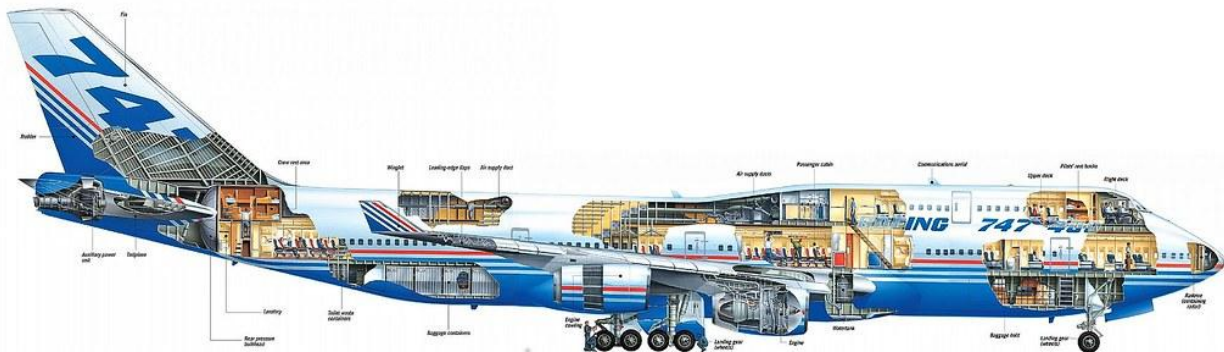
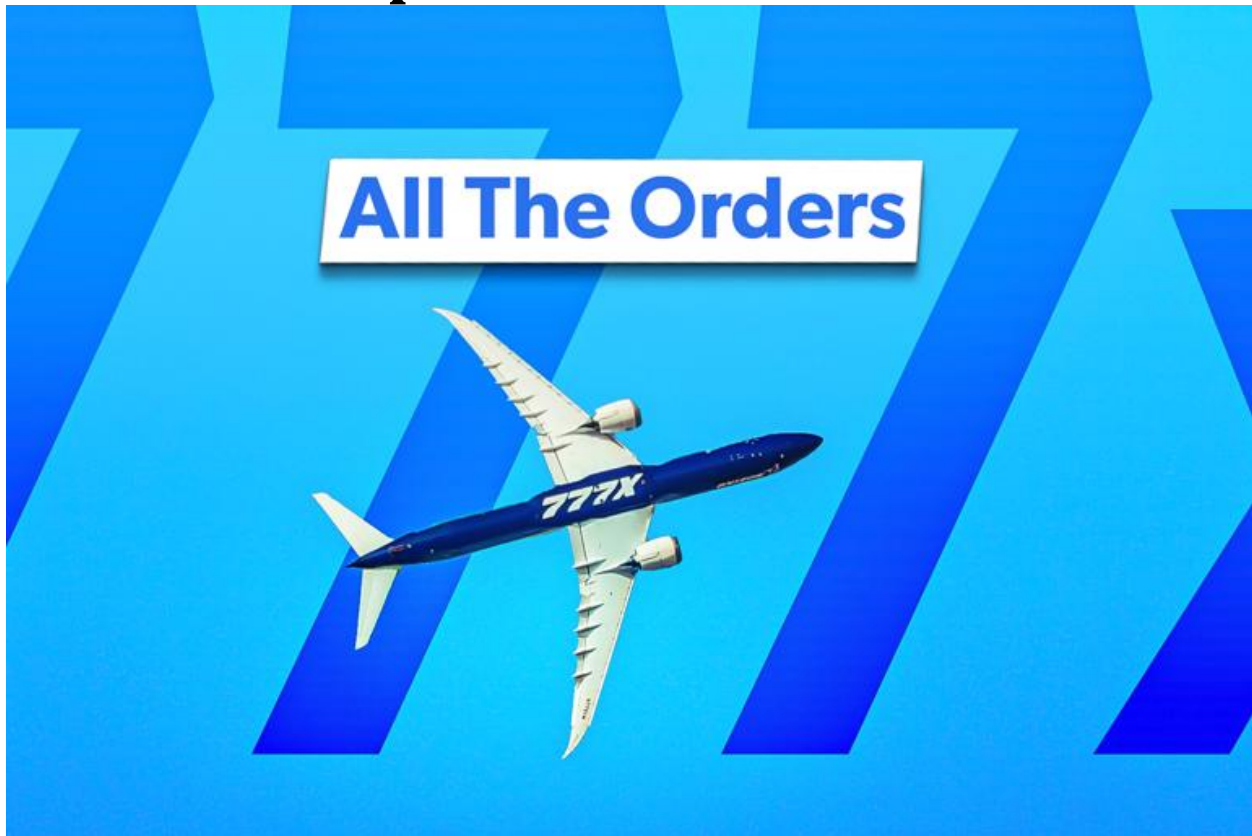


# COMMERCIAL AVIATION



# Which Airlines Have Ordered The Boeing 777X? A Complete List



Which Airlines Have Ordered The Boeing 777X? A Complete List

The Boeing 777X is set to offer a new level of passenger comfort. The 777X is the third generation of the popular Boeing 777, the most-built widebody aircraft and the largest commercial aircraft still in production. The Boeing 777X is being developed in three variants: the 777-8, 777-8F, and the 777-9. Here are all the airlines that have ordered the third generation Triple Seven. The main competitor of the 777X is the Airbus A350 family, including the freighter variant of the Airbus A350 expected to enter service in mid-2027.

# The Boeing 777X's three variants

## Boeing 777-8

The development of the Boeing 777-8 was launched in 2013 and is being designed with a range of 10,060 miles or 16,190 kilometers. The aircraft comes with a max take-off weight of 777,500 lbs and has a speed of around 551 miles per hour. In a typical two-class configuration, it will be able to carry around 395 passengers.

Being 232 feet and 6 inches long and carrying fewer passengers, it is the shortened derivative of the Boeing 777-9 variant. However, it has a greater range, flying around 1,700 miles further than the 777-9. The 777-8 is designed to succeed the 777-200LR (long range) airliner and compete with the Airbus A350-1000.

## Boeing 777-8F

The Boeing 777-8F is the freighter variant of the 777X. The Boeing 777 is one of the world's most popular choices for freighters. The Airbus A330 is also popular, while most Boeing 747s remaining in service around the world are also freighters. The 777-8F is set to compete with the upcoming Airbus A350F freighter variant.

The freighter will have a maximum structural payload of 118 tonnes. Its range is markedly shorter than its passenger counterpart at just 5,074 miles.

Boeing is [hailing](#) its upcoming 777-8 freighter as "*the world's most capable and fuel efficient freighter for a sustainable future. The Boeing freighter family delivers the right payload capacity and range capability, all with superior economics.*"

Meanwhile, Airbus is [claiming](#) its rival A350F as "*the only choice for the future of the large widebody freighter market.*"

Boeing notes that the rise in e-commerce for consumer goods to demand for general freight is expected to grow the world's freighter fleet by over 70% over the next 20 years.

## Boeing 777-9

The 777-9 is the stretched variant of the 777X and has the ability to carry 426 passengers in a typical 2-class configuration. The variant measures 251 feet and 9 inches long and has a range of 8,383 miles or 13,500 kilometers. The Boeing 777-9 is expected to be the first variant to enter service, with the first deliveries now expected to occur in 2026. The launch customer is to be Germany's Lufthansa.

## Boeing 777X orders by customers

The Boeing 777-9 is currently the most popular variant of the 777X. It has attracted a total of 379 orders from nine buyers, excluding the four built for Boeing to test and develop the type.

So far, it appears that the 777-8 passenger variant is the less popular variant and has attracted only two buyers. [Ch-aviation](#) lists only two airlines to have ordered the variant, [Etihad Airways](#) and Emirates. Etihad and Emirates are the twin flag carriers of the United Arab Emirates and boast large widebody fleets.

Emirates' fleet has been exclusively made up of Airbus A380s and Boeing 777s. However, it is now diversifying its fleet. It took delivery of its first Airbus A350s in late 2024 and has Boeing 787 Dreamliners on order.

Emirates is also looking to continue operating 777s for decades to come as it has 35 Boeing 777-8s and 17 Boeing 777-9s on order. Etihad has a smaller order for 8 the smaller variant and an order of 17 examples of the stretched variant.

The table above shows the firm orders listed by [ch-aviation](#). More airlines may have placed orders as Boeing's website lists a total of 534 orders, including 12 orders from unidentified customers. Many airlines also have options for more 777X aircraft.

Notably, [Boeing's website](#) lists Singapore Airlines as having placed 31 orders for the 777X family of aircraft that do not show up in [ch-aviation's](#) data. At 31 orders, that would make Singapore Airlines the third largest purchaser of the 777X to date behind Emirates and Qatar.

Notably, of the 481 orders for the 777X family listed by ch-aviation, 171 of them are from the three major Gulf State carriers: Qatar, Etihad, and Emirates. That represents a third of the orders so far.

With 55 orders, the Boeing 777-8F so far has more orders than its passenger counterpart. So far, ANA-All Nippon Airways, Cargolux, Lufthansa Cargo, Qatar Airways, and Silk Way West Airlines have placed orders for the aircraft. More than half of these orders (34) have been placed by Qatar.

More orders for the 777-8F are likely to roll in. For example, in December 2024, [Air Cargo News reported](#), "*Taiwan based China Airlines has announced plans to order four 777-8F freighters with deliveries expected from 2029.*"

## **No American orders for the 777X**

Perhaps the most striking omission from the list of 777X orders is any US-based or even North American/South American airlines. These are completely absent. Delta Air Lines has switched to operating Airbus widebodies (except for the medium-sized 767), while United has not shown any interest in the 777X. [Southwest Airlines](#) exclusively operates a fleet of Boeing 737s and doesn't operate any long-haul routes.

The US-based passenger airline considered more likely to order the 777X is American Airlines. However, time will tell if the giant will actually order any. It also seems unlikely that other US carriers will order Boeing's new flagship as other airlines like JetBlue and Alaska Airlines exclusively operate fleets of narrowbody aircraft. In November 2024, Simple Flying suggested that American cargo carriers, like FedEx or UPS, are the most likely to order the 777-8F.

## **What to know of the 777X program**

The Boeing 777X will be a modernized version of the 777. It will incorporate some of the new technologies found in the Boeing 787 and will include some new technologies. The aircraft is expected to keep the 777 competitive and ensure it is able to compete with the Airbus A350 for years to come. Whereas,

previous 777s had the options of three engines, the 777X will be exclusively powered by the GE Aerospace GE9X engine.

[Boeing says](#) the Boeing 777X "*will be the world's largest and most efficient twin-engine jet, unmatched in every aspect of performance. With new breakthroughs in aerodynamics and engines, the 777X will deliver 10 percent lower fuel use and emissions and 10 percent lower operating costs than the competition.*"

"A true family, the 777X offers low-risk, profitable growth, industry-leading reliability and seamless integration with the 777 and 787 Dreamliner families for even more flexibility. But performance is just part of the story. With a spacious, wide cabin, new custom architecture and innovations from the 787 Dreamliner, the 777X will deliver the flight experience of the future." - [Boeing](#)

The Boeing 777-8F's entry into service has been delayed, with the date now pushed back to 2028 or 2029. Meanwhile, Boeing will end 767F production in 2027. In October 2024, [Air Cargo News reported](#), "*Boeing had a total of 10 orders for 767-300Fs in 2022, from UPS and FedEx, but Boeing's order data shows no further orders in 2023 and 2024.*"

The 777X freighter was originally slated to come to the market in 2027. Now it seems the Airbus A350F will hit the market before the 777-8F. Qatar Airways is planned to be the launch customer of the 777-8F. It will now have to wait more than six years from when it placed its order in 2022 to when it receives its aircraft.

A total of 1,742 Boeing 777s have been delivered since 1994, spanning two generations. Meanwhile, the A350 was introduced in 2015 and it has attracted a total of 1,363 orders, of which half (645) have been delivered and half (644) remain outstanding. With a total order book of around 481 aircraft, the outstanding 777X remains behind the remaining order book for the A350 for now.

## **Widebody Private Jet: A Look At The Private Boeing Business Jet 777 Jumbo Jet**

The Boeing Business Jet (BBJ) 777 represents the pinnacle of private aviation, offering an unparalleled combination of range, space, and luxury. As a widebody private jet, the BBJ 777 is derived from Boeing's proven 777 airframe but

customized for ultra-high-net-worth individuals, heads of state, and corporations that demand the very best in long-haul private air travel.

## The BBJ 777: An overview

The BBJ 777 is part of Boeing's Business Jet series, which transforms commercial airliners into opulent private aircraft. It comes in two main variants:

- **BBJ 777-200LR** – Known for its [ultra-long-range capabilities](#), this model can fly non-stop for over 10,000 nautical miles. It is based on the commercial Boeing 777-200LR, which was originally designed for extended-range flights operated by major airlines. The BBJ 777-200LR is optimized for intercontinental travel, allowing owners to fly directly between distant global destinations such as New York to Sydney or London to Buenos Aires without requiring a fuel stop. The -200LR's slightly smaller fuselage allows for highly efficient aerodynamics, making it a preferred choice for those who prioritize range over sheer cabin space.
- **BBJ 777-300ER** – A larger version with additional cabin space, this variant offers a range of approximately 9,300 nautical miles. Based on the Boeing 777-300ER, this model features a significantly longer fuselage, providing more room for customized luxury interiors. The trade-off for its increased cabin volume is a slightly reduced range compared to the -200LR variant. However, the additional space allows for more expansive layouts, including larger master suites, conference rooms, and entertainment areas. The -300ER variant is ideal for buyers who prioritize in-flight comfort and entertainment over maximum range.
- **BBJ 777x** – The next generation of design is represented here. The 777X incorporates advanced technologies derived from the 787 Dreamliner along with new innovations. The improved fuel efficiency and reduced operating costs make it an attractive option compared with its predecessors. This family comes with two main passenger variants. The 777-8 is designed for longer-range flights with slightly smaller passenger capacity. The 777-9 is designed for higher passenger capacity on long-haul routes. It should be noted that while Boeing is taking orders for these jets,

they are still in production and none have been delivered at the time of publication.

All models provide vast interior space, advanced avionics, and efficiency that make them ideal for intercontinental travel without refueling. With the ability to connect nearly any two cities in the world non-stop, the BBJ 777 is a true workhorse of luxury aviation, eliminating the need for layovers or refueling stops. The choice between the options ultimately depends on the owner's preference for range versus interior space, with both models offering unmatched luxury and performance in the private aviation sector.

## **Interior space and luxury customization**

One of the most compelling aspects of the BBJ 777 is its sheer size. With a cabin width of 19 feet and a length of up to 233 feet (in the case of the BBJ 777-300ER), this jet offers unmatched interior space compared to smaller private jets like the Gulfstream G700 or Bombardier Global 7500.

## **Full-sized dining areas**

In-flight fine dining is taken to a new level with full-service galleys, where onboard chefs can prepare gourmet meals. Custom kitchens feature top-of-the-line appliances, wine cellars, and dedicated storage for the finest china and crystal. Some configurations include separate dining rooms with tables seating up to a dozen guests, ideal for business dinners or intimate gatherings.

## **Cinema rooms and gaming lounges**

Entertainment is a key priority for many BBJ 777 owners, leading to fully integrated cinema lounges with massive OLED screens, Dolby Atmos surround sound, and ultra-luxurious reclining seats. Gaming enthusiasts can install VR suites or high-performance gaming setups with access to high-speed satellite internet for lag-free streaming and online play. Why leave behind entertainment options when you can have the same thing (or perhaps even better) at 40,000 feet?

## **Dedicated office spaces**

Ensuring productivity during long-haul flights, dedicated workspaces include executive desks, multiscreen setups, ergonomic chairs, and real-time global connectivity. These offices are designed to rival those found in high-rise corporate headquarters, allowing business leaders to work efficiently at 40,000 feet. Features make sense given the fact that many of these planes are owned and operated by corporations expressly for business use.

## **Wellness and spa areas**

Some owners opt for onboard gyms with treadmills, elliptical machines, and weight training equipment. Others prefer yoga studios with mirrored walls and tranquil lighting. Massage therapy rooms with professional tables and certified onboard therapists are also available. These wellness spaces help passengers stay active and refreshed on long journeys.

## **Advanced lighting and climate control systems**

The BBJ 777 features fully customizable LED mood lighting to mimic natural daylight cycles, reducing jet lag. High-tech air purification systems filter out pollutants, while humidity control ensures a comfortable environment, preventing dehydration and fatigue.

## **Expansive storage and wardrobe spaces**

With such a large aircraft, owners can include walk-in closets, dedicated luggage compartments, and secure storage areas for valuables, ensuring all personal belongings travel in style.

The BBJ 777's unmatched cabin volume allows for creativity and extreme personalization, resulting in a flying palace that is uniquely tailored to its owner's preferences.

# **Operating costs and ownership considerations**

Owning a BBJ 777 is not just about luxury; it also comes with significant operational expenses.

## **Acquisition cost**

A fully outfitted BBJ 777 can range from \$350 million to over \$450 million, depending on customization. This price includes basic interior outfitting but can increase significantly with high-end customizations.

## **Fuel costs**

The BBJ 777 consumes significantly more fuel than smaller private jets, with an average fuel burn of 6,000+ gallons per hour. With global jet fuel prices fluctuating, annual fuel costs alone can reach tens of millions of dollars, depending on flight frequency and distance.

## **Maintenance and crew**

Annual maintenance costs can exceed \$10 million, including routine inspections, engine servicing, avionics updates, and unforeseen repairs. A full-time flight crew, including at least two pilots, a flight engineer, and cabin staff, adds additional payroll expenses of several million dollars per year. Owners may also require multiple crew rotations for extended operations, further increasing labor costs.

## **Hangar and insurance**

Due to its size, the BBJ 777 requires specialized hangar space at major international airports, which can cost over \$1 million annually. Comprehensive insurance, covering hull damage, liability, and crew coverage, can cost an additional \$3-\$5 million per year.

## **Regulatory compliance and operational logistics**

Operating a BBJ 777 requires adherence to international aviation regulations, including flight planning, permits, and security measures. Many owners work with professional aircraft management companies to handle these logistics, further adding to annual operating costs. Additionally, private airports and ground handling services for widebody aircraft incur premium fees.

## **Depreciation and resale value**

While private jets hold their value well compared to commercial airliners, the resale market for a BBJ 777 is limited to a niche group of ultra-wealthy buyers. Significant depreciation occurs, especially with outdated avionics or interior configurations.

Despite these high costs, for those who require non-stop global travel with maximum comfort, the BBJ 777 remains a practical choice. Many ultra-wealthy individuals and corporate entities offset expenses by chartering their aircraft when not in personal use, generating revenue to mitigate ownership costs.

## **Mission use**

The BBJ 777 doesn't have much breadth in terms of multiple uses. Its size doesn't make sense for use in medevac or medical transport and the configuration lends itself to the one thing it does very well: transporting many people long distances. It's no wonder that it's the favorite of corporations, heads of state and governments for long-distance travel.

## **The gold standard of private aviation**

The BBJ 777 is a masterpiece in private aviation, offering the ultimate blend of range, luxury, and space. While its operational costs are significantly higher than smaller jets, the benefits—such as non-stop global travel and unparalleled

comfort—make it an attractive option for billionaires, royal families, and multinational corporations. Compared to other private jets, the BBJ 777 stands as a true flying palace, redefining what is possible in high-end air travel.

# AIRBUS ACJ 220

Airbus calls it the **game changer**. With a capacity of up to 19 and a flying endurance of up to 12 hours, Airbus promises customers lower economic costs and greater capabilities compared to its contemporaries.

It's named the [Airbus ACJ TwoTwenty](#), and it fits into a new market for Airbus's corporate department. While Airbus has a long history of selling converted versions of its airliners, these planes were huge, both in size and cost. Really, these aircraft, along with the competing **Boeing Business Jets** (BBJ), function more as **VIP transports** than as a business jet. Many sales for both companies come from governments, to serve a role transporting high-ranking officials.



The ACJ TwoTwenty, however, is **not** a VIP transport. Airbus promotes it as the company's first "Bizjet," and with its smaller size and lower costs, it may just fit the bill. The price is not much higher than the top long-range executive

planes, and its based on the [Airbus A220-100](#) (formerly the Bombardier CS100), the smallest and most efficient airliner that Airbus has ever sold.

The narrowbody is becoming an increasingly popular aircraft among European airlines.

## ACJ TwoTwenty Specifications


The ACJ TwoTwenty was [launched in 2020](#), and costs anywhere from **\$80 million to \$100 million**. While tremendously expensive, its not much more than some of the world's top private jets. Then again, its not much larger than some of those jets either.

	<b>Airbus ACJ TwoTwenty</b>	<b>Bombardier Global 7500</b>	<b>Gulfstream G700</b>
<b>Length</b>	114 ft 10 in (35 m)	111 ft (34 m)	109 ft 10 in (33.48 m)
<b>Wingspan</b>	155 ft 2 in (35.1 m)	104 ft (32 m)	103 ft (31 m)
<b>Height</b>	37 ft 9 in (11.5 m)	27 ft (8.2 m)	25 ft 5 in (7.75 m)
<b>Capacity</b>	19	19	19
<b>Cabin length</b>	77.9 ft (23.7 m)	54 ft 5 in (16.59 m)	56 ft 11 in (17.35 m)
<b>Cabin width</b>	10 ft 9 in (3.28 m)	8 ft (2.4 m)	8 ft 2 in (2.49 m)
<b>Cabin height</b>	6 ft 11 in (2.11 m)	6 ft 2 in (1.88 m)	6 ft 3 in (1.91 m)
<b>MTOW</b>	63.1T	52.1T	48.8T
<b>Range</b>	5,650 nm (10,460 km)	7,700 nm (14,300 km)	7,750 nm (14,350 km)
<b>Cruise speed</b>	Mach 0.78	Mach 0.85	Mach 0.85
<b>Service ceiling</b>	41,000 ft	51,000 ft	51,000 ft

	<b>Airbus ACJ TwoTwenty</b>	<b>Bombardier Global 7500</b>	<b>Gulfstream G700</b>
<b>Engines</b>	2x Pratt & Whitney PW1500G	2x General Electric Passport	2x Rolls-Royce Pearl 700
<b>Starting price</b>	\$80 million	\$75 million	\$75 million

On the surface, the ACJ TwoTwenty may seem like a bad deal. The plane is more expensive, slower, less capable, can't fly as high, and doesn't have an elite brand name like **Gulfstream** . Its size and weight also means that it's less practical, taking up more ramp space and being restricted from more airports versus its competitors.

### **The TwoTwenty's selling point**

What has always been a benefit of airliner-derived executive aircraft is that they're **big**, which means that they have a lot of space inside to move around the cabin. Without the crammed seats and overhead bins, passengers can walk around in an Airbus or  **Boeing** jet as easily as inside their own house.

While the TwoTwenty is the smallest of the Airbus Corporate Jets currently being made, the plane is still big and spacious on the inside. Even large purpose-built business jets are essentially configured like more luxurious airliners, with seats and couches on both ends of a **single aisle**.

Learn more here about the latest aviation news happening in **Europe** .

The planes are narrow, and even customers who can stand up straight may find the cabin claustrophobic due to the low ceiling, while taller customers may need to bend down to move around.

The cabin of the TwoTwenty, however, is sufficiently wide to make the living zones feel like proper rooms, and the ceiling is tall enough for anyone not named Shaq to walk around comfortably.



*Photo: Airbus*

Meanwhile, although the plane doesn't quite have the legs of the Bombardier Global or the Gulfstream, the **12-hour** endurance is still enough to reach much of the world. Airbus advertises that, from Dubai, the aircraft can fly as far north as Keflavik, and as far down under as Perth.



*Photo: Airbus*

In order to achieve this range on a short-medium haul single aisle aircraft, Airbus adds up to **five** auxiliary fuel tanks in the cargo hold.

## **On the outside**

The TwoTwenty is based on the Airbus A220-100 passenger airliner. While its range may seem small in comparison to other long-range business jets, that's because it wasn't designed to carry business tycoons across oceans in luxury. Rather, it was designed to carry **100** passengers on short flights while sipping fuel versus its contemporaries.



In fact, the A220-100 has **incredible** range for a narrowbody airliner, owing to its low weight and incredible fuel efficiency. The TwoTwenty shares the same composite fuselage and wing as the A220, which both increases durability and reduces weight. The Pratt & Whitney engines feature a gearbox inside, which reduces fuel burn compared to prior-generation jets.

## On the inside

While the exterior may be indistinguishable from the airliner, there is **no** trace of airliner inside the ACJ TwoTwenty. Airbus offers a wide array of interior configurations, with up to **six** living zones. The finishes are handcrafted, and Airbus offers four baseline design schemes for customers to choose from:

- **Avant-garde:** A modern interior using an assortment of dark colors and various shades of grey.
- **Timeless:** Intended to make the jet more homey, this design features a variety of light-colored woods and blues/greens.
- **Quintessence:** A natural theme with organic colors making for a more sophisticated look.
- **Special Edition by Cyril Kongo:** A quirky art-themed design that resembles a modern gallery.

The cabin features electro-chromatic window shades, unique to the corporate version, and Airbus fits **50 mbps wifi**, for superior inflight connectivity. Airbus also offers a king-size bed and a shower, with video monitors located throughout the cabin.

Each part of the interior can be customized, and Airbus advertises that the TwoTwenty can be optioned in over **100** different configurations. The plane can be used for meetings, a family hauler with beds, or as a place of leisure. A fully optioned TwoTwenty can cost upwards of **\$100 million**.



### **Airbus Begins Building The First ACJ TwoTwenty Private Jet**

The flight deck is one of the most technologically advanced in the skies. The Bombardier-designed fly-by-wire system reduces weight and complexity while also improving safety, through its flight envelope protection. The aircraft is controlled by two **side-sticks**, and dual heads-up displays allow pilots to view critical information while keeping their eyes outside the cockpit.

The aircraft in this photo does **not** have the two heads-up displays that the ACJ TwoTwenty is offered with.

## Owning the TwoTwenty

With hundreds of Airbus A220s in service around the world and an extensive ACJ support network, the TwoTwenty will not be a troublesome aircraft to keep around. Airbus also advertises that the plane costs [three times less to operate](#), with two times better value retention and **99% reliability**.



### **Lufthansa Technik Teases Government Airbus ACJ220 Interior**

The new cabin can be configured to host traveling dignitaries or perform medical evacuation flights.

While the aircraft is big and heavy, the type does come with integrated air stairs for embarking and disembarking the jet. With its large wing and powerful plane, the TwoTwenty can take-off from runways as short as 5,000ft, which is actually slightly better than the take-off distances of the giant Bombardier and Gulfstreams.

The aircraft offers some impressive capabilities.

## **What's next for the ACJ TwoTwenty**

The first Airbus ACJ TwoTwenty went to a [company called Comlux](#) for cabin fittings. The designs were to be done for a Dubai-based hotel company called FIVE. The plane is owned and operated by Comlux, while the cabin crew will be provided by FIVE, and the aircraft would be registered in Malta.



*Photo: Comlux*

The ACJ TwoTwenty is an appealing jet, offering nearly all the capabilities of a prestigious long-range business jet while also being cheaper to operate and larger on the inside. It may be less practical in some ways, but the newest Airbus Corporate Jet has all the traits to make it appealing to a wider range of customers compared to Airbus's previous offerings.

In the past, big airliner-derived business jets were **big**. They were immense aircraft with immense costs, purchased mainly by governments that required the extra size. The ACJ TwoTwenty, however, is not. It's a small plane with small operating costs that has thorough support from the world's largest jet aircraft manufacturer.

Whether customers will flock away from Gulfstreams and Bombardier Globals remains to be seen. Companies such as these have been selling business jets for decades and are firmly established in such markets. The Airbus ACJ TwoTwenty, however, may just be the most serious new competitor to the high-end business jets that we all know.

# How Many Years Do Commercial Airframes Last?

Like any other machine, aircraft are also designed with a specific lifetime. The lifespan of an aircraft depends on the structure's ability to hold while taking on flight stresses. [The aircraft's structural design is based on the stressed skin philosophy - the skin, frame, beams, and ribs are load carriers.](#)

While the actual life of an aircraft depends on the number of cycles and hours it runs, most modern commercial airliners are built for roughly 30,000 cycles. In terms of timeframe, an airframe can last between 25 and 35 years.

Pressurization cycles add to the stresses the aircraft structure undergoes during flight. A typical day in the life of a narrowbody jet, such as the Airbus A320, calls for 5-6 flight sectors, and such a frequency of structural stresses limits the aircraft's lifetime. This article focuses on the typical lifespan of some of the most iconic jetliners.

## [Aircraft Design & Aerodynamics: Key Principles and Concepts](#)

The aircraft design process entails the estimation of weights, performance, structural loads, aerodynamics, controls, and propulsion.

### Life-line strategies

- Tensile strength of the aircraft structure
- Loads experienced by the airframe during flight
- Number of pressurization and de-pressurization events (takeoffs and landings)
- External impact (such as foreign object debris impact)
- Environmental factors affecting the airframe

An airliner's operational life is specified through the fail-safe and safe-life philosophies of manufacturing. The fail-safe philosophy ensures that the

structure does not completely fail even if part of it fails. For example, frequent pressure cycles incur high stresses on the airframe. As a result, the structure is fatigued and prone to cracks and breakage.

If a specific airframe section is ruptured, it will not cause the entire structure to fail. The stressed skin philosophy prevents the fuselage from breaking and causing a complete failure. The safe-life philosophy allows manufacturers to establish lowered inspection programs for systems that cannot be covered by a fail-safe design.

For example, an aircraft's landing gears cannot be covered under fail-safe operations despite the stresses they take upon each landing. As such, a safe-life strategy is implemented by lowering the inspection requirements to identify anomalies long before failure.

An aircraft's landing gear can survive 30,000 routine landings before the need for inspection for abnormalities. However, a safe-life strategy imposes a detailed stress inspection at 10,000 cycles, preventing the chance of uncaught fatigued parts.

Related

## **[5 Ways Composite Materials Have Revolutionized Aircraft Design](#)**

Composite materials increase the life span of the aircraft.

### **So, how long should commercial airframes last?**

- Designed for 25 to 45 years
- Between 30,000 and 50,000 flight cycles
- The actual lifespan depends on the duration of flights, external impact, and environmental factors

Aircraft manufacturers maintain a balance between the hard limits of safe-life parts and failure modes of fail-safe designed systems. [AviationFile](#) states that short-range narrowbody jets are typically intended for 50,000 flight cycles. With an average of five flight cycles per day, a narrowbody aircraft can last 27 years of operation, plus downtime for maintenance. According to [Airbus](#),

"As commercial aircraft spend 30-plus years in operational service, Airbus takes the long-term view in accompanying the aircraft it produces throughout their lifetime enabling operators to maximise performance and minimise costs, while also contributing to the overall sustainability of air transportation."

Long-range widebody airliners like the Boeing 747 are designed for approximately 30,000 flight cycles. With an average of 1.2 cycles per day, such an aircraft can last over four decades. The life limit of newer composite-driven widebody airframes is much higher. According to Boeing, the designed lifespan of a Boeing 787 Dreamliner is 44,000 flight cycles.

## [Development To End-Of-Life: Examining An Airliner's Typical Life Cycle](#)

An airliner may have multiple operators and configurations during its lifetime.

### **Premature aging**

- Airbus A340
- Airbus A380
- Boeing 747-8I

While it is common for airliners to have over thirty years of operational life, unusual routines and events age the aircraft prematurely. Airplanes that regularly fly very short distances are prone to frequent stresses on the airframe and wings. For example, aircraft that run short island hops for Hawaiian Airlines age much more quickly than others.

Photo: Alaska Airlines

Economic factors also force some airliners into premature retirement, as in the case of the Airbus A380. Several [major airlines retired the A380s in their teen years](#) due to the diminished economic viability of those aircraft. With Airbus most iconic aircraft being obsolete, the company had no choice but to [pull the plug on its production](#).

New entrants to the market also push less economical aircraft out well before retirement age. As such, operators frequently renew their fleets to fly advanced fuel-efficient aircraft and provide their customers with the latest offerings.

## What Aircraft Does Boeing Own & Operate?



We all know Boeing as one of the world's largest aircraft manufacturers and a pioneer of commercial aviation in the jet age with iconic types such as the Boeing 737 and 747. Nearly every commercial aircraft that Boeing manufactures ends up with an airline or private customer somewhere across the globe - but not all of them.

A lesser-known fact is that Boeing maintains a fleet of 25 aircraft that it owns and operates, all of which are used for a diverse range of purposes for the manufacturer. Not all of them were even originally manufactured by Boeing. However, each of the types in service has a fascinating history or serves an important role, so let's take a closer look at Boeing's own fleet.

## The 25 aircraft in the Boeing fleet

According to [ch-aviation](#), the Boeing fleet is made up of a total of 25 aircraft, 22 of which come off its own production lines, with three McDonnell Douglas MD-90 airframes (produced before the merger) included as well. With an average age of over 16 years, the aircraft range from the first B757 to roll off the line, to a B737 MAX 9 that is a little over a year old.

### Aircraft owned and operated by Boeing

Aircraft type	Number in fleet	Average age (years)	Variants
B737	6	8.1	-700; MAX 7, 9, 10
B747	5	25.7	-400; -8
B757	1	43.1	-200
B767	4	9.3	-200

B777	5	8.4	-200; -9
B787	1	15.0	-8
MD-90	3	27.2	-90
<b>Total</b>	<b>25</b>	<b>16.6</b>	

Historically, it has also had a number of other fascinating aircraft in its private fleet, including:

- **Boeing 367-80 (N70700):** Also known as the [Dash 80](#), this was the prototype for the Boeing 707, built to demonstrate the advantages of jet propulsion for commercial aviation. It is now preserved and is on public display at the Smithsonian's National Air and Space Museum.
- **Boeing 707-700C (N707QT):** The last Boeing 707 ever produced (in 1979), Boeing used it as a testbed before it served as a cargo aircraft for the Moroccan government for nearly two decades, and now serves as a tanker with the Israeli Air Force.
- **4 Boeing 717s (N717XA-D):** The original B717 testbeds that were produced in the late 1990s when Boeing took over the McDonnell Douglas program. The first has been scrapped, but two now fly with Hawaiian Airlines and one with Delta Air Lines .
- **Boeing 747 (N7470):** The original B747 prototype, the aircraft first flew in 1969 and was used as a testbed until 1995. It was subsequently donated to the Museum of Flight in [Seattle](#), where it is preserved and on display at the "City of Everett".

Related

## [The Story Of Boeing's Game-Changing 367-80 Prototype](#)

## **B737s: A mix of baby Boeings**

Boeing owns and operates a total of six B737s. Two are MAX 7s and two are MAX 10s, and all four are part of the ongoing program to [get both variants certified](#), so are flying regularly from Boeing Field in Seattle. The MAX 7s are ultimately destined to be delivered to [Southwest Airlines](#), while the MAX 10s will go to United Airlines.

Boeing also has a B737-700 with a VIP configuration, which the company uses for flights for its own staff. This was the aircraft that infamously had a [hangar collision with a Las Vegas Sands Boeing 747SP in 2020](#), with its wing ripping a huge tear in the underside of the forward fuselage of the larger aircraft. The B747SP was subsequently written off, but the B737 returned to service with Boeing in 2021.

The final B737 in the fleet is another headline-grabber for all the wrong reasons. This is N704AL, the B737 MAX 9 from Alaska Airlines that had an explosive decompression in January last year after the plugged exit door separated in flight. The aircraft only entered service two months prior and is just over a year old.

Alaska Airlines returned the aircraft to Boeing, which took ownership in June last year. Its registration appears to be the same, although there have been suggestions on aviation forums that it could change to N0D00R...

## **B747s: The Dreamlifter team**

Four of the five B747s in the Boeing fleet are its [B747-400 LCF](#) 'Dreamlifters'. Boeing launched its Dreamlifter program in 2006 to support the construction of the Boeing 787 Dreamliner. The B787 wings are constructed by Mitsubishi in Japan, while fuselage sections are built in Japan, Italy, and the US. These pieces are too big for standard shipping containers or the hold of a regular freighter, so Boeing converted B747-400s to accommodate them.

In total, four ex-passenger 747-400s were converted. These previously operated with Air China, Malaysia Airlines, and China Airlines (two aircraft), with the conversions and deliveries carried out between 2006 and 2010. The aircraft are

operated for Boeing by [Atlas Air](#), and after long passenger and cargo lives, are the oldest aircraft in the Boeing fleet after the B757, with an average age of 34 years.

The other B747 in the Boeing fleet is a B747-8 BBJ variant that was ordered by the Saudi Arabian government. It was intended for use by Saudi Crown Prince Sultan Abdul Aziz, who died unexpectedly in 2011, nine months before the delivery of the aircraft.

Five months after it rolled off the line in 2012, the aircraft was ferried to [EuroAirport Basel Mulhouse Freiburg](#) for interior completion, and there it sat for the next decade before Boeing purchased the aircraft back from the Saudis. Having flown just 50 hours, the aircraft is currently being scrapped for parts to serve the MRO needs of Boeing's other B747-8 customers.

## **B757: The very first 'Flying Pencil'**

The B757 was designed to replace the B727 tri-jet, and the initial aircraft of the type, N757A, flew for the first time in February 1982. This plane would lead the way for the seven-month test program, and be the first of over 1,050 B757s that were eventually built from 1981 to 2004. That same aircraft remains in the Boeing fleet to this day, having given over 43 years of service as a testbed.

N757A has been used for a wide range of testing purposes, the most high profile of which has been in the development of the Lockheed Martin F-22 Raptor. It had the F-22's avionics installed before the first Raptor even flew, and these test avionics are operated from within the cabin, where a mock F-22 cockpit exists. It also has a sensor wing located on the crown of the aircraft, directly behind the flight deck, an F-22 radar housed in the nose, various sensors, and an upgraded interior to house up to 30 software engineers during testing.

While the Raptor ceased production in 2011, the United States Air Force is still continually working on software upgrades to the aircraft, so despite the aircraft now being over 43 years old, there is ongoing demand to use N757A as a testbed. Speaking about the current testing ability of the N757A, Boeing Agile Integration Laboratory F-22 Lead Test Director, Rachel Kitzmann, stated:

*"Our F-22 mission equipment is completely segregated from the 757 flight controls, so we can fly with prototype software that has not gone through a formal Equipment Operational Flight Clearance process. This allows us to have an early look at developmental software and problem fixes before release to the 411 Flight Test Squadron here at Edwards."*

## **The remaining Boeing widebodies**

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## **The remaining Boeing widebodies**

Outside of its B747s, Boeing has ten other widebodies as part of its in-house fleet, although this number is expected to drop in the near future. These include the following:

### **B767s: Off to join the Air Force**

The four B767s in the Boeing fleet are modified B767-200s that have been testbeds for the Boeing KC-46A Pegasus program. Rolled out from 2014-2016, they were part of the original development contract for the type which called for the delivery of 18 initial operational KC-46s by 2017.

With full production now well underway, these four examples are being readied to be delivered to the United States Air Force, which plans to take delivery of 179 of the KC-46A tankers by 2027.

### **B777s: Certification testing**

Boeing operates five B777s, with four of them being the testbed B777-9s that are part of the ongoing 777X certification testing that the manufacturer is currently undertaking with

the FAA. The final example is an ex-Singapore Airlines B777-200ERm, which is part of Boeing's [ecoDemonstrator program](#).

## **How Often Have Boeing's 4 Test 777Xs Flown This Year?**

The Boeing 777X test fleet is finally back in the air. So where are they flying?

The program has been running for over a decade and tests technology to improve the flying experience, reduce environmental impact, and enhance safety for passengers. Current projects include airport noise reduction, touchless inflight services, water conservation, and cabin concepts like sensor-equipped seats.

## **B787: The last remaining testbed**

Boeing has a solitary B787 (N7874) from the original six that it built from 2007 as testbeds for the program. N7874 is the fourth B787 to be built, and the first three are now preserved at the Flight of Dreams Complex in Nagoya, Japan, at the Pima Air and Space Museum in Arizona, and at the Museum of Flight in Seattle.

## **MD-90s: Supporting the X-66 program**

Boeing also owns and operates three ex-Delta Air Lines MD-90s, which were originally built by McDonnell Douglas nearly 30 years ago, prior to its merger with Boeing. These aircraft are part of the X-66 program, a joint project between Boeing and NASA that aims to revolutionize aviation sustainability by reducing fuel consumption and CO2 emissions.

Related

## **X-66: A Look At NASA & Boeing's Sustainable Flight Demonstrator Project**

The two aerospace giants are building an experimental aircraft to help the US achieve net-zero aviation emissions.

The MD-90s will be [converted into the planned X-66 aircraft testbeds](#), featuring Transonic Truss-Braced Wings (TTBW) that have a wingspan that is 50% wider than a Boeing 737 MAX 9 today. They will also be fitted with Pratt & Whitney GTF engines, as the project hopes to unlock a new design space for next-generation aircraft that seat 130–210 passengers while saving at least 20% in fuel burn.

## The 10 Most-Luxurious Features Of The Airbus A380



The [Airbus A380](#) has always been a firm passenger favorite. It is a unique double-decker aircraft and the world's largest commercial aircraft. The aircraft entered service in 2005 and since then has flown over 800,000 flights and carried more

than 300 million passengers. What are the 10 most luxurious speeches of this iconic aircraft?

## **Clean air quality and lower cabin pressure**

The advanced air filters recycle the cabin air every two minutes, renewing and humidifying it at 40,000 feet. Lufthansa offers a unique automatic air humidification system for the best quality air and also has excellent soundproofing in the first-class cabin so that you can work or rest with no disturbance.

The cabin altitude is lower than that of most commercial aircraft, which typically reach an altitude of 8000 feet above sea level. The A380's altitude is approximately 6000 feet, similar to that of the [Boeing 787 Dreamliner](#) and the Airbus A350. The lower altitude results in less jet lag, making long-haul travel much more comfortable. For passengers with breathing or heart issues, the lower altitude reduces the risk of a medical emergency.

## **Onboard space**

The Airbus A380 is the widest commercial aircraft and has higher ceilings, as well as the two huge decks. Sometimes there are fewer seats per row, making the aircraft seem even more spacious. There is approximately 15% more space for luggage compared to other aircraft. The Airbus A380 has 2 wide staircases, one at the front and one at the back, again a unique feature but bringing more space to the aircraft. The LED lighting in the cabin is designed to encourage a natural wake and sleep cycle and reduce jet lag.

## **Less chance of turbulence**

The A380 doesn't attract much turbulence. The aircraft's sheer size and weight can dampen the effect of turbulence and the large wing surface area is equipped to withstand the effect of the disrupted air flow, so less turbulence is felt than on a normal commercial aircraft. The A380 is only beaten by the Boeing 787, in that respect, which has a gust suppression system that reduces the possibility of air

turbulence but is also built of composite materials that can help disperse shockwaves further.

## **Quiet cabin**

The A380 has one of the quietest aircraft cabins, so quiet you can barely hear the aircraft accelerate on takeoff. The noise level at cruising altitude is akin to that of a normal conversation. However, it is not quite so popular with the crew members on crew rest, as normally, the engine noise cuts out the sounds of the passenger cabin.

## **Camera in the tail**

Cameras on the aircraft exterior have become more popular in recent years, providing live streaming of the flight via the inflight entertainment system. The first aircraft that had a tail camera was the Airbus A340. On the A380, the tail camera provides a wide-angle view of the aircraft from above. It has been said that the Airbus A350 has a better-quality tail camera. Not all A380 have this feature for passengers. For example, the tail camera is only available to the flight crew at Singapore Airlines and British Airways.

## **First class washroom**

Because of the A380 design, there is more space available on the upper deck. Many operators use this space to create extra large first class washrooms with a lavatory and sometimes a shower. Other features include vanity units, benches, large sinks, and mirrors. Air France and Thai Airways have dressing rooms where passengers can change clothes and freshen up.

Etihad Airways and Emirates are operators that have onboard showers. Emirates has two showers for fourteen first class passengers, and Etihad Airways has one shower for nine first class passengers, but they have a second shower in the Residence. Also, these washrooms have first-class amenities such as fluffy towels, luxury products, and a hair dryer.

## Large beds

In 2007, Singapore Airlines introduced a larger bed in its first class cabin. The two middle seats could be converted into a double bed. In 2008, Qantas debuted its first class seat-bed and sofa lounge. Recently, Singapore Airlines revamped the A380 first class cabin and it features beds that can be joined into a double bed, by lowering a partition. They later extended this to some seats in business class.

Their first class suites have a chaise longue, table, armchair, and sliding doors for privacy. Etihad Airways also offers a similar product in its first class apartments. Qantas also has suites on the A380 with a lie-flat bed with a sheepskin mattress and an ottoman for a companion. Signature pajamas and slippers are offered along with an amenity kit.

## On board bar

In the 1950s and 60s, the airlines offered a much more glamorous product and had lounges, private dining areas, bars and a piano. Virgin Atlantic was the first to install bars on its aircraft before the launch of the Airbus A380. The bars are only accessible to the premium cabins. The A380s of Emirates, Korean Air, Etihad Airways, and Qatar Airways have bars fitted. It's a good place for relaxing, networking, or catching up on work.

Korean Air has the Celestial bar and sky lounge for business and first class passengers, the perfect place to relax during a flight. Air France La Première has an onboard bar and buffet for its first class passengers. Thai Airways has its own Royal First lounge onboard. Qatar Airways first class and business class passengers can visit the A380 bar and lounge.

## First class apartments and suites

Etihad Airways introduced the apartment concept in 2014. It was one step beyond first class on the A380. The apartment had a bed, a large leather armchair, and space to walk around, and it was closed off by a privacy door. Singapore Airlines followed in 2016, with larger suites and a forward-facing layout. Etihad Airways had nine smaller suites, and most were facing aft.

Korean Air has 12 first class Kosmo Suites which have a privacy screen and workspace. British Airways has 14 first class suites on the A380 with a fully flat bed, cotton bedding and pajamas, and a Liberty London amenity kit. Emirates first class suites have a sliding door for privacy, a minibar, a lie-flat bed, and a vanity table. They also offer moisturizing sleepwear and Bulgari amenities.

## **The Residence by Etihad**

The Residence by Etihad Airways is the ultimate in luxury and could be almost as prestigious as traveling by private jet. It has a living area, a separate bedroom, and an ensuite shower room. These are the only three-room suites on a commercial airline and are designed for two people traveling together. There is a luxurious leather sofa and two dining tables. There are two large flat-screen TVs, one in the bedroom and one in the lounge area. There is also a private shower room with a large vanity unit, hair dryer, and mirror.

Airbus started the A380 project in 1988 and announced it in 1990 to challenge the dominating Boeing 747 in the long-haul market. In 2000, the official A380 project, costing \$10.7 billion, was launched. The first prototypes were unveiled in 2005, and the following year, they received both European Union Aviation Safety Agency (EASA) and Federal Aviation Administration (FAA) certification.

Singapore Airlines received the first A380 in 2007, followed by Emirates and then Qantas. The full-length double-decker aircraft typically seats 525 passengers in a three- or four-class configuration but can have a maximum capacity of 853 passengers, although this has never been realized. The aircraft is powered by four Alliance GP7200 or Rolls-Royce Trent turbofan engines and has a range of 8,000 nautical miles or 14,800 kilometers. The Airbus A380 cost \$432.6 million.

Airbus decided to cease production of the A380 in 2019, after 254 aircraft were built, and the final aircraft was completed in 2021. Airlines were shifting towards smaller wide-bodied aircraft. Then the pandemic hit the world, making the Airbus A380 almost obsolete and many A380s were sent into storage.

However, once the pandemic was over, the aircraft made a comeback as there was a need to shift more cargo and there was a travel boom with people wanting to travel. There were delays in the supply chain that meant that new aircraft deliveries were delayed, such as the Boeing 777X. So the Airbus A380 returned to

the skies, with many returning to service on busy popular passenger routes. As of 2024, 189 of the aircraft remained in service with 10 operators worldwide. Five airlines fully retired the Airbus A380 from their fleets.

## Everything To Know About The Boeing 707 Jetliner



In the 1940s, if you were in a hurry and needed to travel across the continental United States, the fastest option was to hop inside one of the many propeller-driven planes of that era. [The Douglas DC3](#) — perhaps the most popular commercial airplane of the time — let passengers travel from New York to Los Angeles in roughly 18 hours, with only three stops on the way. While these travel times look comically long by today's standards, it was a great improvement compared to the average transcontinental flight in the '30s when it took more than 25 hours to get from the East Coast to the West by air.

After World War 2 ended, there was a massive boom in the number of people taking flights, prompting aircraft companies to work on faster, more efficient aircraft. A major step in this direction came after the arrival of the [de Havilland](#)

[Comet](#). While the Comet is widely regarded as the world's first jet airliner, its legacy is also [marred by a series of unfortunate incidents — including several crashes](#).

Despite teething troubles, the airline industry quickly realized the many advantages of jet engine-powered aircraft and continued working on more capable jet-powered planes. American aviation company — Boeing — which was primarily known for its military planes during the pre and post-war era, was also considering entering the booming commercial aviation market.

The company's efforts finally led to the creation of the Boeing 707 in 1957. The Boeing 707 is a significant aircraft in several aspects. Most modern-day jet-powered passenger planes owe their existence to the 707. The spirit of the design pioneered by the Boeing 707 is still in use today, more than 60 years since it first burst onto the scene. Its contribution to commercial aviation is remarkable, and the aircraft is widely credited for ushering in the jet age.

## **Birth Of A Legend: How Boeing 707 Came To Be**



The post-war era was a challenging time for American military aircraft makers. While the end of the war resulted in orders drying up for military-focused aircraft, there was also a surge in the number of civilians taking to the skies. Boeing, realizing that it had fallen behind players like Douglas and Lockheed, started working on a new mixed-use jet aircraft in 1952.

It took Boeing over two years to develop the first prototype of what would go on to become the Boeing 707. The company called this plane the Boeing 367-80 (also called "Dash 80"), and the first working prototype of the plane rolled out of Boeing's production facility on May 14, 1954. Two months later, on July 15, 1954, the Boeing 367-80 took to the skies in its first-ever test flight.

What is notable here is the fact that Boeing had designed the Dash 80 as a multi-role aircraft that could be used for both military and civilian purposes. This was an understandable move because Boeing wasn't sure whether the civilian model of the plane would be successful. Nevertheless, three years after the prototype Dash 80 took to the skies, Boeing was ready with the first production variant of the Boeing 707. It took off for the first time on December 20, 1957, and Pan Am operated the first commercial flight on October 26, 1958, when its Boeing 707 named "Clipper America" took off from New York's Idlewild Airport, and landed at Paris Le Bourget Airport 8 hours and 41 minutes later.

To differentiate Boeing's jet engine-toting aircraft from its existing product line that included propeller-driven planes from the 300 series, Boeing decided that its passenger-focused jet planes would bear the 700-series numbers. Boeing has continued this tradition, and even today, its passenger jet planes still bear the 7xx- tag.

## **Which U.S. Airlines Operated The Boeing 707?**



Panam operated Boeing 707 aircraft© Michael Ochs Archives/Getty Images

Even though the first test flight of the Boeing 707 didn't happen until 1957, Boeing had already received orders for the in-development aircraft in 1955. These first orders came from [Pan Am](#), a leading carrier at the time. Pan Am committed to purchasing 20 Boeing 707s, a promise it fulfilled by becoming the Boeing 707's launch customer.

Two months after the first commercial flight of the Boeing 707 with Pan Am on October 26, 1958, National Airlines became the first U.S. carrier to operate domestic flights using the Boeing 707 when the first of this service flew its route between Florida and New York on December 10, 1958. Barely a month later, on January 25, 1959, TransWorld Airlines, another major U.S. carrier at the time, deployed the first of its Boeing 707s on the San Francisco to New York route. The same year Continental Airlines also added the Boeing 707 to its fleet.

The Boeing 707's success in the U.S. led to Boeing receiving large orders for the aircraft from overseas. The first non-U.S. carrier to operate the aircraft was the Australian carrier Qantas. American airline companies operated the original Boeing 707 and its updated variants well into the 80s. Globally, however, several international airlines operated the Boeing 707 aircraft until as recently as 2013.

# What Are The Different Passenger Variants Of The Boeing 707?



Qantas operated Boeing 707© James D. Morgan/Getty Images

The first Boeing 707 variants that went into commercial service bore the model number 707-120. Boeing also made an upgraded variant of the 707-120 and called it the Boeing 707-120B. These planes featured quieter, more powerful engines, and had slight modifications made to the wings and the tailplane.

Other less-known variants of the 707-120 series include the Boeing 707-138 and the 707-138B, the latter being the same variant of the plane specifically built for Qantas. The Boeing 707-138 was smaller in size than the standard models and featured a fuselage that was 10 feet shorter. This modification made the aircraft lighter and more fuel-efficient. Alongside the 707-120, Boeing also developed a stretched version of the aircraft called the Boeing 707-320. This one featured a longer fuselage and longer wings, the latter enabling it to carry more fuel. The 707-320 also featured upgraded, more powerful engines, and the longer fuselage allowed airline companies to offer better comfort to passengers.

The Boeing 707-320 series of planes would become the most widely produced variants of the Boeing 707. The company made 69 units of the 707-320 and 174

units of the Boeing 707-320B. The most widely produced variant, however, was the Boeing 707-320C, of which there were 337 individual aircraft. Boeing also made a 4-series variant of the plane, called the Boeing 707-420, which was identical to the 320 series but featured engines made by Rolls-Royce instead of Pratt & Whitney.

## **Military And Special Variants Of The Boeing 707**



A Boeing E3 Sentry aircraft© M.J.J. de Vaan/Shutterstock

While the Boeing 707 was primarily used for passenger operations, the aircraft was also used by militaries of various countries. Notable examples of these include the Boeing E-3 Sentry, which was an airborne warning and control system (AWACS) aircraft. It was a commercial passenger jetliner modified to perform battleground surveillance. The most striking feature of the plane was its large rotating radar dome that let it track enemy aircraft that were more than 250 miles away. The Northrop Grumman E-8 Joint STARS was another such aircraft that was modified from a Boeing 707-300.

Perhaps the most recognizable Boeing 707s of its time were the two models designated as the VC-137B and the VC-137C. These planes operated as the official aircraft of the president of the United States under the Air Force One callsign. These modified Boeing 707s operated as the Air Force One between 1962 and 1990, after which they were replaced by Boeing 747s.

Boeing also made planes like the C-136 Stratolifter and the KC-135 Stratotanker, the latter specifically being used [for airborne refueling purposes](#). Between 1971 and 1997, the Canadian military also used a Boeing 707 aircraft that was better known as the CC-137 Husky.

## Are Any Boeing 707's Still In Use Today?



Boeing KC 135 Stratotanker© Gary Chalker/Getty Images

The Boeing 707 was arguably one of Boeing's most successful and important aircraft. The passenger variants of the plane entered service towards the end of the '50s and remained in service as recently as 2019. In the U.S., however, the last commercial flight using a Boeing 707 by a U.S. carrier was operated by Trans World Airlines on October 30, 1983.

The aircraft was in operation in several other countries long after that. 707s were in operation across the Middle East well into the late 90s. The last airline to operate a passenger-carrying Boeing 707 was Iran's Saha Air, which flew until 2013. Saha Air's cargo wing continued to operate the Boeing 707 until 2019 when the aircraft was lost in a crash.

The only Boeing 707 variants still operational today are all military-focused aircraft. The most notable among these are the variants known as the KC-135 Stratotanker. These planes have been in service since the 60s and are expected to remain flying well into the 2030s, thanks to these receiving periodic upgrades.

## How Heavy Is The Boeing 747 And How Much Can It Carry?



Boeing 747 flying© Markus Mainka/Shutterstock

When Boeing's iconic 747 aircraft first took to the skies in 1969, the massive aircraft almost immediately changed the aircraft game, proving itself a plane capable of carrying both cargo and passengers to all corners of the globe. Over the years, the vessels would even earn the nickname "Queen of the Skies," and rank as the largest commercial craft in the world.

Overtly customized versions of Boeing's 747s are, of course, currently serving the U.S. government under the designation of Air Force One. However, that fact will have to change sometime down the road, as Boeing officially ceased production on its beloved 747 build in 2023, rolling its final plane off the line in January of that year. [The decision to phase out the 747](#) was reportedly made after a decade or two of airlines and freighter companies sizing down to smaller, more fuel-efficient aircraft. There are, however, still 747's flying throughout the world. Many are 747-8s, which are the last of the 747 lineup and arguably [the best jets in the sky these days](#).

Per the plane's specs, the 747-8 was every bit the behemoth its predecessors were, boasting a wingspan of 224 ft five inches, a height of 63 ft 6 inches, and a length of more than 250 ft. The final 747 also reportedly weighed in at a whopping 485,300 lbs or just over 220 tons. Even at that size, the craft can push mach .086, ranking it among the fastest commercial jets in the sky.

## **Boeing's 747 Can Carry Some Serious Weight Into The Skies**



Boeing 747 in flight© Scm Jeans/Getty Images

Given the reported size and weight of Boeing's 747-8, it might seem reasonable to assume the bulk of weight the aircraft carries into the sky resides in the nuts, bolts, steel, and fuel that goes into its making -- not to mention the four immense GEnx engines required to actually get all that weight airborne. You would be correct in that assumption, as the 747-8's reported operating empty weight accounts for much of the plane's maximum takeoff weight.

As for the 747-8's cargo capacity, the aircraft can reportedly carry a payload of up to 308,000 pounds, or about 154 tons. As Boeing playfully points out, that's about 10,767 gold bars. The aircraft manufacturer claims that its final line of 747s has a maximum takeoff weight of 987,000 pounds, which converts to a staggering 493.5 tons.

Be it gold bars, or human beings that are tucked away inside the fuselage of a 747-8, they are clearly capable of carrying some serious weight from Point A to Point B. That fact makes it all the more impressive that the enormous vessels can do so with such speed and relative grace. Given the 747-8's incredible capabilities, and the legacy of the various models that preceded the build, it will be a truly sad day when [one of Boeing's best jets](#) finally disappears from the skies. But it may be a long time before that actually happens, as 747-8s are still very much flying high across the world, with even the U.S. Government reportedly commissioning Boeing for a pair of Air Force One replacements before the line was officially retired.

## **How Fast Does A Boeing 747 Fly? Take-Off Vs Max Cruise Speed Explained**



Lufthansa Boeing 747-200 takeoff© Markus Mainka/Shutterstock

The Boeing 747 is one of the primary long-range wide-body airplanes flown throughout the world. These four-engine passenger planes can carry over 360 passengers and crew and were the first aircraft to be dubbed a "Jumbo Jet." More than 1,500 have been built since the aircraft was first introduced in 1970 for Pan Am, and it remains a popular workhorse aircraft for a number of airlines around the world as well as the base model for [several aircraft designated USAF Air Force One](#).

Like most aircraft, there are numerous versions of the 747, each with modifications allowing for an increased passenger load among multiple classes. The 747-8 is the most recent variant, which is designed to be quieter and operate more economically and environmentally friendly. The fastest 747s can fly to a distance close to 9,000 miles. It accomplishes this despite [the heavy load the Boeing 747 carries](#) with its four powerful engines.

Initially, the 747 featured four Pratt & Whitney JT9D turbofan engines, but later models traded these out for General Electric CF6-50 and Rolls-Royce RB211-524G/H-T engines. These powerful engines empower the aircraft to reach 184 mph during takeoff and up to 660 mph at maximum cruising speed. That's a top speed of Mach 0.86, so it's incredibly fast, which is one of the reasons the 747 is

flown across the Atlantic and Pacific Oceans: It can carry a lot and do so quickly, shortening flight times and making the 747 a truly desirable aircraft.

## **The Difference Between Takeoff And Cruising Speed, Explained**

There are two primary speeds of concern when you're talking about a passenger plane: takeoff and cruising speed. The takeoff speed is that which the aircraft must reach in order to literally take off from the ground. This can be impacted by several key factors: the airplane's total shape as well as its wing shape, the direction of airflow, and the aircraft's size and weight. For the Boeing 747, under ideal conditions, the aircraft must reach a speed of 184 mph to take off.

Cruising speed is the speed the aircraft can reach and sustain for extended periods. As the aircraft rises to its standard altitude of 35,1050 feet, its speed increases exponentially. Once it reaches its cruising altitude, it can be pushed to a speed of 660 mph. This is an incredibly fast cruising speed for [a commercial passenger jet](#).

For comparison, the average cruising speed of all commercial passenger planes is between 480 and 575 mph. Still, the 747 typically flies at around 570 mph while cruising. The speed is determined by several things, including the same factors mentioned previously for the plane's takeoff speed as well as the mission parameters. It may not be necessary, for example, to push a 747 to its maximum speed for a short flight, while wind conditions may also impact its ability to move at its fastest speed.

# How Much Fuel Does A Boeing 747 Need To Fly At Max Range?



head on view of a Boeing 747 taking off© Alvin Man/Getty Images

At 01:52 EST on January 22, 1970 an aviation legend made its first paying passenger flight. The Boeing 747 Pan Am flight from JFK to London Heathrow was the first commercial flight to feature a plane that would rule the long-haul air routes for decades to come and become synonymous with the burgeoning jet age. However, it wasn't a smooth introduction to service, with issues occurring on both the outbound and return journeys. On the outbound journey, the original plane developed engine problems shortly before take-off and a replacement plane had to be organized. On the return journey passenger numbers had to be restricted due to a fault with the emergency slides. However, this was the low point of the career of a jet destined to become the most iconic commercial plane of all time and a craft still considered one of the [best jets in the sky](#).

Over the coming years, the jet underwent continual development. Even though the spirit of the original design remained, this development is clearly visible when comparing the last version to emerge from Boeing's production line-the 747-800-with the jet that began the story. A large part of the development process was to improve fuel efficiency. The later models of the jet were able to fly far

further on a "full tank of gas", a point much appreciated by airlines. Of course, this begs the question; Just how much fuel does a Boeing 747 need to fly its maximum distance? By looking at this across the different generations, we not only discover just how far this design evolved but also how much more fuel-efficient commercial aviation became generally over the same period.



Pan Am Boeing 747 pictured on runway© Morse Collection/gado/Getty Images

Before we begin to look at the numbers, it's important to understand what is meant by maximum range and the variables that can affect it. This allows us to lay the ground rules needed to draw a fair comparison. First, let's look at what we mean by max range. Although this is obviously the furthest distance a Boeing 747 can fly on full tanks, we need to set some baselines that we can apply to the calculation. Factors like weather, altitude, cruising speed, and passenger/cargo load all need to be considered. These variables will all affect the airplane's performance and how we quantify what its maximum range is.

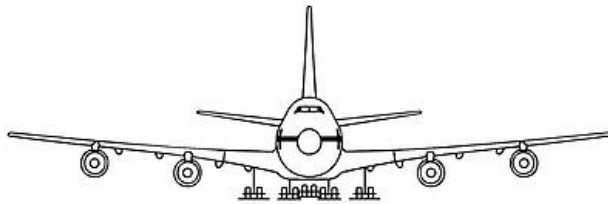
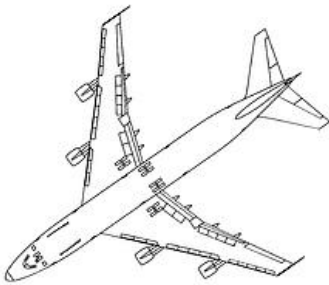
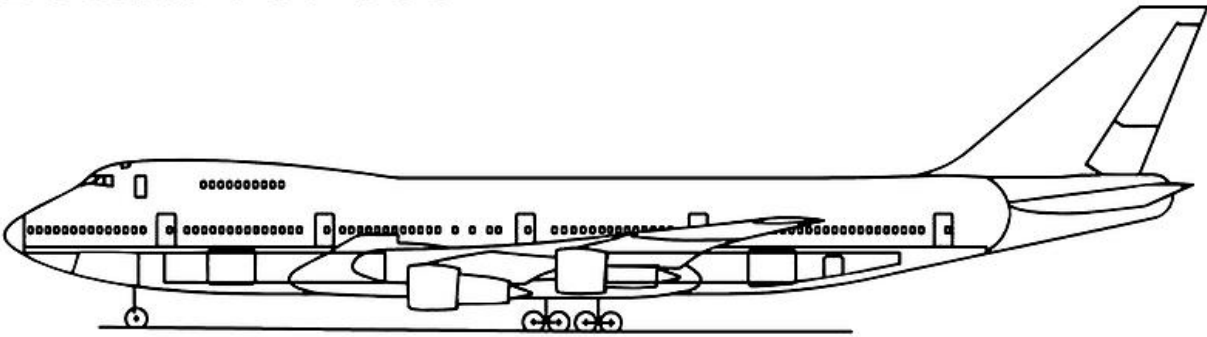
Of course, we could simplify it and just state that the amount of fuel the jet needs to fly its full range is simply knowing [how much fuel a Boeing 747 can hold](#). But that would be too easy. To get a more complete picture, we can dig a little further into the figures and look at how things like engine efficiency, aerodynamic improvements, and fuel capacity all affected what was achievable on full tanks. To see just how far things progressed, we will look at the first and

final passenger variants of the jet, namely the original 747 version that made the maiden flight and the 747-800 variant. We'll also simplify by assuming the planes flew in perfect conditions at the optimum altitude, at the normal cruising speed, and were flying free of inconveniences like passengers or cargo.

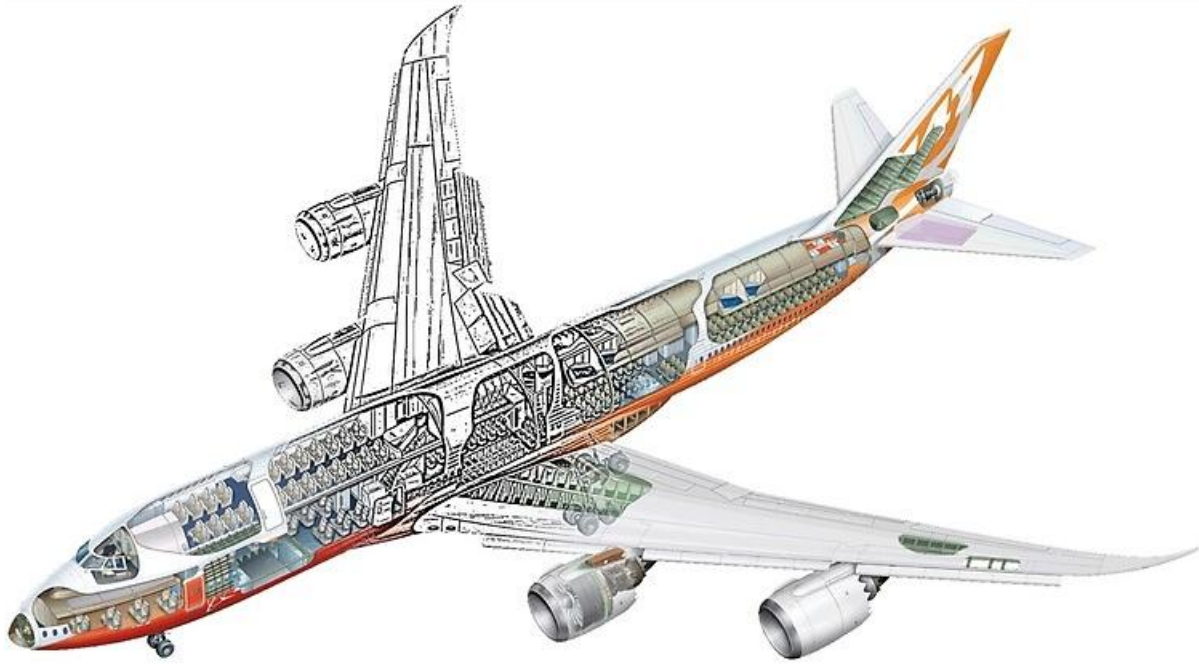
## **Boeing 747 Models And Their Maximum Range**



# Boeing 747-100



Let's begin where it all started with the Boeing 747-100 variant that was the first to make a commercial flight. This plane was powered by four Pratt & Whitney JT9D-3AW engines, each producing up to 19,730 kg of thrust. These powered the jet to a maximum speed of 616 mph with an impressive cruising speed of 595 mph. However, in terms of this article, the more important figures are a maximum fuel capacity of 48,066 US gallons (181,950 liters), giving it a maximum range of 5,620 miles (9045 km). From this, we can perform a simple calculation (fuel efficiency = max range/fuel capacity). Plugging the figures in, we can extrapolate that the fuel efficiency of this model is 0.117 mpg or 0.050 kpg.



Next up, let's look at the 747-800 passenger variant. This was powered by four GE GENx-2B engines, each of which produced a thrust of 66,500 lbs of thrust (30164 kgs). These gave the 747-800 a top speed of 614 mph (988 km/h), a cruising speed of 572 mph (920 km/h), and a potential range of 8,482 miles (13,650 km). Now, we need the fuel capacity -- the standard capacity of this variant is 64,300 US gallons (243,400 liters). Finally, we can plug these figures into the calculation, and we see that the fuel efficiency of this version is 0.132 mpg or 0.056 kpg. Those numbers are surprisingly close to the 747-100, which underlines just why this remains one of the [best jets Boeing ever made](#). But it's still a substantial enough saving when considered from the point of view of an aircraft traveling thousands of miles each day.

# UNITED AIRLINES PREPARES FOR PREMIUM 737 MAX 10 TO REPLACE AGING 757-200



The first United Airlines 737 MAX 10 has been spotted in Seattle, though delivery is still about a year away and could be complicated by regulatory challenges. Still, United intends a premium sub fleet of this aircraft with lie-flat seating in business class that will eventually replace the aging fleet of 757-200 planes currently operating on transcontinental and select European routes.

## United Airlines 737 MAX 10 – What We Know So Far

Boeing has over 700 orders for the 737 MAX 10, but United Airlines is first in line. The Chicago-based carrier has ordered over 200 aircraft. This week, the first aircraft (registration N27753) bearing United's blue livery was [spotted](#) at Boeing Field in Seattle.

Boeing faces a regulatory hurdle thanks to the 2020 Aircraft Safety and Certification Reform Act. Although Boeing is currently under a two-year enforcement waiver, that is set to expire later this year and if not renewed or approved by the Federal Aviation Administration (FAA) before the waiver deadline (which is unlikely), Boeing will have to upgrade the flight deck to add new safety features.

Boeing CEO David Calhoun has [warned](#):

*“If I lose the fight to avoid upgrading the flight deck, I lose the fight, and the MAX 10 would not be developed.”*

I tend to think that is a bluff, but scrapping the 737 MAX 10 program could deal a fatal blow to United Next, an ambitious plans to grow United Airlines' fleet rapidly over the next five years.

## What Will The United 737 MAX 10 Look Like Onboard?

The first 737 MAX 10 will be a premium service aircraft, currently targeted for a July 2023 delivery. Ultimately, United has ordered 50 in a premium configuration (up from the original order of 34) and 182 in a domestic configuration. The domestic configuration deliveries will begin in July 2024.

The move signals that the 737 MAX 10 will replace the 757-200 fleet and be used for domestic flights, including transcontinental and Hawaiian service.

A leaked LOPA (layout of passenger accommodations) suggests the aircraft will feature 22 lie-flat herringbone-style seats in business class. Patrick Quayle, United's Senior Vice President, Global Network Planning and Alliances, has confirmed the aircraft will have lie-flat seating that will vary from the current Polaris business class seat.

Meanwhile, United plans to use the Airbus A321XLR for international service.

## CONCLUSION

The first United Airlines 737 MAX 10 is out of the paint shop, but regulatory hurdles mean delivery is still many months (or years) away. United will take delivery of premium-heavy MAX 10s first, with the goal of replacing its aging 757-200 fleet. Absent the dire warning from the Boeing CEO, United's fleet of narrowbody aircraft will grow much younger and fuel-efficient in the years ahead and passengers can look forward to modern cabins with seatback screens in all cabins.

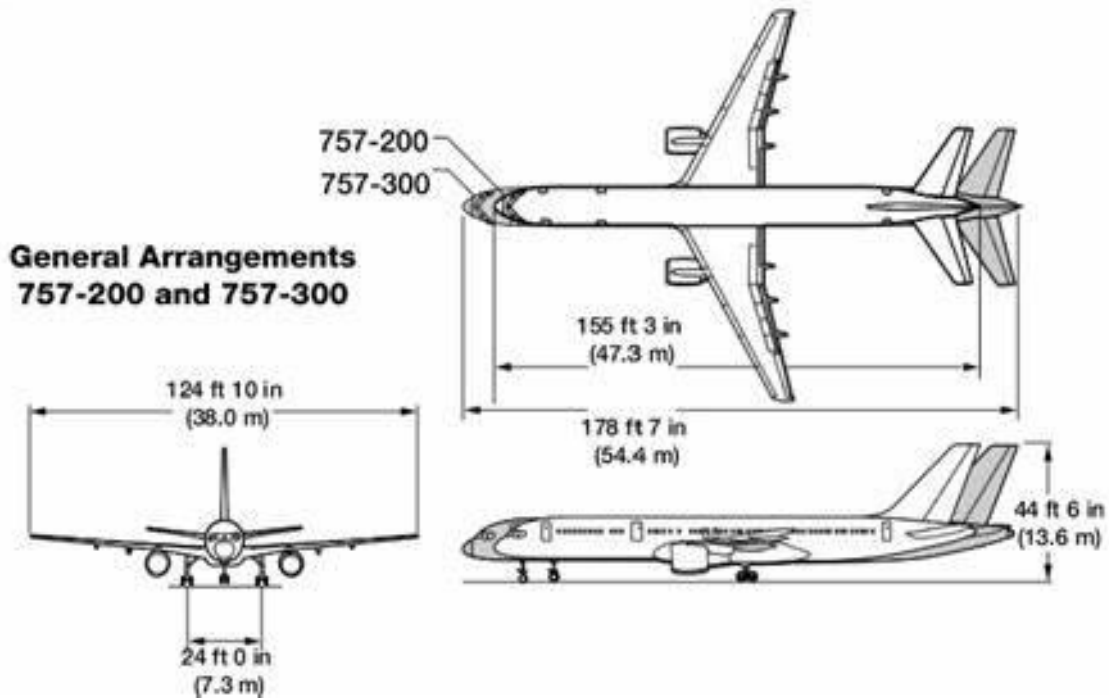
**Boeing 737 MAX-10**

Length 143ft 7in, with type I emergency exits aft of wings (4 inches wider than type II).

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## Boeing 737 Max 10 vs 757: A Comprehensive Comparison

23/01/2025

### Understanding the Aircraft: A Closer Look at Two Giants

When it comes to commercial aviation, Boeing has produced some of the most iconic aircraft in history. Among them, the 737 Max 10 and the 757 stand out, each with its unique characteristics, strengths, and weaknesses. While both serve the aviation industry, they cater to different needs and operational requirements. Let's dive into the specifics of each aircraft, examining what makes them tick and how they stack up against each other.

## **Design and Dimensions**

The design philosophy behind these two aircraft is quite different, reflecting the eras in which they were developed.

### **Boeing 737 Max 10**

The 737 Max 10 is the latest iteration of the 737 family, designed with efficiency in mind. It boasts a length of approximately 143 feet, making it the longest 737 variant. This aircraft is equipped with advanced wing designs and larger engines, specifically the LEAP-1B engines, which provide better fuel efficiency and lower emissions.

- **Length:** 143 ft
- **Wingspan:** 117 ft 10 in (with split scimitar winglets)
- **Passenger Capacity:** Up to 230 in a single-class configuration

### **Boeing 757**

The Boeing 757, on the other hand, is a classic that has stood the test of time since its introduction in the early 1980s. It has a length of around 155 feet, making it longer than the Max 10. The 757 is known for its versatility, capable of operating on shorter runways while still serving transcontinental routes.

- **Length:** 155 ft 3 in
- **Wingspan:** 124 ft 0 in
- **Passenger Capacity:** Typically 200-280 depending on configuration

## **Performance and Efficiency**

Performance metrics are crucial when comparing aircraft, especially in terms of fuel efficiency and operational costs.

### **Boeing 737 Max 10**

The Max 10 is designed to be a fuel-efficient option for airlines. With its modern engines and aerodynamic improvements, it boasts a significant reduction in fuel burn compared to older models. This efficiency translates to lower operational costs, which is a big selling point for airlines looking to maximize profits.

### **Boeing 757**

The 757 was considered a fuel-efficient aircraft for its time, but it can't compete with the modern efficiencies of the Max 10. However, it still has its advantages, particularly in terms of range and payload capacity. The 757's ability to carry more passengers and cargo over longer distances makes it a favorite for certain routes, particularly in the transatlantic market.

## **Cabin Comfort and Technology**

Passenger experience is a major consideration for airlines, and both aircraft offer different levels of comfort and technology.

### **Boeing 737 Max 10**

The Max 10 features a modern cabin design with larger overhead bins and improved lighting. The use of the Boeing Sky Interior enhances the overall passenger experience. Additionally, the aircraft is equipped with advanced avionics and in-flight entertainment systems, making it a more appealing option for travelers.

### **Boeing 757**

While the 757's cabin design is more dated, it still offers a comfortable experience, especially in its first-class configurations. The larger windows and spacious layout provide a pleasant atmosphere for passengers. However, it lacks some of the modern amenities found in the Max 10, which may deter some airlines from choosing it for newer fleets.

## Operational Flexibility

Both aircraft serve different niches in the market, and their operational flexibility is a key factor in their appeal.

### Boeing 737 Max 10

The Max 10 is primarily designed for short to medium-haul routes, making it ideal for airlines that focus on high-density markets. Its ability to carry a large number of passengers efficiently makes it a favorite for low-cost carriers and major airlines alike.

### Boeing 757

The 757 is a workhorse for airlines that need versatility. It can operate on shorter runways, making it suitable for regional airports, while still being capable of long-haul flights. This flexibility allows airlines to serve a wide range of routes, from domestic to international.

## Cost Considerations

When it comes to purchasing and operating these aircraft, costs are a primary concern for airlines.

### Boeing 737 Max 10

The Max 10 comes with a higher price tag due to its modern technology and efficiency. However, the lower operating costs can offset the initial investment over time, making it a financially sound choice for many airlines.

### Boeing 757

The 757 is often available at a lower acquisition cost, which can be attractive for airlines looking to expand their fleets without breaking the bank. However, the older technology means potentially higher operating costs in terms of fuel and maintenance.

## Final Thoughts

Both the 737 Max 10 and the 757 have their unique strengths and weaknesses. The choice between them ultimately depends on the specific needs of an airline, including route structure, passenger capacity, and operating costs. Each aircraft has carved out its niche in the aviation market, and understanding their differences is crucial for making informed decisions in fleet management.

## Comparative Analysis of Two Iconic Aircraft

When it comes to commercial aviation, the Boeing 737 Max 10 and the Boeing 757 are two aircraft that have made significant impacts in their respective eras. Each model brings unique capabilities to the table, and their differences can influence an airline's operational strategy. Let's break down the key aspects of these two aircraft to see how they compare.

### Boeing 737 Max 10

The Boeing 737 Max 10 is the latest and largest variant of the 737 family, designed to meet the demands of modern airlines. Here's what you need to know:

- **Technology:** The Max 10 is equipped with the latest LEAP-1B engines, which provide improved fuel efficiency and reduced emissions compared to older models.
- **Capacity:** It can seat up to 230 passengers in a single-class configuration, making it ideal for high-density routes.
- **Range:** The Max 10 has a maximum range of approximately 6,110 km (3,350 nautical miles), allowing it to serve a variety of domestic and international routes.
- **Modern Features:** Enhanced cabin design, larger overhead bins, and advanced avionics contribute to a better passenger experience.

## Boeing 757

The Boeing 757 has been a staple in the aviation industry since its first flight in 1982. It is known for its versatility and performance. Here's a closer look:

- **Technology:** While the 757 features older technology, its Pratt & Whitney and Rolls-Royce engines provide reliable performance.
- **Capacity:** Depending on the configuration, it can accommodate between 200 and 280 passengers, making it a flexible choice for airlines.
- **Range:** The 757 has a maximum range of around 5,500 km (3,000 nautical miles), which is adequate for many transcontinental routes.
- **Operational Flexibility:** Its ability to operate from shorter runways gives it an edge for certain regional routes.

## Key Specifications Comparison

To give you a clearer picture of how these two aircraft stack up against each other, here's a detailed comparison table:

Specification	Boeing 737 Max 10	Boeing 757
Length	143 ft	155 ft 3 in
Wingspan	117 ft 10 in	124 ft 0 in
Max Passenger Capacity	Up to 230	200-280 (depending on configuration)
Max Range	6,110 km (3,350 nautical miles)	5,500 km (3,000 nautical miles)
Engine Type	LEAP-1B	Pratt & Whitney / Rolls-Royce
Fuel Efficiency	Higher due to modern technology	Lower compared to newer models
Cabin Features	Modern amenities, larger overhead bins	More dated design, but spacious

## Operational Considerations

When choosing between the Max 10 and the 757, airlines must consider several operational factors:

- **Route Structure:** The Max 10 is better suited for high-density routes, while the 757 offers flexibility for both regional and long-haul flights.
- **Cost Efficiency:** The Max 10 may have higher upfront costs, but its fuel efficiency can lead to lower operational costs over time.
- **Fleet Commonality:** Airlines with existing 737 fleets may prefer the Max 10 for maintenance and training efficiencies.
- **Market Demand:** Airlines must assess passenger demand on specific routes to determine which aircraft will yield the highest profitability.

## Safety Records

Safety is paramount in aviation, and both the Max 10 and the 757 have robust safety records, though they come from different eras of aviation safety standards.

- **737 Max Series:** The Max series faced scrutiny due to earlier incidents, but improvements and regulatory oversight have since been implemented to enhance safety.
- **757:** This aircraft has a long-standing reputation for safety, with many airlines still operating it successfully after decades of service.

## **Conclusion**

While both the Boeing 737 Max 10 and the Boeing 757 have their merits, the choice ultimately comes down to the specific needs of the airline. The Max 10 offers modern technology and efficiency, while the 757 provides versatility and a proven track record. Understanding these differences helps airlines make informed decisions about their fleets and operational strategies.

## **Justification of Aircraft Specifications and Performance**

Understanding the specifications and performance of the Boeing 737 Max 10 and the Boeing 757 requires backing by authoritative data and industry sources. Here's a breakdown of the facts presented earlier, supported by credible references.

### **Aircraft Specifications**

#### **Length and Wingspan**

- The Boeing 737 Max 10 has a length of 143 feet and a wingspan of 117 feet 10 inches . This information is corroborated by Boeing's official specifications for the 737 Max series, which detail the dimensions of each variant.
- The Boeing 757 measures 155 feet 3 inches in length and has a wingspan of 124 feet . These dimensions are consistently reported in aviation databases such as the Federal Aviation Administration (FAA) and Boeing's own technical documentation.

#### **Passenger Capacity**

- The Max 10 can seat up to 230 passengers in a single-class configuration, as stated in Boeing's marketing materials and technical specifications.
- The 757's capacity varies widely, accommodating between 200 and 280 passengers based on the airline's chosen configuration. This variability is supported by data from the International Air Transport Association (IATA) and various airline fleet reports.

### **Performance Metrics**

#### **Range**

- The maximum range of the Boeing 737 Max 10 is approximately 6,110 km (3,350 nautical miles) , as confirmed by Boeing's performance specifications.
- The Boeing 757 has a maximum range of around 5,500 km (3,000 nautical miles) , which is validated by historical performance data and operational manuals from airlines that operate the 757.

#### **Engine Type and Efficiency**

- The LEAP-1B engines on the Max 10 are recognized for their fuel efficiency and lower emissions, with performance metrics published by the engine manufacturer, CFM International.
- The Pratt & Whitney and Rolls-Royce engines used in the 757 have been noted for their reliability; however, they are less fuel-efficient compared to modern engines, as discussed in industry analysis reports by aviation consultancy firms.

### **Operational Considerations**

#### **Cost Efficiency and Market Demand**

- According to industry analysts, the Boeing 737 Max 10's fuel efficiency can lead to lower operational costs, which is a significant factor for airlines looking to maximize profit margins. Reports from the Airline Financial Monitor support this claim.
- The operational flexibility of the 757 is well-documented in various airline case studies, showcasing its ability to adapt to both regional and long-haul routes, as outlined by the Aviation Week Network.

## **Safety Records**

### **Safety Performance**

- The Boeing 737 Max series has undergone extensive scrutiny and regulatory review since the earlier incidents. The Federal Aviation Administration (FAA) and the European Union Aviation Safety Agency (EASA) have published reports detailing the corrective actions taken to enhance safety.
- The Boeing 757 has maintained a strong safety record over its decades of operation, with data from the Aviation Safety Network highlighting its historical performance and accident statistics. By referencing these authoritative sources, the facts presented about the Boeing 737 Max 10 and the Boeing 757 are confirmed, providing a solid foundation for understanding the capabilities and operational considerations of these two aircraft.

## **Boeing 737 MAX**

Over the last few years, Boeing has developed a new aircraft that combines less fuel use, less noise and an innovative redesign of the aircraft cabin. Boeing 737 MAX 8 and Boeing 737 MAX 9 now comprise the bulk of our fleet; we fly 21 MAX aircraft.

Based on Boeing 737 NG, the best-selling aircraft of all time, Boeing 737 MAX is a twin-engine airliner that brings together impressive performance parameters and comfortable flying experience. Taking one step further in operating of trans-Atlantic flights the 737 MAX family comprises 4 models aimed at lowering per-seat costs with an emphasis on environmentally friendly air travel. Both the Boeing 737 MAX 8 and Boeing 737 MAX 9 have a maximum cruise speed of 839 km/h (521 mph) and a flight range up to 6,510 km (4,045 mi).

### **A more powerful lightweight engine**

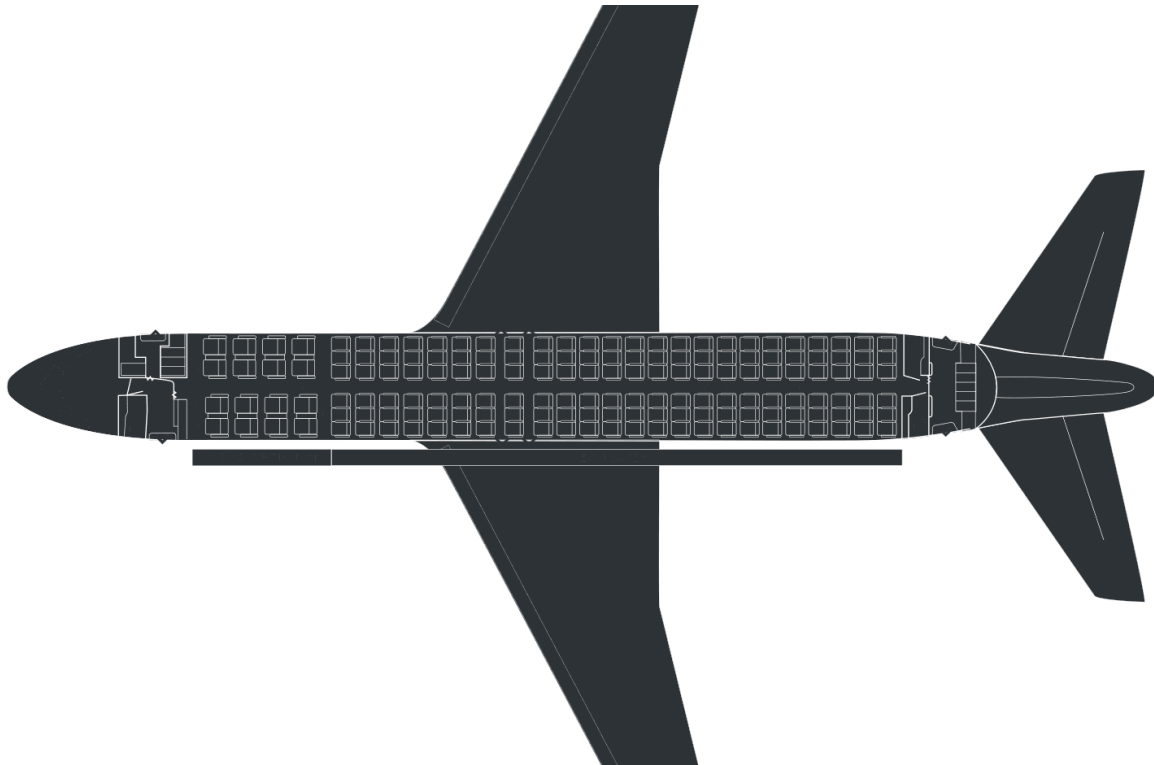
The Boeing 737 MAX uses 37% less fuel per trip compared to the Boeing 757-200, which currently makes up the bulk of the Icelandair fleet, and 14% less than the Boeing 737 NG type of aircraft. The 737 MAX also leaves a 40% smaller noise footprint than its predecessors, even though the engines are more powerful. This is due, both to a new aerodynamic design of the body and wings (notably split tip winglets) and an innovative design of the engines.

The engine blades are made of super strong carbon, woven together with a 3D-technique. This means each engine is over 500 lbs lighter than before, saving fuel and creating less pollution.

## 737 MAX 8 and 9

Icelandair has ordered nine 737 MAX 8 and seven MAX 9 aircraft. The aircraft will be fitted with all the comforts Icelandair passengers have come to expect, including in-flight entertainment systems, gate-to-gate Wi-Fi access, and plenty of legroom. The MAX 8 is 39.5 meters (129 feet, 8 inches) long with seating for 160 using Icelandair's configuration, while the longer MAX 9, at 42.2 meters (138 feet 4 inches), will have room for 178 passengers. The aircraft have a greater flight range than previous 737 models and will help to increase Icelandair's flexibility and efficiency.

### Technical specification



- Length:39.5 m / 129'6"
- Wingspan:35.9 m / 117'10"
- Cruising speed:839 km/h / 521 mph
- Maximum range:6,510 km / 4,045 mi
- Maximum take-off weight:82,200 kg / 181,200 lb
- Engine:2 x CFM International LEAP-1B

# 15 Little-Known Differences Between Airbus and Boeing



We take flying for granted. But how many of us really think about the type of aircraft we are traveling in? The two most well-known giants, Airbus and Boeing, have always dominated the aviation industry. But how do we tell them apart at a glance? Let's take a look!



## 1. Size Variations

Right off the bat, the first major difference is in the size of the aircraft. Airbus typically offers wider seats and more spacious cabins in its A320 series compared to Boeing's 737. This difference in cabin width affects passenger comfort and airline seating arrangements.



## 2. Nose Shape

Generally, Airbus aircraft have a more rounded, bulbous nose. For example, the A320 family has a distinctively curved nose, which gives it a more "snub-nosed" appearance. Meanwhile, the Boeing aircraft often have a more pointed and streamlined nose, which gives it a sharper and more elongated appearance.

## 3. Wing Shape and Winglets

The Airbus models use 'sharklet' winglets, given that they are curved structures that extend upward and slightly backward. Cute, right? On the other hand, the Boeing winglet designs have both upward and downward extensions, thus accurately termed as 'split-tip'.



## 4. Engine Mounting

Boeing aircraft engines are typically mounted slightly further back on the wing, and the engine nacelles have a distinctive flat-bottom architecture to provide ground clearance. But if you notice closely, you'll see that the Airbus engines are mounted further forward on the wings.



## 5. Tail Design

There is a simple way to tell the two aircraft apart, and that is by the shape of the tail. The Airbus features a more triangular tail fin, whereas the Boeing is distinctly rectangular with a somewhat curved edge.



## 6. Noise Levels and Cabin Comfort

Apart from the appearance, there are several other contrasts between the two aircraft that reside on the interior. For example, the Airbus features quieter engines and advanced soundproofing materials to reduce noise levels along with more cabin space, creating a more comfortable experience when compared to the Boeing.



## 7. Design Philosophy

One of the more interesting differences between the two is the philosophy used to construct the aircraft. Boeing believes in a pilot-driven approach, where the pilot can make decisions independently from the aircraft. But the Airbus system automates and limits the plane's actions to avoid accidents, featuring a fly-by-wire system that blocks dangerous maneuvers.



## 8. Technological Advancements

Airbus has been a pioneer in fly-by-wire technology and continues to innovate with systems like the A350's touchscreen cockpit displays. Boeing, known for its durable and reliable designs, integrates technology that enhances safety, like the advanced avionics in the 787.



## 9. Fuel Efficiency and Range

Both aircraft have impeccable range, but the Airbus is slightly ahead of the Boeing, boasting a flight range of up to 8,000 nautical miles. But Boeing takes the lead when it comes to fuel efficiency, using a composite fuselage and advanced engines that reduce fuel burn by up to 20%.



## 10. Cockpit Controls

In Airbus aircraft, pilots use a sidestick to control the plane, allowing for more space and easier movement in the cockpit. In contrast, Boeing aircraft, like the 737, use a traditional control yoke, providing pilots with direct feedback from the aircraft's movements.



## 11. Flight Control Systems

Sometimes, the limit of an aircraft is decided by the skill and precision of the pilot. However, not all aircraft allow that luxury. For instance, Airbus's flight control system prevents pilots from exceeding the aircraft's performance limits by automating stall recovery features. But the Boeing allows more manual control, letting pilots make decisions without software restrictions.



## **12. Pilot Training Requirements**

We all know that pilots go through a rigorous training period before they can command an aircraft. But the training also depends on the make and model of the machine. Airbus's sidestick and fly-by-wire technology require pilots to learn specific automated systems, while Boeing's traditional yoke and manual control systems focus more on hands-on flying skills.



### 13. Safety Features and Records

Both Airbus and Boeing have strong safety records, but their approaches differ. Airbus relies heavily on automated connections and multiple repetitions to prevent errors, while Boeing emphasizes pilot skill and judgment, putting more faith and effort into the pilots themselves.



## **14. Customer Preferences and Airline Partnerships**

Boeing has long-term relations with a variety of US airlines, making it a favorite of long-distance international carriers. Comparatively, Airbus has a stronger presence in Europe and Asia and tailors its aircraft to meet the needs of airlines in those regions.



## **15. Impact on the Global Economy**

Airbus and Boeing both play significant roles in the global economy, but their impacts are different. Airbus contributes to economic growth in Europe with its dispersed manufacturing model, while Boeing's centralized production in the U.S. supports American jobs and the economy, particularly in the Pacific Northwest and South Carolina.

# The art of balancing a plane – and what happens if your jet is too heavy



Fuel accounts for the bulk of an aircraft's weight - getty

Most travellers don't think much about the [physics of their flight](#) and how the plane stays balanced. Indeed, I suspect most people can't think of anything worse to ponder during take-off.

Luckily for us, then, there are some very smart people paid to think about these things. Most of their time their calculations and decisions are invisible to the average traveller, but every now and then we hear about them.

Just last month, [Switzerland's](#) flagship carrier, Swiss, made the embarrassing admission that it was redesigning its new cabins after realising that the first-class seats risked making the plane too nose-heavy.

And then there's the Canadian outfit, Porter Airlines, which recently asked a passenger – a 14-year-old child – to disembark the plane in order to help balance its weight.

So just how difficult is it to keep a plane balanced? And what calculations and decisions go on behind the scenes to make it happen?

## The basic physics of flying

On their most basic level, the physics of keeping a plane in the sky aren't that difficult – even if they can be head-scratchingly complex in practice.

The first thing to know is that every single model of aeroplane will have something called a MTOW (or “maximum take-off weight”), which specifies how heavy the plane can be without causing dangerous complications.

For example, the [Boeing 737-800](#), Ryanair's most popular plane, has a maximum weight limit of 174,200lb. For those uninitiated, that's equivalent to more than four double decker buses.

Each plane will also have something called CG (or “centre of gravity”) points which set out the safe range in which a plane's load should be balanced (both from front to back, and left to right).

## How do pilots measure the weight?

When it comes to making sure an aircraft is fit to fly, pilots need to be satisfied both that the plane is at a safe weight and that the load is adequately balanced.

To do that, pilots need to take into account multiple things, including the weight of the passengers and crew, the mass of luggage and other cargo, and the tonnes of airline fuel they need to carry.

While you might expect that passengers are the heaviest thing on board, it's actually the fuel that typically takes up the biggest share of the weight allowance.

“Most of the time, managing the weight will be a trade-off between the amount of fuel you need balanced against the weight of everything else, including the passengers,” says Dave Alexander, a former RAF pilot and flight instructor with Leading Edge Aviation.

For short-haul flights, the level of fuel on board could be around one third of the plane's weight, rising to around a half for long-haul. In some weather conditions, pilots need to take extra, further limiting the room for anything else.

## **What if a plane is too heavy?**

Given the weight of jet fuel, it's not hard to imagine circumstances where a pilot may feel that their plane is cutting it too fine when it comes to the weight allowance.

When that happens, commercial airlines usually go for one or two options. They may offer to pay some passengers to exit the flight, as was the case in the story involving Porter Airlines in Canada.

Alternatively, they may decide to leave some of the checked baggage behind. In most cases, passengers may not even know about the issue until they arrive at their destination.

If this happens, the airline is still responsible for getting your bags to you eventually, but how and when (and whether you are paid compensation) will depend on their rules.

## **How to balance a plane**

In order for the pilot to be able to control the plane, it's important that everything on board is distributed in accordance with CG. While that includes the passengers, they aren't necessarily the key to the puzzle.

"With large loads of passengers it is unlikely that CG will be a limiting factor given that passengers will be spread throughout the cabin," says Scott Trainor, a British Airways pilot.

The plane itself is also designed to help achieve balance. Most planes will have fuel tanks in both wings, ensuring that the heaviest load is spread evenly. If there is an issue with balance, pilots usually have the option of using more fuel from the heavier side to compensate.

## **Does it matter how much I weigh?**

Despite some of Michael O’Leary’s witterings about overweight flyers, airlines aren’t actually too worried about the weight of individual passengers.

“Airlines will normally be working from an assumption as to how much the typical passenger weighs,” says Alexander. They will also take into account the weight of your baggage and clothes too, anticipating extra for the winter.

When you’re dealing with hundreds of passengers, it isn’t particularly significant if some passengers weigh more or less than the benchmark, provided they are dispersed sensibly throughout the plane.

“Occasionally when an aircraft is very empty passengers will be asked to move to make sure the CG is within range,” says Trainor. If that does happen to you, you can rest assured that you haven’t been chosen because of your weight.

## **How does it feel to fly on an unbalanced plane?**

Ask any pilot this question and they will probably wince and remind you that no unbalanced flight should be taking off in the first place.

“Any plane that is outside of its CG is going to be much more difficult to pilot,” says Alexander. Depending on the exact imbalance, the controls could be much more sensitive or much more cumbersome.

All of these issues are likely to be much worse during take-off or landing, when pilots have to make far quicker decisions when it comes to guiding the plane.

In more challenging and dynamic environments – like flying a military aircraft with departing troops – adjusting to an unbalanced plane is very much part of the task, Alexander adds. For a commercial flight though, it remains an absolute no-no.

# 5 Different Types Of Boeing Private Jets



5 Different Types Of Boeing Private Jets© Provided by SimpleFlying

- BBJ offers highly customizable luxury business jets based on Boeing commercial aircraft models.
- Upgraded BBJ models have lower cabin altitude, improved range, and enhanced interiors for comfort.
- BBJ's lineup includes the Dreamliner, 737 MAX family, 777X, and even a special BBJ 747 based on the iconic 747.

Boeing is one of the most famous commercial aircraft manufacturers in the world and has been producing aircraft since 1916. Over the years, [Boeing](#) has developed and produced some of the most important aircraft in commercial aviation, including the [Boeing 747](#), which is known as the Queen of the Skies. Currently, the company produces the [Boeing 737](#), 767, 777, and [787 Dreamliner](#) for commercial airlines across the world.

However, what many travelers do not know about Boeing is that the company also produces business jets. Boeing customizes some of its existing commercial aircraft into business jets for private owners, head-of-state operators, or even corporate companies. These jets are known as [Boeing Business Jets \(BBJ\)](#). Let's take a closer look at some of the unique business jets that Boeing has created over the years. Let's also take a look at some of the customizable options that Boeing has implemented in the design of these aircraft.

## **BBJ 737 MAX family of aircraft**

### **Estimated pricing: \$101.5 million to \$118.5 million**

**Length**      129 feet eight inches to 138 feet 2 inches

**Wingspan**    117 feet ten inches

**Height**      40 feet four inches

**Approximate range** 6,465 nautical miles (7,440 miles) to 6,600 nautical miles (7,595 miles)

**Cruise speed**    Mach 0.79 (521 miles per hour)

The set of aircraft is based on the Boeing 737 MAX aircraft. This family includes the BBJ MAX 8 and BBJ MAX 9. The commercial family began with the 737 MAX 8 in 2015. The BBJ MAX family was announced shortly before the first commercial aircraft rolled out of production.

The BBJ MAX replaces the existing BBJ 737 family, similar to the commercial side of Boeing. The BBJ MAX family also has significant upgrades from the previous

iteration. This includes a lower cabin altitude for improved customer comfort, which reaches about 6,500 feet in altitude. Additionally, the range was increased to over 6,000 nautical miles (6,904 miles), mostly due to a reduction in fuel burn from the new and improved CFM LEAP-1B engines, which provide just under 30,000 pounds of thrust each. Other upgrades include the addition of auxiliary fuel tanks and other avionics upgrades.

Additionally, the interiors were heavily upgraded to allow for larger cabin floor areas and more overall space. These aircraft have the following cabin measurements:

- BBJ MAX 8: 1,025 square feet of cabin area and 593 cubic feet of cargo volume
- BBJ MAX 9: 1,120 square feet of cabin area and 775 cubic feet of cargo volume

## **BBJ Select**

### **Estimated pricing: \$95 million**

<b>Length</b>	116 feet eight inches
<b>Wingspan</b>	117 feet ten inches
<b>Height</b>	40 feet four inches
<b>Approximate range</b>	6,600 nautical miles (7,595 miles)
<b>Cruise speed</b>	Mach 0.79 (521 miles per hour)

This aircraft is based on the existing Boeing 737 MAX 7 aircraft. First announced in late 2023, Boeing does not expect to begin delivering this aircraft until 2026. This allows customers to purchase a private Boeing 737 MAX 7 for significantly cheaper, as Boeing itself does all customizations and refurbishments. Boeing expects to continue to sell unfinished BBJ 737 MAX 7s, but customers are required to find completion hangars for these aircraft.

Boeing will offer this aircraft with a six-zone interior. The front zone is required to hold a crew rest area and lavatory, while the rear zone is required to include a VIP bed and shower suite. The remaining four zones are customizable and may include lounges, private bedrooms, or various seating arrangements. The overall interior measurements for this aircraft include 884 square feet of cabin area and 274 cubic feet of cargo volume.

## **BBJ 787 Dreamliner family**

### **Estimated pricing: \$250 million to \$300 million**

**Length**      186 feet one inch to 206 feet one inch

**Wingspan**    197 feet three inches

**Height**      55 feet six inches to 55 feet ten inches

**Approximate range** 9,475 nautical miles (10,903 miles) to 9,960 nautical miles (11,462 miles)

**Cruise speed**    Mach 0.85 (652 miles per hour)

Boeing produces both the BBJ 787-8 and BBJ 787-9. The 787-9 is a slightly longer aircraft, about 20 feet longer. It also has an increased payload, which can hold 104,600 pounds instead of the 78,000 pounds of the 787-8. This brings the total

maximum takeoff weight (MTOW) of each aircraft to 560,000 pounds and 502,500 pounds, respectively.

Each of these aircraft is designed to fly at cabin altitudes of just 6,000 feet. These aircraft have the same cross-section, which has the following measurements:

- Cabin height: eight feet one inch
- Cabin width: 18 feet

Other interior improvements include multiple filtration systems to provide cleaner air and smooth ride technology that has sensors to detect and mitigate turbulence during flight.

## **BBJ 747**

### **Estimated pricing: \$370 million**

<b>Length</b>	250 feet two inches
<b>Wingspan</b>	224 feet seven inches
<b>Height</b>	63 feet six inches
<b>Approximate range</b>	7,730 nautical miles (8,900 miles)
<b>Cruise speed</b>	Mach 0.855 (656 miles per hour)

The BBJ 747 is obviously based on the famous Boeing 747. This specific BBJ is based on the 747-8 variant. Although it is no longer in production, several high-ranking customers took advantage of this offering, and a total of seventeen BBJ

747s were ordered and delivered. Approximately 13 of these aircraft are still in use today.

The double-decker aircraft provides over 4,700 square feet of cabin area. The cabin has a width of over 20 feet, per Corporate Jet Investor. Its standard BBJ configuration can also fly up to 100 passengers.

## **BBJ 777X family of aircraft**

### **Estimated pricing: \$400 million to \$450 million**

<b>Length</b>	229 feet to 251 feet nine inches
<b>Wingspan</b>	235 feet five inches
<b>Height</b>	63 feet eleven inches to 64 feet one inch
<b>Approximate range</b>	11,330 nautical miles (13,038 miles) to 11,835 nautical miles (13,619 miles)
<b>Cruise speed</b>	Mach 0.84 (644 miles per hour)

This variant of Boeing Business Jet was initially launched at the Middle East Business Aviation Association Show in December 2018. Boeing hopes to bring these aircraft to market by 2025 after the Boeing 777X completes its certification.

These will be the largest business jets in the world. The BBJ 77-8 will have over 3,256 square feet of cabin area, and the BBJ 777-9 will have over 3,689 square feet of cabin area. The cargo area of these two aircraft is approximately 6,332 cubic feet and 7,705 cubic feet, respectively.

## • Boeing

**Stock Code:** BA

**Date Founded:** 1916-07-15

**CEO:** Dave Calhoun

**Headquarters Location:** Chicago, USA

**Key Product Lines:** Boeing 737, Boeing 747, Boeing 757, Boeing 767, Boeing 777, Boeing 787

**Business Type:** Planemaker

## Where Does Airbus Build Its Airplanes?



Airbus headquarters in France © Coby Wayne/Shutterstock

Born from a joint government project amongst European countries in the 1970's, Airbus quickly established itself as a global aircraft manufacturing powerhouse. Despite its American competitor, Boeing, having a head start for over half a century, the European aircraft manufacturer quickly made a name for itself by producing several noteworthy airplanes for both commercial and military

use. These have included the likes of the Airbus A380, or the [largest passenger aircraft](#) that is no longer in production, and the [small airliner A220](#), which went through dramatic changes before Airbus stuck the landing. With [Boeing's recent safety issues](#) netting serious consequences, it's unsurprising that many people are wondering where its main competitor, Airbus, is made. However, the answer isn't that simple. Due to the nature of globalization, it's important to note that supply chains for many complex pieces of technology are seldom limited to a certain geographic location and Airbus planes are no different.

On its website, [Airbus](#) shares that about 80% of its aircraft components are made outside its manufacturing plants. In addition, Airbus has over 20 manufacturing sites that depend on thousands of different global suppliers for various components across dozens of assembly lines.

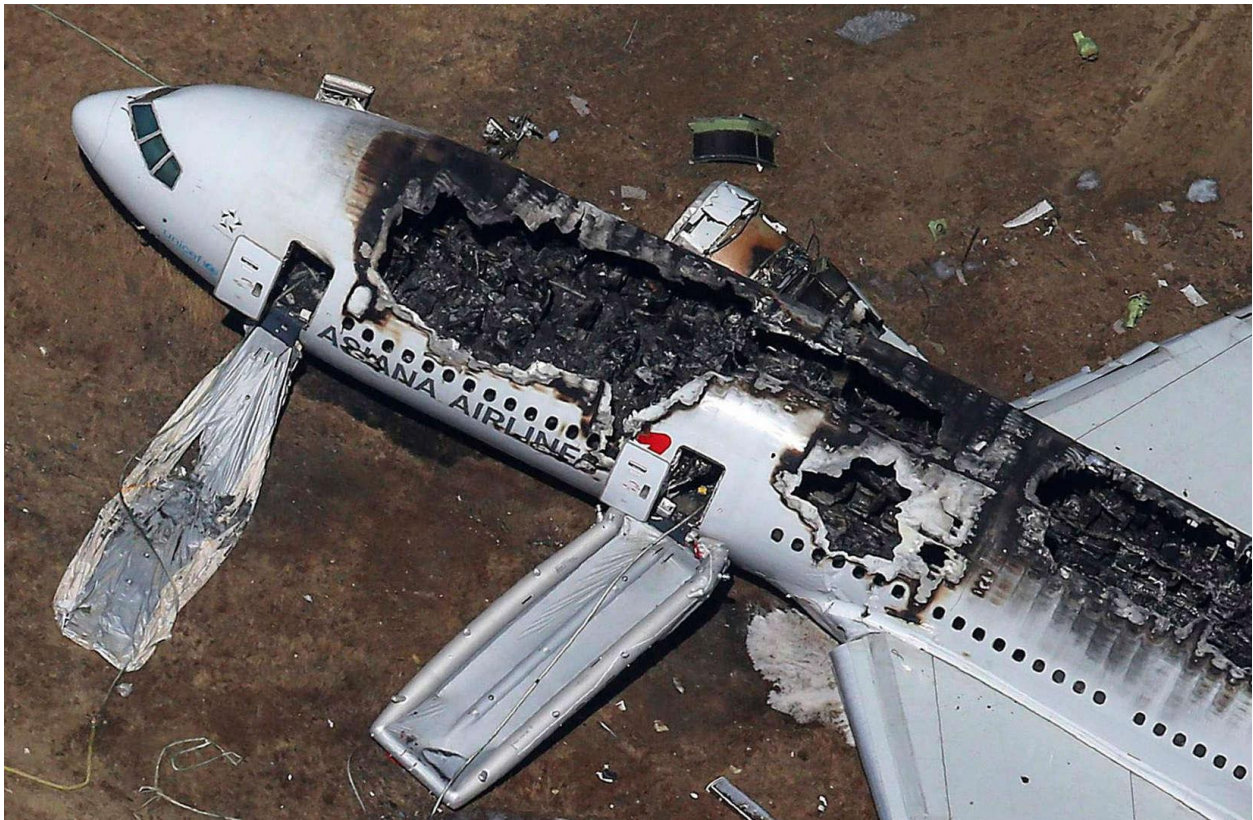
## Why It Matters Where Airbus Airplanes Are Made

Airbus has final assembly lines located in France, Germany, China, and North America. If you're wondering why these particular locations matter, Airbus has its manufacturing facilities where its top spending clientele are. In 2023, [Statista](#) cites that Airbus' top revenue generating regions were Europe, Asia-Pacific, and North America, respectively. In 2020, the United States introduced additional tariffs on European aircraft manufacturing parts, which would have significantly affected margins for Airbus manufacturing. With almost \$14 billion in revenue from North America in 2023 (via [Statista](#)), it's no wonder why Airbus is doubling down on more local manufacturing in the region. Some local airlines that use Airbus airplanes include American Airlines, United Airlines, Delta Airlines, JetBlue, and Spirit. Apart from final assembly lines in Alabama, Airbus also has training centers, customer service centers, and engineering facilities in North America.

Aside from commercial planes, Airbus also builds [planes for the military](#), such as the Airbus A400 Atlas, the Airbus A330 MRTT, and the Airbus C295. Airbus has also produced commercial and military helicopters in Columbus, Mississippi for over 20 years. In this particular factory, the company shares that veterans make up a fifth of its employees, producing the UH-72A, the newest arrival in the [United States Army helicopter fleet](#).

## Worst Airplane Crashes That Changed How They Design Planes

©NYTimes No one wants to admit it, but everyone's worst nightmare has to be getting into an airplane crash. It's completely out of your control. Every time you enter that airplane, you're trusting your life with a pilot, copilot, and huge hunk of metal. Luckily, airplane crashes are extremely rare, and if they do happen, manufacturers are quick to learn from these mistakes, so they can continue protecting us so it never happens again. Even if it might change your perspective on flying, just remember, that you're more at risk for dying by driving a car than flying in an airplane.



## American Airlines Flight 587 (2001)

After leaving JFK Airport in New York, the American Airlines flight crashed, killing all 260 people on board and five unfortunate people on the ground. It tore through a neighborhood just outside of the airport, leaving a trail of fire. According to an author on Medium, they said, "As the plane encountered wake turbulence from a Boeing 747, the first officer overcorrected, then overcorrected in the opposite direction, over and over until the plane slewed so hard to the side that the vertical stabilizer ripped off in flight." This led manufacturers to reassess the rudder design of aircraft and necessary pilot training. Investigators were not sure what made the pilot recorrect the plane during turbulence, and why the plane practically tore itself apart mid-air ([Admiral Cloudberg](#)).



## **Boeing 737 MAX Crashes: Lion Air Flight 610 (2018) and Ethiopian Airlines Flight 302 (2019)**

These two crashes highlighted the mistakes in the design of the Boeing 737 MAX aircraft. The design, particularly, the Maneuvering Characteristics Augmentation System (MCAS), had many faults. Unfortunately, these faults were not pointed out until after these two crashes. Manufacturers had to redesign the MCAS system and increase scrutiny of the aircraft certification process.

The Lion Air flight was only in the air for 13 minutes. It then plunged into the Java Sea, off the coast of Indonesia. Six minutes after takeoff, an Ethiopian Airlines flight crashed near Addis Ababa airport. According to ABC News, "In both crashes, incorrect data from a faulty sensor caused MCAS to misfire, forcing the plane to nose down repeatedly even as pilots struggled to regain control and gain altitude. MCAS was not mentioned in the pilot manual." Pilots on both flights were bombarded with alarms before crashing, which likely contributed to their confusion ([ABC News](#)).



## Air France Flight 4590 (2000)

After taking off from Paris Charles de Gaulle Airport in 2000, this Concorde supersonic aircraft crashed. All 109 people died. This led manufacturers and designers to rethink the design of these crafts and make necessary improvements. Fortunately, it was Concorde's only fatal accident. This explosion was the result of "large pieces of rubber being thrown against the underside of the left-wing and the rupturing part of a fuel tank. As a result, a severe fire broke out under the left wing, and around the same time, engines 1 and 2 suffered a loss of thrust as the fire engulfed the aircraft." After this crash, designers had to completely rethink the purpose of the Concorde and if it was even worth flying ([Simple Flying](#)).



## United Airlines Flight 232 (1989)

After this McDonnell Douglas DC-10 crashed in Iowa, aircraft engineers had to improve emergency procedures and make improvements to aircraft systems all around. This aircraft suffered an engine failure and crash-landed in Sioux City. The number two engine practically tore itself into two pieces, which prompted pilots to control an uncontrollable airplane. According to a report, this crash happened because engineers failed to catch a crack in the engine that was slowly becoming bigger over time.

They wrote, "The hard material inside the nitrogen impurity was knocked loose, creating a void which acted as a weak point in the otherwise uniform titanium alloy. The enormous rotational stresses that should have been distributed evenly over the rapidly spinning disk now ran up against a tiny spot that absorbed stress differently from the rest of the material. Over time, the disk began to suffer from metal fatigue as a tiny crack grew imperceptibly outward from the cavity throughout every flight." Because of the incident, 112 people died, though there were miraculously quite a few survivors ([Admiral Cloudberg](#)).



## Ariana Afghan Airlines Flight 202 (2005)

Due to this horrible Boeing 737 crash, engineers had to improve the way they maintain planes. This also led to an improvement in pilot training. Out of 27 people on the flight, 24 of them died. The main cause of this crash was pilot error and a fire in engine number one. The flight was previously delayed for 20 hours because of technical issues, but those issues were overlooked and the result was fatal ([Aviation Safety](#)).



## Air France Flight 447 (2009)

When this plane took off in Rio de Janeiro, passengers had no idea it was the last flight they'd ever take. While it was en route to Paris, it crashed into the Atlantic Ocean. The investigation following the crash prompted improved pilot training, revised cockpit instrumentation, and increased learning regarding high-altitude stalls.

According to a news report, this prompted " airlines around the world will change their training programs to enforce habits that might have saved the doomed airliner: paying closer attention to the weather and to what the planes around you are doing; explicitly clarifying who's in charge when two co-pilots are alone in the cockpit; understanding the parameters of alternate law; and practicing hand-flying the airplane during all phases of flight." For a while, it remained aviation's greatest mystery ([Popular Mechanics](#)).



## Japan Airlines Flight 123 (1985)

This Boeing 747 crash resulted in a whopping 520 fatalities. It remains one of the most horrendous single-aircraft accidents in aviation history. This led to necessary improvements in maintenance and better structural design in aircraft. Only twelve minutes after takeoff, “the pressure differential increased to the point that the fatally compromised aft pressure bulkhead could no longer hold itself together. The skin ripped open along the joint between the repaired section and the original bulkhead, and within milliseconds the pressurized cabin air blasted through the gap with tremendous force.” Many engineers had to reconsider the design of the bulkhead to prevent a catastrophe like this one from ever happening again ([Medium](#)).



## China Airlines Flight 611 (2002)

This Boeing 747 crash forced engineers to improve maintenance procedures for older aircraft. Because of metal fatigue in the fuselage, the plane crashed into the Taiwan Strait, killing all 225 people on board. Decades prior, the plane had suffered a tail strike, and since then, improper maintenance caused it to break down. Instead of fixing the issues, engineers simply installed a doubler over the damaged part, much like putting on a bandaid over an infected wound ([Simple Flying](#)).



## Turkish Airlines Flight 981 (1974)

During an unfortunate flight in 1974, a Turkish Airlines flight experienced a DC-10 cargo door failure. This led to design changes and safety improvements to prevent it from ever happening again. All 346 people were killed in the crash. Only nine minutes into the flight, the cargo door on the lefthand side burst open. This caused a violent decompression in the aircraft, and two rows of three passengers were immediately evicted from the airplane. This then caused an immediate descent of the aircraft until it crashed into the ground. This fault in design prompted engineers to improve their safety requirements ([Aerotime](#)).



## EgyptAir Flight 990 (1999)

When this Boeing 767 crashed, it forced engineers to improve cockpit procedures and forced extra pilot training. This entire crash happened because of revenge. The pilot, who was reprimanded and blamed for supposed sexual allegations, felt forced to crash the plane. He killed all 217 passengers and staff on board, including the captain who punished him. Because of this incident, cockpit procedures and background checks were enforced to prevent human emotion from getting in the way of hundreds of lives ([The Guardian](#)).



## Aeroflot Flight 593 (1994)

The Airbus A310 crashed in 1994 due to improper pilot handling. This led to revised pilot training and improvement in schooling and communication. Back then, even though it wasn't technically permitted, people could visit the cockpit if they knew the pilot. During this detrimental event, a son and daughter visited his father in the cockpit during the flight. For some reason, the father allowed his children to sit in the seats and hold onto the controllers. Even though the plane was on autopilot, the son hit the controllers too hard, sending the plane to a fatal angle. The aircraft spun out of control and crashed to the ground ([Simple Flying](#)).



## ValuJet Flight 592 (1996)

Because of this fatal crash, it prompted changes in hazardous materials handling. After this crash, the airline mechanic went on the run to hide from charges that would inevitably send him to jail. Pilots lost control of the airplane only a few minutes into the flight when a fire started in the cockpit and sent the plane on fire. It's speculated that one tire in the freight of the belly exploded during takeoff, contributing to the fire ([Click Orlando](#)).



## Nigeria Airways Flight 2120 (1991)

More than 200 people died on the Nigeria Airways Flight in 1991. This DC-8 crash prompted engineers to make some serious changes in tire safety procedures. The under-inflated tire caused this fatal crash, forcing a necessary look at the design of aircraft tires. Pilot error was also a part of this. A report on a fatal day said, "Before take-off, the lead mechanic of the Nigeria Airways Flight 2120 noticed two tires were below the minimum for flight dispatch and tried to inflate them - but no nitrogen gas was readily available. But despite this, the project manager, not willing to delay, gave the all-clear for take-off." This pilot error, in addition to mechanical error, had a fatal result ([Daily Star](#)).



## Swissair Flight 111 (1998)

A simple failure in the electrical system of The McDonnell Douglas MD-11 crash prompted changes in future aircraft's electrical systems to prevent horrible results such as this one. During the flight, "inside the attic, a high-power wire supplying the new in-flight entertainment system suffered a failure that led to electrical arcing." The fire spread exponentially throughout the plane, with no chance of stopping it, causing fatalities of everyone on board ([Medium](#)).



## **Korean Air Flight 801 (1997)**

In 1997, when Korean Air Flight 801 attempted to land at Guam International Airport, it crashed, killing 228 people. This crash highlighted the importance of communication in the cockpit and why crew training is so important. Even though the captain was an experienced pilot with many awards, he made one dire mistake that ended up killing everyone. The pilot failed to brief the crew on his landing procedure and felt fatigued before flying. All of this combined caused a catastrophic event ([Simple Flying](#)).



## Air Florida Flight 90 (1982)

De-icing is an incredibly important part of flying an airplane. This is why, in 1982, the Boeing 737 crash caused engineers to seriously improve de-icing procedures. Miraculously, only a few survived. For starters, "Though the outside temperature was well below freezing and snow was falling, the crew did not activate the engine anti-ice system that prevents sensors in the engines from freezing and giving incorrect engine power readings." Those who did survive woke up in the icy waters of a river ([Safety Compass](#)).



## Colgan Air Flight 3407 (2009)

It comes as no surprise that pilots suffer fatigue mid-flight. That's exactly what happened to this Bombardier Dash 8-Q400, which forced changes in pilot training and fatigue regulations. During the flight, "The captain responded to the device improperly, and the stick pusher activated to prevent the aircraft from stalling. The captain overpowered the stick pusher. Furthermore, the first officer lowered the flaps, which was a mistake. The aircraft stalled and crashed into a house in Clarence Centre in the state of New York." All the passengers and crew perished, forcing aviation to rethink how they train pilots ([Aerotime](#)).



## Copa Airlines Flight 201 (1992)

The Boeing 737 Copa Airlines crash, prompted engineers to improve the cockpit voice recorder. It was Panama's worst air crash in history. First, the plane died from bad weather. The pilots lost control of the plane as it descended rapidly and crashed into the jungle, killing all 47 people. This crash happened thanks to a series of things, including A loss of control due to false readings, the lack of a visible horizon due to nighttime and the approaching lousy weather, a non-standard cabin configuration, and incomplete simulator training." The short circuit sent the wrong information to pilots, making a fatal mistake ([Simple Flying](#)).



## Delta Air Lines Flight 723 (1973)

Nowadays, we don't have to worry as much about detrimental weather as we used to. But this wasn't the case in the 70's. This caused a DC-9 crash, which resulted in changes to weather-related flight procedures. During the flight, "the collision tears off some of the fuselage and the plane slams into the ground, breaking apart and bursting into flames." Because of poor visibility, pilots had to rely on sensory instruments to land, which had a fatal result where many people died ([History](#)).



## Arrow Air Flight 1285 (1985)

This crash in 1985 led engineers to seriously change maintenance practices to make sure this sort of crash never happens again. As one of Canada's deadliest crashes, all 256 people died. The main cause was ice on the wings and miscalculated weight. Before crashing and exploding, the plane lifted into the air and then crashed. This system failure caused aviation engineers to rethink ice, speed with takeoff, and how the engines operate ([Simple Flying](#)).



## Avianca Flight 52 (1990)

As we all know, fuel management is important in aircraft. This is why the major Boeing 707 crash resulted in a necessary improvement in communication and fuel management procedures. As the flight approached JFK airport, en route from Medellin, Colombia, it crashed, killing 73 people out of 158 people. The plane ran out of fuel, and the mismatch in communication between the captain and copilot caused this fatal crash which made engineers rethink how they design planes and carry out fuel measurements ([Lingoblog](#)).



## Trans World Airlines Flight 800 (1996)

Because of the Boeing 747 explosion in 1996, it forced engineers to redesign airplane fuel tanks. At first, people believed it was a terrorist attack, but it ended up being a horrible mechanical failure. It happened only minutes after departing JFK. It was on its way to Paris, and exploded over the Atlantic Ocean, just near Long Island. Everyone on the flight died. According to aviation's managing director, "The investigation of the crash of T.W.A. Flight 800 is a seminal moment in aviation safety history. From that investigation, we issued safety recommendations that fundamentally changed the way aircraft are designed." ([History](#)).



## Air New Zealand Flight 901 (1979)

DC-10 crash into Mount Erebus in Antarctica resulted in changes to flight navigation and training. This was the worst crash in aviation history. It crashed on the lower slopes of Mt. Erebus. All 237 passengers died, and not one survived. The plane originally departed on a sightseeing tour of Antarctica. Investigators assumed the main cause of the crash was due to changes in the flight plan, and the management computer which was not on properly ([NZ History](#)).



## Delta Air Lines Flight 191 (1985)

When this Lockheed L-1011 crashed, it led to major changes in weather-related flight procedures to prevent something as detrimental as this crash in 1985. A microburst in a thunderstorm caused the plane to come crashing down from the sky, while it attempted to land. After this crash, it forced the FAA to require all commercial flights to detect low-level wind shear ([Fox Weather](#)).

