Bombardier Challenger/Global Series

General Aviation/Utility
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Global 6000

Program Briefing

The Bombardier Challenger is a large, long-range twin-turbofan business jet. Four models have been produced—the 600, 601, 604, and the 605, which entered service in early 2007. The 650 will enter service in 2015. The first Challenger flew in November 1978. Over 1,000 have been built. Military versions of the Challenger are in service with several air forces. A stretched regional jet version of the CL-601 is known as the Canadair RJ (see report).

In addition to the Challenger, Bombardier offers another widebody bizjet, the Global Express. This has the cabin length of the RJ, with all-new wings. It was FAA certified in November 1998. A shortened version is known as the Global 5000. The baseline Global Express is also known as the 6000. The 7000 and 8000 are larger derivatives, due to enter service in 2018.

Also, the Corporate RJ is now known as the Challenger 800, while Bombardier's Continental business jet is now known as the Challenger 300. These are covered in separate reports.

Manufacturer

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Challengers are built at the Canadair facility in Montreal. Final assembly of the Global Express takes place at de Havilland Canada's facility in Downsview, Ontario.

Subsystems

Airframe

The Challenger has a cantilever low-wing monoplane. The aircraft is constructed of aluminum alloy. Wings are built in one piece. There are winglets on the Challenger 601, 604, 605 some 600s, and the Global Express. Engines mounted on rear fuselage. Hydraulically powered control surfaces on both planes. Global Express airframe work is split among the Bombardier companies. The former Canadair is doing the nose section, Short Brothers is providing the forward fuselage, horizontal stabilizer and composite components, and De Havilland Canada is responsible for the rear fuselage, vertical stabilizer, engine pylons, and final assembly. Completions are handled by Bombardier and Goodrich Aerospace, The Jet Center, and Marshall Aerospace.

Airframe Subcontractors

- Aerolia: Center fuselage on Global 7000/8000
- Aérospatiale Matra (Airbus): tail cone on Global Express
- GKN Aerospace: windows on Global 7000/8000; composite winglets and ailerons on 7000/8000 (for Triumph); integrated rudder/elevator on 7000/8000

- Messier-Dowty: main and nose landing gear for 604, Global Express, Global 7000/8000
- Mitsubishi: wing, center fuselage on Global Express
- Triumph Aerostructures: high-speed transonic wing on Global 7000/8000

Propulsion

Engine

Challenger 600: two Textron Lycoming (now Honeywell) ALF502L-2 or -3 turbofans, each rated at 7,500 lbst.

Challenger 601: two General Electric CF34-1A (-3A in 601-3A and -3A1 in 601-3R) turbofans, each rated at 9,140 with automatic power reserve (8,650 without APR).

Challenger 604/605/650: two CF34-3Bs rated at 8,729 lbst each.

Global Express: two Rolls-Royce BR710A2-20s rated at 14,750 lbst.

Global 5000: two Rolls-Royce BR710A2-20s rated at 14,750 lbst.

Global 7000/8000: two GE Passports (formerly TechX) rated at 16,500 lbst each

Propulsion System Subcontractors

- Allfast: rivets for engine nacelles on Challenger
- Derlan Aerospace Canada: accessory gear boxes, power takeoff assemblies on CF34
- General Electric: integrated propulsion system on Global 7000/8000
- Heroux-Devtek: CF 34 engine components
- Hispano-Suiza (Snecma): transmissions on Challenger
- IHI: low-pressure turbine module, aerodrive systems, fan hub frame and aft fan case on Passport for 7000/8000
- International Nacelle Systems (Shorts, Hurel-Dubois): nacelles on Global Express
- Parker Aerospace: atomization nozzles on BR710 for G5000/6000
- Sumitomo Precision: engine heat management systems on Challenger
- Techspace Aero: booster module, lube tank and pump, heat exchangers on Passport for 7000/8000

Electronics

Designation	*Description*	*Manufacturer*	*Note*
Communications			
FA2100	flight data cockpit voice recorders	L-3 Communications	on 604
HF-9000	communications systems	Rockwell Collins	on Global Express (dual)
SATCOM 5000	satellite communications systems	Collins	on Challenger 604 (option)
TDR-90	ATC transponder	Collins	dual; on 601-3A
VHF-20A	com	Collins	not on 601-3A
VHF-22B	VHF communications	Collins	dual; on 601-3A
Displays & Instrumentation			
MFD	multi-function display	Honeywell	on 601-3A
HGS-6605	head-up flight guidance system	Rockwell Collins	certified for 605 in 2009
n/a	head-up flight guidance system	Flight Dynamics	option
n/a	HUD	Thales (Sextant)	option on Global Express
Electronic Warfare			
DAG	defensive aids group	BAE Systems (Sanders)	on ASTOR
Miscellaneous or Multipurpose Systems			
A-100A	cockpit voice recorder	Fairchild	on 601-3A
CMA-2038	network interconnection unit	BAE Sys. (Canadian Marconi)	on 604
FZ-800	flight guidance computer	Collins	on 601-S
Global Vision (Pro Line Fusion)	integrated avionics system	Rockwell Collins	Global Express/6000 and 5000 starting 2012; Global 7000/8000
n/a	cabin management system	DPI Labs	Challenger
n/a	primary flight control computer	Rockwell Collins	on Global 7000/8000
NZ-801	flight management system	Honeywell	dual; on 601-3A
Primus 2000 XP	integrated avionics system	Honeywell	Global Express, Global 5000 until 2012
Pro Line 4	avionics suite	Rockwell Collins	on 604
Pro Line 21	avionics suite	Rockwell Collins	on 605/650; available on 600 upgrade
SPZ-600	flight director	Honeywell	dual; not on 601-3A

SPZ-8000	electronic flight instrumentation sys.	Honeywell	on 601-3A; EDZ-815 on 601-S
n/a	2" standby altimeter and airspeed indicator	Aeromech	on 601-S
Navigation			
ALT-4000	radio altimeter	Collins	on Global Express
DME-42	distance measuring equipment	Collins	on 601-S
Flagship	inertial reference system	Northrop Grumman (Litton)	on 604
Laseref II	laser inertial reference system	Honeywell	two on 601-3A; Laseref III on Global Express
VIR-30A	VOR/ILS/marker beacon receiver	Collins	dual; not on 601-3A
VIR-32	VHF navigation	Collins	dual; on 601-3A
n/a	2" gyro horizon	J.E.T.	on 601-S
Sensors			
Primus 400	weather radar	RCA	not on 601-3A
Primus 870	weather radar	Honeywell	on 601-3A

Other Systems

Other Contractors

Other contractors involved in miscellaneous subsystems are as follows:

- ABG-Semca: integrated air management system on Global Express
- AP Precision Hydraulics: systems components on Challenger
- Abex NWL (with Intertechnique, Liebherr-Aero-Technik, and Stainless Steel Products): hydraulic systems on Global Express
- Aircraft Braking Systems: landing gear brakes; wheels on 605
- Apparatebau Gauting GmbH: water and waste system on Global 7000/8000
- Astronics Corp: lighting control system on Global Express
- CAE Electronics: simulator for Global Express
- Crouzet: detection and sensors, electrical protection and distribution (on 604 and Global Express), man-machine interface on Global Express
- Dowty Aerospace Yakima: landing gear actuators on 604
- Dowty Rotol: landing gear shock absorbers on Challenger
- Dunlop Precision Rubber: passenger door seal on Global Express
- Goodyear: tires on Challenger on Challenger
- Hamilton Sundstrand: pressurization system, bleed air anti-icing of wing, tailplane, engine intake cowls and guide vanes on Challenger; flap and slat actuation system on Global Express; electrical system, auxiliary power unit and wing high-lift system on Global 7000/8000
- Hella: lighting systems on Global Express
- Honeywell: air conditioning system, GTCP-150 auxiliary power unit on Challenger, RE220[GX} APU on Global Express
- Innotech Aviation: cabin interior on Challenger
- Intertechnique: fuel system, fuel inerting system and oxygen system on Global 7000/8000
- Kawasaki Heavy Industries: APU gearbox on Global Express
- Liebherr Aerospace: integrated air management system on Global Express and 7000/8000
- Lucas Aerospace: electrical systems on Global Express
- Meggitt: wheels and braking system on Global 7000/8000
- Normalair-Garrett: hydraulic system components on Global Express
- Parker Aerospace: fuel system on Global Express, flight control actuators on Global Express; hydraulics system and fly-by-wire flight control technology on Global 7000/8000
- Raytheon (E-Systems): pitch feel systems on Global Express
- Safe Flight Instrument Corp: autothrottle on 604 (option)
- Sargent Aerospace: throttle quadrant on Challenger
- Securaplane: battery charger on 604
- Thales (Sextant Avionique): flight control systems, including spoilers and trim controls, on Global Express

Specifications

	Challenger 601-3A	*Challenger 605*	*Global Express XRS/6000*
Length overall:	68 ft 5 in (20.9 m)	same	99 ft 5 in (30.3 m)
Height overall:	20 ft 8 in (6.3 m)	same	24 ft 9 in (7.6 m)
Wing span:	64 ft 4 in (19.6 m)	same	94 ft (28.7 m)
Empty operating weight:	24,685 lb (11,197 kg)	26,985 lb (12,240 kg)	49,600 lb (22,498 kg)
Max. T-O weight:	43,100 lb (19,550 kg)	48,200 lb (21,863 kg)	98,000 lb (44,452 kg)
Max. cruise speed:	529 mph (851 km/h)	Mach 0.80	Mach 0.85
Range:	3,365 nm (6,236 km)	4,077 nmi (7,490 km)	6,500 nmi (12,038 km)
Passengers:	9-15	9-18	10-24

	Global 5000	*Global 7000*	*Global 8000*
Length overall:	96 ft 9 in (29.5 m)	110 ft 7 in (33.8 m)	101 ft 7 in (31.1 m)
Height overall:	24 ft 9 in (7.6 m)	26 ft 8 in (8.2 m)	26 ft 8 in (8.2 m)
Wing span:	94 ft (28.6 m)	104 ft 4 in (32 m)	same
Max. T-O weight:	87,700 lb (39,780 kg)	104,900 lb (47,582 kg)	103,400 lb (46,901 kg)
Cruise speed:	Mach 0.85 (488 kt)	Mach 0.85 (488 kt)	Mach 0.85 (488 kt)
Range:	4,800 nmi (8,889 km)	7,400 nmi (13,705 km)	7,700 nmi (14,260 km)
Passengers:	8-16	10-19	10-19

Costs

A Challenger 601-3A cost approximately $16 million. A 601-S sold for approximately $14 million. The 605 sells for $31.1 million equipped, as of 2015. The 650 sells for $34 million.

A green Global Express originally sold for $27.95 million (1994 dollars) for the first 38 customers. In 2017, the XRS/6000 costs $66 million equipped. Original Global Express deposits cost $250,000, which were later firmed up into 5% down payments.

The Global 5000 launch price was $32.95 million, but 2017 planes cost $54 million.

The Global 7000 and 8000 sell for $65 million in 2010 dollars.

Sales/Deliveries Data

Deliveries

	1980	***1981***	***1982***	***1983***	***1984***	***1985***	***1986***	***1987***	***1988***	***1989***	***1990***
Challenger 600	3	29	35	13	4	—	—	—	—	—	—
Challenger 601	—	—	—	14	17	9	19	6	2	—	—
Challenger 601-3A	—	—	—	—	—	—	—	11	23	20	28
Total	**3**	**29**	**35**	**27**	**21**	**9**	**19**	**17**	**25**	**20**	**28**

	1991	***1992***	***1993***	***1994***	***1995***	***1996***	***1997***	***1998***	***1999***	***2000***	***2001***
Challenger 600	—	—	—	—	—	—	—	—	—	—	—
Challenger 601	—	—	—	—	—	—	—	—	—	—	—
Challenger 601-3A	21	22	9	—	—	—	—	—	—	—	—
Challenger 601-3R/604	—	—	13	25	24	32	34	36	42	38	41
Global Express	—	—	—	—	—	—	—	3	32	35	30
Total	**21**	**22**	**22**	**25**	**24**	**32**	**34**	**39**	**78**	**73**	**71**

	2002	***2003***	***2004***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***	***2011***	***2012***
Challenger 600	—	—	—	—	—	—	—	—	—	—	—
Challenger 601	—	—	—	—	—	—	—	—	—	—	—
Challenger 601-3A	—	—	—	—	—	—	—	—	—	—	—
Chall. 601-3R/604/5	31	24	29	36	29	35	44	36	38	43	34
Global 5000*	—	—	4	15	15	19	17	16	17	17	18
Global Express*	17	14	20	15	25	29	35	35	32	36	36
Total	**48**	**38**	**53**	**66**	**69**	**83**	**96**	**87**	**87**	**96**	**88**

	2013	2014	2015	2016	Total
Challenger 600	—	—	—	—	84
Challenger 601	—	—	—	—	67
Challenger 601-3A	—	—	—	—	134
Chall. 601-3R/604/5	32	36	25	26	783
Global 5000*	22	26	31	20	237
Global Express/6000*	40	54	42	31	561
Total	**94**	**116**	**98**	**77**	**1,866**

**Estimates; Bombardier did not break down 2007-2016 Global deliveries.*

Program Overview

Challenger History

Development

The Challenger design came from Bill Lear's LearStar 600, for which Canadair obtained exclusive design and manufacture rights in 1976. Canadair launched the program in October of that year, after the Canadian Government purchased the company from General Dynamics. In 1977 Canadair modified the design and renamed it the Challenger, with very extensive design changes. One of these changes widened the fuselage cross-section, creating the widest dedicated business jet cabin on the market (to this day).

Challenger 600

The 600 was the first Challenger model. Three prototypes were built, the first one flying in November 1978. The first production Challenger flew in September 1979. The first prototype crashed in April 1980 during stall tests. The program continued, and Canadian certification was obtained in August 1980. The 600 was powered by Lycoming ALF502 turbofans, which kept the aircraft from obtaining its original design range of 6,300 km.

A total of 84 600s was built.

Challenger 601

After the ALF502 problems, Canadair designed the follow-on Challenger 601 with new GE CF34 engines. A production 601-1A flew for the first time in September 1982. The 601 is distinguished also by winglets (although the majority of 600s produced have been retrofitted with these).

The 601-3A superseded the 601-1A in 1987. It features a new avionics package, and flew for the first time in September 1986. The 601-3A received US and Canadian certification in April 1987 and UK certification in December 1989. A total of 134 -3As was built.

A 601-3A modification with extended range capability is available – 92 modification kits were ordered as of mid-1995.

The 601-S is a 12-seat version of the 601-3A for shorter range transcontinental use. Some avionics have been removed from the base -3A, and the 601-S has no auxiliary fuel tanks. It was approximately $2 million less expensive than the -3A. The 601-S first flew in November 1989.

Challenger in Military Service

The Canadian Air Force (CAF) and Department of Transportation (DOT) both use the Challenger for several roles. The CAF has designated the Challenger the CC-144 and uses them for training, testing and government transport. Three were missionized by Lockheed as EW training platforms. The Canadian DOT has two 601s for flight inspection missions.

Outside of Canada, the German Luftwaffe has seven 601s, employed in transport and ambulance roles (In 2011 the German MoD began replacing these 601s with four Global 5000s). The Danish Air Force has two 601s, and has also ordered two maritime patrol 604s. The Royal Malaysian Air Force has two Challengers, and the People's Republic of China Air Force uses five 601s in a VIP transport role, while Australia has three 604s for VIP use. In June 1999 South Korea ordered a 604 for maritime surveillance. These use IAI/Elta EL/M-2022 surveillance radars. In October 2011 the Hong Kong Government Flying Service ordered two 605s for SAR.

Finally, the US Coast Guard operates a single 604 as a command and control plane. This is designated C-143A.

Bombardier and Pemco also offer a Challenger cargo conversion.

Challenger 601-3R/604/605

At the Paris Air Show in June 1993 Canadair launched the Challenger 604. The new variant has a range of 3,800 nmi and sells for around $20 million. First flight with the upgraded engines took place in September 1995, although a modified Challenger with the airframe and landing gear improvements flew in 1994. FAA certification was granted in November 1995, and deliveries began in January 1996.

The 604 succeeded the 601-3R, which was announced one month before the 604. A total of 59 -3Rs were built, with the last delivered in January 1996. The last green 604 was built in September 2006, capping production of 365 aircraft.

In November 2005 Bombardier announced the 605. It features a Pro Line 21 avionics suite as used on the Challenger 300. It also has bigger windows and a redesigned cabin. It made its first flight in January 2006. Certification was awarded in October 2006 and the 605 entered service in January 2007. A total of 288 was built.

605NG/650

In 2012 Bombardier announced the 605NG, a modest upgrade with mostly interior improvements (customized cabinetry, upgraded seating, next-generation (IFE) and lighting). Later re-designated Challenger 650, the new model will arrive in the second quarter of 2015. NetJets has ordered 25, with options for an additional 50.

Global Express/Global 5000

Background

Beyond the Challenger, Canadair began developing a new derivative that uses technology from the RJ program. This project was announced at the NBAA show in October 1991. Originally, the program was known as the 601 EJ, and was proposed as a derivative with the wings and undercarriage of the RJ but with a shorter fuselage. This project, now known as Global Express, produced an aircraft with the same cabin length as the RJ, with all-new supercritical wings.

Global Express Moves Ahead

Global Express entered the advanced design phase in February 1993. In March, Rolls-Royce/BMW's BR710 was chosen as powerplant, and in September Mitsubishi signed a risk sharing agreement covering up to 20% of the aircraft's development costs.

Global Express Launched, Certified, Delivered

On December 20, 1993, Bombardier officially launched the Global Express, the first bizjet to bear the name of the parent corporation. The company wanted 40 firm orders before launch, but settled for 30, with eight options. Development costs are estimated at C$800 million ($680 million), with risk-sharing partners paying for about half of this. Bombardier has signed up numerous partners and subcontractors on the program—all are listed above.

The Global Express was rolled out in August 1996. A first flight took place in October 1996, and the last of four prototypes flew in September 1997. Canadian certification was awarded in late July 1998, followed by FAA certification in November 1998 and JAA certification in May 1999. The first Global Express was delivered in July 1999, to AirFlite of California (operating the plane for Toyota).

In 2000, Bombardier claimed to hold well over 120 firm orders, including 15 from TAG Aeronautics, Canadair's Middle East agent. Japan's Itochu also has paid deposits on five. Some 27 orders have come from Bombardier's FlexJet. A total of 148 Global Expresses was built before XRS production began.

At the 2003 NBAA show, Bombardier announced a GEx upgrade, the XRS. It offers better range/speed performance, and has Collins Airshow 21 cabin management system. It entered service ahead of schedule in November 2005.

Sometime around the launch of the 7000/8000, Bombardier renamed the XRS the 6000.

Global Express Wins ASTOR Competition

In June 1999 the UK Government selected a Raytheon Systems sensor package mounted on a Global Express for its Airborne Stand-Off Radar (ASTOR) requirement. The UK will acquire five GExes equipped with Racal ASARS-2 radars, with deliveries beginning in 2005 and continuing into 2008. The first GEx for ASTOR made its first flight in August 2001, but the fully installed system version flew in May 2004. The RAF has designated the type Sentinel R Mk1, and took delivery of the first aircraft in June 2007. In 2010 the UK SDSR included plans to scrap ASTOR, despite a successful entry into service, but as of 2014 retirement had been delayed until 2018.

Other Military and Government Globals

Bombardier has sold Globals two for flight inspection duties to Japan's Civil Aviation Bureau (the first delivered in May 2001).

In 2011, the US Air Force acquired an XRS used as an overhead communications-relay platform in Southwest Asia. Designated E-11A, the aircraft carries Northrop Grumman's Battlefield Airborne Communications Node, which allows battlefield communications systems to share data. Additional 6000s were acquired, with the fourth E-11 arriving in September 2013.

In 2014, India acquired two 5000s for intelligence gathering, with IAI/Elta ELINT/SIGINT packages. The second arrived in February 2015.

At the November 2015 Dubai Airshow the UAE Ministry of Defense awarded Saab a contract for two Global 6000s with its Swing Role Surveillance System (SRSS), using a new version of the Saab Erieye radar system.

Bombardier Launches Global 5000

In February 2002 Bombardier firmly launched the Global 5000, a shortened version of the Global Express first announced in October 2001. It will have the same engines and avionics used on the larger plane, with a maximum range of 4,800 nmi and a price tag of $33 million.

The Global 5000 made its first flight in March 2003, and Transport Canada awarded type certification in March 2004. First deliveries took

place in late 2004. At the time of launch, Bombardier held letters of intent for 15 aircraft, including five for TAG, the Middle East distributor.

Global 7000/8000 Launched

At the October 2010 NBAA show Bombardier announced two new very large/very long range models to compete with Gulfstream's 650. The two planes will be largely new with an all-new wing, but with some structures derived from the XRS and 5000. The 7000 is longer than the 8000, but with just 7,100 nmi range compared with the 8000's 7,700 nmi. The flight deck will be Global Vision series, derived from Collins' Pro Line Fusion.

Deliveries were to begin in 2017. Both will sell for $65 million in 2010 dollars.

G7000/8000 Delayed

In July 2015 Bombardier announced a delay in the two new programs, due to wing redesign requirements (related to weight issues). Global 7000 entry into service has been delayed two years to the second half of 2018, with the 8000 to follow in 2019.

The third test 7000 flew in May 2017. At that point Bombardier claimed to hold 115 orders for the type.

NetJets Places Large Order

In March 2011 NetJets announced plans to acquire up to 120 new Global series aircraft. The deal includes a firm order for 50 aircraft (30 Global 5000 Vision and Global Express XRS Vision aircraft, and 20 Global 7000/8000 aircraft), with options for an additional 70 aircraft. Deliveries began in late 2012.

Teal Group Evaluation

Holding Up Well, Considering The Circumstances

Like Gulfstream and Dassault, Bombardier's top end products had an enviably easy time during the great downturn. Deliveries actually grew. Compare this to bottom half of the market, which collapsed.

Output of the Global 5000/6000 went from 54 deliveries in 2012 to 80 last year. As a result of this production increase, the company brought in billions of dollars in extra revenue, and grew its market share. Over the past few years Bombardier went from a 30% market share to a 35% market share. Bombardier held 35.9% of the business jet market in 2014, up from just 30% in 2010.

The problem with this cash source – needed for the CSeries – is that the market's overall health didn't justify some or all of this output increase. In May 2015, the company was forced to slash Global business jet production, cutting another 1,750 jobs in the process. While the company blamed weak high end business jet markets, neither Dassault nor Gulfstream announced any similar plans to cut output. Clearly, Bombardier had simply been aggressive about selling and delivering jets, but the result was excess production (and lowered new jet prices and reduced existing jet values).

Given weakness in emerging markets and the serious decline in oil prices, we are not expecting a recovery until the next generation arrives.

The Belated Next Globals

The 6000 and G550 competed for customers who want the very best dedicated business jet available (i.e., a business jet with small airport access). The 650 boosts Gulfstream to a totally new level. With Bombardier moving ahead with the CSeries, it would have been difficult to find the resources to create a G650 direct competitor.

That means a family of derivatives, but a very good one. Fortunately for Bombardier, they already have a superb cabin. A stretch, a new wing, a new powerplant should do the trick, and make the 7000/8000 series into successful programs. But keeping the weight below the magic Teterboro-friendly 100,000 lb mark has proven impossible.

But most of all, with CSeries spending ramping up, Bombardier's new product needed to wait until 2017. This has been delayed until 2018. It looks like it's finally on track, but we are conservatively expecting a single delivery that year.

When it arrives, the 7000/8000 will allow Bombardier to maintain a very respectable high end position, but Gulfstream is clearly going to dominate the top of the market. They'll basically get the first seven years of this emerging segment, at least.

A notch below, the 5000 should also benefit from upgrades, but it is facing new competitive threats. Smelling blood in the water, Dassault and Gulfstream are attacking with the Falcon 5X and G500/600. These competitive threats will definitely pressure Global numbers downward.

Regarding the Challenger 605/650, the past few years have seen strong delivery rates. On the positive side, the series has remained competitive with the other guys—range improvements kept the 605 competitive with the Falcon 2000EX. The death of Cessna's Columbus helped. The Longitude, however, will have an impact, and the Hemisphere is aimed directly at the 650.

A few years back, we thought Bombardier's next move would be a stretched version of the 604, with improved engines and avionics. The 5000 went first, and the company's CSeries diversion means any major Challenger improvement will be put off until the next decade. In the meantime, there's the very modest 605 upgrade, which has led to the even less ambitious 650. Since Bombardier won't be able to launch a more thorough product improvement, the series will suffer a steady market share erosion in the next ten years.

In short, aside from the 650, Bombardier's high end will continue to do relatively well, even with the nightmarish expense of the CSeries. But again, the 7000/8000 could be delayed again. The Lear 85 experience provides a cautionary tale.

Production Forecast

User (Variant)	Through 2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Total
Bombardier/Canadair												
All users (Challenger 600)	84	—	—	—	—	—	—	—	—	—	—	84
All users (Challenger 601)	67	—	—	—	—	—	—	—	—	—	—	67
All users (601-3/604/5/650)	917	22	24	26	28	24	20	14	10	10	7	1,102
All users (Global 5000)	237	24	24	24	22	20	18	16	16	14	12	427
All users (Global Ex./6000)	561	26	26	26	26	26	26	22	22	20	18	799
All users (Global 7/8000)	—	—	1	14	24	36	36	36	34	32	30	243
Total	**1,866**	**72**	**75**	**90**	**100**	**106**	**100**	**88**	**82**	**76**	**67**	**2,722**