Ascent failure--hydraulic system failure.	
34	8-23-61	6001	S-01	LV-3A	F**	NT†	Propulsion	Ascent failure--pressure switch malfunction.	
35	8-30-61	1112	S-01	SLV-2	S	S			
36	9-9-61	2120	S-01	LV-3A	NT	NT		Booster engine failure at liftoff.	
37	9-12-61	1113	S-01	SLV-2	S	S			
38	9-17-61	1114	S-01	SLV-2	S	F	Electrical	Orbit failure--electric power malfunction.	
39	10-13-61	1115	S-01	SLV-2	S	S			
40	10-21-61	1202	S-01	LV-3A	S**	F	Guidance	Orbit failure--control gas exhaustion.	
41	10-23-61	1116	S-01	SLV-2	F	NT	Guidance	Ascent failure--hydraulic system failure.	

** Dual Burn

† Short mission flight (includes NASA probes)

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AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No.	Agena Vehicle Type	First-Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
42	11-5-61	1117	S-01	SLV-2	S	F	Guidance	Orbit failure--loss of control gas by 8th orbit.	
43	11-15-61	1118	S-01	SLV-2	S	S			
44	11-18-61	6002	S-01	LV-3A	F**	NT†	Guidance	Ascent failure--rolling vehicle at separation.	
45	11-22-61	2202	S-01	LV-3A	NT	NT		Booster guidance failure caused attitude deviation exceeding S-01 recovery capability.	
46	12-12-61	1119	S-01	SLV-2	S	S			
47	12-22-61	2203	S-01	LV-3A	S	F	Communications	Orbit failure--command programmer went to recovery mode on 6th orbit.	
48	1-13-62	1120	S-01	SLV-2	F	NT	Electrical	Ascent failure--electrical transient at separation.	
49	1-26-62	6003	S-01	LV-3A	NT	NT†		Personnel error in calculations resulting in velocity meter incorrect calibration.	Guidance

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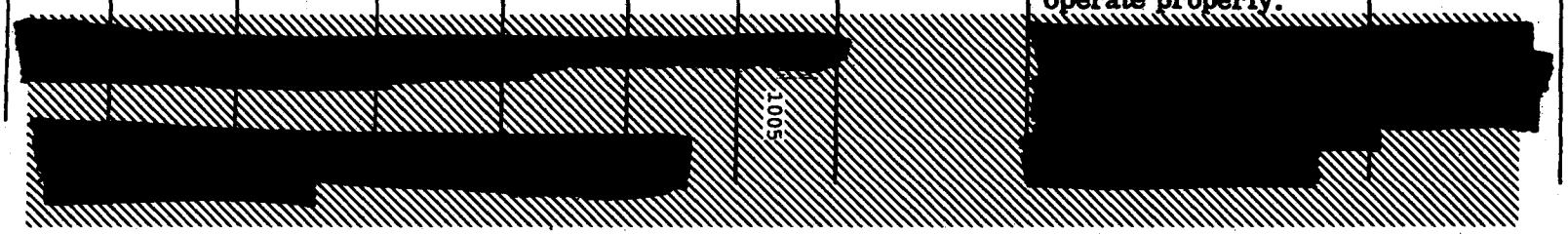
AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No.	Agena Vehicle Type	First-Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
51	2-27-62	1123	S-01	SLV-2	S	S			
52	3-7-62	2204	S-01	LV-3A	S	F	Guidance	Orbit failure--control gas exhaustion on 22nd orbit.	
53	4-9-62	1203	S-01	LV-3A	S**	F	Electrical	Orbit failure--loss of stability on 7th orbit.	
54	4-17-62	1124	S-01	SLV-2	S	S			
55	4-23-62	6004	S-01	LV-3A	S**	S†			
56	4-26-62	2401	S-01	LV-3A	S	S		Success because major objectives were met. Retro-rocket engine thrust misalignment. Excessive control gas usage.	Propulsion; Guidance
57	4-28-62	1125	S-01	SLV-2	S	S			
58	5-15-62	1126	S-01	SLV-2	S	S			
59	5-29-62	1128	S-01	SLV-2	S	S			
60	6-1-62	1127	S-01	SLV-2	S	S			
61	6-17-62	2402	S-01	LV-3A	S	F	Guidance	Orbit failure--control gas regulator did not operate properly.	



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AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First-Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
63	6-22-62	1129	S-01	SLV-2	S	S			
64	6-27-62	1151(1)	SS-01A	SLV-2	S	S		Velocity meter error.	Guidance
65	7-18-62	2403	S-01	LV-3A	S	F	Propulsion	Orbit failure--electrical short in secondary propulsion system.	
66	7-20-62	1130	S-01	SLV-2	S	S			
67	7-22-62	6901	S-01	LV-3A	NT	NT†		Booster destroyed because of excessive deviation from programmed trajectory.	
68	7-27-62	1131	S-01	SLV-2	S	S			
69	8-1-62	1152(2)	SS-01A	SLV-2	S	S			
70	8-5-62	2404	S-01	LV-3A	S	S			
71	8-27-62	6902	S-01	LV-3A	S**	S†			
72	8-28-62	1153(3)	SS-01A	SLV-2	S	S		Horizon sensor failure after orbit 45.	Guidance
73	9-1-62	1132	S-01	SLV-2	S	S			
74	9-17-62	1133	S-01	SLV-2	S	S			
75	9-28-62	6101	S-01	SLV-2	S**	S†			
76	9-29-62	1154(4)	SS-01A	SLV-2	S	S		Temporary dropout of dc power supply; horizon sensor failure between orbits 18 and 19.	Electrical; Guidance

* Standard Agena vehicle number

† Short mission flight (includes NASA probes)

** Dual Burn

AGENA FLIGHT PERFORMANCE (Continued)

(S= Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First-Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
77	10-9-62	1134	S-01	SLV-2	S	S			
78	10-18-62	6005	S-01	LV-3A	S**	S †			
79	10-26-62	1401(8)	SS-01A	SLV-2	S	S †			
80	11-5-62	1136	S-01	SLV-2	S	S			
81	11-11-62	2405	S-01	LV-3A	S	S			
82	11-24-62	1135	S-01	SLV-2	S	S			
83	12-4-62	1155(5)	SS-01A	SLV-2	S	S			
84	12-12-62	2351(10)	SS-01A	SLV-2	S**	S ††		Velocity meter failure and sequence timer programming error.	Guidance
85	12-14-62	1156(6)	SS-01A	SLV-2	S	S		Telemetry performance degradations.	Communi-cations
86	12-17-62	1205	S-01	LV-3A	NT	NT			
87	1-7-63	1157(7)	SS-01A	SLV-2	S	S		Capsule recovered 866 nm from programmed point of impact because of horizon sensor malfunction.	Guidance
[redacted]									
89	2-28-63	1159(9)	SS-01A	LV-2A	NT	NT		Booster destroyed because one of auxiliary rockets failed.	

* Standard Agena vehicle number
† Short mission flight (includes NASA probes)
** Dual Burn
†† Long mission flight

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First-Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
90	3-18-63	1164(20)	SS-O1A	LV-2A	F	NT	Electrical	Random foreign material presumed to have caused short in aft safe/arm J-box under zero-g conditions; this triggered second short which shut down engine prematurely, thereby causing failure to achieve orbit.	
91	4-1-63	1160(12)	SS-O1A	SLV-2	S	S		Zener diode failure in single-phase power amplifier led to decision to recover on the third day.	Electrical
92	4-26-63	1411(17)	SS-O1A	SLV-2	F	NT	Guidance	Wrong setting of horizon sensor torque bar resulted in failure to achieve orbit.	
93	5-9-63	1206	S-O1	LV-3A	S**	S††		Link 1 inoperative.	Communications

* Standard Agena vehicle number
** Dual Burn
†† Long mission flight

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First-Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
94	5-18-63	1165(18)	SS-O1A	LV-2A	S	S		Electrical system malfunction resulted in continued BTL operation and insufficient electrical power to primary payload. Agena operation assessed as success because primary flight objectives were met.	Electrical
95	6-12-63	1204	S-O1	LV-3A	NT	NT		Due to booster guidance malfunction, SLV-3/01 combination was destroyed.	
96	6-12-63	1161(21)	SS-O1A	LV-2A	S	S			
97	6-15-63	2353(11)	SS-O1A	SLV-2	F**	NT	Propulsion	Ullage rocket ignition was not achieved preventing attainment of second burn.	
98	6-26-63	1166(19)	SS-O1A	LV-2A	S	S		Horizon sensor had slow response, probably due to a motor malfunction which occurred on pass 16.	Guidance
99	6-29-63	2314	S-O1	LV-2A	S**	S			

* Standard Agena vehicle number
** Dual Burn

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First-Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures	
[redacted]										
101	7-18-63	1412(16)	SS-O1A	SLV-2	S	S		Loss of Link II.	Communications	
102	7-18-63	1207	S-O1	LV-3A	S**	S		Solar array I did not extend. Link II failed.	Electrical; Communications	
103	7-30-63	1167(22)	SS-O1A	LV-2A	S	S				
104	8-24-63	1162(23)	SS-O1A	LV-2A	S	S		Intermittent operation of Link I. Single-phase inverter failure.	Communications; Electrical	
105	8-29-63	1169(27)	SS-O1A	SLV-2	S	S		Electrical power overload during separation.	Electrical	
[redacted]										
107	9-23-63	1163(24)	SS-O1A	LV-2A	S	S		S-Band beacon and Link I defective operation.	Communications	x
108	10-16-63	1801(14)	SS-O1A	LV-3A	S	S†				
[redacted]										
110	10-29-63	1601(37)	SS-O1A	LV-2A	S	S				

* Standard Agena vehicle number

† Short mission flight (includes NASA probes)

** Dual Burn

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

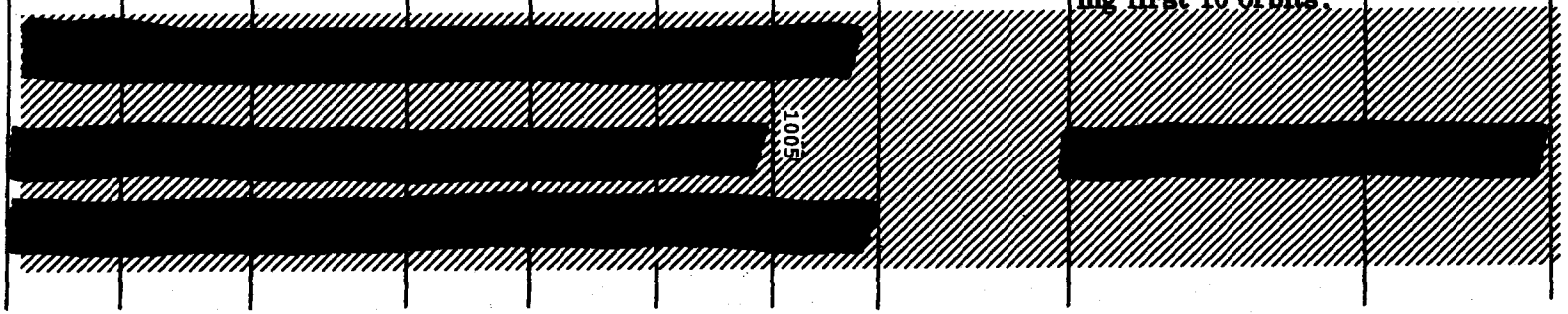
Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First-Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
111	11-9-63	1171(30)	SS-O1A	SLV-2	NT	NT		A booster malfunction at liftoff prevented completion of boost phase.	
112	11-27-63	1172(32)	SS-O1A	SLV-2	S	S		A payload separation malfunction, which probably was not due to Agena equipment operation, prevented capsule recovery.	
[redacted]									
114	12-21-63	1168(25)	SS-O1A	LV-2A	S	S			
115	1-11-64	2354(31)	SS-O1A	LV-2A	S**	S††		Solar Array drive motors failed after primary mission accomplishment.	Electrical
116	1-19-64	2303(36)	SS-O1A	SLV-2	S**	S†			

*Standard Agena vehicle number
**Dual burn
†Short mission flight (includes NASA probes)
††Long mission flight

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First-Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
117	1-25-64	6301	S-01	SLV-2	S**	S†		Part of nose shroud failed to separate when programmed. Resulting orbit was out of tolerance.	Shroud
118	1-30-64	6008	S-01	LV-3A	S**	S†			
119	2-15-64	1174(35)	SS-01A	LV-2A	S	S		Defective fuel valve operation during ascent.	Propulsion
								Excessive control gas expenditure during first 10 orbits.	Guidance



*Standard Agena vehicle number
**Dual burn
† Short mission flight (includes NASA probes)

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
123	3-24-64	1175(43)	SS-O1A	LV-2A	F	NT	Electrical	Electrical short in the Type IX DC/DC converter.	
[redacted]									
125	4-27-64	1604(45)	SS-O1A	LV-2A	S	F	Electrical	Electrical overload at Agena-booster separation and consequent partial loss of pyro bus power.	
[redacted]									
127	6-4-64	1176(49)	SS-O1A	LV-2A	S	S			
128	6-13-64	1606(51)	SS-O1A	LV-2A	S	S			
129	6-17-64	2304(40)	SS-O1A	SLV-2	S**	S†			
130	6-19-64	1609(62)	S-O1B	LV-2A	S	S			

*Standard Agena vehicle number
**Dual burn
†Short mission flight (includes NASA probes)

SECRET

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
[redacted]									
133	7-10-64	1177(50)	SS-O1A	LV-2A	S	S		Horizon sensor malfunction.	Guidance
								Commutator malfunction.	Communication
134	7-17-64	1802(42)	SS-O1A	LV-3A	S	S†			
135	7-28-64	6009	S-O1	LV-3A	S**	S†			
136	8-5-64	1605(46)	SS-O1A	LV-2A	S	S		S-band beacon transmitter failed after pass 53.	Communication
[redacted]									
138	8-21-64	1603(38)	SS-O1A	LV-2A	S	S			
139	8-28-64	6201	S-O1	SLV-2	S**	S†		Premature termination of second burn.	Propulsion

*Standard Agena vehicle number
**Dual burn
†Short mission flight (includes NASA probes)
†† Long mission flight

SECRET

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
140	9-4-64	6501	S-01	LV-3A	S**	S†			
141	9-14-64	1178(54)	SS-01A	LV-2A	S	S			
143	10-5-64	1170(28)	SS-01A	LV-2A	S	S		Pyro battery short prevented second recovery.	Electrical
145	10-17-64	1179(56)	SS-01A	LV-2A	S	S		S-band beacon malfunction.	Communications
								Type IX DC/DC converter malfunction.	Electrical
147	11-2-64	1173(34)	SS-01A	LV-2A	S	S		Multicoupler malfunction.	Communication

*Standard Agena vehicle number
**Dual burn
†Short mission flight (includes NASA probes)

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
[redacted]									
149	11-5-64	6931(68)	SS-O1B	LV-3A	S**	S†		Possible shroud honeycomb structure failure.	Shroud
150	11-18-64	1180(60)	SS-O1A	LV-2A	S	S		Commutator malfunction.	Communication
151	11-28-64	6932(69)	SS-O1B	LV-3A	S**	S†			
[redacted]									
153	12-19-64	1607(59)	SS-O1A	LV-2A	S	S		Pyro battery malfunction caused by electrolyte leakage.	Electrical
								Commutator malfunction.	Communication
[redacted]									

*Standard Agena vehicle number
**Dual burn
†Short mission flight (includes NASA probes)

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
155	1-15-65	1608 (61-2)	SS-O1A	LV-2A	S	S			
[redacted]									
157	2-17-65	6006	S-O1	LV-3A	S**	S †			
158	2-25-65	1611 (64)	S-O1B	LV-2A	S	S			
159	3- 9-65	2701 (15)	SS-O1A	SLV-2	S**	S †			
[redacted]									
161	3-21-65	6007	S-O1	LV-3A	S**	S †			
162	3-25-65	1612 (67)	S-O1B	LV-2A	S	S			
163	4- 3-65	7001 (79)	SS-O1B	SLV-3	S**	S			
[redacted]									
165	4-29-65	1614 (72)	SS-O1B	LV-2A	S	S		System incompatibility - between orbital programmer and SS-O1B vehicle	Guidance

*Standard Agena vehicle number
**Dual Burn
†Short mission flight (includes NASA probes)

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
166	5-18-65	1615(73)	SS-O1B	LV-2A	S	S			
[redacted]									
168	6- 9-65	1613(70)	SS-O1B	LV-2A	S	S		Type IX DC-DC converter failed	Electrical
[redacted]								Booster malfunction prevented placing the SS-O1B on the proper orbit.	
171	7-16-65	2702(86)	SS-O1B	LV-2A	S**	S††		Wing No. 3 control box failure resulted in array power reduced output.	Electrical
172	7-19-65	1617(77)	SS-O1B	LV-2A	S	S			
173	7-20-65	1803 (61-6)	SS-O1A	LV-3A	S	S†			
[redacted]									
175	8-17-65	1618(80)	SS-O1B	LV-2A	S	S			

* Standard Agena Vehicle number
** Dual Burn
† Short mission flight (includes NASA probes)
†† Long mission flight

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
176	9- 2-65	1602(41)	SS-O1A	SLV-2	NT	NT		Drift caused by high winds resulted in command destruct during boost phase.	
177	9-22-65	1619(81)	SS-O1B	LV-2A	S	S			
[redacted]									
179	10- 5-65	1616(75)	SS-O1B	LV-2A	S	S			
180	10-14-65	6801(74)	SS-O1B	LV-2A	S	S†			
181	10-25-65	5002(82)	S-O1C	SLV-3	F	NT	Propulsion	Premature engine shutdown resulted in overpressurization and rupture of main propellant tanks.	
182	10-28-65	1620(90)	SS-O1B	LV-2A	S	S			
[redacted]									
184	11-28-65	6102	S-O1	SLV-2	S**	S†			

*Standard Agena Vehicle number
**Dual Burn
† Short mission flight (includes NASA probes)

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
185	12- 9-65	1621(94)	SS-O1B	LV-2A	S	F	Guidance	Flight control pneumatics did not switch from high to low pressure, resulting in control gas depletion.	
186	12-24-65	1610(63)	S-O1B	LV-2A	S	S			
[redacted]									
188	2- 2-66	1623(101)	SS-O1B	LV-2A	S	S			
189	2- 9-66	2703(88)	SS-O1B	LV-2A	S**	S††			
[redacted]									
191	3- 9-66	1622(97)	SS-O1B	LV-2A	S	S			
192	3-16-66	5003(108)	S-O1C	SLV-3	S	S			
[redacted]									
194	4- 7-66	1627(111)	SS-O1B	LV-2A	S	S			
195	4- 8-66	6703(99)	SS-O1B	SLV-3	S**	S†			
[redacted]									

*Standard Agena Vehicle number
**Dual Burn
†Short mission flight (includes NASA probes)
††Long mission flight

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
197	5- 3-66	1625(106)	SS-O1B	LV-2A	F	NT	Propulsion	Primacord failed to ignite preventing booster-Agena separation.	
[redacted]									
199	5-15-66	6202	S-O1	LV-2A	S**	S†			
200	5-17-66	5004(109)	S-O1C	SLV-3	NT	NT		Atlas Engine No. 2 went hard over at 120.68 seconds after liftoff, causing the Atlas/GATV to pitch-tumble severely. Eventually the Atlas/Agena combination re-entered the atmosphere	
201	5-23-66	1630(116)	SS-O1B	LV-2A	S	S			
[redacted]									
203	6- 6-66	6502	S-O1	SLV-3	S**	S†			

*Standard Agena Vehicle number
**Dual Burn
†Short mission flight (includes NASA probes)

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
204	6- 9-66	1351(91)	SS-O1B	SLV-3	F**	NT	Propulsion	The rocket engine propellant isolation valves remained partially open after first burn, thus preventing the initiation of second burn.	
205	6-21-66	1626(107)	SS-O1B	LV-2A	S	S			
206	6-23-66	6311(123)	SS-O1B	LV-2A	S**	S†			
[redacted]									
208	7-18-66	5005(129)	S-O1C	SLV-3	S	S			
[redacted]									
210	8-9-66	1631(117)	SS-O1B	SLV-2G	S	S		Horizon sensor control output showed anomalous variations	Guidance
								S-band beacon showed signal strength up to 30 db below nominal.	Communications

*Standard Agena Vehicle number
**Dual Burn
†Short mission flight (includes NASA probes)

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
211	8-10-66	6630(121)	SS-O1B	SLV-3	S**	S†			
[redacted]									
213	8-19-66	1352(103)	SS-O1B	SLV-3	S**	S††		Increasing disturbance torque occurred	Guidance
214	9-12-66	5006(130)	S-O1C	SLV-3	S	S		Horizon sensor anomaly was observed	Guidance
[redacted]									
216	9-20-66	1628(114)	SS-O1B	LV-2A	S	S			
[redacted]								A short circuit from the bridge wire of a helium-pressure-valve-OPEN squib to structure occurred.	Electrical
								Horizon sensor anomalies occurred.	Guidance
218	10-5-66	1353(112)	SS-O1B	SLV-3	S**	S††		Intermittent anomalies on Link 2 were observed.	Communications

*Standard Agena Vehicle number
**Dual Burn
†Short mission flight (includes NASA probes)
††Long mission flight

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
[redacted]									
221	11-6-66	6631(122)	SS-O1B	SLV-3	S**	S†			
222	11-8-66	1632(118)	SS-O1B	SLV-2G	S	S			
223	11-11-66	5001(71)	S-O1C	SLV-3	S	S			
[redacted]									
225	12-6-66	6151(136)	SS-O1B	SLV-3	S**	S†			
[redacted]									
~~227~~	~~12-29-66~~	~~2731(124)~~	~~SS-O1B~~	~~LV-2A~~	~~S**~~	~~S††~~		~~Cyclical level shifting in several monitors occurred.~~	~~Guidance~~
228	1-14-67	1629(115)	SS-O1B	LV-2A	S	S			
[redacted]									
230	2- 4-67	6632(128)	SS-O1B	SLV-3	S**	S†			

*Standard Agena Vehicle number
**Dual Burn
†Short mission flight (includes NASA probes)
††Long mission flight

AGENA FLIGHT PERFORMANCE (Continued)

(S = Success; F = Failure; NT = No Try)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystem Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
231	2-22-67	1635(126)	SS-O1B	LV-2A	S	S			
[redacted]									
233	3-30-67	1636(127)	SS-O1B	LV-2A	S	S			
234	4- 5-67	6152(137)	SS-O1B	SLV-3	F**	NT	Propulsion	The oxidizer propellant isolation valve remained partially open after first burn, thus preventing second burn.	
~~235~~	~~4-26-67~~	~~4755(151)~~	~~SS-O1B~~	~~SLV-5B~~	~~NT~~	~~NT~~		~~A malfunction of the Booster Stage II prevented the attainment of the required velocity at Booster/SS-O1B separation.~~	
236	5- 4-67	6633(131)	SS-O1B	SLV-3	S**	S†			
237	5- 9-67	1634(120)	SS-O1B	SLV-2G	S	S		Velocity meter failure resulting in high orbital period.	Guidance
[redacted]									
239	5-31-67	2704(89)	SS-O1B	SLV-2	S**	S†			
[redacted]									

*Standard Agena Vehicle number
**Dual Burn
†Short mission flight (includes NASA probes)
††Long mission flight

AGENA FLIGHT PERFORMANCE (Continued)

Agena Flight No.	Date of Launch	Agena Serial No. (AD No.)*	Agena Vehicle Type	First Stage Booster	Ascent Phase Result	Orbit Phase Result	Subsystems Affected by Catastrophic Failure	Remarks	Subsystems Affected by Degradation Failures
241	6-14-67	6933(157)	SS-O1B	SLV-3	S**	S†			
242	6-16-67	1633(119)	SS-O1B	SLV-2G	S	S			
[redacted]									
245	7-28-67	6802(133)	SS-O1B	LV-2A	S	S†			
246	8-1-67	6634(159)	SS-O1B	SLV-3	S**	S†			
247	8-7-67	1637(134)	SS-O1B	SLV-2G	S	S			
[redacted]									
249	9-15-67	1641(152)	SS-O1B	SLV-2G	S	S		A malfunction occurred in the pneumatic portion of the Lifeboat System.	Guidance
[redacted]									
252	11-2-67	1639(142)	SS-O1B	SLV-2G	S	S			
253	11-5-67	6153(140)	SS-O1B	SLV-3	S**	S†			
[redacted]								Gas valve No. 5 malfunction.	Guidance
								Internal decoder command failed to execute.	Communications
255	12-9-67	1642(156)	SS-O1B	SLV-2G	S	S			

*Standard Agena Vehicle number
**Dual Burn
†Short mission flight (includes NASA probes)
††Long mission flight

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Section 4

DESCRIPTION OF AGENA FLIGHTS

All Agena flight histories are summarized in this report. Wherever feasible, special emphasis has been given to the corrective action taken and to the present status of each failure, discrepancy, or other event that created a reliability problem.

The flight analyses, presented in vehicle launching sequence, are treated in two parts:

(1) Flight Analysis: This lists all major and minor malfunctions, discrepancies, and other events, with the related corrective action.

(2) Mission Results: This is a brief summary of the overall mission results; it is concluded by two assessments:

   (a) A flight assessment, based on the achievement of mission objectives

   (b) An assessment of vehicle equipment operations in both ascent and orbit

Flight 1, Vehicle 1022 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
Because of a probable antenna failure, radar and telemetering signals were not received by ground stations.	

MISSION RESULTS

When the Agena engine was ignited, pitch gyro reference was shifted, probably due to shock environment. This produced an orbit-injection angle of -2.35 deg, and resulted in an extremely short orbital life.

(1) This flight is assessed as a vehicle loss after successful ascent because mission objectives did not include orbital functions.

(2) On the basis of equipment performance, this flight was a failure in ascent and a no try in orbit.

Flight 2, Vehicle 1018 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
Engine relay failed, probably as a result of environmental vibrations.	
Incorrect adjustment within the orbital timer on orbit 2 resulted in loss of proper contact with the vehicle.	

MISSION RESULTS

Launch, boost, Agena A engine operation, and injection into orbit were achieved. The defective operation of the engine relay resulted in engine cutoff prior to integrator command. Orbital operation was successful until the orbital timer failure on orbit 2. The capsule was ejected, impacted near Spitzbergen and was not recovered. Vehicle lifetime was approximately 13 days.

(1) This flight was a success in both ascent and orbit.
(2) On the basis of equipment operation, this flight was a failure in both ascent and orbit.

Flight 3, Vehicle 1020 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
Propellant exhaustion occurred before proper injection velocity was attained.	

MISSION RESULTS

Liftoff was normal. First-stage boost phase events and vehicle separation were achieved. However, Agena engine operation was not sufficient to place the satellite into orbit.

(1) This flight was a failure in ascent and a no try in orbit.

(2) On the basis of equipment operation, this flight was a success in ascent and a no try in orbit.

Flight 4, Vehicle 1023 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
Propellant exhaustion occurred before proper injection velocity was attained.	

MISSION RESULTS

Subnormal second-stage (Agena) performance, combined with the losses resulting from booster performance variations, resulted in an injection velocity that was insufficient for the attainment of orbital status.

(1) This flight was a failure in ascent and a no try in orbit.

(2) On the basis of equipment operation, this flight was a success in ascent and a no try in orbit.

Flight 5, Vehicle 1029 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
No significant Agena malfunctions occurred during this flight.	

MISSION RESULTS

Launch, boost, Agena engine operation, and injection into orbit were achieved. Orbital operation was satisfactory, but the capsule was not recovered because of improper satellite attitude. This was caused by the low-temperature effect on a mercury battery, which in turn resulted in improper functioning of the capsule electrical system.

(1) This flight was a success in both ascent and orbit.

(2) On the basis of equipment operation, this flight was a success in both ascent and orbit.

Flight 6, Vehicle 1028 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
Horizon scanner failed on orbit 17.	
Commands to timer were not received.	

MISSION RESULTS

Launch, boost, Agena engine operation, and injection into orbit were achieved. Orbital operation was normal until the horizon scanner failed on orbit 17.

(1) This flight was a success in ascent and a failure in orbit.

(2) On the basis of equipment operation, this flight was a success in ascent and a failure in orbit.

Flight 7, Vehicle 1051 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
The 400-cps, three-phase inverter failed during orbit 1.	

MISSION RESULTS

Launch, boost, Agena engine operation, and injection into orbit were achieved. Stabilization and control of vehicle attitude during orbit were not accomplished because of the inverter failure during orbit 1. Control gas was depleted by Pass 2. Recovery was impossible because of inability to eject capsule. The vehicle remained in orbit 19 days.

(1) This flight was a success in ascent and a failure in orbit.

(2) On the basis of equipment operation, this flight was a success in ascent and a failure in orbit.

Flight 8, Vehicle 1050 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
A failure occurred in the accelerometer-integrator circuit during ascent. Control-gas exhaustion occurred prior to orbit 15.	

MISSION RESULTS

Launch, boost, Agena engine operation, and injection into orbit were achieved. The accelerometer-integrator failure during ascent resulted in Agena engine operation to propellant exhaustion. This produced a high injection velocity with an eccentric orbit, and 103.7 minute period. The period exceeded the capabilities of the vehicle's orbital timer.

The eccentric orbit took the satellite beyond the range of the horizon scanner.

Control-gas exhaustion occurred prior to orbit 15.

Capsule re-entry sequence was verified although, due to attitude control gas depletion, the re-entry trajectory was indeterminate and an accurate impact point could not be determined. Capsule was not recovered.

Vehicle life was estimated to be in excess of 90 days.

(1) This flight was a success in ascent and a failure in orbit.

(2) On the basis of equipment operation, this flight was a failure in ascent and a success in orbit.

Flight 9, Vehicle 1052 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
The SLV-2 booster failed.	

MISSION RESULTS

Because the SLV-2 booster failed, the Agena did not have an opportunity to operate.

(1) This flight is assessed as a no try in both ascent and orbit.

(2) The equipment operation is considered a no try in both ascent and orbit.

Flight 10, Vehicle 1054 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
The SLV-2 booster failed.	

MISSION RESULTS

The SLV-2 booster failed and was destroyed by Range Safety. The Agena did not have an opportunity to operate.

(1) This flight is assessed as a no try in both ascent and orbit.

(2) The equipment operation is considered a no try in both ascent and orbit.

Flight 11, Vehicle 1008 (Agena A) – 461

FLIGHT ANALYSIS

Event	Corrective Action
The destruct electrical system malfunctioned.	

MISSION RESULTS

After initiation of the Agena separation sequence, an explosion occurred. The failure was believed to have been in the destruct electrical system.

(1) This flight is assessed as a failure in ascent and a no try in orbit.

(2) On the basis of equipment operation, this flight is assessed as a failure in ascent and a no try in orbit.

Flight 12, Vehicle 1055 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action

No significant malfunctions occurred during this flight.

MISSION RESULTS

Launch, boost, Agena engine operation, and injection into orbit were achieved. Orbital operation was satisfactory. Initiation of the recovery sequence was verified; however, the capsule was not recovered. Failure of the capsule to properly reenter and descent into the recovery area was investigated but no single specific cause was isolated.

(1) This flight was a success in both ascent and orbit.

(2) On the basis of equipment operation, this flight was a success in both ascent and orbit.

FLIGHT ANALYSIS

Event	Corrective Action
FM/FM telemetry was unusable after orbit 4. The loss of data was probably caused by a multicoupler failure.	

MISSION RESULTS

Launch, boost, Agena engine operation, and injection into orbit were achieved. The satellite was unstable in orbit as a result of the main Agena engine's propellant-venting torques, which were not properly controlled by the attitude-damping system.

(1) On the basis of mission results, this flight is assessed as a success in both ascent and orbit because major objectives were achieved.

(2) On the basis of equipment operation, this flight was a success is ascent and a failure in orbit.

Flight 14, Vehicle 1053 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
The horizon scanner's pitch channel failed during ascent.	

MISSION RESULTS

Launch, boost, and Agena engine operation were achieved. Orbit injection would have been achieved had the Agena velocity gain been horizontally directed as planned. However, the horizon scanner failure caused a negative satellite attitude (flight-path angle of approximately -8.3 deg at burnout); and the satellite failed to achieve orbit.

(1) This flight is assessed as a failure in ascent and a no try in orbit.

(2) On the basis of equipment operation, this flight is assessed as a failure in ascent and a no try in orbit.

Flight 15, Vehicle 1057 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action

No significant malfunctions occurred during this flight.

MISSION RESULTS

Launch, boost, Agena engine operation, and injection into orbit were achieved. Orbital operation was satisfactory. The recovery sequence was initiated on orbit 17, and the capsule was recovered from the water.

(1) This flight was a success in both ascent and orbit.

(2) On the basis of equipment operation, this flight was a success in both ascent and orbit.

Flight 16, Vehicle 1056 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
IRP amplifier failure prevented proper performance during the recovery pitch phase.	

MISSION RESULTS

Launch, boost, Agena engine operation, and injection into orbit were achieved. Orbital operation was satisfactory. Aerial recovery was accomplished on orbit 17.

(1) This flight was a success in both ascent and orbit.

(2) On the basis of equipment operation, this flight was a success in ascent and a failure in orbit.

Flight 17, Vehicle 1058 (Agena A) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
Failure of valve no. 1 channel prevented the valve from responding properly to the commands of the pitch and roll sensors. As a result, greater-than-normal angular deviations were experienced at Thor/Agena separation and at engine burnout.	

MISSION RESULTS

Launch, boost, Agena engine operation, and injection into orbit were achieved. Orbital performance was satisfactory except for an abnormally high consumption of control gas during early passes. This led to gas exhaustion by orbit 16. Postflight investigation showed that the roll limit cycle was high.

(1) This flight was a success in ascent and a failure in orbit.

(2) On the basis of equipment operation, this flight was a failure in ascent and a success in orbit.

Flight 18, Vehicle 2101 (Agena A) – SAMOS

FLIGHT ANALYSIS

Event	Corrective Action
The nitrogen control-gas fitting (GSE) failed.	

MISSION RESULTS

Liftoff and boost occurred normally; however, at liftoff a failure of the umbilical mast prevented proper retraction of the satellite umbilicals. The nitrogen control-gas fitting on the Agena broke off and caused control-gas depletion shortly after launch. Orbit was not achieved.

(1) This flight is assessed as a failure in ascent and a no try in orbit.

(2) On the basis of equipment operation, this flight is assessed as a no try in both ascent and orbit.

Flight 19, Vehicle 1061 (S-01) - Program 162

FLIGHT ANALYSIS

Event	Corrective Action
An inoperative D-timer prevented programming of Agena Functions.	

MISSION RESULTS

Booster vernier and main engines cut off nearly simultaneously. Separation and Agena engine ignition did not occur. After booster burnout, the Agena followed a ballistic trajectory and impacted in the ocean approximately 650 nautical miles down range.

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(1) This flight was assessed as a failure in ascent and a no try in orbit.
(2)

Flight 20, Vehicle 1062 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
Commutator no. 3 appeared to stop and start intermittently during certain periods early in the flight.	

MISSION RESULTS

Liftoff and boost occurred normally. Injection into orbit was successful. After pass 31 on the second day of orbital life, the reentry and recovery phases occurred normally. The capsule was recovered in the air approximately 56 nm north and 10 nm west of the predicted impact point.

All objectives were accomplished.

(1) This flight was a success in ascent and orbit.

(2) No major equipment failures occurred during the flight.

Flight 21, Vehicle 1103 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
No significant S-01 equipment malfunctions occurred.	

MISSION RESULTS

Liftoff and boost were normal. Ejection, retro-sequence, and parachute deployment occurred as programmed after pass 48. Air recovery of the capsule was accomplished on the first attempt. All objectives were achieved.

(1) This flight was a success both in ascent and orbit.

(2) No major equipment failure occurred during this flight.

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Flight 23, Vehicle 2102 (Agena A) – SAMOS

FLIGHT ANALYSIS

Event	Corrective Action
Failures were observed in the following equipment: 400-cps, three-phase inverter; 2000-cps, single-phase inverter; and wideband data link.	

MISSION RESULTS

Launch, boost, Agena engine operation, and injection into orbit were achieved. Orbit objectives were accomplished, even though several major pieces of electrical equipment malfunctioned.

(1) This flight was a success in both ascent and orbit.

(2) On the basis of equipment operation, this flight was a success in ascent and a failure in orbit.

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Flight 25, Vehicle 1102 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
The S-01 oxidizer tank relief valve stuck in the open portion on two occasions. Consequently, the oxidizer tank pressure fell to 20 psig for 20 sec.	
Failure of the 400-cps inverter resulted in excessive control-gas usage and loss of stability after pass 5.	

MISSION RESULTS

Launch, boost, and injection into orbit, followed by satellite engine restart and burning for 1 sec during first orbit, occurred as programmed. As a consequence of a 400-cps, single-phase inverter failure, satellite stability was lost after pass 5; and all control gas was used. However, telemetered satellite and payload data were obtained until normal depletion of electrical power on pass 54. Except for minor performance degradation, all program objectives were attained.

(1) This flight was a success in both ascent and orbit.

(2) The equipment operation was a success in ascent and a failure in orbit.

Flight 27, Vehicle 1106 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
Subsequent to pass 6, anomalies appeared in the operation of the horizon sensor, resulting in the loss of all the control gas by pass 10.	
During pass 28, the satellite was commanded to initiate separation of the capsule on pass 32. (The satellite attitude would have been nearly correct for recovery during pass 32.) The command was incorrectly entered in the satellite decoder, and separation was initiated on pass 31. The capsule was injected into a new and higher orbit.	An investigation has shown that the VERLORT antenna scan frequency can mix with the VERLORT command frequencies and present unwanted command tones to the beacon command decoder when the null of the beacon antenna is pointing at the VERLORT antenna. Modifications have been made to eliminate this problem.

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MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were satisfactory.

The capsule was separated from the satellite but, due to attitude and transmission difficulties, it was injected into a higher orbit.

(1) This flight was a success in ascent and a failure in orbit.

(2) The equipment operation was a success in ascent and a failure in orbit.

Flight 29, Vehicle 1107 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
The orbital programmer slowed down 60 to 70 sec per orbit following pass 18. The timer reset and period adjustment functions were utilized to keep the satellite functions under the control of the ground stations.	

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit proceeded satisfactorily. Except for the orbital timer, the S-01 satellite performed satisfactorily in orbit until after capsule separation. Sea recovery of the capsule was satisfactorily accomplished.

(1) This flight was a success in both ascent and orbit.

(2) No major equipment failures occurred during this flight.

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FLIGHT ANALYSIS

Event	Corrective Action
An error in calibration or scale factor caused a constant percentage-of-acceleration error that resulted in an excessive orbital period.	
Measurement A-4 (Y-axis acceleration) output reading was erroneously high during S-01 burn. This was possibly caused by a change in gain of the associated amplifier.	

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were satisfactory.

Orbital performance was satisfactory. The capsule was ejected on pass 32 and was successfully air recovered.

(1) The flight was a success in both ascent and orbit.

(2) The equipment operation was a success in both ascent and orbit.

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FLIGHT ANALYSIS

Event	Corrective Action
Failure of solar array 2 to fully extend reduced the availability of electrical power. The failure which appeared to be mechanical, could have been caused by hinge jamming, spring failure, etc. Loss of 400-cps power to the attitude control system resulted in attitude instability.	Solar array latch mechanism was removed, and hinge modification and rate extension redesign were accomplished.

MISSION RESULTS

Launch, boost, S-01 engine first operation, injection into orbit, engine second operation, and final orbital injection were satisfactory.

Failure of the solar array to extend fully prevented proper payload operation. However, several programmed measurements were successfully accomplished.

(1) This flight was a success in ascent and a failure in orbit.

(2) The equipment operation was a success in ascent and a failure in orbit.

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Flight 32, Vehicle 1110 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
Severe oscillations in the SLV-2 booster, beginning at 59.2 sec after liftoff, resulted in disintegration and automatic destruction of the S-01.	No LMSC action required.

MISSION RESULTS

No objectives were achieved.

(1) This flight is assessed as no try in both ascent and orbit.

(2) The equipment operation is considered no try in both ascent and orbit.

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Flight 33, Vehicle 1111 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
Approximately 40 sec before planned S-01 engine cutoff, a failure occurred in the hydraulic system. This resulted in shorter engine thrust duration than predicted and a loss of attitude control.	(1) The pressure transducer has been replaced by a better, fail-safe equivalent. (2) A suspect hydraulic line has been redesigned. (3) The same corrective action outlined for Vehicle 1105 has been applied.

MISSION RESULTS

Launch, boost, and separation were normal, as were S-01 pitchover and engine ignition. However, due to the abbreviated thrust duration and the loss of control, orbit was not achieved.

(1) This flight is assessed as a failure in ascent and a no try in orbit.

(2) The equipment operation is considered a failure in ascent and a no try in orbit.

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Flight 35, Vehicle 1112 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
A pitch attitude error of +2.5 deg during S-01 operation caused excessive orbital eccentricity. This error was programmed inadvertently into the combustion sequence.	
The fuel tank relief valve stuck partly open after its normal first relieving function on ascent. The resulting reduction in helium pressure caused a premature blowdown of fuel and oxidizer tanks.	
Measurement B-101 (fuel level indicator) showed questionable operation after T+330 sec. Oxidizer level indicators (B-141 through B-144) failed to indicate changes of oxidizer level.	

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were successful. The capsule was ejected on pass 33 and was successfully recovered in the ocean.

(1) This flight was a success in both ascent and orbit.

(2) No major equipment failures occurred during this flight.

Flight 37, Vehicle 1113 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
Measurements B-141 through B-144 (digital readout points for the oxidizer level indicator) failed to show any changes in oxidizer level during S-01 engine operation.	The manufacturer of this instrument has checked the S-01 installation with a simulator to determine the reason for the malfunction. A method of checkout had been unavailable.

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit proceeded normally. Capsule recovery operations, planned for pass 33, proceeded normally; the capsule was air retrieved successfully.

(1) This flight was a success in both ascent and orbit.

(2) No significant equipment failures occurred during this flight.

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FLIGHT ANALYSIS

Event	Corrective Action
Ullage rocket 1 monitor (B-108) showed no indication of firing, although the rocket had fired.	
On pass 22, S-01 orbital programmer malfunctioned and failed to turn on the telemetry and S-band beacon transmitters as programmed. Thereafter, the programmer operation was intermittent.	
Sometime during pass 32 or 33, both the single-phase and the three-phase 115-vac, 400-cps inverters failed. Power to the horizon sensor and gyros was therefore terminated.	The next six flights were instrumented to provide extra data concerning this problem. Checkout procedures for the inverter circuit were modified.
Measurements B-141 through B-144 (oxidizer level indicators) failed to indicate changes in oxidizer level during ascent. Measurement B-101 (fuel level indicator) showed no evidence of operation during main-stage combustion.	

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MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were satisfactory.

Because of the cited malfunctions, capsule separation did not occur. The capsule and vehicle remained in orbit.

(1) This flight was a success in ascent and a failure in orbit.

(2) On the basis of equipment operation, this flight was a success in ascent and a failure in orbit.

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FLIGHT ANALYSIS

Event	Corrective Action
The horizon scanner stalled between passes 33 and 38, producing a constant pitch and roll output.	
The orbital programmer tape incurred a plus or minus 2 percent error during punching.	

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were satisfactory.

Recovery, planned for pass 65, was moved up to pass 39 when transients on the telemetry system were interpreted as an indication of imminent power failure. Recovery proceeded normally, and the capsule was successfully retrieved in the air.

(1) This flight was a success in both ascent and orbit.

(2) The equipment operation was a success in ascent and a failure in orbit.

Flight 40, Vehicle 1202 (S-01) – 461

FLIGHT ANALYSIS

Event	Corrective Action
During ascent (at 185 sec), roll control to the SLV-3 vernier engines was lost and the vehicle performed 8-1/2 revolutions before S-01 separation. S-01 control gas required to correct the roll was excessive.	
During pass 1, periodic sun inhibition of the pitch horizon sensor caused attitude perturbations, which in turn caused the pitch gas valves to fire alternately. Because of nearly complete gas depletion and uneven pitch gas valve thresholds, one valve ceased firing; this resulted in a pitch-plane rotation with a period of 92 sec.	The horizon sensor head was depressed and the left head deactivated in the orbital mode.

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MISSION RESULTS

Launch and boost were normal until approximately 185 sec, when the SLV-3 booster lost roll control. The S-01 guidance operation compensated for the separation attitude error in achieving circular orbit.

Excessive control-gas usage and the solar array malfunction prevented proper payload operation. Some partial measurements were obtained.

(1) This flight was a success in ascent and a failure in orbit.

(2) The equipment operation was a success in ascent and a failure in orbit.

Flight 41, Vehicle 1116 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
A failure in the S-01 hydraulic system resulted in loss of S-01 control, tumbling, and consequent premature S-01 engine cutoff due to interruption of fuel to the pump.	The corrective action indicated for Vehicle 1105 has been taken.

MISSION RESULTS

Launch, boost, separation, coast, and S-01 engine ignition were normal.

Because of an excessively high flight-path angle and insufficient velocity (caused by premature engine cutoff), orbit was not achieved.

(1) The flight is assessed as an ascent-phase failure, and a no try in orbit.

(2) The equipment operation is considered a no try in orbit owing to the ascent failure.

FLIGHT ANALYSIS

Event	Corrective Action
High fuel and oxidizer flow rates caused fuel depletion and excessive injection velocity. The resulting high apogee caused the horizon scanner to operate 26 min outside its design areas; the result was excessive use of control gas.	
Gas valve 2 was operating before gas valve 1; complete control gas usage resulted by the eighth orbit.	Investigation of this malfunction led to the development of the model K valve.
Orbital programmer punched tape and reset errors made station-crossing predictions difficult, although the operation was not compromised.	

MISSION RESULTS

Launch and boost were satisfactory. Since reorientation for the capsule retrophase depends upon attitude-control capability, which in turn is dependent on control-gas supply, capsule recovery was not attempted.

(1) The flight was a success in ascent and a failure in orbit.

(2) The operation of equipment was a failure in both ascent and orbit.

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FLIGHT ANALYSIS

Event	Corrective Action
Telemetry data from passes 1 through 7 indicated a high control-gas expenditure and constant gyro offsets. Subsequent to pass 7, the gas expenditure was reduced to normal.	A design review of the gas-supply systems indicated that certain elements of the plumbing and regulator could leak and then reseal as the pressure decays. To detect this type of leak during ground tests, the final propulsion system leak check was expanded to provide a more comprehensive test of the high-pressure system.

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MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit proceeded satisfactorily.

Recovery, originally planned for pass 65, was initiated on pass 18 owing to excessive use of control gas. The capsule was ejected on pass 18, and a successful aerial retrieval was accomplished.

(1) This flight was a success in both ascent and orbit.

(2) No major equipment failure occurred during this flight.

Flight 44, Vehicle 6002 (S-01) – Ranger II

FLIGHT ANALYSIS

Event	Corrective Action
Second engine operation was terminated after 1 sec. The operation was initiated properly but shut down prematurely as a result of variations in the satellite attitude. The roll gyro, which was inoperative from liftoff, caused the S-01 to become unstable after separation from the booster. Error signals from this failed gyro resulted in complete exhaustion of the control-gas supply shortly after first engine operation.	Modifications have been performed to allow monitoring of the position of the spin motor relays in the three IRP gyros. In addition, IRP's with spin motor rotation detection (SMRD) have been incorporated. Positive checkout of the spin motors has been accomplished.
Measurement B-12 (fuel venturi inlet pressure) indicated about 200 psi higher than nominal after second engine operation.	

MISSION RESULTS

Launch, boost, and S-01 separation from the booster were successfully accomplished. First engine operation was normal. Afterwards, the S-01 rolled, due to the S-01 roll gyro malfunction, causing depletion of the control gas. S-01 engine second burn lasted only 1 sec because of gas ingestion due to the unstable vehicle attitude. S-01/spacecraft separation occurred, but the S-01 did not reorient for lack of control gas. The principal objective of the flight, that of injecting the payload into an elliptical earth orbit extending beyond the orbit of the moon, was not achieved.

(1) On the basis of mission objectives, this flight is assessed as an ascent failure and a no try in probe injection.

(2) This flight is assessed as a no try in probe injection, due to the ascent failure.

Flight 45, Vehicle 2202 (S-01) – SAMOS

FLIGHT ANALYSIS

Event	Corrective Action
A failure in the SLV-3 guidance system resulted in a pitch-up angle of approximately 145 deg above the normal flight-path angle at S-01 separation. The S-01 could not recover from this excessive attitude deviation and therefore did not attain orbit.	

MISSION RESULTS

Launch and boost were normal until the failure of the SLV-3 pitch control. The S-01 engine ignited and operated satisfactorily. The S-01 and payload impacted at sea.

(1) This flight is assessed as a no try in both ascent and orbit.

(2) The equipment operation is considered a no try in both ascent and orbit.

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FLIGHT ANALYSIS

Event	Corrective Action
Link 1 telemetry on two occasions exhibited drops in signal strength, which precluded the use of automatic data processing. An investigation of this performance degradation, performed in the laboratory, indicated that the cause of signal strength loss was an intermittent open circuit in the power amplifier plate supply.	

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were satisfactory. Capsule ejection and recovery were successful. The capsule was recovered from the water.

(1) This flight was a success in both ascent and orbit.

(2) No significant equipment failure occurred during this flight.

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FLIGHT ANALYSIS

Event	Corrective Action
During pass 6, it was observed that the command programmer had erroneously shifted to channel 31 (the recovery command channel); and satellite re-orientation for recovery was inadvertently accomplished. Because of the S-01's velocity and attitude at retroignition, the capsule and satellite remained in orbit. This malfunction was attributed to high noise output from the mixer-filter and synchronous channels during power turn-on in absence of an RF signal, which caused the erroneous shift to channel 31.	

MISSION RESULTS

Launch, boost, S-01 operation, and injection into orbit were accomplished. The capsule was inadvertently ejected and remained in orbit.

(1) This flight was a success in ascent and a failure in orbit.

(2) The equipment operation was a success in ascent and a failure in orbit.

FLIGHT ANALYSIS

Event	Corrective Action
At separation, an electrical transient, possibly emanating from the pyrotechnic circuitry, caused a fuse to blow in the 400-cps, three-phase power line to the gyro package. The resultant loss of attitude control caused the vehicle to tumble, which further resulted in premature engine cutoff due to fuel starvation. Orbital status was therefore not achieved.	The separation pinpullers and retrorockets are now supplied from a separate power source.

MISSION RESULTS

Launch, boost, separation, coast, and S-01 engine ignition were normal. However, due to the primary failure described above, orbital status was not achieved.

(1) This flight is assessed as an ascent failure and a no try in orbit.

(2) The equipment operation is considered as a no try in orbit, due to the ascent failure.

Flight 49, Vehicle 6003 (S-01) – Ranger III

FLIGHT ANALYSIS

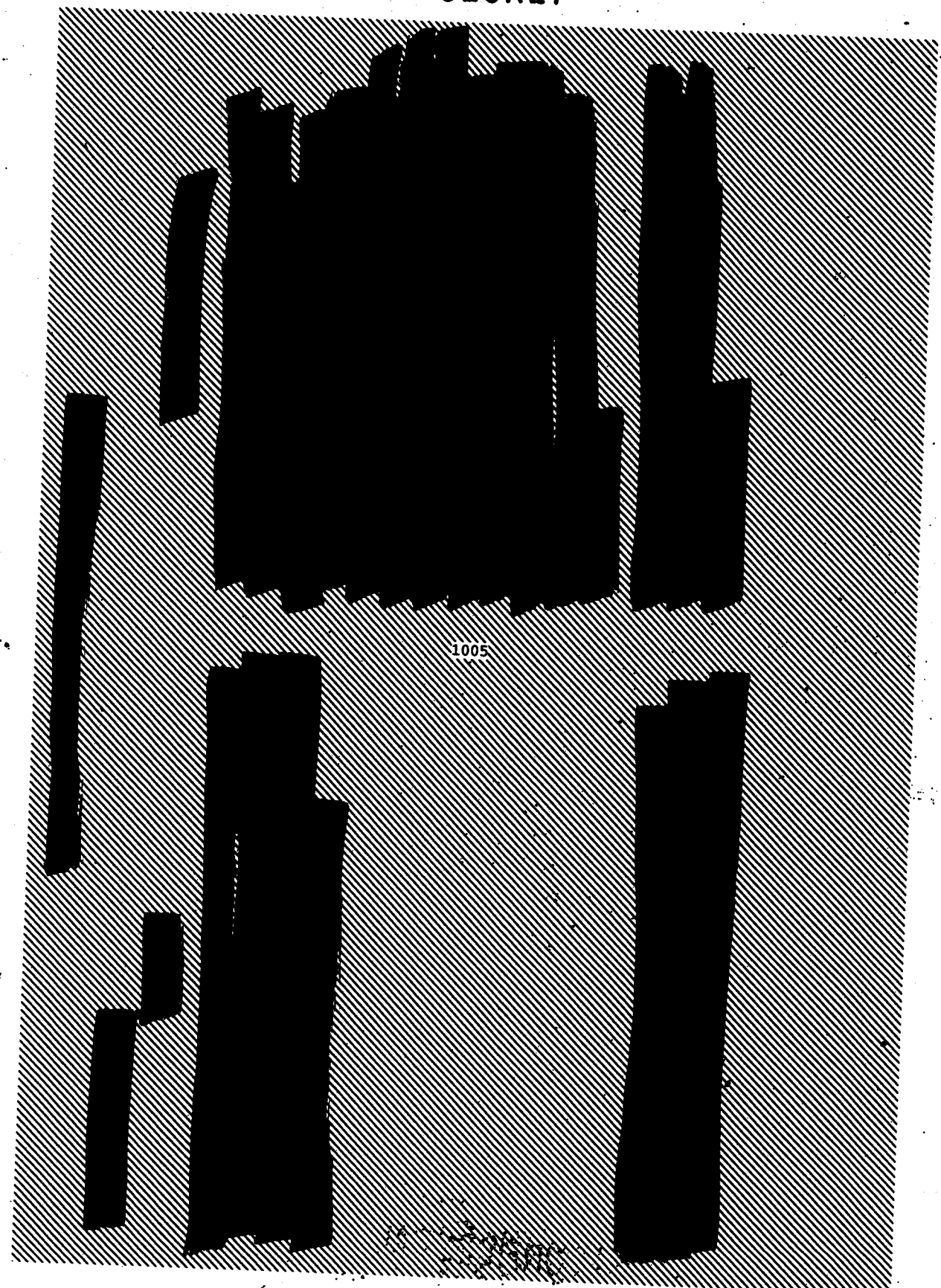
Event	Corrective Action
The SLV-3 pulse beacon failed, preventing the receipt of steering or discrete commands by the SLV-3 and resulting in improper inertial velocity.	
Due to a personnel error in calculation, an incorrect calibration was applied to the velocity meter. This would have prevented the desired lunar impact even with the proper SLV-3 performance.	Double-check on calculations and checkout procedures.
Measurement B-12 (fuel venturi inlet pressure) showed a 190-psi shift in zero level after first engine operation. (This malfunction also occurred on Vehicle 6002 and several flights of other programs.)	

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into the parking orbit were normal. However, due to the SLV-3 pulse beacon failure which resulted in improper inertial velocity and the incorrect S-01 velocity meter calibration, the desired lunar impact was not achieved.

(1) This flight is assessed as a no try in both ascent and orbit.

(2) The equipment operation is assessed as a success in both ascent and probe injection.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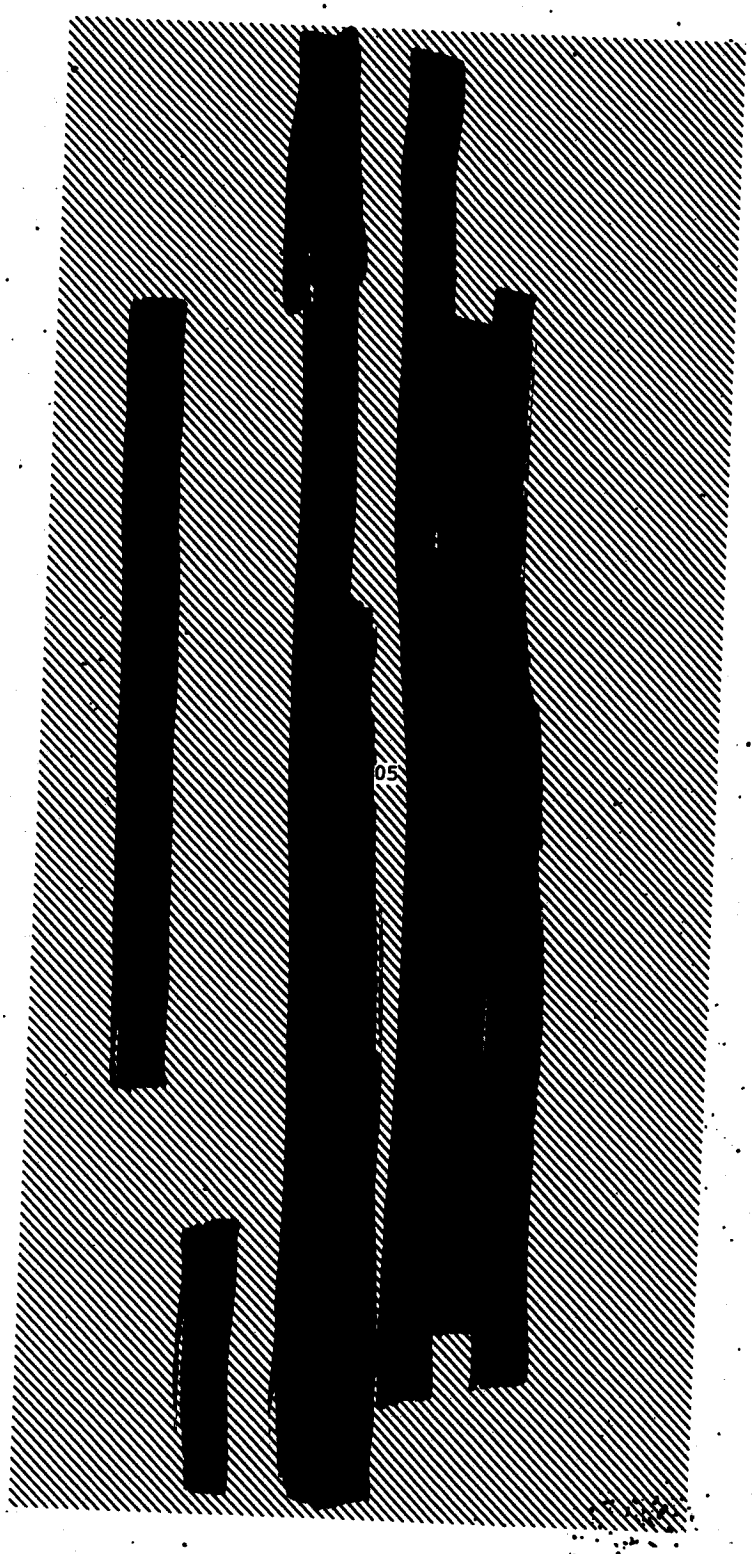

FLIGHT ANALYSIS

Event	Corrective Action
Subsequent to orbital injection (at antenna switchover), the signal strengths to telemetry links 1 and 2 and the continuous wave acquisition transmitter (CWAT) beacon dropped sharply. (A mechanical deformation of orbit antenna is suspected as the cause of this degradation of signal strength, as well as a faulty coaxial cable from the exit-orbit antenna switch to the orbit antenna.)	Additional operational procedures have been instituted to assure that the antenna is not deformed or deflected and will extend properly at separation. Proper coaxial cable connection will be ensured through careful quality assurance inspection of all cable connector safety wire installations.
Measurement B-108 (ullage rocket monitor 2) showed no indication that ullage rocket number 2 fired. (An improper mechanical setting of the monitor microswitch assembly is suspected.)	

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MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were normal. The capsule was ejected on pass 65 and was successfully air recovered.

(1) This flight was a success in both ascent and orbit.

(2) The equipment operation was a success in both ascent and orbit.

Flight 52, Vehicle 2204 (S-O1) – SAMOS

FLIGHT ANALYSIS

Event	Corrective Action
The pitch rate gain failed to switch from ascent mode to orbital mode. This condition, probably due to a wiring error, led to excessive control-gas usage and eventually to control-gas depletion by pass 22. Loss of attitude control caused slosh-induced fuel starvation at the pump inlets, resulting in premature shutdown of the S-O1 engine second operation.	(1) The flight control package specification has been changed to call out a test which verifies the orbital rate time constants. (2) The systems test procedure now includes a special test devised to detect whether proper rate switching has taken place.

MISSION RESULTS

Launch, boost, S-O1 engine-first operation, and injection into orbit were normal.

Payload recovery, planned for pass 17, was prevented because of a ground command error.

Payload recovery attempted on pass 33 resulted in injection of both the S-O1 and the payload into a new and higher orbit.

(1) This flight was a success in ascent and a failure in orbit.

(2) Equipment operation was a failure in ascent and a success in orbit.

SECRET

SECRET

FLIGHT ANALYSIS

Event	Corrective Action
Owing to an SLV-3 pitch program deficiency, pitchover during the open-loop booster and sustainer phase was less than nominal; and the orbit was not as planned.	
During pass 3, the secondary battery group voltages approximated 33 volts, with an ensuing rise in battery 3 temperature to 190°F by pass 7. Battery 3 apparently failed, and an isolating diode failed, causing the battery bus to drop to 22 volts; this resulted in marginal operation of command and communication equipment. Stability was lost due to equipment malfunction caused by the low bus voltage; and a nutation was established in pitch, roll, and yaw. Last usable RF contact was on pass 10, but HEPDEX continued to transmit.	S-01 battery voltage limiters have been redesigned to incorporate battery cell temperature as a limiting control to charge rates. Better battery-to-bus isolation has been provided.

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were satisfactory. However, owing to a failure in the SLV-3 pitch program, the transfer orbit achieved was not as predicted; consequently, the final orbit was not as planned. Battery failure and the resulting loss of stability prevented any useful contact with the vehicle after pass 10.

SECRET

Flight 53, Vehicle 1203 (S-01) – 461 (Continued)

(1) This flight was a success in ascent and a failure in orbit.

(2) Equipment operation was a success in ascent and a failure in orbit.

SECRET

Flight 54, Vehicle 1124 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
Link 1 telemetry operated as programmed from launch through pass 25. Loss of modulation of the link 1 RF carrier occurred 20 sec prior to programmed turn-off and continued throughout the remainder of the flight. Analysis showed that a failure of a capacitor in the dc-dc converter was the most probable cause.	The dc-dc converters to be flown in subsequent S-01 vehicles are assembled with a more reliable capacitor. Fansteel tantalum capacitor was replaced with Sprague capacitor in dc-dc converter P/N 1462027.
Measurement B-35 (turbine speed) displayed sporadic bursts of invalid data during ascent. Valid data were obtained for 92 sec after ignition until engine cutoff, with invalid data appearing during the turbine coast-down period.	

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were satisfactory. Air recovery of the capsule was accomplished on pass 33 as planned.

(1) This flight was a success in both ascent and orbit.
(2) No major equipment failure occurred during this flight.

Flight 55, Vehicle 6004 (S-01) – Ranger IV

FLIGHT ANALYSIS

Event	Corrective Action
Measurement B-12 (fuel venturi inlet pressure) data showed a 200-psig shift in the zero level after engine first cutoff, and a level shift out of band negatively at second ignition, where it remained throughout the remainder of engine operation.	A snubber has been provided in the pressure line to the existing transducer.

MISSION RESULTS

Launch, boost, S-01 engine first operation, parking orbit, S-01 engine second operation, spacecraft injection and retromaneuver were normal. All S-01 objectives were accomplished successfully, and the spacecraft impacted on the far side of the moon.

(1) This flight was a success in both ascent and probe injection.
(2) No major equipment malfunctions occurred during this flight.

FLIGHT ANALYSIS

Event	Corrective Action
During the SLV-3 boost phase, control gas valve 4 showed a full ON condition. Firing of this valve began when the SLV-3 passed through the maximum dynamic pressure flight condition, at which time the vehicle was being subjected to vibration. Excessive use of control gas resulted. Normal operation of this valve was noted on all subsequent passes.	
During yaw maneuvers on pass 13, erroneous signals from the horizon sensor resulted in additional excessive use of control gas.	
During deboost, impingement of the exhaust plume of the single ullage rocket on the engine exit nozzle is believed to have caused the observed pitchup. Engine operation in an effort to correct the attitude resulted in a stop-to-stop oscillation, and a gyro reference shift ensued. A boost, rather than the planned deboost, resulted.	
Measurement B-11 (fuel venturi inlet pressure) showed a 200-psi zero level shift following second shutdown of the engine.	Pressure snubbers have been designed to correct this type of malfunction.

SECRET

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were successful despite the control gas system malfunction.

The yaw-around maneuver on pass 13 was successful despite erroneous signals from the horizon sensor. The deboost phase on pass 18 was not successful, and the satellite and payload were injected into a more eccentric orbit.

(1) In spite of these malfunctions, this flight is assessed as a success in both ascent and orbit because most mission objectives were attained.

(2) On the basis of equipment operation, this flight is assessed as a success in ascent and a failure in orbit.

SECRET

Flight 57, Vehicle 1125 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
Two orbital timer anomalies occurred: (1) anomalous reset traces, and (2) loss of 188 sec between passes 2 and 9.	(1) Longer subcycle identification periods have been programmed. (2) Further studies have been conducted to prevent extensive loss of orbital programmer time.
Measurement D-56 (control-gas pressure, low range) failed at 165 sec.	This measurement is now monitored by a transducer produced by another manufacturer.
Parachute cover failed to separate.	All remaining lots are not checked for faulty squibs. Questionable squibs are removed from stock. Mechanical release details are being redesigned.

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were satisfactory. Recovery operations proceeded normally, but the capsule was lost when no parachute deployment occurred.

(1) This flight was a success in both ascent and orbit.
(2) No major equipment failure occurred during this flight.

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Flight 58, Vehicle 1126 (S-O1) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
The telemetry link 2 operation resulted in intermittent loss of orbital programmer time after pass 62. Lost programmer time was also experienced on Vehicle 1125. It is believed that a faulty input capacitor or a mechanical slippage caused the malfunction.	Tests are being conducted to confirm the mode of failure. The tape drive mechanism has been reworked to prevent slack in tape.
Measurement D-59 (control-gas pressure, high range) failed during S-O1 operation. An internal potentiometer is suspected as the cause.	The manufacturer of these transducers has furnished units with improved potentiometers for the next flight.

MISSION RESULTS

Launch, boost, S-O1 engine operation, and injection into orbit proceeded satisfactorily. The capsule was air retrieved on pass 65, 300 nm downrange from the predicted point (due to the malfunction of the orbital programmer).

(1) This flight was a success in both ascent and orbit.

(2) No major equipment failure occurred during this flight.

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FLIGHT ANALYSIS

Event	Corrective Action
Excessive control gas consumption, probably due to ullage-rocket and turbine-exhaust misalignments, was observed during this flight.	LMSC test and alignment procedures were reviewed to determine whether any improvement in tolerance could be achieved.
Measurement B-108 (ullage rocket monitor) failed to indicate firing of rocket 1. (This type of failure was also noted on Vehicle 1127.)	The test procedure was revised to include microswitch actuation by movement of the rocket carrier assembly.

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were satisfactory. The capsule was ejected on pass 49 as planned and was successfully air recovered, 150 nm from the predicted point. The cause of the impact divergence is not known.

(1) This flight was a success in both ascent and orbit.

(2) Equipment operation was successful in both ascent and orbit.

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Flight 60, Vehicle 1127 (S-01) - *Program 162*

FLIGHT ANALYSIS

Event	Corrective Action
Measurement B-108 (ullage rocket monitor) failed to indicate firing of rocket 1. (This type of failure was also noted on Vehicle 1128.)	The test procedure was revised to include microswitch actuation by movement of the rocket carrier assembly.

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit proceeded normally. The capsule was successfully ejected on pass 65 and descended into the predicted recovery area. However, when the parachute was damaged during attempted aerial recovery, the capsule fell into the ocean and was lost.

(1) This flight was a success in both ascent and orbit.

(2) No major equipment failure occurred during this flight.

FLIGHT ANALYSIS

Event	Corrective Action
Because of the effect of undetermined torques on the satellite during the first four passes, attitude control gas consumption was excessive.	A careful study has been made to ascertain and correct the source of these torques.
During the retrograde sequence, a pressure regulator malfunction caused the control system to be at effectively low gas pressure, thus permitting SPS impingement torques to overpower the control system and force the satellite away from the planned attitude.	
Horizon sensor perturbations, due to cold-cloud effects, were noted throughout the flight.	Test procedure revision included a bench test to determine the slicing level on each sensor. Adjustments were made to minimize cold-cloud effects.

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were satisfactory. Following deboost, the recovery vehicle did not separate.

(1) This flight was a success in ascent and a failure in orbit.

(2) The equipment operation was a success in ascent and a failure in orbit.

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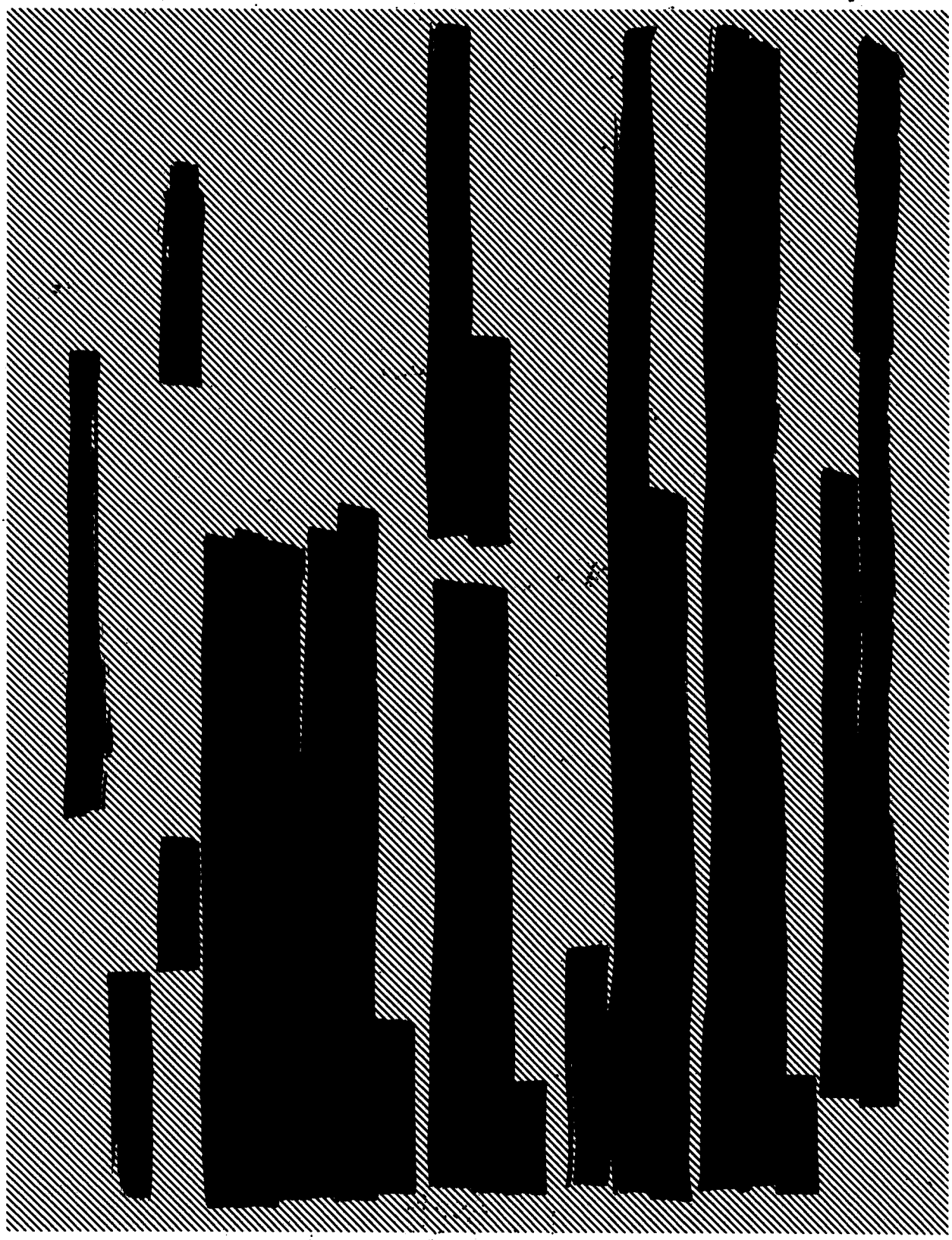

Flight 63, Vehicle 1129 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
No major malfunction or deficiency occurred during this flight.	

MISSION RESULTS

Launch, boost, S-01 engine operation, and orbital injection were normal. All test objectives were achieved and air recovery of the capsule occurred after orbit 50.

(1) This flight was a success in both ascent and orbit.

(2) No major equipment failure occurred during this flight.

Torques caused by propellant dump operation resulted in excessive control gas usage.	A propellant venting design change has been incorporated on later vehicles.
Telemetry channel 16 failed to read out on pass 41 for HTS and during the first 210 seconds of acquisition by the KTS. The apparent cause of this malfunction was the voltage controlled oscillator (VCO) failing to oscillate.	Design change of all oscillators was incorporated on SS-O1A No. 6 and subsequent vehicles.
Payload adapter temperature monitor malfunctioned. This malfunction is believed to have been caused by an open thermistor.	FER's were initiated for open thermistors in other temperature monitors, and it was found that the cause of these failures was largely due to assembling and handling techniques. Immediate action consisted of the use of lower-powered soldering irons when assembling thermistor-type temperature sensors. An educational program in assembling and handling temperature sensors was initiated.

MISSION RESULTS

Launch, boost, SS-O1A engine operation, and injection into orbit were achieved. Orbital parameters were outside the three-sigma tolerances, because of velocity meter malfunction. Orbital operations were satisfactory.

The capsule was recovered in the air during orbit 63.

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MISSION RESULTS (Continued)

The Lifeboat system was exercised prematurely on orbit 76, because of a short in the system harness.

Battery depletion occurred on orbit 88.

1. This flight is assessed as a success in both ascent and orbit.
2. Based on program Standard Agena equipment operation, this flight is assessed as a success in ascent and a failure in orbit.
3. There were no major basic Standard Agena equipment failures during this flight. The velocity meter malfunction is assessed as a system and interface problem; no part in the velocity meter failed.

Flight 65, Vehicle 2403 (S-01) – SAMOS

FLIGHT ANALYSIS

Event	Corrective Action
An electrical malfunction in the secondary propulsion system prevented the S-01 engine from operating to deboost the satellite out of its orbit. However, first engine operation was normal, even though controlled ullage orientation was not provided.	Investigations indicate the possiblity of a shorted solenoid winding or a short between a solenoid winding and the vehicle. Both circuitry and test methods have been changed.
Strain gages A-117, A-119, and A-120 failed during ascent; A-104 and A-112 failed intermittently; and A-101, A-109, and A-111 failed before flight.	Preflight and flight failures of strain gages are attributed to fatigue or damage of the gages as the result of repeated handling. Recommendations have been made for special handling of these devices.

SECRET

MISSION RESULTS

Launch, boost, S-01 engine first operation, and injection into orbit were satisfactory despite the failure of the SPS (ullage orientation) system. S-01 engine operation during the deboost phase was not achieved owing to lack of ullage orientation; since the velocity of the separated payload was not retarded, it remained in orbit.

(1) This flight was a success in ascent and a failure in orbit.

(2) Equipment operation was a success in ascent and a failure in orbit.

Flight 66, Vehicle 1130 (S-01) – Program 162

FLIGHT ANALYSIS

Event	Corrective Action
The type VII orbital programmer operation during this flight was unsatisfactory. Two major anomalies were experienced: (1) failure of the orbital programmer to reset properly upon command, and (2) failure of certain orbital programmer events to occur at all or at the proper time in the second deck of the programmer. (This type of programmer has also demonstrated unsatisfactory performance on Vehicles 1125 and 1126.)	A design review of the type VII programmer was scheduled for 13 August 1962 to present the results of a Fairchild reliability analysis and detailed review. Immediate action involved establishing procedures to reduce the number of tape changes and to assure that the programmers are serviced only in approved clean areas and by specially qualified personnel.
Measurement B-6 (combustion chamber pressure monitor) was inadequate in performance. The readout indicated an abnormally slow response.	

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit proceeded normally. Aerial recovery was successfully accomplished on pass 33, within the predicted recovery area.

(1) This flight was a success in both ascent and orbit.

(2) No major equipment failure occurred during this flight.

Flight 67, Vehicle 6901 (S-01) – Mariner I

FLIGHT ANALYSIS

Event	Corrective Action
The booster was destroyed after it had deviated considerably from its programmed trajectory.	

MISSION RESULTS

The booster deviated from the proper trajectory and was destroyed by Range Safety personnel.

(1) This flight is assessed as a no try in both ascent and probe injection.

(2) The equipment operation is considered a no try in both ascent and in probe injection.

FLIGHT ANALYSIS

Event	Corrective Action
Measurement C-4 (battery current monitor) was erroneously high. Data and circuit analysis indicated that the most probable cause was a malfunction in the voltage regulation circuitry of the low-level dc amplifier used with the current shunt.	
A loss of output from the type VIII dc-dc converter supplying power to the research payload occurred. The type VIII power supply (P/N 1461165) is considered unqualified for primary flight requirements; due to the unavailability of other power supplies, it was flown only to meet secondary requirements.	The use of this power supply for flight requirements is being discontinued. It will be replaced with the type XI unit.

MISSION RESULTS

Launch, boost S-01 engine operation, and injection into orbit were normal. Orbital operations and control were satisfactory. The recovery capsule was successfully retrieved in the air on pass 65.

(1) This flight was a success in both ascent and orbit.

(2) On the basis of equipment operation, this flight was a success in ascent and a failure in orbit.

FLIGHT ANALYSIS

Event	Corrective Action
Excessive control gas usage was observed during the first three orbits. Torques transmitted to the vehicle during propellant dump are suspected as causing this excessive consumption. (This same condition was noted on 1151.)	A propellant venting design change was incorporated in later vehicles.
The Barnes Type IIA horizon sensor exhibited anomalous behavior during almost every pass for which there was acquisition. These perturbations, in general, were not severe enough to degrade the satellite attitude control beyond acceptable limits, except during pass 2. During pass 2, relatively large attitude errors, estimated between 5^{o} and 30^{o} in yaw and roll, were observed. No such errors were observed before or subsequent to pass 2. These perturbations are believed to have been caused by cold cloud effects on the sensor.	(1) Horizon sensors have been modified for reduced sensitivity to earth gradients. (2) Horizon sensor telemetry data has been included on the satellite borne tape recorder to provide additional data between contacts with stations. (3) On a long-term basis, an investigation in conjunction with the Infra-red Radiation Transmission Experiment (IRATE) was already under way to determine the optimum spectrum for the horizon sensor; immediate action was to modify the sensitivity of the electronics on 1154.
The VCO for channel 14 failed during orbit 28 but operated normally during all other phases of the flight. This equipment was known to have a starting problem, but a modified replacement was not available for installation.	All units of this type have been modified. (See comment on vehicle 1151.)

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Loss of measurement D-59 (control gas, high-range pressure transducer) after launch. This transducer operated erratically prior to launch and remained so until orbit 15, when it became unusable. After orbit 15 the operation of the transducer returned to normal and remained so for the duration of the flight. The malfunction was probably caused by over-torquing of the transducer during installation. This type of malfunction has been duplicated in laboratory tests conducted separately by LMSC and the manufacturer. Temperature monitors were lost prior to launch, for the battery rack, programmer, and exhaust duct shield.	A redesigned transducer has been incorporated on later vehicles.
The S-band beacon return pulse became extremely weak during orbit 32, with a constant low amplitude. This malfunction hampered tracking operations but did not affect command functions. Tests have shown that premature beacon interrogation will cause cavity cathode damage and that rapid start-up will reduce cavity life. The type of failure observed in this flight could be attributed to either cause.	Caused by open circuit. No corrective action required. None. Long-range effort includes plans for a redesigned "light-weight" beacon.

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MISSION RESULTS

Launch, boost, SS-O1A engine operation, and injection into orbit were achieved. Orbital parameters were within three-sigma tolerances. Orbital operations were satisfactory, except for large attitude perturbations during the early orbits.

Air recovery of the capsule occurred on orbit 65.

Lifeboat was successfully exercised.

Battery depletion occurred on orbit 87.

1. This flight is considered an ascent and orbit success.
2. There were no major equipment failures during this flight.

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Flight 70, Vehicle 2404 (S-01) – SAMOS

FLIGHT ANALYSIS

Event	Corrective Action
Disturbing torques were noted during the early orbits of this flight.	The source of these torques was investigated, and a comparison made with flights of other programs where disturbing torques have been noted during the early orbits.

Measurement A-10 (Z-axis vibration) displayed an erratic saw-tooth signal instead of the normal sinusoidal response; this made frequency determination impossible and amplitude determination invalid.

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were normal.

(1) Since all mission objectives were achieved, this flight is assessed as a success in both ascent and orbit.

(2) No major equipment malfunctions occurred during this flight.

FLIGHT ANALYSIS

Event	Corrective Action
Measurement B-90 (ullage rocket 3) failed during engine second operation. An incorrect microswitch adjustment is suspected as the cause.	
Measurement C-11 (battery case temperature) failed at 64.8 sec. The sensor apparently became shorted.	

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were successful. The spacecraft was successfully injected into a satisfactory interplanetary intercept trajectory.

(1) This flight was a success in both ascent and probe injection.

(2) No significant equipment operation failure occurred during this flight.

Event	Corrective Action
Barnes Type IIA horizon sensor failed during orbit 47.	Design change effective on 1155. Extended temperature range heads, better sealing, higher torque motor with larger bearings and improved lubricants were incorporated.
Perigee altitude problem due to Barnes horizon sensor sensitivity to cold-cloud and other earth infrared gradients.	The horizon sensor has been modified on all subsequent satellites to provide less sensitivity to earth infrared gradients. This modification includes reducing the booster limiter amplifier gain and decreasing the threshold or slicing level of each head assembly. The downrange telemetry tracking aircraft and the weather reconnaissance will be retained to observe the effect of sensor modification. The sensor telemetry outputs will be recorded on the satellite's 200-minute recorder to derive further information on the sensor performance between orbit acquisitions.
Inadvertent Lifeboat exercise. A design error resulting in a sneak circuit caused this malfunction.	The design error has been corrected for future vehicles.

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Torques caused by propellant dump operation caused excessive control gas usage during the early passes. (This was also observed on 1151 and 1152.)	A propellant venting design change was incorporated beginning with 1154.
Telemetry channel 14 failed to read out on pass 15. (This is the same type of malfunction noted on 1151 and 1152.)	A modified oscillator was not available for installation on this particular channel. (See comment on Vehicle 1151.)
Measurement D-59 (control gas high-range pressure) inadequate during passes 15, 16, and 17.	Vendor performed tests to simulate this problem. (See comment on Vehicle 1152.)
Measurement A-458 (upper bulkhead fuel tank strain sensor) failed at 252 seconds. Failure characteristics indicate an open circuit or gage failure.	Open circuit. No action practical.

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MISSION RESULTS

Launch, boost, SS-01A engine operation, and injection into orbit were achieved. Orbital parameters were outside the three-sigma tolerances, because of the horizon sensor sensitivity to cold-cloud. Orbital operations were normal until pass 47 when the horizon sensor failed. Capsule separation, planned for orbit 65, was initiated inadvertently by Lifeboat (the result of a wiring change). Recovery proceeded normally and the capsule was recovered in air during orbit 65.

1. This flight is considered an ascent and orbit success.
2. Based on equipment operation, this flight is assessed as a success in ascent and a failure in orbit for both program and basic Standard Agena.

FLIGHT ANALYSIS

Event	Corrective Action
Orbital programmer operation was not normal because of erratic resets, although command capabilities were not impaired. Instead of the normal reset time of approximately 0.5 sec, resets were delayed 8 to 12 sec after commands were transmitted. The following anomalies were observed: (1) When the resets were late, the SCID were normal. (2) When the resets were normal, the SCID were approximately 4 sec longer than when the resets were late. (3) The tape was pulled back when there was a late reset, but not always when there was a normal reset. (4) Several normal resets occurred late in the flight.	The following actions have been taken: (1) pinning the reset stop upon disengagement of the cams; (2) inspecting the timer prior to shipment by the vendor, and (3) allowing sufficient time to analyze thoroughly telemetry data prior to launch to assure proper setting.

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit proceeded normally. The capsule was ejected properly on orbit 62. However, the parachute was torn from the capsule during the attempted aerial pickup, and the capsule was lost.

(1) This flight was a success in both ascent and orbit.

(2) There were no major equipment failures during this flight.

FLIGHT ANALYSIS

Event	Corrective Action
Perturbations in the horizon scanner output were observed on several south-to-north passes. This was caused by sun interference during the normal orbital pass. These perturbations, observed on all S-01's, have been caused by both sun and cold-cloud interference.	The sensor heads have been modified.
Because of an integrator error, the engine did not cut off when the required velocity was reached. The integrator flight data indicate that the correct velocity-to-be gained was set into the integrator, that the integrator responded properly to the adjust command (D-1), and that there was no integrator drift.	Subsequent units have been calibrated at LMSC-Sunnyvale and at the launch base. Checkout procedures have been changed to prevent the possibility of degradation to the summing circuit due to overvoltage during calibration.
An orbital timer reset monitor error occurred during the orbital flight phase. Reset occurred 12.8 sec late on pass 6 over NHS. Another late reset (8.4 sec) was observed on pass 10 over KTS. No other late resets were noted. As in Vehicle 1132, this anomaly did not affect other programmer or command capabilities. Investigation by the vendor representative disclosed that the reset cams were not properly adjusted. (This same type of malfunction occurred in Vehicle 1132.)	Further ground testing and inspection has been initiated to ensure that proper adjustments have been accomplished.

Measurement A-4 (Y-axis acceleration) displayed abnormal activity during the 5-sec period following thrust attainment. The voltage trace dropped rapidly from 2.5 volts to a negative out-of-band condition, then slowly returned to 2.5 volts. This malfunction was attributed to a faulty capacitor in the output circuitry of the carrier amplifier associated with the transducer.

MISSION RESULTS

Launch, boost, S-01 engine operation, and injection into orbit were satisfactory. However, owing to the delay in the velocity integrator engine cutoff command, the S-01 engine produced excessive velocity and the orbit was not as predicted.

Recovery proceeded normally, and the capsule was ejected on pass 17 and successfully air retrieved.

(1) This flight was a success in both ascent and orbit.
(2) No major equipment failure occurred during this flight.

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Flight 75, Vehicle 6101 (S-O1) – Canadian Satellite (I)

FLIGHT ANALYSIS

Event	Corrective Action
Noisy turbine-speed data precluded an accurate determination of flow rates.	
The control-gas regulator indicated irregular behavior.	
Horizon sensor anomalies were observed after engine first operation.	

MISSION RESULTS

Launch, boost, S-O1 first and second operation, and injection of the spacecraft into the required orbit were satisfactorily attained.

(1) This flight was a success in both ascent and orbit.

(2) No major equipment malfunctions occurred during this flight.

FLIGHT ANALYSIS

Event	Corrective Action
The right head of the Barnes Type IIA horizon sensor became inoperative during pass 19 and remained inoperative. A loss of proper yaw control ensued. This malfunction is attributed to motor seizure. (The observed failure characteristic is similar to that observed on 1153.)	Improved sensor head assemblies incorporating a higher torque motor, improved lubricant, and rotation assembly were installed beginning on 1155.
The + and -28 vdc voltages dropped to zero during pass 1 and returned to normal during pass 2.	After a thorough failure mode analysis, part by part failure simulation test, and ascent through orbit environment testing; the malfunction could not be duplicated. No corrective action appropriate.
Loss of channel 14 on pass 17. No subcarrier on pass 24. Returned to normal operation during pass 24 and operated normally throughout the rest of the flight. (Similar VCO losses have occurred on 1151, 1152, and 1153.) These failures are the result of unreliable starting characteristics of the VCO's in use.	Reliable replacements were not yet available for all the telemetry channels employed in this flight. Unmodified VCO's were used on channels 8, 9, 11, 15, and 16.

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Measurement B-35 (turbine speed) displayed random losses of output during early part of engine operation.	A low-pass filter has been installed.

MISSION RESULTS

Launch, boost, SS-O1A engine operation, and injection into orbit were achieved. Orbital parameters were within the three-sigma tolerances. Orbital operations were normal until orbit 19 when the horizon sensor failed. Recovery was initiated by the Lifeboat system on orbit 49 and the capsule was retrieved in the air.

1. This flight is considered an ascent and orbit success.
2. Based on equipment operation, this flight is assessed as a success in ascent and a failure in orbit for both program and basic Standard Agena.

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