

A340-200/-400 fleet analysis

There are 242 A340-200s and -300s in operation. The oldest are 14 years old, and a large number are no longer flown by their original operators.

The A340 and closely related A330 were launched in June 1987. The A340 entered service with Lufthansa and Air France in March 1993, following Joint Airworthiness Authority (JAA) certification in December 1992.

A total of 242 A340-200/300 aircraft powered by several variants of the CFM56-5C engine have been delivered, and there is a backlog of 12 A340-300s. Most of the fleet are in service with their original operators.

The CFM-powered A340 fleet is split between the -200 and -300 models. The A340-200, of which there are 27 in passenger service, has a standard tri-class capacity of 261 passengers and a range of up to 7,450nm. South African Airways (SAA) is the largest A340-200 operator with six ex-Lufthansa aircraft. Overall, there are 10 A340-211s, 15 A340-212s, and three A340-213s. Two of the three -213s are in VIP service in Saudi Arabia.

The longer A340-300 is the more popular version, with 213 in the fleet. It also has the highest retention rate with original operators. Of the 213 A340-300 model series delivered, 166 aircraft (78% of those delivered) are still with their original operators, while only six of the 28 -200 series aircraft are with their original operator, giving a retention ratio of 21%.

The -200 and -300 are powered by three main variants of the CFM56-5C, which provides three thrust ratings. The A340-200 and -300 sub-variants are denoted by model-respective suffixes. The A340-211 and -311 are powered by four CFM56-5C2s rated at 31,200lbs thrust. The A340-212 and -312 are powered by four CFM56-5C3s rated at 32,500lbs thrust, and the A340-213 and -313 are powered by four CFM56-5C4s rated at 34,000lbs thrust.

It should be mentioned that most of the installed CFM56-5C3 fleet, which originally had an exhaust gas temperature (EGT) redline limit of 950°C at take-off, have been upgraded to the CFM56-5C/F standard, which incorporates improved low pressure turbine (LPT) hardware to increase the EGT redline limit to 965°C. CFMI subsequently offered an additional LPT and high pressure turbine (HPT)

upgrade to further raise the allowable redline limit from 965°C to 975°C, thereby increasing the available EGT margin to improve time on-wing. These modified engines were subsequently denoted with -5C2/G and -5C3/G suffixes. However, most operators have not opted for this upgrade.

According to the Aircraft Fleet & Analytical System (ACAS) database, only three A340s with the /G suffix are in operation: a -5C2/G-powered A340-211 with the Government of Jordan (ex-Lufthansa); and two -5C3/G-powered A340-312s with Air Namibia (ex-Sabena). Lufthansa upgraded six CFM56-5C/F-powered A340-200s and eight A340-300s to /G standard, while still operating them as '/Fs'. That is, it reverted to the 965°C redline limit in order to improve on-wing life. These aircraft are now flying with SAA, and are listed in ACAS as having CFM56-5C3/Fs.

A340-200

The shorter-fuselage A340-211 variant is powered by the lowest rated -5C2 engines (31,200lb thrust), and all 10 of these aircraft in the fleet are certified with a maximum take-off weight (MTOW) of 565,400lbs. Eleven -211s were originally delivered, but one Air France aircraft was destroyed in a non-fatal runway overrun accident. All but one of the -211 sub-fleet are no longer flying with their original operators, the exception being an aircraft operated by the Qatar Amiri Flight.

Of the 10 aircraft that have changed operators, four -211s originally ordered by Philippine Airlines are now flying with Aerolineas Argentinas, two aircraft delivered to Austrian are now with the French Air Force, one ex-Lufthansa aircraft is with the government of Jordan, one ex-UTA aircraft is with ConViasa, and one with Qatar Amiri Flight.

As early-build aircraft (with ages ranging from 12 to 14 years), these passenger examples have accumulated 39,300-54,300 flight hours (FH) and 5,300-7,000 flight cycles (FC). These are above the average for the entire A340 fleet. These aircraft have been operated at FH:FC ratios of 7.4:1-8.2:1 since delivery. Given their age, all -211s will have undergone their first D-check.

Only 15 A340-212s remain in operation, powered by CFM56-5C3/Fs, rated at 32,500lbs thrust. The MTOWs range from 557,700lbs to 572,000lbs for the -312s fleet, which were all delivered from January 1993 to June 1997. Most of the -212s have been sold by their original operators. For example, Lufthansa took delivery of six -212s in 1993, which are all now operated by SAA. Royal Jordanian operates four -212s, two of which came from Sabena, and two from UTA.

Although most of the 15 -212s have accumulated 7,000-8,000FC, there is a marked difference in the accumulated FHs. For example, the ex-Lufthansa and ex-UTA aircraft (delivered from 1993 to 1994) have FH:FC ratios of 7:1-8:1 and have each accumulated more than 56,000FH. However, the aircraft operated by EgyptAir and Royal Jordanian in particular have accumulated significantly fewer FH: EgyptAir's three aircraft each have 36,000-37,000FH; and Royal Jordanian's two ex-Sabena aircraft have 47,000-49,300FH. Its third aircraft, an ex-UTA model, has 56,000FH. These relatively low FHs are a result of low hour-to-cycle ratios, and range typically from 4.3:1 to 6.6:1. Given that all aircraft are at least 10 years old, all will have already undergone their first D-check.

The A340-213 is the most powerful

A340-200/-300 FLEET SUMMARY

Engine variant	CFM56-5C2	CFM56-5C3	CFM56-5C4
A340-211	10		
A340-212		15	
A340-213			3
A340-311	27		
A340-312		17	
A340-313			169
Total	37	32	172



version of the -200 model, and shares the same -5C4 34,000lbs thrust engine with the larger A340-313. With these more powerful engines, the aircraft was dubbed the 'A340-8000' because it would have an 8,000nm range with 260 passengers. However, the high operating costs precluded sales success in this market. Only three were delivered, for use as long-range VIP transports. Two were originally delivered to the Government of Brunei, and are now with Afriqiyah Airways and a private operator in Saudi Arabia. The third aircraft is also owned by a Saudi Arabian VIP.

A340-300

The A340-300 fleet is subdivided into the A340-311, -312, and -313, depending on the installed engine thrust rating. As with the A340-211, the longer fuselage A340-311 variant is powered by the lowest rated engine at 31,200lbs thrust. Aircraft MTOWs range from 557,700lbs to 572,000lbs.

Of 27 A340-311s originally delivered between 1993 and 1997, all but one are still flying, with one Sri Lankan Airlines aircraft having been destroyed in a non-fatal terrorist-related incident at an airport. Of the 26 remaining aircraft, 20 are still flying with their original operators. The six exceptions include one aircraft originally delivered to Air France, one to Gulf Air, and four to Virgin Atlantic, all of which are now with other operators. The A340-311 fleet is 10-14 years old, and therefore most, if not all, -311s, will have already had their first D-check. These aircraft have accumulated 26,300-65,000FH and 4,725-10,420FC since delivery. These are above the average figures for the entire A340 fleet,

whose average FH:FC ratios since delivery range from 5.8:1 to 8.7:1.

Lufthansa operates eight -311s, all of which are older than 12 years, and have accumulated high FHs and FCs with 60,000-64,600FH and 7,700-8,500FC. In fact, five of these Lufthansa aircraft have the highest accumulated FH of the entire A340 fleet.

The A340-312 variant is powered by more powerful CFM56-5C3/Fs rated at 32,500lbs thrust each. In turn, A340-312 MTOWs are generally higher than the -211's and range from 565,400lbs to 605,000lbs. Of 17 A340-312s originally delivered from 1993 to 2000, 11 are still flying with their original operators, and six are with new ones. Gulf Air continues to operate its six -312s (delivered from 1994 to 1996), and TAP Air Portugal operates four which it had delivered over 12 years ago. All -312s, apart from two, are over 10 years old. Two -312s operated by Sri Lankan are 6.5 years old, and will not have had their first D check.

The operational A340-312s have accumulated 26,340-61,000FH, and 4,248-13,430FC since delivery. These are FH:FC ratios of 4.2:1 to 7.8:1 since delivery. All the -312s belonging to Gulf Air have the highest number of accumulated cycles in relation to the number of hours flown, 11,000FC and 13,430FC. Indeed, while most of the other aircraft in this group have an FH:FC ratio of well above 6:1, the ratios for all of the Gulf Air -312s range from 4.2:1 to 4.6:1. All the five Gulf Air aircraft in this group have averaged more than 1,000FC annually since delivery.

The A340-313 is by far the most popular variant, with 169 being delivered to operators from 1995 to the end of 2006. This version is powered by the

The majority of A340s are -313s, powered by CFM56-5C4s. These are the most powerful engines that feature hardware that allows longer on-wing removal intervals than the older and less powerful -5C2 and -5C3 engines.

most powerful CFM56-5C4 engine rated at 34,000lbs thrust each. As with the A340-312, aircraft MTOWs range from 565,400lbs to 605,000lbs. Most of the fleet are still flying with their original tier-one flag-carrier operators. The main exception is Singapore Airlines, which has now disposed of its entire original fleet of 17 A340-313s as part of a deal with Boeing to buy 777s. Most of these -313s have gone to Emirates, Cathay Pacific or Gulf Air.

With ages ranging from brand new to just over 12 years, the operational A340-313s have accumulated up to 54,420FH and 9,860FC, since delivery. These figures reflect a range of average hours-to-cycle ratio from 2.2:1 to 5:1 (aircraft from China Eastern, Air China, Emirates, Gulf Air and Kuwait Airways in particular, fall into this category) and increasing to nine hours per FC for the highest utilised aircraft. The latter are typically operated by Air Canada, Virgin Atlantic, SAS, and South African Airways in particular.

It should be noted that to improve the EGT margin, and hence reliability of the CFM56-5C4, CFMI introduced an upgrade incorporating 3D hot-section blade aerodynamics. This improved version is denoted by a 'P' suffix and the same thrust rating as the original -5C4 (see *A340-200/-300 modification programmes*, page 13).

To date, 15 aircraft are equipped with these improved /P engines. Swiss was the first customer to take delivery of the first of six CFM56-5C4/P-powered aircraft from November 2003, and South African Airways followed in March 2004 with deliveries of six (three of these are now being operated by Jet Airways in India). In addition, Air Tahiti Nui is operating one, and Air Mauritius operates two.

Another 11 CFM56-5C4/P-powered A340-313s are due for delivery. Ten are for Finnair, and according to ACAS's order-backlog database, these will be delivered from 2007 through to 2010. There is also one other -5C4/P-powered A340 listed for an undisclosed customer.

Of 243 A340-313s, 102 are younger than nine years and 130 are younger than 10 years. As a rough guide, more than half the -313 fleet have yet to undergo their first D-check. The oldest aircraft will be coming due their second IL check within the next one to two years. 

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