A321-200

KEY DIFFERENCES TO A320

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It is certainly true that the differences between the A320 and its larger sibling are still rather subtle compared to the wide-body A330 aircraft family, however there are areas where the A321 feels more like a wide-body jet and the handling differences can be felt very clearly by pilots. In other words, the A321 features more substantial differences compared to the A320, as opposed to the smaller A319 compared to the A320.

A longer fuselage and significantly higher weights do alter quite a number of characteristics, which is easy to imagine when you think about the max. take-off weight being increased by 15.5 tonnes compared to the A320, and the max. landing weight being increased by 11.8 tonnes. All this while using the same wing, with only minor modifications to the inboard flaps, increasing lift slightly for take-off and landing.
While it is possible to engineer things out of the aircraft via the fly-by-wire flight control system, some physics can't be bent by software.

Different iterations of the CFM56 and IAEV2500 engines also provide for some new characteristics to be noticed.

The Flight Sim Labs A321-X product features all that makes an A321 different to the A320.

A321 VS. A320 KEY POINTS

A321-X Technical Data

Max. Take-Off Weight (MTOW): **93.5t**

Operating Empty Weight (OEW): **48.5t**

Max. Zero Fuel Weight (MZFW): **71.5t**

Max. Landing Weight (MLW): **77.8t**

Engine variants
IAE V2533-A5 / CFM56-5B3

- Revised flight characteristics that resemble true A321 behaviour and are not just those of an A320 with higher weight.
- New engine variants with realistic performance and fuel consumption
- Flight Augmentation Computers (FAC) have been re-modelled with correct speeds (Green Dot, Slats, Flaps, VLS etc.)
- Trim settings are accurate to A321 numbers, precisely calibrated to Centre of Gravity (CG), Angle of Attack (AOA) and Mach number.
- Fuel system re-coded to A321 specifications with proper ECAM fuel page displays. Also, the installation of up to 2 auxiliary fuel tanks (ACT) is supported.
- Proper flaps modelling both visually, and also for accurate lift and drag changes.
- Ground handling revised to resemble changed behaviour due to higher weights and longer wheelbase.
- Exit configuration changed to A321 specifications. The L1 door is still the main door for boarding, however you may use the L2 door as well to speed up boarding.
- Supports the removal of brake fans to match the configuration of certain airframes.

ENGINES

The engine options chosen for the A321-X are the CFM56-3B3 and the IAE V2533-A5, both models featuring the same maximum thrust rating of 33'000 lbf or 150kN.
You will therefore not notice any handling differences in-flight, however there's still a small idle thrust difference between the two models, which is noticeable during taxi.

PILOT POINT OF VIEW

The A321-X is a very different aircraft from the 320/319. It is longer, heavier, different flap system and some other different systems. This means that some study is required before it can be flown well.

On the ground
Even with more powerful engines some power is required to start moving at high weights, even in an IAE-engined aircraft. The cockpit is further from the main wheels so the pilot will have to 'overturn' slightly when going around corners and lining up on the runway.

Take-Off
Expect much higher V speeds especially at high weights, so take offs can be much longer. Apart from the speeds, the technique is the same as the 320/319 except the initial pitch attitude for the SRS will be lower. Also, if an engine fails smooth pitch control is vital to avoid pitching too high, and therefore loosing speed (consider TOGA power).

Due to these higher V speeds, expect increased runway requirements for many airports, leading to the performance calculation tool suggesting departure using Flaps 3.
A Flaps 3 take-off is essentially the same as Flaps 1, except the take-off speed is normally lower. On rotation the initial pitch attitude for SRS will usually be lower. At acceleration altitude lower the nose normally to follow the FD. The speed acceleration will be slower than F1 (more drag). Allow the aircraft to start to accelerate (positive trend arrow), above F speed and (I would suggest) 20kt+ above V_{LS} - then select F1. At S speed plus a bit (5-10kt) select the flaps up. As in all Airbus flying, in bumpy/windshear conditions have some extra margin from V_{LS}. The flaps retract quickly so the limiting speeds are not normally a problem.

Initial Climb
Be aware of the flap retraction speed (S speed) versus the flap limiting speeds. At high weights S speed may be close to the red 'barbers' poll. In this case the flaps will auto retract to F1 (just slats) at 210kt (1+F limit of 215kt minus 5kt) and give the pilot some speed to play with up to the next limit (230kt). Green Dot speed may also be close to, or slightly above, 230kt so a quick selection of flaps up at 230kt is required to avoid the overspeed. The whole climb out will be SLOW! A careful look at the PERF page before take-off will give the pilot a 'heads up' so the flap retraction method can be briefed.

When heavy, you can very quickly get yourself into Alpha Floor...It normally happens with turning departures and just above S speed, you go Flaps 0 and the aircraft passes a waypoint, and as it rolls, V_{LS} charges up because of bank angle and a lack of slats. Give yourself 10kts past F speed prior to retracting to slats only.

Climb
The climb at 250kt will be only slightly above the GD speed at high weights. Expect lower initial cruise FLs, possibly FL310/320, when the initial take-off weight is circa 85T plus. The climb speeds above FL100 in the 321 are normally a little higher than the 320/319 (at a given CI) which will result in an earlier transition to the MACH climb phase. The final stages of the climb will take some time with rates of climb around 500fpm to be expected.

Cruise
If the pilot is on a long flight expect to carry out one or two step climbs to get the optimum fuel consumption for the flight. Use the PROG page to assess when to climb. In a 321 it is normally advisable to wait until the Optimum Level is within 500ft of the next cruise level (i.e. cruising at FL320, OPT FL335 would be ok to climb to FL340). Note - the fuel penalty of cruising 1000ft away from optimum is less at a lower level in a 321 than higher level (i.e. OPT FL330 and cruising at FL320 would be less fuel inefficient than cruising at FL340). If the pilot climbs too close to the MAX FL on the PROG page he/she will be faced with a very narrow operating speed band between VLS and MMO (not good if it gets bumpy!).

Descent
There is no major difference in the descent technique when compared to the 320/319.
One thing to be aware of is the lack of availability of speedbrake at less than 250kts at high landing weights. VLS is always rising with any use of speedbrake on a clean wing. So at these weights, room for speedbrake use can be very marginal if at all without using Flap 1 to get the slats out.
If you got high or needed to get down quickly, Flap 1, 225kts and full speedbrake is an option in a high landing weight lowish speed scenario.

Approach
The maximum landing weight is normally 75.5T in the 321 which results in higher S and F speeds for the approach, and higher VAPP for landing. However, the gates for the approach (i.e. selecting F2 by 2000ft to go to landing to start the slow down to be stabilised by 1000ft) remain the same. The amount of speed to lose from S to VAPP is the same as the 320/319, the actual speeds are just a little higher all round.

Approach (continued)

Finally, the flaps are different on the 321 and the angles also. The limiting speeds are higher too, allowing the pilot to select flaps earlier on the approach. Finally, whereas F3 is recommended in the 320/319 for turbulence etc, Flaps Full is suggested in the 321. The handling of the 321 in Flaps Full is good, and there will be more room to spare for the tail on touchdown!

Landing
The higher landing speeds will take more distance to stop, and expect higher brake temperatures taxying in. If you need to keep the brake temperatures down (short turnaround and no brake fans for example) I would suggest landing using Auto Brake LOW and full reverse.
The 321 is notorious for its tail strike ability. Avoid doing abrupt flare manoeuvres, and if in turbulence you get a high rate of descent near the ground, just let the aircraft fly on with constant attitude to avoid pulling back and dragging the tail.

Immediate Return after Take Off
At high weights, the manoeuvring speeds will be above the flap limiting speeds. In these situations, selected speeds below the limit speeds will need to be made before moving the flaps when close to VLS. VLS will move away as the flaps travel allowing the pilot to go back to managed speeds.