



In February 1959, the *New York Times* announced that the Earth's atmosphere had been joined with outer space and that the Air Force had coined a new word, "aerospace," to describe it.

The article quoted the testimony of Gen. Thomas D. White, USAF Chief of Staff, to the House Committee on Science and Astronautics. "Since there is no dividing line, no natural barrier, separating these two areas, there can be no operational boundary between them," White said. "Thus, air and space comprise a single continuous operational field in which the Air Force must continue to function. This area is aerospace."

There was more to it than a new word. It was the beginning of the "aerospace" issue, which would persist for another

## The Air Force has been up and down several times in defining the vast medium in which it operates.

50 years, spilling over into doctrine, research and development, organizational turf disputes, and even calls for the Air Force to change its name to the Aerospace Force.

The Air Force itself has swung back and forth on whether the medium in which it operates is "air" or "air and space" or "aerospace."

In the beginning there was air. Space did not become of serious interest to the armed forces until the 1950s, and

by then, aircraft were flying to altitudes never before achieved and new realms of flight were emerging.

In 1956, Air Force Capt. Iven C. Kincheloe Jr. piloted the Bell X-2 rocket plane to a record altitude of 126,200 feet. By later standards of the space program,

*Covers of Air Force Magazine, November 1958 and August 1986 editions. It's generally agreed that the first use by Gen. Thomas White, then USAF Chief of Staff, of the term "aerospace" was in Air Force Magazine.*

# Air and Space and Aerospace

By John T. Correll

it wasn't that high—about 24 miles up—but Kincheloe had reached the edge of the Earth's atmosphere. The press called him "Mr. Space." The Air Force took it as a logical step toward more ambitious regimes of flight.

ICBMs complicated the issue. The Air Force regarded ballistic missiles as pilotless aircraft. The Army saw them as a kind of artillery. The Navy, not to be left out of anything, had space and missile programs of its own.

In 1958, President Dwight D. Eisenhower awarded NASA overall responsibility for human spaceflight but the Air Force managed to hang on to a few of its space-related programs that had significant overlap with suborbital flight.

Thus the context for White's testimony in 1959 was an intense competition for roles and missions (and budgets) in space.

Furthermore, the *New York Times* report on the new word "aerospace" was late in noticing a movement already in progress. The term had been used previously, several times by White.

The concept—although not yet the term—appeared in White's speech to the National Press Club in November 1957 when he said that "air and space are an indivisible field of operations." It is generally conceded that White first used the word "aerospace" in an *Air Force Magazine* article in August 1958. The magazine, quick to spot a trend, adopted a new monthly subhead, "The Magazine of Aerospace Power," on its cover for November 1958.

Clearly, White envisioned that the Air Force would fly and fight in space. In further testimony in 1959, he said that "eventually we will have manned space vehicles as combat weapons."

## GAINING MOMENTUM

There are competing claims about who coined the term "aerospace." Credit is variously accorded to one of two Air Force civilian employees who may not have known about each other's work until later.

In an item distributed to base newspapers by Air Force News Service in October

1957, Frank W. Jennings referred to the expanse beyond the Earth's surface as "Air-Space." In a glossary published by Air University in March 1958, Woodford A. Heflin defined "Aero-Space" as the combination of the atmosphere and space, which could be "considered as a single realm" for the launch and control of missiles, satellites, and "dirigible space vehicles."

The first unhyphenated use of "aerospace" was by Jennings in an AFNS release in July 1958. Jennings subsequently pointed out that Heflin's definition implied that air and space were "two separate entities," whereas his interpretation—like White's—was for an indivisible field of operations.

In December 1959, a revision to Air Force basic doctrine declared, "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."

From there, the term caught on fast. By the end of 1959, the Air Force had adopted "Aerospace Power for Peace" as its official slogan, the Aircraft Industries Association was renamed the Aerospace Industries Association, the School of Aerospace Medicine was established, and the exhibition hall at the Air Force Association had become the "Aerospace Panorama."

A major federal contract research center, The Aerospace Corp., came along in 1960. AFA's affiliate, the Air Education Foundation, was redesignated the Aerospace Education Foundation in 1961.

"Aerospace" has been included in standard dictionaries since 1961. The most recent (2008) edition of the Merriam-Webster's Collegiate Dictionary defines

it as the "space comprising the Earth's atmosphere and the space beyond," taking no position on whether the regimes of air and space are seamless or separate.

## VIEWS TO THE CONTRARY

There was considerable disagreement with the aerospace concept. "That means everybody is out of space except the Air Force," Rep. Daniel J. Flood (D-Pa.) said at a congressional hearing in 1960. "They have now staked out a claim to 'aerospace.'"

The other services saw it as an attempt by the Air Force to grab a proprietary interest in space—which it clearly was. They refused to accept the USAF proclamation of aerospace and the Joint Staff and the Department of Defense agreed with them.

JCS Pub 1, "Dictionary of United States Military Terms for Joint Usage," published in 1962, defined aerospace as "of, or pertaining to, the Earth's envelope of atmosphere and the space above it: two separate entities considered as a single realm for activity in launching, guidance, and control of vehicles which will travel in both realms."

That definition persisted in joint usage into the 21st century, with only the last word "realms" changed to "entities." Then, in March 2012, "aerospace" was abruptly dropped from the official Department of Defense dictionary on instructions from the joint doctrine shop.

There was also criticism from within the Air Force, particularly from those who feared that "aerospace" would rob space of its individuality and interfere with the emergence of an independent space command.

In a widely read monograph from Air University, Lt. Col. David E. Lupton lambasted "the invention of the bastardized word aerospace" and said that the



USAF photo via National Museum of the US Air Force



USAF photo

“aerospace fallacy” was “a hindrance to the development of space doctrine.”

Others faulted the Air Force for relying too much on bold assertions. “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,” said Benjamin S. Lambeth, a foremost analyst of airpower.

“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,” Lambeth said. It was, he added, “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.”

Undeterred by the critics, the Air Force stuck with the perspective expressed in the 1984 edition of its basic doctrine, which described aerospace as ‘the multidimensional operating environment where air forces can perform all of their missions’ and held that space was “the outer reaches of the aerospace operational medium.”

## INTO THE TRANSATMOSPHERE

A strong vindication for the concept

would be an aerospace plane that could operate in both air and space. That was the objective of the Air Force’s X-20 Dyna-Soar program, which predated NASA’s Project Mercury and was carried forward from the 1950s.

The plan was for a Titan missile to boost Dyna-Soar into space, from where it could re-enter the atmosphere, fire its rockets to resume orbit, and eventually glide to a landing on Earth. The Department of Defense canceled Dyna-Soar in 1963 before its first flight.

Meanwhile, NASA and the Air Force continued experiments with the sleek X-15 rocket plane, carried aloft under the wing of a B-52 bomber and sent hurtling as high as it could go by a burst from its own engines. In 1963, former Air Force test pilot Joseph A. Walker took the X-15 to 354,300 feet—accelerated by an 85-second engine burn and reaching its apogee of 67 miles on a ballistic trajectory. Walker’s altitude record stood until broken by the Space Shuttle Columbia in 1981.

The Air Force awarded astronaut wings to X-15 pilots who flew higher than 50 miles, a practice later adopted by NASA as well. However, the X-15 flights, like those of the X-2 before it, were of short duration to test or demonstrate a capability. Kincheloe’s flight was 16 minutes, 35 seconds; Walker’s was only 11 minutes, eight seconds.

Sustained operational flying was something else. In 1965, the Air Force’s SR-

71 set the world record for horizontal flight at 85,135 feet, or 16.12 miles, not nearly enough to justify description as aerospace.

New possibilities arose in 1986 when the Air Force announced with great fanfare the X-30 program, dubbed the “National Aerospace Plane.” It would use scramjets (supersonic-combustion ramjets) to reach hypersonic speeds up to 8,000 mph, take off from a runway on Earth, enter space orbit or fly in the atmosphere, cruise in the “transatmosphere” as high as 350,000 feet, and descend to land on a conventional runway.

The X-30 was eventually canceled, 500 percent over budget and with no compelling mission, but the quest for an aerospace plane continued. The most recent incarnation is the USAF X-37B robotic spaceplane, a test vehicle that flew in orbit for 674 days on a classified mission before landing on Earth in October 2014. A scaled-up version that could carry pilots was said to be under consideration.

## THE SPACE AND AIR FORCE

As space satellites assumed greater importance, Rep. Ken Kramer (R-Colo.) introduced a bill in Congress in 1981 to change the name of the Air Force to the United States Aerospace Force. Kramer’s attempt failed but the proposal popped up again sporadically over the next 20 years.

In June 1992, following the great contribution of space assets in the Gulf War, Gen. Merrill A. McPeak, USAF Chief of Staff, restated the Air Force mission in



Illustration by John Porter

13 words—“to defend the United States through the control and exploitation of air and space”—with the addition of space.

The other services were happy to have the Air Force carrying nearly the full load in the military space program, providing about 90 percent of the people, systems, and money, but they were unwilling to give the Air Force clear title to space or recognize the existence of aerospace.

In an announcement that sent shock waves through the Air Force, the next Chief, Gen. Ronald R. Fogleman, declared in 1996, “We are now transitioning from an air force into an air and space force on an evolutionary path to a space and air force.” Secretary of the Air Force Sheila Widnall joined him in that forecast.

In part, Fogleman was trying to head off the loss of the space mission to a new military service, called the US Space Force by its advocates, but nobody doubted the sincerity of Fogleman’s commitment.

“We operate in a medium that encompasses and touches 100 percent of the Earth’s surface and population,” Fogleman said. “This provides air and space forces with unparalleled access and global awareness.”

Fogleman said further, “We’ve com-

bined air and space superiority into one core competency. This reflects the transition to an air and space force and the need to control the entire vertical dimension.” Curiously, all of his references were to air and space; there was no mention of aerospace.

The curiosity deepened with a revised version of Air Force basic doctrine, completed in the last days of Fogleman’s tour as Chief in 1997. The word “aerospace” disappeared completely, replaced in every instance by “air and space.”

The 46-year run of aerospace in basic doctrine was over. The revision did not explicitly repudiate aerospace, but it said, “Warfare is normally associated with the different mediums of air, land, sea, and space.”

In effect, Fogleman’s view “promised that air operations would eventually be supplanted by space functions and that the

service’s space professionals would, in the fullness of time, inherit the Air Force and its most senior leadership positions,” Lambeth said.

Because of the timing of Fogleman’s departure, the new doctrine document was signed by his successor, Gen. Michael E. Ryan, who would soon have something of his own to say on the subject.

### CALL IT AEROSPACE

At first, Ryan took the same direction as Fogleman. At an Air Force Association symposium in November 1997, he said, “Our goal is to eventually evolve from an air and space force, which we call ourselves today, into a space and air force.”

Within a few months, Ryan had reconsidered his position. At the Corona South meeting of top Air Force leadership in early 1998, officials decided to refocus on what Ryan called “the integration of air and space power into an aerospace force.”

“You will notice the growing use of the word ‘aerospace’ among the general officers here,” Ryan said at the AFA Air Warfare symposium in February. “We all prefer aerospace to air and space force because it captures the seamless nature of the vertical dimension and highlights

*Far left: White (l) after the 1960 midair recovery of Discoverer XIII, the first man-made object recovered from orbit. Center: (l-r) X-2 pilot Capt. Milburn Apt, Col. Horace Hanes, Air Force Flight Test Center director, and X-2 pilot Capt. Iven Kincheloe next to the X-2 rocket plane in 1956. Kincheloe took the X-2 to a height of about 24 miles in 1956. Left: A painting of the “National Aero-space Plane”—the X-30—taking off. It appeared on the cover of the June 1986 issue of Air Force Magazine. The X-30 program went greatly over budget and was eventually canceled.*

that it is one environment. Because of our commitment to integrate all the elements of the aerospace force, I am not satisfied that the only thing that holds air and space together is a conjunction.”

Ryan did not call for another change to basic doctrine, so recently amended to exclude aerospace, but he found plenty of venues to hammer his point home.

Air University’s flagship publication, *Airpower Journal*, became *Aerospace Power Journal* with the winter 1999 issue, in which Ryan said the new name was intended “to reflect what the Air Force is all about.”

“In every respect, the Air Force is defined by aerospace power,” Ryan said. “Airmen often speak their own language and that language for the next century and beyond is ‘aerospace power.’”

Nor was that all. A white paper published in May 2000 by Secretary of the Air Force F. Whitten Peters and Ryan said USAF was “moving forward into the 21st century as a seamless integrated aerospace force” and that “the environmental differences between air and space do not separate the employment of aerospace power within them.”

In June 2000, an Air Force vision statement said, “Our domain stretches from the Earth’s surface to the outer reaches of space in a seamless operational medium.”

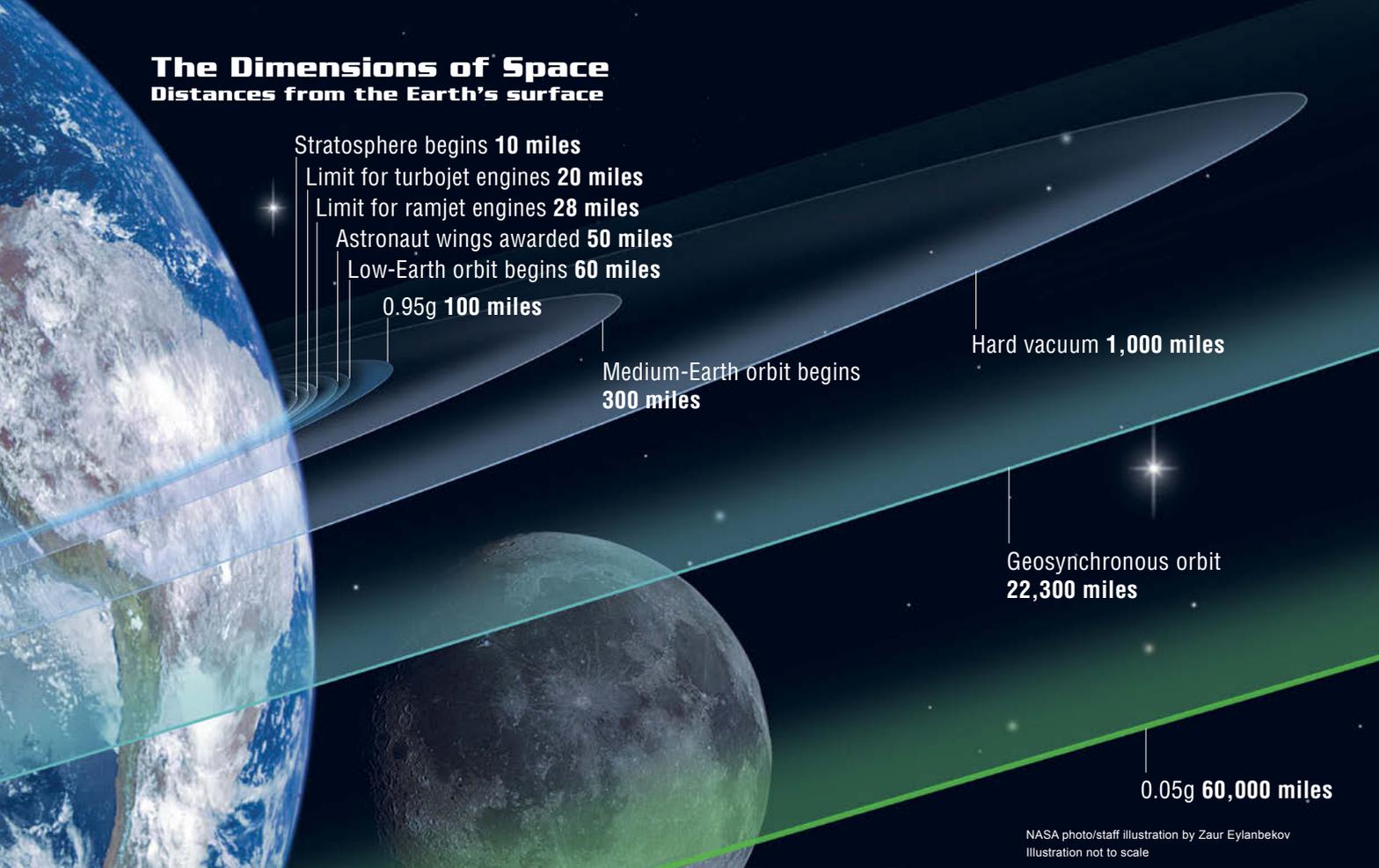
Aerospace had been fully restored after only a brief absence, or so it seemed.

### BACK TO AIRPOWER

The stage was set for a reversal by the report in January 2001 of a congressionally chartered commission on space, whose chairman, Donald H. Rumsfeld, was soon to become Secretary of Defense. The commission urged the development of a distinctive space operation and “space culture” within the Air Force and showed little or no interest in aerospace integration.

# The Dimensions of Space

## Distances from the Earth's surface



Stratosphere begins **10 miles**

Limit for turbojet engines **20 miles**

Limit for ramjet engines **28 miles**

Astronaut wings awarded **50 miles**

Low-Earth orbit begins **60 miles**

0.95g **100 miles**

Medium-Earth orbit begins  
**300 miles**

Hard vacuum **1,000 miles**

Geosynchronous orbit  
**22,300 miles**

0.05g **60,000 miles**

NASA photo/staff illustration by Zaur Eylanbekov  
Illustration not to scale

That perspective resonated with Gen. John P. Jumper, who succeeded Ryan as Chief of Staff in September 2001. In the fall of 2002, *Aerospace Power Journal* became *Air & Space Power Journal*.

In an opening essay in that issue, Jumper noted that the space commission report “does not use the term ‘aerospace’ because it fails to give the proper respect to the culture and to the physical differences that abide between the environment of air and the environment of space.”

“We need to respect those differences, and that’s why the description of our warfighting environment as air and space is important. We will respect the fact that space is its own culture and has its own principles. And when we talk about operating in different ways in air and space, we have to also pay great attention to combining the effects of air and space.”

A change to basic doctrine in November 2003 made the departure from aerospace explicit. “Air and space are separate domains requiring the exploitation of different sets of physical laws to operate in, but are linked by the effects they can produce together,” it said.

In 2010, a “Doctrine Summit” convened by Gen. Norton A. Schwartz,

Chief of Staff, adopted airpower as the “unitary term” for what the Air Force does. Gen. Mark A. Welsh III, who followed Schwartz as Chief, said, “America has only one force specifically employed to exploit the unique global advantages realized from operating in air, space, and cyberspace.”

To remove any doubt, basic doctrine was revised again in 2013. “Doctrine is about warfighting, not physics,” it said. “Air, space, and cyberspace are separate domains, requiring different sets of physical laws to operate in, but linked by the effects they can produce.” The latest doctrine adjustment, in February 2015, confirmed airpower as the preferred unifying term.

### STAND BY

No matter what the Air Force, the Joint Staff, or anybody else thinks, aerospace is still alive and kicking. As of April 2016, “aerospace” drew 101 million hits on the Google search engine.

Colleges turn out aerospace engineers. Industrial firms have aerospace in their

names or have aerospace divisions. Standard & Poors has an “Aerospace and Defense” index for investments. The internet offers advice to those seeking a career in aerospace.

Among the latest adopters are the Russians, who activated the Aerospace Forces as a new military branch in August 2015. The Aerospace Forces (VKS) were formed by a merger of the Russian Air Forces (VVS) and the Russian Aerospace Defense Forces (VKO).

The merger drew a critical reaction from the English-language *Moscow Times*, which complained that air and space are “two different environments,” adding that “the laws of physics, however, are nothing compared to the desire of bureaucrats.”

Within the US Air Force, airpower has not yet completely taken root as the all-inclusive “unitary term.” The keepers of USAF doctrine notice that the “air and space” usage still appears regularly, reinforcing the notion of “hyphenated airmen.” Even “aerospace” shows up now and then. ★

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