

Walking the High Ground:

**The Manned Orbiting Laboratory
and the Age of the Air Force Astronauts**



by Will Holsclaw

Department of History

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Thesis Advisor:

Andrew DeRoche, Department of History

Thesis Committee:

Matthew Gerber, Department of History

Allison Anderson, Department of Aerospace Engineering

Abstract

This thesis is an examination of the U.S. Air Force's cancelled – and heretofore substantially classified – Manned Orbiting Laboratory (MOL) space program of the 1960s, situating it in the broader context of military and civilian space policy from the dawn of the Space Age in the 1950s to the aftermath of the Space Shuttle *Challenger* disaster. Several hundred documents related to the MOL have recently been declassified by the National Reconnaissance Office, and these permit historians a better understanding of the origins of the program and its impact. By studying this new windfall of primary source material and linking it with more familiar and visible episodes of space history, this thesis aims to reevaluate not only the MOL program itself but the dynamic relationship between America's purportedly bifurcated civilian and military space programs. Many actors in Cold War space policy, some well-known and some less well-known, participated in the secretive program and used it as a tool for intertwining the interests of the National Aeronautics and Space Administration (NASA) with the Air Force and reshaping national space policy. Their actions would lead, for a time, to an unprecedented militarization of NASA by the Department of Defense which would prove to be to the benefit of neither party. As a recently emergent field within the study of history, the serious study of the Space Age is still in the process of maturing. By understanding and interpreting the story of the Manned Orbiting Laboratory, this thesis aspires to contribute to that process.

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In Praise of Theory

*The Air Force is the house that aviators built
On a proud theory of air power, even though, for most,
The affection was really, if truth be known, for the airplane.*

*They wielded the theory as a sword to gain their independence
And to claim primacy in military power,
Demonstrating it with a stunning monument to Armageddon.*

*But there were other dreamers abroad who looked to the stars
And made robots that might take them there,
Only to find their tickets had been taken by other robots.*

*The aviators accepted the robots, as servants, into their house,
Not because they liked them or even understood them,
But because neighbors had eagerly bid for their ownership.*

*The robots, however, kept challenging the boundaries of the theory
With which the aviators had won their freedom,
Built their house, and enshrined their monument to Armageddon.*

*The aviators, alas, instead of expanding their theory to the stars
And extending the house to include its new domains,
Revealed by every decision their true affection, the airplane.*

*Throughout years of plenty, it became accepted throughout the house,
That there was more than enough for all,
Whatever their particular affection for vehicle or trade or domain.*

*And in those separate devotions, the unity of the house slowly fractured;
To be sure, the aviators continued to own the house,
But no longer the loyalty of its occupants.*

*For in the absence of the aviator's dedication to the theory,
There was no household commitment to mission
And, ultimately, inevitably, no profession of arms.*

*Thus, the house is now besieged, from without and within;
The world, once owned, has become hostile;
And both occupants and neighbors are pulling their shades.*

— Carl Builder
from *The Icarus Syndrome*, 1995

Introduction

The celebrated historian Bernard Bailyn, when reflecting on the historical memory of the American Revolution, endorsed the notion that “the earliest historical writings that follow a great and controversial event are still a significant part of the event itself... attempts at explanations of what happened tend to be *heroic* in character... individuals count overwhelmingly.”¹ Bailyn, addressing his own subject with the benefit of two centuries of hindsight, was able to perceive – and participate in – several generations’ worth of historical reinterpretation. By comparison, historians of the Space Age are a somewhat nascent breed, only just embarking on the unending process of putting their subject into an interpretive framework. While the history of our species’ space endeavors encompasses unprecedented technological and cultural high points and has produced artifacts that will perhaps endure for billions of years,² it nevertheless presents unique challenges to the historian. At first glance, we seem to be presented with a blinding abundance of primary source material published by the National Aeronautics and Space Administration (NASA), permitting the study of past space flights in exhaustive detail. Yet this cornucopia of fascinating and invaluable minutiae only helps to conceal stories from the Space Age that have been, by design, kept wholly or partly covert. But the curtain of secrecy has begun to be pulled back; one such story, that of the U.S. Air Force’s Manned Orbiting Laboratory, is now largely declassified.

¹Bernard Bailyn, *The Ordeal of Thomas Hutchinson* (Cambridge, MA: Harvard University Press, 1974), viii.

² Many spacecraft are expected to survive in space nearly indefinitely, subject only to solar and cosmic radiation and micrometeoroid collisions. In 2011, NASA established guidelines for the historical preservation of the Apollo 11 & 17 moon landing sites; the Voyager interplanetary probes each famously included a “Golden Record” intended explicitly as a historical artifact for the hypothetical benefit of non-human audiences. See Leonard David, “NASA Sets Buffers for Apollo Moon Landing Sites,” *NBC News*, October 21, 2011; Carl Sagan et al., *Murmurs of Earth: The Voyager Interstellar Record* (New York: Random House, 1978)

The Manned Orbiting Laboratory (MOL)³ was a semi-secret Air Force space station program that was first publicly, if quietly, disclosed by Secretary of Defense Robert McNamara in December of 1963. It was more formally and loudly authorized by President Lyndon B. Johnson in an August 1965 press conference, in which he vaguely outlined the mission of the MOL: “This program will bring us new knowledge about what man is able to do in space [and to] enable us to relate that ability to the defense of America.” He announced that the station itself would be built by the Douglas Aircraft Company, while the contract for the accompanying “space experiments” would be fulfilled by General Electric.⁴ The “experiments” that Johnson alluded to were largely wrapped up in a single mission module: the KH-10 “DORIAN” photographic reconnaissance system, developed by the National Reconnaissance Office (NRO),⁵ a successor to its early series of KH (“Key Hole”) unmanned spy satellites. This suite of telescopes and cameras would occupy more than half of the MOL station’s orbiting volume. The remainder would consist of a modified NASA Gemini capsule and a habitable laboratory module (see Figure I.1).

In essence, the MOL would thus serve the unprecedented role of a crewed, high resolution reconnaissance satellite. During its six-year developmental lifespan, the MOL program would see only one unmanned launch, but the long-term impact of the program on American space policy – both military and civilian – would be immense. With the help of directives from McNamara and others, the program saw a cooling of the somewhat tense early rivalry between the Air Force and NASA, and the two agencies were brought into much closer

³ MOL is usually pronounced not as an initialism but as an acronym, like “mole.”

⁴ Lyndon B. Johnson, Presidential News Briefing, August 25, 1965, White House.

⁵ Remarkably, even the existence and name of the National Reconnaissance Office were not officially declassified until 1992. For the story of its declassification, see John L. McLucas, *Reflections of a Technocrat* (Maxwell Air Force Base, AL: Air University Press, 2006)

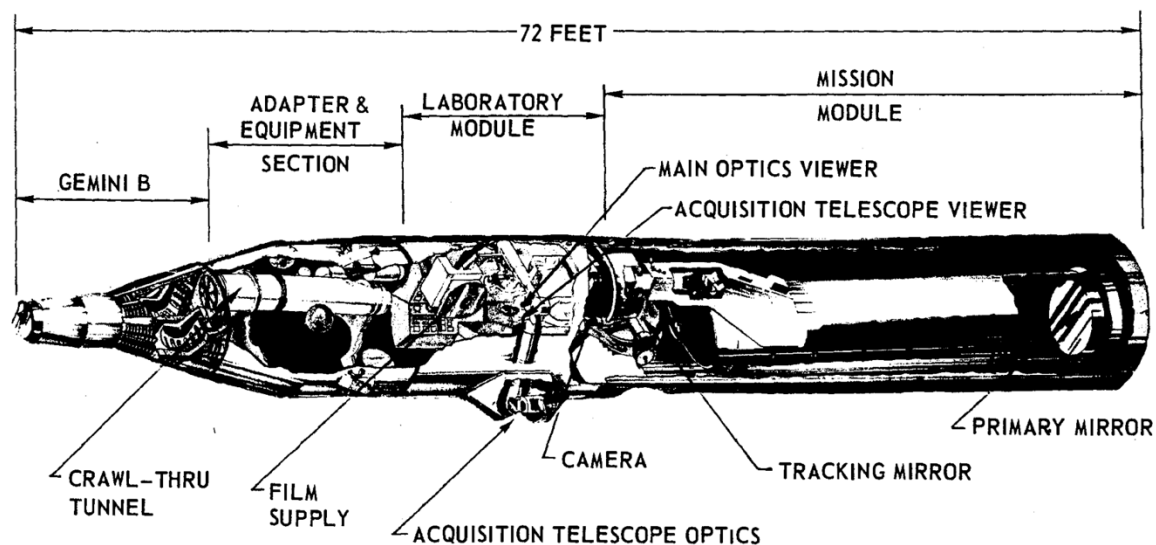


Figure I.1. MOL Baseline System. From *"The Roles of Man in MOL, Vol. 2"* (Washington, D.C.: Manned Orbiting Laboratory Program Office, 1969). Declassified by National Reconnaissance Office, October 2015, MOL Document 735.

cooperation with each other. Seventeen MOL “aerospace research pilots” would be selected and trained, ending NASA’s monopoly on professional American astronauts. Upon the program’s cancellation in June of 1969, eight of these men would transfer to NASA and help to lead the largest joint effort ever undertaken between the Department of Defense (DOD) and NASA: the Space Shuttle.

Historiographic Review

Though certain details of the Manned Orbiting Laboratory were publicly known almost from its inception, it has since become largely forgotten, and is today unfamiliar even to many human spaceflight enthusiasts. Its profile was raised somewhat with the 2008 airing of “Astrospies,” a 1-hour installment of PBS’s venerable *NOVA* documentary series. The episode was produced with the cooperation of the NRO and included snippets of classified archival footage, much of which remains unpublished in its full form. In addition to the MOL program,

almost equal time was devoted in this documentary to its contemporary Soviet counterpart, the “Almaz” orbiting space stations. This program, unlike MOL, became fully operational in the 1970s.⁶

“Astrospies” unofficially constituted the first major disclosure of previously classified material related to MOL. In the years since, the NRO has gone on to release a considerable trove of newly declassified documents. The great bulk of this new material was published online by the agency in October of 2015, accompanied by an e-book entitled *The Dorian Files Revealed*. This latter item largely consists of the 1970 postmortem “History of the MOL Program,” written by Air Force historian Carl Berger. Berger’s history, itself classified for 45 years, appears to be the lengthiest monograph written to date to be dedicated solely to this secretive program.⁷ However, having been written by an insider when the ink was hardly dry on its cancellation, this document is, as Bailyn would put it, “still a significant part of the event itself.”

The remainder of the NRO release included 825 scanned text documents, encompassing approximately 20,000 pages of material, dating from August 1962 to November 1978. Also included, though frustratingly without any captions or annotation, are a small archive of images and films.⁸ This windfall of primary source material is a major new resource for space historians, and has already yielded numerous articles in various space publications, including several excellent articles in *The Space Review* on specific aspects of the MOL program by the military

⁶ *NOVA*, season 35, episode 4, “Astrospies,” dir. by Andreas Dirr & Scott Willis, aired February 12, 2008, on PBS.

Note: this episode incidentally sparked my own first awareness of the Manned Orbiting Laboratory. At the time, as a casual space history enthusiast, I was rather startled by its content.

⁷ National Reconnaissance Office, *The Dorian Files Revealed: A Compendium of the NRO’s Manned Orbiting Laboratory Documents* (Chantilly, VA: National Reconnaissance Office, Center for the Study of National Reconnaissance, 2015).

⁸ “Index of Declassified Manned Orbiting Laboratory (MOL) Records,” National Reconnaissance Office, October 22, 2015, <http://www.nro.gov/foia/declass/MOL.html>.

space historian Dwayne Day. Dr. John B. Charles, recently retired head scientist at NASA's Human Research Program, has also contributed to *The Space Review*, recently wrote an article for the British Interplanetary Society's *Spaceflight* magazine, and has lectured on the MOL program. In addition to his bringing his considerable professional experience in bioastronautics to bear on the subject, Dr. Charles's contribution to MOL research is notable for its "art history" element. His articles and lectures have given space historians the benefit of his keen interpretation of MOL-related paintings he has recovered by former Douglas Aircraft aerospace artist Neil Jacobe, as well as the innumerable schematics and technical diagrams scattered throughout the NRO's declassified files.⁹

Though the MOL remains a very fresh subject in space history in the wake of the NRO release, it has long figured, often with some prominence, in books about the military's early role in space. David Spires, a military and space historian and former professor at the University of Colorado Boulder, discussed the origins and demise of the MOL program in his 2007 book *Beyond Horizons*, which offers a comprehensive account of the U.S. Air Force's ambitions in space. Spires characterizes the MOL as – in the final calculation – a modest and perhaps disappointing chapter in that service's long quest for a leading role in the United States' manned space efforts.¹⁰ The legacy of the MOL, and particularly its cadre of astronauts, was recently highlighted in Rowland White's exceedingly readable 2016 popular history, *Into the Black*.

⁹ Dwayne Day, "Blue Suits and Red Ink," *The Space Review*, November 2, 2015, accessed March 2, 2018, <http://www.thespacereview.com/article/2858/1>; John B. Charles, "A Snapshot of MOL in 1968," *The Space Review*, January 11, 2016, accessed March 2, 2018, <http://www.thespacereview.com/article/2898/1>; John B. Charles, "MOL: The Untold Story," *Spaceflight* 60 no. 2, February 2018; John B. Charles, "Astrospies: The Art of Neil Jacobe" (lecture, Friendswood Public Library, Friendswood, TX, March 29, 2017).

¹⁰ David Spires, *Beyond Horizons: A History of the Air Force in Space, 1947-2007* (Peterson Air Force Base, CO: United States Air Force, 2007).

White, focusing on the early days of the Space Shuttle program, follows the career highs and lows of the MOL astronauts and their later impact on NASA.¹¹

The MOL's assumed role as a manned spy satellite was mentioned frequently – albeit fleetingly – during a 1980s-1990s spike in publication about the militarization of space. This surge in space literature owed much to renewed public interest in the subject after Ronald Reagan's 1983 announcement of the Strategic Defense Initiative (SDI, usually referred to as "Star Wars" in the popular press of the time, much to his chagrin), as well as the inauguration of NASA's Space Shuttle program.¹² It seems a rare occurrence when a book concerned with either military space history or the evolution of the space station won't spare at least a footnote to MOL. Howard McCurdy's 1990 book, *The Space Station Decision: Incremental Politics and Technological Choice*, is a startling example of just such a rarity. McCurdy purports to comprehensively discuss the evolution of the U.S. project to build a space station from its inception to its realization. The first chapter, covering the decade between 1961 and 1971 (during which the MOL saw its birth, life and death), treats the period as mere prelude, with almost no discernible movement toward an American space station, and only the hint of Skylab on the horizon. That the United States' most thoroughly developed early space station effort managed to be entirely omitted from this book is dramatic evidence of the degree to which it has been forgotten in the annals of space history.¹³

¹¹ Rowland White, *Into the Black: The Extraordinary Untold Story of the First Flight of the Space Shuttle Columbia and the Astronauts Who Flew Her* (New York: Touchstone, 2016).

¹² Much of this literature concerns space weapons systems and reconnaissance. The following two books are broadly representative of their approach: Thomas H. Karas, *The New High Ground: Systems and Weapons of Space Age War* (New York: Simon and Schuster, 1983); Jeffrey Richelson, *America's Secret Eyes in Space: The U.S. Keyhole Spy Satellite Program* (New York: HarperCollins Publishers, 1990).

¹³ Howard E. McCurdy, *The Space Station Decision: Incremental Politics and Technological Choice* (Baltimore: Johns Hopkins University Press, 1990).

It is also important to ponder the degree to which the Manned Orbiting Laboratory has been obscured by the dazzling glare of the Apollo program, which was enjoying the greatest heights of its ambition and glamour concurrently with the peak of the MOL program. It is difficult to exaggerate the shadow cast by Apollo over the historiography of the Space Age. So much material, whether written or visual, has been produced focusing on the moon landing effort that Apollo has become virtually synecdochic, if not outright synonymous, with the public's conception of "space history." This is certainly understandable; the impact of humanity's first venture beyond low Earth's orbit was global and immediate, and the legacy of this achievement still reverberates today. Against the heroic backdrop of Neil Armstrong's first steps on the moon's surface or the high-stakes drama of Apollo 13, the moon shot's secret, cash-starved, and ultimately failed little sibling was bound to be forgotten.

The Legacy of the MOL

The Manned Orbiting Laboratory must be remembered. Not only as a beguiling fringe curiosity of early human spaceflight, as it is sometimes presented, but as a deeply impactful chapter in the blurry relationship between the United States' military and civilian space programs. It is an especially revealing case study of the Air Force's desire for its own manned space capability, founded as much in romanticism and emotion as it was in practical considerations. As the program that ended NASA's monopoly on the astronaut, it produced a corps of military space men who substantially enhanced the credibility of the Air Force in determining U.S. space policy. As the instrument of a major reversal in the competitive Air Force-NASA relationship, it led to an increased partnership between the agencies that would, at least for a time, effectively militarize the civilian arm of the American space program to an

unprecedented degree. Though the MOL itself never flew, it exerted a powerful, and up till now sometimes invisible, effect on the politics of the U.S. military and space programs. Now that it has begun to emerge from the shadows, it will tell a new story that has yet to be fully heard by history: a story about an age of Air Force astronauts.

Chapter 1: NASA vs. USAF

Sputnik, the Secrecy Gap and the Warrior Astronaut

The living historical epoch that has come to be known as the Space Age nominally began with an event that was undertaken in total secrecy but when announced as a *fait accompli*, immediately startled the globe: the launch of Sputnik I, the world's first artificial satellite, by the Soviet Union on October 4, 1957. The United States by this point had already publicly advertised its own efforts – and spectacular failures – in the pursuit of the same objective. In the ensuing Cold War space race of the 1950s and 60s, the combined effect of the Soviet space program's penchant to only broadcast their successes, and NASA's stated commitment to maximum transparency, was the reinforcement of a perception of both a disparity between the U.S. and U.S.S.R. in technological competence as well as the comparative openness of American versus Russian society. As the space historian Slava Gerovich observed, it was the Soviet insistence on the outward infallibility of socialism that instigated their “erasure of any space failures from cultural memory... the Soviet master narrative of space history was reduced to a set of clichés: flawless cosmonauts flew perfect missions, supported by unfailing technology.” Similarly, the presentation of the Soviet space effort as intrinsically peaceful was aided by the literal erasure of military personnel from published photographs. The very identity of the Soviet space infrastructure's chief architect, Sergei Pavlovich Korolev, was hidden assiduously from the world; the West knew him only as the “Chief Designer” or “S.P.”¹

¹ Slava Gerovich, *Soviet Space Mythologies: Public Images, Private Memories, & the Making of a Cultural Identity* (Pittsburgh: University of Pittsburgh Press, 2015), xiv-2.; James Harford, *Korolev: How One Man Masterminded the Soviet Drive to Beat America to the Moon* (New York: John Wiley & Sons, 1997), 1.

Meanwhile, the American master narrative, wrought with the enduring images of exploding rockets, the fatal Apollo 1 fire, the Apollo 13 crisis, and eventually the deaths of the *Challenger* and *Columbia* crews, seemed to eschew this impulse to mask failure. The concealment of direct military involvement in U.S. space efforts appeared unnecessary. NASA was founded under the Eisenhower administration with the explicit purpose of putting the nation's space program in civilian rather than military hands, and its peaceful public image was rigorously preserved.² Certainly, its early launch vehicles – Redstone, Atlas and Titan – were derived from Army and Air Force ICBMs, but their nuclear payloads were replaced with scientific satellites and civilian astronauts. While the Navy did support NASA with its highly visible capsule recoveries at sea, this role did little to tarnish the American space program's non-threatening posture, while still serving as a gentle reminder of the U.S. military's capacity for global power projection. At a stage in the Cold War when many Americans measured the score in terms of "gaps" – e.g. the bomber gap, the atomic gap, the missile gap, or the education gap – the U.S. move to segregate its civilian and military space programs helped to cultivate this apparent secrecy gap between the two superpowers.³

This cultivation was often quite active and deliberate. During the early years of human spaceflight, the prevailing image of astronauts in American pop culture was at least vaguely – and for NASA, uncomfortably – militaristic. This image, however, was far from uncomfortable or unnatural for many Americans. Having been steeped in Atomic Age anxiety and a 1950s run of predominantly paranoid Hollywood science fiction, Sputnik mania had only reinforced their notion of space travel as a "romantic but eerie enterprise... with sudden and irresistible

² National Aeronautics and Space Act, Public Law 85-568, 85th Cong., 2nd sess., July 29, 1958.

³ Many of these "gaps" were crafted or exaggerated for political gain, particularly the fictitious "bomber gap" which was wielded as a weapon to attack Eisenhower's record on national security. See Matthew Brzezinski, *Red Moon Rising: Sputnik and the Hidden Rivalries That Ignited the Space Age* (New York: Times Books, 2007), 56-59.

horrors.”⁴ The image of NASA astronauts as stoic, imperturbable warriors was comfortable and reassuring. In his book *Inventing the Astronaut*, Matthew Hersch described the trend:

The theme of the astronaut as warrior was a common one from the 1960s through the 1980s; motion picture depictions of astronauts often assigned to them military skills that no real astronaut was expected to possess. The astronauts in the James Bond installment *You Only Live Twice* (1967) fight their captors with expert hand-to-hand combat; later, in 1979’s *Moonraker*, shuttle astronauts are laser-armed space warriors who help capture an enemy orbital outpost.⁵

In many respects, these images were not wholly inaccurate. Throughout the 1960s, not a single civilian astronaut flew in space who had not been recruited directly from the ranks of active-service military personnel. Even the seemingly preposterous *Moonraker* scenario (See Figure 1.1) was not without its echoes of reality given the military’s ambitions surrounding the Space Shuttle at the time, which will be explored more fully in Chapter 5.

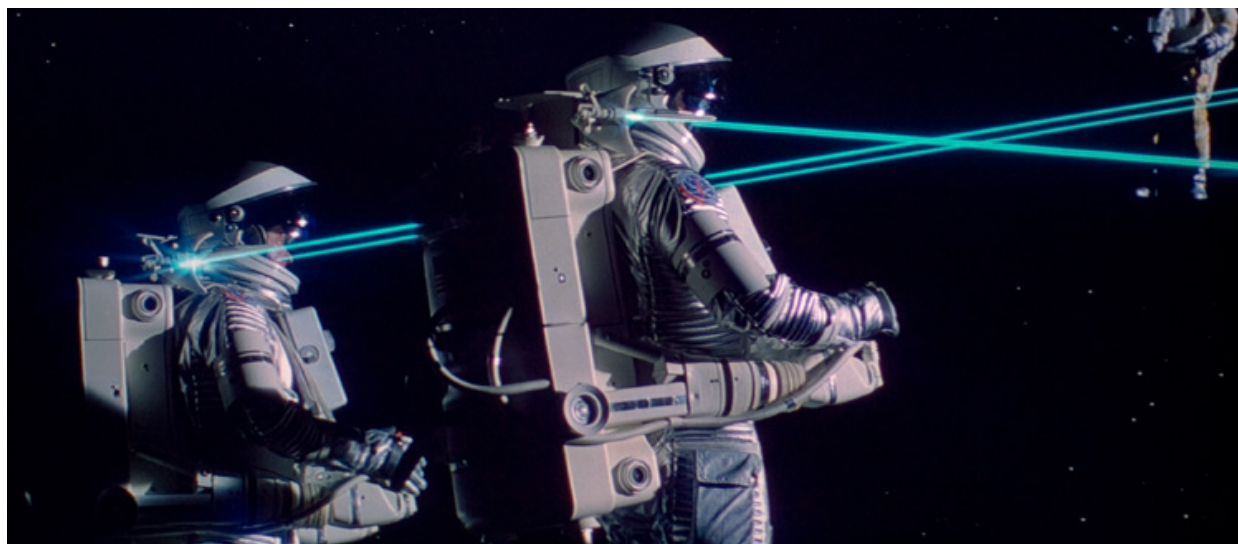


Figure 1.1. American "space marine" astronauts engage in battle in the James Bond film *Moonraker*, from *Moonraker*, directed by Lewis Gilbert (Eon Productions, 1979), Blu-ray (MGM, 2012).

⁴ Walter A. McDougall, ...*The Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, Inc., 1985), 142.

⁵ Matthew H. Hersch, *Inventing the Astronaut* (New York: Palgrave Macmillan, 2012), 132-3.

Nevertheless, NASA actively discouraged such depictions; they frequently “withheld permission from filmmakers seeking to use its name or logo in fictional programming, and, where possible, attempted to steer popular representations of astronauts to suit its political agenda.” The agency even actively consulted on the likes of the campy fantasy sitcom *I Dream of Jeannie* (1965-70), which followed the escapades of an astronaut who finds a female genie, vetting scripts and offering suggestions to improve accuracy. They chastised the producers, however, for their coding of the astronauts as active duty Air Force or Army officers, nearly always in uniform (see Figure 1.2). For NASA, however, the primary concern wasn’t necessarily for their image amongst the American public, but rather abroad. As its Public Affairs officer Walter Whitaker explained to the show’s creators, the agency wished to “project the image of the program as peaceful, scientific exploration of space... This is an important part of our international relations.”⁶



Figure 1.2. The Army and Air Force uniforms worn by NASA astronauts in *I Dream of Jeannie*.

⁶ Ibid., 133.

The creation of NASA itself was intrinsically wrapped up in international Cold War posturing. In the aftermath of Sputnik, President Eisenhower was under intense political pressure to allow the Defense Department to take the lead in the nation's space activities, putting any science or research in explicitly military hands. Eisenhower, with his overriding desire to maintain fiscal responsibility, was at first disposed to allow this, given that the creation of any new agency for the purpose would be an expensive undertaking. Foreign policy considerations, however, would change his mind. He later wrote in his memoirs:

After extensive consultation and deliberation, however, I decided that non-military research in outer space could best be conducted by a new civilian agency. Information acquired by purely scientific exploration could and should, I thought, be made available to all the world. But military research would naturally demand secrecy. The highest priority should go of course to space research with a military application, but because national morale, and to some extent national prestige, could be affected by the results of peaceful space research, this should likewise be pushed, but through a separate agency.⁷

In Eisenhower's vision, however, this bifurcation of the United States' space efforts would not necessarily be equally balanced. In his "division of labor" between civilian and military arms, as historians David Callahan and Fred Greenstein argued, top priority would be given to a "vigorous military space program [to] spearhead America's missile and spy satellite programs; a civilian program would be the public face of American space exploration, undertaking those operations that had only propagandistic or scientific value."⁸

On June 29, 1958, Eisenhower signed the National Aeronautics and Space Act into law, creating NASA and defining the separation of civilian and military responsibilities in space, albeit vaguely. The text of the bill outlined the division thusly:

⁷ Dwight D. Eisenhower, *Waging Peace, 1956-1961: The White House Years* (New York: Doubleday, 1965), 257.

⁸ David Callahan & Fred I. Greenstein, "The Reluctant Racer: Eisenhower and U.S. Space Policy," in *Spaceflight and the Myth of Presidential Leadership*, eds. Roger D. Launius & Howard E. McCurdy (Urbana, IL: University of Illinois Press, 1997), 37-8.

The Congress further declares that [aeronautical and space] activities shall be the responsibility of, and shall be directed by, a civilian agency exercising control over aeronautical and space activities sponsored by the United States, except that activities peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States (including the research and development necessary to make effective provision for the defense of the United States) shall be the responsibility of, and shall be directed by, the Department of Defense; and that determination as to which such agency has responsibility for and direction of any such activity shall be made by the President...⁹

The vagueness was, to some degree, by design; as Dwayne Day has argued, the bill “established a purposely blurry line between NASA and the military space programs.”¹⁰

NASA itself would be assembled from the pieces of many hitherto military-driven entities and absorb a great deal of military funding, mostly from the U.S. Army. The seed for the new agency would be the National Advisory Committee for Aeronautics (NACA), a research organization founded in 1915 in the militarized atmosphere of World War I, and which had from its inception been closely tied with defense-related aeronautical research and development. Remarkably, it did not consider space to be a key aspect of its activities prior to Sputnik – even “the word *space* was considered a dirty word” within the organization. At the time the plans for NASA were being drafted, the most successful American space agency was the Army Ballistic Missile Agency (ABMA). On January 31, 1958, it was the ABMA, led by former Nazi rocket scientist Wernher Von Braun, that had been responsible for launching the first U.S. satellite, *Explorer 1*. The ABMA would eventually be handed over in its entirety to the nascent NASA, along with the Army’s Jet Propulsion Laboratory (JPL). This effectively marked the end of any

⁹ National Aeronautics and Space Act (unamended).

¹⁰ Dwayne Day, “Invitation to Struggle,” from *Exploring the Unknown: Selected Documents in the History of the U.S. Civilian Space Program, Vol. II: External Relationships*, ed. John M. Logsdon (National Aeronautics and Space Administration, NASA History Office: NASA SP-4407, 1996) 251.

significant Army role in spaceflight.¹¹ As these political moves were taking shape, meanwhile, another, much younger branch of the U.S. armed forces watched with jealous anxiety.

The Air Force's Tortuous Quest for Space

The leadership of the United States Air Force (USAF) had argued, even before its existence, that space would be a natural extension of its mandate. Like much of NASA, the service had been severed from Army parents, having been designated throughout World War II as the Army Air Forces; before that, as the Army Air Corps. The National Security Act of 1947, which formalized its creation as an independent branch of the U.S. Armed Forces, defined its mandate simply as responsibility for “prompt and sustained offensive and defensive air operations,” with no mention of space.¹² Yet, as early as 1945, one of its fathers, General Henry “Hap” Arnold, was publicly imagining ways that “space ships” [satellites] could be employed as weapon platforms.¹³ Arnold had been exposed to space-oriented thinking through his friendship with Dr. Theodore von Kármán,¹⁴ whom he had first met in 1935. Von Kármán, a Hungarian émigré scientist at the California Institute of Technology and eventual co-founder of JPL, was an aerospace visionary working in experimental rocket propulsion systems. Arnold followed his work with interest and the two developed a long-term partnership.¹⁵

¹¹ Mark Erickson, *Into the Unknown Together: The DOD, NASA, and Early Spaceflight* (Maxwell AFB: Air University Press, 2005), 19-118. Erickson implicitly attributes the “dirty word” remark to former NACA employee Chris Kraft, who would later become well-known as a NASA flight director and lead the development of its mission control procedures.

¹² National Security Act of 1947, Public Law 253, 80th Cong., 1st Sess., July 26, 1947.

¹³ Carl Berger, “History of the Manned Orbiting Laboratory Program” (Washington, D.C.: Manned Orbiting Laboratory Program Office 1970; Declassified by National Reconnaissance Office, October 2015: MOL Document 800), 3.

¹⁴ Von Kármán’s name has become literally synonymous with space, as the “Kármán line” which he helped to define (100 kilometers above the Earth’s surface) has become the accepted boundary between the Earth’s atmosphere and space beyond.

¹⁵ David Spires, *Beyond Horizons*, 1-3.

The Air Force interest in space was made official in January of 1948 when its Chief of Staff, General Hoyt Vandenberg,¹⁶ issued the first space policy statement by a service chief. He opted to pursue an ongoing study of missile and spacecraft development, arguing that “the USAF, as the service dealing primarily with air weapons – especially strategic – has logical responsibility for the satellite.”¹⁷ Mere months after coming into existence, the Air Force leadership was already lobbying for a larger mission, with an increased share of the budget to go along with it.

Progress in Air Force rocket and satellite development was slow and underfunded going into the mid-1950s, however. In May of 1954, the first significant steps to develop an Air Force ICBM (intercontinental ballistic missile) program were undertaken, which was put under the direction of Brigadier General Bernard A. “Bennie” Schriever, considered by many to be the “father” of the Air Force space effort.¹⁸ Though Schriever was a disciple of Hap Arnold and later recalled his mentor as “one of the most farsighted persons he had ever known,” he did not initially have much appreciation for military satellites and even saw such programs as unwanted potential competitors for his own funding and personnel. Nevertheless, his program was a success, developing the first of the Atlas and Titan families of rockets in parallel.¹⁹ Iterations of these designs would eventually be used by NASA to loft the Mercury and Gemini capsules carrying the first American astronauts to reach orbit.

By 1956, the U.S. policy of emphasizing manned strategic bomber centered nuclear deterrence, not missile or space research, had inflated the Air Force’s share of national defense

¹⁶ Vandenberg’s interest in space would be appropriately commemorated by the October 4, 1958 renaming of Cooke Air Force Base in California to Vandenberg Air Force Base, a site which continues to play host to a large proportion of U.S. space launch activity.

¹⁷ David Spires, *Beyond Horizons*, 26.

¹⁸ *Ibid.*, xviii.

¹⁹ *Ibid.*, 33-5.

spending to a staggering 46% of every dollar spent. The diminished Army began touting its historic experience with artillery as a justification for taking the lead in rocketry with the ABMA. The Air Force responded with the reasoning that nuclear-armed missiles should naturally be considered a part of its own Strategic Air Command. The Navy, in turn, began developing its own rocket programs to fight for this spending, and very quickly an “all-out rocket war had erupted between the services.”²⁰ The first NASA administrator, T. Keith Glennan, would later remember one such fight between the Navy and the Air Force over west coast space jurisdictions as “an argument that has bordered on the ridiculous... The situation reminded me of two little boys arguing over which of their fathers could lick the other.”²¹

Eisenhower, finding this internecine squabbling within the armed services both wasteful and counterproductive, made moves to reform the military establishment by centralizing decision-making authority with a strengthened Secretary of Defense. In his memoirs, he remarked in a footnote,

I have always believed that a nation’s defense would be most efficiently conducted by a single administrative service, comprising elements of land, sea and air. I did not (and do not) join those who insist that a system of “checks” and balances” among services contributes to a nation’s security. Successful defense cannot be conducted under a debating society.²²

Eisenhower’s reforms reflected his own wartime experience as Supreme Allied Commander during World War II, as well as his overriding sense of fiscal responsibility. This was in turn colored by a growing distrust of what he ominously referred to in his farewell address as an emerging “military-industrial complex.”²³ His creation of a stronger Secretary of Defense,

²⁰ Matthew Brzezinski, *Red Moon Rising*, 47.

²¹ Mark Erickson, *Into the Unknown Together*, 110.

²² Dwight D. Eisenhower, *Waging Peace*, 247-9.

²³ Dwight D. Eisenhower, Farewell Address, January 17, 1961, White House.

however, would have significant ramifications for space policy under the two succeeding administrations, and the birth of the Manned Orbiting Laboratory in particular.

The Soviet launch of Sputnik in October of 1957, Schriever would later remark, “woke [the Air Force] up” to the potential of satellites. The service’s first photoreconnaissance satellite program, codenamed WS-117L (later to be CORONA, the first in the Key Hole series) had previously been languishing without the benefit of much attention from Air Force leadership, Schriever included. In the post-Sputnik atmosphere, the spy satellite had suddenly been elevated to a higher public profile which was thought by many to compromise its secret mission. Much to Schriever’s embarrassment, the program was loudly cancelled, citing the slow-moving Air Force bureaucracy as a justification. In reality, it was not terminated at all, but rather its control was transferred quietly to the Central Intelligence Agency, where it got its new name. The Air Force would continue to participate in the program and develop new space reconnaissance technology.²⁴

Injury was added to insult when Eisenhower decided to put a new civilian agency at the forefront of the nation’s space efforts. Though the Air Force, unlike the Army, would retain most of its fledgling space infrastructure, it was directed to divert \$53.8 million of its space funding to NASA. By this time, both the Air Force and its contractors had already commissioned several plans and studies for developing manned military space systems, and a mockup of a human space capsule had already been built. The service was ordered to turn all of these over to their civilian rivals. It was left only with a handful of explicitly military space projects, mostly related to

²⁴ Matthew Brzezinski, *Red Moon Rising*, 249-50.

reconnaissance, but it remained “authorized to pursue in-house studies of advanced spacecraft which might have military significance.”²⁵

These “in-house studies” did not lack for ambition, and they did not come cheap. Eisenhower’s science advisor, George Kistiakowsky, would later reflect that many of these proposals “were quite partisan, to put it mildly... I still recall becoming indignant on discovering that the cost of exclusively paper studies in industrial establishments on ‘Strategic Defense of Cis-Lunar Space’ and similar topics amounted to more dollars than all the funds available to the NSF [National Science Foundation] for the support of research in chemistry.”²⁶

With six decades of hindsight, we may credit Eisenhower, reluctant and disinterested as he sometimes was, as something of a visionary in space policy. His insistence on putting a civilian face on the nation’s most public space efforts through NASA might be one of the most important – and least appreciated – de-escalations of the Cold War arms race. However, his brusque treatment of the military establishment in the process left a bitter taste in many thirsty Air Force mouths. Efforts were made from the outset to foster cooperation: the act that created NASA included a provision for a “Civilian-Military Liaison Committee” in the hope that the two agencies might “advise and consult with each other on all matters within their respective jurisdictions relating to aeronautical and space activities and shall keep each other fully and currently informed with respect to such activities.” But there were still too many bruises on both sides, and the American space establishment began to settle into a years-long competitive paradigm. As Dwayne Day observed, “almost from the beginning, this committee did not work very well.”²⁷

²⁵ Carl Berger, “History of the MOL,” 8.

²⁶ Mark Erickson, *Into the Unknown Together: The DOD, NASA, and Early Spaceflight* (Maxwell AFB: Air University Press, 2005), 110.

²⁷ Dwayne Day, “Invitation to Struggle,” 253.

After having its resources and ambitions forcibly depleted by NASA, the Air Force directed much of its space-related attention to its newest manned spaceflight program, the X-20 “Dyna-Soar” spaceplane. This project was approved mere weeks after Sputnik’s launch. For many in the Air Force, who still saw through the lens of the manned strategic bomber which had carried them to dominance of the DOD, this was a far more comfortable and familiar system than a soulless satellite or warhead lobbed by a wingless missile. The Dyna-Soar (a punning abbreviation of “Dynamic Soarer”) was conceived as a single-pilot winged orbiter that could be launched atop a rocket but return to Earth as a glider. While on orbit, it could perform a host of provocative military missions, including reconnaissance, nuclear weapons delivery from space, and the inspection or disruption of Soviet satellites. In the eyes of the Air Force, such a vehicle had too much potential and versatility to be restricted to a single mission.²⁸ It was an all-purpose space superiority war machine. The fact that it survived two administrations – one which inaugurated a policy of “space-for-peace” and a successor which vocally doubled down on it – raises the question: what did space-for-peace actually mean?

The Space for Peace Doctrine

When *Eagle*, Apollo 11’s lunar module, launched its ascent stage from the moon’s surface on July 21, 1969, NASA astronauts Neil Armstrong and Buzz Aldrin had done more than fulfill the late John F. Kennedy’s goal of putting a man on the moon “before this decade is out.” They also left behind the descent stage, upon which was affixed a plaque bearing their signatures

²⁸ Dwayne Day, “Invitation to Struggle,” 243-51; Nicholas Michael Sambaluk, *The Other Space Race: Eisenhower and the Quest for Aerospace Security* (Annapolis, Maryland: Naval Institute Press, 2015), 224. Nicholas Michael Sambaluk, “‘What’s a Heaven For?’ National Public Culture’s Role in Shaping US Space Policy, Aerospace Doctrine, and the Future of the Dyna-Soar, 1957–61.” Order No. 3556135, University of Kansas, 2012.

(along with President Nixon's) and with the words: "We came in peace for all mankind."²⁹ This statement appeared to fulfill a more symbolic promise delivered eleven years earlier by the National Aeronautics and Space Act, which declared that "it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind."³⁰ Even today, the Apollo 11 moon landing ranks in the public consciousness as a high watermark of space history, and the words upon that plaque have resonated through the intervening five decades, not only among space enthusiasts but in broader American (perhaps global) collective memory. The words were echoed in the title of Al Reinert's documentary on the Apollo missions, the Oscar-nominated *For All Mankind* (1989).³¹ A version of the plaque and its message of peace would even be prominently featured – to ominously ironic effect – in the opening to the alien invasion epic *Independence Day* (1996).³²

The meaning of the space policy dictum encapsulated in the seemingly innocuous phrase, "peaceful purposes for the benefit of all mankind," has been transformed, and perhaps distorted, by the very historical events it set in motion. This effect has long been recognized and expounded upon by many space historians, particularly those who study the military dimension of the Space Age. The Air Force historian Mark Erickson, in his book *Into the Unknown Together: The DOD, NASA, and Early Spaceflight*, directly addressed future historians and cautioned that they "must be clear as to the central importance of reconnaissance satellites and

²⁹ Andrew Chaikin, *A Man on the Moon: The Voyages of the Apollo Astronauts* (New York: Penguin Books, 1994), 212.

³⁰ The National Aeronautics and Space Act (unamended).

³¹ *For All Mankind*, directed by Al Reinert (Apollo Associates, 1989), Blu-ray (Criterion Collection, 2009).

³² *Independence Day*, directed by Roland Emmerich (20th Century Fox, 1996), Blu-ray (20th Century Fox, 2017).

the associated idea of freedom of space which, when combined with space for scientific research, formed the space-for-peace policy.”³³

The centrality of “freedom of space” to the space-for-peace policy had its roots in 1955, when Eisenhower’s science advisor James Killian (at that time president of MIT) chaired the Technological Capabilities Panel (TCP) which was tasked with producing a thorough assessment of American defensive posture in the event of a nuclear war. The TCP’s report to the president, “Meeting the Threat of Surprise Attack” (sometimes referred to simply as the Killian Report), was a major impetus for the U.S. policy of pursuing nuclear deterrence throughout the Cold War paradigm of mutual assured destruction. The unclassified parts of the document are a fascinating, harrowing classic of early Cold War doomsday scenarios; Part 5 of the report, which related to space, remains classified, but several elements of it were quoted or referred to in National Security Council (NSC) memos and other briefings which have since been released. Among the Killian Report’s recommendations to the President was to determine a legal framework for “freedom of space” analogous to the established “freedom of the seas” defined as beginning three miles from sovereign coast lines. It encouraged the development of a scientific satellite at the earliest opportunity to establish a legal precedent that would later permit overflights of the Soviet Union and other hostile nations by reconnaissance satellites.³⁴

Ultimately, it would be the Soviet Union’s own overflights of the United States with its Sputniks that would establish the freedom of space precedent. In response, Eisenhower publicly endorsed an “open skies” ideal to highlight the peaceful image of his bifurcated military-civilian

³³ Mark Erickson, *Into the Unknown Together*, 102-3.

³⁴ U.S. National Security Council, 257th meeting of the National Security Council: Significant World Developments Affecting U.S. Security and Report to the President by the Technological Capabilities Panel of the Science Advisory Committee, August 5, 1955; David Spires, *Beyond Horizons*, 39-40.

space program.³⁵ As space historian David Spires remarked, “the civilian satellite would serve as a stalking horse to establish the precedent of ‘freedom of space’ for the military satellite, but the administration maintained great secrecy on the latter so that attention would remain focused on the former.” Given the alarming Soviet lead in space technology, the Air Force was itself content for a time to operate within this framework. Its leadership recognized that “the policy of ‘peaceful uses of outer space’ embraced the development of reconnaissance systems but never offensive weapon systems... Weapons in space threatened the reconnaissance assets judged vital to national security.”³⁶

During the crucial months of 1958 which saw the emergence of NASA, the National Security Council drafted a secret statement outlining “Preliminary U.S. Policy on Outer space.” This document did not employ the phrase “freedom of space,” but rather evoked Eisenhower’s own word choice. It highlighted military reconnaissance satellites as having “a high potential use as a means of implementing the ‘open skies’ proposal or policing a system of international armaments control,” linking freedom of space explicitly with the potential for military space activity as well as arms treaty verification. This statement put considerable stress on the potential of space for international cooperation and even for “opening up” the Soviet bloc, while acknowledging “the fact that the results of cooperation in certain fields, even though entered into for peaceful purposes, could have military application, may condition the extent of such cooperation in those fields.” The NSC also granted that many military space vehicles could themselves have “peaceful applications.”³⁷

³⁵ David Spires, *Beyond Horizons*, 50.

³⁶ *Ibid.*, 41-55.

³⁷ U.S. National Security Council, Preliminary U.S. Policy on Outer Space, August 18, 1958.

The historian Walter McDougall, in his trenchant Pulitzer prize-winning book *The Heavens and the Earth: A Political History of the Space Age*, insisted on the possibility of distinguishing “peaceful” from “nonmilitary” uses of space. In his view, “U.S. military space programs, especially spy satellites, did serve peaceful purposes in that they promised to strengthen the deterrent, keep watch on the Soviets, and prevent a Soviet hegemony in space.” McDougall went on to admonish voices from “the Left” which had criticized the militarization of space, declaring that had “space exploration been truly internationalized or demilitarized, the Superpowers would have had little incentive to make huge investments for its realization... Space programs would have been stunted with malnutrition.”³⁸ While McDougall’s characterization of space militarization critics is founded on an imagined or exaggerated image of their insensitivity to its subtleties, his argument that military reconnaissance could be considered “peaceful” is sound. A clearer distinction, perhaps, is made by Sean Kalic, who draws the line instead between “militarization” and “weaponization.” A military spacecraft, he argues, could be considered compatible with space-for-peace so long as it is not armed with offensive weapons.³⁹

The other major element of the U.S. space-for-peace policy was tied up in propaganda and the preservation of America’s international prestige. As the NSC statement on preliminary space policy makes clear, the publicity of NASA’s peaceful scientific missions was key to emphasizing an image of the United States as the “leading exponent of the use of outer space for peaceful purposes.” Anticipating that the question of militarizing space would soon be raised by the Soviets in the United Nations General Assembly, the statement advised that the U.S. take “an

³⁸ Walter McDougall, *The Heavens and the Earth*, 188-9.

³⁹ Sean N. Kalic, *US Presidents and the Militarization of Space, 1946-1967* (College Station: Texas A&M University Press, 2012).

imaginative and positive position.” Recommendations were also made for exploiting the powerful psychological impact of space travel, with an emphasis on aggressive publicity efforts which could be employed “during the period while the USSR has superior over-all outer space capabilities [to] counter the psychological impact of Soviet outer space activities and to present U. S. outer space progress in the most favorable comparative light.”⁴⁰ Eisenhower, however, was consistently suspicious of the element of national prestige in U.S. space policy. In his memoirs, he reluctantly conceded that “national morale, and to some extent national prestige, could be affected by the results of peaceful space research,”⁴¹ but during his presidency he explicitly discouraged programs that had no immediate practical or scientific value, whether within NASA or the Air Force.⁴²

John F. Kennedy, in the early months of his presidency, dramatically reversed Eisenhower’s stance on national prestige, and in the process also reversed the balance of space funding between NASA and the DOD. Overton Brooks, the Chairman of the House Science and Astronautics Committee, wrote to Kennedy less than two months after his inauguration in 1961 and expressed concern that the civilian agency would see itself subordinated to military interests. Kennedy’s reply acknowledged a military role in space, but more strongly emphasized NASA:

It is not now, nor has it ever been, my intention to subordinate the activities in space of the National Aeronautics and Space Administration to those of the Department of Defense. I believe, as you do, that there are legitimate missions in space for which the military services should assume responsibility, but that there are major missions, such as the scientific unmanned and manned exploration of space and the application of space technology to the conduct of peaceful activities, which should be carried forward by our civilian space agency.⁴³

⁴⁰ U.S. National Security Council, Preliminary U.S. Policy on Outer Space, 13, 20.

⁴¹ Dwight D. Eisenhower, *Waging Peace*, 257.

⁴² Dwayne Day, “Invitation to Struggle,” 258.

⁴³ John F. Kennedy to Overton Brooks, March 23, 1961, in *Exploring the Unknown*, vol. II, 317.

On May 8, the Kennedy administration's space policy would be further clarified and defined by a memo co-authored by newly-minted Secretary of Defense Robert McNamara and NASA administrator James Webb. The Webb-McNamara Memo strongly urged that the U.S. immediately "make a positive decision to pursue space projects aimed at enhancing national prestige... [civilian projects] are part of the battle along the fluid front of the cold war." To achieve this goals, Webb and McNamara recommended a massive increase in NASA budgeting in order to accomplish a manned lunar landing by the end of the decade.⁴⁴ Kennedy almost immediately endorsed the idea and addressed Congress two weeks later to announce his decision. When he delivered his famous moon-shot speech at Rice University a year later, he eloquently and indelibly defined the U.S. rhetoric regarding the exploration of space, implicitly casting the Soviets as tyrannical militarists and America as the only legitimate guarantor of peace in the "new ocean" of space:

For the eyes of the world now look into space, to the moon and to the planets beyond, and we have vowed that we shall not see it governed by a hostile flag of conquest, but by a banner of freedom and peace. We have vowed that we shall not see space filled with weapons of mass destruction, but with instruments of knowledge and understanding... For space science, like nuclear science and all technology, has no conscience of its own. Whether it will become a force for good or ill depends on man, and only if the United States occupies a position of pre-eminence can we help decide whether this new ocean will be a sea of peace or a new terrifying theater of war.⁴⁵

The space-for-peace policy, enacted by the Eisenhower administration and emphatically endorsed by Kennedy, was thus two-fold in its goals and meanings: first, it formulated a legal framework to *protect* the U.S.'s "peaceful" military uses of space rather than curtail them;

⁴⁴ James Webb and Robert McNamara to Lyndon Johnson, "Recommendations for Our National Space Program: Changes, Policies, Goals," memorandum, May 8, 1961 (John F. Kennedy Presidential Library, Boston, MA).

⁴⁵ John F. Kennedy, Speech at Rice University, Houston, TX, September 12, 1962.

second, it used the open and civilian face of NASA to promote its public (and especially international) prestige and technological credibility. While the second arm of this strategy was demonstrated spectacularly by both the announcement and the eventual achievement of the Apollo program, its blinding success has managed to obscure the first. Whatever the reasons behind the rhetoric, as the space-for-peace doctrine became ever more prominent, programs like the Air Force's Dyna-Soar began to look more and more incompatible with it.

Chapter 2: A Military Man in Space

Dynamic Soaring

The historian Dwayne Day has observed that the young U.S. Air Force, an institution premised entirely on the advent of modern aviation, was possessed of a natural appetite for new technologies. It was an organization that would accept rocketry and space satellites into its jurisdiction (and budget), but it wasn't always an easy fit. In the late 1950s and early 1960s it was still "dominated by the culture of the manned strategic bomber, and any new missions had to service this culture... the concept of strategic rocketry was not one that was adopted readily or without resistance..." The Air Force, after all, was created and led by old aviators, who couldn't help but look at a wingless, pilotless rocket and feel a certain disconnect. After the creation of NASA in 1958, they saw many of their space ambitions diverted to the new agency, but they were left with a program they could truly understand: the X-20 Dyna-Soar (Dynamic Soarer) spaceplane (see Figure 2.1). According to Day, this was "not simply a consolation prize; it was,



Figure 2.1. An artist's conception of the Dyna-Soar "Dynamic Soarer" spaceplane in flight. Source: Boeing.

in fact, the most important mission to many within the Air Force space community...It had everything that an Air Force space program was expected to have – wings and a human in the cockpit.... What it lacked was a clearly defined mission.”¹

The initial concept from which the Dyna-Soar emerged, however, was hardly undefined: for the Air Force, it was first and foremost a suborbital strategic bomber, capable of unprecedented speed and range. Its earliest conceptual origins emerged from the work of Nazi Austrian aerospace pioneer Eugen Sänger, who had envisioned a vehicle which could fly at the edge of space and “skip along the atmosphere like a stone on a pond.” During World War II, Sänger developed his idea into a proposal for an *Amerikabomber* that could cross the Atlantic without interference and deliver imagined nuclear payloads to New York and other U.S. cities. While insufficient resources thankfully prevented his research from being realized, it caught the attention of some in the U.S. aerospace community. Such a space plane appeared to be an ideal strategic weapons delivery platform – fast, difficult to intercept and with a pilot in the cockpit to aid in aerodynamic navigation and evasion. Even better, it might eventually even be used to intercept and destroy Soviet satellites.²

How could a program like this survive the purge of Air Force space projects which accompanied NASA and the national adoption of a space-for-peace doctrine? There were three main reasons. First, the Air Force found ways to sell the project as an aeronautical research platform that did not duplicate NASA’s manned capsule programs. This was aided by its designation as the X-20, presenting it as a successor to the unarmed X-15 suborbital rocket research plane. Second, its nature as a weapon platform was always kept negotiable, and its

¹ Dwayne Day, “Invitation to Struggle,” 243, 251.

² Nicholas Michael Sambaluk, “‘What’s a Heaven For?’ National Public Culture’s Role in Shaping US Space Policy, Aerospace Doctrine, and the Future of the Dyna-Soar, 1957–61.” Order No. 3556135, University of Kansas, 2012, 11-12.

potential mission profile flexible. Its potential as an ultra-high-altitude reconnaissance plane became especially appealing after the May 1, 1960 incident in which a U-2 spy plane was unexpectedly shot down by Soviet anti-aircraft missiles and its pilot, Francis Gary Powers, captured. Third, while officials conveniently refrained from recognizing the plane as a weapon system, the Air Force moved ahead in the belief that space weapons development should nevertheless be pursued in case the Soviets unveiled some new military space capability.³

For the leadership of the Air Force, space-for-peace represented an “albatross that prevented them from pursuing a space program they believed necessary to provide the nation with the security it required... not only defense support functions such as satellite communications, reconnaissance, and navigation activities, but potentially offensive functions in space through space-borne antisatellite and antimissile defense measures.”⁴ In their eyes, Dyna-Soar could simply serve too many of these functions to be abandoned.

As the expensive program crawled into the 1960s without becoming operational, NASA’s manned spaceflight program was thriving. Project Mercury had at last sent American astronauts on suborbital and orbital space flights, though they were narrowly beaten by Yuri Gagarin’s flight in April 1962. The successor to the Mercury capsule was Project Gemini: a larger, two-man capsule capable of demonstrating both the delicate orbital maneuvering and rendezvous operations needed for the Apollo lunar missions, and spaceflights as long as the two weeks thought necessary for a round trip to the moon. Meanwhile, the Air Force struggled in developing a booster powerful enough to launch its Dyna-Soar. The Kennedy-enriched NASA had decisively outstripped the Air Force in manned spaceflight capabilities. Wernher von Braun

³ Walter McDougall, *The Heavens and the Earth*, 340-1; David Spires, *Beyond Horizons*, 120-6; Mark Erickson, *Into the Unknown Together*, 351-61.

⁴ David Spires, *Beyond Horizons*, 51.

even offered, on several occasions, the use of NASA's new Saturn rocket to launch Dyna-Soar. But the rivalry between the two agencies was still too keenly felt, and the Air Force was reluctant to rely on the civilians or give up on developing its own booster technology.⁵

Meanwhile, the October 1961 Soviet test of its 57-megaton "Tsar Bomb" in the Arctic – still the most powerful explosive ever detonated by humans – prompted a greater international concern about the specter of nuclear weapons in orbit, a system for which the Tsar was the prototype.⁶ While the leadership of the Air Force – Bernard Schriever in particular – saw such a development as cause to argue for the development of new manned military spaceflight systems, the U.N. General Assembly began to move for a ban on any nuclear weapons in space. On the 17th of October 1963, it passed Resolution 1884, which stated in part:

The General Assembly... Solemnly calls upon all States:
To refrain from placing in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, installing such weapons on celestial bodies, or stationing such weapons in outer space in any other manner;⁷

This would help make the Dyna-Soar program politically untenable unless the Air Force could dream up a sufficient non-bomber justification for it.

In fact, the Dyna-Soar had now become an obstacle to the Air Force's cherished dreams for a "military man-in-space." Without a role as a dynamically soaring bomber, its wings looked superfluous, expensive and needlessly heavy. Its potential as a space reconnaissance vehicle was increasingly emphasized, but even this began to look questionable. Satellite reconnaissance had already become a valuable national asset in the eyes of the Kennedy administration, but as Dwayne Day argues, "the Air Force apparently continued to view reconnaissance solely in terms

⁵ Ibid., 75-7.

⁶ Nicholas Sambaluk, "What's a Heaven For?", 308.

⁷ United Nations General Assembly, *Resolution on Question of General and Complete Disarmament*. Resolution 1884, 18th session (New York: UN, 1963).

of military capabilities and thus sought a way of neutralizing Soviet reconnaissance satellites--doing so in a highly visible manner... Dyna-Soar would militarize space in all the ways that the administration did not want to see it militarized.”⁸

What really put Dyna-Soar on the chopping block was Project Gemini. Secretary of Defense McNamara’s analysts began to look more closely at the military potential for the NASA program, which was already approaching its first launch. Meanwhile the schedule for the X-20’s maiden flight had been pushed back to 1966 by a funding compromise which left it with only \$130 million in Fiscal Year 1963. The Air Force broached the idea of using Gemini capsules to test its “military man-in-space” idea, and its representatives met with NASA in November 1962. This scheme would come to be familiarly known as “Blue Gemini,” reflecting the color that had become indelibly associated with the air service. The civilian agency was not at all averse to increased DOD participation in Gemini; an extra influx of defense money could only speed it along. The Air Force, in turn, would get the “stick time” in space that they so desperately craved. But McNamara, also present at the meeting, shocked all parties when he unexpectedly proposed a complete merger of the NASA Gemini office with the Air Force and putting the entire program under DOD control.⁹

NASA Administrator James Webb was incensed by his former ally’s “open assault” on the civilian agency. In January 1963, Webb wrote to McNamara and expressed his unequivocal opposition to a joint management board for Gemini, arguing both that NASA’s lunar mission timeline would be seriously jeopardized and that such a program would unambiguously indicate to the world that the U.S. space program was becoming militarized. Webb won the debate –

⁸ Dwayne Day, “Invitation to Struggle,” 261.

⁹ Carl Berger, “History of the MOL,” 17; Dwayne Day, “Invitation to Struggle,” 259; Walter McDougall, *The Heavens and the Earth*, 340-1.

Gemini was indeed essential to Kennedy's goal of a moon-shot by the end of the decade; Blue Gemini stayed by definition "a much more open-ended and ambiguous mission."¹⁰

The argument had revealed McNamara's own defining space policy doctrine. The Secretary's office had been given increased authority by Eisenhower's sweeping reforms of the military the previous decade, and he sometimes wielded it imperiously. When NASA pointed out to him that the civilian agency was legally bound by the Space Act to refrain from participation in weapons development, the Secretary indicated his willingness to "change the law if necessary." As Dwayne Day observed, "[McNamara's] view of his authority and mission was quite expansive indeed."¹¹ He made a consistent effort to reverse the previous administration's move to divide the civilian and military arms of the U.S. space effort. He had explicitly linked his support for a joint NASA-DOD Gemini Board with his desire for "one national space program instead of two," and throughout the 1960s he would speak of the "National Space Program" as a singular entity. Late in his tenure, he would reflect that "in every case, I have insisted that the space projects undertaken by the Defense Department... mesh in all vital areas with those undertaken by NASA, so that, together, they constitute a single fully integrated national program."¹²

Though he was unable to fully commandeer NASA's Gemini, McNamara was still convinced that the Air Force would be sooner able to satisfy its military man-in-space aspirations using the capsule. In a press conference on December 10, 1963 – mere weeks after President Kennedy was assassinated in Dallas and succeeded by Lyndon Johnson – the Secretary announced that Dyna-Soar would be cancelled and replaced with a new Air Force space mission,

¹⁰ Dwayne Day, "Invitation to Struggle," 259; Walter McDougall, *The Heavens and the Earth*, 340.

¹¹ Dwayne Day, "Invitation to Struggle," 261.

¹² U.S. Secretary of Defense, Statement on The Fiscal Year 1969-73 Defense Program and the 1969 Defense Budget, by Robert S. McNamara, January 22, 1968, 161; Carl Berger, "A History of the MOL," 19.

one that included Gemini as a vital component. He described the new program, the Manned Orbiting Laboratory, as “experimental... not related to a specific military mission.” Its stated goal was merely to “determine military usefulness of man in space.” It would be a military space station, docked with a modified Gemini capsule, with two Air Force astronauts conducting undefined “experiments” purportedly to figure out what its mission would be. Even at this early stage, it was already known what its primary mission would be: a manned spy satellite.¹³

Whence the MOL?

Compared with most space programs (with the possible exception of the Space Shuttle) the name of the Manned Orbiting Laboratory (MOL) is so blandly descriptive that its precise origins are hard to pin down. The Air Force project that formally bore the name was authorized by Air Force Secretary Eugene Zuckert to proceed with development on August 25, 1962, with Douglas Aircraft and General Electric selected as contractors to build the “laboratory” (space station) and “mission module” (photographic reconnaissance system) respectively. General Bernard Schriever, the father of the Air Force space program himself, was named as its director.¹⁴

But the idea of a “manned orbiting laboratory” (often “manned *orbital* laboratory,” even in official program documents) had been bandied about in aerospace circles for years, and the idea of orbital reconnaissance stations with crews looking back at Earth with telescopes was even older. Hermann Oberth, one of the conceptual fathers of modern rocketry and von Braun’s

¹³ Carl Berger, “History of the MOL,” 49-51.

¹⁴ Eugene M. Zuckert to Bernard Schriever, “Authorization to Proceed with MOL,” memorandum, August 25, 1962 (Washington: Department of the Air Force, Declassified by National Reconnaissance Office October 2015, MOL Document 1); Eugene M. Zuckert, “Director of the Manned Orbiting Laboratory (MOL) Program,” Secretary of the Air Force Order #117.4, August 25, 1962 (Washington, Department of the Air Force, Declassified by National Reconnaissance Office October 2015, MOL Document 130).

former teacher, had by 1923 already envisioned orbiting “observation stations” equipped with “precise instruments” to be used by its crew for reconnaissance and communication. Many of his proposals for the practical applications of such a station were distinct to the concerns of the day – among them the ethnographic study of “unexplored countries and unknown peoples” and watches for sea ice to prevent a recurrence of the still-recent *Titanic* catastrophe. But he also imagined that space travelers could make military observations in regions with low cloud cover.¹⁵ In 1950, von Braun presented a paper echoing his mentor’s observation post idea and endorsed its use for “civilian and military purposes.” By 1956, Oberth had refined his ideas and tied them explicitly with the Cold War reconnaissance game. He surmised that a manned space telescope in a polar orbit could offer “an almost terrifying power of observation which would make any kind of ‘Iron Curtain’ completely senseless.”¹⁶

In April of 1958, the Air Force’s Deputy Director for Research and Development, Brigadier General Homer Boushey, had testified before congress and touted the recent strides in “telescopic and photographic resolution” and their application for manned space stations. With only a 40-inch telescope, he said, “it is estimated that objects on the earth of a size less than 2 feet could be detected.”¹⁷ The following year, the Air Force investigated the possibility of a Military Test Space Station (MTSS) which could be used to experiment with orbital military activities. By the summer of 1962, the Air Force had formalized a “Five Year Space Plan” which included plans to “explore the capabilities and limitations of man in space.”

It should be stressed that the period between McNamara’s first December 1963 announcement of the Manned Orbiting Laboratory and the President Lyndon Johnson’s August

¹⁵ Hermann Oberth, *The Rocket Into Planetary Space*, trans. by Trevor C. Sorensen et al. (Munich: De Gruyter, 2014), 82-3.

¹⁶ Carl Berger, “History of the MOL,” 4-16.

¹⁷ *Ibid.*, 6-7.

1965 press briefing was strictly a period of study and investigation for the program, not active development. When McNamara gave the MOL to the Air Force, the potential reconnaissance mission was not the only experiment being considered for the station. On April 1, 1964, the program's investigators compiled a two-volume 1,686-page report outlining 176 different candidate experiments to be considered for the MOL. To date, only the first volume of this report (approximately 500 pages) has been declassified, but the table of contents for both volumes was included. The potential activities proposed for the MOL astronauts were enormously varied and not confined to military applications. These included scientific studies, including: astronomical photography of other planets in the solar system, spectral observations of auroras, studies of cosmic rays, recovery of meteoric material, space rescue and recovery, and weather observation and prediction. Also considered were various tests of general spacecraft and human spaceflight systems and hazards, with examples such as studies examining extravehicular maintenance and repair, cold welding, expandable pressurized structures, Earth-moon communications relays, and radiation countermeasures.¹⁸

In addition to these comparatively innocuous applications and the “peaceful” primary reconnaissance mission, a host of more exotic and provocative military missions were investigated. Though the details of most of these remain secret, the names of several proposals offer tantalizing clues, such as “Projectile Firing of RMU [Remote Maneuvering Unit] for Neutralization of Enemy Satellite” which would employ a small remote-operated vehicle to destroy other spacecraft, presumably either by direct ramming or an onboard weapon system. The “MOL Combat Information Center” would perhaps provide an orbiting hub for wartime communications and logistics. The AMU (Astronaut Maneuvering Unit, see Figure 2.2), a sort of

¹⁸ Manned Orbiting Laboratory Experiments Working Group, “Candidate Experiments for MOL, vol. I,” April 1, 1964, Declassified by NRO October 2015, MOL Document 22 of 825.

“rocket pack,” was likely intended to allow astronauts to inspect Soviet satellites during EVAs (extra-vehicular activities).¹⁹



Figure 2.2. The Gemini AMU (Astronaut Maneuvering Unit), first developed for the MOL. Source: NASA

The nature and abundant variety of the experiments under consideration for the MOL anticipated many spaceflight applications and technologies that would take decades to realize. However, the sheer number of possible missions also made it appear directionless to many outside observers. In fact, while its potential missions were legion, the number one Air Force objective for the MOL was a somewhat romantic one. As Dwayne Day observed, the young organization “remained wedded to the image of flying Air Force pilots in space, but this was an image that was more emotional than logical... at the beginning of its life, the Manned Orbital Laboratory, similar to Dyna-Soar, was amorphous, with no clear, overriding purpose other than

¹⁹ The AMU would in fact be developed and built for the Air Force for use on the MOL; it was the first system ever developed to allow an astronaut to maneuver during an EVA independent of their vehicle. The unit was lent to NASA in 1966 to be tested by Gene Cernan during his Gemini 9 EVA. The test was a failure; Cernan’s attempts to don the backpack while already outside of the capsule quickly overexerted him, his visor fogged up, and it was decided to abandon the attempt. It was to be the only test of the MOL AMU, but the experience would help prompt NASA to construct its Weightless Environment Testing Facility (WETF) in Houston. See David M. Harland, *The Story of the Space Shuttle* (Chichester, UK: Praxis Publishing, 2004), 153-4; Kenneth S. Thomas and Harold J. McMann, *U.S. Spacesuits* (Chichester, UK: Praxis Publishing, 2006), 67-90.

technology development and the ever-persistent Air Force desire to fly its own astronauts in space.”²⁰

The Icarus Syndrome

Many of the essential threads of the MOL’s story – and the larger story of the Air Force experience in human spaceflight which comprises the scope of this thesis – have to do with its institutional culture. What was it that led to the overriding obsession of the Air Force – or powerful factions within it – to pursue its own human spaceflight program? Why did the phrase “military man-in-space” remain preeminent in Air Force space planning for over three decades? We can glimpse the answer through a brief tour through the history and culture of the service. Unsurprisingly, this culture was dominated heavily by the airplane.

In 1993, the Rand Corporation military analyst Carl H. Builder published *The Icarus Syndrome*, an organizational appraisal of the Air Force. In his book, Builder sought to diagnose “a host of problems plaguing the institution” in the early post-Cold War years. In his analysis, the problems were rooted decades earlier, in the 1950s and 60s when the Air Force was still freshly independent and its mission was becoming dominated increasingly by a theory of airborne strategic deterrence exemplified by the B-52 bomber (See Figure 2.3). The airplane, which the service began using shortly after the Korean War, would become the mainstay of both its bomber fleet and its psychology for over four decades.²¹ Builder observed that “somewhere

²⁰ Dwayne Day, “Invitation to Struggle,” 260, 262.

²¹ The B-52 remains in use by the Air Force today and is expected to remain operational into the 2040s, when the design will be approaching its centennial. See “B-52 Stratofortress,” United States Air Force, last modified December 16, 2015, accessed March 4, 2018. <http://www.af.mil/About-Us/Fact-Sheets/Display/Article/104465/b-52-stratofortress/>

during this time, the institutional Air Force was shifting its compass from a *guiding* theory of air power to a devotion to the *symbols* or means of air power – to the airplanes themselves.”²²



Figure 2.3. The B-52 Stratofortress strategic bomber, the mainstay of the U.S. Air Force’s Strategic Air Command. Source: U.S. Air Force.

The founders and early leadership of the Air Force, after all, were aviators, forged in the cockpits of two World Wars. Their wartime experiences had taught them a theory of air power by which they were able to win their independence from the Army, but they secretly wielded this theory to pursue their first love: the airplane. In the early years of the service this presented no problem; their theory of air power rested solely on piloted aircraft, and so “they could afford to sell the theory in the terms of its serious ends rather than its more joyous means.” A problem arose when new tools emerged that didn’t look like airplanes: “when other means such as unmanned aircraft, guided missiles, and spacecraft became available, it was the aviators who revealed, by deeds more than words, that their real affection was for their airplanes and not the concept of air power.” The new theories about the “control of space – the high ground – echoed

²² Carl Builder, *The Icarus Syndrome* (New Brunswick, NJ: Transaction Publishers, 1994), 151.

the air power theorizing of 40 years earlier.”²³ The military historian Michael R. Terry shared Builder’s view, observing that “a technological parallel to the manned bomber was envisioned by airmen to operate in space and keep the institutional tradition at the forefront of Air Force thinking.”²⁴ While neither Builder nor Terry explicitly mentioned the MOL or Dyna-Soar, these programs are textbook examples of this cultural trend.

As the MOL program progressed in the late 1960s, the necessity of having humans aboard would come under ever greater scrutiny as unmanned reconnaissance satellite technology advanced. Its Air Force defenders would frequently invoke the history of aviation in response. Retired Army Air Force General Ira C. Eaker, one of the architects of the strategic bombing campaigns during World War II, would editorialize along these lines in the July 14, 1965 issue of the *San Antonio Express*:

Building blocks from civil air transports did not produce the B-52 bomber. We had to build and test 51 earlier bomber models. Effective space weapons will never come solely from the fall-out from the NASA program... MOL is said to be held up until the Air Force can precisely define and defend a military mission which MOL can be certain to accomplish. To require anyone to visualize and indicate definitely and in detail now, all that man may ultimately do in space, would be like having asked the Wright brothers in 1910 to lay down the specifications for a supersonic transport.²⁵

The pervasiveness of the “military man-in-space” dogma among Air Force airmen was not lost on outsiders. John McLucas, a Navy veteran who became undersecretary of the Air Force in

²³ Ibid., 31-32, 166.

²⁴ Michael R. Terry, "Formulation of Aerospace Doctrine From 1955 to 1959," *Air Power History* 38, no. 1 (1991): 52.

²⁵ Quoted in National Aeronautics and Space Administration, Scientific and Technical Information Division, *Astronautics and Aeronautics, 1965: Chronology on Science, Technology, and Policy*, ed. by Science and Technology Division, Library of Congress, NASA SP-4006, 1966, 330.

1969 with the incoming Nixon administration, would later recall that when he expressed any skepticism of the MOL his opinions were perceived as “sort of heretical.”²⁶

McLucas would indeed have a minor hand in the demise of the Manned Orbiting Laboratory, but by the time he arrived on the scene the program had already developed considerably from its early days. By 1969 the MOL had a well-defined reconnaissance mission, a prodigious secret optical machine with which to accomplish it, and a launch facility from which to loft it. It also had a much closer and warmer relationship with NASA. Perhaps most importantly, it had its own astronauts – men who would eventually make the “military man-in-space” a reality. They wouldn’t prove the idea of manned space reconnaissance, however – the Russians would beat them to that.

²⁶ John L. McLucas, *Reflections of a Technocrat* (Maxwell Air Force Base, AL: Air University Press, 2006), 195.

Chapter 3: Spies in the Sky

That's no MOL... it's a Space Station

The Manned Orbiting Laboratory, as a nugget of oft-forgotten space trivia, is often credited with *almost* being the first space station in history. But was the MOL really a “space station?” Jay Chladek’s new history of the space station, *Outposts on the Frontier*, discusses the MOL at some length, introducing it “America’s first space station program.”¹ Yet the program was rarely credited as such during its own lifetime. On January 1, 1964, a few weeks after the program had been announced, NASA drafted its official position paper on the MOL. It echoed McNamara’s new terminology by referring to the MOL as a “single military project (a specific goal; not a broad program) within the overall National Space Program.” The paper cautioned, however, that the program “should not be construed as the national space station... The MOL is, rather, a specific experimental test bed utilizing NASA’s Gemini project and the Titan III for certain potential military space applications not within the scope of NASA’s activities.”²

Carl Berger’s 1970 “History of the MOL” does occasionally refer to the project as a space station, but scarcely any other internal document produced by the Air Force, or other parties to the program, describe it in those words. In the public press, it would only occasionally be named as such; the MOL was generally treated as a *precursor* to a station rather than a station proper. In the immediate wake of President Johnson’s official announcement of the MOL in August 1965, the Air Force collected 24 newspaper cuttings to gauge the public response to the

¹ Jay Chladek, *Outposts on the Frontier: A Fifty-Year History of Space Stations* (Lincoln, NE: University of Nebraska Press, 2017), 11.

² National Aeronautics and Space Administration, Scientific and Technical Information Division, *Astronautics and Aeronautics, 1964: Chronology on Science, Technology, and Policy*, ed. by Science and Technology Division, Library of Congress, NASA SP-4005, 1965, 1.

program. Of these 24 articles and editorials, only one, from *Newsweek*, passingly referred to the MOL proposal as a “space station,” almost as a slip of the tongue.³

NASA’s explicit rejection of the MOL as a space station, and the Air Force’s concession of the point, likely stems from the civilian agency’s desire to jealously guard its own nascent space station program, which would eventually merge with the Apollo Applications Program (AAP) to become Skylab.⁴ With McNamara’s “National Space Program” being predicated on increased cooperation between the civilian and military space programs and an avoidance of duplicated efforts, one agency’s space station program might ruin the other. As for the press, even well-informed reporters were rarely given images of the proposed spacecraft itself, so its size and nature were left vague to the public, and they had no reason to call it anything other than a modest “laboratory.”

The MOL would have been worthy of every reasonable definition of a space station save one: unlike Salyut, Almaz, Skylab, Mir, Tiangong, and the International Space Station (ISS), which stayed in space to be visited by multiple crews over time, the first MOLs to launch would be one-use with only one crew. Two astronauts would launch in their modified Gemini-B capsule while it was already attached atop the MOL in an “integral launch” configuration. Upon reaching orbit, they would open a special hatch and pass through a pressurized tunnel into the main laboratory where they would live and work for a month. After their 30-day mission of reconnaissance and other assorted experiments, they would climb back into their Gemini (with a fresh cargo of classified film and intelligence data), detach the capsule from the MOL, and leave

³ Manned Orbiting Laboratory Program, “Impact of Recent Publicity on the MOL Program,” September 1965, declassified by National Reconnaissance Office, October 2015: MOL Document 134.

Note: this item was misdated August 25, 1965 by the NRO in its declassified DORIAN document index. The document itself is not dated, but it includes analysis of news items from as late as September 20 and was likely produced shortly thereafter.

⁴ David J. Shayler, *Skylab: America’s Space Station* (Chichester, UK: Praxis Publishing, 2001), 19.

the laboratory abandoned in space. The Aerospace Corporation did conduct at least three serious studies on the subject of MOL rendezvous and resupply in 1964, 1967 and 1969. These could extend the mission of the MOL baseline system and, in some schemes, combine multiple MOL modules over time into a larger space station. A risk versus cost-benefit analysis, however, led to their conclusion in all three instances that these procedures would have to wait until the MOL had already been proven on orbit.⁵

However, if this supposed space station prerequisite is disregarded, the MOL looks an awful lot like a proper space station. Its pressurized volume would have been 46.4 cubic meters (m^3), more than triple the 14.1 m^3 enjoyed by the Apollo astronauts during lunar transits, when their command and lunar modules were joined together, and more than 10 times the phone booth-sized 4 m^3 in the Gemini alone.⁶ Additionally, its mission duration of 30 days was more than double the 14-day record set uncomfortably in 1965 by Frank Borman and Jim Lovell. The two NASA astronauts had, as writer Mary Roach aptly describes it, “spent two weeks on a loveseat” together on Gemini 7 to test whether a long-duration moon mission was physically (and psychologically) advisable.⁷

The laboratory’s “integral launch” configuration would itself present a sticky engineering conundrum to the MOL engineers: with the Gemini capsule lacking an airlock and having to be docked with its “back end” to the station, they were with left no choice but to cut a hatch into its

⁵ Systems Research and Planning Division, “MOL Rendezvous,” Aerospace Corporation presentation, October 15, 1964, Declassified by NRO Oct. 2015, MOL document 49; Manned Orbiting Laboratory Program, “Application of MOL Hardware for Rendezvous/Resupply Operating Mode,” Aerospace Corporation, March 31, 1967, Declassified by NRO Oct. 2015, MOL document 363; Manned Orbiting Laboratory Program, “MOL Rendezvous Vehicle Evolution,” Aerospace Corporation presentation, May 7, 1969, declassified by NRO Oct. 2015, MOL document 720.

⁶ John B. Charles, “Astrospies: The Art of Neil Jacobe.”

⁷ Mary Roach, *Packing for Mars: The Curious Science of Life in the Void* (New York: W.W. Norton & Co., 2010), Kindle locations 550-5.

heat shield to allow the astronauts entry into the laboratory module (see Figure 3.1).⁸ This was a seemingly perilous proposition, as any compromise or hole in the heat shield could potentially be fatal to the astronauts on reentry. Yet, as NASA scientist and MOL researcher John B. Charles reflects, “it turns out the Space Shuttle flew with 5 holes in its heat shield [to accommodate its landing gear] and reentered successfully 133 times; this did it once.”⁹ The necessity to test the modified heat shield thoroughly, however, is what prompted the only (unmanned) launch of MOL hardware into orbit during the lifetime of the program.



Figure 3.1. The NASA Gemini capsule in its modified MOL Gemini-B configuration, with Air Force livery. This capsule is now on display at the National Museum of the Air Force at Wright-Patterson AFB. Source: U.S. Air Force.

⁸ Manned Orbiting Laboratory Systems Systems Program Office, “MOL Flight Test & Operations Plan,” May 8, 1968, declassified by NRO Oct. 2015, MOL document 512, F-13.

⁹ John B. Charles, “Astrospies: The Art of Neil Jacobsen.”

A NASA-built Gemini capsule (which had already flown on an unmanned test mission) was given to the Air Force and its heat shield modified into the “Gemini B” configuration. It was attached to an abbreviated test mockup of the MOL and launched from Cape Canaveral on November 3, 1966. The capsule successfully survived reentry – the modified hatch having been welded shut by the heat – and was recovered.¹⁰ In addition to its historic significance as the only launch of the Manned Orbiting Laboratory, it was also the first time a previously space-flown vehicle had ever been reused in the history of spaceflight (See Figure 3.2).¹¹

By almost every contemporary measure in human spaceflight, the MOL was a huge, luxurious environment for an Air Force astronaut to spend his time. While its own amenities would be soon dwarfed by those contained within the cavernous 329 m³ of the Skylab station, they were only modestly bested by the Soviet Salyut-2 (Almaz-1) station’s 61.6 m³.¹² MOL thus deserves the moniker “space station,” which it was cruelly denied for political reasons in its own lifetime. But a manned space station still needed men to run it.

¹⁰ MOL Director, “Manned Orbiting Laboratory Monthly Status Report for November 1966,” memorandum, December 6, 1966, declassified by NRO Oct. 15, 2015, MOL document 316.

¹¹ Jeffrey Richelson, *America’s Secret Eyes in Space*, 89-90.

¹² John B. Charles, “Astrospies: The Art of Neil Jacobs.”



Figure 3.2. The Titan IIIC rocket carrying the MOL configuration Gemini-B test capsule, the only launch of MOL hardware during the life of the program, on November 3, 1966. Source: NASA

“Aerospace Research Pilots”

The first crew selection for the Manned Orbiting Laboratory began in 1964, a year before the program was fully approved by Johnson. Eight officers – six from the Air Force and two from the Navy – had been chosen from a pool of eighty-five unsuspecting graduates of the Aerospace Research Pilot School (ARPS) at Edwards Air Force Base in California’s Mohave Desert. The man who led the selection process was the school’s commandant, Chuck Yeager, who had achieved fame there 18 years earlier by breaking the sound barrier in the experimental Bell X-1 aircraft (first of the X-plane series that would eventually include the X-20 Dyna-Soar). Yeager had watched the progress of MOL and its military man-in-space mission with enthusiasm and took it for granted that any of his students would jump at the chance to be an astronaut, believing that “no bluesuiter [USAF officer] wanted to surrender space to NASA.” Only once he

had narrowed his candidate pool down to fifteen did he finally inform them that they were in the running for a new Air Force space station project.¹³

Yeager's curious crew selection process for the MOL program would have significant ramifications for his pilots' future careers and, in turn, for the history of American spaceflight. By not asking for volunteer applicants, his candidates included students who did not yet consider themselves qualified for such an assignment; as a result, the MOL astronauts skewed a few years younger on average than their NASA counterparts. Richard "Dick" Truly, who turned 28 the day of his selection, was the youngest of the eight chosen in the first MOL group. He later recalled, "I was working hard [just] to get through the test pilot school, and I wasn't thinking about flying in space." Even after he made the shortlist, he didn't think he'd be chosen: "I mean, some of the world's most famous test pilots had already graduated from the school... it didn't occur to me that I had any chance of being selected."¹⁴

Yeager's unilateral selection process for the first MOL group was plagued with complaints by some older ARPS graduates who felt cheated that they hadn't had a chance to apply while they were pursuing doctorate degrees in graduate school. The selection process was changed for the next two MOL astronaut groups, so that voluntary application would be required for consideration, but only one pilot with a PhD would ever be selected, and many MOL astronauts chosen would continue to average younger than their NASA counterparts.¹⁵

Truly and his seven newly-minted MOL comrades coined themselves the "Magnificent Eight" in a riff on NASA's Mercury Seven. They were officially selected behind the scenes in September of the following year, a few weeks after Johnson had announced the program

¹³ Richard Truly, interview by Rebecca Wright, Golden, CO, June 16, 2003, NASA Oral History Program, Houston; Rowland White, *Into the Black*, 28-9.

¹⁴ Ibid.

¹⁵ Ibid.

publicly. On November 12, at a press event in Los Angeles “intended for low-key publicity,” they were introduced to the world, not as astronauts but instead as “aerospace research pilots.”¹⁶ The nondescript job title served both to dampen publicity as well as to “reflect the cultural difference between NASA and [the] Air Force.”¹⁷ The event amounted to the only fanfare they would enjoy during the program; it was indeed “low-key” as hoped. The *New York Times* ran a short story about their selection the next day, naming them “astronauts” in the headline but “aerospace research pilots” in the text. The piece appeared on page 11.¹⁸ Two more groups of MOL pilots would be chosen in June 1966 and June 1967. The second group of five received even less press attention than the first; they appear not to have merited any mention in the *Times*.

This was not the case for the third group, however. The final four MOL astronauts – James Abrahamson, Robert Herres, Don Peterson, and Robert H. Lawrence – appeared prominently with a photograph on the newspaper’s front page in its July 1, 1967 issue. The headline read: “Negro Among Four Chosen as Crew of Manned Orbiting Laboratory” (See Figure 3.3). The subject of the article was Major Lawrence – the first African-American to be selected as an astronaut in the history of U.S. spaceflight. He was interviewed about his perspective on the Civil Rights Movement; a reporter asked him whether he had faced “the same problems other Negroes are complaining they face in getting ahead?” Lawrence replied:

Somewhat, I think... But exactly what problems an individual faces is hard to say. I’ve been fortunate at certain junctures in my life. People happened to be at the right place at the right time to supply me with the necessary motivation. My mother was probably the

¹⁶ MOL Director, “Manned Orbiting Laboratory Monthly Status Report for November 1965,” memorandum, December 9, 1965, declassified by NRO Oct. 15, 2015, MOL document 192.

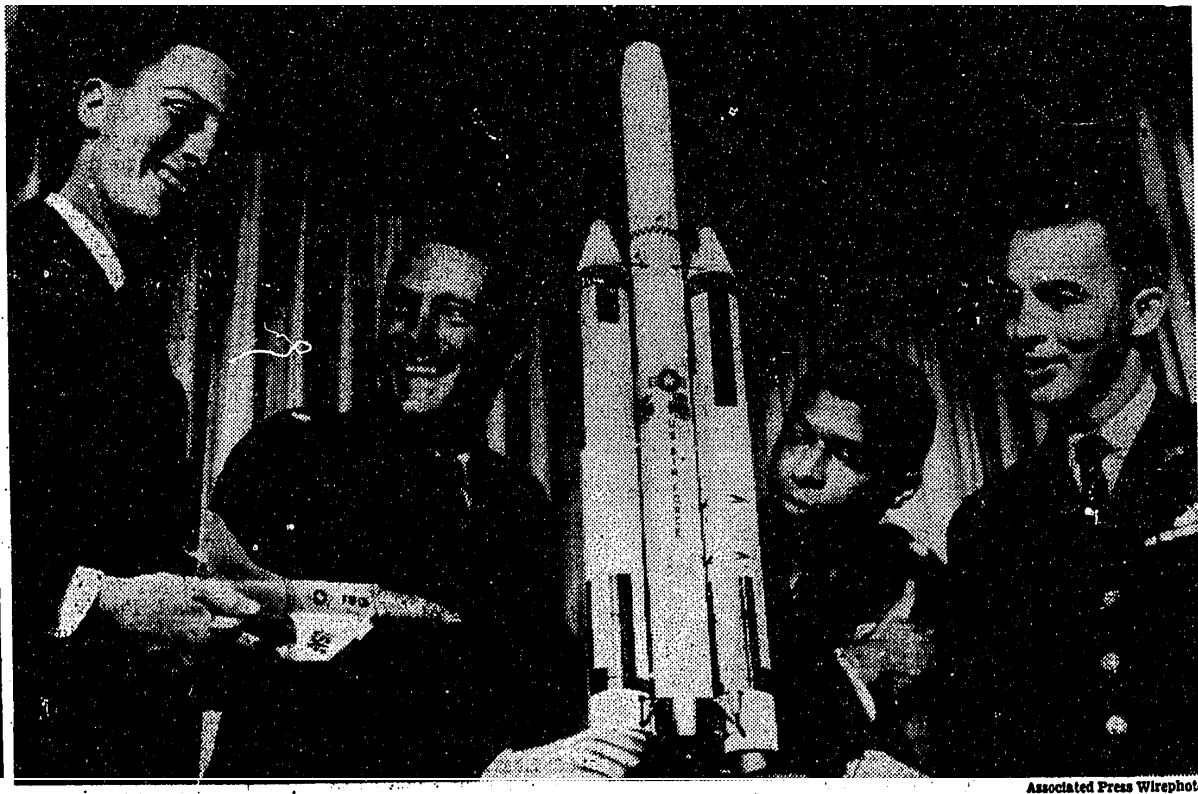
¹⁷ Kenneth S. Thomas and Harold J. McMann, *U.S. Spacesuits*, 2nd ed. (New York: Springer Science & Business Media, LLC, 2012), 212.

¹⁸ “Military Project Picks Astronauts,” *New York Times*, November 13, 1965.

most responsible for many of the things. At college there were teachers who put me on the right track, so to speak.¹⁹

No other news item, during the entire history of the Manned Orbiting Laboratory, was ever featured as prominently.

Negro Among Four Chosen as Crew of Manned Orbiting Laboratory



Associated Press Wirephoto

Figure 3.3. The third group of MOL astronauts (from left: James A. Abrahamson, Robert T. Herres, Robert H. Lawrence Jr., and Donald H. Peterson) make the front page of the *New York Times*. Source: *The New York Times*.

Lawrence's passion for science perhaps ran deeper than for his MOL colleagues. Unlike most of them, he had actively applied to both the civilian and military space agencies. His dream of spaceflight was cut short, however, on December 8, 1967 when his F-104D *Starfighter* crashed into the runway at Edwards Air Force Base during a training flight. He was killed

¹⁹ Gladwin Hill, "Negro Among Four Chosen as Crew of Manned Orbiting Laboratory," *New York Times*, July 1, 1967.

instantly. After news of the tragedy reached the national newspapers, his widow Barbara began receiving clippings of the story from anonymous individuals celebrating his death. One included the message “I’m glad he’s dead... We don’t want no coons on the moon!”²⁰

Lawrence was among the best educated and most qualified astronaut designees in either the civilian or military space programs at that time. He had earned a PhD from Ohio State University in nuclear physics, and was the only MOL astronaut with a doctorate; at that time, only a select handful of NASA’s astronaut corps had achieved higher than a Master’s degree. His dissertation had studied the reaction of tritium rays to methane gas. On the dedication page, he wrote:

This work is dedicated to those American Negroes who have spent their lives in the performance of menial tasks struggling to overcome both natural and man-made problems of survival. To such men and women, scientific investigation would seem a grand abstraction. However, it has been their endeavors which have supplied both the wherewithal and motivation that initiated and helped sustain this work.²¹

At the time the MOL program was cancelled in 1969, Lawrence would still have been under 35 years of age and therefore eligible to transfer to NASA like the other younger MOL astronauts. All seven of the MOL pilots who did join the NASA astronaut corps would fly the early Space Shuttle missions, and it is probable that Lawrence would have done the same. Among the greatest benefits that have accrued from the recent increased attention to the Manned Orbiting Laboratory is the hope that his personal accomplishments, and the contributions he made to the causes of civil rights and space exploration, may receive renewed and long-overdue recognition.

²⁰ Alfred J. Phelps, *They had a Dream: The Story of African-American Astronauts* (Novato, CA: Presidio, 1994), 47-55.

²¹ *Ibid.*, 47-58.

Though Major Lawrence's selection may have elicited more fanfare than other aspects of the MOL, the program did receive sporadic notice in the press and elsewhere, both within and outside the U.S. space community. The day after President Johnson's announcement of the project, the Howard Simons of the *Washington Post* noted that "the Administration is very wary about destroying the image of a peaceful American manned space flight program, which it has so carefully and lovingly constructed."²² The following day, the *Post* editorialized further:

...anxiety arises out of the Air Force commitment to total secrecy in its space operations...[NASA] has pursued a brilliantly successful open public information policy. It has made every American a participant in its exciting conquest of space, aroused the national interest in the whole world of science, stirred the youth of the country to enthusiasm and stimulated national pride. The Vandenberg Air Force Base which will become a major site for MOL launching has operated under a veil of secrecy... Such secrecy is bound to arouse international suspicions and alarms, particularly since the flights will be over Soviet territory. Either this is primarily a project in the peaceful penetration of space that requires little secrecy; or it is a secret military project that cannot be reconciled with our previous professions.²³

Though the MOL's existence and more innocuous elements were publicly disclosed, the Defense Department kept the details of its reconnaissance mission carefully secret. Despite their efforts, however, its Air Force origins and launch site from Vandenberg AFB left little doubt in the minds of informed observers. During one conference, when a reporter asked a DOD official "about the purpose of the MOL's polar orbit, the assembled press just laughed."²⁴

The MOL's mission module may have been an open secret, but it *was* still a secret. At a 1966 Senate hearing on the program's launch facilities at Vandenberg, Senator Spessard Holland of Florida entered into a heated exchange with MOL representative John S. Foster, Jr. In his

²² Howard Simons, "Orbiting Lab to Settle Question of AF's Manned Role in Space," *Washington Post*, August 26, 1965.

²³ Editorial, *Washington Post*, August 27, 1965.

²⁴ Jeffrey T. Richelson, *America's Secret Eyes in Space*, 83.

remarks, Holland quoted a flurry of irate newspaper editorials from his home state. These lamented the Air Force's refusal to launch the station from Canaveral, a decision which, it was feared, would deprive Florida of high-paying jobs and send them to California. Foster tried to explain the risks to the populations of Miami and Jacksonville involved with launching southward or northward into a polar orbit from the Cape. Holland pressed the issue and insisted on having the MOL's orbit justified on record. Foster could not oblige without divulging too much about the program.²⁵

Some of MOL's most vocal critics, however, came from within the military establishment. Among them was the space editor of the *Journal of the Armed Forces*, James Haggerty Jr. A few weeks after McNamara's December 1963 announcement of the MOL, he wrote that it was "an ominous harbinger of a reversal in trend, an indication that the military services may play a more prominent role in the future space exploration at NASA's expense... Whether you label it development platform, satellite or laboratory, it is clearly intended as a beginning for space station technology."²⁶ In March of 1966, he sarcastically castigated McNamara for his insistence that the program was proceeding "on a deliberate and orderly schedule." He wrote that "deliberate is an excellent word in this context; according to one definition . . . it means leisurely in movement or action... In these terms MOL shows promise of becoming one of the most deliberate projects of all time... "Orderly, though, is not such a good word."²⁷

Thanks to its almost-famous astronauts and only-partial secrecy, many officials became concerned that the MOL, as a potentially exciting and glamorous manned system, was "far too

²⁵ U.S. Congress. Senate. Committee on Aeronautical and Space Sciences. *Hearing on Launch Facilities for the Manned Orbiting Laboratory Program*, 89th Cong., 2d sess., February 24, 1966.

²⁶ NASA, *Aeronautics and Astronautics Chronology: 1964*, 10.

²⁷ NASA, *Aeronautics and Astronautics Chronology: 1966*, 87.

visible for its own good, especially for a reconnaissance system.” In one contentious 1968 meeting, Vice President Hubert Humphrey expressed his frustration that the station might never launch without “Walter Cronkite looking over your shoulder.”²⁸ Many in the CIA considered “space espionage and manned spaceflight [to be] an unstable combination.”²⁹ Some reporters had raised the concern that the MOL’s visibility as a military mission might provoke a “new space arms race” with the Soviets.³⁰ Their concern was shared by a secret State Department [CIA] briefing on the MOL, likely written in mid to late September 1965. Its author considered it “likely that the Soviet Union suspecting the ‘defensive’ nature of the MOL, will inaugurate a MOL project of its own within its military programme... there is no possibility of ascertaining a similar Soviet project in advance.”³¹ Indeed it wasn’t. The Soviets had already begun their MOL program almost two years earlier.

Almaz: The Soviet MOL

The Soviet lead in space technology was not altogether erased by the Apollo moon landings. Its chief space architects, Sergei Korolev and Vladimir Chelomei, were in many areas ahead of the United States. The two men headed the “Experimental Design Bureaus” OKB-1 and OKB-52 respectively, the principal internal competitors for Soviet space development. Korolev and his bureau had been responsible for developing the spectacularly successful R-7 family of rockets that would launch Sputnik I and later the Vostok, Voskhod and Soyuz capsules that carried Yuri Gagarin and every subsequent Soviet and Russian cosmonaut into orbit. Chelomei

²⁸ Dwayne Day, “Invitation to Struggle,” footnote on 262.

²⁹ Jeffrey Richelson, *America’s Secret Eyes in Space*, 86.

³⁰ Evert Clark, “Military Space Station Plan Stirs Concerns Abroad,” *New York Times News Service*, September 18, 1965.

³¹ [US Department of State], *A Note on the MOL and the Military Implications of Outer Space*, (Document no. A-744, Declassified 2010).

in turn developed a competing UR-500 “Proton” rocket design and an associated architecture for manned spaceflight. His Proton launch vehicle and Zond capsule were initially favored by Soviet premier Nikita Krushchev for manned lunar missions. Despite their highly competitive professional relationship, by all accounts their personal association remained respectful and cordial.³²

The two bureaus would also pursue divergent space station programs. Korolev’s group began work on the design that would eventually become Salyut, the first successful space station, in 1971. The Chief Designer himself would not live to see this particular accomplishment, however; on January 14, 1966 he succumbed to heart failure, exacerbated by compromised health – a consequence of abuses he received years earlier while imprisoned in Stalin’s “gulag archipelago.” OKB-52, meanwhile, was answering an August 24, 1965 decree (coincidentally the day before Johnson announced MOL) from the Ministry of Defense to expand the Soviet military space presence and build a manned military station to be used for photographic reconnaissance.³³

Aware of the MOL concept, Chelomei had already begun work in October 1964 on his own Almaz (“Diamond”) orbital complex concept (See Figure 3.4). His design, however, was more ambitious. Instead of a one-shot 30-day mission like MOL, the Almaz station was intended to remain on orbit for up to two years and play host to a rotating series of cosmonaut crews. Though many details of the Almaz program remain sketchy, space historian Asif Siddiqi and others have surmised that its photographic reconnaissance system, Agat-1, approached that of the

³² Phillip Clark, *The Soviet Manned Space Program* (New York: Orion Books, 1988), 37-41; James Harford, *Korolev*, 258-68; Slava Gerovich, *Soviet Space Mythologies*, 118; Jay Chladek, *Outposts on the Frontier*, 43-51.

³³ *Ibid.*, 43-51.

MOL's KH-10 DORIAN.³⁴ As Almaz designer Vladimir Polyachenko would later recall, “we could see details that were less than half a meter long from 250 kilometers in outer space... for example, we could see the make of the car, if it's a Ford or Toyota.” One feature that distinguished the MOL from the Almaz was the latter's more modest orbital inclination, and thus reduced global reach. Had the Air Force astronauts flown on MOL's polar orbit, they would have been the first space travelers to be able to see every inch of the planet's surface and ride their spacecraft straight through the northern and southern auroras. The Almaz cosmonauts only nearly did.³⁵

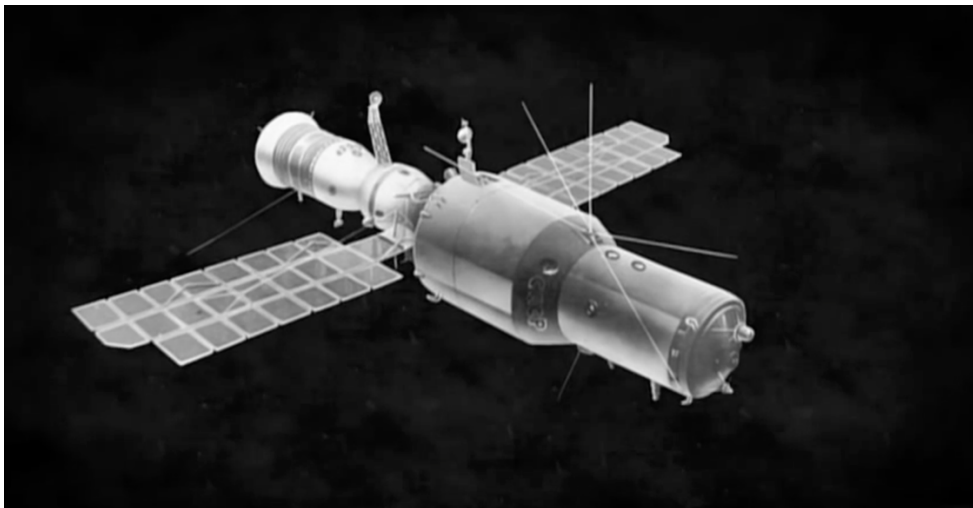


Figure 3.4. The Almaz orbital complex, from NOVA's "Astrospies."

What most distinguishes Almaz from MOL is the simple fact that it was not canceled. However, like its American counterpart, it was hidden in plain sight. Three Almaz stations were launched and crewed between April 1973 and February 1977, each announced to the world 24 hours after they had reached orbit; they were not publicly called “Almaz” by the Soviets but rather Salyut 2, 3, and 5 respectively. The Almaz configurations superficially resembled their

³⁴ Asif A. Siddiqi, “The Almaz Space Station Complex: A History, 1964-1992,” *Journal of the British Interplanetary Society* 54, no. 11/12 (November/December 2001), 389-416.

³⁵ NOVA, “Astrospies.”

“civilian” Salyut counterparts (the Soviets never formally separated their military and civilian space efforts as the U.S. did) well enough to be convincing. Though their military purpose came to be reasonably well understood in the West, they were still known only by the Salyut name as late as 1988.³⁶

One remarkable curiosity of the Almaz was its distinction as the only known manned spacecraft to be armed with a weapon for self-defense. Concerned about possible American attempts to intercept and perhaps even board the stations, the Soviets equipped each with a single Nudelman-Rikhter 23 millimeter cannon, a design adapted from the MiG-15 jet fighter. Almaz crews would be able to employ a special periscope as their gunsight and adjust the entire station’s orientation to aim at incoming targets. The system was never tested manually for fear of vibration damage to the spacecraft, but the cannon on the second Almaz station, OPS-2/Salyut-3, was fired remotely after its crew had left the station. Reports are conflicting as to whether this test involved an actual target of any kind.³⁷

Ironically, the most visible legacy of the Almaz program today is an emblem of *cooperation* in space, not militarization. To support its modular orbital complex design and resupply system, Chelomei had developed the versatile TKS “transport supply ship” spacecraft, comprised of a joined VA capsule and FGB “functional cargo block.” Though the vehicle was not ready to fly to Almaz before the program ended, it would be used on the later Salyuts as well as space station Mir. In November of 1998, a modified FGB called *Zarya* was launched into orbit atop one of Chelomei’s Proton rockets. Two weeks later, the Space Shuttle *Endeavour* launched and released a module named *Unity* from its payload bay and performed a rendezvous with

³⁶ Phillip Clark, *The Soviet Manned Space Program*, 67-104; Jay Chladek, *Outposts on the Frontier*, 98-114.

³⁷ Asif Siddiqi, “The Almaz Space Station Complex,” 395; Jay Chladek, *Outposts on the Frontier*, 103.

Zarya. The two modules were joined together, and the International Space Station was born (See Figure 3.5).³⁸

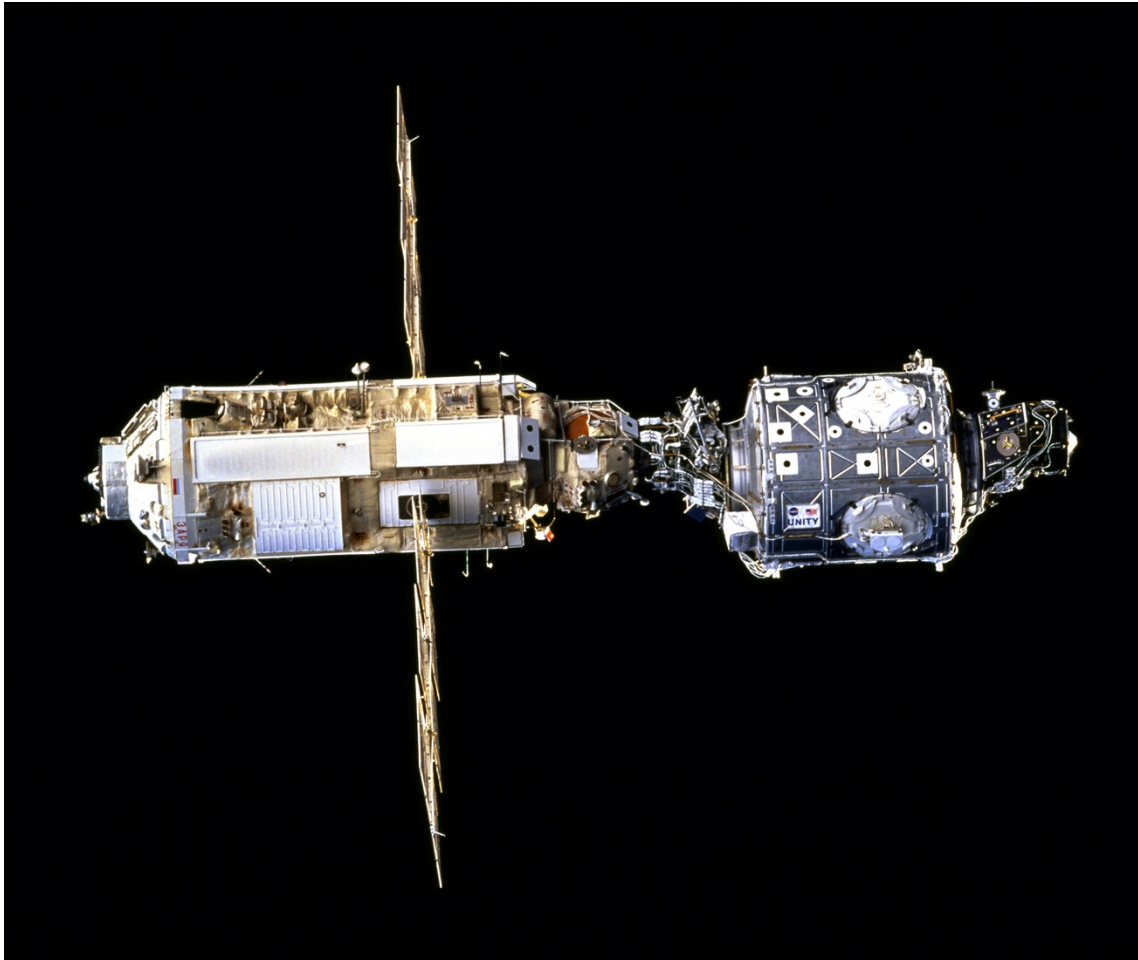


Figure 3.5. The Russian Zarya (left) and U.S. Unity (right) modules joined together to form the core of the International Space Station. Source: The Planetary Society.

³⁸ Jay Chladek, *Outposts on the Frontier*, 57-8, 209-11.

Chapter 4: Highs and Lows

Have Space Suit – Will Travel

The Manned Orbiting Laboratory survived over five years before its cancellation, and considerable investments in U.S. spaceflight technology and infrastructure were made by the program during this time. Many of its achievements would be unrealized or short lived. The incoming Nixon administration's space policies would lead to a substantial diminution of American spaceflight resources and priorities, both for NASA and the Air Force. The MOL program would be the first to fall under this axe, but several of its astronauts would find a new home in the civilian space agency, where they would contribute to the largest joint venture yet between the military and civilian space programs: Space Shuttle.

The peak year for the MOL program was 1968, both in terms of funding and activity, but the program's days were numbered. McNamara's budget request for FY 1968 was \$157 million lower than the MOL Program Office had hoped. The greatest culprit for the decrease was the Vietnam War, which was descending into its bloodiest and costliest stage just as MOL's first manned launches were being planned in earnest. The MOL was by then the single largest line item in the entire defense budget, making it a tempting target for cancellation.¹ General Harry Evans, then Vice Director, characterized the situation as a "Pearl Harbor" moment for the program. The schedule for MOL flights continued every year to slip in roughly 15-month increments, so the goal kept receding further and further out of sight.² McNamara continued to make big promises for FY 1969, but the pattern was repeated and the House appropriations

¹ Dwayne Day, "Invitation to Struggle," 262.

² Carl Berger, "History of the MOL," 251-4.

committee further reduced MOL funding by \$85 million.³ One of the MOL astronauts, Gordon Fullerton, later reminisced about “three-years-to-launch parties,” which became an annual tradition for the program.”⁴

But tangible hardware was being developed. Perhaps the most visible museum-worthy historical artifacts of the MOL were its space suits. At the outset of the program, the Air Force dictated that, unlike NASA, the MOL pressure and EVA suits would not be custom-made for each astronaut but manufactured in a set of eight sizes to accommodate its astronaut corps. The requirement was for them to be less expensive yet more compact – a necessity given the confined dimensions of the Gemini-B heat shield hatch and access tunnel. For initial training and testing, leftover pressure suits from the canceled Dyna-Soar were used, but bids for a new MOL suit began to come in from suit contractors.⁵

In January 1967, the contractors faced off in a competition. In July, the MOL suit contract was awarded to Hamilton Standard, a new entrant in the pressure suit game that was concurrently working on the Apollo EVA suits that would eventually be worn on lunar excursions. After several design iterations, at least 17 MH-7 production model suits (in a blue “training configuration,” see Figure 4.1) were delivered by Hamilton between May 1968 and July 1969, a month after the program’s cancellation. Reportedly, only one white flight certification-ready MH-8 suit was completed.⁶ Several of the blue MH-7 suits ended up in various warehouses, and the discovery of one in an abandoned blockhouse at Cape Canaveral

³ Robert McNamara, Fiscal Year 1969-73, 162; NASA, *Aeronautics and Aerospace, 1968*, 166.

⁴ C. Gordon Fullerton, interview by Rebecca Wright, NASA Dryden Center, CA, May 6, 2002, NASA Oral History Project, Houston.

⁵ Kenneth Thomas and Harold McMann, *US Spacesuits*, 212-21.

⁶ *Ibid.*, 224-6.

was presented in NOVA's "Astrospies" as the inciting incident which prompted the rediscovery of the MOL program.⁷

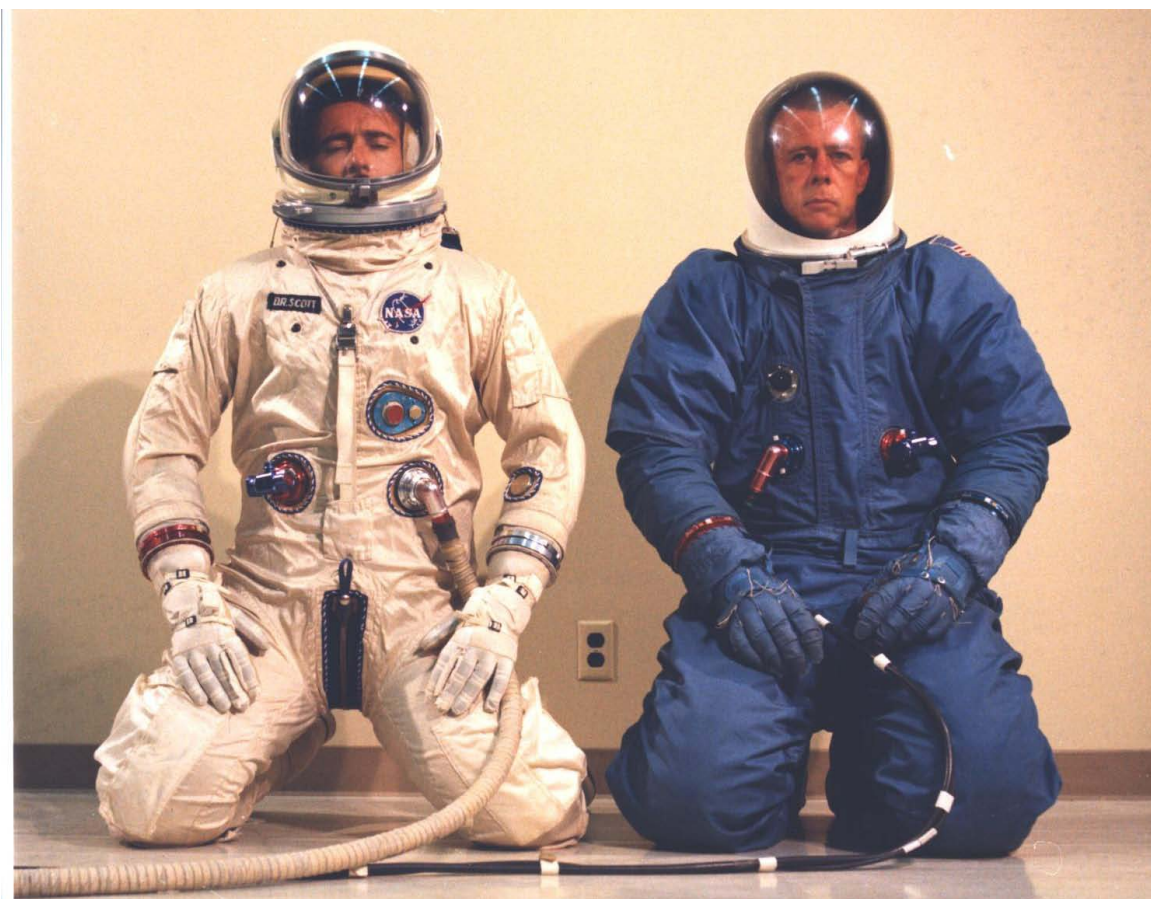


Figure 4.1. The MOL MH-7 training suit (right) being tested against its NASA Gemini counterpart (left). Source: National Reconnaissance Office, declassified DORIAN images, Picture 19.

Within the MOL laboratory module itself, the Air Force was also ready to experiment with new environmental control and life support systems (ECLSS). The MOL would forego the 100% oxygen atmosphere that had been standard on all NASA capsules in favor of a helium-oxygen mixed gas. Though this option was considered as early as January 1965, its initial consideration was largely focused on reducing decompression sickness (known familiarly as “the

⁷ NOVA, “Astrospies.”

bends”).⁸ The abandonment of a pure-oxygen cabin atmosphere for the MOL system was made certain in the aftermath of the fatal Apollo 1 fire which killed NASA astronauts Gus Grissom, Ed White, and Roger Chaffee on January 24, 1967. In 1967, Lieutenant Colonel John Ord, the program’s chief of aerospace medicine, announced that the MOL would use helium* as a diluent for its oxygen; which was more expensive but had the advantages of being lightweight and conducted heat away from the spacecraft.⁹

Among the NRO’s cache of 825 recently declassified documents are tantalizing glimpses of the future that the MOL planners were beginning to imagine for the station. Among the last of them, Document 794, was a General Electric briefing entitled “Advanced MOL Planning: Missions and Systems.” This series of slides include graphic depictions of more ambitious engineering works that could be constructed on orbit in a modular system using MOL spacecraft pieces. Regrettably, annotation is negligible for these images, but among them is an illustration (See Figure 4.2) of 3 MOL stations docked together in a “Y” shaped formation, with Gemini or Apollo capsules docked at the hub and large solar panels deployed. The caption reads “Synchronous Altitude Command Post,” implying that the station would be kept in a geosynchronous orbit at an altitude of over 22,000 miles, a first for a manned spacecraft. The three modules’ roles are labeled as “living quarters, general quarters and housekeeping, and

⁸ Aerospace Corporation, “Study of Utilizing Apollo for the MOL Mission, Volume II: Subsystem Studies-Applied Mechanics Division” (El Segundo, CA: Air Force Space Systems Division, January 11, 1965; Declassified by National Reconnaissance Office, October 2015: MOL Document 63), 6-19.

* The use of helium in the MOL atmosphere may conjure in readers’ minds an image of chipmunk-voiced military astronauts, a situation only permissible in a classified program where space-ground communications would not be broadcast to the world. Regrettably, this would seem not to have been the case – experiments at the time had already shown that helium-oxygen mixtures at the low 5.0 psia atmosphere to be used on MOL would have a “barely noticeable” shift in voice pitch. See Dale E. Havens, “Helium as a Diluent in Spacecraft Atmospheres,” from Helium Symposia Proceedings in 1968: A Hundred Years of Helium

⁹ NASA, *Astronautics and Aeronautics Chronology, 1967*, 39.

combat information center,” suggesting an ongoing interest in developing some of the more exotic “candidate experiments” considered for the MOL five years earlier.¹⁰

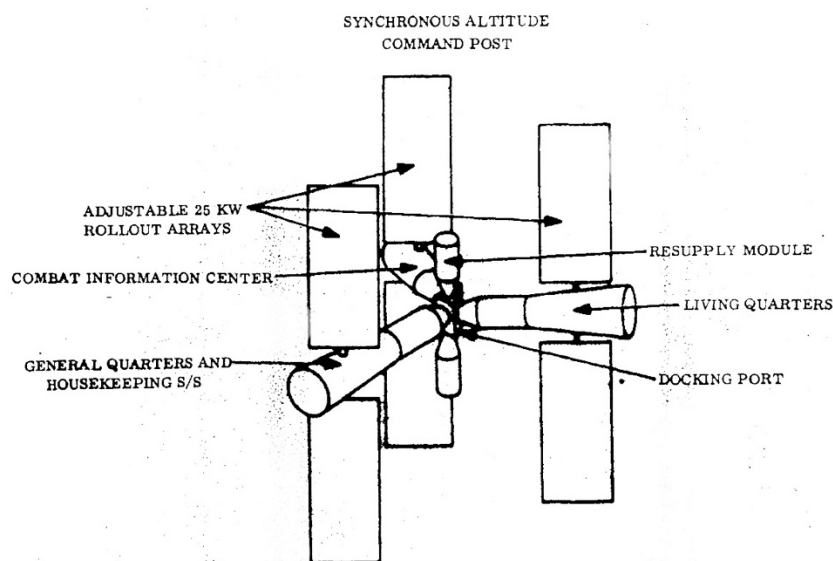


Figure 4.2. Three MOL modules joined in a “synchronous altitude command post” configuration, from General Electric Corporation, “Advanced MOL Planning: Missions and Systems,” briefing charts, 1969, declassified by NRO Oct. 2015, MOL document 794.

By the time the briefing was drafted, however, the MOL was already doomed. In January 1969, Richard Nixon was inaugurated. Even as he was basking in the reflected glory of the Apollo 11 landing that July and leveraging it for maximum political advantage, the new president was making a thorough review of both civilian and military space programs, and neither would be left with what they had hoped for.

¹⁰ General Electric Corporation, “Advanced MOL Planning: Missions and Systems,” briefing charts, 1969, declassified by NRO Oct. 2015, MOL document 794.

Note: Elsewhere in the briefing slides, the Y-shaped MOL command post is included in an illustration (see Figure 4.3) apparently depicting its role in the scenario of a full nuclear exchange with the Soviet Union. Among the many interconnected elements is a low-orbit rocket labeled “LASP,” presumably indicating a role in the space apocalypse for the Laboratory of Atmosphere and Space Physics at the University of Colorado Boulder. A small label by the MOL station ominously notes its “key requirement: post-attack survivability.”

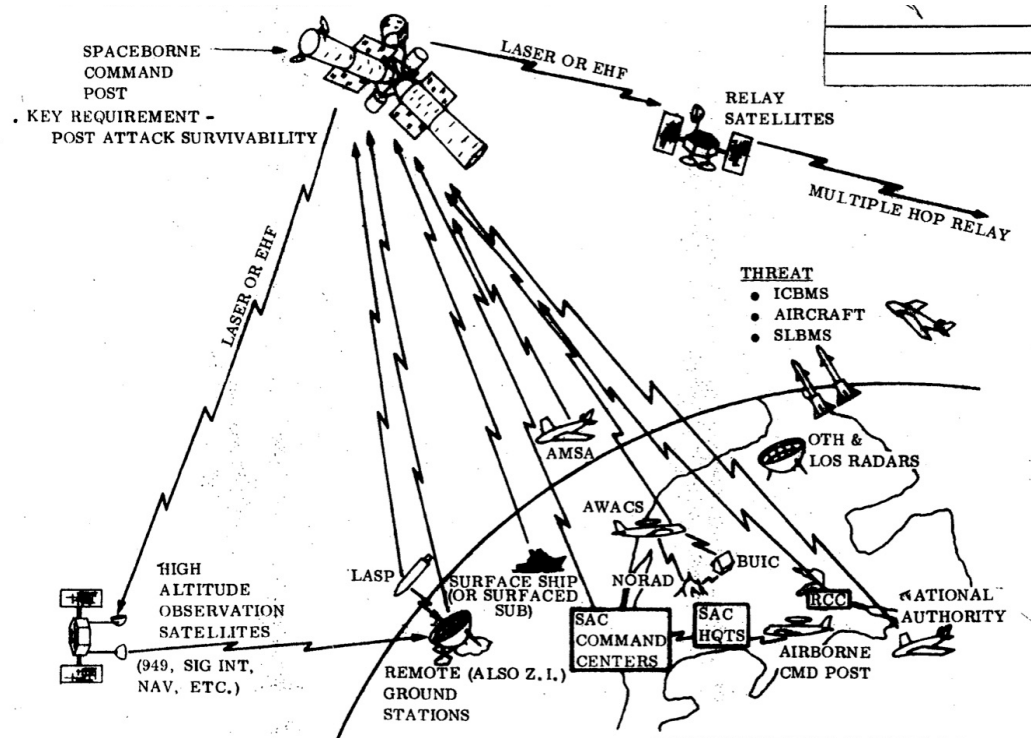


Figure 4.3. The MOL-derived command post depicted in the context of a hypothetical role as a command post in a strategic nuclear exchange, from General Electric Corporation, "Advanced MOL Planning."

Nixon's Change of Course

Shortly after Neil Armstrong and Buzz Aldrin exited their Apollo 11 *Eagle* lander to take "one small step" on July 20, 1969, they received an unexpected phone call through their helmet radios from the White House. The new president, Richard M. Nixon, congratulated the two men for their accomplishment and remarked that "for one priceless moment in the history of man all the people on this earth are truly one – one in their pride in what you have done and one in our prayers that you will return safely to earth."¹¹ Nixon's sentiment would prove to be more than mere rhetoric – in the following weeks and months he would leverage the Apollo astronauts and the moon landing achievement as a means of achieving his most enduring foreign policy

¹¹ John M. Logsdon, *After Apollo? Richard Nixon and the American Space Program* (New York: Palgrave Macmillan, 2015), 21.

accomplishment. Meanwhile, however, he was looking for ways to cut federal government spending bloated by the war in Vietnam and the expensive moonshot. NASA would pay the price. So too would the Manned Orbiting Laboratory.

When the Apollo 11 crew returned to Earth a few days later, Nixon flew out to the Pacific to greet them, even as they looked out from behind the glass of their quarantine trailer aboard the *U.S.S. Hornet*. He beamed for photographs and engaged in a bit of hyperbole, remarking that “this is the greatest week in the history of the world since the Creation.” Both Nixon and the NASA astronauts shortly departed on global diplomatic tours, which were codenamed “GIANTSTEP” and “The Spirit of Apollo.” The key stop for Nixon was Romania, where the president hoped to use the reflected glory of the moon landing (and a gift of moon rocks) to gain an audience with Romanian head of state Nicolae Ceausescu, who in turn might “serve as a communication channel to Chinese Premier Chou En-Lai.” The meeting was a success, helping pave the way for his historic rapprochement with China three years later; Nixon informed the astronauts that this alone had “paid for everything we spent on the space program.”¹²

While the new president had capitalized spectacularly on the nation’s investment in space, however, he did not continue that investment for the benefit of future diplomats. Shortly after being elected in November 1968, Nixon requested the formation of a Space Task Group (STG) to review the nation’s space priorities after Apollo. The STG would be chaired by Vice President Spiro Agnew and include Air Force Secretary Robert Seamans, acting NASA administrator Thomas Paine, and Nixon’s science advisor Lee DuBridge.¹³

¹² Ibid., 13-29.

¹³ Ibid., 48-82.

The central thrust of the STG's deliberations would center on future missions and budget options for NASA, but the DOD also sent representatives from the MOL program office to report on the Air Force project. Major General James T. Stewart, Vice Director of the MOL, delivered the presentation, making an effort to underline the program as pragmatic and practical (especially compared to NASA's prestige missions). He reported that the "Space Task Group could not help but get the impression that the DOD really is applications minded and views space as a place rather than a mission – and it was quite clear that the large majority of DOD space dollars is allocated to operational systems development and employment." Stewart was questioned by the task group about the need for having a manned system, which had been met with ever greater skepticism as unmanned reconnaissance satellites improved. He defended the MOL as primarily a manned system, insisting that "we would use man's brain power rather than as a 'servo.'" He left, however, with the impression that the Group was more interested "on the civilian than the military space program (the value of space technology to national security *other* than military application)."¹⁴

During the five-year life of the MOL program and its KH-10 DORIAN reconnaissance mission module, significant improvements were also being made to its unmanned Key Hole siblings. The KH-9 HEXAGON satellite (sometimes known by the nickname "Big Bird" thanks to its huge size, though it was still slightly smaller than the MOL) was nearing operation in 1969, and its photographic resolution was considered to rival what was expected of a manned DORIAN system.¹⁵ Compared with such a system, so much cheaper and faster to develop and operate, the MOL began to look foolish in many eyes. In one *Newsweek* interview, a source from

¹⁴ James T. Stewart, "Presentation by DoD/MOL to Space Task Group," memorandum, December 24, 1968, declassified by NRO Oct. 2015, MOL document 653.

¹⁵ Richelson, *America's Secret Eyes in Space*, 105-6.

inside the Defense Department even confided that “MOL really is an Air Force toy... it’s fascinated with the idea of putting men in space, but there are still many unanswered questions as to whether we really have to put men there.”¹⁶ Nixon, confronted with never-ending Vietnam spending, was eager for any excuse to cut redundant programs, and HEXAGON provided it.

The moment when the tide finally turned decisively against the Manned Orbiting Laboratory appears to have been in mid-April of 1969. A White House “telcon” memo dated April 21 related a telephone conversation between Robert Mayo (director of the Bureau of the Budget) and Henry Kissinger (the president’s National Security Advisor). Kissinger’s reading was that Nixon’s mind had just changed “the other day” on the program and that he would “probably decide to go ahead with HEXAGON and turn the other way on MOL.” Mayo agreed on the condition that the MOL be canceled outright – “if stretched out, it does not save a great deal.”¹⁷ By June, Nixon’s mind was fully, if reluctantly, settled on the matter. To “ease the pain,” he offered to speak at the Air Force Academy’s graduation in Colorado Springs.¹⁸ During the June 4 speech, he said:

America's wealth is enormous, but it is not limitless. Every dollar available in the Federal Government has been taken from the American people in taxes. And a responsible government has a duty to be prudent when it spends the people's money. There is no more justification for wasting money on unnecessary military hardware than there is for wasting it on unwarranted social programs. And there can be no question that we should not spend unnecessarily for defense.¹⁹

¹⁶ Jeffrey Richelson, *America’s Secret Eyes in Space*, 86.

¹⁷ United States Assistant to the President for National Security Affairs. [*Richard Nixon Favors Hexagon Program*]. 1969.

¹⁸ Carl Berger, “History of the MOL,” 288-292.

¹⁹ *Ibid.*, 291.

Five days later, The Secretary of Defense was formally directed to terminate the Manned Orbiting Laboratory program.²⁰

Black Tuesday and the Aftermath of MOL

June 10, 1969, the day the termination of the Manned Orbiting Laboratory was announced to its employees, would be remembered by all within the program as “Black Tuesday.” Dick Truly and the other MOL astronauts had in a single moment been deprived of all their hopes for a chance at spaceflight, and they were crestfallen. Truly would later recall that while “all the NASA people were happy because they were getting ready to go to the Moon... MOL people were just crushed.”²¹

The long-cherished Air Force dream of a military man-in-space seemed to have perished definitively. There was no manned military program proposed to replace the MOL, as the MOL had replaced the Dyna-Soar. During the late 1960s, the debate over military manned missions was no longer raging solely between the DOD and politicians but within the military itself. Hans Mark – Jimmy Carter’s Air Force Secretary and deputy NASA administrator under Reagan – would look back and observe that “the people in the national security establishment who advocated the development and use solely of unmanned spacecraft for national security purposes gained the upper hand. They made a virtue of necessity and, as we shall see, have a dominant voice in military space matters to this day.”²²

After MOL was canceled, the Air Force was left with \$1 billion worth of its own space hardware, mostly in the form of Titan IIIM launch vehicles, as well as a (still unfinished)

²⁰ David Packard to Robert Seamans, “Termination of MOL Program,” memorandum, June 9, 1969, declassified by NRO Oct. 2015, MOL document 744.

²¹ Richard Truly, NASA Oral History.

²² Hans Mark, *The Space Station: A Personal Journey* (Durham, NC: Duke University Press, 1987), 63.

dedicated MOL facility at Vandenberg from which to launch them, SLC-6 (nicknamed “Slick Six”). Arrangements were made for the funding necessary to complete the facility on schedule on the assumption that it could still be used for unmanned launches. Other MOL buildings had been built at the base for administration, training, and medical use at a cost of almost \$3 million. These would be adapted for office space. The biggest hit would fall on the workers of the seven aerospace contractors for the MOL. Douglas Aircraft (now McDonnell Douglas) was the largest, with 7,200 employees dedicated to the project.²³

They were left “scurrying” to find new employment. One of them had a teenage daughter, Susan Kasperian, who wrote an incensed letter to Secretary of Defense Melvin Laird:

The MOL program has been discontinued. I don't understand why and how the government can do something like that--cancel something which has taken years to start, that has taken so much money to continue and time from men who could have been more secure in another area of work. The past four years have been a waste to every man involved in the MOL program. How can the government say--all right, no more, find something else to do? I don't notice anyone cancelling the government.

It's not a very pleasant experience to be out of a job.

There's so much to worry about. My father is now looking for a job, we may move, because of the now extinct MOL program. He got up every morning at 6:30, sat behind a desk working for the government, came home at 5:30 and started the cycle again the next day. For what: Nothing, nothing at all. He has wasted his time, his effort and his intelligence on a whim of the government. Every single man and woman is like my father. What are they getting in return for this. The satisfaction of completing a job? The guarantee of another job in the same area. No, nothing--I don't understand what happens to all these People? I can't ask you to change your decision, so I'm just asking you--why?²⁴

A miniscule subset of the now-unoccupied MOL workforce, of course, were the seventeen trained Air Force astronauts the program had produced. Their hope of flying in space on exciting and patriotic missions appeared to have been dashed, and their career options limited.

²³ NASA, *Aeronautics and Astronautics 1969*, 185.

²⁴ Quoted in Carl Berger, “History of the MOL,” 295.

Their participation in a highly-classified space program now seemed to hinder rather than improve their chances at career advancement. The Air Force would not permit them to fly combat missions in Vietnam – a viable path to promotion – fearing the risk that they be captured and interrogated.²⁵ For several of them, it would be NASA, and perhaps Chuck Yeager's unique recruitment methods, that saved their dreams of spaceflight.

George Mueller, the associate administrator of NASA's Manned Spaceflight Center, decided to "poach" the MOL astronauts for the civilian agency, and invited the seven youngest (those 35 years old or younger) to transfer. One of them, Don Peterson, later recalled that they "didn't have much choice... you couldn't fly, for example, combat missions, and you couldn't fly certain reconnaissance missions, because you were exposed to being captured by some enemy...[we] had information that was secret enough that they didn't want that to happen." Deke Slayton, head of NASA's astronaut office, had to be pressured to take them by Mueller – in August 1969, confronted by a rapidly diminishing roster of upcoming missions, he had neither the need nor desire for more astronauts.²⁶

Indeed, Nixon's diminution of America's space efforts was not confined to the MOL or other military programs; it was NASA that would face the biggest cuts. The Space Task Group had presented the President with three options for post-Apollo missions – the most expensive and ambitious was to immediately begin increasing NASA's budget into the neighborhood of \$9-10 billion per year in order to send a human mission to Mars in 1981. The second was a more modest plan with more modest future funding increases, to achieve the Mars objective in 1986. The third option would defer a Mars mission in favor of concentrating on a new Space

²⁵ Matthew Hersch, *Inventing the Astronaut*, 106-7.

²⁶ Donald H. Peterson, interview by Jennifer Ross-Nazzari, Houston, November 14, 2002, NASA Oral History Project, Houston.

Transportation System (STS) including a space shuttle and space tug, to ferry cargo and astronauts into low Earth orbit, along with an ambitious modular space station project to be built using the STS.²⁷ Nixon, unimpressed at the prospect of such massive budgetary commitments, ultimately elected to pursue Option 3. He would then move to postpone the station and tug until the shuttle, the first rung on the STS ladder, could be proven. Meanwhile, he heavily abbreviated the schedule of upcoming moon flights, cancelling what were originally planned to be Apollo 18, 19 and 20. In December 1972, as Apollo 17 was departed the moon on the last manned lunar mission, Nixon pondered whether “this may be the last time in this century that men will walk on the Moon.” As space policy expert John Logsdon argues in his excellent history *After Apollo?*, the president’s decisions “ensured that his forecast would come true.”²⁸

All of this made the MOL astronauts’ prospects for spaceflight at NASA doubtful, but they remained nonetheless. Their position in the civilian agency at the bottom end of seniority on the flight roster, was at first somewhat tenuous; Karol “Bo” Bobko later recalled that they were threatened with being fired on two occasions: “They said, ‘The program is not going anyplace. We don’t need you folks, and so you’re going to be let go and go back to the air force...’ but that was rescinded, and we stayed and got involved in the programs that were going on here.”²⁹

Most of them became heavily involved in NASA’s own space station project, Skylab. Walt Cunningham, the veteran NASA astronaut who was managing the program, “put them to work where their skills and knowledge of similar systems were invaluable... the scientist-astronauts became the direct interface with the scientists hoping to fly their experiments on the

²⁷ U.S. Space Task Group, *The Post-Apollo Space Program: Directions for the Future; Report to the President*, September 1, 1969, 19-23.

²⁸ John Logsdon, *After Apollo?*.

²⁹ Karol J. Bobko, interview by Summer Chick Bergen, NASA Oral History Project.

workshop, while the MOL astronauts would help with configuration and hardware design.”³⁰

Former MOL pilot Hank Hartsfield worked as support crew for the Skylab astronauts and served as Capcom “capsule communicator,” a mission control job traditionally exclusively reserved for astronauts) on the station’s missions.³¹

The final manned flight of the Apollo era, the Apollo-Soyuz Test Project, would also see the involvement of the MOL veterans. The project, a product of Nixon’s desire to leverage the space program as a diplomatic tool, would see Soviet and American capsules docked together while on orbit. Bo Bobko and fellow MOL pilot Bob Overmyer would travel to Moscow and were among the first U.S. astronauts to work closely their Soviet cosmonaut counterparts. The former Air Force pilots were amused at the intrinsic irony of their close cooperation with the very adversary they had been intended to spy on. As they visited Red Square, Bobko remarked to Overmyer that “I never doubted that I’d be here, [but] I always thought it would be at 200 feet and a full afterburner.”³²

As Skylab ended and the MOL veterans waited patiently throughout the 1970s for a chance at a mission, they began work on NASA’s new manned spaceflight system, a program that would give them that opportunity. The new project had everything an Air Force astronaut aviator could want: as a joint DOD-NASA project it was built from the outset for meaningful military missions, and it looked an awful lot like an airplane.

³⁰ Jay Chladek, *Outposts on the Frontier*, 81-2.

³¹ Henry W. Hartsfield, Jr., interview by Carol Butler, Houston, TX, June 12, 2001, NASA Oral History Project, Houston.

³² Karol J. Bobko, interview by Summer Chick Bergen, NASA Oral History Project.

Chapter 5: The Aviators' New Airplane

The Space Transportation System

On October 15, 1969, in the months between the Apollo 11 and 12 lunar landings, a story appeared the *Washington Post* reporting that “the Air Force has put together a new plan to launch itself into manned space flight in a big way... The basic idea is to climb into the cockpit with the civilian National Aeronautics and Space Administration rather than try to go it alone again as was the case with the recently canceled Air Force manned orbiting laboratory.”¹ The Air Force proponents of its own manned spaceflight program may have been defeated, but they were not extinct. NASA’s new Space Shuttle (a name as blandly descriptive as Manned Orbiting Laboratory had been) – would finally give them their chance to fly a military man in space.

Almost from the beginning, the Space Shuttle was thought of as a fitting coda, not only to the Manned Orbiting Laboratory, but to its Dyna-Soar predecessor. Carl Berger concluded his 1970 post-mortem history of the MOL by observing that “the Air Force had only the feeblest hope that a new joint effort with NASA--to develop a "reusable" space shuttle that could rendezvous with orbiting vehicles and return to land on earth a la Dyna-Soar--might provide it with the opportunity to get in the necessary "stick time" in space that it had sought for more than a decade.”²

As the Space Task Group had first envisioned it, a reusable shuttle would have a low enough launch cost and enough versatility to serve as the exclusive launch vehicle for *all* American space flights – civilian, military, and commercial. As the first rung of the national Space Transportation System (STS) ladder, it would be a “reusable chemically fueled” ferry that

¹ George C. Wilson, “Air Force Seeking Manned Flight Role With Space Shuttle,” *Washington Post*, October 15, 1969.

² Carl Berger, “History of the MOL,” 304.

would operate in “airline-type mode” between Earth and low Earth orbit. The higher rungs of the STS would consist of a “space tug” to achieve other orbits and a nuclear stage for interplanetary flights.³ After Nixon scrapped these latter options, the shuttle remained as NASA’s only human spaceflight program. For it to survive, they needed to find a way for it to be indispensable to everyone. As Walter McDougall put it, while Apollo had been “a matter of going to the moon and building whatever technology could get us there, the Space Shuttle was a matter of building a technology and going wherever it could take us.”⁴ Where it could take us was only one place – low Earth orbit. Its biggest customer there would be the Department of Defense and its fleet of increasingly large intelligence satellites. To sell the shuttle, they built it first and foremost to accommodate this customer – a decision which would carry enormous consequences for U.S. spaceflight for decades to come.

³ U.S. Space Task Group, *The Post-Apollo Space Program*, 15.

⁴ Walter McDougall, *The Heavens and the Earth*, 423.



Figure 5.1. NASA Administrator James Fletcher shows Nixon an early conceptual model for the Space Shuttle. Source: NASA History Office.

A Militarized Space Shuttle and the *Challenger* Disaster

In February 1970, NASA and the Air Force formed a joint Space Transportation System Committee to facilitate their collaboration on the Space Shuttle. They settled on a shuttle program that would be unclassified, with potential for international cooperation, and both parties agreed to contribute heavily to its development and operation. The STS Committee was also the means by which the Air Force could appraise its civilian partner of its payload requirements for their shared vehicle. NASA had originally planned for a much smaller, cheaper and lighter shuttle orbiter than the one familiar today, but the military had two major requirements which

forced them to make it larger. First, its payload bay needed to be able to accommodate the largest DOD payload currently on the drawing board – its KH-11 KENNAN reconnaissance satellite, the immediate successor to the KH-9 HEXAGON and MOL’s KH-10 DORIAN. Second, it needed to be able to launch into a polar orbit. This not only required an appropriate shuttle launch facility in California at Vandenberg, but a considerably enhanced capacity for “cross-range” maneuvering while in the atmosphere. The latter requirement arose from the concern that in the event of an abort after launch, the vehicle would need to be able to turn around and land back in California while catching up with the constant rotation of the Earth. Without this capability, the astronauts might be forced to land in the Soviet Union with their classified payload, an undesirable outcome to say the least. Thanks to NASA’s Faustian bargain with the DOD, the Shuttle grew larger and heavier, with huge delta wings rather than shorter straight ones.⁵

In order to make the construction of the required Vandenberg launch facilities more economical, it was decided that the Air Force could simply refurbish the SLC-6 “Slick Six” launch pad that had been built for the MOL. Such cost-saving measures looked increasingly necessary to ensure DOD commitment to – and reliance upon – the shuttle. In June 1974, NASA Administrator James Fletcher wrote to Secretary of Defense James Schlesinger in a bid to keep the program on track:

Through our regular contacts with DOD, we understand that in the present review of the DOD five-year plan questions are being raised on the DOD participation in the shuttle program... [the Air Force] are working on ways to reduce the cost of the facilities planned at Vandenberg Air Force Base and to minimize the budgetary impact on DOD procurement of orbiters... My concern is that a decision in the DOD planning process to back away from previously planned DOD participation in the shuttle program, or a decision which implies that the DOD will not rely on the shuttle for its space activities in

⁵ Dwayne A. Day, “Invitation to Struggle,” in *Exploring the Unknown*, vol. 2, 263-4.

the 1980's, could be used by Congressional opponents of the program to attack and perhaps even cut back the shuttle development program.”⁶ Fletcher's plea was well-received. In August Deputy Defense Secretary William Clements wrote to assure him that once “the Shuttle's capabilities and low operating cost are demonstrated we expect to launch essentially all of our military space payloads on this new vehicle and phase out of inventory our current expendable launch vehicles.”⁷ Their receptiveness to the idea had a lot to do with the continued Air Force appetite for the military man-in-space. Schlesinger's predecessor David Packard had observed in 1971 that the shuttle was always about “national security and an intangible thing which might be called ‘men's presence in space.’”⁸

One of the shuttle's foremost champions in the late 1970s was Hans Mark, Jimmy Carter's Air Force Secretary. Mark was keenly aware of the Air Force's desire for military manned space flight. In his memoirs he paid special notice to former MOL astronauts like James Abrahamson and Robert Herres, “who would subsequently, and in different ways, make very important contributions to the nation's space program,” though neither were among the seven who became NASA astronauts. In 1978, Mark would co-author a study called “The Utility of Military Man in Space” to help sell the shuttle to the DOD.⁹ Mark's most consequential action was to direct the Air Force to build its satellites to be “Shuttle optimized” – that is, designed to exploit its unique capacities in payload size and on-orbit retrieval and servicing – to such an extent that they could often no longer be launched on expendable launch vehicles (ELVs). During the late 1970s, as they patiently waited for the shuttle to launch, the DOD reduced its

⁶ James Fletcher to James R. Schlesinger, June 21, 1974, in *Exploring the Unknown*, vol. 2, 380-1.

⁷ William Clements to James Fletcher, August 7, 1974, in *Exploring the Unknown*, vol. 2, 381-2.

⁸ Logsdon, *After Apollo?*, 224-5.

⁹ Hans Mark, *The Space Station: A Personal Journey*, 63-4.

procurement of national security satellites, creating, in Dwayne Day's words, "a 'bow wave' of unfunded requirements that drove up DOD space spending in the 1980s."¹⁰

The Shuttle finally saw its first orbital flight, STS-1, in 1981. Later that year, James Abrahamson, formerly a member of the last group of MOL astronauts, was named the associate administrator for the entire Space Shuttle program. Abrahamson had just barely missed out on being an astronaut transfer to NASA, having only just turned 36 when the MOL program was cancelled. Through his friendship with NASA astronaut Bill Anders, however, he was invited to aid in space policy through the National Aeronautics and Space Council, where he stayed until 1973. He then went back to the Air Force to direct the development of a new missile system and later the F-16 fighter. He consciously applied his previous experience with MOL in his effort to overcome budget cuts and delays. He later recalled that "trying to apply what I'd learned in the Manned Orbiting Laboratory, I said, 'We're going to find a way and we're going to keep going forward.'" His imperious dealings with contractors netted him a "drubbing-down" from his superiors, but the program was a success. Early in Ronald Reagan's first term, Hans Mark (now NASA deputy administrator) invited him to direct the Shuttle.¹¹

After managing the successful second and third Shuttle flights (STS-2 and -3), Abrahamson would play a key role in the public declaration that the vehicle – and the Space Transportation System it now represented – were now "fully operational." In 1982 Reagan desired to use the upcoming launch of STS-4 – the first shuttle flight to carry a classified DOD payload – as a backdrop for a speech announcing his space policy. Abrahamson warned that the weather at Canaveral might delay the launch and that an unexpected tragedy would reflect poorly

¹⁰ Dwayne A. Day, "Invitation to Struggle," in *Exploring the Unknown*, vol. 2, 265-6.

¹¹ James A. Abrahamson, interview by Jennifer Ross-Nazzari, Herndon, VA, July 23, 2012, NASA Oral History Project, Houston.

on the Administration. He suggested that the president instead attend the shuttle's Fourth of July landing at Edwards Air Force Base, where "the weather is nearly always okay."¹² On July 4, Space Shuttle *Columbia* touched down in California, and Reagan greeted its returning crew, Ken Mattingly and former MOL astronaut Hank Hartsfield. Addressing the crowd on a spangled bandstand erected in front of the test orbiter *Enterprise* (see Figure 5.2), Reagan declared:

Beginning with the next flight, the *Columbia* and her sister ships will be fully operational, ready to provide economical and routine access to space for scientific exploration, commercial ventures, and for tasks related to the national security...

... in the area of national security, our space systems have opened unique opportunities for peace by providing advanced methods of verifying strategic arms control agreements. The shuttle we just saw land carried two kinds of payloads, one funded entirely by private industry, and the other, related to our national security, sponsored by the Air Force.

To conclude his speech, Reagan directed his audience's attention away from *Columbia* and *Enterprise* to the Space Shuttle fleet's newest orbiter:

...if you'll all just look—well, I'm sure down in front maybe you can't see—but way out there on the end of the runway, the space shuttle *Challenger*, affixed atop a 747, is about to start on the first leg of a journey that will eventually put it into space in November. It's headed for Florida now, and I believe they're ready to take off. *Challenger*, you are free to take off now.¹³

Abrahamson was well rewarded for the spectacular success of the event. He joined Reagan on the stage, and the president affixed the third star on his uniform that would signify his promotion to Lieutenant General. Several months later on March 23, 1983, Reagan delivered a television address to announce his Strategic Defense Initiative (SDI), which came to be popularly

¹² Ibid.

¹³ Ronald Reagan, Remarks at Edwards Air Force Base, California, on Completion of the Fourth Mission of the Space Shuttle Columbia, July 4, 1982, transcript, *The American Presidency Project*, <http://www.presidency.ucsb.edu/ws/index.php?pid=42704>.

known, often derisively, as “Star Wars.” Abrahamson immediately pitched the Space Shuttle as a vital contributor to the SDI experiments, and a year later he was invited to become the SDI’s first director. As much as he loved his NASA work, he couldn’t pass up what he saw as the “chance to change the effectiveness of ballistic missiles and have a real impact on whether or not mankind survives.”¹⁴



Figure 5.2. Ronald Reagan declares the Space Shuttle “fully operational” before a crowd at Edwards Air Force Base, July 4, 1982. Source: NASA.

One of the first SDI-related payloads intended to be tested on the shuttle was an experimental aircraft tracking system codenamed Teal Ruby. It was decided that the satellite would require a polar orbit for adequate testing, so it was slated for the first flight planned to launch from SLC-6 at Vandenberg – STS-62A* – in July 1986.¹⁵ The mission was to be commanded by MOL veteran Robert Crippen and be crewed largely by astronauts who had been recruited into NASA by the Air Force. Among them was younger astronaut Mike Mullane. In his

¹⁴ James Abrahamson, NASA Oral History Project.

* The shuttle mission numbering changed between STS-9 and STS-26 to a system in which the first digit would be the last digit of the slated year for the launch, the second would indicate whether the launch was from Canaveral or Vandenberg, and the letter was a sequential numbering of flights within the year. For example, STS-62A would indicate the first 1986 flight from launch range 2 (Vandenberg).

¹⁵ David M. Harland, *The Story of the Space Shuttle*, 93-94.

colorfully candid (and thoroughly entertaining) memoir *Riding Rockets*, he reminisced about his anticipation of the experiencing the polar-orbiting spaceflight that MOL had been designed for:

I was deliriously happy about my good fortune. The Vandenberg mission was going to be a true first. It would carry me and the rest of the crew into polar orbit, something no human had ever done. The poor schmucks flying out of KSC [Kennedy Space Center] on the commercial communication satellite deployment missions only got to see a narrow strip of the Earth between 28 degrees north and 28 degrees south latitude... How boring. In a polar orbit we would see all of the Earth. We would fly *through* the northern and southern lights. We would fly over the Greenland ice cap and the mountain ranges of Antarctica. We would pass over all of the Soviet Union. It was a mission [MOL veteran] Hank Hartsfield would have loved — he could have made the Kremlin a target for one of his BMs... I was mad to get into space on this mission.¹⁶



Figure 5.3. The SLC-6 “Slick Six” launch complex at Vandenberg AFB, with the Enterprise test orbiter in a launch configuration mockup. Source: U.S. Air Force.

STS-62A would never fly.

Six months before its slated launch, shuttle mission STS 51-L launched from Cape Canaveral. About 65 seconds after liftoff, one of its solid rocket boosters (SRBs) developed a

¹⁶ Mike Mullane, *Riding Rockets: The Outrageous Tales of a Space Shuttle Astronaut* (New York: Scribner, 2006), 216-7.

leak through a rubber O-ring chilled brittle during the previous night, and a blowtorch-like jet of flame penetrated the shuttle's external fuel tank, which began spilling hydrogen. The SRB broke partly free and caused a leak of liquid oxygen which mixed with the hydrogen and detonated. The Space Shuttle *Challenger* was destroyed and its seven astronauts killed, live on television.¹⁷ It was the most public disaster in NASA history.

Once the problem had been traced to an SRB failure, the polar orbiting shuttle was a thing of the past. Because flights from Vandenberg did not benefit from the extra "boost" provided by the Earth's rotation, as with eastward launches from Florida, some payload sacrifices had to be made to compensate. NASA tried to recover some of the lost weight by developing lightweight spun filament versions of the SRBs to be used in Vandenberg launches, and they now appeared to be too dangerous to certify. As Mullane remarked, if the engineers "had been unable to seal a steel booster, the thinking went, how much more difficult would it be to seal one made of spun filament and glue?"¹⁸

Several billion dollars had been spent by the Air Force modifying the old MOL launch pad for shuttle use, and now that money appeared to be wasted. The shuttle would be grounded for almost three years, while the DOD was left sitting on a series of vital payloads that, thanks to Hans Mark, could not be launched on anything else.¹⁹ In the aftermath of *Challenger*, the Air Force intensified its search for an alternative to the shuttle for SDI and other military launches. In a December 1986 DOD report, the SLC-6 launch facility at Vandenberg was determined to be largely incompatible with the launch vehicles required for non-shuttle SDI vehicle systems, assumed to consist largely of kinetic energy weapon (KEW) platforms designed to destroy

¹⁷ David M. Harland, *The Story of the Space Shuttle*, 48.

¹⁸ Mike Mullane, *Riding Rockets*, 229

¹⁹ John L. McLucas, *Reflections of a Technocrat*, 195.

incoming ballistic missiles. The former MOL facility was recommended to be used only for “contingency and surge operations.”²⁰

The love affair between NASA and the Air Force, which began when McNamara forced their collaboration on MOL, was over. Neither party had benefitted in the long term. NASA was left with a launch vehicle literally weighed down by the military requirements it had been designed to meet and would be forced to use it for decades after those requirements vanished. The Air Force, in turn, was left for a time with no ability to launch its most vital payloads at all. For some, the bitterness may have been personal. Air Force Under Secretary Pete Aldridge, following the lead of shuttle “passengers” like Senator Jake Garn and Congressman Bill Nelson, had finagled his way onto the crew of STS-62A. He displaced one of the spaceflight engineers who were to oversee the deployment of Teal Ruby in his desire to ride along on the historic first flight from Vandenberg. Shortly after *Challenger* he was promoted to Secretary, and immediately “initiated development of the Titan IV, scrapped SLC 6, and wound down the Air Force’s commitment to the Shuttle as quickly as he could.”²¹

The Military Man in Space Flies at Last

The *Challenger* disaster doomed the Air Force’s dreams of manned spaceflight, but they did not immediately end them. All seven of the MOL “cuckoos” who came to NASA in 1969 had waited patiently for over a decade for a chance to fly in space, and they all made it there. Every one of the Space Shuttle’s first eight missions was either commanded or piloted by a MOL veteran, often two at once. Though they were now civilian astronauts, they still carried the legacy

²⁰ U.S. Department of Defense, *Launch Systems for the Strategic Defense Initiative: Data Book*, Air Force Space Division, December 1986.

²¹ David M. Harland, *The Story of the Space Shuttle*, 97-8; Mike Mullane, *Riding Rockets*, 202-6.

of the “military man-in-space” idea. Hank Hartsfield had flown NASA’s first classified payload to orbit on STS-4. They were soon joined by a new generation of Air Force astronauts recruited by Hans Mark for the shuttle in 1979 – these “manned spaceflight engineers” (MSEs) would not be civilian astronauts but active duty military personnel tasked with overseeing the deployment of classified DOD payloads.²²

Only two MSEs ever flew in space, however. The first was Colonel Gary Payton, who joined the crew of STS-51C, the first fully secret Department of Defense shuttle mission. This flight was “so classified that even the imminence of its launch was not announced until the clock picked up at the end of the T-9 minute hold.” As Payton himself would later reflect, this was a “big cultural change for NASA,”²³ where the rule had always been maximum openness. The “closed door” of STS-51C became the focus of media attention and resentment, but the mission was a success. It ended up being one of the shortest shuttle flights in the vehicle’s history, reflecting the Air Force ethos to “get airborne, carry out the mission, and return to base with the minimum of distractions – in other words, operational efficiency.”²⁴ Missions like Payton’s may have helped give rise to a new slang term in the Air Force: “Space Shuttle door gunner” became a gently derogatory name for an “armchair commando, one who likely did not serve in the military yet insists they did highly unbelievable things.”²⁵

The age of the dedicated military astronaut ended with the termination of the MSE program in 1988, but the DOD continued to fly the last of its “Shuttle optimized” payloads after the shuttle program became operational again that year. Some of these were classified missions,

²² David M. Harland, *The Story of the Space Shuttle*, 97-8.

²³ Gary E. Payton, “The Cold War Space Race” (lecture, University of Colorado Boulder, April 3, 2018)

²⁴ David M. Harland, *The Story of the Space Shuttle*, 40.

²⁵ “Space shuttle door gunner,” Urban Dictionary, last updated October 14, 2005, accessed March 19, 2018, [https://www.urbandictionary.com/define.php?term=space shuttle door gunner](https://www.urbandictionary.com/define.php?term=space%20shuttle%20door%20gunner)

but a few were not. One in particular would seem to be a spiritual revival of the MOL – the M88-1 “Military-Man-in-Space” module was carried aboard STS-44 in its November-December 1991 flight. M88-1 was a tri-service (Air Force, Army and Navy) experiment designed to assess the capabilities of the human eye for on-orbit military reconnaissance. During the mission, the experiment was conducted by Payload Specialist Thomas Hennen and Jim Voss. Both were originally from the Army and already had security clearances as a result. Though Hennen was a trained military intelligence specialist, Voss thought his own selection for the flight was “not so much due to any previous reconnaissance training I had, but more because of the clearance convenience.”²⁶

The experiment was a moderate success, despite minor damage to M88-1 module suffered during its pre-flight stowage, the poor optical qualities of the Shuttle’s rear viewports, and the flight being described as “one of the cloudiest missions in shuttle history.” The post-mission report by the experiment’s principal investigators stated:

With the small sample size, statistical analysis was difficult, at best. Even without statistical significance, we believe that with the data collected, we have successfully met our objectives. The ability of the PS [Payload Specialist] to dynamically acquire targets other than those which were provided to him in real time, detect target motion, work around or fix hardware anomalies, and use his decision making abilities to streamline the conduct of the experiment, demonstrated the flexibility and utility of the man-in-the-loop. These were all worthwhile data points which are hard to quantify.²⁷

While the M88-1’s tracking system profited from over two decades of advancement in computer-aided tracking, the mission did not have the benefit of MOL’s huge KH-10 DORIAN telescope and camera apparatus. Even the modest success of this “Military-Man-in-Space,” therefore,

²⁶ James Voss, interview by author, Boulder, CO, January 30, 2018.

²⁷ John Huth, James D. Whiteley, and John E. Hawker, “Visual Earth Observation Performance in the Space Environment,” *National Aeronautics and Space Administration: Sixth Annual Workshop on Space Operations Applications and Research (SOAR 1992) vol. 2* (February 1993): 529-539.

seemed to be a partial vindication of the unrealized military man-in-space mission of the Manned Orbiting Laboratory.

Conclusion

Was the Manned Orbiting Laboratory merely an Air Force toy, a deservedly forgotten piece of trivia to be wondered at by spaceflight historians and enthusiasts? Certainly not. A full exploration of the MOL's story, upon which this thesis has aspired to embark, reveals a saga that is inextricably –heretofore in many ways invisibly – woven into the fabric of modern American military and space policy.

It was a textbook example of the young Air Force's persistent fixation on the dream of a military man in space. Due to its reliance on NASA's Gemini technology, its genesis prompted the beginnings of a reversal of the civilian-military rivalry that defined the early Space Age, a reversal that endured for nearly three decades. During the height of the program, it advanced the science of spacecraft design, bioastronautics, and especially photographic reconnaissance technology. It ended NASA's monopoly on trained astronauts, and its military space men would come to play a dominant role in shaping space policy for twenty years. Even the cancellation of the MOL would bring NASA and the DOD even closer together to drink at a shrinking pond dried up by economic and political forces. The system that MOL built would thus, for a time, militarize the U.S. civilian space program, which had been intended to be a peaceful beacon of American technological might. Thanks to its accession to the requirements of its Air Force partner, NASA was left with a Space Shuttle that was oversized, overweight and dangerously unreliable.

The historian Dwayne Day has argued that this era of NASA-Air Force partnership – wrought by the MOL and ending with and the Space Shuttle – was engineered not by either agency's own personnel but rather by a succession of civilian leaders who imposed it on them from above. As a consequence, the "institutional memory" of the Air Force was left with an

enduring suspicion of enforced coalitions. “The situation,” he says, “was akin to what Mark Twain once said about a cat that sits on a hot stove top: it will never sit on a hot stove top again, but neither will it sit on a cold one... despite the change of the civilian political leadership at both DOD and NASA from both the change of administrations and simple personnel turnover, the institutional memory of the Air Force – its uniformed officers – remained highly distrustful of any cooperative agreement foisted on them by civilians.”¹

It is true that many, though certainly not all, of the decisions that gave birth to these agreements were made not by uniformed military officers or NASA employees but by their civilian leadership. A succession of Defense and Air Force Secretaries and Under Secretaries, with their NASA Administrator and Deputy Administrator counterparts, were indeed instrumental in forging this close partnership between the civilian and military space programs. The NASA-DOD alliance would likely not have taken the shape it did without the dictums of Robert McNamara, James Webb or Hans Mark. But the age of the Air Force astronauts enabled by this era of cooperation would not have come to pass without active complicity from the likes of Chuck Yeager, James Abrahamson or the uniformed father of the Air Force space program himself, Bernard Schriever. As we have seen, neither NASA nor the Air Force would benefit from its collaboration in the long term.

In spite of all its political entanglements, though, we space enthusiasts may still take a step back to admire the sheer ambition and Space Age adventure of a story like the Manned Orbiting Laboratory and ask the tantalizing “what ifs.” What if those men had been able to climb atop the Titan rockets and ride their cherished machines, for weeks at a time, over unknown terrain and through the auroras? What if it was the U.S. and not the Soviet Union who won the

¹ Dwayne A. Day, “Invitation to Struggle,” 269.

race for the first space station? What if the Air Force astronauts had been able to turn their state-of-the-art telescopes away from their Soviet adversary and look at the planets and stars? In the context of its day, the MOL was an impressive, audacious machine. It was not a toy. Bernard Schriever would look back on the program from the close of the last century and remark: “you know, after all, we were involved in something brand new, and it wasn’t just a plaything that we were dealing with.”²

² Bernard Schriever, interview by Carol Butler, April 15, 1999, transcript, NASA Oral History Project, Johnson Space Center, Houston

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