

Fact Sheet

SHENLONG ORBITAL TEST VEHICLE

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SUMMARY

The Shenlong spaceplane is a technology demonstrator and experimental vehicle which is likely used for testing reusable space launch vehicle technologies, as well as on-orbit testing of new sensor technologies and satellite hardware for risk reduction. Shenlong has deployed a small satellite during each of its three missions. Shenlong has demonstrated limited rendezvous and proximity operations with the satellites that it has released during its missions, but the spaceplane has near-zero feasibility as an orbital weapons system for attacking targets on the ground.¹

BACKGROUND

- Shenlong is an experimental re-usable spaceplane. Similar to the United States' X-37B, the spaceplane is uncrewed and estimated to be relatively small.²
- Shenlong has historically been launched on top of China's Long March 2F rocket from Jiuquan Satellite Launch Center, and is thought to have concluded its missions with horizontal landings at the Lop Nur test site.
- Development of Shenlong began in 2000, making it the oldest known Chinese spaceplane program.³
- Chengdu Aircraft Industry Group is reported to be Shenlong's main designer, although China Aerospace Science and Technology Corporation (CASC) has also been involved in research and development.⁴
- The U.S. military has catalogued Shenlong test flights as occurring between 331 and 620 kilometers in altitude and 49.99° and 50.2° inclination orbit.⁵
- As of May 2025, China has not specified which government entity is responsible for the Shenlong program.

SHENLONG ORBITAL FLIGHT HISTORY

Flight History Table

Launch Date	Launch Location	Landing Date	Landing Location	Time on Orbit	Launch Vehicle
Sep. 4, 2020	Jiuquan Satellite Launch Center	Sep. 6, 2020	Lop Nur Test Site	2 days	Long March 2F
Aug. 4, 2022	Jiuquan Satellite Launch Center	May 8, 2023	Lop Nur Test Site	276 days	Long March 2F
Dec. 14, 2023	Jiuquan Satellite Launch Center	Sep. 5, 2024	Lop Nur Test Site	268 days	Long March 2F

DEBATE OVER MISSION AND RATIONALE FOR THE SHENLONG PROGRAM

China's official objectives of the Shenlong program include verification and space science experiments to "provide technical support for the peaceful use of space" and to "pave the way for more convenient and affordable round-trip methods for the peaceful use of space in the future."⁶ However, many have questioned and speculated upon the official mission of the Shenlong program.

Over the course of its three missions, Shenlong has tested multiple technologies, including vertical takeoff and horizontal landing, capture and docking operations, and rendezvous and formation flying. The first Shenlong mission lasted from September 4 to September 6, 2020, during which time an unknown object was deployed and subsequently catalogued by the U.S. military (Object A, 2020-063G, 46395).⁷ The object, which was believed to be a subsatellite, broadcast S-band transmissions for several weeks after Shenlong's mission concluded.⁸ The second Shenlong mission began on August 4, 2022 and concluded on May 8, 2023, totaling 276 days in orbit. On October 23, 2022, Shenlong raised its perigee⁹ and released a new object catalogued by the U.S. military as OBJECT J (2022-093J, 54218).¹⁰ Shenlong is believed to have conducted rendezvous and proximity operations on multiple occasions, as well as at least two capture/docking operations with Object J in November-December 2022, January 2023, and February-March 2023. On at least five occasions, Object J maneuvered independently of Shenlong, indicating that the subsatellite was equipped with independent propulsive capabilities.¹¹ The third Shenlong mission began on December 14, 2023 and concluded on September 5, 2024, totaling 268 days in orbit. In late January 2024, Shenlong raised its perigee, and on May 24, 2024, Shenlong released an unknown object (OBJECT G, 2023-195G, 59884) into orbit. After releasing Object G, Shenlong performed a series of close maneuvers with the object and possible recapture operations¹² on June 5-7, June 11-12, June 14, and June 15-16, 2024.¹³ Following the third Shenlong mission, Chinese press reporting emphasized the success of the experimental mission and the growing maturity of the spaceplane program.¹⁴

There is speculation that Shenlong could serve as a space weapon launch platform or a platform for surveillance, intelligence, and early-warning missions. China's *Global Times* outlet refuted these claims, reiterating that Shenlong is "just a verification platform for testing the reentry glide return technology of a winged aircraft." The *Global Times* article was subsequently featured on the official website of the China Academy of Space Technology (CAST).¹⁵ As of May 2025, Shenlong has not approached nor maneuvered with non-Chinese space objects. Similar to the X-37B spaceplane, Shenlong's utility as a space-to-ground weapon is constrained by orbital mechanics. Any hyperkinetic weapon dropped from the spaceplane's bay would need to be equipped with its own thrusters capable of performing a deorbit burn. Based on the estimated size of Shenlong, such a weapon would be unlikely to fit within the spaceplane's payload bay.¹⁶ However, co-orbital concerns remain around Shenlong's dual use capabilities, due to the spaceplane's demonstrated ability to release, dock, and maneuver with objects in low Earth orbit.

SHENLONG FEATURES

Similar to the X-37B, Shenlong is uncrewed and appears to be relatively small.¹⁷ Model designs from 2000 show a delta-winged craft that is equipped with one vertical stabilizer and three high-expansion engines. Based upon these designs, it was estimated that Shenlong weighs approximately 10 metric tons, is 12 meters in length, and possesses an 8 meter wingspan.¹⁸ China's use of the Long March 2F rocket for Shenlong's past three flights suggests that the spaceplane is comparatively smaller in size than the model

from 2000 suggests, due to the Long March 2F rocket's reported payload capacity of around 8 metric tons for low Earth orbit placement.¹⁹ The Shenlong spaceplane is thought to have returned to Earth autonomously through a horizontal runway landing, similar to a conventional aircraft.

Shenlong's time spent in orbit increased significantly between its first flight, which lasted two days, and its second flight, which lasted 276 days. The time intervals between flights has decreased, from nearly two years between the first and second flight to seven months between the second and third flight.²⁰

MANEUVERABILITY OF SHENLONG

The Shenlong spaceplane is reportedly equipped with three high expansion engines,²¹ which maximize the spaceplane's thrust efficiency. During its second flight, Shenlong raised its orbit significantly, from 346 km by 593 km to 607 km by 597 km, rising to a nearly circular orbit. During the third Shenlong flight, the spaceplane raised its orbit from 333 km by 348 km to 609 km by 601 km.²² As stated above, Shenlong has demonstrated an ability to perform maneuvers and capture/docking operations with other objects equipped with independent propulsive systems. These maneuvers and orbit raises suggest that Shenlong possesses significant delta-v capability.

TRANSPARENCY CONCERNS

Much of the speculation over the Shenlong stems from the program's secretive nature. China has not revealed any official details about Shenlong's mission or on-orbit activities. Official statements are limited to launch announcements, which are released day-of, and applause for the program's success.²³ China has repeatedly claimed that the Shenlong program is in line with the country's commitment to the "peaceful uses of outer space," but China has not registered the Shenlong spaceplane nor its sub satellites with the United Nations for any of the spaceplane's past three missions, in contradiction to its legal responsibilities under the 1975 Registration Convention.²⁴

DEPLOYMENT OF SATELLITES

Shenlong has deployed satellites during each of the spaceplane's three missions, although China has never announced or confirmed these deployments. Identification and announcements of deployed objects have been conducted by commercial SSA companies, and object cataloging has been done by the U.S. military. The satellite deployed during the first mission demonstrated transmission broadcast capabilities,²⁵ and the satellite deployed during Shenlong's second mission is thought to have displayed independent propulsive capabilities.²⁶ Shenlong has conducted numerous close maneuvers and capture/docking operations with the deployed satellites.

ENDNOTES

1. For more information about the Shenlong spaceplane, please see: Victoria Samson and Laetitia Cesari, editors, *Global Counterspace Capabilities: An Open Source Assessment*, Secure World Foundation, April 2025, <https://swfound.org/counterspace/>.
2. Daniel Shats and Peter Wood, *China Aerospace Studies Institute*, "Chinese Spaceplane Programs," November 2021, <https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/Space/2021-12-06%20Spaceplanes.pdf>.
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5. Victoria Samson and Laetitia Cesari, editors, *Global Counterspace Capabilities: An Open Source Assessment*, Secure World Foundation, April 2025, <https://swfound.org/counterspace/>.
6. "China successfully lands reusable experimental spacecraft," *Xinhua*, September 6, 2024, <https://english.news.cn/20240906/651bb65c0c0b4dce896882d815c293a1/c.html>.
7. Data compiled from the public U.S. military satellite catalog at <https://space-track.org>.
8. Andrew Jones, "China's mystery spaceplane releases object into orbit," *SpaceNews*, November 2, 2022, <https://spacenews.com/chinas-mystery-spaceplane-releases-object-into-orbit/>.
9. Andrew Jones, "China's spaceplane raises orbit and national funding," *SpaceNews*, October 25, 2022, <https://spacenews.com/chinas-spaceplane-raises-orbit-and-national-funding/>.
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15. Daniel Shats and Peter Wood, *China Aerospace Studies Institute*, "Chinese Spaceplane Programs," November 2021, <https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/Space/2021-12-06%20Spaceplanes.pdf>.
16. Secure World Foundation, *X-37B Orbital Test Vehicle Fact Sheet*, May 2022, <https://swfound.org/media/207377/swf-x-37b-otv-fact-sheet-may-2022.pdf>.
17. Joanna Thompson, "China's mysterious space plane released an unidentified 'object' in orbit, US intelligence reveals," *Space.com*, May 27, 2023, <https://www.space.com/china-mysterious-space-plane-released-unidentified-object-in-orbit>.
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19. Andrew Jones, "China's secretive spaceplane releases object into orbit," *SpaceNews*, May 26, 2024, <https://spacenews.com/chinas-secretive-spaceplane-releases-object-into-orbit/>.
20. Andrew Jones, "China's secretive spaceplane conducts proximity operations with small spacecraft," *SpaceNews*, June 13, 2024, <https://spacenews.com/chinas-secretive-spaceplane-conducts-proximity-operations-with-small-spacecraft/>.
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