# Strategic Bombers in the Modern Era: Operation Spiderweb and More

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## 1. Abstract

Strategic bombers have comprised the backbone of aerial power and nuclear deterrence; however, modern advancements have led to a shift in their roles from their primary function. Recently, low-cost unmanned systems have demonstrated their capabilities in striking traditionally high-value assets, such as tanks and bombers, destroying expensive equipment at marginal loss. This paper examines the viability of strategic bombers in modern combat doctrine, taking into account real-life developments in the Russo-Ukrainian War, cost-effectiveness comparisons with other platforms (e.g., multirole fighters and drones), and the broader shift in the roles of bombers in military doctrine.

## 2. Introduction

Strategic bombers have influenced modern warfare for nearly a century. Strategic bombers are defined by their ability to deliver massive ordnance deep into enemy territory, especially capable of carrying out nuclear strikes. Throughout the Cold War, strategic bombers comprised the backbone of their nations' nuclear deterrent power. Today, major global superpowers still maintain a fleet of strategic bombers: the United States operates the B-1, B-2, and B-52, Russia operates the Tu-160 and Tu-95, and China operates the H-6.

However, the role traditionally occupied by strategic bombers today differs from their intended purpose during the Cold War. Strategic bombers typically have whopping costs for the nations developing them, as well as high maintenance, modernization, and

operational costs. Over time, changes in doctrine have slowly removed the need for strategic bombers as they were meant to be during the mid-20th century— precision strikes, nuclear missiles, and directed munitions have debatably taken the niche strategic bombers used to occupy. Recent conflicts, especially the Russo-Ukrainian war, raise questions about the practicality of strategic bombers in modern combat, especially with drone warfare reaching a new high.

3. **Changing Roles of Strategic Bombers over Time**

Modern strategic bombers serve vastly different purposes than their original functionality. Initially designed for the mass destruction of enemy industrial centers, their role has gradually shifted toward precision strike, deterrence, and nuclear delivery.

a. Strategic bombers in World War II

The first true "strategic bombers" saw action in World War II. Aircraft such as the British Lancaster and American B-17 were used primarily for area bombing campaigns against enemy cities and industrial targets (Overy, 2014). Their purpose was to deliver heavy payloads to vital enemy targets and devastate large areas with a single strike. Near the end of the war, the strategic bomber gained the ability to drop nuclear payloads with the B-29.

b. Strategic bombers during the Cold War

After World War II ended, nations further explored the applications of strategic bombers to carry nuclear weapons. Bombers such as the Soviet(now Russian) Tu-95 and American B-52 gained a new primary objective of nuclear deterrence. With the rise of mutually assured destruction (MAD), strategic bombers became representative of a nation's power—they were airborne components of the nuclear

triad alongside land-based ICBMs and submarine-launched missiles (Kristensen & Norris, 2018).

c. Strategic bombers after the Cold War

By the end of the Cold War, ICBM technology had surpassed the effectiveness of strategic bombers at deploying nuclear weapons. Rather than deploying mass weaponry to devastate a large area, strategic bombers were fitted with intelligent, guided bombs, such as the U.S. JDAM. The American B-1B Lancer and B-52 Stratofortress were deployed extensively in Operations Desert Storm, Enduring Freedom, and Allied Force, dropping both guided and unguided munitions on military targets, supply routes, and command centers (Watts, 2008). Post-Cold War, strategic bombers found a new niche of loitering over enemy-controlled areas and deploying large payloads of guided munitions.

d. Strategic bombers in the Modern Era

Today, strategic bombers see decreased use. With missiles taking over the role of nuclear deterrence, and with precision strikes phasing out large-scale devastation, the intended purpose of strategic bombers has become rarer. Small, nimble, multirole aircraft are better suited to precision strikes, and strategic bombers typically cannot get close enough to deliver bombs due to advanced air defenses. Both the United States and Russia have repurposed strategic bombers as missile beds—B-52s have launched AGM-86 cruise missiles in recent conflicts, and, Russia's Tu-95 and Tu-160 have deployed Kh-101 missiles in Ukraine, hitting targets from hundreds of miles away (Cooper, 2024). These missions demonstrate

that modern bombers rarely leave national airspace, undermining their traditional image as deep-penetration aircraft.

Additionally, these same bombers have become stationary targets when not airborne. The 2025 Operation Spiderweb demonstrated that long-range aviation assets can be vulnerable even deep within friendly territory, further complicating their strategic role.

## 4. Case Study of Operation Spiderweb

On June 1, 2025, Ukraine launched Operation Spiderweb, a coordinated drone campaign targeting five Russian bomber airbases deep inside Russia: Belaya, Dyagilevo, Ivanovo Severny, Olenya, and Ukrainka(Axios, 2025). Ukrainian operatives reportedly smuggled 117 drones into Russian territory in trucks and containers, launching them in a coordinated surprise strike. Aircraft targeted by the drones included Tu-95MS, Tu-22M3, and Tu-160 bombers, along with A-50 early warning planes (Shinkman, 2025).

Ukraine claimed the attack damaged or destroyed 41 aircraft, with U.S. estimates suggesting a total of around 20 aircraft struck, including at least 10 destroyed, representing approximately 10% of Russia's long-range bomber fleet (Hernandez, 2025). Financial damages from the operation are estimated at US $7 billion (Wright, 2025).

While the operation did not give a great strategic advantage to Ukraine, it has resurfaced the debate over the role of strategic bombers, since as much as 34% of Russia's strategic bomber fleet was lost in the attack. Additionally, the attack was carried out using especially advanced drones. Many of the drones used first-person view (FPV) control systems and some incorporated autonomous navigation, allowing them to reach targets even with disrupted communication links (Hernandez, 2025). The attack

highlights inexpensive, non-traditional weapons destroying costly traditional symbols of air dominance.

Operation Spiderweb sent shockwaves not just to Russia, but to militaries worldwide. The notion that strategic bombers could be kept safe in the country's interior was decisively challenged. The operation also underscored the need for protective shelters, dispersed bases, and anti-drone defenses, all of which significantly raise the cost and logistical burden of maintaining already costly strategic bombers (Detsch, 2025).

On an even larger scale, Operation Spiderweb demonstrates a strange asymmetry in airpower. A weaker state without strategic bombers of its own was able to inflict severe damage on those of a nuclear superpower, relying entirely on unmanned, low-cost systems. As military analysts at Chatham House and NATO have noted, this incident marks a doctrinal inflection point, forcing major powers to reconsider the survivability of traditional airpower platforms in the drone era, especially strategic bombers (Financial Times, 2025).

## 5. Cost Comparison: Drones vs. Strategic Bombers

Strategic bombers are some of the most expensive aircraft ever created. Their complex systems, vast ranges, and requirements for payloads and survivability lead to soaring acquisition, maintenance, and operation costs. In contrast, modern drone warfare has demonstrated that far less expensive unmanned systems can threaten or even disable these high-value assets.

Unit Costs and Fleet Expenses

A single American B-2 Spirit costs approximately $2.13 billion per unit, with operational costs exceeding $130,000 per flight hour (Congressional Budget Office

[CBO], 2023). The upcoming B-21 Raider, while designed to reduce costs and enhance survivability, is still estimated to exceed $700 million per unit (Department of the Air Force, 2023).

On the Russian side, the Tu-160 costs around $270 million, while the Tu-95MS—an aging Soviet-era turboprop bomber still in service—costs roughly $32 million, though modernization programs significantly raise this figure (Cooper, 2024). In comparison, Ukrainian drones used in Operation Spiderweb were constructed for an estimated $20,000 to $50,000 per unit (Wright, 2025). Even conservative estimates for the inexpensiveness of the drones project Ukraine's total drone cost at $5 million for the operation— this amounts to less than 0.1% of the value of the aircraft damaged or destroyed in the raid. Additionally, the logistical and operational cost of deploying these drones is negligible when compared to fueling, maintaining, and basing manned bombers.

Strategic Value vs. Financial Risk

Strategic bombers serve unique roles, such as nuclear deterrence, standoff cruise missile delivery, and flexible strike options. However, their primary functions such as nuclear deterrence and extensive bombing have been replaced by missile warfare and precision strikes. The modern uses of strategic bombers, such as being platforms for missile delivery, can also be done by smaller multirole attack aircraft. Because of this, their high price tag makes their loss strategically and economically intolerable. As Spiderweb illustrated, even a small number of low-cost drones can inflict billions in damage if bombers are inadequately defended.

Furthermore, the cost of protecting bomber bases—through dispersal, hardened shelters, and layered air defense—adds significantly to their operational burden. These

measures are increasingly seen as necessary, especially as drones grow more autonomous and precise (Detsch, 2025).

These modernization measures only exacerbate the cost problem posed by strategic bombers, alongside their soaring prices and questionable necessity in the first place. Strategic bombers are suited for large-scale state conflict and power projection, and therefore are ill-suited for the low-intensity, high-frequency demands of modern drone-based conflicts. Conversely, drones can be mass-produced and deployed with minimal training and infrastructure.

## 6. A Related Example- Battleships

Near the end of the 19th century, naval power was redefined by the introduction of a new form of capital ship—the battleship. Battleships quickly rendered traditional ships obsolete, with massive firepower capable of devastating ship-to-ship fire as well as powerful coastal bombardment. Battleships typically came with a brimming set of three or four large-caliber turrets, alongside multiple smaller support turrets and dozens of point-defense weapons for anti-aircraft fire (Hore, 2006).

Up until World War II, battleships comprised the backbone of a nation's navy. Their sheer firepower could outclass any other type of vessel. The World War I Battle of Jutland showcased one of the largest clashes between battleships, with huge fleets of dreadnoughts going head-to-head (Campbell, 1998). The most powerful battleships emerged during World War II, with titans such as the Japanese Yamato, the German Bismarck, the British Vanguard, and the American Iowa. During the early stages of the war, battleships devastated hostile fleets, with only four German battleships managing to hinder the Royal Navy across vast areas (Garzke & Dulin, 1985).

However, even the most devastating battleships—with all their firepower—fell victim to small, strategic, precision strikes. Vessels such as the Yamato were destroyed by swarms of light torpedo bombers, taking 17 torpedoes and multiple bombs before sinking (Parshall & Tully, 2005). Other vessels, such as the Japanese Kongō, were sunk by much smaller and cheaper submarines. The age of devastating naval gunfire came to an end, and battleships were gradually replaced by aircraft carriers as the backbone of modern fleets.

Especially notable is the case of the four Iowa-class battleships—the Iowa, Missouri, New Jersey, and Wisconsin. These ships were the final class of battleships built by the U.S. Navy and were some of the largest and most powerful ever made (Stillwell, 1996). While decommissioned during the Cold War, the ships of the Iowa class served until the turn of the 21st century. The USS Missouri and USS Wisconsin even participated in Operation Desert Storm, but they rarely used their main armament—the vessels fired only a combined 39 shells from their 16-inch guns (O'Rourke, 1991). Instead, they launched Tomahawk cruise missiles at Iraqi positions, rarely even getting close enough to fire their guns at all. Eventually, all four ships were decommissioned for their soaring operational costs, living as long as they did only due to repeated modernization for evolving combat doctrines (Friedman, 2004).

## 7. Conclusion

The traditional role of strategic bombers as the centerpiece of a nation's long-range strike capability has become challenged by the rapid evolution of drone warfare and changing combat doctrines. While bombers still serve somewhat niche

strategic functions—particularly in nuclear deterrence and standoff missile delivery—their enormous cost and increasing vulnerability raise significant concerns about their continued practicality in future conflicts.

As the case of Operation Spiderweb demonstrated, even well-defended strategic assets located deep inside a country can be damaged or destroyed by low-cost, unmanned systems. This raises significant questions about cost-effectiveness and survivability, especially as drone swarms, autonomous weapons, and precision-guided munitions become more sophisticated, more affordable, and widely accessible.

Strategic bombers may not be entirely obsolete; they still work as political tools of deterrence, symbols of power, and platforms for high-payload delivery in specific conditions. However, they are no longer unrivaled. Modern warfare increasingly favors versatility, affordability, and survivability—qualities better exemplified by drones and multirole aircraft.

For military planners, this signals a potential inflection point: maintaining fleets of strategic bombers may continue to serve a purpose, but only if complemented by layered defenses, strategic redundancy, and integration with new technologies. Without this adaptation, strategic bombers risk becoming relics of an earlier era—powerful, but ill-suited to the threats of 21st-century warfare.

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