Practical exercises

Commercial air carriers

Problem no.1

A common problem found in the data sent to ICAO and also among users is a lack of clear understanding between the data for On-flight Origin and Destination (OFOD) and for Traffic by Flight Stage (TFS). The traffic data shown below represents the OFOD type data (Form B) for flight ZA 040 (both air carrier and flight data are fictitious).

Air carrier: **ZACK (ZA), India**

Aircraft type	No. of seats	Total revenue payload (kg)	Itinerary
Boeing 777 200	326	52 000	BOM-DEL-LON-NYC

Traffic data:

Aircraft Type	Flight stage	Distance (km)	Flight time (hours)	Destination	Revenue passengers	Revenue freight (kg)
Boeing 777 200	BOM-DEL	1100	2.0	DEL LON NYC	110 60 70	0 3500 4000
	DEL-LON	6700	4.0	LON NYC	80 75	2500 4500
	LON-NYC	5500	7.5	NYC	85	2000

a) Use the data shown above to complete the capacity and traffic table shown below.

Flight stage	Available capacity		Traffic carried	
	No. of seats	Revenue payload	Passengers	Freight (kg)

b) Using the ICAO definitions calculated the international and domestic traffic carried for flight ZA 040.

Description	International flights	Domestic Flights	Total
Passengers			
Freight (t)			

Problem No.2

Statistical reports sent to ICAO show that many air carriers do not appear to know how to calculate the revenue payload available. In the exercise below you are asked you to calculate the freight and payload available for the aircraft identified in the table. Aircraft data has been obtained from the manuals on Aircraft characteristics for airport planning published by the aircraft manufacturers and generally freely available on the Web.

Description	Airbus A320-200	Boeing 767-200	Boeing 777-200
Number of passenger seats	150	250	327
Maximum cargo volume available (m^3)	37.4	86.9	160.0
Av. passenger mass plus checked baggage (kg)	95	100	105
Av. checked baggage mass (kg)	15	20	25
Checked baggage density (kg/m^3)	161		
Freight density (kg/m^3)	161		
Available capacity (kg)			
Freight capacity available (kg)			
Total payload available (kg)			
Maximum structural payload (kg)	**19200**	**32200**	**63950**

Problem No. 3

Using the data from problem No. 1 plus the additional data for flight ZA 062 included below, please complete Form A for carrier ZA.

Stations		Type of aircraft	Number of flights	Capacity available		Revenue traffic		Stage lemgth (km)	Block time (hrs)
From	to			Number of seats	Total payload (tonnes)	Passenger numbers	Freight (tonnes)		
BOM	DEL	Boeing 777 200	1	326	52	240	7.5	1100	2
DEL	LON	Boeing 777 200	1	326	52	285	14.5	6700	9.5
LON	NYC	Boeing 777 200	1	326	52	230	10.5	5500	8
DEL	AUH	Airbus A300 C4	1	0	22	0	15	2400	4

Description	Unit	TOTAL ALL SERVICES (passenger, mail and freight including all-freight) Classified by flight stage		ALL-FREIGHT SERVICES ONLY (included in columns c and d data) Classified by flight stage	
		International	Domestic	International	Domestic
a	b	c	d	e	f
SCHEDULED REVENUE FLIGHTS					
1. Aircraft kilometres	number				
2. Aircraft departures	number				
3. Aircraft hours	number				
4. Passengers carried	number			- -	- -
5. Freight tonnes carried	number				
6. Passenger-kilometres performed	number			- -	- -
7. Seat-kilometres available	number			- -	- -
8. Passenger load factor	%			- -	- -
9. Tonne-kilometres performed					
a) passengers (incl. baggage)	number			- -	- -
b) freight (incl. express)	number				
c) mail	number				
d) total (9a to 9c)	number				
10. Tonne-kilometres available	number				
11. Weight load factor	%				

Notes:

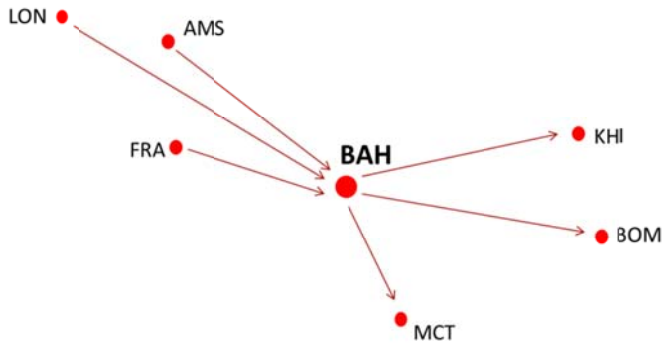
For the purposes of this exercise assume the weight of a passengers plus its checked baggage is 100kg.

Please note that for some fields the ***Units*** have been changed from the original Form A due to the low values used in this example.

Problem No. 4

A State has submitted a **Form B. (**Only eastbound passenger numbers shown below)

From	To	Passenger numbers
AMS	BAH	10 000
AMS	BOM	2 000
BAH	BOM	30 000
BAH	KHI	8 000
BAH	MCT	50 000
FRA	BAH	15 000
FRA	BOM	3 000
FRA	MCT	500
LON	BAH	50 000
LON	BOM	4 000
LON	KHI	500
LON	MCT	700



The total number of passengers identified in the Form B above is 173700, while for the same period the number of passengers carried reported in Form A is 184400. The flight itineraries published by this carrier show that there are no non-stop flights between Europe and Asia. Consequently **all** passengers have to change flights (and hence utilise a new coupon) in Bahrain (BAH). Using this as a basis, recalculate the data shown above and indicate below the correctly amended version of Form B.

From	To	Passenger numbers

Problem No. 5

A State has submitted the following **Form C**, please validate the data and identify potential errors.

Stations		Type of aircraft	Number of flights	Capacity available		Revenue traffic		
From	To			Passenger seats (number)	Total payload capacity (tonnes)	Passengers (number)	Freight (tonnes)	Mail (tonnes)
a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**
ABJ	PAR	772	251	66212	9514	53352	1853220	3250
ALG	PAR	319	288	38390	1608	18346	0	0
PAR	BZV	332	175	18325	5553	27227	522	41

Please note the following aircraft characteristic

772 = Boeing 777-200 /264 seats/ capacity 38t
319 = Airbus 319 / 133 seats/ capacity 13t
332 = Airbus 330-200 / 219 seats/ capacity 32t

Validation:

For each stage and aircraft types calculate the following and identify potential errors:

City-pair	Aircraft type	Avg. seats	Avg. payload (tonnes)	Total revenue payload (tonnes)	Passenger load factor %	Weight load factor %

Problem No. 6

A State has sent the following **Form A**.
Note: this carrier flies Boeing 737 and 767 with 176 and 267 seats each. This airline only performs passenger flights (no all-cargo flights).

Question 1: Fill the missing information in the form A (only the scheduled all services part of form A is provided)

Description	Unit	Flight stage	
		International	Domestic
a	b	c	D
A. Aircraft kilometres	000	7730	5858
B. Aircraft departures	number	1528	6690
C. Aircraft hours	number	7362	8679
D. Passengers carried	number	816044	617829
E. Freight tonnes carried	number	2500	0
F. Passenger-kilometres performed	000	181380	
G. Seat-kilometres available	000	225348	199172
H. Passenger load factor	%		46.5
Tonnes-kilometres performed *I. passengers (incl. baggage)*	000	19045	13900
J. freight (incl. express)	000		0
K. mail	000	0	0
L. total (I to K)	000	21045	
M. Tonnes-kilometres available	000	28397	25096
N. Weight load factor	%		

Question 2: Fill the validation table below and indicate which errors may be present

Indicators	Formula	International	Domestic
Avg. stage (km)	1000*A/B		
Avg. speed (km/hour)	1000*A/C		
Avg. flight time (hours)	C/B		
Avg. number of passenger per departure	D/B		
Avg. passenger mass incl. baggage (kg)	(I/F)*1000		

Problem No. 6 bis

A State has sent the following **Form A**.

ICAO code	Description	Unit	TOTAL ALL SERVICES (passenger, mail and freight including all-freight) Classified by flight stage		ALL-FREIGHT SERVICES ONLY (included in columns c and d data) Classified by flight stage	
			International	Domestic	International	Domestic
	a	b	c	d	e	f
	SCHEDULED REVENUE FLIGHTS					
1010	1. Aircraft kilometres	000	14.6	1.1	2,400.0	
1020	2. Aircraft departures	number	3	1	1.0	
1030	3. Aircraft hours	number	21.5	2.0	4.0	
1040	4. Passengers carried	number	370	2,400	-	-
1050	5. Freight tonnes carried	number	31.5	7.5	15.0	
1060	6. Passenger-kilometres performed	000	3,174.5	4,569.0	-	-
1070	7. Seat-kilometres available	000	3,977.2	358.6	-	-
1080	8. Passenger load factor	%	79.8	73.6	-	-
	9. Tonne-kilometres performed					
1091	a) passengers (incl. baggage)	000	317.5	26.4	-	-
1092	b) freight (incl. express)	000	190.9	8.3	36.0	
1093	c) mail	000	-	-	-	
1094	d) total (9a to 9c)	000	508.4	34.7	36.0	
1100	10. Tonne-kilometres available	000	687.2	57.2	52.8	
1110	11. Weight load factor	%	74.0	60.6	68.2	
	NON-SCHEDULED REVENUE FLIGHTS					
2010	12. Aircraft kilometres	000				
2020	13. Aircraft departures	number				
2030	14. Aircraft hours	number				
2040	15. Passengers carried	number			- -	- -
2050	16. Freight tonnes carried	number				
2060	17. Passenger-kilometres performed	000			- -	- -
2070	18. Seat-kilometres available	000			- -	- -
	19. Tonne-kilometres performed					
2091	a) passengers (incl. baggage)	000			- -	- -
2092	b) freight (incl. express)	000				
2093	c) mail	000				
2094	d) total (19a to 19c)	000				
2100	20. Tonne-kilometres available	000				
	NON REVENUE FLIGHTS					
2330	21. Aircraft hours	number				

Remarks (including a description of any unavoidable deviation (s) from reporting instructions):

Question 1: Create an extension of the form A for Passenger related data only (excluding all-freight traffic)

Description	Unit	**PASSENGER** SERVICES ONLY Classified by flight stage	
		International	Domestic
		c	d
1. Aircraft kilometres	000		
2. Aircraft departures	number		
3. Aircraft hours	number		
4. Passengers carried	number		
5. Freight tonnes carried	number		
6. Passenger-kilometres performed	000		
7. Seat-kilometres available	000		
8. Passenger load factor	%		
9. Tonne-kilometres performed			
a) passengers (incl. baggage)	000		
b) freight (incl. express)	000		
c) mail	000		
d) total (9a to 9c)	000		
10. Tonne-kilometres available	000		
11. Weight load factor	%		

Question 2: Complete the following tables and identify potential errors

	TOTAL ALL SERVICES (passenger, mail and freight including all-freight)		ALL-FREIGHT SERVICES ONLY (included in columns c and d data)	
Indicators	International	Domestic	International	Domestic
Avg. stage (km)				*N/A*
Avg. speed (km/hour)				*N/A*
Avg. flight time (hours)				*N/A*
Avg. passenger mass incl. baggage (kg)			*N/A*	*N/A*
Avg. number of passenger per departure	*N/A*	*N/A*	*N/A*	*N/A*
Avg. number of freight tonnes per departure				*N/A*

	PASSENGER SERVICES ONLY	
Indicators	International	Domestic
Avg. stage (km)		
Avg. speed (km/hour)		
Avg. flight time (hours)		
Avg. passenger mass incl. baggage (kg)		
Avg. number of passenger per departure		
Avg. number of freight tonnes per departure		