

CHAPTER 3

The Air Force in the Era of Apollo: A Dream Unfulfilled

In the spring of 1961 the Air Force appeared poised to play the dominant role in the nation's military space program and, hopefully, the national space effort for at least the next decade. In March, Secretary of Defense Robert McNamara designated the Air Force the military service for space research and development, thereby diminishing the prospects for disruptive interservice rivalry. In response, the Air Force reorganized its research and development elements to provide a stronger focus on space issues. Although the administration in May awarded NASA the lunar landing mission, the Air Force fully expected the civilian agency to remain dependent on the service for program management, key personnel, various launch vehicles, and ground support. Above all, Air Force leaders continued to believe that NASA's lunar landing agenda did not preclude its own aspirations for testing the usefulness of military manned spaceflight. Despite the promise of major advances by unmanned, artificial earth satellites in support of operational requirements, man-in-space remained the centerpiece of Air Force efforts during the 1960s to institutionalize space within the traditional airplane-oriented service.

Unlike its predecessor, the Kennedy administration promised the nation an integrated, national space program retooled to overtake the Soviet lead in space. The Air Force interpreted the new approach as a challenge to convince government leaders that national security requirements demanded an expanded military space program under Air Force control. For two years, the Air Force waged an aggressive campaign to achieve leadership of an "independent" space program. By 1963, how-

ever, its hopes and expectations ended in the wake of NASA's growing confidence, its success in Project Mercury, the formation of the National Reconnaissance Office, and the McNamara Defense Department's assertiveness and rigid criteria for space program approval.

The Air Force would find itself the loser in the tug-of-war between the civilian space agency and the Defense Department over priorities and responsibilities for space exploration, both manned and unmanned. Although the service would continue lobbying for an ambitious military space program, its efforts would prove fruitless. Ultimately, it failed to gain approval to establish an operational space-based anti-satellite and antimissile capability to thwart potential Soviet space dominance. It also encountered roadblocks to develop proposals it considered important for defense support functions. Above all, the service proved unsuccessful in retaining its man-in-space mission. From the Dyna-Soar orbital glider to the Blue Gemini space capsule to the Manned Orbiting Laboratory, the Air Force fought hard to convince skeptical Defense Department officials of the need for a military man-in-space role independent of NASA's responsibilities and capabilities. By mid-decade success seemed assured when President Johnson announced development of a military space research laboratory under Air Force management. But later in the 1960s, the growing financial and emotional demands of the Vietnam War and the Great Society, along with public disenchantment with space, doomed Air Force pretensions for manned spaceflight in the competitive battle over the defense budget.

With the advent of the Nixon administration, Air Force leaders readjusted their priorities from space requirements to other more pressing and achievable needs. Frustrated by failure to claim leadership of an expanded "independent" space program and stymied in realizing its main goal of manned spaceflight, Air Force leaders turned their attention to more traditional "flying" needs of the service. Represented by major Air Force commands, priorities for tactical and strategic weapons took precedence. While NASA basked in the glow of the historic Apollo lunar landing, the Air Force seemed confined to a secondary role in the national space program. Yet appearances proved deceiving, because the Air Force had quietly established a space applications satellite program that rapidly made space support routine and important to tactical as well as strategic commanders. At the same time, the Air Force found itself with a major voice in development of the Space Shuttle, the re-usable space launch and manned orbital system of the future. Space seemed ready to move from the arena of research and development to operations.

The Air Force Position in the Spring of 1961

With the advent of the Kennedy administration, Air Force leaders had every reason to believe that their service would play a larger role in an expanded national space program to achieve space leadership and thwart potential Soviet space threats to national security. The new President clearly recognized the requirement for both

civilian and military space activities. In his 1961 report to Congress, President John F. Kennedy declared that “space competence is as essential for national security as it is for national growth.”¹ While affirming the Eisenhower policy of space for peaceful purposes, he noted that his vision of an expanded national space program “included space projects to help keep the peace and space projects to increase man’s well-being in peace.”² His initial actions encouraged the Air Force to believe that military space proposals would receive new emphasis in the high-profile national space program. With the President’s announcement on 25 May 1961 of the ambitious lunar landing initiative, the nation received a distinct, long-range objective, the pursuit of which promised to make space big in business and government. As the responsible agency, NASA’s fiscal year 1962 budget request came to \$1.8 billion, twice the previous year’s appropriations. Administrator James E. Webb predicted that final costs for what became known as Project Apollo would reach between \$20 and \$40 billion.³

At the same time, the military also benefited from the new space priorities. The final fiscal year 1962 appropriations totaled \$1.1472 billion, nearly \$350 million higher than the previous year and only \$0.7 billion less than NASA’s final figure of \$1.7968. Moreover, every major Air Force space program, whether approaching operational capability like Samos and Spacetrack, or still in the exploratory stage like MIDAS and Saint, the space-borne satellite detection and inspection proposal, received increased funding.* Beyond specific system development projects, the Defense Department received greater funding for basic research in some areas that had no clear military application at that time. Of the latter, the large solid-rocket-motor project represented an important achievement for Air Force space advocates who, during the Eisenhower administration, had repeatedly championed development of a military superbooster and the need to conduct basic space technology and exploratory research apart from the civilian agency.⁴

Indeed, the Kennedy administration’s highly touted “national” and “integrated” space program encouraged the Air Force in its quest for a greater leadership role in space.⁵ As Vice President and Space Council Chairman Lyndon B. Johnson asserted, “It is national policy to maintain a viable national space program, not a separate program for NASA and another for Defense and still another for each of several other agencies.”⁶ Although NASA could move forward with plans for big rockets, an operational communications satellite system, and manned orbiting spacecraft experiments, the agency’s mushrooming requirements for facilities, equipment, bioastronautics data and personnel would encourage Air Force leaders, including Chief of Staff General Thomas D. White, Vice Chief of Staff General Curtis E. LeMay, and newly appointed commander of Air Force Systems Command Lieutenant General Bernard A. Schriever, to believe that NASA’s dependence on the Air Force

* See Appendix 3-1.

would continue to allow the service a major voice in NASA's manned and unmanned spaceflight operations.

With responsibility for ninety percent of the military space effort in the spring of 1961, the dominant Air Force role in space had received acknowledgment that March from Secretary of Defense Robert S. McNamara, whose directive, "Development of Space Systems," accorded the Air Force what General Schriever referred to as "the prime responsibility for military space."⁷ Although the Army and Navy would continue with their existing satellite projects and conduct preliminary space research, the Air Force became responsible for nearly all future defense space research and development, with exceptions authorized only by the Secretary of Defense. If the Air Force did not receive sole responsibility for the military space mission, the Defense Department directive for all intents and purposes made the Air Force the leading military space service and effectively muted the rivalry among the three services over space issues that had plagued the Eisenhower administration.

In response, the Air Force had reorganized internally to provide the desired focus for leadership of the military space program. General Schriever's newly formed Air Force Systems Command now controlled release of new weapon systems from research and development to operational status, while its subordinate Space Systems Division on the West Coast prepared to direct the service's space effort with strong technical support from the Aerospace Corporation. The service hoped and expected to lead a "crash" program for space similar to the high-powered ICBM effort of the 1950s. This had been General Schriever's purpose in charging Trevor Gardner's committee in late 1960 to perform a role for space similar to that of John von Neumann's earlier Strategic Missiles Evaluation Committee for missile development. The Gardner Committee's report of 20 March 1961 advocated an ambitious Air Force-led space program to overtake the Soviets and achieve military spaceflight dominance. In the spring of 1961 Air Force leaders believed that the McNamara directive and the national space agenda would provide such a mandate, and they considered the Air Force well-organized and prepared to lead the effort.

Despite the service's new prominence, Air Force leaders realized that a campaign for a greater Air Force role in space faced major challenges. The President's announcement of the lunar mission heightened NASA's prestige and responsibility in support of the nation's "space for peace" policy, while its new manned spaceflight mission threatened to eliminate the Air Force focus on a military man-in-space mission of its own. At the same time, the Air Force confronted a Defense Department intent on maintaining the precedent of "freedom of space" and, therefore, skeptical of earlier Air Force proposals for antisatellite and antimissile space capabilities as well as military manned space operations that might threaten it. Under its dynamic leader, Secretary Robert S. McNamara, the Defense Department advocated an integrated national space program in the name of cost effectiveness and the end to wasteful duplication.

Such a program meant emphasizing mutual cooperation, coordination, and support between NASA and the services. The Air Force found itself in an ambivalent position. As the military service for space, it could look forward to greater involvement with a civilian space agency still dependent for much of its hardware, infrastructure, and launch support on the Air Force. At the same time, a centralized space effort might very well find the Air Force overly dependent on the civilian space agency for scientific and technical data and hardware. Above all, it might be frozen out of manned spaceflight activities that NASA now claimed as its own, and compelled to rely on experience derived from NASA's near-earth orbital and lunar projects for military applications, if any.

Air Force leaders decided on an aggressive campaign to lead an expanded military space effort. In 1961 their "plan of action" would proceed on three discernible levels that often overlapped. First came policy concerns. Despite the President's acknowledgment of a major military role in national space policy, service spokesmen publicly assailed what they considered an artificial distinction between military and civilian space activities. This resulted in a narrowly-construed "space for peace" policy that prohibited development and deployment of offensive space systems that could deny the Soviets space superiority. Air Force spokesmen often took their argument public to convince sympathetic congressmen and a reluctant administration that only an offensive space capability and military manned spaceflight proficiency could ensure space for "peaceful purposes." On a second level, Air Force planners moved rapidly to shed the constraints of the Eisenhower administration and devise a formal Air Force space plan with related programming documents. These, they hoped, would serve to crystallize Air Force institutional thinking on space and win from the administration permission to lead an ambitious national space effort. The third element of the campaign involved establishing what Secretary of the Air Force Eugene M. Zuckert termed an "equal partnership" with NASA. This meant lobbying the Defense Department for formal designation of the Air Force as the executive agent for military support to NASA. While Air Force leaders expected to parley their pervasive support of NASA into a major voice in NASA's affairs, they also solicited NASA's help to overcome a growing Defense Department tendency to rely on the civilian agency for military space needs. The Air Force resorted to logic, cooperation, and pressure to convince NASA officials that, despite the policy of an integrated national space program, NASA alone could not satisfy military space requirements in the two vital areas of space exploration and man-in-space. In effect, NASA might serve as the wedge Air Force space leaders needed to maneuver Defense Department officials into approving a larger Air Force role in space.

Over the course of the 1960s, the Air Force would find itself in the middle of an ever-evolving saga of cooperation and competition between NASA and the Defense Department for leadership in space. In retrospect, the ambitious Air Force plan of action might seem doomed from the outset in view of Secretary McNamara's strong

leadership and NASA's high-profile Project Apollo. Nevertheless, in the spring of 1961 the new administration's ambitious space goals, Air Force prominence in the space program, and sensitivity to Soviet manned space successes opened the door to an aggressive Air Force campaign for an expanded space program. Not until the end of 1962 did it become clear to Air Force leaders that their efforts had proven unsuccessful and that they would need to reassess the service's relationship with NASA and the Defense Department.

Seizing the Initiative

The Air Force opened its campaign for a greater space role by renewing its criticism of what it termed the "space for peace" policy.⁸ In July 1961, newly-confirmed commander of Air Force Systems Command, General Bernard Schriever, the service's highly respected and most outspoken space advocate, appeared before Senator John Stennis' Senate Preparedness Investigating Subcommittee and testified that the military space program was inadequately supported. "I think we have been inhibited in the space business through the 'space for peace' slogan," Schriever declared. "I think that there has been too arbitrary a division made between the Department of Defense and NASA in this area."⁹ Coming in the wake of Soviet Yuri A. Gagarin's historic first manned orbital flight on 12 April, Schriever found a congressional audience receptive to charges of neglect and artificial impediments to America's space potential. Impressed with the General's testimony, committee members requested that he provide them a written report on the problem.

By late summer the proverbial political winds seemed increasingly favorable to Air Force efforts to have the "space for peace" policy modified. The Soviets' second manned space spectacular, a 17-orbit flight on 6 August by Cosmonaut Gherman S. Titov, reaffirmed the specter of Soviet space superiority and compelled congressmen to deem the American situation "critical." Even NASA watchdog Representative Overton Brooks, chairman of the House Committee on Science and Astronautics, seemed to capture the public mood when he asserted that the Soviets "obviously now have the capability to send up manned satellites carrying bombs and other equipment for destroying other nations."¹⁰

General Schriever's statement, which received Air Force Secretary Zuckert's blessing, reached the Stennis committee on 11 September, soon after the Titov flight. His report described the potential threat posed by the cosmonaut's space flight and a Soviet space program unencumbered by its American counterpart's handicap: "an unnecessary, self-imposed restriction—namely, the artificial division into 'space for peaceful purposes' and 'space for military uses,' when in fact no technical and little other distinction between the two exists." The general focused on manned space-flight by stressing the findings of a recent Air Force Scientific Advisory Board study, which concluded that "the sense of urgency that exists across the whole front of space projects should be injected into the manned military space program."¹¹

Alarmed by Schriever's argument, a sympathetic Senator Stennis took to the Senate floor in late September to warn his colleagues and the nation of a growing Soviet space threat. Afterward, he promised to study the issue over the congressional break in preparation for holding major hearings early in 1962 on the issue of "whether the present division of responsibility between the military and NASA is proper in light of international developments."¹²

Responding to congressional and public concern, Air Force leaders that fall spoke out more openly for a stronger military space program. In an address to the American Rocket Society on 12 October 1961, General Schriever reiterated his theme of artificial constraints on Air Force programs and the growing threat posed by Russian rockets equally as capable of carrying 100-megaton warheads as of launching cosmonauts.¹³ Later that month, on 26 October, Chief of Staff General Curtis E. LeMay drew a parallel between airpower during the First World War and space in the early 1960s. Speaking to the American Ordnance Association in Detroit, Michigan, he described the evolution of early airpower operations from peaceful, chivalric, unarmed reconnaissance flights to combat efforts designed to deny the enemy air superiority. "I think we will be very naive," he declared, "if we don't expect and prepare for the same trends in space."¹⁴ By late fall President Kennedy and his Space Council chairman, Vice President Johnson, publicly acknowledged the increasing Soviet space threat and expressed interest in a greater military space role. The Vice President cautioned against applying "arbitrary distinctions . . . between military and civilian space efforts," while the President asserted that America could not let the Soviets dominate space.¹⁵

At the end of 1961 Air Force leaders had good reason to believe their criticism of the nation's military space posture foreshadowed an expansion of the Air Force space role. The stage seemed set for a major congressional debate early in the new year, while administration leaders increasingly responded to public pressure and Air Force concerns. Even the troubled Dyna-Soar manned space glider program benefited from the changing climate when the Defense Department in December authorized the Air Force to eliminate the suborbital phase and proceed with an accelerated orbital flight program using the Titan III booster in place of the Titan II. Air Force leaders fully expected that the momentum established for an expanded space effort would lead to major Air Force-led space initiatives.

The Soviet Union's monopoly with respect to manned spaceflight and the new administration's commitment to a greater national space effort in 1961 also stimulated an internal Air Force space planning and programming initiative to prepare the service for its expected leadership role in space. Gone were the Eisenhower administration's proscriptions against publishing long-range Defense Department military space plans, which had stemmed from considering space as supporting traditional mission areas rather than as a distinct mission in itself. The Kennedy administration's focus on an integrated national space program provided the Air Force the necessary

“green light” to undertake preparation of a comprehensive space plan. Such a plan could serve to clarify Air Force views on space objectives in a rapidly changing technological environment and help gain the Defense Department’s support for Air Force goals.

At the suggestion of Major General William B. Keese, the Air Staff’s Director of Development Planning, the Chief of Staff directed Keese to establish a task force made up of Air Staff and Air Force Systems Command representatives to prepare the plan. The group completed work on the Air Force’s first formal Space Plan on 21 September 1961. In the tradition of Theodore von Kármán’s post-World War II *New Horizons* study and subsequent service proposals like the Gardner Committee’s report, the plan emphasized the importance of a basic research and development focus that would establish the technical foundation for enhanced military space operations.¹⁶

The space plan called for an “aggressive military space program” focused on “a vigorous applied research program...[conducted in the fields of guidance, propulsion, and sensors]...to insure that military potentials, when developed, will be promptly identified and vigorously pursued...[with operational systems]...to insure the security of the Nation.”¹⁷ Such an initiative would support an integrated national space program in which Air Force capabilities and facilities would support the entire national program. Consistent with earlier views on mission application, space capabilities would be used only when deemed the sole available recourse or most cost-effective operational solution to support existing mission areas, which the planners identified as reconnaissance and surveillance, defense, offense, command-control, and support.¹⁸

The space plan proceeded to recommend future action in specific Air Force space program areas.* Discoverer (Project CORONA), MIDAS, Samos, and the Blue Scout research vehicle, for example, should be continued at their present pace, while efforts to develop weapons in orbit, the antisatellite and antimissile defensive systems, should be accelerated. Planners recommended that Saint, the satellite inspector project, be revised and enhanced to include testing of unmanned techniques for rendezvous, inspection, docking, and “satellite neutralization,” while Bambi, the space-based anti-ballistic missile concept, be shifted from ARPA to Air Force control and prepared for feasibility demonstrations. Authorized to develop a large heavy-lift booster, Air Force planners advocated acquisition of an economical and reliable military space booster capable of launching payloads of 10,000 to 50,000 pounds into a 300-mile low earth orbit.¹⁹

Military manned spaceflight requirements received special attention from the Air Force planners. Declaring that “it is...imperative for the United States to determine

* See Chapter 4 for discussion of specific unmanned Air Force space programs.

the military utility of man-in-space at the earliest possible time,” the plan outlined tasks potentially handled better by manned systems, such as command and control decision-making, especially “placing man in a satellite inspection and neutralization system,” as well as reconnaissance, and in-space maintenance and repair. Planners strongly supported an accelerated Dyna-Soar project designed to achieve manned orbital flight and emphasized the need for a close, cooperative relationship with NASA. The Air Force should expand and accelerate its bioastronautics program in conjunction with NASA, they said, while the civilian agency could share its experience in earth orbital programs “in order to provide for early multi-manned testing of military subsystems in space for duration up to two weeks.” In addition, the space plan called for increased study and research efforts to develop “a manned, maneuverable, recoverable spacecraft” and, for the first time, declared the Air Force’s strong interest in “a long-duration military test space station.” The space plan indicated that the Air Force would continue to pursue both the aerodynamic and ballistic methods of reentry.²⁰

After hearing a presentation on the space plan, Secretary Zuckert recommended updating the basic plan periodically and using it to develop “detailed implementing plans on major aspects of the program.” The space plan’s initial impact came at year’s end with its use in preparing the space budget presentation in early 1962. On 4 December 1961 the Vice Chief of Staff appointed Lieutenant General James L. Ferguson, Deputy Chief of Staff for Research and Development, to develop programming documents depicting costs and schedules for use in defending the Air Force fiscal years 1963 and 1964 space program before Congress in February 1962. The Ferguson group consisted of eight separate panels of Air Staff and Air Force Systems Command space specialists, who laid the groundwork for the most comprehensive testimony of the decade describing the Air Force’s position on space.²¹

On 19 February 1962 General Ferguson appeared before the House Armed Services Committee and testified in favor of an expanded military space program. Based on the September 1961 Air Force Space Plan, the Air Force space budget recommended raising the fiscal year 1963 figure of \$826.2 million proposed by the Office of the Secretary of Defense to \$1.31 billion, and the fiscal year 1964 total from \$1.32 billion to \$1.86 billion. General Ferguson argued that the nation must exploit space to achieve military superiority as the best means of insuring “the peaceful use of space.” This meant a potential “offensive” military requirement to inspect non-U.S. satellites, perform surveillance and reconnaissance functions, and establish a defense against potential ballistic missile attack.²²

Although he noted that an integrated national space program found both NASA and the Air Force pursuing mutually supportive rather than competitive programs, he strongly argued that:

some operational and related technological needs are not common to both the civilian and military effort...military tasks frequently require routine and repetitive operations. We therefore need low-cost, high reliability and, if possible, reusability in our systems. Military tasks also may require quick reaction, positive control, and the ability to operate in a combat environment. These factors have different implications than those involving scientific, commercial, or prestige missions.²³

As one example, he cited the importance of rendezvous in space with “non-cooperative” targets that demanded techniques different from a lunar landing mission involving “cooperative” targets in specific, controlled orbits. He next proceeded to describe eleven important areas of technology in which the Air Force worked to exploit earlier military space applications and broaden its knowledge and capability. In doing so, he declared against the increasingly restrictive Defense Department guidelines for approval of space projects. “We must not be restricted,” he said, “from exploratory developments merely because a clear application is not yet evident.”²⁴

The attainment of manned military space operations represented the main theme of his presentation. He argued that including man-in-space operations would markedly improve system flexibility and the likelihood of mission success. After describing the various functions for man in space outlined in the September 1961 space plan, he asserted that “it is for these reasons that we believe that man is essential not only in operational space systems, but also in those programs designed primarily to further technological capabilities in space.” To answer the basic question of military man’s utility in space, the Air Force advocated a program, coordinated with NASA, to develop a manned military test station in space. An orbiting space station, he asserted, would answer the urgent question of special military concern: “Can man effectively perform specific military combat and non-combat functions in space?”²⁵ General Ferguson concluded his statement with a strong plea for an expanded space program. The Air Force, he said, believed that space systems could solve major national problems both then and in the future if military space technology was adequately supported as proposed in the 1963 Air Force Space Program. Moreover, “the program in future years will need to be even more vigorous and comprehensive.”²⁶

Ferguson’s testimony seemed to elicit the desired reaction from congressmen and helped increase pressure on the administration to reassess its military space posture. In short, the Air Force sought to force a decision on weapons in orbit and a change in space policy on Kennedy and McNamara. The question became whether the Eisenhower space doctrine would prevail or be overturned, as the Air Force desired. That same month, on 23 February 1962, Secretary of Defense McNamara pleased Air Force leaders by formally approving the accelerated Dyna-Soar proposal and informing Air Force Secretary Zuckert that he recognized the importance for national security of an investigation of military manned space roles. He acknowledged that

“performance specifications and design requirements for military space systems may differ substantially from those stipulated for non-military applications.” For the first time the Defense Secretary appeared to agree with the Air Force position on military manned spaceflight and the need to establish a military technological base and operational capability even without clearly defined missions.²⁷

Encouraged by congressional and administrative action, Air Force leaders continued to press their advantage. In late March 1962 General LeMay spoke at Assumption College in Worcester, Massachusetts, on the need to “develop military space systems as quickly as possible” to avoid a Soviet technological surprise in the 1970s. Commenting on LeMay’s speech, a *Washington Post* article compared LeMay and other Air Force leaders of the current period with their predecessors prior to World War II. They both possessed “supreme faith in the overwhelming need for military aerospace power but [were] unable to demonstrate it.”²⁸ On 2 April, when the *Post*’s comments appeared, McNamara met with the Chief of Staff and suggested the Air Force outline specific technological needs, increase its space allocation in the fiscal year 1963 budget, and prepare a five-year Air Force space program to complement the effort of the Office of the Secretary of Defense already underway. The Chief of Staff called on General Ferguson, who responded first by reassessing the programs he presented to Congress earlier, then adding \$252.9 million to the Air Force supplemental proposal for approved programs like Dyna-Soar, MIDAS, and Titan III, and those in the advanced study and development stage dealing with satellite interception and missile defense. On 16 May the Chief of Staff submitted the supplemental budget request to the Defense Department and authorized work on a five-year space program.²⁹ By the spring of 1962 Air Force leaders optimistically expected success from their efforts to champion an effective space plan and program.

Achieving a “workable” relationship with NASA represented the third element in the Air Force campaign for a greater space role. Following President Kennedy’s announcement of the manned lunar landing project, NASA and Defense Department officials met to coordinate their requirements for mutual support and delineate lines of responsibility in order to avoid duplication. Much of their work centered in the Aeronautics and Astronautics Coordinating Board (AACB), which was cochaired by Dr. Robert C. Seamans, Jr., NASA’s Associate Administrator, and Dr. Harold Brown, Director of Defense Research and Engineering, together with its six subordinate panels. The Assistant Secretary of the Air Force chaired the Launch Vehicle Panel and served as vice chairman of the Manned Space Flight Panel, while senior Air Force officers and officials maintained a strong presence on every panel.³⁰

Already in the Kennedy administration the Defense Department and NASA had established a pattern for future cooperative measures through an agreement reached on 23 February 1961, by which both parties agreed to seek the consent of the other before developing new launch vehicles. Discussions during the summer of 1961

resulted in agreements that placed the Air Force well on its way to a guarantee of parity with NASA in booster development. In July the Defense Department and NASA established a large launch vehicle planning group that led to a division of labor concerning long-term booster requirements for both agencies. According to several formal agreements signed in the fall, NASA would pursue development of large liquid-propellant rockets, in tandem with the Air Force's work on large solid-propellant rockets until it became clear which would better support the lunar mission. The Air Force project initially included a proposal for a 3,000,000-pound thrust motor, but eventually settled on development of two large motors, one a 156-inch diameter segmented motor and the other a monolithic (unsegmented) 240-inch diameter motor. At the same time, the panel approved Air Force plans to develop a large, standardized "workhorse" booster for potential future needs of both NASA and the Defense Department. By autumn, this proposed system had become the Titan III, a vehicle which would consist of a basic Titan II, modified by the addition of two strap-on solid rockets. The Titan III would be capable of orbiting near-earth payloads of 5,000 to 25,000 pounds.³¹

A second coordination effort involved facilities and resources needed to support the lunar landing program, which NASA had already designated Project Apollo back in the summer of 1960. Interest centered on a joint study of possible launch sites conducted by Major General Leighton I. Davis, who had succeeded Major General Donald N. Yates as commander of the Air Force Missile Test Center and the Defense Department's representative for coordinating range support for NASA, and NASA's Dr. Kurt H. Debus, chief of the agency's Cape Canaveral launch operations. In July they agreed on Cape Canaveral as the Apollo launch site, with the recommendation that NASA purchase 80,000 acres on Merritt Island just north of the already overcrowded missile and space launch complex. On 24 August 1961, NASA Administrator James E. Webb and Deputy Secretary of Defense Roswell Gilpatrick signed an arrangement that made NASA responsible for costs associated with the lunar project and "technical test control" of its launch operations, while designating the Air Force range manager for the Apollo program. As agent for NASA, the Air Force would direct facilities and land improvements subject to NASA's approval.³²

The Air Force expected to parley its strong supporting role into a "full partnership" with NASA. With this objective in mind, on 4 August 1961 Air Force Secretary Zuckert formally requested the Defense Department to name the Air Force "executive agent" for NASA support. Expecting a positive response in the near future, General Schriever received permission to begin discussions with the agency's Associate Administrator Seamans to develop the necessary organizational and procedural requirements for Air Force Systems Command support of NASA. He also directed Dr. Brockway McMillan, Assistant Air Force Secretary for Research and Development, to prepare essential NASA-Defense Department directives and procedures following acknowledgment by Defense Department representatives that the

Air Force would continue to provide the vast majority of military resources necessary to support NASA. Based on the fall discussions involving cooperation and support between Air Force and NASA representatives, in late December 1961 Secretary Zuckert also proposed formation of a new Air Force Systems Command office, Deputy Commander for Manned Space Flight, to include members of all three services and be located at NASA headquarters.³³

While the Office of the Secretary of Defense studied the Air Force's December proposal, on 24 February 1962 it granted the earlier Zuckert request by officially designating the Air Force the "executive agent" for NASA support. Under terms of Defense Department Directive 5030.18, titled "Department of Defense Support of National Aeronautics and Space Administration (NASA)," the Secretary of the Air Force became responsible for "research, development, test, and engineering of satellites, boosters, space probes, and associated systems necessary to support specific NASA projects and programs arising under basic agreements between NASA and DoD." Air Force responsibilities included "detailed project level planning" and contract and management arrangements.³⁴

As the 24 August 1961 arrangement suggested, NASA remained heavily dependent on Defense Department support. The civilian agency relied on the Defense Department's experience with the Navy Transit navigational satellite in planning its own commercial or civilian satellite system and looked to the Defense Department for procurement procedures, contract management services, and cost and work scheduling methods. From civilian agency's beginning, the Defense Department, largely through the Air Force, had supplied personnel, rocket boosters, launch and range facilities, and communications and tracking networks, as well as experience gained from the ballistic missile program. By 1962, the Air Force and NASA had concluded ten major agreements and a host of implementing arrangements. For NASA's Project Mercury, the nation's first manned program, the Air Force provided most of the astronauts, launch facilities and vehicles, range support, and the necessary recovery forces. The Defense Department and NASA already had begun talks on Project Gemini, the low-earth orbital follow-on program to Mercury, in which the Air Force would play a similar supporting role. Beyond this, the Air Force supported fourteen specific NASA programs, assigned ninety-six R&D officers to various NASA offices, and assisted NASA with substantial Air Force funding. Moreover, NASA officials recognized Air Force pretensions for a military role in space exploration and manned spaceflight, and they sought to assuage Air Force concerns by pledging that NASA would continue to support military interests as required.³⁵

To Air Force leaders, the tactics of cooperation and advocacy appeared to be achieving their objective of "full partnership" with NASA in the nation's space program. Indeed, by the spring 1962 it seemed that Air Force space advocates could point to success in all three areas of their campaign for an expanded Air Force-led

space program. Then came the “firestorm.” On 11 June 1962, the *New York Times* reported on its front page that the Defense Department was “embarking upon a man-in-space program to prevent [foreign] military control of space as well as its exploitation.” In response to this threat, the report stated, the Air Force would develop a manned satellite designed to destroy hostile space vehicles. The newspaper went on to assert that the White House and Space Council had authorized the Defense Department to conduct a six-month study in order to prepare an expanded military space program because, officials had said, NASA could not be relied on exclusively. Apparently, an earlier speech by Deputy Defense Secretary Gilpatrick on 13 May precipitated the *Times* article. In that speech Gilpatrick argued in favor of having military insurance in space. For the first time, he publicly acknowledged that the Defense Department “has decided to develop the technology of manned orbital systems able to rendezvous with satellites [neutralize or destroy them] and then land at preset locations on earth.” Such a system might combine the capabilities of both Dyna-Soar and Saint. The Air Force interpreted the deputy secretary’s remarks as authorizing feasibility studies for Saint and, that same month, began negotiations with contractors on a three-month study.³⁶

The *Times* report in June unexpectedly precipitated a public outcry from critics who worried that a military man-in-space program meant direct competition with NASA and an antisatellite system in violation of the administration’s declared use of space for “peaceful purposes.” The immediate political fallout proved disastrous to Air Force hopes of changing administration policy. Administration officials quickly reaffirmed the “space for peace” policy, while the Defense Department denied authorizing the Air Force to proceed with antisatellite system development. The Air Force System Command’s Space Systems Division immediately canceled its contract negotiations on the Saint project.³⁷

Later in June Deputy Secretary Gilpatrick and Harold Brown, the Director of Defense Research and Engineering, appeared before the Senate Committee on Aeronautical and Space Sciences to publicly deny that the Defense Department intended to preempt NASA’s role in manned spaceflight. But in doing so, Brown raised doubts about the entire concept of military manned spaceflight. In response to a question on the subject, he asserted that “I cannot define a military requirement for them. I think there may, in the end, turn out not to be any.” In effect, the director also implied that the Department’s new “building block” approach to research and development also might be invalid. If so, the Air Force would be prohibited from conducting research on all programs without clear, defined missions. Moreover, during a news conference following the newspaper story, President Kennedy responded to a question about a larger role for the military in space by saying, “No, the military have [sic] an important and significant role, though the prime responsibility is held by NASA and is primarily peace.” Such a remark did little to alleviate continued public confusion about military space activities. Moreover, the Air Force

could do little to educate the public following the government's information blackout on all military space programs that became effective on 23 March 1962. With the secrecy ban in place, which administration officials refused to acknowledge, the sensitive reconnaissance programs begun under the Eisenhower administration disappeared from public view. The ban also applied to the Navy's Transit navigational satellite and Air Force sounding rockets and space probes. As a result, the Air Force found it difficult to promote and justify the results of its successful "peaceful" space efforts in areas like communications, navigation, advanced spacecraft techniques, guidance systems, and basic scientific research.³⁸

The controversial events of May and June 1962 signaled the end to the year-long Air Force initiative to modify the "space for peace" policy and gain a larger Air Force leadership role in space. In all likelihood, the Air Force space campaign and the spring "firestorm" of publicity contributed to President Kennedy's decision on 26 May, in National Security Action Memorandum (NSAM) 156, directing the Secretary of State to form an interagency committee to review the political ramifications of satellite reconnaissance policy. The 156 Committee focused on the question of banning weapons of mass destruction from outer space. Efforts to prevent the arms race from adding space to its arena dated back to the Eisenhower administration's policy of freedom of space through "Open Skies." But any agreement on space seemed unachievable apart from a general disarmament scheme that ensured adequate inspection and verification. With the development of a satellite reconnaissance and other intelligence capabilities, what became known as "national technical means" of verification answered this requirement. Soviet criticism of American "spy" satellites diminished in 1963 following the Cuban Missile Crisis and their own progress in developing reconnaissance satellites. By the end of the year, the United Nations passed a resolution banning weapons of mass destruction from orbiting in space. Later, in 1967, fear of a nuclear arms race in space had diminished to the point where negotiators, using the 1963 resolution as a basis for concluding a more comprehensive arrangement, succeeded in reaching agreement on an Outer Space Treaty that prohibited weapons in space.³⁹

Although the brouhaha in the spring of 1962 took administration and Air Force leaders by surprise, several warning signs suggested that earlier Air Force optimism might have been misplaced. For one thing, on 20 February 1962, Colonel John H. Glenn, Jr., became the first American to orbit the earth part of the NASA Mercury program. The largest television audience to that date watched his three-orbit *Friendship 7* flight, and on 1 March he and fellow astronauts Alan B. Shepard, Jr., and Virgil I. "Gus" Grissom received a ticker-tape parade in New York City attended by four million people.⁴⁰ In the acclaim and euphoria after the Glenn flight, NASA's star ascended, and Soviet space achievements seemed less threatening and insurmountable. With the end of a Soviet monopoly on manned spaceflight, Senator Stennis and

his colleagues lost interest in pursuing their investigation of the “peaceful purposes” policy and separation of responsibilities between NASA and the Defense Department. The Glenn flight relieved pressure on NASA and dashed Air Force hopes for a larger voice in the national space program.⁴¹

As for Air Force space planning efforts, Secretary Zuckert and Air Staff planners encountered little more than faint praise from Defense Department officials like John H. Rubel, Deputy Director of Defense Research and Engineering, who had listened to an earlier Air Force presentation of the plan in the fall of 1961 yet declined to recommend approval to his superiors. As one might suppose, the Defense Department hewed to the President’s space policy, but the Air Force held different views about space objectives and the direction of Air Force space programs. Even so, Air Force leaders initiated a major planning and programming analysis in the spring of 1962 without first clarifying and agreeing with the Defense Department on military space objectives.⁴²

Another sign that the administration began having second thoughts about an expanded military space program came with the Defense Department’s final decision on proposed increases in the fiscal year 1963 budget. Despite Secretary McNamara’s offer to entertain budget increases for Air Force space initiatives, by late spring of 1962 General Ferguson’s new list of space projects and cost figures drew charges of padding from Assistant Secretary of the Air Force for Research and Development Brockway McMillan, and in August the Secretary disapproved the supplemental request. In the wake of the Glenn flight and the June “firestorm,” the administration felt much less inclined to accede to Air Force arguments.⁴³

Finally, the Air Force-NASA relationship proved less harmonious than suggested by signed agreements and expressions of mutual cooperation from their leaders. Almost immediately after the signing of the 24 August 1961 “Agreement on Responsibilities at the Manned Lunar Landing Program Launch Site,” the two sides became embroiled in disagreements over interpretation of the accord. The precipitating issue involved the Air Force’s desire to locate the proposed Titan III launch site within NASA’s area of operation at Cape Canaveral, to purchase an additional 11,000-acre buffer region to the north, and to establish overflight procedures. By the spring of 1962, on the eve of the public outcry against perceived military usurpation of NASA’s responsibilities, differences over range use remained unresolved, and the Air Force also had raised the issue of reimbursable funding for support costs. Although these issues might appear minor and easily settled, they in fact represented larger, long-term questions of position and responsibility within the nation’s space program.⁴⁴ At the same time, the Air Force and the Defense Department did not always agree on responsibilities and relationships toward the civilian agency. Indeed, Defense Department officials proved in no hurry to recognize a special role for the Air Force in support of NASA. It took six months before Secretary McNamara sanctioned Secretary Zuckert’s request to have the Air Force designated “executive agent” for

NASA support. Likewise, Zuckert's December 1961 request for an AFSC liaison office at NASA headquarters did not receive approval until April 1962, and another month passed before the Air Force designee, Major General O. J. Ritland, assumed his new duties at NASA headquarters. Moreover, while the Air Force became the official military service for NASA support, decision-making responsibility for supporting NASA remained in the hands of the Defense Department's Director of Defense Research and Engineering. With its campaign for a larger space role in shambles in late spring of 1962, the Air Force clearly needed to establish a more effective working relationship with both the Defense Department and NASA if it expected to preserve the prerogatives it still held.

By the summer of 1962, the 156 Committee had reaffirmed the Eisenhower policy on space and decided against the Air Force on the issue of weapons in orbit. The Air Force also failed in its efforts to take over management of Project CORONA following cancellation of its Samos reconnaissance satellite program in the spring. Moreover, with the military man-in-space mission in question, the Air Force now faced the prospect of greater reliance on NASA for any involvement in manned spaceflight operations. The decisions taken in 1962 effectively ended Air Force efforts to lead an expanded effort that included weapons in space.⁴⁵

Confronting the McNamara Defense Department

In the early months of the Kennedy administration, Air Force leaders had chosen to overlook signs that their position as the military space service faced potentially severe constraints. By the same 6 March 1961 directive assigning future space research and development to the Air Force, Secretary McNamara moved to restrict "the independent freedom of action of the three military services...by limiting the latitude of the military departments to increase emphasis and funding for various projects."⁴⁶ In the McNamara Defense Department, the office of the Director of Defense Research and Engineering (DDR&E), under Harold Brown, became more forceful as the Secretary's central staff reviewing agency for all military space research projects. The 1961 directive noted that DDR&E—not the Air Force—would define the parameters of military space research, select projects for development, and review all space proposals before sending them on to Secretary McNamara.⁴⁷

The lunar landing decision masked the full impact of the Defense Department's approach as both Congress and the administration increased funding and support to a variety of space programs. At the same time, while the Defense Department directive had specified and tightened the basic rules for performing space research and development, it left open the question of the criteria for acceptable military space programs as well as their relation to NASA's agenda. Under pressure from the Air Force campaign for a greater military space role, the intention of the Defense Department to force the services to defend their programs by comparing costs and benefits emerged only gradually over the course of 1961.⁴⁸

More than any other service or agency, the Air Force found itself increasingly on a collision course with the DDR&E review agency that the Defense Secretary relied on to control costly new space development proposals. Having reorganized in large part to perform as the “military space agency,” the Air Force hoped for a repeat of the relatively “free hand” it had to build missiles without undue concern for cost overruns and duplication. At the same time, the Air Force found itself the service most heavily committed to expensive space programs, especially those like Dyna-Soar and others that involved manned spaceflight, without well-defined military operational missions. With decisions on funding these important and expensive new projects in the hands of the Defense Secretary and his civilian staff offices, prospects for disagreement between the Office of the Secretary of Defense and the Air Force proved unavoidable.⁴⁹ Indeed, when confronted with Air Force proposals, Director Brown and his staff increasingly demanded more precise requirements and “program definition” in terms of costs, schedules, and technical hurdles. Defense Department review officials applied rigorous cost analyses to programs from the development stage through full-scale production to deployment. The initial history of the Titan III space booster illustrated the Defense Department roadblocks facing Air Force space programs.⁵⁰

The prospect of a standardized launch vehicle strongly appealed to the cost-conscious McNamara Defense Department. Initial discussions by AACB members led DDR&E’s deputy director, John Rubel, to promote the idea as a “unified program concept” that would provide the model for future space program planning. In early August 1961 he and Assistant Air Force Secretary for Research and Development Brockway McMillan organized under the auspices of the AACB an Ad Hoc Committee for Standardized Workhorse Launch Vehicles to examine alternate approaches for a rugged booster capable of orbiting 10,000-pound payloads at 300-mile altitudes. Later the committee raised the booster performance requirement, calling for a capability of launching payloads between 5,000 and 25,000 pounds into low-earth orbit. By September the committee and the Air Staff had agreed on the combination of a Titan II upgraded with strap-on solid boosters and a high-energy upper stage for future, heavier satellites. Led by Space Systems Division, Air Force agencies immediately began intensive studies of roles, designs, performance capabilities and reliability, and a cost and development schedule. On 13 October 1961 the Air Force received permission from Deputy Director Rubel to start a “phase I” study for a system “package” comprising “a family of launch vehicles based on the Titan III.”⁵¹

Although the Air Force favored the prospect of a standardized booster more powerful than either the Thor or Atlas, the Defense Department’s micromanagement soon proved unwelcome. As Secretary McMillan recalled, the Titan project became the “most comprehensive advanced development planning effort ever undertaken by the Air Force.”⁵² In effect, Secretary McNamara saw in the Titan III booster the ideal test case for applying his innovative management procedures to reduce costs and acceler-

ate development schedules. As a result, Defense Department officials accorded the booster project the closest scrutiny of any project heretofore developed by the Air Force. Project "definition" required more detail; a strong program office supervised every aspect; and the Air Force received direction to use new Program Evaluation Review Techniques and establish special accounting and auditing procedures. Director Rubel involved his office in initial study proposals, and he required use of a civilian consultant agency throughout the bidding period. When the Defense Department delayed the release of funds and continued to "refine" procurement procedures, the Air Force had to extend the study's due date from 1 February to 1 April 1962. Meanwhile, after Space Systems Division presented its findings on technical aspects of the project, Rubel requested a "white paper" assessing the program's philosophy and technical approach. Even after a thorough review of the phase I plan by Air Force officials, Rubel returned it a number of times for additional data and lower cost estimates to assist the Defense Department's review. By late spring the repeatedly revised schedule projected an initial Titan IIIA test flight in May 1964 and the first Titan IIIC flight in January 1965.⁵³

The Defense Department's intensive scrutiny and persistent involvement drew the wrath of General Schriever. On 30 April 1962 he complained to Chief of Staff LeMay of "unprecedented... demands for large volumes of information and program data that is magnified at each succeeding organizational level. Decisions on matters that have never been previously reviewed are being withheld for inordinate lengths of time." He especially worried about the future impact of demands for detailed design specifications before the decision on program approval had been taken. "If we are to be held to this overly conservative approach, I fear the timid will replace the bold and we will not be able to provide the advanced weapons the future of the nation demands."⁵⁴

The Defense Department's management procedures and system development criteria failed to convince Air Force leaders that space systems could reach maturity faster and cheaper. Defense Department practices also threatened to eliminate all Air Force programs that failed to convince the Office of the Secretary of Defense of ultimate mission success. As a result, under the new administration, the old dilemma posed by the "new ocean" of space became more acute for Air Force planners. While space continued to represent an unknown frontier that required exploration to determine its potential uses and missions, the Defense Department's rigid approach to requirements cast doubt on the service's ability to preserve both its hard-won fight to conduct basic research in space and pursue projects whether or not they could claim a viable mission in the end. But how to answer the military's argument that, in order to counter Soviet superiority in space and avoid a technological surprise, the nation must pursue military space research and development initiatives regardless of guaranteed mission success? The Defense Department's solution was the "building block" approach to military preparedness.

Secretary McNamara first described this concept during testimony before Congress on the fiscal year 1963 budget in early 1962. It subsequently appeared in the President's *Aeronautics and Space Activities Report* for 1962. As the Defense Secretary explained, space projects comprise two categories, those with "identifiable military needs and requirements," and those "designed to investigate promising military space capabilities... [to insure] ... a broad flexible technological base" ready for adaptation and development for systems once future military requirements were identified. The latter category represented "building blocks" for future use, and the Titan III, which initially supported no operational requirement, exemplified this approach.⁵⁵ In this manner, the Defense Department continued to fund a variety of additional space projects, including space probes, large solid-propellant rocket engines, laser technology, ion propulsion, and bioastronautics, along with a host of related supporting research and development activities. On the other hand, the "building block" rationale provided the Defense Department more control over a growing number of expensive projects. Air Force leaders became increasingly alarmed at the shrinking research and development budgets for space.* In General Schriever's view the McNamara Defense Department's focus on cost effectiveness and the desire to accommodate the Soviet Union stifled the Air Force's efforts to move from exploratory to advanced research.⁵⁶

Following the public furor in June 1962 about potential Air Force "offensive" systems in space, the Secretary and his staff showed less willingness to accommodate Air Force proposals. The new attitude became especially clear by fall in the remarks of the Deputy Director of Defense for Research and Engineering. In a speech on 9 October 1962, John Rubel asserted that the Defense Department's space spending was as high as it could go given the "uncertainties" of the military program. Therefore, although new space projects might seem potentially useful, they would undergo increased scrutiny for their contribution to the military mission. Most alarming to Air Force leaders, Rubel suggested that many Air Force proposals did not meet the required high research and development standards of his office but merely served abstract doctrines about the military space role. He pointedly referred to the now traditional Air Force concept of aerospace, by which space represented a mere continuum of the atmosphere and the logical area for Air Force operations. He saw no useful purpose in such theories that suggested the vacuum of outer space would become the next battleground, or that "control" of space, whatever that implied, meant control of the earth. An expanded Air Force space program had no place in the Deputy's view of the nation's current and future space posture.⁵⁷

Although all Air Force space proposals received increased attention from the Defense Department, Rubel's remarks indicated that the Defense Department found

* See Appendices 2-2 and 2-3.

fault more with new proposals than existing programs and studies. The “building block” approach would allow continuation of a variety of carefully controlled research projects, while providing the means of avoiding commitment to costly new programs. In light of the Defense Department’s rigid criteria and conservative research and development philosophy, Air Force space planners encountered major road-blocks in their efforts to develop credible long-range space planning and programming documents. Rubel’s speech, in fact, occurred shortly after the Air Force had completed its most intensive space planning effort to date. The Air Force endeavor represented the era’s “last hurrah” in the service’s aggressive campaign for an expanded, Air Force-led space program.

The Air Force Plans and Programs for Space Leadership

In the spring and summer of 1962 Air Force leaders carried out three major space planning initiatives in response to perceived weaknesses in the national space program: the “West Coast” phase; the Five-Year Space Program Study; and an Air Staff-supervised revision of the Air Force Space Plan. The “West Coast” phase involved a technically oriented study conducted at Space Systems Division in Los Angeles under the direction of Lieutenant General Howell Estes, Jr., Deputy Commander of Air Force Systems Command for Aerospace. An “Executive Committee” phase represented a second space study effort led by Lieutenant General James L. Ferguson, Deputy Chief of Staff for Research and Development, who formed a joint Air Staff-major command task group to formulate a Five-Year Space Program. Finally, during the spring and summer the Air Staff’s Deputy for Development Planning supervised a revision of the September 1961 Air Force Space Plan.⁵⁸

The “West Coast” phase occurred in response to Secretary McNamara’s 23 February 1962 letter to Secretary Zuckert, in which he emphasized the need to establish the “necessary technological base and experience,” or building blocks, for possible manned space requirements at some future date.⁵⁹ In mid-April General Estes convened a Space Technical Objectives [planning] Group composed of a wide spectrum of the “best scientific and technical personnel available to AFSC.” Its mission was to formulate long-range space program requirements centered around technical objectives. In a revealing initial address to the group on 14 April, Estes described the prevalent atmosphere of great skepticism at the Defense Department surrounding the project. He was “shocked,” he said, to find that the Defense Department believed the Air Force developed technical justifications to support preconceived ideas and objectives; moreover, Defense officials considered that their technical work in coordinating Defense Department-NASA programs had left the Air Force with little of value to offer. The general expected his study group’s work to convince the Defense Department otherwise. He also reminded his audience that the Defense Department intended to maintain control of all military space programs and, as a formal procedure, had required Air Force Systems Command to obtain clearance from DDR&E

through specific development plans before proceeding with any space research project in excess of \$200,000. As a result, every aspect of the task force's findings had to be absolutely credible and integrated into the overall space program. Finally, the Defense Department remained "suspicious of our desires to run a military space program," and believed that the Air Force should focus on building a sound technical base rather than development of operational systems.⁶⁰

General Estes formed several directing committees and twelve technical panels to assess important space research and development areas, including launch vehicles, space propulsion, spacelift support, space communication equipment, weapons, reentry vehicles, and spacecraft. On 14 June, after two months of study, the general and his Space Systems Division colleagues presented their analysis and findings on current programs and future requirements to Defense Department representatives, who suggested that the Air Force, like the Defense Department, move forward on preparing a Five-Year Space Program. Although on 25 June the "West Coast" group briefed its results at Air Force Systems Command and Air Force headquarters, their report never received approval or release authority, even within AFSC. By the end of June the Estes study had been superseded by the Executive Committee's Five-Year Space Program effort.⁶¹

The "Executive Committee" phase of the Air Force space effort, which lasted from 26 June to 16 September, brought together at Air Force headquarters representatives from the Air Staff and major commands. In contrast to the "West Coast" group's technical focus, the Executive Committee sought to meet specific operational objectives. Much of the effort centered on a "requirements panel" of full colonels that directed Air Force Systems Command's Space Systems Division to prepare a program that conformed to specific strategic, reconnaissance, defense, command and control, and support "capability requirements." In early September, Space Systems Division presented an ambitious program of sixteen projects with a five-year cost of \$9.8 billion. Yet by 9 November, when Secretary Zuckert submitted the Air Force fiscal year 1964 space budget request, the total figure had been progressively reduced to \$2.85 billion. Even so, "in view of the magnitude of these amounts," the Secretary explained, he elected to request major funding increases totaling \$200 million beyond currently approved Defense Department funding only for four of the programs—the Military Orbital Development System space station, the Blue Gemini manned spaceflight project to experiment with Gemini capsules, the MIDAS missile detection system, and Saint, the satellite inspector. Beyond the four on the Secretary's list, only Dyna-Soar and the large solid-fuel booster program could even expect to receive substantial funding.⁶²

As the Five-Year Space Program study neared completion, the Air Staff already had finished its revisions to the 1961 Space Plan.⁶³ In its detailed review of space technology, the plan relied heavily on the "West Coast" study by projecting "state-of-the-art" in each of the twelve technical areas. It also defined objectives for each

“capability requirement,” and provided employment concepts and performance capabilities. Like the basic 1961 plan, the revised Air Force Space Plan emphasized the operational importance of manned military systems. “[M]an has certain qualitative capabilities which cannot be ignored,” argued the planners, who proceeded to elaborate on potential roles for man-in-space described earlier in General Ferguson’s congressional testimony and the previous year’s space plan. They also noted that “requirements for manned military space systems seem inevitable despite present uncertainties concerning man’s exact military role in space.”⁶⁴ On 29 August 1962 planners circulated the revised draft for comment. Although most responses proved favorable, the Air Force never officially issued an approved version of the plan.

None of the three initiatives received formal acceptance from the Air Force or the Defense Department. Launor F. Carter, the Chief Scientist for the Air Force, pointedly remarked that the Air Force could hardly expect to formulate an effective space program without an approved space plan. Lacking initial agreement between the Defense Department and the Air Force on concepts and objectives, he argued, neither plan nor program would see the light of day. Like its September 1961 predecessor, the August 1962 Space Plan remained a draft study only, unapproved.

In early 1963 Carter subjected the entire 1962 planning and programming process to a scathing critique. He asserted that much of the Estes initiative proved ineffectual due to the absence of long-term plans approved by the Defense Department and the Secretary of the Air Force. Without these, operational commands could insist on unreasonable operational capability requirements which made an orderly research and development program impossible. Moreover, in preparation of the Five-Year Space Program, top-level decision makers envisioned a modest five year program, while the action panels established requirements calling for funding increases upwards of \$5 billion. Realistic programming proved impossible under these circumstances. The chief scientist also criticized the practice of requesting from scientists only their opinion of technical feasibility without the additional complexities involving cost, timing, and alternative systems. In this regard, he singled out the Air Force’s misuse of its best technical resource, the Aerospace Corporation. Rather than play a vital role in the study process, the service’s major support contractor for space seemed to provide significant inputs only when “they happened to coincide with those of their military employers.” Above all, Carter explained the failure of the space program development effort as the result of “distant relations” between the Air Force and DDR&E, characterized by the Air Force’s failure to involve the Defense Department agency continuously in the process.⁶⁵

From the chief scientist’s perspective, the Air Force would have to establish better relations with the Defense Department, and especially DDR&E, before it could hope to achieve its space objectives. The unilateral pursuit of space objectives in a

planning vacuum had proven unrewarding. At the same time, while the Air Force's relationship with the Defense Department by late 1962 had altered substantially, the service also had become much more dependent on NASA for participation in manned spaceflight operations.

Developing a "Partnership" with NASA

The Defense Department directive of 6 March 1961 and subsequent guidance had been no more specific on the relationship of Air Force and NASA space programs than it had on requirements for Defense Department approval of Air Force initiatives. Although the 1958 Space Act designated NASA responsible for civilian space activity, it also required the agency to support military needs by "making available to agencies directly concerned with national defense...discoveries that have military value or significance."⁶⁶ In declaring itself for an integrated national space program, the Kennedy administration reinforced the need to emphasize cooperative efforts and interagency coordinating mechanisms to provide mutual support and avoid duplication. The Air Force relationship with NASA in the 1960s involved four major aspects: shared programs and technologies; NASA's overwhelming dependence on the Air Force for launch and ground support; NASA's continued support of Air Force aeronautical research; and "persistent attempts by the Air Force to investigate the military applications of space," especially of manned earth-orbital operations.⁶⁷ Characterized by support, coordination, and rivalry, the Air Force association with NASA would depend less on the actions of the Air Force itself than on the evolution of both the Defense Department's and NASA's assertiveness and their interrelationship on space policy and programs.

Throughout 1961 the pervasive nature of NASA's dependence on military support—especially from the Air Force—and continued high-level coordination between the Defense Department and NASA tended to conceal the fact that NASA was evolving into the dominant space organization. By the spring of 1962 it had grown in one year from 57,500 to 115,500 personnel, and a year later had 218,000 on its roster.⁶⁸ Meanwhile, NASA's budget also signaled its phenomenal growth. Its fiscal year 1961 budget of \$926 million, or 51.2 percent of the total space budget, represented the first year the civilian agency received more funding than the Defense Department. By fiscal year 1963, the NASA budget comprised 66.7 percent of the total space budget, while the Defense Department's figures indicated a decline from 45 percent of the total budget in fiscal year 1961 to 28.5 percent in fiscal year 1963.*

NASA's increased size and budgets reflected its responsibility for all manned spaceflight and strengthened its bargaining power and willingness to take a more active part in coordinating programs with the Air Force. Disagreement over pro-

* See Appendix 3-2.

cedures and responsibilities worked out for Cape Canaveral operations represented one aspect of NASA's new assertiveness, while differences over funding arrangements indicated another. In March 1962, NASA took the additional step of establishing independent field offices at both the Cape Canaveral and Vandenberg missile ranges in order to assert its "own identity" and prerogatives. The following year, it concluded an agreement with the Air Force whereby it signed on to use the Agena upper stage. In doing so, NASA officials became involved early in the planning stage and joined the Air Force Configuration Control Board for the Atlas, Thor, and Agena space vehicles. It also participated in the production phase by establishing special coordination groups at Air Force Systems Command to monitor production development. NASA's extensive involvement in Defense Department activities led in December 1962 to the appointment of a Deputy Associate Administrator for Defense Affairs. Under retired Admiral W. F. Boone, this office became a central coordination and liaison element between NASA and both the Defense Department and the individual military services.⁶⁹ By contrast, the earlier Air Force initiative to establish the AFSC Office of the Deputy Commander for Space at NASA headquarters represented the need for closer coordination and establishment of a strong Air Force presence with the increasingly important space agency. With the Air Force's disappointment over its failed campaign for a larger military space role, it became increasingly interested in cooperative programs with NASA. When the Defense Department continued to question the requirement for an Air Force man-in-space role, the particular focus for Air Force-NASA relations became manned spaceflight.⁷⁰

By early 1963 both the Defense Department and NASA had become more determined to establish their own prerogatives and responsibilities for man-in-space activities, with the Air Force often playing the role of spectator as well as participant. The Project Gemini agreement of 21 January 1963, signed by Defense Secretary McNamara and NASA Administrator Webb, represented a major watershed in the evolving relationship between the three parties.

The Air Force Pursues a Dyna-Soar and a Space Station

In 1963, action in space involved manned spaceflight, and NASA possessed all of it. The Air Force, however, had in various stages of study and development a number of projects involving manned spaceflight, with which it hoped to claim a role of its own. Dyna-Soar represented the only program approved by the Office of the Secretary of Defense and the one reflecting the Air Force's strongest institutional commitment and interest. The remaining manned projects centered on some form of space station or laboratory.

Although the modern idea of a space station dates back to Hermann Oberth's work in the 1920s, Air Force researchers began actively studying the concept in 1957 when a Wright Air Development Center report examined the requirement for possible space research stations. In the wake of Sputnik the Air Force received a variety of contractor

proposals for orbiting space stations, including one calling for an Atlas-launched, four-man crew orbiting at an altitude of 400 miles. However, when NASA received the manned spaceflight and space exploration missions, the Air Force found itself confined largely to space development activities with recognized military requirements or likely military implications. Even so, the space station concept continued to receive attention from Air Force planners like Brigadier General Homer A. Boushey, Director of Advanced Technology, who believed it might serve as an effective observation post and patrol or bombardment platform. In June 1960, the Air Research and Development Command approved a study requirement calling for a military test space station (MTSS) to assess the potential of military men and equipment to function in space.⁷¹ By 1961 Air Force leaders had deemed the space station essential to the Air Force space program. The September 1961 Space Plan justified its acquisition as necessary for evaluating “space command posts, permanent space surveillance stations, space resupply bases, permanent orbiting weapon delivery platforms, subsystems, and components.”⁷²

Defense Department officials became aware of the Air Force space station concept late in the fall of 1961 during presentations of the Space Plan and correspondence between Secretaries Zuckert and McNamara. While the Defense Department studied the matter, General Ferguson told congressional committees in early 1962 that in order to conduct testing in “the true space environment... we are convinced that a manned, military test space station should be undertaken as early as possible.” He went on to refer to possible coordination with NASA for use of the Gemini as the ferry vehicle for the orbiting station. Underway since December 1961, planning for Gemini, NASA’s successor to Project Mercury, had always assumed substantial Air Force involvement.⁷³

In a letter to Secretary Zuckert on 22 February 1962, Secretary McNamara encouraged the Air Force to pursue the concept by using Dyna-Soar and Gemini technology in the initial development phase. By late March Air Staff and AFSC planners had confirmed the technical feasibility of the project, now designated the military orbital development system (MODS). When submitted to the Pentagon for approval in early June, MODS consisted of a permanent station test module, a Gemini spacecraft, and the Titan III “building block” launcher. In August the Air Force had added a separate program for the spacecraft termed Blue Gemini, which focused specifically on rendezvous, docking, and personnel transfer functions. Air Force pilots would fly on six Gemini missions to gain astronaut experience for the MODS missions. But the Blue Gemini project did not elicit universal support within the Air Force. Some, like Chief of Staff General Curtis E. LeMay, worried that it might endanger the troubled Dyna-Soar program. Others argued that its use of available technology and equipment would make it operational before the X-20. NASA, on the other hand, saw in Blue Gemini a means of adding more defense funding to the entire Gemini project. By December 1962, however, Secretary McNamara had canceled Blue

Gemini, declined to support MODS in the fiscal year 1963 budget, and limited the Air Force to conducting a series of “piggy-back” experiments as part of NASA’s Gemini mission.⁷⁴

Although actions by the Office of the Secretary of Defense reflected Secretary McNamara’s strong reservations about Air Force manned spaceflight projects, he remained unwilling to close the door entirely on determining a military role for man in space and leave the field of manned spaceflight entirely to NASA. Indeed, his view of an integrated national space program envisioned a continued major Defense Department voice in space decision-making, and he proved determined to assert the prerogatives of his office with Administrator Webb and his colleagues. In fact, during the week and a half before the signing of the Gemini agreement, Secretary McNamara attempted to take complete control of the Gemini project. Stressing the Defense Department’s experience and the integrated nature of the national space program, he first informally proposed that all Defense Department and NASA manned spaceflight programs be centralized under Defense Department management. When Webb declined, the Defense Secretary countered by suggesting that Gemini be managed jointly by the Defense Department and NASA. Once again, to preserve its freedom of action, NASA refused the Secretary’s advances. Nevertheless, in the agreement NASA concluded with the Defense Department on 21 January 1963, it went far to accommodate Defense Department concerns.⁷⁵

Although managed by NASA, the project would involve Defense Department participation in every phase. The agreement created a joint Gemini Program Planning Board cochaired by NASA’s Associate Administrator, Robert Seamans, and the Assistant Secretary of the Air Force for Research and Development, Brockway McMillan. Its charter called for it to plan and conduct operations to “avoid duplication of effort in manned spaceflight and to insure maximum attainment of both DoD and NASA objectives.” Ultimately sixteen of the forty-nine Gemini experiments represented Defense Department projects that proved important for NASA, too. They focused on determining the military usefulness of manned spaceflight by testing extravehicular maneuvers with chest units and propulsion equipment designed for the Gemini space suit and the effects of weightlessness over extended periods of time in space. Additional projects included radiometric, radiation, and navigation experiments, and a variety of photographic and visual tests to determine the capability of acquiring, tracking, and photographing space objects and terrestrial features from the Gemini capsule. Because the Air Force considered many of these experiments classified, NASA officials worried about compromising their “peaceful” image. Despite considerable internal opposition, top agency officials agreed with the argument of NASA’s Defense Affairs chief, Admiral Boone, that the national interest and NASA’s charter warranted their inclusion.⁷⁶

Above all, NASA submitted to McNamara’s insistence that “NASA and the DoD would initiate major new programs or projects in the field of manned spaceflight in

near-earth orbit only by mutual agreement.” NASA officials worried that this provision might provide the Defense Department with veto authority over the civilian agency’s scientific proposals on the basis of an unfavorable cost-benefit ratio while compelling the agency to agree to the Defense Department’s manned spaceflight projects in the name of national security. Although NASA’s fears did not materialize, this concession helped provide the Defense Department and the Air Force the leverage to secure future military inputs in national space decisions.⁷⁷ Yet the Air Force could not be entirely pleased with the Gemini decision. Despite retaining strong involvement with experiments and operational support, it did not represent the separate military manned spaceflight program it desired. Nor did it ease fears that NASA’s Project Gemini competed with Air Force programs and might convince the Defense Department to cancel Dyna-Soar and other Air Force man-in-space projects. In fact, Gemini seemed to imply that there could be no Air Force manned space program independent of NASA.

By 1963 both the Defense Department and NASA confronted difficult questions about the nation’s post-Apollo space future. For NASA, the main focus of what it called its Apollo Applications Program proved to be some form of space station, for which it had already initiated preliminary studies. Despite the already impressive performance of automated spacecraft, Air Force leaders continued to view the space future largely in terms of manned spaceflight and pressured a reluctant Defense Department accordingly. The task proved difficult. Following the Gemini agreement Defense Secretary McNamara established more stringent criteria for approving military space projects. As he explained to the Senate Appropriations Subcommittee in the spring of 1963, the space program must satisfy two basic criteria. “First, it must mesh with the efforts of...NASA...in all vital areas.... Second, projects supported by the Defense Department must promise, insofar as possible, to enhance our military power and effectiveness.” He went on to defend the importance of cooperative efforts between the two agencies for the success of an integrated national program.⁷⁸

For the Air Force, the new criteria seemed to mean that NASA came first, and space proposals would continue to suffer from the “requirements merry-go-round.” By 1963, a cost-conscious Defense Department confronted crucial decisions on a number of major Air Force space programs for which research and development had reached important milestones. Consuming an ever larger share of the \$1.5 billion space budget, now these projects faced more demanding Defense Department approval criteria.⁷⁹ Should the Defense Department support advanced development, proceed with development at scaled-back levels, or cancel the projects entirely? Programs under this kind of scrutiny included Bambi, MIDAS, Saint, and—especially—Dyna-Soar.

Armed with its new approval criteria, the Defense Department chose to “reorient” MIDAS with reduced funding and an extended development schedule in spite of its five successful flights in 1963. As Secretary McNamara explained, there still

remained “unanswered questions regarding the technical feasibility, complexity, and cost-effectiveness of a space-borne [early warning] ballistic missile alarm system.”⁸⁰ Determining that Bambi and Saint unfavorably competed with NASA programs and alternative Defense Department systems, he canceled Bambi entirely and reduced Saint to a “definition” study. Although the Air Force had argued that NASA’s projects did not involve “non-cooperative” targets, the Defense Secretary had decided to turn from antimissile and antisatellite defense to more “reliable” and “cost effective” ground-based radar and missile systems. Above all, only ground-based systems qualified in terms of national policy of space for peaceful purposes.⁸¹

The one-man piloted Dyna-Soar faced the most intense scrutiny because it represented the costliest space project in the budget, and Defense officials continued to question what it would be used for since it could not be used for its original purpose of orbital bombing. As the Defense Secretary commented to the House Armed Services Committee in January 1963, “some very difficult technical problems still remain to be solved in this program, particularly in connection with the mode of reentry.”⁸² That same month he charged his DDR&E chief, Harold Brown, to assess the advantages and disadvantages of Dyna-Soar compared to expected benefits from NASA’s two-man Gemini program.⁸³ Yet the technical challenges seemed to worry Secretary McNamara less than the high costs and especially the military purpose served. In March 1963 he consulted with NASA’s Administrator, James Webb, on possible alternatives to spending \$600 million for the Dyna-Soar program, with its “ill defined military requirement.”⁸⁴ Later, in October, he visited the Martin-Marietta plant in Denver to review progress on the X-20 and Titan III. His concerns remained the same ones he had expressed in the spring. The Air Force focused primarily on getting into and out of orbit rather on the basic question: “what does the Air Force really want to do in space and why?” The Secretary left dissatisfied with the answers he had received.⁸⁵

By the fall of 1963, while the door was closing on the Dyna-Soar program, it had opened for the concept of developing a military space station. Although the MODS project had been eliminated from the fiscal year 1963 budget, Secretary McNamara authorized the Air Force in the spring of 1963 to examine a similar concept known as the national orbital space station (NOSS). Apparently, McNamara approved the Air Force study in response to indications that NASA was ready to sign a \$3.5-million contract study for a Manned Orbital Research Laboratory. At this point, both the Defense Department and the Air Force believed that a military version could be selected as the national space station in competition with NASA for post-Apollo space applications.⁸⁶

During the spring and summer of 1963 senior Defense Department and NASA officials discussed the possibility of developing new manned earth orbital research and development projects. Secretary McNamara lobbied forcefully for the Defense Department’s involvement from the start in any exploratory study effort. For him

the Gemini agreement of 21 January 1963 did not go far enough to guarantee initial Defense Department participation to ensure its requirements would be incorporated into the design. He believed that the recommendation of the AACB's Manned Space Flight panel for coordination and exchange of information did not go far enough. He proposed a joint "sign off" clause for "initiation of any contractor study program or project in the field of manned orbital test stations of a magnitude equal to or greater than a \$1,000 per year level of effort."⁸⁷

The Secretary's tactic consisted of submitting to NASA officials signed draft Defense Department-NASA agreements for Administrator Webb's signature without preliminary staffing by both parties. McNamara's position and tactics alarmed Webb and his colleagues, who refused to allow the Defense Secretary veto power over initial studies NASA officials considered necessary to make effective planning and programming decisions.⁸⁸ With the two sides deadlocked, in late July Vice President Johnson asked for their views on space stations. The Defense Secretary took the opportunity to forcefully commit his agency to a space project that promised "immediate utility as a laboratory and development facility" that could evolve into an effective military vehicle. The Vice President's interest helped provide momentum for agreement. After declining to sign several proposed arrangements, officials from both agencies met informally and worked through the AACB to reach a compromise.⁸⁹

On 14 September 1963 the Defense Department and NASA signed an agreement covering a "Possible New Manned Earth Orbital Research and Development Project." By terms of the accord, the two sides agreed on a "common approach" to projects involving new manned orbital research and development vehicles, particularly manned orbital systems larger and more complex than Gemini and Apollo. The goal would be a single project capable of meeting the requirements of both agencies. The Aeronautics and Astronautics Coordinating Board would coordinate the studies with the intention of submitting a joint recommendation for presidential approval. Management responsibility and funding apportionment would be determined jointly. Although Defense Secretary McNamara had reservations about NASA's head start and the method for handling disagreements, Administrator Webb reassured him with promises of full cooperation from the outset on all manned spaceflight projects. The Defense Secretary's concerns notwithstanding, the new agreement superseded the Gemini accord and ensured Defense Department an equal voice in post-Apollo national space decisions.⁹⁰

Following the NASA-Defense Department space station agreement, Defense Secretary McNamara proceeded with his own plans for a military manned spaceflight research project to replace the Dyna-Soar manned orbital glider. By November DDR&E had completed the evaluation of Dyna-Soar's future that had engaged its attention since January. On the 14th Director Brown recommended that the Air

Force program be ended and replaced by a military space station and expansion of the Air Force's ASSET (aerothermodynamic/elastic structural systems environmental tests) project, previously a part of the Advanced Reentry and Precision Recovery Program begun in June 1960.⁹¹

Interestingly, of the six alternative Gemini-based space station proposals considered, Brown favored one far more ambitious than the Manned Orbiting Laboratory, the project announced by Secretary McNamara in December 1963. DDR&E's initial proposal called for a large, 2,140 cubic foot, four-room station with a crew of four astronauts on a thirty-day rotation, and launched by a Titan III. The ambitious plan included extensive ferrying, docking, and resupply operations. When the Director submitted the proposal to NASA as required by terms of the 13 September agreement, however, he encountered opposition from agency officials who believed the project conflicted with the civilian agency's mandate for such experiments. NASA countered with a more restricted alternative, an orbiting military laboratory. By considering the system a laboratory and not a space station, NASA could effectively argue that the military should leave ferry, docking, and resupply experiments to future NASA programs. Similar to the original Air Force MODS proposal, the NASA-proposed laboratory consisted of a Gemini capsule linked to a test module and launched by a Titan IIIC. The modest project seemed based more on the interagency Gemini agreement of January 1963 than on the September accord. As such, it would serve to postpone a formal decision on management responsibility for a national space station and, thereby, allow the Air Force to retain a man-in-space mission. Although Director Brown continued to advocate his original proposal, he agreed that the NASA alternative represented a credible "near-term" manned military space program. There the matter stood in December 1963 when the Defense Secretary made a major decision on the future of Air Force manned spaceflight.⁹²

Setting Course on a Manned Orbiting Laboratory

Although the DDR&E recommendations precipitated a last-ditch effort by Air Staff officers to save Dyna-Soar, their arguments proved futile. At a 10 December 1963 press conference, Secretary McNamara announced the cancellation of Dyna-Soar and the approval of a Manned Orbiting Laboratory (MOL). The Secretary justified his decision to end the Dyna-Soar (X-20) program by citing imposing technical challenges to achieving an overly ambitious set of objectives that included maneuverable capability and precise reentry and landing techniques. Furthermore, the vehicle could carry only one man and had already moved beyond the Titan I and II to the Titan III. As the booster sequence suggests, budgetary concerns seemed uppermost in the Secretary's thinking. Already accounting for over half the budget for space research and development at \$400 million, planners estimated a final program cost of \$1 billion. Under existing constraints, the Air Force budget clearly could not accommodate both Dyna-Soar and the MOL.⁹³

Two days after the press conference the Air Force began dismantling the program with the purpose of salvaging as much as possible for other projects. Although canceled nearly two years before its first scheduled orbital flight, Dyna-Soar left important legacies. Secretary Zuckert approved continuation of thirty-six specific activities in areas of advanced technology, hardware, and technical data. Improvements with high-temperature materials and fabrication processing contributed to development of other spacecraft and large rocket boosters. Data from over 2,000 hours of wind tunnel testing provided significant knowledge on aerodynamic stability and control and structural design problems. Engineers expected to adapt the X-20's environmental control system for future use, while the four guidance subsystems found immediate application in space activities.⁹⁴ The Dyna-Soar represented the first approved military spacefaring system, and the only one that initially included an offensive role. It kept the focus on manned military spaceflight and, most importantly, helped lead to the development of the Titan III, the "DC-3 of the space age." Its aerodynamic approach to space operations would reappear in the future in the form of the Space Shuttle. Meanwhile, Air Force space interests would now focus on examining man's capability to operate in the controlled environment of a space laboratory. This laboratory would have no offensive capability but, rather, would conduct passive defense functions in keeping with national space policy.

In the Manned Orbiting Laboratory, the Air Force at long last believed it would attain its man-in-space objectives, whatever they might be. The proposed laboratory, which closely resembled NASA's alternative to DDR&E's space station proposal, would rely on existing components from both Defense Department and NASA programs. Launched by a Titan III, a modified Gemini capsule would act as the transport vehicle for an attached laboratory canister "approximately the size of a house trailer." In the laboratory a two-man crew would conduct "shirt-sleeve" experiments, such as pointing cameras, for a three-day period.⁹⁵

In one sense, the MOL represented a significant departure from the Defense Department's stringent requirements criteria. To this point the Air Force had faced a requirements paradox for military manned spaceflight projects. Because the Defense Department saw no specific requirements for military man-in-space, it had continued to oppose development of Air Force programs and authorized only participation in NASA-managed projects like Gemini. From the Air Force viewpoint, such projects did not provide necessary data on potential military capabilities on the frontier of space. Secretary McNamara's comments on the MOL reveal both his skepticism about manned spaceflight and his concession to the Air Force:

This is an experimental program, not related to a specific military mission. I have said many times in the past that the potential requirements for manned operations in space for military purposes are not clear. But that, despite the fact they are not clear, we will undertake a carefully controlled program of developing the techniques which would

be required were we to ever suddenly be confronted with...[a]...military mission in space.⁹⁶

In effect, the Manned Orbiting Laboratory would become the new military manned spaceflight “building block.”

As for his established criterion requiring compatibility with NASA’s projects, the Secretary stated that MOL did not duplicate NASA programs because, unlike Apollo and other current NASA projects, it filled a gap in the national space program by providing long-duration “near-earth orbit” manned spaceflight experiments under conditions of weightlessness. Furthermore, the Defense Department’s laboratory would pursue military objectives like reconnaissance and satellite detection and inspection when possible. NASA had been invited to participate, although McNamara pointedly declared that “this entire program will be Air Force managed.”⁹⁷ Later, NASA and Defense Department officials reaffirmed that the MOL did not violate the September 1963 space station agreement. The MOL, they said, was not a space station as defined by the agreement because it did not represent a future spacecraft “larger and more sophisticated than Gemini and Apollo.” Therefore, it did not require a joint recommendation as a “national” project submitted for presidential approval. It would be a military program directed by the Air Force.⁹⁸

The fact that the Defense Secretary had forcefully stressed the MOL as an Air Force-directed project suggests that he remained sensitive to the service’s continued pressure for a military manned space role and to its concerns after the series of program cancellations and “reorientations” during the past year. From the Secretary’s point of view, an Air Force MOL made good sense because, unlike Apollo, it would be based on Gemini, which offered the advantage of proven technology and use of the Titan III rather than NASA’s Saturn IB. It also would keep the Defense Department active in the exploratory stage for the national space station. Air Force leaders clearly considered the MOL the first step to a permanent place for military man-in-space activities.⁹⁹ On the other hand, the Defense Secretary in December 1963 only authorized feasibility studies for the laboratory. The Air Force would have to establish convincing mission requirements before receiving approval for system production. Over the next twenty months, the Air Staff and Air Force Systems Command responded with organizational initiatives and intense study of system capabilities and potential mission functions.

The Air Force found itself reasonably well prepared when McNamara awarded it the Manned Orbiting Laboratory. Hoping for approval of its national orbital space station proposal, the Air Staff had been assessing organizational options since August 1963. That August General Ferguson urged Vice Chief of Staff General William F. McKee to provide a space station focal point in response to new organizational actions by both the Defense Department and NASA. The Defense Department had established a Deputy Director for Space, and NASA had under consideration a special management structure for its space station program. Impressed with General

Ferguson's argument, the Air Staff on 15 August created the Office of the Deputy Director of Development Planning, Space, headed by Colonel Kenneth W. Schultz. Colonel Schultz would support both Under Secretary of the Air Force McMillan and Alexander Flax, who succeeded McMillan as Assistant Air Force Secretary for Research and Development, on the Air Force side, and Albert C. Hall, the Defense Department's new Deputy Director for Space.¹⁰⁰

A month after Secretary McNamara's decision, General Schriever proposed that he head a new MOL office at Air Force Systems Command headquarters to serve as "management agency" between the west coast Space System Division program office and the Office of the Secretary of the Air Force. Although Under Secretary McMillan found favor with Schriever's proposal, initially he pursued other options. First, he moved to upgrade and redesignate Colonel Schultz's position to that of the Office of the Assistant to the Deputy Chief of Staff for Research and Development for the MOL Program in order to accommodate the expected high degree of inter-agency and interservice coordination. Later, on 18 January 1965, he and Air Force Secretary Zuckert created the new office of Special Assistant for MOL under the Secretary's direct supervision and supported by a MOL Policy Committee. Finally, General Schriever received more responsibility than he first requested when he became head of a new MOL program office established at the Secretarial level under special security directives. The organizational evolution of the MOL's management structure reflected increasing high-level interest in the laboratory's mission. By mid-1965 it had become part of the sensitive national space reconnaissance effort.¹⁰¹

The long project definition phase, from December 1963 to August 1965, suggests the difficulty the Air Force faced in establishing convincing military missions for its astronauts to perform in space. It called on seventeen contractors to assess sub-systems and experiments for possible incorporation in the MOL's mission. Areas examined included navigation, communication, observation, and biomedicine. Yet proposed mental and physical health studies, as well as experiments to determine if man could enhance the results produced by automated and semi-automated equipment, failed to convince the Defense Secretary of MOL's cost effectiveness, especially compared with automated spacecraft performing the same functions.¹⁰²

During 1964, however, the Defense Department added two reconnaissance tasks involving radar and camera assembly and operation in space. The MOL launch site shifted from Cape Kennedy to Vandenberg Air Force Base, California, in order to conduct high-inclination launches needed for intelligence collection over Soviet territory. With the additional requirements for inspecting non-U.S. satellites when they passed in view and for ocean surveillance to meet naval concerns, the Defense Secretary found the MOL sufficiently important. Eventually, the requirements called for fifteen primary and ten secondary experiments.¹⁰³

On 25 August 1965 President Johnson announced approval of the MOL for full-scale development with an initial budget of \$150 million. The project involved three

main contractors: Douglas would be responsible for the laboratory canister; McDonnell the Gemini capsule; and General Electric all space experiments. By this time the project's configuration differed somewhat from McNamara's description in December 1963. The laboratory canister now measured 41 feet long by 10 feet wide and weighed 14,000 pounds, with the reconnaissance payload comprising 5,000 pounds of the total 25,000-pound system. Once in orbit, the two astronauts would move through a specially constructed hatch into the laboratory, where one section housed pressurized living quarters and the other the experiments section with the reconnaissance telescope. The camera's lens would measure six feet in width, with a resolution between six and nine inches depending on atmospheric conditions. After completing their 30-day mission, the astronauts would close the laboratory, move back into the Gemini B capsule, and separate from the canister for the flight to earth and an ocean recovery. The laboratory would be left to burn up on reentering the atmosphere. The Air Force expected to launch the first of five MOLs in early 1968.¹⁰⁴

At the decade's midpoint, Air Force leaders had renewed cause for optimism. It seemed that the service at last had a manned spaceflight project that would reach operational status. They confidently predicted that the laboratory's test of man's usefulness in space would ensure a permanent role for manned military spacefaring. By mid-decade the Air Force had also established a more effective working relationship with both the Defense Department and NASA.

Following criticism of Air Force space planning and programming by its chief scientist, both the Air Staff and the Office of the Secretary of the Air Force moved to develop closer rapport with the Office of the Secretary of Defense. Lieutenant General James L. Ferguson, Deputy Chief of Staff for Research and Development, Under Secretary McMillan and Assistant Secretary for Research and Development Alexander Flax led the way through many informal meetings with DDR&E's Harold Brown and his staff. As a result, Air Force space planning became more practical and realistic—and more modest. In late September 1963, when the Air Staff's Director of Plans proposed revising the 1962 Five-Year Space Program, General Ferguson recommended the Air Force forego another tedious official effort to define space goals and programs. He argued that the work involved in preparing the 1961 Space Plan and the 1962 studies had not been worth the effort and the acrimony that resulted. He also noted that the current proposed draft revision to the 1961 plan, now termed "USAF Space Objectives," offered no new space goals, thereby suggesting the soundness of past Air Force thinking on space. He reminded the Air Staff of the major headway achieved, largely through his office, in creating a more favorable attitude toward Air Force space issues in the Defense Department. Why take unnecessary action that might derail improving Air Force-OSD relations? The Air Staff persisted, however, and in the spring of 1964 General LeMay approved the "Space Objectives" paper. Yet, as a sign that relations between DDR&E and the Air

Force indeed had improved, Brown's office raised no objection, even though the list of Air Force space objectives included antimissile and antisatellite proposals already disapproved by the Defense Department.¹⁰⁵

General Ferguson also referred to *Project Forecast* as offering nothing new on space. If so, this long-range projection of the Air Force's research and development requirements, which took place under General Schriever's direction from March 1963 to February 1964, provided what an official Air Force history termed "the most credible Air Force planning document on space yet."¹⁰⁶ It proposed "a balanced military space program" of systems necessary to support earth-based operations, studies of space-based "offensive" proposals, and advanced technical programs to improve launch vehicles and spacecraft subsystems. Taking into account the existing funding constraints, *Project Forecast* projected a "realistic" annual budget of just over \$2 billion during the next five years. The more modest proposal also reflected the new reality of Air Force-Defense Department approaches to the military space program.¹⁰⁷

Following the August 1965 decision to proceed with development of the Manned Orbiting Laboratory, Defense Department pronouncements remained encouraging, funding support continued, and NASA provided impressive assistance largely through the joint Manned Space Flight Policy Committee (MSFPC). In an agreement signed by Secretary McNamara and Administrator Webb on 14 January 1966, the MSFPC superseded the Gemini Policy Planning Board as the central joint planning and monitoring mechanism for Projects Gemini, Apollo, and the Apollo Applications program. Under its auspices, NASA furnished the Air Force a wealth of data, material, and experience for use in MOL development. This included three Gemini spacecraft, test capsules, a simulator, ground equipment, and subsystem hardware, as well as training aids, Apollo ships and tracking stations, and NASA engineers and technicians.¹⁰⁸

The Air Force could point to significant progress in the MOL development program. In November 1966, the Air Force conducted successful tests with a smaller, simulated Gemini capsule that included nine on-board experiments, launched by a Titan IIIC. By this time, the experiments had increased the total weight to 30,000 pounds, which called for developing a more powerful Titan booster, the Titan IIIM. With its seven strap-on solid-fuel boosters producing a total thrust of 3.2 million pounds, the booster could launch the heavier spacecraft into polar orbit. By 1967 planners had completed design work on the basic Gemini-Titan MOL configuration, as well as the new west coast launch complex, and had selected for training twelve astronauts from the Air Force, Navy, and Marine Corps. Although Air Force Secretary Harold Brown doubted the Air Force could achieve its new projected initial launch date at the end of 1969, expectations remained high that the Air Force would receive its \$600 million fiscal year 1969 budget request to complete the Vandenberg complex and final necessary MOL components.¹⁰⁹

By 1968 more than technical challenges threatened the future of the MOL. In the latter half of the decade, the escalating financial burden of Vietnam and the domestic “Great Society” social agenda diminished support for the national space program across the board. Both Defense Department space programs and Project Apollo suffered reduced budgets.* In the competition for scarce resources, space generally and the MOL particularly became convenient targets for the budget cutters. Space represented a sizable twenty percent of the Defense Department’s research and development budget. Of the Air Force budget, astronautics programs comprised one-third of the total, and half of this involved the MOL, the costliest project unrelated to the war in the Air Force budget for research and development.¹¹⁰

Cost-conscious critics also claimed that unmanned space systems could perform the MOL’s experiments just as effectively at lower cost. Others raised the old cry of duplication with NASA’s space exploration programs. Indeed, back in 1964, prior to President Johnson’s announcement, the MOL had encountered considerable opposition during reviews by the President’s Science Advisory Council and the Bureau of Budget. They concluded that NASA already had a major interest in orbiting a space station, while the military proposal seemed too small for the stated operational mission, and unmanned instrumented satellites could perform the functions identified more inexpensively. Charges of duplication became more persistent by the late 1960s, when NASA embarked on a large space station project as the centerpiece of its post-Apollo applications program. Although NASA and Defense Department officials argued that both the MOL and a civilian station would conduct necessary experiments that would not duplicate each others’ efforts, critics remained unconvinced. A national poll taken in mid-July 1968 indicated that the majority of Americans thought the space program not worth the annual \$4 billion price tag.¹¹¹

Lower funding levels resulted in schedule “stretch outs,” delayed milestone target dates and, ultimately, increased costs. Congress cut \$85 million from the Air Force fiscal year 1969 request, which meant that final expected costs now totaled \$2.2 billion rather than the fiscal year 1969 prediction of \$1.5 billion. The Johnson administration’s fiscal year 1970 defense budget that the Nixon administration inherited contained \$576 million for the MOL, but the new Secretary of Defense, Melvin R. Laird, faced with continued high Vietnam war costs, targeted the MOL for reduction following a major review of the project. He chose to eliminate the fifth scheduled flight at a savings of \$22 million and then cut an additional \$31 million. This decision would delay until mid-1972 the first manned flight, leaving a total cost of \$3 billion, twice the initial estimate. By June 1969, the administration determined additional defense cuts, and chose to cancel the MOL rather than eliminate competing satellite projects.¹¹² In his announcement on 10 June 1969, Deputy Defense

* See Appendix 3-4.

Secretary David Packard justified the decision as imperative in order to “reduce the defense research and development budget significantly.” Moreover, “since the MOL program was initiated, the Department of Defense has accumulated much experience in unmanned satellite systems for purposes of research, communications, navigation, meteorology.”¹¹³ As Secretary Laird reaffirmed shortly thereafter, “these experiences as far as unmanned satellites are concerned have given us confidence that the most essential Department of Defense space missions can be accomplished with lower cost unmanned spacecraft.”¹¹⁴ The field of manned spaceflight now was left for NASA to exploit.

Immediately following the decision, the Air Force began closing down the project that by mid-1969 had cost \$1.4 billion. Like its experience with the Dyna-Soar’s termination a half-decade earlier, the Air Force salvaged a number of important elements for future use. One proved to be designation of the Vandenberg launch complex for future west coast Space Shuttle launches, while another involved the transfer of data and equipment to NASA for use in what became its Skylab space station operation. Most importantly the research experience gained from work on the Dyna-Soar and the MOL would prove instrumental in development of the new recoverable booster system—the Space Shuttle.¹¹⁵

An End and a Beginning

Termination of the Manned Orbiting Laboratory signaled the death knell of Air Force efforts to make manned spaceflight the center of a space-oriented military service. Although NASA’s Gemini and Apollo programs included a number of military astronauts and experiments, the utility of military man-in-space activities remained untested.

Critics like retired Air Force Lieutenant General Ira C. Eaker declared that “cancellation...concedes to the Russians control of space.”¹¹⁶ Yet for other Air Force leaders, space represented abstract goals and assets that drained scarce operational funding from terrestrial needs. In the MOL’s aftermath, former NASA Associate Administrator and now Air Force Secretary Robert Seamans knew spaceflight operations and requirements intimately. He nonetheless pointed to the shortcomings of conventional forces and the important requirement for F-15 fighters, C-5 transports, and an upgraded air defense posture. “The cost of a manned [space] system,” he said, “is too great to be borne at this time.” The Air Force, he said, must focus on modernizing its tactical and strategic forces rather than exploit the potential of space for future capabilities.¹¹⁷ In effect, by decade’s end, budgetary pressures and the impact of Vietnam compelled the Air Force to return to more traditional institutional interests. However desirable improved communications and navigation might be, space projects seemed more a luxury than a necessity.

On one level, Air Force manned spaceflight enthusiasts could look back on the decade of the 1960s as a graveyard of false optimism. High expectations at the onset

of the Kennedy era for an expanded, “independent” Air Force space program proved unfounded. In the contest over manned flight projects between the Defense Department and the National Aeronautics and Space Administration, the Air Force emerged second best. Its campaign for more responsibility in the national space program diminished in the wake of NASA’s Mercury—and later Gemini—successes and the growing détente between the United States and the Soviet Union. At the same time, elaborate, thoughtful efforts to formulate an acceptable Air Force Space Plan and a long-range development program received no blessing from a Defense Department determined to prohibit offensive systems in outer space and to put the brakes on spiraling space research and development costs by enforcing rigid mission requirements. The Air Force’s man-in-space pretensions suffered most of all from skeptical defense officials increasingly who were obliged to rely on cooperative efforts with NASA.

An integrated national space program implied a mutually supportive relationship between civilian and military space agencies. Air Force leaders had hoped to make permanent NASA’s early dependence on the “executive agent” for NASA support. Yet the lunar landing mission precipitated rapid growth in the civilian agency’s responsibilities, independence, and funding. As a result, the Air Force’s military manned spaceflight proposals became imperiled, and the service could never remove itself from NASA’s shadow. Sensitive to public criticism of military encroachment on NASA’s space exploration prerogatives, the administration reigned in aggressive Air Force space advocates and publicly questioned the usefulness of military manned space activities compared with automated satellites. By the end of 1962, the Air Force campaign for an ambitious, Air Force-led space program lay in shambles.

Air Force leaders responded by establishing closer, more effective working relationships with both the Defense Department and NASA. The price proved to be acceptance of a more modest space program without the schemes for antisatellite and antimissile orbiting space systems. Because the latter did not conform to U.S. space policy, the Pentagon elected to develop earth-based weapons instead. The Air Force, nevertheless, retained its man-in-space “mission” throughout the 1960s. Although compelled to forego Dyna-Soar and implement experiments only as part of NASA’s Gemini and Apollo projects, approval of the Manned Orbiting Laboratory in 1965 seemed to promise an operational system by the end of the decade. Although President Johnson consistently supported the development effort, spiraling costs, schedule slips, and cost-effective satellites ultimately doomed the space laboratory.

At this point, the Air Force’s space posture reflected changes within the service. Gone from the scene was General Schriever, long the service’s most aggressive campaigner for Air Force space interests. In a sense, his retirement in 1966 confirmed the transition to the more modest and “practical” approach to military space. His able successor as commander of Air Force Systems Command, General Ferguson, proved more accommodating as an advocate of space interests within the

framework of Defense Department and NASA relations. He also implemented a major reorganization within his command to respond to lower expectations and the changing state of space and missile development. By late 1966 General Ferguson and his staff decided that their west coast space and missile organizations should be reconsolidated. The Ballistic Missile Division's responsibilities had declined considerably with completion of most site activation work. As for the Space Systems Division, it never realized the potential General Schriever envisioned for it in the spring of 1961. NASA had garnered the bulk of the manpower and funding, while Secretary McNamara maintained severe limitations on defense research and development projects. On 1 July 1967, the Air Force created the Space and Missile Systems Organization (SAMSO) in place of the separate divisions.¹¹⁸

Yet, if the Air Force's space fortunes appeared to have plummeted at the end of the decade, the reality of space achievements proved very different. In 1969, President Richard Nixon established a Space Task Group to assess the nation's post-Apollo space requirements. Of the various options examined, it recommended development of a Space Transportation System (STS) based on a reusable launch capability. Earlier agreements between NASA and the Defense Department had ensured a joint military-civilian effort as part of the integrated national space program. Soon referred to as the Space Shuttle, its final configuration would reflect Air Force requirements. The development of the Space Shuttle also would precipitate a contest for operational responsibility among Air Force major commands, which would become a factor in quickening the pace for creation of an operational space command.¹¹⁹

Unmanned defense-support space systems represented another element in the evolution of a separate space command. Throughout the 1960s, the Air Force focus on its high profile man-in-space objectives overshadowed the growing importance of unmanned, instrumented satellites and the elaborate space infrastructure that had emerged to support them. In defending termination of the Manned Orbiting Laboratory program, Secretary Laird stressed the progress made in unmanned systems.¹²⁰ In effect, the end of the Air Force program for a manned space presence cleared the path for the dominance of unmanned military spacecraft with their important operational applications. By the late 1960s space programs increasingly moved from the realm of research and development to the operational arena where space could provide important support to traditional tactical as well as strategic mission areas. Although the dreams of a military man-in-space presence seemed over automated spacecraft proved to be making the "new ocean" an arena for military support applications and force enhancement.