

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). 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: https://www.faa.gov/airports/engineering/aircraft_char_database.

Date Completed	Manufacturer	Model	Colored cells contain data not yet verified.	Physical Class (Engine)	# Engines	AAC	ADG	TDG	Approach Speed (V _{app})	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 A1	1121 Jet Commander		Jet	2	C	I	2	129	no winglets	44.79	55.58	15.79
2018-Jun-29	Aero Commander A1	500 Commander		Piston	2	A	II	1A	77	no winglets	51.71	36.81	14.50
2018-Jun-29	Aero Commander A1	500-A Commander		Piston	2	A	II	1A	77	no winglets	49.04	36.81	14.50
2018-Jun-29	Aero Commander A1	500-B Commander		Piston	2	A	II	1A	77	no winglets	49.04	36.81	14.50
2018-Jun-29	Aero Commander A1	500U/500S Shrike Commander		Piston	2	A	II	1A	77	no winglets	49.04	36.81	14.50
2018-Jun-29	Aero Commander A1	520 Twin Commander		Piston	2	A	II	1A	64	no winglets	49.04	36.81	14.50
2018-Jun-29	Aero Commander A1	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 A1	560-E Commander		Piston	2	A	II	1A	77	no winglets	51.71	36.81	14.50
tbd	Aero Commander A1	560-F Commander		Piston	2	A	er than 26	2	77	no winglets	same as 680F	tbd	tbd
tbd	Aero Commander A1	680 Commander		Piston	2	A	II	2	77	no winglets	49.04	tbd	tbd
tbd	Aero Commander A1	680-E Commander		Piston	2	A	II	2	77	no winglets	51.71	24.20	tbd
tbd	Aero Commander A1	680-F Commander		Piston	2	A	II	2	77	no winglets	49.04	tbd	tbd
tbd	Aero Commander A1	680-FL Grand Commander and 680-FL(P) Pressurized		Piston	2	A	er than 26	2	77	no winglets	same as 680F	stretched 680F	tbd
2018-Jun-29	Aero Commander A1	680-T Turbo Commander		Turboprop	2	B	I	2	98	no winglets	44.06	41.48	14.50
2018-Jun-29	Aero Commander A1	680-V Turbo Commander		Turboprop	2	B	I	2	98	no winglets	44.06	41.48	14.50
2018-Jun-29	Aero Commander A1	680-W Turbo Commander		Turboprop	2	B	I	2	98	no winglets	44.06	42.98	14.50
2018-Jun-29	Aero Commander A1	681 Hawk Commander		Turboprop	2	B	I	2	100	no winglets	46.55	44.35	14.95
2018-Jun-29	Aero Commander A1	685 Commander		Piston	2	B	I	2	98	no winglets	44.08	43.00	15.00
2018-Jun-29	Aero Commander A1	690/690-A Twin Commander		Turboprop	2	B	I	2	100	no winglets	46.55	44.35	14.95

Aircraft Characteristics Database.

- 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.
- Can an airport have multiple Taxiway Design Groups (TDG) for various taxiways in the field? Briefly explain.
- 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.



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.



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.



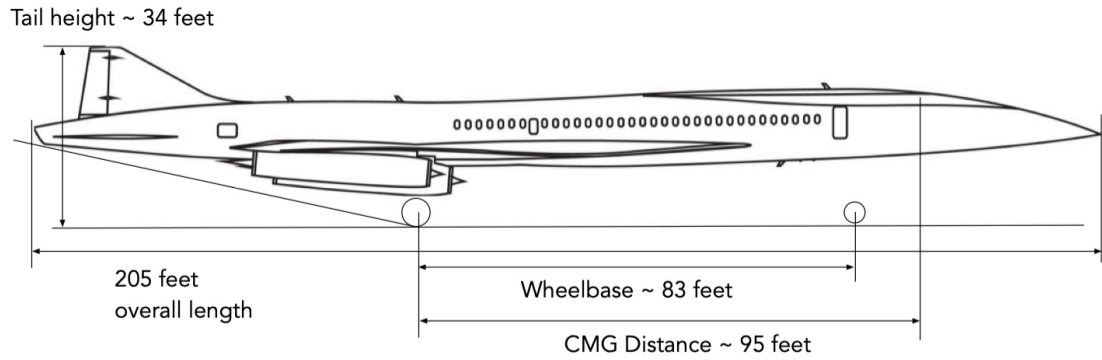
Bombardier Global Express 6000 (XRS). Model name is Bombardier BD-700-1A10. Source: A. Trani.

- 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.



Gulfstream Aerospace G280. Source: A. Trani.

f) 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). 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.








Boom Overture Supersonic Aircraft.






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
				
				
				
				

Picture	Aircraft Name	ADG	TDG	AAC
				
				
				
				
				

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:

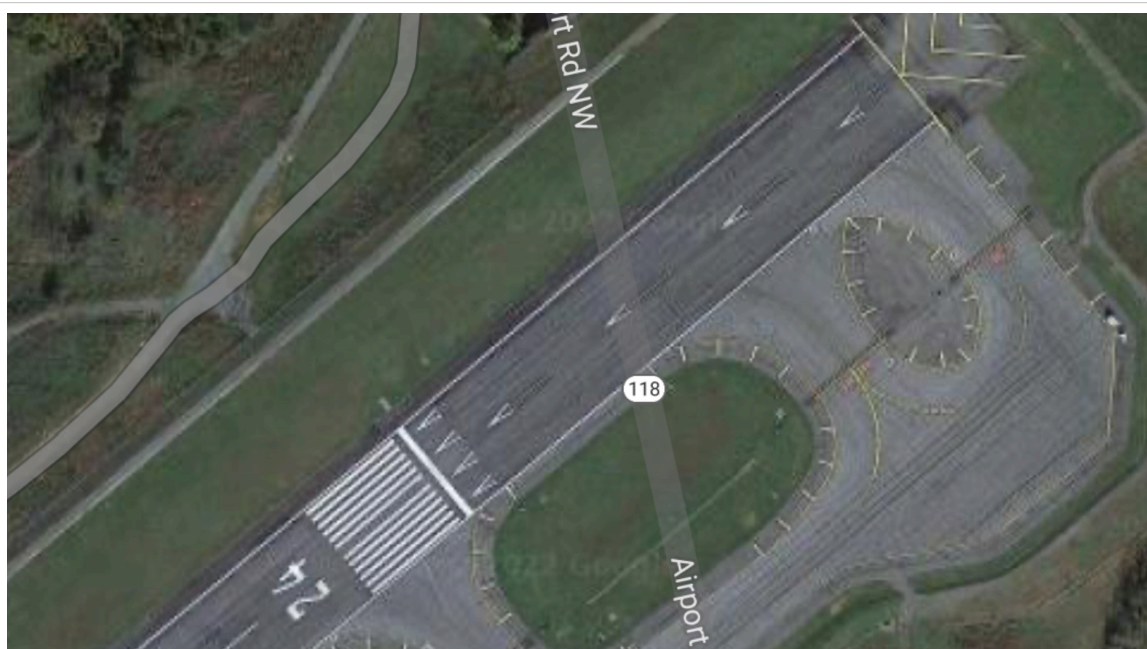
1) Roanoke - Blacksburg Regional Airport (ROA).

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

Note: A runway has two runway ends labeled numerically. For example Runway 18/36 indicates the number of degrees from the magnetic North multiplied by 10. So an aircraft landing on runway end 18 would be flying South (180 degrees from the magnetic North which is heading zero).

- b) Find out if runway 6 at ROA has any obstructions according to the Airnav database.
- c) Does runway 24 at ROA has approach lights? State what kind of 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 Airnav database to obtain the exact dimension of the displaced threshold on runway 24.



Roanoke-Blacksburg Regional Airport Runway 24 End Showing a Displaced Runway Threshold (i.e., area with the chevrons before the Runway Numeral). Source: Google Maps.

- d) Find out if the longest runway at ROA and at BCB.
- e) What kind of pavement is used on runway 31 at BCB airport?
- 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](#)"
- g) Find the number of arriving passengers at ROA in the year 2019.



Select a month: Select an airport:
(The month selection does not apply to on-time data.) [Show all airports \(by state\)](#)

Charlotte, NC: Charlotte Douglas International (CLT) Scheduled Services except Freight/Mail BTS Data as of 8/25/2021

BTS Web site with airport data.

Problem 4

True or false section.

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