

The A320 family fleet now totals almost 5,000. The oldest aircraft are already 23 years old, more than 100 have been parted-out, and aircraft and engines being traded in large volumes. The used market options for A320 family members and their engines are examined.

The investment & used market potential of the A320s family

With 4,700 aircraft in operation, and a backlog of 3,500 to be built, the A320 family could be a strong market for used aircraft and engines. Possibilities for traders, part-out specialists, and lessors to investigate in the used A320 market include: the economics of breaking older aircraft for airframe parts and engines; the market and economics for leasing aircraft of several vintages; the economics of sale & leaseback (SLB) transactions; general trading and leasing, and the leasing market for the A320 family's engines.

A320 family fleet

As of January 2012, there are 4,700 active aircraft in service, 125 parked ones, and 3,400 on order, equal to six to seven years of production at current build rates. Since production started in 1988, 135 aircraft have been destroyed or retired.

Of the aircraft in active service and parked, 466 are fitted with CFM56-5A engines, 2,331 with CFM56-5Bs, 99 with V2500-A1s, and 1,920 with V2500-A5s. A small number have PW6000 engines.

The A320 family fleet has grown rapidly in the past five years. Since 2007 when just below 3,000 aircraft had been built, almost 2,000 have been built, equal to an annual production rate of 450.

Most of the current fleet, 4,250, is equipped with CFM56-5B or V2500-A5 engines. The fleet of CFM56-5A-powered aircraft remains at 441 operational and 35 parked aircraft, which still require a lot of technical and maintenance support.

The fleet of V2500-A1-powered aircraft is small: 76 active and 23 parked.

Breaking used aircraft

The larger number of CFM56-5A-powered aircraft compared to V2500-A1-powered ones reflects the activity and economics of buying used aircraft for breakage. A total of 111 aircraft have been retired: seven A318s; and 104 A320s, of which 60 were powered with CFM56-5A1s, 40 with V2500-A1s, and only four with the more desirable -5B and -A5 engines.

The 100 retired -5A- and -A1-powered aircraft were built before May 1994. "The economics of breaking aircraft of 20 or more years old relies on the value that can be realised by breaking the engines and selling parts for shop visits. This is either to support existing -5As and -A1s, or to supply parts for shop visits on -5Bs and -A5s," says Gary Fitzgerald, vice president commercial at Avinco. "While there are returns to be made in breaking the engines, the returns from breaking the airframes are small. The most that can be made from selling rotatable components, interior equipment, and flight control surfaces from 1989-91-build aircraft is \$0.8-1.0 million."

This airframe teardown value may be as low as \$0.5 million, especially for the oldest airframes. "Unfortunately, much of the value is calendar-related, even though rotatables and heavy components are maintained on an on-condition basis," says Julian Rees, senior vice president commercial at TES Aviation Group.

The value of the engines depends on the market for individual parts. The potential markets are support for shop visits for existing -5A and -A1 fleets; or supply of parts for -5B and -A5 fleets, wherever possible.

"The problem is that the -A1 fleet was initially small. The retirement of 40 -A1-powered aircraft and a remaining fleet of just 76 means there is a limited market for supplying -A1 parts," says Fitzgerald. "This makes the -A1-powered fleet the worst performing in terms of value retention." The only remaining substantial V2500-A1 fleets are operated by Air India (25 aircraft), Egyptair (8) and USAirways (14). Other fleets are even smaller, so the market for parting-out -A1s is limited or even non-existent.

This is made worse by the limited commonality between the -A1 and -A5. "The commonality between them is less than 50%, because their configurations are different," says Rees. "The -A5 has a half-inch wider fan and one more low pressure compressor (LPC) stage than the -A1, a refined hot section, and a redesigned high pressure compressor (HPC). Few high-value parts from the -A1 can be used in the -A5."

This lack of commonality in high-value parts between the two variants is why Avionco decided against buying old -A1-powered aircraft for teardown. Fitzgerald estimates that values of -A1s in a time-continued status are only \$0.2-0.5 million, although he adds that these could rise as the fleet dries up in a few years.

"The -5A fleet is saved by the fact that a large number are still operating," continues Fitzgerald. The main -5A-powered operators are Air Canada (64), Air France (28), All Nippon Airways (21), Condor Berlin (11), Delta (126 ex-Northwest Airlines), Lufthansa (55), S7 (19), Tunisair (15) and Vueling (8).

The teardown of -5A engines is helped by there being two markets. "The first is a substantial fleet that needs



technical support,” says Rees. “The second is that the -5B can use 52% of the -5A’s part numbers,” says Rees. “The actual percentage varies by module. The lowest is the low pressure turbine (LPT), which shares only 19% of parts with the more advanced -5B variant. There is almost 100% commonality with the gearboxes and bearings. Some life-limited parts (LLPs) are almost swappable.

“There is low commonality of HPT parts between the two variants,” adds Rees. “There is only 21% commonality of nozzle guide vane (NGV) parts and 37% commonality of rotor parts between the two modules. This includes blades, vanes, discs, shafts and smaller parts.

“Another example of commonality between the two variants is that six of the seven different part numbers for the HPC front shaft are compatible with the -5B,” continues Rees. “Overall there is enough commonality of parts with the -5B for it to be economic to acquire old -5A-powered aircraft for teardown. Care is needed since parts commonality between older and younger -5Bs is variable. Many time-continued -5A parts can be sold to supply the market for supporting -5B shop visits. The value for -5As in a half-life maintenance condition is \$2.5 million, but can be as low as \$1 million for one with a poor maintenance status.”

Fitzgerald explains that the purchase value of a 1989-91-build A320 for part-out is \$3.5-5.0 million. “The actual value depends heavily on the condition and sales market for the engines’ parts. Since the airframe is only likely to have a value of \$0.5 million, most of what is paid has to be returned by the breakage value of the engines. This has to be \$2 million or more per engine just to break even.”

Consignment of engines to part-out

specialists is one way of phasing out older fleets. “Engine Lease Finance generally sells engines towards the end of their lives to breakers,” says Joe O’Brien, executive vice president sales at Engine Lease Finance. “The breaker’s fee is 15-20% of the sale revenue of parts taken from the disassembled engine. The best parts go first, usually within two months. It takes 18-24 months for all the parts to be sold, depending on the turbomachinery’s condition, the life remaining of the LLPs, and commonality with later variants of the engine. Consignees include TES Aviation, Aeroturbine and GA Telesis.”

Availability of used A320s

The first way in which used A320 family members come available is the sale of aircraft, at time of delivery, by the original ordering airline to a lessor, which leases the aircraft to the original ordering airline. This allows lessors to increase portfolios, and acquire aircraft for SLB.

A second is for aircraft to be sold by lessors and owners to new owners mid-way through leases, with a lease attached.

Fleet data show that since January 2008, 290 A320 family aircraft have changed owner. This only includes aircraft that were already delivered prior to January 2008.

A third way for aircraft to come available is for a change in operator, but not a change in ownership. This is usually associated with the end of a lease, when aircraft are leased to new operators.

Fleet data indicate that at least 340 A320 family aircraft have changed operator, while maintaining the same ownership, since January 2008. This only includes aircraft that were already delivered prior to January 2008.

More than 60 CFM56-5A-powered aircraft have been retired. The market for parting out these aircraft is strong, since there are still more than 440 aircraft with these engines still in operation. This provides an active market for providing engine material.

A fourth way is for aircraft to change both owner and operator, either at the same time or at different dates. Aircraft can be sold by lessors when leases expire, and then re-leased by new lessors, or they can be acquired by lessors with leases attached, and then several years later by a new operator.

Fleet data show that at least 400 aircraft have changed operator and owner since January 2008. This excludes aircraft delivered since January 2008.

More than 1,000 A320 family types already in service in January 2008 have therefore changed owner or operator over little more than four years, equal to about 260 aircraft transactions per year.

A319s that have changed operators since January 2008 have been leased to Aegean, Aerogal, Air India, Brussels Airlines, Delta Airlines, Easyjet Switzerland, S7, TACA and WindJet.

Large numbers of A320s have been leased to Delta Airlines, United Airlines, Ural Airlines, Vladivostok and Vueling. Smaller numbers have been leased to Air New Zealand, Air India, Brussels Airlines, Cyprus Airways, Batavia, Iberia, Meridiana, Onur Air, Rossiya and Thomas Cook Airlines.

These include 29 aircraft that had been leased to Northwest Airlines and were subsequently leased to Delta Airlines. Excluding these, 270 A319s and A320s have changed operator since January 2008.

A321s have been leased to Air Berlin, Atlasjet, Monarch Airlines, Thomas Cook, Ural Airlines and Onur Air.

Lessors that have acquired aircraft since January 2008 include Amentum Capital, AerCap, AWAS, AirCastle Investment, BOC Aviation, Fly Leasing, Hong Kong Aviation Group, MacQuarie Airfinance and NBB Leasing.

Airlines acquiring aircraft over the same period, include Air Canada, Air France, Swiss, TAM, TAP Air Portugal, and United Airlines.

Many aircraft have changed both operator and owner over the past four years. New operators include Atlasjet, Air Berlin, Air China, Azerbaijan, Interjet, jetBlue, Meridiana, TAM, United Airlines and Vueling.

Re-leasing aircraft

While the A320 family has been a stable investment for many years, high

production rates and recent stagnating global economy have caused a glut of aircraft; especially the A319 and A320. This not only erodes lease rentals for medium-aged and old aircraft, but also for aircraft aged less than five years old.

Production rates have exceeded 400 units per year in recent years, and are climbing, expected to reach 44 per month by the end of 2013. High and increasing production rates also apply to the A320 family's competitor; the 737NG.

A few airlines are making profits, but many are not. Ever-rising fuel prices are also squeezing the industry, so demand from airlines for aircraft is weaker than it was up to three years ago.

Factors countering this are that the US domestic industry is strengthening, following a consolidation of capacity by the majors. The global fleet is growing with continued high growth rates in China and India, but the economy is weak in many other parts of the world.

One case in favour of high production rates is the 3,500 aircraft on firm order, equal to seven or eight years' production at projected rates; although 1,000 of these aircraft are due for delivery in 2020-2022. Most aircraft on order are due for delivery to airlines, and few delivery positions up to 2018 have not been allocated. US majors have delayed a lot of their re-fleeting requirements, so there is now a need for large numbers of

aircraft. Lessors with aircraft on order will have to satisfy some of this demand.

There is still a general oversupply of aircraft, and this is depressing lease rates and values. The number of A320 family aircraft coming on the market is high, putting pressure on investors, owners and lessors that have a residual value position on older aircraft. Each year many aircraft on medium-term leases get dispersed, and the secondary market is currently not deep enough to take all available aircraft. One factor compounding the problem is that new aircraft are available to smaller operators at low lease rates.

Fitzgerald comments that lease rates have going down since 2010. "The A319 has seen lease rates and values drop for the past three years; the longest period for the three main models," says Fitzgerald. "Rates for A320s have been under pressure for the past year, while rates for the A321 have held steady. Reasons for the softening of lease rates are that the availability of debt is drying up, making it harder to finance aircraft, and production rates of new aircraft have been steadily rising. These have led to a high supply of aircraft."

One concern is that airlines and lessors have ordered in large numbers, and may have double-ordered.

"The A319 is having the worst time in the current market," says Fitzgerald. "It has the same cash operating cost as

the A320, but its smaller size dents its cost per available seat-mile (CASM) performance. Demand is weakest, and values and lease rates have been in the doldrums for the past two years.

"Lease rates for aircraft built in 1997-2000 are down to \$120,000-160,000 per month," continues Fitzgerald. "These are good quality aircraft, and not that old, so this indicates that rates are suffering."

The A320 market is better than the A319, with demand for the larger model being stronger on account of its higher capacity and better CASM performance. "There is a clear division between aircraft powered by the CFM56-5A and by the -5B," says Fitzgerald. "Lease rentals for -5A-powered aircraft built prior to 1997 are less than \$100,000 per month.

"Monthly rentals for -5B-powered aircraft built in 1997-2000 are \$180,000-220,000," continues Fitzgerald. "It is harder to get sister ships, with the same engine, component and interior configurations as aircraft age. The A320 fleet tends to be more homogenous than the 737 fleet, however. The 737-800 is often regarded as the alternative to the A320, but the glut of A320s means that its values are lower.

"The A321 is doing best," continues Fitzgerald. "The A321 market was awful after the Sabena and Swissair bankruptcies nine years ago, but the A321's large size, and improved

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A320 SALE & LEASEBACK ECONOMICS

Build year	1990	2000	2007
Purchase value-\$m	4.5	16.0	25.0
Lease term-months	60	60	120
Estimated residual value-\$m	1.25	8.0	12.0
Equity-\$m	4.5	6.0	7.5
Debt-\$m	N/A	10.0	17.5
Debt balloon-\$m	N/A	3.5	5.0
Cost of debt-%	N/A	7.5	7.5
Monthly debt repayment-\$	0	151,000	178,000
Monthly lease rental-\$	85,000	180,000	235,000
Lease rental cashflow-\$m	4.9	0.95	4.3
Residual value less debt balloon & equity	(3.25)	(1.5)	(0.5)
Overall cashflow-\$m	1.6 + maintenance reserves	(0.55) + maintenance reserves	3.8

performance of recently built aircraft, makes it very attractive now. Unlike the A319 and A320 whose lease rates and values are being squeezed by the youngest and oldest aircraft, the A321 is under less pressure.”

Sale & leaseback economics

Large numbers of SLB transactions are being completed. They can generate positive cashflow but investors should be wary of several pitfalls.

The economics of SLBs are considered for A320s of three vintages and over varying terms: aircraft built in 1990, 2000 and 2007. The purchase value and lease rental of these three will clearly vary, as will the amount of debt and size of debt balloon that can be negotiated at the start of the lease, and the likely residual value at the end of the term.

Fitzgerald estimates that the 1990-build aircraft, now 22 years old, with CFM56-5B or V2500-A5 engines, can be acquired for \$4-5 million (*see table, this page*). “It could be leased for five years, after which its condition would probably mean it has to be parted-out,” says Fitzgerald. “This means its residual value is doubtful, since it is too hard to predict how many aircraft will have been scrapped at this stage, and how many -5B or -A5 engines will have been parted-out. Given that it will be 27 years old at the end of a five-year term, it will not be possible to secure any debt financing, so it will have to be acquired with 100% equity. A monthly lease rental of \$80,000-90,000 could be achieved for

this aircraft. This would generate a monthly cashflow of \$80,000, once overhead has been deducted.”

This will generate a cashflow of \$4.9 million over the term, only just enough to repay the lessor’s equity investment of a similar amount, before taking any interest into account. Fitzgerald points out that the aircraft’s residual value could be similar to that of -5A-powered aircraft scrapped in recent years, mainly for parts retrieval. This could be as high as \$3-4 million, although \$1.0-1.5 million should be planned for. The residual value will improve the investor’s return on equity. “This sort of transaction is risky, but can work,” notes Fitzgerald. Risks are the lessor being unable to lease the aircraft for as long as five years, lease rentals less than \$80,000-90,000, or part-out values being poor due to an imploded fleet.

The lessor could cash in reserves the lessee has paid over the term for a heavy airframe check and engine shop visits and life-limited part (LLP) replacement, and so not perform any maintenance. These reserves will not be needed if the aircraft is going to be parted-out, and so will add to the investor’s return.

A 2000-build aircraft, now 12 years old, leased for five years, will be 17 years old at the end of the term. This gives the lessor the flexibility to re-lease it if there is sufficient demand, or sell it for part-out if this is more economic.

Fitzgerald estimates an A320 of a 2000 vintage could be acquired for \$16 million. “If this were leased for five years, a lease rental of \$180,000 is possible,” he says. “It is possible to negotiate \$10

million of debt for an aircraft of this age, and a debt balloon of 35%, so \$6.5 million would be repaid over the term. The lessor would have to invest \$6 million of its own equity.”

Debt terms have changed over the past four years. Levels of equity must be higher, and debt balloons are smaller or even hard to negotiate, while the elements of the cost of debt have also changed. For example, a typical swap rate in 2007, for five-year lease terms, was 5%, whereas now it has fallen to less than 1%. To counter this, the rate charged for a lessee’s or asset’s credit risk has risen from 1-2% to 3%, depending on the transaction. Bank margins have risen, from just 0.1-0.3% in 2007, to 2-4% now. The total for these three elements has changed from 7-8% in 2007 to 6-10%, so the overall cost of debt can be similar to that prior to the financial and banking crises of 2008. Swap rates will rise for a longer-term transaction, because of the transaction’s higher risk.

The monthly repayment for \$10 million of debt, with a \$3.5 million balloon over 60 months, is \$151,000. The monthly cashflow of lease rentals net of debt repayments and overheads is thus \$15,000. This generates cashflow of \$930,000 over the term (*see table, this page*).

The \$6 million of equity and \$3.5 million debt balloon have to be repaid from this lease rental cashflow and the aircraft’s residual value. “There are two options for the lessor at this stage,” says Fitzgerald. “The aircraft may have been depreciated to a book value of \$7 million over the term, when it is 17 years old.”

The aircraft’s residual value would have to be \$10 million to pay back equity and the debt balloon, and still leave a positive cashflow. An alternative for the lessor if the market and residual values are weak at the time is to sell the aircraft for part-out, in particular for engine teardown. The lessor can also cash in the reserves for airframe and engine maintenance. The aircraft may have a part-out value of \$8 million or more if the engines are in a mid-life status, and demand for -5B and -A5 material is still strong in 2017. This is likely, since more than 4,000 aircraft with these engines are still in operation, and more are on order. “The value of -5Bs in a better than half-life condition is currently \$7-8 million,” says Rees. This suggests what the same engines may be worth in five years in a similar maintenance condition.

Add this value to the reserves that will be accumulated during the term and the lessor could realise a strong return.

Fitzgerald says a 2007-build aircraft, now five years old, could be leased for a longer term of up to 10 years. At the end it will be 15 years old, and could be re-leased, given its age and condition.

With more than 4,250 aircraft equipped with CFM56-5Bs and V2500-A5s in the active fleet, and several hundred more on order, the market for leasing these engines is strong. The historically strong residual value performance of these engines indicates returns on leasing transactions should be attractive, but residual values could be negatively impacted in the future by new generation powerplants.

A 2007-build aircraft could be bought for \$25 million. “It would have a lease rate factor of 0.9%, and a lease rental of \$235,000 per month,” says Fitzgerald.

The terms for this age of aircraft are likely to be debt of 70% (\$17.5 million), and a debt balloon of 30% (\$5 million). Monthly debt repayments will be \$178,000. The lessor will have to invest \$7.5 million in equity.

The net monthly cashflow from lease rentals, debt repayment and an allowance for overhead will thus be \$35,000, equal to \$4.3 million over the term (see table, this page).

The resale value needs to be at least \$12.5 million to repay the lessor’s equity and the debt balloon. This may be close to the residual value the aircraft is likely to realise at an age of 15 years in 2022. Many A320neos and 737MAXs will be operating by this time, however, while the average age of -5B- and -A5-powered aircraft will be 15 years. More difficult to gauge is the supply and demand for aircraft in 2022.

Engine leasing & trading

Care has to be taken with older and younger engines over parts commonality.

“The CFM56-5B series has been through several upgrade and modification programmes, which must be considered carefully by investors, since they will affect future residual values,” says Rees. “The first modification on the -5B is the 3-D aero upgrade. This incorporated 3-D aero turbomachinery parts to lower the engine’s fuel burn rate. Modified engines are designated with a -5B/P suffix. This upgrade could be incorporated in a shop visit, as well being a build standard.

“A second major hardware upgrade was the Tech Insertion programme, which was part of the Tech 56 programme,” continues Rees. “This was to improve reliability, and modified engines have a -5B/3 suffix. A few smaller modification programmes also affect the engine’s part and component configuration. These upgrades all affect the engine’s commonality with later build -5Bs.

“The V2500-A5 has also had upgrade programmes,” continues Rees. “The -A5 had a Select One, and then a SelectTwo programme. The SelectOne was a retrofit to improve reliability, incorporated into all new production engines. It included



hardware upgrades to the HPC, turbine and combustor. The net effect was for the engine to achieve up to a 20% longer removal interval. The SelectTwo upgraded the engine’s software, which tweaked engine operation.”

Of 4,000 V2500-A5s built, 1,200 have the SelectOne production standard, while 100 SelectOne retrofit kits have been installed on earlier build engines. Up to 2,700 unmodified engines, built prior to the SelectOne standard, are becoming available. These will have a different parts and build standard to later engines, so their residual value will suffer, as the younger SelectOne standard engines become the desired model.

The market for leasing CFM56-5Bs and V2500-A5s is relatively stable because there are up to 4,200 active aircraft with these engines, and up to 40 per month being introduced into service. “The market moves up and down, especially for short-term leases,” says O’Brien. “Engine leasing is a more reliable market than aircraft, and there is always an active market for short-term leases of about 90 days to cover shop-visit activity.

“The list prices of new -5B8 and -5B3 engines, rated at 21,600lbs and 32,000lbs thrust, are \$8 million and \$10.7 million respectively,” continues O’Brien. “A bare V2522-A5 has a list price of \$8 million, while the V2527 and V2533 have list prices of \$10 million and \$11 million. These engine variants have good residual value retention, so lease rates and values remain stable. A lessor can expect a lease rate factor of 0.7-0.8% per month for an engine on an SLB transaction.”

This puts monthly lease rentals of the -5B8 at \$56,000-64,000, and \$75,000-

86,000 for the -5B3. Corresponding monthly lease rates for the V2522, V2527 and V2533 are \$56,000-64,000, \$70,000-80,000 and \$77,000-88,000.

“Lease rates will be higher for spot deals for short-term leases, and will be 0.8-0.9% per month,” estimates O’Brien. “Occasionally they will reach 1% per month in peak demand. Long-term transaction lease rate factors will be lower, maybe at similar rates to SLBs.”

As engines age, lease rates will stay at similar levels, so higher lease rate factors are achieved. Rees puts the value of used -5Bs in a better than half-life maintenance condition at \$7-8 million, compensated for by maintenance reserves paid by the lessee. Although variable according to engine variant and operation, reserves can be \$165 per engine flight hour. A reserve of \$2.2 million will have accumulated over a five-year term.

The lease rentals and residual values for these engines indicate the returns that can be made in SLBs. They will tend to be better than similar transactions for complete aircraft, mainly because the market value of engines depreciates more slowly than that of complete aircraft. Debt terms for engines will also be better, so lessors will need to invest lower levels of equity and will be given larger debt balloons.

Overall, the cashflow from lease rentals, engine residual value and maintenance reserves are high enough to cover equity investment and the debt balloon, and so generate a strong enough return for the investor. **AC**

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