"News will be Worse Before it is Better:" MA-3 and LJ-5B

Although Project Mercury was not stampeded by the flight of *Vostok I*, Congress nearly was. As Mercury approached its goal, its ends became merely a means to the Moon. While the funding for Project Apollo was being discussed in Congress, the Gagarin flight provided a tremendous impetus to the desires of Americans, as mirrored in the lower house of their national legislature, to become first once again. In the chagrin of the moment, some Congressmen appeared willing to appropriate more money than NASA could spend. Robert Seamans, third in command of NASA as Associate Administrator and general manager, actually had difficulty restraining the House space committee's demands for an all-out crash program for a lunar landing. President Kennedy, consistent with one of his campaign promises, reacted to the Gagarin announcement by saying, "We are behind . . . the news will be worse before it is better, and it will be some time before we catch up."[90]

The President knew not how well he had prophesied the major Mercury events of the next two weeks. The time was up for Mercury to be first in space, but the qualification flight tests were still far from over. Mercury-Atlas 3, composed of "thick-skinned" Atlas 100-D and capsule No. 8, was, on April 10, 1961, standing on the pad at the Cape being groomed for a long ballistic flight over Bermuda and the Atlantic Ocean. A primary purpose of MA-3 was to test the dual abilities of the Cape and Bermuda to handle an abort about the time of orbital insertion. Walter Williams had already satisfied himself that this was no problem and that the MA-3 mission should be more ambitious. After Gagarin's flight the Mercury senior staff on April 14 decided it was technically feasible to change the MA-3 mission objectives to a full-scale one-orbit goal. When Warren North informed Silverstein of this change on April 17, he also noted that MA-4 should be a chimp-carrying orbital flight about mid-July.[91] However, Low, [337] acting for Silverstein, in direct consultation with Seamans, Gilruth, Williams, and others after Gagarin's flight, had already approved the speedup in the mission objectives for MA-3.

Carrying a "crewman simulator," an electronic mannequin that could "inhale" and "exhale" manlike quantities of gas, heat, and water vapor, MA-3 should test not only the capsule systems but also the reliability of this standard Mercury-Atlas. The critical tracking system and computer arrangement at Goddard, the Cape, and Bermuda must prove its ability to predict the "go/no go" decision before the danger of impacting in Africa. It was too late to change most of the documentation for MA-3, including the information summary and mission directive, but revised preflight trajectory data were hastily computed and disseminated. Computer programmers James J. Donegan of Goddard and John P. Mayer of STG worked their men through the eve of the flight checking the changed flight plan.[92]

MA-3 failed tactically, but strategically this orbital flight attempt probably did more than anything else in the Mercury program to implement the "gold-plating," or the real man-rating of the Atlas. It carried the last of the first series of capsules with the dual ports and without a landing impact bag. The capsule was to be inserted into orbit at an altitude of 100 miles and a slant range of 515 miles from Cape Canaveral. If the velocity of Atlas 100-D was not high enough, it could be aborted into any one of several preplanned recovery zones between Bermuda and the Canary Islands.

As it happened, the Atlas attempt to orbit a robot, made at 11:15 a.m. on April 25, 1961, was intentionally destroyed by the range safety officer only 40 seconds after launch when the autopilot programmer on the Atlas failed to roll and pitch the vehicle over toward the horizon. The mission having

aborted, however, the entire Mercury escape system worked perfectly and the launch site recovery team responded exactly as if there had been a pilot's life at stake. The spacecraft was towed to a maximum altitude of 24,000 feet by the escape rocket and lowered gently by its main parachute a short distance offshore. The capsule came through this relatively easy abort with only minor damages and was quickly recovered and refurbished for reuse on MA-4.[93] Destroyed after its failure to initiate roll and pitch programs, booster 100-D left few artifacts as memorials of its existence. Before the official investigation board could complete its report two months later, however, a significant piece of the MA-3 autopilot, the programmer, was found buried in the mud near the beach, thereby leading to the corroboration of one of the prime hypotheses for this failure.[94]

Meanwhile, back at Wallops Island, the seventh and last booster in the Little Joe series was fitted with capsule No. 14 and made ready for a repeat of LJ-5 and LJ-5A in hopes that the third try would be charmed. This was to be an extremely critical test before MR-3. Gilruth, from Low's home in Washington, called William Bland at Wallops Island to encourage the launching if weather permitted. The preflight documentation was virtually identical to that of the previous Little Joe flight, as was the refurbished spacecraft. [338] Still more instrumentation and even more careful checkout procedures to ensure that the abort would occur at the right time were instituted in addition to the redesigned clamp ring and limit switches. A steep trajectory up to about 45,000 feet was desired before tower separation and drogue chute deployment. The max-q punishment of about 990 pounds per square foot was desired to match the worst of the Atlas abort conditions.[95]

When on April 28, 1961, at 9:03 a.m., LJ-5B rammed upward, technical observers cringed when they saw immediately that one of the booster's Castor rocket motors failed to ignite for 5 seconds after liftoff. This resulted in a much lower trajectory than planned, giving a maximum altitude of only 14,600 feet, but the dynamic pressure, instead of 990 pounds per square foot, was about twice that amount, 1920 pounds. The abort was initiated about 33 seconds after launch as intended, and all events following the abort occurred as they should have. Recovery by helicopter was quick and clean, even though the low-flying capsule impacted two miles farther downrange after skidding through the atmosphere rather than vaulting through it. Lewis R. Fisher, Leo T. Chauvin, and Norman F. Smith of the STG Little Joe team were able therefore to wind up their program with a boast despite the erroneous trajectory:

> This launching successfully demonstrated the structural integrity of the Mercury capsule and escape system and sequential system under significantly more severe conditions than those expected to be encountered during a nontumbling type of abort from an Atlas booster during a Mercury orbital launch . . . . Changes in circuitry and redesign of clamp-limit-switch installations in Capsule 14 for the Little Joe 5-B mission successfully eliminated the problem of premature ignition of the escape rocket motor.[96]

One by one the major obstacles to the growth of the manned space flight enterprise seemed to have dissolved. The opposition of some in the scientific community was not expected to become a factor in national policy. The so-called "military-industrial complex" had failed, if indeed it had ever tried, to reduce NASA. The White House and NASA administrators were determined to advance national capability in space technology. Political dangers were now neutralized. Except for the Atlas and the spacecraft's orbital capacities, all Mercury systems were qualified. Despite the embarrassment to American nationalism brought by Gagarin's flight, Mercury as a technological accomplishment was on the verge of sending a man to visit the edge of the black sea of space. And certainly this year of grace 1961 should also see an American citizen orbit the globe.[97]

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[90] House Committee on Science and Astronautics, 87 Cong., 1 sess. (1961), Report No. 391, to accompany H.R. 6874, *Authorizing Appropriations to the National Aeronautics and Space Administration*, testimony of Seamans, 360-382; *Aeronautical and Astronautical Events of 1961*, 11, 15; and Seamans, interview, Washington, Sept. 1, 1965. See also "Ups and Downs in Space as U.S. Gets Set to Launch Man,"*Life*, L (May 5, 1961).

[91] Memos, North to Dir., Space Flight Programs, "Operational Considerations for MA-3," April 10, 1961; "Mission Change for MA3," April 17, 1961; Williams, interview, Houston, Aug. 23, 1965; John P. Mayer, comments, Sept. 8, 1965.

[92] Memos, Silverstein to Assoc. Administrator, "Mission Change for Mercury-Atlas 3," April 18, 1961; Snyder to NASA Technical Personnel, Technical Information Center, "Mercury-Atlas 3 (MA-3) Launch, " April 24, 1961; "R. J. W." for record, "MA-3 Flight Particulars," April 24, 1961; "Technical Information Summary of Mercury-Atlas Mission No. 3 (Capsule No. 8)," STG, April 17, 1961; "Mission Directive for MA-3," Project Mercury, Oct. 18, 1960, rev. March 31, 1961; "Calculated Pre-Flight Trajectory Data," NASA Project Mercury working paper No. 184, April 14, 1961; "Mercury Control Center Countdown Flight Control and Overall Operations MA3," March 16, 1961; rev. April 20, 1961; "MA-3 Mission Rules—Correction Copy," undated. See also Huss comments.

[93] Memo, Low to Administrator, "Mercury Atlas 3 Launching," April 24, 1961; John H. Disher to Administrator, "Mercury-Atlas Flight No. 3," April 26, 1961; "Mercury-Atlas No. 3 (MA-3) Memorandum Report for the Project Director," STG, April 28, 1961. This realistic exercise for the launch site recovery team, as well as the beautiful performance of the escape tower, increased confidence in spite of the mission failure.

[94] Memo, Low to Dir., Space Flight Programs, "Atlas 100-D Programmer," June 12, 1961; Hohmann, "Atlas 100-D Investigation Board Status Report," June 14, 1961.

[95] "Mission Directive for Little Joe No.5-B (Capsule No. 14)," NASA Project Mercury working paper No. 183, April 7, 1961; "Technical Information Summary of Little Joe No. 5-B," April 12, 1961; Alfred I. Alibrando and Horton, "Information Plan: Project Mercury Little Joe Seven," April 7, 1961; NASA News Release 61-82,"Project Mercury Escape System Test: Little Joe Seven," April 20, 1961. Low has commented that "if Little Joe 5B had failed, it might have put a constraint on MR-3 that would have prevented its launching."

[96] "Post-Launch Report for Mercury Little Joe Mission 5B (LJ5B)," NASA Project Mercury working paper No. 195, June 12, 1961, 11, 2-1, passim. So far above the design limits for max-q on Little Joe was the performance of LJ-5B that this production capsule might have carried a man safely after all if all other provisions had been developed: Williams interview.

[97] "Status Report No. 10 for Period Ending April 30, 1961," STG, was the tenth quarterly review of Project Mercury by the 700 or so members of STG for NASA Headquarters. Of six flights since January, only two (MA-3 and LJ-5A) were admitted failures. Of 10 qualification flight tests with production McDonnell capsules to date (the 4-inch flight of MR—1 was excluded), 6 (including MR—BD) were counted as "successful," although a historical accounting should, on the basis of intent, make that record read 5 out of 10 "unsuccessful" at least. Capsule orbit weight was calculated at 2,836 pounds and expected to be 2,874 pounds by July, still within Atlas capabilities. "Project Orbit," the simulated orbital test program using Capsule No. 10 in McDonnell's altitude chamber, was well underway; the tracking

network and ground instrumentation system was reported 95 percent complete; while ground qualifications testing and reliability testing were said to be 95 and 90 percent complete, respectively. Readiness for the first manned sub-orbital test flight, including the lately renewed studies to "quick-fix" the impact protection, landing system, and reaction control system, and to test more animals in centrifuges, was asserted to be clear if the flight safety review board meetings at the Cape on April 28-29, 1961, should certify both capsule and booster.