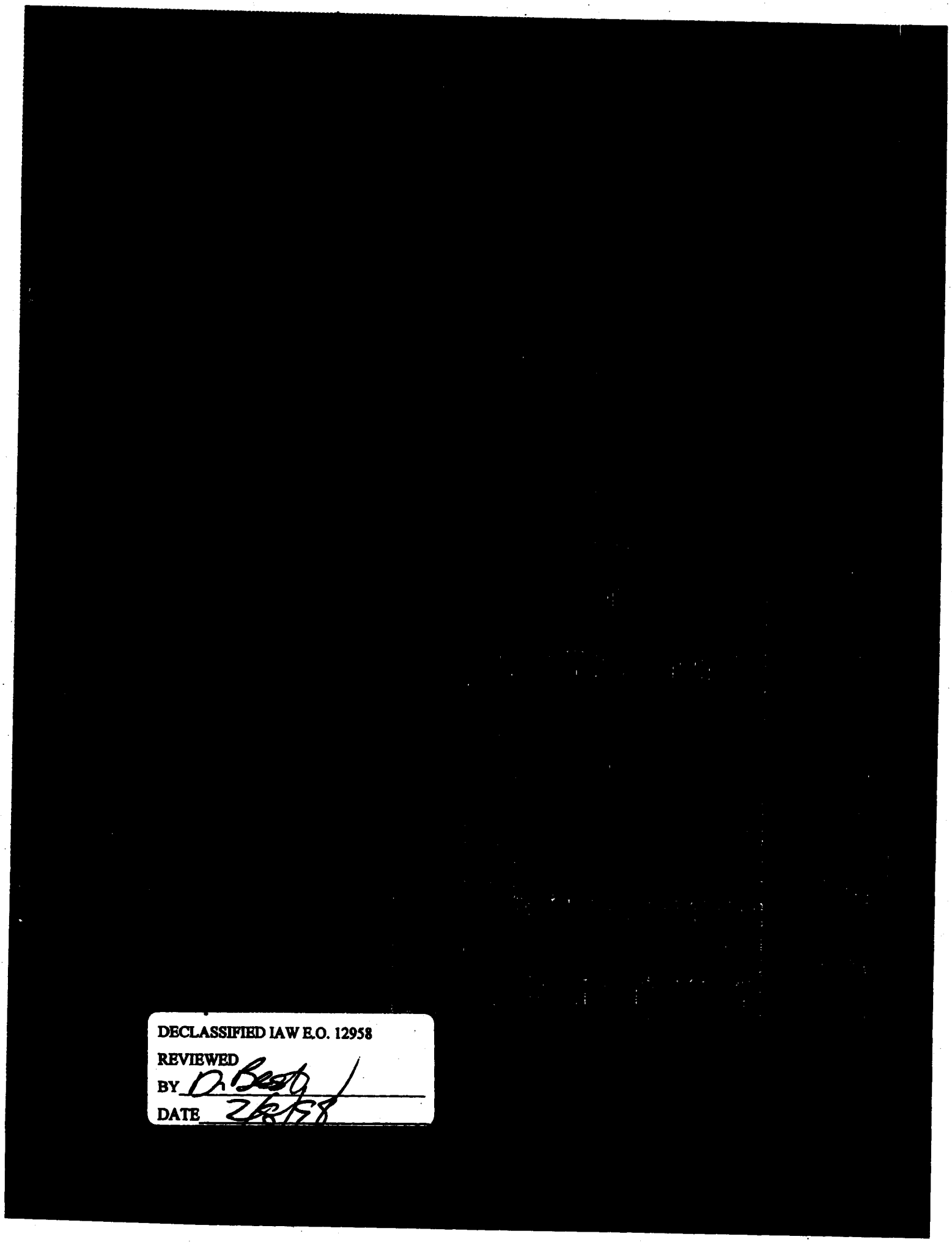

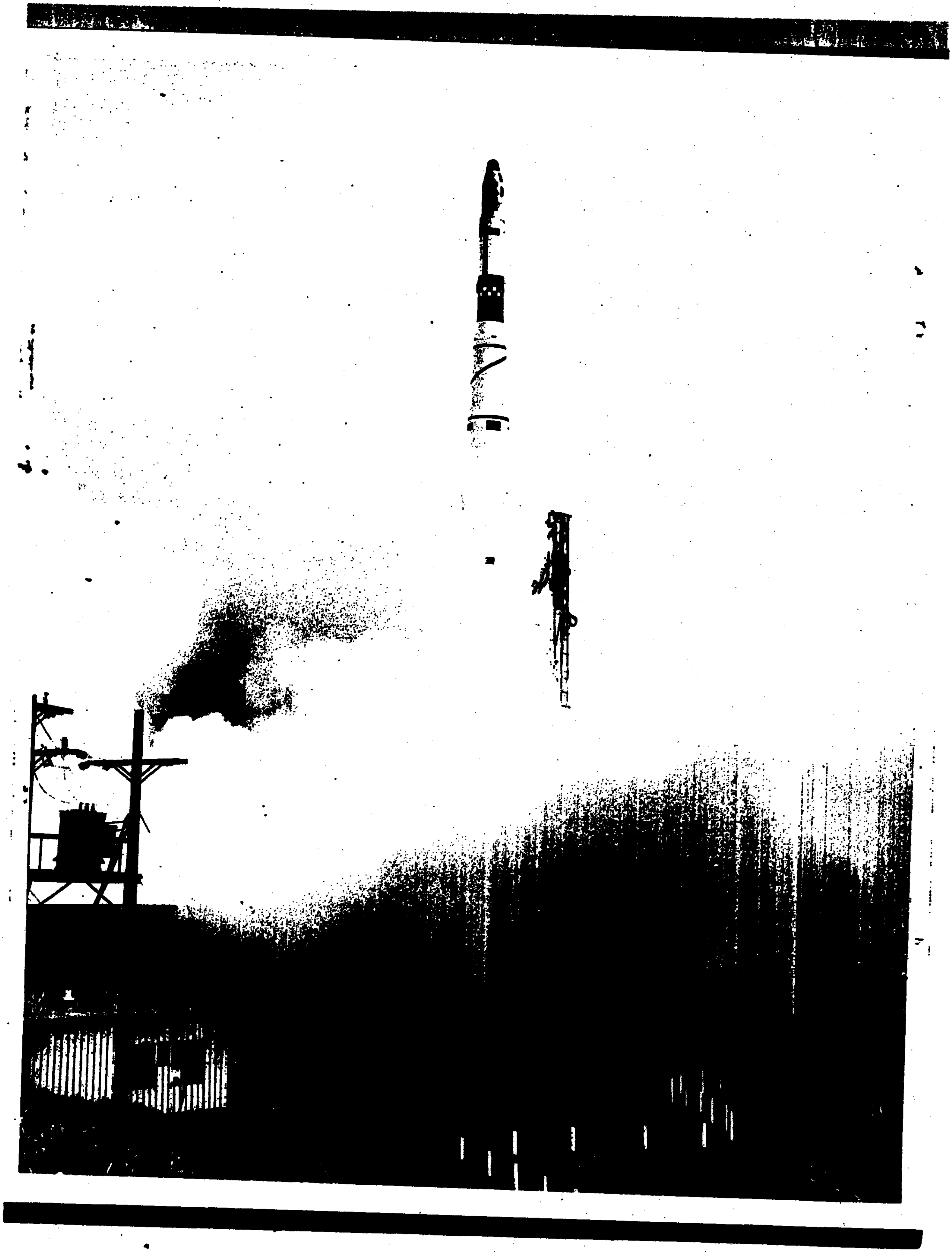

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UNCLASSIFIED

VWZE 4-2-04

1701

LAUNCH REPORT

LV-2A/395 SS-01A/1604

PMR OPERATION NO. 2921 - "NICE BIRD"

LUCIUS A. PERRY, JR., COL., USAF

DEPUTY COMMANDER FOR SPACE SYSTEMS

6595TH AEROSPACE TEST WING

Vandenberg Air Force Base, California

15 May 1964

DOWNGRADED AT 3-YEAR INTERVALS:
DECLASSIFIED AFTER 12 YEARS
DOD DIR 5200.10

UNCLASSIFIED

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SECTION II

CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS.

1. A vehicle consisting of LV-2A booster stage (S.N. 395) and SS-01A orbital stage (S.N. 1604) was launched on the first attempt from Vandenberg AFB, Complex 75-3, Pad 4, at 1623:43.55 PDT on 27 Apr 1964. The primary launch objective, to place the SS-01A satellite with payload into a specified orbit was achieved.

2. The SS-01A electrical pyro system incurred a short circuit at separation. The malfunction was isolated to the lifeboat control junction box assembly, its input or output circuitry, or the C1S1 research payload (RP) lockout switch.

3. The telemetry system instrumentation schedule, LMSC DWG No. 1359017, dated 3 Feb 1964 and the final vehicle 1604 calibration book, dated 20 Mar 1964, were in error as to pyro current instrumentation. The confusion caused by this error resulted in delays and application of unnecessary man-hours to isolate and determine the nature of the electrical system malfunction.

4. Vehicle telemetry was left in the calibrate position during countdown due to an operator error.

5. The hydraulic power package temperature transducers and the gyro inertial reference package (IRP) block temperature transducer exceeded the calibrated band limits, although the temperatures were most likely well within the desired operating limits.

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B. RECOMMENDATIONS.

1. Recommend the function and design of the lifeboat control junction box assembly and the C1S1 lockout switch be investigated.

2. Recommend that instrumentation be added to the SS-01A electrical system to further isolate these continuing electrical short circuits that occur at separation. Suggested points of instrumentation would be as current monitors at the input to the lifeboat control junction box assembly and key points within the lifeboat junction box.

3. Recommend that the telemetry system instrumentation schedule and final vehicle calibration book be amended before launch, to reflect as close as possible the true vehicle status.

4. Recommend that the range of the 28 VDC current monitor be increased from 50 to 100 amperes to give a better measurement for analysis of electrical malfunctions.

5. Recommend that the maximum transducer range of the hydraulic power package temperature and the gyro IRP block temperature be modified to preclude these transducer readings from exceeding band limits on nominal measurements.

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SECTION II

EVALUATION

A. VEHICLE PREPARATION.

During the first dry count of the first stage, a slow slew condition was revealed. Special checks were then performed to determine the reason for the slow slew. During this special check the left vernier engine hung up in the yaw position. The trouble for both problems was traced to the control electronics assembly. The assembly was removed, lab-checked and the problems were resolved by the removal and replacement of the HIG Yaw Gyro and a D.C. amplifier located in the left vernier engine circuit. A successful dry countdown was then completed. During pre-launch testing of the second stage, it was necessary to replace the guidance cannister, DC-DC type X converter, and "H" timer.

B. COUNTDOWN HISTORY AND PAD DAMAGE.

1. The countdown was initiated at 0625 PDT on 27 Apr 1964 and proceeded to liftoff with two holds. Hold number 1 was imposed at T-60 minutes from 1453 to 1515 PDT to complete the replacement of the oxidizer fill line that had been leaking. Hold number 2 was imposed at T-15 minutes from 1601 to 1609 PDT to allow the pad crew to return to the pad to adjust the pneumatic regulators that were drifting.

2. Pad damage was normal for an LV-2A launch and the pad turnaround time can be maintained.

C. LAUNCH SUMMARY.

1. Launch Objectives vs Results Attained.

The objectives listed below are for the checkout and ascent phase of the test. The orbit phase lies beyond the scope of this report. A complete listing of the objectives can be found in the Systems Test Objectives (STO) for Program 162, document number LMSC-B001081-A.

Objective	Results	Comment
Primary Test Objectives		
1. Place payload in desired orbit.	Achieved	
2. Secure telemetered data for evaluation.	Achieved	

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Objective	Results	Comment
3. In order to achieve the primary objectives it is mandatory that the 162 system shall provide or demonstrate the following capabilities:		
a. 162 Booster		
(1) Attain correct position at MECO.	Achieved	
(2) Attain correct velocity direction at MECO.	Achieved	
(3) Attain correct velocity magnitude at MECO.	Achieved	
(4) The BTL guidance system must maintain correct guidance and functional commands to the vehicle.	Achieved	
b. SS-01A Airframe and Adapter		
(1) Withstand guidance maneuvers and flight environment.	Achieved	
(2) Provide compatibility between booster and satellite stages.	Achieved	
c. SS-01A Propulsion System		
(1) Proper retro-rocket operation.	Achieved	
(2) Obtain impulse for orbital velocity.	Achieved	

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OBJECTIVE	Results	Comment
(3) Demonstrate the capability for extended burn time.	Achieved	
d. SS-01A Electrical Power System must demonstrate acceptable performance.	Not achieved	Short circuit in SS-01A Pyro System.
e. SS-01A Guidance and Flight Control System.		
(1) Determine the time for orbital boost.	Achieved	
(2) Initiate and terminate orbital boost.	Achieved	
(3) Provide and maintain proper vehicle orientation.	Achieved	
(4) Provide and control the sequence of operations.	Achieved	
f. SS-01A Communications System.		
(1) Transmit continuous tracking signal.	Achieved	
(2) Receive and transmit radar tracing impulses.	Achieved	
(3) Control vehicle telemetry and S-band beacon operation.	Achieved	
(4) Accept and act upon ground commands.	Achieved	

[redacted]

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Objective	Results	Comment
g. Aerospace Ground Equipment		
(1) Checkout booster and satellite stages.	Achieved	
(2) Control, monitor and power the 162 satellite and booster during countdown.	Achieved	
h. 162 System Facilities		
(1) Monitor vehicle functions to insure satisfactory flight.	Achieved	
(2) Produce adequate telemetry records of inflight data.	Achieved	
(3) Properly transmit and verify reception of all commands.	Partial	Pyro Power Problem
(4) Determine an orbit ephemeris.	Achieved	
(5) Provide interstation and intrastation communications.	Achieved	
4. Not applicable to ascent phase of operation.	N/A	
Secondary Test Objectives		
5. The 162 personnel must demonstrate the capability to:		
a. Calibrate and operate system checkout equipment.	Achieved	

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Objective		Results	Comment
	b. Operate SS-01A and payload consoles and related equipment.	Achieved	
	c. Transport, checkout, mate, fuel, and launch the 162 vehicle.	Achieved	
	d. Communicate within and between operating locations.	Achieved	
	e. Accomplish checkout, launch, orbital and recovery, normal and emergency procedures.	Achieved	
6.	Determine temperature of satellite structure and components.	Achieved	
7.	Execute specialized tests.	Achieved	

2. First Stage.

a. Airframe - Performance of the airframe was satisfactory; however, the inherent oscillations of 16.5 to 19 cps occurred from T+114 until T+139 seconds respectively. The maximum peak-to-peak amplitude was 4.6 g's at T+132 seconds. Maximum loading of 7 g's occurred at T+132 seconds due to the combination of the steady state acceleration and the oscillations present.

b. Instrumentation - Turbine Inlet Temperature (Channel E, Segment 1, Link 28) - This transducer read high and out of band, starting at liftoff. The problem appears to be a circuit malfunction in the magnetic amplifier.

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c. Aerospace Ground Equipment - The aerospace ground equipment for the first stage performed satisfactorily to support checkout and launch of the vehicle with one exception. A spurious liftoff signal was received by all stations outside the launch area, at approximately T-16 minutes. The liftoff monitor was reset properly at T-15 minutes.

3. Second Stage.

a. Electrical - Certain anomalies in the SS-01A electrical system telemetry data were observed prior to launch and at stage I/II separation command. The 28 VDC current monitor, channel 3, read approximately 48 amperes until T-0.4 seconds when it instantaneously returned to a normal level of 25 amperes. This apparent excessive current drain has been attributed to the SS-01A instrumentation in-flight calibration unit having been placed in the CAL HOLD mode from the blockhouse control console, as other telemetry channels connected to this unit were similarly affected. Umbilical separation at liftoff caused the external 28 VDC unregulated power to be removed and the calibration unit to be returned to a CAL OFF mode. Therefore, the high current flow shown on the monitor before liftoff is a false indication. From liftoff, and until about T+160 seconds, all electrical systems appeared to be normal. About 28 milliseconds after separation command, T+159.9 seconds, indications of large current surges were noted on the Agena 28 volt dc current monitor and the current indications remained at an off-band reading for about 800 milliseconds. For about 0.1 second after the separation command, exact electrical conditions are uncertain because of a telemetry drop-out which is normal. At recovery of the telemetry system, the shorted conditions still existed as shown by the current monitor indications. This large current surge, which exceeded the 50 amperes upper limit of the measurement range, was the result of a short circuit in the electrical system. A second 60 millisecond large current surge occurred at about T+161.7 seconds. The current continued erratic between 20 and 30 amperes until T+164 seconds after which the current returned to a normal value.

There is some speculation from simulation data taken at LMSC at Sunnyvale that the electrical system damage occurred as a result of detonation shock from the separation primacord. This is pure speculation as there is no evidence in the launch data that the primacord performed abnormally. It may be advisable for instrumentation of the SS-01A engine cone area to determine the shock from detonation of the separation primacord. Every possible malfunction cause, however slight, should be thoroughly investigated where practical. Simultaneously with the first current surge, the pyro bus voltage dropped from a 28.6 volt indication to about 17.9 volts. After 0.6 seconds at 17.9 volts, the pyro bus indication dropped to a zero bandwidth reading on telemetry indicating a value of less than 17.2 volts. During this same period the indication of pyro current

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as listed in the telemetry system instrumentation schedule, LMSC DWG No. 1359017 dated 3 Feb 1964 and in the Final Vehicle 1604 calibration book, dated 20 Mar 1964, was about 9 amperes, the value it remained at throughout the entire flight. These two instrumentation documents were in error as the vehicle pyro current monitor point had been modified as directed by a LMSC engineering order. The modified instrumentation was such that pyro current was not indicated on telemetry and this monitor point indicated only a voltage to simulate a fixed meaningless reading. Thus this launch was without a telemetry reading of pyro current, so with the large current drain and with the drop of, and probably loss of, pyro bus voltage indication it is most likely that the short circuit occurred in the pyro circuit. The events that occurred in the pyro system isolate the failure to the lifeboat control junction box assembly, its input feeder line from the pyro bus, or its output circuitry. The single pyro voltage monitor point was installed in the lifeboat junction box. The occurance of pyro events subsequent to the anomalies at separation, such as ullage rocket ignition, rocket motor ignition, etc., indicate that the integrity of the main pyro power distribution system remained intact. Therefore, it can be deduced that the pyro buss feeder line to the lifeboat junction box may have opened due to the short circuit in the lifeboat junction box or its output circuitry. Electrical simulation studies by LMSC at Sunnyvale were reported to have duplicated the current and voltage flight indications by shorting out DRP lockout switch C1S1. This does not explain the reported lack of switched pyrotechnic voltages which would better be explained by a malfunction in wiring such as at plug C1P500A. Circuitry indicates other short circuits in this area of the pyro system could also cause the same indications. The DRP payload, which receives its pyro power from this junction box, was eliminated as being a contributory factor to the malfunction because its power is routed through the C1S1 adapter switch which should not normally be closed until separation complete. A short in the C1S1 switch or its lead-in wires would require other shorting such as in the C1P500A plug to explain the lack of switching in the pyrotechnic voltages. From the initial short the current drain was high and fluctuating, as if it was an arcing short, until ullage rocket burn at T+164.1 seconds where the current made a recovery. Ullage acceleration may have opened the short circuit, but it is more likely that the circuit burned an open at this time. Without more extensive instrumentation, it is impossible to pinpoint the area of malfunction more accurately in the lifeboat junction box, C1S1 switch, or the associated circuitry and thus pin down an accurate possibility of cause.

b. Instrumentation -

(1) During Phase IV of the terminal count, vehicle calibrations from the blockhouse were manually introduced into the telemetry system in order to calibrate certain continuous channels on Link 1. At T-0.35 sec this calibrate voltage was removed and the affected channels returned to nominal values.

[redacted]

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(2) No. 3 Battery Temperature (17-01-23): This transducer was reading high and out of band at approximately 5.9 v throughout the flight. The problem appears to be a circuit malfunction.

(3) Hydraulic Power Package Temperature (12-01-27): The range of this transducer is calibrated from -26 deg F to +197 deg F. Since the pump has the capability of operating as high as +225 deg F and usually not below 50 deg F, the range of this transducer should be displaced upwards approximately 50 deg F. Presently, the T/M readout for this measurement approaches 0.5 v and calibrations beyond 0.4 v are invalid.

(4) Gyro Block Temperature (17-01-14): This transducer was reading high and out of band at approximately 5.1 v. The range is calibrated from -54 deg F to +137 deg F. Data from previous vehicles show this measurement to read approximately 145 deg F. The T/M voltage monitor for this transducer is calibrated between 3.7 v and 5.0 v (corresponding to -54 deg F and +137 deg F respectively). Data appears valid, however the transducer range should be corrected.

c. Aerospace Ground Equipment - The aerospace ground equipment for the second stage (LMSC) performed satisfactorily to support checkout and launch of the vehicle with the following exceptions:

(1) The oxidizer fill line developed a leak under its metal shroud. Replacement of the line was necessary, thus causing a hold in the countdown.

(2) The pneumatic regulators were drifting out of specifications during the terminal count which requires the dispatching of a pad crew to make adjustments.

(3) The dehumidifier on a Type 4 air conditioner on the pad malfunctioned and the air conditioner was replaced by a substitute unit.

(4) A hand load valve on the pad helium supply equipment malfunctioned and was replaced.

(5) A helium regulator, also on the pad helium supply equipment, malfunctioned and was replaced.

(6) A leak occurred at a fitting on the guidance gas pressurization supply trailer, but it was determined to be insufficient to delay the countdown for repairs.

[redacted]

[redacted]

(7) When the air conditioning was turned on, the oxidizer sniffer indicated full scale. Evaluation indicated that oxidizer fumes remained in the lines after the oxidizer circulation pump was replaced before countdown initiation.

(8) Spurious side band signals were observed from -10 to +20 KC on SS-01A Link 2 due to excessive signal strength received by the tracking station. This is a normal close-proximity reception and the condition is relieved after liftoff.

4. Launch Support - Photography -

a. A review of quick-look prints and a critique of original films by the Film Services Unit of engineering sequential photography and documentary photography revealed that IRIG-B timing was used on pad and tracking cameras. However, on all pad cameras reviewed by this office, (item 11.1, 11.2, 11.5, 11.9, 11.15 and 11.16) timing was garbled. Marker pulses were absent, and all liftoff times, though the same, were meaningless. The following additional discrepancies were noted:

(1) Lost in processing; not delivered

(a) Item 11.6 (high speed surveillance)

(b) Item 11.8 (umbilical ejection)

(c) Item 12.A (ignition and liftoff)

(d) Item 11.25 (tracking)

(2) Timing absent

(a) Item 11.4 (surveillance)

(b) Item 11.7 (umbilical ejection)

(c) Item 11.11 (ignition and liftoff)

(d) Item 11.13 (ignition and liftoff)

(3) Timing weak

(a) Item 11.15 (lower missile and launcher-liftoff)

(b) Item 11.23 (tracking)

[redacted]

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(4) Scratched

(a) Item 11.4 (surveillance)

(b) Item 11.23 (tracking)

(c) Item 11.24 (tracking)

(d) Item 12.1 (tracking)

(e) Item 12.2 (tracking)

(5) Dirty Aperture

(a) Item 11.1 (surveillance)

(b) Item 11.5 (high speed surveillance)

(c) Item 11.23 (tracking)

(d) Item 11.24 (tracking)

(e) Item 12.2 (tracking)

(6) Broken perforation; not delivered

(a) Item 11.12 (ignition and liftoff)

(7) Obstruction in upper corners of frame

(a) Item 11.4 (surveillance)

(8) Spurious circular image

(a) Item 12.3 (tracking)

(9) Over-exposed print

(a) Item 11.9 (umbilical ejection)

(10) Image not centered

(a) Item 11.16 (blast effects against base mast)

[redacted]

[redacted]

(11) Erratic tracking

(a) Item 11.21 (tracking)

(b) Item 11.22 (tracking)

(c) Item 11.23 (tracking)

In view of the timing problems, loss of film in processing, and an abundance of poor picture quality, photographic support for this mission was unusually poor. No items of documentary photography were delivered.

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APPENDICES

PREPARATION AND HISTORY

A. FIRST STAGE.

20 Jun 63	Booster 395 arrived.
24 Jun 63	Receiving inspections were completed.
2 Jul 63	Booster subsystems modifications were started.
8 Jul 63	Primacord installation was completed.
18 Jul 63	Booster subsystems modifications were completed.
29 Jul 63	Booster continuity checks were completed and hydraulic checks were started.
30 Jul 63	Telemetry modifications and hydraulic checks were completed.
1 Aug 63	Command destruct tests were completed.
6 Aug 63	Electrical checks and telemetry checks were completed.
8 Aug 63	An all-systems test was completed.
15 Aug 63	Booster 395 was weighed, secured, and transported to MAB 5 for post-checkout storage.
9 Oct 63	Booster 395 was transported to LE-2.
11 Oct 63	Booster indexing was completed and launcher checks with the booster were started.
16 Oct 63	Because of a change in launch schedule, booster 395 was demated and was placed in temporary storage in the pad shelter.
21 Oct 63	Booster 395 was returned to MAB 5 for storage.
28 Dec 63	The vernier engine actuators were removed for rework of the Cadillac valves.
2 Jan 64	Telemetry and electrical subsystem modifications were completed.

14 Jan 64	New vernier engine actuators were installed.
16 Jan 64	A rerun of hydraulic checks to verify vernier engine actuator replacement was completed.
22 Jan 64	Booster electrical checks and an all-systems test were completed. The booster was placed in post-checkout storage.
5 Feb 64	The main engine actuators were removed for rework.
12 Feb 64	A new main engine flame guard was installed.
26 Feb 64	The vernier engine actuators were removed for rework.
11 Mar 64	The feedback potentiometers on the vernier engine actuators were replaced.
16 Mar 64	Installation of main engine actuators was completed.
17 Mar 64	Hydraulic checks were rerun.
19 Mar 64	Booster electrical checks were rerun.
20 Mar 64	An all-systems test was completed.
23 Mar 64	Booster 395 was secured and transported to LE-4.
24 Mar 64	Booster indexing was completed and launcher checks were started.
25 Mar 64	Launcher checks were completed and booster leak checks were started.
3 Apr 64	Booster leak checks and hydraulic checks were completed.
10 Apr 64	Booster electrical checks were started.
14 Apr 64	Electrical checks were completed.
15 Apr 64	An all-systems test was completed.
17 Apr 64	A dry countdown was completed.
19 Apr 64	A single and dual propellant loading exercise was completed.
20 Apr 64	R-5 day preflight procedures were completed.

21 Apr 64	A dry countdown and phasing and polarity checks were completed.
22 Apr 64	R-3 day preflight procedures were completed.
23 Apr 64	Special checks revealed a bad HIG yaw gyro and the flight controller was removed and sent to the lab.
24 Apr 64	The flight controller was reinstalled and a dry countdown was completed.
25 Apr 64	R-2 day preflight procedure was completed. The phasing and polarity test were also completed.
26 Apr 64	R-1 day preflight procedures were completed and the solid motors were mated.
27 Apr 64	Booster 395 was successfully launched.

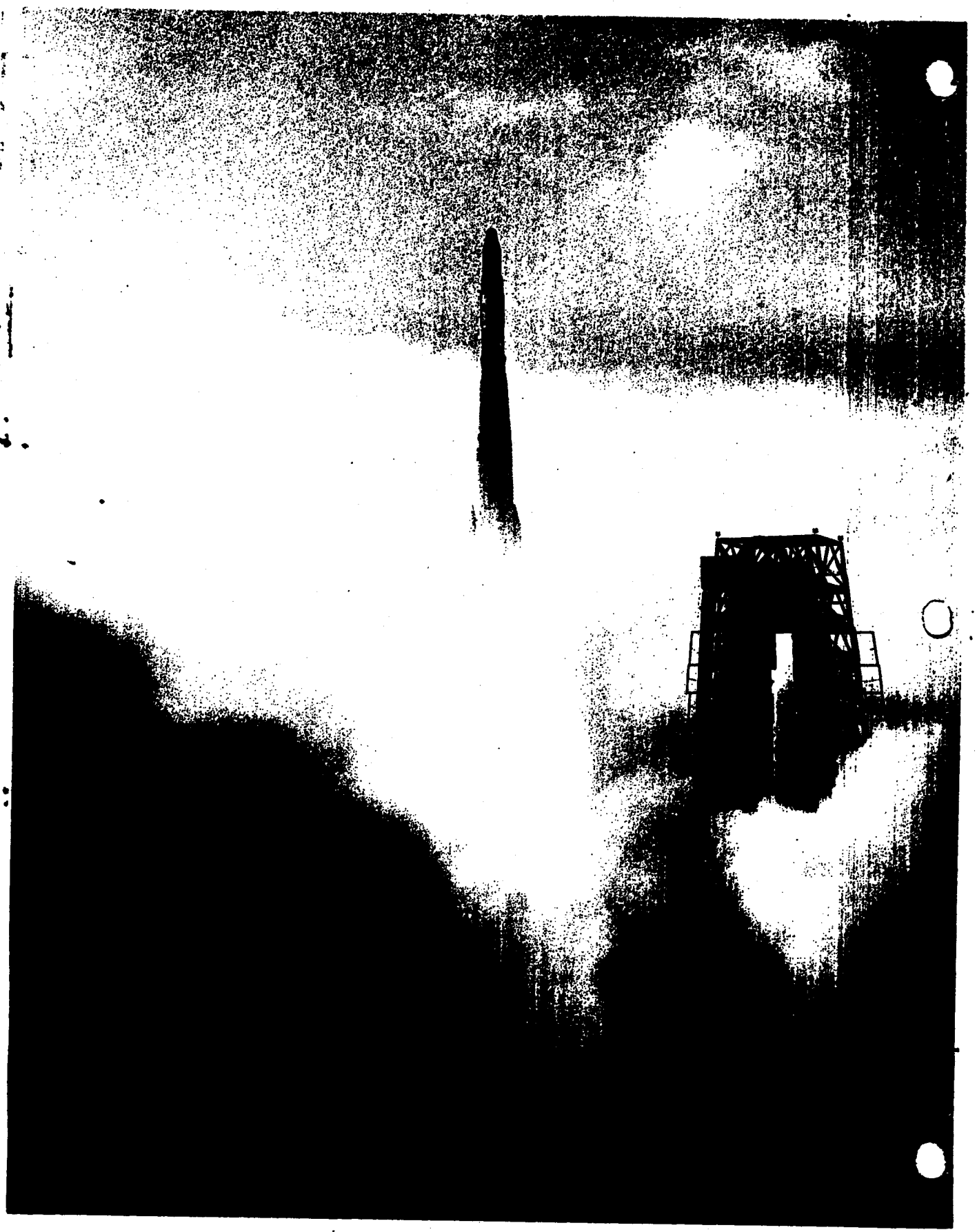
B. SECOND STAGE.

11 Mar 64	Vehicle arrived at VAFB and the receiving inspection was performed.
12 Mar 64	SS/B checks,guidance module cleanup and installation, and SS/D validations were performed.
19 Mar 64	Telemetry functional checks were begun, the pitch actuator was replaced, and the Brayco and hydraulics checks were re-run.
20 Mar 64	Telemetry functional checks were completed.
23 Mar 64	Voltage standing wave ratio checks were performed.
24 Mar 64	Magnetometer was sent to magnetometer range; pneumatic cleanliness verification was performed; Discoverer Research Payload (DRP) fit checks (aft panel only), booster adapter fit check, destruct checks, and D-timer sequence settings were performed.
25 Mar 64	Alignments were performed.
26 Mar 64	Payload monitor capability checks were performed.
27 Mar 64	Sequence timer functions leak checks were performed.
30 Mar 64	Magnetometer range checks were performed and the vehicle returned to the MAB.

31 Mar 64	Sequence timer leak checks and battery fit checks were performed.
1 Apr 64	DRP fit checks, booster adapter fit checks and destruct checks were performed.
3 Apr 64	Cleanup and modifications were performed.
8 Apr 64	Helium control valve functional tests were performed.
9 Apr 64	D-timer pressure checks and MAB finals were performed.
10 Apr 64	Pneumatic leak checks were performed.
11 Apr 64	Engine functional checks were performed.
13 Apr 64	Compatibilities were performed.
14 Apr 64	DRP fit checks (2 panels), advanced payload and adapter ring fit checks were performed and the DC/DC converter was changed.
15 Apr 64	Douglas all-systems run was performed.
17 Apr 64	Systems run phase 1 and 2, and Douglas flow checks were performed.
20 Apr 64	Evaluation, engine servicing, premate pyrotechnics, and research payload installation were performed. Launch slipped one day due to advanced projects payload problems.
21 Apr 64	The booster adapter was installed and the vehicles were mated.
22 Apr 64	Douglas dry countdown and flush and purge, BTL phasing and polarity checks, and Douglas all systems run were performed.
23 Apr 64	Battery modifications, post-mate pyrotechnics, and destruct checks were performed.
24 Apr 64	Advanced payload was mated and the Douglas all-systems run was performed.
26 Apr 64	The solid motors were mated.
27 Apr 64	The vehicle was successfully launched.

DISTRIBUTION

QUANTITY	RECIPIENT
18	LMSC/VAFB, Calif
10	Douglas Aircraft Co., VAFB, Calif.
1	6595th ATW, (TWOCE) Sunnyvale, Calif.
1	NASA, (Test Support Office) P.O. Box 435, Lompoc, Calif.
1	SSD (SSVXE) AF Unit Post Office, Los Angeles 45, Calif.
1	SSD (SSVAE-1)
1	SSD (SSVAE-2)
1	SSD (SSZD)
1	6595th ATW (VWZD), VAFB, Calif.
1	Air Force Western Test Range Attn: WTSO, VAFB, Calif.
1	Naval Missile Facility Point Arguello, Lompoc, Calif.



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UNCLASSIFIED

VWZE 4-2-02

170P

LAUNCH REPORT

LV-2A/396 SS-01A/1175

LUCIUS A. PERRY, JR., COL., USAF
DEPUTY COMMANDER FOR SPACE SYSTEMS
6595TH AEROSPACE TEST WING
Vandenberg Air Force Base, California

13 Apr 1964

DOWNGRADED AT 3-YEAR INTERVALS:
DECLASSIFIED AFTER 12 YEARS
DOD DIR 5200.10

UNCLASSIFIED [redacted]

CONTROL NO. 6595-64-1494

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SECTION I

CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS.

1. A vehicle consisting of LV-2A booster stage (S.N. 396) and SS-01A orbital stage (S.N. 1175) was launched from Point Arguello launch complex 1, Pad 1, on 24 Mar 1964. This was the first launch of a vehicle of this combination from this complex. The primary launch objective, to place the SS-01A satellite with payload into a specified orbit was not achieved. This was caused by a failure of the SS-01A. All first stage booster systems performed satisfactorily.

2. The leak indicators (sniffers) have erroneously indicated leaks on several occasions, thereby holding up the countdown at critical times.

3. Data indicates that a short circuit occurred in the subsystem "C" electrical system. This first short circuit has been traced to the Type IX dc/dc converter. The original malfunction probably caused further deterioration of the electrical system until complete loss of regulated 28 volt dc power to the guidance module occurred.

4. After VECO, but prior to T+231 seconds, performance of the second stage flight control system had deteriorated due to a degraded output of the Type IX dc/dc converter but adequate attitude control of the vehicle was maintained. Subsequent to T+231 seconds, when complete loss of the Type IX dc/dc converter regulated output voltage occurred, portions of the flight control system ceased to function and a catastrophic loss of vehicle attitude control resulted.

B. RECOMMENDATIONS.

1. The reliability of the leak indicators (sniffers) should be improved so that only actual leaks are reported.

2. Recommend Lockheed Missile and Space Company (LMSC) engineering staff study the physical integrity of Type IX dc/dc converter components for possible weak or failure prone parts. Consideration should be given to near vacuum environment, event shocks, acceleration forces, 20 cps vibrations, rain water and effect of condensation moisture.

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3. Recommend the LMSC Engineering staff perform an investigation of the horizon sensor fairing pin pusher assembly for possible reasons of plug or case failure. Also LMSC should conduct tests to simulate the damage that would give indications as observed, in the electrical system of vehicle 1175, during flight.

4. Recommend steps be taken to improve the Type IX dc/dc converter regulated power supply to prevent permanent loss of regulated voltage to the guidance module.

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SECTION II

EVALUATION

A. VEHICLE PREPARATION.

On 21 Mar 1964, problems in the SS-01A flight controller caused the launch to be postponed 24 hours.

B. COUNTDOWN HISTORY AND PAD DAMAGE.

1. The countdown was initiated on schedule at 0335 PST, 24 Mar 1964 and proceeded to liftoff with three technical holds. At T-14 minutes the LV-2A gyro heaters were not cycling properly; therefore, hold number one (DAC) was imposed from 1347 to 1400 to increase electrical power to the heaters. This provided proper cycling. The second hold (BTL) was imposed in Phase III of the terminal count from 1404 to 1406 to recycle the guidance loop checks. In Phase V of the terminal count a third hold (LMSC) was imposed from 1417 to 1421 when the SS-01A fuel sniffer indicated a leak.

2. Pad damage was greater than previously encountered for launches from Complex 75. This was the first LV-2A launch from PALC-1, Pad 1 and the increased blast created by the solid motors burned through several pipes around the base of the launch stand. The pad turnaround time will not be affected by the repairs to the pad. Approval is being sought for the removal of GDA Aerospace Ground Equipment so that Douglas Aircraft Co. (DAC) can proceed with modifications to reduce pad damage in future launches.

C. LAUNCH SUMMARY.

1. Launch Objectives vs Results Attained.

The objectives listed below are for the checkout and ascent phase of the test. The orbit phase lies beyond the scope of this report. A complete listing of the objectives can be found in the Systems Test Objectives (STO) for Program 162, document number LMSC-B001081-A.

[redacted]

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[redacted]

Objective	Results	Comment
Primary Test Objectives		
1. Place payload in desired orbit	No	
2. Secure telemetered data for evaluation	Yes	
3. In order to achieve the primary objectives it is mandatory that the 162 system shall provide or demonstrate the following capabilities:		
a. 162 Booster		
(1) Attain correct position at MECO	Yes	
(2) Attain correct velocity direction at MECO	Yes	
(3) Attain correct velocity magnitude at MECO	Yes	
(4) The BTL guidance system must maintain correct guidance and functional commands to the vehicle	Yes	
b. SS-01A Airframe and Adapter		
(1) Withstand guidance maneuvers and flight environment	No	Payload separation due to severe tumbling.
(2) Provide compatibility between booster and satellite stages	Yes	

[redacted]

[redacted]

[redacted]

[redacted]

Objective	Results	Comment
c. SS-01A Propulsion System		
(1) Proper retro-rocket operation	Yes	
(2) Obtain impulse for orbital velocity	No	Vehicle shutdown 205.5 seconds after ignition.
(3) Demonstrate the capability for extended burn time	No	Same as above.
d. SS-01A Electrical Power System must demonstrate acceptable performance	No	A type IX dc/dc converter failed 28 milli seconds after VECO
e. SS-01A Guidance and Flight Control System		
(1) Determine the time for orbital boost	Yes	This time was invalid.
(2) Initiate and terminate orbital boost	No	Boost terminated prematurely by fuel starvation.
(3) Provide and maintain proper vehicle orientation	No	Steering orders were not effective.
(4) Provide and control the Sequence of operations	No	Steering sequential commands were not accepted by the vehicle.
f. SS-01A Communications System		
(1) Transmit continuous tracking signal	Yes	
(2) Receive and transmit radar tracing impulses	Yes	
(3) Control vehicle telemetry and S-band beacon operation	Yes	

[redacted]

[redacted]