

747-200/-300 specifications

There are several 747-200/-300 variants with different MTOW & engine combinations, as well as different MTOW limits for Stage 3 compliance.

The 747-200 and -300 followed almost instantly on the heels of the initial -100 series aircraft.

The various combinations of gross weight, engines, permissible weight at Stage 3, and range are analysed here.

A total of 476 -200s and -300s were manufactured between August 1970 and October 1991. Of these, 395 were the -200 and 81 were the -300 with the 23ft 4in extended upper deck that added 40 economy seats.

The first -200 to roll off the production line was line number 88 in August 1970 for Northwest Orient Airlines, although KLM was first in service with the -200B in February 1971. The last aircraft was line number 886 delivered on 19th November 1991, a -200F for Nippon Cargo Airlines. The first -300 series aircraft was line number 570 delivered in March 1983. The last -300 was line number 810 completed in August 1990.

-200B & -300 development

Even before the first flight of the -100, Boeing announced a higher gross weight variant with a choice of engines from Pratt & Whitney (PW), General Electric (GE) and Rolls-Royce (RR). The -200 was the first 747 to be configured as a freighter, a combination passenger-freighter and a convertible.

Several developments have been made to the -200 that allow more power, increased weight and range, and a variety of seating combinations. Several specialist versions were produced, including the hinge-nosed -200F freighter, -200C Convertible, the -200 Combi with side cargo (SCD) door, and the -200SUD (stretched upperdeck).

The first 747-300, with an extended upper deck compared to the -200, was built in September 1982 (line number 570) and entered commercial service in March 1983 with Swissair as a Combi. The extended upper deck increased seat capacity by about 10%. The -300 also had improved engines with a reduced fuel burn of 25% per passenger. Passenger capacity was also increased by 10% by the extended upper deck. Boeing delivered 81 747-300s in passenger,

Combi and short-range configurations, the last being line number 810 in August 1990 for Sabena.

The -200 and -300 production line was closed on November 19th 1991, the last aircraft being a -200F.

Technical description

The technical capability of the 747-200B and -300 series is determined by a combination of its installed engines, MTOW permitted by the installed engines, fuel volume and Stage 3 compliant MTOW.

The earlier built 747-200B has a structure and landing gear to permit a MTOW of up to 775,000lbs. Further structural changes were made from line number 409 to permit an MTOW up to 833,000lbs.

The -200 fleet has a choice of Pratt & Whitney (PW) JT9D-3A, -7A, -7F, -7J, -7Q, and -7R4G2 engines. These are rated at 45,000lbs to 54,000lbs thrust. General Electric supplied the CF6-50E/-50E1/-50E2 variants rated at 52,500lbs thrust. The Rolls-Royce options are the RB211-524C2 and -524D4 rated at 51,500lbs and 53,100lbs thrust.

On the larger -300, engine options are the JT9D-7R4G2 rated at 54,000lbs thrust, CF6-50E2 and newer CF6-80C2B1 rated at 56,700lbs thrust, and the RB211-524D4 rated at 53,100lbs thrust.

The different MTOWs that are possible for each engine type are shown (see first table, page 7), together with fuel volume in US Gallons (USG).

Aircraft with the JT9D-7A installed had an original certified MTOW of 775,000lbs and 785,000lbs (see first table, page 7).

The later -7F/-7FW/-7J all allowed the aircraft to operate up to a MTOW of 800,000lbs. These three variants were also used on aircraft which originally had MTOWs certified at 775,000lbs and 785,000lbs (see first table, page 7).

Aircraft with the JT9D-70A had MTOWs of up to 820,000lbs.

The later JT9D-7Q and -7R4G2 variants, the CF6-50 and the RB211-524 engines all permitted a MTOW of up to 833,000lbs (see first table, page 7).

Stage 3 compliance

These MTOWs are the original take-off weight limits, and some engine-MTOW combinations are not Stage 3 compliant. The non-Stage 3 compliant combinations have had a limit imposed on their MTOW. This has the effect of reducing engine throttle setting, and so reducing noise emissions.

The Stage 3 MTOW limits for the JT9D-7Q, JT9D-7R4G2, CF6-50 and RB211-524C2/D4 are unchanged from the original MTOWs (see second table, page 7). This gives the passenger-configured aircraft a range of 5,900-6,100nm, depending on engine installed.

Aircraft with the JT9D-7A are limited to a MTOW of 734,000lbs for Stage 3 compliance (see second table, page 7). Range for this aircraft is 4,250nm.

The JT9D-7F limits the MTOW to 750,000lbs, and the corresponding range is 4,650nm. Aircraft with the JT9D-7J are limited to a MTOW of 770,000lbs and a range of 5,000nm (see second table, page 7).

Payload capacity

In a passenger configuration, the -200B has a tri-class seat capacity of 360-420 seats. The 747-300's tri-class capacity is typically about 20-30 seats more.

All -200 and -300 models have significant belly cargo space of about 5,250 cubic feet with containerised cargo in 30 LD-1 containers. They can also take palletised cargo.

-200M Combi

The -200M or 'Combi' has a maindeck that has a SCD at the left rear of the fuselage. This allows freight to be carried in the rear section of the maindeck, while the front section is configured to carry passengers. The Combi became popular in the late 1970s and early 1980s. Six 10-foot high pallets can be carried at the rear of the main deck in Zone E. Each of these has a volume of 773 cubic feet, thus providing 4,638 cubic feet of cargo volume. The passenger accommodation is reduced by up to 238 passengers in three-class layout, depending on configuration.

The -200B Combi has the same range characteristics as the -200B in all-passenger configuration.

-200C Convertible

The -200C was made available at the same time as the -200F. The -200C is similar in appearance to the -200B except that it has the upward-opening nose door and strengthened floor of the -200F. The interior can be configured in either a

passenger or freighter role.

The conversion of the aircraft from one role to another allows operators to take account of seasonal fluctuations in passenger and freight traffic. The -200C did not prove particularly popular, and only 13 were produced.

-200F Freighter

The -200F, with a MTOW of 775,000lbs, had a larger payload-range capability than the -100F. The -200F has the upward hinging nose door. This is the fundamental difference between the -200F and the subsequently modified -200SF. The nose door is standard, with the main deck SCD an option.

The nose door only permits eight-feet high maindeck freight containers, which have an internal volume of 623 cubic feet. The maindeck can accommodate 29 of these, and so has a total freight volume of 18,270 cubic feet (*see third table, this page*).

The SCD allows 21 10-foot high containers to be carried in the mid and aft sections of the maindeck, while eight eight-feet high containers have to be carried in forward section. The 10-foot high containers have an internal volume of 773 cubic feet, and overall aircraft with a SCD have a maindeck freight volume of 20,685 cubic feet (*see third table, this page*).

Combined with the 5,250 cubic feet provided by the 30 LD-1 containers in the belly, total freight volume is 23,520 cubic feet for the -200F with only the nose door, and 25,935 cubic feet for aircraft with the SCD.

The -200F has a maximum zero fuel weight of 590,000lbs. Operating empty weight, including tare weight of containers, varies between 342,000lbs and 351,000lbs, depending on MTOW variant and installed engine. This allows an available structural payload of 239,000-248,000lbs (*see third table, this page*).

-200 SUD

When Boeing announced the 747-300 programme in June 1980, Boeing and the press referred to it as the -200 SUD. The new aircraft was later re-designated as the -300. A modification was available to operators of -200Bs, however, to stretch the upper deck to the same capacity as the -300. KLM ordered the modification of its 10 -200Bs to -200 SUD.

-300 series

The -300 programme was announced by Boeing on June 12th 1980, originally as a modification to the existing models. Typical seating is 405 in a three-class configuration. The -300's weights and

747-200/-300 SERIES GROSS WEIGHT & ENGINE CONFIGURATIONS

| Variant | -200 | -200 | -200 | -200/-300 |
|-----------------|----------------------------------|----------------------------------|----------------------|-----------------------------------------------------------------|
| MTOW lbs | 775,000 | 785,000 | 800,000 | 833,000 |
| Fuel volume USG | 52,410 | 52,035 | 52,410 | 52,410 |
| Engine options¶ | JT9D-7AW JT9D-7FW JT9D-7JW | JT9D-7AW JT9D-7FW JT9D-7JW | JT9D-7FW JT9D-7JW | JT9D-7Q JT9D-7R4G2 CF6-50E2 RB211-524C2 RB211-524D4 |

747-200/-300 MTOW & MLW LIMITS FOR STAGE 3 COMPLIANCE

| Variant & engine | -200 JT9D-7A | -200 JT9D-7F | -200 JT9D-7J | -200/-300 JT9D-7Q |
|----------------------------|-------------------------|-----------------------|-----------------------------------------|-----------------------------------------|
| MTOW lbs | 734,000 | 750,000 | 770,000 | 833,000 |
| MLW lbs | 630,000 | 630,000 | 630,000 | 666,000 |
| Range nm (Pax aircraft) | 4,250 | 4,650 | 5,000 | 5,900 |
| Variant & engine | -200/-300 JT9D-7R4G2 | -200/-300 CF6-50E2 | -200/-300 RB211-524C4 RB211-524D4 | -200/-300 RB211-524C4 RB211-524D4 |
| MTOW lbs | | 833,000 | 833,000 | 833,000 |
| MLW lbs | | 666,000 | 666,000 | 666,000 |
| Range nm (Pax aircraft) | | 6,100 | 5,900 | 6,050 |

747-200F FREIGHT SPECIFICATIONS

| Aircraft model | -200F Nose door only | -200F Nose door & SCD |
|----------------------------------|-------------------------|--------------------------|
| Type maindeck containers: | 96" X 125" X 96" | 96" X 125" X 96" |
| Number of containers: | 29 | 8 |
| Type of maindeck containers: | | 96" X 125" X 118" |
| Number of containers: | | 21 |
| Maindeck container volume cu ft: | 18,270 | 20,685 |
| Belly containers | 30 | 30 |
| Belly container volume cu ft: | 5,250 | 5,250 |
| Total container volume cu ft: | 23,520 | 25,935 |
| MZFW lbs | 590,000 | 590,000 |
| OEW lbs | 342,000-351,000 | 342,000-351,000 |
| Structural payload lbs | 239,000-248,000 | 239,000-248,000 |

engine options are described (*see first table, this page*).

The Combi is identical to the standard -300, except for a 120 x 134 in main deck cargo door aft of the wing. Zones D and E have a strengthened floor with cargo handling equipment. A typical Combi configuration is 289 passengers in three classes and seven 10-foot high pallets aft. The weights and engine options are described (*see table, this page*).

-300 SR

In 1987 Boeing offered the -300 in an SR version for high-density traffic volumes to Japan Airlines. In a two-class, high-density configuration, the -300SR can seat 563 passengers. In single-class configuration it can carry 624 passengers. The -300SR is offered at MTOWs of 520,000lbs and 600,000 lbs with fuel capacities of 48,000USG and 48,500USG. Only four were built for JAL. **AC**