

CESSNA GRAND CARAVAN

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CESSNA HISTORY

Clyde Vernon Cessna was born in Iowa in 1879 and grew up on a Kansas farm. He became captivated with flying after learning of Louis Blériot's 1909 flight across the English Channel. He purchased a monoplane for himself and spent the next several years travelling to exhibition air shows, meeting many of the daredevil pilots of the era, including Roland Garros, René Simon, Charles Hamilton, and René Barrier.

Travelling east to New York, Cessna spent a month at the Queen Airplane Company factory, learning the fundamentals of flight and the art of plane building. He became so enthusiastic about flying that he spent his life savings of \$7,500 to buy an exact copy of the Blériot XI monoplane, shipping it west to his home in Enid, Oklahoma. Cessna flew this aircraft, along with others he designed and built, in exhibition flights throughout the Midwest, continuously modifying the planes to improve their performance.

In 1924, Clyde partnered with fellow aviation pioneers Lloyd C. Stearman and Walter H. Beech to form the Travel Air Manufacturing Co., Inc., a biplane-manufacturing firm, in Wichita, Kansas. Clyde infused the fledgling company with cash and equipment and became its president.

But Clyde always preferred monoplanes, so in 1927, he left Travel Air to form his own company, the Cessna Aircraft Company. There



he would build his vision of the ideal aircraft, a full-cantilever-winged monoplane dubbed the Phantom. Commercially successful, the Phantom, along with the Model AW and DC-6, sold well until the start of the Great Depression.

Clyde and his son Eldon turned their attention to building racing aircraft in the early 1930s—their CR-1 racer made a notable showing in the 1932 National Air Races, and the CR-3 established an international speed record in 1933. But Clyde abruptly retired from aviation when his close friend Roy Liggett was killed in the crash of a Cessna-built racing plane. He never again participated actively in the industry.



Clyde's nephew Dwane Wallace, an aeronautical engineer, along with brother Dwight and engineer Jerry Gerteis, designed a sleek monoplane, the Model C-34. Dwane

then assumed the mantle of leadership, reviving the Cessna Aircraft Company in 1934 to manufacture and market the plane.

The C-34 became the aircraft that enabled Cessna Aircraft Company to emerge intact from the Depression and established the firm as one of the leaders in American general aviation. A four-passenger high-winged monoplane, it could achieve a top speed of 162 miles per hour (261 kilometres per hour). Known as the Airmaster, the



C-34 won the title of the “world's most efficient airplane” in 1936.

The Airmaster evolved into the C-37 and C-38, improved versions with wider fuselages and landing gear, rubber engine mounts, wing-mounted flaps on the C-37 and a belly-mounted drag flap on the C-38. The last Airmasters, the C-145 and C-165 models, sported longer fuselages, split wing-flaps, and more powerful engines.



The Airmaster line ended with the arrival of World War II after a total of about 180 had been built. Its design reappeared after the war with the larger, all-aluminium Cessna 190 and 195, produced from 1947 to 1954.

Cessna introduced its first twin-engine design, the Model T-50, in 1939. Thousands were sold to the Canadian and U.S. armed forces for use as pilot training aircraft during World War II.

After the war's end in 1946, Cessna's facility began manufacturing two versions of tail-wheel monoplanes, the Model 120 and 140, selling more than 7,000 of these popular and inexpensive two-seaters before shifting to the production of four-seat aircraft.

In 1948, advertisements began appearing in aviation publications for what would become the biggest selling and most widely produced light aircraft in history—the Cessna 170. This single-engine four-seat plane was actually a



stretched and enlarged version of the Model 140. It had fabric-covered wings, V-shaped wings struts, and three fuel tanks for additional range. Late in 1948, Cessna replaced the fabric-covered wings with all-metal wings with larger flaps and changed the V-strut to a single strut configuration, creating the most recognizable variation of the aircraft—now dubbed the Cessna 170A. The future direction of Cessna now centred on the design of all-aluminium, high-winged, monocoque fuselage aircraft, featuring side-by-side seating, flat-spring steel landing gear and dependable engines. Known as a “good, honest taildragger,” a total of more than 5,000 Cessna 170s of all types were manufactured during the plane's six-year production run—half of those aircraft are still flying in 2001.

In 1953, Cessna began manufacturing the Model 310, a twin-engine lightweight five-passenger aircraft. Popularized by the television series “Sky King,” the Model 310 is widely regarded as one of the most attractive aircraft ever built. Produced for almost 30 years, more than 5,500 Model 310s were manufactured, eventually becoming Cessna's most popular twin-engine model.

Cessna unveiled a pair of twin-engine aircraft in the early 1960s that were designed to avoid the asymmetrical drag that often occurs if one of the two engines fails—the Model 336 Skymaster (with fixed landing gear) and the Model 337 Super Skymaster (with retractable landing gear). Capable of carrying six passengers, it also served with the U.S. armed forces during the Vietnam War. The aircraft's versatility and excellent cockpit visibility for the pilot made it ideally suited as a spotting aircraft that searched and marked targets for other aircraft to attack. Approximately 2,000 Skymasters were manufactured in its 20-year production run that ended in 1983, becoming Cessna's second best selling twin-engine model.

A specialized aircraft designed for crop-dusting, the Model 188, was developed in the mid-1960s, selling under a variety of names. These aircraft featured lights for night operations, safety windshields, and wire-cutter blades designed for unexpected encounters with telephone wires. Equipped with powerful turbocharged engines and

large hoppers, about 4,000 Model 188s were manufactured.



The Model 172 Skyhawk, developed as Cessna's answer to Piper Aircraft's popular PA-22 Tri-Pacer, replaced the 170 in 1956. It featured tricycle landing gear and a new tail design. Affordably priced and easy to handle, the Model 172

could fly at almost 144 miles per hour (232 kilometres per hour) and would become (and remains) the best selling four-seat aircraft in the history of general aviation.

A tricycle-geared version of the Model 140 soon became aviation's most common two-seat training aircraft—the Model 150. The second most popular general aviation aircraft ever built, its production started slowly at first. Only 122 were built during 1959, its first year of production, but eventually, a grand total of 23,840 were manufactured before production ended in 1977.

In 1966, a version of the 150 designated the Model F150 started production in Reims, France—a total of 1,758 model F150s were built. An aerobatic version of the 150 saw limited production, starting in 1970. This plane used a four-cylinder 100-

horsepower (75-kilowatt) Continental O-200 engine and Cessna made a number of changes to the plane's airframe and configuration during its 18-year production run. In 1978, Cessna introduced the more powerful Model 152, which was also better adapted to newer aviation fuel blends. By the time production ended in 1985, a total of 7,500 Model 152s were manufactured.

In the 1960s, Cessna began producing lighter twin-engine aircraft with a pair of pressurized cabin models, the 411 and 421, followed by a move into the business jet aircraft market with the turboprop-powered Quest 500 in 1968. In December 1993, the Cessna Citation X business jet made its first flight, establishing itself as one of the fastest mass-produced aircraft in the world, capable of carrying 12 passengers and two pilots while flying at Mach 0.92 (about 600 miles per hour [447 kilometres per hour]).

After becoming a subsidiary of General Dynamics Corporation in 1985, Cessna stopped producing piston-engine airplanes with the 1986 model year due to concerns over product liability. In 1992, Textron, Inc. acquired Cessna Aircraft and soon resumed producing light aircraft; however, rising production costs and concerns over product liability did not justify the reintroduction of the popular and affordable two-seat models.

Clyde Cessna, with only a fifth-grade education and lacking a private pilot's license, helped create the general aviation industry. Although it was his two nephews, Dwane and Dwight Wallace, who transformed Cessna Aircraft into the aviation powerhouse that produced more than 100,000 piston-powered airplanes and another 2,000 Citation jets, it is Cessna's name that has become synonymous with small planes—a legacy to Clyde Cessna's vision.



The Cessna 208 Caravan I, Grand Caravan & Cargomaster

CESSNA GRAND CARAVAN HISTORY

With sales exceeding the 1000 mark the useful Caravan is a popular utility workhorse worldwide.

Design work for the Caravan dates back to the early eighties. First flight of a prototype occurred on December 9 1982 and certification was granted in October 1984. When production began the following year it became the first all new single engine turboprop powered aircraft to achieve production status.

The Caravan I has had a close association with US package freight specialist Federal Express (FedEx), on whose request Cessna especially developed two pure freight versions. The first of these was the 208A Cargomaster (40 delivered), the second was the stretched 208B Super Cargomaster (260 delivered). The first Super Cargomaster flew in 1986 and features a 1.22m (4ft) stretch and greater

payload capacity, including an under fuselage cargo pannel. FedEx's aircraft lack cabin windows.

The 208B Grand Caravan first flew in 1990 and like the Super Cargomaster is a stretched version of the basic Caravan powered by a 505kW (675shp) PT6A-114. It can seat up to 14 passengers.

Announced at the 1997 NBAA convention, the 208-675 has replaced the basic 208. It combines the standard length airframe of the 208 with the more powerful PT6A-114 of the 208B.



Canada/Soloy Dual Pac powerplant, consisting of two PT6D-114A engines driving a single propeller. Other distinguishing features of the Pathfinder 21 include a 72in cabin stretch behind the wing and a large integral cargo pod.



Underbelly cargo pods, floats and skis are offered as options on the Caravan I family, and the type is easily converted from freight to passenger configurations. A military/special missions version of the 208A, dubbed the U-27A, is also on offer. The Brazilian Air Force designation is C-98.

Soloy is offering a dual-engine conversion of the 208B, named Pathfinder 21. This version is powered by a 991kW (1329shp) Pratt & Whitney



Dashboard and what is behind...



ENGINE

- 208 - One 450kW (600shp) Pratt & Whitney Canada PT6A-114 turboprop driving a three blade variable pitch Hartzell propeller.
 - 208-675, 208B Super Cargomaster & Grand Caravan - One 505kW (675shp) PT6A-114A.
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PERFORMANCE

- 208A - Max cruising speed 340km/h (184kt). Initial rate of climb 1215ft/min. Range with max fuel and reserves 1797km (970nm), range with max fuel and reserves 2066km (1115nm).
- 208B Super Cargomaster - Max cruising speed 317km/h (171kt). Max initial rate of climb 770ft/min. Range with max fuel and reserves 2000km (1080nm).
- Grand Caravan - Max cruising speed 337km/h (182kt). Max initial rate of climb 975ft/min. Range with max fuel and reserves 1667km (900nm).

Additional performance Grand Caravan

- Single Pilot Certified Yes
- Certified Ceiling 25,000 ft (7,620 m)
- Airport Performance Takeoff Distance 2,420 ft (738 m) Landing Distance 1,795 ft (547 m)
- STOL Performance Trained bush pilots with total load limited to 7'000lb can use airstrip from 1,600 ft (Takeoff and Landing)



WEIGHTS

- 208A - Empty 1725kg (3800lb), max takeoff 3310kg (7300lb).
- 208B Super Cargomaster - Empty 2073kg (4570lb), max takeoff 3970kg (8750lb).
- Grand Caravan - Empty equipped 2250kg (4965lb), max takeoff 3970kg (8750lb).

DIMENSIONS

- 208A - Wing span 15.88m (52ft 1in), length 11.46m (37ft 7in), height 4.32m (14ft 2in). Wing area 26.0m² (279.4sq ft).

- 208B - Same except for length 12.67m (41ft 7in).

CAPACITY

- 208A - Pilot and typically nine passengers, or up to 14 with an FAA FAR Part 23 waiver. Cargo capacity 1360kg (3000lb).
- 208B - Passenger accommodation same. Cargo capacity for 1587kg (3500lb).
- Grand Caravan - One pilot and up to 14 passengers.

PRODUCTION

1000th unit delivered in October 1998. More than 60% of production sold outside the United States.

FLIGHT TEST

(The pictures in the below text make obvious the versatility of the Cessna Grand Caravan)

The Cessna Caravan was big to begin with; now it is gargantuan. The Caravan is the largest single-engine airplane ever produced by Cessna. Comparing it to a Cessna 182 is like standing a pro basketball player next to a jockey — the 182 is lost in the Caravan's shadow. The latest version, the Grand Caravan, is even more imposing. It is 4 feet longer than the original Caravan and is the largest single-engine turboprop utility aircraft currently in production. You want big? You got it in the Grand Caravan.



Cessna has produced four Caravan models, plus several variations: a special-missions version available with roll-up cargo door and pod for carrying eavesdropping electronics, a military cargo version, and a floatplane. The Caravan is available with either straight or amphibious floats. The Wipline floats are huge affairs — on dry land, the top of the amphibious float is 40 inches high. Fifteen float-equipped short-body Caravans have been sold. (Floats are not available for the stretch Caravans.)

The prototype Caravan first flew in December 1982. It was intended as a replacement for Cessna 206s, 208s, and other smaller, aging utility aircraft doing hard labour in remote regions of Africa and other places where facilities can be crude and avgas scarce.

Even before it was certified in 1984, the Caravan found a

big home in the U.S. Federal Express Corporation ordered a specially equipped, windowless version, the 208A Car to expand and extend its overnight small-package pickup and delivery service to medium and small communities.



Lovely it is not, although there is a certain stately appeal to the utilitarian, efficient look of the Grand. Because beauty wasn't even on the first page of Cessna's priority list for the Caravan, designers concentrated on features that help the airplane and pilot do their work better. Ease and cost of maintenance also were primary considerations, starting with the propeller, a fat, three-blade McCauley. Originally, the Caravan used a composite Hartzell. The switch was made to metal because it costs half as much to buy and repair, according to Cessna — which owns McCauley.



The nose-wheel is an ingeniously simple design. The strut is filled with oil only. Shock absorption is provided by a long, springy tube — a 172RG main gear leg if you want to know the truth — that extends from the strut yoke back and up into the belly of the airplane. The bumps are absorbed by the tube instead of the nose-wheel strut.

Outboard wing spars and the wing lift struts are designed to take the punishment of bush operations. The outer 6 feet on each side of the 52-

foot-long wing can sustain damage without it affecting the main wing and spar or the fuel tanks. Each lift strut — they are interchangeable — has double spars bonded back to back, and each spar can carry the load without failing. The main gear legs attach to a tank-like section of reinforced skin. Gear loads are absorbed by the main fuselage structure and by a center connecting tube covered by the belly skin. In the event of a ground roll mishap, each main gear leg is designed to twist back 45 degrees rather than distort the fuselage structure.



Look underneath the Grand Caravan, and you'll see a pair of stout, semicircular metal loops between the main gear legs. They carry the fuselage loads around the main-gear connecting tube, which allows for a flat cabin floor.



The Grand Caravan has four doors: one for each crewmember, a right-side airstair door, and a yawning left-side cargo door. The cabin has 14 seats. There is plenty of room for more, but few countries allow more than 14 people in a turbine airplane without imposing some extensive and expensive additional requirements, according to Cessna. (The FAA

permits a maximum of nine passengers and two crew.) Firing up the Pratt & Whitney is a simple matter of toggling the battery, fuel boost, and start switches. As the gas generator (Ng) speed passes through 12 percent, the fuel condition lever is moved to

Low Idle position. At 52 percent Ng, the starter switch goes to Off. Except for cockpit checks, that's it.

Occasional use of the Beta range to reverse propeller pitch keeps the taxi speed to a manageable clip and helps save the brakes, which are very effective. Mash either pedal, and the Grand Caravan will pivot on a main tire.

It is suggested two notches (20 degrees) of flaps for the takeoff roll. The initial acceleration is slow, but we don't cover much ground before rotating at 65 knots. Ground roll for a maximum gross weight takeoff in



sea level standard conditions is 1,365 feet, according to handbook figures.

Put the nose on the horizon, and the airplane cruise-climbs at 110 knots and between 900 and 1,000 feet per minute. In low-altitude level cruise at 1,900 rpm, the airspeed creeps up to just below the 175-knot VMO. A more representative scenario is a quieter, more comfortable 1,750 rpm at 6,000 feet. Those numbers should yield a true airspeed of 180 knots on about 415 pounds per hour (62 gallons) of fuel, according to the handbook. A cargo pod would scrub about 9 knots off the cruise speed.



With 332 gallons of usable fuel, the Grand will fly for 4.6 hours at maximum cruise power with a 45-minute reserve, according to specifications. Our Caravan for the day, is loaded with most of the options on Cessna's list, including Bendix/King KFC 150 autopilot/flight director system and RDS 81 radar, yet it could still take on full fuel and 1,715 pounds of payload. Reduce the fuel load to half and the power to best-range cruise, and you can carry 2,800 pounds of

people and cargo and cruise for three hours at 147 KTAS on 47 gallons per hour.

If there is no comparison in size between a Grand Caravan and a 182, there is in flying qualities. In fact, once you acclimate to the height and the spaciousness of the cockpit, you tend to imagine yourself in a smaller Cessna.

It is remarkable that the Grand Caravan can take on two tons of fuel and payload and still handle like a much smaller airplane. Long, single-slotted flaps that incorporate leading edge vortex generators and trailing edge angles (to keep airflow attached and thus maintain the effectiveness of the flaps) enable the Grand Caravan to easily beat the 61 knot stall requirement for singles.

Long flaps mean short ailerons, so the Grand Caravan has spoilers to augment roll control. Roll forces are light considering the huge wing, and there is almost no adverse yaw.

The pilot has excellent control over the entire speed range of the airplane. To demonstrate, One can have a transition from cruise to approach by pushing the prop control full forward, pulling the power back to the stop, and selecting full flaps. The airplane noses down as if we are on a ski slope, but the airspeed lounges at around 80 knots. You can pretty much pick the patch of ground you want to plunk down on, even if you're high and close in to the runway.

Great aircraft in all conditions and particularly adapted to bush flying.

CESNNA CARAVAN ACCIDENTS (at this date approx 1900 C208 in service)



Aviation**Safety**Network



an exclusive service of **Flight Safety Foundation** www.flightsafety.org



Cessna 208 Statistics

Hull-loss Accidents: 137 with a total of 298 fatalities

Other occurrences (hull-loss): 1 with a total of 0 fatalities

Unfiled occurrences (hull-loss): 1 with a total of 0 fatalities

Criminal occurrences (hull-loss, excl. hijackings): 0 with a total of 0 fatalities

Hijackings: 4 with a total of 0 fatalities

Survival rate for all fatal accidents: on average 21.3% of all occupants survived fatal accidents

GRAND CARAVAN AND FLIGHT SIMULATOR X



Thanks to the authors of the FSX program, a beautiful and detailed CESSNA GRAND CARAVAN is integrated in the basic package's fleet... and with a choice of 4 different liveries.

It flies very well in all conditions and is remarkably stable even in very bad weather. With its powerful turboprop engine it can take-off and land from and on very short airstrips (1,600 ft). As in the reality, with flaps extended it can fly as low as 61 kn which is very comfortable to land on dangerous short airfields.

It is not difficult to create new textures (livery) with a freeware program called DXTBmp which allows to convert the original FSX dds texture files into bmp files and to rework the design using a free program like "Photofiltre" and then reconvert the bmp file into dds format to replace the original design...

On the other hand, the tuning "specialist" can play with an aircraft config file editor to modify some basic specification such as engine power, fuel capacity (to increase the range) or flaps angle fine tuning to specific bush conditions...

Finally, to test-fly most of the bush operations division destinations I have extensively used the Cessna Grand Caravan. In the past year only I must have flown this favourite aircraft for more than 300 hours... with two round the World trips with this bird and lots of bush flying.

A look at my former VA pilot's hours-page, Knight Air, will show my total of more than 1'500 hours recorded mostly with VFR and bush flight... from which I estimate that approximately 70% were flown aboard the Cessna Grand Caravan. Nothing can better testify of my love for this versatile aircraft.

<http://www.knightair.com/?kpage=hours>

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