

Assignment 1: Familiarization with Aviation Data Sources and Aircraft Classifications

Date Due: September 5, 2025

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Problem 1

Download the latest version of the FAA Advisory Circular 150/5300-13B with Change 1 (see the link on our home page). Read carefully Sections 1.1 to 1.2.3 and 1.6 of the advisory circular before answering the following questions.

Also, download the FAA Aircraft Characteristics Database at: https://www.faa.gov/airports/engineering/aircraft_char_database (second item in the home page).

ICAO_Code	FAA_Designator	Manufacturer	Model_FAA	Model_BADA	Physical_Class
A10	A10	FAIRCHILD	Fairchild A10	Fairchild A-10A	Jet
A124	A124	ANTONOV	Antonov AN-124 Ruslan	Antonov AN-124-100	Jet
A19N	A19N	AIRBUS	Airbus A319 Neo	Airbus A319 Neo	Jet
A20N	A20N	AIRBUS	Airbus A320 Neo	Airbus A320-271N	Jet
A21N	A21N	AIRBUS	Airbus A321 Neo	Airbus A321-251N	Jet
A306	A306	AIRBUS	Airbus A300 B4-600	Airbus A300B4-622	Jet
A30B	A30B	AIRBUS	Airbus A300-B2	Airbus A300B4-203	Jet
A310	A310	AIRBUS	Airbus A310	Airbus A310-204	Jet
A318	A318	AIRBUS	Airbus A318	Airbus A318-112	Jet
A319	A319	AIRBUS	Airbus A319	Airbus A319-131	Jet
A320	A320	AIRBUS	Airbus A320	Airbus A320-231	Jet

Aircraft Characteristics Database.

- a) Briefly explain the differences between standards, recommended practice and requirements used in airport design.

Please see FAA AC150/5300-13B 1.2.1 Meaning of Terms.

- b) How many Aircraft Approach Categories are used in airport design?

Five: A through E

AAC	V _{REF} /Approach Speed
A	Approach speed less than 91 knots
B	Approach speed 91 knots or more but less than 121 knots
C	Approach speed 121 knots or more but less than 141 knots
D	Approach speed 141 knots or more but less than 166 knots
E	Approach speed 166 knots or more

- c) Why would approach speed be important in airport design?

Faster aircraft require more protection around runways and safety areas.

- d) Define the two parameters that dictate the Taxiway Design Group in airport design.

MGW (Main Gear Width) and CMG (Cockpit to Main Gear distance)

- e) A new commercial airport has a 10,300-foot long runway. The Airbus A350-1000 (see Figure 1) is expected to be the critical aircraft. Find the ADG, AAC and TDG code for the airport.

In the FAA Aircraft Characteristics database, the Airbus A350-1000 is labeled as A35K.

ADG = V

AAC = D

TDG = 6

- f) If the airport is located in Asia, find the ICAO design codes (codes 1 and 2). Are there any differences in the FAA and ICAO standards?

ICAO Code Element 1 = 4

ICAO Code Element 2 = E (wingspan 212.4 feet)



Figure 1. Virgin Atlantic Airbus A350-1000. Source: A. Trani.

- g) Find the airport ADG, AAC and TDG codes allowing an airline to conduct operations with Boeing 787-9 aircraft (see Figure 2). Assume the visibility minima is 1,200 feet. State the ICAO Aerodrome Reference Code (Element 2) for the Boeing 787-9.

In the FAA Aircraft Characteristics database, the Boeing 787-9 is labeled as B789.

ADG = V

AAC = D

TDG = 5

ICAO Code Element 2 = E (wingspan 197.2 feet)



Figure 2. Japan Airlines Boeing 787-9 Dreamliner at Chicago O'Hare Airport (ORD). Source: A. Trani.

- h) A new airport project identifies the Embraer 190 (see Figure 3) as the critical aircraft for the future facility. Find the ADG, AAC and taxiway design groups to design the airport.

In the FAA Aircraft Characteristics database, the Embraer 190 is labeled as E190.

ADG = III

AAC = C

TDG = 3



Figure 3. Aeromexico Connect Embraer 190 in tow at Atlanta Hartsfield Airport (ATL).
Source: A. Trani.

- i) A small reliever airport is upgrading its airside facility to accommodate Bombardier Challenger 650-class aircraft (see Figure 4) as the critical aircraft for the future facility. Find the ADG, AAC and taxiway design group to design the airport.

In the FAA Aircraft Characteristics database, the Challenger 650 is labeled as CL60.

ADG = II

AAC = C

TDG = 1B



Figure 4. Netjets Bombardier Challenger 650 at Teterboro Airport (TEB). Source: A. Trani.

Problem 2

Aircraft Consolidated Wake Classification

- a) A Boeing 747-400 (ICAO Code is B744) lands ahead of a Bombardier Challenger 650 (ICAO Code is CL60) on runway 24R at Los Angeles International Airport (LAX). Find the minimum separation between the Challenger 650 trailing the Boeing 747-400 according to the Consolidated Wake Turbulence Reclassification (see course notes on aircraft classifications starting on pages 53-54 of aircraft classification the class notes). Figure 5 shows both aircraft.

Aircraft Types Categorized											
A Super	B Upper Heavy	C Lower Heavy	D Non-Pairwise Heavy		E B757	F Upper Large		G Lower Large		H Upper Small	I Lower Small
A388	A332	A306	A124	DC85	B752	A318	C130	AT43	E170	ASTR	BE10
A225	A333	A30B	A339	DC86	B753	A319	C30J	AT72	E45X	B190	BE20
	A343	A310	A342	DC87		A320	CVLT	CL60	E75L	BE40	BE58
	A345	B762	A3ST	E3CF		A321	DC93	CRJ1	E75S	B350	BE99
	A346	B763	A400	E3TF		B712	DC95	CRJ2	F16	C560	C208
	A359	B764	A50	E6		B721	DH8D	CRJ7	F18H	C56X	C210
	B742	C17	AN22	E767		B722	E190	CRJ9	F18S	C680	C25A
	B744	DC10	B1	IL62		B732	GL5T	CRJX	F900	C750	C25B
	B748	K35R	B2	IL76		B733	GLEX	DC91	FA7X	CL30	C402
	B772	MD11	B52	IL86		B734	GLF5	DH8A	GLF2	E120	C441
	B773		B703	IL96		B735	GLF6	DH8B	GLF3	F2TH	C525
	B77L		B741	K35E		B736	MD82	DH8C	GLF4	FA50	C550
	B77W		B743	KE3		B737	MD83	E135	SB20	GALX	P180
	B788		B74D	L101		B738	MD87	E145	SF34	H25B	PAY2
	B789		B74R	MYA4		B739	MD88			LJ31	PA31
	C5		B74S	R135			MD90			LJ35	PC12
	C5M		B78X	T144						LJ45	SR22

		FOLLOWER								
		A	B	C	D	E	F	G	H	I
LEADER	A		5 NM	6 NM	6 NM	7 NM	7 NM	7 NM	8 NM	8 NM
	B		3 NM	4 NM	4 NM	5 NM	5 NM	5 NM	5 NM	5 NM
	C					3.5 NM	3.5 NM	3.5 NM	5 NM	5 NM
	D		3 NM	4 NM	4 NM	5 NM	5 NM	5 NM	5 NM	5 NM
	E									4 NM
	F			Empty Cells: Apply Minimum Radar Separation 3 nm default 2.5 nm for runways that meet a 50 second Runway Occupancy Time criteria						
	G									
	H									
	I									

Consolidated Wake Turbulence separation matrix (see page 2 52 and 53 in Notes #2).

B744 = CWT group B

CL60 = CWT group G

B group leading G group requires 5 nm of separation.

- b) If the Challenger 650 in part (a) travels at 132 knots on the final approach, find the time between successful arrivals (in seconds) between the arrival of the Boeing 747-400 and the Challenger to the runway threshold (see example in the notes).

Consider a 20-second buffer. Traveling at 132 knots, the Bombardier Challenger 650 will take:

$$\text{Headway} = \frac{\text{distance}}{\text{speed}} = \frac{5 \text{ nm}}{132 \text{ knots}} 3600 \text{ s/hr} \approx 136.36 \text{ seconds}$$

$$\text{TotalHeadway} = 136.36 \text{ seconds} + 20 \text{ seconds} = 156.36 \text{ seconds}$$



Figure 5. Boeing 747-400 (top) and Bombardier Challenger 650 (bottom). Source: A. Trani.






Problem 3

Identify the commercial aircraft presented in 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): Cirrus SR-22 (SR22), Embraer Phenom 300 (E55P), Boeing 777-200 (B772), Boeing 737-900 (B739), Boeing 717-200 (B712), Beechcraft King Air B350, Cessna 172 (C172), Embraer 175 (E175), Airbus A320-200 (A320), and Airbus A321 (A321). Use the FAA Aircraft Characteristics Database to get information on ADG, TDG, AAC.

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
	Embraer 175	III	3	C
	Airbus A321	III	3	D
	Phenom 300	II	1B	B

Picture	Aircraft Name	ADG	TDG	AAC
	Boeing 777-200	V	5	C
	Boeing 717-200	III	2B	C
	Cirrus SR 22	I	1A	A
	Boeing 737-900	III	3	D
	Cessna 172	I	1A	A

Problem 4

True or false section.

Question	True / False
The Douglas DC-3 was the first successful commercial aircraft.	TRUE
In the late 1920s, Pan-American Airlines introduces passenger service to Cuba.	TRUE
The Boeing 707-320 required a runway length of 6,000 feet.	False (10,000 feet)
Runway length requirements for piston and turboprop aircraft doubled between 1936 and 1959.	TRUE
President Reagan fired 11,000 air traffic controllers in 1978.	False (1981)
The NAS is made up of 10,000 landing facilities.	False (21,000)
ADS-technology is used to track aircraft in real-time today.	TRUE
Radar technology is still in use today to track aircraft.	TRUE
The Airbus A321neo offers 11% improved fuel economy over the aircraft it replaced (e.g., Airbus A321)	False (20%) https://aircraft.airbus.com/en/aircraft/a320-family/a321neo
There are about 3300 airports in the US that can receive federal funds.	TRUE