

# 777-200 & -300 specifications

The 777-200/-300 family is powered by three main engine types. There are several weight, fuel capacity and range specification variants of the two series.

The 777 family is used mainly for long-haul operations, although operators in the Asia Pacific also use it for medium-haul services. The 777 family is based on two basic variants: the -200 series and larger -300 series. Within each series there are a number of variants, with longer range capability achieved through higher maximum take-off weight (MTOW), matched with higher engine thrust.

The first variant of the shorter -200 series entered service in June 1995 with United Airlines, and has an MTOW of 545,000lbs (247,200kg). The -200's standard three-class seat capacity is 305 passengers. The first variant of the longer -300 series entered service in May 1998 with Cathay Pacific and has an MTOW of 660,000lbs (299,370kg). The -300 series can carry an additional 50 extra passengers in a tri-class configuration.

Boeing has also launched ultra-long-range versions of the -200 and -300. The extended range -200ER can fly 7,700nm (14,260km), which gives it an additional range of about 2,500nm on the standard -200. This model was originally designated the -200IGW, for Increased Gross Weight. It had an increased MTOW, to take account of its additional fuel capacity, which was 656,000lbs (297,550kg).

Boeing has introduced two ultra-long-range passenger variants: the -200LR and the -300ER. These have additional range and MTOWs.

The 777-200LR has the -200's fuselage, a standard passenger configuration of 301 seats, an MTOW of 766,000lbs and 9,380nm range. It is powered by the GE90-110B, rated at 110,000lbs thrust (see table, page 7).

The 777-300ER has the same passenger capacity as the -300, a range of 7,930nm and an MTOW of 775,000lbs (see table, page 7).

The last quarter of 2008 will see the entry into service of the first 777F freighter. This is based on the 777-200LR, and has the same MTOW as the -200LR. It has a structural payload of 226,700lbs and range of 4,885nm.

## Engine options

### GE90 series

The GE90 engine is the only engine to be offered on all 777 models. There are six GE90 variants across the 777 fleet. These start with the GE90-76B, rated at 77,000lbs thrust for the 777-200, and continue to the GE90-115B, rated at 115,000lbs thrust for the -300ER (see table, page 7). Only the GE90-94B and the GE90-115B are in production.

The GE90-94B is rated at 94,000lbs thrust, and has had its performance improved by a three-dimensional aerodynamic high pressure compressor (HPC) and other new technologies. The -94B's 10-stage HPC is driven by a two-stage high pressure turbine (HPT). The three-stage low pressure compressor (LPC) is driven by a six-stage low pressure turbine (LPT). The engine is the heaviest and longest 777 engine option, at over 16,500lbs and 287 inches.

GE is now offering a Performance Improvement Package (PIP) which can upgrade an operator's current GE90 engine to a standard similar to that of the GE90-94B. The advantages consist of a 1.6% fuel burn improvement and about a 20°C increase in Exhaust Gas Temperature (EGT) margin, thereby providing an improvement in operating costs.

The GE90-115B is the only engine type available on the 777-300ER. This form of the GE90 has one less HPC stage, but one more LPC than the -94B.

For the 777-200LR and -200F, the GE90-115B is derated to 110,000lbs of thrust and designated the GE90-110B. The GE90-110B has a flat rated temperature of 92°F, while all other GE90s (including the -115B) are flat rated at 86°F.

The fan diameter for the standard GE90 is 123 inches, and has a bypass ratio of 8.7.

The -110B and -115B have a larger fan diameter of 128 inches, and a bypass ratio of 7.2.

### PW4000-112 series

The PW4000-112 has a fan diameter of 112 inches. This engine is operated on the 777-200, -300 and -200ER, and has become the most popular option on the -200. There are five variants of the PW4000-112, ranging from 74,000lbs to 98,000lbs of thrust (see table, page 7).

All five engine models have a single stage fan, a two-stage HPT driving the 11-stage HPC and a six-stage LPC driven by a seven-stage LPT. All have a bypass ratio of 6.4 and a flat rating temperature of 86°F/30°C. This engine series is one of the heaviest available for commercial aircraft, second only to the GE90.

The first PW4000-112 engine was an industry first, with 180-minute ETOPS (extended-range twin-engine operations) qualified before it entered service in 1995. The PW4084 went on to be the first engine approved for 207-minute ETOPS.

The PW4084 was the third engine in the series. It has a thrust rating of 84,600lbs, and is operated on the -200 and -200ER. The PW4090 is rated at 91,790lbs, and is operated on the -200, -200ER and -300. The PW4098 is only operated on the 777-300, and has a thrust rating of 98,000lbs.

### Trent 800 series

There are five basic variants of the Trent 800 which power the 777-200, -200ER and -300. These have thrust ratings between 75,000lbs and 95,000lbs (see table, page 7). The Trent 800 is the most popular engine selection on the 777 models it powers.

All Trent 800 models have a fan diameter of 110 inches and a flat rate temperature of 86°F/30°C, except the Trent 895 which has 77°F. Bypass ratios for each model vary, with the ratio decreasing as the thrust rating increases.

The Trent 875 has a thrust of 75,000lbs with a bypass ratio of 6.2 and only operates on the -200. The Trent 877, also only operated on the -200, is rated at 77,000lbs thrust and has a 6.1 bypass ratio. The Trent 884 has a thrust of over 84,000lbs and a bypass ratio of 5.9. The family's two most powerful engines are the Trent 892 and Trent 895 with 92,000lbs and 95,000lbs thrust respectively and a smaller bypass ratio of 5.8.

All five models have the same engine composition: the fan driven by a five-stage LPT; a single-stage HPT driving the six-stage HPC; and a single intermediate pressure turbine (IPT) driving an eight-stage intermediate pressure compressor (IPC).

The Trent 800 follows the standard build of the Trent family with next generation wide-chord fans and three-shaft architecture, so the additional IPT

## 777-200/-300 SPECIFICATIONS TABLE

Aircraft variant	Engine type	Engine take-off thrust lbs	MTOW lbs	MLW lbs	MZFW lbs	OEW lbs	Max payload lbs	Fuel capacity USG	Seats 3-class	Range nm	Belly freight cu ft
777-200	GE90-76B	77,200	506,000/ 545,000	445,000	420,000	310,100	109,900	31,000	305	5,235	5,330
	GE90-85B	84,700	580,000	460,000	430,000	316,600	113,400	45,220	305	5,795	5,330
	PW4074	74,500	506,000	445,000	420,000	306,200	113,800	31,000	305	4,015	5,330
	PW4077	77,200	545,000	445,000	420,000	306,500	113,500	31,000	305	5,140	5,330
	PW4084	84,760									
	PW4090	90,500									
	Trent 875	73,500	506,000	445,000	420,000	302,100	117,900	31,000	305	4,100	5,330
Trent 877	76,000	545,000	445,000	420,000	302,400	117,600	31,000	305	5,210	5,330	
777-200ER	GE90-90B	90,000	580,000/ 656,000	460,000	430,000			45,220	305	7,700	5,330
	GE90-94B	93,700	656,000	460,000	430,000	317,000	113,000	45,220	305	7,770	5,330
	PW4084	84,600	580,000	460,000	430,000	312,700	117,300	45,220	305	5,845	5,330
	PW4090	90,200	656,000	460,000	430,000	314,400	115,600	45,220	305	7,650	5,330
	Trent 884	83,600	580,000	460,000	430,000	308,600	121,400	45,220	305	5,910	5,330
	Trent 892	92,000		460,000	430,000			45,220	305	7,665	5,330
	Trent 895	93,400	656,000	460,000	430,000	309,000	121,000	45,220	305	7,740	5,330
777-200LR	GE90-110B	110,100	766,000	492,000	461,000	320,000	141,000	47,890	301	9,380	5,330
777-300	GE90-94B	93,700	660,000					45,220	368	6,015	7,120
	PW4090	90,000	660,000	524,000	495,000	348,400	146,600	45,220	368	6,015	7,120
	PW4098	98,000	660,000	524,000	495,000	349,400	145,600	45,220	368	5,645	7,120
	Trent 892	91,600	660,000	524,000	495,000	342,900	152,100	45,220	368	5,955	7,120
777-300ER	GE90-115B	115,000	775,000	554,000	524,000	370,000	154,000	47,890	368	7,930	7,120
777-200F	GE90-110B	110,100	766,000	575,000	547,000	318,300	226,000	47,890		4,885	23,051

and IPC. This design means that the Trent 800 is the lightest engine for the 777.

### Fuel capacities

The original 777-200 has a fuel capacity of 31,000 US Gallons (USG) (see table, this page). The 777-200 derivatives, the -200ER and -200LR (and -200LRF) have additional fuel capacity of 45,220USG and 47,890USG. The 777-300 has the same fuel capacity as the -200ER, while the -300ER has the same capacity as the -200LR.

### Accommodation & interior

The 777-200 model series has 305 seats in a standard tri-class layout, 375 in a two-class layout, and 418 in all-economy.

Of the two-class operators, none have as many as 375 seats. Emirates has the highest number, with 346 seats on its -200. Other operators, which had a high number of seats in a two-class configuration, were mostly based in the Asia Pacific area, including Thai and Cathay Pacific. Delta has the least with 268 on the -200ER.

In three-class layouts on the -200ER, Air New Zealand has the largest number of seats with 313 in business, premium-economy and economy cabins. Nine-abreast configurations are used in the

economy and premium-economy cabins.

Most other operators use fewer than the standard 305 seats. All Nippon Airways (ANA) has 223 seats in the tri-class layout, but has a large 70-seat business class.

This number is unsurpassed by any other 777 business cabin except on some ANA and JAL -300ERs, although Air France comes close with 67 business seats on its -300s.

United Airlines and British Airways are the only airlines to have a four-class configuration on their 777-200s, with 255-269 seats and 229 seats respectively.

The 777-300 series has a standard tri-class layout of 368 seats, 451 seats in a two-class layout, and up to 550 in an all-economy charter layout. Air France comes close to this with 472 seats in one configuration of the -300.

Most three-class -300s have 300-380 seats, while JAL and Singapore Airlines have less on theirs. Emirates and KLM have 425 seats in a two-class layout on their -300s, but most operators only get 350-400.

Qatar Airways' also configures its -300ER with two classes, but it only holds 335 passengers due to the generous pitch and width of its business and economy seats. The four-class layout is equally popular on the -300, and ANA and JAL configure their -300ERs to hold 246-272 passengers.

### Freight capacities

The five passenger variants have belly freight capacity. The -200 series can carry six 96-inch X 125-inch pallets or 18 LD-3 containers in the forward cargo compartment (each with 158 cubic feet capacity). The aft cargo compartment can hold 14 LD-3 containers or four pallets. The bulk cargo compartment at the rear has a capacity of 600 cubic feet. If the three optional fuel tanks are added to the -200LR, the aft cargo compartment capacity drops to eight LD-3 containers, reducing the total from 32 LD-3s to 26.

The -300 series can hold up to eight pallets or 24 LD-3 containers in the forward hold, 20 LD-3 containers or six pallets in the aft hold, and 600 cubic feet of bulk cargo. If the optional lower hold toilet facilities are fitted to the -300ER, the aft hold capacity falls to four pallets.

The 777F has the same lower deck cargo capacity as the -200LR passenger aircraft, with a large maindeck cargo door accommodating 96-inch X 125-inch pallets. The maindeck capacity is 27 pallets, making the total capacity 37 pallets plus 600 cubic feet of additional bulk cargo. Live animal carriage is possible on the 777 freighter. 

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