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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

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FOR RELEASE: SUNDAY
May 9, 1965

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PROJECT: APOLLO BOILERPLATE 22

SCHEDULED LAUNCH:

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To be launched no earlier than May 19.

NEWS NASA
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NASA TO TEST
APOLLO ESCAPE SYSTEM
AT HIGH ALTITUDE

The National Aeronautics and Space Administration will conduct the fourth in a series of Apollo spacecraft launch escape system test at White Sands Missile Range, N. M., no earlier than May 19.

The spacecraft, called Apollo Boilerplate 22, will be launched by a Little Joe II rocket to an altitude of 112,000 feet above the ground where the Apollo launch escape subsystem will be fired. The escape motor will carry the spacecraft to a peak altitude of about 175,000 feet

The spacecraft is expected to land about 110 miles up-range near Williams Ranch, private property leased by the government to extend the White Sands Range.

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Main objectives of this test are:

1 To determine performance of the launch escape vehicle at an altitude approximating the upper limit of the canard subsystem. Canards are small wings on the forward section of the escape rocket to orient the Apollo command module aerodynamically in an escape situation in the atmosphere.

2. To demonstrate orientation of the launch escape vehicle to a relatively stable position with the main heat shield forward, using the canards, for proper deployment of dual drogue parachutes.

During a launch of the three-man Apollo spacecraft, the launch escape subsystem would be used to propel the spacecraft and its crew to safety in the event of a Saturn launch vehicle failure either on the pad or during powered flight.

The Apollo Biolerplate spacecraft will incorporate for the first time a jettisonable forward heat shield which will be separated from the command module by thrusters prior to parachute deployment. A new pilot and main parachute design also will be used for the first time.

Previous tests of Apollo spacecraft launch escape vehicles conducted from White Sands were:

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Boilerplate 6 - Nov. 7, 1963 - Successful abort from the launch pad.

Boilerplate 12 - May 13, 1964 - Successful high dynamic pressure tests dispite failure of one of the three main spacecraft parachutes to deploy fully.

Boilerplate 23 - Dec. 8, 1964 - Successful abort at maximum dynamic pressure region. (This abort was at about 31,000 feet.)

Last December's test was the first using canard subsystem, dual drogue parachutes, a command module boost protective cover and a Little Joe II with control fins for guided flight during the boost phase, all of which will be used for this test

Two more abort tests are planned this year at White Sands, including an off-the-pad abort using Boilerplate 23 again (redesignated BP-23A), and a fourth Little Joe II abort test using a flight production Apollo spacecraft (Spacecraft 002) instead of an engineering test "boilerplate." Spacecraft 002 will be the first actual Apollo spacecraft to be launched.

(BACKGROUND INFORMATION FOLLOWS)

FLIGHT PLAN

The test vehicle will be launched from Complex 36 at White Sands Missile Range in a northerly direction at an angle of about 84 degrees to the horizontal. A launch signal, via electrical cables from the blockhouse, will ignite three first stage Algol solid propellant rocket motors in the Little Joe II launch vehicle.

The three second-stage Algol motors will be ignited about 40 seconds after liftoff by an onboard timer ignition circuit as the first stage burns out The second-stage Algols will propel the test vehicle to the test point, about 112,000 ft. Flight trajectory will be programmed by an autopilot aboard the Little Joe II, "sterring" the launch vehicle by actuating aerodynamic control surfaces on the launch vehicle's fins.

Abort will take place about 89 seconds after liftoff, commanded by radio from the ground The abort signal will begin separation of the Apollo command module from the service module, ignition of the pitch control and launch escape rocket motors, and (11 seconds later) depolyment of the canard surfaces

The Apollo launch escape vehicle will coast in tumbling flight to an altitude of about 175,000 feet, then begin its tumbling descent. Canards and the launch escape subsystem will stabilize the spacecraft with its aft heat shield forward and downward.

At an altitude of about 21,000 feet above the range the tower jettison rocket motor will carry away the launch escape subsystem and boost protective cover. The forward heat shield will be jettisoned 0.4 seconds later, exposing the compartment which contains parachutes, the egress hatch and other equipment.

Dual-drogue parachutes will be deployed in reefed condition two seconds after jettison of the launch escape subsystem. The drogues will be reefed for eight seconds.

At an altitude of about 6,000 feet above the range, the dual-drogue parachutes will be jettisoned and three main parachutes will be deployed in reefed condition by mortar-actuated pilot chutes. Eight seconds later the main parachutes will be disreefed and inflated fully, lowering the spacecraft to a landing approximately 110 miles from the launch point.

An approximate time sequence follows:

T	Lift-off
T plus 40 seconds	Second stage ignition at about 27,000 feet altitude above range. *
T plus 89 seconds	Abort initiation at about 112,000 feet altitude above range.
T plus 100 seconds	Canard deployment
T plus 152 seconds	Peak altitude, about 175,000 feet.
T plus 300 seconds	Launch escape subsystem jettison at about 21,000 feet above the range. **
T plus 302 seconds	Drogue parachutes deploy at about 19,000 feet above the range.
T plus 348 seconds	Main parachutes deploy at about 19,000 feet above the range.
T plus 547 seconds	Command module landing about 110 miles from the launch site.

TEST VEHICLE COMPONENTS AND CHARACTERISTICS

Total Height: 85 feet, 7 inches

Little Joe II: Height, 32 feet, 10 inches; diameter, 154 inches; powered by six Algol motors of 103,200 pounds thrust each.

* Range is about 4,000 feet MSL in launch area.

** Range is about 5,500 feet MSL in recovery area.

The Little Joe II has an attitude control subsystem consisting of elevons (aerodynamic control surfaces) and hydrogen-peroxide reaction controls actuated by an autopilot in the airframe. Two radio frequency command receivers inside the launch vehicle initiate abort upon receipt of a ground signal.

Service Module (Boilerplate): Height, 13 feet, 2 inches; diameter, 154 inches: weight, 10,000 pounds.

Command Module (Boilerplate): Conical shape; height, 11 feet, 3 inches; diameter at base, 12 feet, 10 inches; weight, about 11,000 pounds. A main hatch provides access to the interior of the command module. Four tracking beacons and four telemetry antennas are installed in the structural shell.

The command module exterior surface has a boost protective cover which provides protection from aerodynamic heating during boosted flight and from heat and soot generated by the launch escape and jettison motors. It is made of ablative cork and Teflon-impregnated glass cloth, supported by glass honeycomb in the upper third portion.

The forward (apex) heat shield forms the upper third of the exterior shell of the command module, protecting parachutes, egress hatch and other equipment. Separate thrusters will be used to jettison the forward heat shield for the first time. Previously, the forward heat shield was bolted to the launch escape tower and jettisoned with the launch escape system.

The dummy aft (base) heat shield on the command module is used to protect the command module from Earth landing damage.

It is of sandwich construction with an inner and outer glass laminated skin with an aluminum honeycomb core.

Two tape recorders, each recording 14 tracks, and three motion picture cameras are installed in the spacecraft. The tape recorders will be recording telemetry and other data. A total of 230 measurements will be received from thermocouples, vibration sensors, rate and attitude gyros, breakwire systems, accelerometers, pressure transducers and other sensors during the flight. One camera is in the command module, one in the service module and one in the LES tower.

The Earth landing subsystem consists of three ring-sail main parachutes 83.4 feet in diameter, three pilot chutes 7.2 feet in diameter, two conical-ribbon drogue parachutes 13.7 feet in diameter, and Pyrotechnics to actuate the parachutes, reefing lines, reefing cutters, deployment bags, bridles, risers and sequencers to program events.

A new main parachute suspension system is being flown for the first time, causing the spacecraft to hang at a 30-degree angle during descent. This will allow the command module to impact properly into water. Although BP-22 is being flown over land, actual Apollo manned flights will re-enter for recovery at sea.

Launch Escape Subsystem: The launch escape subsystem consists of a launch escape rocket motor, a pitch control rocket motor, a tower jettison rocket motor, a tower release mechanism, a canard subsystem, a Q-ball assembly, ballast and tower structure. Total height is 33 feet.

The launch escape motor is 26 inches in diameter, 15 feet, 3 inches long and burns approximately 3,200 pounds of solid propellant while providing normal thrust of 155,000 pounds.

The pitch control motor is nine inches in diameter and 22 inches long. The housing forms the structure between the Q-ball assembly and forward end of the jettison motor. It burns solid propellant.

The tower jettison motor is 26 inches in diameter and 47 inches long, uses solid propellant and develops 33,000 pounds thrust.

The tower release mechanism consists of four explosive bolts, each containing a single explosive charge with a dual ignition feature to increase reliability.

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The canard subsystem is mounted in the pitch control motor housing between the Q-ball assembly and the forward end of the jettison motor. Each of the two canard surfaces is about 18 inches wide and 24 inches long. These aerodynamic surfaces are Pyrotechnic-actuated 11 seconds after the escape motor fires, acting as "wings" to stabilize the launch escape vehicle in a blunt-end-forward position and reduce descent oscillations.

The Q-ball assembly is a conical-shaped unit on the forward end of the pitch control motor housing. Four pressure sensors in the forward section of the Q-ball system are used to determine flight angles of attack and dynamic pressure. It is used for postflight test vehicle trajectory analysis and evaluation.

Ballast is installed in the launch escape subsystem to achieve desired dynamic characteristics of the launch escape vehicle during the abort sequence.

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Launcher: The launcher for Little Joe II is fabricated steel, using heavy I-beams for main supports. It uses a pivot frame mounted on a crane-type truck for rotation to the required launch azimuth, a support platform adjusted by jacks for launch angles, and a launcher mast.

CONTRACTOR PARTICIPATION

North American Aviation, Inc., Space and Information Systems Division, Downey, Calif., prime contractor for spacecraft command and service modules.

General Dynamics/Convair, San Diego, Calif., Little Joe II.

Aerojet-General Corp., Sacramento, Calif., Algol motors.

Lockheed Propulsion Co., Redlands, Calif., launch escape and pitch control motors.

Thiokol Chemical Corp., Elkton, Md., escape system, jettison motor.

Northrop Ventura Division, Newbury Park, Calif., landing system.

American Wiancko, Los Angeles, Calif., Little Joe II guidance gyros.

Walter Kidde, Belleville, N.J., Little Joe II reaction control system.

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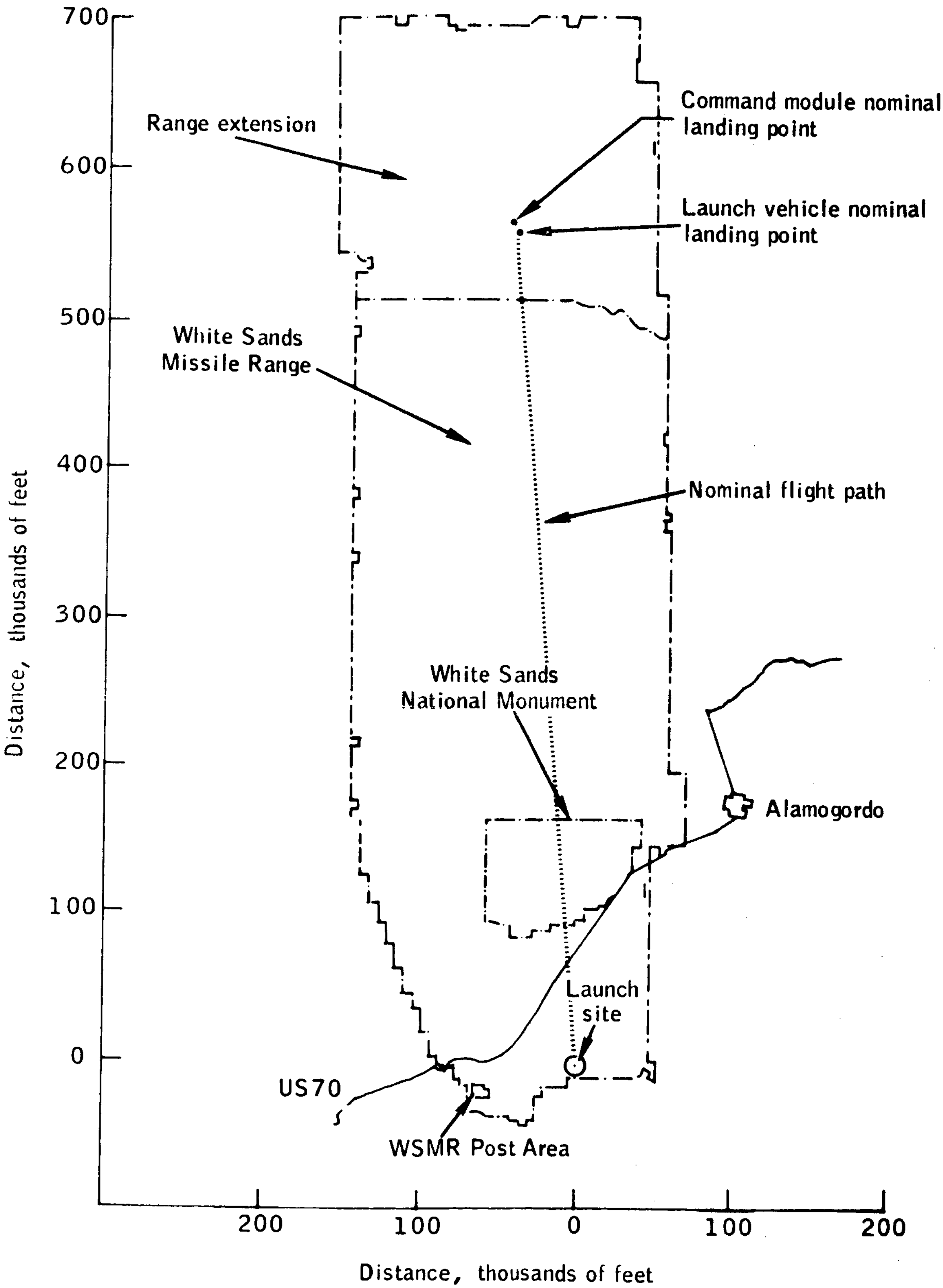
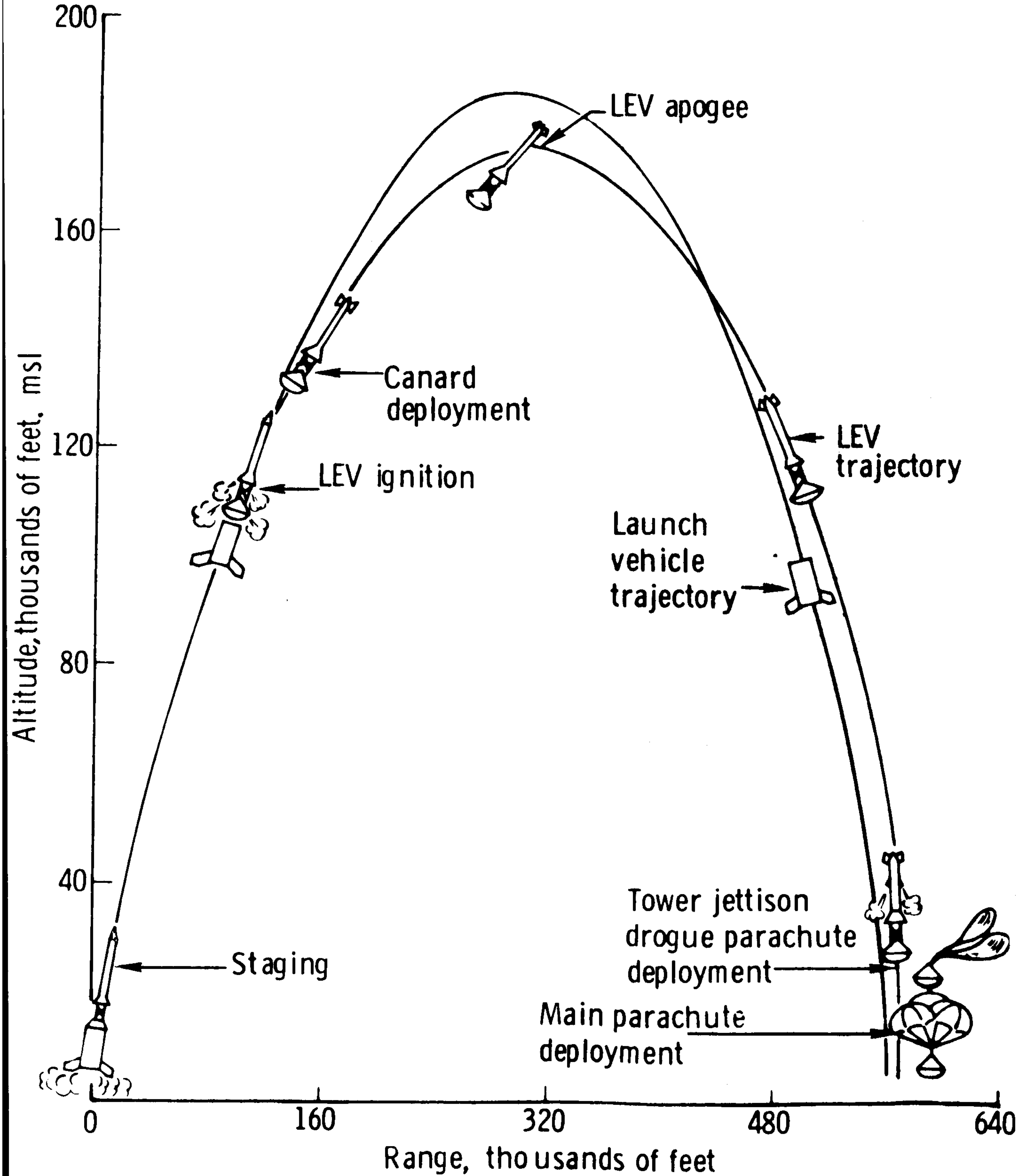


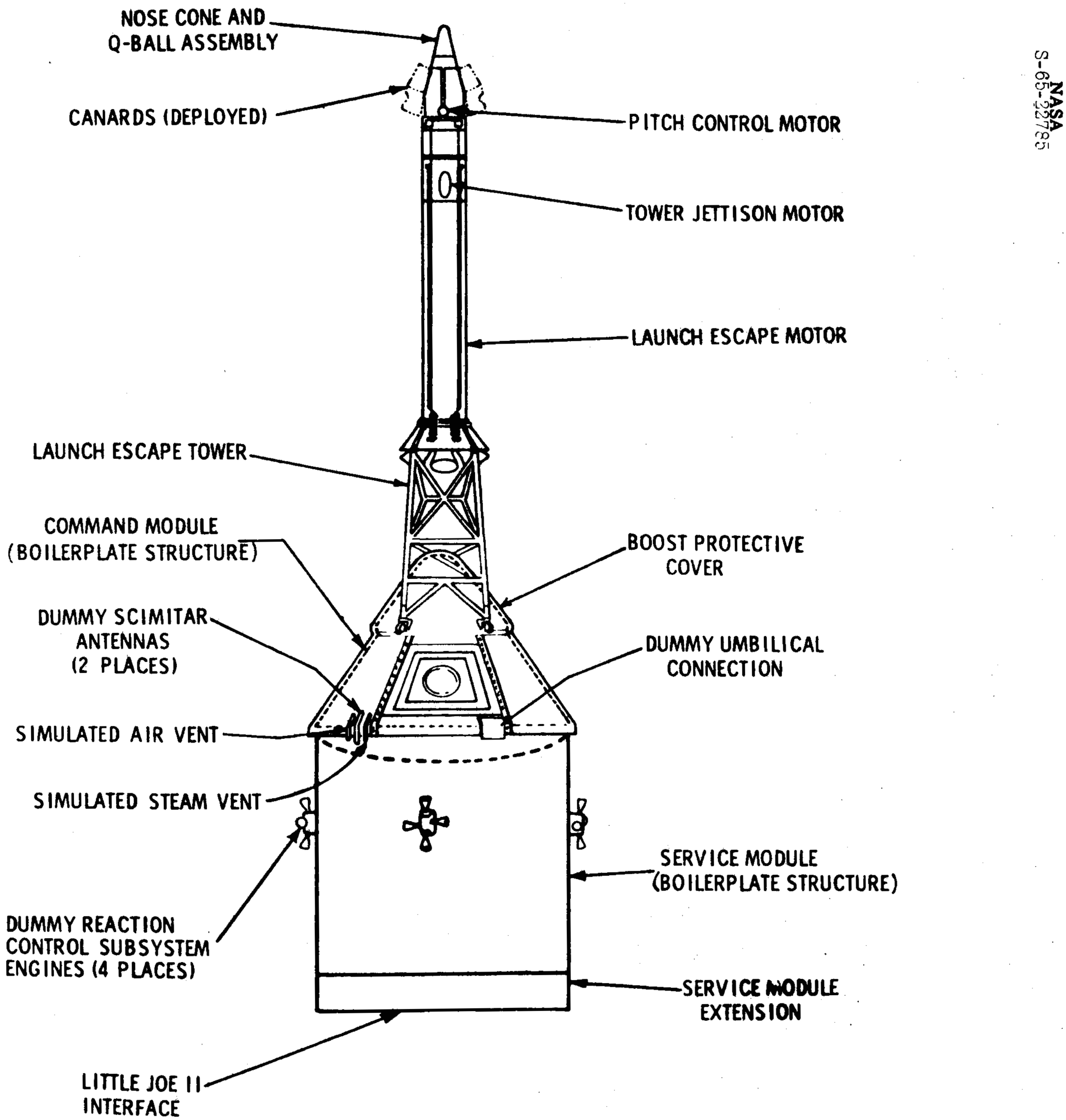
Mission A-003 launch and landing areas at WSMR

NASA
S-65-22783



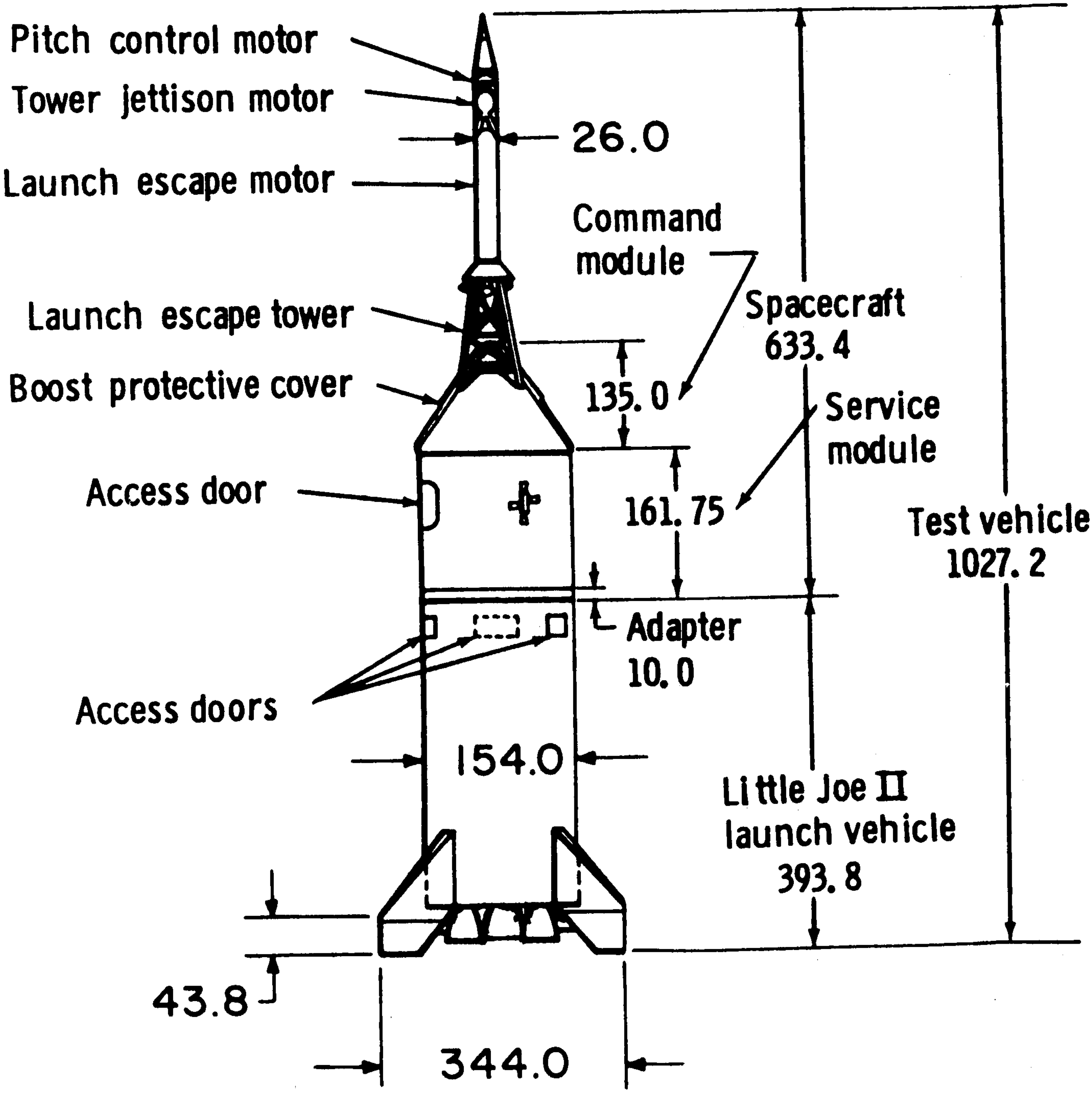
Mission A-003 nominal mission profile

NASA
S-65-22781



Spacecraft external configuration

Note: All dimensions in inches



NASA
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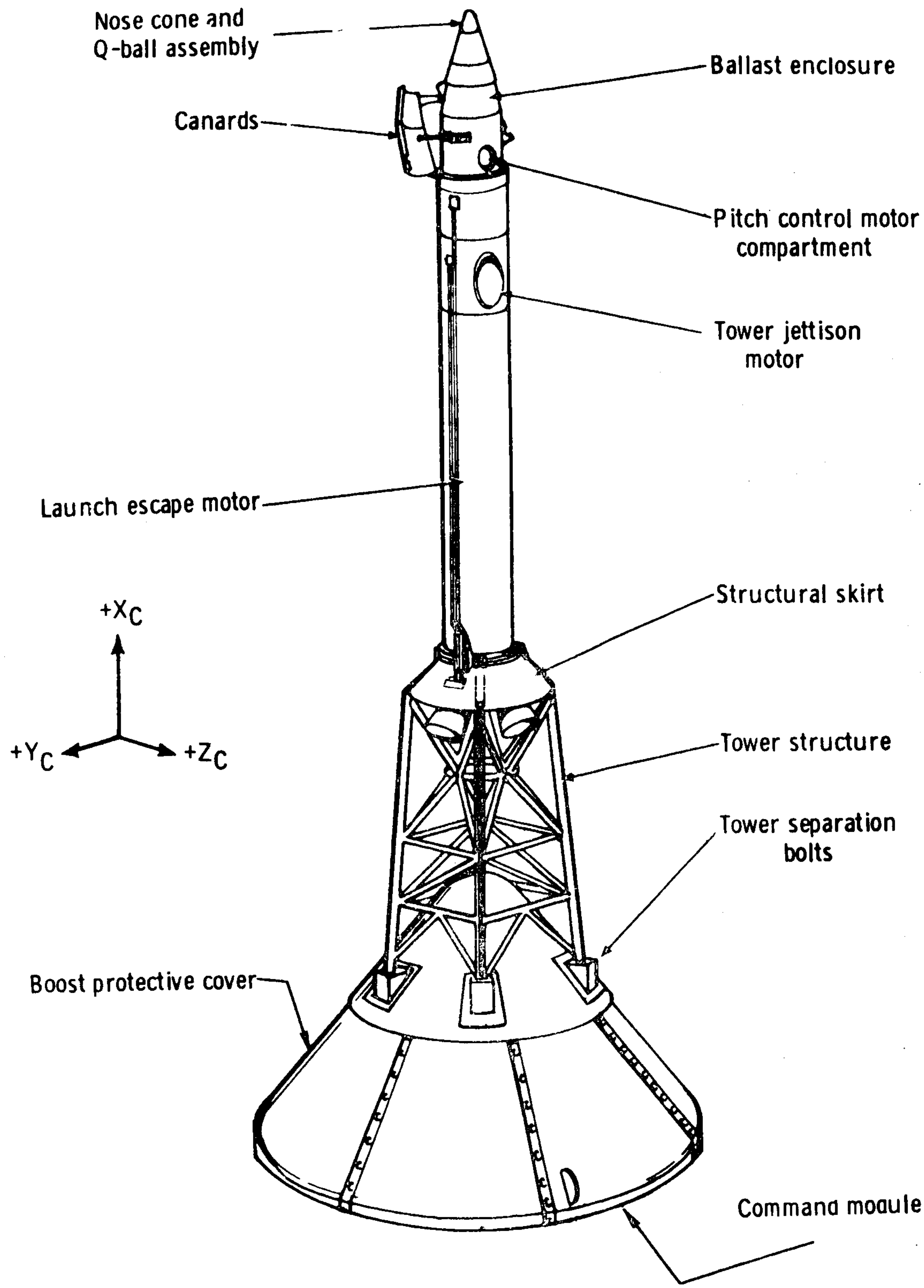
Apollo mission A-003 test vehicle lift-off configuration



Launch escape vehicle configuration

NASA
S-65-22784