
AIR AND SPACE VERSUS “AEROSPACE”

From the earliest days of its independence from the Army in 1947 until nearly the end of the next decade, the Air Force paid close attention to space as an arena of interservice feuding over rightful prerogatives when it came to missile and satellite development. However, not only did it do little to begin actually pursuing the requisite missile and satellite technologies for exploiting space until well into the 1950s, it did virtually nothing to develop a coherent set of principles for understanding how space related to its evolving air doctrine.¹ Indeed, during that period, the Air Force did not invest in space as an operating environment in any significant way. It merely asserted jurisdictional claims to the development and ownership of any missiles and military satellites that might happen to operate in or transit it. To all intents and purposes, the Air Force’s first decade was doctrine-free with respect to space and its potential contributions to joint warfare.

Then, in 1958, came Air Force chief of staff General Thomas D. White’s introduction of the term “aerospace,” a new construct that depicted air and space as a seamless continuum stretching from the earth’s surface to infinity. More important yet to an understanding of the organizational politics of military space, that term further claimed *both* parts of the continuum as the Air Force’s due preserve. Although the term’s advent was preceded by no evident conceptual

¹The December 1945 report of the AAF’s Scientific Advisory Board (headed by Theodore von Karman), entitled *Toward New Horizons*, placed its greatest weight on the postwar AAF’s most immediate concern—developing jet-propelled aircraft. It paid only lip service to missiles and satellites.

deliberations or serious debate within the Air Force, it became the service's new mantra almost overnight and was soon inserted into formal Air Force doctrine.

Not everyone in the Air Force during the ensuing years, however, signed up to the notion of air and space as a unitary operating environment. Not only did the rest of the national security community continue to view air and space as separate mediums, even many among the Air Force's most senior leaders demurred on the proposition that air and space represented an indivisible whole, at least when it came to the everyday practicalities of institutionalizing space as a military mission area. As the previous chapter showed in broad outline, those Air Force leaders—from the highest level on downward—who engineered the establishment of Air Force Space Command well appreciated that space was a separate medium warranting separate mission-area development. Nevertheless, throughout the Air Force's history since 1958, "aerospace" has figured prominently in the service's rhetoric. Moreover, the idea behind it underwent a forceful resurgence during the second half of the 1990s, as the Air Force leadership declared that the service had become an "air and space force" on an evolutionary path toward becoming a "space and air force." That refrain appeared at first glance to recognize air and space as separate mediums. In fact, in keeping with the earlier logic of aerospace, it considered them a seamless continuum comprising the Air Force's rightful milieu—but with the added implication that military space operations, once fully developed and proven, would eventually displace air operations as the service's main activity.

As a result, the Air Force entered the 21st century deeply divided over space and heavily caught up in what one space officer called "a heated and ongoing debate between two schools of thought."² One school stressed "aerospace" as a single continuum in the vertical dimension. The other regarded space as an operating medium separate and distinct from the earth's atmosphere. For those espousing the single-continuum idea, that approach was seen as the only way to ensure that the Air Force retained an organizational lock on space.

²Major M. V. Smith, USAF, "Ten Propositions Regarding Spacepower," M.A. thesis, School of Advanced Airpower Studies, Maxwell AFB, Alabama, June 2001, p. 2.

For those on the other side of the debate, the term “aerospace” was considered a guaranteed recipe for space *not* to get the attention it properly deserved and, hence, an approach that threatened to lose space for the Air Force sooner or later.

THE ROOTS OF THE “AEROSPACE” CONSTRUCT

There continues to be disagreement over the precise origin of the “aerospace” idea. A respected chronicler of Air Force doctrine, Robert Frank Futrell, has ascribed the term’s provenance to Woodford Hefflin of the Air University’s Research Studies Institute, who issued a document on February 23, 1958 called “Interim Glossary, Aero-Space Terms.”³ Another Air Force writer has countered that it was he who introduced the term, in an Air Force News Service release issued on July 8, 1958.⁴ Whatever the term’s exact derivation, however, it seems clear that the idea behind it had not been given much serious reflection within the Air Staff before General White formally introduced it into official Air Force rhetoric.

In an important precursor statement that anticipated the term by indicating the direction of Air Force leadership thinking, General White declared in testimony to the House Appropriations Subcommittee in 1957 that “missiles are but one step in the evolution from manned high-performance aircraft to true manned spacecraft; and in the force structure of the future . . . we will have all three systems.”⁵ Later, on November 29, 1957, the Air Force chief observed at the National Press Club that just as air power enabled land and sea operations, so henceforth “whoever has the capability to control space will likewise possess the capability to exert control of the surface of the earth.” Continuing, White said, “I want to stress that there

³Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907–1960*, Vol. 1, Maxwell AFB, Alabama: Air University Press, 1989, p. 553.

⁴Frank W. Jennings, “Doctrinal Conflict over the Word Aerospace,” *Airpower Journal*, Fall 1990, p. 52. See also Frank W. Jennings, “Genesis of the Aerospace Concept,” *Air Power History*, Spring 2002, pp. 46–55.

⁵Futrell, pp. 545–546.

is no division, per se, between air and space. Air and space are an indivisible field of operations.”⁶

Finally, the term “aerospace” itself officially surfaced for the first time during the summer of 1958 when General White announced that Americans were now living in “the aerospace age.” Succinctly stating the Air Force’s newly emergent position on air and space, he said: “Air and space are not two separate media to be divided by a line and to be readily separated into two distinct categories; they are in truth a single indivisible field of operations. Space is the natural and logical extension of air; space power is merely the cumulative result of the evolutionary growth of air power. . . . Air Force goals have changed in degree only; the basics have been constant—greater speed, longer range, and higher altitude.”⁷

That declaration, characterized by Walter Boyne as “intuitive” on White’s part, seems in hindsight to have been impromptu in its genesis rather than arrived at in any systematic and considered way.⁸ One observer has maintained that the single-medium idea had its origins in a vision of air and space as a unitary continuum constituting the natural province of airmen first enunciated in 1945 by Army Air Force (AAF) chief of staff General Henry H. “Hap” Arnold, who was said to have “formally introduced the aerospace concept.”⁹ Yet although that observer offers a rich and insightful accounting of the Air Force’s early struggle for dominance of space as a mission area, his case for General Arnold’s “vision” of aerospace as an Air Force birthright is based entirely on presumption, apparently derived from little more than a report by Arnold to Secretary of War Robert Patterson in November 1945. That report made passing reference to the

⁶General Thomas D. White, USAF, “At the Dawn of the Space Age,” *The Air Power Historian*, January 1958, pp. 15–19.

⁷General Thomas D. White, USAF, “The Inevitable Climb to Space,” *Air University Quarterly Review*, Winter 1958–59, pp. 3–4.

⁸Walter J. Boyne, *Beyond the Wild Blue: A History of the U.S. Air Force, 1947–1997*, New York: St. Martin’s Press, 1997, p. 267.

⁹Major Stephen M. Rothstein, USAF, *Dead on Arrival? The Development of the Aerospace Concept, 1944–58*, Maxwell AFB, Alabama: Air University Press, November 2000, p. 11.

possibility of delivering high-velocity projectiles from “true space ships, capable of operating outside the earth’s atmosphere.”¹⁰

Indeed, quite to the contrary, it is all but beyond dispute that the Air Force’s earliest motivations with regard to space had to do with turf protection rather than with any bona fide interest in space operations concept development. Fears of Army pretensions and a staunch determination to stake out a forceful claim to space-related systems by the AAF were first manifested in a January 1946 memorandum from Colonel T. A. Sims of the AAF’s new R&D Division to the vice chief of staff, General Ira Eaker: “Many [Army] Ordnance developments encroach on the AAF field. . . . The [issue] is whether we should continue as is for the time being . . . or whether we should attempt to energize our guided missiles program and take over some of the projects started by Ordnance. . . . Admittedly, we do not know the composition of a guided missile launching force . . . [but] just to indicate progressive thinking and the AAF interest in taking a major part in the lightning warfare of the future. If we do not do this, the Artillery may beat us to the punch.”¹¹

Similarly, the head of AAF R&D, then–Major General Curtis LeMay, wrote to the AAF’s chief of staff, General Carl Spaatz, later that September: “At the outset, it was recognized that Ordnance was entering the [space] field early and aggressively to antedate AAF competition. . . . One very serious reason for not giving ground is the stated opinion of Army Ground Forces that AGF should operate its own guided missiles, close support aircraft, and strategic bombardment aircraft, classing all these as extensions of artillery. It is fairly certain that if development of missiles is turned over to Ordnance, operation will be done by Army Ground Forces, and it will be only a short and logical step from this to operation of support and strategic aircraft by AGF. . . . Our best course seems to be to . . . [seek] assign-

¹⁰Ibid., pp. 11–12. No reference to any such “aerospace” vision can be found in a substantial recent treatment of Arnold’s career by Dik Alan Daso, *Hap Arnold and the Evolution of American Air Power*, Washington, D.C.: Smithsonian Institution Press, 2000.

¹¹Memorandum from Colonel Sims to General Eaker, January 2, 1946, cited in Edmund Beard, *Developing the ICBM: A Study in Bureaucratic Politics*, New York, Columbia University Press, 1976, p. 33.

ment of all guided missiles.”¹² By the same token, when the Navy in December 1947 submitted to the Defense Department’s Research and Development Board a claim for sole rights to satellite development, the AAF’s deputy chief of staff, General Hoyt Vandenberg, countered with a policy statement declaring that “the USAF, as the service dealing primarily with air weapons—especially strategic—has the logical responsibility for the satellite.”¹³ It was with these bureaucratic rights-of-ownership concerns uppermost in his mind that General White first introduced the term “aerospace” into the Air Force’s lexicon in 1958.

Five months after White first broached the “aerospace” idea in a public statement, the assistant vice chief of staff, Major General Jacob E. Smart, sent a letter to the commander of Air University outlining how that idea should be folded into the Air Force’s prevailing doctrine. In that letter, Smart recommended that the new Air Force doctrine include the assertion that “the positioning of aerospace power geographically and/or astronautically may have dominating significance in peace or war.”¹⁴ In 1959, the Air Force adopted as its official slogan “U.S. Air Force—Aerospace Power for Peace.”¹⁵ By the end of that year, the word *aerospace* had entered formal Air Force doctrine and was used not only as an adjective but as a noun. As defined by the edition of Air Force Manual (AFM) 1-2, *United States Air Force Basic Doctrine*, that was promulgated on December 1, 1959, “aerospace is an operationally indivisible medium consisting of the total expanse beyond the earth’s surface. The forces of the Air Force comprise a family of operating systems—air systems, ballistic missiles, and space vehicle systems. These are the fundamental aerospace forces of the nation.”¹⁶

¹²Major General Curtis E. LeMay, DCAS (Deputy Chief of the Air Staff), R&D, memorandum to General Carl A. Spaatz, September 20, 1946, cited in Beard, pp. 37–39.

¹³Robert L. Perry, *Origins of the USAF Space Program, 1945–1956*, Vol. 4, History of DCAS 1961, Air Force Systems Command Historical Publications Series 62-24-10, Los Angeles, Space Systems Division, AFSC, 1961, p. 30.

¹⁴Futrell, p. 553.

¹⁵Jennings, pp. 46–58.

¹⁶Futrell, pp. 553–554.

In sum, the bulk of evidence suggests that the “aerospace” idea was advanced by the Air Force leadership almost entirely by fiat, with little serious analysis or prior systematic thought given to it. Not only that, it was pressed into Air Force doctrine in complete indifference to the important physical and operational differences which exist between the two mediums (see the next section). As a testament to the failure of senior Air Force leaders to think very far beyond aerospace as a slogan for advancing the service’s programmatic interests, even General Bernard Schriever, the acknowledged father of serious Air Force involvement in space, had trouble articulating a persuasive aerospace concept of operations when pressed by a senator in congressional testimony to say whether he thought that “control of space [was] extremely important to the free world.” Schriever replied: “Well, I certainly do, although I would not give you exactly why in tangible terms. . . . A year ago, I thought perhaps the future battles would be space battles instead of air battles, and I still feel that way about it.”¹⁷ As space historian David Spires observed, “While the so-called indivisibility of ‘aerospace’ provided a conceptual approach to space that supported the service’s quest for military space missions, it did not contribute effectively to a planning process that required consideration of space as a separate medium.”¹⁸

CONCEPTUAL PROBLEMS WITH THE IDEA OF AEROSPACE

It is revealing of the aerospace construct’s origins and early intent that, whereas one looks in vain for a body of writing to develop the case for that perspective beyond its value in helping to justify an Air Force claim to space stewardship, there has been a profusion of thoughtful commentary by Air Force space professionals laying out variations on the argument for treating space as a separate medium and mission area. This commentary starts from the premise that the idea of aerospace is not only logically but empirically flawed. As one space weapons officer has compellingly noted, although the aerospace formula has long insisted that there is no clear line of demarcation between air and space, that formula ignores the 60-mile-

¹⁷“The USAF Reports to Congress,” *Air University Quarterly Review*, Spring 1958, pp. 50–51.

¹⁸David N. Spires, *Beyond Horizons: A Half-Century of Air Force Space Leadership*, Washington, D.C.: U.S. Government Printing Office, 1997, p. 82.

high band separating the highest altitude at which air-breathing aircraft can sustain flight and the lowest at which satellites can remain on orbit—and within which *no* systems can sustain other than ballistic flight. This transverse region begins at around 28 miles above the earth's surface, the upper limit of air-breathing engines, and ends at around 93 miles' altitude, the lowest sustainable perigee of an orbiting satellite. It is, in effect, an aerospace no-man's land. Vehicular operations within it are not practical with current and foreseeable technologies, since the energy expenditures required for maneuvering are prohibitively costly due to the laws of physics. The wings on so-called "aerospace" vehicles like the space shuttle and the abortive X-33 (canceled by NASA in March 2001) are only recovery systems analogous to parachutes.¹⁹ By this account, the rule of thumb that "if it's on orbit, it's in space" flatly belies the "aerospace" refrain that air and space are indivisible.

There are also some fundamental differences between air and space vehicles with respect to their freedom of operation.²⁰ To begin with, aircraft are fully maneuverable. Spacecraft, in contrast, operate at higher altitudes and speeds than do aircraft, and they cannot maneuver except through the costly expenditure of extremely limited onboard fuel provided for occasional orbital repositioning. Similarly, aircraft can mass repeatedly by maneuvering as appropriate within an area of operations. Spacecraft, in contrast, can mass for short periods of time with great effort and expenditure of fuel, but they will disperse almost immediately, and a repeat massing will be unlikely. In addition, air operations can be performed on demand. Spacecraft operations, in contrast, occur as scheduled or when on-orbit assets are available. Finally, the would-be inseparability of air and space is belied by important contrasts in the way international law and political conventions apply to the two. On the first count, aircraft do not enjoy unrestricted overflight rights over sovereign territory, especially over denied areas, whereas spacecraft do. On the second count, aircraft carrying bombs (and even ballistic missile warheads that traverse space en route to their targets) are not considered "space

¹⁹Smith, "Ten Propositions Regarding Spacepower," pp. 34–35.

²⁰For amplification of these points, see Lieutenant Colonel Michael R. Mantz, *The New Sword: A Theory of Space Combat Power*, Maxwell AFB, Alabama: Air University Press, May 1995, pp. 79–80.

weaponization,” whereas placing offensive space-to-ground munitions on orbit would most definitely be so considered.²¹

These and other differences one might list between air and space vehicles are far from inconsequential. On the contrary, they attest that air and space are separate mediums not only with respect to the laws of physics, but also in an important operational and tactical sense with regard to systems employment opportunities and constraints. For example, air power *can* be global in its reach and ability to impose effects on an opponent, whereas space power, by its very nature, can *only* be global.²² Because orbiting assets in space are widely separated, however, they cannot offer as much concentrated presence as can air power. On the upside, satellites—especially those in geosynchronous orbit—can be persistent in a way that aircraft cannot. (Even satellites in low earth orbit can offer discontinuous persistence.) The downside of this is that satellite movements are completely predictable and lack the freedom of maneuver enjoyed by aircraft.

Such contrasts between air and space as operating mediums point up the limits of the aerospace construct as a helpful framework for nurturing the sort of unrestricted theory of space power that was finally developed for air power after the latter was fully freed from the inhibiting bonds of land-warfare concepts of operations. An overly restrictive conception throughout much of the cold war cast air power in terms of either intercontinental nuclear attack or theater and battlefield support to land operations. It barely recognized the broad spectrum of conventional air employment options in between, such as those that were finally developed during the 1980s and showcased for the first time during the 1991 Gulf War—to say nothing of

²¹Smith, “Ten Propositions Regarding Spacepower,” p. 39.

²²This contrast in relative breadth of regard offered by the two mediums has been manifest in recent practice in one interesting respect: The one Air Force Space Operations Center (SOC) attached to 14th Air Force at Vandenberg AFB, Calif., maintains a global perspective by its very nature, whereas the numerous Air Operations Centers (AOCs) attached to U.S. regional joint-force headquarters around the world maintain only theater-wide perspectives. This important difference between the two was masked in an artificial and unconstructive way, however, by an exercise in verbal sleight of hand several years ago by which the very different terms “Air Operations Center” and “Space Operations Center” were superseded by “Aerospace Operations Center.” (The term now in use is “Air and Space Operations Center.”)

the potential for producing strategic outcomes independently of ground actions.²³ By the same token, the hobbled appreciation of what space might offer joint force commanders in principle—which has been occasioned by viewing space through the lens of air power theory—has arguably hindered our pursuit of the potential promise of space for achieving desired objectives independently of air or other terrestrial force applications.

OPPORTUNITY COSTS OF THE AEROSPACE EMPHASIS

As noted at the outset of this chapter, the aerospace idea was first put forward by the Air Force leadership during the late 1950s in an attempt to define an expanded operating arena for future Air Force assets. Yet that leadership did not offer, nor did it even attempt to offer, a convincing basis for explaining and justifying to a skeptical Eisenhower administration what the Air Force's role in space should be and how it should be fulfilled. It is tellingly indicative of the parochial and organizationally self-serving roots of the term aerospace that only the Air Force routinely employs it. Neither any of the other services nor the Office of the Secretary of Defense has ever endorsed the idea, and the term does not resonate in the joint arena. For example, it does not appear in the Defense Department's 1999 directive entitled *Space Policy*. Nor does it figure in any way in the unified U.S. Space Command's expansive *Long-Range Plan* which was promulgated in March 1998. It cannot be found anywhere in the Space Commission's report to Congress issued in January 2001. Consistent with these examples, all other U.S. national security documents similarly treat space as both a medium and a mission area separate and distinct from air. As early as 1958, concurrent with the initial surfacing of General White's idea of a unitary aerospace continuum, the National Security Council formally demurred, proclaiming on June 20, 1958 that the realm above the earth's surface was "divided into two regions: 'air space' and 'outer space.'"²⁴ That perspective has

²³For more on this topic, see Benjamin S. Lambeth, *The Transformation of American Air Power*, Ithaca, N.Y.: Cornell University Press, 2000, especially pp. 1–11 and 297–321.

²⁴NSC 5814, *U.S. Policy on Outer Space*, June 20, 1958, quoted in Rothstein, p. 2. That same NSC document for the first time also declared as national policy that although the U.S. government would take all appropriate measures in space to ensure the

unwaveringly stood as declared U.S. policy throughout the four decades since.²⁵

To many observers outside the Air Force, the aerospace construct tends to be understood primarily as a flawed but handy device for enabling that service to justify a roles and missions claim to space as well as to air.²⁶ To skeptics within the Air Force, it is widely viewed as a doctrinal liability—which has given the service a convenient, if not wholly convincing, basis for articulating that claim, albeit at the cost of limiting the development of a more robust space power theory unburdened by the baggage of familiar air power thinking. On the latter count, a midcareer Air Force space officer wrote as far back as 1985 that the very term “aerospace doctrine . . . inappropriately links our air and space doctrines.” In truth, he insisted, space systems have characteristics fundamentally different from those of air-breathing systems, “which cause differences in the principles of war as they apply to possible conflicts in space.”²⁷ He went on to suggest that “the environmental principles of aerospace war do not uniformly apply to space because the air and space environments are different.” Given the distinctive characteristics of orbital operations, he declared, there is no doctrinal foundation for the term aerospace.

nation’s security, it was the government’s intent that space “be used only for peaceful purposes.”

²⁵It bears noting, however, that the term had gained enough popular currency by 1991 that it was defined in Webster’s as “the earth’s atmosphere together with cosmic space beyond.” (*The New Lexicon Webster’s Dictionary of the English Language*, New York: Lexicon Publications, Inc., 1991, p. 13.)

²⁶Soon after the Air Force introduced the term aerospace, Major General Dwight Beach of the Army’s Office of the Deputy Chief of Staff for Military Operations was asked by Congressman John McCormick during testimony before the House Committee on Science and Astronautics what he thought of the term and which service he believed should have overall responsibility for military space activity. The Army general replied disdainfully: “Well, I never heard of that term before. I always heard of ‘armospace.’ . . . Congressman McCormick, I don’t believe any one service should have overall responsibility. It should be a national effort. . . . The Army has specific requirements in space, and our position is that no single military department should be assigned sole responsibility for military space operations.” (House of Representatives, *Missile Development and Space Sciences: Hearings Before the Committee on Science and Astronautics*, 86th Congress, 1st Session, February–March 1959, pp. 76–77.)

²⁷Lieutenant Colonel Charles D. Friedenstien, USAF, “The Uniqueness of Space Doctrine,” *Air University Review*, November–December 1985, p. 13.

He further charged that existing space doctrine was “highly constrained by . . . the misapplication of air principles to space.”²⁸

As for outsider perspectives, Colin Gray more recently observed in a similar vein that “aerospace is an unfortunate term because it denies the laws of physics and implies an operational continuum which technology and its dependent tactics thus far flatly deny. . . . A concept such as aerospace that effects a linguistic fusion of physically and operationally distinctive elements needs to be treated with caution. . . . Space is as geophysically, and hence technologically, tactically, and operationally distinctive from the air as it is from the land and the sea.”²⁹ Offering a concrete example of how the Air Force’s use of aerospace as a concept of force employment has tended to inhibit the fuller development of a pure theory of space power, two critics recently noted how the Air Force from the very beginning simply substituted the word “aerospace” for “air” in its doctrine manuals and thereby “inappropriately ascribed such [well-known attributes of air power] as speed, range, and flexibility to space forces,” when, in fact, the three main distinguishing features of space forces should more properly be thought of as “emplacement, pervasiveness, and timeliness.”³⁰

Of arguably even greater consequence than impeding the growth of a more forward-looking theory of space power, the aerospace construct has put the Air Force in the discomfiting predicament of having to make trade-offs between competing air and space systems in its resource allocations. Given its limited funds for R&D and procurement, these choices have increasingly forced it to sell *both* mediums and mission needs short. The latter problem can be traced to the early 1970s or thereabouts, when the Air Force first began acquiring a costly array of spaceborne assets aimed at serving the needs of not only nuclear deterrence by providing strategic

²⁸Ibid., p. 21.

²⁹Colin S. Gray, *Explorations in Strategy*, Westport, Connecticut: Praeger Publishers, 1996, pp. 64–65.

³⁰Lieutenant Colonel Peter Hays, USAF, and Karl Mueller, “Going Boldly—Where? Aerospace Integration, the Space Commission, and the Air Force’s Vision for Space,” *Aerospace Power Journal*, Spring 2001, p. 37. The latter characteristics were first proposed by Colonel Kenneth A. Myers and Lieutenant Colonel John G. Tockston, USAF, in “Real Tenets of Military Space Doctrine,” *Airpower Journal*, Winter 1988, p. 59.

intelligence, enemy missile launch warning, and attack characterization, but also senior warfighters by better enabling the application of conventional firepower in joint warfare. As long as the Air Force had so little invested in the space portion of aerospace, it could easily indulge itself with a vision that proclaimed both air and space as its rightful domain.³¹ Once it began buying into space-based equities in a serious way, however, it quickly learned that a major downside of staking out a mission area that included both air *and* space was that it now had to pay for both its air *and* space programs out of its largely fixed share of annual defense total obligational authority (TOA).

In brief, from a resource-apportionment perspective, the net result of insisting on aerospace as a single medium belonging primarily to the Air Force has been to saddle the service with the burden of funding what are, in fact, *two* mission areas with a share of TOA intended only for one—at least when it comes to needed hardware and investment in infrastructure and personnel. As a serving space officer has well described the Air Force’s conundrum in this respect, “today’s zero-sum budget environment does not provide enough money for organizations to support both their core competencies and other essential, though ancillary, functions. . . . Indeed, in many cases, the majority of users of space services resides outside the organization paying the bills. . . . Under today’s configuration, the Air Force is expected to equally prioritize funding opportunities for its own direct war-fighting capabilities as well as its own and its customers’ [space] support needs. These space services represent non-core, non-war-fighting services that carry some of our nation’s largest must-pay bills.”³² Former commander in chief of U.S. Space Command (CINCSpace) General Charles Horner has been even more outspoken on this point since his retirement from the Air Force in 1994. As he has complained time and again, “as long as each

³¹That was a time, one may recall, when the term aerospace was not taken seriously in most Air Force circles, since the “space” portion of it remained so underdeveloped in any operationally significant way. People merely giggled when ground power carts to start aircraft jet engines were grandiosely referred to as “Aerospace Ground Equipment.”

³²Lieutenant Colonel Cynthia A. S. McKinley, “The Guardians of Space: Organizing America’s Space Assets for the Twenty-First Century,” *Aerospace Power Journal*, Spring 2000, pp. 40–41.

service is funded at an artificial rate almost equal to one-third of the defense budget, the Air Force will be hard-pressed to fill its core air responsibilities while expanding its role in space. . . . At some point, the nation must ask itself whether our air and space capabilities should remain artificially limited with the present budgeting methodology, when both functions are becoming of greater importance to our defense strategy.”³³

A RESURGENT AIR FORCE FIXATION ON AEROSPACE

For a time during the 1980s and early 1990s, it appeared that the differentiation between the two mediums of air and space had come to be at least tacitly accepted by the fielded Air Force at senior leadership levels. Although aerospace rhetoric continued to find its way into Air Force vision and policy statements, Air Force Space Command had been activated and had begun to function as a space operations entity parallel to, but apart from, the Air Force’s other air-related major commands. To all intents and purposes, at least when it came to the day-to-day organization and management of the Air Force’s assets, the two mediums of air and space were each considered to be *sui generis*. The latter was viewed as supporting and enhancing the former, yet both were treated as operating arenas in and of themselves rather than part of a seamless aerospace continuum.

Then, at a high-level Corona meeting of the Air Force’s top leadership in 1996, the chief of staff, General Ronald R. Fogleman, led a novel initiative to characterize the Air Force as a service transitioning from an “air force” to an “air and space force” on an evolutionary path toward becoming a “space and air force.”³⁴ In that bold initiative, space was portrayed not only as the Air Force’s rightful domain and destiny, but also as an arena that would eventually displace air as the service’s primary realm of operations. In effect, Corona 1996 promised that air operations would eventually be supplanted by space functions and that the service’s space

³³General Charles A. Horner, USAF (Ret.), “Air Power: Growing Beyond Desert Storm,” *Aviation Week and Space Technology*, April 16, 1997, p. 73.

³⁴General Ronald R. Fogleman and the Honorable Sheila E. Widnall, *Global Engagement: A Vision for the 21st Century Air Force*, Washington, D.C.: Department of the Air Force, November 1996, p. 8.

professionals would, in the fullness of time, inherit the Air Force and its most senior leadership positions. It most definitely regarded air and space as a seamless continuum in all but name.

The Corona 1996 line, however, was not universally accepted in senior Air Force circles. One Air Staff three-star general frankly wondered whether the statement about transitioning from “air and space” to “space and air” was sincerely motivated or merely represented a ploy aimed at staking a renewed claim to Air Force rights of military space ownership while also striving to co-opt any would-be space separatists who might otherwise become inclined at some point to abandon the Air Force and press for the establishment of an independent U.S. space force. He added that the statement was most definitely the product of a conscious effort to keep space within the Air Force family at all costs. He further observed that in so doing, it both overpromised and embraced the wrong vision.³⁵ Other skeptics questioned the extent to which the service was determined to back its rhetorical assurances with the appropriate resource allocations, with one senior space general noting wryly that however much the idea of transitioning to a bona fide “air and space force” may have been accepted by the Air Force leadership in principle, genuine commitment to it had yet to attain what he called “brush-fire proportions.”³⁶

Indeed, a concern voiced in at least some Air Force quarters was that if the Corona 1996 formula was pursued to its natural conclusion, the Air Force could end up having to mortgage its *air* force-projection responsibilities in order to pay for its declared commitment to developing space as an expanded mission area. Nevertheless, Air Force space professionals seemed understandably inclined to take the promise at face value. The vice chief of staff and most senior serving Air Force space officer at the time, General Thomas S. Moorman, Jr., characterized Corona 1996 as an “incredibly significant” watershed, representing not merely the thinking of “a subset of folks doing a focused study, but rather the consensus of the

³⁵Interview by the author, Headquarters U.S. Air Force, Washington, D.C., April 30, 1998.

³⁶Interview by the author, Headquarters Air Force Space Command, Peterson AFB, Colorado, June 18, 1998.

Air Force leadership.”³⁷ An unfortunate by-product of that reaction was a fear among some Air Force leaders that the service’s space professionals may have been set up for what could prove to be unrealistic expectations. As long as the present arrangement for funding Air Force air and space programs remained unaltered, it would become ever harder as a practical matter to provide for the legitimate resource needs of both.

Partly as an outgrowth of that concern, Fogleman’s successor as Air Force chief, General Michael E. Ryan, concluded that the Corona 1996 formula was more divisive than unifying for the service’s air and space communities. Attempting to apply a corrective, he reaffirmed in late 1997 that the Air Force’s destiny was indeed as a “space and air force.” Yet he endorsed more resoundingly than ever the single-medium/single-mission outlook in stressing that “air and space are a continuum—forever . . . [and that] requires a clear realization that there is no delineation, break, or boundary in the third dimension. There is space in air and air in space; it’s just that the molecules further out are a long way apart. . . . We can have no fire-support coordination line in the vertical dimension.”³⁸

Early the following year, General Ryan moved to reconsider the wisdom and appropriateness of continuing to use the “air and space” formula put forward at Corona 1996. In a memorandum to the Air Force’s top generals, he reported that “at Corona South ’98, the senior Air Force leadership committed to the integration of air and space power into an aerospace force.” He then directed the creation of an Aerospace Integration Task Force (AITF) composed of the Air Force’s “best ‘aerospace’ thinkers” to work toward building “a single, consolidated plan that will provide continued integration of air and space power and orderly migration to future capabilities which best exploit the seamless aerospace dimension.”³⁹

The AITF eventually concluded that the Air Force should more assertively play up the “aerospace” theme to underscore the pro-

³⁷Letter to the author from General Thomas S. Moorman, Jr., USAF, July 8, 1997.

³⁸General Michael E. Ryan, USAF, speech to the Air Force Association national symposium, Los Angeles, November 14, 1997.

³⁹General Michael E. Ryan, USAF, memorandum on Aerospace Integration Plan Task Force, April 13, 1998, quoted in Rothstein, pp. 2–3.

claimed indivisibility of the two mediums. In short order, the Air Force vision statement released in June 2000 duly spotlighted that theme and called for more fully melding the Air Force’s air and space equipment, capabilities, and personnel toward the common goal of improving the effectiveness of “aerospace power” in joint warfare.⁴⁰ In a similar vein, a white paper issued by the Air Force a month earlier posited an Air Force view of the “flight domains of air and space as a seamless operational medium.” It added: “The environmental differences between air and space do not separate the employment of aerospace power within them. . . . [Our] vision includes a mix of air and space capabilities interacting for maximum effect throughout the aerospace continuum.”⁴¹ As but one of many symbolic totems attesting to that change, the name of the Air University’s professional quarterly, *Airpower Journal*, was summarily changed to *Aerospace Power Journal* in late 1999.⁴²

In a subsequent effort to clarify the reasons for the change, former CINCSPACE General Howell M. Estes III described the Air Force of the late 1990s as standing “at a crossroads much like the one encountered earlier this century between land forces and air power advocates. The result of the Army’s inability to make the necessary culture change was decades of delay, higher costs and casualties, and finally a separate service.”⁴³ The implication was that the Air Force would run a comparable risk of losing space to another organizational entity if it failed to embrace space as an inherent part of its own corporate charter. How the Air Force might increase overall funding for

⁴⁰General Michael E. Ryan and the Honorable F. Whitten Peters, *Global Vigilance, Reach and Power: America’s Air Force Vision 2020*, Washington, D.C.: Department of the Air Force, June 2000.

⁴¹General Michael E. Ryan and the Honorable F. Whitten Peters, *The Aerospace Force: Defending America in the 21st Century*, Washington, D.C.: Department of the Air Force, May 2000.

⁴²Action officers on the Air Staff also became single-minded terminology policemen in their blanket insistence on indiscriminately and uniformly substituting the word “aerospace” for “air” whenever the latter was invoked, even if the intended usage was only in reference to “air” power more narrowly construed. One such case in which the author was involved was *Aerospace Operations in Urban Environments: Exploring New Concepts* by Alan Vick et al., RAND MR-1187-AF, 2000. The title originally submitted was *Air Operations in Urban Environments*.

⁴³General Howell M. Estes III, USAF (Ret.), “The Aerospace Force of Today and Tomorrow,” in Hays et al., eds., *Spacepower for a New Millennium*, p. 165.

new space systems within its own limited budget, however, was left unexplained. Estes suggested that a proper funding level for military space would give it 20 percent of the Air Force's TOA from FY03 to FY15. Yet he did not indicate what other Air Force programs should be cut in order to free up that additional funding, let alone broach the delicate but increasingly unavoidable question of how to get the other services to help underwrite those Air Force-provided space support and force-enhancement functions of which they were and remain the principal beneficiaries.

On a related but separate issue, Estes saw as "problematic" the use of the "air and space" and "space and air" formulations that had been endorsed at Corona 1996, suggesting that they had led to "community entrenchment and fruitless debates about when the transitions might occur," to say nothing of causing Air Force airmen "to lose sight of our true vision, namely, that airmen must control the *vertical dimension*" [emphasis in the original]. Estes added that those on the "space and air" side were perceived by their air-oriented brethren as space zealots, whereas those on the "air and space" side were seen by Air Force space professionals as back-pedalers. The undesirable result, he said, was a perpetuation of two separate and segregated Air Force communities, those of air and space, "rather than encouraging cooperation between, and integration of, the two." He insisted that the Air Force needed to think in terms of "aerospace solutions . . . rather than air or space solutions."⁴⁴ In explaining the intent and results of General Ryan's AITF, he added that the Air Force had "resolved to get back on course by dropping the original *Global Engagement* terminology in favor of the single term aerospace" and to encourage airmen to think in terms of exploiting the vertical dimension, or, as he characterized it using a noun, "the aerospace."

⁴⁴Ibid., p. 167. In a telling reflection of the Air Force's conceptual drift with respect to the core issue of whether air and space should be treated as a single medium and mission area or as two separate and distinct operating mediums and mission areas, General Estes only two years earlier, while still on active duty as CINCSpace, had routinely referred to space as "the fourth medium of military operations" whose time for full and deserved mission development had finally come. Similarly, U.S. Space Command's *Vision for 2020* expressly portrayed space as a separate medium in its declaration that "the goal is to achieve the same level of joint operations between space and other mediums of warfare as land, sea, and air currently enjoy today." See General Howell M. Estes III, USAF, "Posture Statement for Senate Armed Services Committee Hearings," Washington, D.C., March 11–12, 1997.

Ultimately, Estes suggested, Air Combat Command might become Space Combat Command, or else the two would merge to become the Aerospace Combat Command, all with a view toward controlling “the aerospace” and transitioning the Air Force into “the United States Aerospace Force.”⁴⁵ All of this, observed defense analyst Barry Watts, made it clear that the then-incumbent Air Force leadership had “rejected the possibility of evolutionary progress toward distinct, much less separate, space and air forces.”⁴⁶

THE CALL FOR AEROSPACE INTEGRATION

In keeping with this shift in emphasis, “aerospace integration” became the new Air Force rallying cry during General Ryan’s tenure as chief. The focus was on the seamless melding of the service’s atmospheric and orbital assets in support of a more effective strategy for pursuing terrestrial goals. As the Air Staff’s director of strategic planning, Major General John Barry, later explained, that idea constituted “one of the latest steps” in the process of changing “the way we think about air and space power.” To those who maintained that “operations in the air and space differ so fundamentally as to require separate organizations,” Barry countered that this argument was “unsound” because it was “based on physics, not military art” and ignored the fact that “military operations in the aerospace continuum require a mix of air and space systems.”⁴⁷ Although Barry admitted that “all military communities [now] use space on a daily basis,” he nevertheless took a narrow service perspective rather than an overarching national view of space as an enabling medium. In so doing, he cut almost directly against the grain of the broader notion of “full force integration” that had been so carefully laid out two years earlier in the unified U.S. Space Command’s *Long-Range Plan*,

⁴⁵Estes, “The Aerospace Force of Today and Tomorrow,” p. 174.

⁴⁶Barry D. Watts, *The Military Use of Space: A Diagnostic Assessment*, Washington, D.C.: Center for Strategic and Budgetary Assessments, February 2001, p. 47. Watts was subsequently appointed director of the Office of Program Analysis and Evaluation in the Department of Defense.

⁴⁷Major General John L. Barry and Colonel Daniel L. Herriges, USAF, “Aerospace Integration, Not Separation,” *Aerospace Power Journal*, Summer 2000, p. 42.

defined as “integrating space forces and space-derived information with their counterparts on land, sea and air.”⁴⁸

An Air Force space officer astutely divined the underlying dynamic at work here in commenting that while the Air Force’s leaders at Corona 1996 “originally viewed integration as a method by which to guarantee continued Air Force stewardship of space, within months of the meeting, integration was being interpreted as the *necessary and sufficient* condition by which the Air Force could seize the opportunity to call itself an aerospace force.”⁴⁹ As if to bear that out, General Barry acknowledged that the heavy multiservice dependence on space was an argument used by some in favor of concentrating “all space assets in a dedicated organization.” He also conceded that the notion of “aerospace integration” was “opposed by . . . people [who] argue that operations in the air and in space differ so fundamentally as to require separate organizations.” He concluded, however, by taking exception to “those who would split air and space today,” thereby tacitly confirming that a barely hidden consideration behind this line of reasoning was an underlying Air Force fear that military space might end up in a separate service.⁵⁰ As another space-literate skeptic who had given much thought to the issue observed several years earlier of the Air Staff’s resurrection of aerospace rhetoric in 1997, “to justify exploitation of the aerospace environment as a unified whole, AFM 1-1 points to the fact that no absolute boundary exists between air and space. . . . But the distinction between military realms is based on the nature of the environment—not on the boundaries between them. The flawed logic of AFM 1-1 probably results from creating evidence to support a decision already made—specifically, consumption of space roles and missions by the Air Force.”⁵¹

⁴⁸*Long-Range Plan: Implementing USSPACECOM Vision for 2020*, Peterson AFB, Colorado: U.S. Space Command, March 1998, p. 73.

⁴⁹McKinley, “The Guardians of Space: Organizing America’s Space Assets for the Twenty-First Century,” p. 39, emphasis added.

⁵⁰Barry and Herriges, “Aerospace Integration, Not Separation,” pp. 45, 47.

⁵¹The author added: “Unsurprisingly, an initial draft of AFDD 1, which clearly separated air and space without ever using the term aerospace, was disapproved. But the term dominates the latest draft version of AFDD 1 (14 May 1996), which is now on the verge of acceptance.” (Major Bruce M. DeBlois, “Ascendent Realms: Characteristics of Air Power and Space Power,” in Colonel Philip S. Meilinger, ed., *The Paths of Heaven*:

To be sure, one could hardly fault the Air Force’s commitment to integrating the contributions of its air and space assets more closely within the service’s overall operating repertoire. As then–vice chief of staff General Moorman summarized the direction of the Air Force in 1996, “an integrated air and space program that combines total battlespace awareness and knowledge with rapid and deployable communications to get information to the decisionmaker or shooter, fully integrated with highly capable, survivable aircraft and a fleet of unmanned aerial vehicles, both with precision munitions, is the wave of the future.”⁵² That was, both then and now, an entirely appropriate performance vision for tomorrow’s U.S. Air Force as far as it went, and one could only welcome it as a statement of general principle.

Indeed, apart from the collapse of the Soviet Union in 1991, the unprecedented focus since Desert Storm on bringing U.S. air and space capabilities more closely together was arguably the pivotal development that made American military power preeminent in the world today. It played an important part in accounting for the substantially reduced sensor-to-shooter data cycle time which was recently displayed during the most intense portions of air and land force employment in phase one of Operation Enduring Freedom in Afghanistan. Thanks to this new focus, space has now been increasingly integrated into joint-force training and exercise schedules, Air Force Space Command now maintains a presence in support of every regional combatant commander worldwide, and a permanent space support cadre has been provided for every Joint Force Air Component Commander (JFACC). These are but three of the many salutary steps toward the closer integration of air and space that have been implemented by the Air Force since Operation Desert Storm.

That said, however, since the potential offerings of space promise to redound to the benefit not only of Air Force air power but of *all* force elements in *all* services, focusing solely on *air* and space integration

The Evolution of Air Power Theory, Maxwell AFB, Alabama: Air University Press, 1997, pp. 554–555.)

⁵²General Thomas S. Moorman, Jr., USAF, “The Challenge of Space Beyond 2000,” in Alan Stephens, ed., *New Era Security: The RAAF in the Next 25 Years*, proceedings of a conference held by the RAAF, Air Power Studies Center, RAAF Fairbairn, Canberra, Australia, June 1996, p. 173.

(or, in the Air Force's more recent preferred variant, "aerospace" integration) has come to be an overly restrictive paradigm for the sort of evolutionary change that is really called for. Now that air and space integration within the Air Force at the operator level is producing tangible results, the real question should be how best to integrate the Air Force's space offerings with *all* force employment and operational support functions across service lines. Yet as matters now stand, the Air Force has apparently devoted relatively little attention to its obligation, as the nation's military space custodian, to see to the closer integration of its space assets with the future needs of land and maritime as well as air operations. Moreover, rather than recognizing that air and space are, in fact, separate and distinct mediums when it comes to technology application, mission employment, and—most important—funding needs, formal Air Force doctrine on space until recently continued to insist that "the aerospace medium can be most fully exploited when *considered as a whole*." It added that "although there are physical differences between the atmosphere and space, there is no absolute boundary between them. The same basic military activities can be conducted in each, albeit with different platforms and methods. Therefore, space operations are an integral part of aerospace power."⁵³

In effect, the Air Force's reversion to the "aerospace" formula as its organizing theme for air and space beginning in late 1997 turned the clock back to the 1950s by applying a bureaucratically satisfying approach to a serious conceptual and resource apportionment challenge that has unfortunately remained unresponsive to such easy rhetorical solutions. In an apt coda to the story of an Air Force long divided over how to understand and embrace space, a former deputy chief of staff for operations at Air Force Space Command noted at the end of 1997 that the service's leadership had "simply not come to grips with whether to treat space as a continuum of air power or a separate domain." He added darkly (and also arguably both correctly and presciently): "The ultimate resolution [of this question] will likely determine whether space remains a part of the USAF or is ultimately

⁵³AFDD 2-2, *Space Operations*, Maxwell AFB, Alabama: Air Force Doctrine Center, 1998, p. 1. Air Force chief of staff General John Jumper approved an updated and revised version of AFDD 2-2 on November 27, 2001.

organized as the fifth service within the [Department of Defense]."⁵⁴ Chapter Four considers in broad outline how the Space Commission ultimately elected in January 2001 to try to effect that resolution and what reactions its wide-ranging recommendations prompted within both the Department of Defense and the Air Force.

⁵⁴Major General William E. Jones, USAF (Ret.), former deputy chief of staff for operations, Air Force Space Command, white paper on the creation of an air and space force within the USAF prepared at the request of Major General David McIlvoy, AF/XPX, December 22, 1997, p. 2.