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Boeing 777 Long-Range Jetliner

DESCRIPTION:

What eventually became the 777 project began when several airlines expressed desire for an airliner with a capacity in between the 767-300 and 747-400. The 777 is designed for both intercontinental and transcontinental routes and is targeted primarily at the Pacific rim market. The design is typical of previous Boeing airliners except it is equipped with only two engines, unlike the transcontinental 707 and 747.

To achieve flight certification for the twin-engine layout on long flight over oceans, Boeing had to ensure new levels of reliability in engines, avionics, and the fly-by-wire control system as well as the ability to maintain level flight for three hours even with one engine inoperative. Like the 747, the 777 includes three powerplant options depending on airline preference, and these air-breathing engines are the most powerful ever fitted to any aircraft. To give some idea of the size of the 777, the engine nacelles are nearly as wide as the fuselage of the 737. However, some airlines requested the large airliner be able to use passenger gates designed for the DC-10 and smaller aircraft, so the outer wing panels are designed to fold upward on some models.

Five major variants of the 777 have been delivered to date. Base models are the 777-200 and stretched 777-300, and extended and long range models and a freighter have also been developed. Nearly 800 aircraft had been built by July 2009 out of more than 1,100 ordered.

Last modified 02 May 2011

HISTORY:

First Flight (777-200) 12 June 1994
(777-200ER) 7 October 1996
(777-200LR) 8 March 2005
(777F) 14 July 2008
(777-300) 16 October 1997
(777-300ER) 24 February 2003

Service Entry (777-200) 7 June 1995 (with United Airlines)
(777-200ER) 9 February 1997 (with British Airways)
(777-200LR) February 2006 (with Pakistan International Airlines)
(777-300) 27 May 1998 (with Cathay Pacific Airways)
(777-300ER) 10 May 2004 (with Air France)

CREW: two flight crew: pilot, co-pilot

PASSENGERS:
(777-200) 305 in three classes, 400 in two classes, 440 in one class
(777-200ER) 301 in three classes, 400 in two classes, 440 in one class
(777-200LR) 301 in three classes
(777-300) 368 in three classes, 451 in two classes, 550 in one class
(777-300ER) 365 in three classes

COST:
(777-200LR) $231 to $256.5 million [2007$]
(777-300ER) $250 to $279 million [2007$]

DIMENSIONS:

Length (777-200) 209.08 ft (63.73 m)
(777-200ER) 209.08 ft (63.73 m)
(777-200LR) 209.08 ft (63.73 m)
(777-300) 242.33 ft (73.93 m)
(777-300ER) 242.33 ft (73.93 m)

Wingspan (777-200) 199.92 ft (60.93 m)
(777-200ER) 199.92 ft (60.93 m)
(777-200LR) 212.58 ft (64.86 m)
(777-300) 199.92 ft (60.93 m)
(777-300ER) 212.58 ft (64.86 m)

Height (777-200) 60.75 ft (18.51 m)
(777-200ER) 60.75 ft (18.51 m)
(777-200LR) 60.92 ft (18.58 m)
(777-300) 60.75 ft (18.51 m)
(777-300ER) 60.92 ft (18.58 m)

Fuselage Diameter 20.30 ft (6.19 m)

CABIN:

Length (777-200) 160.67 ft (48.98 m)
(777-300) 194.33 ft (59.24 m)

Width 19.25 ft (5.87 m)

Height unknown

Main Passenger Door 6.17 x 3.50 ft (1.88 x 1.07 m)

CARGO CAPACITY:

Baggage Volume 600.3 ft^3 (17.00 m^3)

Cargo Volume (777-200) 5650.3 ft^3 (160.0 m^3)
(777F) 22,455 ft^3 (636.0 m^3)
(777-300) 7553.8 ft^3 (213.9 m^3)

Container Capacity (777-200) 14 LD3 or 6 standard pallets
(777F) 37 standard pallets

(777-300) 20 LD3 or 8 standard pallets

Freight Doors 8.83 x 5.58 ft (2.69 x 1.70 m) [forward]
5.83 x 6.17 ft (1.78 x 1.88 m) [aft]

WING:

Root Airfoil Section unknown

Tip Airfoil Section unknown

Area (777-200) 4,605 ft² (427.8 m²)

Aspect Ratio 8.68

Sweepback Angle 31.64° at quarter chord

Max Deflection Angles *ailerons:* up 30°, down 10°
flaps: six settings for both outboard and inboard
flaperons: up 10°, down 36°
leading-edge flaps: three settings
leading-edge slats: three settings
spoilers: up 60°

TAIL:

Tailplane Span 70.63 ft (21.53 m)

Tailplane Area unknown

Tailfin Area unknown

Max Deflection Angles *tailplane:* up 4°, down 11°
elevators: up 30°, down 25°
rudder: ±27.3°

UNDERCARRIAGE:

Type Retractable tricycle with two main gear and single steerable nose gear

Main Gear Six wheels per unit, tire size 49 x 19-22

Nose Gear Twin wheels per unit, tire size 44 x 18-18

Wheel Track 36.00 ft (10.97 m)

Wheel Base 84.92 ft (25.88 m)

WEIGHTS & LOADINGS:

Empty (777-200) 307,000 lb (139,255 kg)
(777-200ER) 315,000 lb (142,880 kg)
(777-200LR) 326,000 lb (147,870 kg)
(777F) 326,000 lb (147,870 kg)
(777-300) 353,600 lb (160,390 kg)
(777-300ER) 366,940 lb (166,440 kg)

Normal Takeoff (777-200) 534,700 lb (243,045 kg)

Maximum Takeoff (777-200) 545,000 lb (247,205 kg)
(777-200ER) 656,000 lb (297,555 kg)
(777-200LR) 766,000 lb (347,450 kg)
(777F) 766,000 lb (347,450 kg)
(777-300) 660,000 lb (299,370 kg)
(777-300ER) 775,000 lb (351,535 kg)

Maximum Landing (777-200) 445,000 lb (201,850 kg)
(777-200ER) 460,000 lb (208,655 kg)
(777-200LR) 492,000 lb (223,165 kg)
(777-300) 524,000 lb (237,680 kg)
(777-300ER) 554,000 lb (251,290 kg)

Fuel Capacity (777-200) 212,040 lb (96,345 kg) in 31,000 gal (117,350 L) wing tanks
(777-200ER) 309,275 lb (140,285 kg) in 45,215 gal (171,160 L) wing tanks
(777-200LR) 365,520 lb (165,795 kg) in 53,440 gal (202,285 L) wing tanks
(777F) 327,565 lb (140,300 kg) in 47,890 gal (181,280 L) wing tanks
(777-300) 309,305 lb (140,300 kg) in 45,200 gal (171,175 L) wing tanks
(777-300ER) 327,565 lb (140,300 kg) in 47,890 gal (181,280 L) fuselage and wing tanks

Maximum Payload (777-200) 125,530 lb (56,940 kg)
(777-200ER) 131,000 lb (59,420 kg)
(777F) 225,000 lb (102,060 kg)
(777-300) 147,200 lb (66,770 kg)
(777-300ER) 154,000 lb (69,855 kg)

Wing Loading unknown

Thrust/Weight Ratio unknown

PROPULSION:

Powerplant (777-200) two Pratt & Whitney PW4077 turbofans
or two Rolls-Royce Trent 877 turbofans
or two General Electric GE90-77B turbofans
(777-200ER) two Pratt & Whitney PW4084/PW4090 turbofans
or two Rolls-Royce Trent 884/892/895 turbofans
or two General Electric GE90-85B/92B/94B turbofans
(777-200LR) two General Electric GE90-110B1/115B turbofans
(777F) two General Electric GE90-110B turbofans
(777-300) two Pratt & Whitney PW4098 turbofans
or two Rolls-Royce Trent 892 turbofans
or two General Electric GE90-94B turbofans
(777-300ER) two General Electric GE90-115B turbofans

Engine Rating (777-200) 2 x 77,200 lb (343 kN) [P&W]
(777-200) 2 x 76,000 lb (338 kN) [RR]
(777-200) 2 x 77,000 lb (342 kN) [GE]
(777-200ER) 2 x 90,200 lb (401 kN) [P&W]
(777-200ER) 2 x 93,400 lb (415 kN) [RR]
(777-200ER) 2 x 93,700 lb (417 kN) [GE]
(777-200LR) 2 x 110,000 lb (489 kN)
(777F) 2 x 110,000 lb (480 kN) [GE]
(777-300) 2 x 98,00 lb (435 kN) [P&W]
(777-300) 2 x 90,000 lb (400 kN) [RR]
(777-300) 2 x 94,000 lb (410 kN) [GE]
(777-300ER) 2 x 115,000 lb (512 kN)

Engine Intakes Two nacelles on wing pylons

Fuel Type Jet A, Jet A-1

PERFORMANCE:

Max Level Speed (at altitude) 575 mph (930 km/h) at 35,000 ft (10,675 m), Mach 0.87

Max Level Speed (at sea level) unknown

Cruise Speed 560 mph (900 km/h) at 35,000 ft (10,675 m), Mach 0.84

Takeoff Speed 165 to 215 mph (270 to 345 km/h)

Landing Speed 150 to 175 mph (245 to 285 km/h)

Takeoff Distance (777-200) 8,300 ft (2,530 m)
(777-200ER) 11,600 ft (3,535 m)
(777-200LR) 11,600 ft (3,535 m)
(777F) 11,600 ft (3,535 m)
(777-300) 11,200 ft (3,415 m)
(777-300ER) 10,500 ft (3,200 m)

Landing Distance (777-200) 5,600 ft (1,705 m)
(777-300) 6,100 ft (1,860 m)

Maximum Climb Rate unknown

Service Ceiling 43,100 ft (13,135 m)

Range (777-200) 5,210 nmi (9,650 km)
(777-200ER) 7,730 nmi (14,315 km)
(777-200LR) 9,420 nmi (17,445 km)
(777F) 4,895 nmi (9,065 km)
(777-300) 5,950 nmi (11,030 km)
(777-300ER) 7,705 nmi (14,270 km)

g-Limits unknown

SYSTEMS:

Radar Honeywell weather radar

Flight Controls Digital fly-by-wire

Electrical 400 Hz AC supplied by 120 kVA constant frequency generators attached to each engine and an AlliedSignal GTCP331-500 APU, equipped with an emergency ram air turbine

Hydraulics Three independent systems rated at 3,000 psi (20,685 kPa) each

Braking AlliedSignal mutli-disk carbon brakes

De-icing Thermal heaters used on leading edges of wings and engine intakes, electric heaters used on cockpit windows and pitot tubes

COMPOSITION:

- *Aluminum:* majority of structure including a lightweight 7055 alloy used on the upper wing skin and stringers

Composites account for 9% of structural weight, including

- *Carbon fiber & carbon fiber reinforced plastic:* used on portions of the tail including the tailfin and elevators, wing trailing edge control surfaces, engine nacelles, landing gear doors
- *Hybrid composites:* floor beams, flap track fairings, and wing/fuselage junction fairings
- *Glass fiber:* nose radome, engine pylon parts, portions of the wings and tail

VARIANTS:

777-100X Proposed long-range model with a shortened fuselage accommodating 259 passengers in a three-class layout over a range

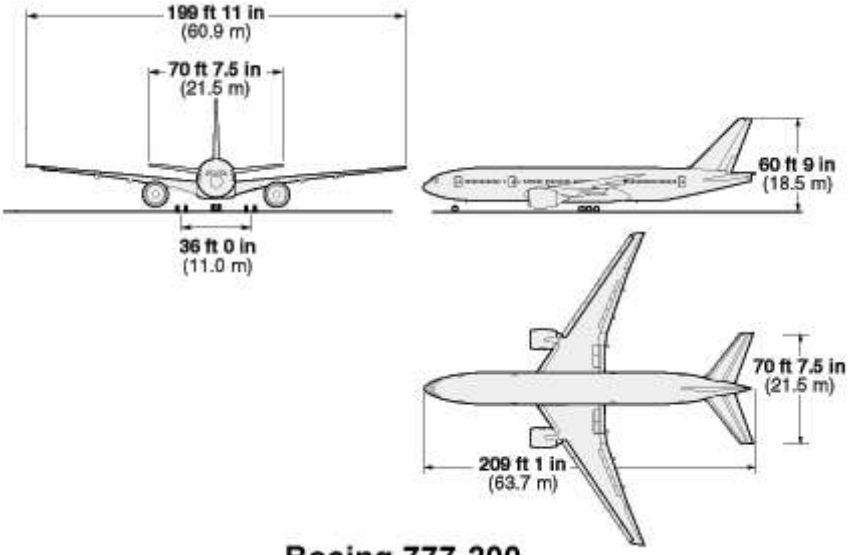
	of 8,600 nmi (15,925 km); not developed
777-200	First production model originally designated as the 777-200A; 88 built by late 2009
777-200BCF	Boeing Converted Freighter proposed to convert 777-200 airframes into cargo frieghters capable of transporting 150,000 lb (68,040 kg) of payload over 2,500 nmi (4,630 km)
777-200ER	Extended range model originally designated 777-200B or 777-200IGW (Increased Gross Weight) with greater fuel capacity and uprated engines; 412 built by late 2009
777-200ERBCF	Boeing Converted Freighter proposed to convert 777-200ER airframes into cargo transports capable of carrying 175,000 lb (79,380 kg) of payload over 4,000 nmi (7,410 km)
777-200LR	Long range model based on the 777-200 but with more powerful engines and increased fuel capacity plus greater wingspan, originally known as the 777-200X
777F	Cargo freighter model based on the 777-200LR; 9 built by late 2009
777-300	Stretched model with a lengthened fuselage for greater passenger capacity, also features uprated engines and greater fuel capacity for improved range compared to the 777-200; 34 built by 2001
777-300ER	Extended range 777-300 model with more powerful engines and additional fuel carried in a wing of increased span as well as two auxiliary tanks in the cargo hold, originally known as the 777-300X
KC-777	Proposed aerial refueling tanker based on the 777-200 that Boeing has considered offering to the US Air Force

OPERATORS:

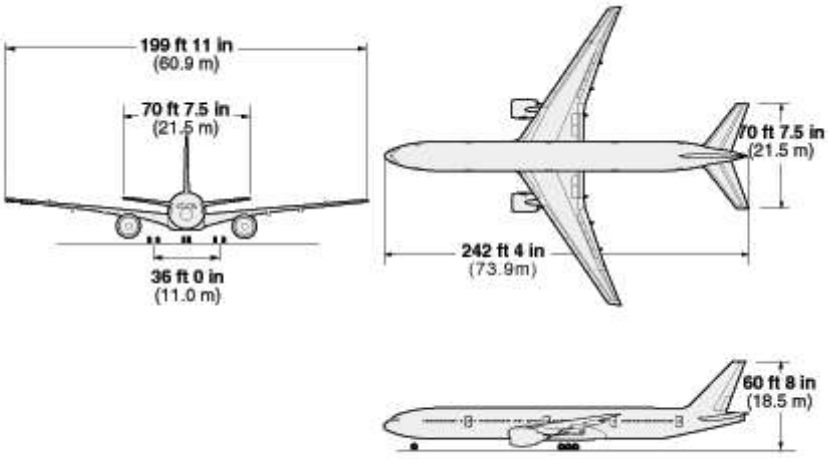
Aeroflot
Air Austral
Air Canada
Air China
Air France
Air Europe Italy
Air India
All Nippon Airways
American Airlines
Arik Air
Asiana Airlines
Babcock & Brown Aircraft Management
Biman Bangladesh Airlines
BOC Aviation
British Airways
Cathay Pacific Airways
China Southern Airlines
Continental Airlines
Delta Air Lines
Egyptair
El Al
Emirates Airlines
Ethiopian Airlines
Etihad Airways
FedEx
Garuda Indonesia
GE Commercial Aviation Services (GECAS)
GMG Airlines

Hong Kong Airlines
Japan Airlines
Japan Air Systems
Jet Airways
Kenya Airways
KLM - Royal Dutch Airlines
Korean Air Lines
Kuwait Airways
LAN Chile
Lauda Air
Malaysian Airline System (MAS)
Mid East Jet
OceanAir
Pakistan International Airlines
Philippine Air Lines
Qatar Airways
Royal Brunei Airlines
Saudia
Saudi Oger
Singapore International Airlines
South African
Southern Air
TAAG Angola Airlines
TAM Brazil
Thai Airways International
THY Turkish Airlines
TransBrazil
United Airlines
Veling
Vietnam Airlines
V Australia
Virgin Airways
Virgin Blue Airlines
Varig

3-VIEW DIAGRAM:



Boeing 777-200



Boeing 777-300

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Remember
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