

Assignment 1: Familiarization with Aviation Data Sources and Aircraft Classifications

Date Due: September 1, 2023

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 of the advisory circular 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	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 Ai	1121 Jet Commander	Jet	2	C	I	2	129	no winglets	44.79	55.58	15.79
2018-Jun-29	Aero Commander Ai	500 Commander	Piston	2	A	II	1A	77	no winglets	51.71	36.81	14.50
2018-Jun-29	Aero Commander Ai	500-A Commander	Piston	2	A	II	1A	77	no winglets	49.04	36.81	14.50
2018-Jun-29	Aero Commander Ai	500-B Commander	Piston	2	A	II	1A	77	no winglets	49.04	36.81	14.50
2018-Jun-29	Aero Commander Ai	500U/500S Shrike Commander	Piston	2	A	II	1A	77	no winglets	49.04	36.81	14.50
2018-Jun-29	Aero Commander Ai	520 Twin Commander	Piston	2	A	II	1A	64	no winglets	49.04	36.81	14.50
2018-Jun-29	Aero Commander Ai	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 Ai	560-E Commander	Piston	2	A	II	1A	77	no winglets	51.71	36.81	14.50
tbd	Aero Commander Ai	560-F Commander	Piston	2	A	II	28	77	no winglets	same as 680F	tbd	tbd
tbd	Aero Commander Ai	680 Commander	Piston	2	A	II	2	77	no winglets	49.04	tbd	tbd
tbd	Aero Commander Ai	680-E Commander	Piston	2	A	II	2	77	no winglets	51.71	24.20	tbd
tbd	Aero Commander Ai	680-F Commander	Piston	2	A	II	2	77	no winglets	49.04	tbd	tbd
tbd	Aero Commander Ai	680-FL Grand Commander and 680-FL(P) Pressurized	Piston	2	A	II	28	77	no winglets	same as 680F	stretched 680F	tbd
2018-Jun-29	Aero Commander Ai	680-T Turbo Commander	Turboprop	2	B	I	2	98	no winglets	44.06	41.48	14.50
2018-Jun-29	Aero Commander Ai	680-V Turbo Commander	Turboprop	2	B	I	2	98	no winglets	44.06	41.48	14.50
2018-Jun-29	Aero Commander Ai	680-W Turbo Commander	Turboprop	2	B	I	2	98	no winglets	44.06	42.98	14.50
2018-Jun-29	Aero Commander Ai	681 Hawk Commander	Turboprop	2	B	I	2	100	no winglets	46.55	44.35	14.95
2018-Jun-29	Aero Commander Ai	685 Commander	Piston	2	B	I	2	98	no winglets	44.08	43.00	15.00
2018-Jun-29	Aero Commander Ai	690/690-A Twin Commander	Turboprop	2	B	I	2	100	no winglets	46.55	44.35	14.95

Aircraft Characteristics Database.

- Name the two aircraft characteristics used to estimate the FAA Aircraft Design Group (ADG).
- A commercial airport with a single 7,500-foot runway has RDC code C-III. Can the airport accommodate the Boeing 757-200 (see the picture below)? Briefly Explain.



Boeing 757-200 at Atlanta Hartsfield-Jackson Airport. Source: A. Trani.

- Find the airport RDC parameters allowing an airline to conduct operations with Airbus A350-900 aircraft (see the picture below). State the ICAO Aerodrome Reference Code (Element 2) for the Airbus 350-900.



Airbus A350-900 at ATL Airport. Source: A. Trani.

- d) A new airport project identifies the Bombardier Challenger 350 (see picture below) as the critical aircraft for the future facility. Find the RDC code and taxiway design group to design the airport.



Bombardier Challenger 350. Model name is Bombardier BD-100-1A10. Source: A. Trani.


- e) A Boeing 757-200 (FAA ID is B752) follows an Airbus A350-900 (FAA ID is A359) that is landing on runway 28C at Chicago O'Hare International Airport (ORD). Find the minimum separation between the Boeing 757-200 trailing the Airbus A350-900 according to the Consolidated Wake Turbulence Reclassification (see course notes on aircraft classifications starting on page 51).
- f) If the Boeing 757-200 in part (e) travels at 140 knots on final approach, find the time between successful arrivals (in seconds) between the A359 arrival and the B752 arrival to the runway threshold (see example in the notes).
- g) How many landings can be performed on runway 28R if the sequence of part (f) is repeated many times.
- h) A new generation of supersonic aircraft is expected to operate in 2035. The Boom Overture (<https://boomsupersonic.com/>) will be able to operate at speeds 1.7 times the speed of sound in cruise (Mach 1.7). The Overture is expected to land at 162 knots. What is the FAA AAC class for the 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 CJ3, Boeing 777-300, Boeing 737-800, Boeing 717-200, Boeing 767-400, Boeing 787-8, Beechcraft King Air B200, Cirrus SR-22, Embraer 145, Airbus A320-200, and Embraer 175. Use the FAA Aircraft Characteristics Database to get information on ADG, TDG, AAC (https://www.faa.gov/airports/engineering/aircraft_char_database).

To help you identify the aircraft use my web site which contains similar pictures with annotations (<https://photos.app.goo.gl/8bdSvdwPQU7IHIDi2>). Other good sites to help identify aircraft are 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:

RDU - Raleigh-Durham International Airport.

- 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).
- Find out the elevations of runway thresholds 5L and 23R at RDU. Estimate the difference in elevation and find the average runway slope (in percent) using the two elevation points and the runway length published in Airnav.
- Does runway 5L at RDU has approach lights? State what kind of lights.
- Name any obstruction for runway 32. State the slope to clear the obstruction.
- What kind of pavement is used on the longest runway at RDU?
- Use the Bureau of Transportation Statistics web site to find the number of departures (called scheduled departures) at RDU 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](#)"
- Find the number of annual arriving and departing passengers at RDU in the year 2019 (before Covid-19).
- Find the number of annual passengers (arrivals and departures) at RDU in the year 2022. Comment on the number of passengers served in 2022 compared to 2019.

The screenshot shows the Bureau of Transportation Statistics (BTS) website interface. At the top, there is a search bar labeled "Search BTS site" and a navigation menu with links for "Topics and Geography", "Statistical Products and Data", "National Transportation Library", "Newsroom", and "About BTS". Below the navigation, the breadcrumb "BTS > TranStats" is visible. The main content area features two dropdown menus: "Select a month:" with "January 2022" selected, and "Select an airport:" with "Raleigh/Durham, NC: Raleigh-Durham International" selected. A "Submit" button is to the right of the airport dropdown. Below these filters, a note states "(The month selection does not apply to on-time data.)" and a link "Show all airports (by state)". A table header is displayed with "Raleigh/Durham, NC: Raleigh-Durham International (RDU)" in a dark blue box, followed by "Scheduled Services except Freight/Mail" and "BTS Data as of 8/24/2023". At the bottom of the table, there are two tabs: "Summary Data (U.S. Flights Only)" and "Carrier Shares for February 2021 - January 2022".

BTS Web site with airport data.

Problem 4

True or false section.

Question	True / False
There were more than 2,000 Douglas DC-6Bs built after WW II.	
The Douglas DC-3 was a successful commercial aircraft introduced in 1936.	
The Boeing 747-100 carried five times the passengers as the first generation jet-powered aircraft.	
The first generation, jet-powered aircraft introduced in the 1960's required ~10,200 feet of runway length.	
Automated people movers were introduced in the late 1940's at US airports	
Regional jets require the same runway length as the first generation of jet-powered commercial aircraft.	
The average runway length of NPIAS airports is ~4,650 feet	
An airport in the US served more than 100 million passengers (arrivals and departures) in 2019.	
Regional jets account for 1/3 of the commercial flights in the National Airspace System (NAS).	
ADS-technology is used to track aircraft in real-time today.	