

## Night-time v Daylight Bombing

While the United States Army Air Force (USAAF) is primarily known for daylight precision bombing, it conducted numerous night bombing operations during World War II, most notably in the Pacific theatre.

### Primary Roles

- **Eighth Air Force (USAAF):** The core doctrine of the 8AF was to conduct high-altitude, daylight "precision" bombing against specific military and industrial targets using the Norden bombsight. The aim was to destroy key elements of the German war machine with minimal collateral damage, a goal that was often difficult to achieve in reality due to weather and defensive opposition.
- **RAF Bomber Command:** The RAF, having experienced heavy losses during unescorted daylight raids early in the war, switched its strategy to night-time "area" bombing, targeting entire cities and industrial areas to undermine German morale and industrial capacity.

### Limited Night Operations in Europe



Following devastating losses during daylight raids in mid-1943 (such as the "Black Thursday" raid on Schweinfurt), the 8th Air Force leadership briefly considered shifting to night bombing. They conducted eight experimental night missions alongside the RAF to test feasibility.

- **Experimentation:** A squadron of B-17s (*left*) was modified and trained to fly with RAF Bomber Command in combat missions over German-occupied territories. However, these experiments showed that the B-17s needed further modifications and the crews required significant additional training for effective night operations, and the idea was largely abandoned in favour of waiting for long-range fighter escorts like the P-51 Mustang.
- **Pathfinder and Weather Operations:** Later in the war, the 8th Air Force utilized H2X radar (an American version of the British H2S) and "Pathfinder" techniques. While these were primarily used to bomb through heavy cloud cover during the day, they effectively enabled "blind" bombing that did not rely on visual daylight conditions.
- **Strategic Doctrine:** Overall, the Allies maintained a "round-the-clock" offensive where the 8th Air Force bombed by day to hit specific industrial targets, while the RAF Bomber Command conducted area bombing at night. The Americans ultimately stuck to daylight raids once long-range escort fighters like the P-51 Mustang became available to protect the bomber formations.

### The Pacific Theatre

Starting in early 1945, the USAAF shifted to large-scale night firebombing raids against Japanese cities.



**Operation Meetinghouse:** On the night of March 9–10, 1945, 334 B-29 Superfortresses (*left*), conducted a low-altitude night raid on Tokyo, creating a massive firestorm that killed an estimated 100,000 people. It remains the most destructive aerial raid in history.

**Strategic Shift:** Major General Curtis LeMay ordered these night raids at low altitudes (5,000–9,000 ft) because Japanese night defences were weak and the jet stream at high altitudes made daylight precision

bombing difficult. In the final months of the war, the USAAF sometimes participated in "blind bombing" through heavy cloud cover or at night using radar (H2X) as part of broader area bombing campaigns against German cities.

### Reasons for the Standard "Day vs. Night" Split

The Allied strategy in Europe was designed to provide round-the-clock bombing.

- USAAF (Day): Used the Norden bombsight, which required clear visibility for "precision" targeting of industrial sites.
- RAF (Night): Switched to night bombing early in the war to reduce unsustainable aircraft losses, focusing on "area bombing" to destroy industrial workers' housing and morale.

### The Norden Bombsight



The Norden bombsight (*left*), was technologically advanced for its time, showing great promise in tests, but in combat, it was overhyped and failed to meet its legendary "pickle barrel" accuracy, performing similarly to other sights due to factors like poor quality control and the chaos of war (smoke, clouds, defences). While it offered better optical clarity than its rival (Sperry), its real-world effectiveness was limited, leading to a shift towards area

bombing and later, radar-guided systems.

### What Made it Seem Good (In Theory):

- **Advanced Design:** It was a complex, gyroscopically stabilized device designed for precise, high-altitude daytime bombing, promising accuracy for attacking ships and factories
- **Great Test Results:** Pre-war tests showed astonishing accuracy (150 ft Circular Error Probable), leading to massive secrecy and investment.
- **Superior Optics:** It generally offered clearer views than earlier sights.

### Why It Didn't Live Up to the Hype (In Practice):

- **Mass Production Issues:** Poor quality control during mass production compromised its performance.
- **Combat Realities:** Smoke, clouds, enemy defences, and the sheer difficulty of steady bombing made pinpoint accuracy impossible.
- **Over-Hype:** The "pickle barrel" myth was largely propaganda, setting unrealistic expectations.
- **Actual Performance:** By 1943, its average accuracy (around 1,200 ft CEP) was similar to other Allied and German sights, not revolutionary.

**The Verdict:** The Norden bombsight was a technologically ambitious device that never delivered its promised precision in war. Its failure to revolutionize bombing led to the adoption of area bombing tactics and, eventually, radar bombing technology, making the Norden more a symbol of military over-optimism than a true game-changer in combat.

The following is an article from [Quora.com](https://www.quora.com/), written by **Richard Meakin M.A.**

*Question: Why did the RAF bomb at night, and the USAAF bomb in daylight?*

A matter of experience and technological development. There are some very misleading answers to this question regarding the sustainability of daylight raids and the reality of precision bombing.

I should note at the beginning that it is also necessary to take into account the very rapid development of technology during this period. This was a constantly shifting battle with the advantage changing hands many times. Attempts to compare bombing practices in 1940 or 1941 with those in 1944 or 1945 are meaningless.



The Combined Bomber Offensive (CBO) emphasised round-the-clock bombing with the USAAF operating during the day and the RAF [operating bombers such as the Handley Page Halifax, *left*], during the night. However, this reflected doctrine rather than a well thought through plan. In fact, the RAF did not believe that the USAAF could sustain a

daylight campaign and wanted them to bomb at night. As we shall see, the RAF were very nearly proved right.

In the early part of the war both the Germans and the British rapidly realised that the losses from daylight bombing raids were unsustainable. Giulio Douhet's pre-war doctrine that *the bomber will always get through*, espoused in his book *The Command of the Air*, which influenced so many commanders and politicians, turned out to be very wrong.

In response to heavy losses, both sides turned to night bombing as the only viable alternative. Bombing at night has the advantages of making it harder for intercepting fighters to locate the bombers and of covering the bomber's approach from flak.

When the USAAF started their main strategic (deep) bombing campaign in August 1943, they believed that their heavily armed B-17 bombers would be able to defend themselves effectively. They were wrong.



Eighth Air Force losses were so heavy, 30% of its bombers each month, that, statistically, bomber crews had no chance of surviving a tour. In the August 17, Schweinfurt/Regensburg raid, 71 bombers were lost or damaged beyond repair out of the 230 participating (31%) and post-war analysis shows that three B-17s were lost for every German fighter shot

down. After a **two month pause** to regroup, another deep raid was made on Schweinfurt, this time suffering 77 losses (26.4%). During this raid the 305th Bomb Group lost 13 of its 16 B-17s. This was the last unescorted deep bomber strike by the USAAF.

Eight days later, on October 22, 1943, the unescorted daylight strategic bombing campaign was put on hold as the USAAF leadership realised the Eighth Air Force could not continue to sustain such heavy losses, in both aircraft and aircrews, and remain an effective force. **This pause lasted for over four months.** The question then arises: why did the Eighth Air Force leadership discount strategic bombing lessons from earlier in the war.

The USAAF commanders ignored two clear lessons the RAF and the Luftwaffe had learned early on: that all deep operations required air superiority, without which attacking aircraft suffered unsustainable losses, and that finding and hitting targets under anything but perfect daylight conditions presented a major challenge. The reasons for this are to be found in a mixture of hubris, over-confidence, a misinterpretation of loss rates experienced during what the British called "milk runs", the shallow penetration raids carried out in the first half of 1943, and exaggerated claims as regards the number of German fighters destroyed.

During this period of re-evaluation, the Eighth Air Force worked with RAF Bomber Command to experiment with night bombing and flew several night missions to see if it was possible to transfer to night bombing. After eight missions, it was determined the B-17s needed further modifications and that the USAAF crews required considerable additional training to perform night bombing raids.

The solution was a technological one, and one not available earlier in the war: the long-range escort fighter. Hap Arnold ordered all P-38 and P-47 fighter groups deploying overseas to be sent to the UK. The P-38 proved to be unsuitable in Northern Europe; *[While the P-38 Lightning was highly successful in the Pacific, it faced significant challenges in Europe. Engine/mechanical issues in cold weather (fuel, heating, turbochargers), aerodynamic problems (compressibility) in high-speed dives that limited pursuit tactics, and tactical mismatches against nimble German fighters like the Bf 109, especially in*

its early escort role, leading to heavy losses until later models and improved tactics emerged.] However, the P-47, equipped with drop tanks, was a success and was then supplemented by the newly arriving P-51 (*below*), equipped with the Merlin engine.



The fighter escorts were staggered, with Spitfires providing short range cover, then P-47s and then P-38s or P-51s, which meant that fighters could cover the bombers initially up to 450 miles and later up to 600 miles. In addition, the close fighter escort was rotated in order to save fuel and allow the fighters to spend a proportion of their time hunting German fighters or beating up German infrastructure.

The *only* reason that the daylight bombing campaign could be resumed was the advent of the long-range escort fighter.

Besides the self-defending bomber concept, precision bombing was another misconception which obscured daylight strategic bombing theory. The Norden bombsight was tested under conditions far different than wartime bombing in Europe where the target was often obscured by clouds, smokescreens or fog, and fighter opposition, coupled with antiaircraft fire, caused many aircraft to zig-zag on their approach.

As a result, daylight bombing was not necessarily significantly more accurate than night bombing, especially after the introduction of navigational aids such as Gee and Oboe and the H2S (H2X to the USAAF) airborne ground scanning radar by the RAF.

USAAF bombers operated in combat boxes sometimes up to a kilometre across and two kilometres deep and dropped their bombs on the command of a lead bomber - who was the only one equipped with a Norden bombsight. It is clear that this practice could not lead to precision bombing as we think of it today. One analysis states that 648 bombs were required to guarantee a 96% chance of two hits on a 400 x 500 ft target, but the other 646 bombs also went somewhere. In general practice, perhaps 20% of the bombs landed within 1,000 feet of the target. In the final analysis, precision bombing was more of an aspiration than a reality and it was emphasised as a sop to US public opinion (except in the case of Japan where it apparently wasn't an issue).

Therefore, the RAF bombed mainly at night because it had found daylight losses to be unsustainable in the early part of the war and therefore directed its technological development and training to night bombing. The USAAF bombed during the day because it thought it could, learned that it couldn't the hard way, and was finally able to succeed - *Deus ex machina* [an unexpected power or event saving a seemingly hopeless situation] - because of the arrival of the new long range escort fighters. Without them the USAAF daylight bombing campaign could not have continued.

None of this is to denigrate the amazing bravery of the men of RAF Bomber Command and the Eighth Air Force, who flew against incredible odds, nor is it a judgement on the effectiveness of the bombing

campaign as a whole, nor on the types of aircraft used - these are whole other topics. Where there is a case for criticism to be made, it is of the overall commanders: Portal and Harris for the RAF and Arnold and Eaker for the USAAF.