

# Assignment 1: Familiarization with Aviation Data Sources and Aircraft Classifications

Date Due: September 2, 2022

Professor: Dr. Trani

## Problem 1

Download the latest version of the FAA Advisory Circular 150/5300-13B ([https://www.faa.gov/documentLibrary/media/Advisory\\_Circular/150-5300-13B-Airport-Design.pdf](https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5300-13B-Airport-Design.pdf)). Read carefully Section 1.6 before answering the following questions. Also become familiar with Appendix 1 in the same Advisory Circular and download the Aircraft Characteristics Database (see sample below). The FAA Aircraft Characteristics Database can be downloaded at:

Date Completed	Manufacturer	Model	Physical Class (Engine)	# Engines	AAC	ADG	TDG	Approach Speed (V <sub>ref</sub> )	Wingtip Configuration	Wingspan, ft	Length, ft	Tail Height, ft (@ OEW)
2018-Apr-11	Aero Boero	AB-180 RVR	Piston	1	A	I	1A	52	no winglets	35.38	23.23	6.73
2018-Apr-11	Aero Boero	AB-95	Piston	1	A	I	1A	34	no winglets	34.19	22.63	7.21
2018-Jul-3	Aero Commander A	1121 Jet Commander	Jet	2	C	I	2	129	no winglets	44.79	55.58	15.79
2018-Jun-29	Aero Commander A	500 Commander	Piston	2	A	II	1A	77	no winglets	51.71	36.81	14.50
2018-Jun-29	Aero Commander A	500-A Commander	Piston	2	A	II	1A	77	no winglets	49.04	36.81	14.50
2018-Jun-29	Aero Commander A	500-B Commander	Piston	2	A	II	1A	77	no winglets	49.04	36.81	14.50
2018-Jun-29	Aero Commander A	500U/500S Shrike Commander	Piston	2	A	II	1A	77	no winglets	49.04	36.81	14.50
2018-Jun-29	Aero Commander A	520 Twin Commander	Piston	2	A	II	1A	64	no winglets	49.04	36.81	14.50
2018-Jun-29	Aero Commander A	560 and 560-A Twin Commander	Piston	2	A	II	1A	82	no winglets	49.04	36.81	14.50
2018-Jun-29	Aero Commander A	560-E Commander	Piston	2	A	II	1A	77	no winglets	51.71	36.81	14.50
tbd	Aero Commander A	560-F Commander	Piston	2	A	II	2	77	no winglets	same as 680F	tbd	tbd
tbd	Aero Commander A	680 Commander	Piston	2	A	II	2	77	no winglets	49.04	tbd	tbd
tbd	Aero Commander A	680-E Commander	Piston	2	A	II	2	77	no winglets	51.71	24.20	tbd
tbd	Aero Commander A	680-F Commander	Piston	2	A	II	2	77	no winglets	49.04	tbd	tbd
tbd	Aero Commander A	680-FL Grand Commander and 680-FL(P) Pressurized	Piston	2	A	II	2	77	no winglets	same as 680F	stretched 680F	tbd
2018-Jun-29	Aero Commander A	680-T Turbo Commander	Turboprop	2	B	I	2	98	no winglets	44.06	41.48	14.50
2018-Jun-29	Aero Commander A	680-V Turbo Commander	Turboprop	2	B	I	2	98	no winglets	44.06	41.48	14.50
2018-Jun-29	Aero Commander A	680-W Turbo Commander	Turboprop	2	B	I	2	98	no winglets	44.06	42.98	14.50
2018-Jun-29	Aero Commander A	681 Hawk Commander	Turboprop	2	B	I	2	100	no winglets	46.55	44.35	14.95
2018-Jun-29	Aero Commander A	685 Commander	Piston	2	B	I	2	98	no winglets	44.08	43.00	15.00
2018-Jun-29	Aero Commander A	690/690-A Twin Commander	Turboprop	2	B	I	2	100	no winglets	46.55	44.35	14.95

[https://www.faa.gov/airports/engineering/aircraft\\_char\\_database](https://www.faa.gov/airports/engineering/aircraft_char_database).

### Aircraft Characteristics Database.

- a) Name and **briefly explain** in your own words the three components of the Runway Design Code (RDC) considered in the geometric design standards of the airport.
  - a. **ADG - aircraft design group**
  - b. **AAC - aircraft approach class**
  - c. **Visibility minima**
  
- b) Can an airport have multiple Taxiway Design Groups (TDG) for various taxiways in the field? Briefly explain.
  - a. **Yes they can. Some areas of the airfield may only be used by certain aircraft. Taxiways in some areas of the airfield may be restricted to some aircraft TDG groups. For example, in Los Angeles and New York Kennedy airports, an Airbus A380 has designated routes to follow on the ground.**
  
- c) A commercial airport with a single 10,000-foot runway has RDC code C-IV-1200. Can the airport accommodate an Airbus A321(see the picture below)? Explain.
  - a. **Yes. The A321 belongs to ADG III and AAC C (140 knots approach speed). There are some heavy weight version of the A321 that actually belong to AAC D. However, you only had data from the FAA Aircraft Database.**



Airbus A321 Landing at Atlanta Hartsfield-Jackson Airport. Source: A. Trani.

- d) A new airline would like to start operations next year to the airport described in part (c) with Boeing 787-8 aircraft (see the picture below). Can the airport support such operations? Explain the RDC parameter requirements for the Boeing 787-8.
- a. No because the Boeing 787-8 belongs to ADG group V.



Boeing 787-8 Departs Chicago O'Hare Airport. Source: A. Trani.

- e) The Virginia Tech Montgomery County Executive Airport currently has an RDC code C-II-4000. Can the airport accommodate a Bombardier Global Express 6000 XRS (see the picture below)? Explain.
- a. No because the Global Express technically belongs to ADG group III (94 feet wingspan).



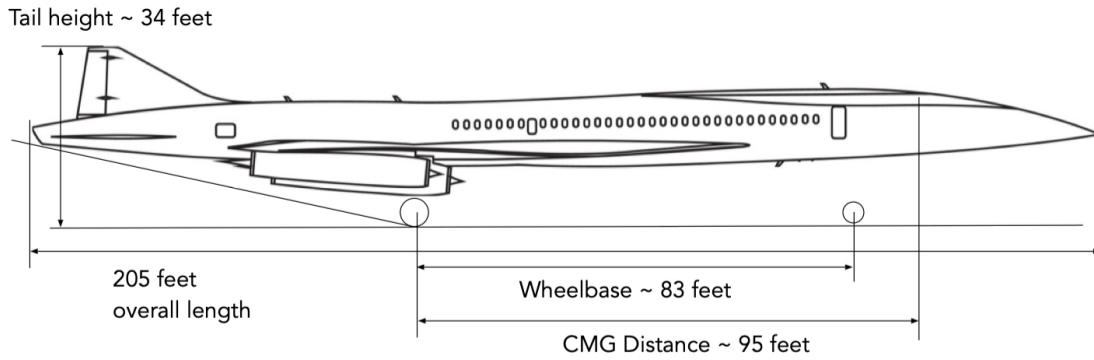
Bombardier Global Express 6000 (XRS). Model name is Bombardier BD-700-1A10. Source: A. Trani.

- f) g) Can an air taxi operator fly routinely to the Virginia Tech/Montgomery Executive airport using a Gulfstream Aerospace G280 (see the picture below)? Explain.
- a. **Yes. The Gulfstream G280 belongs to ADG group II and AAC C.**



Gulfstream Aerospace G280. Source: A. Trani.

- g) Boom Aircraft expects to introduce new supersonic aircraft in the year 2030. The sketch below shows some of the dimensions of the Boom Overture ([https://en.wikipedia.org/wiki/Boom\\_Overture](https://en.wikipedia.org/wiki/Boom_Overture)). The aircraft wingspan of the aircraft is expected to be 60 feet and the main gear width is estimated to be 37 feet. Approach speeds are expected to be ~158 knots. Find the ADG, TDG, and AAC parameters for the Boom Overture.








- a. Overture belongs to ADG II, AAC D and TDG group 5.

**Problem 2**

Identify the commercial aircraft presented in the Table 1. State the FAA Aircraft Design Group (ADG), Taxiway Design Group (TDG) and Aircraft Approach Class (AAC). Here is a list of possible choices (more choices than pictures to add a little challenge): Cessna Citation Latitude, Bombardier Challenger 350, Boeing 757-200, Boeing 747-400, Boeing 767-300, Boeing 787-8, Boeing 737-800, Cessna 172, Airbus A380-800, Airbus A320-200, Embraer 175.

You can consult various web sites to help you identify these aircraft. Examples are: my web site (<https://photos.app.goo.gl/8bdSvdwPQU7IHIDi2>), Airliners.net <http://www.airliners.net> and Jet Photos <http://www.jetphotos.net>.

**Table 1. Aircraft for Problem 2.**

Picture	Aircraft Name	ADG	TDG	AAC
	Airbus A320-200	III	3	C
	Embraer 175	III	3	C
	Airbus A380	VI	6	C
	Bombardier Challenger 350	II	1B	C
	Boeing 737-800	III	3	D

Picture	Aircraft Name	ADG	TDG	AAC
	Boeing 747-400	VI	5	D
	Boeing 787-8	VI	5	D
	Boeing 737-700	III	3	C
	Boeing 757-200	IV	4	C
	Cessna 172	I	1A	A

### Problem 3

Airport features using the Airnav.com and BTS web sites.

Go to the Airnav web site (accessible through our page with "[Interesting Web Sites](#)") and look at the following airport:

1) Roanoke - Blacksburg Regional Airport (ROA).

- a) Create a simple table with the following data: list the runway name (numeric or alphanumeric label), runway length and runway width.

Runway 6/24 has dimensions 6800 feet (long) by 150 feet (wide).

Runway 16/34 has dimensions 5810 feet (long) x 150 feet (wide).

- b) Find out if runway 6 at ROA has any obstructions according to the Airnav database.

a. No obstructions for runway 6 at ROA listed in Arnav.

- c) Does runway 24 at ROA has approach lights? State what kind of lights.

a. No approach lights for runway 24. Note that runway 6 has 1,400 foot medium intensity approach lighting system (MALSR) with runway alignment indicator lights

The diagram below (using Google Maps) shows a runway displaced threshold at ROA runway 24. The displaced threshold is the area with chevrons (arrows) before the threshold markers. Displaced threshold areas cannot be used for landing. Use the Arnav database to obtain the exact dimension of the displaced threshold on runway 24.

Displaced threshold on runway 24 is 790 feet long.

- d) Find out if the longest runway at ROA and at BCB.

a. Runway 6/24 is 6,800 feet long.

- e) What kind of pavement is used on runway 31 at BCB airport?

a. Asphalt/grooved, in fair condition

- f) Use the Bureau of Transportation Statistics web site to find the number of departures (called scheduled departures) at ROA airport in the year 2019. the link is: <https://www.transtats.bts.gov/airports.asp>. The link is also accessible through our accessible through our page with "[Interesting Web Sites](#)"

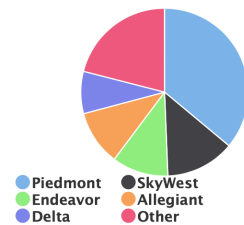
<b>Roanoke, VA: Roanoke Blacksburg Regional Woodrum Field (ROA)</b>	Scheduled Services except Freight/Mail	BTS Data as of 8/30/2022
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#### Summary Data (U.S. Flights Only)

#### Carrier Shares for January - December 2019

Passengers*	2018**	2019**	%Chg	Rank***
Arrival	326k	358k	9.79%	151
Departure	327k	359k	9.63%	151
<b>Scheduled Flights</b>				
Departures	7,582	7,784	2.66%	142
<b>Freight/Mail (lb.) (Scheduled and Non-Scheduled)</b>				
Total	28m	27m	-3.76%	127
<b>Carriers</b>				
Scheduled	14	16	14.29%	

Carrier	Passengers	Share
Piedmont	259	36.05%
SkyWest	95.65	13.33%
Endeavor	78.00	10.87%
Allegiant	76.07	10.60%
Delta	58.34	8.13%
Other	151	21.00%



Based on enplaned passengers(000) both arriving and departing.

\* Scheduled enplaned revenue passengers.

\*\* 12 months ending December of each year.

\*\*\* Among 771 U.S. airports, 12 months ending December 2019

ROA had 7,784 scheduled flight departures in 2019 (see figure below).

- g) Find the number of arriving passengers at ROA in the year 2019.

According to BTS data, ROA processed 358,000 arriving passengers in 2019 (see figure above).

#### Problem 4

##### True or false section.

Question	True / False
There were more than 11,000 Douglas DC-3 built.	1
The Ford Tri-motor was a popular commercial aircraft in the 1960s.	0
The British Comet I was the first commercial jet-powered aircraft in the world.	1
Today, most transatlantic (long-range) operations are carried out using twin-engine aircraft.	1
Federal Aviation Regulations parts 23 and 25 define the rule for certification of aircraft.	1
There are more than 24,000 landing facilities in the US.	0
The average runway length of NPIAS airports is 4,000 feet.	0
NPIAS airports are eligible to receive federal funds.	1
Turboprop regional aircraft require more runway length than jet-powered regional jets.	0