

AGUSTAWESTLAND

AGUSTAWESTLAND
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MARKETING MANAGER: G Orsi
PUBLIC RELATIONS MANAGER: Gianluca Grimaldi (Italy)
David Bath (UK)
PARTICIPATING COMPANIES
Finmeccanica: see Agusta SpA under Italy
GKN: see Westland Helicopters Ltd under UK

MoU covering joint merger of helicopter divisions signed by Finmeccanica and GKN on 16 April 1998; heads of agreement 18 March 1999; details finalised (subject to

regulatory approval) and name AgustaWestland announced 26 July 2000; company declared fully operational 12 February 2000.
Westland also contributed its 50 per cent share in EH 101, GKN's aerospace transmissions business and 50 per cent share in Aviation Training International (joint venture with Boeing to support British Army WAH-64 Apaches). Agusta also contributed half of EH 101, transmissions and aerostructures business and own shares in NH90 (32 per cent) and Bell/Agusta (45 per cent). Joint revenue in 2001 was US\$2,100 million, and order backlog at January 2002 was US\$6,400 million. Employees totalled 10,546 in mid-2001.
Together, the two companies have built over 7,100 helicopters for customers in more than 80 countries.
Wholly and part-owned subsidiaries are detailed below.

Finmeccanica:
Agusta Aerospace Corporation (USA)
Agusta Aerospace Services BV (Belgium)

EH1 Ltd (50 per cent)
Bell/Agusta Aerospace Corporation (USA) (45 per cent)
NHI srl (27 per cent)
other subsidiaries and holdings
GKN:
Westland Industrial Products Ltd
Westland Transmissions Ltd
EH1 Ltd (50 per cent)
Aviation Training International Ltd (50 per cent)
other subsidiaries and holdings.

On 31 October 2001, AgustaWestland initiated a joint marketing effort with Lockheed Martin, under which the latter will promote a US market version of the EHI EH101 (which see), known as the US101.

VERIFIED

AIRBUS

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Airbus Industrie set up 18 December 1970 as Groupement d'Intérêt Economique (GIE: a company which makes no profits or losses in its own right) and has been profitable since 1990, producing an operating surplus that is shared among its partners. Its first task was to manage development, manufacture, marketing and support of A300; this management now extends to A300-600, A310, A318, A319/ACJ, A320, A321, A330, A340 and A380. Large Airliner Division created in March 1996 to oversee A3XX (later A380) project. Airbus delivered its 3,000th aircraft, an A320 for JetBlue Airways, on 18 July 2002. It is currently studying A30X concepts for a short-range, 200-passenger and long-range 250-passenger airliner as potential replacements for the A300 and A310 from about 2010, once development of the A380 is completed.
A new single-aisle internal flight deck door, complying with pre-existing and new FAA anti-intrusion regulations, received JAA design approval on 21 May 2002 and is in production; it was certified for the A330/A340 family on 26 June 2002, and subsequently for all Airbus aircraft. In early 2003, Airbus selected Thales as its preferred supplier of HUDs for its entire range of FBW airliners.

Plans for establishment of a single corporate entity (SCE) overtaken and modified by formation of European Aeronautic, Defense and Space Company (EADS, which see). Planned restructuring of the consortium into Airbus Integrated Company (AIC) was revealed in March 2000 and approved by the EC in late 2000; official starting date was 1 January 2001, although completion of formalities was delayed. EADS holds 80 per cent and BAE Systems 20 per cent of AIC, which incorporated in France on 11 July 2001 as an SAS (Société par Actions Simplifiées) following a formal decision on 23 June 2000.
Airbus responsible for all work by partner companies and has some 45,000 employees, including workers at its spare parts centre in Hamburg and its US, Chinese and Japanese subsidiaries. Approximate European breakdown is Germany 16,000, France 14,000, UK 8,300 and Spain 2,400. Stork (formerly Fokker) is an associate in A300 and A310 and Belairbus (Belgian consortium) in A310, A320, A330 and A340. Alenia manufactures front fuselage plug for A321. An engineering centre has been established in Moscow in a joint venture (registered in December 2002) with the Kaskol group, which has shares in Sokol, Hydromash, Rostvertol and other Russian aerospace companies; this was opened, with a workforce of 25, in late March 2003, and will develop and co-produce components for the A380 and other Airbus types; General Director is Vladimir Raschupkin.
Subsidiaries include Airbus North America, Airbus Finance Company (AFC) formed in 1994, Airbus Training Centre (Miami) and Airbus China. Airbus's training centre in Toulouse, previously a subsidiary known as Aeroformation, and the main spares centre, Airbus Materiel Support, formerly Airspares Hamburg, have been integrated within the consortium's Customer Services Directorate; a new, purpose-built mockup centre was added to the Toulouse facilities during 1999 and was fully operational by end 2000. A training centre was opened in Miami, Florida, in October 1999.
In July 1996, Airbus Training and Support Centre in Beijing was opened, becoming operational in October 1997.

UPDATED

AIRBUS A300-600

TYPE: Wide-bodied airliner.
PROGRAMME: Launched 29 May 1969; initial variants were A300B1 (first flight 28 October 1972, service entry November 1974, A300B2 (first flight June 1973, service entry 30 May 1974) and A300B4 (first flight December 1974, service entry June 1975; 248 built. A300-600 go-ahead 16 December 1980; first flight (F-WZLR) 8 July 1983; certified (with JT9D-7R4H1 engines) 9 March 1984; first delivery (to Saudia) 26 March 1984.
Improved version with CF6-80C2 engines and other changes (see Current Versions) made first flight 20 March 1985; French certification for Cat. IIIB take-offs and landings 26 March 1985; first delivery of improved version (to Thai Airways) 26 September 1985. Extended-range A300-600R (then known as -600ER) made first flight 9 December 1987, receiving European and FAA certification

DEVELOPMENT MILESTONES	
A300B	
Launched	29 May 69
First flight (B1)	28 Oct 72
Certification	15 Mar 74
Entered service (B2) (Air France)	30 May 74
Subsequent versions	
A300-600	
Go-ahead	16 Dec 80
First flight	8 Jul 83
Certification	9 Mar 84
First delivery (Saudi Arabian Airlines)	26 Mar 84
A300-600R	
First flight	9 Dec 87
Certification	10 Mar 88
First delivery (American Airlines)	20 Apr 88
A300-600F	
First flight	2 Dec 93
Certification	Apr 94
First delivery (Federal Express)	27 Apr 94

10 and 28 March 1988 respectively, deliveries (to American Airlines) beginning 20 April 1988; A300-600 powered by GE CF6-80C2A5 with FADEC granted 180-minute ETOPS April 1994. CIS certification granted May 1996. Bulk of production backlog are A300F4-600R Freighters for United Parcel Service.
CURRENT VERSIONS: **A300-600**: Advanced version of A300B4-200; major A300 version since early 1984. Passenger and freight capacity increased by fitting rear fuselage of A310 with pressure bulkhead moved aft; wings have simple Fowler flaps and increased trailing-edge camber; forward-facing two-person flight deck with EFIS; new digital avionics; new braking control system; new APU; simplified systems; weight saving by use of composites for some secondary structural components; payload/range performance and fuel economy improved by comprehensive drag clean-up. Further improvements introduced in 1985 included CF6-80C2 or PW4000 as engine options, carbon brakes, wingtip fences and 'New World' flight deck; basic equipment of aircraft delivered from late 1991 further improved by incorporating standard options.
Cargo conversions of A300-600 and earlier A300B4 are offered; see *Jane's Aircraft Upgrades* for details.
Detailed description applies to current production A300-600/600R except where indicated.
A300-600R: Extended-range version of A300-600, differing mainly in having fuel trim tank in tailplane and higher maximum T-O weight.
A300-600 Convertible: Convertible passenger/cargo version, described separately.

TOTALS OF AIRBUS AIRLINERS										
(at 1 January 2004)	A300	A310	A318	A319	A320	A321	A330	A340	A380	Totals
Firm orders	589	260	79	925	1,679	409	469	347	129	4,886
Delivered	525	255	9	564	1,247	289	282	261	0	3,432
Operating	414	241	9	563	1,236	288	279	259	0	3,289
AIRBUS ORDERS and DELIVERIES 2003										
Net orders	6	0	-8	188	-40	-6	50	30	34	254
Delivered	8	0	9	72	119	33	31	33	0	305
Backlog	6	5	70	361	432	120	187	86	129	1,454
	44									

A300-600 Freighter: Non-passenger version, described separately.

Airbus Super Transporter: A300-600R conversion as Super Guppy replacement.

AIRBUS A300 MARKS AND VARIANTS

Series	Mark	Power Plant	FAA Certification
B1	-	CF6-50A	not certified
B2	1A	CF6-50A	30 May 74
B2	1C	CF6-50C	19 Jun 75
B2K	3C	CF6-50C	30 Jun 76
B2	203	CF6-50C2	1 Oct 80
B4	2C	CF6-50C	30 Jun 76
B4	103	CF6-50C2	4 Oct 79
B4	203	CF6-50C2	2 Oct 81
B4	601	CF6-80C2A1	28 Mar 88
B4	603	CF6-80C2A3	19 Sep 88
B4	605R	CF6-80C2A5	28 Mar 88
B4	620	JT9D-7R4H1	19 Sep 88
B4	622R	PW4158	1 Aug 91
C4	605 (F)	CF6-80C2A5	21 Jun 02
F4	605R	CF6-80C2A5	27 Apr 94
F4	622R	PW4158	14 Jul 00

Series	Variant	MTOW (kg)
B2-1A	00	137,000
B2-1C	00	137,000
B2-1C	02	142,000
B2K-3C	00	142,000
B2-203	00	142,000
B4-2C	00	150,000
B4-2C	02, 03, 14	157,500
B4-103	00	150,000
B4-103	02, 03, 14	157,500
B4-203	00, 07	165,000
B4-601/03/20	00	165,000
B4-605R/22R	00	170,500
B4-605R/22R	01, 02	171,700
B4-605R/22R	03	167,800
C4-605R	00	170,500
F4-600R/22R	00	170,500
F4-600R/22R	06	165,100
F4-600R/22R	09	168,000

Note: Variant parameters may include differences in data other than max T-O weight. Except as constrained by Series, Variants are applicable to several engine options

CUSTOMERS: Total of 589 of all A300 versions ordered, of which 525 delivered, by 31 December 2003. There were six orders and eight deliveries in 2003. Outstanding contracts at 1 January 2003 comprised six for Air Hong Kong and 58 for United Parcel Service.

COSTS: US\$109.9 million (2001).

DESIGN FEATURES: Mid-mounted wings with 10.5 per cent thickness/chord ratio, 28° sweepback at quarter-chord, and (since 1985) tip fences; circular-section pressurised fuselage; all-swept tail unit.

FLYING CONTROLS: Power-assisted. Each wing has three-segment, two-position (T-O/landing) leading-edge slats (no cutout over engine pylon), small Krueger flap at leading-edge wingroot, three cambered tabless flaps on trailing-edge, all-speed aileron between inboard flap and outer pair, and seven spoilers forward of flaps on each wing; flaps occupy 84 per cent of trailing-edge, increasing wing chord by 25 per cent when fully extended; ailerons deflect 9° 2' downward automatically when flaps are deployed; all 14 spoilers used as lift dumpers: outboard 10 for roll control and inboard 10 as airbrakes; variable incidence tailplane. Ailerons/elevators/rudder fully powered by hydraulic servos (three per surface), controlled mechanically; secondary surfaces (spoilers/flaps/slats) fully powered hydraulically with electrical control, tailplane by two independent hydraulic motors electrically controlled with additional mechanical input; preselection of spoiler/lift dump lever permits automatic extension of lift dumpers on touchdown; flaps and slats have similar drive mechanisms, each powered by twin motors driving ball screwjacks on each surface with built-in protection against asymmetric operation.

STRUCTURE: Two-spar main wing box, integral with fuselage and incorporating fail-safe principles; third spar across inboard sections; semi-monocoque fuselage (frames and open Z-section stringers), with integrally machined skin panels in high-stress areas; primary structure is of high-strength, damage-tolerant aluminium alloy, with steel or titanium for some critical fuselage components, honeycomb panels or selected glass fibre laminates for secondary structures; metal slats, flaps and ailerons. CFRP fins replaced aluminium alloy unit from 1988; secondary structure composites include AFRP for flap track fairings, rear wing/body fairings, cooling air inlet fairings and radome; GFRP for wing upper surface panels above mainwheel bays, fin leading/trailing-edges, fin/fuselage fairings, tailplane trailing-edges, elevator leading-edges, tailplane and elevator tips and elevator actuator access panel; carbon-reinforced GFRP for elevators and rudder; CFRP for spoilers, outer flap



Airbus A300-600 twin-turboprop airliner in the insignia of Japan Air Lines (JAL)

NEW/0567736

AIRBUS A300 ORDERS
(at 1 January 2004)

Customer	Qty
Air Afrique	3
Air France	23
Air Hong Kong	6
Air India	3
Air Inter Europe	8
Alitalia	8
American Airlines	35
Amiri Flight	2
Ansett	8
Australian Airlines	5
China Airlines	15
China Eastern Airlines	7
China Northern Airlines	6
China Northwest Airlines	3
CityBird	2
Continental Airlines	3
Cruzeiro	2
Eastern Airlines	34
Egyptair	17
Emirates	5
Federal Express	36
Finnair	2
Garuda	9
Hapag Lloyd	7
Iberia	6
Indian Airlines	10
ILFC	9
Iran Air	8
Japan Air System	32
Japan Fleet Service	2
Korean Air	32
Kuwait Airways	8
Laker	3
LaTur	2
Lufthansa	23
Malaysia Airlines	4
Monarch	4
Olympic	10
Pakistan International Airlines	4
Pan Am	12
Philippine Airlines	5
Polaris Aircraft Leasing	5
Saudi Arabian Airlines	11
SAS	4
Singapore Airlines	8
SOGERMA SOCEA	1
South African Airways	7
Thai Airways	33
Trans European Airways	1
Tunis Air	1
United Parcel Service	90
Varig	2
VASP	3
Total	589

deflector doors and fin box; all CFRP moving surfaces have aluminium or titanium trailing-edges. Nosewheel doors and mainwheel leg fairings doors also of CFRP. Nose gear is structurally identical to that of B2/B4/A310; main gear is generally reinforced, with a new hinge arm and a new pitch damper hydraulic and electrical installation. Nacelles have CFRP cowling panels and are subcontracted to Rohr (California); pylon fairings are of AFRP.

Airbus France builds nose (including flight deck), lower centre-fuselage, four inboard spoilers, wing/body fairings and engine pylons; Airbus Deutschland builds forward fuselage (flight deck to wing box), upper centre-fuselage, rear fuselage (including tailcone), vertical tail, 10 outboard spoilers and some cabin doors; it also equips wings and installs interiors and seats; Airbus UK (formerly BAe) designed wings and builds wing box; Airbus España manufactures horizontal tail, port and starboard forward

passenger doors and mainwheel/nosewheel doors; Stork Aerospace produces wingtips, ailerons, flaps, slats and main gear leg fairings. Large, fully equipped and inspected airframe sections airlifted by Beluga to Airbus France at Toulouse for assembly and painting, aircraft then being flown to Hamburg for outfitting and returned to Toulouse for customer acceptance.

LANDING GEAR: Hydraulically retractable tricycle type, of Messier-Bugatti design, with Messier-Bugatti/Liebherr/Dowty shock-absorbers and wheels standard; twin-wheel nose unit retracts forward, main units inward into fuselage; free-fall extension; has four-wheel main bogies interchangeable left with right. Standard bogie size is 927 × 1,397 mm (36½ × 55 in); wider bogie of 978 × 1,524 mm (38½ × 60 in) is optional. Mainwheel tyres size 49×17-20 or 49×17.0R20 (30 ply) (standard) or 49×19-20 (30 ply) (wide bogie), with respective pressures of 12.41 and 11.10 bar (180 and 161 lb/sq in). Nosewheel tyres size 40×14 or 40×14.0R16 (22 ply), pressure 9.38 bar (136 lb/sq in). Steering angles 65°/95°. Messier-Bugatti/Liebherr/Dowty hydraulic disc brakes standard on all mainwheels. Normal braking powered by 'green' hydraulic system, controlled electrically through two master valves and monitored by a brake system control box to provide anti-skid protection. Standby braking (powered automatically by 'yellow' hydraulic system if normal 'green' system supply fails) controlled through a dual metering valve; anti-skid protection is ensured through same box as normal system, with emergency pressure supplied to brakes by accumulators charged from 'yellow' system. Automatic braking system optional. Bendix or Goodrich wheels and brakes available optionally. Minimum ground turning radius (effective, aft CG) 22.00 m (72 ft 2¼ in) about nosewheel, 34.75 m (114 ft 0 in) about wingtips.

POWER PLANT: Two turboprops in underwing pods. A300-600 was launched with 249 kN (56,000 lb st) Pratt & Whitney JT9D-7R4H1 and currently available with 249 kN (56,000 lb st) Pratt & Whitney PW4156 or 262 kN (59,000 lb st) General Electric CF6-80C2A1. A300-600R is offered with 274 kN (61,500 lb st) CF6-80C2A5 or 258 kN (58,000 lb st) PW4158. CF6-80C2A5 and PW4158 also available as options on A300-600.

Fuel in two integral tanks in each wing, and fifth integral tank in wing centre-section, giving standard usable capacity of 62,000 litres (16,379 US gallons; 13,638 Imp gallons). Additional 6,150 litre (1,625 US gallon; 1,353 Imp gallon) fuel/trim tank in tailplane (-600R only) increases this total to 68,150 litres (18,004 US gallons; 14,991 Imp gallons). Optional extra fuel cell in aft cargo hold can increase total to 73,000 litres (19,285 US gallons; 16,058 Imp gallons) in -600R. Two standard refuelling points beneath starboard wing; similar pair optional under port wing.

ACCOMMODATION: Crew of two on flight deck, plus two observers' seats. Passenger seating in main cabin in six-, seven-, eight- or nine-abreast layout with two aisles; typical mixed class layout has 266 seats (26 first class and 240 economy), six/eight-abreast at 96/86 cm (40/32 in) seat pitch with two galleys and one lavatory forward, one galley and two lavatories at Door 2 position, and one galley and four lavatories at rear; typical economy class layout for 285 passengers eight-abreast at 86 cm (34 in) pitch. Maximum capacity (subject to certification) 361 passengers. Closed overhead baggage lockers on each side (total capacity 10.5 m³; 370 cu ft) and in double-sided central 'super-bin' installation (total capacity 14.5 m³; 512 cu ft), giving 0.03 to 0.09 m³ (1.2 to 3.2 cu ft) per passenger in typical economy layout.

Two outward parallel-opening Type A plug-type passenger doors ahead of wing on each side, and one on each side at rear. Type I emergency exit on each side aft of wing. Underfloor baggage/cargo holds fore and aft of wings, with doors on starboard side; forward hold can accommodate 12 LD3 containers, or four 2.24 × 3.17 m (88 × 125 in) pallets or, optionally, 2.43 × 3.17 m (96 × 125 in) pallets, or engine modules; rear hold can accommodate 10 LD3 containers; additional bulk loading of freight provided for in an extreme rear compartment with usable volume of 17.3 m³ (611 cu ft); alternatively,

rear hold can carry 11 LD3 containers, with bulk cargo capacity reduced to 9.0 m³ (318 cu ft); bulk cargo compartment can be used to transport livestock. Entire accommodation is pressurised, including freight, baggage and avionics compartments.

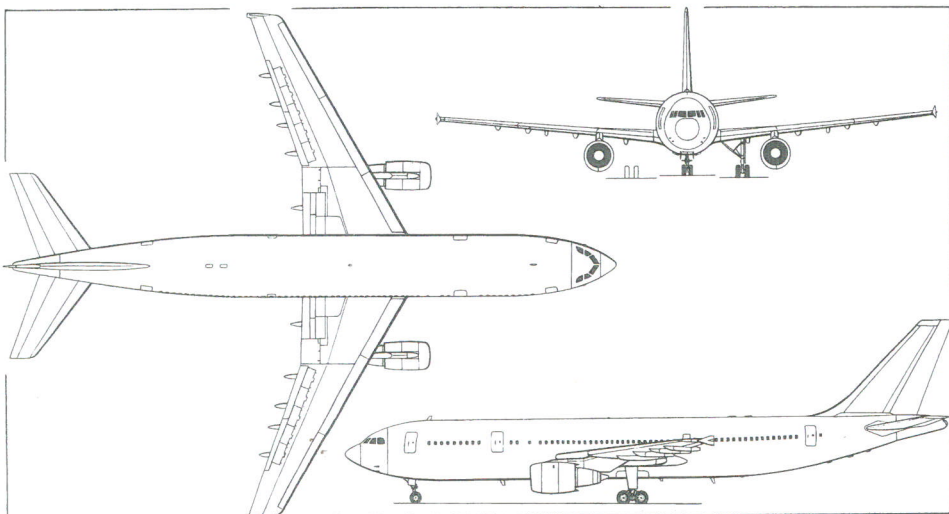
SYSTEMS: Air supply for air conditioning system taken from engine bleed and/or APU via two high-pressure points; conditioned air can also be supplied direct to cabin by two low-pressure ground connections; ram air inlet for fresh air ventilation when packs not in use. Pressure control system (maximum differential 0.574 bar; 8.32 lb/sq in) consists of two identical, independent, automatic systems (one active, one standby); automatic switchover from one to other after each flight and in case of active system failure; in each system, pressure controlled by two electric outflow valves, function depending on preprogrammed cabin pressure altitude and rate of change of cabin pressure, aircraft altitude, and preselected landing airfield elevation. Automatic prepressurisation of cabin before take-off, to prevent noticeable pressure fluctuation during take-off. Modular box system provides passenger oxygen to all installation areas.

Hydraulic system comprises three fully independent circuits, operating simultaneously; each system includes reservoir of direct air/fluid contact type, pressurised at 3.52 bar (51 lb/sq in); fire-resistant phosphate ester-type fluid; nominal output flow 136 litres (35.9 US gallons; 30 Imp gallons)/min delivered at 207 bar (3,000 lb/sq in) pressure; 'blue' and 'yellow' systems have one pump each, 'green' system has two pumps. The three circuits provide triplex power for primary flying controls; if any circuit fails, full control of aircraft is retained without any necessity for action by crew. All three circuits supply ailerons, rudder and elevators; 'blue' circuit additionally supplies spoiler 7, spoiler/airbrake 4, airbrake 1, yaw damper and slats; 'green' circuit additionally supplies spoiler 6, flaps, Krueger flaps, slats, landing gear, wheel brakes, steering, tailplane trim, artificial feel, and roll/pitch/yaw autopilot; 'yellow' circuit additionally supplies spoiler 5, spoiler/airbrake 3, airbrake 2, flaps, wheel brakes, cargo doors, artificial feel, yaw damper, tailplane trim, and roll/pitch/yaw autopilot. Ram air turbine pump provides standby hydraulic power should both engines become inoperative.

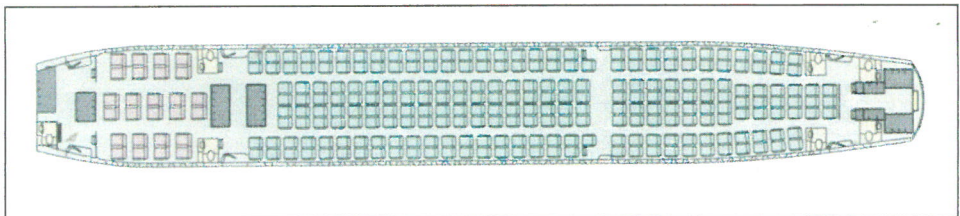
Main electrical power supplied under normal flight conditions by two integrated drive generators, one on each engine; third (auxiliary) generator, driven by APU, can replace either of main generators, having same electromagnetic components but not constant-speed drive; each generator rated at 90 kVA, with overload ratings of 112.5 kVA for 5 minutes and 150 kVA for 5 seconds; APU generator driven at constant speed through gearbox. Three unregulated transformer-rectifier units (TRUs) supply 28 V DC power. Three 25 Ah Ni/Cd batteries used for emergency supply and APU starting; emergency electrical power taken from main aircraft batteries and emergency static inverter, providing single-phase 115 V 400 Hz output for flight instruments, navigation, communications and lighting when power not available from normal sources.

Hot air anti-icing of engines, engine air intakes, and outer segments of leading-edge slats; electrical heating for anti-icing flight deck front windshields, demisting flight deck side windows, and for sensors, pitot probes and static ports, and waste water drain masts.

Honeywell 331-250F APU in tailcone, exhausting upward; installation incorporates APU noise attenuation. Self-contained fire protection system, and firewall panels protect main structure from an APU fire. APU provides bleed air to pneumatic system, and drives auxiliary AC generator during ground and in-flight operation; APU drives 90 kVA oil-spray-cooled generator, and supplies bleed air for main engine start or air conditioning system. For current deliveries of A300-600, APU has improved re-light capability, and can be started throughout flight envelope.



Airbus A300-600R wide-bodied transport (two GE CF6-80C2 turbofans) (Jane's/Dennis Punnett)



Two-class A300-600 interior for 26 first and 240 economy class passengers

0044877

For new A300-600s and -600Rs, two optional modifications offered for compliance with full extended-range twin-engine operations (ETOPS) requirements: hydraulically driven fourth generator and increased cargo hold fire suppression capability. ETOPS kit qualified for aircraft with CF6-80C2 and JT9D-7R series engines and, since mid-1988, for those with PW4000 series.

AVIONICS: *Comms:* Standard communications radios include two VHF, with provision for a third, two HF, two transponders, one Selcal, interphone and passenger address systems, ground crew call system and cockpit voice recorder. Provision for Mode S transponders.

Radar: Weather radar standard, with provision for second.

Flight: Radio navigation avionics include two VOR, two ILS, two DME, one ADF, two marker beacon receivers and two radio altimeters; TCAS and GPWS. Most other avionics are to customer requirements, only those relating to the instrument landing system (Honeywell or Rockwell Collins ILS and Rockwell Collins or TRT radio altimeter) being selected and supplied by the manufacturer. Two Honeywell digital air data computers standard; basic digital AFCS has dual flight control computers (FCCs) for flight director and autopilot functions (for Cat. III automatic landings), single thrust control computer (TCC) for speed and thrust control, and two flight augmentation computers (FACs) to provide yaw damping, electric pitch trim, and flight envelope monitoring and protection. Options include second FCC (for Cat. III automatic landing); second TCC; two flight management computers (FMCs) and two control display units for full flight management system. Basic aircraft also fitted with ARINC 717 data recording system with digital flight data acquisition unit, digital flight data recorder and three-axis linear accelerometer; optional additional level of windshear protection is available. Honeywell Enhanced GPWS available from March 1997.

Instrumentation: Six identical and interchangeable CRT electronic displays (four electronic flight instrument system and two electronic centralised aircraft monitor), plus digitised electromechanical instruments with liquid crystal displays.

DIMENSIONS, EXTERNAL:	
Wing span	44.84 m (147 ft 1 in)
Wing chord at root	9.40 m (30 ft 10 in)
Wing aspect ratio	7.7
Length overall	54.08 m (177 ft 5 in)
Fuselage: Length	53.30 m (174 ft 10½ in)
Max diameter	5.64 m (18 ft 6 in)
Height overall	16.51 m (54 ft 2 in)
Tailplane span	16.26 m (53 ft 4 in)
Wheel track	9.60 m (31 ft 6 in)
Wheelbase (c/l of shock-absorbers)	18.62 m (61 ft 1 in)
Passenger doors (each): Height	1.93 m (6 ft 4 in)
Width	1.07 m (3 ft 6 in)
Height to sill: forward	4.60 m (15 ft 1 in)
centre	4.80 m (15 ft 9 in)
rear	5.50 m (18 ft 0½ in)
Emergency exits (each): Height	1.60 m (5 ft 3 in)
Width	0.61 m (2 ft 0 in)
Height to sill	4.87 m (15 ft 10 in)
Underfloor cargo door (forward): Height	1.71 m (5 ft 7¼ in)

Width	2.69 m (8 ft 10 in)
Height to sill	3.07 m (10 ft 1 in)
Underfloor cargo door (rear): Height	1.71 m (5 ft 7¼ in)
Width	1.81 m (5 ft 11¼ in)
Height to sill	3.41 m (11 ft 2¼ in)
Underfloor cargo door (extreme rear): Height (projected)	0.95 m (3 ft 1 in)
Width	0.95 m (3 ft 1 in)
Height to sill	3.56 m (11 ft 8 in)

DIMENSIONS, INTERNAL:	
Cabin, excl flight deck: Length	40.70 m (133 ft 6¼ in)
Max width	5.28 m (17 ft 4 in)
Max height	2.54 m (8 ft 4 in)
Underfloor cargo hold: Length: forward	10.60 m (34 ft 9¼ in)
rear	7.95 m (26 ft 1 in)
extreme rear	3.40 m (11 ft 2 in)
Max height	1.76 m (5 ft 9 in)
Max width	4.20 m (13 ft 9¼ in)
Underfloor cargo hold volume: forward	75.1 m ³ (2,652 cu ft)
rear	55.0 m ³ (1,942 cu ft)
extreme rear	17.3 m ³ (611 cu ft)

AREAS:	
Wings, gross	260.00 m ² (2,798.6 sq ft)
All-speed ailerons (total)	7.06 m ² (75.99 sq ft)
Trailing-edge flaps (total)	47.30 m ² (509.13 sq ft)
Leading-edge slats (total)	30.30 m ² (326.15 sq ft)
Krueger flaps (total)	1.115 m ² (12.00 sq ft)
Spoilers (total)	5.40 m ² (58.13 sq ft)
Airbrakes (total)	12.59 m ² (135.52 sq ft)
Fin	45.20 m ² (486.53 sq ft)
Rudder	13.57 m ² (146.07 sq ft)
Tailplane	44.80 m ² (482.22 sq ft)
Elevators (total)	19.20 m ² (206.67 sq ft)

WEIGHTS AND LOADINGS (A: CF6-80C2A1/A5 engines, B: PW4156/4158 engines, both in 266-seat configuration)*:

Manufacturer's weight empty:	
A (600)	79,210 kg (174,630 lb)
A (600R)	80,070 kg (176,525 lb)
B (600)	79,151 kg (174,500 lb)
B (600R)	79,320 kg (174,870 lb)

Operating weight empty:	
A (600)	90,115 kg (198,665 lb)
A (600R)	91,040 kg (200,700 lb)
B (600)	90,065 kg (198,565 lb)
B (600R)	90,965 kg (200,550 lb)

Max payload (structural): A (600)	
A (600R)	39,885 kg (87,931 lb)
B (600)	38,962 kg (85,896 lb)
B (600R)	39,993 kg (88,169 lb)
B (600R)	39,037 kg (86,061 lb)

Max usable fuel:	
600: standard	49,786 kg (109,760 lb)
600R: standard	54,721 kg (120,640 lb)
with optional cargo hold tank	58,618 kg (129,230 lb)

Max T-O weight (A and B):	
600	165,000 kg (363,765 lb)
600R (basic)	170,500 kg (375,885 lb)
600R (option)	171,400 kg (377,870 lb)

Max ramp weight (A and B):	
600	165,900 kg (365,745 lb)
600R (basic)	171,400 kg (377,870 lb)
600R (option)	172,600 kg (380,520 lb)

Max landing weight (A and B):	
600	138,000 kg (304,240 lb)
600R (basic)	140,000 kg (308,645 lb)

Max zero-fuel weight (A and B):	
600, 600R (basic)	130,000 kg (286,600 lb)

Max wing loading: 600	634.6 kg/m ² (129.98 lb/sq ft)
600R (basic)	655.8 kg/m ² (134.32 lb/sq ft)

*Production aircraft from late 1996 onward. See 1989-90 and previous editions for original versions; 1996-97 and six previous editions for intermediate versions

PERFORMANCE (A and B as for Weights and Loadings):	
Max operating speed (V _{MO}) from S/L to FL267	335 kt (621 km/h; 386 mph) CAS
Max operating Mach No. (M _{MO}) above FL267	0.82
Max cruising speed:	
at FL250	480 kt (890 km/h; 553 mph)
at FL300	M0.82 (484 kt; 897 km/h; 557 mph)
Typical long-range cruising speed at FL310	M0.80 (472 kt; 875 km/h; 543 mph)
Approach speed: 600	135 kt (249 km/h; 155 mph)
600R	136 kt (251 km/h; 156 mph)
Max operating altitude	12,200 m (40,000 ft)
Runway ACN for flexible runway, category B: standard bogie and tyres: 600	

600R	59
600R (option)	60
optional bogie and tyres: 600	52
600R	55
600R (option)	56
T-O field length at S/L, ISA + 15°C:	
600: A	2,378 m (7,800 ft)
B	2,270 m (7,450 ft)
600R: A (C2A5 engines)	2,408 m (7,900 ft)
B (PW4158 engines)	2,362 m (7,750 ft)
Landing field length: 600	1,536 m (5,040 ft)
600R	1,555 m (5,100 ft)
Range (1996 and subsequent deliveries) at typical airline	
OWE with 266 passengers and baggage, reserves for	
200 n miles (370 km; 230 miles):	
600, GE/PW engines	3,700 n miles (6,852 km; 4,257 miles)
600R, GE/PW engines, standard fuel	4,050 n miles (7,500 km; 4,660 miles)
600R, GE/PW engines, optional fuel	4,157 n miles (7,700 km; 4,784 miles)
OPERATIONAL NOISE LEVELS (A300-600R, ICAO Annex 16, Chapter 3):	
T-O: A	91.1 EPNdB (96.3 limit)
B	92.2 EPNdB (96.3 limit)
Sideline: A	98.6 EPNdB (99.9 limit)
B	97.7 EPNdB (99.9 limit)
Approach: A	99.8 EPNdB (103.3 limit)
B	101.7 EPNdB (103.3 limit)

UPDATED

AIRBUS A300-600 CONVERTIBLE and A300-600 FREIGHTER

TYPE: Twin-jet freighter.
PROGRAMME: Specialised versions of A300-600. First flight of A300-600F 2 December 1993; certified early April 1994, delivered to Federal Express 27 April and entered service in same month; A300-600F powered by GE CF6-80C2A5 with FADEC was first A300-600 version to operate with 180-minute ETOPS in May 1994.

CURRENT VERSIONS: **Convertible:** For all-passenger or all-cargo configuration. Typical options include accommodation (in mainly eight-abreast seating) for maximum 375 passengers (subject to certification) on the main deck; or up to twenty 2.24 x 3.17 m (88 x 125 in) pallets; or five 88 x 125 in plus nine 2.44 x 3.17 m (96 x 125 in) pallets.

Freighter: For freighting only; no passenger systems provided; various systems options give airlines ability to adapt basic aircraft to specific freight requirements; Airbus offers conversion with port-side forward freight door, or as new-production **A300F4-600R**, with payload capacity of 54,000 kg (119,050 lb). Freighter conversions, offered by Airbus UK and EADS EFW, are detailed in *Jane's Aircraft Upgrades*; over 65 under conversion or completed by June 2001; maiden flight 13 December 2001 (D-ASAE, c/n 477); certified by LBA and FAA eight days later.

General Freighter: Similar to A300-600F, but with side door and cargo loading system able to handle all sizes of freight from small packets to large containers. Launch customer Air Hong Kong, which announced order for six in January 2003 (deliveries from 2004), with further four on option.

CUSTOMERS: Federal Express became A300-600 Freighter launch customer July 1991 with order for 25 and commitments for 50 more, of which 11 confirmed as orders in September 1996; all now delivered. UPS placed order on 9 September 1998 for 30 PW4158 powered A300F4-600R Freighters plus options on a further 45 (later confirmed and a further 15 firm orders, to total 90, of which 24 delivered and in operation by mid-2002); 30 more on option. Deliveries began mid-2000; UPS has an option to convert some of the order to A380s if it wishes. First (of two) for CityBird of Belgium delivered 23 July 1999; production set to continue to at least 2009. As at April 2003, orders and commitments for A300F4-600R totalled 134.

STRUCTURE: Generally similar to A300-600. Main differences are large port-side main deck cargo door, reinforced cabin floor, smoke detection system in main cabin; main deck cargo door is on opposite side to door of forward

underfloor hold, allowing simultaneous loading or unloading at all positions.

POWER PLANT: Options as for A300-600R; first example was first Airbus aircraft powered by GE CF6-80C2A5 with FADEC.

DIMENSIONS, EXTERNAL: As A300-600R, plus:
Main deck cargo door (fwd, port):
Height (projected) 2.57 m (8 ft 5 1/4 in)
Width 3.58 m (11 ft 9 in)
Height to sill 4.91 m (16 ft 1 in)

DIMENSIONS, INTERNAL:
Cabin main deck usable for cargo:
Length 33.45 m (109 ft 9 in)
Min height 2.01 m (6 ft 7 in)
Max height:
ceiling trim panels in place 2.22 m (7 ft 3 1/2 in)
without ceiling trim panels 2.44 m (8 ft 0 in)
Volume 192.0-203.0 m³ (6,780-7,169 cu ft)

WEIGHTS AND LOADINGS (basic Convertible. A: with CF6-80C2A5 engines, B: with PW4158 engines):

Manufacturer's weight empty:
A, passenger mode 82,555 kg (182,000 lb)
B, passenger mode 82,470 kg (181,815 lb)
A, freight mode 80,345 kg (177,130 lb)
B, freight mode 80,260 kg (176,945 lb)

Operating weight empty:
A, passenger mode 93,550 kg (206,240 lb)
B, passenger mode 93,475 kg (206,075 lb)
A, freight mode 81,600 kg (179,895 lb)
B, freight mode 81,525 kg (179,730 lb)

Max payload (structural):
A, passenger mode 36,448 kg (80,354 lb)
B, passenger mode 36,523 kg (80,519 lb)
A, freight mode 48,400 kg (106,705 lb)
B, freight mode 48,475 kg (106,870 lb)
Max T-O weight: A, B 170,500 kg (375,900 lb)
Max landing weight: A, B 140,000 kg (308,650 lb)
Max zero-fuel weight: A, B 130,000 kg (286,600 lb)

WEIGHTS AND LOADINGS (basic Freighter variant of -600R):
Manufacturer's weight empty:
A 78,335 kg (172,700 lb)
B 78,250 kg (172,510 lb)
Operating weight empty: A 79,050 kg (174,275 lb)
B 78,980 kg (174,120 lb)

Max payload (structural):
A, range mode 50,950 kg (112,325 lb)
B, range mode 51,020 kg (112,480 lb)
A, payload mode 54,750 kg (120,705 lb)
B, payload mode 54,820 kg (120,855 lb)
Max T-O weight: A, B:
range mode 170,500 kg (375,900 lb)
payload mode 165,100 kg (363,980 lb)
Max landing weight: A, B:
range mode 140,000 kg (308,650 lb)
payload mode 140,600 kg (309,970 lb)
Max zero-fuel weight: A, B:
range mode 130,000 kg (286,600 lb)
payload mode 133,800 kg (294,980 lb)

PERFORMANCE:
Range with max (structural) payload, allowances for 30 min hold at 460 m (1,500 ft) and 200 n mile (370 km; 230 mile) diversion:
A, B, range mode 2,650 n miles (4,908 km; 3,050 miles)
A, B, payload mode 1,900 n miles (3,519 km; 2,186 miles)

UPDATED

AIRBUS A310

Canadian Forces designation: CC-150 Polaris
TYPE: Wide-bodied airliner.

PROGRAMME: Launched 7 July 1978; first flight (F-WZLH) 3 April 1982; initial French/German certification 11 March 1983; first deliveries (Lufthansa and Swissair) 29 March 1983, entering service 12 and 21 April respectively; JAA Cat. IIIa certification (France/Germany) September 1983; UK certification January 1984; JAA Cat. IIIB November 1984; FAA type approval early 1985. First flight of extended-range A310-300 8 July 1985 (certified with JT9D-7R4E engines 5 December 1985, delivered to launch

DEVELOPMENT MILESTONES

A310-200	
Launched	7 Jul 78
First flight	3 Apr 82
Certification	11 Mar 83
First deliveries (Lufthansa, Swissair)	29 Mar 83
Entered service (Lufthansa)	12 Apr 83
First Convertible delivered (Martinair)	29 Nov 84

Subsequent versions	
A310-300	
Launched	29 Mar 83
First flight	8 Jul 85
Certification	5 Dec 85
First delivery (Swissair)	17 Dec 85
First flight of Convertible	30 Jan 01

customer Swissair 17 December); wingtip fences introduced as standard on A310-200 from early 1986 (first delivery: Thai Airways, 7 May); certification/delivery of A310-300 with CF6-80C2 engines April 1986, with PW4152s June 1987. Russian State Aviation Register certification October 1991 (first Western-built aircraft to achieve this status). A310s powered by PW4000 series and CF6-80C2 approved for 180-minute ETOPS. Enhanced GPWS installed March 1997, following certification.

CURRENT VERSIONS: **A310-200:** Basic passenger version. Detailed description mainly applies to A310-200.

A310-200C: Convertible version of A310-200; first delivery (Martinair) 29 November 1984.

A310-P2F: Conversion of A310-200 marketed by EADS EFW in Dresden; max payload 40,600 kg (89,508 lb) and max T-O weight 142,000 kg (313,055 lb). Large cargo door in forward fuselage, port side. Main cargo deck accommodates up to eleven 2.44 x 3.18 m (96 x 125 in) or sixteen 2.24 x 3.18 m (88 x 125 in) pallets, or a mix of both; plus further three pallets of former size in underfloor hold, in addition to six LD3s; alternatively 14 LD3s can be carried in underfloor hold. Total available internal volume 302 m³ (10,665 cu ft) standard, or up to 338 m³ (11,936 cu ft) using winged pallets in front belly hold. See *Jane's Aircraft Upgrades* for further details.

A310-300: Extended-range passenger version, launched March 1983; second member of Airbus family to introduce delta-shaped wingtip fences as standard. Extra range provided by increased basic maximum T-O weight (150,000 kg; 330,695 lb) and greater fuel capacity (higher maximum T-O weights optional); standard extra fuel capacity is in tailplane, allowing in-flight CG control for improved fuel efficiency. For extra long range, one or two ACTs (additional centre tanks) can be installed in part of cargo hold; modification certified November 1987 (first customer Wardair of Canada).

A310-300 also available as conversion by EADS/EFW; initial example (for Federal Express) first flown 30 January 2001. See *Jane's Aircraft Upgrades* for further details.

AIRBUS A310 MARKS AND VARIANTS

Series	Mark	Power Plant	FAA Certification
200	203	CF6-80A3	21 Feb 85
200	204	CF6-80C2A2	8 Jan 01
200	221	JT9D-7R4D1	21 Feb 85
200	222	JT9D-7R4E1	21 Feb 85
300	304	CF6-80C2A2	12 Feb 88
300	322	JT9D-7R4E1	10 Jun 87
300	324	PW4152	10 Jun 87
300	325	PW4156A	22 Mar 96

Series	Variant	MTOW (kg)
200	00	132,000
200	01	138,600
200	04	142,000
300	00	150,000
300	01	153,000
300	05	157,000
300	08	164,000

Note: Variant parameters may include differences in data other than max T-O weight. Except as constrained by Series, Variants are applicable to several engine options.

CUSTOMERS: Total of 260 sold and delivered (including prototype). Final aircraft first flew 6 April 1998 and delivered to Uzbekistan Airways on 15 June 1998 as UK-31003.

{OL}Belgian Air Force obtained two second-hand A310-200s in 1997; Canadian Forces operate five A310-300s, German Luftwaffe seven and French Air Force three; last-named have ETOPS for 180 minutes; Spanish intention to buy two for VVIP use, following modification by EADS CASA, announced December 2000. Details of projected military versions appear under Airbus Military Company (AMC, which see).



Airbus A300-600F freighter of United Parcel Service

NEW/0527076

AIRBUS A310 ORDERS
 (at 1 January 2004)

Customer	Qty
Aeroflot	5
Air Afrique	4
Air Algerie	2
Air France	11
Air India	8
Air Niugini	2
Austrian Airlines	4
Balair	4
Biman Bangladesh	2
British Caledonian Airways	2
China Eastern Airlines	5
Condor Flugdienst	5
Cyprus Airways	4
Czech Airlines	2
Delta	9
Ecuatoriana	2
Emirates	8
Hapag Lloyd Flug	7
Interflug	3
ILFC	7
Iraqi Airways	5 (delivered elsewhere)
Kenya Airways	2
KLM	10
Kuwait Airways	11
Lufthansa	20
Martinair	2
Nigeria Airways	4
Oasis Group	2
Pakistan International Airlines	6
Pan Am	18
Royal Jordanian	6
Royal Thai Air Force	1
Sabena	3
Singapore Airlines	23
Somali Airlines	1
Swissair	9
TAP-Air Portugal	5
Tarom	2
Thai Airways	2
THY	14
Trans European Airways	1
Uzbekistan Airways	1
Wardair	12
Yemenia	2
Undisclosed	2
Total	260

COSTS: US\$86.9 million (2001).

DESIGN FEATURES: Retains same fuselage cross-section as A300, but with cabin 11 frames shorter and overall fuselage 13 frames shorter than A300B2/B4-100 and -200; new advanced-technology wings of reduced span and area; new and smaller horizontal tail surfaces; common pylons able to support all types of GE and PW engines offered; advanced digital two-man cockpit; landing gear modified to cater for size and weight changes. Wings have 28° sweepback at quarter-chord, root incidence 5° 3', dihedral 11° 8' (inboard) and 4° 3' (outboard) at trailing-edge, and thickness/chord ratios of 15.2 (root), 11.8 (at trailing-edge kink) and 10.8 per cent (tip).

FLYING CONTROLS: Wing leading-edge movable surfaces as for A300-600; trailing-edges each have single Fowler flap outboard, vane Fowler flap inboard, lateral control by inboard all-speed aileron and fly-by-wire outboard spoilers, without outboard ailerons; all 14 spoilers used as lift dumpers, inner eight also as airbrakes; fly-by-wire spoiler panels controlled by two independent computer systems with different software to ensure redundancy and operational safety. Tail control surfaces as for A300-600.

STRUCTURE: Mainly of high-strength aluminium alloy except for outer shrouds (structure in place of low-speed ailerons), spoilers, wing leading-edge lower access panels and outer deflector doors, nosewheel doors, mainwheel leg fairing doors, engine cowlings, elevators and fin box, which are all of CFRP; A310 was first production airliner to have carbon fin box, starting with A310-300 for Swissair in December 1985; flap track fairings, flap access doors, rear wing/body fairings, pylon fairings, nose radome, cooling air inlet fairings and tailplane trailing-edges made of AFRP; wing leading-edge top panels, panel aft of rear spar, upper surface skin panels above mainwheel bays, forward wing/body fairings, glideslope antenna cover, fin leading/trailing-edges, fin and tailplane tips (GFRP); and rudder (CFRP/GFRP). Wing box is two-spar multirib metal structure, with top and bottom load-carrying skins. Undertail bumper beneath rear fuselage, to protect structure against excessive nose-up attitude during T-O and landing.

Manufacturing breakdown differs in detail from that of A300-600: Airbus France builds nose section (including flight deck), lower centre-fuselage and wing box, rear wing/body fairings, engine pylons and airbrakes, and is responsible for final assembly; Airbus Deutschland builds forward fuselage, upper centre-fuselage, rear fuselage and



Pakistan International Airlines Airbus A310-300

NEW/0543356

associated doors, tailcone, fin and rudder, flaps and spoilers, and fits control surfaces and equipment to main wing structure produced by Airbus UK; Airbus España's contribution includes horizontal tail surfaces, nose-gear and mainwheel doors, and forward passenger doors; Stork Aerospace manufactures main landing gear leg doors, wingtips, all-speed ailerons and flap track fairings; wing leading-edge slats and forward wing/fuselage fairings produced by Belgian Belairbus consortium. An A310 of German Luftwaffe used as testbed for fuselage panel constructed from a new lightweight composites material, Glare, in preparation for its use in A380; this is first employment of Glare in a primary structure.

LANDING GEAR: Hydraulically retractable tricycle type. Twin-wheel steerable nose unit (steering angle 65°/95°) as for A300. Main gear by Messier-Bugatti, each bogie having two tandem-mounted twin-wheel units. Retraction as for A300-600. Standard tyre sizes: main, 46×16-20 (28/30 ply), pressure 11.24 bar (163 lb/sq in); nose, 40×14 or 40×14.0R16 (22/24 ply), pressure 9.03 bar (131 lb/sq in). Two options for low-pressure tyres on main units: (1) size 49×17.0R20 (30/32 ply), pressure 9.86 bar (143 lb/sq in); (2) size 49×19-20, pressure 8.89 bar (129 lb/sq in). Messier-Bugatti brakes and anti-skid units standard; Bendix type optional on A310-200. Carbon brakes standard since 1986. Minimum ground turning radius (effective, aft CG) 18.75 m (61 ft 6 in) about nosewheel, 33.00 m (108 ft 3¼ in) about wingtips.

POWER PLANT: Launched with two 213.5 kN (48,000 lb st) Pratt & Whitney JT9D-7R4D1 or 222.4 kN (50,000 lb st) General Electric CF6-80A3 turbofans; currently available with 238 kN (53,500 lb st) CF6-80C2A2, or 231 kN (52,000 lb st) Pratt & Whitney PW4152. Available from late 1991 with 262 kN (59,000 lb st) CF6-80C2A8 or 249 kN (56,000 lb st) PW4156A.

Total usable fuel capacity 54,920 litres (14,509 US gallons; 12,081 Imp gallons) in A310-200. Increased to 61,070 litres (16,133 US gallons; 13,434 Imp gallons) in basic A310-300 by additional fuel in tailplane trim tank. Further 7,200 litres (1,902 US gallons; 1,584 Imp gallons) can be carried in each, of up to two, additional centre tanks (ACT) in forward part of aft cargo hold. Two refuelling points, one beneath each wing outboard of engine.

ACCOMMODATION: Crew of two on flight deck; provision for third and fourth crew seats. Cabin, with six-, seven-, eight- or nine-abreast seating, normally for 210 to 250 passengers, although certified for up to 280; typical two-class layout for 220 passengers (20 first class, six-abreast at 102 cm; 40 in seat pitch, plus 200 economy class mainly eight-abreast at 81 cm; 32 in pitch); maximum capacity for 280 passengers nine-abreast in high-density configuration at pitch of 76 cm (30 in). Standard layout has two galleys and lavatory at forward end of cabin, plus two galleys and four lavatories at rear; depending on customer requirements, second lavatory can be added forward, and lavatories and galleys can be located at forward end at class divider position. Overhead baggage stowage as for A300-600, rising to 0.09 m³ (3.2 cu ft) per passenger in typical economy layout. Four passenger doors, one forward and one aft on each side; oversize Type I emergency exit over wing on each side. Underfloor baggage/cargo holds fore and aft of wings, each with door on starboard side; forward hold accommodates eight LD3 containers or three 2.24 × 3.17 m (88 × 125 in) standard or three 2.44 × 3.17 m (96 × 125 in) optional pallets; rear hold accommodates six LD3 containers, with optional seventh LD3 or LD1 position; LD3 containers can be carried two-abreast, and/or standard pallets installed crosswise.

SYSTEMS: Honeywell 331-250 APU. Air conditioning system, powered by compressed air from engines, APU or a ground supply unit; two separate packs; air is distributed to flight deck, three separate cabin zones, electrical and electronic equipment, avionics bay and bulk cargo compartment; ventilation of forward cargo compartments optional. Pressurisation system has maximum normal differential of 0.57 bar (8.25 lb/sq in). Air supply for wing ice protection, engine starting and thrust reverser system bled from various stages of engine compressors, or supplied by APU or ground supply unit.

Hydraulic system (three fully independent circuits operating at 207 bar (3,000 lb/sq in) details as described for A300-600).

Electrical system, similar to that of A300-600, consists of a three-phase 115/200 V 400 Hz constant frequency AC system and a 28 V DC system; two 90 kVA engine-driven brushless generators for normal single-channel operation, with automatic transfer of busbar in the event of a generator failure; each has overload rating of 135 kVA for 5 minutes and 180 kVA for 5 seconds; third (identical) AC generator, directly driven at constant speed by APU, can be used during ground operations, and also in flight to compensate for loss of one or both engine-driven generators; current production A310s have APU with improved re-light capability, which can be started and operated throughout the flight envelope. Any one generator can provide sufficient power to operate all equipment and systems necessary for indefinite period of safe flight; DC power is generated via three 150 A transformer-rectifiers; three Ni/Cd batteries.

Flight crew oxygen system fed from rechargeable pressure bottle of 2,166 litres (76.5 cu ft) capacity; standard options are second 76.5 cu ft bottle, a 3,256 litre (115 cu ft) bottle, and an external filling connection; emergency oxygen sets for passengers and cabin attendants. Anti-icing of outer wing leading-edge slats and engine air intakes by hot air bled from engines; and of pitot probes, static ports and plates, and sensors, by electric heating.

For current production A310s, an ETOPS modification kit, as for the A300-600, is available.

AVIONICS: As described for A300-600. A310 was first airliner to introduce CRTs with its ECAM system.

DIMENSIONS, EXTERNAL:

Wing span	43.90 m (144 ft 0 in)
Wing chord: at root	8.38 m (27 ft 6 in)
at tip	2.18 m (7 ft 1¼ in)
Wing aspect ratio	8.8
Length overall	46.66 m (153 ft 1 in)
Fuselage: Length	45.13 m (148 ft 0¼ in)
Max diameter	5.64 m (18 ft 6 in)
Height overall	15.80 m (51 ft 10 in)
Tailplane span	16.26 m (53 ft 4¼ in)
Wheel track	9.60 m (31 ft 6 in)
Wheelbase (c/l of shock-absorbers)	15.21 m (49 ft 10¼ in)
Passenger door (forward, port): Height	1.93 m (6 ft 4 in)
Width	1.07 m (3 ft 6 in)
Height to sill at OWE	4.54 m (14 ft 10¼ in)
Passenger door (rear, port): Height	1.93 m (6 ft 4 in)
Width	1.07 m (3 ft 6 in)
Height to sill at OWE	4.85 m (15 ft 11 in)
Servicing doors (forward and rear, stbd)	as corresponding passenger doors

Upper deck cargo door (A310C/F)	as A300-600F
Emergency exits (overwing, port and stbd, each):	
Height	1.39 m (4 ft 6¼ in)
Width	0.67 m (2 ft 2½ in)
Underfloor cargo door (forward):	
Height	1.71 m (5 ft 7¼ in)
Width	2.69 m (8 ft 10 in)
Height to sill at OWE	2.61 m (8 ft 6¼ in)
Underfloor cargo door (rear):	
Height	1.71 m (5 ft 7¼ in)
Width	1.81 m (5 ft 11¼ in)
Height to sill at OWE	2.72 m (8 ft 11 in)

Underfloor cargo door (aft bulk hold):	
Height	0.95 m (3 ft 1½ in)
Width	0.95 m (3 ft 1½ in)
Height to sill at OWE	2.75 m (9 ft 0¼ in)

DIMENSIONS, INTERNAL:

Cabin, excl flight deck: Length	33.25 m (109 ft 1 in)
Max width	5.28 m (17 ft 4 in)
Max height	2.33 m (7 ft 7¼ in)
Volume	210.0 m³ (7,416 cu ft)
Forward cargo hold: Length	7.63 m (25 ft 0¼ in)
Max width	4.18 m (13 ft 8¼ in)
Height	1.71 m (5 ft 7¼ in)
Volume	50.3 m³ (1,776 cu ft)
Rear cargo hold: Length	5.03 m (16 ft 6¼ in)
Max width	4.17 m (13 ft 8¼ in)
Height	1.67 m (5 ft 5¼ in)
Volume	34.5 m³ (1,218 cu ft)
Aft bulk hold: Volume	17.3 m³ (611 cu ft)
Total overall cargo volume	102.1 m³ (3,605 cu ft)

AREAS:

Wings, gross	219.00 m ² (2,357.3 sq ft)
Ailerons (total)	6.86 m ² (73.84 sq ft)
Trailing-edge flaps (total)	36.68 m ² (394.82 sq ft)
Leading-edge slats (total)	28.54 m ² (307.20 sq ft)
Spoilers (total)	7.36 m ² (79.22 sq ft)
Airbrakes (total)	6.16 m ² (66.31 sq ft)
Vertical and horizontal tail surfaces	as A300-600

WEIGHTS AND LOADINGS (220-seat configuration. C2: CF6-80C2A2 engines, P2: PW4152s, C8: CF6-80C2A8s, P6: PW4156As):

Manufacturer's weight empty:

200: C2	71,660 kg (157,975 lb)
P2	71,600 kg (157,850 lb)
300: C2	72,140 kg (159,040 lb)
P2	72,080 kg (158,910 lb)
C8	72,525 kg (159,890 lb)
P6	72,455 kg (159,735 lb)

Operating weight empty:

200: C2	80,140 kg (176,685 lb)
P2	80,125 kg (176,645 lb)
300: C2	81,205 kg (179,025 lb)
P2	81,165 kg (178,940 lb)
C8	81,610 kg (179,920 lb)
P6	81,545 kg (179,775 lb)

Max payload: 200: C2

P2	32,858 kg (72,439 lb)
300: C8	32,875 kg (72,476 lb)
P6	32,388 kg (71,403 lb)
P6	32,456 kg (71,553 lb)

Max usable fuel: 200

300	44,100 kg (97,224 lb)*
300	49,039 kg (108,110 lb)

Max T-O weight: 200

300: basic	142,000 kg (313,050 lb)
option 1	150,000 kg (330,675 lb)
option 2	157,000 kg (346,125 lb)
option 2	164,000 kg (361,550 lb)

Max landing weight: 200, 300

options (200 and 300)	123,000 kg (271,150 lb)
options (200 and 300)	124,000 kg (273,375 lb)

Max zero-fuel weight: 200, 300

options (200 and 300)	113,000 kg (249,120 lb)
options (200 and 300)	114,000 kg (251,325 lb)

*optional additional tank in aft cargo hold adds 5,779 kg (12,740 lb) of fuel and increases OWE/reduces max payload by 726 kg (1,600 lb). Two additional tanks add 11,560 kg (25,485 lb) of fuel and increase OWE/reduce max payload by 1,536 kg (3,386 lb)

PERFORMANCE (at basic max T-O weight except where indicated; engines as under Weights and Loadings):

Typical long-range cruising speed at FL310-410:

C2, P2, C8, P6	M0.80
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Max operating Mach No. (Mmo) 0.84

Approach speed at max landing weight:

C2, P2, C8, P6	135 kt (250 km/h; 155 mph)
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T-O field length at S/L, ISA + 15°C:

200: C2	1,960 m (6,430 ft)
P2	1,890 m (6,200 ft)
300: C2 (at 150 tonne MTOW)	2,410 m (7,910 ft)
P2 (at 150 tonne MTOW)	2,180 m (7,155 ft)
C8 (at 164 tonne MTOW)	2,485 m (8,155 ft)
P6 (at 164 tonne MTOW)	2,360 m (7,745 ft)

Landing field length at S/L, at max landing weight (200 and 300): C2

P2	1,479 m (4,850 ft)
P2	1,555 m (5,100 ft)

Runway ACN for flexible runway, category B:

standard tyres: 200	43
300	49
optional tyres: 200	41
300	47

Range (1991 and subsequent deliveries) at typical airline OWE with 220 passengers and baggage, international reserves for 200 n mile (370 km; 230 mile) diversion:

200, GE engines	3,650 n miles (6,759 km; 4,200 miles)
200, PW engines	3,600 n miles (6,667 km; 4,142 miles)
300, GE engines	4,300 n miles (7,963 km; 4,948 miles)
300, PW engines	4,350 n miles (8,056 km; 5,005 miles)
300, option, at T-O weight 157,000 kg (346,125 lb):	
GE engines	4,750 n miles (8,797 km; 5,466 miles)
PW engines	4,800 n miles (8,889 km; 5,523 miles)
300, option, at T-O weight 164,000 kg (361,560 lb):	
GE engines	5,150 n miles (9,537 km; 5,926 miles)
PW engines	5,200 n miles (9,630 km; 5,984 miles)



Airbus A320 operated by JetBlue Airways

NEW/0527080



TunisAir has bought 12 Airbus A320s

NEW/0527081

OPERATIONAL NOISE LEVELS (ICAO Annex 16, Chapter 3):

T-O: 200: C2	89.6 EPNdB (95.3 limit)
300: C2	91.2 EPNdB (95.6 limit)
Sideline: 200: C2	96.4 EPNdB (99.2 limit)
300: C2	96.3 EPNdB (99.4 limit)
Approach: 200, 300: C2	98.6 EPNdB (102.9 limit){/OL}

UPDATED

AIRBUS A320

TYPE: Twin-jet airliner.

PROGRAMME:

DEVELOPMENT MILESTONES

A320-100	
Launched	23 Mar 84
First flight	22 Feb 87
Certification	26 Feb 88
First delivery (Air France)	28 Mar 88
Subsequent versions	
A320-200	
Certification	8 Nov 88

Launched 23 March 1984; four-aircraft development programme (first flight 22 February 1987 by F-WWAI); JAA (UK/French/German/Dutch) certification of A320-100 with CFM56-5 engines, for two-crew operation, awarded 26 February 1988; first deliveries (Air France and British Airways) 28 and 31 March 1988 respectively; JAA certification of A320-200 with CFM56-5s received 8 November 1988, followed by FAA type approval for both models 15 December 1988; certification with V2500 engines (first flown 28 July 1988) received 20 April (JAA) and 6 July 1989 (FAA), deliveries with this power plant (to Adria Airways) beginning 18 May 1989; FAA approved common type rating on A320 and A321 without further training in early 1994; 500th A320 delivered, 20 January 1995, to United Airlines; 1,000th member of family (an A319) and 1,001st (A320 for United Airlines) were delivered 15 April 1999. Chosen by Thales as platform for its competitor in the South Korean Air Force's E-X AEW&C requirement. In 2000, Airbus agreed to transfer A320 assembly from Toulouse to Hamburg, where A319 and A321 already produced.

CURRENT VERSIONS: **A320-100:** Initial version (21 ordered).

Superseded by A320-200. Max T-O weight 68,000 kg (149,940 lb); fuel capacity (usable) 24,090 litres (6,364 US gallons; 5,299 Imp gallons).

A320-200: Now called simply **A320**. Basic version from third quarter 1988; differs from initial A320-100 in having wingtip fences, wing centre-section fuel tank and higher maximum T-O weights.

Detailed description applies to A320-200.

MPA 320: Proposed maritime patrol version as replacement for Dassault-Breguet Atlantic 1; see AMC entry.

A320 research: An A320 was used for riblet research 1989-91. In mid-1998 Airbus Industrie began testing an experimental laminar-flow fin on an A320; air is sucked through small holes in the leading-edge to reduce drag and save fuel.

A320 Freighter, Convertible and Quick-Convertible: Freight variants under consideration by Airbus and Hindustan Aeronautics; cargo capacities would be 20,000 kg (44,090 lb), 22,000 kg (48,500 lb) and 30,000 kg (66,140 lb), respectively. EADS EFW began feasibility studies in 2001 into producing freight versions of the A320 and A321; considering the start of a conversion line in 2008.

A318: Shortened version of A320; described separately.

A319: Shortened version of A320; described separately.

A321-100 and -200: Stretched versions of A320; described separately.

AIRBUS A320 MARKS AND VARIANTS

Series	Mark	Power Plant	FAA Certification
100	111	CFM56-5A1	15 Dec 88
200	211	CFM56-5A1	15 Dec 88
200	212	CFM56-5A3	26 Nov 90
200	214	CFM56-5B4	
		or 5B4/P or -5B4/2P	12 Dec 96
200	231	V2500-A1	6 Jun 89
200	232	V2527-A5	12 Nov 93
200	233	V2527E-A5	17 Nov 95

Series	Variant	MTOW (kg)
100	000	68,000
200	000	73,500
200	001	68,000
200	003	75,500
200	007	77,000
200	008	73,500
200	009	75,500
200	010	77,000
200	011	75,500
200	012	77,000
200	013	71,500
200	014	73,500

Note: Variant parameters may include differences in data other than max T-O weight. Except as constrained by Series, Variants are applicable to several engine options.



Airbus A320 of bmi (British Midland Airways)

NEW/0567737

CUSTOMERS: Total 1,679 sold by 31 December 2003, of which 1,247 then delivered.

AIRBUS A320 ORDERS
(at 1 January 2004)

Customer	Qty
ACES	8
Adria Airways	5
Aer Lingus	11
Aero Lloyd	4
Aeroflot	2
Aerostar	12
Air 2000	4
Air Caledonie	1
Air Canada	28
Air France	31
Air Inter Europe	22
Air Jamaica	4
Air Malta	2
Air New Zealand	5
Alitalia	11
All Nippon Airways	28
America West Airlines	21
Ansett Australia	19
Asiana Airlines	2
Austrian Airlines	8
Boulliou Aviation Services	20
British Airways	32
British Midland Airways	6
Canadian Airlines International	2
China Aviation Supplies	6
China Eastern Airlines	30
China Northwest Airlines	13
China Southern Airlines	20
CIT Group	46
Condor Flugdienst	12
Croatia Airlines	2
Cyprus Airways	8
Debis AirFinance	14
Dragonair	5
Edelweiss Air AG	3
Egyptair	12
Finnair	9
Flightlease	9
GATX/CL AIR	35
GATX/Flightlease	2
GB Airways	7
GECAS	78
GPA	51
Gulf Air	14
Iberia	56
Iberworld	2
ILFC	200
Indian Airlines	31
JetBlue Airways	143
Kawasaki Leasing International	8
Kuwait Airways	4
LAN Chile	14
Lombard	5
Lotus Airline	1
LTU	4
Lufthansa	37
Mexicana	16
Monarch Airlines	2
MyTravel Airways	6
Northwest Airlines	84
Nouvelair	2
ORIX Corporation	24
Philippine Airlines	4
Qantas	9
Qatar Airways (incl Amiri Flight)	11
Royal Jordanian	3
SALE	43
Sabena	3
Shorouk Air	2
Sichuan Airlines	2
Silkair	10
South African Airways	22
Spanair	11
SriLankan Airlines	2
Sudan Airways	1
Swissair	17
Syrian Arab Airlines	6
TACA	40
TAM	25
TAP-Air Portugal	5
Thomas Cook	2
TransAsia Airways	5
Tunis Air	12
United Airlines	117
US Airways	30
Zhejiang Airlines	3
undisclosed	4
undisclosed cancellations	(-13)
Total	1,679



Airbus A320 flight deck with sidestick controllers outboard and six-screen EFIS NEW/0527082

COSTS: Average cost of A320-200 is US\$53.7 million, depending on choice of engines, customisation and design weights (2001).

DESIGN FEATURES: First subsonic commercial aircraft to have composites for major primary structures, and centralised maintenance system; advanced-technology wings have 25° sweepback at quarter-chord, 5° 6' 36" dihedral plus experience from A310 and significant commonality with other Airbus aircraft where cost-effective; 6° tailplane dihedral.

FLYING CONTROLS: A320 is first subsonic commercial aircraft equipped for fly-by-wire (FBW) control throughout entire normal flight regime, and first to have sidestick controller (one for each pilot) instead of control column and aileron wheel. Thales/SFENA digital FBW system features five main computers and operates, via electrical signalling and hydraulic jacks, all primary and secondary flight controls; pilot's pitch and roll commands are applied through sidestick controller via two different types of computer; these have redundant architecture to provide safety levels at least as high as those of mechanical systems they replace; system incorporates flight envelope protection features to a degree that cannot be achieved with conventional mechanical control systems and its computers will not allow aircraft's structural and aerodynamic limitations to be exceeded; even if pilot holds sidestick fully forward, it is impossible to go beyond aircraft's maximum operating speed (Vmo) for more than a few seconds; if pilot holds sidestick fully back, aircraft is controlled to an 'alpha floor' angle of attack, a safe airspeed above stall and throttles opened automatically to ensure positive climb. Nor is it possible to exceed g limits while manoeuvring. If a bank angle of more than 30° is commanded with the sidestick, the bank angle is automatically returned to 30° when pressure is released.

Fly-by-wire system controls ailerons, elevators, spoilers, flaps and leading-edge slats; rudder movement and tailplane trim connected to FBW system, but also signalled mechanically when used to provide final back-up pitch and yaw control, which suffices for basic instrument flying. Each wing has five-segment leading-edge slats (one inboard, four outboard of engine pylon), two-segment Fowler trailing-edge flaps, and five-segment spoilers forward of flaps; all 10 spoilers used as lift dumpers, inner six as airbrakes, outer eight and ailerons for roll control and outer four and ailerons for gust alleviation; slat and flap controls by Liebherr and Lucas.

STRUCTURE: Generally similar to A310, but with AFRP for fuselage belly fairing skins; GFRP for fin leading-edge and fin/fuselage fairing; CFRP for wing fixed leading/ trailing-edge bottom access panels and deflectors, trailing-edge flaps and flap track fairings, spoilers, ailerons, fin (except

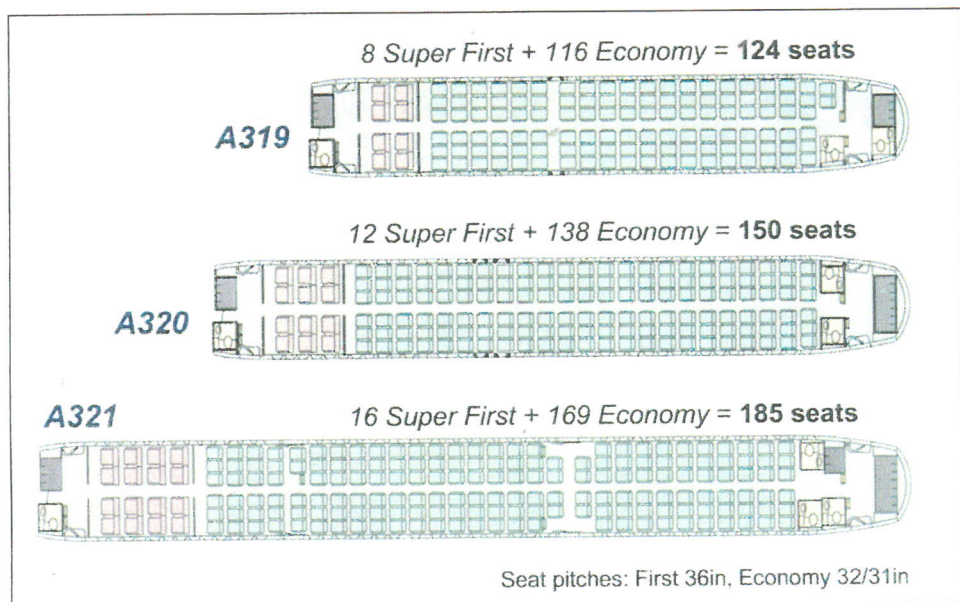
leading-edge), rudder, tailplane, elevators, nosewheel/ mainwheel doors, and main gear leg fairing doors. A320 was first airliner to go into production with CFRP tailplane.

Airbus France builds entire front fuselage (forward of wing leading-edge), cabin rear doors, nosewheel doors, centre wing box and engine pylons, and is responsible for final assembly; centre and rear fuselage, tailcone, wing flaps, fin, rudder and commercial furnishing undertaken by Airbus Deutschland; Airbus UK builds main wings, including ailerons, spoilers and wingtips, and main landing gear leg fairings; Belgian consortium Belairbus produces leading-edge slats; Airbus España responsible for tailplane, elevators, mainwheel doors, and sheet metal work for parts of rear fuselage; Mitsubishi builds wingroot shroud box under Airbus UK subcontract; AVIC I of China provides wing components and signed an MoU in November 2000 to increase its participation, possibly leading to complete wing production by 2007; GKN Aerospace providing cargo door actuators from January 2002. Final assembly undertaken at Toulouse until 2000; now at Hamburg.

LANDING GEAR: Hydraulically retractable tricycle type, with twin wheels and oleo-pneumatic shock-absorber on each unit (four-wheel main-gear bogies, for low-strength runways, optional); Dowty main units retract inward into wing/body fairing; steerable Messier-Bugatti nose unit retracts forward; nosewheel steering angle ±75° (effective turning angle ±70°). Tyre size 46x16 or 46x17.0R20 (30 ply) on main gear and 30x8.8 or 30x8.8-R15 (16 ply) on nose gear; optional tyres for main gear are 49x17 or 49x17R20 or 49x19R20 or 46x16-20 or 49x19-20. Tyres for main-gear bogie option are 915x300R16 or 36x11 or 46x17.0R20. Carbon brakes standard. Minimum ground turning radius 13.80 m (45 ft 3¼ in) about nosewheels, 22.90 m (75 ft 1½ in) about mainwheels. Minimum width of pavement for 180° turn 23.1 m (75 ft 9½ in).

POWER PLANT: Two turbofans. Options comprise IAE V2500-A1, V2527-A5 or V2527E-A5, all 110.3 kN (24,800 lb st); CFM International CFM56-5A1 of 111.2 kN (25,000 lb st); CFM-56-5A3 of 117.9 kN (26,500 lb st); or CFM56-5B4, -5B4/P or -5B4/2P of 120.1 kN (27,000 lb st). Nacelles by Rohr Industries; thrust reversers by Hispano-Suiza (pivoting door type) for CFM56 engines, by IAE (cascade type) for V2500s. Dual-channel FADEC system standard on each engine.

Standard usable fuel capacity in wing and wing centre-section tanks is 23,860 litres (6,303 US gallons; 5,249 Imp gallons); further 82 litres (21.6 US gallons; 18.0 Imp gallons unusable. One or two additional centreline tanks (ACTs), each holding 2,900 litres (766 US gallons; 638 Imp gallons); can be fitted in rear underfloor baggage/ cargo hold.



Typical Airbus interiors for the A320 family

0044884

ACCOMMODATION: Standard crew of two on flight deck, with one (optionally two) forward-facing folding seats for additional crew members; seats for four cabin attendants. Single-aisle main cabin has seating for up to 179 (FAR) or 180 (JAR) passengers, depending upon layout, with locations at front and rear of cabin for galley(s) and lavatory (ies). Multiple customer choice of four-, five- and six-abreast layouts and standard or double-width aisle. Typical two-class layout has 12 seats four-abreast at 91.5 cm (36 in) pitch in 'super first' and 138 six-abreast at 81 cm (32 in) pitch in economy class; alternative 152 six-abreast seats (84 business + 68 economy) at 86 and 78 cm (34 and 31 in) pitch respectively; single-class economy layout could offer 164 seats at 81 cm (32 in) pitch, or up to 179 in high-density configuration. Compared with existing single-aisle aircraft, fuselage cross-section is significantly increased, permitting use of wider triple seats to provide higher standards of passenger comfort; five-abreast business class seating provides standard equal to that offered as first class on major competitive aircraft. In addition, wider aisle permits quicker turnarounds. Overhead stowage space superior to that available on existing aircraft of similar capacity, and provides ample carry-on baggage space; best use of underseat space for baggage is provided by improved seat design and optimised positioning of seat rails.

Passenger doors at front and rear of cabin on port side, forward one having optional integral airstairs; service door opposite each of these on starboard side. Two overwing emergency exits each side. Fuselage double-bubble cross-section provides increased baggage/cargo hold volume and working height, and ability to carry seven containers derived from standard interline LD3 type. As base is same as that of LD3, all existing wide-body aircraft and ground handling equipment can accept these containers without modification. Forward and rear underfloor baggage/cargo holds, plus overhead lockers; with 164 seats, overhead stowage space per seat is 0.06 m³ (2.0 cu ft). Mechanised cargo loading system will allow up to seven LD3-based containers to be carried in freight holds (three forward and four aft). Additional bulk cargo hold at rear, underfloor.

SYSTEMS: Liebherr/ABG-Semca air conditioning, Hamilton Sundstrand/Nord-Micro pressurisation. Honeywell 36-300 APU standard; Honeywell 131-9(A) or APIC APS 3200 available as standard options. All are interchangeable on A318/319/320/321 family. Primary electrical system powered by two Hamilton Sundstrand 90 kVA constant frequency generators, providing 115/200 V three-phase AC at 400 Hz; third generator of same type, directly driven at constant speed by APU, can be used during ground operations and, if required, during flight. Hydraulic system pressure 207 bar (3,000 lb/sq in).

AVIONICS: *Flight:* Fully equipped ARINC 700 digital avionics including advanced digital automatic flight control and flight management systems; AFCS integrates functions of SFENA autopilot and Honeywell FMS; Honeywell air data and inertial reference system.

Instrumentation: Each pilot has two Thales/VDO electronic flight instrumentation system (EFIS) displays (primary flight display and navigation display); PFD was first on an airliner to incorporate speed, altitude and heading. Between these two pairs of displays are two Thales/VDO electronic centralised aircraft monitor (ECAM) displays developed from the ECAM systems on A310 and A300-600; upper display incorporates engine performance and warning, lower display carries warning and system synoptic diagrams.

DIMENSIONS, EXTERNAL:

Wing span	34.09 m (111 ft 10 in)
Wing chord at root	6.10 m (20 ft 0 in)
Wing aspect ratio	9.5
Length overall	37.57 m (123 ft 3 in)

Fuselage: Max width	3.94 m (12 ft 11 in)
Max depth	4.14 m (13 ft 7 in)
Height overall	11.76 m (38 ft 7 in)
Tailplane span	12.45 m (40 ft 10 in)
Wheel track (c/l of shock-struts)	7.59 m (24 ft 11 in)
Wheelbase	12.65 m (41 ft 6 in)
Passenger doors (port, forward and rear), each:	
Height	1.85 m (6 ft 1 in)
Width	0.81 m (2 ft 8 in)
Height to sill	3.415 m (11 ft 2½ in)
Service doors (stbd, forward and rear), each	
as corresponding passenger doors	
Overwing emergency exits (two port and two stbd), each:	
Height	1.02 m (3 ft 4¼ in)
Width	0.51 m (1 ft 8 in)
Underfloor baggage/cargo hold doors (stbd, forward and rear), each: Height	1.25 m (4 ft 1¼ in)
Width	1.82 m (5 ft 11½ in)

DIMENSIONS, INTERNAL:

Cabin, excl flight deck: Length	27.50 m (90 ft 2¾ in)
Max width	3.68 m (12 ft 1 in)
Max height	2.16 m (7 ft 1 in)
Aisle width: standard	0.48 m (1 ft 7 in)
option 1	0.58 m (1 ft 11 in)
option 2	0.635 m (2 ft 1 in)
option 3	0.69 m (2 ft 3 in)
Underfloor baggage/cargo holds:	
Length: forward	4.85 m (15 ft 11 in)
rear	9.80 m (32 ft 2 in)
Max width	2.63 m (8 ft 7½ in)
Max height	1.24 m (4 ft 1 in)
Volume: forward	13.30 m ³ (469 cu ft)
rear	24.15 m ³ (853 cu ft)

AREAS:

Wings, gross	122.40 m ² (1,317.5 sq ft)
Ailerons (total)	2.74 m ² (29.49 sq ft)
Trailing-edge flaps (total)	21.10 m ² (227.12 sq ft)
Leading-edge slats (total)	12.64 m ² (136.06 sq ft)
Spoilers (total)	8.64 m ² (93.00 sq ft)
Airbrakes (total)	2.35 m ² (25.30 sq ft)
Vertical tail surfaces (total)	21.50 m ² (231.4 sq ft)
Horizontal tail surfaces (total)	31.00 m ² (333.7 sq ft)

WEIGHTS AND LOADINGS (typical 150-passenger configuration.

A: CFM56-5B4/P engines, B: V2527-A5S):

Operating weight empty: A	42,100 kg (92,815 lb)*
B	42,482 kg (93,657 lb)

Baggage capacity:

forward hold	3,402 kg (7,500 lb)
rear hold	4,536 kg (10,000 lb)
bulk hold	1,497 kg (3,300 lb)

Max payload: A

B	18,633 kg (41,079 lb)
---	-----------------------

Max fuel

B	18,518 kg (40,825 lb)
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Max T-O weight: basic

option 1	73,500 kg (162,040 lb)
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option 2

option 1	75,500 kg (166,445 lb)
----------	------------------------

Max ramp weight: basic

option 1	77,000 kg (169,755 lb)
----------	------------------------

option 2

option 1	73,900 kg (162,920 lb)
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Max landing weight: basic

options 1 and 2	75,900 kg (167,330 lb)
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Max zero-fuel weight: basic

options 1 and 2	77,400 kg (170,635 lb)
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Max wing loading:

basic	64,500 kg (142,195 lb)
-------	------------------------

option 1

option 1	66,000 kg (145,505 lb)
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option 2

option 2	61,000 kg (134,480 lb)
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Max power loading (V2527 engines):

basic	62,500 kg (137,789 lb)
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option 1

option 1	599.5 kg/m ² (122.79 lb/sq ft)
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option 2

option 2	615.8 kg/m ² (126.13 lb/sq ft)
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*Options raise OWE to a maximum of 43,000 kg (94,799 lb)

PERFORMANCE (engines A and B as for Weights and

Loadings, C: CFM56-5A3/5B4, D: 77,000 kg; 169,756 lb

max T-O weight):

Max operating Mach No. (MMO)

Optimum cruising speed

Max operating speed

Max rate of climb at S/L

Initial cruise altitude

Max certified altitude

Service ceiling, OEI

T-O distance at S/L, ISA + 15°C: A

B

C

D

Landing distance at max landing weight:

A, B, C, D

Runway ACN (flexible runway, category B):

twin-wheel, standard 45×16R20 tyres

four-wheel bogie option, 36×11-16 Type VII or

900×300-R16

Range with 150 passengers and baggage in two-class

layout, FAR domestic reserves and 200 n mile

(370 km; 230 mile) diversion:

basic: A

B

option 1: A

B

option 2:

A, C

B

OPERATIONAL NOISE LEVELS (ICAO Annex 16, Chapter 3; A, B

and C as for performance):

T-O: A

B

C

Sideline: A

B

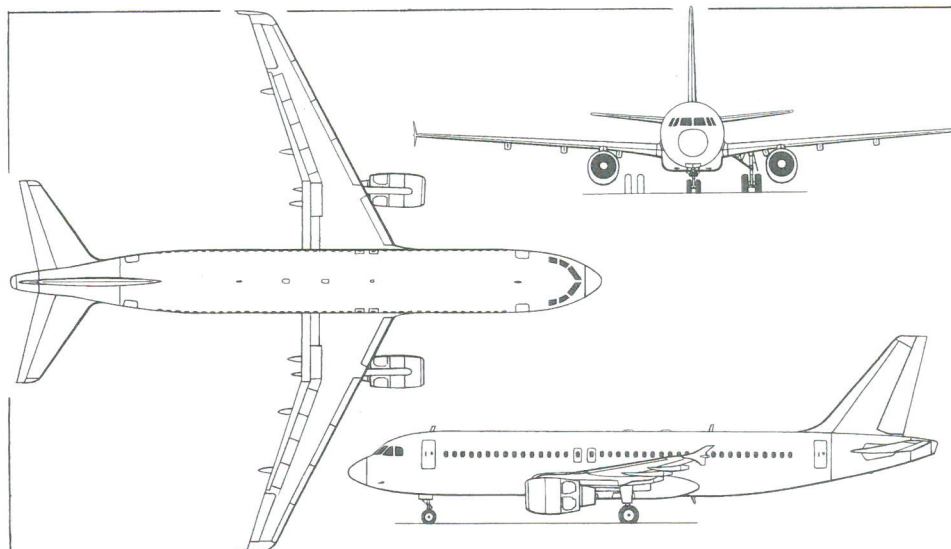
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Approach: A

B

C

UPDATED



Airbus A320 twin-turboprop single-aisle 150/179-seat airliner (Jane's/Dennis Punnett)

AIRBUS A318

TYPE: Twin-jet airliner.
PROGRAMME:

DEVELOPMENT MILESTONES

A318	
Announced	7 Sep 98
Launched	26 Apr 99
First flight	15 Jan 02
Public debut	6 May 02
Certification	23 May 03
First delivery (Frontier Airlines)	22 Jul 03

Short-bodied version of A319 (itself a truncated A320). Formally announced at Farnborough Air Show, 7 September 1998, although known to be under consideration (as A319M5) since late 1997 when AVIC/AIA/STPL AE316/AE317 venture became uncertain. Smallest aircraft in Airbus family; programme launched 26 April 1999 with orders, commitments and options for 109 aircraft; launch customer Air France (via ILFC). Final assembly at Hamburg, resulting in some A319 production being moved to Toulouse. First metal cut November 2000; final assembly began 9 August 2001; three scheduled for completion in 2002 with production increasing to four per month by mid-2003.

Prototype (F-WWIA; 1,599th of A320 family) made maiden flight 15 January 2002, powered by PW6000 engines. Public debut at ILA, Berlin, 6 to 12 May 2002. Second prototype, F-WWIB, flew 3 June 2002; shown at Farnborough July 2002. Certification originally planned for October and service entry December 2002; however, delays in PW6000 programme (not now expected to be available until mid-2005) caused revised schedule; as a result, F-WWIA re-engined with CFM56-5B/Ps, making maiden flight in this form on 29 August 2002 and receiving JAA certification 23 May 2003. FAA approval came in following month, preceding initial deliveries to Frontier Airlines (22 July) and Air France (9 October 2003). Second prototype allocated to development of the PW6000-powered version, certification of which now anticipated in November 2005.

CURRENT VERSIONS: **A318-100**: Basic version.

AIRBUS A318 MARKS AND VARIANTS

Series	Mark	Power Plant	FAA Certification
100	111	CFM56-5B8/P	4 Jun 03
100	112	CFM56-5B9/P	4 Jun 03

Series	Variant	MTOW (kg)
100	000	59,000
100	001	61,500
100	002	63,000
100	003	64,500
100	004	66,000
100	005	68,000
100	006	56,000
100	007	61,000
100	008	64,000

Note: Variant parameters may include differences in data other than max T-O weight. Except as constrained by Series, Variants are applicable to several engine options.

CUSTOMERS: First customer, International Lease Finance Corporation (ILFC), signed MoU for up to 30 aircraft on 17 November 1998, subject to launch of project, followed by firm order 30 April 1999. First conditional airline customer, TWA, signed LoI on 9 December 1998 for 50, confirming 25 by firm order 14 December 1999 but cancelled when TWA taken over by American Airlines; other early customers include Egyptair (three on 17 July 1999 – first firm airline order, followed by two further examples, but subsequently all cancelled). Total orders 79, of which nine delivered, at 1 January 2004.

AIRBUS A318 ORDERS
(at 1 January 2004)

Customer	Engines	Qty
Air France	CFM	15
America West Airlines	PW	15
CIT Group	CFM	1
Frontier Airlines	CFM	5
GECAS	CFM	28
ILFC	CFM	15
Total		79

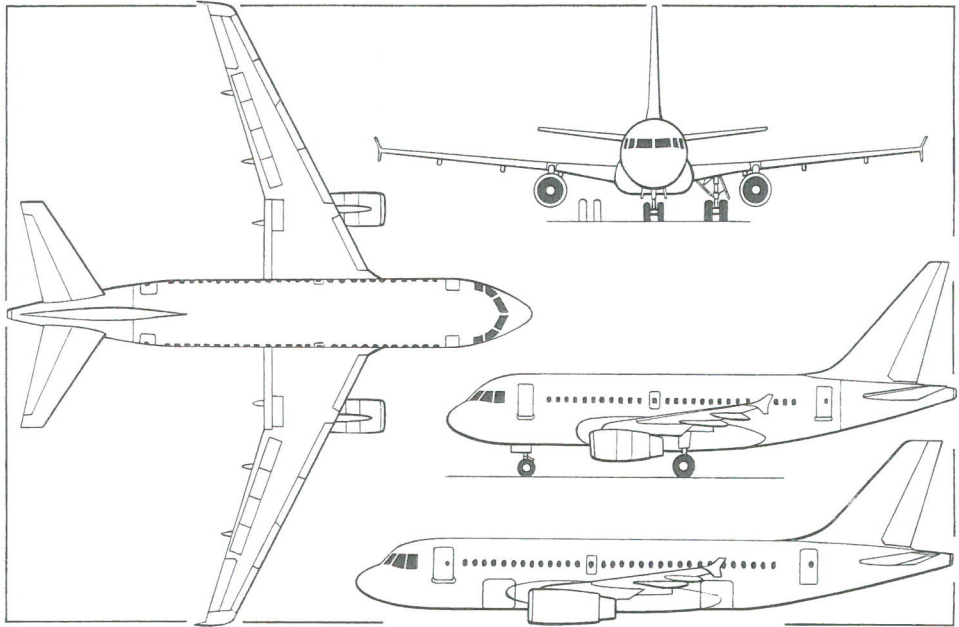
COSTS: Programme cost estimated as US\$300 million. Unit price US\$41.7 million (2001).

DESIGN FEATURES: Shorter fuselage and taller fin than rest of A320 family, with which it has 95 per cent commonality, including A319 wing, pylon and interface. Laser welding (rather than riveting) used on lower fuselage to reduce



Airbus A318 of launch operator Frontier Airlines

NEW/0567723



General arrangement of the Airbus A318 with additional side view (lower) of A319 (James Goulding)

0121271

costs and weight; first use of this technology on airliner. Common pilot type rating with A319, A320 and A321.

FLYING CONTROLS: As A320.

STRUCTURE: As A320, but fuselage 4½ frames (2.39 m; 7 ft 10 in) shorter than A319; 0.79 m (2 ft 7 in) removed forward and 1.60 m (5 ft 3 in) aft of wing. Redesigned cargo doors. Fin has tip extension. Assembled in Germany by Airbus Deutschland. AVIC of China will have share of production work to offset AE31X project cancellation.

LANDING GEAR: As A320. Minimum ground turning radius 11.30 m (37 ft 1 in) about nosewheels, 19.50 m (63 ft 11¼ in) about mainwheels.

POWER PLANT: Two 98.3 kN (22,100 lb st) Pratt & Whitney PW6122 or 105.9 kN (23,800 lb st) PW6124 turbofans with clamshell-type thrust reversers; A318 is launch aircraft for PW6000 family. Alternative (and first in-service) power plant is 96.1 kN (21,600 lb st) CFM International CFM56-5B8/P or 103.6 kN (23,300 lb st) CFM International CFM56-5B9/P, officially announced 4

August 1999. Thrust reversing and deflection, fuel tank capacities and locations as A320.

ACCOMMODATION: Two flight crew plus three cabin crew. Typical passenger capacity eight first class and 99 second class with 96/81 cm (38/32 in) seat pitch, or 117 in single-class seating; high-density seating for 129 passengers; certified for up to 136. Front and rear passenger doors on port side; service door opposite each on starboard side. Overwing emergency exit each side. A318 will not carry containerised freight due to smaller baggage doors (of which size reduced to maintain same engine nacelle clearance for loading vehicles as A319).

SYSTEMS: Generally as A320; new-generation cabin intercom data system (CIDS).

AVIONICS: Generally as A320, but with new LCD screens.

DIMENSIONS, EXTERNAL: As A320 except:

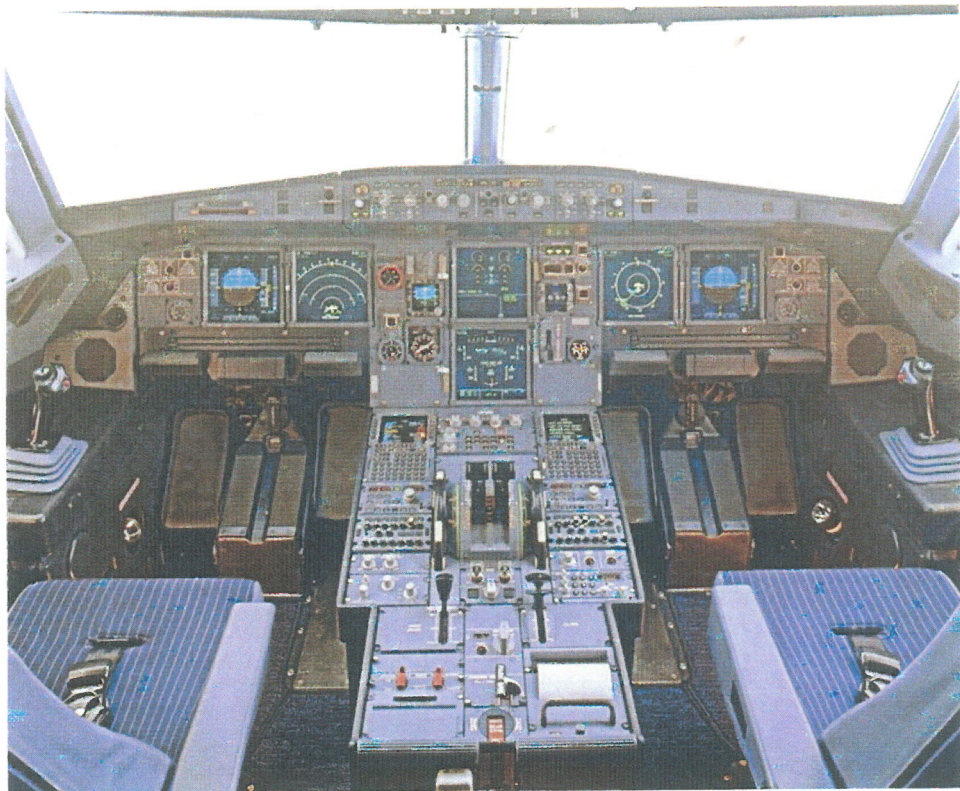
Length overall	31.45 m (103 ft 2 in)
Height overall	12.55 m (41 ft 2 in)
Wheelbase	10.25 m (33 ft 7½ in)



Airbus A318 representative cabin layouts for 107 seats (top) and 117 seats

A: attendant's seat, S: screen

0044887



Flight deck of the A318

NEW/0567722

Baggage doors (each): Height	1.24 m (4 ft 1 in)
Width	1.28 m (4 ft 2½ in)
DIMENSIONS, INTERNAL: As A320 except:	
Cabin: Length	21.38 m (70 ft 1¼ in)
Underfloor baggage/cargo holds:	
Length: forward	2.57 m (8 ft 5in)
rear	6.07 m (19 ft 11 in)
Volume: forward	6.51 m³ (230 cu ft)
rear	14.70 m³ (519 cu ft)
AREAS: As A320 except:	
Fin and rudder (total, incl tab)	21.50 m² (231.4 sq ft)
WEIGHTS AND LOADINGS:	
Typical operating weight empty	39,035 kg (86,057 lb)
Baggage capacity:	
forward hold	1,614 kg (3,558 lb)
rear hold	2,131 kg (4,698 lb)
bulk hold	1,372 kg (3,025 lb)
Max payload	13,965 kg (30,788 lb)
Max T-O weight: basic	59,000 kg (130,075 lb)
option	68,000 kg (149,915 lb)
Max ramp weight: basic	59,400 kg (130,955 lb)
option	68,400 kg (150,800 lb)
Max landing weight: basic	56,000 kg (123,460 lb)
option	57,500 kg (126,765 lb)
Max zero-fuel weight: basic	53,000 kg (116,845 lb)
options	54,500 kg (120,150 lb)
Max wing loading: basic	481.2 kg/m² (98.57 lb/sq ft)
option	555.6 kg/m² (113.79 lb/sq ft)
Max power loading, CFM56-5B8/P engines:	
basic	307 kg/kN (3.01 lb/lb st)
option	354 kg/kN (3.47 lb/lb st)
PERFORMANCE:	
Max operating Mach No. (MMO)	0.82
Max operating speed	350 kt (648 km/h; 403 mph) IAS
Max certified altitude	12,200 m (40,000 ft)
Runway ACN: flexible Cat. B runway: basic MTOW	29
option 3 MTOW	34
T-O run at basic MTOW 500 n mile (925 km; 575 mile)	
mission, elevation 610 m (2,000 ft), ISA +15°C:	
PW6122	1,670 m (5,479 ft)
CFM56	1,630 m (5,348 ft)
Landing run at MLW, S/L, ISA:	
PW6122	1,332 m (4,370 ft)
CFM56	1,355 m (4,446 ft)
Range with 107 passengers, FAR domestic reserves,	
200 n miles (370 km; 230 miles) diversion, max	
payload:	
basic MTOW:	
PW6122	1,462 n miles (2,707 km; 1,682 miles)
CFM56	1,455 n miles (2,694 km; 1,674 miles)
option 1 MTOW:	
PW6122	1,960 n miles (3,630 km; 2,255 miles)
CFM56	1,980 n miles (3,667 km; 2,278 miles)
option 2 MTOW:	
PW6122	2,820 n miles (5,222 km; 3,245 miles)
CFM56	2,880 n miles (5,333 km; 3,314 miles)
option 3 MTOW 3,250 n miles (6,019 km; 3,740 miles)	
OPERATIONAL NOISE LEVELS (estimated):	
T-O with PW6122 at MTOW	79.7 EPNdB
Sideline	90.4 EPNdB
Approach	89.7 EPNdB

UPDATED

AIRBUS A319

TYPE: Twin-jet airliner.
PROGRAMME:

DEVELOPMENT MILESTONES

A319	
Launched	10 Jun 93
Rolled out	24 Aug 95
First flight	29 Aug 95
Certification	10 Apr 96
First delivery (ILFC)	25 Apr 96
Entered service (Swissair)	8 May 96
Subsequent versions	
ACJ	
Announced	15 Jun 97
First flight	12 Nov 88
First delivery (AL Kharafi)	8 Nov 99

Short-fuselage A320. Airbus Board officially authorised start of sales 22 May 1992; programme launched 10 June 1993. Final assembly of first aircraft (F-WWDB, the 546th of the A319/320/321 family) began 23 March 1995; rolled out at Hamburg 24 August; first flight (with CFM56-5A engines) on 29 August; second aircraft (F-WWAS, No. 572) flew (with CFM56-5A engines and commercial interior) 31 October 1995; 650 hour flight test programme resulted in initial certification (CFM56-5B) on 10 April 1996 (CFM56-5A and V2500-A5 followed); first delivery, HB-IPV to ILFC on 25 April 1996 and immediately to Swissair on 30 April, flying first service on 8 May; F-WWAS re-engined with IAE V2524 engines, first flight 22 May 1996 and certified on 18 December 1996; other 1996 first receipts included Air Inter (F-GPMA 21 June); Lufthansa (D-AILA 19 July); and Air Canada (C-FYIY 12 December). JAA 120 minute ETOPS approval granted 14 February 1997 and extended to ACJ in December 2000.

1,000th member of family (an A319 for Air France via ILFC) delivered 15 April 1999.
CURRENT VERSIONS: **A319-100**: Baseline version.
Description applies to A319-100.

ACJ: Airbus Corporate Jetliner. Announced at 1997 Paris Air Show. Standard aircraft will carry up to 40 passengers over a range of 6,300 n miles (11,667 km; 7,250 miles), cruising at 12,500 m (41,000 ft) at speeds of up to M0.82. Certified as a commercial airliner to Cat. IIb landing criteria and 120-minute ETOPS, and will convert easily to airliner configuration. First customer, announced on 18 December 1997, is Mohamed Abdulmohsin Al Kharafi of Kuwait. First aircraft (G-OMAK, 913th of A320 family), type A319-132, first flew 12 November 1998 and delivered to Jet Aviation, Switzerland, for outfitting on 31 December 1998; customer receipt 8 November 1999, operated by Twinjet Aircraft for Al Kharafi. Demonstrator F-WWIC first flew (as D-AVYB) 28 May 1999 and to Toulouse for trials 31 May; is 910th of A320 family, but followed c/n 913.

Other customers include DaimlerChrysler, Italian Air Force (first of two aircraft delivered 7 March 2000; second in August 2000), Finnair, French Air Force (two; first delivered February 2002) and Aero Service Executive (one). Orders and commitments totalled more than 30 by mid-2002, of which 14 then delivered. FAA (FAR Pt 121) certification for both scheduled service and private operation in USA received October 2002.

Set world record non-stop 15 hour 13 minute flight of 6,918 n miles (12,812 km; 7,961 miles) from Santiago to Le Bourget on 16 June 1999. JAR certification (as amendment of A319 certificate) received August 1999.

Airbus announced in 2000 that production of the ACJ would be restricted to four per year until 2003; this was increased to six, due to demand. By mid-2002, six companies were recommended for outfitting: Lufthansa Technik, Hamburg; Jet Aviation, Basle; Air France Industries, Toulouse; Ozark Aircraft Systems, Bentonville, Arkansas; and EADS Sogerma, Toulouse.

A319LR: Long-range variant of ACJ. Second aircraft for Qatar Airways (two-class layout for 110 passengers) is to this standard; entered service August 2003. Three more ordered by 30 September 2003: two for PrivatAir via CIT (48-seat all business class cabin) and one undisclosed.

A319 Executive: Variant of ACJ. Three ordered by 30 September 2003: two for PrivatAir via CIT and one for Blue Moon Aviation (USA) via SALE.

AIRBUS A320 MARKS AND VARIANTS

Series	Mark	Power Plant	FAA Certification
100	111	CFM56-5B5 or -5B5/P	20 Jun 97
100	112	CFM56-5B6 or -5B6/P or -5B6/2P	30 Aug 96
100	113	CFM56-5A4	20 Jun 97
100	114	CFM56-5A5	20 Jun 97
100	115	CFM56-5B7 or -5B7/P	22 Oct 02
100	131	V2522-A5	20 Jun 97
100	132	V2524-A5	20 Jun 97
100	133	V2527M-A5	22 Oct 02
Series	Variant	MTOW (kg)	
100	000	64,000	
100	001	70,000	
100	002	75,700	

Note: Variant parameters may include differences in data other than max T-O weight. Except as constrained by Series, Variants are applicable to several engine options.

CUSTOMERS: Total of 925 sold, of which 564 delivered, by 31 December 2003, including 17 ACJs.



Airbus A319 delivered to Croatia Airlines

NEW/0567738

AIRBUS ACJ CUSTOMERS

c/n	Series	Registration	Customer
910	-133	F-WWIC	Airbus
913	-132	G-OMAK	Al Kharafi Aviation
1002	-112CJ	MM62173	Italian AF
1053	-133	D-ADNA	DaimlerChrysler Aviation
1157	-115CJ	MM62174	Italian AF
1212	-133CJ	VP-CVX	Volkswagen Group
1256	-133CJ	F-GSVU	CIP Transports/Aero Services Executive
1335	-133CJ	A7-ABZ	Amiri Flight/Qatar Airways
1468	-133CJ	0001	Venezuelan AF
1485	-115CJ	FRBFA	French AF
1556	-115CJ	FRBFB	French AF
1589	-133CJ	VP-CIE	Bugshan Group
1656	-133CJ	A7-CJA	Doha Leasing/Qatar Airways
1727	-133CJ(LR)	D-APAC	Privatair
1795	-115CJ	MM62209	Italian AF
1880	-133CJ(LR)	D-APAD	Privatair
1908	-155CJ		Royal Thai AF
	(EX)		Blue Moon Aviation
	(EX)		Privatair
	(EX)		Privatair
	(LR)		undisclosed
	CJ		undisclosed
	CJ		undisclosed

AIRBUS A319 and ACJ ORDERS
(at 1 January 2004)

Customer	Qty
Aero Services Executive	1*
Aeroflot	6
Air Bosna	2
Air Canada	37
Air China	17
Air France	18
Air Inter Europe	9
Air Mauritius	2
Al Kharafi Group	1*
Alitalia	12
America West Airlines	30
Austrian Airlines	7
Boullioun Aviation Services	6
British Airways	36
China Aviation Supplies	3
CIT Group	18
Croatia Airlines	4
Cyprus Airways	2
DaimlerChrysler Aviation	1*
Debis AirFinance	10
Druk Air	2
easyJet	120
Finnair	5
French Air Force	2*
Frontier Airlines	27
GATX/CL AIR	1
GECAS	44
Germanwings	6
Iberia	3
ILFC	132
Italian Air Force	2*
JAT	8
LAN Chile	14
Lufthansa	20
Northwest Airlines	78
Qatar Airways	2*
Royal Thai Air Force	1*
SALE	2
Sabena	15
Sichau Airlines	4
Silkair	6
South African Airways	11
Swissair	6
TACA	9
TAM	18
TAP-Air Portugal	13
Tunis Air	3
United Airlines	78
US Airways	66
Venezuelan Air Force	1*
Undisclosed	4
Total	925

* ACJ; Italian Air Force has ordered a third

COSTS: Total development cost estimated at US\$275 million, entirely financed by Airbus Industrie. A319-100 cost approximately US\$48.7 million depending on choice of engines and level of customisation (2001); ACJ cost US\$36 million (2001), excluding outfitting of between US\$4 million and US\$10 million.

DESIGN FEATURES: Seven fuselage frames shorter than A320 (1.60 m; 5 ft 3 in forward of wing, 2.13 m; 7 ft 0 in aft); modified rear cargo hold; bulk hold door and forward overwing emergency exit deleted; derated engines; otherwise little changed. Seats 124 passengers in typical

two-class layout, compared with 150 in A320 and 185 in A321; range of 3,550 n miles (6,574 km; 4,085 miles) said to be the longest in this category of airliner; common pilot type rating with A320 and A321.

FLYING CONTROLS: Same flight deck and flying control system as A320.

STRUCTURE: As A320. Assembled in Germany by EADS Deutschland Airbus, alongside the stretched A321; partner workshares rearranged to maintain overall workshare balance between France and Germany.

LANDING GEAR: As A320, but 46x16 or 46x17.0R20 main tyre options only. Minimum ground turning radius 12.10 m (39 ft 8½ in) about nosewheels, 20.60 m (67 ft 7 in) about mainwheels.

POWER PLANT: Two turbofans. Options comprise CFM56-5B5, -5B5/P or -5A4, all 97.9 kN (22,000 lb st); IAE V2522-A5 of 102.5 kN (23,040 lb st); CFM56-5B6, -5B6/P or -5B6/2P or -5A5, all 104.5 kN (23,500 lb st);

IAE V2524-A5 of 108.9 kN (24,480 lb st), IAE V2527M-AS of 110.3 kN (24,800 lb st); or CFM56-5B7 or -5B7/P of 120.1 kN (27,000 lb st).

Standard (three tanks) fuel as for A320: 23,860 litres (6,303 US gallons; 5,249 Imp gallons) usable. Up to six additional centreline tanks (ACT) for maximum (nine tanks) of 40,640 litres (10,737 US gallons; 8,939 Imp gallons).

ACCOMMODATION: Typically 124 passengers (eight in 'super first' class plus 116 economy); maximum 145 passengers in all-economy configuration. Built-in airstairs in ACJ.

'Prestige' cabin option for ACJ configures forward and centre sections with dining and work areas complete with tables, lounge and bar; aft cabin has private office area and enclosed bedroom. Amenities include 64 kbyte communications links, large-screen video displays, external video cameras for security and flight progress monitoring, and additional aft cabin soundproofing.

DIMENSIONS, EXTERNAL: As A320 except:

Length overall 33.83 m (111 ft 0 in)
Wheelbase 11.05 m (36 ft 3 in)

DIMENSIONS, INTERNAL: As A320 except:

Cabin length (excl flight deck) 23.77 m (77 ft 11¼ in)

Underfloor baggage/cargo holds:

Length: forward 3.35 m (11 ft 0 in)

rear 7.67 m (25 ft 2 in)

Volume: bulk total 27.64 m³ (976 cu ft)

WEIGHTS AND LOADINGS:

Typical operating weight empty:

standard 40,160 kg (88,537 lb)

option 41,203 kg (90,837 lb)

Baggage capacity: forward hold

rear hold 2,268 kg (5,000 lb)

bulk hold 3,020 kg (6,600 lb)

Max payload 1,497 kg (3,300 lb)

Max T-O weight: standard 16,653 kg (36,714 lb)

option 64,000 kg (141,095 lb)

Max landing weight: standard 75,500 kg (166,450 lb)

option 61,000 kg (134,480 lb)

Max zero-fuel weight: standard 62,500 kg (137,790 lb)

option 57,000 kg (125,665 lb)

Max wing loading:

standard 522.9 kg/m² (101.09 lb/sq ft)

option 616.8 kg/m² (126.34 lb/sq ft)

Max power loading: standard, CFM56-5B5

327 kg/kN (3.21 lb/lb st)

option, CFM56-5B7 314 kg/kN (3.08 lb/lb st)



Interior of ACJ operated by Aero Services Executive

NEW/0527104



German carrier Eurowings is an operator of the Airbus A319 (Paul Jackson)

NEW/0526950



Airbus Corporate Jetliner of Qatar Airways

NEW/0567721

PERFORMANCE (A: with CFM56-5A4, CFM56-5B5 or V2522-A5; B: with CFM56-5A5, CFM56-5B6 or V2524-A5):

Max operating Mach No. (Mmo) 0.82
Max operating speed 350 kt (648 km/h; 403 mph) IAS
Typical operating Mach No. 0.78
Max rate of climb 152 m (500 ft)/min
Max certified altitude: A319 12,130 m (39,800 ft)
ACJ 12,500 m (41,000 ft)
Service ceiling, OEI 6,400 m (21,000 ft)
T-O distance, S/L ISA+15°C:
standard: A 1,720 m (5,643 ft)
option: B 2,640 m (8,661 ft)
Landing distance, S/L ISA: A, B 1,430 m (4,692 ft)
Range on normal fuel tankage with 124 passengers and baggage, FAR domestic reserves and 200 n mile (370 km; 230 mile) diversion:
A, at T-O weight 64,000 kg (141,095 lb) 1,813 n miles (3,357 km; 2,086 miles)
B, at T-O weight 75,500 kg (166,450 lb) 3,697 n miles (6,846 km; 4,254 miles)

OPERATIONAL NOISE LEVELS (A, B as above):

T-O: A 82.5 EPNdB
B 82.4 EPNdB
Sideline: A 92.6 EPNdB
B 92.2 EPNdB
Approach: A 93.9 EPNdB
B 94.2 EPNdB

UPDATED

AIRBUS A321

TYPE: Twin-jet airliner.
PROGRAMME:

DEVELOPMENT MILESTONES

A321-100

Announced 22 May 89
Launched 24 Nov 89
Rolled out 3 Mar 93
First flight 11 Mar 93
Certification 17 Dec 93
First delivery (Lufthansa) 27 Jan 94
Entered service (Lufthansa) 18 Mar 94

Subsequent versions

A321-200

Launched 12 Apr 95
First flight 12 Dec 96
First delivery (Monarch Airlines) 24 Apr 97

North American domestic routes; charter routes between northern and southern Europe; and on scheduled routes between Europe and Middle East. First aircraft flew 12 December 1996 at Hamburg; became G-OZBC of Monarch Airlines and delivered 24 April 1997. Higher-MTOW version, with option of second ACT, launched January 1999; first customer Spanair, for delivery September 2000.

A321CJ: Airbus Industrie reported to be considering a corporate version with additional fuel tanks; no formal plans to launch known by late 2003.

A321 Freighter: EADS EFW conducting feasibility studies into an A321 Freighter with capacity for 14 standard pallets.

AIRBUS A321 MARKS AND VARIANTS

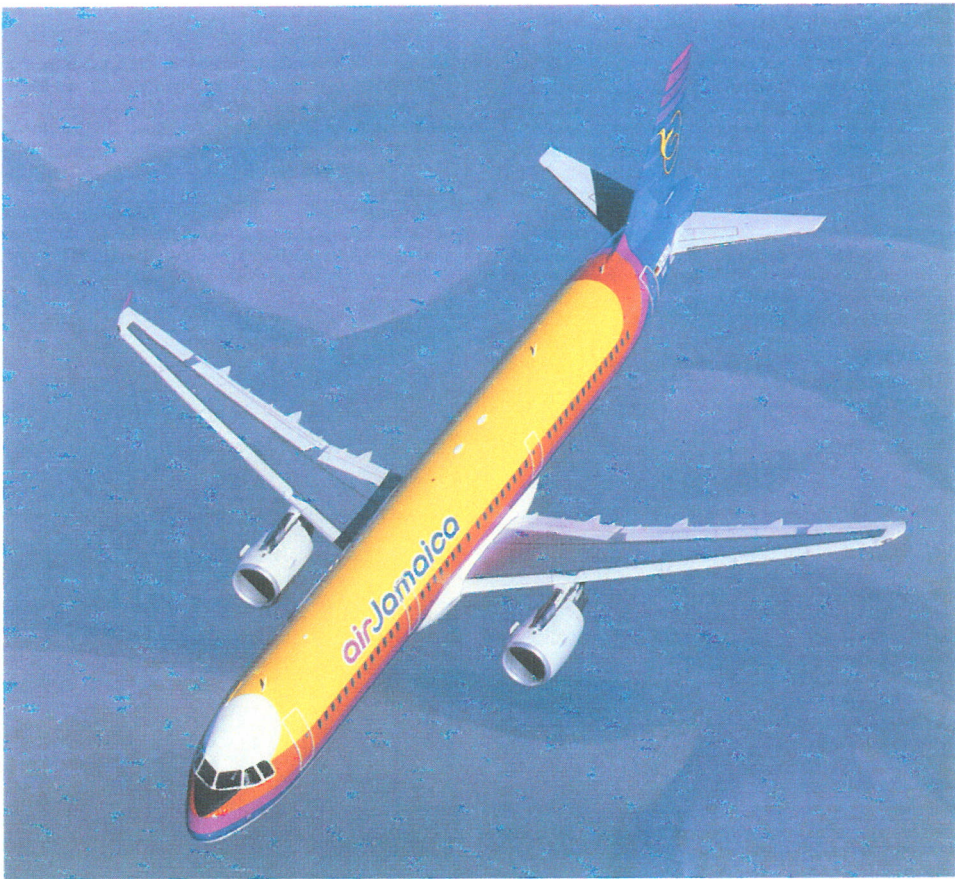
Series	Mark	Power Plant	FAA Certification
100	111	CFM56-5B1 or -5B1/P or -5B1/2P	20 Dec 95
100	112	CFM56-5B2 or -5B2/P	20 Dec 95
100	131	V2530-A5	20 Dec 95
200	211	CFM56-5B3/P or -5B3/2P	18 Sep 97
200	231	V2533-A5	18 Sep 97

Series	Variant	MTOW (kg)
100	000	83,000
100	002	83,000
100	003	85,000
200	000	89,000
200	000	93,000

Note: Variant parameters may include differences in data other than max T-O weight. Except as constrained by Series, Variants are applicable to several engine options.

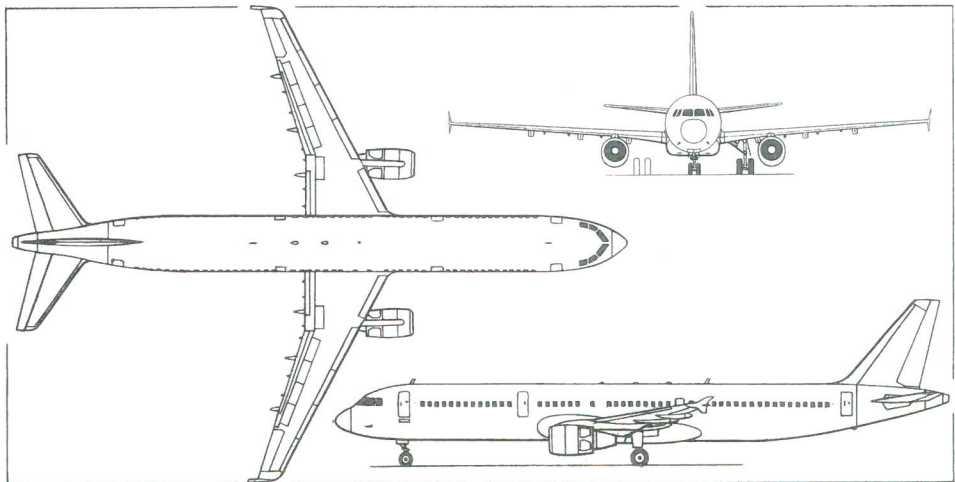
CUSTOMERS: Total of 409 sold, of which 289 delivered by 1 January 2004.

COSTS: A321-2001 unit cost approximately US\$65.6 million, depending on engine choice and customisation level (2001).



Air Jamaica's colourful scheme applied to an Airbus A321

NEW/0527102



A321 stretched development of the Airbus A320 (Jane's/Dennis Punnett)

Stretched version of A320. Announced 22 May and launched 24 November 1989; four development aircraft; rolled out 3 March 1993, first flight with V2530 lead engine 11 March 1993 (F-WWIA), second aircraft with alternative CFM56-5B engine in May 1993; V2530-powered version received European JAA certification 17 December 1993; CFM56-5B2-powered version certified by JAA 15 February 1994; CFM56-5B1 certified by JAA 27 May 1994; first delivery (D-AIRA to Lufthansa) 27 January 1994; first service with Lufthansa 18 March 1994. A321 powered by CFM56-5Bs passed cold-weather trials in Kiruna, January 1994; first with alternative engine handed over to Alitalia 18 March 1994. JAA approval for Cat. III automatic landings achieved in December 1994. 120-minute ETOPS granted 29 May 1996. The 100th A321 (Alitalia's I-BIXZ) flew 1 July 1998. A321 also recommended by Northrop Grumman as platform for Joint STARS, competing for NATO's Airborne Ground Surveillance requirement (later dropped) and by Raytheon for the Republic of Korea Air Force's E-X AEW&C competition.

CURRENT VERSIONS: A321-100: Initial version.

A321-200: Extended-range version, launched 12 April 1995; features reinforced structure, higher-thrust versions of existing engines and optional additional centre tank (ACT), capacity 2,900 litres (766 US gallons; 638 Imp gallons) which increases maximum T-O weight to 89,000 kg (196,210 lb) and range by 350 n miles (648 km; 402 miles). A321-200 expected to have increased market appeal on

AIRBUS A321 ORDERS
(at 1 January 2004)

Customer	Qty
Aer Lingus	3
Aero Lloyd	5
Air Canada	12
Air France	4
Air Inter Europe	7
Air Macau	1
Alitalia	23
All Nippon Airways	7
Asiana Airlines	10
Austrian Airlines	6
Boullioun Aviation Services	4
British Airways	12
British Midland Airways	6
China Eastern Airlines	4
China Northern Airlines	10
CIT Group	5
Debis AirFinance	7
Dragonair	2
Egyptair	4
Finnair	4
Flightlease	1
GATX/CL AIR	7
GB Airways	3
GECAS	14
Iberia	16
ILFC	90
Leisure International Airways	2
LTU	2
Lufthansa	26
Middle East Airlines	6
Monarch Airlines	7
MyTravel Airways	4
Onur Air	2
Qatar Airways	2
Royal Air Maroc	4
Sabena	3
SALE	6
Scandinavian Airlines System	12
Sichuan Airlines	2
Spanair	3
Swissair	6
TAP-Air Portugal	3
TransAsia Airways	6
US Airways	41
Vietnam Airlines	5
Total	409

DESIGN FEATURES: Compared with A320, A321 has 4.27 m (14 ft 0 in) fuselage plug immediately forward of wing and 2.67 m (8 ft 9 in) plug immediately aft; pairs of wing fuel tanks unified and system simplified; other changes include local structural reinforcement of existing assemblies, slightly extended wing trailing-edge with double-slotted flaps, uprated landing gear and higher T-O weights.

STRUCTURE: As for A320 except for airframe changes noted under Design Features; front fuselage plug by Alenia and rear one by BAE Systems; final assembly and outfitting by Airbus Deutschland at Hamburg.

LANDING GEAR: Uprated, with 22 in wheel rims, 49×18.0-22 or 46×17.0R20 (30 ply) mainwheel tyres and increased energy brakes; wheels and brakes by Aircraft Braking Systems. Minimum ground turning radius 18.00 m (59 ft 0¼ in) about nosewheels, 27.60 m (90 ft 6½ in) about mainwheels.

POWER PLANT: Two turbofans. Options comprise: A321-100: IAE V2530-A5 of 133.0 kN (29,900 lb st); CFM56-5B1, -5B1/P or -5B1/2P of 133.4 kN (30,000 lb st); CFM56-5B2 or -5B2/P of 137.9 kN (31,000 lb st); and, for A321-200: IAE V2533-A5 of 140.6 kN (31,600 lb st); or CFM56-5B3/P or -5B3/2P of 142.3 kN (32,000 lb st).

Normal three-tank fuel capacity 23,700 litres (6,261 US gallons; 5,213 Imp gallons) usable. Fourth tank increases usable quantity to 26,600 litres (7,027 US gallons; 5,851 Imp gallons) in high pressure fuel system or 26,692 litres (7,051 US gallons 5,872 Imp gallons) in low pressure system. Fifth tank increases usable quantity to 29,684 litres (7,842 US gallons; 6,530 Imp gallons) low pressure (only).

ACCOMMODATION: Typically offers 24 per cent more seats and 40 per cent more hold volume than A320; examples are 185 passengers in two-class layout (16 'super first' class at 91 cm; 36 in seat pitch and 169 economy class at 81 cm; 32 in), or 220 passengers (certified limit) in all-economy high-density configuration. Each fuselage plug incorporates one pair of emergency exits, replacing single overwing pair of A320.



Airbus A321 operated by Japan's All Nippon Airways

NEW/0567720

SYSTEMS: Choice of Honeywell 36-300 or APIC APS3200 APU; Honeywell 131-9(A) available from 1998; full commonality with A320 installation.

DIMENSIONS, EXTERNAL: As for A320 except:

Length overall	44.51 m (146 ft 0 in)
Height overall	11.81 m (38 ft 9 in)
Wheelbase	16.92 m (55 ft 6¼ in)
Emergency exits (forward stbd and rear port/stbd, each):	
Height	1.52 m (5 ft 0 in)
Width	0.76 m (2 ft 6 in)
Emergency exit (forward port, usable also as passenger door):	
Height	1.85 m (6 ft 1 in)
Width	0.76 m (2 ft 6 in)

DIMENSIONS, INTERNAL: As A320 except:

Cabin, excl flight deck: Length	34.44 m (113 ft 0 in)
Underfloor baggage/cargo holds:	
Length: forward	8.15 m (26 ft 9 in)
rear	11.40 m (37 ft 5 in)
Volume: forward	22.81 m³ (806 cu ft)
rear	28.93 m³ (1,022 cu ft)

WEIGHTS AND LOADINGS (A321-200):

Max fuel weight: three tanks	18,960 kg (41,800 lb)
four tanks	21,280 kg (46,914 lb)
five tanks	23,746 kg (52,350 lb)
Max T-O weight: basic	89,000 kg (196,210 lb)
option	93,000 kg (205,030 lb)
Max landing weight: basic	75,500 kg (166,450 ft)
option	77,800 kg (171,520 lb)
Max zero-fuel weight: basic	71,500 kg (157,630 lb)
option	73,800 kg (162,705 lb)
Max wing loading:	
basic	727.1 kg/m² (148.93 lb/sq ft)
option	759.8 kg/m² (156.62 lb/sq ft)
Max power loading, CFM56-5B3:	
basic	313 kg/kN (3.07 lb/lb st)
option	327 kg/kN (3.20 lb/lb st)

PERFORMANCE:

Max operating Mach No. (MMO)	0.82
Max operating speed	350 kt (648 km/h; 403 mph) IAS
Typical operating Mach No.	0.78
Max rate of climb at S/L	152 m (500 ft)/min

Max certified altitude	12,130 m (39,800 ft)
Service ceiling, OEI: A321-100	5,180 m (17,000 ft)
A321-200	5,000 m (16,400 ft)
T-O distance at max T-O weight, S/L, ISA +15°C:	
C1	2,220 m (7,285 ft)
V	2,065 m (6,775 ft)
C2	2,270 m (7,450 ft)
C3	2,330 m (7,645 ft)
V2	2,341 m (7,680 ft)

Landing distance at max landing weight:

C1, V	1,540 m (5,055 ft)
C2	1,530 m (5,020 ft)
C3, V2	1,577 m (5,175 ft)

Runway ACN (flexible runway, category B):

basic	48
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Range on normal fuel tankage with 185 passengers and baggage at typical airline OWE, FAR domestic reserves and 200 n mile (370 km; 230 mile) diversion:

A321-100:	
C1, C2:	
basic	2,138 n miles (3,959 km; 2,460 miles)
optional	2,250 n miles (4,167 km; 2,589 miles)
V: basic	2,253 n miles (4,172 km; 2,592 miles)
optional	2,386 n miles (4,418 km; 2,745 miles)

A321-200:	
with one ACT	
2,700 n miles (5,000 km; 3,107 miles)	
with two ACT	
3,000 n miles (5,556 km; 3,452 miles)	
V2: basic	2,384 n miles (4,415 km; 2,743 miles)
with one ACT	
2,714 n miles (5,026 km; 3,123 miles)	

OPERATIONAL NOISE LEVELS (ICAO Annex 16, Chapter 3, estimated):

T-O: C1	87.0 EPNdB (92.1 limit)
V	85.4 EPNdB (92.1 limit)
Sideline: C1	96.2 EPNdB (97.2 limit)
V	94.5 EPNdB (97.2 limit)
Approach: C1	96.1 EPNdB (100.9 limit)
V	95.4 EPNdB (100.9 limit)

UPDATED



Aero Lloyd Airbus A321 in special colours (Paul Jackson)

0526949

For details of the latest updates to *Jane's All the World's Aircraft* online and to discover the additional information available exclusively to online subscribers please visit jawa.janes.com

AIRBUS A340

TYPE: Wide-bodied airliner.
PROGRAMME:

DEVELOPMENT MILESTONES

A340-300	
Launched	5 Jun 87
First flight	25 Oct 91
Certification	22 Dec 92
First delivery (Air France)	26 Feb 93
Entered service (Air France)	Mar 93

Subsequent versions

A340-200	
First flight	1 Apr 92
Certification	22 Dec 92
First delivery (Lufthansa)	29 Jan 93
Entered service (Lufthansa)	15 Mar 93

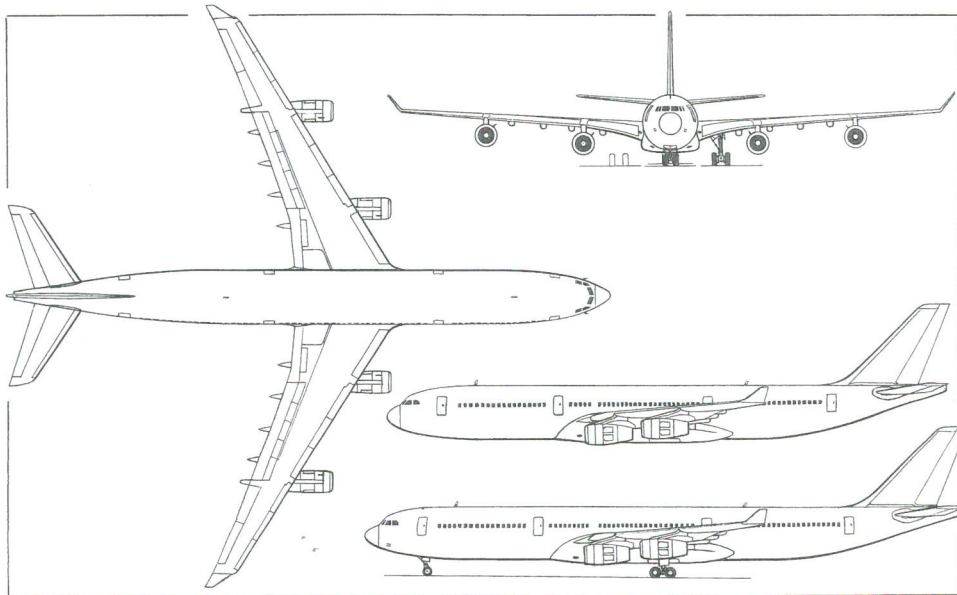
A340-600	
Launched	8 Dec 97
Rolled out	23 Mar 01
First flight	23 Apr 01
Public debut	16 Jun 01
Certification	29 May 02
First delivery (Virgin Atlantic)	22 Jul 02
Entered service (Virgin Atlantic)	1 Aug 02

A340-500	
Launched	17 Jun 97
Go-ahead	8 Dec 97
First flight	11 Feb 02
Certification	3 Dec 02
First delivery (Emirates)	23 Oct 03

Launched 5 June 1987 as parallel programme with A330, uniquely offering twin- and four-engine variants of same basic design. First flight of four-engine A340-300 25 October 1991; A340-200 and -300 certified simultaneously by 18 European joint airworthiness authorities (JAA) on 22 December 1992; first deliveries to Lufthansa on 29 January 1993 (-200) and Air France on 26 February 1993 (-300); both versions entered service March 1993; both received FAA certification 27 May 1993. A340/A330 certified by JAA for GPS satellite navigation January 1994; successful trials conducted at Toulouse in October 1994 using differential global positioning (DGPS) for fully automatic landings, including roll-out. The 200th aircraft from A330/340 assembly line flew in November 1997; 100th A340 delivered to Singapore Airlines in February 1997; 180-minute ETOPS for Rolls-Royce Trent 700 engines awarded May 1996. A340-500 and -600 were launched on 8 December 1997, at an estimated investment cost of US\$2.9 billion. First flights took place on 11 February 2002 and 23 April 2001 respectively, followed by certifications on 3 December 2002 and 29 April 2002. A340-600 entered service with Virgin Atlantic 1 August 2002. 2,000th Airbus was A340-300 for Lufthansa, delivered 18 May 1999. 400th A330/A340 family member first flown 23 March 2001.

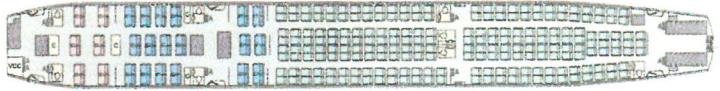
Cathay Pacific took delivery of an A340-300 covered with 700 m² (7,535 sq ft) of plastic film riblets in October 1996 in a trial intended to reduce fuel consumption (average ¾ tonne per medium- or long-range flight) by reducing drag (see illustrations in 1998-99 edition).

CURRENT VERSIONS: **Initial A340-300:** Higher-capacity version, carrying up to 375 passengers (standard) or 440 (optional) and powered initially by CFM56-5C2 turbofans.

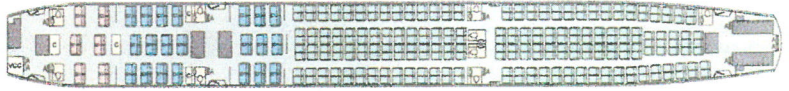


Airbus A340-300 four-turboprop long-range airliner, with additional side view (upper) of A340-200 (Jane's/Dennis Punnett)

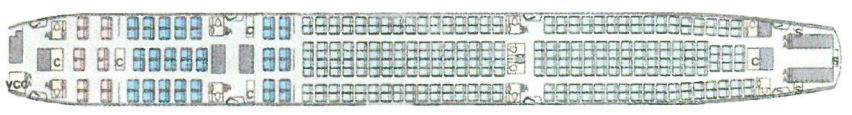
A340-200 12 First + 36 Business + 213 Economy = 261 seats



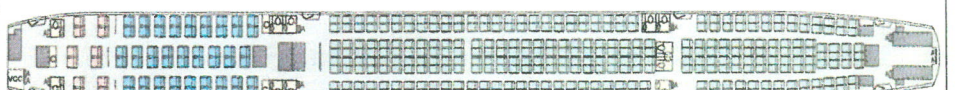
A340-300 12 First + 42 Business + 241 Economy = 295 seats



A340-500 12 First + 42 Business + 259 Economy = 313 seats



A340-600 12 First + 54 Business + 314 Economy = 380 seats



Seat pitches: First 62in, Business 40in, Economy 32in

Potential interior arrangements of the Airbus A340

Able to carry typical load of 295 passengers over distances of 7,300 n miles (13,519 km; 8,400 miles).

Current A340-300 (engineering designation -300X) powered by 151.2 kN (34,000 lb st) CFM56-5C4 turbofans; maximum T-O weight 271,000 kg (597,450 lb) with optional MTOW of 275,000 kg (606,275 lb); stronger landing gear, and aerodynamic and engine refinements, plus optional additional centre tank (ACT) for increased fuel capacity compared with basic A340-300. First flight (F-WWJH; CFM56-5C4 engines) 25 August 1995; first delivery, to Singapore Airlines, 17 April 1996.

A340-300E: Enhanced version with upgraded CFM56-5C4/P engines (trial engine first flew on an A340 on 19 November 2002); optional increased MTOW of 276,500 kg (609,575 lb); new-style cabin from A340-600. Initial customer, South African Airways, ordered six in 2002; first delivery due early 2004.

A340-300 Aviator: Company testbed for Aircraft Wing with Advanced Technology Operation (Aviator) R & D programme to explore ways of reducing aircraft wake, drag, noise and fuel consumption, and other technologies, which could be applied to future Airbus designs. Two-year programme (to mid-2005) will test such features as

enlarged winglets, modified inboard spoilers/airbrakes, turbulence sensors and various vortex devices.

Initial A340-200: Short-fuselage, longer-range version of A340-300, with same initial power plant; seating capacity 420 passengers, but more typically 303 in a two-class or 263 in three-class configuration; first flight (F-WWBA) 1 April 1992; entered service January 1993 with Lufthansa.

Current A340-200: Advanced version (previously referred to as A340-8000) with additional fuel in two tanks in rear cargo hold, strengthened fuselage and wings, CFM56-5C4 engines and 275,000 kg (606,275 lb) maximum T-O weight; first order placed March 1996 by Prince Jefri of Brunei for one VVIP aircraft, which first flew 19 December 1997 and was retained by Airbus during 1998; stored at Schönefeld-Berlin in 'green' condition, in 1999. Sold to Jordan for Royal Flight. New-build aircraft no longer marketed by Airbus.

A340-400: Series discontinued in favour of A340-600.

A340-500: Ultra-long-range variant of A340-600 able to carry (typically) 313 passengers in three classes across 8,650 n miles (16,020 km; 9,954 miles). Fuselage 3.20 m (10 ft 6 in) longer than A340-300, representing 14-frame shrink of A340-600, plus additional fuel in rear centre tank. Launched at 1997 Paris Air Show and received go-ahead December 1997. Commonality with existing A330/A340 variants allows cross-crewing and employment of common cargo containers and interiors to minimise training, staffing, provisioning and maintenance costs. Stated to be the world's longest-range airliner. Development time of A340-500/-600 series reduced by 25 per cent by use of Airbus Concurrent Engineering (ACE) shared CADD-CAD/CAM systems.

Compared with -300, has 0.53 m (1 ft 9 in) fuselage plug ahead of wings and 1.07 m (3 ft 6 in) plug to the rear; wings of increased chord (incorporating a third fuselage plug of 1.60 m; 5 ft 3 in) with span stretched to 63.45 m (208 ft 2 in); 31° 6' sweepback at quarter-chord; taller vertical stabiliser is married to a new horizontal stabiliser to give increased chord fin with 0.50 m (1 ft 7 7/8 in) height extension. Max T-O weight 368,000 kg (811,300 lb). Landing gear adaptation involves replacement of central twin-wheel unit with forward-retracting brakeable double-bogie unit. Rolls-Royce Trent 553 of 236 kN (53,000 lb st) chosen as power plant; this combines fan diameter of Trent 700 with scaled IP and HP compressors and turbines of Trent 800, plus new high-lift LP turbine. Honeywell 331-600 APU chosen for A340-500/-600 in March 1999. A340-500 initial launch commitments received from Air Canada, Emirates, SIA and ILFC. Maiden flight (F-WWTE, c/n 394) took place 11 February 2002; certified 3 December 2002.

A340-600: Derivative of A340-300 with 20-frame fuselage stretch, 267 kN (60,000 lb st) class engines, increased horizontal tail area, full electrical control of rudder (replacing mechanical linkage between computer and



First class accommodation aboard A340-600

NEW/0527109

actuator for both primary and secondary systems), additional fuel capacity, four-wheel central landing gear and 365,000 kg (804,690 lb) basic and 368,000 kg (811,300 lb) optional maximum T-O weights; can carry 380 three-class passengers or 475 in all-economy class up to 7,500 n miles (13,890 km; 8,630 miles) and designed as Boeing 747 replacement with significantly lower costs and full commonality with A330/A340 family. Compared with A340-300, has same wing chord/fuselage centre-section, wing span, tailplane and fin modifications as -500, but with further 5.87 m (19 ft 3 in) plug ahead of wing and 3.20 m (10 ft 6 in) to the rear. Airbus and GE Aircraft Engines agreed in April 1996 that latter should be sole power plant source for -600, but this accord dissolved in February 1997 and Rolls-Royce Trent 556 of 249 kN (56,000 lb st) chosen on non-exclusive basis. Ram-air turbine fitted in underwing pod between engines on starboard wing. Launch commitments from Aerolineas Argentinas, Air Canada, Egyptair, Lufthansa, Swissair and Virgin Atlantic; initial firm order placed by Virgin on 15 December 1997 for eight, plus options. First metal cut 27 July 1998. Final assembly began June 2000; airframe completed September 2000 and engines fitted November 2000. Prototype (c/n 360) rolled out 23 March 2001 and first flew (F-WWCA) 23 April 2001; public debut at Paris Air Show, June 2001; second aircraft (c/n 371) handed to test department 8 June 2001 and first flown (F-WWCB) 18 June 2001; third test example, (c/n 376) flew 24 September 2001 (F-WWCC/G-VATL); three-aircraft 1,600 hour test programme completed. Programme of weight reduction and engine improvements implemented as a result of test data; weight optimisation to be achieved gradually by structural modifications; optimum configuration reached in 2003. Certification by JAA awarded 29 April 2002; first delivery (fourth aircraft, G-VSHY, to Virgin Atlantic) 22 July and entered service 1 August 2002.

A340-600F: Development study for freighter version; considered by UPS for order eventually placed for MD-11 freighters; airline has option to convert some of its 60 A300-600Fs to A340-600Fs if required.

AIRBUS A340 MARKS AND VARIANTS

Series	Mark	Power Plant	FAA Certification
200	211	CFM56-5C2 or -5C2/F or -5C2/G	27 May 93
200	212	CFM56-5C3/F or -5C3/G	7 Jul 94
200	213	CFM56-5C4	2 Oct 94
300	311	CFM56-5C2 or -5C2/F or -5C2/G	27 May 93
300	312	CFM56-5C3/F or -5C3/G	7 Jul 94
300	313	CFM56-5C4	2 Oct 97
500	541	Trent 553-61	27 Jan 03
600	642	Trent 556-61	22 Jul 02

Series	Variant	MTOW (kg)
200	000	253,500
200	001	257,000
300	000	253,500
300	001	257,000
500	000	368,000
500	001	372,000
600	000	365,000
600	001	368,000

Note: Variant parameters may include differences in data other than max T-O weight. Except as constrained by Series, Variants are applicable to several engine options.

CUSTOMERS: Sales at 1 January 2004 totalled 347, of which 261 delivered. See table.

AIRBUS A340 ORDERS
(at 1 January 2004)

Customer	Qty
Aerolineas Argentinas	6
Air Canada	13
Air China	3
Air France	14
Air Mauritius	3
Air Tahiti Nui	3
Austrian Airlines	4
Cathay Pacific	11
China Airlines	6
China Eastern Airlines	10
China Southwest Airlines	3
Egyptair	3
Emirates	26
Flightlease	2
Gulf Air	6
Iberia	26
ILFC	28
Kuwait Airways	4
LAN Chile	6
Lufthansa	45
Olympic Airways	4
Philippine Airlines	8
Qatar Airways	4
Sabena	5
SAS	7
Singapore Airlines	22
South African Airways	12
SriLankan Airlines	3
Swiss International Air Lines	12
TAP-Air Portugal	4
Thai Airways International	8
Turk Hava Yollari	7
UTA	7
Virgin Atlantic Airways	17
Undisclosed	5
Total	347

COSTS: Development cost of A340-500/-600 set at US\$2.9 billion, 20 per cent lower than basic A340. Unit cost of A340-300 US\$161.1 million; A340-500 US\$177.8 million; A340-600 US\$186.4 million (2002 prices).

DESIGN FEATURES: A340 capitalises on commonality with A330 (identical wing/cockpit/tail unit and same basic fuselage) to create aircraft for different markets, and also

has much in common (for example, existing Airbus wide-body fuselage cross-sections, A310/A300-600 fin (except on -500/-600), advanced versions of A320 cockpit and systems) with rest of Airbus range; FAA has approved cross-crew qualification for A320 series, A330 and A340.

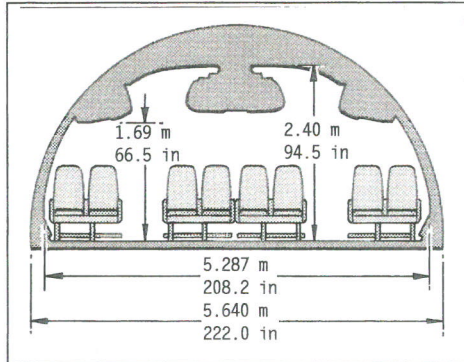
New design wing (by BAE Systems), approximately 40 per cent larger than that of A300-600, has 30° sweepback at quarter-chord and winglets raked at 29° 42'; thickness/chord ratios 15.25 per cent at root, 11.27 per cent at inner kink, 9.86 per cent at outer kink and 10.60 per cent at tip. A340-500/600 wing 20 per cent larger than basic A340, has increased sweepback of 30° 6' and 1.60 m (5 ft 3 in) (removable) extension to each wingtip, rake angle 31° 30'.

FLYING CONTROLS: In A330/A340 electronic flight control system (EFCS), roll axis is controlled by two individual outboard ailerons and five outboard spoiler panels on each wing; pitch axis control is by trimmable tailplane and separate left and right elevators; tailplane can also be mechanically controlled from flight deck, but fly-by-wire computer inputs are superimposed; single rudder is directly linked to rudder pedals, with dual yaw damping inputs superimposed. High-lift devices consist of full-span slats, flaps and aileron droop; speed braking and lift dumping by raising all six spoilers on each wing and raising all ailerons. Slats and flaps controlled outside main fly-by-wire complex by duplicated slat and flap control computers (SFCC).

Control surface maximum deflections (A340-500 and 600 in parentheses, where different): ailerons ±25° (inner +20°/-30°; outer ±25°); aileron droop 10°; elevator +15°/-30° (+17°/-30°); rudder ±31° 35' (±35°); flaps 32° (33° 40°); No 1. spoiler, speed brake 25°, lift dumper 25°; Nos. 2 and 3 spoilers, roll 35°, speed brake 30° (35°), lift dumper 50°; Nos. 4 and 5 spoilers (and No. 6), roll 35° (40°), speed brake 30° (40°), lift dumper 50°; slat No. 1 (21°); Nos. 2 to 7 slats 24°; stabilisers +2°/-14°.

Control surface actuation by three hydraulic systems (green, yellow, blue); two powered control units (PCU) at each aileron and elevator are controlled either by primary or secondary flight control computers; single actuators at spoiler panels controlled by primary or secondary flight control computers; dual PCUs for fly-by-wire tailplane trimming, and for centrally located flap and slat actuators; three PCUs at rudder.

Fly-by-wire computers include three flight control primary computers (FCPC) and two flight control secondary computers (FCSC); each computer has two processors with different software; primary and secondary computers have different architecture and hardware; power supplies and signalling lanes are segregated; system provides stall protection, overspeed protection and manoeuvre protection as in the A320, but the A330/340 computer arrangement maintains the protections for longer in the face of failures of sensors and inputs; FCPC and FCSC all operate continuously and provide comparator function to active channels, but only one in active control at any one control surface; reconfiguration logic can provide alternative control after failures; different normal and alternative control laws apply fly-by-wire basically as a g demand in pitch and rate demand in roll, plus complex manoeuvre limitations; if all three inertial systems fail (removing attitude information), system reverts to direct mode in which control surface angle is directly related to sidestick position; ultimate control mode is direct control



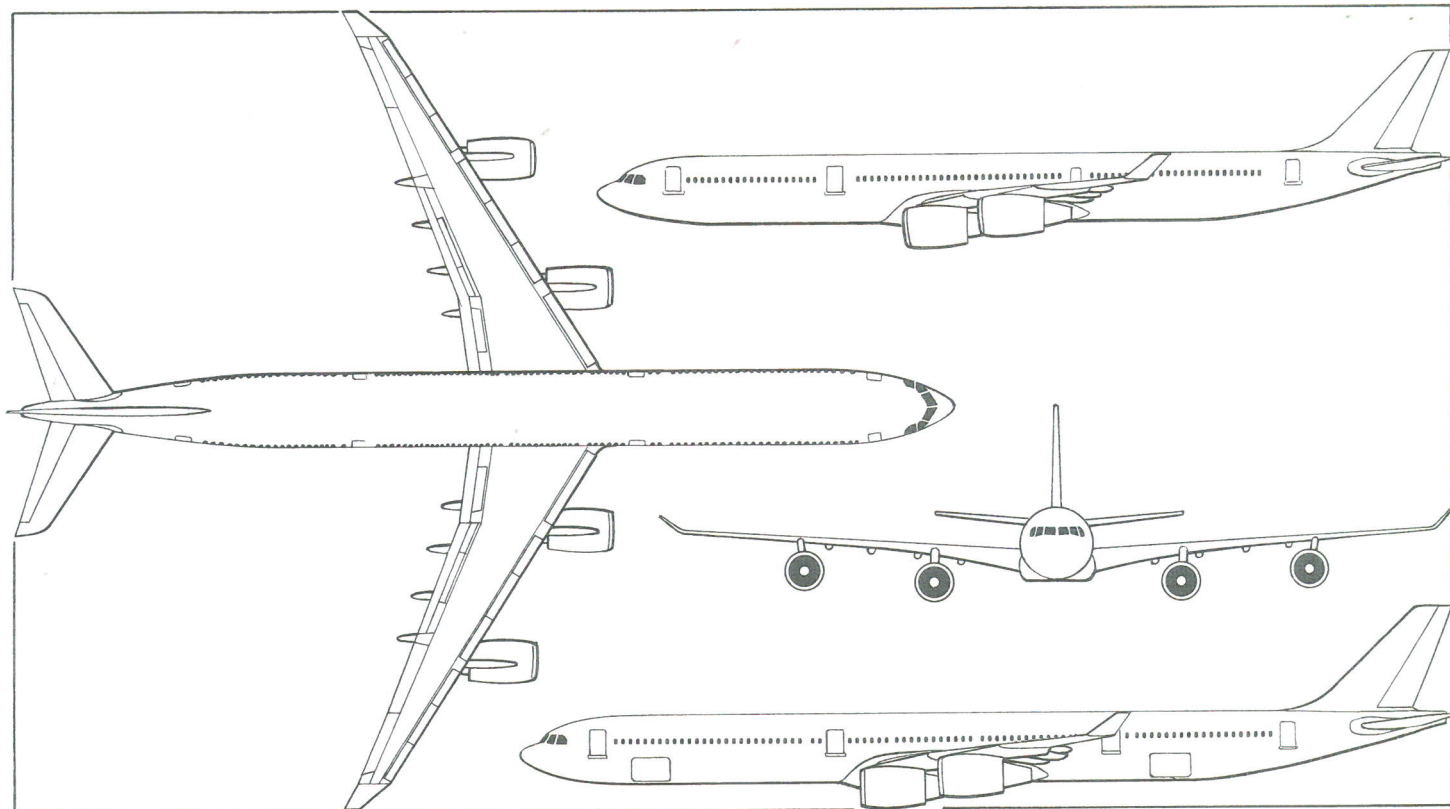
Airbus A330/340 passenger cabin cross-section (Jane's/Mike Keep)

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Airbus A340-300 in the colours of Turkish Airlines

NEW/0527112



Airbus A340-600 four-turboprop ultra-long-range airliner, with additional side view (upper) of A340-500 (James Goulding)

0126690

of rudder and tailplane angle from rudder pedals and manual trim wheel, which is sufficient for accurate basic instrument flight.

Pilots have sidestick controllers and normal rudder pedals; EFIS instrumentation consists of duplicated primary flight displays (PFD), navigation displays (ND) and electronic centralised aircraft monitors (ECAM); three display management computers, with separate EFIS and ECAM channels, can each control all six displays in their four possible formats; flight path control by duplicated flight management and guidance and envelope computers (FMGEC); they control every phase of flight including course, attitude, engine thrust and flight planning using information from GPS and inertial systems; point of no return calculations made automatically for long-range flights in A340/A330. Control system data are collected for maintenance purposes by two flight control data concentrator (FCDC) computers. Honeywell Pegasus flight management system evaluated 1999, before January 2000 certification.

In normal flight, bank angle limited to 33° hands-off (autopilot control) and 67° with full stick displacement; airspeeds limited to 305 kt (565 km/h; 350 mph) and M0.82 under automatic flight control; if stick is held fully forward, the nose is automatically raised when airspeed reaches $V_{MO} + 15$ kt (28 km/h; 17 mph); if nose is raised, equivalent protections apply; 'alpha max' (13° clean and 19° with flap), slightly below maximum lift coefficient, is the greatest achievable with sidestick; 'alpha floor' is the angle of attack beyond which throttles progressively open to go-around power and airspeed is finally held steady just above stall, even if stick is continuously held back; alpha protection applied at 'normal' and 'hard' modes according to alpha rate; below protection speed (V_{PROT}) of 142 kt (263 km/h; 163 mph) automatic and manual trimming stops; outer ailerons remain centred at over 200 kt (371 km/h; 230 mph); if a spoiler panel fails, the symmetrical opposite panel stops operating; if rudder yaw damping fails, pairs of spoiler panels are used instead; minimum-speed marker on PFD adjusts to changing aircraft configuration, airbrake and pitch rate; fuel automatically transferred between wing and tailplane tanks to minimise trim drag when cruising above 7,620 m (25,000 ft).

Engines controlled by setting throttle levers to marks on quadrant, such as climb (CLB), maximum continuous and flexible take-off (Flex T-O); digital engine control makes detailed settings appropriate to altitude and temperature.

During landing and take-off, nosewheel steering, by rudder pedals, automatically disengages above 100 kt (185 km/h; 115 mph); demands for more than 4°/s nose-up pitch restrained near ground; maximum airspeeds for flaps and slats signalled on airspeed scale; trim automatically cancels effect of flaps, landing gear and airspeed; ailerons droop with full flap selection and deflect 25° up with spoilers in lift dump after touchdown; thrust reverser failure automatically countered by cancelling symmetrical opposite reverser; voice warning demands throttle closure at 6 m (20 ft) during landing flare; autothrottle disengaged when throttles closed at touchdown; on touch-and-go landing, trim automatically reset for take-off when Flex

T-O power selected; engine failure in flight compensated automatically, with wings held level, slight heading drift and spoiler panels sucked down to avoid unnecessary drag. A340-600 has forward-facing taxi-aid cameras mounted in fin and belly fairing to assist pilots during ground manoeuvres.

STRUCTURE: A330 and A340 wings almost identical except latter strengthened in area of outboard engine pylon with appropriate modification of leading-edge slats 4 and 5; main three-spar wing box and leading/trailing-edge ribs and fittings of aluminium alloy, with Al-Li for some secondary structures; steel or titanium slat supports; approximately 13 per cent (by weight) of wings is of CFRP, GFRP or QFRP, including outer flaps and flap track fairings, ailerons, spoilers, leading/trailing-edge fixed surface panels and winglets; common fuselage for all initial versions, except in overall length (A340-300 same size as A330-300; A340-200 and A330-200 respectively eight and ten frames shorter; A340-500 and A340-600 described above; see also dimensions, below); construction generally similar to that of A310 and A300-600 except centre-section to accept new wing; tail unit (common to all versions except A330-200 and A340-500/600, which have larger tailplane, fin and rudder) utilises same CFRP fin as A300-600 and A310; new tailplane incorporates trim fuel tank and has CFRP outer main boxes bridged by aluminium alloy centre-section. A340-500/600 have Aircelle nacelles constructed from carbon composites.

Work-sharing along lines similar to those for A310 and A300-600, with percentages similar to those held in the original consortium. Airbus France thus responsible for flight deck, engine pylons, part of centre-fuselage, centre-

section cabin doors wing-to-body fairings and final assembly and outfitting at Toulouse; Airbus UK for wings and landing gear; Airbus Deutschland for most of fuselage, tailcone, fin, wing moving surfaces, cabin doors and interior; Airbus España for tailplane and forward starboard cabin doors; Belgian consortium Belairbus for leading-edge slats and slat tracks. Aircelle for engine nacelles. Before final assembly at Toulouse, Saint Nazaire (Airbus France) pre-assembles flight deck and three forward fuselage sections; and two (of three) rear fuselage sections.

LANDING GEAR: Main (four-wheel bogie) and twin-wheel nose units identical on all A330/340 versions. Main tyres size 54x21.0-23 or 46x17.0R20 or 1400x530R23 (32/36 ply); nose tyres 40.5x15.5-6 or 30x8.8R15 or 1050x395R16 (28 ply). A340-200/300 have additional twin-wheel auxiliary unit on fuselage centreline amidships, retracting rearward. A340-500 and -600 have four-wheel centre bogie, retracting forward. Goodyear tyres available on all units; Michelin tyres also available for A340-500/600.

POWER PLANT: Four 138.8 kN (31,200 lb st) CFM56-5C2 turbofans initially; 144.6 kN (32,500 lb st) CFM56-5C3 and 151.2 kN (34,000 lb st) CFM56-5C4/P; CFM56 upgrade announced in July 2000, combining CFM56-5C with core of CFM56-5B/P. Rolls-Royce Trent 553-61 of 248 kN (55,780 lb st) in A340-500; Trent 556-61 of 260 kN (58,460 lb st) in A340-600.

A340-200/300: Maximum fuel capacity: (-200 and -300 until 1996) 138,600 litres (36,614 US gallons; 30,488 Imp gallons); (-200/300 1996-97) 140,640 litres (37,154 US gallons; 30,937 Imp gallons); (-200, 300, 1997 and subsequent deliveries) 141,500 litres (37,381 US gallons; 31,126 Imp gallons); (-200/300, 1997 and subsequent deliveries, including optional ACT) 148,700 litres (39,283



Airbus A340-500 in the livery of Air Canada

NEW/0567719



Flight deck of the A340-600

NEW/0527110

US gallons; 32,710 Imp gallons). Totals include 6,230 litres (1,646 US gallons; 1,370 Imp gallons) in tailplane trim tank.

A340-500: Total capacity 214,405 litres (56,641 US gallons; 47,164 Imp gallons) total, including 771 litres (204 US gallons; 170 Imp gallons) unusable. Centre and wing group tanks as for A340-600; plus Rear Centre tank of 19,883 litres (52,500 US gallons; 43,716 Imp gallons) and Trim tank of 8,011 litres (2,116 US gallons; 1,762 Imp gallons).

A340-600: Total capacity 194,897 litres (51,511 US gallons; 42,892 Imp gallons) total, including 761 litres (201 US gallons; 167 Imp gallons) unusable. Centre tank of 55,373 litres (14,732 US gallons; 12,181 Imp gallons), Trim tank of 8,386 litres (2,215 US gallons; 1,845 Imp gallons) and six wing tanks: Tank 1/4 of 49,070 litres (12,963 US gallons; 10,794 Imp gallons), Tank 2/3 of 69,744 litres (18,425 US gallons; 15,342 Imp gallons) and Outer tanks with combined 12,324 litres (3,256 US gallons; 2,711 Imp gallons).

ACCOMMODATION: Crew of two on flight deck (all versions); flight deck can be supplied with humidifier system. Passenger seating typically six-abreast in first class, six-abreast in business class and eight-abreast in economy (nine-abreast optional), all with twin aisles. A typical three-class layout seats 295 in A340-300, 239 in the A340-200, 313 in A340-500 and 380 in A340-600. Single-class seating capacities for A340-300/200/500/600 are 440, 420, 375 and 475 respectively. A340-300 is available with optional, removable, lower deck crew rest module, replacing pallet in rear cargo hold with a sleeper cabin for

seven or eight cabin crew. Optional lower deck facilities in rear cargo hold of -600 include an area with stand-up headroom and lavatories plus up to eight crew rest bunks and galleys. A further facility is under study for -500 and -600 that could offer up to 10 full-length beds for passengers or a lower-deck lounge. A340-600 (except prototype) has two overwing Type III emergency exits in addition to standard eight Type A doors. Underfloor cargo holds house up to 32 LD3 containers or 11 standard 2.24 x 3.17 m (88 x 125 in) pallets in A340-300, 26 LD3s or nine pallets in A340-200, 30 LD3s or 10 pallets in A340-500, and 42 LD3s or 14 pallets in A340-600; front and rear cargo holds have doors wide enough to accept 2.44 x 3.17 m (96 x 125 in) pallets; all versions have a 19.7 m³ (695 cu ft) bulk cargo hold aft of the rear cargo hold.

SYSTEMS: Hamilton Sundstrand GTCP 331-350C APU. **AVIONICS:** Airbus Future Air Navigation System (FANS-A), comprising Smith's Industries digital control and display system married to Honeywell FMS, underwent testing end 1999 and was certified July 2000; can be retrofitted to all A330/A340s. Tenzing Communications in-flight e-mail/Internet access system was successfully tested on an A340-600 during flight testing with a full passenger load.

DIMENSIONS, EXTERNAL:	
Wing span: A340-200/300	60.30 m (197 ft 10 in)
A340-500/600	63.45 m (208 ft 2 in)
Wing chord at root: A340-200/300	10.60 m (34 ft 9 1/4 in)
A340-500/600	12.20 m (40 ft 0 1/4 in)
Wing aspect ratio: A340-200/300	10.1
A340-500/600	9.3

Length overall: A340-200	59.42 m (194 ft 11 1/4 in)
A340-300	63.68 m (208 ft 11 in)
A340-500	67.51 m (221 ft 6 in)
A340-600	74.96 m (245 ft 11 in)
Fuselage: Max diameter (all versions)	5.64 m (18 ft 6 in)
Height overall:	
A340-200/-300	16.84 m (55 ft 3 in)
A340-500/-600	17.75 m (58 ft 3 in)
Tailplane span: A340-300	
A340-500/-600	19.41 m (63 ft 8 in)
A340-500/-600	22.96 m (75 ft 4 in)
Wheel track (all versions)	10.69 m (34 ft 5 in)
Wheelbase: A340-200	
A340-300	23.47 m (77 ft 0 in)
A340-500	25.40 m (83 ft 4 in)
A340-600	27.58 m (90 ft 6 in)
A340-600	32.89 m (107 ft 11 in)

DIMENSIONS, INTERNAL:	
Cabin:	
Length (excl flight deck):	
A340-200	46.08 m (151 ft 2 in)
A340-300	50.34 m (165 ft 2 in)
A340-500	53.54 m (175 ft 8 in)
A340-600	60.99 m (200 ft 1 in)
Max width	5.28 m (17 ft 4 in)
Max height	2.40 m (7 ft 10 1/2 in)
Underfloor baggage/cargo holds:	
Max height	1.70 m (5 ft 7 in)
Width at floor	3.175 m (10 ft 5 in)
Volume: forward hold:	
A340-300/-500 standard	69.1 m ³ (2,442 cu ft)
A340-300/-500 option	80.5 m ³ (2,844 cu ft)
A340-600 standard	92.2 m ³ (3,256 cu ft)
A340-600 option	107.4 m ³ (3,792 cu ft)
Volume: rear hold:	
A340-300 standard	55.6 m ³ (1,965 cu ft)
A340-300 option	62.6 m ³ (2,212 cu ft)
A340-500 standard	46.1 m ³ (1,628 cu ft)
A340-500 option	53.7 m ³ (1,896 cu ft)
A340-600 standard	69.1 m ³ (2,442 cu ft)
A340-600 option	80.5 m ³ (2,844 cu ft)
Volume: bulk hold (all versions)	19.7 m ³ (695 cu ft)

AREAS:	
Wings, gross:	
A340-200/-300	361.60 m ² (3,892.2 sq ft)
A340-500/-600	437.00 m ² (4,703.8 sq ft)

WEIGHTS AND LOADINGS:	
Baggage capacity:	
A340-200:	
forward hold	18,507 kg (40,801 lb)
rear hold	15,241 kg (33,601 lb)
bulk hold	3,468 kg (7,646 lb)
A340-300:	
forward hold	22,861 kg (50,400 lb)
rear hold	18,507 kg (40,801 lb)
bulk hold	3,468 kg (7,646 lb)
A340-500:	
forward hold	24,494 kg (54,000 lb)
rear hold	16,330 kg (36,001 lb)
bulk hold	3,458 kg (7,624 lb)
A340-600:	
forward hold	30,482 kg (67,201 lb)
rear hold	22,861 kg (50,400 lb)
bulk hold	3,468 kg (7,646 lb)
Operating weight empty (basic weight options):	
A340-200 current	129,500 kg (285,500 lb)
A340-300 basic	130,000 kg (286,600 lb)
A340-500	170,900 kg (376,770 lb)
A340-600	177,700 kg (391,760 lb)
Max payload (maximum weight options):	
A340-200: initial	
current	44,000 kg (97,005 lb)
45,530 kg (100,375 lb)	
A340-300 basic	
50,900 kg (112,215 lb)	
A340-500	
54,100 kg (119,270 lb)	
A340-600	
67,200 kg (148,150 lb)	
Max T-O weight:	
A340-200, -300: basic	
option	253,500 kg (558,875 lb)
257,000 kg (566,600 lb)	



Airbus A340-600 in the insignia of South African Airways (SAA)

NEW/0567718

A340-500: basic	368,000 kg (811,300 lb)
option	372,000 kg (820,125 lb)
A340-600: basic	365,000 kg (804,675 lb)
option	243,000 kg (535,725 lb)
Max ramp weight:	
A340-200, 300: basic	254,400 kg (560,850 lb)
option	257,900 kg (568,575 lb)
A340-500: basic	369,200 kg (813,950 lb)
option	373,200 kg (822,750 lb)
A340-600: basic	366,200 kg (807,325 lb)
option	369,200 kg (813,950 lb)
Max landing weight:	
A340-200	181,000 kg (399,025 lb)
A340-300 basic and option	186,600 kg (410,050 lb)
A340-500: basic	240,000 kg (529,105 lb)
option	243,000 kg (535,725 lb)
A340-600 basic	256,000 kg (564,380 lb)
option	259,000 kg (570,995 lb)
Max zero-fuel weight:	
A340-200	169,000 kg (372,575 lb)
A340-300 basic and option	174,000 kg (383,600 lb)
A340-500: basic	225,000 kg (496,040 lb)
option	230,000 kg (507,075 lb)
A340-600: basic	242,000 kg (533,520 lb)
option	245,000 kg (540,130 lb)
Max wing loading:	
A340-200, -300	760.5 kg/m ² (155.76 lb/sq ft)
A340-500, -600	835.2 kg/m ² (171.07 lb/sq ft)

PERFORMANCE:	
Max operating Mach No. (Mmo)	0.86
Max operating speed	330 kt (611 km/h; 380 mph) IAS
Typical operating Mach No.:	
A340-200/300	0.82
A340-500/600	0.83
Stalling speed:	
A340-300, at 267,000 kg (588,625 lb), wheels up:	
flaps up	161 kt (299 km/h; 186 mph)
flaps down	133 kt (247 km/h; 153 mph)
Max certified altitude, all	12,525 m (41,100 ft)
T-O field length at S/L, basic MTOW, ISA + 15°C:	
A340-200	3,017 m (9,900 ft)
A340-300	3,125 m (10,250 ft)
A340-500 (estimated)	3,125 m (10,250 ft)
A340-600	3,140 m (10,300 ft)
Range at typical OWE, international allowances and 200 n mile (370 km; 230 mile) diversion:	
A340-200 with 239 passengers	8,000 n miles (14,816 km; 9,206 miles)
A340-300 with 295 passengers:	
basic	7,200 n miles (13,334 km; 8,285 miles)
optional	7,400 n miles (13,704 km; 8,515 miles)
A340-500 with 313 passengers	8,650 n miles (16,019 km; 9,954 miles)
A340-600 with 380 passengers:	
basic	7,500 n miles (13,890 km; 8,630 miles)
OPERATIONAL NOISE LEVELS (at basic MTOW):	
T-O, fly-over: A340-300	95.6 EPNdB
A340-600	93.5 EPNdB
Sideline: A340-300	96.1 EPNdB
A340-600	95.5 EPNdB
Approach: A340-300	96.9 EPNdB
A340-600	99.9 EPNdB

UPDATED

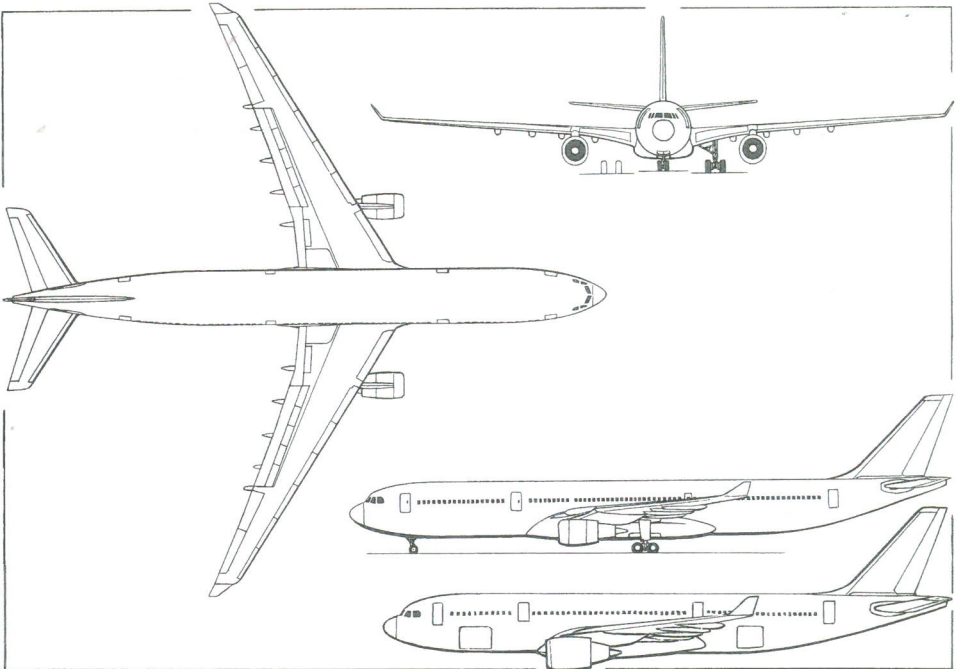
AIRBUS A330

TYPE: Wide-bodied airliner.
PROGRAMME:

DEVELOPMENT MILESTONES

A330-300	
Launched	5 Jun 87
First flight	2 Nov 92
Certification	21 Oct 93
First delivery (Air Inter)	30 Dec 93
Entered service (Air Inter)	17 Jan 94
Subsequent versions	
A330-200	
Launched	24 Nov 95
First flight	13 Aug 97
Public debut	16 Nov 97
Certification	31 Mar 98
First delivery (Canada 3000)	29 May 98

Twin-engined A330 was developed simultaneously with four-engined A340; launched 5 June 1987; first flight (F-WWKA) with GE engines 2 November 1992; first R-R Trent 700-powered A330 flew 31 January 1994; simultaneous European and US certification with initial GE CF6-80E1 engines received 21 October 1993; first delivery (Air Inter) December 1993, entered service January 1994; certification with PW4164/4168 obtained 2 June 1994; A330 powered by GE CF6-80E1 with FADEC granted 120-minute ETOPS approval May 1994; Aer Lingus flew first ETOPS services across the Atlantic in May 1994; A330 powered by PW4164/4168 granted 90-minute ETOPS approval November 1994; certification with R-R Trent achieved 22 December 1994; 90-minute ETOPS approval granted before first delivery, to



Airbus A330 twin-turbofan airliner, with additional side-view of A330-200 (James Goulding) 0126564

Cathay Pacific Airways, 24 February 1995. Further extensions of ETOPS to 180 minutes granted on 6 February 1995 (GE engines), 4 August 1995 (P&W) and 17 June 1996 (R-R); 180-minute ETOPS for PW4168A-powered A330-300 granted July 1999.

All main structural and systems information common to both A330 and A340 is listed in A340 entry. Differences in A330 given here.

CURRENT VERSIONS: **A330-300:** Baseline version; seating capacity 295 in three classes (12 first, 42 business, 241 economy). Payload increase of 7,000 kg (15,432 lb) offered for standard A330-300 in October 1993. Maximum T-O weight increased to 217,000 kg (478,400 lb) from November 1995 to allow typical 335 passengers to be carried 4,850 n miles (8,982 km; 5,581 miles), further increase to 230,000 kg (507,050 lb) with range increased to 5,600 n miles (10,370 km, 6,444 miles) offered in 1997; first aircraft to this standard ordered by Air Canada in 1997, but first in service was a Korean Air example in May 1999. Optional higher maximum T-O weight of 233,000 kg (513,675 lb) available from early 2001; earlier 230,000 kg (507,050 lb) versions can be retrofitted.

A330-200: Extended-range version; launched 24 November 1995; 10-frame reduction in fuselage length to 59.00 m (193 ft 6 1/4 in); maximum T-O weight 230,000 kg (507,050 lb); higher MTOW available from early 2001, as per A330-300. 253 passengers in three classes (12 first, 36 business, 205 economy) or 293 passengers in two classes; range with 253 passengers 6,650 n miles (12,315 km; 7,652 miles); engine choice as for A330-300; initial order, for 13, placed in March 1996 by ILFC. First flight (c/n 181, F-WWKA, with CF6-80E1 engines) 13 August 1997 was followed by public debut at Dubai Air Show in November 1997. Canada 3000 first user (on lease from ILFC) with first flight of production aircraft (C-GGWA) 20 January 1998 and delivery on 29 May 1998 following FAA/JAA/Transport Canada certification on 31 March 1998. First direct airline order from Korean Air, received second built in June 1998 (c/n 195, with PW4000 engines) following 4 December 1997 first flight and May 1998 certification. Version with Rolls-Royce Trents (re-engined first prototype) flew 24 June 1998 and following JAR and Transport Canada certification in January 1999 was delivered to Air Transat in February 1999. First with updated CF6-80A1A3s delivered to Air France 17 December 2001.

AirTanker consortium bid for UK Future Strategic Tanker Aircraft (FSTA) contract offered A330-200 tankers, using new airframes converted by Cobham, which

would enter service in 2007; selected as preferred platform January 2004.

A330-100: Proposed nine-frame reduction of A330-200; not built.

A330-200F: Proposed freighter version; possible DC-10/MD-11 replacement; planned launch at Paris Air Show in June 2001 was deferred to unspecified date. Maximum payload 63,500 kg (140,000 lb) over 4,200 n miles (7,778 km; 4,833 miles). Capacity for 20 2.24 x 3.17 x 2.44 m (88 x 125 x 96 in) pallets or containers on main deck and a combination of up to 14 LD3 plus up to 6 LD6 containers on the lower deck. Estimated market for 200 aircraft over next 10 years.

A330-500: Proposed eight-frame reduction of A330-200, announced July 2000 and initially internally designated A330-M18; suspended in favour of A380 programme.

AIRBUS A330 MARKS AND VARIANTS

Series	Mark	Power Plant	FAA Certification
200	201	CF6-80E1A2	1 Apr 03
200	202	CF6-80E1A4	31 Mar 98
200	203	CF6-80E1A3	1 Nov 02
200	223	PW4168A	21 Jun 99
200	243	Trent 772B-60	21 Dec 00
300	301	CF6-80E1A2	21 Oct 93
300	321	PW4164	21 Jun 99
300	322	PW4168	21 Jun 99
300	323	PW4168A	8 Oct 99
300	341	Trent 768-60	21 Dec 00
300	342	Trent 772-60	21 Dec 00
300	343	Trent 772B-60	21 Dec 00

Series	Variant	MTOW (kg)
200	020	230,000
300	000	212,000
300	001	184,000
300	002	212,000
323/343 only	020	230,000
323 only	022	233,000
323 only	050	230,000
323 only	052	233,000

Note: Variant parameters may include differences in data other than max T-O weight. Except as constrained by Series, Variants are applicable to several engine options.



Airbus A330-200 in Cyprus Airways colours

NEW/0567717

CUSTOMERS: Total of 469 sold, of which 282 delivered, by 1 January 2004. See table.

AIRBUS A330 ORDERS
(at 1 January 2004)

Customer	Qty
Aer Lingus	3
Air Algerie	5
Air Calédonie International	2
Air Canada	8
Air France	8
Air Inter Europe	7
Asiana Airlines	6
Austrian Airlines	3
British Midland Airways	1
Cathay Pacific Airways	23
China Airlines	14
China Aviation Supplies	4
CIT Group	15
Corsair	2
Dragonair	5
Egyptair	7
Emirates	28
EVA Air	2
Flightlease	9
Garuda Indonesia	9
GECAS	18
Gulf Air	6
ILFC	93
KLM	6
Korean Air	19
LTU	5
Lufthansa	10
Malaysia Airlines	10
Monarch Airlines	2
MyTravel Airways	7
Northwest Airlines	32
Philippine Airlines	8
Qantas	13
Qatar Airways	22
Sabena	3
SAS	4
SriLankan Airlines	6
Swissair	4
TAM	5
Thai Airways International	12
US Airways	19
Undisclosed	4
Total	469

COSTS: A330-200 US\$135.3 million; A330-300 US\$150.6 million (2002).

FLY CONTROLS: Control surface maximum deflections: ailerons ±25°; aileron droop 10°; elevator +15°/–30°; rudder ±30°; flaps 32°; No. 1 spoiler, speed brake 23°, lift dumper 35°; Nos. 2 to 6 spoilers, roll 35°, speed brake 30°, lift dumper 50°; slats 23°; stabilisers +2°/–14°.

POWER PLANT: Two turbofans. Initial application was 287 kN (64,530 lb st) GE CF6-80E1A2 turbofans (297 kN; 64,530 lb st E1A4 on longer-range version); alternative engines, using common pylon and mount, GE CF6-80E1A3 (each 305 kN; 68,530 lb st), P&W PW4168/A (305 kN; 68,600 lb st), R-R Trent 772-60/772B-60A (316 kN, 71,100 lb st), PW4164 (287 kN; 64,500 lb) and Trent 768-60 (300 kN; 67,500 lb st).



Common flight deck of the A330 (illustrated) and A340 permits crew cross-qualification 0116958

Fuel capacities: **A330-200:** Total 139,527 litres (36,860 US gallons; 30,693 Imp gallons), of which 437 litres (115.4 US gallons; 96.1 Imp gallons) unusable. Wing tanks total 91,648 litres (24,212 US gallons; 20,160 Imp gallons); centre tank 41,643 litres (11,001 US gallons; 9,160 Imp gallons); trim tank 6,236 litres (1,647 US gallons; 1,372 Imp gallons).

A330-301/321/322/341/342: Total 97,525 litres (25,764 US gallons; 21,453 Imp gallons), of which 354 litres (93.4 US gallons; 77.9 Imp gallons) unusable. Wing tanks total 91,404 litres (24,147 US gallons; 20,107 Imp gallons); trim tank 6,121 litres (1,617 US gallons; 1,346 Imp gallons).

A330-323/343: Total 98,239 litres (25,952 US gallons; 21,610 Imp gallons), of which 354 litres (93.4 US gallons; 77.9 Imp gallons) unusable. Wing tanks total 92,112 litres (24,334 US gallons; 20,262 Imp gallons); trim tank 6,127 litres (1,619 US gallons; 1,348 Imp gallons).

ACCOMMODATION: A330-200 and -300 certified for 375 passengers, with three pairs of Type A and one pair of Type 1 emergency exits, or 379 passengers with four pairs of Type A exits.

DIMENSIONS, EXTERNAL: As A340 except:
Length overall: A330-200 59.00 (193 ft 7 in)
A330-300 63.58 m (208 ft 7 in)
Height overall: A330-200 17.88 m (58 ft 8 in)
A330-300 16.84 m (55 ft 3 in)

DIMENSIONS, INTERNAL: As A340 except:
Underfloor baggage/cargo holds:
Volume: forward hold:
A330-200 basic 55.0 m³ (1,944 cu ft)
A330-200 option 62.6 m³ (2,212 cu ft)
A330-300 basic 69.1 m³ (2,442 cu ft)
A330-300 option 80.5 m³ (2,844 cu ft)
Volume: rear hold:
A330-200 basic 46.1 m³ (1,628 cu ft)
A330-200 option 53.7 m³ (1,896 cu ft)

A330-300 basic 55.6 m³ (1,965 cu ft)
A330-300 option 62.6 m³ (2,212 cu ft)
Volume: bulk hold (all versions) 19.7 m³ (695 cu ft)

WEIGHTS AND LOADINGS (C: with CF6-80E1A3/A4, P: with PW4168A, T: with Trent 772B):

Operating weight empty, basic versions, three-class layout:
C 120,500 kg (265,655 lb)
P 121,100 kg (266,980 lb)
T 120,600 kg (265,875 lb)

A330-300:
C 124,500 kg (274,475 lb)
P 125,100 kg (275,800 lb)
T 124,600 kg (274,695 lb)

Baggage capacity: A330-200:
forward hold 18,869 kg (41,599 lb)
rear hold 15,241 kg (33,601 lb)
bulk hold 3,468 kg (7,646 lb)

A330-300:
forward hold 22,861 kg (50,400 lb)
rear hold 18,507 kg (40,800 lb)
bulk hold 3,468 kg (7,646 lb)

Max payload, basic versions: A330-200: C 47,500 kg (104,720 lb)
P 46,900 kg (103,395 lb)
T 47,400 kg (104,500 lb)

A330-300:
C 48,500 kg (106,925 lb)
P 47,900 kg (105,600 lb)
T 48,400 kg (106,705 lb)

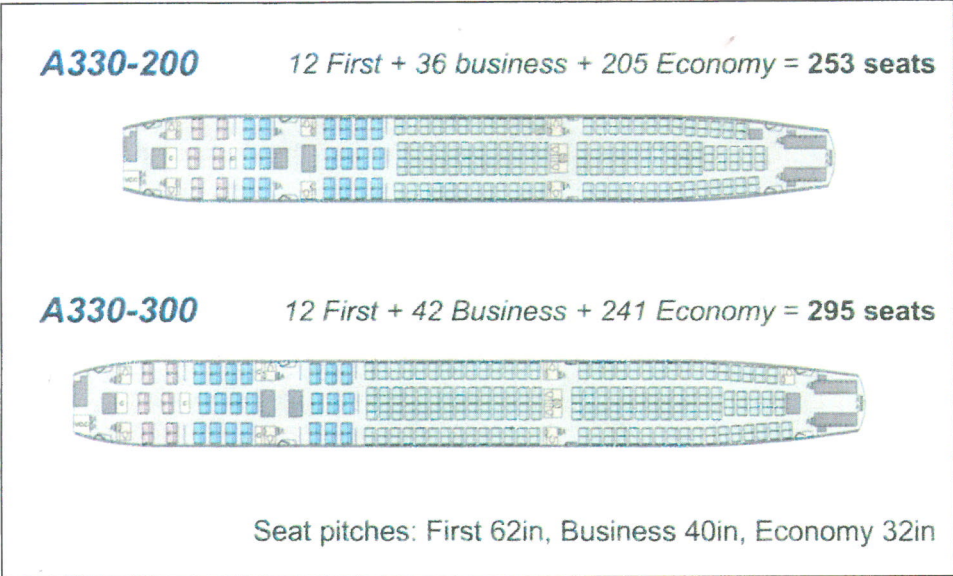
Max T-O weight:
A330-200/-300 basic 230,000 kg (507,060 lb)
-300 option 233,000 kg (513,675 lb)

Max landing weight:
A330-200 basic 180,000 kg (396,825 lb)
A330-200 option 182,000 kg (401,250 lb)



Airbus A330-300 retouched to depict the colours of Air Pacific

NEW/0567716



Airbus A330 alternative interiors

A330-300 basic	185,000 kg (407,855 lb)
A330-300 option	187,000 kg (412,265 lb)
Max zero-fuel weight:	
A330-200 basic	168,000 kg (370,375 lb)
A330-200 option	170,000 kg (374,775 lb)
A330-300 basic	173,000 kg (381,400 lb)
A330-300 option	175,000 kg (385,810 lb)
Max wing loading:	
A330-200/-300 basic	633.4 kg/m ² (129.74 lb/sq ft)
A330-200/-300 option	644.4 kg/m ² (131.97 lb/sq ft)
PERFORMANCE:	
Max operating Mach No. (MMO)	0.86
Max operating speed	360 kt (666 km/h; 414 mph) IAS
Typical operating Mach No.	0.82
Max certified altitude	12,525 m (41,100 ft)
T-O field length at S/L, ISA + 15°C, Trent 772B engines:	
A330-200, basic MTOW	2,530 m (8,300 ft)
A330-200, option MTOW	2,652 m (8,700 ft)
A330-300, basic MTOW	2,515 m (8,250 ft)
A330-300, option MTOW	2,606 m (8,550 ft)
Landing field length at S/L, ISA + 15°C, Trent 772B engines:	
A330-200, option MLW	1,722 m (5,650 ft)
A330-200, option MLW	1,753 m (5,750 ft)
Range, typical OWE plus max passengers, international allowances and 200 n mile (370 km; 230 mile) diversion:	
A330-200 at option MTOW	6,650 n miles (12,315 km; 7,652 miles)
A330-300 at option MTOW	5,600 n miles (10,371 km; 6,444 miles)
OPERATIONAL NOISE LEVELS (A330-300: A: 217,000 kg (478,400 lb) with Trent 768; B: 230,000 kg (507,050 lb) with Trent 772):	
T-O, flyover: A	89.8 EPNdB
B	98.0 EPNdB
Sideline: A	96.5 EPNdB
B	101.0 EPNdB
Approach: A	96.8 EPNdB
B	104.0 EPNdB
UPDATED	

AIRBUS A380

TYPE: High-capacity airliner.

PROGRAMME: Engineering work began in early June 1994; known as A3XX until December 2000; separate A3XX directorate (Large Aircraft Division) formed within Airbus in March 1996; concept definition began April 1996; Airbus will allocate approximately 40 per cent of programme to new partners. Full-size mockup of fuselage cross-section shown at Paris in 1997; completed, including partial concept interior, in 2000.

Airbus Industry Supervisory Board authorised programme go-ahead 8 December 1999; commercial launch authorised 23 June 2000; industrial launch and A380 designation confirmed 19 December 2000, on receipt of required 50th launch order. First metal and first carbon fibre lap were cut at Nantes on 23 January 2002. Test programme calls for 2,200 flying hours over 15 months using four prototypes; the first to explore the flight envelope, second to verify performance, third for technical and commercial adaptations and fourth for route proving. Static testing to be carried out at Toulouse from mid-2002 and fatigue testing at Dresden from November 2005. First flight due early 2005, with certification and first deliveries to Emirates and Singapore Airlines by end of first quarter of 2006. Production intended to reach four per month by 2008.

First metal and/or CFRP cut at Nantes (France) January 2002; at Bremen (Germany) March 2002; at Varel (Germany) April 2002; at Filton (UK) August 2002; at

Illescas (Spain) February 2003. First metal cut for wing centre-section 'bathtub' by EADS Military Aircraft at Augsburg 18 February 2003; first Saab-built wing leading-edge components delivered 24 April 2003; new Airbus UK factory at Broughton opened 4 July 2003. Six main subassemblies for prototype (front, centre and rear fuselage, tailcone, tail unit and wings) due for delivery to Toulouse in April 2004 for final assembly.

CURRENT VERSIONS (specific): **001:** First prototype, for airframe, systems and flight trials; R-R Trent 970 engines (311 kN; 70,000 lb st).

002: Second aircraft (third to be built); fully equipped passenger cabin; early long-range flight trials, then eventual delivery to customer; R-R engines.

003: Third aircraft (fifth to be built): first for Singapore Airlines; R-R engines.

004: Fourth aircraft (second to be built): airframe and systems trials, then eventual delivery to customer; R-R Trent 970 engines.

005: Fifth aircraft (sixth to be built): second for Singapore Airlines; R-R engines.

006: Sixth aircraft (seventh to be built): third for customer airline; R-R engines.

AIRBUS A380 CONFIRMED ORDERS
(at 31 December 2003)

Airline	Passenger	Freighter	Options	Engines	Order confirmed	First delivery
Air France	10	—	4	GP7200	18 Jun 01	Nov 2006
Emirates	41	2	10	GP7200	4 Nov 01	Mar 2006
Federal Express	—	10	20	GP7200	Jul 02	2008
ILFC	5	5	—	Trent 900	17 Jun 01	2006
Korean Air	5	—	3	TBD	23 Oct 03	2007
Lufthansa	15	—	—	Trent 900	20 Dec 01	2007
Penerbang Malaysia	6	—	—	TBD		2003
Qantas Airways	12	—	12	Trent 900	6 Mar 01	2006
Qatar Airways	2	—	—	TBD		2003
Singapore Airlines	10	—	15	Trent 900	16 Jul 01	Mar 2006
Virgin Atlantic Airways	6	—	6	Trent 900	25 Apr 01	Jul 2006
Total	112	17	70			



Computer-generated image of the twin-deck Airbus A380-800 in the livery of launch customer Emirates

007: Seventh aircraft (fourth to be built): fully equipped cabin; route-proving flights in 2006, the eventual delivery to customer; R-R engines.

008: Eighth aircraft; R-R engines.

009: Ninth aircraft; first with (and used to test and certify) GP7270 engines.

CURRENT VERSIONS (general): **A380-700:** Potential short-fuselage version, more closely aligned to Boeing 747 replacement market.

A380-800: Baseline version; nominal 555 passengers in three-class layout and range of 8,000 n miles (14,816 km; 9,206 miles). Engine thrust 311 kN (70,000 lb), MTOW 560,000 kg (1,234,585 lb). Lower deck capacity 13 pallets or 38 LD3 containers. Deliveries to begin March 2006.

Following description applies to A380-800 except where indicated.

A380-800F: All-cargo version, carrying 150,000 kg (330,700 lb) of payload over 5,600 n miles (10,371 km; 6,444 miles). Standard layout is 25 pallets on upper deck, 33 pallets on main deck and 13 pallets in cargo hold/lower deck. Optional high-volume configuration offers more than 1,133 m³ (40,000 cu ft) of capacity. Deliveries to begin June 2006.

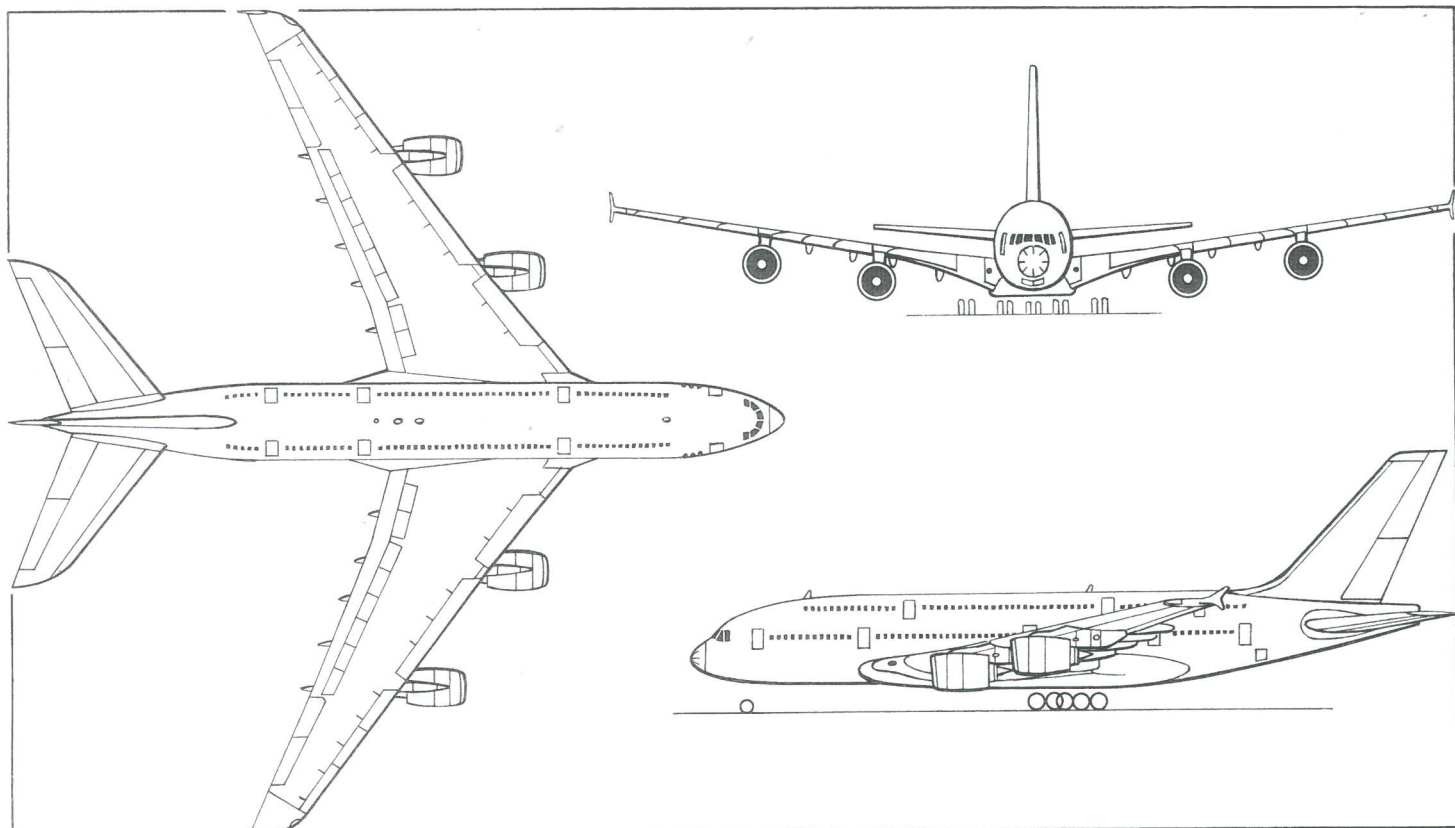
A380-900: Potential stretched version, initially known as A3XX-200; 656 seats in three-class layout and up to 990 at high density. Increased MTOW and fuel volume.

CUSTOMERS: Total of 129 firm orders by 31 December 2003 (see table). Potential market for 1,200 and over 300 cargo aircraft in A380 class up to 2020. Initial launch customer, on 24 July 2000, was Emirates, which committed to five A380s and two A380-800Fs, plus five options, subsequently increased to 20 passenger examples plus 10 options and 2 freighters in November 2001; further 21 of passenger version ordered 16 June 2003. Federal Express became A380-800F launch customer in January 2001.

COSTS: Estimated development cost US\$10.7 billion for whole A380 family given during June 2001; of which US\$3.1 billion was sought from risk-sharing partners. Projected unit cost at launch was US\$217 million for passenger version and US\$233 million for freighter; revised to average unit price for A380-800 of US\$265 million by mid-2002.

DESIGN FEATURES: First version, designated A380-800, is conventional in external appearance except for two rows of windows, but incorporates new developments in structures, materials, systems, landing gear design and aerodynamics. Dassault CATIA and IBM computer-aided design. Flight deck commonality with in-service Airbus permits crew cross-qualification.

Fuselage is vertically orientated oval three-deck arrangement; this 'vertical ovoid' accommodates 10



Airbus A380-800 555-seat airliner (James Goulding)

0103547

passengers abreast on main deck and eight-abreast on upper deck, offering greater space per passenger than Boeing 747. Seating ranges from a nominal 555 (22 first class and 334 economy on main deck and 96 business and 103 economy on upper deck) in three-class layout 840 in high-density, shorter-range applications. Typical launch customer layouts are for about 525 passengers. Dual-lane boarding stair allows four-aisle boarding and deplaning through main deck.

Lower deck can accommodate shop, bar, restaurant and/or normal range of 38 LD3 cargo containers or 13 pallets and 18.4 m³ (650 cu ft) of bulk freight; main deck is large enough to accommodate two 2.44 × 2.44 m (8 ft 0 in × 8 ft 0 in) containers side by side in the freighter version.

Modifications to engines, nacelles and aerodynamics at customer request late in the launch phase have resulted in major reductions in noise levels.

Wing sweep 33° 30' at 25 per cent chord.

FLYING CONTROLS: Single-slotted flaps incorporate droop-nose device to improve climb performance. Two ailerons and two actuators on each wing, plus eight spoilers with individual actuators. Elevators have two panels and actuators on each side; rudder also has two panels and actuators. Flaps, ailerons and engines have all been specifically positioned to keep wake vortex at a minimum.

STRUCTURE: Extensive use of composites for all flaps and spoilers, rear pressure bulkhead, centre wing box (first in CFRP on any Airbus), all tail surfaces, tailcone aft of fin leading-edge intersection with fuselage and engine cowlings. New 'Glare' material, consisting of alternate layers of aluminium and glass fibre-reinforced adhesive which offers significant weight reduction and fatigue/damage resistance, developed by Stork Aerospace with Technical University of Delft and Netherlands National Aerospace Laboratories; tested on a German Air Force A310 since October 1999 and used for upper fuselage shell. Laser beam welding, which reduces cost and weight, used to attach stringers to lower fuselage panels. Wing leading-edge constructed of thermoplastics. Outer wings metal bonded.

Upper floor beams on A380-800 constructed of composites; those in A380-800F aluminium; throughout the structure, lighter 2524 aluminium alloys used in place of more traditional 2024.

Work allocation of major subassemblies is Airbus France (St Nazaire): flight deck and centre fuselage; Airbus Deutschland (Hamburg): forward centre fuselage, rear fuselage; Airbus Deutschland (Stade): fin and rudder; Airbus UK (Broughton): wing main panels; Airbus España: wing/fuselage fairings, belly fairing and fixed horizontal tail; Airbus France (Toulouse): engine pylons and final assembly. For more detailed breakdown, see table.

Transport of major components undertaken by purpose-built ship from Hamburg via UK and St Nazaire (forward centre fuselage disembarked, joined to flight deck and re-embarked, accompanied by centre fuselage), the aircraft set then transferred to barge at Bordeaux and joined by Spanish-built elements for river transport to within 80 km

A380 MAJOR AIRFRAME INDUSTRIAL PARTNERS
(at June 2003)

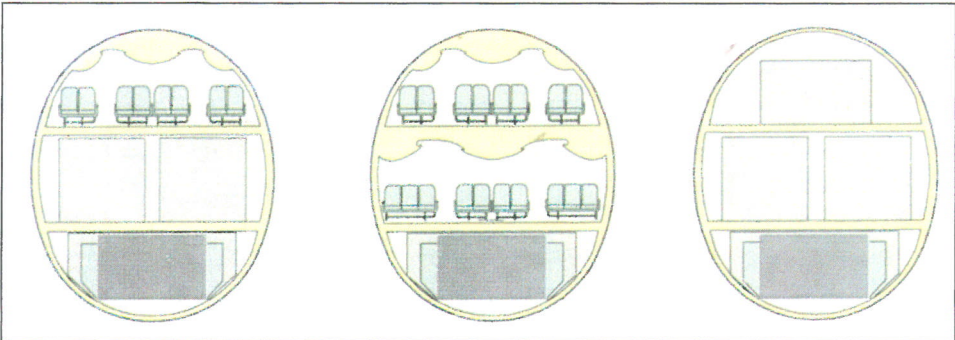
Country	Company	Item
Australia	Hawker de Havilland	Wingtip fences
Austria	Fischer Advanced Composites	Flap track fairings; CFRP window frames; other components
Belgium	Belairbus*	Wing slat tracks and droop noses
	Sabca*	Centre rear lower fuselage shell
Finland	Patria Aerospace Structures*	Composites wing spoilers
France	EADS Socata*	Nose lower structure; nosewheel doors
	EADS Sogerma Services*	Centre rear main deck floor; flight deck seats
	Hurel-Hispano	Engine nacelles and thrust reversers
	Latécoère*	Upper deck passenger doors; lower nose section
	Mecachrome	Wing spars; upper and lower floor assemblies
	Messier-Dowty	Nose landing gear
	Michelin	Tyres
Germany	EADS Military Aircraft*	Wing inner inboard fixed leading-edges
	Eurocopter Deutschland*	Passenger and cargo doors
Italy	Alenia Aeronautica*	Centre upper and forward lower fuselage
Japan	Bridgestone	Tyres
	Fuji*	Vertical tail composites assemblies
	JAMCO	Upper floor deck crossbeams; vertical tail reinforcements
	Mitsubishi	Front and rear lower cargo doors
	Nippi*	Tailplane tips
	ShinMaywa	Wing end root fillet fairings
Korea, South	KAI	Wing bottom panels
Malaysia	CTRM*	Wing fixed leading-edge lower panels and inboard outer fixed leading-edges
Netherlands	Stork Aerospace*	Thermoplastic wing leading-edge 'J-noses'; selected forward and aft fuselage panels
Spain	Aries	Elevator and rudder components
	Gamesa*	Rear fuselage metal structures
	MASA	Tailplane leading/trailing-edges and ribs; wing ribs
	Sacasa	Belly fairing panels
Sweden	Saab Aerostructures*	Wing fixed leading-edge outboard of inner engine nacelles
Switzerland	RUAG Aerospace*	D-nose skins for wing inner fixed leading-edge and outer fixed trailing-edge
UK	BAE Systems Aerostructures*	Wing inboard outer fixed leading-edges
	Dunlop Aerospace	Nosewheels and brakes
	GKN Aerospace Services*	Wing fixed trailing-edge composites secondary structures; flap track beams
USA	Goodrich	Main landing gear
	Honeywell	Mainwheels and brakes
	Ralee Engineering	Wing top skin stringers

* Risk-sharing partner

(50 miles) of Toulouse, completing journey by road. New component assembly hall at Airbus Deutschland's Hamburg site started 6 December 2001 and inaugurated 21 May 2003; Airbus France's final assembly hall at Toulouse to be completed in 2004.

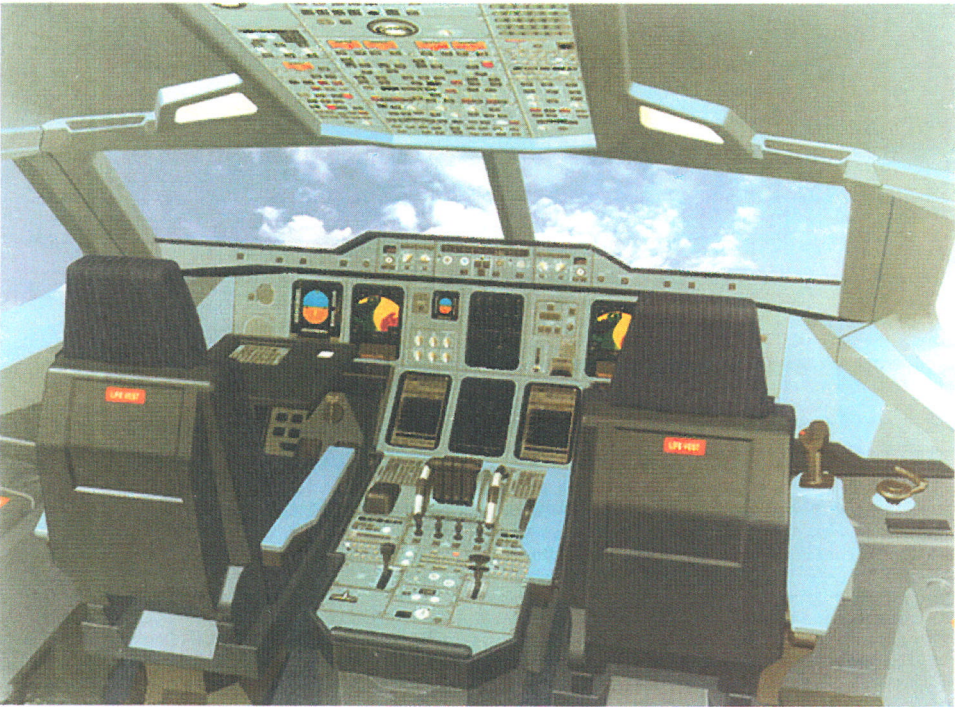
Once completed, 'green' aircraft will be flown to Hamburg for internal fitting out. European and Middle Eastern aircraft will be delivered from Hamburg; those for the rest of the world will return to Toulouse before despatch to customer.

LANDING GEAR: Goodrich main landing gear; each four-wheel wing-mounted unit weighs 2,310 kg (5,093 lb) and each six-wheel underfuselage unit weighs 4,080 kg (8,995 lb). Messier-Dowty twin-wheel nose landing gear. Michelin AIR X NZG tyres: 1400×530 R 23 (40 ply) on A380-800 main units, 1270×455 R 22 (32 ply) on nose unit; corresponding sizes for -800F are 56×22.0 R 24 (40 ply) and 1400×530 R 23 (40 ply). Bridgestone (Japan) is alternative tyre supplier. Underfuselage main gear set slightly aft of underwing units. Normal steering on nose



Airbus A380 alternative cross-sections for Combi, passenger and freighter service

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Impression of the A380's flight deck

0527164

gear and rear axle of body gear; back-up steering of nose gear in event of hydraulic power loss. Carbon brakes on all main group wheels. Manoeuvring compatible with 45 m (148 ft) wide runways and 23 m (75.5 ft) wide taxiways; U-turn possible on 60 m (200 ft) wide runways, by differential braking or asymmetrical thrust.

POWER PLANT: A380 is offered with a choice of Alliance (GE/P&W) GP7200 or Rolls-Royce Trent 900 series; Airbus Industrie and Rolls-Royce signed an MoU specifying the Trent as favoured power plant in November 1996; due for first flight in late 2004 and certification in 2005; ILFC, Lufthansa, Singapore Airlines, Virgin and Qantas have selected R-R power plant; Air France, Emirates and FedEx have selected GP7200, which will make its first flight in 2005. Trent 970 will be initially certified at 311 kN (70,000 lb st) but derated to 302 kN (68,000 lb st), with eventual growth to 374 kN (84,000 lb st). FADEC for GP7270 under development by BAE Systems Controls and Hispano-Suiza.

Alliance GP7200 uses same core as power plants for Boeing 747X and long-range 767. Detailed design work

was due to have started in August 2001 but slipped to early 2003, with a first run due in April 2004, certification at 363 kN (81,500 lb st) in July 2005 and first flight in early 2006.

Standard fuel capacity of both models is 310,000 litres (81,893 US gallons; 68,192 Imp gallons); extra fuel tanks would be fitted in wing centre box for longer-range models.

ACCOMMODATION: Flight deck crew of two; rest areas are provided for crew in flight deck area; see Design Features for details of passenger cabins. Five main deck and three upper deck emergency exits on each side of fuselage; Goodrich evacuation slides, those for upper decks stored within the airframe rather than the door. Seat pitches: first class 173 cm (68 in), business class 122 cm (48 in), economy class 81 or 84 cm (32 or 33 in).

SYSTEMS: Integrated modular avionics (IMA) system provided by Thales Avionics in conjunction with Diehl Avionik Systeme using computing modules slotted into cabinets throughout aircraft. Rockwell Collins supplying Ethernet avionics communications infrastructure at 100

Mbit/s speed with full duplex networking. Variable frequency AC electrical generating systems to be incorporated. Cameras fitted to top of fin and under fuselage for taxiing assistance. Fuel management systems provided by Parker Aerospace including in-tank sensors and wiring, avionics and software to fit into IMA system.

Two 241 bar (3,500 lb/sq in) hydraulic systems (yellow and green) and two electrical systems (red and orange) for flight controls, each of the latter using at least two different systems in case of failure of any one; each system fully independent. Hydraulic systems use lighter, more compact pipework compared with earlier Airbus products. Wing-mounted landing gear powered by green system; underfuselage main gear runs on yellow system. Power generation systems with 180 kVA generators for each engine to be provided by Hamilton Sundstrand, which has also been selected (with P&WC) to provide APU. Eaton 345 bar (5,000 lb/sq in) hydraulic generators using eight engine-driven pumps and four electric pumps.

Onboard oxygen generator (OBOGS) optional.

A380 MAJOR INTERNAL SYSTEMS SUPPLIERS
(at June 2003)

System	Supplier
Air conditioning	Hamilton Sundstrand/ L'hotellier
Air data	Goodrich
APU	Pratt & Whitney Canada
Brake-by-wire	Messier-Bugatti
Electrical harnesses	Labinal
Electrical power distribution	ECE/Intertechnique
Electrical power generation	Aerolec (Thales Avionics/ Goodrich)
Environmental control	Nord-Micro
Evacuation	Goodrich/Diehl Avionik
Fire detection	Siemens-Cerberus
Flight deck displays	Thales Avionics/Diehl Avionik
Flight management	Honeywell
Fuel distribution	FR-HiTEMP/Intertechnique
Fuel quantity and management	Parker Aerospace
Hydraulic	Eaton Corporation
Ice detection	Goodrich
Oxygen	Intertechnique
Pneumatic	Honeywell
Primary flight controls	Goodrich (ailerons, elevators and rudder); Liebherr (spoilers)
Ram-air turbine (emergency electrical power generation)	Hamilton Sundstrand
Supplementary cooling	Fairchild Controls/ Microtecnica
Water and waste management	Monogram Systems

AVIONICS: Honeywell flight management system, with Thales/Diehl displays; Rockwell Collins com/nav standard (includes VHF-920 and HF-900 data radios, multimode receiver, VOR-900 omnirange/marker beacon receiver, DME-900 and ADF-900. Dual Thales HUDs optional. Cockpit layout, by Airbus Toulouse division, will be compatible with other Airbus family members. Eight new-generation 15 x 20 cm (6 x 8 in) LCDs form centre of package. Onboard information system (OIS) will integrate databases with operator's in-house software packages and enable flight planning and documentation updates while en route, plus ancillary operations including passenger credit card validation, Internet access and entertainment. Onboard maintenance system (OMS)



Interior impression of the A380, showing passengers' bar

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Rear central area of the A380's main cabin

0527166

Airbus A380-800, cutaway drawing key

- 1 Radome

2 Weather radar antenna

3 Antenna mounting structure

4 Dual ILS antennas

5 Front pressure bulkhead

6 Nose landing gear wheel bay

7 Flight deck pressure floor

8 Rudder pedals

9 Side console with sidestick controller

10 Instrument panel with 10 full colour multifunction displays

11 Windscreen wipers

12 Electrically heated windscreen panels

13 Overhead systems switch

14 Two-pilot flight deck with central observer's seat

15 Flight deck bulkhead

16 Maintenance station

17 Folding supernumerary crew seats, port and starboard

18 Main avionics equipment bay

19 Nose landing gear pivot mounting

20 Nosewheel leg doors

21 Leg-mounted taxiing lights

22 Twin nosewheels, forward retracting

23 Hydraulic nosewheel steering

24 Forward main door, all doors outward opening

25 Crew lavatory

26 Wardrobe

27 Crew rest compartment

28 Upper avionics equipment bay

29 Forward staircase

30 Lower deck lavatory

31 Fuselage lower lobe structure with welded skin/stringer panels

32 First class passenger cabin, 22 seats, six abreast

33 Upper deck toilet compartment

34 Overhead baggage lockers

35 Cabin roof trim/lighting panels

36 Passenger service units

37 Business class passenger cabin, 96 seats, six abreast

38 Cabin divider curtain

39 Main deck galley compartment

40 Wing and engine inspection lights

41 Forward cargo hold, door on starboard side

42 Conditioned air mixing and distribution units

43 Wing centre box carry-through structure with CFRP skins and web panels, dry bay on 800-series aircraft

44 Upper deck forward door, port and starboard

45 Upper deck window panels

46 Upper deck galley

47 Forward service trolley lift

48 Cabin wall trim panelling

49 Starboard wing inboard fuel tank

50 Starboard mid tank

51 Inboard drooped leading-edge, lowered

52 Starboard thrust reverser, open

53 Starboard engine nacelles

54 Nacelle pylons

55 Central leading-edge slats, extended

56 Pressure refuelling/defuelling connectors

57 Slat torque shaft and rack-and-pinion drive mechanism

58 Wing skin panelling

59 Wing stringers
- 99 Aft upper deck galley unit, crew rest area on port side

100 Aft service trolley lift

101 Aft staircase

102 Rear pressure bulkhead, aluminium alloy frame and CFRP dome structure

103 CRFP fin leading-edge

104 Machined fin support frames and joints

105 CRFP fin leading-edge

106 Starboard trimming tailplane structure

107 Tailplane integral trimming fuel tank

108 Tailplane vent tank, starboard side only

109 Starboard outboard elevator flap, extended

110 Fin CFRP skin panels

111 Fin two-spar and rib all-CFRP torsion box structure

112 Upper rudder segment

113 Rudder hydraulic actuators

114 Lower rudder segment

115 Rudder CFRP rib and skin structure

116 Tailplane mounting bulkhead

117 Tailplane pivot mountings, port and starboard

118 APU bay fireproof bulkhead

119 APU intake

120 PW980A auxiliary power unit (APU)

121 Rear position light

122 APU exhaust

123 Port inboard elevator

124 Elevator hydraulic actuators

125 Port outboard elevator segment

126 Elevator CFRP rib and skin structure

127 Static dischargers

128 Aluminium alloy tailplane tip fairing

129 Tailplane two-spar and rib all-CFRP torsion box structure

130 Fin 'Logo' light

131 Tailplane sliding root seal

132 Tailplane screw jack trim actuator, hydraulic motor driven

133 Fuselage iulcone frame and stringer structure

134 Main deck aft door, port and starboard

135 Aft lavatories

136 Main deck tourist class cabin aft seat rows

137 Seat mounting rails

138 Bulk cargo hold side door

139 Cargo hold bulkhead

140 Aft cargo hold floor with roller conveyors

141 Wing root trailing-edge fairing, Nomex honeycomb core and glass/CFRP skin panels on aluminium and titanium substructure

142 Port fuselage-mounted (BLG) main landing gear wheel bay

143 Wheel bay doors

144 Leg pivot mounting and hydraulic retraction jack

145 Wing-mounted (WLG) main landing gear wheel bay

146 Six-wheel BLG bogie with steerable aft wheel pair

147 WLG pivot mounting and hydraulic retraction jack

148 Side breaker strut

149 Shock-absorber leg strut

150 Four-wheel WLG bogie

151 Wing panel semi-span centre spar

152 Inboard spoiler panels (two)

153 Inboard single-slotted flap segment

154 Flap interconnection

155 Hinged flap track fairings

156 Outboard spoiler panels

157 Spoiler hydraulic jacks

158 Port two-segment outboard single-slotted flap

159 Fuel jetison, port and starboard

160 Port flap extended position

161 Alleron CFRP/Nomex honeycomb core structure

162 Port three-segment alleron

163 Fixed trailing-edge segment

164 Port winglet

165 Aft facing obstruction light

166 Port navigation (red) and strobe (white) lights

167 Wingtip vent tank

168 Port outboard three-segment leading-edge slat

169 Fixed leading-edge rib structure
- 170 Two-spar outer wing torsion box structure

171 Wing bottom skin/stringer panel with access manholes

172 Outer wing panel aluminium alloy ribs

173 Outboard engine pylon mounting

174 Engine pylon structure

175 Bleed air pre-cooler

176 Exhaust plug

177 Hot stream exhaust nozzle

178 Cold stream exhaust duct

179 Engine turbine section

180 Oil cooler

181 Ventral accessory equipment gearbox

182 Full-authority digital engine controller (FADEC)

183 Rolls-Royce Trent 900 turbofan

184 Fan case forward mounting

185 Acoustically lined engine intake

186 Nacelle pylon fairing

187 Wing three-segment centre leading-edge slat

188 Slat guide rails

189 Centre slat bleed-air de-icing

190 De-icing air telescopic duct

191 Port wing integral fuel tankage

192 CRFP wing ribs, typical

193 Port pressure refuelling/defuelling connectors

194 Inboard engine pylon mounting

195 Bleed air pre-cooler exhaust louvers

196 Translating rear engine cowling

197 Thrust reverser cascades, inboard engines only

198 Hinged cowling panels

199 Inboard Trent 900 turbofan engine

200 Engine starter air duct

201 Intake lip bleed-air de-icing

202 Wing inboard two-segment drooped leading-edge hinge links

203 Drooped leading-edge hinge links

204 Engine bleed-air ducting

205 Port wing inboard feed tank

206 Wingroot skin attachment crossmember

207 Air conditioning system dual air ducting units

208 Fixed leading-edge structure

209 Leading-edge taxiing light

210 Landing and runway turn-off lights

211 Wingroot leading edge fairing

212 Ventral fairing forward section

213 Alliance (General Electric and Pratt & Whitney) GP7200 alternative turbofan engine

214 Dedicated Alliance engine pylon

215 Pylon main suspension lugs

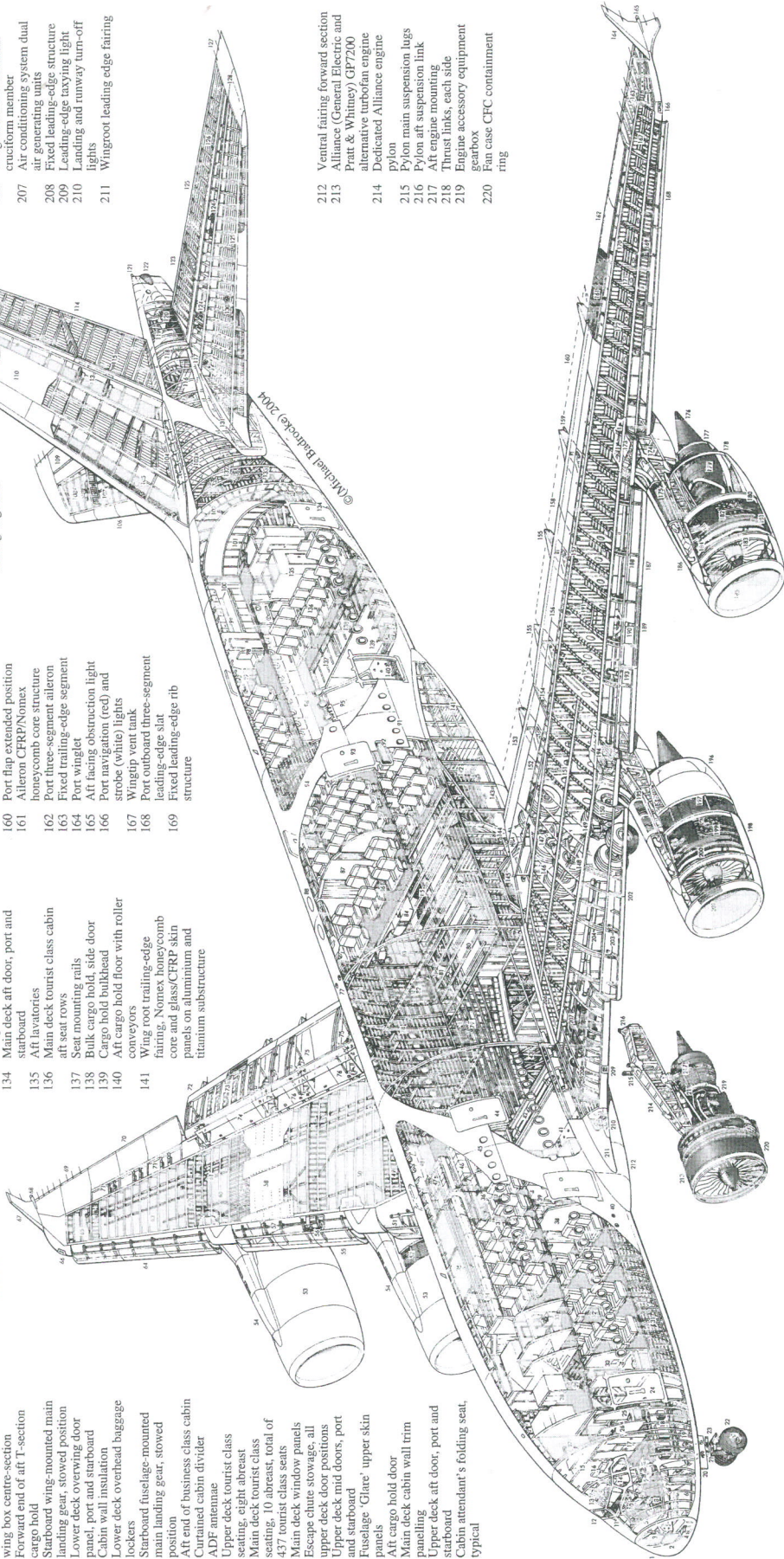
216 Pylon aft suspension link

217 Aft engine mounting

218 Thrust links, each side

219 Engine accessory equipment gearbox

220 Fan case CFC containment ring



provides real-time information to ground crew. Honeywell terrain guidance and on-ground navigation will be integrated into FMS.

DIMENSIONS, EXTERNAL:

Wing span	79.80 m (261 ft 9 3/4 in)
Wing chord at root	16.60 m (54 ft 5 1/2 in)
Wing aspect ratio	7.5
Length overall	72.75 m (238 ft 8 in)
Fuselage max width	7.14 m (23 ft 5 in)
Height overall	24.08 m (79 ft 0 in)
Tailplane span	30.38 m (99 ft 8 in)
Wheel track: A380-800	14.33 m (47 ft 0 1/4 in)
A380-800F	14.39 m (47 ft 2 1/2 in)
Wheelbase: A380-800	30.40 m (99 ft 8 3/4 in)
Rear cargo door (A380-800F):	
Max width	3.43 m (11 ft 3 in)
Max height	2.54 m (8 ft 4 in)

DIMENSIONS, INTERNAL:

Cabin, A380-800: Length	50.68 m (166 ft 3 3/4 in)
Max width:	
main deck	6.58 m (21 ft 7 in)
upper deck	5.92 m (19 ft 5 in)
Width at floor:	
main deck	6.20 m (20 ft 4 in)
upper deck	5.33 m (17 ft 6 in)
Bulk hold volume: A380-800	18.4 m³ (650 cu ft)
A380-800F	20.0 m³ (706 cu ft)
Total hold volume: A380-800	171.0 m³ (6,039 cu ft)
A380-800F	1,134 m³ (40,047 cu ft)

AREAS:

Wings, gross	845.0 m² (9,095.5 sq ft)
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WEIGHTS AND LOADINGS:

Operating weight empty:	
A380-800	277,000 kg (610,680 lb)
A380-800F	252,000 kg (555,565 lb)
Max payload: A380-800	84,000 kg (185,190 lb)
A380-800F	150,000 kg (330,700 lb)
Max T-O weight: A380-800	560,000 kg (1,234,580 lb)*
A380-800F	590,000 kg (1,300,720 lb)
Max ramp weight: A380-800	562,000 kg (1,239,000 lb)
A380-800F	592,000 kg (1,305,140 lb)
Max landing weight:	
A380-800	386,000 kg (850,980 lb)*
A380-800F	427,000 kg (941,370 lb)
Max zero-fuel weight:	
A380-800	361,000 kg (795,860 lb)*
A380-800F	402,000 kg (886,260 lb)
Max wing loading:	
A380-800	662.7 kg/m² (135.74 lb/sq ft)
A380-800F	698.2 kg/m² (143.01 lb/sq ft)
Max power loading:	
A380-800	463 kg/kN (4.54 lb/lb st)
A380-800F	433 kg/kN (4.25 lb/lb st)

*As of December 2003, Airbus was considering offer of higher MTOW and MLW options on A380-800 from outset, of 569,000 kg (1,254,430 lb) and 391,000 kg (862,005 lb) respectively. New MZFW had not been defined at that time.

PERFORMANCE (estimated, Trent 900 engines):

Max operating speed M0.89 (340 kt; 630 km/h; 391 mph)	
Econ cruising Mach No.	0.85
Initial cruising altitude	10,670 m (35,000 ft)
Service ceiling	13,100 m (42,980 ft)
T-O field length, ISA + 15°C:	
A380-800	2,987 m (9,800 ft)
A380-800F	3,009 m (9,870 ft)
Runway ACN	approx 68
Time from brake release to FL350:	
A380-800	36 min
A380-800F	35 min
Range:	
A380-800	8,000 n miles (14,816 km; 9,206 miles)
A380-800F	5,600 n miles (10,371 km; 6,444 miles)



Computer-aided impression of A380-800F in the colours of Federal Express

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OPERATIONAL NOISE LEVELS: Complies with London airports' 'Quota Count 2' category for departures (3 dB quieter than, or half the noise energy level of, most in-service Boeing 747s.

UPDATED

AIRBUS MULTIROLE TANKER-TRANSPORT (MRTT)

TYPE: Tanker-transport.

PROGRAMME: Belgian, Canadian, French, German and Thai air forces already operate A310s variously fitted for VIP, troop and/or freight transport. Airbus has delegated development and marketing of flight refuelling versions to its major partners, using either pre-owned or new aircraft. Demonstrator MRTT produced by conversion of former airline A310-324 N816PA; undertook compatibility trials with RAF aircraft, July 1995. Marketing efforts originally centred on the A310 version, which offered for the RAF's FSTA future tanker aircraft requirement. This planned to entail start of replacement of VC10s in 2005, although more than one type of tanker is expected to be obtained, probably by lease rather than purchase. Exclusive marketing rights for MRTT assigned to Raytheon (which will also become Design Authority), June 1999. Four Luftwaffe A310-300s will be converted into MRTTs for delivery from 2006; Canada has also announced intent to modify two Polaris MRTs into MRTTs in same programme. NATO reported to be considering utilising converted A310-300 cargo aircraft pending decision on future acquisition and to bridge gap until Airbus A400M becomes available.

A330-200 is being developed as strategic tanker/transport and has been chosen by the Air Tanker consortium as most suitable platform for UK FSTA programme. Consortium members EADS, Rolls-Royce, Thales and FRA are advocating a private finance initiative (PFI) solution with service entry in 2008 and programme life of 27 years. Also offered to Australia for AIR 5402 requirement.

CURRENT VERSIONS: Interim MRT (MultiRole Transport) version of A310, without tanker capability, converted by Elbe Flugzeugwerke, Dresden and Lufthansa Technik, Hamburg, for Luftwaffe. Structural strengthening and 3.50 m x 2.50 m (11 ft 5 1/4 in x 8 ft 2 1/2 in) cargo door added in port forward fuselage. Capacity of up to 214 passengers; or 36 tonnes of cargo/passengers; or 56 stretchers and six intensive care patients in the casevac role. First redelivered from Dresden in June 1999; four of

seven Luftwaffe A310s redelivered as MRTs by early 2002. In service, Luftwaffe aircraft proved partially incompatible with military cargo handling equipment and upper deck therefore rarely used for freight; full conversion of two MRTs to MRTT, plus conversion of further pair of standard aircraft directly to MRTT, being undertaken between 2002 and 2005; first tanker kit delivered by EADS CASA in November 2002, with first flight following modification set to take place in fourth quarter of 2003. Remaining Luftwaffe A310s comprise two in VIP configuration and one passenger transport.

DESIGN FEATURES: Conversions offer greater refuelling and transport capability than earlier airliners in combination with modern aircraft with better lifetime costs and longer life expectancy. Possible roles include tanker with underwing HDUs and fuselage-mounted boom and/or hose transfer systems and carrying in excess of 111,270 kg (245,300 lb) of fuel (139,060 litres; 36,737 US gallons; 30,590 Imp gallons); and cargo and personnel transports which can be combined with refuelling, medevac, airborne command post and reconnaissance/airborne warning.

Airbus conversions offer payloads from 35,000 to 50,000 kg (77,161 to 110,231 lb), full payload transatlantic range, long on-station time, combined boom and hose reel transfer capability (fuel transfer rate at each refuelling point of 1,590 litres (420 US gallons; 350 Imp gallons) per minute), standard Airbus forward port-side freight door (projected height 2.57 m; 8 ft 5 1/4 in, width 3.58 m; 11 ft 9 in); quick-change main deck layout, probe or receptacle fuel receiver capability; commonality with existing airliners and same worldwide support resources, predictable spares requirements and longer remaining airframe life.

About 100 civil operators on all five continents are flying A300/310, and first-generation Airbus airliners are now available on second-hand market; military rendezvous and self-protection systems can be fitted; main deck can be converted with palletised seating for up to 270 passengers in under 24 hours; up to 28,000 kg (61,729 lb) of additional fuel can be carried in tanks in underfloor cargo compartments.

DIMENSIONS, EXTERNAL (310: A310-300 MRTT, 330: A330-200 MRTT):

Length overall, incl probe:	310	47.36 m (155 ft 4 1/2 in)
	330	59.69 m (195 ft 10 in)

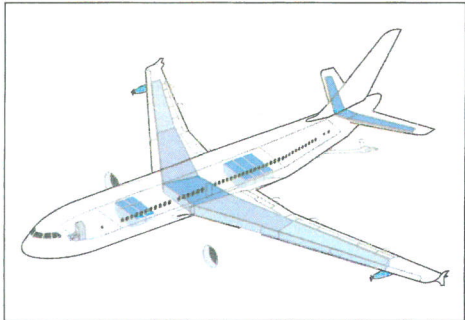
DIMENSIONS, INTERNAL:

Usable cabin length:	310	43.90 m (144 ft 0 in)
	330	45.00 m (147 ft 7 1/4 in)



Standard production Airbus A330 and two German Panavia Tornados simulating a refuelling exercise at the 2003 Royal International Air Tattoo (Paul Jackson)

NEW/0561584



Cutaway drawing of Airbus A310 MRTT 0126935

Cabin height: both	2.28 m (7 ft 5¼ in)
Max cabin width: both	5.29 m (17 ft 4¼ in)
Underfloor freight hold volume:	
310	80.0 m³ (2,825 cu ft)
330	136.0 m³ (4,803 cu ft)

WEIGHTS AND LOADINGS:

Operating weight empty:	
310	80,830 kg (178,200 lb)
330	120,500 kg (265,650 lb)
Max non-fuel payload: 310	37,000 kg (81,571 lb)
330	61,300 kg (135,140 lb)
Max normal fuel capacity:	
310	47,940 kg (105,690 lb)
330	111,270 kg (245,300 lb)
Additional fuel: 310	28,240 kg (62,258 lb)
Max T-O weight:	
normal, 310	157,000 kg (346,125 lb)
330	230,000 kg (507,075 lb)
optional, 310	164,000 kg (361,550 lb)
330	233,000 kg (513,675 lb)
Max ramp weight: 310	164,900 kg (363,550 lb)
330	233,900 kg (515,650 lb)
Max landing weight: 310	124,000 kg (273,375 lb)
330	182,000 kg (401,250 lb)
Max zero-fuel weight: 310	114,000 kg (251,325 lb)
330	170,000 kg (374,775 lb)

PERFORMANCE:

Refuelling speed:	
both, boom	240-320 kt (444-592 km/h; 276-368 mph)
both, hose and drogue:	
S/L to FL275	200-325 kt (370-602 km/h; 230-374 mph)
FL275 to FL350	M0.82
T-O run: 310	2,347 m (7,700 ft)
Max range, standard fuel:	
310	4,800 n miles (8,889 km; 5,523 miles)
Max range, using transferable fuel:	
310	7,200 n miles (13,334 km; 8,285 miles)
330	9,000 n miles (16,668 km; 10,357 miles)

UPDATED

AIRBUS AEW&C

TYPE: Airborne early warning and control system.

PROGRAMME: A310 originally selected by Raytheon Systems as a platform for its bid for the Australian AEW&C requirement (Project Wedgetail), competing against Boeing 737 and Lockheed Martin C-130J. Incorporates Elta Phalcon 360° phased-array radar in a fixed dorsal dome; formally announced in January 1997. Australia selected Boeing 737 in July 1999, but A310 AEW&C also offered to Turkey (again unsuccessfully) and South Korea, which due to select E-X platform in 2004 and award contract in 2005. However, latest proposals anticipate using either A320 (Thales) or A321 (Raytheon); Boeing and Northrop Grumman are also expected to offer Boeing 737 system.

UPDATED

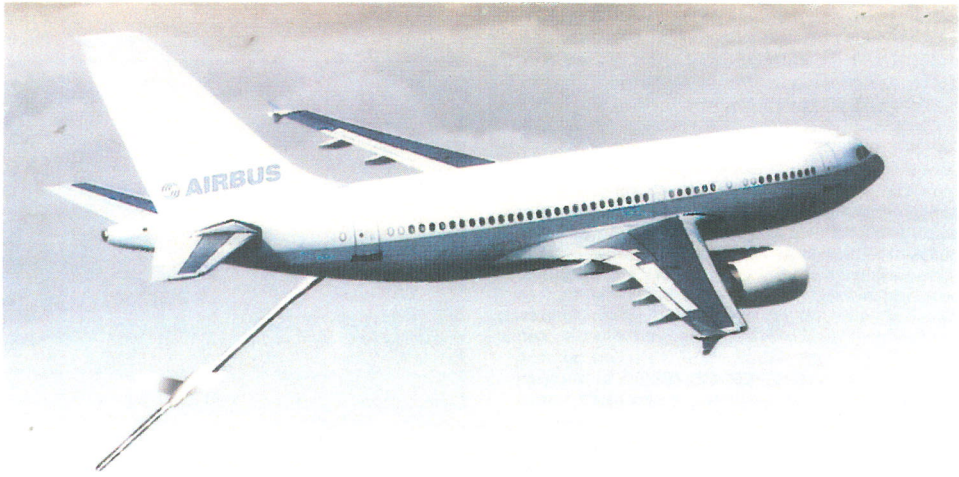


Airbus A310 AEW&C proposal with non-rotating Elta radar above rear fuselage (Paul Jackson) 0062385

AIRBUS A321 AGS

TYPE: Airborne ground surveillance system.

PROGRAMME: Northrop Grumman recommended the A321 as its preferred Joint STARS platform (see E-8 entry) to compete for NATO's AGS (airborne ground surveillance) requirement. Considered in 1996 and rejected on cost grounds, the A321 was reconsidered in the light of NATO's unwillingness to accept a Boeing 707-based solution. Plans called for selection in 2002 and IOC, with six aircraft, by 2007, but implementation delayed by US refusal to release all technology. Northrop Grumman's



Computer-generated image of an A310 MRTT with 'flying boom' equipment

NEW/0554424

AGS proposal features the US Army's AN/APY-X RTIP (Radar Technology Insertion Program) with an underfuselage electronically scanned antenna array, giving spot/swath SAR, wide area MTI, ultra-high resolution SAR, inverse SAR and long-range high-resolution MTI modes. It would have between 10 and 12 operator stations.

By 2002, Northrop Grumman, EADS and Galileo Avionica promoting TIPS (Transatlantic Industrial Proposed Solution) based on A319/A320/A321 airframe and with participation of wide range of subcontractors throughout NATO countries; target IOC of 2010, given 2003 political decision, would involve estimated four aircraft and 18 ground stations to provide minimum single-orbit coverage; full requirement may be 12 and 48, respectively, although six and 24 would ensure two simultaneous missions. Promotion continued into 2003, with addition to programme of UAVs as 'gap-fillers'.

UPDATED

AIRBUS MPA

TYPE: Maritime surveillance twin-jet.

PROGRAMME: Alenia Aeronautica/Finmeccanica and EADS Military Aircraft revealed at Farnborough Air Show in July 2002 that they had joined forces to submit proposal based on Airbus A320 to satisfy joint German/Italian MPA-R (Maritime Patrol Aircraft Replacement) requirement. Joint concept by EADS Deutschland (Ottobrunn) and EADS France (Toulouse). Ventral search radar; undernose EO/IR sensor; capacity for internal torpedo carriage in wing/body box; seven operator stations in cabin. Total development time expected to be five years. Request for proposals

issued in November 2002 by German-Italian management team, with Airbus offer anticipating production of 24 MPA320 aircraft (10 German and 14 Italian), as well as provision of training simulators and a complete package of logistic and customer support services. Contract award was expected in mid-2003 to permit first delivery in October 2008. Competing bids received by 26 July 2002 from Boeing, L-3 Communications and Lockheed Martin; result still awaited in mid-September 2003.

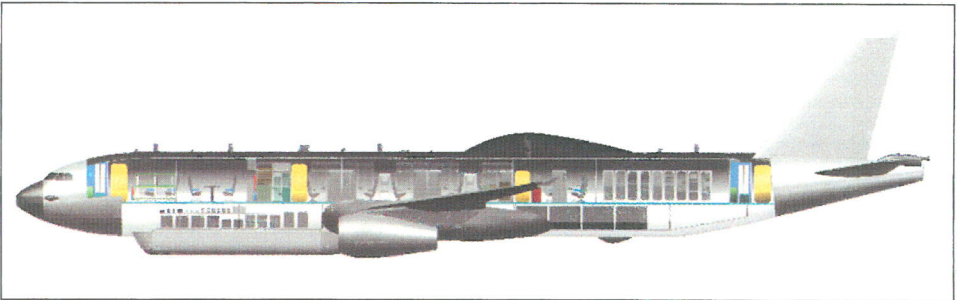
In second quarter of 2003, EADS Military Aircraft revealed MPA319; based on commercial A319, this version targeted at customers seeking smaller and less costly maritime patrol aircraft than the MPA320. MPA319 would feature ventral 'canoes' before and behind main landing gear in which weapons, including torpedoes and air-to-surface missiles, would be contained. Mission system equipment expected to include retractable radar and electro-optical sensor turrets in nose section. MPA319 customers will be able to specify IAE V2500 or CFM International CFM 56 turbofan power plants.

Description for MPA 320 generally as for Airbus A320, except that below:

WEIGHTS AND LOADINGS:	
Weight empty: manufacturer's	35,400 kg (78,044 lb)
operational	44,600 kg (98,326 lb)
Max weapon load	4,900 kg (10,803 lb)
Max fuel weight	27,200 kg (59,966 lb)
Max T-O weight	77,000 kg (169,755 lb)
Max landing weight	66,000 kg (145,505 lb)

PERFORMANCE (estimated):	
Turn radius, clean	less than 1,850 m (6,070 ft)
Ferry range	4,200 n miles (7,778 km; 4,833 miles)

UPDATED



Cutaway diagram of Airbus A321 AGS (Northrop Grumman)

0073146



Computer-generated image of proposed Airbus MPA320

NEW/0527122

AIRTECH

AIRCRAFT TECHNOLOGY INDUSTRIES

PARTICIPATING COMPANIES:

EADS CASA: (Spain)
Dirgantara: (Indonesia)

Airtech was formed by CASA (now part of EADS) and IPTN (now known as Dirgantara) to develop the CN-235 twin-turboprop transport; design and production was shared equally. The partnership applied only to the Series 10 and Series 100/110, with later versions being developed independently by CASA, according to a statement by that company.

UPDATED

AIRTECH CN-235

Spanish Air Force designations: T.19A and T.19B

TYPE: Twin-turboprop transport.

PROGRAMME: Launched as joint venture between CASA and Indonesian manufacturer IPTN (now Dirgantara, which see), which formed Airtech company to manage programme. Series 10 and Series 100/110 versions covered by this agreement; subsequent versions, notwithstanding Indonesian Series 220 and 330 equivalents, stated by CASA to be wholly Spanish.

Preliminary design began January 1980, prototype construction May 1981; one prototype completed in each country, with simultaneous roll-outs 10 September 1983; first flights 11 November 1983 (by CASA's ECT-100) and 30 December 1983 (IPTN's PK-XNC); Spanish and Indonesian certification 20 June 1986; first flight of production aircraft 19 August 1986; FAA type approval (FAR Pts 25 and 121) 3 December 1986; deliveries began 15 December 1986 from IPTN line and 4 February 1987 from CASA; entered service (with Merpati Nusantara Airlines) 1 March 1988; JAR 25 type approval October 1993.

Licence agreement with TAI (see Turkish section) announced January 1990, initially to assemble and later to manufacture locally 50 of 52 ordered; first flight of Turkish-assembled aircraft 24 September 1992; first delivery 13 November 1992; final air force delivery 10 August 1998, but TAI subsequently produced follow-on batch of nine maritime patrol variants and may build further 10 for maritime missions.

In 1995, CASA unilaterally launched development of a stretched CN-235, as C-295; this is described under CASA heading in Spanish section.

CURRENT VERSIONS: **CN-235 Series 10:** Initial production version (15 built by each company), with CT7-7A engines.

CN-235 Series 100/110: Generally as Series 10, but CT7-9C engines in new composites nacelles; replaced Series 10 in 1988 from 31st production aircraft. Series 100 is Spanish-built and, following JAA certification, was certified by FAA in February 1992. Series 110 is Indonesian-built, with improved electrical, warning and environmental systems to comply with JAR 25; certification of this version achieved in Europe (JAA), July 1995.

Detailed description applies to the above version except where indicated.

CN-235 Series 200/220: Structural reinforcements to cater for higher operating weights, aerodynamic improvements to wing leading-edges and rudder, reduced field length requirements and much-increased range with maximum payload; Series 200 is Spanish-built and was certified by FAA March 1992. Series 220 is Indonesian-built, with improvements similar to Srs 110; prototype, flown early 1996, is converted from a company development aircraft (PK-XNV, the 20th production aircraft from the Indonesian line); orders include six for Malaysian Air Force, all of which completed to Srs 220 standard (including three in maritime patrol configuration) by early 1998 (34th to 39th Indonesian-built). Revised leading-edge shape led to requirement to requalify pneumatic de-icer boots, delaying initial deliveries. Further orders for Series 220 from South Korea (eight, including one for VIP use and one for VVIP use) and Pakistan (four).

CN-235 Series 300/330: IPTN originally offered Series 330 **Phoenix** (with new Honeywell avionics, ARL-2002 EW system and 16,800 kg; 37,037 lb MTOW) to Royal Australian Air Force to meet Project Air 5190 tactical airlift requirement, but was forced by financial constraints to withdraw in 1998. Separately, CASA offered its own Series 300 to meet the same specification.

CN-235 Series 300 under certification in 2000 with an open-systems avionics architecture, based on MIL-STD-1553B and ARINC 429 digital databuses. Full NVG-compatible cockpit; four-dimensional navigation system with avionics suite, including Thales (Sextant) Topdeck colour weather radar, radios, solid-state flight data and cockpit voice recorders, enhanced TCAS, enhanced GPWS and four 152 × 203 mm (6 × 8 in) LCDs; twin HUDs and Totem 3000 ring laser gyro INS optional. Other features include in-flight refuelling capability, improved pressurisation (2,440 m; 8,000 ft cabin environment at 7,620 m; 25,000 ft) and provision for optional twin nosewheel installation to provide better soft-field taxiing capability.

CN-235 PRODUCTION
(at mid-2003)

Customer	Qty	First order	First aircraft	First delivery	Delivered	Mfr
Civil version:						
Austral (Argentina)	2 ¹⁵	19 Dec 1989	LV-VHM	1993	2	CASA
Binter Canarias (Spain)	4 ^{1, 16}	10 Jun 1988	EC-EMO	22 Dec 1988	4	CASA
Binter Mediterraneo (Spain)	4 ²	19 Dec 1989	EC-FAD	4 Sep 1990	4	CASA
Mandala Airlines (Indonesia)	3	-	-	-	0	Dirgantara
Merpati Nusantara (Indonesia)	15 ¹	-	PK-MNA	15 Dec 1986	15	Dirgantara
Military version:						
Abu Dhabi Air Force	7	-	810	31 Aug 1993	7	Dirgantara
Botswana Defence Force	2 ¹	10 Jun 1986	OG-1	21 Dec 1987	2	CASA
Brunei Air Wing	3 ³	-	-	-	0	Dirgantara
	1	-	ATU-501	1997	1	Dirgantara
Chilean Army	4	12 Feb 1989	E-216	31 Aug 1989	4	CASA
Colombian Air Force	3 ²	Jul 1997	1260	28 Jan 1998	3	CASA
Colombian Navy	2	Dec 2002	ARC 801	2003	2	CASA
Devon Holding & Leasing Inc	1	-	N168D	March 2002	1	CASA
Ecuadorean Army	1	6 Jun 1989	AEE-502	6 Jun 1989	1	CASA
Ecuadorean Navy	1	27 Jul 1988	ANE-204	13 Jun 1989	1	CASA
French Air Force	15 ⁸	11 Apr 1990	043	28 Feb 1991	15	CASA
	5 ²	2002	152	2002	5	CASA
Gabon Air Forces	1	26 Feb 1990	TR-KJE	19 Mar 1991	1	CASA
Indonesian armed forces	24 ¹¹	-	A-2301	12 Jan 1993	7	Dirgantara
Irish Air Corps	1 ¹³	3 Apr 1991	250	10 Apr 1991	1	CASA
	2 ³	3 Apr 1991	252	8 Dec 1994	2	CASA
Malaysian Air Force	8 ^{7, 9}	-	M44-01	26 Aug 1999	6	Dirgantara
Moroccan Air Force	7 ¹⁰	19 Sep 1989	CNA-MA	27 Sep 1990	7	CASA
Oman Police	2	15 Feb 1992	A40-CU	14 Jan 1993	2	CASA
Pakistan Air Force	4 ⁹	29 Jun 01	-	2004	0	Dirgantara
Panama National Guard	1 ^{1, 12}	19 Mar 1987	SAN-265	13 Sep 1988	1	CASA
Papua New Guinea Defence Force	2	26 Oct 1991	P2-0501	15 Nov 1991	2	CASA
Saudi Air Force	4 ¹	5 Feb 1984	118	9 Feb 1987	4	CASA
South African Air Force (ex-Bophuthatswana)	1 ¹	29 May 1990	8026	6 Jan 1991	1	CASA
South Korean Air Force	12	19 Aug 1992	078	13 Nov 1993	12	CASA
	8 ⁹	21 Oct 1997	-	18 Dec 2001	8	Dirgantara
Spanish Air Force	2 ⁴	16 Nov 1988	T.19-01	7 Dec 1988	2	CASA
	18	28 Dec 1990	T.19-03	1 Feb 1991	18	CASA
	4 ³	-	-	-	0	CASA
Thai Ministry of Agriculture and Co-operatives	2 ⁹	Oct 1996	2221	Apr 1999	2	Dirgantara
Thai Police	0 ^{2, 14}	Apr 1995	28053	4 Mar 1996	0	CASA
Turkish Air Force	52 ⁶	11 Dec 1990	051	25 Jan 1992	52	TAI/CASA
Turkish Navy	6 ³	23 Sep 1998	TCB-651	23 Dec 2001	6	TAI/CASA
Turkish Coast Guard	3 ³	23 Sep 1998	TCSG-551	23 Dec 2001	3	TAI/CASA
US Coast Guard	2	May 2003	-	2006	-	CASA
Subtotals	239				204	
Demo/trials	3 ⁵		EC-016		3	CASA
	5		PK-XNC		5	Dirgantara
Totals	247				212	

¹ Series 10

² Series 200

³ Maritime patrol

⁴ VIP version

⁵ Includes one -100QC; plus one -200QC sold in 1996 to East Texas Aircraft Services Corporation, then Turbo Flight Aviation, March 1998

⁶ 50 built in Turkey by TAI

⁷ Including two ordered 2002

⁸ Including option on seven taken up in February 1996; first eight as Srs 100, but upgraded to Srs 200 from 1999

⁹ Series 220

¹⁰ Includes one VIP version

¹¹ Includes six maritime patrol of which three on firm order

¹² To Flight International (USA) 1995

¹³ Withdrawn at end of lease, 1995

¹⁴ Former demonstrator

¹⁵ Converted from -100 to Series 200

¹⁶ Withdrawn 1998; three to Luftmeister, South Africa; one to Turkish Army

Note: All are Series 100/110 unless indicated otherwise. Croatian order not counted by CASA, which reported 189 military orders by mid-2000 and implies reduction in Indonesian requirement.



CN-235 Srs 300 demonstrator, before its lease to Austria

0106524



Airtech CN-235 Srs 200 of the French Air Force (Paul Jackson)

NEW/0554433

CN-235 AEW: Proposals were revealed in December 1995 for fitment of an Ericsson Erieye electronically scanned phased-array radar above the fuselage of a CN-235. Initial interest was from the Indonesian Air Force, but primarily in the ocean surveillance role; retrofit of three existing aircraft was considered, but has not been undertaken. Radar, three surveillance operators' positions and associated equipment increase aircraft weight by approximately 2,000 kg (4,409 lb).

CN-235ER: Extended-range version (based on Series 300) originally selected by US Coast Guard in 2002 as fixed-wing element of Project Deepwater re-equipment programme, but subsequently shelved in favour of the basic CN-235 Series 300M. At time of announcement, in June 2002, it was revealed that total of 35 aircraft would be purchased. Firm order for initial batch of six aircraft anticipated in mid-2002, but still awaited in mid-2003, although FY03 budget included US\$147 million appropriation for first two aircraft to be delivered in 2006. Will feature EADS CASA Fully Integrated Tactical System (FITS).

CN-235 M: Other military transport versions.

CN-235 MP Persuader and CN-235 MPA: Maritime patrol versions; described separately.

CN-235 QC: Quick-change cargo/passenger version; certified by Spanish DGAC May 1992.

CN-245: Indonesian stretched version; not built.

C-295: Spanish stretched version; described separately under CASA heading.

N2XXM: Project abandoned.

CUSTOMERS: See table. One (s/n 66049) acquired (presumably second-hand) by USAF in 1998. Turkey signed a lease agreement on 16 April 1999 to allow a one-year renewable lease of two Turkish Air Force CN-235s to Jordan. Switzerland leased a Spanish Air Force CN-235 in 1999 to support peacekeeping operations in the former Yugoslavia. Three Merpati aircraft leased to Air Venezuela from May 1999; three leased to Asian Spirit Airlines, Philippines, from March 2000, including two on lease-purchase. Intention to buy a further two announced by Papua New Guinea in mid-1998. National Jet Systems of Australia interested in two coastal patrol variants; signed MoU for possible acquisition of two, plus five options, February 1998. One CN-235-300 (first of this subvariant in service) leased by Austrian Ministry of Defence for six months from April 2000. CN-235 is contender in Taiwanese requirement for 18 to 22 light transports, and for the US Army Airborne Common Sensor platform requirement. Winner of US Coast Guard Project Deepwater competition, with total of 35 aircraft to be acquired.

COSTS: US\$17.1 million (2002) programme unit cost, Malaysia.

DESIGN FEATURES: Optimised for short-haul operations, enabling it to fly four 860 n mile (1,593 km; 990 mile) stage lengths (with reserves) before refuelling and to operate from paved runways or unprepared strips; high-mounted wing; pressurised fuselage (including baggage compartment) of flattened circular cross-section, with upswept rear end incorporating cargo ramp/door; sweptback fin (with dorsal fin) and rudder; low-set non-swept fixed incidence tailplane and elevators; two small ventral fins; vortex generators on rudder and elevator leading-edges; optional extended nose radome.

NACA 65-218 aerofoil with no-dihedral/constant chord centre-section; tapered outer panels have 3° dihedral and 3° 51' 36" sweepback at quarter-chord.

FLYING CONTROLS: Conventional and manual. Ailerons, elevators and rudder statically and dynamically balanced (duplicated actuation for ailerons); mechanical servo tab and electric trim tab in each aileron, rudder and starboard elevator, trim tab only in port elevator; single-slotted inboard and outboard trailing-edge flaps (each pair interchangeable port/starboard), actuated hydraulically by Dowty irreversible jacks.

STRUCTURE: Conventional semi-monocoque, mainly of aluminium alloys with chemically milled skins; composites (mainly glass fibre or glass fibre/Nomex honeycomb sandwich, with some carbon fibre and Kevlar)

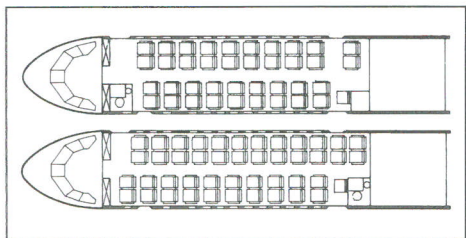
for leading/trailing-edges of wing/tail moving surfaces, wing/fuselage and main landing gear fairings, wing/fin/tailplane tips, engine nacelles, ventral fins and nose radome. Propeller blades are of glass fibre, with metal spar and urethane foam core.

CASA builds wing centre-section, inboard flaps, forward and centre fuselage, engine nacelles; Dirgantara builds outer wings, outboard flaps, ailerons, rear fuselage and tail unit; both manufacturers use numerical control machinery extensively. Final assembly line in each country. Part of tail unit built by ENAER Chile under subcontract from CASA. TAI (Turkey) initially assembled under licence before progressing gradually to local manufacture of balance of 50 aircraft for Turkish Air Force.

LANDING GEAR: Messier-Bugatti retractable tricycle type with levered suspension, suitable for operation from semi-prepared runways. Electrically controlled hydraulic extension/retraction, with mechanical back-up for emergency extension. Oleo-pneumatic shock-absorber in each unit. Each main unit comprises two wheels in tandem, retracting rearward into fairing on side of fuselage. Mainwheels semi-exposed when retracted. Single steerable nosewheel (±48°) retracts forward into unpressurised bay under flight deck. Dunlop 28x9.00-12 (12 ply) tubeless mainwheel tyres standard, pressure 5.17 bar (75 lb/sq in) on civil version, 5.58 bar (81 lb/sq in) on military version; low-pressure mainwheel tyres optional, size 11.00-12 (10 ply), pressure 3.45 bar (50 lb/sq in). Dunlop 24x7.7 (10/12 ply) tubeless nosewheel tyre, pressure 5.65 bar (82 lb/sq in) on civil version, 6.07 bar (88 lb/sq in) on military version; optional 8.50x10 (12 ply). Dunlop hydraulic differential disc brakes; Dunlop anti-skid units on main gear. Chilean Army aircraft used in Antarctic have wheel/ski gear. Minimum ground turning radius 9.50 m (31 ft 2 in) about nosewheel, 18.98 m (62 ft 3/4 in) about wingtip.

POWER PLANT: Two General Electric CT7-9C turboprops (CT7-9C3 in Srs 300), each flat rated at 1,305 kW (1,750 shp) (S/L, to 41°C) for take-off and 1,394.5 kW (1,870 shp) up to 31°C with automatic power reserve. Hamilton Sundstrand 14RF-21 (14RF-37 in Srs 300) four-blade constant-speed propellers, with full feathering and reverse-pitch capability. Fuel in two 1,042 litre (275 US gallon; 229 Imp gallon) integral main tanks in wing centre-section and two 1,592 litre (421 US gallon; 350 Imp gallon) integral outer-wing auxiliary tanks; total fuel capacity 5,264 litres (1,391 US gallons; 1,158 Imp gallons), of which 5,128 litres (1,355 US gallons; 1,128 Imp gallons) are usable. Single pressure refuelling point in starboard main landing gear fairing; gravity filling point in top of each tank. Propeller braking permits No. 2 engine to be used as on-ground APU. Oil capacity 14 litres (3.7 US gallons; 3.1 Imp gallons).

ACCOMMODATION: Crew of two on flight deck, plus cabin attendant (civil version) or third crew member (military version). Accommodation in commuter version for up to 44 passengers in four-abreast seating, at 76 cm (30 in) pitch, with 22 seats each side of central aisle. Lavatory, galley and overhead luggage bins standard. Pressurised baggage compartment at rear of cabin, aft of movable bulkhead; additional stowage in rear ramp area and in overhead lockers. Can also be equipped as mixed passenger/cargo combi (for example, 19 passengers and



CN-235 in typical configurations for 38 (top) and 44 passengers

two LD3 containers), or for all-cargo operation, with roller loading system, carrying four standard LD3 containers, five LD2s, or two 2.24 x 3.18 m (88 x 125 in) and one 2.24 x 2.03 m (88 x 80 in) pallets; or for military duties, carrying up to 57 fully equipped troops or 46 paratroops (51 troops or paratroops on Srs 300). Other options include layouts for aeromedical airlift (18 stretchers and two medical attendants on Srs 300), electronic warfare, geophysical survey or aerial photographic duties.

Main passenger door, outward- and forward-opening with integral stairs, aft of wing on port side, serving also as a Type I emergency exit. Type III emergency exit facing this door on starboard side. Crew/service downward-opening door (forward, starboard) has built-in stairs, and serves also as a Type I emergency exit, or as passenger door in combi version; second Type III exit opposite this door on port side. Wide ventral door/cargo ramp in underside of upswept rear fuselage, for loading of bulky cargo. Accommodation fully air conditioned and pressurised.

SYSTEMS: Hamilton Sundstrand air conditioning system, using engine compressor bleed air. Honeywell electropneumatic pressurisation system (maximum differential 0.25 bar; 3.6 lb/sq in) giving cabin environment of 2,440 m (8,000 ft) up to operating altitude of 5,480 m (18,000 ft) on Srs 200; Srs 300 cabin pressurisation increased to 0.38 bar (5.5 lb/sq in), giving cabin environment of 2,350 m (7,700 ft) at altitude of 7,620 m (25,000 ft). Hydraulic system, operating at nominal pressure of 207 bar (3,000 lb/sq in), comprises two engine-driven, variable displacement axial electric pumps, a self-pressurising standby mechanical pump, and a modular unit incorporating connectors, filters and valves; system is employed for actuation of wing flaps, landing gear extension/retraction, wheel brakes, emergency and parking brakes, nosewheel steering, cargo ramp and door, and propeller braking. Accumulator for back-up braking system.

28 V DC primary electrical system powered by two 400 A Auxilec engine-driven starter/generators, with two 24 V 37 Ah Ni/Cd batteries for engine starting and 30 minutes' (minimum) emergency power for essential services. Constant frequency single-phase AC power (115/26 V) provided at 400 Hz by three 600 VA static inverters (two for normal operation plus one standby); two three-phase engine-driven alternators for 115/200 V variable frequency AC power. Fixed oxygen installation for crew of three (single cylinder at 124 bar; 1,800 lb/sq in pressure); three portable units and individual masks for passengers.

Pneumatic boot anti-icing of wing (outboard of engine nacelles), fin and tailplane leading-edges. Electric anti-icing of propellers, engine air intakes, flight deck windscreen, pitot tubes and angle of attack indicators. No APU; starboard engine, with propeller braking, can be used to fulfil this function. Engine fire detection and extinguishing system.

AVIONICS (civil): Comms: Two Rockwell Collins VHF-22B com radios, one Avtech DADS crew interphone, Rockwell Collins TDR-90 ATC transponder. Fairchild A-100A cockpit voice recorder, Avtech PACIS PA system. Dorne & Margolin ELT 8-1 emergency transmitter. Optional second TDR-90; optional HF-230 radio.

Radar: Rockwell Collins WXR-300 weather radar.

Flight: Two VIR-32 VOR/ILS/marker beacon receivers; DME-42; ADF-60A; two 332D-11T vertical gyros; two MCS-65 directional gyros; two ADI-85A; two HSI-85; two RMI-36; APS-65 autopilot/flight director; ALT-55B radio altimeter; two 345A-7 rate of turn sensors (all by Rockwell Collins); SFENA H-301 APM standby attitude director indicator; Hamilton Sundstrand Mk II GPWS; and Fairchild/Teledyne flight data recorder. Options include second DME-42 and ADF-60A, Rockwell Collins RNS-325 radar nav, Litton LTN-72R inertial nav or Global GNS-500A Omega navigation system.

Instrumentation: Rockwell Collins EFIS-85B five-tube CRT system standard.

AVIONICS (military) (Indonesian aircraft): Comms: Rockwell Collins AN/ARC-182 VHF/UHF; Rockwell Collins HF 9000 HF; IFF.

Flight: Rockwell Collins VIR-32 VHF nav; Litton LTN92 GPS-aided INS; Rockwell Collins DF-206A ADF; Rockwell Collins AN/APS-65F autopilot; GPWS.

Instrumentation: Rockwell Collins EFIS-85B(14) EFIS (four or five screens). IPTN developing cockpit lighting system compatible with night vision goggles.

AVIONICS (military): Series 300: Thales Avionics Topdeck suite (see Current Versions) as core system.

Flight: Twin ADU 3000 air data units, GPSs and AHRs; radar altimeter; TCAS; GPWS; weather radar; optional Totem 3000 LINS, Cat. II landing capability, MLS and satcom.

Instrumentation: Four 152 x 203 mm (6 x 8 in) LCDs; optional HUDs. Optional electro-optical sensors display imagery on LCDs. NVG compatibility.

Mission: Four-dimensional navigation FMS calculates high-altitude and computed air release points for load-dropping.

EQUIPMENT: Navigation lights, anti-collision strobe lights, 600 W landing light in front end of each main landing gear fairing, taxiing lights, ice inspection lights, emergency door lights, flight deck and flight deck emergency lights,

cabin and baggage compartment lights, individual passenger reading lights, and instrument panel white lighting, all standard. Hand-type fire extinguishers on flight deck (one) and in passenger cabin (two); smoke detector in baggage compartment.

ARMAMENT (military version): Three attachment points under each wing. Weapons can include Harpoon anti-ship missiles; Indonesian MPA version (which see) can be fitted with two Mk 46 torpedoes or AM 39 Exocet anti-shiping missiles.

Data follow for CASA-built Srs 300.

DIMENSIONS, EXTERNAL:

Wing span	25.81 m (84 ft 8 in)
Wing chord: at root	3.00 m (9 ft 10 in)
at tip	1.20 m (3 ft 11 1/4 in)
Wing aspect ratio	10.2
Length overall, standard nose	21.40 m (70 ft 2 1/2 in)
Fuselage: Max width	2.90 m (9 ft 6 in)
Max depth	2.615 m (8 ft 7 in)
Height overall	8.18 m (26 ft 10 in)
Tailplane span	10.60 m (34 ft 9 1/4 in)
Wheel track (c/l of mainwheels)	3.90 m (12 ft 9 1/2 in)
Wheelbase	6.92 m (22 ft 8 1/2 in)
Propeller diameter: Srs 200	3.35 m (11 ft 0 in)
Srs 300	3.66 m (12 ft 0 in)
Propeller ground clearance	1.66 m (5 ft 5 1/2 in)
Distance between propeller centres	7.00 m (22 ft 11 1/2 in)
Passenger door (port, rear) and service door (stbd, fwd):	
Height	1.70 m (5 ft 7 in)
Width	0.73 m (2 ft 4 3/4 in)
Height to sill	1.22 m (4 ft 0 in)
Paratroop doors (port and stbd, rear, each):	
Height	1.75 m (5 ft 9 in)
Width	0.90 m (2 ft 11 1/2 in)
Height to sill	1.22 m (4 ft 0 in)
Ventral upper door (rear): Length	2.365 m (7 ft 9 in)
Width	2.35 m (7 ft 8 1/2 in)
Height to sill	1.22 m (4 ft 0 in)
Ventral ramp/door (rear): Length	3.04 m (9 ft 11 1/4 in)
Width	2.35 m (7 ft 8 1/2 in)
Height to sill	1.22 m (4 ft 0 in)
Type III emergency exits (port, fwd, and stbd, rear):	
Height	0.92 m (3 ft 0 1/4 in)
Width	0.51 m (1 ft 8 in)

DIMENSIONS, INTERNAL:

Cabin, excl flight deck: Length	9.65 m (31 ft 8 in)
Max width	2.70 m (8 ft 10 1/2 in)
Width at floor	2.365 m (7 ft 9 in)
Max height	1.88 m (6 ft 2 in)
Floor area	22.8 m ² (246 sq ft)
Volume	43.2 m ³ (1,527 cu ft)

AREAS:

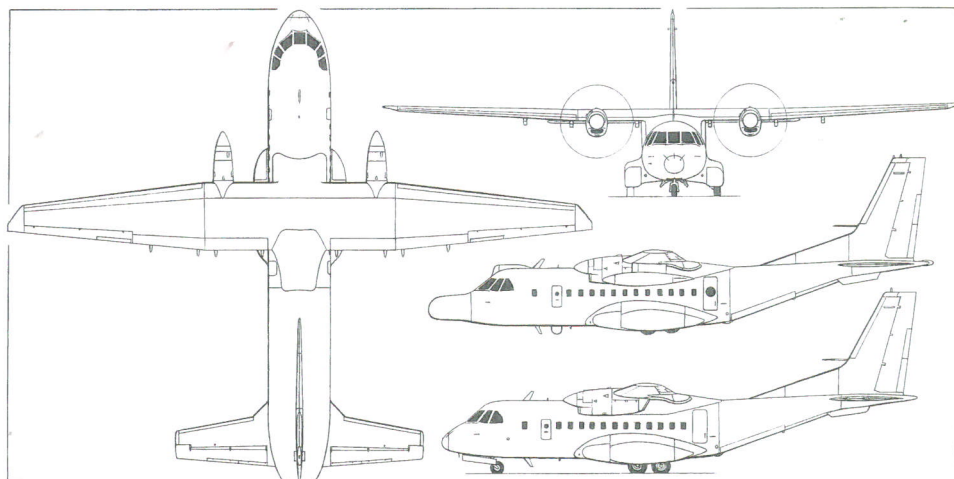
Wings, gross	59.10 m ² (636.1 sq ft)
Ailerons (total, incl tabs)	3.14 m ² (33.80 sq ft)
Trailing-edge flaps (total)	10.87 m ² (117.00 sq ft)
Fin, incl dorsal fin	11.11 m ² (119.59 sq ft)
Rudder, incl tabs	4.20 m ² (45.21 sq ft)
Tailplane	21.20 m ² (228.2 sq ft)
Elevators (total, incl tabs)	6.17 m ² (66.41 sq ft)

WEIGHTS AND LOADINGS (Srs 300):

Operating weight empty	9,909 kg (21,846 lb)
Max payload	6,000 kg (13,228 lb)
Max fuel weight	4,230 kg (9,326 lb)
Max T-O weight	16,500 kg (36,376 lb)
Max ramp weight	16,550 kg (36,486 lb)
Max landing weight	16,500 kg (36,376 lb)
Max zero-fuel weight	15,400 kg (33,951 lb)
Max wing loading	279.2 kg/m ² (57.19 lb/sq ft)
Max power loading (without APR)	6.33 kg/kW (10.39 lb/shp)

PERFORMANCE (Srs 300):

Max cruising speed	246 kt (455 km/h; 283 mph)
Max rate of climb at S/L	183 m (600 ft)/min
Service ceiling	9,145 m (30,000 ft)
Service ceiling, OEI	4,275 m (14,020 ft)
T-O run	398 m (1,305 ft)
T-O to 15 m (50 ft)	754 m (2,474 ft)
Landing from 15 m (50 ft)	603 m (1,978 ft)



CASA CN-235 twin-turboprop multipurpose transport, with additional side view (centre) of a representative CN-235 MPA (Dennis Punnett)

Range:

with max fuel	2,701 n miles (5,003 km; 3,108 miles)
with 4,000 kg (8,818 lb) payload	1,549 n miles (2,870 km; 1,783 miles)
with max payload	393 n miles (727 km; 452 miles)
g limits: at MTOW	+2.5/-1
below 14,100 kg (31,085 lb)	+3/-1

UPDATED

AIRTECH CN-235 MP PERSUADER and CN-235 MPA

TYPE: Maritime surveillance twin-turboprop.

CURRENT VERSIONS: **CN-235 MP Persuader:** CASA version; different avionics from Indonesian MPA. In service with Irish Air Corps and ordered by Spain (four) and Turkey (nine: six for Navy, three for Coast Guard, assembled by TAI at Ankara). In mid-1999, Turkey sought proposals from at least seven potential integrators of surveillance systems to provide radar, FLIR and an acoustics suite for naval CN-235s; on 6 September 2002, contract signed with Thales covering supply and integration of maritime patrol mission equipment for these nine aircraft by 2006. Contract worth US\$350 million and could be followed by further 10 systems to equip additional batch of aircraft.

CN-235 MPA: Indonesian-developed version; available either with lengthened nose housing radar and IFF; or with normal CN-235 nose, plus belly radar; CN-235 prototype PK-XNC served as testbed. Maximum T-O weight 15,400 kg (33,951 lb), endurance more than 8 hours. Provision for quick-change configuration for general transport, communications or other duties. Required by Indonesian Navy (six included in national order for 24), Indonesian Air Force (three) and Brunei (three).

Indonesia confirmed initial three firm orders in May 2000, when Thomson-CSF (now Thales) selected to supply AMASCOS airborne maritime situation control system, comprising Elettronica ALR-733 RWR, T-CSF Ghlio thermal imager and Sextant Gemini navigation computer. Brunei chose Boeing as Argo Systems integrator for its three aircraft in late 1995, specifying individual sensors in October 1996 as AN/AAQ-21 FLIR, BAE Sky Guardian ESM, Cossor 3500 IFF and AN/APS-134 radar, plus two operators' consoles. BAE Systems Australia marketing CN-235 MPA in Asia-Pacific region under September 1997 agreement; BAE also to provide advanced systems development for proposed configurations.

AVIONICS (Persuader): Radar: Litton APS-504(V)5.

Mission: FLIR-2000HP undernose-mounted night vision system and Litton AN/ALR-85(V) ESM system, fully integrated via a central tactical processor with reconfigurable consoles.

AVIONICS (CN-235 MPA): Radar: BAE Systems Seaspray 4000, or Raytheon AN/APS-134 (LW) or Thales Ocean Master 100.

Flight: Litton LN92 ring laser gyro INS; Trimble TNL 7900 Omega/GPS.

Mission: Argo data processing and display system with multifunction consoles. BAE Systems Sky Guardian SG-300, or Argo Systems AR-700 or Litton AN/ALR-93(V)4 ESM. FLIR Systems AN/AAQ-21 Safire or BAE Systems MRT FLIR. Cossor 3500 IFF interrogator. (Trials aircraft originally equipped with APS-504 and Ocean Master; SG-300. Reconfigured by 1994 with AN/APS-134, MRT, AR-700, LN92 and TNL 7900. Further alternatives available at customer's option.)

UPDATED



Maritime surveillance CN-235 MP Persuader of the Irish Air Corps (Paul Jackson)

NEW/0561587

AM

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PARTICIPATING COMPANIES:

Airbus SAS (France)

EADS CASA (Spain)

FLABEL (Belgium)

OGMA (Portugal)

TAI (Turkey)

Airbus Military was legally established in January 1999 as a 'Société par Actions Simplifiées' as the prospective manufacturer of the Airbus A400M, formerly known as the Future Large Aircraft (FLA). Airbus is the major (63 per cent) shareholder in Airbus Military; TAI, OGMA and FLABEL are full risk-sharing partners. Airbus Military has assigned overall programme management, during development, to Airbus in Toulouse; as the programme reaches production, responsibility will progressively transfer to Spain.

Conceptual work was undertaken by the European FLA Group (Euroflag). Euroflag Srl originally formed 17 June 1991, with headquarters in Alenia head office in Rome, to manage European FLA development. Aerospaziale, Alenia,

British Aerospace, CASA and Daimler-Benz Aerospace Airbus (DaimlerChrysler from 1998) had equal shares in Euroflag Srl; MoUs established 1992 with FLABEL (SABCA, SONACA, ASCO and BARCO) of Belgium, OGMA of Portugal and Turkish Aerospace Industries (TAI) of Turkey to allow integrated participation in FLA programme; BAE and FLABEL were industrial, not national, partners contributing their own funds, although the UK government announced in December 1994 that membership was to be upgraded to national participation.

The partners agreed in September 1994 to industrialise the programme by transferring it to their existing airliner production company; formal announcement was made on 14 June 1995 that Airbus Military Company would be established, replacing Euroflag, which then disbanded. Programme makes use of Airbus procedures and industrial infrastructure and takes advantage of technologies developed