



The Power of We™

"Let's Fly" Series Montreal to Frankfurt

Data Science Technology

Python Program

Apps Intellect →

```
FlightPath: ===== get aircraft =====

BadaAircraftDatabase: file folder= C:\Users\Acer\Documents\workspace\Flight
Profile\src\Tests\..\BadaAircraftPerformance

BadaAircraftDatabase: file path= C:\Users\Acer\Documents\workspace\Flight
Profile\src\BadaAircraftPerformance\SYNONYM.NEW

BadaAircraftDatabase: opening file= C:\Users\Acer\Documents\workspace\Flight
Profile\src\BadaAircraftPerformance\SYNONYM.NEW

BadaAircraftDatabase: number of aircrafts in db= 322 BadaAircraftDatabase: aircraft=
A310 exists= True BadaAircraftDatabase: aircraft= A310 - found in database
BadaAircraftDatabase: aircraft= A310 - OPF file=

C:\Users\Acer\Documents\workspace\Flight Profile\src\Bada381DataFiles\A310__.OPF
- exists= True

FlightPath: performance file= C:\Users\Acer\Documents\workspace\Flight
Profile\src\Bada381DataFiles\A310__.OPF

BadaAircraft: Wing Area Surface= 219.0 Square-Meters
BadaAircraft: stall speed= {'AP': 105.0, 'CR': 142.0, 'IC': 116.0, 'LD': 97.0, 'TO': 109.0}
knots
AircraftMass: aircraft reference mass= 120000.00 kilograms
AircraftMass: aircraft minimum mass= 81000.00 kilograms
AircraftMass: aircraft maximum mass= 150000.00 kilograms
AircraftMass: aircraft maximum pay load mass= 32850.00 kilograms
BadaAircraft: =====
BadaAircraft: default configuration= departure-ground-run
BadaAircraft: =====
BadaAircraft: transition altitude= 24452.32 feet
BadaAircraft ICAO code= A310
BadaAircraft aircraft full name= AIRBUS-A310
```

Explanatory Notes:

- **BADA:** Base of Aircraft Data (Performance Model)
- **Stall Speed:** Minimum Flight Speed at Which Airplane is Controllable
- **AP:** Approach
- **CR:** Cruise
- **IC:** Initial Climb
- **LD:** Landing
- **TO:** Takeoff
- **Knots:** Speed Which is the Number of Units of Distance that is Covered for a Certain Amount of Time
- **01 Knot = 1 Nautical Mile Per Hour = 6076 Feet Per Hour**
- **1 mph = 1 Mile Per Hour = 5280 Feet Per Hour**
- **Transition Altitude:** Change of Use of the Barometer Derived Altitude to the Use of Flight Levels



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Explanatory

Notes:

- **FL = 390: Flight Level 39,000 Feet**
- **Mach: Speed of an Aircraft Divided by Speed of Sound**
- **Stall: When Smooth Airflow over the Airplane's Wings is Disrupted, Resulting in Loss of Lift**
- **Calibrated AirSpeed (CAS): Speed Shown by AirSpeed Indicator after Correction for Instrument & Position Error**
- **True AirSpeed (TAS): Speed of the Aircraft Relative to the Air it's Flying Through (At 10,000 Feet, True AirSpeed is Roughly 20% Faster Than What You Would Read Off Your AirSpeed Indicator)**

```

AircraftMass =====
AircraftMass: set Aircraft Mass= 120000.00 kilograms - Mass= 264554.71 pounds
AircraftMass =====
BadaAircraft: set Cruise FL= 390 - QNH= 1003.61 hecto Pascals - computed Altitude
MSL= 11887.20 meters
BadaAircraft =====
BadaAircraft: set target cruise Mach= 0.83
BadaAircraft =====
===== Flight Plan compute ===== 03/19/19 20:29:59
time zero= 1.02257216737
flight path length= 3204.29 nautics
FlightPath ===== build the departure ground run =====
GroundRunLeg: ground run - run-way true heading= 45.4 degrees
GroundRunLeg: V stall Calibrated AirSpeed= 109.00 knots
BadaAircraft: TAS= 131.35 knots - CAS= 130.87 knots > (1.2 * V CAS stall)= 130.74
knots
BadaAircraft =====
BadaAircraft: entering take-off configuration - distance flown 1098.16 meters -
distance flown 0.59 nautics
BadaAircraft: alt= 82.30 meters alt= 270.00 feet
BadaAircraft: tas= 65.64 m/s - tas= 127.59 knots - cas= 65.40 m/s - cas= 127.12 knots -
mach= 0.19
BadaAircraft: real time = 33.00 seconds - 0.00 hours 0.00 minutes 33.00 seconds
BadaAircraft =====
ClimbRamp: run-way orientation degrees= 45.4 degrees
BadaAircraft: CAS= 133.10 knots >= Initial Climb Stall Speed= 115.94 knots
BadaAircraft =====
BadaAircraft: entering initial-climb configuration - distance flown 1504.71 meters -
distance flown 0.81 nautics
BadaAircraft: alt= 125.12 meters alt= 410.49 feet

```



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```
BadaAircraft: tas= 68.66 m/s - tas= 133.47 knots - cas= 68.28 m/s - cas= 132.73 knots -
mach= 0.20
BadaAircraft: real time = 39.00 seconds - 0.00 hours 0.00 minutes 39.00 seconds
BadaAircraft =====
FlightPath: last leg orientation= 45.40 degrees
FlightPath===== add final turn, descent and ground run =====
GroundRunLeg: ground run - run-way true heading= 249.6 degrees
ArrivalRunWayTouchDownConstraint: add touch down constraint= Frankfurt-Frankfurt
Main-Rwy-25Ctouch- down - latitude= 50.04 degrees - longitude= 8.57 degrees -
altitudeMSL= 110.95 meters
Frankfurt-Frankfurt Main-Rwy-25C-touch-down - latitude= 50.04 degrees - longitude= 8.57
degrees - altitudeMSL= 110.95 meters
FlightPath ===== final 3 degrees descending glide slope =====
DescentGlideSlope: airport field Elevation Above Sea Level= 110.95 meters
DescentGlideSlope: distance from RunWay - TouchDown to RunWay - End= 1490.0 meters
DescentGlideSlope: bearing from touch-down to runway end= 69.59 degrees
DescentGlideSlope: glide slope Length= 9260.0 meters
DescentGlideSlope: glide slope orientation= 249.6 degrees
DescentGlideSlope: distance from last way point to touch-down: 5.00 nautics
FlightPath: top of arrival glide slope= glide-slope-pt-99-9260.0-meters - latitude= 50.01
degrees - longitude= 8.45 degrees - altitudeMSL= 596.24 meters
FlightPath = need a turn leg to find the junction point the last way-point in the fix list
to the top of the final glide slope
TurnLeg: turn from= 249.60 degrees to 316.60 degrees - turn step is= 3.00 degrees
TurnLeg: tas= 107.81 knots - radius of turn= 3584.36 meters - radius of turn= 1.94 nautics
TurnLeg: initial heading= 249.60 degrees
FlightPath: begin of last turn= turn-pt-78-319.64-degrees - latitude= 50.02 degrees -
longitude= 8.39 degrees - altitudeMSL= 596.24 meters
TargetApproachConstraint: add target approach way point constraint= turn-pt-78-319.64-
degrees - latitude= 50.02 degrees - longitude= 8.39 degrees - altitudeMSL= 596.24 meters
```

Explanatory Notes:

• AltitudeMSL:
Altitude Mean Seal
Level