U.S. Trends in Policy and Related Developments Regarding Supersonic Passenger Aircraft

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1. Overview

It is said that supersonic passenger aircraft capable of speeds exceeding Mach 1 will revolutionize travel. Travel time between Tokyo and the U.S. will be cut from over 10 hours down to 6 hours. While supersonic passenger aircraft had disappeared from the market after the Concorde was retired, in recent years companies such as Boom Supersonic in the U.S. have emerged to develop supersonic passenger aircraft, and momentum is building for their revival.

Against this backdrop, on June 30, 2026, a major announcement regarding supersonic passenger aircraft was made. The U.S. Department of Transportation (DOT) and the Federal Aviation Administration (FAA) initiated a Notice of Proposed Rulemaking (NPRM) on noise standards for supersonic aircraft.[1] Currently, commercial civil operations of supersonic aircraft are prohibited under 14 CFR Parts 91.817–819, except when a special flight authorization (SFA) is granted by the Administrator of the FAA on a flight-by-flight basis; however, this proposal would end this policy of general prohibition and establish conditions for conducting supersonic flights.

The proposal is based on Executive Order No. 14304 (hereinafter referred to as the "Executive Order"), issued on June 6, 2025, with the goal of "Leading the World in Supersonic Flight."[2] Together with the takeoff and landing noise standards to be proposed separately later this year, it aims to revive supersonic flight, unleash American innovation, and usher in a golden age of aviation.

This report outlines U.S. government policy regarding supersonic passenger aircraft.

2. The History of Supersonic Passenger Aircraft

In the 1970s, at the same time that the Boeing 747 revolutionized air travel, two supersonic passenger aircraft emerged as equally revolutionary developments in commercial passenger transport. One was the Concorde (manufactured by the United Kingdom and France), which entered service in 1976, and the other was the Tu-144 (manufactured by the Soviet Union), which entered service in 1977.[3] Due to operational cost issues—specifically the need to keep the afterburner engaged at all times during flight—the Tu-144 was limited to a single route between Moscow and Almaty; however, the Concorde operated on routes such as New York–London and New York–Paris for approximately 27 years, until 2003.

However, even with the Concorde, only 20 units were manufactured—and no orders were placed by any airline other than Air France and British Airways—due to factors such as its high fuel consumption compared to subsonic passenger aircraft and the fact that it was restricted to flying over the ocean to avoid the shock waves known as sonic booms generated by supersonic flight. Furthermore, following the crash of Air France Flight 4590 in 2000, operations were suspended in 2003.

Since then, there have been no supersonic passenger aircraft in service.

3. Sonic Boom

Sonic booms are a challenge for supersonic flight, including in older aircraft.

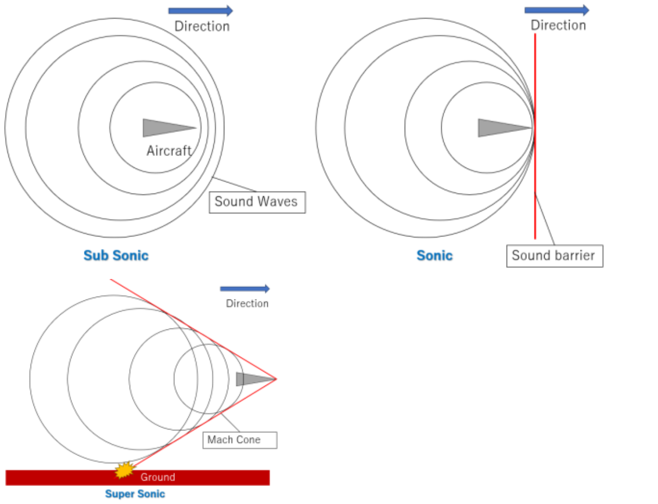

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Figure 1: Comparison of Sound Propagation at Subsonic, Sonic, and Supersonic Speeds

As shown in Figure 1, during subsonic flight, the sound waves generated by the aircraft propagate throughout the entire aircraft and are heard continuously; however, when the aircraft reaches the speed of sound—Mach 1 (1,225 km/hr in standard atmosphere)—the sound waves catch up to the aircraft, forming the "sound barrier." When the aircraft exceeds the speed of sound, it generates a shock wave known as the "Mach cone." The noise generated by the entire aircraft converges at two points—the nose and the tail—and, as it propagates to the ground, is observed as a shock wave that can be perceived as a very loud, explosive sound commonly known as a sonic boom. A sonic boom consists of two shock waves: one representing a sudden increase in pressure and the other a sudden decrease in pressure (also referred to as an "N-wave" because the pressure distribution graph resembles the letter "N," as shown in Figure 2.[4])

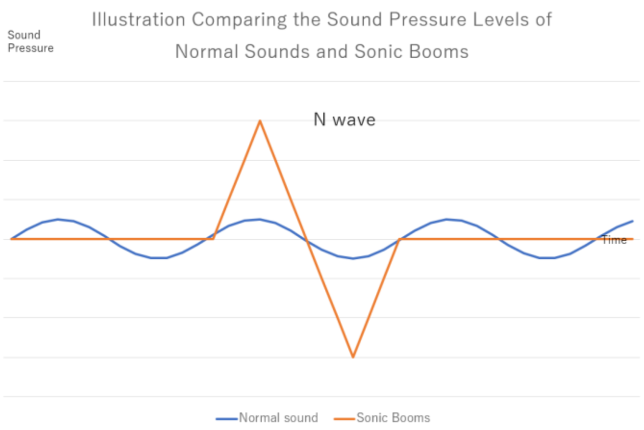

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Figure 2: N wave

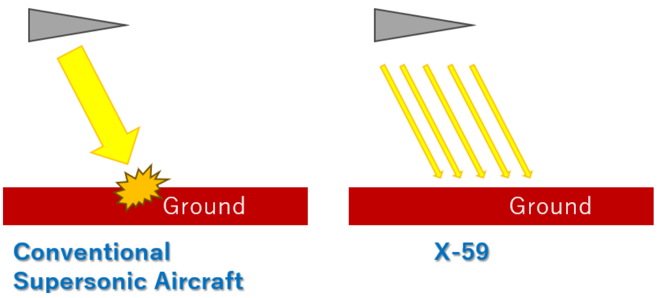
Sonic booms cause a great deal of damage on the ground, such as broken windows and building vibrations. After the FAA conducted assessments of the impact of sonic booms on the general public from the 1960s to the 1970s, the results sparked significant public backlash. Consequently, with the aim of protecting the public from these shock waves, the FAA banned supersonic passenger flights for approximately 50 years;[1] as a result, the Concorde was unable to fly over land, and many commercial passenger aircraft were limited to subsonic flight.

4. Technological Advances

Even after supersonic passenger aircraft disappeared from the scene, research into supersonic passenger aircraft continued at various institutions around the world, including the National Aeronautics and Space Administration (NASA) and the FAA. As a result, two solutions were developed to reduce sonic booms:

(1) Shock Wave Fragmentation

The X-59, a supersonic flight demonstration aircraft currently being tested by NASA in collaboration with Lockheed Martin, features an extremely long nose, canard wings, and engines mounted on top of the fuselage.[5] It is believed that these features can reduce the impact of sonic booms by fragmenting the conventional N-wave into multiple smaller shock waves[6] (see Figure 3). Specifically, it is estimated that when flying at Mach 1.4 at an altitude of 55,000 ft, the noise level will be 75 PLdb—roughly equivalent to the sound of a car door closing. Since its first flight on October 28, 2025, the aircraft has been undergoing continuous test flights, and the data obtained is intended to support the establishment of noise regulations by U.S. and international regulatory authorities.[7]

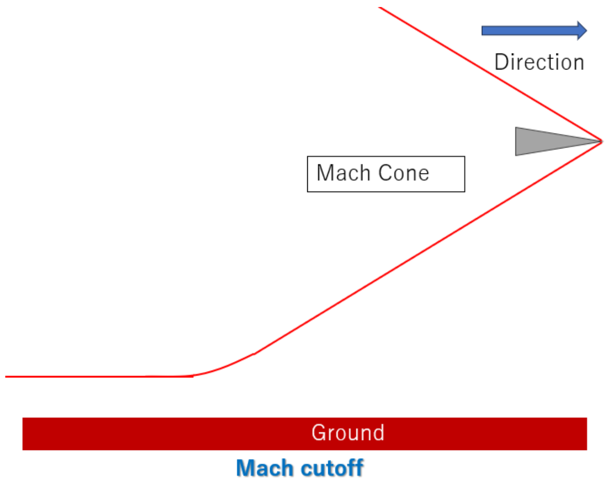


Source: Created by the author

Figure 3: Shock Wave Fragmentation

(2) Mach Cutoff

Sound waves do not necessarily travel in a straight line; they refract under certain conditions, such as temperature, atmospheric pressure, and speed. Taking advantage of this phenomenon, there is a technology that combines airframe geometry, atmospheric conditions, speed, and altitude to prevent shock waves from reaching the ground (see Figure 4). Research funded by the FAA was conducted from 2016 to 2019.[8] This technology was also demonstrated during the supersonic flight of Boom Supersonic's XB-1 demonstration aircraft in February 2025.[9] Furthermore, this technology is described in the NPRM.[1] According to Boom Supersonic, flying under these conditions requires real-time weather data, advanced computers, and powerful engines capable of reliable flight under cutoff conditions;[10] it can be said that this has become achievable precisely due to technological advances.



Source: Created by the author

Figure 4: Mach cutoff

5. Executive Order, NPRM

Thanks to years of research by NASA and the FAA, as well as Boom Supersonic's successful demonstration in February 2025, U.S. supersonic passenger aircraft technology is now a global leader, and the feasibility of reviving commercial passenger transport has greatly increased. Furthermore, in May 2025, the bipartisan Supersonic Aviation Modernization Act (SAM Act) was introduced, calling for the repeal of 14 CFR Part 91.817,[11] which further strengthened political momentum for revising supersonic standards.

Against this backdrop, the executive order issued in June 2025 is believed to have been formulated with these technological advancements and congressional trends in mind; it calls for the revision of existing regulations with the aim of repealing "outdated and overly restrictive regulations" (as stated in the executive order) and "leading the world in supersonic flight."

As shown in Table 1, the NPRM proposed pursuant to the presidential order revises the previous standard—which uniformly prohibited supersonic flight in the absence of an SFA—by stipulating that flights are permitted provided the following conditions are met: (1) the sound pressure at the ground does not exceed 0.11 psf (approximately 5.27 Pa); (2) the operator demonstrates that sound pressure exceeding 0.11 psf does not reach the ground and obtains FAA approval; and (3) the operator operates in accordance with conditions issued by the administrator. The proposal establishes a standard based on the sound pressure of the shock wave as it reaches the ground, rather than the shock wave at the moment of its generation, reflecting the incorporation of technologies such as the Mach cutoff.

Source: Paoposal from FAA NPRM,[12] Original from Code of Federal Regulations[13]

Table 1: Major Amendments in the NPRM (Key points are underlined)

Proposal	Original
§ 91.817 Civil Supersonic Flight. (a) **(aNo person shall operate a civil aircraft in the United States at a true flight Mach number greater than 1 unless—** (1) The sonic boom overpressure at the surface does not exceed 0.11 pound per square foot (psf); (2) The operator demonstrates and the Administrator finds each of the following: (i) Through measurement, modeling, or other methods approved by the Administrator, that sonic boom overpressure— (A) Does not exceed 0.11 psf for primary sonic boom levels at the surface; (B) Does not exceed 0.11 psf for secondary direct sonic boom levels at the surface; and (C) Does not exceed 0.11 psf for secondary indirect sonic boom levels at the surface. (ii) The operator has a means to comply that ensures sonic boom overpressure in excess of 0.11 psf, as provided in paragraph (a)(1), does not reach the surface; and (3) The aircraft is operated in compliance with any conditions and limitations issued by the Administrator to ensure compliance with paragraph (a)(1) and (a)(2)(ii). (b) Notwithstanding paragraph (a), no person shall operate a civil aircraft in the United States at a true flight Mach number greater than 1 unless the operator of the aircraft is conducting operations in compliance with conditions and limitations in a special flight authorization issued to the operator in accordance with § 91.818. (c) No person may operate a civil aircraft for which the maximum operating limit speed MM0 exceeds a Mach number of 1, to or from an airport in the United States, unless— **(1)** The person is conducting operations under paragraph (a) of this section; **(2)** Information available to the flight crew includes flight limitations that ensure flights entering or leaving the United States will not cause a sonic boom to reach the surface within the United States and the operator complies with these flight limitations; **or** **(3)** The operator complies with conditions and limitations in a special flight authorization to exceed Mach 1 issued in accordance with § 91.818. 5. Revise the introductory paragraph and paragraph (a)(8)(v) of § 91.818 to read as follows:	**§ 91.817 Civil aircraft sonic boom.** (a) No person may operate a civil aircraft in the United States at a true flight Mach number greater than 1 except in compliance with conditions and limitations in an authorization to exceed Mach 1 issued to the operator in accordance with § 91.818. (b) In addition, no person may operate a civil aircraft for which the maximum operating limit speed M_{MO} exceeds a Mach number of 1, to or from an airport in the United States, unless— (1) Information available to the flight crew includes flight limitations that ensure that flights entering or leaving the United States will not cause a sonic boom to reach the surface within the United States; and (2) The operator complies with the flight limitations prescribed in paragraph (b)(1) of this section or complies with conditions and limitations in an authorization to exceed Mach 1 issued in accordance with § 91.818.
§ 91.818 Special flight authorization to exceed Mach 1. For all civil aircraft, any operation in excess of Mach 1 that does not meet the requirements of § 91.817(a) or (c)(2) of this part must be conducted only in accordance with a special flight authorization issued to an operator in accordance with the requirements of this section.	**§ 91.818 Special flight authorization to exceed Mach 1.** For all civil aircraft, any operation that exceeds Mach 1 may be conducted only in accordance with a special flight authorization issued to an operator in accordance with the requirements of this section.

(a) **Application. Application for a special flight authorization to exceed Mach 1 must be made to the FAA Office of Environment and Energy for consideration by the Administrator.** Each application must include: … **(8)** The reason(s) that operation at a speed greater than Mach 1 is necessary. A special flight authorization to exceed Mach 1 may be granted only for operations that are intended to: … **(v)** Measure the noise characteristics of an aircraft to demonstrate compliance with noise requirements imposed under this chapter, or to determine the limits for operation in accordance with § 91.817(c).	(a) Application. Application for a special flight authorization to exceed Mach 1 must be made to the FAA Office of Environment and Energy for consideration by the Administrator. Each application must include: … (8) The reason(s) that operation at a speed greater than Mach 1 is necessary. A special flight authorization to exceed Mach 1 may be granted only for operations that are intended to: … (v) Measure the noise characteristics of an aircraft to demonstrate compliance with noise requirements imposed under this chapter, or to determine the limits for operation in accordance with § 91.817(b).

6. International Standards

The Committee on Aviation Environmental Protection (CAEP) of the International Civil Aviation Organization (ICAO) are currently reviewing international standards regarding noise from supersonic aircraft. CAEP/13 (the Thirteenth Meeting of CAEP) recommends new international noise standards for supersonic aircraft during takeoff and landing (applicable January 1, 2029).[14) Meanwhile, noise standards for cruise flight are subject to future consideration, and this NPRM precedes the ICAO's deliberations.

The presidential executive order states that the administration will work with the ICAO to ensure the consistency of regulatory frameworks, suggesting an intention to take the lead in discussions on international standards.

7. Conclusion

This report has provided an overview of trends in U.S. policies and other developments related to supersonic passenger aircraft. It has become clear that the NPRM regarding supersonic aircraft proposed this time is a technology-backed policy resulting from many years of research.

In Japan, the Japan Aerospace Exploration Agency (JAXA) has been conducting research and development since the 1990s,[15) including joint research with NASA,[16) and has contributed to the formulation of standards at the ICAO. In recent years, as part of the Re-BooT (Flight demonstration of robust low-boom design technology) project—which is part of the "Key and Advanced Technology R&D through Cross Community Collaboration Program" (commonly known as the K Program) established under the leadership of the Cabinet Office—the agency plans to demonstrate design technologies acquired through previous research aimed at reducing sonic booms, with flight tests scheduled to be conducted around 2028.[17)

As Japan possesses a wealth of technical expertise in supersonic aircraft, it is hoped that the country will continue to work alongside the United States and other nations on the international stage—such as within the ICAO—toward the revival of supersonic passenger aircraft. The future of supersonic passenger aircraft appears to be just around the corner. I will continue to closely monitor developments.

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