



Encyclopedia of  
**Business Aircrafts**

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## Chapter- 1

# Brazilian Business Aircrafts

## Embraer Legacy 450

### Legacy 450



MLJ concept drawing as of October, 2007.

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<b>Role</b>	Business jet
<b>Manufacturer</b>	Embraer
<b>Status</b>	In development
<b>Number built</b>	None
<b>Unit cost</b>	15.25 million
<b>Variants</b>	Embraer Legacy 500

The **Embraer Legacy 450** is a business jet being developed by Brazilian aircraft manufacturer Embraer.

### ***Design and development***

Launched as a concept called the **MLJ** (Mid-Light Jet) at the NBAA Convention in 2007, the Legacy 450 (and its big brother the Legacy 500) were officially launched at EBACE in May 2008. It is designed to carry 7 to 8 passengers over 2,300 nautical miles (4,300

km). The aircraft has full fly-by-wire flight controls, a Collins ProLine Fusion flight deck, Honeywell HF7500 series engines, and a full stand up flat floor cabin. First flight is scheduled for 2012, and entry into service is in late 2013.

## ***Specifications***

### **General characteristics**

- **Crew:** 2 pilots
- **Capacity:** 7 to 10 passengers
- **Length:** 19.15 m (62 ft 10 in)
- **Wingspan:** 20.25 m (66 ft 5 in)
- **Height:** 6.74 m (22 ft 1 in)
- **Powerplant:** 2 × Honeywell HTF7500E

### **Performance**

- **Maximum speed:** Mach 0.83
- **Range:** 4,260 km (2,647 mi; 2,300 nmi)
- **Service ceiling:** 14,000 m (45,932 ft)

### **Avionics**

Rockwell Collins Pro Line Fusion

# Embraer Legacy 500

## Legacy 500



MSJ concept drawing as of October, 2007

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<b>Role</b>	Mid-size jet
<b>Manufacturer</b>	Embraer
<b>Status</b>	In development
<b>Number built</b>	None
<b>Unit cost</b>	\$18,400,000
<b>Variants</b>	Embraer Legacy 450

The **Embraer Legacy 500** is a business jet being developed by Brazilian aircraft manufacturer Embraer.

### ***Design and development***

Initially called the **MSJ** (Mid-Size Jet) Concept at NBAA 2007, the Legacy 500 was officially launched at EBACE in 2008, along with its smaller sibling, the Legacy 450. It can be configured to carry between 8 and 10 passengers. It can carry 8 passengers over 2,800 nautical miles (5,190 km), or four passengers over 3,000 nautical miles (5,600 km). First flight is scheduled for 2011 and entry into service in late 2012.

### ***Specifications***

#### **General characteristics**

- **Crew:** 2 pilots
- **Capacity:** up to 15 passengers

- **Length:** m (67 ft 4in)
- **Wingspan:** m (66 ft 5in)
- **Height:** m (22 ft 1in)
- **Wing area:** m<sup>2</sup> (ft<sup>2</sup>)
- **Empty:** kg (lb)
- **Loaded:** kg (lb)
- **Maximum takeoff:** kg (lb)
- **Powerplant:** Honeywell HTF7500E
- **Avionics:** Rockwell Collins Pro Line Fusion

## Performance

- **Maximum speed:** Mach 0.82 (870.84 km/h)
- **Range:** 5,186 kilometers (3,000 nautical miles)
- **Service ceiling:** 45,000 ft (13,700 m)
- **Rate of climb:**
- **Wing loading:**
- **Thrust-to-weight:**

# Embraer Legacy 600

## Embraer Legacy 600



An Embraer Legacy 600 at the Berlin Air Show.

<b>Role</b>	Business jet
<b>Manufacturer</b>	Embraer
<b>First flight</b>	2001
<b>Introduced</b>	2000
<b>Status</b>	In production
<b>Produced</b>	183 as of Dec. 31, 2010
<b>Unit cost</b>	US\$27.450 million

**Developed from**      Embraer ERJ 135 family

The **Embraer Legacy 600** is a business jet derivative of the Embraer ERJ 135 family of commercial jet aircraft.

### ***Design and development***

The Legacy 600 is based on the ERJ 135 model, with avionics from ERJ 140 model, includes added range with extra fuel tanks in the tail and forward of the wing, added winglets and an extensive drag reduction. It is certified to 41,000-foot (12,000 m) altitude versus 37,000 feet (11,000 m) for the airline configuration. Launched in 2000 at the Farnborough Airshow, the Legacy carries 16 passengers for 3,050 nautical miles (5,650 km) or 8 passengers for 3,450 nautical miles (6,390 km). The Legacy family includes the **Legacy Shuttle**, which is an ERJ 135 with a 19-seat passenger cabin configuration as standard (it does not have the same range as the Legacy Executive / Legacy 600).

The Legacy 600 competes on the upper end of the small to mid sized range of business jets. It has nearly the opposite design progression as the rival Canadair Challenger. The Legacy 600 was derived from the established ERJ family of regional jets, while the Canadair Regional Jet was developed by Bombardier from the Challenger business jet. Both lines of aircraft are competitors. Embraer has since launched an extensive lineup of business aircraft, from the entry-level Phenom 100 to the Lineage 1000, a very-long-range business jet version of the company's 100-seat E-190.



Embraer Legacy 600 at Birmingham International Airport, England

In seven years of service, Embraer have delivered over 150 Legacy 600 aircraft in more than 20 countries. It has seating for 16 passengers in three partitioned sections, or seating for 19–37 in airline-style seats on the Legacy Shuttle. In the cockpit, the Legacy also includes a Honeywell Primus 1000 avionics suite, with a full glass cockpit.

## **Legacy 650**

The Legacy 650 is a longer-range version of the Legacy 600 giving it a range capability of 7,223km (3,900nm), nonstop with four passengers, or 3,840 nm. (7,112 km.) with eight passengers, or about 500 nm (926 km.) farther than the Legacy 600. It was announced at the 2009 NBAA show.

## **Incidents**

- On 29 September 2006, an ExcelAire Embraer Legacy EMB-135BJ, civil registration N600XL, collided with Gol Transportes Aéreos Flight 1907, a Boeing 737-800, while flying over the northern state of Mato Grosso, Brazil en route to Manaus from São José dos Campos. The Boeing crashed and the Embraer landed safely with minor damage.

## **Aircraft deliveries**

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of deliveries	9	13	13	20	27	36	36	18	11

## **Specifications**

### **General characteristics**

- **Crew:** Three - pilot, co-pilot, flight attendant (optional)
- **Capacity:** 13 passengers + 1 in cockpit jumpseat
- **Length:** 26.33 m (86 ft 5 in)
- **Wingspan:** 21.17 m (68 ft 11 in)
- **Height:** 6.76 m (22 ft 2 in)
- **Empty weight:** 16,000 kg (30,000 lb)
- **Max takeoff weight:** 22,500 kg (49,604 lb)
- **Powerplant:** 2× Rolls-Royce AE 3007/A1P turbofans, 39,2 kN (8,810 lbs) each

### **Performance**

- **Maximum speed:** 834 km/h (450 kt, 518 mph)
- **Range:** 6,060 km (3,250 nm, 3,740 mi)
- **Service ceiling:** 12,496 m (41,000 ft)
- **Thrust/weight:** 0.36:1Max fuel capacity: 18,800 lb (Legacy Executive) / 11,321 lb (Legacy Shuttle) - both figures approx.

# Embraer Lineage 1000

## Lineage 1000

<b>Role</b>	Business jet
<b>Manufacturer</b>	Embraer
<b>First flight</b>	October 26, 2007
<b>Status</b>	in production
<b>Unit cost</b>	US\$49.25M
<b>Developed from</b>	Embraer E-Jets

The **Embraer Lineage 1000** is a variant of the Embraer 190 regional jet airliner, launched as a private jet on May 2, 2006. Manufactured by the Brazilian aerospace firm Embraer, the Lineage is advertised as an "ultra-large" business jet with comfortable seating for 19.

## *Design*

The Lineage 1000 is largely based on the successful Embraer passenger jet, the Embraer 190. The greatest change in the Lineage 1000 is the added fuel tanks in the lower deck cargo hold space, nearly doubling the jet's range, which also boasts a lavish interior, divided into up to 5 sections including an optional bedroom, washroom with running water, and a walk-in cargo area at the rear. Another selling point is the larger fuselage cross-section than other comparable business jets, such as the Gulfstream V and the Bombardier Global Express. The Lineage 1000 is only topped in available space by the 737 and A319 conversions, the BBJ and ACJ.

## *Production history*

The Lineage 1000 received its certification from Brazil's ANAC and from EASA in December 2008. It was certified by the USA Federal Aviation Administration on 7 January 2009. The first Lineage 1000 was delivered to HE Amer Abdul Jalil Al Fahim on May 7, 2009.

The aircraft has gained significant popularity in the Middle East as several operators have taken delivery or have ordered the Lineage 1000. Al Jaber Aviation has taken delivery of their first Lineage in January 2010 with four more ordered. Flemming House has taken delivery of their corporate Lineage 1000 aircraft in June 2010. In September 2010, Royal Jet has added a Lineage 1000 to their fleet to be managed on behalf of Al Habtoor Group. Falcon Aviation Services has ordered one Lineage 1000 to be delivered in 2010.

Outside of the Middle East, Grupo Omnilife de Mexico has taken delivery of their Lineage 1000 aircraft in August 2010. Hangar8, one of Europe's leading operators of privately owned passenger jets, took delivery of the first Embraer Lineage 1000 aircraft available for charter outside of the Middle East.

The aircraft is priced at \$49.25 million based on 2009 figures.

## **Specifications**

### **General characteristics**

- **Crew:** Three (pilot, co-pilot, optional flight attendant)
- **Capacity:** 19 passengers
- **Length:** 36.24 m (118 ft 11 in)
- **Wingspan:** 28.72 m (94 ft 3 in)
- **Height:** 10.28 m (34 ft 7 in)
- **Max takeoff weight:** 55,000 kg (121,252 lb)
- **Powerplant:** 2× GE CF34-10E turbofans, 82.3 kN (18,500 lbf) each

### **Performance**

- **Maximum speed:** Mach 0.82 (481 knots, 890 km/h)
- **Range:** 8,344 km (4,500 nm, 5,179 mi)
- **Service ceiling:** 12,496 m (41,000 ft)
- **Thrust/weight:** 0.41:1
- **Balanced field length (SL, ISA, MGTOW):** 6,660 ft (2,030 m)

# **Embraer Phenom 300**

## **Phenom 300**



Embraer Phenom 300 Mockup in 2006

<b>Role</b>	Light business jet
<b>National origin</b>	Brazil
<b>Manufacturer</b>	Embraer
<b>First flight</b>	2008
<b>Introduction</b>	2009

<b>Status</b>	Certified
<b>Unit cost</b>	US\$8.14million (2010)
<b>Variants</b>	Embraer Phenom 100



The Phenom 300 interior mockup at the Oakland NBAA, 8 November 2007

The **Embraer Phenom 300** is a light jet aircraft developed by the Brazilian aircraft manufacturer Embraer. It can carry 8 or 9 occupants with a flying range of 1,971 nautical miles. Its price is estimated at US\$ 8.14 million in 2010 economic conditions, with a production date of 2009. The plane has a flexible configuration for up to nine occupants, with a private rear lavatory, refreshment center and baggage area. At 45,000 feet, the Phenom 300 is pressurized to a cabin altitude of 6,000 feet. The jet features single-point refueling and an externally serviced lavatory. It received FAA Type Certification on 14 December 2009 as the Embraer EMB-505.

On 29 December 2009 Embraer delivered the first Phenom 300 to Executive Flight Services at the company's headquarters at São José dos Campos, Brazil. Prior to delivery the company trained four customer pilots in the aircraft type at its CAE Training Services Facility at Dallas, TX.

## **Operators**

 United Kingdom

- Flairjet (European launch customer)

 United States

- - The first operator in the United States to certify the Phenom 300 under FAR Part 135

## **Specifications**

### **General characteristics**

- **Crew:** 1 pilot
- **Capacity:** 6 passengers standard (8 maximum)
- **Length:** 15.9 m (52 ft 1 in)
- **Wingspan:** 16.2 m (53 ft 2 in)
- **Height:** 5 m (16 ft 4 in)
- **Max takeoff weight:** 7951 kg (17526 lb)
- **Powerplant:** 2× Pratt & Whitney Canada PW535E turbofans, 14.2 kN (3,200 lbf) each

### **Performance**

- **Maximum speed:** 834 km/h (453 ktas)
- **Range:** 3,650 km (IFR reserves, 6 occupants) (1,971 NM)
- **Service ceiling:** 13,716 m (45,000 ft)

### **Avionics**

Embraer "Prodigy" Flight Deck 300 (based on Garmin G1000)

## Chapter- 2

# British Business Aircrafts

## British Aerospace BAe 125

### BAe 125/Dominie Hawker 1000



A Dominie navigation trainer of the Royal Air Force

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<b>Role</b>	Mid-size business jet
<b>Manufacturer</b>	de Havilland (design) Hawker Siddeley (to 1977) British Aerospace (1977-1993) Raytheon (1993- 2007)
<b>First flight</b>	Hawker Beechcraft (Since 2007) 13 August 1962
<b>Primary users</b>	Royal Air Force South African Air Force United States Air Force
<b>Number built</b>	1,000+
<b>Variants</b>	Hawker 800

The **British Aerospace BAe 125** is a twin-engined mid-size corporate jet, with newer variants now marketed as the Hawker 800. It was known as the **Hawker Siddeley HS.125** until 1977. It is also used by the British Royal Air Force as a navigation trainer (as the **Hawker Siddeley Dominie T1**), and was used by the United States Air Force as a calibration aircraft (as the **C-29**).

## ***Development***

In 1961, de Havilland began working on a revolutionary small business jet, the **DH.125 Jet Dragon**, intended to replace the piston engined de Havilland Dove business aircraft and light transport. The DH.125 design was for a low-winged monoplane with a pressurised fuselage accommodating two pilots and six passengers. It was powered by two Bristol Siddeley Viper turbojets mounted on the rear fuselage. The slightly swept wing employed large slotted flaps and airbrakes to allow operation from small airfields. The first of two prototypes flew on 13 August 1962, with the second following on 12 December that year. The first production aircraft, longer and with a greater wingspan than the two prototypes, flew on 12 February 1963, with the first delivery to a customer on 10 September 1964.

The aircraft went through many designation changes during its service life. Hawker Siddeley had bought de Havilland the year before project start, but the old legacy brand and the "DH" designation was used throughout development. After the jet achieved full production, the name was finally changed to "HS.125". When Hawker Siddeley Aircraft merged with the British Aircraft Corporation to form British Aerospace in 1977, the name changed to **BAe 125**. Then, when British Aerospace sold its Business Jets Division to Raytheon in 1993, the jet acquired the name **Raytheon Hawker**. The fuselage, wings and tail-fin are to this day fully assembled and partially equipped (primary and secondary flight controls) in Airbus UK's Broughton plant, on the outskirts of Chester, sub-assemblies are produced in Airbus UK's Buckley (Bwcle in Welsh) site. All these assembled components are then shipped to Wichita, Kansas in the United States, to where final assembly was transferred in 1996.

Over 1,000 aircraft have been built.

## Variants



BAe 125 CC3 of No. 32 Squadron, RAF



Raytheon Hawker 800

- **DH.125 Series 1** - first version, powered by 3,000 lbf (13 kN) Viper 20 or 520 engines. Nine built, including two prototypes (43 ft 6 in (13.26 m) long, 44 ft (13.41 m) span) and seven production aircraft (47 ft 5 in (14.56 m) long, 47 ft (14.33 m) long).
- **DH.125 Series 1A/1B** - upgraded Bristol Siddeley Viper 521 or 522 engines with 3,100 lbf (14 kN) of thrust each, and five cabin windows instead of six. Series 1A for US FAA certification (62 built), Series 1B for sale elsewhere (13 built).
- **HS.125 Series 2** - navigation trainer for Royal Air Force, known in service as the **Dominie T.Mk.1** - (Rolls Royce Viper 301)
- **HS.125 Series 3** - upgraded engines
- **HS.125 Series 400** - upgraded engines
  - **HS.125 CC1** - Series 400 liaison aircraft for Royal Air Force
- **HS.125 Series 600** - 3 ft 1 in (0.94 m) fuselage stretch to increase capacity to 14 passengers
  - **HS.125 CC2** - Series 600 liaison aircraft for Royal Air Force
- **HS.125 Series 700** - Honeywell TFE731-3RH turbofan engines with 3,720 lbf (16.5 kN) of thrust each, first flight 19 June 1976
  - **BAe 125 CC3** - Series 700 liaison aircraft for Royal Air Force
- **HS.125 Protector** - Series 700-based maritime patrol aircraft with a search radar and cameras
- **BAe 125 Series 800** - increased wingspan, streamlined nose, tail fin extension, increased fuel capacity, first corporate jet to feature an EFIS cockpit, upgraded engines, first flight 26 May 1983
- **Hawker 800** - BAe 125-800 after 1993
- **Hawker 800XP** - TFE731-5BR1H turbofan engines with 4,660 lbf (20.7 kN) of thrust each
- **Hawker 800SP and 800XP2** - New designation for 800A/B and 800XP aircraft when upgraded with aftermarket winglets
- **Hawker 850XP** - 800XP with factory installed winglets and interior updates
- **Hawker 900XP** - 850XP with Honeywell TFE731-50R turbofan engines for increased hot/high performance and longer range
- **Hawker 750** - 800XP with a light-weight interior and heated baggage compartment in place of the ventral fuel tank
- **C-29A** - Series 800 for US military designed to replace the Lockheed C-140A, used by the Air Force to accomplish the combat flight inspection and navigation mission (C-FIN) at US airbases around the world, participated in Operation Desert Shield and Operation Desert Storm during the First Persian Gulf War.
- **U-125** - Series 800-based flight inspection aircraft for Japan (similar to C-29A)
- **U-125A** - Series 800-based search and rescue aircraft for Japan
- **BAe 125 Series 1000** - intercontinental version of the Series 800, 2 ft 9 in (0.84 m) fuselage stretch to increase capacity to 15, increased fuel capacity, Pratt & Whitney Canada PW-305 turbofans with 5,200 lbf (23 kN) thrust each, first flight 16 June 1990, 52 built
- **Hawker 1000** - BAe 125-1000 after 1993
- **Handley Page HP.130** - A 1965 proposal with boundary layer control wings (not built). It was to be powered by two Bristol Siddeley Viper 520s of 3,000 lbf (13

kN) thrust with a projected Maximum speed of Mach 0.8. This conversion was for laminar-flow research purposes.

## **Operators**

### **Civil operators**

Private operators, air taxi, shared ownership and corporate charter operators worldwide.

#### Australia

- Qantas - Two HS.125 Series 3s were used for crew training. The aircraft were in service from 1965 to 1972.

#### Canada

- Air Georgian - 1 HS.125 in service operated on behalf of Air Canada

#### Nigeria

- Associated Aviation - 2 HS. 125 Series 700 are in use.

#### China

- Deerjet, Hainan Airlines - 4 Hawker 800XP, 2 Hawker 850XP and 1 Hawker 900XP are in service in Deerjet based at Beijing. Deerjet is a branch of Hainan Airlines(HNA)
- Shanghai Airlines - 1 Hawker 800XP is in service in Shanghai Airlines based at Shanghai.

#### Pakistan

- Royal Airlines - 1 Hawker Siddeley HS 125 (Passenger) V.I.P

### **Military operators**

#### Argentina

- Argentine Naval Aviation operated one VIP.

#### Biafra

- Biafran Air Force operated one aircraft.

#### Brazil

- Brazilian Air Force

 Botswana

- Botswana Defence Force Air Wing

 Ireland

- Irish Air Corps

 Japan

- Japan Air Self-Defense Force

 Malawi

- Military of Malawi

 Malaysia

- Royal Malaysian Air Force

 Nicaragua

- National Guard (Nicaragua)

 Nigeria

- Nigerian Air Force

 Saudi Arabia

- Royal Saudi Air Force

 South Africa

- South African Air Force
  - No. 21 Squadron SAAF

 United Kingdom

- Royal Air Force
  - No. 32 Squadron RAF
  - No. 55(R) Squadron RAF (Dominie T1)

 United States

- United States Air Force

## ***Accidents and incidents***

- On 22 November 1966, de Havilland DH.125 N235KC of Florida Commuter Airlines crashed into the sea 7.3 kilometres (3.9 nmi) off Grand Bahama International Airport, Freeport, Bahamas during an illegal flight from Miami, Florida.
- On 26 May 1971, three Mercurius HS-125 aircraft belonging to the South African Air Force flew into Devil's Peak, Cape Town, while practising for a flypast for the 10th anniversary of the republic.
- On 20 November 1975, a British Aerospace BAe 125 overran the runway at Dunsfold Aerodrome after a bird strike on take off. The aircraft hit a car and stopped in a field, killing six people in the car and one crew member out of nine passengers and crew.
- On March 16, 1991 a Hawker Siddeley charter aircraft carrying band members for Reba McEntire crashed into the side of Otay Mountain. The accident occurred shortly after take off from a municipal airport outside of San Diego, California. All eight band members aboard plus two pilots were killed in the crash believed to have been caused by poor visibility.
- On 3 January 2006, Russian aircraft (AVCOM - Moscow) crashed in Kharkiv, Ukraine into the Komsomolsk lake, 3 people died (crew).
- On 31 July 2008, East Coast Jets Flight 81 crashed on approach to an airport in Owatonna, Minnesota killing all 8 passengers and crew.
- On 26 October 2009, S-Air Flight 9607, operated by BAe 125 RA-02807 crashed on approach to Minsk International Airport. All three crew and both passengers were killed.

## ***Specifications (HS 125 Series 600)***

### **General characteristics**

- **Crew:** 2
- **Capacity:** 8 passengers (normal layout), 14 passengers in high density layout
- **Length:** 50 ft 6 in (15.39 m)
- **Wingspan:** 47 ft 0 in (14.33 m)
- **Height:** 17 ft 3 in (5.26 m)
- **Wing area:** 353.0 ft<sup>2</sup> (32.8 m<sup>2</sup>)
- **Empty weight:** 12,530 lb (5,683 kg)
- **Max takeoff weight:** 25,000 lb (11,340 kg)
- **Powerplant:** 2× Rolls-Royce Viper 601-22 turbojets, 3,750 lbf (16.7 kN) each

### **Performance**

- **Maximum speed:** 522 mph (454 knot, 840 km/h) at 28,000 ft (8,500 m) (Max cruise)
- **Cruise speed:** 464 mph (403 knot, 747 km/h) at 39,000 ft (11,900 m) (Econ cruise)

- **Stall speed:** 96 mph (83 knots, 155 km/h) (flaps down)
- **Range:** 1,796 mi (1,560 nmi, 2,891 km) max fuel and payload
- **Service ceiling:** 41,000 ft (12,500 m)
- **Rate of climb:** 4,900 ft/min (24.9 m/s)

## CMC Leopard

### Leopard



CMC Leopard, *G-BRNM*, on display at the Midland Air Museum.

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<b>Role</b>	Business jet
<b>Manufacturer</b>	Chichester-Miles Consultants
<b>Designed by</b>	Ian Chichester-Miles

<b>First flight</b>	12 December 1988
<b>Status</b>	Project cancelled, both aircraft withdrawn from use
<b>Number built</b>	2

The **CMC Leopard** was a British light personal business jet aircraft under development in the United Kingdom in the 1980s. Two prototypes were built and flown but the type was not put into production.

## ***Design and development***

The Leopard was a low-wing cantilever monoplane of composite construction with all-swept flying surfaces and jet fighter-like styling other than the podded engines on either side of the aft fuselage. The entire canopy hinged forward to allow access to the four seats. A mockup was completed in 1982, leading to a prototype (registration *G-BKRL*) built by the Designability company. The prototype first flew late in 1988. Development suffered a major setback when the engine manufacturer (Noel Penny Turbines) ceased business, leading to the grounding of the prototype. A second, refined prototype (registration *G-BRNM*) was then constructed to use Williams International turbofans. This aircraft also incorporated a pressurised cabin, revised undercarriage, and a generally strengthened airframe. This second prototype was unveiled at the 1996 Farnborough International Airshow and first flew on 9 April 1997.

As of 2002, development was confined to these two aircraft, by then retrospectively redesignated **Leopard FOUR** to distinguish them from a proposed six-seat variant, the **Leopard SIX**.

## ***Aircraft on display***

Until 2008 the two prototype Leopards (001 & 002) were on display at The Bournemouth Museum. But with the museum closing in early 2008, 002 moved to the Midland Air Museum at Coventry. 001 was on display at the Bournemouth Aviation Museum.

## ***Specifications (second prototype)***

### **General characteristics**

- **Crew:** One pilot
- **Capacity:** 3 passengers
- **Length:** 24 ft 9 in (7.54 m)
- **Wingspan:** 23 ft 6 in (7.16 m)
- **Height:** 6 ft 9 in (2.06 m)
- **Wing area:** 63 ft<sup>2</sup> (5.85 m<sup>2</sup>)
- **Powerplant:** 2 × Williams FJX-1, 700 lbf (3.1 kN) each

## Performance

- **Maximum speed:** 540 mph (869 km/h)
- **Range:** 1,726 miles (2,778 km)
- **Service ceiling:** 55,000 ft (16,765 m)
- **Rate of climb:** 6,340 ft/min (32.7 m/s)

## Chapter- 3

# Canadian Business Aircrafts

## Bombardier Global Express

### Global Express / Global 5000



A Global Express of Tyrolean Jet Service landing at Frankfurt Airport

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<b>Role</b>	Business jet
<b>National origin</b>	Canada
<b>Manufacturer</b>	Bombardier Aerospace
<b>First flight</b>	October 13, 1996
<b>Introduced</b>	1993
<b>Status</b>	In Service
<b>Number built</b>	400 (as of November 11, 2010)
<b>Unit cost</b>	Global Express XRS:US \$45 million (2008\$) Global 5000:US \$40 million (2008\$)
<b>Variants</b>	Raytheon Sentinel

The **Bombardier Global Express** is an ultra long range corporate and VIP high speed jet aircraft produced by Bombardier Aerospace. The **Bombardier Global 5000** is a slightly shorter version. The Global Express has also been modified for military missions, such as the Raytheon Sentinel.

### ***Design and development***

Bombardier Aerospace began studies in 1991 and the aircraft was officially launched in 1993. The first flight occurred on October 13, 1996. The Global Express shares the Canadair Regional Jet's fuselage cross section and is similar in length, but despite the size similarities the two aircraft are very different due to the nature of their roles. The Global Express features an advanced all new supercritical wing with a 35° sweep and winglets, plus a new T-tail. The aircraft is powered by two BMW RollsRoyce BR-710 turbofans with FADEC. The advanced flightdeck features a six screen Honeywell Primus 2000 XP EFIS suite and is offered with optional heads-up displays.



Bombardier Global Express takes off

The Global Express was announced on October 28, 1991 at the NBAA convention. Full-scale cabin mockup was exhibited at the NBAA convention in September 1992. Conceptual design started early 1993 and the programme was officially launched on December 20, 1993. The aircraft high-speed configuration was frozen in June 1994 and the low-speed configuration was established in August 1994.

The Global Express can fly intercontinental ranges without refueling (e.g. New York–Tokyo) or between most two points in the world with only one stop. In this class the Global Express competes with the Airbus Corporate Jet, Boeing Business Jet, Dassault Falcon 7X and Gulfstream G550.

Bombardier subsidiaries have three specific roles in the project: Canadair is the design leader and manufactures the nose; Short Brothers, Belfast is responsible for the design and manufacture of the engine nacelles, horizontal stabiliser and forward fuselage; and de Havilland Canada builds the rear fuselage and vertical tail and carries out final assembly. The major external supplier is Japan's Mitsubishi Heavy Industries which builds the wing and centre fuselage sections.

### **Global Express XRS**

The **Global Express XRS** is an improved version of the original aircraft, (announced on October 6, 2003 during the NBAA Convention at Orlando (Florida)) offering higher cruise speed, increased range, improved cabin layout and lighting. It is reported that the letters have no significance, but were chosen by focus groups simply to improve the brand image. The range increase is achieved by addition of a 1,486 lb (674 kg) fuel tank at the wing root. The Global Express XRS entered service in early 2006. The unit price is estimated to be \$45.5 million (US). Bombardier claims it takes 15 minutes less to fuel the XRS than the original model thanks to improved computer systems and mechanical refinements.

### **Global 5000**



A Global 5000 takes off



Global 5000

The **Global 5000** (model designation BD-700-1A11) is a derivative based on Global Express, with 0.813 m (32 in) reduction in forward fuselage length, and 1,200 nm reduction in maximum range. Seating capacity is up to 19 passengers. The aircraft was announced at a special event on October 25, 2001 in Montreal. The official launch came (with a slight delay) on 5 February 2002, after a positive market assessment with letters of intent for 15 aircraft.

The aircraft is manufactured by Bombardier Aerospace in Toronto, Canada, and flown "green" to Montreal, St. Louis or Savannah for final completion.

The Global 5000 is built on the same production line as the Global Express XRS, and the two types' serial numbers are intermingled.

The first Global 5000 aircraft (s/n 9127) took off from Bombardier's Downsview, Ontario facility under clear skies, at 12:24 p.m. EST and returned at 4:08 p.m. EST on March 7, 2003. During the course of its three-hour, 44-minute flight northwest of Toronto, it reached a maximum altitude of 45,000 feet (13,716 m), and a maximum indicated airspeed of 340 knots (391 mph; 630 km/h). The flight was dedicated to testing basic system functionality and assessing the aircraft's handling and flying qualities. Captain Craig Tylski, principal engineering test pilot, Bombardier Flight Test Center, flew the aircraft with co-pilot Gary Bruce, senior engineering test pilot. Also on board was flight test engineer Scott Runyan. Loaded with 23,000 pounds (10,433 kg) of fuel, the aircraft's takeoff weight was 77,600 pounds (35,199 kg). The aircraft completed its preliminary

testing at Bombardier's Downsview facility, before it moved to Bombardier's Wichita facility to begin the flight test program. The Global 5000 made its first appearance at the Paris Air Show in June 2003.

The Global 5000 can fly close to 5,000 nautical miles (9,300 km) nonstop at Mach 0.80. The average trip lengths for most operators is 2.5 hours where the aircraft will cruise between Mach 0.85 and Mach 0.89, making it one of the fastest long range jets available today.

Typical configuration features 18 passenger seats including fully berthable seats and an aft lounge/bedroom. The aircraft has a full galley and two lavatories. The crew rest area was removed, but is being considered on newer versions.

Originally, the maximum takeoff weight was 89,700 lb (40,700 kg). With typical equipment and passenger accoutrements, the empty weight was 52,000–55,000 pounds (22,600–25,000 kg). In April 2008, Bombardier announced that the certified gross weight had been increased to 92,500 lb (41954 kg), which permitted an increased fuel load—projected maximum range increased to 5,200 nm (9637 km).

The maximum certified altitude is 51,000 ft (16,000 m) The typical approach speed is 108 knots (200 km/h) requiring approximately 2,600 feet (790 m) of runway for landing. Template:Prose-section Global 5000 changes compared to the Global Express are:

- Fuselage shortened by 0.813 m (32 in).
- Removal of the fuel tank in the tail and limiting fuel in the wings.
- Reduction in MTOW by 5,500 pounds (2,500 kg).
- Reduction in maximum range by 1,200 nm.
- Rearrangement of some avionics to gain usable cabin length.
- generous allowance for interior completions (3200 kg).

## ***Variants***

- **Global Express** - (model designation BD-700-1A10) is the basic model.
- **Global Express XRS** -
- **Global Express 5000** -
- **Raytheon Sentinel** -

## ***Operators***

### **Military operators**

 Botswana

- Botswana Air Force - operates a single BD-700-1A10 for VIP transport.

 Germany

- Luftwaffe - 4 ordered

#### Malaysia

- Royal Malaysian Air Force - 1

#### United Kingdom

- Royal Air Force - 5

#### Mexico

- Mexican Air Force - 1 ordered

### **Civilian operators**

- Orion Air Group, LLC.
- Ion Țiriac Air
- Albninati Aeronautics
- TAG Aviation
- Tyrolean Jet Services
- Global jet luxembourg
- ACM Air Charter
- VistaJet Holding SA

### ***Specifications***

#### **Global Express XRS**

##### **General characteristics**

- **Crew:** Two (minimum) - four (typical)
- **Capacity:** 8-19 passengers
- **Length:** 99 ft 5 in (30.3 m)
- **Wingspan:** 94 ft 0 in (28.65 m)
- **Height:** 24 ft 10 in (7.57 m)
- **Wing area:** 1,022 ft<sup>2</sup> (94.9 m<sup>2</sup>)
- **Empty weight:** 49,750 lb (22,600 kg)
- **Useful load:** 1,775 lb (w/full fuel) (805 kg)
- **Max takeoff weight:** 99,500 lb (44,500 kg)
- **Powerplant:** 2× Rolls-Royce Deutschland BR710A2-20 turbofans, 14,750 lbf (65.5 kN) each
- **Cabin length:** 48 ft 4 in (14.73 m)
- **Cabin max width (centerline):** 8 ft 2 in (2.49 m)
- **Cabin max width (floorline):** 6 ft 11 in (2.11 m)
- **Cabin height:** 6 ft 3 in (1.91 m)

- **Cabin floor area:** 335 ft<sup>2</sup> (31.1 m<sup>2</sup>)

## Performance

- **Maximum speed:** Mach .89 (513 kt, 590 mph, 950 km/h)
- **Cruise speed:** Mach .85 (488 kt, 564 mph, 907 km/h)
- **Range:** 6,325 nm (7,080 mi, 11,390 km)
- **Service ceiling:** 51,000 ft (15,500 m)
- **Wing loading:** 95.9 lb/ft<sup>2</sup> (468 kg/m<sup>2</sup>)
- **Thrust/weight:** 0.301
- **Balanced field length (SL, ISA, MGTOW):** 6,120 ft (1,870 m)
- **Landing distance (SL, ISA, MLW):** 2,670 ft (814 m)

## Global 5000

### General characteristics

- **Crew:** Two - Three
- **Capacity:** 8 in a typical configuration, up to 19 in high density arrangement
- **Length:** 96.8 ft (29.5 m)
- **Wingspan:** 94 ft 0 in (28.65 m)
- **Height:** 25.5 ft (7.7 m)
- **Wing area:** 1,882 ft<sup>2</sup> (53.29 m<sup>2</sup>)
- **Useful load:** 1,775 lb (w/full fuel) (805 kg)
- **Max takeoff weight:** 92,750 lb (42,071 kg)
- **Powerplant:** 2× Rolls-Royce Deutschland BR710A2-20 turbofans, 14,750 lbf (65.6 kN) each
- **Cabin length:** 42.47 f (12.94 m)
- **Cabin width (centerline):** 8.17 ft (2.49 m)
- **Cabin width (floorline):** 6.92 ft (2.11 m)
- **Cabin height:** 6.25 ft (1.91 m)
- **Cabin floor area:** 317 ft<sup>2</sup> (29.4 m<sup>2</sup>)
- **Cabin Total Volume 1,884 ft<sup>3</sup> (53.9 m<sup>3</sup>)**

### Performance

- **Maximum speed:** Mach .89 (513 kt, 590 mph, 950 km/h)
- **Cruise speed:** Mach .85 (488 kt, 562 mph, 904 km/h)
- **Range:** 5,200 nm (9,360 km)
- **Service ceiling:** 51,000 ft (15,000 m)
- **Basic Operating Weight:** 50,840 lb (23,061 kg)
- **Maximum Ramp Weight:** 92,750 lb (42,071 kg)
- **Maximum Takeoff Weight:** 92,500 lb (41,957 kg)
- **Maximum Zero Fuel Weight:** 56,000 lb (25,401 kg)
- **Maximum Fuel Weight** 39,250 lb (17,804 kg)
- **Balanced field length (SL, ISA, MTOW):** 5,540 ft (1,689 m)

- **Landing distance (SL, ISA, MLW):** 2,670 ft (814 m)

### **Avionics**

- Rockwell Collins Pro Line Fusion avionics suite

# **Bombardier Challenger 600**

## **Challenger 600/601/604/605**



Bombardier CL-604, built 2001

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<b>Role</b>	Business jet
<b>Manufacturer</b>	Bombardier Aerospace
<b>First flight</b>	8 November 1978
<b>Status</b>	In production

The **Bombardier Challenger 600 series** is a family of business jets designed by Bill Lear and produced first by Canadair until that company was bought by Bombardier Aerospace in 1986.

### ***Development***

The aircraft was an independent design by Bill Lear in 1976, who had resigned as Chairman of Lear Jet seven years previously. Originally dubbed the **LearStar 600**, Lear sold exclusive rights to produce and develop the design to Canadair, who renamed it the **CL-600 Challenger**.

While similar in general configuration to Lear's previous designs, notable changes were made that distinguished the new aircraft from the Learjets, including the use of a widened fuselage that allowed a 'walk-about cabin', a feature not shared by any other business aircraft of the time. The Challenger was also one of the first bizjets designed with a supercritical wing.

On 8 November 1978, the prototype aircraft took off at Montreal, Canada. The second and third prototypes flew in 1979. An 3 April 1980 test flight in the Mojave Desert resulted in disaster, the aircraft crashing due to a deep stall, killing one of the test pilots (the other test pilot and the flight test engineer parachuted to safety).

Despite the crash, both Transport Canada and the Federal Aviation Administration in the United States certified the aircraft in 1980, albeit with restrictions to pilots including a limited maximum take-off weight. A program to reduce the aircraft's weight was then implemented to improve the aircraft's range.

Challengers can be identified visually by their distinctive fowler flap design, where the fairings can be seen below the wings, a sight much more common on commercial airliners.

### ***Variants***



Bombardier Challenger 601 shortly after take off. The main undercarriage wheels are left exposed during flight



Bombardier Challenger 605 at the Paris Air Show 2007

### **CL-600**

- **CL-600** - original production version, powered by Avco Lycoming ALF 502L turboprops of 7,500 lbf (33.6 kN) thrust each. Built until 1983 (83 built)
  - **CL-600S** - 76 CL-600s retrofitted with the winglets introduced on the CL-601-1A. 12 aircraft purchased by Canadian Forces Air Command, named **CC-144**, **CE-144**, and **CX-144**.

### **CL-601**

- **CL-601-1A** - refined version including winglets to reduce drag and more powerful General Electric CF-34 engines. (66 built, including 4 Canadian Forces CL-144/ CC-144B)
  - **CL-601-1A/ER** - 601-1A retrofitted with an additional fuel tank in the tail
- **CL-601-3A** - engine with a higher flat rating and a glass cockpit. This was the first version marketed by Bombardier.
  - **CL-601-3A/ER** - 601-3A with an additional, optional fuel tank in the tail
- **CL-601-3R** - the tail tank was made standard, and airline style 'unsided' engines (no left or right) were used, matching what was used on the CRJ.

## CL-604



CL-604 of the Royal Danish Air Force at RIAT 2010

- **CL-604** - major upgrade of the 601 design, incorporating more powerful engines, larger fuel supply, including saddle tanks in the rear of the aircraft, new undercarriage for a higher takeoff and landing weight, structural improvements to wings and tail, and a new Collins ProLine 4 avionics system. The **C-143A** is a single Challenger 604 aircraft, which was acquired by the United States Coast Guard in December 2005 as its new Medium Range Command and Control Aircraft (MRC2A).
  - **CL-604 Multi-Mission Aircraft** - militarized version in Danish service. The aircraft are employed on maritime patrol and Search and Rescue missions. They are capable of landing on the short, rough, gravel airstrips common in the Arctic.

## CL-605

- **CL-605** - introduced in early 2006 as an avionics and structural upgrade of the 604 design. Structural improvements include larger cabin windows. Cockpit instrumentation updated with the Collins Proline 21 avionics and "electronic flight bag" capability. It can be visually identified by a new, rounded tailcone.

## CL-610

- **CL-610 Challenger E** was to have been a stretched version with seating for 24 passengers. Development was halted by Canadair in 1981 without any having been built. A few years later, a new project would develop the Canadair Regional Jet based on a stretched Challenger design.

## Operators

Military operators



The Challenger 601 is used to transport the Canadian Royal Family, Governor General, and Prime Minister using the designation CC-144 Challenger.



U.S. Coast Guard VC-143 Challenger provides VIP transport for high-ranking members of the Department of Homeland Security and U.S. Coast Guard using the designation *Coast Guard 02*.

 Argentina

- Argentine Air Force

 Australia

- Royal Australian Air Force
  - No. 34 Squadron RAAF

 Canada

- Canadian Forces - designated as the Bombardier CC-144 Challenger
  - No. 412 Squadron
  - No. 434 Squadron (former)

 China

- People's Liberation Army Air Force

 Croatia

- Croatian Government (EMS and VIP Transport)

 Czech Republic

- Czech Air Force

 Denmark

- Royal Danish Air Force

 Germany

- Luftwaffe

 United States

- United States Air Force
- United States Coast Guard - designated as the Bombardier VC-143 Medium Range Command and Control Aircraft.

## Civilian operators

- VistaJet Holding SA
- Nomad Aviation SA

## Specifications (CL-601-3A)

### General characteristics

- **Crew:** Two (pilot & co-pilot)
- **Capacity:** Up to 19 passengers, depending on configuration
- **Length:** 20.85 m (68 ft 5 in)
- **Wingspan:** 19.61 m (64 ft 4 in)
- **Height:** 6.30 m (20 ft 8 in)
- **Wing area:** 48.3 m<sup>2</sup> (520 ft<sup>2</sup>)
- **Empty weight:** 9,292 kg (20,485 lb)
- **Loaded weight:** 19,618 kg (43,250 lb)
- **Useful load:** 1,814 kg (4,000 lb)
- **Max takeoff weight:** 19,550 kg (43,100 lb)
- **Powerplant:** 2× General Electric CF34-3A turbofans, 40.7 kN (9,140 lbf) each

### Performance

- **Maximum speed:** 882 km/h (476 knots, 548 mph)

- **Cruise speed:** 851 km/h, (459 knots, 529 mph)
- **Range:** 6,236 km (3,366 nm, 3,875 mi)
- **Service ceiling:** 12,500 m (41,000 ft)
- **Rate of climb:** 1,355 m/min (4,450 ft/min)

# Bombardier Challenger 300

## Challenger 300



A Bombardier Challenger 300 lifts off from London Luton Airport

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<b>Role</b>	Business jet
<b>Manufacturer</b>	Bombardier Aerospace
<b>First flight</b>	14 August 2001
<b>Status</b>	In production
<b>Unit cost</b>	US\$20 million



Bombardier Challenger 300



TAG Aviation Challenger 300

The **Bombardier Challenger 300** is a super-mid-sized jet capable of traversing transcontinental distances. It is not developmentally related to the similarly named Challenger 600-series or the 600-series derived 800-series.

### ***Design and development***

The project was launched at the Paris Air Show on July 13, 1999, at which time it was called the **Bombardier Continental**. The jet was renamed in September 2002, and entered commercial service in January 2004.

### ***Specifications (Challenger 300)***

#### **General characteristics**

- **Crew:** Two (pilot & co-pilot)
- **Capacity:** Up to 16 passengers (normally 8)
- **Length:** 20.93 m (68 ft 8 in)
- **Wingspan:** 19.46 m (63 ft 10 in)
- **Height:** 6.20 m (20 ft 4 in)
- **Wing area:** 48.5 m<sup>2</sup> (522 ft<sup>2</sup>)
- **Empty weight:** 10,591 kg (23,349 lb)
- **Useful load:** 7031 kg (15,501 lb)
- **Max takeoff weight:** 17,622 kg (38,850 lb)
- **Powerplant:** 2× Honeywell HTF7000 turbofan engines, 30.4 kN (6,825 lbf) each

#### **Performance**

- **Maximum speed:** 0.84 Mach (481 knots, 553 mph, 891 km/h)
- **Range:** 5,741 km (3,100 NM, 3,568 mi) at 0.78 Mach
- **Service ceiling:** 13,716 m (45,000 ft)
- **Rate of climb:** 25.4 m/s (5,000 ft/min) at 17,622 kg (38,850 lb) max gross weight
- **Wing loading:** 359.5 kg/m<sup>2</sup> (73.52 lb/ft<sup>2</sup>)

# Bombardier Challenger 850

## Challenger 800 / 850



Challenger 850 C-GWWW at Manchester May 2008

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<b>Role</b>	Business jet
<b>Manufacturer</b>	Bombardier Aerospace
<b>Status</b>	In production
<b>Developed from</b>	Bombardier CRJ200

The **Bombardier Challenger 800** is the largest super-mid size business aircraft offered by Bombardier Aerospace. It is based on Bombardier's 50-seat CRJ200LR. The **Challenger 850** is the updated, current version.

### ***Design and development***

The **Challenger 850** is derived from the Bombardier CRJ200 airliner. It is capable of accommodating 15-19 passengers. The Challenger 850 jet has a transcontinental range and a high-speed cruise of Mach 0.80.

The average price for the Challenger 850 is \$31.862 million.

### ***Specifications***

#### **General characteristics**

- **Crew:** 2 + 1
- **Capacity:** 15 to 19 passengers
- **Length:** 87.83 ft (26.77 m)
- **Wingspan:** 69.58 ft (21.21 m)
- **Height:** 20.42 ft (6.22 m)
- **Wing area:** 520.4 ft<sup>2</sup> (48.35 m<sup>2</sup>)
- **Empty weight:** 34,790 lb (15,780 kg)
- **Useful load:** 18,210 lb (8,261 kg)

- **Max takeoff weight:** 53,250 lb (24,041 kg)
- **Powerplant:** 2× General Electric CF34-3B1 turbofan engines, 8,729 lbf (38.84 kN) each

## **Performance**

- **Cruise speed:** 442 kts (819 km/h)
- **Range:** 2,811 nm (5,206 km)
- **Service ceiling:** 41,000 ft (12,497 m)
- **Balanced field length (SL, ISA, MTOW):** 6,305 ft (1,922 m)
- **Landing distance (SL, ISA, MLW):** 2,910 ft (887 m)
- **Noise Level (EPNdB):** Flyover: 78.8, Approach: 92.1, Lateral: 82.4

## Chapter- 4

# French Business Aircrafts

## Aérospatiale Corvette

SN 601 Corvette



Aérospatiale Corvette

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<b>Role</b>	Business jet
<b>Manufacturer</b>	Aérospatiale
<b>First flight</b>	16 July 1970
<b>Produced</b>	1974 - 1977
<b>Number built</b>	40

The **Aérospatiale SN 601 Corvette** is a French business jet of the early 1970s, Aérospatiale's only venture into that market. Sales were disappointing, and only 40 prototype and production Corvettes were built.

## ***Design and development***

Design work began in the second half of the 1960s as a joint venture between Sud Aviation and Nord Aviation. In January 1968 Sud and Nord decided to proceed with the programme after SNECMA announced it was developing a suitable engine, the M49 Larzac. The SN 600 was first shown to the public as a scale model, on display described as the **SN 600 Diplomat** at the 1968 Hannover ILA Air Show. It was a conventional design for its class, a low-wing monoplane with turbofan engines mounted in rear fuselage nacelles. The prototype SN 600 first flew on 16 July 1970 with two Pratt & Whitney Canada JT15Ds installed; the Larzac was never fitted to the aircraft as it was still in development over a year after the SN 600 crashed on 23 March 1971.

The first of two prototype **SN 601s** (by this time called **Corvette 100**), with a fuselage 3 ft 5½ in (1.05 m) longer than the SN 600's 41 ft 11½ in (12.79 m), flew for the first time on 20 December 1972. In late 1976 Aérospatiale decided to cease production after the company had only received orders for 27 aircraft in the two-and-a-half years following the type's certification (it had hoped to sell six per month). Aérospatiale studied a version with a further fuselage stretch to accommodate 18 seats, to be called the **Corvette 200**, but SN 601 production ended before any had been built.

## ***Operational history***



SN601 Corvette of Sterling Airways at Brussels Airport in 1985

A number of Corvettes sold were used by French regional airlines Air Alsace, Air Alpes, Air Champagne and TAT. Sterling Airways of Denmark also operated the type. One

Corvette was used as a VIP transport by the Congolese Air Force. As of January 2009 a small number of Corvettes are still active in Europe and Africa, including one (F-GPLA cn 28) in France fitted out for aerial photography. This Corvette was used in the TGV high speed test as a chase vehicle/aircraft.

Airbus industries used a fleet of five Corvettes for internal transportation from 1981 to 2009.

## ***Variants***

### SN 600

The first Corvette prototype, powered by two 2,200 lbf (9.8 kN) thrust Pratt & Whitney Canada JT15D-1 turbofan engines.

### SN 601

Production version with longer fuselage than SN 600 and 2,500 lb (11.1 kN) thrust JT15D-4 engines. 39 built, including two prototypes.

## ***Operators***

### Algeria

- Air Algerie

### Belgium

- Sotramat

### Benin

- Government of Benin

### Central African Republic

- Government of the Central African Republic

### Congo

- Congolese Air Force

### Denmark

- Sterling Airways

### France

- Aero Vision
- Air Alsace

- Air Alpes
- Air Languedoc
- Centre d'Essais en Vol
- Protection Civile
- Cogesat
- SFACT
- Sterlings Airways
- TAT European Airlines
- Uni-Air

 Gabon

- Air Inter Gabon

 Netherlands

- Jetstar Holland

 Senegal

- Air Africar

 Sweden

- Scan Fly

 United States

- Aero Service Corporation
- Air National

## ***Accidents***

Including the prototype SN 600, a total of seven Corvettes are recorded as having been written-off in crashes. The worst loss of life in a Corvette crash was on 3 September 1979, when an SN 601 of Sterling Airways crashed in the Mediterranean Sea off Nice following a double engine failure. All ten occupants were killed.

On March 19, 1998 a Corvette crashed in Portland, Oregon after the pilots decided to take off with only the portside engine running, while the starboard one was inoperational due to a damaged engine starter. Nobody was injured, while the aircraft suffered damage after only a short flight.

## **Specifications (SN 601)**

### **General characteristics**

- **Crew:** 1 or 2 pilots
- **Capacity:** 6 to 14 passengers, depending on configuration
- **Length:** 13.83 m (45 ft 4½ in)
- **Wingspan:** 12.87 m (42 ft 2½ in)
- **Height:** 4.23 m (13 ft 10½ in)
- **Wing area:** 22.00 m<sup>2</sup> (236.8 sq ft)
- **Aspect ratio:** 7.45
- **Empty weight:** 3,510 kg (7,738 lb)
- **Max takeoff weight:** 6,600 kg (14,550 lb)
- **Powerplant:** 2× Pratt & Whitney Canada JT15D-4 turbofan, 11.12 kN (2,500 lbf) each

### **Performance**

- **Maximum speed:** 760 km/h (410 knots, 472 mph) at 9,000 m (30,000 ft) (max cruise)
- **Cruise speed:** 566 km/h (306 knots, 352 mph) at 11,900 m (39,000 ft) (econ cruise)
- **Stall speed:** 168 km/h (91 knots, 105 mph) flaps and wheels down
- **Range:** 2,555 km (1,380 nmi, 1,588 mi) (econ cruise power, with tip tanks, 45 min reserves)
- **Service ceiling:** 12,500 m (41,000 ft)
- **Rate of climb:** 13.7 m/s (2,700 ft/min)

# Dassault Falcon 900

## Falcon 900



A Dassault Falcon 900B of Gazpromavia at Pulkovo Airport in Saint Petersburg

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<b>Role</b>	Business jet
<b>National origin</b>	France
<b>Manufacturer</b>	Dassault Aviation
<b>First flight</b>	21 September 1984
<b>Primary users</b>	French Air Force Japan Coast Guard Nigerian Air Force Royal Malaysian Air Force
<b>Number built</b>	260
<b>Developed from</b>	Dassault Falcon 50
<b>Variants</b>	Dassault Falcon 2000 Dassault Falcon 7X

The **Dassault Falcon 900** is a French-built corporate jet aircraft made by Dassault Aviation. It, and its larger sibling the Falcon 7X, are the only trijets in production. Both aircraft are notable in featuring an S-duct central engine.

### ***Development***

The Falcon 900 is a development of the Falcon 50, itself a development of the earlier Falcon 20. The Falcon 900 design incorporates composite materials.

Improved models include the **Falcon 900B**, featuring improved engines and increased range, and the **Falcon 900EX** featuring further improvements in engines and range and an all-glass flight deck. The **Falcon 900C** is a lower-cost companion to the Falcon

900EX and replaces the Falcon 900B. Later versions are the **Falcon 900EX** EASy and the **Falcon 900DX**. At EBACE 2008, Dassault announced another development of the 900 series; the Falcon 900LX incorporating High Mach Blended Winglets designed by Aviation Partners Inc. The same winglets are being developed for the entire Falcon 900 series as a retrofit kit with certification planned for 2011.

Pre-owned value: \$18,000,000-\$40,000,000

### ***Operational service***



Dassault Falcon 900EX



Dassault Falcon 900 at Centennial Airport



A Falcon 900 on Sal Island, Cape Verde



Dassault Falcon 900B lands at Birmingham International Airport, England



Italian Air Force Falcon 900EX in 2008

The Falcon 900 is used by the *Escadron de transport, d'entraînement et de calibrage* which is in charge of transportation for officials of the French state.

## **Variants**

### Falcon 900

Original production. Powered by three 20 kN (4,500 lbf) Garrett TFE731-5AR-1C turbofan engines.

### Falcon 900 MSA

Maritime patrol version for Japan Coast Guard. Equipped with search radar and hatch for dropping rescue stores.

### Falcon 900B

Revised production version from 1991. Powered by 21.13 kN (4,750 lbf) TFE731-5BR-1C engines.

### Falcon 900EX

Long range version, with 22.24 kN (5,000 lbf) TFE731-60 engines and more fuel to give range of 8,340 km (5,180 miles). Improved avionics. Entered service 1996.

### Falcon 900C

Replacement for 900B with improved avionics. Introduced 2000.

### Falcon 900DX

Current medium range production type. TFE731-60 engines.

### Falcon 900LX

Variant of EX fitted with Blended Winglets designed by Aviation Partners Inc.. Improved range of 8,890 km (5,525 miles).

## **Operators**

### **Civil operators**

A wide range of private owners, businesses and small airlines operate Falcon 900s.

### **Military operators**

#### Algeria

- Algerian Air Force

#### Australia

- Royal Australian Air Force - five in service from 1989-2003.
  - No. 34 Squadron RAAF

#### Belgium

- Belgian Air Component

#### Bolivia

- Bolivian Air Force

 France

- French Air Force

 Gabon

- Gabon Air Force

 Italy

- Italian Air Force

 Japan

- Japan Coast Guard

 Malaysia

- Royal Malaysian Air Force

 Namibia

- Namibian Air Force

 Nigeria

- Nigerian Air Force

 South Africa

- South African Air Force

 Spain

- Spanish Air Force

 Syria

- Syrian Air Force

 United Arab Emirates

- United Arab Emirates Air Force

 Venezuela

- Venezuelan Air Force

## ***Specifications (Falcon 900B)***

### **General characteristics**

- **Crew:** Two
- **Capacity:** 19 passengers
- **Length:** 20.21 m (66 ft 4 in)
- **Wingspan:** 19.33 m (63 ft 5 in)
- **Height:** 7.55 m (24 ft 9.5 in)
- **Wing area:** 49 m<sup>2</sup> (527 ft<sup>2</sup>)
- **Empty weight:** 10,255 kg (22,608 lb)
- **Max takeoff weight:** 20,640kg (45,503 lb)
- **Powerplant:** 3× Honeywell TFE731-5BR-1C turbofan, 21.13 kN (4,750 lbf) each

### **Performance**

- **Maximum speed:** Mach 0.84-0.87
- **Cruise speed:** 950 km/h (513 knots, 590 mph) at 36,000ft (10,970 m) (Mach 0.85)
- **Stall speed:** 158 km/h (85 knots, 98 mph) (wheels and flaps down)
- **Range:** 7,400 km (3,995 nm, 4,598 mi) (7 passengers)
- **Service ceiling:** 15,500 m (51,000 ft)
- **Wing loading:** 435kg/m<sup>2</sup> (91lb/ft<sup>2</sup>)

# Dassault Falcon 7X

## Falcon 7X



Rossiia Falcon 7X in May 2010.

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<b>Role</b>	Business jet
<b>Manufacturer</b>	Dassault Aviation
<b>First flight</b>	5 May 2005
<b>Status</b>	In production
<b>Unit cost</b>	US\$50m

The **Dassault Falcon 7X** is a large-cabin, long range business jet manufactured by Dassault Aviation, the flagship offering of their business jet line. It was first presented to the public at the 2005 Paris Air Show.

### ***Development***

The aircraft has over 200 orders to date. It has received its Type certification from both FAA and EASA on 27 April 2007. The first 7X, MSN05, entered service on June 15 2007; the hundredth was delivered in November 2010.

In 2001, the Falcon 7X, at approximately \$35 million, was nearly \$10 million cheaper than its nearest competitors in the long range, large cabin market segment, the Gulfstream G550 and Bombardier Global Express. Its 2007 cost is \$41 million. As of 2008, the approximate unit cost of the 7X is \$50 million.

## ***Design***



Dassault Falcon 7X at Paris—Le Bourget

It is the first fully fly-by-wire business jet. It is also equipped with the same avionics suite, the Honeywell Primus EPIC "Enhanced Avionics System" (EASy), that was used on the Falcon 900EX and later on the Falcon 2000EX.

The Falcon 7X is notable for its extensive use of computer-aided design, the manufacturer claiming it to be the "first aircraft to be designed entirely on a virtual platform", using Dassault Systemes' CATIA and PLM products.

It is also unusual in having an S-duct central engine, and is one of only two trijets currently in production, the other being the Dassault Falcon 900 (the Russian Tupolev Tu-154 is on a limited production run since 1998 as the **Tu-154M**). It was also the first production Falcon jet to offer winglets.

### ***Specifications (Falcon 7X)***

#### **General characteristics**

- **Crew:** Three (pilot/co-pilot & 1 cabin crew)
- **Capacity:** Up to 14 passengers (not including crew)
- **Length:** 23.19 m (76 ft 1 in)
- **Wingspan:** 26.21 m (86 ft)

- **Height:** 7.863 m (25 ft 8 in)
- **Wing area:** 70.7 m<sup>2</sup> (761 ft<sup>2</sup>)
- **Empty weight:** 15,456 kg (34,072 lb)
- **Useful load:** 15,843 kg (34,928 lb)
- **Max takeoff weight:** 31,750 kg (70,000 lb)
- **Powerplant:** 3× Pratt & Whitney Canada PW307A turbofans, 28.46 kN (6,400 lbf) each

## Performance

- **Maximum speed:** 953 km/h (515 knots, 593 mph)
- **Cruise speed:** 900 km/h (486 knots, 559 mph)
- **Range:** 11,019 km (5,950 nm) 8 passengers
- **Service ceiling:** 15,545 m (51,000 ft)
- **Wing loading:** 435 kg/m<sup>2</sup> (91 lb/ft<sup>2</sup>)

## Avionics

- Falcon EASy

## Chapter- 5

# German Business Aircrafts

## HFB-320 Hansa Jet

### Hansa Jet



Hamburger Flugzeugbau HFB-320 Hansa Jet of the Luftwaffe at Basle Airport

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<b>Role</b>	Business jet
<b>Manufacturer</b>	Hamburger Flugzeugbau
<b>First flight</b>	21 April 1964
<b>Retired</b>	24 June 1994
<b>Number built</b>	≈45

The **HFB-320 Hansa Jet** is an all-metal, twin-engine, 10-seat business jet built by German aircraft manufacturer Hamburger Flugzeugbau between 1964 and 1973.

The most notable feature of the aircraft is its forward-swept wing, which is mid-mounted in the fuselage. This arrangement allows the wing spar to pass through the fuselage behind the passenger cabin without decreasing cabin volume. As of 2011, it remains the only civilian jet ever to use a forward-swept wing.

## ***Development***

The prototype first flew on April 21, 1964 and was followed by a second prototype on October 19 of the same year. On May 12, 1965, the first prototype was lost in an accident caused by a design issue with the T-tail. Hamburger Flugzeugbau's chief test pilot perished in the crash. As a result of the accident, modifications were made to improve the aircraft's stall performance, including a stick pusher on production models. Assembly of the first ten production aircraft began in May 1965, with the first flying on February 2, 1966 and two others shortly thereafter. Certification was achieved in 1967, and General Air of Hamburg took first customer delivery in March 1968.

The Luftwaffe had ordered 13 HFB-320s in 1963. As part of the evaluation of the type, two production aircraft were delivered to the Est61 wing at Oberpfaffenhoffen in 1966. Production deliveries for use as VIP transports commenced in 1969.

Increased competition from newer executive jet models and a comparatively poor safety record led to dwindling orders, with production ceasing in 1973. The Aviation Safety Network lists a total of nine accidents (six fatal) for the type, an astounding 20 percent hull-loss rate, but only the crash of the prototype was directly attributable to the aircraft's design. Pilot error was blamed in a majority of the accidents.

## ***Military operators***

 West Germany

- Luftwaffe

## ***Specifications (HFB 320)***

### **General characteristics**

- **Crew:** Two
- **Capacity:** 7, 11 or 15 passenger configurations
- **Length:** 16.61 m (54 ft 6 in)
- **Wingspan:** 14.48 m (47 ft 6 in)
- **Height:** 4.92 m (16 ft 2 in)
- **Wing area:** 30.14 m<sup>2</sup> (324.4 ft<sup>2</sup>)
- **Empty weight:** 5,511 kg (12,125 lb)
- **Max takeoff weight:** 9,218 kg (20,280 lb)
- **Powerplant:** 2× General Electric CJ610-5 turbojet engines, 13.15 kN (2,950 lbf) each

### **Performance**

- **Cruise speed:** 825 km/h (445 knots, 513 mph)
- **Range:** 2,413 km (1,303 nm, 1,500 mi)

- **Service ceiling:** 11,433 m (37,500 ft)
- **Rate of climb:** 21.6 m/s (4,250 ft/min)

## Grob GF 200

### GF 200



<b>Role</b>	Business aircraft
<b>National origin</b>	Germany
<b>Manufacturer</b>	Grob Aircraft
<b>First flight</b>	26 November 1991
<b>Number built</b>	1

The **Grob GF 200** was a business aircraft of unorthodox design developed in Germany during the 1990s. It was a low-wing cantilever monoplane with retractable tricycle undercarriage and a highly streamlined fuselage. The engine was mounted within the fuselage, to the rear of the passenger cabin, and drove the pusher propeller via a driveshaft. The GF 200 has a T-tail, but also a large ventral fin beneath the fuselage. Like other Grob designs, construction throughout was of composite materials, in the case of this particular aircraft, including the driveshaft.

Development commenced in 1983 but was postponed due to concerns about achieving certification for the composite design. However, with financial support from the German government, development commenced in earnest by the end of the decade. The project officially launched at the Hannover Show in May 1988, at which a mockup of the design was displayed and a hope expressed to have the aircraft flying within two years. As it

transpired, the prototype was rolled out in March 1991, in the hope of a first flight by May, and which finally took place on 26 November. The aircraft made its first public appearance at the Berlin Air Show in 1992. Initial flight tests revealed problems with engine cooling and excessive noise. The former concern was addressed by a redesign of the engine air intakes.

The prototype was intended as a test aircraft and technology demonstrator, and lacked many of the refinements that would have been incorporated into a production aircraft, including cabin pressurisation, de-icing equipment, and even a complete cabin interior. When Grob was unable to find financial backing to take the design further, the company embarked on the construction of a more "true-to-life" prototype in 1997, the **GF 250**, in the belief that this would prove more attractive to potential business partners.

Further planned developments included the turboshaft-powered **GF 300**, and the **GF 350** with twin turboshaft engines driving a common propeller.

## ***Specifications (GF 200)***

### **General characteristics**

- **Crew:** One pilot
- **Capacity:** 4 passengers
- **Length:** 8.70 m (28 ft 6 in)
- **Wingspan:** 11.00 m (36 ft 1 in)
- **Height:** 3.42 m (11 ft 3 in)
- **Wing area:** 12.5 m<sup>2</sup> (135 ft<sup>2</sup>)
- **Gross weight:** 1,600 kg (3,527 lb)
- **Powerplant:** 1 × Teledyne Continental TSIOL-550, 230 kW (310 hp)

### **Performance**

- **Cruising speed:** 370 km/h (230 mph)
- **Range:** 1,850 km (1,160 miles)
- **Rate of climb:** 6.2 m/s (1,220 ft/min)

## Chapter- 6

# Israeli Business Aircrafts

## IAI Westwind

### Jet Commander/Westwind



IAI 1124 Westwind

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<b>Role</b>	Business jet
<b>Manufacturer</b>	Israel Aircraft Industries
<b>First flight</b>	2 January 1963
<b>Introduced</b>	1965
<b>Status</b>	Active service
<b>Primary user</b>	Pel-Air
<b>Produced</b>	1965-1987
<b>Number built</b>	442
<b>Developed from</b>	Aero Commander 500
<b>Variants</b>	IAI Astra Gulfstream G100

The **Israel Aircraft Industries (IAI) Westwind** is a business jet that became a cornerstone of the Israeli aircraft manufacturing industry and remained in production for twenty years. Usually set up for seven passengers, it can carry as many as ten, or be quickly reconfigured as a fast air freight aircraft.

## ***Development***

The Westwind was originally designed in the United States by Aero Commander as a development of its twin-propeller namesake aircraft, first flying on 2 January 1963 as the **Aero Commander 1121 Jet Commander**. It was of broadly conventional business jet arrangement, with two engines mounted in nacelles carried on the rear fuselage. However the wings were mounted halfway up the fuselage instead of the typical low-wing arrangement of aircraft in this class. After successful testing, the aircraft was put into series production with deliveries to customers beginning in early 1965.

Shortly thereafter, Aero Commander was acquired by North American Rockwell. The Jet Commander created a problem, since Rockwell already had an executive jet of its own design, the Sabreliner, and could not keep both in production because of anti-trust laws. It was therefore decided to sell off the rights to the Jet Commander, which were purchased by IAI in 1968.

Jet Commander production amounted to 150 aircraft in the United States and Israel before IAI undertook a series of modifications to create the **1123 Westwind**. These included stretching the fuselage and increased maximum takeoff, maximum landing, and maximum zero-fuel weights, with the wing modified to incorporate double-slotted flaps and drooped leading edges and tip tanks. The trimmable horizontal stabiliser was also modified to have increased span and more travel. Not long after the aircraft went into production, the original turbojet engines were replaced by more fuel-efficient Garrett TFE731 turboprops. There were also numerous airframe modifications, such as drooped leading edges on the wings, a dorsal fin, revised engine pylons and nacelles, and further increases in maximum takeoff, maximum landing, and maximum zero-fuel weights. With improvements to a number of onboard systems incorporated as well, these changes resulted in the **1124 Westwind** delivered from 1976.

In 1976, in the wake of the terrorist takeover of the Savoy hotel in Tel Aviv, the Israeli Air Force decided to use the Westwind as the basis for a maritime patrol aircraft, which became known as the **IAI Sea Scan**.

In 1980 deliveries of the Model 1124A commenced; modifications included a new wing centre-section and the addition of winglets to the tips. The revamped aircraft was called the **Westwind II**, replacing the original design in production. IAI built its last Westwind in 1987, after a total of 442 Jet Commanders and Westwinds had been built, switching production to the Astra.

## Variants

### Aero Commander

#### 1121 Jet Commander

Original production version, powered by two General Electric CJ610-1 engines developing 2,850 lbf (12,700 N) each; or modified with two CJ610-5 engines developing 2,950 lbf (13,100 N) each. 120 built including two prototypes.

#### 1121A

Slightly modified version with CJ610-1 engines. Eleven built.

#### 1121B Commodore

Version manufactured with CJ610-5 engines. Nineteen built.

#### 1122

Improved version developed but not put into production; two aircraft built and subsequently converted to 1123 Westwinds.

## IAI



### Westwind II

#### 1123 Westwind

Improved version of the 1121. The cabin was stretched by 0.51m (1 ft 8in) and the aircraft was fitted with more powerful CJ610-9 engines developing 3,100 lbf (14,000 N) each and a Microturbo Saphir III auxiliary power unit (APU). 36 built

#### 1124 Westwind

Greatly improved version powered by two Garrett TFE731-3-1G turbofan engines developing 3,700 lbf (16,000 N) each, APU deleted.

#### 1124 Westwind I

Name given to 1124 after introduction of Westwind II.

1124N Sea Scan

Maritime surveillance aircraft.

1124A Westwind II

Refined version of the 1124 built from 1980 onwards.

## **Operators**

 New Zealand

 Canada

 Chile

 Germany

 Guatemala

 Honduras

- Honduran Air Force

 Israel

- Israeli Air Force

 Uganda

## **Specifications (1124A Westwind II)**

### **General characteristics**

- **Crew:** Two (pilot & co-pilot)
- **Capacity:** Up to 10 passengers
- **Length:** 15.93 m (52 ft 3 in)
- **Wingspan:** 13.65 m (44 ft 9½ in)
- **Height:** 4.81 m (15 ft 9½ in)
- **Wing area:** 28.64 m<sup>2</sup> (308.3 ft<sup>2</sup>)
- **Empty weight:** 6,010 kg (13,250 lb)
- **Max takeoff weight:** 10,660 kg (23,500 lb)
- **Powerplant:** 2× Garrett TFE731-3-1G turbofan engines, 16.46 kN (3,700 lbf) each

### **Performance**

- **Maximum speed:** 868 km/h (469 knots, 539 mph) at 8,840 m (29,000 ft)
- **Cruise speed:** 723 km/h (390 knots, 449 mph) econ cruise, at 11,890–12,500 m (39,000–41,000 ft)
- **Stall speed:** 184 km/h (99 knots, 114 mph) CAS, flaps down, engines idling
- **Range:** 4,430 km (2,392 nmi, 2,770 mi) with maximum payload
- **Service ceiling:** 13,720 m (45,000 ft) (max certificated ceiling)
- **Rate of climb:** 25.4 m/s (5,000 ft/min)

## Chapter- 7

# Italian Business Aircrafts

## Piaggio PD.808

### PD.808



Piaggio PD.808

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<b>Role</b>	Business & military jet
<b>Manufacturer</b>	Piaggio Aero
<b>First flight</b>	29 August 1964
<b>Introduced</b>	November 1966
<b>Primary user</b>	Italian Air Force

The **Piaggio PD.808** was designed by the Douglas Aircraft Company of Long Beach, California, as a business jet. No orders were received, and the complete project was bought by Piaggio Aero, which flew the first prototype in August 1965. Piaggio also failed to secure any worthwhile commercial interest, but a few examples were taken by the Italian Air Force.

Only 24 examples of this type, with low-set wings and aft-mounted turbojet engines, were produced, and 22 of these went to the Italian Air Force. The first aircraft were configured for the utility role, but the last six aircraft were completed as electronic

platforms with cabin accommodation for specialist electronic intelligence equipment and its three operators.

### **Variants**

- **PD-808VIP:** VIP transport
- **PD-808 ECM:** Electronic warfare aircraft
- **PD-808TA:** navigation trainer
- **PD-808RM:** radio calibration
- **PD-808GE:** EW aircraft
- **PD-808TF:** Proposed turbofan-powered version. Not built.

### **Military operators**

-  Italy: Italian Air Force

### **Specifications (P.166)**



PD.808 in a special commemorative colour scheme at the aircraft show *Giornata Azzurra* 2006

## General characteristics

- **Crew:** two pilots plus mission crew
- **Length:** 12.8 m (42 ft 2 in)
- **Wingspan:** 13.2 m (43 ft 3 in)
- **Height:** 4.8 m (15 ft 9 in)
- **Empty weight:** 4,830 kg (10,650 lb)
- **Max takeoff weight:** 8,165 kg (18,000 lb)
- **Powerplant:** 2× Rolls Royce Viper Mk526 turbojets

## Performance

- **Maximum speed:** 852 km/h (529 mph)
- **Range:** 2,128 km (1,148 nmi)

# Piaggio P.180 Avanti

## P180 Avanti



Aeronautica Militare Piaggio P180 Avanti

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<b>Role</b>	Executive transport
<b>Manufacturer</b>	Piaggio Aero
<b>First flight</b>	26 September 1986
<b>Primary users</b>	Italian Armed Force Avantair
<b>Number built</b>	203 delivered to September 2010

**Unit cost**                      US\$ 7 million

The **Piaggio P180 Avanti** is an Italian twin-engine turboprop aircraft produced by Piaggio Aero. It seats up to nine passengers in a pressurized cabin, and may be flown by one or two pilots.

The innovative design places the main wing behind and above the canard-like horizontal stabiliser, features a laminar flow fuselage and has engines in pusher configuration.

## ***Development***



Cockpit and instrument panel aboard a P180 Avanti

The P180 design was tested in wind tunnels in Italy and the U.S. in 1980 and 1981. A collaboration with Learjet to develop the aircraft began in 1983 but ended on 13 January 1986, with Piaggio continuing development on its own. The first prototype flew on 23 September 1986. U.S. and Italian certification was obtained on 7 March 1990. Learjet's influence can be seen in the two "delta fins" mounted on the bottom of the tail, as found on most Learjets; these devices provide aerodynamic recovery force in the event of an aerodynamic stall. The first 12 fuselages were manufactured in Wichita, with H & H Parts and Plessey Midwest, then flown to Italy for final assembly. Avanti Aviation Wichita ran out of money in 1994; the project languished until a group of investors led by Piero Ferrari became involved in 1998. The 100th aircraft was delivered in October 2005

and the 150th in May 2008. Piaggio has reported that as of October 2010, the Avanti and Avanti II fleets have now logged over 500,000 flight hours.

An improved **Avanti II** obtained European and U.S. certification in November 2005. Six months later, 70 planes were already ordered, including 36 by Avantair. The Avanti II features uprated Pratt & Whitney Canada PT6 turboprop engines and flies about 18 km/h (11 mph) faster, with better fuel economy; an all-new "glass panel" avionics suite reduces cockpit clutter. In addition to heading, attitude and navigation information, flat panel color LCD displays add collision avoidance (TCAS), ground proximity (TAWS) and real-time graphic weather depiction.

## ***Design***

The Avanti's turboprop engines are placed on a mid-fuselage, high aspect ratio wing, located behind the cabin. The design utilizes both a T-tail and a pair of small, fixed anhedral forward wings that lack control surfaces. The arrangement of the wing surfaces allows all three to provide lift, as opposed to a conventional configuration, where the horizontal stabilizer creates a downward force to counteract the nose-down moment generated by the center of gravity being forward of the center of lift. This is patented as "Three-Lifting-Surface Configuration" (3LSC). The Avanti II's forward wing has flaps that move in concert with main wing flaps. The forward wing pitch angle is set so it stalls before the main wing, producing an automatic nose-down effect; its five degree negative dihedral keeps the stream wash interference clear of the engine inlets, the main wing and the horizontal stabilizer

Distinctive design features include a non-constant cross section cabin, the revolutionary shape of which approximates a NACA airfoil section. Piaggio claims the fuselage contributes up to 20% of the Avanti's total lift, with horizontal stabilizer, front and rear wing providing the remaining 80%. Because of the unusual fuselage shape, the mid cabin is considerably wider than the cockpit, and the entire cabin is ahead of the main wing spar. The front and rear airfoils are custom sections designed by Dr. Jerry Gregorek of The Ohio State University's AARL to achieve a drag-reducing 50% laminar flow at cruise.

The company claims the overall design of the P180 Avanti II enables the wing to be 34% smaller than on conventional aircraft and a specific range of 0.84 nmi/lb of fuel. This is significantly better than the 0.31-0.48 nmi/pound of similar small jets.

The P180 makes a distinctive square wave noise when passing overhead, similar to the Beech Starship, due to the wing wake and engine exhaust effects on the pusher propellers.

## Variants



### Aeronautica Militare P180 Avanti

#### P.180 Avanti

First production version.

#### P180 M

**P180 Avanti** military version. Combi configuration for VIP and light utility transport. FLIR, SAR radar and surveillance systems predisposition.

#### P.180 RM

Radio calibration. Chaff and flares predisposition.

#### P.180 AMB

Ambulance Service.

#### P.180 APH

Aerial cartography.

#### P.180 Avanti II

Variant with improved avionics.

## Operators



Avanti belonging to Vigili del Fuoco, Rome-Ciampino



Avanti parked on tarmac



Avanti at Colorado Springs Municipal Airport

## Civil

### Bangladesh

- Youngone - 1

### Canada

- Avmax International Aircraft - 3
- Bell Aliant - 1
- Cascades Inc. - 2
- Skyservice Business Aviation - 2
- Royal Canadian Mounted Police - 1
- Starlink Aviation - 1

### France

- Brittany Ferries - 1
- Pan Européenne Air Service - 1
- Transport'Air - 4

### Indonesia

- Susi Air - 2

### India

- TajAir - 1

### Italy

- Blue Panorama Airlines - 2
- Eurofly Service - 1
- Protezione Civile
- State Forestry Corps - 1
- State Police - 1
- Vigili del Fuoco - 2
- Windjet - 2

### Jordan

- Saraya Skies - 3 (3 others in option)

### Mexico

- Republicair

 Poland

- Lotnicze Pogotowie Ratunkowe (Polish Medical Air Rescue) - 2

 Netherlands

- JetNetherlands - 1
- Solid Air - 1

 United States

- Avantair - 56 aircraft ordered
- Mountain Aviation - 1

## Military

 Italy

- Italian Air Force
- Italian Army
- Italian Navy

 United Arab Emirates

- United Arab Emirates Air Force ordered two aircraft at the 2009 Paris Air Show.

## ***Specifications (P180 Avanti)***

### General characteristics

- **Crew:** one or two pilots
- **Capacity:** up to nine passengers
- **Cabin dimensions:** 1.75 m (5 ft 9 in) high, 1.85 m (6 ft 1 in) wide, 4.45 m (14 ft 7 in) long
- **Payload:** 907 kg (2,000 lb)
- **Length:** 14.41 m (47 ft 3½ in)
- **Wingspan:** 14.03 m (46 ft 0½ in)
- **Height:** 3.97 m (13 ft 0¾ in)
- **Wing area:** 16 m<sup>2</sup> (172.2 ft<sup>2</sup>)
- **Empty weight:** 3,400 kg (7,500 lb)
- **Useful load:** 1,860 kg (4,100 lb)
- **Max takeoff weight:** 5,239 kg (11,550 lb)
- **Powerplant:** 2× Pratt & Whitney Canada PT6A-66 turboprops, 634 kW (850 shp) each

## Performance

- **Maximum speed:** 732 km/h (395 kn, 455 mph)
- **Cruise speed:** 593 km/h (320 kn, 368 mph) (econ cruise)
- **Range:** 2,592 km (1,400 nmi, 1,612 mi) at 11,900 m (39,000 ft) with reserves
- **Service ceiling:** 12,500 m (41,000 ft)
- **Rate of climb:** 14.98 m/s (2,950 ft/min)
- **Wing loading:** 327 kg/m<sup>2</sup> (67.1 lb/ft<sup>2</sup>)
- **Power/mass:** 0.24 kW/kg (6.79 lb/hp)

## Chapter- 8

# Japanese Business Aircrafts

## Honda HA-420 HondaJet

HA-420 HondaJet



<b>Role</b>	Business jet
<b>National origin</b>	Japan
<b>Manufacturer</b>	Honda Aircraft Company
<b>Designed by</b>	Michimasa Fujino
<b>First flight</b>	3 December 2003
<b>Introduced</b>	2011
<b>Status</b>	Under development
<b>Number built</b>	2 prototypes
<b>Unit cost</b>	US\$4.5 million

The **Honda HA-420 HondaJet** is the first aircraft available to the general aviation market to be developed by the Honda Motor Company.

### ***Development***

Honda began research into small sized business jets in the late 1980s, using engines from other manufacturers. The Honda MH02, an organic matrix composite prototype, was

fabricated and assembled at Mississippi State University's Raspet Flight Research Laboratory in the late 1980s and early 1990s.

The HondaJet made its maiden flight in December 2003 and was debuted to the public at the EAA AirVenture air show in Oshkosh, Wisconsin, in July 2005. On July 25, 2006, Honda returned to Oshkosh to announce it would commercialize the HondaJet, establishing the Honda Aircraft Company to seek both type and production certification of the HondaJet with production to take place in the United States. The company began taking customer orders for HondaJet in the fall of 2006 at a price of approximately \$3.65 million US. The plan is to build 70 jets per year.

In August 2006 Honda and Piper Aircraft announced a partnership to market the HondaJet.

In May 2010, it is reported assembly of major components of the first conforming HondaJet, including the composite fuselage, metal wings, empennage, landing gear and over-the-wing-mounted engine pylons has completed, and work to complete integration of major systems, including electrical, hydraulic and environmental control, has started. The first conforming engine will be delivered in the third quarter of 2010 and be installed on the aircraft. Honda Aircraft is reported to begin static testing of a conforming airframe in May 2010.

Because of delays in some components, maiden flight of the first design- and production-conforming plane was scheduled for November 2010, but actually took place on the 20-21st of December 2010 while FAA certification is expected to follow 20 months later. Delivery of the first plane is planned for the third quarter of 2012.

## ***Design***

Honda decided to go with an unusual over-the-wing podded engine configuration, a feature developed on the innovative Vereinigte Flugtechnische Werke VFW-614 decades earlier, which allows for more space within the fuselage and reduction of drag at higher speeds. The fuselage itself is made from lightweight composite materials, while the wings are made from structurally reinforced single sheets of aluminum. The use of a single sheet allows for a smoother surface than more conventional methods. Honda claims that the combination of lightweight materials, aerodynamics and the efficient engines gives the HondaJet a 30-35% higher fuel efficiency than similar aircraft.

Honda began developing its own small turbofan engine, the HF118, in 1999. This led to the evolution of the HF120, which was developed with GE Aviation under the GE Honda partnership, and was test-flown on a Cessna Citation and on a modified Boeing 727-100. The engine features a single fan, a two-stage compressor and a two-stage turbine. Further design testing on wing shape and design were done on a T-33 Shooting Star, modified by AVTEL Services, Inc, and flight tested at the Mojave Airport.

The aircraft is equipped with a touchscreen 3-display Garmin G3000 glass cockpit system (i.e. most of the cockpit readouts are presented on flat-panel displays).

## ***Production***

The aircraft will be made at Piedmont Triad International Airport, Greensboro, North Carolina, USA. The plant for making the aircraft was started in 2007 and will be completed by the end of 2011.

Honda expects to sell 70 planes per year.

## ***Specifications (HA-420 HondaJet)***

### **General characteristics**

- **Crew:** 1-2 crew members
- **Capacity:** 5 passengers (6 Passengers for AirTaxi)
- **Length:** 41.70 ft (12.71 m)
- **Wingspan:** 39.87 ft (12.15 m)
- **Height:** 13.21 ft (4.03 m)
- **Max takeoff weight:** 9,200 lb (4,173 kg)
- **Powerplant:** 2× GE Honda HF120 turbofan engines, 1,880lbf each (Bypass Ratio= 2.9) (8.04kN) each

### **Performance**

- **Maximum speed:** 420 KTAS (778 km/h, 483 mph)
- **Cruise speed:** 420 KTAS (FL300)
- **Range:** 1400 nm (1611 mi, 2,593 km) (VFR Range)
- **Service ceiling:** 43,000 ft (13,107 m)
- **Rate of climb:** 3990 ft/min (20.27 m/s)

### **Avionics**

Garmin G3000 glass cockpit

## Chapter- 9

# Russian Business Aircrafts

## Myasishchev M-101T

### M-101T



An M-101T at 2007 MAKS Airshow

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<b>Role</b>	Passenger and cargo aircraft
<b>National origin</b>	Russia
<b>Manufacturer</b>	Myasishchev
<b>First flight</b>	31 March 1995



An M-101T air taxi operated by Dexter

The **Myasishchev M-101T** is a Russian business class aircraft, designed by Myasishchev and built by Sokol. The aircraft was first flown on 31 March 1995.

### ***Operators***

 Russia

- Dexter (air taxi operator)

### ***Specifications***

#### **General characteristics**

- **Crew:** 1
- **Capacity:** 7 passengers
- **Payload:** 540 kg (1,190 lb)
- **Length:** 9.975 m (32 ft 9 in)
- **Wingspan:** 13.0 m (42 ft 8 in)
- **Height:** 3.72 m (12 ft 2½ in)
- **Wing area:** 17.06 m<sup>2</sup> (183.6 sq ft)

- **Aspect ratio:** 9.906
- **Empty weight:** 2,016 kg (4,445 lb)
- **Max takeoff weight:** 3,000 kg (6,614 lb)
- **Powerplant:** 1× Walter M601F turboprop, 567 kW (760 shp) (take-off power)

## Performance

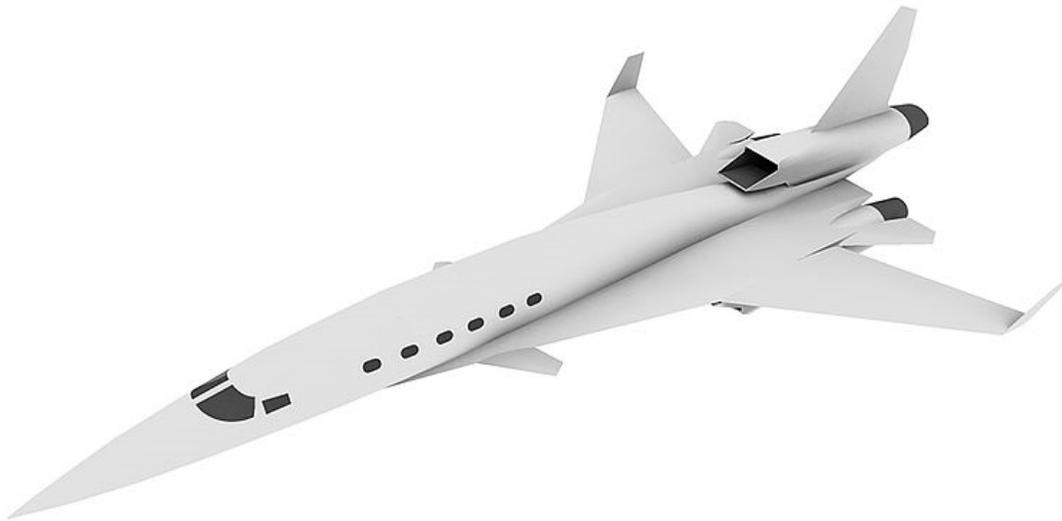
- **Maximum speed:** 525 km/h (283 knots, 326 mph)
- **Cruise speed:** 360-450 km/h (194-243 knots, 224-280 mph)
- **Stall speed:** 112-125 km/h (61-68 knots, 90-93 mph)
- **Range:** 1,410 km (761 nmi, 876 mi)
- **Service ceiling:** 7,600 m (24,900 ft) (Cruise altitude)
- **Climb to 7,600 m (24,900 ft):** 25 minutes

# Sukhoi-Gulfstream S-21

S-21



<b>Role</b>	Supersonic business jet
<b>Manufacturer</b>	Sukhoi-Gulfstream



S-21 3D model

**Sukhoi-Gulfstream S-21** was a projected Russian-American supersonic business jet.

In the early 1990s, Gulfstream Aerospace and the Sukhoi Design Bureau of Moscow began a joint effort to develop a supersonic small business jet, code named the S-21. Due to questionable market demand for commercial supersonic air travel, commitment to the project wavered and delays mounted.

Gulfstream eventually dissolved the partnership, although Sukhoi continued work on the S-21.

The S-21 would be capable of sustained cruise at Mach 2+ and much research and development has gone into the management of the troublesome transonic effects associated with near Mach 1 air speeds.

### ***Specifications (S-21)***

#### **General characteristics**

- **Crew:** 2
- **Capacity:** 6-10
- **Length:** 124.2 ft (37.86 m)
- **Wingspan:** 65.4 ft (19.93 m)
- **Wingsweep:** 32° unswept (68° swept)
- **Height:** 27.1 ft (8.26 m)
- **Empty weight:** 54,167 lb (24,570 kg)

- **Useful load:** 2,000 lb (907 kg)
- **Max takeoff weight:** 114,200 lb (51,800 kg)
- **Fuel:** 58,465 lb (26,519 kg)
- **Powerplant:** 3× Aviadvigatel D-21A1 turbofan, 16,535 lb<sub>f</sub> (73.55 kN) each

## Performance

- **Maximum speed:** 1,483 mph (2,386 km/h)
- **Cruise speed:** 1,483 mph (2,386 km/h)
- **Range:** 4,600 mi (7,403 km)
- **Range (1.4 Mach):** 2,715 mi (4,369 km)
- **Range (0.95 mach):** 4,600 mi (7,403 km)
- **Service ceiling:** 63,900 ft (19,477 m)
- **Thrust/weight:** 0.43

## Chapter- 10

# United States Business Aircrafts

## Cessna Citation Excel

### Citation Excel Citation XLS / Citation XLS+



Cessna 560XL Citation Excel of the Swiss Air Force

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<b>Role</b>	Business jet
<b>Manufacturer</b>	Cessna
<b>First flight</b>	29 February 1996
<b>Status</b>	In production

The Cessna **Citation Excel (Model 560XL)** is a turboprop-powered small-to-medium sized business jet built by the Cessna Aircraft Company in Wichita, Kansas, USA. The Citation brand of business jets encompasses six distinct families of aircraft. The Excel, the **Citation XLS**, and the **Citation XLS+** are one of these families.

## ***Design and development***

With the success of Cessna's high-end Citation X, the manufacturer saw a market for an aircraft with the X's features but aimed at the traditional Citation market, where it chiefly competes with twin turboprop aircraft. Rather than being a direct variant of another Citation airframe, the Excel was a combination of technologies and designs. To produce the Excel, Cessna took the X's wide, stand-up cabin fuselage, shortened it by about 21 feet (6.4 m) and mated it with an unswept wing utilizing a supercritical airfoil (based on the Citation V Ultra's wing) and a Citation V's tail.

To power the aircraft, Cessna chose the a new Pratt & Whitney Canada turbofan, the PW545A. As a result, the Excel has the roomiest cabin in its class of light corporate jets and can seat up to 10 passengers (in high-density configuration; typically the number is six to eight in a corporate configuration), while being flown by a crew of two.



Cessna Model 560XL Citation XLS taxis for takeoff at Manchester Airport, England

The project was announced at the annual NBAA convention in October, 1994, and the prototype aircraft took off on its first flight on February 29, 1996. By the time FAA certification was granted in April 1998, Cessna had over 200 orders for the aircraft. By the time the 100th Excel was delivered in August 2000, the Wichita production line was producing an aircraft every three days. By the time the aircraft was superseded by the Citation XLS, a total of 308 had been built. The Excel has had an exceptional safety record, with only 5 accidents on record, none of which involved fatalities.

The **Citation XLS** was the first "makeover" that the Excel received. Besides a glass cockpit based on the Honeywell Primus 1000 EFIS avionics suite, the XLS featured the upgraded PW545B engines with increased performance.

Cessna upgraded the aircraft again to the **Citation XLS+**, or simply "Plus" configuration, with the inclusion of FADEC engine controls, improved PW545C engines, and a completely revised nose design similar to that found on the Citation Sovereign and Citation X. The Citation XLS+ is the first of the XL line to feature Collins Pro Line 21 Avionics and a four tube EFIS display as opposed to the three tube Honeywell displays in the XL and XLS.

## ***Variants***

Citation Excel  
Citation XLS  
Citation XLS+

## ***Operators***

### **Military operators**

 Switzerland

- Swiss Air Force

## ***Specifications (Citation XLS+)***

### **General characteristics**

- **Crew:** 2
- **Capacity:** 7-10 passengers
- **Length:** 52 ft 6 in (16.0 m)
- **Wingspan:** 56 ft 4 in (17.17 m)
- **Height:** 17 ft 2 in (5.23 m)
- **Empty weight:** 12,800 lb (5,086 kg)
- **Useful load:** 7,400 lb (4,077 kg)
- **Max takeoff weight:** 20,200 lb (9,163 kg)
- **Powerplant:** 2× Pratt & Whitney Canada PW545C turbofans, 4,119 lb (18.32 kN) each

### **Performance**

- **Cruise speed:** 441 ktas (815 km/h)
- **Range:** 1,858 nm (3,441 km)
- **Service ceiling:** 45,000 ft (13,716 m)
- **Rate of climb:** 3,500 ft/min (1,067 m/min)

# Cessna Citation X

## Citation X



Citation X on short final approach.

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<b>Role</b>	Business Jet
<b>Manufacturer</b>	Cessna
<b>Introduced</b>	1990
<b>Status</b>	In production
<b>Produced</b>	1996 – present
<b>Unit cost</b>	\$22 million USD

The **Cessna Citation X** is a long-range medium business jet aircraft. The X is the fastest operative civilian jet, with a top speed of Mach 0.92 (527 ktas(Mach 0.945 with the winglets mentioned below), 607 mph, 977 km/h at 41,000ft ASL (12,700meters ASL). The Citation X is powered by two Rolls-Royce turbofan engines and is built by the Cessna Aircraft Company in Wichita, Kansas. The Citation brand of business jets encompasses six distinct "families" of aircraft. Although based on the earlier Citation III, VI and VII models, the Citation X is a significantly different airplane; it utilizes a totally new wing design, engines, and features a glass cockpit.

### ***Development***

When the Citation X was announced, the Citation 650 series, the "family" at the top of the product line, which includes the Citations III, VI, and VII, was eight years old. In 1990, Cessna made a proposition for an improved 650 model to their Customer Advisory Council. The council was interested in some new elements such as increased speed and a pressurized baggage compartment. This pushed Cessna toward the Citation X program, which became the new 750 series.

Moreover, Cessna wanted to improve the image of the Citation family. The Citation models that emerged in the 1970s were originally intended to be practical and with good handling qualities. Consequently, they turned out to be much slower than the competing

Learjets. Cessna had difficulties in shedding of the popular image of the Citation as a slow airplane, even though their jets had eventually become as fast as the competition.

The development of the Citation X was first announced at the National Business Aviation Association Convention in New Orleans in October 1990, with the first prototype making its maiden flight on December 21, 1993. Originally scheduled for August 1995, the certification of the Cessna Citation X was delayed several times. First, failure of the airframe and engine to meet Federal Aviation Administration requirements caused the planned certification date postponement to late November 1995. The main delay reasons were troubles integrating the avionics and the engine to the aircraft, high-altitude and low-speed engine flame out (high wing attack angles caused insufficient airflow), engines not meeting the bird strike criteria, and directional stability challenges. Efforts to increase the maximum take-off weight of the Citation X by about 800 pounds again delayed the FAA certification schedule, this time to April 1996. These changes were aimed at permitting a full-fuel payload of 1,400 pounds (seven passengers), but Cessna had difficulty achieving a balance between reducing Citation X cabin noise and minimizing the extra weight of sound-dampening materials. The certification, FAA FAR Part 25, Amendment 74, Certification 3, was finally achieved on June 3, 1996.

The first Citation X was delivered in July 1996 to golfer and long-time Cessna customer Arnold Palmer. Once in use, the Citation X continued to set speed records. Arnold Palmer set one of them in September 1997: 473 knots (876 km/h) on a 5,000 km closed course. In February 1997, the Citation X design team was awarded the National Aeronautic Association's Robert J. Collier Trophy. The Citation X was approved by Transport Canada on May 22, 1998, and by the European Joint Aviation Authorities in 1999. In October 2000, Cessna announced an upgrade for all Citation Xs to be delivered after January 1, 2002. The main characteristics of this upgraded version are a 5% increase in thrust, a 400 lb (180 kg) increase in maximum take-off weight and improved Honeywell avionics.

## **Cessna Citation Ten**

In 2010, Cessna initiated a major update of the aircraft, which includes upgraded AE3007C2 engines with new fans, Garmin G5000 flight displays with three 14 inch screens and a heads-up display. The elliptical winglets that were available as an aftermarket option on the Citation X will become standard, and a stretch of 38 cm will improve passenger comfort. Due to a 1.4% improvement in SFC and increased thrust, Cessna is advertizing an increase in payload of 97 kg, an increase in cruise speed at FL490 from 460 to 479 knots, and a range increase of 190 nm (352 km). First flight is expected in December 2011.

## ***Design***

Despite Cessna's long history of building business jets and the number of aircraft in the Citation family, the Citation X was in many ways a completely new aircraft. The wing, tail, tail cone, gear, and systems are designed from scratch and not based on pre-existing

aircraft. The Citation X is also the first aircraft from Cessna to use a Rolls-Royce engine and fully integrated avionics. Although the Citation X may look similar to its predecessors, it is almost entirely composed of new parts. Part commonality is limited to some cockpit controls, the windshield, and the tail light bulb. The pressure bulkhead is also similar to previous designs. The Citation X has the same fuselage diameter as the Citations VI and VII; however, the wing attachment to the fuselage is different from the attachment in any previous Citation.

The aircraft incorporates a number of innovative design features. One attribute that is often first noticed is the large diameter of the engine intakes. This feature, related to the high bypass ratio turbofan, reduces the noise from the engines and improves fuel efficiency. Another obvious characteristic is the highly swept wing with a supercritical airfoil, used in order to increase the critical Mach number and therefore the top speed. The Citation X has 37 degrees of sweepback at the quarter chord, more than any other business jet and, among civil aircraft, second only to the Boeing 747's 37.5 degrees. The horizontal and vertical stabilizers are also highly swept and are arranged in a T-tail configuration.

## **Airframe**

A significant amount of effort throughout the design process was directed towards reducing the Citation X's total drag. The resulting design includes an area-ruled fuselage for efficient transonic flight, and the aforementioned highly swept supercritical wing. The Citation X's wing is slung below the fuselage rather than passing through it. This allows increased volume in the fuselage, a one-piece wing, and simplified wing-fuselage connections.

## **Engines**

The Citation X is powered by two Rolls-Royce AE 3007C1 engines, each with a thrust of 6700 lbf (30 kN), pod-mounted on the sides of the rear fuselage. It is the first Cessna aircraft to be powered by a Rolls-Royce engine. The engine has solid titanium blades and a three-stage low-pressure turbine. The engine's fan has a 5 to 1 bypass ratio for improved fuel efficiency and low acoustic signature.

## **Powered controls**

Another first for Cessna is the inclusion of powered controls in the Citation X. The controls are powered by dual-hydraulic systems for redundancy. There are two elevators and the tailplane is all-moving for trim. The rudder is in two pieces: the lower portion is hydraulically-powered and the upper portion is electrically powered. Each wing has five spoiler panels, to be used both for roll control (in addition to the ailerons) and as speed brakes. One of the major challenges of the Citation X design was finding enough space in the wing to run all the necessary hydraulic lines. As Paul Kalberer, the chief engineer of the Citation X program, explained, the Citation X needs just as many hydraulic pumps and actuators as a Boeing aircraft, but has much less space inside the wings.

## Avionics

Honeywell provides the avionics system for the glass cockpit. The Honeywell Primus 2000 EFIS flight director system is composed of five 7"x8" CRT screens. Dual flight management systems with GPS are standard.

## Speed

The Cessna Citation X is the fastest civilian aircraft currently being flown, attaining Mach .92. The supersonic Concorde and Tupolev Tu-144 are no longer in use. The proposed Gulfstream G650 is planned to top the Citation X's speed record by .005 Mach. Once the G650 reaches production, it will surpass the Citation X as the fastest business jet in the world.

## Elliptical Winglets

In 2008, Winglet Technology, with the help of Cessna, began flight testing epoxy/graphite elliptical winglets on a Citation X. Flight testing was nearing completion in late 2008, with FAA supplemental type certification expected in 2009. The winglets increase range by 150 nm, lower fuel burn by 4-5%, increase hot and high performance as well as climb rate, permitting a climb to FL430 in 22 minutes, as opposed to 26 minutes without the modification. Climb to FL450 at maximum takeoff weight is possible without a step climb. Cruise speed at altitude is expected to increase by 15 knots, and maximum takeoff weight will increase by 1200 lbs (545 kg). Excluding installation, the kit's projected cost is \$395,000.

## Specifications (Citation X)

### General characteristics

- **Crew:** 2
- **Capacity:** 8-12 passengers
- **Length:** 72 ft 4 in (22.05 m)
- **Wingspan:** 63 ft 7 in (19.38 m)
- **Height:** 19 ft 2 in (5.84 m)
- **Wing area:** 527.0 ft<sup>2</sup> (48.96 m<sup>2</sup>)
- **Aspect ratio:** 7.8:1
- **Empty weight:** 21,600 lb (9,798 kg)
- **Max takeoff weight:** 36,100 lb (16,374 kg)
- **Powerplant:** 2× Rolls-Royce/Allison AE 3007C-1 turbofan, 6,764 lb<sub>F</sub> (30.09 kN) each

### Performance

- **Maximum speed:** Mach 0.92 (MMO)
- **Cruise speed:** 525 knots (604 mph, 972 km/h) at 35,000 ft (10,700 m)

- **Range:** 3,216 nmi (3,700 mi, 5,956 km)
- **Service ceiling:** 51,000 ft (15,545 m)
- **Rate of climb:** 3,650 ft/min (18.6 m/s)
- **Takeoff distance:** 5,140 ft (1,567 m)
- **Landing distance:** 3,400 ft (1,036 m)
- **Fuel capacity:** 1,926 US gallons, 7,291 L

## Bombardier Learjet 40

### Learjet 40



Eurojet Italia Learjet 40 (I-ERJE)

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<b>Role</b>	Business jet
<b>Manufacturer</b>	Bombardier Aerospace
<b>First flight</b>	August 31, 2002
<b>Introduced</b>	January 2004
<b>Developed from</b>	Learjet 45

The **Learjet 40** (LJ40) is a light business jet produced by Bombardier Aerospace.

### ***Design and development***

The Learjet 40 is derived from the Learjet 45, but with a shorter fuselage (by 24.5 inches/60 cm), and is powered by two Honeywell TFE731-20AR engines. These are known as the "AR" engines.

The prototype aircraft, a rebuilt Model 45, first flew on August 31, 2002, and the first production aircraft performed its maiden flight on September 5, 2002. Both flights took place from the Wichita Mid-Continent Airport. The LJ40 entered into service in January, 2004.



Cirrus Aviation Learjet 40 (D-CNIK)

The **Learjet 40XR** is an upgraded version introduced in October, 2004, offering higher takeoff weights, faster cruise speeds and faster time-to-climb rates as compared to the LJ40. The increases are due to the upgrading of the engines to the TFE731-20BR configuration. These are the "BR" engines. LJ40 owners can upgrade their aircraft through the incorporation of several service bulletins.

### ***Specifications (Learjet 40)***

#### **General characteristics**

- **Crew:** 2 (minimum)
- **Capacity:** 7 passengers
- **Length:** 55.56 ft (16.93 m)
- **Wingspan:** 47 ft 9 3/8 in (14.56 m)
- **Height:** 14.13 ft (4.31 m)
- **Wing area:** 311.6 ft<sup>2</sup> (28.95 m<sup>2</sup>)
- **Loaded weight:** 13,633 lb (6,200 kg)
- **Max takeoff weight:** 21,000 lb (9,545 kg)
- **Powerplant:** 2× Honeywell TFE731-20AR or -20BR in the Lear 40XR turbofan engines, 3500 lbs (15.56 kN) each
- **Cabin Height:** 4.9 ft (1.5 m)
- **Cabin Width:** 5.1 ft (1.55 m)
- **Cabin Length:** 19.75 ft (6.02 m)
- **Cabin Volume:** 368 ft<sup>3</sup> (10.42 m<sup>3</sup>)
- **Door Height:** 4.8 ft (1.46 m)
- **Door Width:** 2.5 ft (0.76 m)

- **Baggage Volume Internal:** 15 ft<sup>3</sup> (0.425 m<sup>3</sup>)
- **Baggage Volume External:** 50 ft<sup>3</sup> (1.42 m<sup>3</sup>)
- **Maximum Landing Weight:** 19,200 lb (8,727 kg)
- **Usable Fuel:** 5,325 lb (2,420 kg)
- **Payload with Full Fuel:** 993 lb (451 kg)
- **Maximum Payload:** 2,305 lb (1,047 kg)

## Performance

- **Maximum speed:** 464 kt (M.81) (534 mph, 865 km/h)
- **Cruise speed:** 457 kt (526 mph, 852 km/h)
- **Range:** 1,692 nm (1,947 mi, 3,156 km)
- **Service ceiling:** 51,000 ft (15540m)
- **Rate of climb:** 2,820 ft/min (14.32 m/s)
- **Long Range Cruise Speed:** 425 kt (489 mph, 793 km/h)
- **Range - Seats Full:** 1,552 nm (1,786 mi, 2,895 km)
- **Balance Field Length:** 4,285 ft (1,306 m)
- **Landing Distance (Factored):** 4,442 ft (1,354 m)
- **Rate of Climb - One Engine Out:** 710 ft/min (3.6 m/s)
- **One Engine Inoperative Service Ceiling at Maximum Weight:** 27,000 ft (8,200 m)

# Cessna Citation Mustang

## Citation Mustang



Citation Mustang

**Role**

Business jet

<b>National origin</b>	United States
<b>Manufacturer</b>	Cessna
<b>First flight</b>	23 April 2005
<b>Introduced</b>	2006
<b>Status</b>	In production
<b>Primary user</b>	Private Users
<b>Produced</b>	Since 2005
<b>Number built</b>	320
<b>Unit cost</b>	\$2.65 Million USD (2010)

The **Cessna Citation Mustang**, Model 510, is a "very light jet" (VLJ) class business jet built by Cessna Aircraft Company at their Independence, Kansas production facility. The Mustang, in standard configuration, has four passenger seats in the aft cabin, toilet and seating for two in the cockpit. Like most other very light jets, the Mustang is approved for single-pilot operation.

## ***Development***

The Model 510 Mustang first flew on 18 April 2005. The airplane received full type certification from the Federal Aviation Administration on September 8, 2006. Cessna received FAA certification to fly into "known icing conditions" on November 9, 2006. Cessna delivered the first production VLJ on November 23, 2006, the same day the FAA awarded Cessna with the necessary certification. Dave and Dawn Goode of GOODE Ski Technologies received the first retail delivered Cessna Mustang on April 23, 2007.

## ***Design***

The Mustang is a low-wing cantilever monoplane with a tricycle retractable landing gear and two Pratt & Whitney Canada PW615F turbofan engines, mounted in pods on the rear aft fuselage. The airframe is constructed primarily of aluminum alloys, with a three spar wing group. One main door is located in the forward left section of the aircraft, with an additional emergency exit on the center right section of the fuselage.

The flight deck consists of two Garmin G1000 PFD's and one large center MFD, for moving map, weather, traffic and other functions.

## ***Specifications***

### **General characteristics**

- **Crew:** one or two pilots
- **Capacity:** 4 to 5 passengers
- **Length:** 40'7" (12.37 m)
- **Wingspan:** 43'2" (13.16 m)

- **Height:** 13'5" (4.09 m)
- **Empty weight:** 5560 lb (2522 kg)
- **Loaded weight:** 8730 lb (3960 kg)
- **Useful load:** 3170 lb (1442 kg)
- **Max takeoff weight:** 8645 lb (3930 kg)
- **Powerplant:** 2× Pratt & Whitney Canada PW615F turbofan, 1460 lb (6.49 kN) each

## **Performance**

- **Maximum speed:** Mach 0.63
- **Cruise speed:** 340 ktas (630 km/h)
- **Range:** 1167 nmi (at max. takeoff weight) (2161 km)
- **Service ceiling:** 41000 ft (12500 m)
- **Rate of climb:** 3010 fpm (917 mpm)
- **Thrust/weight:** 0.337 (at max. takeoff weight)
- **Takeoff distance:** 3,110 ft (948 m)
  
- **Landing distance:** 2,380 ft (729 m)

## **Avionics**

- Garmin G1000