

Doc 9060/5



Reference Manual on the ICAO Statistics Programme

Approved by the Secretary General
and published under his authority

Fifth Edition — 2013

International Civil Aviation Organization

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Published in separate English, Arabic, Chinese, French, Russian
and Spanish editions by the
INTERNATIONAL CIVIL AVIATION ORGANIZATION
999 University Street, Montréal, Quebec, Canada H3C 5H7

For ordering information and for a complete listing of sales agents
and booksellers, please go to the ICAO website at www.icao.int

Fourth edition, 1994

Fifth edition, 2013

Doc 9060, Reference Manual on the ICAO Statistics Programme

Order Number: 9060

ISBN 978-92-9249-347-9

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AMENDMENTS

Amendments are announced in the supplements to the *Catalogue of ICAO Publications*; the Catalogue and its supplements are available on the ICAO website at www.icao.int. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS		
No.	Date	Entered by

CORRIGENDA		
No.	Date	Entered by

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FOREWORD

For many years, it has been recognized that there is a need for an effective guide to the civil aviation statistics of the International Civil Aviation Organization (ICAO), particularly a need to provide adequate guidance and standards to those officials of governments, airlines and airports who are engaged in the preparation of statistical data to be sent to the Organization.

This fifth edition of the manual takes into account the changes introduced in 2010 to the ICAO Statistics Programme following the adoption by the Council of the Recommendations of the Tenth Session of the Statistics Division (STA/10).

This manual is designed to serve as:

- a general introduction to civil aviation statistics;
- a guide to the reporting requirements of ICAO, and how they should be met by ICAO Member States;
- a reference for persons directly responsible for civil aviation statistics, especially those who compile reports for the ICAO Statistics Programme; and
- a central information source for those using civil aviation statistics who wish to know about the content and availability of the ICAO worldwide statistical series.

Copies of the ICAO Air Transport Reporting Forms which contain relevant instructions and definitions in pdf format, as well as copies of the Reporting Forms in MS Excel to be used to submit data to ICAO in electronic format can be downloaded from:

<http://www.icao.int/staforms>

PART I

BASIC STATISTICS
AND
MAIN TERMS USED IN CIVIL AVIATION

Chapter 1

AN AIR TRANSPORT STATISTICS PRIMER

1.1 INTRODUCTION

1.1.1 This chapter introduces the new definition of air transport activities adopted by ICAO for statistical purposes and introduces the reader to the basic terms used in air transport statistics. More detailed explanatory notes are given in Part III, Chapters 2 to 5 which provide information on how reporting entities should complete the Air Transport Reporting Forms which should be submitted to ICAO.

1.1.2 In order to establish what statistical data ought to be collected, one needs to establish the uses one wishes to make of the data and the expected analytical processes one wishes to carry out based on those data. Hence, while in some cases parameters have a similar name, the purpose for which they are collected will determine the corresponding definitions. For example, the statistical parameters for commercial air carriers which ICAO requests States to collect were established with very specific intentions in mind; all the data requested must correspond to those of the operating air carrier. The purpose of this is so that all data reported for the same entity are homogeneous and can be used to carry out cross-analytical processes comparing, for example, traffic and capacity data, and these with the corresponding revenues and cost figures. Also, it ensures homogeneity of data between the reports for different air carriers thus allowing benchmarking analysis to be carried out.

1.1.3 One point which should be borne in mind throughout this manual is that, depending on the data series, terms with identical or similar names may share a common definition, but the criteria used to collect them may be entirely different (for example, the traffic for on-flight origin and destination compared with traffic by flight stage), or in some cases the definitions themselves may be completely different. The latter is particularly true when comparing definitions for identical terms used for air carrier statistics with those adopted for airports. These differences not only depend on what one is trying to measure but also on the type of information that is available.

1.2 DEFINING CIVIL AVIATION ACTIVITIES

1.2.1 Over the years, ICAO has developed a system of definitions to support the process of preparing and updating the various Annexes to the *Convention on International Civil Aviation* and related documents such as manuals and circulars. Definitions are also provided in the framework of ICAO's statistics programme. ICAO, however, had not developed a formal classification of civil aviation activities.

1.2.2 Outside ICAO, several global, regional and national classifications of economic activities are available. The United Nations developed the *International Standard of Industrial Classification* (ISIC), which is widely used as a means to standardize data collection and promote international comparability. The original code was adopted in 1948, but has been revised periodically in order to keep it up to date and relevant. The latest version ISIC Rev. 4 was officially released on 11 August 2008. Regional classification systems are also available and include, among others, the *North American Industry Classification System* (NAICS) and the *Statistical Classification of Economic Activities in the European Community* (Nomenclature statistique des activités économiques dans la Communauté européenne or NACE). The ICAO Circular *Economic Contribution of Civil Aviation, Volume II: Assessment Methodologies* (Cir 292), demonstrates the application of the ISIC and the related *Central Product Classification* (CPC) when classifying

commercial civil aviation activities of a given local, regional or national economy in order to apply input-output analysis for an impact assessment. These classifications are however quite complex and do not respond to ICAO's statistical needs.

1.2.3 The various uses of civil aviation data such as analyses related to safety, security and the efficiency of civil aviation and its environmental impact as well as forecasting and planning require a suitable classification and a clear definition of civil aviation activities. This is especially true for those covered, directly or indirectly, by ICAO Standards and Recommended Practices (SARPs).

1.2.4 Consequently, on the basis of the Recommendation 13 of the Tenth Session of the Statistics Division (STA/10)¹, in 2010, the Council adopted the classification for civil aviation activities broadly grouped into commercial air transport services, general aviation, airport services, air navigation services, civil aviation manufacturing, aviation training, maintenance and overhaul, as well as regulatory functions and other activities as shown in Figure I-1-1.

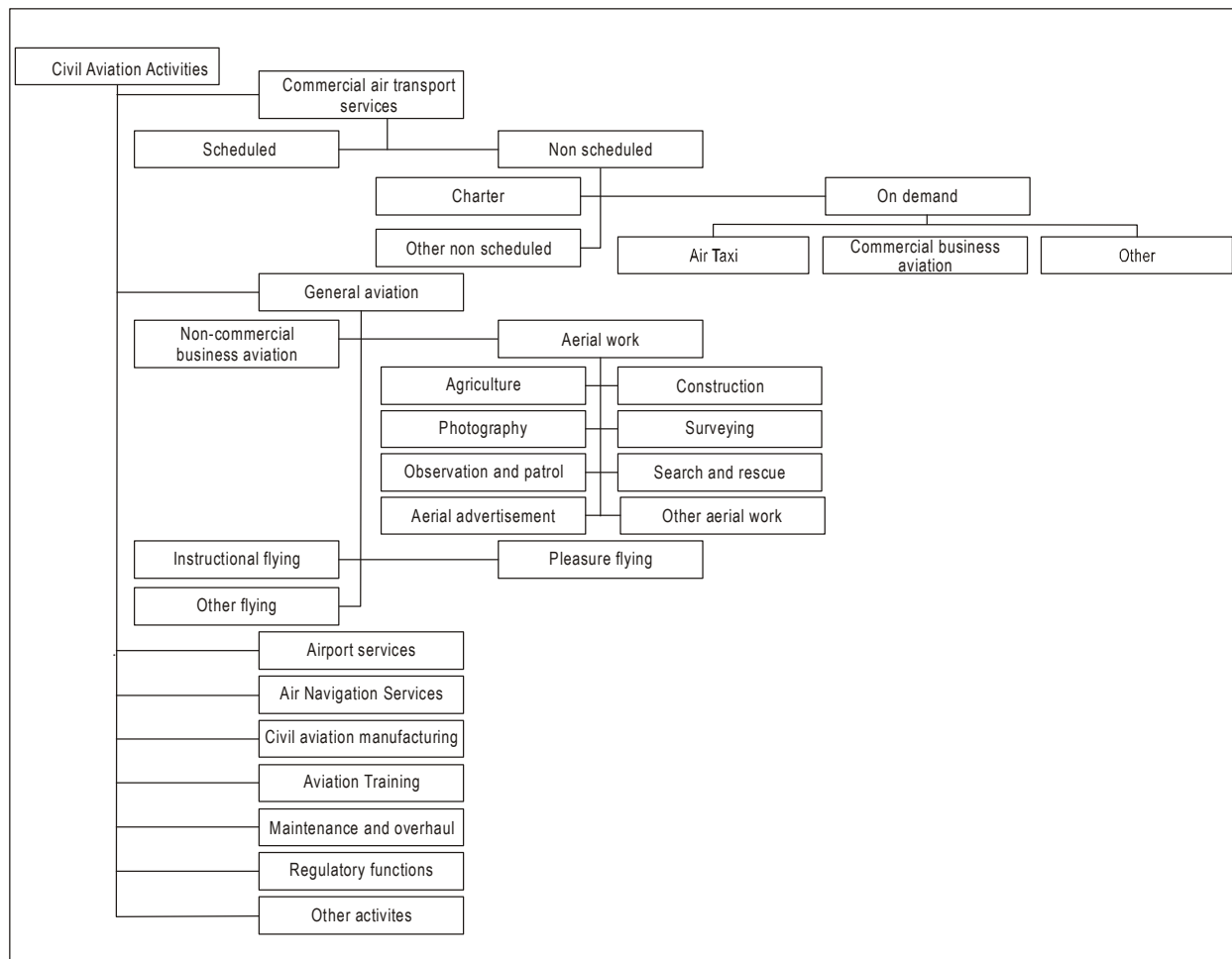


Figure I-1-1. ICAO's classification of civil aviation activities

1. Tenth Session of the Statistics Division, Montréal, 23-27 November 2009 (Doc 9932).

1.2.5 The impact of the new definition of civil aviation activities on the data which were collected through the regular ICAO statistics programme is limited to airport traffic. With this new definition, both air taxi and commercial business flights are no longer included in general aviation; instead they are now part of the commercial traffic to be reported for an airport (see Part III, Chapter 3).

1.3 COMMERCIAL AIR CARRIERS

Scheduled services and non-scheduled operations

1.3.1 As shown in Figure I-1-1 commercial air carrier activities are subdivided in scheduled services and non-scheduled operations, where ***scheduled services*** are defined as flights which are scheduled and performed for remuneration according to a published timetable, or so regular or frequent as to constitute a recognizably systematic series, which are open to direct booking by members of the public. ***Non-scheduled operations*** represent charter flights and special flights, including on-demand flights, performed for remuneration other than those classified as scheduled flights.

1.3.2 While the above definitions may appear to be fairly clear, the problem is that in recent years the distinction between the two has become more blurred. For example, while on the one hand, charter services have become more readily open to use by members of the public and are so regular or frequent that they constitute a recognizable systematic series (known as “scheduled charters” or “programmed charters”), on the other hand, most scheduled carriers now offer reduced fares and conditions which were once more common to charter services. Furthermore, in the case of the European Union (EU), the “third package” of air transport liberalization adopted in July 1992, and applied as from 1 January 1993, effectively eliminated the regulatory distinction² between the two. This has taken away the most obvious criteria to distinguish scheduled and non-scheduled services when collecting traffic and capacity data for statistical purposes. Within the EU it was left to individual air carriers to decide how they wish to report their statistics. The fact that air carriers were left to choose how to report created some uncertainty as to when and if they were going to continue to report their non-scheduled operations and scheduled flights separately or under a single category.

1.3.3 This is not an insignificant issue. Non-scheduled air services had emerged as an important category of air carriage first in Europe, spreading later to North America and other regions. They experienced rapid development in the 1960’s and 1970’s, and it is estimated that by the early 1980’s about half of the number of air passengers travelling within Europe did so on non-scheduled flights. Consequently any shift in reporting traffic data from non-scheduled to scheduled services would have had an impact on the apparent traffic growth shown for the latter by the European air carriers over the latter part of the 1990’s.

1.3.4 During the Ninth Session of the Statistics Division (STA/9)³, a proposal was made to eliminate the distinction between scheduled and non-scheduled operations for statistical purposes. However, many States wished to retain this breakdown because of the regulatory distinction between the two types of operations.

International/Domestic

1.3.5 While defining international or domestic operations would at first sight appear to be a fairly straightforward issue, it is not. In ICAO, and in other international or regional organizations, the allocation of traffic and capacity to international or domestic operations is largely dependent on the data one is looking at and the final result one is aiming

2. Scheduled international air services are regulated primarily on the basis of bilateral agreements between States, whereas non-scheduled international air services are generally authorized on the basis of national regulation.

3. Ninth Session of the Statistics Division, Montréal, 22-26 September 1997 (Doc 9703).

for. For example, the definitions for domestic and international operations differ if the data they refer to are the monthly traffic and capacity statistics or are used to analyse the revenues and expenses by route; airports use a different definition whether it refers to aircraft movements or traffic, and for environmental purposes the Intergovernmental Panel on Climate Change (IPCC) has adopted a definition which differs from those generally used by the air transport industry.

1.3.6 In order not to confuse the issue by showing the various definitions here, readers should refer to the relevant sections of Part III, Chapters 2 and 3 which illustrate how to allocate data to international or domestic operations for commercial air carriers and airports under the ICAO Statistics Programme.

Traffic and capacity data

1.3.7 A commercial air service is defined as an air service performed by aircraft for the public transport of passengers, freight or mail for remuneration or hire. Therefore, it would appear logical that the first metrics one may want to collect are the number of passengers and tonnes of freight and mail carried. At the same time one should also measure the capacity available to carry this traffic in terms of seats and tonnes of payload available in order to assess how efficiently one is selling the capacity produced. This measurement is particularly important in transportation as once a service (flight) takes place any capacity which has not been sold is lost. Consequently one of the arts in managing an enterprise involved in transportation is for each service to try to maximize the loads and minimize the capacity lost.

1.3.8 While at first sight measuring the number of passengers carried and seats offered would appear to be all that is required, it soon becomes apparent that there are complications in how to measure this when a service is composed of two or more flight stages. Figure I-1-2 shows an example of a service between Frankfurt (FRA) and New York (NYC) with an intermediate stop in London (LON).

1.3.9 Seven passengers board the aircraft in FRA: four for LON and three for NYC. In LON four passengers disembark and five new passengers board the aircraft for NYC. This flight carried a total of 12 passengers. However, the service was operated with an aircraft having 10 seats. Hence there appears to be an inconsistency between number of passengers carried and seats available. While there may be different ways of tackling this problem, the solution opted for by the industry is to associate each passenger with the length of each flight stage flown measured in kilometres. In addition to being fairly simple, linking the passenger to the length of the trip associates it in part with the price paid which itself will have taken into consideration a distance component.

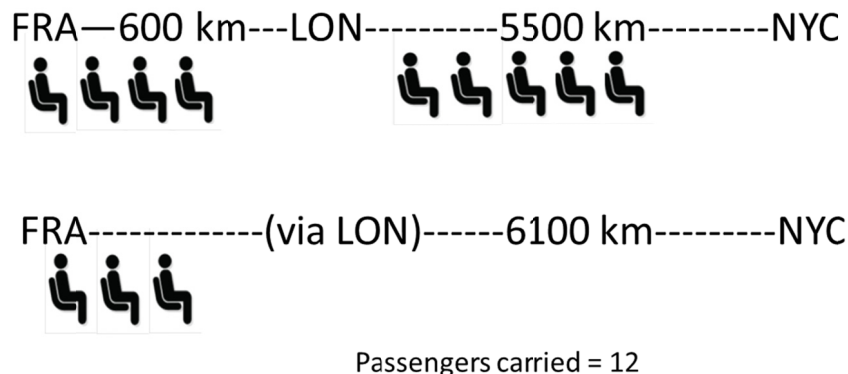


Figure I-1-2. Example of a service with an intermediate stop

1.3.10 This new metric is called **passenger-kilometre performed**, where one passenger-kilometre is performed when a passenger is carried one kilometre. Consequently, the calculation of passenger-kilometres equals the sum of the products obtained by multiplying the number of revenue passengers carried on each flight stage by the stage distance. The resultant figure is equal to the number of kilometres travelled by all passengers. In the case shown above the number of passenger-kilometres performed (PKP) is obtained thus:

$$(4 \text{ pass.} \times 600 \text{ km}) + (5 \text{ pass.} \times 5\,500 \text{ km}) + (3 \text{ pass.} \times 6\,100 \text{ km}) = 48\,200 \text{ PKP}$$

1.3.11 The passenger capacity available is measured in terms of **seat-kilometres available**, where one seat-kilometre is available when a seat is flown one kilometre. Seat-kilometres available are equal to the sum of the products obtained by multiplying the number of passenger seats available for sale on each flight stage by the stage distance. Consequently, for the flight shown above, the seat-kilometres available (ASK) are calculated thus:

$$10 \text{ seats} \times (600 \text{ km} + 5\,500 \text{ km}) = 61\,000 \text{ ASK}$$

1.3.12 The **passenger load factor** measures how efficiently the capacity available was used, and it is expressed as a percentage of passenger-kilometres performed over seat-kilometres available. Again referring to the example shown above, the passenger load factor for the whole flight from FRA to NYC is:

$$48\,200 \text{ PKP} / 61\,000 \text{ ASK} = 79 \text{ per cent}$$

1.3.13 Freight and mail air traffic are computed the same way and their values are measured in **freight** and **mail tonne-kilometres performed**.

1.3.14 The overall traffic (passengers, plus freight and mail) carried by an air carrier is measured in terms of **tonne-kilometres performed** (TKP). One TKP represents a metric tonne of revenue load carried one kilometre. The total tonne-kilometres performed by an air carrier equals the sum of the product obtained by multiplying the number of total tonnes of revenue load (passengers, freight and mail) carried on each flight stage by the stage distance.

1.3.15 To obtain the total TKP for an air carrier it is necessary to convert the passenger-kilometres performed into **passenger tonne-kilometres performed**. This is done by multiplying the PKP by the average passenger mass **plus** that of its luggage. This conversion factor is left at the discretion of the operator. However, if no conversion factor is available, it is recommended that 100 kilograms per passenger be used. Hence, the figure for the flight shown above is 4 820 passenger tonne-kilometres performed.

1.3.16 The total capacity available for a flight is measured in terms of **tonne-kilometres available**, where one tonne-kilometre is available when one tonne of payload capacity is flown one kilometre. As it is for ASK, tonne-kilometres available (ATK) equals the sum of the products obtained by multiplying the number of tonnes available for the carriage of revenue load (passengers, freight and mail) on each flight stage by the stage distance⁴.

1.3.17 The overall load factor for an air carrier (total tonne-kilometres performed expressed as a percentage of total tonne-kilometres available) is called the **weight load factor**.

Revenue traffic

1.3.18 Revenue traffic is the traffic (passenger, freight or mail) flown by an air carrier for which it receives commercial remuneration. Unless otherwise stated, traffic data shown for air carriers generally correspond to revenue traffic even if the word "revenue" is sometimes omitted from the label. Please note that this case is one of the significant

4. Examples on how to calculate the total available capacity (in tonnes) for an aircraft are shown in Part III, Chapter 2, 2.4.18.

differences between the traffic figures shown for air carriers compared with those for airports. In the case of airports, traffic loaded or unloaded corresponds to the total traffic (revenue plus non-revenue) carried by an air carrier.

Operating revenues and expenses

1.3.19 Overall operating revenues are dependent on the tariffs charged, the traffic carried and the tariff/traffic mix on each route. Operating expenses will depend on the input costs, the characteristics of the network, the aircraft type used and the capacity produced. Because of this, overall operating revenues and expenses in absolute amounts will show the profit or loss during the year but they are not very helpful to measure the change in terms of the income per unit sold or the unit cost of production.

1.3.20 The type of financial measurement which relates the total traffic applicable to the total operating revenues is called the **operating yield**. It is computed by dividing the total operating revenues by the tonne-kilometres performed⁵. The measurement which relates the capacity applicable to the operating expenses is called the **unit cost**, and it is usually computed by dividing the operating expenses by the tonne-kilometres available. Where revenues and expenses are quoted in United States Dollars (USD), the operating yield is expressed in US cents per TKP and the unit cost in terms of US cents per ATK.

1.3.21 The weight load factor at which point operating revenues equal operating expenses is known as the **breakeven load factor (BELF)**, where

$$\text{BELF \%} = 100 * (\text{RTK} / \text{ATK}) * (\text{operating expenses/operating revenues})$$

1.3.22 When comparing operating yields between routes or between air carriers, or unit cost between aircraft types operated by the same air carrier or different air carriers, one should always bear in mind how these values vary with distance flown. Figure I-1-3 shows the curve for unit costs against average aircraft stage length (the latter is obtained by dividing the aircraft kilometres flown by the related number of aircraft departures).

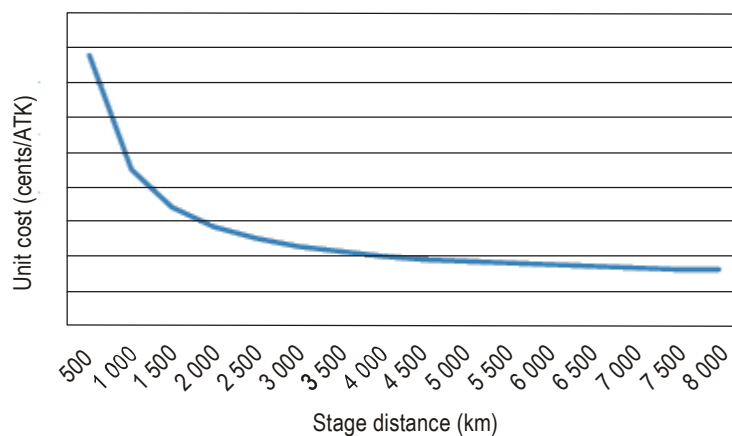


Figure I-1-3. Relationship between unit costs and distance⁶

5. The **passenger yield** is obtained by dividing the passenger revenues by the corresponding passenger-kilometres performed.

6. There are no figures on the Y-axis as the graph is meant to show the generic behaviour rather than a specific operation.

1.3.23 The figure shows that the unit costs drop quite rapidly with increasing flight stage length in the short-/medium-haul range, whereas it has a very gentle decrease with increasing flight stage length in the long-haul range. Unfortunately, the need to quote the corresponding average distance flown when comparing unit costs or operating yields (the operating yield curve behaves in exactly the same manner) between carriers or routes is often forgotten when drafting reports.

1.3.24 Readers wishing to learn more about the effect of input prices, network characteristics and aircraft types on operating expenses should consult the Circulars ICAO has produced since 1976 on *Regional Differences in International Airline Operating Economics*⁷.

Exchange rates (1)

1.3.25 International air carriers operate in an environment where they pay input prices and collect revenues which are *based* in different currencies. The word “based” is used here specifically as it does not matter in which actual currency these transactions take place, the importance is in which currencies the prices or tariffs used were originally established.

1.3.26 For example, contracts for fuel are generally established in USD, many airport taxes and charges are quoted in USD, airport handling contracts may be concluded in USD, and finally, in several countries (notably in Africa, the Middle East and Latin America/Caribbean) international air carrier tariffs are established in USD, while in Europe and in the former Soviet Republics they are established in euro, whether countries are part of the euro zone or not (see Table I-1-2). Also some currencies are linked to the USD so they will change in harmony with that currency. Hence, even if the air carrier does not operate to the United States the USD is likely to be present, in some form or other, in both its revenues and expenses.

1.3.27 Table I-1-1 shows a very simple example of how the change in exchange rates can affect the operating result of an air carrier.

Table I-1-1. Effect of changes in exchange rate on operating result

Year	Established in	Revenues	Expenses	Operating result	Exchange rate
Y1	US Dollars (\$)	60	30	breakeven	\$ 1 = L 1 (parity)
	Local currency (L)	40	70		
	Total	100	100		
Y2	US Dollars (\$)	72	36	gain	\$ 1 = L 1.2 (\$ up)
	Local currency (L)	40	70		
	Total	112	106		
Y2	US Dollars (\$)	48	24	loss	\$ 1 = L 0.8 (\$ down)
	Local currency (L)	40	70		
	Total	88	94		

1.3.28 The table shows that in Y1 the air carrier had identical revenues and operating expenses expressed in local currency (L). However, 60 revenue units (out of 100) were earned in USD while 40 were earned in local currency. These shares were different for the operating costs, where out of the 100 units incurred in expenses, only

7. Prior to 1997 (Cir 280) these studies were known as the *Regional Differences in Fares, Rates and Costs for International Air Transport*.

30 units involved USD while the remaining 70 were incurred in local currency. Assume the same relative proportions are maintained in Y2, however, whereas in Y1 both currencies were at parity, in Y2 the value of the USD to the local currency has changed. Where the USD has gone up in value (USD 1 = L 1.2), because of the different mix of the currencies in the revenues and expenses, the result shows a gain which can be solely attributed to the devaluation of the local currency with respect to the USD. On the other hand, should the USD devalue against the local currency (USD 1 = L 0.8), the operating result would show a loss.

1.3.29 Because of the importance exchange rate movements can have on the bottom line of an air carrier some of them (for example, KLM) have set up sophisticated accounting systems which allow them to evaluate the impact of changes in exchange rate throughout the year and show these results in their financial annual reports.

Table I-1-2. Establishing passenger fares and related charges

Countries for which passenger fares and excess baggage charges are established in US Dollars

Afghanistan	Cuba	Jamaica	Sao Tome and Principe
Angola	Democratic Republic of the Congo	Kenya	Sierra Leone
Anguilla	Dominica	Lao People's Democratic	Somalia
Antigua & Barbuda	Dominican Republic	Lebanon	St. Kitts and Nevis
Argentina	Ecuador	Liberia	St. Lucia
Bahamas	El Salvador	Madagascar	St. Vincent and the Grenadines
Bangladesh	Eritrea	Malawi	Suriname
Barbados	Ethiopia	Maldives	Timor Leste
Belize	Gambia	Mexico	Trinidad and Tobago
Bermuda	Ghana	Mongolia	Uganda
Bolivia (Plurinational State of)	Grenada	Montserrat	Ukraine
Brazil	Guatemala	Nicaragua	United Republic of Tanzania
Burundi	Guinea	Nigeria	United States and US Territories
Cambodia	Guyana	Palestinian Territory, occupied	Uruguay
Cayman Islands	Haiti	Panama	Venezuela (Bolivarian Republic)
Chile	Honduras	Paraguay	Viet Nam
Colombia	Indonesia	Peru	Zambia
Costa Rica	Iraq	Philippines	Zimbabwe
	Israel	Rwanda	

Countries for which passenger fares and excess baggage charges are established in euros

Albania	Cyprus	Greece	Romania
Armenia	Estonia	Kyrgyzstan	Russian Federation
Austria	Finland	Latvia	Serbia
Azerbaijan	Former Yugoslav Republic of Macedonia	Luxembourg	Slovakia
Belarus	France except French Polynesia, and New Caledonia	Malta	Slovenia
Belgium		Monaco	Spain
Bosnia and Herzegovina	Georgia	Montenegro	Tajikistan
Bulgaria	Germany	Netherlands	Turkey
Cape Verde	Ireland	Republic of Moldova	Turkmenistan
Croatia	Italy	Portugal	Uzbekistan

Source: IATA Composite Passenger Tariff Coordinating Conference - Resolution 024a.

1.4 AIRPORTS

Airport traffic

1.4.1 One of the questions often asked is: why does Airports Council International (ACI) report that in year Y airports processed over 4 billion passengers while ICAO (or IATA) state that in the same year commercial air carriers carried almost 2 billion passengers? Who is right? They all are. The issue is how one defines *passengers*. Air carriers count the number of passengers who have embarked on an aircraft. Airports count passengers twice; once at embarkation and once at disembarkation (***passengers embarked and disembarked***). Also, whereas air carriers often do not count non-revenue passengers, airports count all passengers (revenue and non-revenue) carried by an air carrier. Thus even if one were to double the air carrier passenger numbers, those shown for airports would always be slightly higher.

1.4.2 A similar situation arises for freight and mail. However, whereas for passengers the number of passengers embarked is of the same magnitude as that for passengers disembarked, this is not true with regard to freight. The difference in the ***freight loaded and unloaded*** (in tonnes) at an airport can be significantly different as this depends of the types of freight loaded and unloaded at that airport.

1.4.3 With regard to aircraft operations, airports count the number of ***aircraft movements***, where a movement can be either a take-off or a landing (a take-off *plus* a landing equal two movements). Aircraft movements are classified into ***commercial air transport movements*** which covers all air transport services available to the general public for the transportation of passengers, mail and/or freight for remuneration, including air taxis and commercial business flights, and ***general aviation*** which, for ICAO statistical purposes, covers non-commercial business flights, aerial work, instructional and pleasure flying, and other flying (see Figure I-1-1).

1.4.4 Differences also arise in the allocation between domestic and international operations. Readers who are interested in clearly understanding these differences should refer to the appropriate examples in Part III, Chapters 3 and 4, and in particular they may wish to read *How do airports see air carrier traffic* in Chapter 3, 3.2.

1.4.5 These examples highlight the need to read the definitions carefully before drawing any conclusions about data which may originate from different areas of the air transport industry.

Airport revenues

1.4.6 Most airports, particularly major ones, have two main sources of income: one generated through the collection of charges and fees directly linked to all those activities associated with aircraft and air traffic operations (***aeronautical revenues***), and one which airports may receive through all other activities *not* directly linked to aircraft and air traffic operations, such as restaurants, cafeterias and bars, duty free shops, retail outlets, automobile parking (***non-aeronautical revenues***). The latter are very much dependent on the amount of traffic handled at an airport and the nature of the traffic. Suffice to say that at major international airports often the non-aeronautical revenues exceed those earned through aeronautical activities.⁸

The importance of non-aeronautical revenues

As shown in the table below, the non-aeronautical share was highest in Asia and the Pacific, with an average of 60 per cent, followed by North America (54 per cent), Europe (52 per cent), and the Caribbean, Central and South America (37 per cent). Africa and the Middle East showed the lowest

8. Additional information on the economics of airports can be found in ICAO's *Airport Economics Manual* (Doc 9562).

regional average (28 per cent). It is noteworthy that North American airport operators do not provide air traffic services. As a result, their charges on air traffic operations are relatively lower and their shares of non-aeronautical revenues in total income are relatively higher.

The average share of non-aeronautical revenues in the total income of major airports (with high traffic volume, defined as >25 000 traffic units, where one traffic unit is equivalent to 1 000 passengers or 100 tonnes of freight or mail) in Asia/Pacific, Europe and North America amounted to 50 per cent in 2007. These engines of growth in the airport industry saw their non-aeronautical revenues recover in recent years, in comparison to shares of 40 per cent and 53 per cent, respectively, in the 2005 and 2003 surveys. Intensified security measures, affecting retail space design and passenger flows may have had a potentially negative impact on pre-flight time and spending patterns for airport-based commercial activities.

<i>Regions</i>	<i>Number of Airports</i>	<i>Non-aeronautical in total income (% share)</i>
Africa/Middle East	51	28
Asia/Pacific	52	60
Latin America/Caribbean	31	37
Europe	170	52
North America	43	54
Total sample	347	53

Extract from the *Financial situation of airports and air navigation service providers*, ICAO Report, 2007.

1.5 COMPARING MONETARY INFORMATION

Exchange rates (2)

1.5.1 Often for analytical purposes one will need to compare information which is based on different currencies. In order to make the data comparable, these will need to be converted into a single currency. The common currency generally used for this type of exercise is the USD. However, the exchange rate used to convert the various currencies to the USD will depend on the applicable rate at the time. Hence when comparing common data between two years, one is not only comparing the change which has taken place in the local currency but is also introducing into the equation the change in the exchange rate between the USD and the local currency.

1.5.2 Table I-1-3 was compiled from annual studies which ICAO used to conduct comparing the level of air fares and rates between route groups⁹. While the data are somewhat dated they are still valid for the purpose of these examples.

9. *Survey of International Air Transport Fares and Rates* (annual Circulars published between 1973 and 1993).

1.5.3 Between September 1992 and September 1993, the USD strengthened against most other World currencies, hence in September 1993, one would have required fewer USD to purchase the same amount of local currencies than in the previous year. Consequently, a passenger purchasing his or her fare in USD would have seen a lower increase or even a decrease over the previous year when compared with a passenger paying in local currency. Table I-1-3 clearly shows how the change in exchange rate may affect the comparison between two periods and the different perception a passenger would have had on the change in the level of air fares depending on which currency he or she had used to pay. Hence, when comparing over a period of time revenues or costs which were converted from local currency into USD, one should always bear in mind the effect that changes in exchange rate may have had on the relative changes shown.

Table I-1-3. Change in normal economy (Y) air fare — September 1993 over September 1992

Route group	Percentage change by distance							
	250	500	1 000	2 000	4 000	8 000	12 000	16 000
International total								
in USD	-1.4	-1.7	-1.9	-2.2	-2.4	-2.7	-2.8	-2.9
in local selling currencies	13.0	11.5	10.0	8.5	7.0	5.6	4.8	4.2
North America								
in USD	15.3	12.5	9.7	7.0	4.4			
in local selling currencies	20.7	17.0	13.4	9.9	6.6			
Europe								
in USD	-12.1	-8.9	-5.7	-2.3	-1.2			
in local selling currencies	7.3	11.1	15.0	19.0	23.2			
North Atlantic								
in USD						-13.9	-9.3	-6.5
in local selling currencies						1.4	-0.1	-1.5
South Pacific								
in USD						8.1	1.7	-1.9
in local selling currencies						12.7	4.6	0.1

1.5.4 Converting monetary amounts to a single currency and comparing the results at a specific point in time also may give the reader different perceptions in the relationship between the data because of changes in the exchange rate. Hence, one should be very careful in drawing hard and fast conclusions based on a single view of the data.

1.5.5 Table I-1-4 compares the change in the relationship between the level of the international normal economy (Y) air fare between Europe and North America over time. It shows that this relationship varied significantly depending on the behaviour of the exchange rate during the period concerned. While European international air fares were always higher than those for an equivalent distance (250 km) in North America, depending on the year in which the analysis was carried out, the relative difference ranged from 1.3 and 2.1.

Table I-1-4. Changes in the relationship of international air fares

<i>Year</i>	<i>Estimated average air fare at 250 km (US cents per km)</i>		<i>Ratio Europe/North America</i>	<i>USD in relation to the European currencies</i>
	<i>Within Europe</i>	<i>Within North America</i>		
1985	36.6	25.3	1.4	down
1987	54.0	26.4	2.1	up
1991	71.7	47.1	1.5	down
1992	86.6	51.8	1.7	up
1993	76.3	59.5	1.3	

Chapter 2

MAIN TERMS USED IN CIVIL AVIATION STATISTICS

2.1 INTRODUCTION

2.1.1 This chapter lists the most common terms used in civil aviation statistics grouped into:

- commercial air carriers;
- airports;
- en-route facilities and service; and
- national civil aviation authorities.

2.1.2 Additional definitions for more specific terms may be found in the corresponding Air Transport Reporting Forms.

2.1.3 When looking up a definition, users should ensure that they are in the appropriate section, as the words may appear to refer to the same item, but the definition may be significantly different, for example between terms used for commercial air carriers against those adopted for airports.

2.1.4 Please note that all distances and mass figures reported to ICAO must be based on the metric system. The relevant conversion factors from the imperial system to metric are shown in Appendix B.

2.2 COMMERCIAL AIR CARRIERS

Air cargo. Term generally used by the airline industry to mean any property (freight, express and mail) transported by air, except baggage.

Air taxi revenue flights. On-demand, non-scheduled flights on short notice for the carriage by air of passengers, freight or mail, or any combination thereof for remuneration usually performed with smaller aircraft including helicopters (typically no more than 30 seats). Also includes any positioning flights required for the provision of the service.

Aircraft departures. The number of take-offs of aircraft. For statistical purposes, departures are equal to the number of landings made or flight stages flown.

Aircraft hours. Aircraft hours are based on “block-to-block” time (i.e. from the moment the aircraft is pushed back from the gate or starts taxiing from its parking stand for take-off to the moment it comes to a final stop at a gate or parking stand after landing); also known as block time.

Aircraft kilometres performed. The sum of the products obtained by multiplying the number of revenue flight stages flown by the corresponding stage distance.

Blocked-off charters. The whole capacity of an aircraft is blocked off for charter sale on flights published as scheduled flights but carried out as charter flights on the same or similar routing and operating time.

Blocked-space arrangements. A number of passenger seats and/or specified cargo space purchased by an air carrier for the carriage of its traffic on an aircraft of a second air carrier.

Break-even load factor. The weight load factor at which point operating revenues equal operating expenses. It is obtained by multiplying the weight load factor by the ratio of the operating expenses to the operating revenues.

City-pair (OFOD). Two cities between which travel is authorized by a passenger ticket or part of a ticket (a flight coupon) or between which shipments are made in accordance with a shipment document or a part of it (freight bill or mail delivery bill).

Codesharing. The use of the flight designator code of one air carrier on a service performed by a second air carrier, which service is usually also identified (and may be required to be identified) as a service of, and being performed by, the second air carrier.

Commercial air transport operator. An operator that, for remuneration, provides scheduled or non-scheduled air transport services to the public for the carriage of passengers, freight or mail. This category also includes small-scale operators, such as air taxis and commercial business operators, that provide commercial air transport services.

Distances. Aerodrome-to-aerodrome great circle distances should be used at least for international services, in all items involving distance computations. Distances can be calculated using the Great Circle Distance, defined as the shortest distance between any two points on the surface of the Earth, using the Vincenty distance formula associated with the World Geodetic System — 1984 (WGS-84) adopted by ICAO and referred to in paragraph 1.2.1.1 of Annex 15 — *Aeronautical Information Services* to the Chicago Convention. The latitude and longitude of aerodromes can be taken either from aerodrome data published in the national Aeronautical Information Publication (AIP) or from a source using such data, for example, the *Location Indicators* (ICAO Doc 7910).

Distance flown per passenger. The average distance flown per passenger is computed by dividing the passenger-kilometres by the related number of passengers carried.

Domestic flight. A flight having exclusively domestic stages. (See *flight stage, domestic*).

Flight (air carrier operations). The operation of an aircraft on a flight stage or number of flight stages with the same flight number.

Flight coupon. Each component part of a ticket containing separate travel authority for subdivisions of the total travel covered by the passenger ticket.

Flight stage. A flight stage is the operation of an aircraft from take-off to its next landing. A flight stage is classified as either international or domestic based on the following definitions:

International. A flight stage with one or both terminals in the territory of a State, other than the State in which the air carrier has its principal place of business.

Domestic. A flight stage not classifiable as international. Domestic flight stages include all flight stages flown between points within the domestic boundaries of a State by an air carrier whose principal place of business is in that State. Flight stages between a State and territories belonging to it, as well as any flight stages between two such territories, should be classified as domestic. This applies even though a stage may cross international waters or over the territory of another State.

Notes:

1. In the case of multinational air carriers owned by partner States, traffic within each partner State is shown separately as domestic and all other traffic as international.
2. "Foreign" cabotage traffic (i.e. traffic carried between city-pairs in a State other than the one where the reporting carrier has its principal place of business) is shown as international traffic.
3. A technical stop does not result in any flight stage being classified differently than would have been the case had the technical stop not been made.

Franchising. The granting by an air carrier of a franchise or right to use various of its corporate identity elements (such as its flight designator code, livery and marketing symbols) to a franchisee, i.e. the entity granted the franchise to market or deliver its air service product, typically subject to standards and controls intended to maintain the quality desired by the franchiser, i.e. the entity granting the franchise.

Freight mass. The factor to convert freight loads from volume into mass (or vice versa) is left to the discretion of the carrier. However, if no conversion factor is available, it is recommended that 161 kilograms per cubic metre be used. The same conversion factor can be used for passenger baggage.

Freight (or mail) tonnes carried. The number of tonnes of freight carried is obtained by counting each tonne of freight on a particular flight (with one flight number) once only and not repeatedly on each individual stage of that flight. The only exception to this is for freight flown on both the international and domestic stages of the same flight, which is considered in computation both as a domestic and an international shipment or dispatch. The same principle should be used in calculating mail tonnes carried.

Freight (or mail) tonne-kilometres performed. A metric tonne of freight or mail carried one kilometre. Freight tonne-kilometres equal the sum of the products obtained by multiplying the number of tonnes of freight, express, diplomatic bags carried on each flight stage by the stage distance. For ICAO statistical purposes freight includes express and diplomatic bags but not passenger baggage. Mail tonne-kilometres are computed in the same way as freight tonne-kilometres.

International flight. A flight that contains one or more international flight stages. (See *flight stage, international*).

Joint service flight. A flight identified by the designator codes of two air carriers that, with the concurrence of their respective States, typically have agreed with each other to share revenues and/or costs.

Leased aircraft. An aircraft used under a contractual leasing arrangement to increase an air carrier fleet capacity.

Low-cost carrier. See sidebar.

Low-cost carriers (LCCs)

With the deregulation of the air transport industry in the United States some of the new entrants started offering "no-frill" services in order to keep their costs below those of the established air carriers. However, it was the deregulation of the air transport market within the European Community which brought about the explosion in the so-called low-cost carriers (LCCs are also called low-cost airlines, or no-frills, discount, low-fares, budget or value-based airlines or carriers). Until then Europe had had a thriving non-scheduled air carrier industry brought about by the regulatory policies of the day. About half of the air passengers travelling within Europe did so on non-scheduled flights. With deregulation, many non-scheduled operators become scheduled airlines but maintained their original cost structures

and adapted the distribution systems which they had as non-scheduled operators to the new market conditions. In this context, the internet played a significant role in the rapid evolution of the LCCs as it allowed them to market directly to consumers who can do their own bookings on-line.

Though the industry and the specialized press had coined the term LCC, for many years there was no officially recognized definition which could be used to classify an LCC. Chapter 5.1 of the *Manual on the Regulation of International Air Transport* (Doc 9626) defines an LCC as *an air carrier that has a relatively low-cost structure in comparison with other comparable carriers and offers low fares and rates. Such a carrier may be independent, the division or subsidiary of a major carrier or, in some instances, the ex-charter arm of an airline group.*

This definition has been adopted by STA/10 to be used for statistical purposes. Because the definition adopted is more of a business model with a wide margin for interpretation, national administrations have been asked to identify which air carriers in their State are considered LCCs. A list of these carriers is to be maintained and published by ICAO.

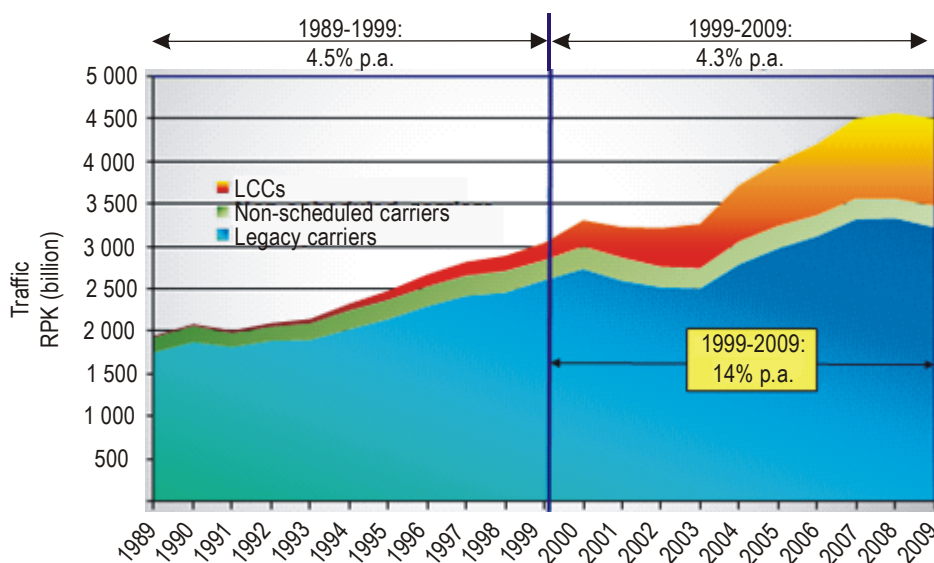


Figure I-2-1. Low cost carriers (LCCs)

Mail. All correspondence and other objects tendered by and intended for delivery to postal administrations.

Maximum certificated take-off mass (MCTOM). The maximum permissible take-off mass of the aircraft according to the certificate of airworthiness, the flight manual or other official documents (see also sidebar in Part III, Chapter 2, 2.7.5).

Non-revenue flights. Aircraft hours flown on non-commercial business aviation, test flights, training and all other flights for which no revenue is received.

Non-scheduled revenue flights (excluding on-demand flights). Charter flights and special flights performed for remuneration other than those reported under scheduled flights. They *include* any items related to blocked-off charters and *exclude* air taxi, commercial business aviation or other on-demand revenue flights.

Operating carrier. That carrier whose flight number is being used for air traffic control purposes. For the purpose of reporting air carrier statistics to ICAO, all operational and traffic items should be reported by the operating carrier, including code-shared, franchised, pooled, blocked-off charter, blocked-space arrangements, joint services and leased aircraft services.

Operating expenses per traffic-unit (unit cost). This is a type of financial measurement which relates the traffic or capacity applicable to the operating expenses. It is computed by dividing the operating expenses by the tonne-kilometres performed or by the tonne-kilometres available.

Operating revenue per traffic-unit (operating yield). This is a type of financial measurement which relates the traffic or capacity applicable to the operating revenues. It is computed by dividing the operating revenues by the tonne-kilometres performed or by the tonne-kilometres available.

Passengers carried. The number of passengers carried is obtained by counting each passenger on a particular flight (with one flight number) once only and not repeatedly on each individual stage of that flight¹, with a single exception that a passenger flying on both the international and domestic stages of the same flight should be counted as both a domestic and an international passenger.

Passenger-kilometres performed. A passenger-kilometre is performed when a passenger is carried one kilometre. Calculation of passenger-kilometres equals the sum of the products obtained by multiplying the number of revenue passengers carried on each flight stage by the stage distance. The resultant figure is equal to the number of kilometres travelled by all passengers.

Passenger load factor. Passenger-kilometres performed expressed as a percentage of seat-kilometres available.

Passenger tonne-kilometres performed. Passenger tonne-kilometres performed are obtained by applying a standard mass per passenger to the passenger-kilometres performed. (See also *passenger mass*.)

Passenger mass. To convert into a mass the number of passengers carried, the latter is multiplied by a factor representing the average mass of the passenger plus both normal baggage allowance and excess baggage. This conversion factor is left to the discretion of the operator. However, if no conversion factor is available, it is recommended that 100 kilograms² be used. (See also *passenger-tonne-kilometres performed*.)

Payload capacity. Total payload capacity available (in metric tonnes), above and below deck, for the carriage of revenue load (passengers, baggage, freight and mail) taking into account any payload and operational restrictions on the supply of capacity. (See also *tonne-kilometres available*.)

Revenue passenger. A passenger for whose transportation an air carrier receives commercial remuneration. See also *passengers carried*. For additional background information see the sidebar.

1. This definition **includes**, for example, a) passengers travelling under publicly available promotional offers (for example, “two-for-one”) or loyalty programmes (for example, redemption of frequent-flyer points); b) passengers travelling as compensation for denied boarding; c) passengers travelling on corporate discounts; d) passengers travelling on preferential fares (government, seamen, military, youth, student, etc.).

1. In pre e-ticket (electronic ticket) days one could equate a passenger as being equivalent to a flight coupon. Paper-based tickets had one or more flight coupons identifying the number of flights a passenger had to take in order to complete his or her journey. Each new coupon identified a *transfer* of the passenger from one flight to another with a different flight number, whether performed by the same carrier or not.

2. The mass of 100 kg was adopted by the Tenth Session of the Statistics Division. Prior to that the recommended passenger mass plus checked baggage stood at 90 kg.

2. This definition **excludes**, for example, a) persons travelling free; b) persons travelling at a fare or discount available only to employees of air carriers or their agents or only for travel on business for the carriers; c) infants who do not occupy a seat.

Revenue passenger: background

Prior to the Ninth Session of the Statistics Division, for statistical purposes a revenue passenger was defined as any passenger paying 25 per cent or more of the normal applicable fare. As it stood, this definition in 1997 was no longer valid. Marketing and pricing practices meant that on some routes there were already super Apex (Advanced purchase excursion) fares which were below the 25 per cent limit. Furthermore, it was becoming more difficult to identify the applicable normal economy fare, the Y class fare. The latter was an unrestricted fare with no booking or travel conditions attached. In some markets, notably across the North Atlantic and the Pacific, this fare had ceased to exist with the introduction of restricted economy class fares such as the Y2 fare, which only allowed intra line travel with the same air carrier.

In addition, loyalty programmes had become more popular, to the extent that in some jurisdictions auditors were insisting that until these were cashed-in, frequent flyer points earned by passengers represented a liability to the air carrier and as such they should be reported in the balance sheet in the same manner as tickets purchased but not flown. Consequently these passengers should be considered as revenue passengers.

Arriving at a definition which would satisfy all participants proved to be a difficult task, and it was only on the last day of the Ninth Session of the Statistics Division (STA/9) that the definition shown in this manual was adopted. The definition per se is quite simple, however, the Division felt that there was a need to expand on what was their intent in defining a revenue passenger. Hence the examples of what is (1) included and (2) excluded by the current definition.

In hindsight, not specifying a relative value as in the previous definition was a good choice. At that time who could have foreseen certain air carriers offering fares as low as 1 euro? Under the current definition, passengers paying this fare are considered revenue passengers.

Revenue traffic. Traffic (passenger, freight or mail) flown by an air carrier for which it receives commercial remuneration. Unless otherwise stated, traffic data shown for air carriers generally correspond to *revenue traffic*, which can then be readily compared with the revenues reported for that traffic.

Seat-kilometres available. A seat-kilometre is available when a seat is flown one kilometre. Seat-kilometres available are equal to the sum of the products obtained by multiplying the number of passenger seats available for sale on each flight stage by the stage distance. It excludes seats not available for the carriage of passengers because of the extra mass of fuel required or other payload restrictions (see also *payload capacity*).

Scheduled revenue flights. Flights scheduled and performed for remuneration according to a published timetable, or so regular or frequent as to constitute a recognizably systematic series, which are open to direct booking by members of the public; and extra section flights occasioned by overflow traffic from scheduled flights.

Speed flown. The average aircraft speed flown is obtained by dividing the aircraft kilometres flown by the related aircraft hours. Where the latter are block-hours flown, the result is known as the average block speed.

Stage distance flown per aircraft. The average stage distance flown per aircraft is obtained by dividing the aircraft kilometres flown by the related number of aircraft departures.

Technical stop. A stop most commonly used to refuel the aircraft, to make unexpected essential repairs or to respond to some emergency need to land the aircraft. No traffic is unloaded or loaded during a technical stop.

Tonne-kilometres available. A tonne-kilometre is available when one tonne of payload capacity is flown one kilometre. Tonne-kilometres available equals the sum of the products obtained by multiplying the number of tonnes available for the carriage of revenue load (passengers, freight and mail) on each flight stage by the stage distance. (See also *payload capacity*.)

Tonne-kilometres performed. A metric tonne of revenue load carried one kilometre. Tonne-kilometres performed equals the sum of the product obtained by multiplying the number of total tonnes of revenue load (passengers, freight and mail) carried on each flight stage by the stage distance.

Traffic. For air transport purposes, traffic means the carriage of passengers, freight and mail.

Weight load factor. Tonne-kilometres performed expressed as a percentage of tonne-kilometres available.

2.3 AIRPORTS

Air taxi operations. On-demand, non-scheduled flights on short notice for the carriage by air of passengers, freight or mail, or any combination thereof for remuneration usually performed with smaller aircraft including helicopters (typically no more than 30 seats). Also includes any positioning flights required for the provision of the service.

Aircraft movement. An aircraft take-off or landing at an airport. For airport traffic purposes one arrival and one departure is counted as two movements.

International. All flights of national or foreign aircraft whose origin or destination is located in the territory of a State other than that in which the airport being reported on is located.

Domestic. All flights of national or foreign aircraft in which all the airports are located in the territory of the same State.

In both cases a flight shall be considered as the operation of an aircraft on a stage or number of stages with an unchanging flight number. Technical stops are not considered.

Commercial air transport. Air transport services available to the general public for the transportation of passengers, mail and/or freight for remuneration. Includes air taxis and commercial business flights.

Commercial business flights. The commercial operation or use of aircraft by companies for the carriage of passenger or goods as an aid to the conduct of their business and the availability of the aircraft for whole aircraft charter, flown by a professional pilot(s) employed to fly the aircraft.

Direct transit traffic. Traffic which both arrives and departs the point (transits the point) as part of a continuous movement under a single air ticket or waybill, without a stopover, on the same or different aircraft identified by the same airline designator and flight number. Direct transit traffic is counted only once.

Freight. Includes express and diplomatic bags but not passenger baggage.

Freight (or mail) loaded/unloaded. These terms as applied to freight and mail have meanings similar to embarked and disembarked for passengers.

General aviation (GA) activities. All civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire (see Annex 6 — *Operation of Aircraft*, Part II — *International General Aviation — Aeroplanes*). For ICAO statistical purposes the general aviation activities are classified into non-commercial business flights, aerial work, instructional and pleasure flying, and other flying.

International airport. Any airport designated by an ICAO Member State in whose territory it is situated as an airport of entry and departure for international air traffic, where the formalities such as customs, immigration, public health, agricultural quarantine and similar procedures are carried out.

Mail. All correspondence and other objects tendered by and intended for delivery to postal administrations.

Non-commercial business flights. These operations cover corporate and owner-operated business flights.

a) *Corporate business flights.* The non-commercial operation or use of aircraft by a company for the carriage of passengers or goods as an aid to the conduct of company business, flown by a professional pilot(s) employed to fly the aircraft.

b) *Owner-operated business flights.* The non-commercial operation or use of aircraft by an individual for the carriage of passengers or goods as an aid to the conduct of his/her business.

Non-scheduled services (revenue). These are charter flights and, special and inclusive tour flights, other than those reported under scheduled flights, performed for remuneration on an irregular basis including empty flights related thereto, air taxi operations, commercial business flights, and blocked-off charters.

Passengers, embarked/diseembarked.

Embarked passengers. Number of air carrier revenue and non-revenue passengers whose air journey *begins* at the reporting airport, including the number of diseembarked passengers, other than direct transit passengers, who are continuing their air journey.

Diseembarked passengers. Number of air carrier revenue and non-revenue passengers whose air journey *terminates* at the reporting airport, including the number of passengers, other than direct transit passengers, who will continue their air journey.

Passenger, freight and mail.

International. Applies to passengers, freight and mail diseembarked at an airport located in a State other than that of the airport of embarkation, or vice versa.

Domestic. Applies to passengers, freight and mail diseembarked at an airport located in the State of the airport of embarkation or vice versa.

Scheduled services (revenue). Flights scheduled and performed for remuneration according to a published timetable, or so regular or frequent as to constitute a recognizably systematic series, which are open to direct booking by members of the public; and extra section flights occasioned by overflow traffic from scheduled flights.

Stopover traffic. Traffic which has taken a stopover, an intentional interruption of movement through a point under a single air ticket or waybill for a period of time beyond that required for direct transit through or, when changing flights, for a period normally extending to the departure time of the next connecting flight and (exceptionally) including an overnight stay.

Traffic units. A traffic unit is equivalent to 1 000 passengers or 100 tonnes of freight or mail; direct traffic shall not be taken into account.

Transfer traffic. Traffic connecting between aircraft identified by *different* airline designators and flight numbers. Transfer traffic is counted twice: once upon arrival and once on departure.

2.4 EN-ROUTE FACILITIES AND SERVICES

AIS (aeronautical information services). Includes all personnel and facilities employed to provide information pertaining to the availability of air navigation services and their associated procedures necessary for the safety, regularity and efficiency of air navigation (AIP, AIC, NOTAM, etc.).

ATCo (Air traffic controller). The holder of a valid air traffic controller licence which permits the individual to control traffic at a specific operational unit.

ATCo OPS. An ATCo who is participating in an activity that is either directly related to the control of traffic or is a necessary requirement for an ATCo to be able to control traffic (OPS).

ATM (air traffic management). Includes all personnel and facilities employed to provide air traffic services (ATS), air traffic flow management and airspace management. ATS comprises air traffic control service (area control service, approach control service, or aerodrome control service), flight information service (including air traffic advisory service) and alerting service.

CNS (communications, navigation and surveillance). CNS includes communication facilities, navigation services and surveillance systems. Communication facilities may be broadly classified under two main categories: aeronautical fixed service and aeronautical mobile service.

Aeronautical fixed service (AFS). All facilities and personnel employed to provide telecommunication services between fixed points, such as AFTN/ATS, the ground part of ATN and ATS direct speech and data circuits.

Aeronautical mobile service (AMS). All ground-based facilities and personnel engaged in air-ground communications and radiotelephony broadcasts such as ATIS and VOLMET (i.e. VHF and HF transmitting and receiving stations). Implementation of AMSS, as well as other ATS air-ground links and other communications sub-networks of the future ATN, will add satellites or satellite transponders and associated ground earth stations.

Navigation services comprise ground-based radio navigation equipment (e.g. VOR, DME and NDB) and precision approach and landing aids (e.g. ILS equipment). Implementation of GNSS will add the satellite constellations providing the standard signal positioning service and the associated augmentation systems required, i.e. satellite-based (wide-area) and ground-based (local area) augmentations. Surveillance systems comprise primary surveillance radar (PSR), secondary surveillance radar (SSR), including SSR Mode S, surface movement radar (SMR) as well as automatic dependent surveillance (ADS), including the supporting network and maintenance personnel.

FIR/UIR. Flight information region/upper flight information region.

Flight (air navigation). The movement of an aircraft during its en-route phase through the airspace of an FIR/UIR. Each such movement following a landing within the FIR/UIR is to be counted as a separate flight.

MET (meteorological services). Meteorological services comprise those facilities and services that provide aviation with meteorological forecasts, briefs and observations as well as SIGMET information, VOLMET broadcasting material and any other meteorological data provided by States for aeronautical use.

OPS support (non-ATCos). Personnel which fulfil the requirements of the operational air traffic management without being either administrative or technical support.

SAR (search and rescue services). Any permanent civil establishment of equipment and personnel maintained for the purposes of providing search and rescue services.

Technical Support. Personnel employed either in maintenance, monitoring and control work for ongoing operational activity, or in work intended to improve safety, capacity, efficiency or quality of service in the future.

2.5 NATIONAL CIVIL AVIATION AUTHORITIES

Aeroplane. A power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.

Air operator certificate (AOC). A certificate authorizing an operator to carry out specified commercial air transport operations.

Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Aircraft — type of. All aircraft of the same basic design including all modifications thereto except those modifications which result in a change in handling or flight characteristics.

Approved training organization. An organization approved by a Member State in accordance with the requirements of Annex 1 — *Personnel Licensing* to the Convention on International Civil Aviation, to perform flight crew training and operating under the supervision of that State.

Certificate of registration. Article 29 of the Convention on International Civil Aviation requires that the certificate of registration be carried on board every aircraft engaged in international air transport (see Figure I-2-2).

Helicopter. A heavier-than-air aircraft supported in flight chiefly by the reactions of the air on one or more power driven rotors on substantially vertical axes.

Licensing Authority. The Authority designated by a Member State as responsible for the licensing of personnel³.

3. In the provisions of Annex 1 — *Personnel Licensing* to the Convention on International Civil Aviation, the Licensing Authority is deemed to have been given the following responsibilities by the Member State:

- a) assessment of an applicant's qualifications to hold a licence or rating;
- b) issue and endorsement of licences and ratings;
- c) designation and authorization of approved persons;
- d) approval of training courses;
- e) approval of the use of flight simulation training devices and authorization for their use in gaining the experience or in demonstrating the skill required for the issue of a licence or rating; and
- f) validation of licences issued by other Member States.

*	State <i>or</i> Common mark registering authority Ministry Department or Service	*
CERTIFICATE OF REGISTRATION		
1. Nationality or common mark and registration mark	2. Manufacturer and manufacturer's designation of aircraft	3. Aircraft serial no.
4. Name of owner		
5. Address of owner		
6. It is hereby certified that the above described aircraft has been duly entered on the in accordance with the Convention on International Civil (name of register) Aviation dated 7 December 1944 and with the (†).....		
(Signature)		
Date of issue		
(†) Insert reference to applicable regulations.		
*		

* For use by the State of Registry or common mark registering authority.

Figure I-2-2. Certificate of Registration

Maximum certificated take-off mass (MCTOM). The maximum permissible take-off mass of the aircraft according to the certificate of airworthiness, the flight manual or other official documents (see also sidebar in Part III, Chapter 2, paragraph 2.7.5).

Nationality of aircraft. The nationality of an aircraft is the State of its Registry (see Article 17 of the Convention on International Civil Aviation).

Operator. A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Rendering (a licence) valid. The action taken by a Member State, as an alternative to issuing its own licence, in accepting a licence issued by any other Member State as the equivalent of its own licence.

State of Design. The State having jurisdiction over the organization responsible for the type design.

State of Manufacture. The State having jurisdiction over the organization responsible for the final assembly of the aircraft.

State of the Operator. The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

State of Registry. The State on whose register the aircraft is entered⁴.

State of Registry or State of Operator?

The fundamental safety question is which State, the State of the aircraft's registry, or the State of the aircraft's operator, is responsible for compliance with the applicable safety standards of the Convention on International Civil Aviation (the Chicago Convention) and its Annexes, and which operator is responsible for compliance with the safety standards in applicable national laws and regulations. In some situations the safety responsibilities of the State and the operator are clear. Potential safety problems arise where a leased aircraft is registered in a State other than that of the operator using it for international air services.

States have addressed safety concerns arising from aircraft leasing using the established procedures in the Chicago Convention and its Annexes and, more recently, through Article 83 *bis* of the Convention. The Convention assigns the task of ensuring compliance with applicable safety standards primarily to the State of Registry of the aircraft but also, for certain aspects, to the State of the Operator. Article 83 *bis* of the Convention, which entered into force on 20 June 1997 (see *Policy And Guidance Material on the Economic Regulation of International Air Transport* (Doc 9587)), sets out a means of transferring all or part of the duties and functions pertaining to Articles 12, 30, 31 and 32(a) of the Convention from the State of the Registry (the lessor air carrier) to the State of the Operator (the lessee air carrier).

Additionally, regulatory concerns about safety are increasingly being dealt with in bilateral air transport agreements, in regulations or resolutions of regional bodies (e.g. the European Union, the European Civil Aviation Conference) and in various ICAO meetings and studies. ICAO has also developed guidance on aircraft leasing, including model clauses on aircraft leasing for optional use by States in bilateral or regional contexts (see Doc 9587), and on the implementation of Article 83 *bis*. (See *Guidance on the Implementation of Article 83 bis of the Convention on International Civil Aviation* (Cir 295)).

Source: Extract from the *Manual on the Regulation of International Air Transport* (Doc 9626).

4. In the case of the registration of aircraft of an international operating agency on other than a national basis, the States constituting the agency are jointly and severally bound to assume the obligations which, under the Convention on International Civil Aviation, attach to a State of Registry.

PART II

INTRODUCTION TO THE ICAO STATISTICS PROGRAMME

Chapter 1

THE STATISTICS PROGRAMME OF THE INTERNATIONAL CIVIL AVIATION ORGANIZATION

1.1 INTRODUCTION

1.1.1 The International Civil Aviation Organization (ICAO) has its origin in the *Convention on International Civil Aviation* signed at Chicago on 7 December 1944¹. ICAO officially came into existence in 1947, and in that year became a specialized agency of the United Nations system. ICAO is an organization representing governments and had a membership of 191 Contracting States in 2013.

1.1.2 The aims and objectives of ICAO, contained in Article 44 of the Convention, are to develop the principles and techniques of international air navigation and to foster the planning and development of international air transport so as to:

- a) ensure the safe and orderly growth of international civil aviation throughout the world;
- b) encourage the arts of aircraft design and operation for peaceful purposes;
- c) encourage the development of airways, airports, and air navigation facilities for international civil aviation;
- d) meet the needs of the peoples of the world for safe, regular, efficient and economical air transport;
- e) prevent economic waste caused by unreasonable competition;
- f) ensure that the rights of Member States are fully respected and that every Member State has a fair opportunity to operate international airlines;
- g) avoid discrimination between Member States;
- h) promote safety of flight in international air navigation; and
- i) promote generally the development of all aspects of international civil aeronautics.

1.1.3 In addition, in its ongoing mission to foster a global civil aviation system that consistently and uniformly operates at peak efficiency and provides optimum safety, security and sustainability, ICAO established three Strategic Objectives for the triennium 2011 — 2013:

- A. **Safety** — Enhance global civil aviation safety

1. Sometimes also known as *the Chicago Convention*.

B. **Security** — Enhance global civil aviation security

C. **Environmental Protection and Sustainable Development of Air Transport** — Foster harmonized and economically viable development of international civil aviation that does not unduly harm the environment.

1.2 THE ICAO STATISTICS PROGRAMME

1.2.1 The need for complete and reliable aviation statistics was foreseen by the framers of the Convention on International Civil Aviation and the obligation to file statistical information with ICAO is set out in Article 67:

“Each contracting State undertakes that its international airlines shall, in accordance with requirements laid down by the Council, file with the Council traffic reports, cost statistics and financial statements showing among other things all receipts and the sources thereof”.

1.2.2 Articles 54 and 55, which outline the functions of the Council of ICAO, also make several references to the collection and dissemination of information.

1.2.3 When the Provisional International Civil Aviation Organization (PICAO) was established in 1945, one of the first tasks of its Interim Council was to implement these articles of the Convention by appointing an Economic and Statistical Committee for the task of preparing statistical reporting forms. The Committee duly prepared reporting forms covering traffic, origin and destination, fleet, personnel and financial statistics and these forms were introduced in 1946. A *Draft Statistical Statement — 1946* was presented to the first Session of the ICAO Assembly in 1947 and, having been favourably received, the first *Statistical Summary* was published in April 1948. The latter publication contained monthly airline traffic statistics for 1946 and 1947. (Subsequently traffic statistics going back to 1929 were compiled by the former Statistics Section.)

1.2.4 Until 2004, these data were made available by the Organization through a series of publications under the general title of *Digests of Statistics*. However since that year, these data are available on line via the Internet.

1.2.5 The ICAO Statistics Programme described in this manual includes those statistics which are collected by the Organization on a recurring basis under this programme and which are made available to Member States and the public. There is certain other statistical information collected by ICAO which is not included in this manual. This includes statistics that are collected by the Organization for particular economic studies, and information primarily of a technical nature such as data on aircraft engine noise and emissions, aircraft accidents and incidents, physical characteristics of airports, and data on navigational aids.

1.3 DIRECTION AND OPERATION OF THE STATISTICS PROGRAMME

1.3.1 The Assembly is the sovereign body of ICAO, and it is convened at least once every three years. At each session, the Assembly reviews the work of the Organization in the technical, economic (including statistics), legal and technical cooperation fields, and guidance is given to the other bodies of ICAO for their future work. In some cases, statistical issues having broad policy implications and national interests are brought before the sessions of the Assembly. Assembly Resolution A37-20, and in particular Appendix B, make reference to the Statistics Programme of the Organization (see sidebar). Through the years, with the assistance of the Statistics Division and the Statistics Panel, the programme has been adapted to maintain its relevance to the Organization and to its Member States.

Resolution A37-20²: Consolidated statement of continuing ICAO policies in the air transport field

Introduction

Whereas the Convention on International Civil Aviation establishes the basic principles to be followed by governments to ensure that international air transport services may be developed in an orderly, regular, efficient, economical, harmonious and sustainable manner and it is therefore one of the purposes of ICAO to support principles and arrangements in order that international air transport services may be established on the basis of equality of opportunity, sound and economic operation, mutual respect of the rights of States and taking into account the general interest;

Whereas air transport is a major factor in promoting and fostering sustained economic development at national as well as international levels;

Whereas it is becoming increasingly difficult, particularly for developing countries, to secure the necessary resources required to optimize the opportunities and meet the challenges inherent in the development of air transport, and to keep pace with the challenges posed by demands on air transport;

Whereas the Organization prepares guidance, studies and statistics on the development of air transport for Contracting States on a continuing basis and these should be kept current, focused and relevant and should be disseminated to Contracting States through the most effective means;

Whereas Contracting States are required to provide accurate and factual statistical data and other information in order that the Organization may prepare this guidance;

Whereas the Organization is moving toward management by objective with more focus on implementation over standard setting;

Whereas guidance developed by the Organization, and action taken by the Organization in implementing its Strategic Objectives, should assist Contracting States in developing policies and practices that facilitate the globalization, commercialization and liberalization of international air transport; and

Whereas it is important for Contracting States to participate in the work of the Organization in the air transport field:

The Assembly:

1. *Resolves* that the Appendices attached to this resolution and listed below constitute the consolidated statement of continuing ICAO policies in the air transport field, as these policies exist at the close of the 37th Session of the Assembly:

- Appendix A — Economic regulation of international air transport
- Appendix B — Statistics
- Appendix C — Forecasting, planning and economic analyses
- Appendix D — Facilitation

2. *Assembly Resolutions in Force (as of 8 October 2010)*, Doc 9958. Assembly Resolutions are reviewed at each Session of the Assembly and new numbers are assigned following their adoption.

- Appendix E — Taxation
- Appendix F — Airports and air navigation services
- Appendix G — Air carrier economics
- Appendix H — Air mail

2. *Urges* Contracting States to have regard to these policies and their continuing elaboration by the Council in documents identified in this consolidated statement and by the Secretary General in manuals and circulars;

3. *Urges* Contracting States to make every effort to fulfil their obligations, arising out of the Convention and Assembly resolutions, to support the work of the Organization in the air transport field, and, in particular, to provide as completely and promptly as possible the statistical and other information asked for by the Organization for its air transport studies;

4. *Requests* the Council to attach particular importance to the problem of financing the development of the human and technical resources necessary to ensure the best possible contribution of air transport to the economic and social well-being of developing countries;

5. *Requests* the Council, when it considers that it would be of benefit in assisting its work on any air transport issues, to consult expert representatives from Contracting States by the most appropriate means, including the establishment of panels of such qualified experts, reporting to the Air Transport Committee or of Secretariat study groups, and working by correspondence or by meetings;

6. *Requests* the Council to convene Conferences or Divisional meetings, in which all Contracting States may participate, as the principal means of progressing the resolution of issues of worldwide importance in the air transport field, when such meetings are justified by the number and importance of the issues to be dealt with and where there is the likelihood of constructive action upon them;

7. *Requests* the Council to provide for workshops, seminars and other such meetings as may be required to disseminate ICAO's air transport policies and associated guidance to and amongst Contracting States;

8. *Requests* the Council to keep the consolidated statement of ICAO's air transport policies under review and advise the Assembly as appropriate when changes are needed to the statement; and

9. *Declares* that this resolution supersedes Resolution A36-15.

APPENDIX B

Statistics

Whereas ICAO's Statistics Programme provides an independent and global foundation for the purpose of fostering the planning and sustainable development of international air transport;

Whereas each Contracting State has undertaken that its international airlines shall file the statistics requested by the Council in accordance with Article 67 of the Convention;

Whereas the Council has also laid down requirements for statistics on domestic airline operations, international airports, and international route facilities, pursuant to Articles 54 and 55 of the Convention;

Whereas the Council has laid down requirements for data collection on civil aircraft on register pursuant to Article 21 of the Convention;

Whereas there is a need for the Organization to collect data from States on annual aviation fuel consumption to be used to address emerging challenges of sustainable development of air transport;

Whereas the nomination by States of focal points for aviation statistics will facilitate the timely filing of statistics and data requested by ICAO;

Whereas the Council has adopted a policy of management by objective which requires collection of pertinent data and analysis to measure the performance of the Organization as a whole and of its constituent parts in meeting the Strategic Objectives of the Organization;

Whereas the development of ICAO's integrated statistical database for validation and storage of data provides Contracting States and other users with an efficient online system for the retrieval of statistical data;

Whereas a number of Contracting States are still not filing, or have not been filing completely, the statistics requested by the Council; and

Whereas cooperation amongst international organizations active in the area of collection and distribution of aviation statistics may enable reduction in the burden of filing statistics:

The Assembly:

1. *Urges* Contracting States to nominate focal points for aviation statistics, and to make every effort to provide the statistics required by ICAO on time and to submit them electronically whenever possible;

2. *Requests* the Council, calling on national experts in the relevant disciplines as required, to examine on a regular basis the statistical data collected by ICAO in order to meet more effectively the needs of the Organization and its Member States, and to establish the necessary metrics to monitor the performance of the Organization in meeting its Strategic Objectives, to improve the uniformity of the statistics, the completeness and timeliness of reporting by Contracting States, and the form and content of analyses; and

3. *Requests* the Council to:

- a) continue to explore ways of closer cooperation with other international organizations active in the collection and distribution of aviation statistics; and
- b) make arrangements, on an appropriate basis, for assistance to be given upon request to Contracting States by personnel of the Secretariat for the improvement of their civil aviation statistics and their statistical reporting to the Organization.

1.3.2 The Council is the permanent governing body responsible to the Assembly. It is composed of representatives from 36 Member States elected by the Assembly for a three-year term. The Council and its subsidiary bodies provide the continuing direction of the work of the Organization. The Council's action is required for all programme and policy decisions of importance in the Statistics Programme.

1.3.3 The Air Transport Committee is a standing committee of the Council which studies and reports to it on all air transport matters, including the statistical activities of the Organization. The members of the Air Transport Committee are appointed by the Council from candidates submitted by Council Member States.

1.3.4 There are two advisory bodies which play an important role in the development of the Statistics Programme of ICAO. All Member States are invited to send delegates and advisers to the Statistics Division meetings, which are held when required at the discretion of the Council. The primary function of these Divisional meetings is to review the ICAO Statistics Programme and to suggest how the programme can be changed or improved to make it more useful and efficient for States and for ICAO. The Division reports to the Air Transport Committee. The second body, the Statistics Panel, is a group of statistical experts whose primary function is to give the Secretariat impartial advice on technical problems. The Panel currently consists of 15 experts who are recommended by their countries and approved by the Air Transport Committee. The Panel meets as needed and, more specifically, in advance of a Divisional meeting. Concerned international organizations are invited to send observers to meetings of these two advisory bodies.

1.3.5 The Secretary General is the Chief Executive of the ICAO Secretariat and has responsibility for the ICAO Statistics Programme. The Economic Analysis and Policy (EAP) Section conducts this Programme under the overall direction of the Director of the Air Transport Bureau (ATB).

1.3.6 ICAO has seven Regional Offices which provide field service to the Member States throughout the world. Each of these Regional Offices is responsible for contacting and assisting States with air transport matters, including assistance in the development of national aviation statistics programmes and participation in the ICAO Statistics Programme.

1.4 RELATIONSHIPS WITH OTHER INTERNATIONAL ORGANIZATIONS

1.4.1 Within the United Nations (UN) system each UN office and specialized agency is responsible for a specific field of activity, such as agriculture, civil aviation, education, environment, health. Article XIII of the agreement signed between ICAO and the UN in 1948 recognizes ICAO:

“... as the central agency responsible for the collection, analysis, publication, standardisation, improvement and dissemination of statistics within its special sphere...”.

1.4.2 There has been no significant infringement of this agreement within the UN system, and other UN bodies ask ICAO for any civil aviation statistics they require such as the civil aviation statistics published in the United Nations Statistical Yearbook and the Monthly Bulletin of Statistics, as well as in the statistical publications of the regional economic commissions. Coordination of statistical activities within the UN system is undertaken by the UN Statistics Division (UNSD) through the Committee for the Coordination of Statistical Activities (CCSA).

1.4.3 As a member of the UN family, in relation to its statistics programme ICAO endeavours to apply the ten *Principles governing international statistical activities* endorsed by the CCSA in 2005, and the good practices these entail (see Appendix A).

1.4.4 Outside the UN system, in addition to ICAO there are other international organizations which collect and publish statistics on civil aviation at a global or regional level. ICAO maintains close contact with all these organizations to try to avoid duplication of effort as well as to maintain common definitions throughout the industry so as not to overburden reporting entities and confuse users.

1.4.5 Coordination with other government and industry international organizations such as the African Civil Aviation Commission (AFCAC), the Arab Civil Aviation Commission (ACAC), the European Civil Aviation Conference (ECAC), the Latin American Civil Aviation Commission (LACAC), the Statistical Office of the European Union (EUROSTAT), the International Air Transport Association (IATA), Airports Council International (ACI) and the Civil Air Navigation Services Organisation (CANSO), is achieved at the strategic level through their participation as Observers at the meetings of the ICAO Statistics Division, Statistics Panel and in many of the regional workshops conducted by ICAO.

1.5 HOW CHANGES ARE MADE TO THE ICAO STATISTICS PROGRAMME

1.5.1 Since its inception in 1947, changes have been made to the ICAO Statistics Programme from time to time by adding, deleting or amending certain data series in order to keep the programme up to date with developments in the aviation industry and be relevant to the needs of ICAO and its Member States. The most recent changes took place following the Tenth Session of the Statistics Division in 2009.

1.5.2 Changes to the instructions or data series collected can be suggested during a meeting of one of the permanent bodies of the Organization, such as the Air Transport Committee, by a member of the Panel, a Member State or one of the Observers. The latter in particular tend to relate to changes or clarification in the definitions used, as both IATA and ACI usually follow the same definitions adopted by ICAO. However, in general, it tends to be the Secretariat which initiates such actions because of the perceived needs of the Organization or because of changes in the way the industry conducts its business which may require new or modified instructions and definitions. For example, the use of code-shared flights required that significant changes be introduced by the Ninth Session of the Statistics Division in the Reporting Forms for commercial air carriers adopted in 2001 to clarify how statistics should be reported when such operations were involved.

1.5.3 Requests for changes are then usually referred to the Members of the Statistics Panel for their views and comments. The Panel will also review the instructions and definitions required and whether such data are likely to be available, and if not, what other data could be used instead. The input of other international organizations, such as IATA and ACI, is generally sought to understand if such changes are feasible and can be adopted. Also, any changes to the ICAO Statistics Programme are likely to affect the workload of their Members who are usually the primary source of the data collected by ICAO.

1.5.4 Once approved by the Panel, depending on the nature of the changes, these may go directly to the Air Transport Committee for their approval and then to the Council. However, more complex and substantial changes are dealt with by the Statistics Division which generally meets every seven to ten years at the request of the Council to review the whole programme and any new proposals put forward by the Statistics Panel.

1.5.5 Part III, Chapter 1, contains a summary of the main recommendations agreed by the Tenth Session of the Statistics Division which were subsequently adopted by the Council and are now part of the new Air Transport Reporting Forms which are to be used to submit data to ICAO starting with the 2012 data reports.

1.6 ASSISTANCE TO MEMBER STATES

1.6.1 Several Statistics Divisions have considered that benefits might be derived from short visits to States by experts in aviation statistics, who would study the local circumstances, determine necessary statistical functions and

provide initial guidance to airlines, airports and government personnel in carrying out these functions. Notably it has been recognized that many States need manpower training and short-term expert assistance for the organization and development of their aviation statistics.

1.6.2 Statistical workshops are conducted by ICAO in the regions of the world, and they constitute a continuous, systematic effort to improve the quality of aviation statistics submitted to ICAO. These informal workshops, usually held once per year, provide those responsible in administrations, airlines and airports for the preparation of statistics for ICAO, an opportunity to work out solutions to practical problems through pooling of experience and ideas.

1.6.3 A more recent initiative has been a short-term familiarization and training programme called "on-the-job statistical training" which is provided at ICAO Headquarters. Participants from several States, particularly from Africa, have used this programme which is open to all ICAO Member States.

Chapter 2

THE STATISTICS PROGRAMME: AN ESSENTIAL TOOL FOR ICAO'S ACTIVITIES

2.1 INTRODUCTION

2.1.1 The civil aviation statistical data collected by ICAO are used by Member States, other international organizations and third party users for a number of economic and regulatory impact studies, to review market and industry trends and for financial and economic studies on the impact of the civil aviation industry on the national and global economies and, more recently, to assess the impact of civil aviation on climate change.

2.1.2 As described below, within ICAO the civil aviation statistics collected by the Organization represent the basic information which other regular programmes have come to rely upon to provide an analytical input to their own activities, such as for future air navigation planning requirements, aviation safety, training of civil aviation licensed personnel to meet future air traffic demand and protecting the environment from civil aviation activities.

2.2 ECONOMIC ANALYSIS ACTIVITIES

2.2.1 The Statistics Programme provides the traffic exposure data necessary to derive trend level indicators related to safety, efficiency and environmental protection, which are required to manage the sustainable development of civil aviation activities (Figure II-2-1). In addition to the safety analysis achieved through cross-linkages with external and internal databases such as the European Co-Ordination Centre for Aviation Incident Reporting Systems (ECCAIRS) database and the ICAO Universal Safety Oversight Audit Programme (USOAP) database, statistics also form the basis for any specific economic study, as required. The provision of guidance to States on cost/benefit analysis and business cases for planning and implementation of air navigation systems and related systems, including communication, navigation, surveillance and air traffic management (CNS/ATM), is a typical example of the kind of use that can be derived from statistics.

2.2.2 In conformity with Appendix G of Assembly Resolution A37-20¹, ICAO economic analysis activities also produce on a regular basis studies on regional differences in international airlines operating economics with a view to assisting States in the assessment of the impact of regulatory change. These studies are also used to support environmental planning, and to assess the effectiveness of measures for the implementation of the Strategic Objectives. In addition, data from these studies are used by the Prorate Agency to assist air carriers with the proration of passenger revenues from interline journeys.

1. *Assembly Resolutions in Force* (as of 8 October 2010), Doc 9958.

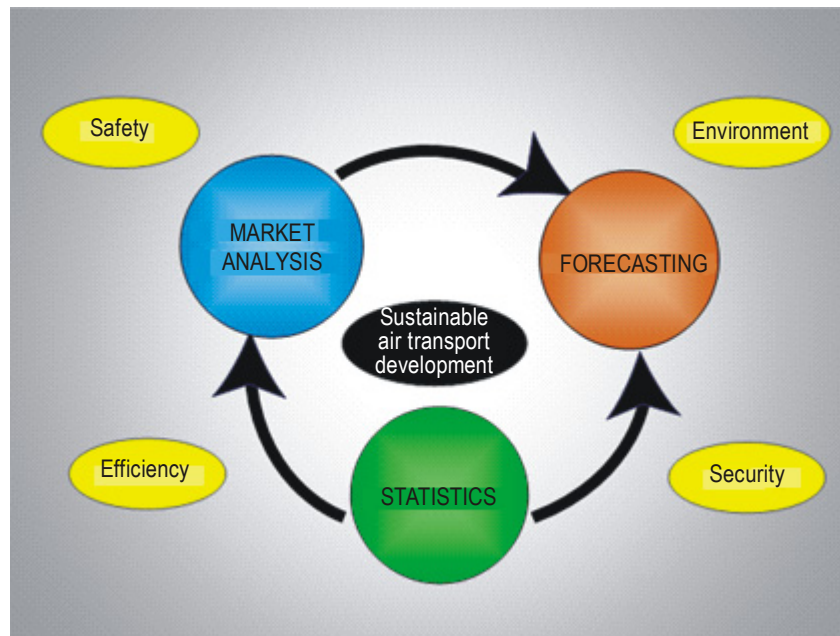


Figure II-2-1. Monitoring air transport development

2.3 FORECASTING ACTIVITIES

2.3.1 Air transport forecasts are needed for most analysis and planning applications related to civil aviation. ICAO's current forecasting activities are governed by Appendix C of Assembly Resolution A37-20. In conformity with this Resolution and the preceding relevant Resolutions, the Secretariat has been developing long-term and medium-term global and regional forecasts of passenger and freight traffic by region of airline registration, as well as passenger traffic forecasts for major route groups and global aircraft movement forecasts.

Global and regional air navigation plans

2.3.2 A crucial element in the achievement of any forecasting activities is the availability of the relevant data, and ICAO is uniquely placed in this respect, due to its extensive and comprehensive Statistics Programme. In the context of its forecasting activities, the Secretariat supports the regional traffic forecasting groups (TFGs) in four ICAO Regions (Africa and Indian Ocean, Asia/Pacific, Caribbean and South America, and Middle East) by providing them with regional passenger/freight traffic flows and aircraft movement forecasts and other planning parameters enabling the planning and implementation regional groups (PIRGs) and States to optimize decision-making as envisaged in the Global Air Navigation Plan (GANP).

Licensed personnel

2.3.3 As air traffic grows, the demand for personnel licensed to perform civil air transport operations, including air traffic control (ATC), increases proportionally. Estimating current and future requirements for licensed aviation personnel on active duty and training capacity in each Member State is essential to lay the ground work for human resources planning, institutional capacity building and related funding and policy measures.

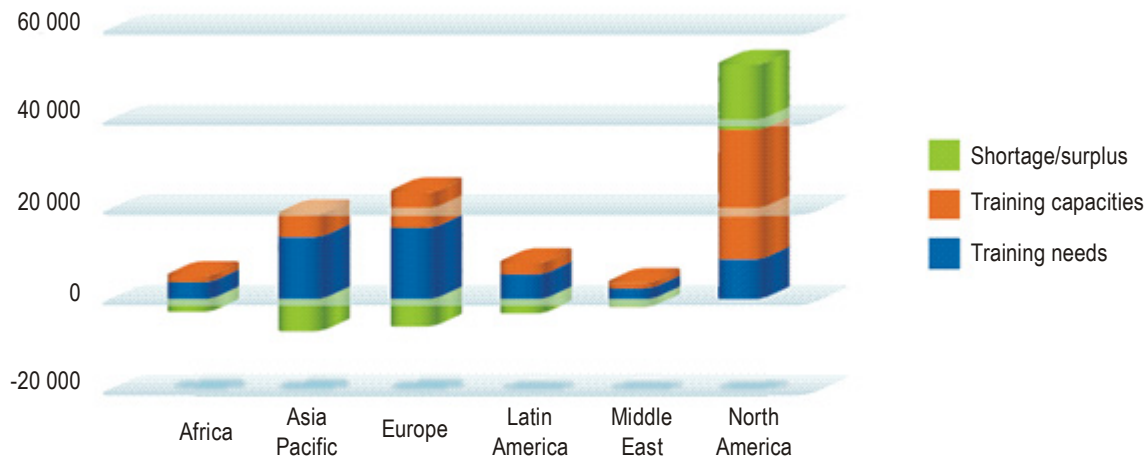


Figure II-2-2. Pilots comparison 2010 – 2030

2.3.4 Failures to quantify potential surplus or shortage of personnel and/or institutional capacities preclude adequate and timely measures from being taken to address these human resources and training imbalances. These shortcomings may adversely affect the safety of air transport operations. In order to allow Member States and the Organization to monitor this situation and, if necessary, to take remedial steps, the Council agreed to introduce a new Air Transport Reporting Form N to collect annual data on civil aviation licensed personnel and training institutions. As a starting point, in 2011 ICAO issued a *Global and Regional 20-Year Forecast — Pilots, Maintenance Personnel and Air Traffic Controllers* (Doc 9956) — see Figure II-2-2.

Improved forecast methodology

2.3.5 A review of ICAO forecasting activities was conducted in 2008 with a view to ensure a better alignment with ICAO's Strategic Objectives and to enhance the value of the forecasts to their users. The review led the Secretariat to conclude that there is a need to produce a single set of ICAO forecasts providing a harmonized ICAO vision of the future of civil aviation. A new forecasting scheme based on econometric modelling through a bottom-up approach has been implemented. Based on these various outputs, ICAO has issued manuals and other guidance material to assist States in their forecasting and economic planning activities.

2.4 ENVIRONMENTAL PROTECTION

2.4.1 On the environmental perspective, active support is also given to the work of Committee on Aviation Environmental Protection (CAEP), both in terms of forecasting and economic analysis activities. Among the latter, one needs to recall the studies carried out to examine the impact of airport noise reduction policies on air carriers of developing nations and how these reports allowed the Organization to introduce a gradual ban on the use of certain aircraft types, thus helping to mitigate the potential negative economic impact on air carriers of these States.

2.4.2 More recently, the issue of environmental protection has moved from noise pollution to pollution due to aircraft engine gas emissions which are a contributing factor to climate change. Basic operational data derived from the traffic by flight stage statistical series, a data collection unique to ICAO, has allowed the Organization to produce an industry-approved carbon calculator which estimates the carbon footprint of a passenger on his or her air journey (see

Figure II-2-3). This industry-approved methodology is now available for any entity to make use of to produce a carbon calculator based on its own operational data.

2.4.3 In view of the growing importance of aviation environmental protection issues, ICAO, its Member States and other civil aviation stakeholders need to have access to reliable data on aviation fuel consumption in order to support the broad range of analysis requested. These data are also required to evaluate the effectiveness of various measures introduced to improve aircraft technology, the efficiency of the different air traffic management (ATM) initiatives being implemented and to monitor the effectiveness of the environmental policies adopted by the Organization.

2.4.4 In addition, in order to measure the achievement of the fuel efficiency goals established in the Programme of Action that was adopted by the Group on International Aviation and Climate Change (GIACC) in May 2009 and endorsed by the High-level Meeting on International Aviation and Climate Change (HLM-ENV) in October 2009, the Council directed the ICAO Secretariat to develop and implement a mechanism under Article 67 of the Chicago Convention to collect annually from States data on traffic and fuel consumption. As a result, States are now required to submit on an annual basis the new Air Transport Reporting Form M on commercial air carriers' fuel consumption by aircraft type.

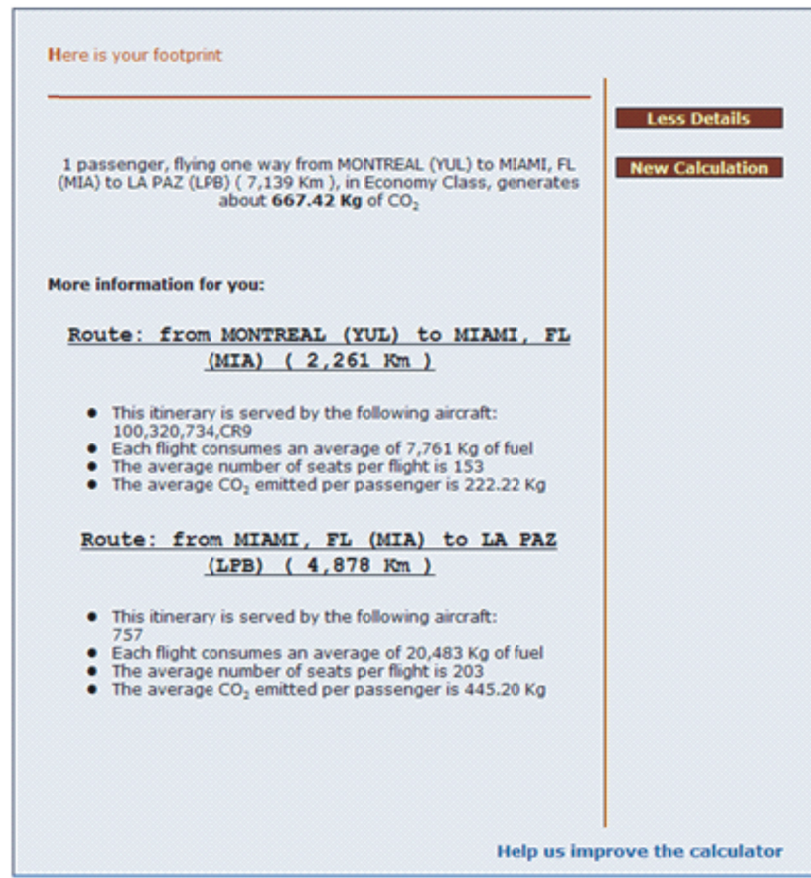


Figure II-2-3. Carbon footprint for a passenger travelling in economy (Y) class

PART III
STATISTICAL REPORTING GUIDE

Chapter 1

SUMMARY OF THE ICAO STATISTICS PROGRAMME

1.1 INTRODUCTION

This chapter provides four information summaries on the ICAO Statistics Programme:

- Main changes to the Statistics Programme approved by the Council following the Tenth Session of the Statistics Division (November 2009);
- General outline of the programme and reporting requirements;
- How to obtain and submit reporting forms;
- Where to obtain further guidance.

1.2 MAIN CHANGES TO THE STATISTICS PROGRAMME

On the basis of the Recommendations of the Tenth Session of the Statistics Division (STA/10)¹, the Council agreed to introduce the following major changes to the ICAO Statistics Programme. Other minor changes were also introduced to some of the reporting instructions and definitions to clarify their intent and purpose.

1.2.1 Changes to the existing Air Transport Reporting Forms (ver. 01/00)

On-flight Origin and Destination — Form B

In addition to the traffic for international scheduled air services, this Form should also cover the collection of international non-scheduled traffic.

Also, all restrictions as to the city-pairs published lifted, hence opening up to Member States and other users all the OFOD data available to ICAO. The only restriction which remains in place is that no data are to be released until six months after the end of the reporting period.

Airport traffic — Forms I and I-S

The criteria for the selection of airports were modified to cover major domestic airports. Also, due to the reclassification of the civil aviation activities, traffic related to air taxis and business commercial aviation are to be included with that of other non-scheduled operations.

1. *Tenth Session of the Statistics Division, Montréal, 23-27 November 2009 (Doc 9932).*

For the same group of airports selected for Form I, States are to submit in **Form I — Part II** the origin and destination (O-D) traffic for each of the airports concerned.

Civil aircraft on Register — Form H

This form was simplified by requiring States to report only the total number of aircraft with certain attributes in terms of engine type, number of engines and type of wing (fixed or rotary).

Airport financial data — Form J

The most significant change to this Form is the addition of data on the number of employees at an airport. This covers both those employed directly by the airport authority and those employed by other entities within the airport boundaries.

En-route services finances — Form K

As for airports, the revised form will include a request to submit data on the number of staff employed by the provider of air navigation services.

1.2.2 New Reporting Forms

Air carrier fuel consumption — Form M

To fulfil the needs of the Environmental Programme at ICAO, States will be requested to submit annual fuel consumption by aircraft type and type of flight.

Licensed personnel and training institutes — Form N

States will be required to submit number of pilots, engineers, air traffic controllers licensed by their national civil aviation authorities as well as the number of approved training institutes.

Quarterly survey on financial parameters of air carriers

This survey will be carried out by the ICAO Regional Offices. The reported individual air carrier data will be treated as confidential and used only to calculate regional and global financial trends of the air transport industry.

1.3 GENERAL OUTLINE AND REPORTING REQUIREMENTS

1.3.1 The ICAO Statistics Programme has its foundation in Article 67 of the Convention on International Civil Aviation. The current reporting requirements, established by Council decision, are described in this chapter by subject category. Table III-1-1 gives an overall view of the structure and content of the Programme and shows a summary of reporting requirements and due dates for submission. Programme areas are outlined under the major subject matter categories: commercial air carriers, airports, air navigation services and en-route facilities, and State civil aviation statistics.

Reports for commercial air carriers

1.3.2 States should file the following reports covering commercial air carriers from their State which offer air transport services (passenger or freight):

- a) Traffic — Commercial air carriers (Form A), individual air carrier statistics to be reported each month;
- b) Traffic — Commercial air carriers (Form A-S), summary traffic data for all commercial air carriers based in the reporting State, for each year;
- c) On-Flight Origin and Destination (Form B), covering international scheduled and, as from 2012, non-scheduled traffic of commercial air carriers sub-divided by city-pair, for each quarter;
- d) Traffic by Flight Stage (Form C), covering international scheduled services of the airline, for each year;
- e) Fleet and Personnel — Commercial air carriers (Form D), for each calendar year, or the fiscal year of the air carrier;
- f) Financial data — Commercial air carriers (Form EF), for each calendar year, or the fiscal year of the air carrier;
- g) Aircraft fuel consumption and traffic — Commercial air carriers (Form M), for each year.

1.3.3 In addition STA/10 recommended that ICAO carries out each quarter a confidential financial survey of major air carriers to monitor the health of the industry. The *Quarterly survey on financial parameters of air carriers* is to be collected with the assistance of the ICAO Regional Offices.

Reports for airports

1.3.4 For the main airports with international services in each State, the reporting requirements are as follows:

- a) Airport Traffic (Form I) — for individual international airport, monthly traffic data;
- b) Airport Traffic (Form I-S) — summary airport traffic data for all the airports in a State, for each year;
- c) Airport Financial Data (Form J) — for each calendar or fiscal year.

Reports for en-route facilities and services

1.3.5 The reporting requirements are as follows:

- a) Air navigation services financial data (Form K) — for each calendar or fiscal year;
- b) En-route facility traffic statistics (Form L) — for each calendar year; and

Reports for State civil aviation statistics

1.3.6 Every Member State is also required to provide the following reports to ICAO:

- a) Civil aircraft on register (Form H) — annually, as at 31 December;
- b) Aviation personnel, licensing and training (Form N) — annually, for the year ended 31 December.

Table III-1-1. ICAO Statistics Programme and reporting requirements

<i>Subject category</i>	<i>ATR</i>	<i>Periodicity</i>	<i>For whom</i>	<i>What</i>	<i>When (due date)²</i>
Commercial air carriers					
Commercial air carrier traffic	A	Monthly	Individual commercial air carriers	Measures aircraft operations and passenger, freight and mail traffic by type and nature of service	One month, but no later than 2
	A-S	Annual	Total for all commercial air carriers of a State		6 months
On flight Origin and Destination	B	Quarterly	Individual commercial air carriers	Passenger, freight and mail carried between international city-pairs on scheduled or non-scheduled services	2 months
Traffic by Flight Stage	C	Annual	Individual commercial air carriers	Traffic (passenger, freight and mail) on-board each aircraft between a take-off and the next landing when performing international scheduled services	2 months
Fleet and Personnel	D	Annual	Individual commercial air carriers	<i>Part I:</i> Number, capacity and utilization of aircraft by type	4 months
		Annual (calendar or fiscal)		<i>Part II:</i> Number and expenditure for personnel by category	4 months
Financial data	EF	Annual (calendar or fiscal)	Individual commercial air carriers	Profit and loss, balance sheet, retained earnings and summary of traffic and capacity	<i>Preliminary:</i> 4 months <i>Final:</i> 6 months
Aircraft fuel consumption and traffic	M	Annual	Individual commercial air carriers	Traffic, capacity offered and fuel consumption by aircraft type	2 months
Survey on financial parameters	-	Quarterly	Major air carriers in ICAO Regions	Quarterly operating revenues and expenses as well as traffic and capacity	2 months

2. Due dates are given in terms of the number of months after the end of each reporting period.

Subject category	ATR	Periodicity	For whom	What	When (due date) ²
Airports					
Airport traffic	I	Monthly	Individual commercial airports	Part I: Aircraft movements, passengers, freight, and mail by type of traffic	2 months
				Part II: International aircraft movements, passengers, freight and mail by city-pair	
	I-S	Annual	Total for all commercial airports of a State	Aircraft movements, passengers, freight, and mail by type of traffic	6 months
Airport financial data	J	Annual (calendar or fiscal)	Individual commercial airports	Revenues, expenses, net investments and number of staff employed at the airport	6 months
En-route facilities and services					
Air navigation services financial data	K	Annual (calendar or fiscal)	FIR/UIR control centres	Revenues, expenses, net investments and number of staff employed at the control centres	6 months
En-route facility traffic	L	Annual	FIR/UIR	Number of flights moving through the corresponding FIR/UIR	4 months
State civil aviation statistics					
Civil aircraft on register	H	Annual	Member State	Number of aircraft on register of a State at the end of the year	2 months
Aviation personnel, licensing and training	N	Annual	Member State	Number of personnel licensed during the year and total with valid licenses at the end of the year; Number and capacity of aviation training institutions	4 months

1.4 HOW TO OBTAIN AND SUBMIT REPORTING FORMS

Air Transport Reporting Forms

1.4.1 The Air Transport Reporting (ATR) Forms are available in six ICAO languages (Arabic, Chinese, English, French, Russian, Spanish). These forms, designed to provide for accurate and efficient reporting, include detailed reporting instructions. Copies of these Forms in electronic format (MS Excel) plus the relevant instructions and definitions published in pdf format can be downloaded from:

<http://www.icao.int/staforms>

Electronic ATR Forms

1.4.2 ICAO has also developed the ATR Forms in MS Excel to be used to submit data in electronic form. They can be downloaded from the website address shown above. States are strongly advised to use these forms as they will enable the Secretariat to automatically load the data into the Integrated Statistics Database (ISDB), thus avoiding having to rekey the figures submitted.

1.4.3 Completed electronic reporting forms can be submitted to ICAO either by email (sta@icao.int) or on a compact disc addressed to the EAP Section in Montréal.

1.4.4 When entering the data on an electronic Form the following points deserve attention:

- a) **do not** attempt to modify the structure of the Forms by inserting or deleting columns or rows, the ICAO-produced Forms were specifically designed to allow automatic loading of the data;
- b) **do not** attempt to create your own forms, use only the ICAO-supplied electronic Forms;
- c) **be sure** to enter the numerical values as numbers, not as text;
- d) **do not** use 1000 separator;
- e) if you need to enter **decimals**, you can use either the decimal point or comma, depending on the local convention.

1.5 WHERE TO OBTAIN FURTHER GUIDANCE

1.5.1 Comprehensive guidance on how to complete the reporting Forms is given in the following Chapters 2 to 5 of this manual. Part III provides information on data processing procedures aimed at assisting staff dealing with quality control aspects. Appendix C provides a list of useful resources in terms of where to obtain airport and air carrier codes or assistance on aircraft names and aircraft characteristics, as well as other organizations which collect civil aviation data. However, should you require further assistance, queries concerning the preparation of the ICAO ATR Forms may be resolved by sending an email to the EAP Section in Montréal at:

sta@icao.int

1.5.2 Users of ICAO statistics are invited to direct oral or written inquiries (using the direct email address above) to ICAO on any question or problem related to availability, use or interpretation of civil aviation statistics.

1.5.3 ICAO conducts regional workshop meetings for informal discussions between personnel concerned with the submission and use of ICAO statistics. From time to time short-term familiarization courses and a training programme called “on-the-job statistical training” are provided at ICAO Headquarters. Any inquiries concerning such workshops and training programmes may be addressed to the EAP Section in Montréal.

Chapter 2

COMMERCIAL AIR CARRIER STATISTICS

2.1 INTRODUCTION

This chapter covers the data that States need to report to ICAO in relation to their commercial air carriers. ICAO collects a variety of data on air carriers dealing with traffic, capacity, fleet, personnel, finances and fuel consumption. While ICAO collects air carrier data using different reporting Forms, the data themselves are often related and, for the data to be correct, these relationships have to be respected. The next section of this chapter will show the data relationship between the various air carrier reporting Forms and how these relationships can be used to validate the information reported. This is discussed in more detail in Part IV, Chapter 3 dealing with the data validation processes used by ICAO.

2.2 TRAFFIC AND CAPACITY DATA

2.2.1 The ICAO Statistics Programme has four Air Transport Reporting Forms dealing with commercial air carrier traffic:

Forms A and A-S — Traffic – Commercial air carrier traffic;

Form B — On-flight Origin and Destination (OFOD); and

Form C — Traffic by flight stage (TFS).

2.2.2 Forms A and A-S are almost identical in terms of the statistical items requested, where they differ is in the coverage. Whereas in Form A States are requested to report monthly traffic and capacity figures for individual commercial air carriers, Form A-S is meant to be reported once a year covering the summarized data for all commercial air carriers with principal place of business in the territory of the reporting State, including air carriers individually reported on Form A, as well as, where possible, air carriers with smaller fleets (i.e. fleets not exceeding 200 tonnes aggregate maximum take-off mass).

2.2.3 The letter reference associated with each Form is only for short-hand identification purposes and no other importance should be attached to it. What is significant in this case is that Forms B and C contain the information which can be used to derive all other traffic and capacity data to be reported to ICAO. Therefore, it is essential to understand what the data collected through these Forms represent in order to be able to report them in all the other forms such as Form A — Traffic, Form D — Fleet, and the traffic and capacity portion of Form EF — Finances (Part 4).

2.2.4 While the data relationship across the various reporting Forms applies to the whole of traffic, ICAO collects Forms B and C only for international services, consequently the comparability with the other forms is limited to these operations. However, since individual air carriers have access to their own raw data for OFOD and TFS collected through their accounting and operations departments they can use the same information obtained for other operations (such as domestic services) to derive the remaining data required for Forms A and D.

2.2.5 The relationships between the various Forms are described below and in Tables III-2-1 and III-2-2.

- a) the summation of the information captured through Form B must correspond to the number of passengers and freight tonnes carried reported in Form A (see Table III-2-1);

Table III-2-1. Relationship between Forms B and A

<i>Form B (OFOD)</i>		<i>Form A</i>
By city-pair:		Total:
Passenger numbers (Pn)	\sum (Pn of Form B) =	Passengers carried
Freight (tonnes) (F)	\sum (F of Form B) =	Freight carried
Mail (tonnes)		

- b) the summation of the number of flights performed by aircraft type reported in Form C must be identical to the number of departures shown in Form A (see Table III-2-2);
- c) the summation of the capacity and traffic for each flight stage (Form C) multiplied by the corresponding flight stage distance (in kilometres) must correspond to the passenger-kilometres performed, seat kilometres available, tonne-kilometres performed (passenger, freight and mail) and tonne-kilometres available reported in Form A (see Table III-2-2);

Table III-2-2. Relationship between Forms C and A

<i>Form C (TFS)</i>		<i>Form A</i>
By city-pair:		Total:
	Calculated distance (km) by station pairs	
Number of flights by aircraft type (D)	\sum (D x km of Form C) =	Aircraft distance
	\sum (D of Form C) =	Number of departures
Passenger seats (S)	\sum (S x km of Form C) =	Seat-km available
Payload (Pd)	\sum (Pd x km of Form C) =	Tonne-km available
Passenger numbers (Pn)	\sum (Pn x km of Form C) =	Passenger-km performed
Freight (tonnes) (F)	\sum (F x km of Form C) =	Freight tonne-km performed
Mail (tonnes) (M)	\sum (M x km of Form C) =	Mail tonne-km performed

- d) in the case of Form D, this is somewhat more difficult since the data in Form C are limited to scheduled international services, but where individual aircraft type operations are restricted to them, the summation of the flight departures, available capacity (and aircraft kilometres) should match those reported for Form C.

2.3 OPERATING AIR CARRIER

2.3.1 A major change which was adopted by the Ninth Session of the Statistics Division (STA/9 — 1997) was to request that all operational, capacity and traffic data reported for commercial air carriers should be the one for the *operating air carrier*. For statistical purposes the latter is defined as that carrier whose flight number is being used for air traffic control purposes, in other words the operator of the aircraft. Hence any traffic this aircraft carries on behalf of other air carriers (the marketing carriers) because of code-sharing or other commercial agreements must be included with the data reported for the operating carrier.

2.3.2 This change was required to ensure that capacity and traffic figures reported by individual carriers are homogeneous. Under the old system where each carrier reported its own data it would happen that traffic and capacity did not match. The marketing carrier would have included traffic which in reality was carried by a different carrier (the operating carrier). Or in the case of capacity a carrier (the operating carrier) would be apparently flying with too much capacity simply because in part the additional capacity was destined for the marketing carrier(s).

2.4 TRAFFIC FLOW DATA (FORMS B AND C)

2.4.1 As stated earlier, in order to complete Form A, one has to have a clear understanding of the differences between the data covered under OFOD and those shown in the TFS. In addition in this section it will be shown that, where the flight itinerary flown by the passengers reported for OFOD is known, one can derive the traffic information for the TFS data; i.e. there is also a relationship between the OFOD and TFS traffic figures. Before discussing this relationship one must clearly understand what the two sets of data represent, in particular as at first sight they would appear to refer to the same thing; however, the traffic to be reported in each of the two forms is based on two completely different sets of criteria.

On-flight origin and destination (OFOD) — Form B

NEW
 As from 2012 States are required to submit a Form B (OFOD) for each one of their non-scheduled operators.

2.4.2 States have to report on a quarterly basis on-flight origin and destination (OFOD) data for the international scheduled and non-scheduled¹ operations of individual commercial air carriers.

<i>City-pair</i>		<i>Airport origin and destination traffic</i>			<i>Air carriers included* (by code)</i>
<i>From</i>	<i>To</i>	<i>Passengers (Number)</i>	<i>Freight (Tonnes)</i>	<i>Mail (Tonnes)</i>	
a	b	c	d	e	f

1. Reporting data for non-scheduled operations of commercial air carriers was introduced in 2012 as a result of a Recommendation from the Tenth Session of the Statistics Division (2009).

2.4.3 The revenue traffic reported for OFOD is classified by city-pair taking as a basis the itinerary of each flight (i.e. the operation of an aircraft on a flight-stage or a number of flight-stages with an unchanging flight number). The traffic on a flight is then subdivided by city-pair in accordance with the point of embarkation and the point of disembarkation. Hence, for OFOD data, the significant elements to be reported are the *points of embarkation and disembarkation of the traffic concerned* regardless of the flight routing (non-stop or direct flight) used.

2.4.4 It should be noted that the statistics are based on origin and destination traffic *by flight number*, and not origin and destination based on the overall route network of an airline nor on the **true** origin and destination of the traffic. Consequently, the on-flight origin and destination reported must correspond to the embarkation and disembarkation cities identified on the individual flight coupon or shipment document.

2.4.5 For statistical purposes, a passenger, who during his or her journey needs to transfer to another flight (i.e. a flight with a *different* flight number) to complete his or her trip, becomes a new passenger with his or her own on-flight origin and destination. For example, passenger A wishes to travel from Montréal to Dakar. As there are no direct flights between these two cities, the passenger has to travel via Paris, where he/she will change flights. Hence, in the OFOD report this passenger will appear twice; once under Montréal — Paris, and a second time, as another completely unrelated passenger, under Paris — Dakar.

2.4.6 It should be noted that in the past, because of the interline capabilities offered by the air transport system, this was the only way to identify the passenger's so-called "origin and destination". With the introduction of the large computer reservation system (CRSs), such as Sabre and Amadeus, it is now possible to track the whole travel itinerary of a passenger and hence identify the **true** origin and destination (in the case of passenger A above, Montréal to Dakar). These data are available for purchase at a fairly high price from the CRSs or from IATA, which makes use of the analysis of sales through travel agents.

2.4.7 With regard to the data to be reported in Form B, the following points deserve attention:

Scheduled and non-scheduled traffic. Where possible States should submit two separate reporting Forms, one for international scheduled services and another for international non-scheduled operations.

Cabotage. Please note that for statistical purposes foreign cabotage traffic (i.e. traffic carried between city-pairs in a State other than the one where the reporting carrier has its principal place of business) is considered as international traffic and therefore the traffic for city-pairs involving foreign cabotage should be included in Form B.

City-pairs. Where possible the cities shown in columns *a* and *b* of the reporting Form should be identified using the IATA Location Identifier (three-letter codes) published in their *Airline Coding Directory*. Please note that IATA, in addition to the code identifying the facility (aerodromes, heliports, harbours, bus and train stations), also includes a corresponding city code. In the majority of cases the two codes (airport and city codes) are identical, except where more than one facility is available within the same metropolitan area. For example, where cities have two or more aerodromes, the metropolitan area is identified by its own three-letter code (e.g. LON for London, PAR for Paris, NYC for New York City, MOW for Moscow). Where there is any doubt about the correct IATA city code to be used, the name of the city should be given instead.

Revenue traffic (passengers, freight and mail). Once the international revenue traffic for each flight during the reporting quarter has been classified in accordance with the points of embarkation and disembarkation as explained above, the traffic for each flight should be aggregated on a city-pair basis in columns *c*, *d* and *e*. Revenue traffic is to be reported for each direction for each city-pair (see the example in the Reporting Instructions attached to Form B).

Air carriers included. States have the option to report a single Form B for each one of the air carriers with principal place of business in their territory, or to report the aggregate data by city-pair for all the air carriers concerned. In the latter case, States are requested to identify in column *d* for *each* city-pair the air carriers whose traffic is being reported. See examples shown in the Reporting Instructions attached to Form B.

Traffic by flight stage (TFS) — Form C

2.4.8 States are requested to submit on an annual basis (calendar year) traffic by flight stage (TFS) data for the international scheduled services of their commercial air carriers.

Station		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

2.4.9 Revenue traffic data (passengers, freight and mail) reported for TFS represents the *traffic on board the aircraft on each flight stage* (regardless of the on-flight origin and destination of the traffic). So, a passenger (or a tonne of freight and mail) flying between Montréal and Amman on a flight with routing Montréal-London-Amman will appear on two stages: once on the stage Montréal – London, and a second time on the stage London – Amman.

2.4.10 It should be noted that in the case of TFS, because the data identifies the traffic on board an aircraft during each flight stage, one is then able to identify the capacity offered during each flight stage and make the connection between traffic carried and capacity offered. In general, such a connection cannot be done using the OFOD data reported in Form B where the relationship between the passenger journey and the relevant flight information and its itinerary are lost.

2.4.11 With regard to the data to be reported in Form C, the following points deserve attention:

Cabotage. Please note that for statistical purposes foreign cabotage traffic (i.e. traffic carried between city-pairs in a State other than the one where the reporting carrier has its principal place of business) is considered as international traffic and therefore the traffic and capacity for flight stages involving foreign cabotage should be included in Form C.

Stations. Where possible the stations (cities) shown in columns *a* and *b* of the reporting Form should be identified using the IATA Location Identifier (three-letter codes) published in their *Airline Coding Directory*. Alternatively, States may use the ICAO four-letter Location Indicators published by the Organization on a quarterly basis in *Location Indicators* (Doc 7910 or its corresponding website). Also, whenever possible, the individual stages of a flight itinerary should be listed first in one direction and then in the reverse direction (see the example in the Reporting Instructions for Form C). In the event that more than one flight number is used for the same itinerary, the data may either be reported by flight number or consolidated by itinerary. Revenue traffic levels should not be used in determining the order of the reporting flight stages on the report.

Technical stops. Stages where one of the stations is a stop required for technical reasons are to be treated as any other flight stage and included in Form C. For example, assume that there is a non-stop service between Seoul (SEL) and New York (JFK). However the aircraft being used has a marginal range and because of the atmospheric conditions it needs to make a technical stop in Anchorage (ANC) to take on board additional fuel. In this case, the reporting entity should show in Form C the stages SEL — ANC and ANC — JFK with exactly the same revenue traffic figures as no traffic would have been unloaded or loaded in ANC.

Type of aircraft. When more than one type of aircraft has been used in operating a certain stage, the capacity and revenue traffic data must be shown desegregated by aircraft type. States which have already adopted the CAST/ICAO² taxonomy to identify aircraft types in their own databases may use this in column c) in preference to the IATA/OAG coding system if they so wish.

Number of flights. The number of flights entered in column *d* is equivalent to the number of departures performed per aircraft type during the reporting period for the corresponding stage from the station identified in column *a*.

Capacity available. Please note that the number of passenger seats (column *e*) and payload available (column *f*), represent *the capacity available for sale* taking into account any restrictions which may apply for operational or commercial reasons. For example certain short-haul air carriers may opt not to carry freight and mail in order to simplify airport handling operations and maximize the daily utilization of the aircraft by maintaining the time spent for turn rounds to a minimum. In this case, the capacity available for sale (expressed in tonnes) is equivalent to the number of seats multiplied by the average passenger mass, as no additional capacity is being made available for sale. As payload capacity seems to be a parameter many air carriers have problems in calculating, a sample calculation is shown in the sidebar following paragraph 2.4.18.

Revenue traffic. As indicated above, the revenue traffic (passengers, freight and mail) reported in columns *g*, *h* and *i* represents the traffic on board the aircraft on each flight stage *regardless* of the point of embarkation or disembarkation of the traffic concerned.

Relationship between the OFOD and TFS data. The best way to illustrate the relationship between the data reported on each one of the two reporting Forms, OFOD and TFS, is through a simple example.

2.4.12 Assume that there is a flight PA 001³ with the following itinerary:

New York (JFK) — Miami (MIA) — Lima (LIM) — Santiago de Chile (SCL)

where PA is a carrier with principal place of business in the United States, and we assume no traffic restrictions apply. The flight is performed with a Boeing 767-200 with 216 seats and a total payload capacity of 31 tonnes.

2. The CAST/ICAO Common Taxonomy Team (CICCT) was established in 1999 by the Commercial Aviation Safety Team (CAST) and ICAO to enhance aviation safety through the development and promotion of common terminology, definitions and taxonomies used to describe aviation safety events. The standardized names of aircraft manufacturer, model and series to be used in aviation databases are available in the CAST/ICAO website, <http://intlaviationstandards.org/>

3. The information concerning this flight and the flight itself are entirely fictitious and were only created for the purposes of this example.

2.4.13 The OFOD data for this flight are as follows:

<i>City-pair</i>		<i>Passengers (number)</i>	<i>Freight (tonnes)</i>
<i>From</i>	<i>To</i>		
JFK	MIA	110	0
JFK	LIM	20	2
JFK	SCL	35	3
MIA	LIM	40	1
MIA	SCL	80	2
LIM	SCL	30	0

2.4.14 The TFS data reported for this flight would look like this:

<i>Stations</i>		<i>Type of aircraft</i>	<i>Number of flights</i>	<i>Capacity available</i>		<i>Revenue traffic</i>	
<i>From</i>	<i>to</i>			<i>Number of seats</i>	<i>Total payload (tonnes)</i>	<i>Passenger numbers</i>	<i>Freight (tonnes)</i>
JFK	MIA	Boeing 767 200	1	216	31	165	5
MIA	LIM	Boeing 767 200	1	216	31	175	8
LIM	SCL	Boeing 767 200	1	216	31	145	5

2.4.15 The table below shows for the passengers only how the OFOD and TFS reports are related

<i>OFOD</i>			<i>TFS</i>		
<i>City-pair</i>		<i>Passenger numbers</i>	<i>Revenue passenger numbers</i>		
<i>From</i>	<i>To</i>		<i>JFK-MIA</i>	<i>MILA-LIM</i>	<i>LIM-SCL</i>
JFK	MIA	110	110		
JFK	LIM	20	20	20	
JFK	SCL	35	35	35	35
MIA	LIM	40		40	
MIA	SCL	80		80	80
LIM	SCL	30			30
TOTALS		315	165	175	145

2.4.16 Regarding the city-pair JFK — SCL, according to the OFOD information 35 passengers boarded flight PA 001 in JFK for destination to SCL. On the TFS side of the table it shows that in order to complete this journey these 35 passengers must have been on board the aircraft on all three stages. Consequently, if in addition to the OFOD information, one has the itinerary of the flight used, it is fairly easy to derive the TFS data for that flight.

2.4.17 This was just an example to illustrate the relationship between the two sets of data. Air carriers do not do this exercise to report these figures. Instead the information required is generally captured from two different documents: the flight coupon (or air waybill) for OFOD and the flight load sheet for the TFS data (see Figure III-2-1).

2.4.18 In the example shown above there are no operational restrictions which would require the operator to reduce the payload capacity available from any of the three sectors concerned. However, if the available capacity had to be reduced because of operational restrictions, then this would have to be reflected in the corresponding reported data.

**Example: how to calculate the
total payload available for an aircraft**

The table below shows how to calculate the payload available for an aircraft. The table shows data for three commonly used aircraft. The physical data are part of the design characteristics of the aircraft and form part of the documentation provided by the manufacturer for each aircraft.

To calculate the payload available for a passenger aircraft one must also know the average passenger and checked baggage mass, the average density of the baggage and of the freight generally carried by the carrier. As indicated in the definitions and instructions issued by ICAO, air carriers are encouraged to make use of the figures which are most representative of their operations, however if these figures are not available, then ICAO suggests carriers may wish to use 100 kg for the average passenger mass plus checked baggage, and a freight and checked baggage density of 161 kg/m³. The example below shows an average passenger mass of 80 kg, but the mass of checked baggage varies between 15 and 25 kg, showing a difference between short-, medium- and long-haul operations.

<i>Description</i>	<i>Airbus A320-200</i>	<i>Boeing 767-200</i>	<i>Boeing 777-200</i>
Number of passenger seats	150	216	327
Maximum cargo volume available (m ³)	37.4	86.9	160.0
Average passenger mass plus checked baggage (kg)	95	100	105
Average 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)	3 767	9 676	17 581
Total payload available (kg)	18 017	31 276	51 916
Maximum structural payload (kg)	19 200	32 200	63 950

Sample calculation for the A320- 200

Volume required for the checked baggage = $15 \times 150/161 = 14 \text{ m}^3$

Hence, volume available for freight = $37.4 - 14 = 23.4 \text{ m}^3$

Consequently,

Payload available for passengers plus checked baggage = $150 \times 95 = 14\,250 \text{ kg}$

Payload available for freight = $23.4 \times 161 = 3\,767 \text{ kg}$

Total payload available = $18\,017 \text{ kg}$

The resultant payload needs to be compared with the maximum structural payload which is the value which cannot be exceeded. The table above shows that under the weights and densities used in these calculations, for the three aircraft shown above, the restrictive factor is the volumetric capacity for cargo. In fact, because the checked baggage and freight density are identical, if the number of passengers on board is reduced, all that would occur is that the space vacated by the checked baggage could be used for freight, but there would be no gain in the overall capacity available (in terms of kg) from the reduction in passenger numbers.

In this case no reductions in payload were assumed due to operational reasons. However, if because of the latter, the maximum take-off mass from a particular airport is affected, this in turn may have an impact on the maximum payload available from that airport.

Originator ALC	LDM	Flight ZZZ1234/28	A/C reg BAE3	Version 0a3Y112	Crew 2 / 3	Date 28th-X-2007					
Loadsheet and Loadmessage ZZZ -AIRLINE EXAMPLE- All weights in KGS			Maximum Weights for →	ZERO FUEL 3 5 6 0 6	TAKE-OFF 7 0 0 0	LANDING 3 8 3 2 8 4 5 0 0					
Dry Operating Wt.	2 5 6 0 0	Max. Allowed TOW lowest of three	4 2 6 0 6	4 4 2 2 5	4 2 8 2 8						
Take-Off Fuel +	7 0 0 0	Operating Weight -	3 2 6 0 0								
Operating Weight	3 2 6 0 0	Allowed Traffic load	1 0 0 0 6								
			DISTRIBUTION - WEIGHT		REMARKS						
Dest	M	A/F	CH	I	Cabin bags	TOTAL	FWD 1	AFT 4		PAX C Y	
O R Y	12	10	2	2		Tranit Tr 3 0 0	300			24	
	5					2 Pcs B 2 6 28				5	
						CARGO C 2 6 28				PAX-29 PADD	
						ULD	0			AVI1	
						MA	0				
	17	10	2	2	0	T 3 5 2	352				
B R U	20	25	10	1		Tranit Tr 0				55	
						50 Pcs B 6 5 0		650			
						CARGO C 1 0		10		PAX-55 PADD	
						ULD	0			FEPA	
						MA	0				
	20	25	10	1	0	T 6 6 0		660			
T O T A L	37	35	12	3		1 0 1 2	352	660		84	
Passengers weight →			x 10 KGS			3 0				Seating Conditions	
→			x 35 KGS			4 2 0				MAX Seats	
→			x 69 KGS			2 4 1 5				Actual	
→			x 83 KGS			3 0 7 1				CA 24 17	
Allowed Traffic Load						5 9 3 6		1 0 0 0 6		OB 54 41	
Total Traffic Load -						6 9 4 8		6 9 4 8		OC 34 26	
Dry Operating Weight +						2 5 6 0 0		3 0 5 8			
Zero Fuel Weight =						3 2 5 4 8				Balance	
MZPW	35606	LMC x								DOI 302.00	
Take-Off Fuel +						7 0 0 0				%MAC	
Take-Off Weight =						3 9 5 4 8				DLI 306.2 37.8	
MTOW	44225	LMC x								LZPW 305.1 37.0	
Trip Fuel -						4 5 0 0				LITOW 306.1 38.88	
Landing Weight =						3 5 0 4 8				LILAW 311.0 38.6	
MLW	38328	LMC x								Total Passengers 84+3 INF	
Notes			Standard weights are used for Passengers Baggage weights to ORY are Standard (13 KGS x Piece) Baggage weights to BRU are Standard (13 KGS x Piece)		FLAPS STABO 35	EET 0155 ALTN LFQO	Prepared by M.GOMIS	Approved by EDUARDO			
C. G. LIMITS of			Fuel ZFI 271.7 MACZF 26.5 AR ZFI 331 MACZF 45.2 Fuel TOI 288.4 MACTO 28.7 AR TOI 337.9 MACTO 45.2		END 0330	FUP 6000	13:00 PW		I hereby certify that the loading of this aircraft is in accordance with currently approved Loading Instructions.		
Cabin AREA TRM / PAX							Signed _____ Aircraft Dispatcher				

Figure III-2-1. Example of a passenger aircraft load sheet

The area highlighted by the square shows the next flight destinations (ORY and BRU) and passenger loads on this aircraft. It also shows the number of passengers which were already on board and are in transit at this stop. Note that the passengers can be identified as M-male, F-female, CH-child and I-infant, or alternative as A-adults, CH, and I. Each one of these categories is associated with an average passenger mass. Looking at the destinations, this flight to ORY, had 12 M, 10 F, 2 CH and 2 I, i.e. 22 adults, 2 children and 2 infants already on board who are in transit. It also shows that there are five male passengers are joining this flight going to ORY, plus 45 adults, 10 children and 1 infant who are going to BRU.

Source : Manuel Gomis Saavedra © '98/2007 www.aircraftloadsheets.com

2.5 Commercial air carrier traffic by carrier — Form A

2.5.1 This form is used to report on a monthly or annual basis the traffic and operational data for individual commercial air carriers. With regard to the data to be reported in Form A, the following points deserve attention:

Form A

Description a	Unit b	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 c	Domestic d	International e	Domestic f
SCHEDULED REVENUE FLIGHTS					
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) passenger (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	%				

Description a	Unit b	TOTAL ALL SERVICES (passenger, mail and freight including all-freight)		ALL-FREIGHT SERVICES ONLY (included in columns c and d data)	
		Classified by flight stage		Classified by flight stage	
		International c	Domestic d	International e	Domestic f
NON-SCHEDULED REVENUE FLIGHTS					
12. Aircraft kilometres	000				
13. Aircraft departures	number				
14. Aircraft hours	number				
15. Passengers carried	number				
16. Freight tonnes carried	number				
17. Passenger-kilometres performed	000				
18. Seat-kilometres available	000				
19. Tonne-kilometres available	000				
a) passenger (incl. baggage)	000				
b) freight (incl. express)	000				
c) mail	000				
d) total (19a + 19c)	000				
20. Tonne-kilometres available	000				
NON REVENUE FLIGHTS					
21. Aircraft hours	number				

Breakdown by service type. States are requested to break down the data for total all services and all-freight services into international and domestic flights (columns *c*, *e* and *d*, *f* respectively). Please note that all-freight services (columns *e* and *f*) **must also be included** in the total (columns *c* and *d*). Hence the value any of the individual items entered in columns *e* or *f* must be equal or smaller than the equivalent figure entered in columns *c* or *d*, respectively.

In addition data must be segregated by type of operation: scheduled and non-scheduled revenue flights.

Classification of a flight stage. As suggested in the headings for the columns in Form A, data are defined as domestic or international according to the nature of the flight stage to which they belong.

2.5.2 According to the definition adopted by ICAO, *in this particular case*⁴, for a flight stage to be classified as *domestic* it must meet two criteria:

- a) it must be flown between points within the domestic boundaries of a State; **and**

4. This definitions applies to the traffic for the commercial air carrier statistics reported for the ICAO regular statistics programme. Other definitions for domestic and international traffic exist for other purposes such as for determining the operating costs and revenues by route, and for airports.

- b) the flight must be performed by an air carrier whose principal place of business is in *that* State.

Consequently, any other type of flight stage is deemed to be international.

Scheduled and non-scheduled. The distinction between scheduled and non-scheduled operations is linked to the type of operating license awarded and the nature of the operations allowed under the Air Services Agreement exchanged between two or more States for the international routes flown. It is therefore up to the individual air carrier to clearly identify under which categorization the individual traffic flight data should be reported.

Operating carrier. As for all the other air carrier reporting Forms, all operational and traffic items in Form A should be reported for the *operating carrier* (i.e. that carrier whose flight number is being used for air traffic control purposes). Hence, in the case of code-shared operations, the traffic data of the marketing carrier must be included with the data being reported for the operating carrier. The purpose of this is to have a direct correspondence between traffic carried and capacity available.

Aircraft kilometres (items 1 and 12). Please note that there has been a change in the manner in which the aircraft distance should be calculated. Though the distance is still the shortest distance between two points on the surface of the Earth (usually referred as to the great circle distance), the new method of calculation no longer treats the earth a perfect sphere, but as an ellipsoid (World Geodetic System – 1984 (WGS-84) adopted by ICAO). In this case the calculation of the distance is based on the Vincenty formula⁵. This method to calculate the air distances is also being used by the European Union for their Emission Trading Scheme (ETS).

Aircraft hours (items 3 and 14). Also known as block time, is calculated from the moment the aircraft is pushed back from the gate or starts taxiing from its parking stand for take-off to the moment it comes to a final stop at a gate or parking stand after landing.

Traffic carried (items 4,5,15 and 16). The fact that the flight stage determines the nature of the traffic does create a problem in the case of international flights with domestic sectors, as in this case there is likely to be international traffic on board a domestic stage. Refer to the example flight PA 001 (see paragraph 2.4.12). This flight is composed of a domestic flight stage (JFK–MIA) and two international flight stages (MIA–LIM and LIM–SCL).

2.5.3 The information associated with passenger traffic for this flight shown below indicates that in New York (JFK), flight PA 001 embarked 110 domestic and 55 international passengers who were on board the aircraft on the flight stage JFK–MIA. The table above also suggests that if one is to make any sense of the TFS data for this flight when compared with capacity offered (see TFS data in paragraph 2.4.14) one must count the international passengers in the domestic stage. Consequently, as indicated in the reporting instructions associated with Form A, international passengers on a domestic flight stage must be counted twice: one as domestic and a second time as international. Hence Form A for flight PA 001 would show 165 passenger carried on the domestic stage and 205 (315 – 110) passengers carried on international services. Please note that passengers carried are obtained by adding up the passenger figures shown for OFOD.

5. Copies of this formula are available on the internet, e.g. <http://www.movable-type.co.uk/scripts/latlong-vincenty.html>

OFOD				TFS		
City-pair		Passenger numbers	Nature of traffic	Revenue passenger numbers		
From	To			JFK-MIA	MILA-LIM	LIM-SCL
JFK	MIA	110	Domestic	110		
JFK	LIM	20	International	20	20	
JFK	SCL	35		35	35	35
MIA	LIM	40			40	
MIA	SCL	80			80	80
LIM	SCL	30				30
TOTALS		315		165	175	145
				Nature of stage	Domestic	International

2.5.4 The rules discussed above are also applicable to freight and mail.

Operational and traffic (remaining items). As discussed at the beginning of this Section, except for passenger numbers and freight tonnes carried, all other elements in Form A can be readily derived from the TFS data. Refer once again to flight PA 001. In addition to the information shown in the TFS data table, one needs to have the stage distance (in km) and the block flight time for each stage, as shown below:

Stations		Type of aircraft	Number of flights	Capacity available		Revenue traffic		Stage Length (km)	Block Time (hrs)
From	to			Number of seats	Total payload (tonnes)	Passenger numbers	Freight (tonnes)t		
JFK	MIA	Boeing 767 200	1	216	31	165	5	1754	3.0
MIA	LIM	Boeing 767 200	1	216	31	175	8	4198	5.5
LIM	SCL	Boeing 767 200	1	216	31	145	5	2453	3.5

2.5.5 On the basis of the data shown above and an average passenger mass plus baggage of 100 kg, Form A for flight PA 001 would look as follows:

<i>Description</i>	<i>Units</i>	<i>International</i>	<i>Domestic</i>
1. Aircraft kilometres	units	6 651	1 754
2. Aircraft departures	units	2	1
3. Aircraft hours	units	9	3
4. Passengers carried	units	205	165
5. Freight carried (tonnes)	units	8	5
6. Passenger-kilometres performed	000	1 090	289
7. Seat-kilometres available	000	1 437	379
8. Passenger load factor	%	75.9	76.3
9. Tonne-kilometres performed			
a) Passenger (inc baggage)	units	109 034	28 941
b) Freight	units	45 849	8 770
c) Mail	units	0	0
d) Total	units	154 883	3 7711
10. Tonne-kilometres available	units	206 181	54 374
11. Weight load factor	%	75.1	69.4

Note.— Most units have been altered from those shown in Form A to display the data for a single flight.

2.6 COMMERCIAL AIR CARRIER TRAFFIC BY STATE — FORM A-S

2.6.1 Except for the additional information requested on air taxis, the elements to be reported on Form A-S are identical to those found in Form A. However, the most significant difference between these two forms relates to the data they refer to. Form A is reported on a monthly or annual basis for individual air carriers with the principal place of business in the reporting State. In Form A-S, States are to report on an annual basis the aggregate data for **all** the commercial air carriers with the principal place of business in that State. The aim of this data collection is to obtain a clear view of the air transport industry development in a State by covering all commercial air carriers irrespective of their size.

2.6.2 The data in Form A-S must also include the data for those air carriers which were individually reported using Form A. Consequently, the sum of the individual elements reported for all the air carriers of a State in Form A must be equal or less than the figure reported for the same element in Form A-S.

2.7 FLEET AND PERSONNEL — FORM D

2.7.1 States are to report on an annual basis (calendar or fiscal year) data on the fleets and personnel of their commercial air carriers. Form D consists of two Parts:

Part I, covers data on the number and types of aircraft operated, their capacity and their utilization; and

Part II, shows the numbers of airline personnel by job category, and the annual expenditures for these personnel.

Part I — Fleet

2.7.2 In this Part, States are to register the data on the aircraft operated by their commercial air carriers during the reporting year for their own operations as the operating carrier. The statistics are reported separately for each type of aircraft (manufacturer and model) in the fleet whether these are owned, leased or chartered by the carrier.

2.7.3 The headings of the columns in Part I of Form D are shown below. For readability purposes, the table is shown split in half.

Aircraft in Fleet by Type		Number of Aircraft of each Type				Size of Aircraft		
Manufacturer and Model	Use/Version code ¹	At the beginning of the year	Changes during the year		At the end of the year	Number of Installed Passenger Seats	Average payload capacity (tonnes)	Average MCTOM (tonnes)
			Acquired	Disposed of				
a	b	c	d	e	f	g	h	i

Utilization of aircraft during the year									
Number of aircraft departures			Aircraft hours flown			Aircraft kilometres flown			Total aircraft days available
Revenue flights		All flights (total)	Revenue flights		All flights (total)	Revenue flights		All flights (total)	
Scheduled	Non-Scheduled		Scheduled	Non-Scheduled		Scheduled	Non-Scheduled		
j	k	l	m	n	o	p	q	r	

2.7.4 With regard to the fleet data to be reported in Form D, the following points deserve attention:

Aircraft manufacturer and model (columns a and b). If possible the names used to identify the aircraft reported should follow the taxonomy adopted by CAST/ICAO⁶. The common taxonomy uses the aircraft name, model and series as it was given by the manufacturer. Sometimes this is not sufficiently clear to identify the cabin layout of the aircraft, for example whether it is a passenger or “combi”⁷ aircraft, hence the additional information requested in column b.

Number of aircraft (columns c to e). The number of aircraft in the fleet of the air carrier at the beginning of the year given in column c should correspond with the number reported in column f for the end of the previous year.

6. The standard names of aircraft manufacturer, model and series to be used in aviation databases are available in the CAST/ICAO website, <http://intlaviationstandards.org/>

7. “Combi” aircraft are passenger aircraft which have been configured to carry freight on the main deck.

Average MCTOM (column i). See sidebar following paragraph 2.7.5 on the *maximum declared take-off mass (MDTOM)*. Where air carriers are using the MDTOM they should enter the latter instead of the manufacturer's declared MCTOM.

Revenue flights (columns j, k, m, n, p and q). When excluding the data for aircraft which have been leased out over the reporting period, the summation of the revenue flight data for all the aircraft reported in Form D should correspond to the figures reported for the same period in Form A. The various items reported for each aircraft type should be consistent with each other, i.e. the number of departures, hours and kilometres flown should all correspond to the same operations. Consequently, the average stage length and block speed should fall within the operational parameters for the aircraft type being reported.

All flights (columns i, o and f). The figures reported here include non-revenue flights (e.g. testing, training, repositioning). Hence the sum of the revenue scheduled and non-scheduled figures for the corresponding heading and aircraft type must be equal or less than the figure reported for all flights.

Total aircraft days available (column s). The instructions for this item clearly state that the following days should be **excluded** from the days available:

- the days between the date of purchase of an aircraft and the date it is actually placed in service;
- the days subsequent to an aircraft's last revenue flight and prior to its disposal;
- the days that an aircraft is out of service due to major accidents or conversion;
- the days that an aircraft is in the possession of others;
- the days that an aircraft is not available because of government action such as grounding by government regulatory agencies.

2.7.5 All other days must be considered as days available, **including** the days required for maintenance or overhaul. Please note that the average number of aircraft days available per aircraft type in a year cannot exceed 365 days. Also, the result of dividing the annual hours flown by aircraft type (column o) by the corresponding aircraft days available (column s) cannot exceed 24 hours.

Maximum declared take-off mass (MDTOM)

The Convention on International Civil Aviation allocates to the State of Registry certain functions which that State is entitled to discharge, or obligated to discharge. The maximum take-off mass at which an aircraft can operate is generally certificated by the aeronautical authority of the State responsible for the Type Certificate Data Sheet (TCDS) or the State of manufacture, which are usually the same. For aircraft that are not covered by a TCDS, such as ex-military and permit to fly aircraft, then it is the State of registry that issues the national Certificate of Airworthiness (C of A) or permit to fly that is responsible. However under certain circumstances at the request of the operator, the aeronautical authority of the State of the operator may modify the certificated MTOM of individual aircraft to a maximum declared take-off mass (MDTOM).

The MCTOM of an aircraft is generally the basis on which airport landing and en-route charges are calculated. Air carriers which, for operational or commercial reasons, will never be operating near the official MCTOM can specify a lower take-off mass as there will be no operational penalty to them in declaring a reduced MDTOM. The reason for this could be that they are just carrying less fuel because of the routes on which they are using the aircraft or they opted to forgo the carriage of cargo (most

LCC do this). The purpose of using a MDTOM is to reduce airport and en-route charges. Hence, the reductions in MCTOM are sometimes to just below a particular weight break that the airport or en route providers use. The new maximum take-off mass, the MDTOM, is shown in the flight manual of each of the aircraft for which the change was requested.

Examples of MDTOM approved by a State for the aircraft of its air carriers can be seen in the website of the United Kingdom Civil Aviation Authority (UK CAA) at:

<http://www.caa.co.uk/default.aspx?catid=1425&pagetype=90&pageid=8274>

Part II — Personnel

Category of personnel ²	Number of personnel		Total annual expenditures for each category
	Mid-year	Year-end	Currency: _____
a	b	c	d
Pilots and co-pilots			
Other flight crew			
Cabin crew			
Maintenance and overhaul personnel			
a) Licensed aircraft maintenance engineers			
b) Other maintenance and overhaul personnel			
Ticketing and sales personnel			
All other personnel			
TOTAL			

2.7.6 There is no need to include here additional explanatory notes for the items identified in Part II of Form D as the information given in the corresponding Reporting Instructions are considered to be sufficient. Nevertheless, it is worth stressing that the annual expenditures cover all those staff costs (salaries, social welfare, pension contribution, overtime, flying pay, etc.) as seen from the air carrier point of view. Consequently, expenditures are not limited solely to the annual income received by the staff.

2.7.7 With regard to the actual figures reported, their validity may be checked by dividing the figure in column *d* by the corresponding figure in column *b* to see if the average annual personnel expenditure per person falls within the expected range for each category of personnel.

2.7.8 Please indicate on the Form when staff numbers may appear unusually low for the size of the air carrier concerned because most of an activity (e.g. aircraft maintenance) or several activities have been contracted out to third parties. Similarly, indicate activities being carried out for third parties which require employing additional staff to satisfy the demand for the activities being contracted in.

2.8 FINANCIAL DATA — FORM EF

NEW
A Preliminary Form EF, Part 1, to be reported within four months of the end of the reporting period.

2.8.1 States are to report on an annual basis (calendar or fiscal year) the financial data for their commercial air carriers in Form EF. The Form is divided into four Parts:

Part 1 — Profit and loss statement;

Part 2 — Balance sheet;

Part 3 — Statement of retained earnings; and

Part 4 — Revenue traffic and capacity statistics.

2.8.2 The data collected using Form EF are intended to reflect the financial situation of the air carrier concerned and should include all revenues, expenses, assets and liabilities of that air carrier. If the air carrier is part of a group of companies encompassing other related activities, such as aircraft maintenance, catering, and reservation systems, only the activities pertaining to the air carrier as a provider of commercial air transport services should be reported. However, if some of the financial data, such as the balance sheet, cannot be reported separately for the air carrier entity, only the operating data (revenues and expenses) shown in the *profit and loss statement* (Part 1) need refer to the air carrier activities. The non-operating items as well as the other financial data shown in the *balance sheet* (Part 2) and in the *statement of retained earnings* (Part 3) can be for the group as a whole.

2.8.3 In addition to reporting Form EF as a whole, States are also asked to submit a *provisional* Form EF (restricted to Part 1 only) within four months of the end of the reporting period. The *provisional* data for individual commercial air carriers reported using this Form will be treated as confidential and will be used to produce regional and global estimates.

Part 1 — Profit and loss statement

2.8.4 The profit and loss statement in Form EF has been designed to show the revenues and expenses for a commercial air carrier by major accounting categories. These data are to be associated with the revenue traffic and capacity data reported for the same air carrier on Form A or, in the case where the revenue and cost data include figures for other commercial air carriers in the same financial group, the corresponding revenue traffic and capacity data can be reported in Part 4 of Form EF.

2.8.5 The Reporting Instructions associated with Form EF are quite comprehensive, and these should be read carefully before starting to complete this Form. Particular attention should be given to the instruction related to the *Reporting of data for operations conducted under certain commercial agreements between two or more air carriers* shown in page 5 of the Reporting Instructions.

2.8.6 In addition to the instructions given for Part 1 of Form EF, the following points deserve careful attention:

Exchange rate (part of the header of the form). ICAO requests that for the period concerned the applicable average exchange rate of the reporting currency to the US Dollar be provided whenever the data are not reported in USD. If no exchange rate is provided then ICAO will use its own exchange rate calculated from the average monthly values stored in the ISDB⁸.

Operating revenues (items 1 and 2) and expenditures (items 5 to 12). If after reading the Reporting Instructions for Part 1 there is still some doubt as to where to allocate a particular revenue or expense item, the prevailing principle is that the operating revenues and expenses reported are going to be compared with the related revenue traffic and capacity. Consequently, where these revenues and expenses are **directly** linked to the air transport operations of the air carrier concerned they should be entered as gross amounts under the appropriate operating revenue or expenditure item.

Surcharges. The revised reporting instructions clarify that any monies collected from air passengers on surcharges of fuel or other surcharges that result in revenues retained by the air carrier, i.e. where the carrier does not have the obligation to pass on these amounts so collected to the government or other entity, must be reported in Form EF as passenger revenues under *items 1.1 and 2.1*.

8. The ISDB allows exchange rates to vary on a daily basis. However, for convenience only average monthly values are stored. Consequently the same value is shown for each day of the corresponding month. Hence when the ISDB calculates the average exchange rate over a 12-month period, this is done by taking the average monthly rate as if it was a daily rate and the weighted average is then based on 365 (or 366) days, not 12 months.

Form EF

PART 1 — PROFIT AND LOSS STATEMENT

DESCRIPTION		AMOUNTS	
		SUB-ACCOUNTS	MAIN ACCOUNTS AND RESULTS
OPERATING REVENUES	1. Scheduled services (total) 1.1 Passenger 1.2 Excess baggage 1.3 Freight, express, and diplomatic bags 1.4 Mail		
	2. Non-scheduled operations (total) 2.1 Passenger and excess baggage 2.2 Freight (including express and diplomatic bags) and mail		
	3. Other operating revenues (total) 3.1 Incidental transport related revenues 3.2 Miscellaneous operating revenues		
	4. TOTAL OPERATING REVENUES (sum of lines 1, 2 and 3)		
OPERATING EXPENSES	5. Flight operations (total) 5.1 Flight crew salaries and expenses 5.2 Aircraft fuel and oil 5.3 Flight equipment insurance 5.4 Rentals flight equipment 5.5 Other expenses		
	6. Flight equipment maintenance and overhaul		
	7. Depreciation and amortization (total) 7.1 Depreciation — flight equipment 7.2 Amortization of capital leases — flight equipment 7.3 Depreciation and amortization — ground property and equipment 7.4 Other		
	8. User charges (total) 8.1 Landing and associated airport charges 8.2 Air navigation charges		
	9. Station expenses		
	10. Passenger services (total) 10.1 Cabin crew salaries and expenses 10.2 Other expenses		
	11. Ticketing, sales, and promotion (total) 11.1 Commission expenses 11.2 Other expenses		

	12. General and administrative		
	13. Other operating expenses (total) 13.1 Incidental transport related expenses 13.2 Miscellaneous operating expenses		
	14. TOTAL OPERATING EXPENSES (sum of lines 5 through 13 above)		
	15. OPERATING PROFIT OR (LOSS) (line 4 less line 14)		
NON - OPERATING - REVENUE AND EXPENSES	16. Interest expense (total) 16.1 Interest on debt 16.2 Interest on capital leases		
	17. Capital gain or (loss) on retirement of equipment and other assets		
	18. Payments from public funds		
	19. Affiliated companies		
	20. Other non-operating items		
	21. NON-OPERATING ITEMS (sum of items 16 through 20 above)		
PROFIT OR LOSS	22. PROFIT OR (LOSS) BEFORE INCOME TAXES (sum of lines 15 and 21)		
	23. Income taxes		
	24. PROFIT OR (LOSS) AFTER INCOME TAXES (sum of line 22 and line 23)		
	25. Extraordinary items		
	26. PROFIT OR (LOSS) AFTER extraordinary items (sum of line 24 and line 25)		

Other operating revenues (item 3) or other operating expenses (item 13). As indicated earlier, the main purpose of Form EF is to collect operating revenues and expenses of an air carrier which are directly related to its air transport activity and hence can be linked with the corresponding traffic and capacity figures to obtain unit revenues and costs which can be compared with those of other air carriers. Since the reporting air carrier has to include all the revenues and expenses involved with the operation as the operating air carrier, there is a need to include in Form EF the settlement of accounts between air carriers when, for example, they are involved in code-shared operations or other air transport commercial agreements. Such transfers of monies are to be reported under *items 3.1* (revenues) and/or *13.1* (expenses).

2.8.7 Similarly, the reporting air carrier may be involved in providing services to other carriers such as aircraft maintenance and overhaul, airport handling or catering. Many air carriers which are involved in these activities have spun off these businesses to subsidiary companies. For example Lufthansa has created Lufthansa Technik from whom Lufthansa AG (the airline company) purchases aircraft maintenance. However, where third-party activities are still being carried out in-house, the expenses incurred to provide these services should be separated from those required by the reporting air carrier for its own operations, and the revenues and expenses for third-party activities should be reported as net results (i.e. revenues less expenses) under item 3.2.

Non-operating revenues and expenses (items 16 to 21). Only net amounts should be reported for these items. Where a net result for a given item results in an expense to the air carrier concerned, this should be clearly identified by a negative sign. The non-operating items may include information related to the financial group operations, in which case this should be clearly stated in the Remarks section of the reporting Form.

Main and sub-accounts. The sum of the related sub-accounts must be equal to the amount shown for the main account, i.e. the sum of items 1.1 to 1.4 must equal the figure shown under item 1.

Part 2 — Balance sheet, and

Part 3 — Statement of retained earnings⁹

2.8.8 Where it is not possible to report the balance sheet and retained earning information related to the commercial carrier whose revenues and expenditures were reported under Part 1, States can report in Parts 2 and 3 the group results pertaining to the group holdings to which the air carrier belongs.

2.8.9 In addition the Reporting Instructions on Form EF for Parts 2 and 3, the following points deserve careful attention:

Balance sheet date. The date of the balance sheet should correspond to the day shown as the ending of the calendar or fiscal year reported on Form EF.

Assets and liabilities. The figures reported for total assets (item 6) and total liabilities (item 11) must be equal.

Retained earnings. Please note that:

- a) The figure reported in the balance sheet as the net balance of *retained earnings* (item 10.3), should be the same as that reported in item 5 of the statement of retained earnings; and
- b) In the currency in which the accounts are kept (usually the local national currency), the figure reported for item 1 of the statement of retained earnings should be the same as that reported in item 5 of the previous year's statement.

9. States which have already adopted the International Financial Reporting Standards (IFRS), are most likely to find that data required for Part 3 of Form EF are covered in their air carriers' Statement of Comprehensive Income.

PART 2 — BALANCE SHEET

		DESCRIPTION	AMOUNTS	
			SUB-ACCOUNTS	MAIN ACCOUNTS AND TOTALS
ASSETS	1.	Current assets (total)		
	1.1	Cash, bank balances, and short-term investments		
	1.2	Current accounts and notes receivable		
	1.3	Other Current assets		
	2.	Special funds (total)		
	2.1	Investment in affiliated companies		
	2.2	Equipment purchase funds		
	2.3	Other special funds		
	3.	Operating property and equipment (total)		
	3.1	Flight equipment – owned		
	3.1.1	Less — flight equipment — reserve for depreciation		
	3.2	Ground property and equipment – owned		
	3.2.1	Less — ground property and equipment — reserve for depreciation		
	3.3	Flight equipment under capital leases		
	3.3.1	Less — flight equipment — accumulated amortization		
	3.4	Ground property and equipment under capital leases		
	3.4.1	Less — ground property and equipment — accumulated amortization		
	3.5	Land		
	4.	Non-operating property and equipment (total)		
	4.1	Non-operating property and equipment		
	4.1.1	Less — allowance for depreciation and amortization		
	5.	Other assets (total)		
	5.1	Deferred charges		
	5.2	Intangible assets		
	5.3	Investments in associated companies		
	5.4	Other assets		
	6.	TOTAL ASSETS (sum of lines 1 through 5 and equal to line 11 below)		
LIABILITIES	7.	Current liabilities (total)		
	7.1	Accounts, traffic balances, and notes payable		
	7.2	Air traffic liability		
	7.3	Other current liabilities		
	8.	Non-Current liabilities (total)		
	8.1	Long-term debt		
	8.2	Long-term obligations under capital leases		
	8.3	Advances from affiliated companies		

	8.4 Reserves 8.5 Other non-current obligations		
	9. Deferred credits		
	10. Stockholder's equity (total) 10.1 Capital stock 10.2 Capital surplus 10.3 Retained earnings (Equal to line 5 of Part 3 below)		
	11. TOTAL LIABILITIES AND STOCKHOLDER'S EQUITY (sum of lines 7 through 10, and equal to line 6 above)		

PART 3 — STATEMENT OF RETAINED EARNINGS

	DESCRIPTION	SUB-ACCOUNTS	MAIN ACCOUNTS AND RESULTS
APPROPRIATIONS	1. Net balance of unappropriated retained earnings for previous years, as shown in item 5 of last year's Statement of Retained Earnings		
	2. Profit or (loss) after extraordinary items for this year (item 26 of Part 1)		
	3. Adjustments (total) 3.1 Transfer to reserves 3.2 Amount paid as bonus, dividends, etc. 3.3 Other (Specify):		
	4. Appropriations		
	5. Net balance of unappropriated retained earnings for the current year (equal to line 10.3 of Part 2)		

Part 4 — Revenue traffic and capacity statistics

2.8.10 States are only asked to report the air carrier's total traffic and capacity statistics corresponding to the operating revenues and expenses identified in Part 1 should these be different from the corresponding traffic and capacity data reported on Form A for the air carrier concerned; for example, if the operating revenue and expense figures include data for other commercial air carriers in the Group.

PART 4 — REVENUE TRAFFIC AND CAPACITY STATISTICS

DESCRIPTION	UNIT	TOTAL ALL REVENUE SERVICES		
		SCHEDULED FLIGHTS <i>a</i>	NON-SCHEDULED FLIGHTS <i>b</i>	OVERALL TOTALS <i>a+b</i>
1. Passenger-kilometres performed	000			
2. Seat-kilometres available	000			
3. Tonne-kilometres performed				
3.1 passenger (incl. baggage)	000			
3.2 freight (incl. express)	000			
3.3 mail	000			
3.4 total (sum of lines 3.1, 3.2 and 3.3)	000			
4. Tonne-kilometres available	000			

For detailed explanations of items 1 - 4 shown in the reporting Form above, please refer to Section 2.5 of this chapter dealing with air carrier traffic and capacity (Form A).

2.9 QUARTERLY SURVEY ON FINANCIAL PARAMETERS OF AIR CARRIERS

NEW

Each quarter the ICAO Regional Offices are to conduct a survey on financial parameters of the main air carriers in their Region.

2.9.1 STA/10 recommended that ICAO introduce a new quarterly survey of air carrier financial data to be conducted for the main air carriers in their Region by the ICAO Regional Offices. The data to be collected are limited to six parameters plus the applicable exchange rate to the US dollar during the quarter concerned (see below). Ideally the reports should correspond to individual commercial air carriers which report Form EF, however, if for air carriers which belong to a single financial group it is easier to report for the group as a whole, they should indicate so in the survey form.

<i>Item</i>	<i>Current quarter</i>	<i>Same quarter previous year</i>
1. Operating Revenues (million)		
2. Operating Expenses (million)		
3. Operating Income (million)		
4. Net Income (million)		
5. RTK (million)		
6. ATK (million)		
7. Exchange rate, 1USD =		

2.9.2 With regard to the data to be reported in the quarterly survey, the following points deserve attention:

Confidentiality. Any data reported for the quarterly survey will be treated as **confidential**. Data will be published as regional or global totals only so that individual air carriers cannot be identified.

Quarters. The quarters refer to those of the accounting years of the reporting carriers. The comparison between quarterly data is being done between the most recent quarter and the same quarter the previous year.

Operating revenues and expenses (items 1 and 2). The figures reported here can be preliminary estimates for the quarter concerned.

Operating income (item 3). The difference between operating revenues and expenses.

Net income (item 4). Operating income less non-operating items including income taxes and extraordinary items.

RTK and TKA (items 5 and 6). The traffic and capacity figures shown here *must* correspond to the revenues and expenses reported above in items 1 and 2.

Exchange rate (item 7). Report the applicable average exchange rate for the period concerned for the reporting currency to the US dollar whenever the data are not reported in USD. If no exchange rate is provided then ICAO will use its own exchange rate calculated from the average monthly values stored in the ISDB.

2.10 AIRCRAFT FUEL CONSUMPTION AND TRAFFIC — FORM M

NEW
 States are requested to submit data on aircraft fuel consumption starting with the annual data for 2011 using the new Air Transport Reporting Form M.

2.10.1 As discussed in Chapter 2, in support of the needs of the ICAO environmental protection programme, the Council approved the adoption of a new Reporting Form, Form M, to collect from States information on annual fuel consumption by aircraft type for each of their commercial air carriers that operates scheduled and/or non-scheduled flights (excluding on-demand services).

Aircraft in feet by type		International scheduled services			International non-scheduled services (excluding on-demand flights)			International total (scheduled and non-scheduled excluding on-demand flights)		
Manufacturer, Model an Series	Version code 1/	Fuel Consumed (tonnes)	Tonne- kilometres performed (thousands)	Tonne- kilometres available (thousands)	Fuel Consumed (tonnes)	Tonne- kilometres performed (thousands)	Tonne- kilometres available (thousands)	Fuel Consumed (tonnes)	Tonne- kilometres performed (thousands)	Tonne- kilometres available (thousands)
a	b	c	d	e	f	g	h	i	j	k

Form M is shown split into in two parts for readability purposes.

Total services (international and domestic, scheduled and non-scheduled excluding on-demand flights)			Per cent of biofuels (total services)
Fuel Consumed (tonnes)	Tonne-kilometres performed (thousands)	Tonne-kilometres available (thousands)	
l	m	n	o

2.10.2 With regard to the data to be reported in Form M, the following points deserve attention:

Confidentiality. Individual air carriers' data reported in this Form will be treated as *confidential*. Aggregate data by aircraft type will be used to validate the aircraft fuel consumption models being used by ICAO and measure the progress made in reducing the fuel consumption in relation to traffic growth.

International and domestic services. Other international organizations associated with the protection of the environment may have opted for different definitions for international and domestic services. However, for consistency ICAO has opted to retain the same definition used for the other commercial air carrier data collected through its regular statistics programme. This definition identifies a flight stage as international or domestic according to the nature of the flight stage concerned. However, for a flight stage to be considered as domestic, that flight stage must be flown by an operator based in the same State as the flight stage being flown (for a more exhaustive explanation see Section 6.5 of this chapter).

Aircraft manufacturer, model, series (column a). If possible the names used to identify the aircraft reported should follow the taxonomy adopted by CAST/ICAO¹⁰. The common taxonomy uses the aircraft name, model and series as it was given by the manufacturer. The same aircraft types identified here should also appear in Form D (Fleet) reported for the corresponding period for the same air carrier.

Version (column b). Sometimes the aircraft manufacturer, model and series are not sufficient to identify the cabin layout of the aircraft, for example, whether it is a passenger or "combi"¹¹ aircraft.

10. The standard names of aircraft manufacturer, model and series to be used in aviation databases are available in the CAST/ICAO website, <http://intlaviationstandards.org/>

11. "Combi" aircraft are passenger aircraft which have been configured to carry freight on the main deck.

Fuel consumed — tonnes (columns c, f, i, and l). If the original data are shown in terms of volume (litres, US gallons, etc.), these need to be converted into mass measured in metric tonnes. Ideally such a conversion should be done using the conversion factor based on the atmospheric conditions existing when the fuel was delivered. The Reporting Instructions indicate several places where such factor may appear in the documentation associated with the fuel delivery to the aircraft. However, if no other option exists, it is suggested that the standard density factor of 0.8 kg/litre be applied.

Tonne-kilometres performed (columns d, g, j and m), and tonne-kilometres available (columns e, h, k and n). Please refer to the definitions shown for Form A. The totals for all the aircraft reported here for a particular air carrier should correspond to those reported for the same period by the same air carrier in Form A.

Chapter 3

AIRPORT STATISTICS

3.1 INTRODUCTION

3.1.1 ICAO collects data on traffic, finances and personnel for the principal international and domestic airports (in terms of total commercial traffic) of each Member State. The traffic statistics consist of information on aircraft movements, and passengers, freight and mail traffic. These data are reported in a summarized form for the airport as well as by city-pair, where the reporting airport is located in one of the cities in the pair.

3.1.2 The financial data consist of information on annual income, expenses and gross capital investments; and personnel data which provide information on the number of staff employed at the airport, whether they are working for the airport authority or not.

3.2 AIRPORT TRAFFIC BY INDIVIDUAL AIRPORT — FORM I

REVISED

New airport selection criteria plus traffic data for air taxis and commercial business aviation to be included in commercial operations.

3.2.1 Form I is to be used by ICAO Member States to report traffic statistics for each of their airports that is open to international commercial traffic. In order to capture those international airports which may have a large domestic traffic component, STA/10 recommended to extend the selection criteria to also include:

*“...each principal airport of a State having combined traffic of at least 80 per cent of the **total commercial traffic units**¹ (scheduled and non-scheduled)”*

i.e, the ranking is based on the *total* (domestic plus international) traffic units. For most States this new criterion will not alter the number of airports which they have been reporting. On the other hand it will allow the collection of data for international airports with a large domestic traffic component, such as Tokyo-Haneida, which were not covered under the previous selection criteria.

3.2.2 Consequently the criteria for selecting the airports to be reported have *three* components, each one of which allows a larger number of important airports to be covered. The new selection criteria state that States have to report an individual reporting Form I for:

- a) each of a State's principal airports having combined traffic of at least 90 per cent of the total international commercial traffic units (scheduled and non-scheduled) of all airports of the State; or

1. A traffic unit is equivalent to 1 000 passengers or 100 tonnes of freight or mail; direct traffic is not be taken into account.

- b) each of a State's airports having no less than 1 000 international traffic units in a year, whichever is less restrictive; **plus**
- c) each principal airport of a State having combined traffic of at least 80 per cent of the total commercial traffic units (scheduled and non-scheduled) of all airports of the State which were not selected under the criteria for international airports in a) or b) above.

3.2.3 The example below shows how States should proceed to identify the airports whose traffic data should be sent to ICAO. Assume the table below shows the traffic for all the commercial airports in a State.

Airport	Passengers (number)			Freight (tonnes)		
	International	Domestic	Total	International	Domestic	Total
AAA	1 278 000	2 606 000	3 884 000	50 000	29 000	79 000
BBB	1 061 000	2 756 000	3 817 000	2 000	15 000	17 000
CCC	17 000	62 000	79 000	1 000	0	1 000
DDD	656 000	2 691 000	3 347 000	8 000	14 000	22 000
EEE	0	0	0	41 000	20 000	61 000
FFF	7 155 000	5 154 000	12 309 000	62 000	17 000	79 000
GGG	1 009 000	2 954 000	3 963 000	5 000	9 000	14 000
HHH	16 386 000	13 288 000	29 674 000	296 000	52 000	348 000
JJJ	8 082 000	8 869 000	16 951 000	108 000	73 000	181 000
KKK	565 000	4 990 000	5 555 000	11 000	54 000	65 000

3.2.4 To proceed to the airport selection, one has to convert all the traffic data into traffic units, sort the data by airport size, and calculate the cumulative percentage the airport data represent of the total for the country as a whole. The two tables below show how these calculations are done and which airports are selected under each of the criteria described above:

<i>International services</i>			
<i>Step</i>	<i>Airport</i>	<i>Traffic units</i>	<i>Cumulative %</i>
a)	HHH	19 346	46.0
	JJJ	9 162	67.8
	FFF	7 775	86.3
	AAA	1 778	90.5
b)	BBB	1 081	93.1
	GGG	1 059	95.6
	DDD	736	97.4
	KKK	675	99.0
	EEE	410	99.9
	CCC	27	100.0
	Total	42 049	

<i>All services</i>			
<i>Step</i>	<i>Airport</i>	<i>Traffic units</i>	<i>Cumulative %</i>
c)	HHH	33 154	37.6
	JJJ	18 761	58.8
	FFF	13 099	73.7
	KKK	6 205	80.7
	AAA	4 674	86.0
	GGG	4 103	90.6
	BBB	3 987	95.2
	DDD	3 567	99.2
	EEE	610	99.9
	CCC	89	100.0
	Total	88 249	

3.2.5 The results show that: under criterion a) traffic data for airports HHH, JJJ, FFF and AAA have to be submitted to ICAO; under b) airports with more than 1 000 traffic units, BBB and GGG are added to the list; and finally under c) the only new airport which needs to be included in the list for this State is airport KKK as the other three airports were already captured under criterion a). Hence the final list would read: HHH, JJJ, FFF, AAA, BBB, GGG and KKK.

3.2.6 Please note that following a simulation carried out by ICAO based only on scheduled operations, very few States will need to add new airports to their submissions because of criterion c).

3.2.7 As part of the implementation of the Recommendations adopted by STA/10, the revised Form I now has two Parts:

- a) Part I, where States report the summarized monthly traffic data for the reporting airports; and
- b) Part II, where States report on a quarterly basis the traffic by city-pair from/to the reporting airport.

Part I — Monthly airport traffic

Description	Aircraft movements Total	Passengers			
		Embarked	Disembarked	Total (Col. c + d)	Direct transit
a	b	c	d	e	f
A. Commercial air transport:					
1. International scheduled	_____	_____	_____	_____	_____
2. International non-scheduled	_____	_____	_____	_____	_____
3. Total international (1+2)	_____	_____	_____	_____	_____
4. Domestic scheduled and non-scheduled	_____	_____	_____	_____	_____
5. Total commercial air transport (1+2+4) ...	_____	_____	_____	_____	_____
6. All-freight/mail services*	_____	_____	_____	_____	_____
NEW → 7. Air taxi and commercial business flights**	_____	_____	_____	_____	_____
B. All other movements	_____	_____	_____	_____	_____

*This traffic is to be included also under items 1 to 5 (see the reporting instructions).

**This traffic is to be included also under items 2 to 5 (see the reporting instructions).

Freight (tonnes)			Mail (tonnes)		
Loaded	Unloaded	Total	Loaded	Unloaded	Total
g	h	i	j	k	l
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Note.— Part I of Form I is shown in two parts for readability purposes.

3.2.8 With regard to the traffic data to be reported in Part I of Form I, the following points deserve attention:

Commercial air transport. Aircraft movements, and passengers, freight and mail traffic, arriving or departing on commercial scheduled and non-scheduled flights (*including* air taxis and commercial business flights), should be reported for each month in rows 1 to 6 of Part A.

All other movements. These are to be reported under Part B. Data on passengers, freight and mail on non-commercial air transport movements are not required.

International aircraft movement (rows 1 and 2). For airport statistics an aircraft movement is classified as international if the *total flight* (i.e., the operation of an aircraft on a stage or number of stages with an unchanging flight number), includes one or more international flight stages.

International traffic (rows 1 and 2). Airport traffic (passengers, freight and mail) is classified as international or domestic on the basis of the points of embarkation and disembarkation regardless of classification assigned to the corresponding aircraft movement.

All-freight/mail services (row 6). These services reported separately in row 6 should also *be included* in the data reported in rows 1 to 5. Reports received from States suggest that often this is not done. Such an omission is easily identified when the freight and mail figures are larger in row 6 than in row 5 (total commercial air transport). However, on other occasions this is not so obvious. To avoid any errors or ambiguities it is essential that these reporting instructions be carried out as requested.

Air taxi and commercial business flights (row 7). These flights, reported separately in new row 7, should also *be included* in rows 2 to 5. States are only required to report the number of aircraft movements associated with these flights; however, if available, they can also include the number of passengers and freight embarked and disembarked. As for row 6 (above) it is essential that these reporting instructions be respected.

Traffic (columns c to l). Passenger, freight and mail traffic include both revenue and non-revenue air carrier traffic.

Passengers embarked, disembarked and total (columns c, d and e). Both ICAO and ACI are mute on the issue whether, from an airport point of view, infants under the age of 2 should be considered when calculating the number of passengers embarked and disembarked. This could be because some airports include infants in their passenger charge while others do not. Since one of the metrics ICAO calculates from the traffic and financial data submitted by airports is the average passenger charge per passenger, airports should take this into consideration when reporting the number of passengers embarked and disembarked at their airport.

Direct transit passengers (column f). Includes only those passengers who continue their journey on a flight having the same flight number as the flight on which they arrived at the airport. Stop-over passengers should not be included in this column.

Freight (Cargo) (columns g to j). Includes express and diplomatic bags but not passenger baggage. For some airports only the totals for passengers, freight and mail are reported (columns e, i and l). In the case of passengers this is not too significant as, except in very unusual circumstances, the figures for embarked and disembarked passengers are relatively similar. This is usually not the case for freight, where there may be very significant differences between the loaded and unloaded figures, and it is therefore important that this breakdown be reported.

How do airports see air carrier traffic

3.2.9 The best way to explain how airports view air carrier traffic is through a practical example. Recall the two main tables (OFOD and TFS) of flight PA 001 used to illustrate air carrier traffic (see paragraph 2.4.12 and following). For the purpose of this example, add 5 per cent traffic across the board to allow for non-revenue passengers and see how the airport of Miami (MIA) would view this flight.

Table: How do airports see air carrier traffic

OFOD			TFS		
City-pair		Passenger numbers	Total passenger numbers		
From	To		JFK-MIA	MIA	MIA-LIM
JFK	MIA	116	116	Off	
JFK	LIM	21	21	Direct transit	21
JFK	SCL	37	37		37
MIA	LIM	42		On	42
MIA	SCL	84			84
			174	Totals	184

3.2.10 Miami sees a flight arriving from JFK with 174 passengers on board of which 116 disembark at MIA and 58 passengers go through to Lima (LIM) and Santiago de Chile (SCL) (direct transits). With regard to the outbound flight, in addition to the 58 passengers on direct transit, 126 new passengers board the aircraft in MIA giving a total of 184 passengers on board on the stage to LIM.

3.2.11 Hence, on the basis of the Reporting Instructions the report for MIA for flight PA001 would look as follows:

Description a	Aircraft Movements Total b	Passengers			
		Embarked c	Disembarked d	Total (Col. c + d) e	Direct transit f
Month:					
A. Commercial air transport					
1. International scheduled	2	126		126	58
2. International non-scheduled					
3. Total international (1+2)	2	126		126	58
4. Domestic scheduled and non-scheduled			116	116	
5. Total commercial air transport (1+2+4)	2	126	116	242	58

3.2.12 The table above shows that because of the difference in the definitions used to allocate aircraft movements and traffic to international or domestic services it may happen that, as shown, domestic traffic appears to be recorded with an absence of aircraft movements (row 4). Consequently, in this case, row 5 (total commercial air transport) is the only row where one can make the correct association between traffic embarked, disembarked and in transit with aircraft movements.

Part II — Airport quarterly traffic by Origin and Destination

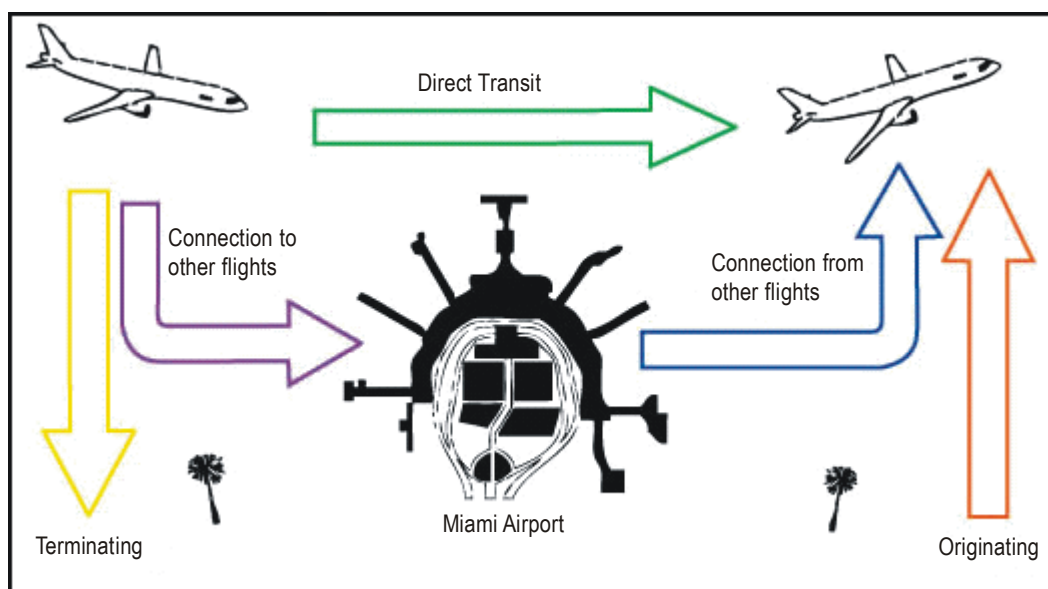
NEW
 As from 2012 States are required to submit Part II of Form I for each one of the selected airports.

City-pair		Airport origin and destination traffic		
From	To	Passengers (Number)	Freight (Tonnes)	Mail (Tonnes)
a	b	c	d	e

3.2.13 While the data to be reported in Part II of Form I seems to be similar in appearance to reporting Form B for commercial air carriers, there is a significant difference which needs to be highlighted as this refers to the origin and destination (O-D) of the traffic as seen by the reporting airport.

“Transfer traffic and airport hubs”

From the moment that airlines introduced the notion of interlinked networks with points where traffic could easily connect within a very short time of arrival to another flight in order to continue its journey, the notion of the airport hub was born. International airlines were the first to exploit this notion which allowed airlines such as KLM, Swissair, and Singapore Airlines to expand their traffic base well beyond what could have been expected from the natural geographical catchment areas.



In ICAO's Reporting Form I, two types of traffic are identified, terminating and originating traffic, and direct transits. The definition used also indicates that, for statistical purposes, transfer traffic should be recorded in the same manner as originating and terminating traffic. This is an oversimplification. In reality, for major hubs, transfer traffic may well exceed the originating or terminating traffic. Hence, knowing what proportion of traffic is truly originating and terminating at an airport in comparison with the transfer traffic is very important for airport planners, especially where international traffic is involved. Some airports, such as Changi (Singapore), have made virtue of this by offering superior facilities in order to attract passengers to transit through them.

So why is ICAO not collecting data on transfer traffic? The difficulty with transfer traffic is that in connecting with another flight a new travel document is used. For example, a passenger transferring to another flight, whether with the same or a different carrier designator, uses a new coupon and consequently, as described Part III, Chapter 2, paragraph 2.3, for statistical purposes he or she becomes a new passenger. This then requires the ability to keep track of passengers throughout their trip. This can be done if one has knowledge of the itinerary which a passenger follows during his or her journey. Such information is available to airlines through the computer reservation systems (CRSs) provided the whole journey was booked under the same passenger reservation number (PNR). However, these days many

passengers use the Internet to make their own direct bookings on different air carriers to take advantage of the cheapest flights being offered to complete their journey. In this case, there is no record of passengers who may be transferring from one flight to another.

3.2.14 Having said that, one point of agreement was that most States are unlikely to have these data, in which case, in its Recommendation 4/1, STA/10 suggested that:

“...ICAO should consider collecting data for all non-stop flight stages arriving and departing to/from the reporting airport”.

3.2.15 Consequently, States can submit the O-D data for their reporting airports based on these criteria, where the origin and destination do not refer to the point of embarkation or disembarkation of the traffic, but to the origin and destination of the *flight stage* arriving or departing from the reporting airport; i.e. the last airport it departed from for an inbound flight (origin) or the first airport it lands for an outbound flight (destination)². Please note that in this case *technical stops* must be ignored when establishing the O-D city-pair³. For example, assume that there is a non-stop service between Seoul (SEL) and New York (JFK). However, the aircraft being used has a marginal range and because of the atmospheric conditions it needs to make a technical stop in Anchorage (ANC) to take on board additional fuel. In this case, the reporting entity should still show the traffic as going from SEL to JFK, ignoring the break in the flight which was required in ANC.

3.2.16 In addition the following points deserve careful attention when preparing this report.

Scheduled and non-scheduled traffic. Where possible, States should submit two separate reporting forms, one for international scheduled services and another for international non-scheduled operations. For the purposes of Part II, air taxi and commercial business flights are *excluded* from the O-D data to be reported for non-scheduled operations.

City-pair (columns a and b). For outbound flights, the city shown in column *a* should correspond to that where the reporting airport is located. Similarly, for inbound flights the city of the reporting airport should appear in column *b*. Where possible the cities shown in columns *a* and *b* of the reporting form should be identified using the IATA Location Identifier⁴ (three-letter codes) published in its *Airline Coding Directory*. Alternatively, States may use the ICAO four-letter code published in *Location Indicators* (Doc 7910). Where there is any doubt about the correct city code to be used, the name of the city should be given instead.

Traffic (columns c to e). This represents the traffic on board flights arriving to and departing from the reporting airport irrespective of their actual points of embarkation or disembarkation. It includes all revenue and non-revenue traffic (passengers, freight and mail) of commercial air carriers. Only the traffic involving international city-pairs is to be included.

2. Recognizing the difficulty in obtaining traffic data beyond the first landing or last take-off from the reporting airport, so-called O and D airport traffic data collections covering only the first stage to and from the reporting airport are also being carried out by the European Union (through Eurostat), the Andean Community of Nations and the US Department of Transportation (through its Form T-100).

3. This is different from Form C – Traffic by Flight Stage (see Part III, Chapter 2, paragraph 2.4.11) where technical stops are included in the report.

4. Additional information on the IATA Location Identifiers can be found under *City-pairs* in paragraph 2.4.7.

3.3 AIRPORT TRAFFIC BY STATE — FORM I-S

REVISED

Traffic data for air taxis and commercial business aviation to be reported as commercial operations and shown separately in row 7.

3.3.1 The elements to be reported on Form I-S are identical to those found in Form I. However, the most significant difference between these two forms relates to the data coverage. Form I is reported on a monthly or annual basis for *individual* airports in the reporting State. In Form I-S, States are to report on an annual basis the aggregate data for *all* the commercial airports in that State. The aim of this data collection is to obtain a clear view of the air transport industry development in a State by covering all commercial airports irrespective of their size.

3.3.2 The data in Form I-S must also include the data for those airports which were individually reported using Form I. Consequently, the sum of the individual elements reported for all the airports of a State in Form I must be equal to or less than the figure for the same element reported in Form I-S.

3.4 AIRPORT FINANCIAL DATA — FORM J


REVISED

Additional items to be identified under income plus a new section on the number of staff employed at the airport.

3.4.1 States are to report annual (calendar or fiscal year) financial data for the airports selected for Form I. It is preferable that a separate reporting form is filed for each selected airport but if this is not possible, a combined report for a group of airports or for the airport authority as a whole may be filed instead. Additional guidance on airport services cost accounting and cost allocation can be found in the ICAO *Airport Economics Manual* (Doc 9562).

3.4.2 Form J is divided into four main sections: income; expenses, gross capital investments, and employment (new).

	DESCRIPTION	SUB-TOTAL	TOTAL
INCOME	<i>Income by function and item</i>		Amount
	1.	Air traffic operations.....	
	1.1	Aircraft-related charges.....	
	1.2	Passenger-related charges.....	
	1.3	Other charges on air traffic operations.....	
	2.	Ground handling charges.....	
	3.	Concessions.....	
	3.1	Fuel and oil.....	
	3.2	Restaurants, bars, cafeterias and catering services.....	
	3.3	Duty-free shops.....	
	3.4	Automobile parking.....	
	3.5	Other concessions.....	
	4.	Rentals.....	
5.	Other revenues.....		
6.	Total revenues (sum of items 1 through 5).....		
7.	Operating subsidies.....		
8.	TOTAL INCOME (sum of items 6 and 7).....		
EXPENSES	<i>A. Expenses by cost item</i>		Amount
	9.	Operation and maintenance (including labour).....	
	9.1	Personnel costs.....	
	9.2	Supplies.....	
	9.3	Services — contracted.....	
	10.	Administrative overhead.....	
	11.	Other non-capital costs.....	
	12.	Capital costs.....	
	12.1	Depreciation and/or amortization.....	
	12.2	Interest.....	
	12.3	Other capital costs.....	
	13.	TOTAL EXPENSES (sum of items 9 through 12).....	
	<i>B. Allocation of total expenses by function</i>		Amount
	13.1	Aircraft movement areas and their associated lighting.....	
	13.2	Passengers and cargo terminal facilities.....	
	13.3	Hangar and maintenance areas.....	
	13.4	Approach and aerodrome control (incl. communication, navigation and surveillance).....	
	13.5	Meteorological services.....	
13.6	Security.....		
13.7	Crash, firefighting and rescue services.....		
13.8	Other (specify).....		
INVESTMENTS	<i>Gross capital investments by function</i>		Amount
	14.1	Aircraft movement areas.....	
	14.2	Terminal buildings (owned by airport).....	
	14.3	Equipment and vehicles.....	
	14.4	Other facilities.....	
	14.5	Land.....	

	14. TOTAL GROSS CAPITAL INVESTMENTS	
	<i>Employment by function</i>	No. of employees
 EMPLOYMENT	15. Personnel of airport operator (in full-time equivalents)	
	15.1 Aeronautical activities	_____
	15.2 Non-aeronautical activities	_____
	16. Personnel of other airport-based entities (in full-time equivalents)	
	16.1 Aeronautical activities (e.g. air carriers, sub-contractors)	_____
	16.2 Non-aeronautical activities	_____
	17. TOTAL AIRPORT-BASED PERSONNEL (sum of 15 + 16 in full-time equivalents)	

3.4.3 The following points deserve careful attention when preparing the data to be reported in Form J:

Airport name. If the report includes data for more than one airport, please clearly identify which other airports are included so that the correct match can be made with the traffic data reported in Form I.

Main and sub-accounts. The sum of the related sub-accounts must be equal to the amount shown for the main account, i.e. the sum of items 1.1 to 1.3 must equal the figure shown under item 1.

Expenses (items 9 through 13). Please note that expenses are shown by item (items 9 through 12) and by function (items 13.1 through 13.8). The common total for these expenses is shown under item 13.

Employment (items 15 through 17). Employment numbers cover both those employees directly employed by the airport (item 15), and hence included under the airport expenses above (items 9 through 11 and item 13), as well as those employed at the airport by other entities (item 16).

Aeronautical activities (items 15.1 and 16.1). Include all those activities associated with aircraft and air traffic operations such as aircraft ramp handling and servicing, passenger and cargo handling, security services, administrative services related to the collection of fees from the aircraft operator for the services and facilities provided by the airport such as for landing, lighting, hangar and parking, etc).

Non-aeronautical activities (items 15.2 and 16.2). Include all those other activities at an airport *not* directly linked to aircraft and air traffic operations, such as restaurants, cafeterias and bars, duty free shops, other retail, automobile parking, etc., which may or may not be operated by the airport. In the latter case the airport is likely to receive income from the concessionaires operating these services. Consequently it also covers staff employed by the airport to administer services linked with concessions fees and rentals (including heating, lighting, air conditioning etc.) inside the airport and for facilities services provided to non-aviation entities outside the airport.

Chapter 4

STATISTICS ON EN-ROUTE FACILITIES AND SERVICES

4.1 INTRODUCTION

ICAO Member States must report financial and traffic statistics in respect of en-route air navigation facilities and services located in their national territory. These data are collected through Air Transport Reporting Forms K and L, respectively.

4.2 AIR NAVIGATION SERVICES FINANCIAL DATA — FORM K

REVISED

Includes a new section on the number of staff employed by the air navigation service provider.

4.2.1 States are to report the annual (calendar or fiscal year) financial data of air navigation service providers using Form K. Additional guidance on airport services cost accounting and cost allocation can be found in the ICAO *Manual on Air Navigation Services Economics* (Doc 9161).

4.2.2 The Form is divided into five Parts:

Part I — Revenues;

Part II — Expenses;

Part III — Expenses by service;

Part IV — Gross capital investments during the year by service; and

Part V — Employment (new).

4.2.3 The following points deserve careful attention when preparing the data to be reported in Form K.

Dual utilization. As some en-route facilities and services have dual utilization, some of the expenses reported in Part II may be allocable to airport utilization (approach and aerodrome control) and/or non-aeronautical utilization. Expenses should be broken down into sub-items 6.1 (en-route utilization), 6.2 (airport utilization), and 6.3 (non-aeronautical utilization). Costs of services provided purely for airport utilization should not be included in the report.

Landing and parking or other airport charges (Part I, item 2). Figures should be reported here only if a portion of landing and parking or other airport charges are specifically allocated to en-route facilities and services. Revenues from charges specifically levied and collected for the provision of en-route facilities and services should be reported under item 1.

Transnational agencies. A State which receives revenues from or contributes towards the expenses of en-route facilities and services provided by another State or agency (e.g., EUROCONTROL, ASECNA, COCESNA) should provide the relevant data on Form K.

Main and sub-accounts. The sum of the related sub-accounts must be equal to the amount shown for the main account, i.e. the sum of items 1.1 to 1.2 must equal the figure shown under item 1.

PART I – REVENUES

Revenue by function and item	Amounts	
	Subtotal	Total
1. En-route service		
1.1 Revenues from route charges		
1.2 Other revenues (e.g. from airport and approach and aerodrome control charges)		
2. Approach and aerodrome control services		
2.1 Revenue from approach and aerodrome control charges		
2.2 Other revenues (e.g. from airport and route charges)		
3. Grants and subsidies		
4. Other revenues		
5. TOTAL REVENUES		

PART II – EXPENSES

Expenses by item	Amounts
1. Operation and maintenance (e.g. staff, supplies, services, etc.)	
2. Administrative overhead	
3. Depreciation and/or amortization	
4. Interest	
5. Other expenses	
6. TOTAL EXPENSES	
Expense allocation by function (amounts and percentage of total expenses)	
6.1 En-route services	
6.2 Approach and aerodrome control services	
6.3 Non-aeronautical activities	

PART III – GROSS CAPITAL INVESTMENTS DURING THE YEAR BY SERVICE

Services	Gross capital investments
1. ATM – Air traffic management	
2. CNS – Communications, navigation and surveillance	
3. MET – Meteorological services	
4. SAR – Search and rescue services	
5. AIS – Aeronautical information services	
6. TOTAL	

PART IV — EMPLOYMENT

Staff by service and category	En route + terminal ANS						Total en-route & terminal ANS	Other ANS	Total ANS
	ATM	CNS	MET	AIS	SAR	Joint			
ATCO OPS									
ATCO other duties									
OPS support (non-ATCO)									
Technical support									
Administration									
Ancillary services									
Other									
TOTAL STAFF (FTE)									



Employment. Please provide as close as possible the average number of staff employed to provide air navigation services by function as shown in the table above. Where staff may be involved in more than one function, staff numbers may be broken down in FTE according to the share of their activity within each function. Where such breakdown between activities may be difficult to assess, please enter the related staff number under *Joint* indicating what functions are covered in the *Remarks* box provided in the form.

Full time equivalents (FTE). The equivalent of a single person carrying out a particular job or activity working on a full-time basis during a year. An employee working half-time either in a part-time job or sharing its time on a 50/50 basis between two activities would be counted as a 0.5 FTE in the corresponding activity.

4.3 EN-ROUTE TRAFFIC STATISTICS — FORM L

4.3.1 Form L covering annual en-route traffic data should be filed by States which provide area control or flight information services for one or more FIRs/UIRs within or outside their own territories. Please note that the data required are the totals at the foot of columns *b* through *e*. The breakdown by FIR/UIR is optional.

<i>Name of FIR/UIR</i>	<i>Number of flights</i>			
	<i>International civil flights (including IGA)</i>	<i>Domestic civil flights (including GA)</i>	<i>Other flights</i>	<i>Total flights</i>
<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>

4.3.2 Flights should be counted separately for each FIR/UIR through which they move in order to arrive at a broad measure of the utilization of facilities and services within each FIR/UIR. On the other hand, should an area control centre cover the same airspace as a flight information centre, or an upper area control centre cover the same airspace as an upper information centre, only one of those centres should report. Also, each flight should be reported only once by each reporting centre, i.e., a flight entering different sectors of the same FIR should be reported once as a single flight, as also should a flight entering different sectors of the same UIR.

Chapter 5

STATE AVIATION STATISTICS

5.1 INTRODUCTION

This chapter deals with the reporting forms collecting information on civil aviation activities carried out by the State, namely the civil aircraft on register (Form H) and a new reporting form on aviation licensed personnel and training (Form N).

5.2 CIVIL AIRCRAFT ON REGISTER (FORM H)

REVISED

Form H was simplified. It no longer requires to split the aircraft use into commercial and non-commercial.

5.2.1 In Form H, States are required to report the number of all civil aircraft on their register which have a valid certificate of airworthiness on 31 December of the reporting year. The Form consists of two parts. Part I summarizes the total number of aircraft registered by type of propulsion and maximum certificated take-off mass category. Part II consists of a list of all the civil aircraft types specified by manufacturer and model having a maximum certificated take-off mass of 9 tonnes and over registered with the State.

5.2.2 The following points deserve careful attention in preparing the report:

Please note the relationship between Parts I and II. Part II has a listing by type of aircraft of those aircraft reported in column *b* of Part I. Consequently, the number of aircraft reported in column *b* of Part I by engine type and number must correspond with the number of aircraft reported in column *b* of Part II for the same engine type and number.

In Part II both the manufacturer and the model of the aircraft should be identified. If possible the names used to identify the aircraft reported should follow the taxonomy adopted by CAST/ICAO¹.

The term *turbo-jets* also covers aircraft powered with turbofan engines.

1. The standard names of aircraft manufacturer, model and series to be used in aviation databases are available in the CAST/ICAO website, <http://intlaviationstandards.org/>

PART I — SUMMARY OF ALL AIRCRAFT ON REGISTER

AIRCRAFT CATEGORY	NUMBER OF AIRCRAFT	
	9 000 kg (20 000 lb) and over	Under 9 000 kg (20 000 lb)
a	b	c
FIXED-WING AIRCRAFT		
<i>Turbo-jet</i>		
6 engines		
4 engines		
3 engines		
2 engines		
1 engine		
<i>Propeller-driven (turbine)</i>		
4 engines		
3 engines		
2 engines		
1 engine		
<i>Propeller-driven (piston)</i>		
4 engines		
3 engines		
2 engines		
1 engine		
ROTARY-WING AIRCRAFT		
<i>Turbine engines</i>		
2 engines		
1 engine		
<i>Piston engines</i>		
2 engines		
1 engine		

PART II — NUMBER OF LARGE AIRCRAFT BY TYPE

TYPE OF AIRCRAFT	TOTAL NUMBER OF AIRCRAFT
List all aircraft with a maximum certificated take-off mass of 9 000 kg (20 000 lb) and over, which were included in the figures reported for columns b, d and f of Part I.	
a	b

5.3 AVIATION PERSONNEL LICENSING AND TRAINING — FORM N

NEW
 States are requested to submit data on aviation personnel licensing, training and training capacity starting with the annual data for 2011 using the new Air Transport Reporting Form N.

5.3.1 On the basis of Recommendation STA/10-9/1, the Council agreed to introduce a new Air Transport Reporting Form N to collect annual data on civil aviation licensed personnel and training institutions to allow Member States and the Organization to monitor the potential surplus or shortage of personnel licensed for civil air transport operations.

5.3.2 Form N consists of two parts:

Part I deals with the current status of personnel licensed for civil aviation, and

Part II lists the number of approved training institutes currently available and seeks information on their future availability and training capacity.

Part I — Aviation personnel qualifications

AVIATION PERSONNEL QUALIFICATIONS						
Qualification category		Qualifications issued (annual)	Total active qualifications	Annual validations/ conversions	Total validations/ conversions	Retirement age
a		b	c	d	e	f
1	ATPL					
2	CPL					
3	MPL					
4	PPL					

AVIATION PERSONNEL QUALIFICATIONS						
Qualification category		Qualifications issued (annual)	Total active qualifications	Annual validations/conversions	Total validations/conversions	Retirement age
5	Flight instructor ratings					
6	Specific authorizations					
7	Aircraft maintenance licences					
8	ATC licences					

5.3.3 With regard to the data to be reported in Part I, the following points deserve attention:

The reported data should cover the following information:

- a) licences/ratings/authorizations (hereafter “qualifications”) issued (initial issue, not renewal) by the reporting State during the twelve-month reporting period and in total; and
- b) conversions or validations of qualifications issued by another State, issued by the reporting State during the reporting period and in total.

Annual data (columns b and d). These refer to the number of qualifications and validations/conversions issued by the licensing authority during the reported calendar year.

Cumulative data (columns c and e). These refer to the cumulative number of qualifications and validations/conversions issued by the licensing authority and still valid at 31 December of the reporting year, *including* those issued during the reporting year.

5.3.4 If possible, States should avoid double counting the number of licenses of different types which may have been obtained by the same individual. On the other hand, States should include all the different qualifications (ratings) the same individual might have obtained.

Part II — Aviation personnel training capacities

<i>AVIATION PERSONNEL FUTURE TRAINING CAPACITIES</i>				
<i>Licence category</i>		<i>Training organizations</i>		<i>Training capacity</i>
		<i>(current)</i>	<i>(5-year)</i>	<i>(5-year)</i>
<i>g</i>		<i>h</i>	<i>i</i>	<i>j</i>
9	Pilots (PPL/CPL/ATPL)			
10	Pilots (MPL)			
11	Aircraft maintenance licences			
12	ATC licences			

5.3.5 With regard to the data to be reported in Part II, the following points deserve attention:

Training capacity (column j). States should report here the cumulative number of licenses which the licensing authority expects to issue after five years from the end of the reporting year, i.e. at 31 December of the fifth year after the reporting year.

5.3.6 Such figures can be based on the expected output planned by the training institutes and/or the possible demand generated by the planned development of the air carriers, airports or new air navigation infrastructure projects in the reporting State. For the latter, the ICAO Regional Air Navigation Plans may be a source of information which could be used to arrive at such estimates, particularly if the training institutes of a State are providing training capacity for other States in the Region.

PART IV

DATA PROCESSING AND DISSEMINATION

Chapter 1

THE ICAO INTEGRATED STATISTICS DATABASE

1.1 INTRODUCTION

This chapter looks at the Integrated Statistics Database used by ICAO to collect, process, store and disseminate the statistics the Organization receives from its Member States through the Air Transport Reporting Forms. It will introduce some of the regular features associated with databases, as well as some of the special features built into the system such as the data-tracking system and the data quality control processes discussed in Part IV, Chapters 2 and 3. These processes may be of interest to States and other entities involved in the collection of air transport statistics as the same or similar principles could be used by them to check the data they collect. In this context, the data collection process would be much more efficient if these data checks were carried out at the level of the national civil aviation administrations who have direct contact with the data providers. Any omissions or errors in the reporting forms can thus be solved at a national level before they reach ICAO.

1.2 THE INTEGRATED STATISTICS DATABASE (ISDB)

1.2.1 Work on the design of the new system was initiated in May 2000, and the new system was put into production in September 2002. The system itself consists of two logical databases in the same physical location (Figure IV-1-1). When a reporting form is received and the data have been entered into the system, they are placed in a “temporary” database. Here a number of quality control checks take place prior to the loading of the data into the “permanent” database. In order to protect the main database, the ISDB resides behind a firewall. Once data are declared permanent, these are pushed through the firewall to the data warehouse from which both internal and external users can access the data through the Internet. As the data move from the database proper to the data warehouse they are restructured into normalized tables to make it easier for casual users to access the information and speed-up the query process. The tables in the data warehouse are updated on a daily basis.

The tracking module

1.2.2 In a year ICAO receives on average the equivalent of some 10 000 reporting forms. Nowadays most are in electronic format, but paper forms are still accepted. Consequently, one of the most important components of the ISDB system is the reporting form tracking module. The module tracks each individual reporting form that ICAO anticipates receiving from Member States, from the moment the form is due until it has been permanently loaded into the database. It also ensures that all processing steps such as reception, data entry, data verification and validation are executed in the proper order for each individual form processed by the system. Although these steps would appear to be distinct, they are in fact integral functions. For each reporting form the tracking system shows when the form was due, when it was received and the date when each step was completed. The system also shows against each step the name of the ICAO staff member who completed it (Figure IV-1-2).

1.2.3 An additional function of the tracking module is the automatic generation of reminders addressed to data providers requesting the submission of forms that are overdue.

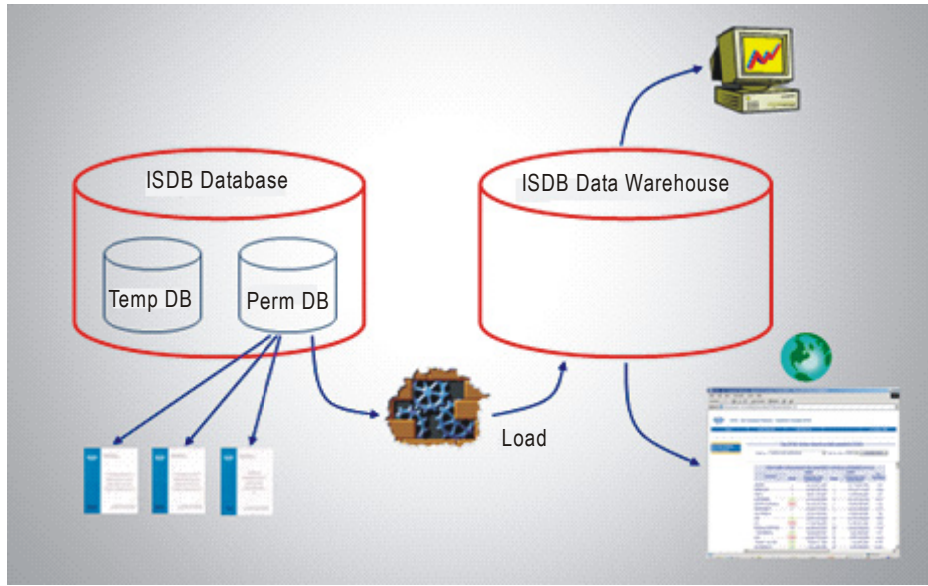


Figure IV-1-1. The ISDB system

Form Tracking Record

Form: Traffic - Commercial Air Carriers

Reported For:

State:

Year: Period Type: Period Type Value:

Provided By:

Track Status: Track Status Date:

Data Status:

Format:

Due Date: Reminder Due Date: Generate Reminder:

From Date: To Date:

Received Date:

File Reference:

Note:

Step	Status	Effective Date	Start on progress	Start on hold	Completed Date	
Reception	Completed	08/01/2003			08/01/2003	TCE
Data Entry	Completed	15/01/2003	14/01/2003		15/01/2003	BGE
Verification	Completed	16/01/2003	16/01/2003		16/01/2003	LUR
Validation	Completed	16/01/2003	16/01/2003		16/01/2003	LUR
Loading	Completed	16/01/2003	16/01/2003		16/01/2003	LUR

Last Updated By: LURBANI Last Updated On: 16/01/2003 11:06:49

Figure IV-1-2. Data tracking module

Reference tables

1.2.4 Another integral part of the system is the series of reference tables (e.g. air carrier, airport, State, currency, aircraft type) which are used by the various processes associated with the ISDB. The intricate relationships between these reference tables and other components of the ISDB can be seen in Figure IV-1-3.

1.2.5 Reference tables contain data which are often accessed by the system, such as during the data entry process, to validate the source of the forms and to ensure that information pertaining to the reporting entity is recognized by the system. For example, Figure IV-1-4 shows the information contained in the reference table for airports. When data for Montréal-Pierre Elliott Trudeau (Canada) are received, one only needs to enter the code associated with this airport so that all pertinent information becomes available. Doing so one does not need to enter these data each time a form is received, but it also verifies that the reporting entity concerned has been correctly identified. For example, if one tried to enter data for Montréal-Pierre Elliott Trudeau for a country other than Canada, the system would signal an error.

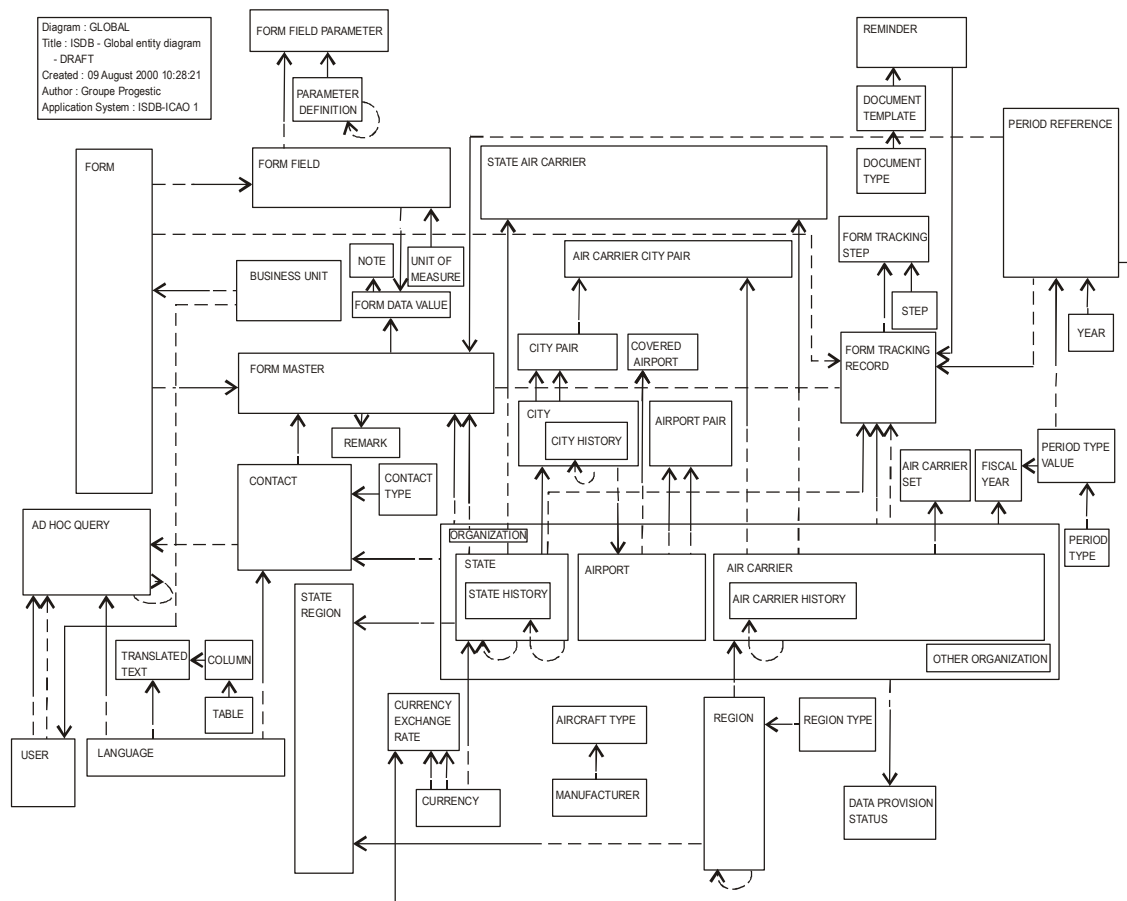


Figure IV-1-3. ISDB relationships

Airport

Name: **PERRE ELLIOTT TRUDEAU INTL**

STA Code: **YUL** ICAO Code: **CYUL** IATA Code: **YUL**

City: **MONTREAL**

State: **CANADA**

Main Airport:

Group:

Administered By: **AEROPORTS DE MONTREAL**

End Date:

Note:

Latitude

Cardinal Point: **North** Degree: **45.28.05** Radian: **0.7936**

Longitude

Cardinal Point: **West** Degree: **073.44.29** Radian: **1.2870**

Last Updated By: **ACOSTAGUTA** Last Updated On: **27/08/2004 16:03:26**

Figure IV-1.4. Airport reference table

State	Name	Short Name	ICAO Code	Alpha2 Code	Alpha3 Code	Num. Code	Administering State	Currency	Effective Date	End Date	Member Group	Keep History	Vers Date
AZERBAIJAN, THE REPUBLIC OF	AZERBAIJAN	AZER	AZ	AZE	31		AZM	08/11/1992		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BAHAMAS	BAHAMAS	BAHM	BS	BHS	44		BSD	26/06/1975		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BAHRAIN, THE KINGDOM OF	BAHRAIN	BAHR	BH	BHR	48		BHD	19/09/1971		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BANGLADESH, THE PEOPLE'S RE	BANGLADESH	BANG	BD	BGD	50		BDT	21/01/1973		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BARBADOS	BARBADOS	BARB	BB	BRB	52		XCD	20/04/1967		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BELARUS, THE REPUBLIC OF	BELARUS	BELA	BY	BLR	112		BYR	04/07/1993		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BELGIUM, THE KINGDOM OF	BELGIUM	BELG	BE	BEL	56		EUR	04/06/1947		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BELIZE	BELIZE	BELI	BZ	BZH	84		BZD	06/01/1991		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BENIN, THE REPUBLIC OF	BENIN	BENI	BJ	BEN	204		XOF	28/06/1961		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BERMUDA	BERMUDA	BERM	BM	BMJ	60	UNITED KINGDOM OF GR	BMD			<input type="checkbox"/>	<input type="checkbox"/>		
BHUTAN, THE KINGDOM OF	BHUTAN	BHUT	BT	BTN	64		BTR	16/06/1989		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BOLIVIA, THE REPUBLIC OF	BOLIVIA	BOLV	BO	BOL	68		BOB	04/05/1947		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BOSNIA AND HERZEGOVINA	BOSNIA & HERZEK	BOSN	BA	BIH	70		BAM	12/02/1993		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BOTSWANA, THE REPUBLIC OF	BOTSWANA	BOTW	BW	BWA	72		BWP	27/01/1979		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BRAZIL, THE FEDERATIVE REPUB	BRAZIL	BRAZ	BR	BRA	76		BRL	04/04/1947		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BRITISH VIRGIN ISLANDS	BRITISH VIRGIN ISI	VRB	VG	VGB	92	UNITED KINGDOM OF GR	USD			<input type="checkbox"/>	<input type="checkbox"/>		
BRUNEI DARUSSALAM	BRUNEI DARUSSA	BRUN	BN	BRN	96		BND	03/01/1985		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BULGARIA, THE REPUBLIC OF	BULGARIA	BULG	BG	BGR	100		BGL	08/07/1967		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BURKINA FASO	BURKINA FASO	BURF	BF	BFA	854		XOF	20/04/1961		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BURUNDI, THE REPUBLIC OF	BURUNDI	BURU	BI	BDI	108		BIF	18/02/1968		<input checked="" type="checkbox"/>	<input type="checkbox"/>		

Last Updated By: **ACOSTAGUTA** Last Updated On: **14/06/2002**

Figure IV-1.5. State reference table

1.2.6 In some cases the reference tables are particularly important in maintaining the integrity of the data series through time. As ICAO's Members are States, an important reference table is the one dealing with States (Figure IV-1-5). Since 1944, some States have changed name, new States have emerged from territories administered by other States, and some States have split into a number of smaller States. Except for the latter, where a larger State has ceased to exist and smaller ones were created, in the other cases, the system is able to keep track of the changes in name and affiliation so that the individual entities (air carriers, airports, air navigation services providers) can continue to be affiliated with that political entity despite the changes which have occurred. Also the same table tracks the name of currency associated with each State¹. Figure IV-1-6 shows the changes over time recorded for a particular State.

Long Name	Short Name	ICAO Code	Alpha2 Code	Alpha3 Code	Item Code	Administering State	Currency	Effective Date	End Date	Member	Group	Vers. No.	Vers. StartDate	Vers. Date
ANGOLA	ANGOLA	ANGL	AO	AOP	24	PORTUGUESE REPUB	AOS			<input type="checkbox"/>	<input type="checkbox"/>	1	01/01/900	01/01/975
ANGOLA, THE REPUBLIC OF	ANGOLA	ANGL	AO	AGO	24		AOS			<input type="checkbox"/>	<input type="checkbox"/>	2	11/11/975	07/01/977
ANGOLA, THE REPUBLIC OF	ANGOLA	ANGL	AO	AGO	24		AOK	10/04/1977		<input checked="" type="checkbox"/>	<input type="checkbox"/>	3	08/01/977	31/03/991
ANGOLA, THE REPUBLIC OF	ANGOLA	ANGL	AO	AGO	24		AON	10/04/1977		<input checked="" type="checkbox"/>	<input type="checkbox"/>	4	01/04/991	30/09/995
ANGOLA, THE REPUBLIC OF	ANGOLA	ANGL	AO	AGO	982		AOR	10/04/1977		<input checked="" type="checkbox"/>	<input type="checkbox"/>	5	01/10/995	31/01/2000

Last Updated By: ISDB_SYS Last Updated On: 23/04/2002 14:08:5

Figure IV-1-6. State history table

Aircraft Type

ICAO code: 762 Series No: 200
 Manufacturer: BOEI Family: 767

Aircraft Category

Engine Type: Turbojet
 Wing Type: Fixed-wing aircraft
 No Of Engines: 2 Cabin Type: Passenger

Min Seat Qty: 174 Max Seat Qty: 290
 Min Payload Capacity Qty: 30 Max Payload Capacity Qty: 40
 Min MCTOM Qty: 128 Max MCTOM Qty: 185
 Maximum Range: 12687 General Designator Code: 762
 Sub-Type Code: 762 Size Category No: B1
 Popular Name:
 Model Description: BOEING 767 200

Last Updated By: ISDB_SYS Last Updated On: 31/03/2011 15:48:39

Figure IV-1-7. Aircraft reference table

1. The value over time of each individual currency against the US Dollar is kept in a separate exchange rate reference table.

1.2.7 A similar situation arises with air carrier names, where the system keeps track of the changes these may undergo in order to recognize over time data pertaining to the same air carrier, regardless of its current name. Unfortunately, the same could not be done in relation to buyouts and mergers. In these cases it is up to the user to identify when sudden changes in a carrier's data may be due to the integration of the operations of another carrier.

1.2.8 Another important reference table is the one dealing with aircraft types (Figure IV-1-7). As will be seen later, the information contained here is used to validate the aircraft data submitted for *Traffic by flight stage — TFS* (Form C), *Fleet* (Form D) and *Civil aircraft on register* (Form H — Part II).

Quality controls

1.2.9 Built into the ISDB are a number of quality checks which the data must go through before they can be made "permanent". Quality control checks can be performed within the same data set and across other data sets. Newly reported data are compared with submissions of the previous month and/or previous year. For some data, such as the monthly air carrier traffic and capacity figures, the system conducts more sophisticated checks to verify the consistency in the relationship between the various data elements. Finally, taking advantage of the integrated nature of the system, quality checks are made between different data sets such as the air carrier traffic and on-flight origin and destination data to ensure homogeneity. Where the system identifies deviations or "errors" in the data submitted, States or other reporting entities may be asked to provide clarification and, if necessary, to submit amended data.

1.2.10 Part IV, Chapters 2 and 3 describe in more detail the checks carried out by the ISDB for data submitted to ICAO in the individual reporting forms.

Statisticians should be wary of using operational codes in databases

As even a first-time airline passenger would know from a glance at his/her baggage tag, the air transport industry favours the use of codes to identify aerodromes. Indeed, ICAO and the International Air Transport Association (IATA) have generated a whole series of codes as a short-hand notation to identify aircraft types, air carrier operators and airports. These codes are used to meet various industry commercial and operational requirements.

The existence of these codes has created a temptation to extend their application to areas for which they were never intended, such as statistical databases, but with poor results. This is because the most important criterion for any statistical database is that the codes employed therein must be permanent and unique over time.

In practice, this is not the case for the existing codes. In such systems, codes need only be correct and typically distinct on the day they are used, and they do not always represent a unique entity over an extended period of time, a characteristic that must raise the concern of any statistician. Consequently this approach should be avoided. At a minimum, before adopting an existing coding system, database administrators would be well advised to consider the system's primary purpose and should not take for granted that it will meet statistical requirements.

Air carriers, airports and air navigation services providers regularly make use of the ICAO or IATA operational codes during the collection process of their own traffic and operational data. Because of this, ICAO encourages the use of these codes when these entities submit data to the Organization as usually they are correct at the time the data are reported. Consequently during the design phase of the ISDB, the issues posed by these codes had to be addressed.

Recognizing that such codes are not useful for identifying historical records, the new ICAO integrated statistical database (ISDB) reference files for air carriers and airports allows both the ICAO and IATA codes (where these exist) to be entered, but also employs a unique, permanent machine-generated code for record identification. For air carriers in particular, the use of the machine-generated code has allowed ICAO to recognize over time the continuous data series for a specific air carrier regardless of how many times it may have changed name or ICAO/IATA codes.

Note.— All IATA codes are available in its Airline Coding Directory. ICAO's codes are published in three separate documents: *Location Indicators* (Doc 7910); *Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services* (Doc 8585) and *Aircraft Type Designators* (Doc 8643).

Chapter 2

DATA QUALITY CONTROLS

2.1 INTRODUCTION

2.1.1 During the design phase of the ISDB it was decided to build into the system a series of data quality control functions to assist ICAO's staff with this process by automating all the necessary calculations and producing a report for each reporting form. These quality control processes were divided into two main activities: verification and validation.

Verification is the more strict of the two. Here the system verifies that the information contained in the header of the form (air carrier name, State, currency, etc.) is valid and in conformity with the information already present in the ISDB. Subsequently, the system verifies that where there are arithmetic relationships these are correct, such as between the partial figures (sub-accounts) and the totals (main accounts). If an error is found in any of the verification steps, the system will not allow the statistical officer to proceed to the next step (validation) until the errors are rectified.

Validation is a process whereby the system uses the reported data, and where available information from the same or other data series, to calculate a number of parameters; for example, the percentage change over the previous period, basic parameters which can be derived from the data themselves (average aircraft speed, average passenger mass, etc.) and comparisons with the same information reported in another form, to assess the quality of the data submitted. In this case it is up to the statistical officer to decide whether to approve, amend or reject the data concerned.

2.1.2 Another important distinction between the two processes has to do with the programming aspects. In the case of the numerical verification it was opted to use mathematical expressions which compare the related fields. These formulas are included in a table and can be readily modified by the ISDB manager. On the other hand the validation processes are hard coded, thus much more difficult to modify without the assistance of a programmer with knowledge of Oracle.

2.1.3 The next sections of this chapter will show as an example the verification steps taken in relation to the numerical data submitted for two of the most complex reporting forms, commercial air carrier traffic — Form A, and air carrier financial data — Form EF. Chapter 3 of Part IV will look at the validation reports.

2.2 VERIFICATION

Commercial air carrier traffic — Form A

2.2.1 Below is a copy of the specification for the verification report of the numerical elements in Form A.

Description: Perform the data value verifications

Common:

- R1. All the data values present should be ≥ 0 .
- R2. For all rows where column e is not disabled
(column e) \leq (column c)
Formula will be defined against all form fields in column e.
- R3. For all rows where column f is not disabled
(column f) \leq (column d).
Formula will be defined against all form fields in column f.

For Scheduled Revenue Flights:

- R4. For column c and column d
(row 7) \geq (row 6)
Formula will be defined against form fields in (row 6, column c and column d) and (row 7, column c and column d).
- R5. For column c and column d
(row 8) – ((row 6) / (row 7) * 100) ≥ -0.3
(row 8) – ((row 6) / (row 7) * 100) ≤ 0.3
Formula will be defined against all form fields in (row 8, column c and column d).
- R6. For column c and column d
(row 9d) – ((row 9a) + (row 9b) + (row 9c)) ≥ -2
(row 9d) – ((row 9a) + (row 9b) + (row 9c)) ≤ 2
Formula will be defined against all form fields in column c and column d for row 9a, row 9b, row 9c and row 9d.
- R7. For column e and column f
(row 9d) – ((row 9b) + (row 9c)) ≥ -2
(row 9d) – ((row 9b) + (row 9c)) ≤ 2
Formula will be defined against all form fields in column e and column f for row 9b, row 9c and row 9d.
- R8. For all columns
(row 10) \geq (row 9d)
Formula will be defined against all form fields in row 9d and row 10.
- R9. For all columns
(row 11) – ((row 9d) / (row 10) * 100) ≥ -0.3
(row 11) – ((row 9d) / (row 10) * 100) ≤ 0.3
Formula will be defined against all form fields in row 11.

For Non Scheduled Revenue Flights:

- R10. For column c and column d
(row 18) \geq (row 17)
Formula will be defined against all form fields in (row 17, column c and column d) and (row 18, column c and column d).
- R11. For column c and column d
(row 19c) – ((row 19a) + (row 19b)) ≥ -2
(row 19c) – ((row 19a) + (row 19b)) ≤ 2

	Formula will be defined against all form fields in column c and column d for row 19a, row 19b and row 19c.
R12.	For column e and column f (row 19c) - (row 19b) >= -2 (row 19c) - (row 19b) <= 2 Formula will be defined against all form fields in column c and column d for row 19b and row 19c.
R13.	For all columns R8 (row 20) >= (row 19c) Formula will be defined against all form fields in row 19c and row 20.

2.2.2 As shown in the specification above, in some cases the comparison made will not necessarily yield an exact value so one has to look at a small range of values which would still allow for the reported data to be correct. For example, **R5** above compares the reported passenger load factor (row 8) with the load factor calculated from the data submitted in Form A: passenger-km (row 6)/seat-km (row 7). In theory, both values should be identical. However, the passenger-km and seat-km reported have been rounded to the nearest thousand. It is possible that the reported passenger load factor might have been calculated when the passenger-km and seat-km were shown in units. In this case one has to take into account that the reported load factor and the calculated load factor may not be identical, and the ISDB allows a tolerance of +/- 0.3 between the two values.

2.2.3 Building into the specification allowances for these small differences due to rounding when comparing reported with calculated data reduces the number of "error messages" the verification process yields and permits the statistical officer to concentrate on those elements where the real problems may be.

Financial data — Commercial air carriers – Form EF

2.2.4 The problems in verifying Form EF stem from the relatively large number of sub-accounts and main accounts which appear in this Form. The specification below shows how each one of these groups is being dealt by the ISDB.

Description:	Perform the data value verifications
	<i>Profit and Loss Statement</i>
R1.	row 1 = row 1.1 + row 1.2 + row 1.3 + row 1.4 Formula will be defined against the form fields in rows 1, 1.1, 1.2, 1.3, 1.4.
R2.	row 2 = row 2.1 + row 2.2 Formula will be defined against the form fields in rows 2, 2.1, 2.2.
R3.	row 3 = row 3.1 + row 3.2 Formula will be defined against the form fields in rows 3, 3.1, 3.2.
R4.	row 4 = row 1 + row 2 + row 3 Formula will be defined against the form fields in row 4, row 1, row 2 and row 3
R5.	row 5 = row 5.1 + row 5.2 + row 5.3 + row 5.4 + row 5.5 Formula will be defined against the form fields in row 5, row 5.1, row 5.2, row 5.3, row 5.4 and row 5.5

- R6. row 7 = row 7.1 + row 7.2 + row 7.3 + row 7.4
Formula will be defined against the form fields in row 7, row 7.1, 7.2, row 7.3 and 7.4
- R7. row 8 = row 8.1 + row 8.2
Formula will be defined against the form fields in row 8, row 8.1 and row 8.2
- R8. row 10 = row 10.1 + row 10.2
Formula will be defined against the form fields in row 10, row 10.1 and row 10.2
- R9. row 11 = row 11.1 + row 11.2
Formula will be defined against the form fields in row 11, row 11.1 and row 11.2
- R10. row 13 = row 13.1 + row 13.2
Formula will be defined against the form fields in row 13, row 13.1 and row 13.2
- R11. row 14 = row 5 + row 6 + row 7 + row 8 + row 9 + row 10 + row 11 + row 12 + row 13
Formula will be defined against the form fields in row 14, row 5, row 6, row 7, row 8, row 9, row 10, row 11, row 12 and row 13
- R12. row 15 = row 4 - row 14
Formula will be defined against the form fields in row 15, row 4 and row 14
- R13. row 16 = row 16.1 + row 16.2
Formula will be defined against the form fields in row 16, row 16.1 and row 16.2
- R14. row 21 = row 16 + row 17 + row 18 + row 19 + row 20
Formula will be defined against the form fields in row 21, row 16, row 17, row 18, row 19 and row 20
- R15. row 22 = row 15 + row 21
Formula will be defined against the form fields in row 22, row 15 and row 21
- R16. row 24 = row 22 + row 23
Formula will be defined against the form fields in row 24, row 22 and row 23
- R17. row 26 = row 24 + row 25
Formula will be defined against the form fields in row 26, row 24 and row 25

Balance Sheet

- R18. row 1 = row 1.1 + row 1.2 + row 1.3
Formula will be defined against the form fields in row 1, row 1.1, row 1.2 and row 1.3
- R19. row 2 = row 2.1 + row 2.2 + row 2.3
Formula will be defined against the form fields in row 2, row 2.1, row 2.2 and row 2.3
- R20. row 3 = (row 3.1 – row 3.1.1) + (row 3.2 – row 3.2.1) + (row 3.3 – row 3.3.1)
+ (row 3.4 – row 3.4.1) + row 3.5
Formula will be defined against the form fields in row 3, row 3.1, row 3.1.1, row 3.2, row 3.2.1, row 3.3, row 3.3.1, row 3.4, row 3.4.1, row 3.5

- R21. $\text{row 4} = \text{row 4.1} - \text{row 4.1.1}$
Formula will be defined against the form fields in row 4, row 4.1, row 4.1.1
- R22. $\text{row 5} = \text{row 5.1} + \text{row 5.2} + \text{row 5.3} + \text{row 5.4}$
Formula will be defined against the form fields in row 5, row 5.1, row 5.2, row 5.3, row 5.4
- R23. $\text{row 6} = \text{row 1} + \text{row 2} + \text{row 3} + \text{row 4} + \text{row 5}$
Formula will be defined against the form fields in row 6, row 1, row 2, row 3, row 4, row 5
- R24. $\text{row 7} = \text{row 7.1} + \text{row 7.2} + \text{row 7.3}$
Formula will be defined against the form fields in row 7, row 7.1, row 7.2, row 7.3
- R25. $\text{row 8} = \text{row 8.1} + \text{row 8.2} + \text{row 8.3} + \text{row 8.4} + \text{row 8.5}$
Formula will be defined against the form fields in row 8, row 8.1, row 8.2, row 8.3, row 8.4, row 8.5
- R26. $\text{row 10} = \text{row 10.1} + \text{row 10.2} + \text{row 10.3}$
Formula will be defined against the form fields in row 10, row 10.1, row 10.2, row 10.3
- R27. $\text{row 11} = \text{row 7} + \text{row 8} + \text{row 9} + \text{row 10}$
Formula will be defined against the form fields in row 11, row 7, row 8, row 9, row 10
- R28. $\text{row 11} = \text{row 6}$
Formula will be defined against the form fields in row 11, row 6

Statement of Retained Earning

- R29. $\text{row 2} = \text{row 26 of Profit and Loss Statement (Part 1)}$
Formula will be defined against the form fields in row 2 and row 26 of Profit and Loss Statement (Part 1)
- R30. $\text{row 3} = \text{row 3.1} + \text{row 3.2} + \text{row 3.3}$
Formula will be defined against the form fields in row 3, row 3.1, row 3.2, row 3.3
- R31. $\text{row 5} = \text{row 1} + \text{row 2} + \text{row 3} + \text{row 4}$
Formula will be defined against the form fields in row 5, row 1, row 2, row 3, row 4
- R32. $\text{row 5} = \text{row 10.3 of Balance Sheet (part 2)}$
Formula will be defined against the form fields in row 5, row 10.3 of Balance Sheet (part 2)

Traffic and Capacity Statistics

- R33. $\text{row 3.4} = \text{row 3.1} + \text{row 3.2} + \text{row 3.3}$
Formula will be defined against the form fields in row 3.4, row 3.1, row 3.2, row 3.3
- R34. $\text{column c} = \text{column a} + \text{column b}$
Formula will be defined against the form fields in column c, column a, column b.

Chapter 3

DATA QUALITY CONTROLS — VALIDATION

3.1 INTRODUCTION

3.1.1 Some data series are easier to validate than others, in particular, those associated with the traffic carried and capacity offered by commercial air carriers. Because the main vehicle to carry passengers, freight and mail is an aircraft, data on traffic carried and capacity offered have certain physical restrictions beyond which one cannot go. Consequently those reporting these data need to ensure that the reported figures fall within the prescribed boundaries. For example, each aircraft type has performance limitations with regard to payload, speed and stage length; they have physical restrictions with regard to number of seats and cargo volume allowed; passenger mass falls within certain limits, etc. Any breach of these values would indicate that the data submitted are being reported incorrectly. Other data series, such as those dealing with finance, are somewhat more difficult and options available to validate these data may be quite limited.

3.1.2 Similarly, some data series may allow for significant validation parameters to be calculated from within the data series itself, while for others one may need to resort to the aid of additional information obtained from related data, e.g. comparing traffic revenues with the corresponding traffic carried (air carriers) or with the traffic embarked (airports).

3.1.3 The following sections of this chapter show the validation process carried out by the ISDB.

3.2 COMMERCIAL AIR CARRIER REPORTING FORMS

Commercial air carrier traffic — Forms A and A-S

3.2.1 In Part III, Chapter 2 it was shown how the data collected for OFOD (Form B) and TFS (Form C) could be used to derive the information required to complete the air carrier traffic and capacity statistics (Form A). Unfortunately for the validation processes carried out by the ISDB, ICAO collects Form A on a monthly basis whereas for the other two, Form B is collected quarterly and Form C annually. Hence, their data are not available to assist with the validation of those submitted in Form A. In this case, the reverse is actually done; i.e. Form A data are used to cross-check the information submitted in Forms B and C.

3.2.2 Nevertheless, the information reported in Form A lends itself to a considerable degree of scrutiny which allows the analyst to have a good idea if it contains potential errors. Below is the specification for the validation of Forms A and A-S specified for the ISDB.

Description: Validation to be done only for Form AS

- V1. For a State for each data value, the sum of all Form A for all air carriers over the year should be less than or equal to the corresponding data value of Form AS excluding the rows 8 and 11. List all the fields where the rule failed. If compatible data are not present, do the validation with a warning that indicates that data are not compatible.

Validation to be done only for Form A

- V2. If for the reported air carrier the service type is "All Freight" then for each row the value in Total All Services International (column c) must be equal to All Freight Services Only International (column e).
- V3. If for the reported air carrier the service type is "All Freight" then for each row the value in Total All Services Domestic (column d) must be equal to All Freight Services Only Domestic (column f).
- V4. If for the reported air carrier the service type is "All Freight" then each column for Passengers carried (row 4 and row 15), Passenger-kilometres performed (row 6 and row 17), Seat-kilometres available (row 7 and row 18), Passenger load factor (row 8) and passenger incl. baggage (rows 9a and 19a) should be null.

Validations to be done for

- Form A
- Form AS
- If there are more carriers in form AS, then for Form AS - Σ Form A over all air carriers for the same state, over the whole year.

Note if the data values in Form AS are greater, then it will imply Form AS contains extra air carriers for which a Form A was not submitted.

- V5. For Scheduled Revenue Flights, if there is data in Freight tonnes carried (row 5) then there should be data in corresponding columns of Freight incl. express (row 9b).
- V6. For Non-Scheduled Revenue Flights, if there is data in Freight tonnes carried (row 16) then there should be data in corresponding columns of Freight and mail (row 19b).
- V7. For Scheduled Revenue Flights, if there is data in Passengers carried (row 4) there should be data in corresponding columns of Passenger-kilometres performed (row 6), Seat-kilometres available (row 7) and passenger incl. baggage (row 9a).
- V8. For Non-Scheduled Revenue Flights, if there is data in Passengers carried (row 15) there should be data in corresponding columns of Passenger-kilometres performed (row 17), Seat-kilometres available (row 18) and passenger incl. baggage (row 19a).

DERIVED DATA TO BE SHOWN IN VALIDATION REPORT

For the set of derived data to be shown in the validation report, first calculate the following values:

ID	ITEM (row)	CALCULATE
	SCHEDULED REVENUE FLIGHTS	
A	1. Aircraft kilometres	c-e, d-f, e, f
B	2. Aircraft departures	c-e, d-f, e, f
C	3. Aircraft hours	c-e, d-f, e, f
D	4. Passengers carried	c, d
E	5. Freight tonnes carried	c-e, d-f, e, f
F	6. Passenger-kilometres performed	c, d

G	7. Seat-kilometres available	c, d
H	8. Passenger load factor	c, d
	9. Tonne-kilometres performed	
I	a) passenger (incl. baggage)	c, d
J	b) freight (incl. express)	c-e, d-f, e, f
K	c) mail	c-e, d-f
L	d) Total (9a to 9c)	c-e, d-f, e, f
M	10. Tonne-kilometres available	c-e, d-f, e, f
N	11. Weight load factor	c-e, d-f, e, f

NON- SCHEDULED REVENUE FLIGHTS

A	12. Aircraft kilometres	c-e, d-f, e, f
B	13. Aircraft departures	c-e, d-f, e, f
C	14. Aircraft hours	c-e, d-f, e, f
D	15. Passengers carried	c, d
E	16. Freight tonnes carried	c-e, d-f, e, f
F	17. Passenger-kilometres performed	c, d
G	18. Seat-kilometres available	c, d
	19. Tonne-kilometres performed	
I	a) passenger (incl. baggage)	c, d
J	b) freight	c-e, d-f, e, f
K	c) mail	c-e, d-f, e, f
L	d) Total (19a to 19c)	c-e, d-f, e, f
M	20. Tonne-kilometres available	c-e, d-f, e, f

NON REVENUE FLIGHTS

C	21. Aircraft hours	c-e, d-f, e, f
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Next, show the following derived data on the basis of the above calculated values.

For Form A the derived data described here will be shown in five columns

- Column 1. Selected form data
- Column 2. Data for the previous time period (if available)
- Column 3. Percentage variance of current data over data for the previous time period
- Column 4. Data for the same time period in previous year (if available)
- Column 5. Percentage variance of current data over data for the same time period in previous year

For Form AS the derived data described here will be shown in three columns

- Column 1. Selected form data
- Column 2. Data for the previous year (if available)
- Column 3. Percentage variance of current data over previous year's data

For (Form AS — Σ Form A) the derived data described here will be shown in three columns

- Column 1. (Form AS - Σ Form A) data
- Column 2. (Form AS - Σ Form A) data for the previous year (if available)
- Column 3. Percentage variance of current data over previous year's data

<i>Fleet Related Data</i>		
ITEM		DERIVED DATA ¹
SCHEDULED REVENUE FLIGHTS		
V9.	Avg. Stage (km)	A/B
V10.	Avg. Speed (km/hour)	A/C
V11.	Avg. Flight Time (hours)	C/B
V12.	Avg. Number of Seats	G/A
V13.	Avg. Payload Available (tonnes)	M/A
NON-SCHEDULED REVENUE FLIGHTS		
V14.	Avg. Stage (km)	A/B
V15.	Avg. Speed (km/hour)	A/C
V16.	Avg. Flight Time (hours)	C/B
V17.	Avg. Number of Seats	G/A
V18.	Avg. Payload Available (tonnes)	M/A
 <i>Traffic Related Data</i>		
ITEM		DERIVED DATA
SCHEDULED REVENUE FLIGHTS		
V19.	Avg. Number of Passengers by Departure	D/B
V20.	Avg. Passenger Trip Distance (km)	F/D
V21.	Avg. Passenger Weight incl. Baggage (kg)	(I/F)*1000
V22.	Avg. Freight Trip Distance (km)	J/E
NON-SCHEDULED REVENUE FLIGHTS		
V23.	Avg. Number of Passengers by Departure	D/B
V24.	Avg. Passenger Trip Distance (km)	F/D
V25.	Avg. Passenger Weight incl. Baggage (kg)	(I/F)*1000
V26.	Avg. Freight Trip Distance (km)	J/E

3.2.3 Assuming a State has reported both Forms A and A-S, one of the first validations is to compare the summation of the data reported in Form A with those for Form A-S. Please note that by definition (see Part III, Chapter 2) the individual elements derived from the summation of the Forms A received for the individual commercial air carriers with their principle place of business in a State must be smaller or equal to the corresponding data element reported in Form A-S for all the commercial air carriers based in that State.

3.2.4 The specification also shows that in order to carry out a meaningful comparison with the derived data one must first ensure that the data are consistent with regard to the type of operations performed. Hence one of the first processes to be done is to see if data for all-freight services have been reported (columns e and f). If that is the case, then one needs to separate the data for *All services* (columns c and d) into passenger and all-freight services, by subtracting the latter (columns e and f) from the former.

1. Regardless of the unit (units, thousand, million) used to submit the data in the reporting forms, to avoid having to remember which units were used in each case when retrieving the data, ALL numbers in the ISDB are converted and held in units. Consequently the formulas shown in the specification for the validation process take this into account.

3.2.5 Once this is done one can proceed to calculate separately for passenger and all-freight services the percentage variations with the previous month and with the same month the previous year as well as the derivatives for the data submitted.

3.2.6 The example below shows how the derivatives for a set of data received on Form A can assist in identifying potential errors. In some cases the information derived from the data submitted may hint at a potential error in which case some additional information may be required to validate the data concerned. The errors shown below are representative of those which are commonly identified by ICAO during the validation process of data received.

<i>Description</i>	<i>Units</i>	<i>International</i>	<i>Domestic</i>
1. Aircraft kilometres	000	7 730	5 858
2. Aircraft departures	number	1 528	6 690
3. Aircraft hours	number	7 362	8 679
4. Passengers carried	number	216 044	617 829
5. Freight carried (tonnes)	number	2 500	0
6. Passenger-kilometres performed	000	181 380	92 674
7. Seat-kilometres available	000	225 348	199 172
8. Passenger load factor	%	80.5	46.5
9. Tonne-kilometres performed			
a) Passenger (inc baggage)	000	19 045	13 900
b) Freight	000	2 000	0
c) Mail	000	0	0
d) Total	000	21 045	13 900
10. Tonne-kilometres available	000	28 397	25 096
11. Weight load factor	%	74.1	55.4

3.2.7 Now let us look at the derivatives and which ones raised a red flag:

<i>Fleet related data</i>	<i>Formula</i>	<i>International</i>	<i>Domestic</i>
V9. Avg. stage (km)	A/B	5 059	876
V10. Avg. speed (km/hour)	A/C	1 050	675
V11. Avg. flight time (hours)	C/B	4.8	1.3
V12. Avg. number of seats per aircraft	G/A	29	34
V13. Avg. payload capacity per aircraft (tonnes)	M/A	3.7	4.3
<i>Traffic related data</i>			
V19. Avg. number of passengers per departure	D/B	141	92
V20. Avg. passenger trip distance (km)	F/D	840	150
V21. Avg. passenger mass incl. baggage (kg)	(I/F)*1000	105	150
V22. Avg. freight trip distance (km)	J/E	800	

V10. The average speed shown for international services is too high. Though average block speeds are related to stage distance (see side bar) they never go beyond the maximum cruise speed of the commercial airliners in service which, for subsonic jets, is around 900 kph. This means that there is an error in either the aircraft kilometres or the hours reported. An investigation of the schedules published suggests that the error lies with the aircraft kilometres reported since the average stage length flown should be of the order of 3 800 km, not 5 059 km as calculated above.

3.2.8 The average speed for domestic services is a little bit high but acceptable.

V12. Comparing these values with those obtained for the number of passengers by departure (V19) suggests that the average number of seats reported is incorrect. Checking the aircraft used by this carrier confirms this, given that it operates Boeings 737 and 767 with 176 and 267 seats, respectively.

V13. The value shown in the derived data is consistent with that one for the average seats (V12). However given that the values for V12 are incorrect so are those for V13.

V20. The average passenger trip distances shown are inconsistent with the corresponding average aircraft stages distances flown (V9). The difference between the two figures is too high. Though a lot will depend on the composition of the routes and the on-flight origin and destination of the passengers, in general the values for V20 and V9 tend to be relatively close.

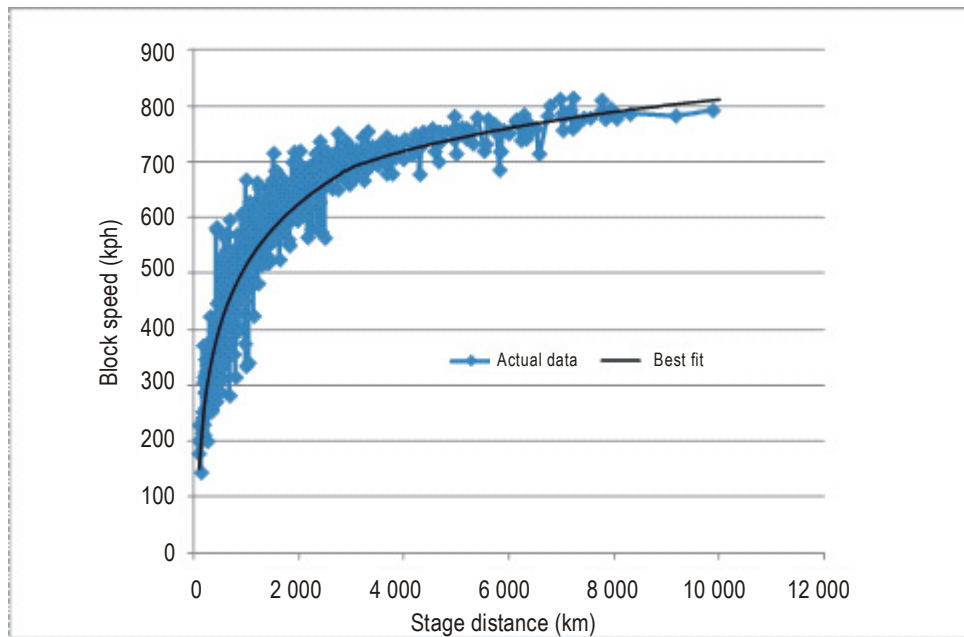
V21. The average passenger mass for domestic services is too high. Comparing this (150 kg) with the one derived for international services (105 kg) suggests a possible error in the original calculation.

V22. Given the average stage distance reported for international services (V9) this value might be too low.

3.2.9 Finally, one word about the reported tonne-kilometres available. As stated above, the relationship between the number of seats reported and the payload available (some 126 kg per seat) is correct for the number of seats shown. However, this relationship assumes that the capacity offered on international and domestic operations includes both passengers and freight. If for operational or commercial reasons, no freight capacity is ever made available for sale on domestic routes, then this capacity should not be included in the available capacity (in tonnes) for domestic services. In this case, the latter is obtained by multiplying the seat capacity available by the average passenger mass plus the checked baggage. Consequently, the passenger and weight load factors for domestic services would be identical.

Relationship between stage distance and block speed

The figure below shows the relationship between aircraft stage distance (km) and block speed (kph) for international passenger operations. The actual data were obtained from the air carrier information shown in the air carrier schedules. Since the distance between airports is based on the great circle distance (Vincenty formula), the variation of the times shown for the same distance can be attributed to differences in the operating environments such as route deviations, delays and prevailing winds.



Source: Air carrier scheduled data published by OAG modified by ICAO

On-flight origin and destination (OFOD) — Form B

Description:	<p>Validation</p> <p>V1. The STATE_ID for From City, To City and AIR_CARRIER should not be the same.</p> <p>CROSS FORM VALIDATION</p> <p>V2. The sum of (column b) for the selected form = (row 4, column c) of sum of all Forms A for the same period and for the same set of air carriers as reported in Form B.</p> <p>V3. The sum of (column c) for the selected form = (row 5, column c) of sum of all Forms A for the same period and for the same set of air carriers as reported in Form B.</p> <p>DERIVED DATA TO BE SHOWN IN THE VALIDATION REPORT</p> <p>V4. Sum of the (column b) for the selected form, sum of (column b) of form(s) covering the same air carriers and same period of the previous year (if available), percentage variance.</p> <p>V5. Sum of the (column c) for the selected form, sum of (column c) of form(s) covering the same air carriers and same period of the previous year (if available), percentage variance.</p> <p>V6. Sum of the (column d) for the selected form, sum of (column d) of form(s) covering the same air carriers and same period of the previous year (if available), percentage variance.</p>
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3.2.10 As described in Part III, Chapter 2, for the corresponding periods, the summation of the traffic reported in Form B for international operations should be identical to the number of passengers and freight tonnes carried reported in Form A.

3.2.11 However, for various reasons, in reality this seldom happens, but in general the figures are sufficiently close to be acceptable.

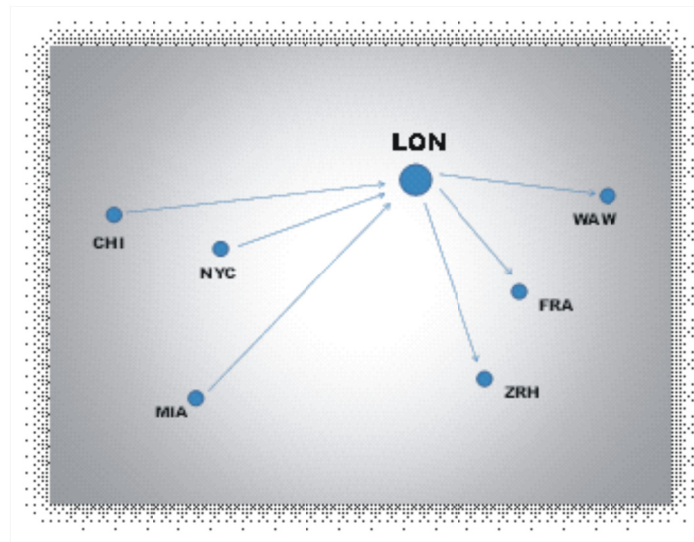
3.2.12 Where the figures show a significant variation this can be caused by the definitions used to calculate traffic carried and OFOD not being consistent. A few States have reported the origin and destination of the traffic over the air carrier's network without taking into account any flight connections which may have been required because of the network configuration.

3.2.13 This error is often suspected when the total figures reported for OFOD are significantly smaller than the corresponding traffic figures shown in Form A. This can be easily corrected by comparing the reported city-pairs with the flight itineraries of the carrier concerned. The comparison will then show that some of the city-pairs reported are not linked with a direct flight (a flight with the same flight number). Consequently the traffic reported for those city-pairs must have connected with other flights of the reporting air carrier.

3.2.14 For example, assume that the following Form B was received (for the sake of brevity only eastbound traffic is shown).

<i>From</i>	<i>To</i>	<i>Passenger numbers</i>
CHI	FRA	950
CHI	LON	5 000
CHI	WAW	2 000
LON	FRA	25 000
LON	WAW	10 000
LON	ZHR	15 000
MIA	LON	3 500
MIA	ZRH	800
NYC	FRA	1 000
NYC	LON	15 000
NYC	WAW	500
NYC	ZRH	750

3.2.15 The total number of passengers reported in Form B (shown above) is 79 500, whereas total number of passengers reported in Form A for the same period is 85 500. Checking the routes flown by this carrier one discovers that it has no direct flights between North America and continental Europe. Instead all passengers must change flights (and hence use a new coupon) in LON. Consequently the OFOD report should show LON as either the arrival or the departure point in each row of the reported data.



3.2.16 To correct the submission, one needs to take all the city-pairs whose traffic needs to transfer flights in LON and reallocate it showing LON as either the arrival or departure (see below).

<i>From</i>	<i>To</i>	<i>Passenger numbers</i>	<i>From</i>	<i>to</i>
CHI	LON	950	LON	FRA
CHI	LON	2 000	LON	WAW
MIA	LON	800	LON	ZHR
NYC	LON	1 000	LON	FRA
NYC	LON	500	LON	WAW
NYC	LON	750	LON	ZRH

3.2.17 The table below shows the correct report for Form B after combining the recalculated figures (above) with those of the city-pairs which already had LON as either the departure or the arrival. The sum of the passenger numbers shown is now 85 500, the same as the number of passengers reported in Form A.

<i>From</i>	<i>To</i>	<i>Passenger numbers</i>
CHI	LON	7 950
LON	FRA	26 950
LON	WAW	12 500
LON	ZHR	16 550
MIA	LON	4 300
NYC	LON	17 250

3.2.18 Clearly the calculation above was facilitated by the fact that there was a single logical transfer point. While this may be the case for most air carriers, other more complex networks may exist which would require the air carriers to carry out the above correction. In either case, the carrier would have to be advised of the error so that subsequent submissions are correct.

3.2.19 In other cases, the summation of the data reported on Form B is higher than that shown in Form A. This may occur when an air carrier reports TFS traffic data as if they were OFOD data. Both are the same *only* if all the flights performed by the carrier are single stage flights. If this is not the case, then by submitting in Form B traffic data by flight stage, the reporting entity is double-counting passengers which are on board for more than one sector (see comparison between OFOD and TFS traffic in paragraph 2.5.3 of Part III, Chapter 2). Unfortunately in this case, one cannot modify the submission to verify this, as for TFS type data one does not know the points of embarkation and disembarkation of the traffic concerned.

3.2.20 Also, there is always the possibility that the reported data may include (correctly) or exclude (incorrectly) the traffic for the marketing carriers.

3.2.21 Finally a common error found in many Forms is that the data reported do not respect the units requested on the Form, for example, in the case of Form B data for freight and mail are sometimes reported in kg instead of metric tonnes.

Traffic by Flight Stage (TFS) — Form C

Description:	Validation
	For each row of Form C check the following
V1.	For each detail data row city-pair should be a valid TFS city-pair for the air carrier reported in the form. A record should exist in AIR_CARRIER_CITY_PAIR table with FROM_ICAO_CITY_ID = CITY_ID of City-Pair From and TO_ICAO_CITY_ID = CITY_ID of To City-Pair To and AIR_CARRIER_ID = AIR_CARRIER_ID of FORM_C_MASTER table and VALID_FOR = 'T' (TFS) and The period covered by EFFECTIVE_DATE, EXPIRY_DATE has overlap with period covered by FORM_C_MASTER.FROM_DATE, FORM_C_MASTER.TO_DATE
V2.	The STATE_ID for From City, To City and AIR_CARRIER should not be same.
V3.	Distance between two cities should be < MAX_RANGE of the aircraft type.
V4.	For each row ((column f) * passenger weight) + (column g) + (column h) <= (column e). The passenger weight (0.09) will be defined as a system parameter.
V5.	If column d is not null and column c is not null then (column d) >= (column c) * MIN_SEAT_QTY defined in the AIRCRAFT_TYPE table for the Type of the Aircraft. If the rule fails show the variance in the message as ((column d) - (column c) * MIN_SEAT_QTY) / (column c).
V6.	If column d is not null and column c is not null then (column d) <= (column c) * MAX_SEAT_QTY defined in the AIRCRAFT_TYPE table for the Type of the Aircraft. If the rule fails show the variance in the message as ((column d) - (column c) * MAX_SEAT_QTY) / (column c).
V7.	If column e is not null and column c is not null then (column e) >= (column c) * MIN_PAYLOAD_CAPACITY_QTY defined in the AIRCRAFT_TYPE table for the Type of the Aircraft. If the rule fails show the variance in the message as ((column e) - (column c) * MIN_PAYLOAD_CAPACITY_QTY) / (column c).
V8.	If column e is not null and column c is not null then (column e) <= (column c) * MAX_PAYLOAD_CAPACITY_QTY defined in the AIRCRAFT_TYPE table for the Type of the Aircraft. If the rule fails show the variance in the message as ((column e) - (column c) * MAX_PAYLOAD_CAPACITY_QTY) / (column c).
V9.	If f > 0 then d should be > 0.
V10.	If d > 0 then f should be > 0.
V11.	All the departures for a city code (Sum of Number of flights (Column c) for the rows where the city appears as Stations From) should be equal to all the arrivals for that city (Sum of Number of flights (Column c) for the rows where the city appears as Stations to).
V12.	If for the reported air carrier the service type is "All Freight" then for each row, Passenger Seats (column d) and Passengers (column f) should be null.

V13. If for the reported air carrier the service type is not “All Freight” then check for the aircraft type in the row if the minimum seat and maximum seat both are zero then Passenger Seats (column d) and Passengers (column f) should be null.

Cross Form validations

V14. Sum of number of flights (column c) should be equal to the sum of Aircraft Departures (row 2, column c) for all the Forms A covering the same period and same air carriers.

V15. Sum of (passenger seats (column d) * distance between city-pair of the row)) in kilometres should be equal to Seat-kilometres available (row 7, column c) for all the Forms A covering the same period and same air carriers.

3.2.22 The most common errors found in TFS are:

- a) Aircraft type identified and the other data reported are not compatible. Checks with published schedules and fleet data indicate that the wrong aircraft type code was used.
- b) Under one city-pair label, traffic and capacity data are aggregated for two or more aircraft types. Since the ISDB does not accept this, ICAO has to split the reported traffic among the aircraft types shown. In the absence of other information, the traffic is redistributed among the aircraft types shown by applying to each aircraft the overall average passenger and weight load factors calculated for that city-pair.
- c) Identifying the aircraft type as “miscellaneous”. There is no such classification allowed in the ISDB.
- d) The reported traffic appears to be too low for the aircraft capacity shown; suggesting that the traffic for the marketing carrier may not be included.
- e) The traffic reported exceeds the aircraft capacity shown; suggesting that on those city-pairs where the reporting carrier is both an operator and a marketing carrier, it is erroneously including the traffic for those flights when it is a marketing carrier.
- f) Freight and mail are reported using the wrong unit, for example, in kg instead of metric tonnes.

Fleet and Personnel — Form D

3.2.23 Because Form D contains two totally unrelated sets of data, the validation calculations carried out by the ISDB are shown in two parts, one for Fleet and the other for Personnel.

Description: Validation — Fleet Data

For each of the rows in Fleet data block do the following validations

- V1. If (column g1) and (column g2) is not null then
In AIRCRAFT_TYPE table for the aircraft type in the row
MAX_SEAT_QTY >= (column g2) and
(column g1) >= MIN_SEAT_QTY
- V2. If (column h1) and (column h2) is not null then
In AIRCRAFT_TYPE table for the aircraft type in the row
MAX_PAYLOAD_CAPACITY_QTY >= (column h2)
(column h1) >= MIN_PAYLOAD_CAPACITY_QTY

- V3. If (column i1) and (column i2) is not null then
In AIRCRAFT_TYPE table for the aircraft type in the row
MAX_MCTOM_QTY >= (column i2) and
(column i1) >= MIN_MCTOM_QTY

Cross Form Validations

- V4. For the same aircraft type Number of aircraft at the beginning of the current year (column c of current year) = Number of aircraft at the end of the previous year (column f of previous year)

Summarize Form A data for the same period (FROM_DATE, TO_DATE) as reported in Form D for the same set of air carrier then do the following validations for the Fleet data.

- V5. Form D (Σ Column j) = Form A (row 2, column c) + Form A (row 2, column d)
- V6. Form D (Σ Column k) = Form A (row 13, column c) + Form A (row 13, column d)
- V7. Form D (Σ Column l) >= Form A (row 2, column c) + Form A (row 2, column d) + Form A (row 13, column c) + Form A (row 13, column d)
- V8. Form D (Σ Column m) = Form A (row 3, column c) + Form A (row 3, column d)
- V9. Form D (Σ Column n) = Form A (row 14, column c) + Form A (row 14, column d)
- V10. Form D (Σ Column o) >= Form A (row 3, column c) + Form A (row 3, column d) + Form A (row 14, column c) + Form A (row 14, column d) + Form A (row 21, column c) + Form A (row 21, column d)
- V11. Form D (Σ Column p) = Form A (row 1, column c) + Form A (row 1, column d)
- V12. Form D (Σ Column q) = Form A (row 12, column c) + Form A (row 12, column d)
- V13. Form D (Σ Column r) >= Form A (row 1, column c) + Form A (row 1, column d) + Form A (row 12, column c) + Form A (row 12, column d)

DERIVED FLEET DATA TO BE SHOWN IN THE VALIDATION REPORT

For each of the rows in Fleet data block do the following calculations and show the result in validation report.

- V14. If (column l) is not null then
If (column c + column d) > 0 then
Average number of departures for an aircraft per day = (column l) / ((column c + column d) * 365)
Else if (column f) > 0 then
Average number of departures for an aircraft per day = (column l) / (column f * 365).
- V15. If (column c + column d) > 0 then
Average hours flown by an aircraft per day = (column o) / ((column c + column d) * 365)
Else if (column f) > 0 then
Average hours flown by an aircraft per day = (column o) / (column f * 365).

- V16. If (column m + column n) > 0 and (column s > 0) then
 Aircraft Utilization = (column m + column n) / (column s)
 Else if (column o > 0) and (column s) > 0 then
 Actual hours = (column o) / (column s)
- V17. If (column j > 0) then
 Average distance flown by aircraft type for scheduled flights = (column p) / (column j)
- V18. If (column k > 0) then
 Average distance flown by aircraft type for non-scheduled flights = (column q) / (column k)
- V19. If (column l > 0) then
 Average distance flown by aircraft type = (column r) / (column l)
- V20. If (column m > 0) then
 Average speed by aircraft type for scheduled flights = (column p) / (column m)
- V21. If (column n > 0) then
 Average speed by aircraft type for non-scheduled flights = (column q) / (column n)
- V22. If (column o > 0) then
 Average speed by aircraft type = (column r) / (column o)
- V23. If (column j + column k) > 0 then
 Percentage of non-revenue departures = ((column l) / (column j + column k) * 100) - 100
- V24. If (column m + column n) > 0 then
 Percentage of non-revenue aircraft hours = ((column o) / (column m + column n) * 100) - 100
- V25. If (column p + column q) > 0 then
 Percentage of non-revenue aircraft kilometres = ((column r) / (column p + column q) * 100) - 100

3.2.24 The most common errors found in Form D related to fleet data are:

- a) The number of aircraft reported for the beginning of the year does not correspond to the number of aircraft reported for the end of the previous year.
- b) The average number of aircraft days per aircraft type reported for the year exceeds 365 days.
- c) The average daily utilization per aircraft type exceeds 24 hours. Please note that V15 provides an estimate of the daily utilization based on the number of aircraft available at the end of the year, whereas V16 shows the daily utilization as reported. The daily utilization figures estimate in V15 should be fairly similar to the actual value derived in V16.
- d) The operational data derived for each aircraft type such as average distance flown (V17 to V19), and average block speed (V20 to V22) exceed the operational parameters of the aircraft type concerned. With reference to the average block speed versus distance please refer to the side bar following paragraph 3.2.8.

- e) The total figures for departures, aircraft kilometres, and/or hours flown do not match the corresponding figures reported for the same air carrier in Form A. Depending on the differences shown it may suggest that i) aircraft leased in were not included, or ii) aircraft leased out are included. If possible States should identify in the Remarks box included in the Form deviations from the Reporting Instructions which would cause the total aircraft data reported in Form D to differ from the same items reported in Form A.

Description:	<p>Validation — Personnel Data</p> <p>DERIVED DATA TO BE SHOWN IN THE VALIDATION REPORT</p> <p>For Form D Personnel data show the derived data values described below in three columns</p> <p>Column 1. Selected form data</p> <p>Column 2. Data for the same time period in previous year for the same Air Carrier (if available)</p> <p>Column 3. Percentage variance</p> <p>V26. If (column b) >0 then Average annual expenditure in USD for each person = (USD equivalent of column d) / (column b) Else if (column c) >0 then Average annual expenditure in USD for each person = (USD equivalent of column d) / (column c)</p> <p>V27. If (column b) >0 then Average monthly expenditure in USD for each person = (USD equivalent of column d) / ((column b) *12) Else if (column c) >0 then Average monthly expenditure in USD for each person = (USD equivalent of column d) / ((column c) *12)</p> <p>V28. For each data value (for all rows column b, column c and column d) show the percentage variance calculated as follows: Percentage variance = (USD Equivalent Data value in current form / USD Equivalent Data value in previous year's form covering same period for same air carrier) * 100) - 100</p> <p>Personnel Data Verification rules</p> <p>V29. Average annual expenditure in USD (calculated in V26) for Pilots and co-pilots should be greater than that for all other categories of personnel (Other flight crew, Maintenance and overhaul personnel, Ticketing and sales personnel, All other personnel)</p> <p>V30. Average monthly expenditure in USD (calculated in V27) for Pilots and co-pilots should be greater than that for all other categories of personnel (Other flight crew, Maintenance and overhaul personnel, Ticketing and sales personnel, All other personnel)</p> <p>Note .— For Form D – Personnel (and all other financial forms) Year = Year of (TO_DATE – 1) if (MM/DD of TO_DATE < 30-JUN) else Year = Year of TO_DATE.</p>
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3.2.25 The most common errors found in Form D related to personnel data are:

- a) The number of personnel by category and the annual remuneration are not consistent with the size of the carrier concerned. Under *Remarks* States should indicate whether this is caused by activities being contracted out (less staff required) or the air carrier is performing work for third parties (such as aircraft maintenance and overhaul) requiring additional staff to be hired.
- b) The average annual remuneration by personnel category is not consistent with activity of the staff involved.

Financial data — Form EF

Description:	<p>Validation</p> <p><i>General rule:</i> If Part 4 of Form EF is present use the data in all validations otherwise take sum of all Forms A for the same air carrier for the same period of time and use it instead. The data equivalence is as follows:</p> <p>Data equivalence table</p> <p>FORM EF PART-4 ΣFORM A</p> <ol style="list-style-type: none"> 1. (row 1, column a) (row 6, column c) + (row 6, column d) 2. (row 2, column a) (row 7, column c) + (row 7, column d) 3. (row 3.1, column a) (row 9a, column c) + (row 9a, column d) 4. (row 3.2, column a) (row 9b, column c) + (row 9b, column d) 5. (row 3.3, column a) (row 9c, column c) + (row 9c, column d) 6. (row 3.4, column a) (row 9d, column c) + (row 9d, column d) 7. (row 4, column a) (row 10, column c) + (row 10, column d) 8. (row 1, column b) (row 17, column c) + (row 17, column d) 9. (row 2, column b) (row 18, column c) + (row 18, column d) 10. (row 3.1, column b) (row 19a, column c) + (row 19a, column d) 11. (row 3.2, column b) + (row 19b, column c) + (row 19b, column d) (row 3.3, column b) 13. (row 3.4, column b) (row 19c, column c) + (row 19c, column d) 14. (row 4, column b) (row 20, column c) + (row 20, column d)
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- V1. If there is data in Form EF Part – 4 then take the sum of all Forms A for the same period and same air carrier and compare each of the equivalent data as described in the above table and report (Form EF data value, Form A data value) if there is a difference.

Note.— For the following rules (V2 to V6) the equivalent Form A data will be used in case Form EF Part – 4 is not reported, but Form A data need not be present for the whole period for which Form EF is reported. All the available Forms A will be summed which have their from date, to date within the Form EF reporting period.

- V2. If there is data in row 1.1 of Part 1 then there should be data in (row 3.1, column a) in Part 4.
- V3. If there is data in row 1.3 of Part 1 then there should be data in (row 3.2, column a) in Part 4.
- V4. If there is data in row 1.4 of Part 1 then there should be data in (row 3.3, column a) in Part 4.
- V5. If there is data in row 2.1 of Part 1 then there should be data in (row 3.1, column b) in Part 4.
- V6. If there is data in row 2.2 of Part 1 then there should be data at least in one of following two fields (row 3.2, column b), (row 3.3, column b) in Part 4.
- V7. Row 3.1.1 of Part 2 of current form - Row 3.1.1 of Part 2 of last period's form = row 7.1 of Part 1 of current form.
- V8. (Row 3.2.1 of Part 2 of current form + Row 3.4.1 of Part 2 of current form) - (Row 3.2.1 of Part 2 of last period's form + Row 3.4.1 of Part 2 of last period's form) = row 7.3 of Part 1 of current form.
- V9. Row 3.3.1 of Part 2 of current form - Row 3.3.1 of Part 2 of last period's form = row 7.2 of Part 1 of current form.

DERIVED DATA TO BE SHOWN IN VALIDATION REPORT

The derived data described here will be shown in three columns

- Column 1. Selected form data
Column 2. Data for the previous time period (if available)
Column 3. Percentage variance

- V10. Show the Weighted Average Exchange Rate of current period and last period and the percentage variation.

REVENUE

Category-wise yield

- V11. ((Row 1 of Part 1) in USD / (row 3.4, column a of Part 4) *100
V12. ((Row 1.1 of Part 1+ row 1.2 of Part 1) in USD / (row 3.1, column a of Part 4)) *100
V13. ((Row 1.3 of Part 1) in USD / (row 3.2, column a of Part 4)) *100
V14. ((Row 1.4 of Part 1) in USD / (row 3.3, column a of Part 4)) * 100
V15. ((Row 2 of Part 1) in USD / (row 3.4, column b of Part 4)) * 100
V16. ((Row 2.1 of Part 1) in USD / (row 3.1, column b of Part 4)) * 100
V17. ((Row 2.2 of Part 1) in USD / (row 3.2, column b + row 3.3, column b of Part 4)) * 100

Total Operation Revenue per RTK

V18. $((\text{Row 4 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

Operation Revenue per ATK

V19. $((\text{Row 1 of Part 1}) \text{ in USD} / (\text{row 4, column a of Part 4})) * 100$

V20. $((\text{Row 2 of Part 1}) \text{ in USD} / (\text{row 4, column b of Part 4})) * 100$

V21. $((\text{Row 4 of Part 1}) \text{ in USD} / (\text{row 4, column a} + \text{row 4, column b}) \text{ of Part 4}) * 100$

V22. If there is an increase in (row 3.4, column a + row 3.4, column b) of Part 4 of current form compared to (row 3.4, column a + row 3.4, column b) of Part 4 of the previous period's Form then (row 1 + row 2) in Part - 1 should be greater for the current Form than that of previous period's Form.

V23. Otherwise if there is a decrease in (row 3.4, column a + row 3.4, column b) of Part 4 of current Form compared to (row 3.4, column a + row 3.4, column b) of Part 4 of the previous period's Form then (row 1 + row 2) in Part - 1 should be less for the current Form than that of previous period's Form.

EXPENSE

Expense per RTK

V24. $((\text{Row 5 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V25. $((\text{Row 5.1 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V26. $((\text{Row 5.2 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V27. $((\text{Row 5.3 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V28. $((\text{Row 5.4 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V29. $((\text{Row 5.5 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V30. $((\text{Row 6 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V31. $((\text{Row 7 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V32. $((\text{Row 7.1 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V33. $((\text{Row 7.2 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V34. $((\text{Row 7.3 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V35. $((\text{Row 7.4 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V36. $((\text{Row 8 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V37. $((\text{Row 8.1 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V38. $((\text{Row 8.2 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V39. $((\text{Row 9 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V40. $((\text{Row 10 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V41. $((\text{Row 10.1 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V42. $((\text{Row 10.2 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V43. $((\text{Row 11 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V44. $((\text{Row 11.1 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V45. $((\text{Row 11.2 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V46. $((\text{Row 12 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V47. $((\text{Row 13 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V48. $((\text{Row 13.1 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V49. $((\text{Row 13.2 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V50. $((\text{Row 14 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

V51. $((\text{Row 15 of Part 1}) \text{ in USD} / (\text{row 3.4, column a} + \text{row 3.4, column b}) \text{ of Part 4}) * 100$

Expense per ATK

- V52. ((Row 5 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V53. ((Row 5.1 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V54. ((Row 5.2 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V55. ((Row 5.3 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V56. ((Row 5.4 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V57. ((Row 5.5 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V58. ((Row 6 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V59. ((Row 7 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V60. ((Row 7.1 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V61. ((Row 7.2 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V62. ((Row 7.3 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V63. ((Row 7.4 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V64. ((Row 8 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V65. ((Row 8.1 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V66. ((Row 8.2 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V67. ((Row 9 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V68. ((Row 10 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V69. ((Row 10.1 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V70. ((Row 10.2 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V71. ((Row 11 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V72. ((Row 11.1 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V73. ((Row 11.2 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V74. ((Row 12 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V75. ((Row 13 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V76. ((Row 13.1 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V77. ((Row 13.2 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V78. ((Row 14 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100
V79. ((Row 15 of Part 1) in USD / (row 4, column a + row 4, column b) of Part 4) * 100

ASSETS AND LIABILITIES

- V80. Row 1 to row 11 (current Form and previous period's Form) data

Note: For Form EF (and all other financial forms)

Year = Year of (TO_DATE – 1) if (MM/DD of TO_DATE < 30-JUN) else

Year = Year of TO_DATE.

3.2.26 Because ICAO needs to use a common currency, all financial data are converted into US dollars (USD) at the average exchange rate corresponding to the reporting period of the Form. Hence the validation process is being done based on monetary values in USD.

3.2.27 Converting all values into unit revenues and costs has the advantage of reducing the figures into more understandable units. Nevertheless, in reviewing the changes in unit revenues and costs from one year to another, one of the major factors that one has to take into account is how the USD behaved in relation to the local currency. Reduction in the value of the USD may give rise to apparent increases of some unit revenues and costs; similarly an increase in the value of the USD in relation to the local currency may show abnormal increases in some unit revenues and costs. How much these changes will be distorted from one year to another will not only depend on the relationship between the USD and the local currency, but also in the share of revenues and costs received or incurred in USD or USD-linked currencies and the changes in the unit prices of the supplies and services purchased.

3.2.28 Though the figures in the profit and loss table will show amounts in local currency, some of the supplies and services shown may actually have been bought at USD-based contract prices. For example, fuel is generally purchased in USD. Many airport landing charges and air navigation service fees, airport handling charges and the price of services purchased from third parties are also often denominated in USD. Finally one should not forget that aircraft prices and the corresponding loans may also have been established in USD. On the other hand, labour and station costs in the State where the carrier is based will be incurred in local currency. Hence, when reviewing the variation in the changes of unit revenues and costs from one year to another for the individual elements identified in the profit and loss account one needs to take all these factors into consideration. In addition, changes in traffic and operations from one year to another will also have had an impact on the overall revenues and expenses.²

3.2.29 The most common issue related to Form EF is that revenues and expenses may have not been allocated to the items concerned according to the definitions and instructions associated with that Form. Some of these problems may occur because of the organizational structure of the carrier concerned (more or less centralized management) and accounting practices which do not permit the air carrier concerned to fully adhere to the definitions of the items as shown in the reporting instructions.

3.2.30 Although to validate Forms I and I-S ICAO has introduced a number of calculations, V4 to V7 and V9 to V12 to calculate the average number of passengers embarking or disembarking for international and domestic flights, as seen in paragraph 3.2.13 (page III-3-8) these figures may be unreliable because of the differences in the definitions used to allocate aircraft movements and traffic to international and domestic services. Consequently the only reliable figures for average number of passengers embarked or disembarked per take-off or landing are those calculated by V8 and V13.

3.3 AIRPORT REPORTING FORMS

Airport traffic — Form I and I-S

Description:	Validation – Part I
	<p>V1. For a State for each data value, the sum of all Forms I for all airports over the year (ΣForm I) should be less than or equal to the corresponding data value of Form IS. If the data values in Form IS are greater, then it will imply Form IS contains extra airports for which Form I was not submitted.</p> <p>V2. For all rows if column e + column f = 0 (i.e. both null) and column i + column l > 0 then all other columns in row 5 should be equal to row 6.</p> <p>V3. The set of airports reported (if present) in Form IS should be a superset of the airports (include more airports or same airports) reported in all Forms I for the State.</p>
	<p><i>DERIVED DATA TO BE SHOWN IN REPORT</i></p> <p>For Form I the derived data described here will be shown in three columns</p> <p>Column 1. Selected form data</p> <p>Column 2. Data for the same time period in previous year (if available)</p> <p>Column 3. Variance in percentage</p> <p>For Form IS the derived data described here will be shown in three columns</p>

² For more examples on the effect of the change in exchange rates on operating results see Part I, Chapter 1, paragraph 1.3.27 and Section 1.5.

- Column 1. Selected form data
- Column 2. Data for the previous year (if available)
- Column 4. Variance in percentage

For (Form IS — ΣForm I) the derived data described here will be shown in three columns

- Column 1. (Form IS - ΣForm I) data
- Column 2. (Form IS - ΣForm I) data for the previous year (if available)
- Column 5. Variance in percentage

ITEM DERIVED DATA

- V4. Avg. number of passengers per take off
 For international scheduled (row 1)
 Else
 $(column\ e + column\ f^2) / (column\ b)$
 If column c is not null then
 $(column\ c + column\ f) / (column\ b / 2)$
- V5. Avg. number of passengers per take off
 For international non-schedule (row 2)
 Else
 $(column\ e + column\ f^2) / (column\ b)$
 If column c is not null then
 $(column\ c + column\ f) / (column\ b / 2)$
- V6. Avg. number of passengers per take off
 For total international (row 3)
 Else
 $(column\ e + column\ f^2) / (column\ b)$
 If column c is not null then
 $(column\ c + column\ f) / (column\ b / 2)$
- V7. Avg. number of passengers per take off
 For domestic scheduled and non-scheduled
 (row 4)
 Else
 $(column\ e + column\ f^2) / (column\ b)$
 If column c is not null then
 $(column\ c + column\ f) / (column\ b / 2)$
- V8. Avg. number of passengers per take off
 For total commercial air transport (row 5)
 Else
 $(column\ e + column\ f^2) / (column\ b)$
 If column c is not null then
 $(column\ c + column\ f) / (column\ b / 2)$
- V9. Avg. number of passengers per landing
 For international scheduled (row 1)
 Else
 $(column\ e + column\ f^2) / (column\ b)$
 If column d is not null then
 $(column\ d + column\ f) / (column\ b / 2)$
- V10. Avg. number of passengers per landing
 For international non-schedule (row 2)
 Else
 $(column\ e + column\ f^2) / (column\ b)$
 If column d is not null then
 $(column\ d + column\ f) / (column\ b / 2)$
- V11. Avg. number of passengers per landing
 For total international (row 3)
 Else
 $(column\ e + column\ f^2) / (column\ b)$
 If column d is not null then
 $(column\ d + column\ f) / (column\ b / 2)$

V12. Avg. number of passengers per landing For domestic scheduled and non-scheduled (row 4) Else	If column d is not null then (column d + column f) / (column b / 2) (column e + column f*2) / (column b)
V13. Avg. number of passengers per landing For total commercial air transport (row 5) Else	If column d is not null then (column d + column f) / (column b / 2) (column e + column f*2) / (column b)
V14. Avg. tonnes of freight departure per take-off For all-freight/mail services (row 6) Else	If column g is not null then (column g) / (column b / 2) (column i) / (column b)
V15. Avg. tonnes of freight arrival per landing For all-freight/mail services (row 6) Else	If column h is not null then (column h) / (column b / 2) (column i) / (column b)
V16. Avg. tonnes of mail departure per take-off For all-freight/mail services (row 6) Else	If column j is not null then (column j) / (column b / 2) (column l) / (column b)
V17. Avg. tonnes of mail arrival per landing For all-freight/mail services (row 6) Else	If column k is not null then (column k) / (column b / 2) (column l) / (column b)

3.3.1 Assuming a State has reported both Forms I and I-S, one of the first validations is to compare the summation of the data reported in Form I with those for Form I-S. Please note that by definition (see Part III, Chapter 3) the individual elements derived from the summation of the Forms I received for the individual major commercial airports in a State must be smaller or equal to the corresponding data element reported in Form I-S for all the commercial airports in that State.

3.3.2 The most common errors found in Part I of Forms I and I-S are:

- a) Errors of omission, i.e. the reported information is incomplete showing only certain totals, such as total passengers, freight and/or mail, but not the numbers for embarked and disembarked passengers or loaded and unloaded freight and/or mail.
- b) When figures for mail are not shown, it is not clear if these are included with freight or not. A note should be included in the reporting form under *Remarks*.
- c) Freight and mail are reported using the wrong unit, for example, kg instead of metric tonnes.
- d) The data for *all-freight services* reported in row 6 are greater than the corresponding figures shown for *total commercial air transport* in row 5. Whereas, according to the reporting instructions, the figures in row 6 *include* those in row 5.

Airport financial data — Form J

Description: Validation

DERIVED DATA TO BE SHOWN IN REPORT

For Form J the following data will be shown in three columns

Column 1. Selected form data

Column 2. Data for the same time period in previous year (if available)

Column 3. Percentage variance

V1. Exchange rate from the reported currency to USD

V2. Each data value in Form J in USD

V3. Calculate X = Sum of Passengers Embarked for Total commercial air transport (row 5 column c) for all the Forms I covering the period reported in Form J for the same airport

Divide Air traffic operations Passenger-related charges (row 1.2) of Form J by X and show the result in the report.

V4. Calculate X = Sum of Passengers Embarked for Total commercial air transport (row 5 column c) for all the Forms I covering the period reported in Form J for the same airport

Divide USD equivalent of Air traffic operations Passenger-related charges (row 1.2) of Form J by X and show the result in the report.

V5. Calculate Y = Sum of Aircraft movement total for Total commercial air transport (row 5 column b) for all the Forms I covering the period reported in Form J

Divide Air traffic operations, Aircraft-related charges (row 1.1) of Form J by Y and show the result in the report.

V6. Calculate Y = Sum of Aircraft movement total for Total commercial air transport (row 5 column b) for all the Forms I covering the period reported in Form J

Divide USD equivalent of Air traffic operations Aircraft-related charges (row 1.1) of Form J by Y and show the result in the report.

Total Expenses by cost item and function

V7. If Total Expenses (row 13) is not null and (row 9 or row 10 or row 11 or row 12 is not null) then

row 9 + row 10 + row 11 + row 12 = Total Expenses (row 13)

V8. If Total Expenses (row 13) is not null and (row 13.1 or row 13.2 or row 13.3 or row 13.4 or row 13.5 or row 13.6 or row 13.7 or 13.8 is not null) then

row 13.1 + row 13.2 + row 13.3 + row 13.4 + row 13.5 + row 13.6 + row 13.7 + 13.8 = Total Expenses (row 13)

3.4 EN-ROUTE FACILITIES AND SERVICES

Air navigation services financial data — Form K

Description:	<p>Validation</p> <p>V1. If row 6 is not null and (row 6.1 or row 6.2 or row 6.3 is not null) then Row 6 = row 6.1 + row 6.2 + row 6.3</p> <p>V2. Row 6 of Part II >= Row 6 of Part III</p> <p>V3. Row 6 of Part IV >= (row 1 + row 2 + row 3 + row 4 + row 5) of Part IV</p> <p>DERIVED DATA TO BE SHOWN IN REPORT</p> <p>V4. (Row 6 Part II - row 6 Part III) as a percentage of row 6 Part II.</p> <p>V5. Row 6 Part III as a percentage of row 6 Part II.</p> <p>For Form K following data will be shown in three columns Column 1. Selected form data Column 2. Data for the same time period in previous year (if available) Column 3. Percentage variance</p> <p>V6. Exchange rate from the reported currency to USD</p> <p>V7. Each data value in Form K in USD</p> <p>V8. Form K (row 1.1) divided by (Form L (column b) + Form L (column c)) for the same set of FIR/UIR for the same year.</p> <p>Note 1.— <i>For Form K (and all other financial forms)</i> Year = Year of (TO_DATE – 1) if (MM/DD of TO_DATE < 30-JUN) else Year = Year of TO_DATE.</p> <p>Note 2.— <i>To match Form K with Form L pick up the detailed lines in Form L covering the FIR/UIRs in Form K and then compare. If all the FIR/UIRs in Form K are not shown in Form L show error message.</i></p>
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En-route services traffic statistics — Form L

Description:	Validation
DATA TO BE SHOWN IN REPORT	
V1. For Form L show each data value in three columns	
Column 1.	Selected form data
Column 2.	Data for the same time period in previous year (if available)
Column 3.	Percentage variance

Chapter 4

ACCESSING THE DATA

4.1 INTRODUCTION

4.1.1 In order to reduce printing and shipping costs and to make more accessible and on a timely basis the statistics which ICAO was receiving from Member States, in 2004, the Organization decided to cease publication of the Digests of Statistics which it had been printing since 1947. From 2004 onwards, the data reported to ICAO were made available to States and other users on-line via the Internet. States had access to the data through the ICAO Secure site, while other users could access the data through one or more of the commercial websites which offered these data, such as <http://www.ICAOdata.com> managed by Reed Business Information (RBI) trading as Air Transport Intelligence (ATI).

4.1.2 In 2011 ICAO decided to develop a new on-line statistics platform which would take advantage of the latest developments in web business intelligence design primarily to improve the service the Organization was providing to its Member States with regard to the dissemination of civil aviation statistics. The new website would also establish a strong basic platform for the dissemination of other data collected by other entities within ICAO such as for environmental or safety studies.

4.1.3 The following section will explain the procedure to access the new statistics website as well as provide examples of the different functionalities available and the implementation criteria used.

4.2 ICAO DATA+

4.2.1 ICAO Data+ is the name of the new website developed and managed by the Organization to disseminate civil aviation statistics. Information about the website and how to obtain access to it is provided on-line at:

<http://www.icao.int/dataplus/Pages/default.aspx>

where users will find information on the data covered, the modules available, their pricing, and a Demo illustrating how data are presented in the new website. The site also includes some useful files such as *Getting started*, *Notes on the data* and *Frequently asked questions (FAQ)*. Because from time to time changes may be made to the new website, to the information on how to subscribe and on pricing, as well as to the files mentioned above, users are encouraged to make use of this website to view the most recent information.

4.2.2 Please note that subscriptions are individually based, whether the user is from a Member State or a third party, he or she will receive from ICAO a user name and password. Passwords have a limited life (six months), hence during the period of a subscription users will be asked to re-set their password or, if they forget, they will need to ask ICAO for a new one assuming their subscription is still valid.

4.2.3 Subscriptions can be requested on- or off-line. In either case, potential users will be asked to fill in a registration form. Unless otherwise instructed, staff from the national civil aviation administrations of Member States are requested to register off-line.

4.2.4 Any problems with either the registration or subscription should be addressed to:

sales@icao.int

4.2.5 Issues related to the application itself or the data content should be sent to:

dataplus@icao.int

4.2.6 However before sending an email users are advised to read the **FAQ** (*Frequently asked questions*) file as it may contain the answer to their problem.

Accessing the data

4.2.7 Once a user has obtained his or her unique user name and password, access to the actual website is achieved by login in at:

<http://stats.icao.int>

4.2.8 Once a user has logged in, the computer will then access the data for the website. The application used by ICAO loads all the required data at the beginning, consequently it will take some 30 seconds after the login was completed before the Home page of the website appears on the screen (Figure IV-4-1).

4.2.9 The Home page shows two tabs on the upper left-hand side, one showing the active page (Home) and the other entitled How to. The latter includes helpful information on how to use the new application such as the **Help** file.

4.2.10 The Home page also shows all the modules which have been developed. Those with the clear legend are those which are accessible to the user; those with the darkened legend are not. The user then should select the module he/she wishes to access by clicking on the appropriate one.

Using the new tool

4.2.11 The next section illustrates some of the most important features of the new application. However, for users to gain the full benefit of the functionalities available they should read the appropriate files, such as *Getting started* and *Notes on the data*, available on line at:

<http://www.icao.int/dataplus/Pages/default.aspx>

4.2.12 In general all modules present the same basic structure. Each module starts with one or more pages (the first tab(s) at the top of the screen) showing a pivot table with the data reported to ICAO and some gauges indicating the percentage change with the previous period of the data selected.



Modules you have subscribed to:



Figure IV-4-1. Home page

4.2.13 Figure IV-4-2 shows the first tab¹ of the *Air carrier traffic* module. In some cases, as shown in the figure, these data have been grouped in related items (such as *Passengers*, *Payload* and *Operational data*) in order to be able to fit and view the information in a single screen. However, all the items related to those data can be viewed and downloaded into MS Excel by **double** clicking on the label *Summary*. Please note that to move from one grouping to another one has to click on the appropriate label. The active label will show a sky-blue background (Figure IV-4-2 shows data for *Passengers*).

4.2.14 On the left-hand side of each module users will find a menu with the various parameters which can be selected when performing a query. All these parameters are linked, hence selecting a State (green background) will cause the menu to indicate with a white background the time period for which data are available and the air carriers from that State which have reported data. Those parameters shown with a grey background are either not available or not applicable. Please note that some modules may have default values already selected when the first screen opens. In the case of the air carrier traffic module, the flight data are set at: *international*, *scheduled*, *all services*. Users can modify this selection according to the data they are seeking.

4.2.15 In Figure IV-4-2, the lower half of the screen shows four gauges which indicate the percentage change with the previous time period. For the gauges to provide the **correct** reading, users must ensure that in the selection made one is comparing like with like. For example, when this screen was captured, there were no data for Japan for the last two quarters of 2011. If no time period is selected, the application will measure the percentage change of the first two quarters (data available for 2011) with the traffic for the *whole year* for 2010. To ensure that the same time periods are compared the users **must** select the same time period for which data are available in both years. A similar situation would arise if data are not available in the corresponding time periods for a State (or States) and/or for one or more air carriers (for example, if air carrier C reported data for 2010, but not for 2011, or *vice-versa*).

1. The active tab shows a sky blue background.

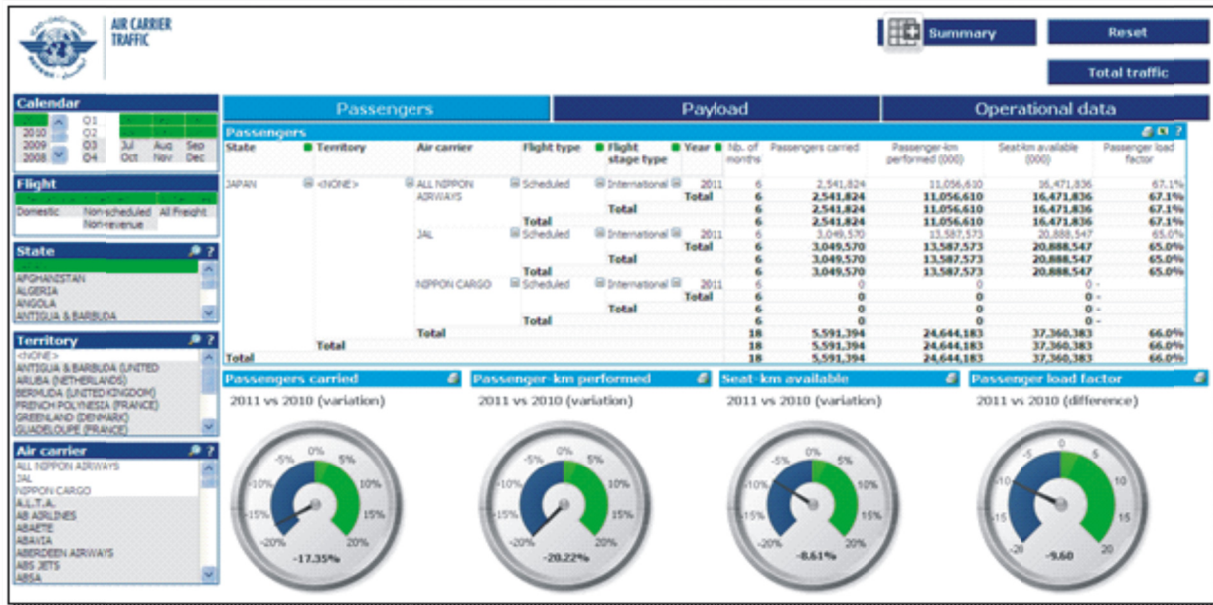


Figure IV-4-2. Air carrier traffic module; opening screen

4.2.16 Up to this stage, apart from the graphical elements shown on the lower half of the screen, the presentation of the data is similar to those other websites which make ICAO data available on line. Where the “plus” comes into play is with the additional analyses carried out on the basic data which are shown in graphical form in the other tabs of each module.

4.2.17 Figure IV-4-3 shows the various tabs available for the reported data in the air carrier traffic module. Unless otherwise indicated, a selection made in the first tab can be carried over to the others. This is identified by the little green square shown in the other tabs. However, in some cases one may want to modify the selection, for example, to cover several years (see Figure IV-4-4), or a different number of air carriers.



Figure IV-4-3. Example of different tabs available in a module

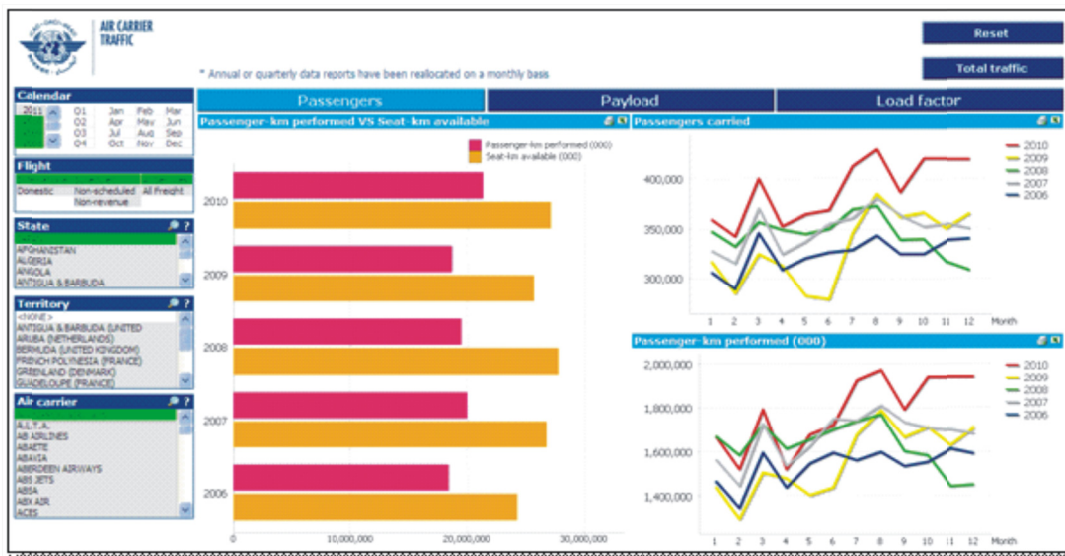


Figure IV-4-4. Example of a traffic trend analysis for a single carrier

4.2.19 Any data selection made can be saved as a *bookmark* which can then be used to generate the same query in the future or to share with others the same view of the data. Also, the data which were used to produce a graph can be downloaded into MS Excel so that users can make use of them to produce their own analyses or graphs.

4.2.20 When changing queries, users are advised to click on the button *Reset*. This will clear the previous selections except for the default values.

Implementation criteria

4.2.21 While all the modules have a similar structure, the way the data are presented depends on the frequency of the data collected and the way they were reported. For example, both air carrier and airport traffic data are to be reported on a monthly basis. However, partly because of historical reasons, how air carriers and airports have been reporting these data differ. In the case of the air carriers most of the reports submitted are on a monthly basis and only a few cover the whole year. Consequently, in this case, when the annual data are presented on a monthly basis, these data have been equally prorated across the twelve calendar months².

4.2.22 For airports, a different criterion was used. In this case ICAO has traffic data for many airports which are only available on an annual basis. It was therefore decided that the tab showing monthly traffic would only cover the data for those airports which had reported on a monthly basis. Airports which had reported on a quarterly or annual basis would be included only in the tab showing annual total figures.

4.2.23 With regard to financial data different criteria were also used in the cases when one was dealing with main accounts or sub-accounts. In many cases, the reporting entities did submit the figures for the main accounts but failed to do so for the sub-accounts. Hence in order to have the largest participation possible in the overall totals, any reporting entity which had submitted data for the main accounts would be considered when consolidating these figures. However,

2. What is described above is a temporary solution, the aim is to use other data, such as the monthly published schedules for that carrier, to estimate the monthly traffic and capacity figures. Until this is done, a carrier which reported annual data will show 1/12th of those data for each month of the corresponding calendar year.

where sub-accounts were concerned these would only be shown as a percentage of the main accounts when both figures (main and sub-accounts) were available.

Reported versus global estimated data

4.2.24 Most of the modules in ICAO Data+ only show the data which were reported or provided to ICAO as part of the regular statistics programme. Ideally all Member States should comply with their obligations towards the Organization as contained in the articles of the Convention on International Civil Aviation and in the applicable Assembly Resolutions. However, in reality not all States submit civil aviation statistics to ICAO as required. Consequently, though the data which ICAO publishes generally have a reasonable overall coverage, they are nevertheless incomplete.

4.2.25 However, for certain studies and activities, ICAO needs to have the overall global figures; these could be by State, region or for the industry as a whole. For a number of years ICAO has been estimating data for the non-reporting entities for two of its data series: those covering commercial air carrier traffic (Form A) and air carrier finances (Form EF). Hence, for these two modules ICAO Data+ has a special section covering these estimates. These data are available in the corresponding modules but to avoid confusion they are clearly separated from the reported data. In each of the corresponding modules users will notice a special button called *Total traffic* or *Regional results* (for the financial data). Clicking on these *Go to* buttons will take the user to the estimated global figures.

4.2.26 Figure IV-4-5 shows a presentation of the estimated traffic data by region. The pie charts show the international scheduled passenger traffic contribution of each of the six statistical regions³ to the world total; whereas the bar chart illustrates the average passenger load factor achieved in each region compared with the world average (blue dotted line).

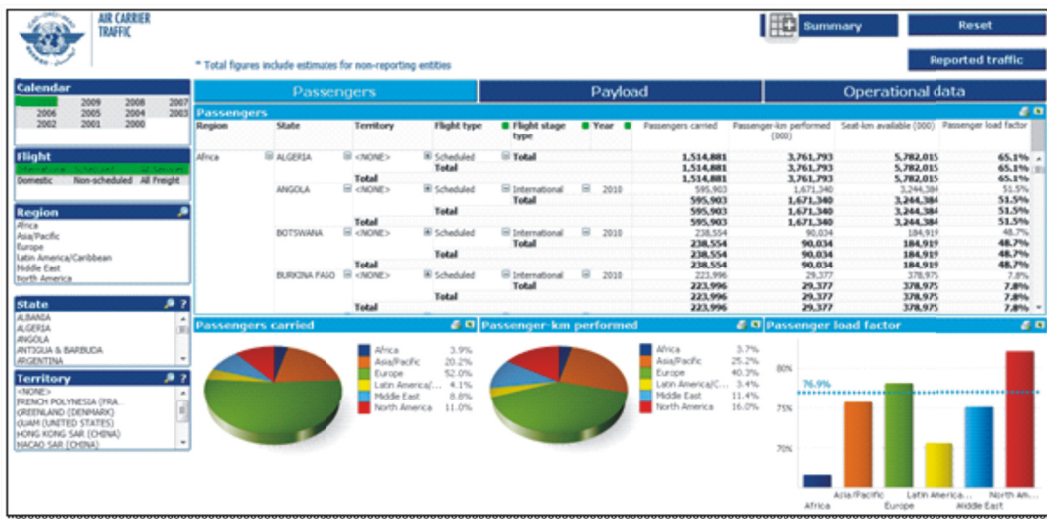


Figure IV-4-5. Example of estimated regional traffic data

3. For statistical purposes ICAO has divided the World into six regions: Africa, Asia and Pacific, Europe, Latin America and Caribbean, Middle East and North America (see Appendix D).

Afterword

With ICAO Data+ the Organization has made a significant step forward in the dissemination of the civil aviation statistics it collects and in providing users with ready-made and easy to understand analyses of these data. The graphical presentation of the data gives the user an immediate visual understanding of the information being conveyed. Nevertheless, there is only so much ICAO can do in presenting this information. It is still up to users to draw their own conclusions from the information provided, but for this users will need to ***know and understand the data*** presented to them.

As stated in the Foreword, one of the aims of this manual is to provide staff from national civil aviation administrations and the industry with the necessary information required to understand the differences among the various data series covered by the civil aviation statistics ICAO collects. This, plus a careful reading of the files describing the nature of the data presented in ICAO Data+, should enable users to arrive at unambiguous and solid conclusions.

APPENDICES

Appendix A

PRINCIPLES GOVERNING INTERNATIONAL STATISTICAL ACTIVITIES

Bearing in mind that statistics are essential for sustainable economic, environmental and social development and that public trust in official statistics is anchored in professional independence and impartiality of statisticians, their use of scientific and transparent methods and equal access for all to official statistical information, the Chief Statisticians or coordinators of statistical activities of United Nations agencies and related organizations, agree that implementation of the following principles will enhance the functioning of the international statistical system.

1. High quality international statistics, accessible for all, are a fundamental element of global information systems

Good practices include:

- Having regular consultations with key users both inside and outside the relevant organization to ascertain that their needs are met.
- Periodic review of statistical programmes to ensure their relevance.
- Compiling and disseminating international statistics based on impartiality.
- Providing equal access to statistics for all users.
- Ensuring free public accessibility of key statistics.

2. To maintain the trust in international statistics, their production is to be impartial and strictly based on the highest professional standards

Good practices include:

- Using strictly professional considerations for decisions on methodology, terminology and data presentation.
- Developing and using professional codes of conduct.
- Making a clear distinction, in statistical publications, between statistical and analytical comments on the one hand and policy-prescriptive and advocacy comments on the other.

3. The public has a right to be informed about the mandates for the statistical work of the organizations

Good practices include:

- Making decisions about statistical work programmes publicly available.

- Making documents for and reports of statistical meetings publicly available.

4. Concepts, definitions, classifications, sources, methods and procedures employed in the production of international statistics are chosen to meet professional scientific standards and are made transparent for the users

Good practices include:

- Aiming continuously to introduce methodological improvements and systems to manage and improve the quality and transparency of statistics.
- Enhancing the professional level of staff by encouraging them to attend training courses, to do analytical work, to publish scientific papers and to participate in seminars and conferences.
- Documenting the concepts, definitions and classifications, as well as data collection and processing procedures used and the quality assessments carried out and making this information publicly accessible.
- Documenting how data are collected, processed and disseminated, including information about editing mechanisms applied to country data.
- Giving credit, in the dissemination of international statistics, to the original source and using agreed quotation standards when re-using statistics originally collected by others.
- Making officially agreed standards publicly available.

5. Sources and methods for data collection are appropriately chosen to ensure timeliness and other aspects of quality, to be cost-efficient and to minimize the reporting burden for data providers

Good practices include:

- Facilitating the provision of data by countries.
- Working systematically on the improvement of the timeliness of international statistics.
- Periodic review of statistical programmes to minimize the burden on data providers.
- Sharing collected data with other organizations and collecting data jointly, where appropriate.
- Contributing to an integrated presentation of statistical programmes, including data collection plans, thereby making gaps or overlaps clearly visible.
- Ensuring that national statistical offices and other national organizations for official statistics are duly involved and advocating that the *Fundamental Principles of Official Statistics* are applied when data are collected in countries.

6. Individual data collected about natural persons and legal entities, or about small aggregates that are subject to national confidentiality rules, are to be kept strictly confidential and are to be used exclusively for statistical purposes or for purposes mandated by legislation

Good practices include:

- Putting measures in place to prevent the direct or indirect disclosure of data on persons, households, businesses and other individual respondents.
- Developing a framework describing methods and procedures to provide sets of anonymous micro-data for further analysis by bona fide researchers, maintaining the requirements of confidentiality.

7. Erroneous interpretation and misuse of statistics are to be immediately appropriately addressed**Good practices include:**

- Responding to perceived erroneous interpretation and misuse of statistics.
- Enhancing the use of statistics by developing educational material for important user groups.

8. Standards for national and international statistics are to be developed on the basis of sound professional criteria, while also meeting the test of practical utility and feasibility**Good practices include:**

- Systematically involving national statistical offices and other national organizations for official statistics in the development of international statistical programmes, including the development and promulgation of methods, standards and good practices.
- Ensuring that decisions on such standards are free from conflicts of interest, and are perceived to be so.
- Advising countries on implementation issues concerning international standards.
- Monitoring the implementation of agreed standards.

9. Coordination of international statistical programmes is essential to strengthen the quality, coherence and governance of international statistics, and avoiding duplication of work**Good practices include:**

- Designating one or more statistical units to implement statistical programmes, including one unit that coordinates the statistical work of the organization and represents the organization in international statistical meetings.
- Participating in international statistical meetings and bilateral and multilateral consultations whenever necessary.
- Working systematically towards agreements about common concepts, classifications, standards and methods.
- Working systematically towards agreement on which series to consider as authoritative for each important set of statistics.

- Coordinating technical cooperation activities with countries between donors and between different organizations in the national statistical system to avoid duplication of effort and to encourage complementarities and synergy.

10. Bilateral and multilateral cooperation in statistics contribute to the professional growth of the statisticians involved and to the improvement of statistics in the organizations and in countries

Good practices include:

- Cooperating and sharing knowledge among international organizations and with countries and regions to further develop national and regional statistical systems.
- Basing cooperation projects on user requirements, promoting full participation of the main stakeholders, taking account of local circumstances and stage of statistical development.
- Empowering recipient national statistical systems and governments to take the lead.
- Advocating the implementation of the Fundamental Principles of Official Statistics in countries.
- Setting cooperation projects within a balanced overall strategic framework for national development of official statistics.

Source: United Nations Statistics Division (UNSD)

Appendix B

CONVERSION FACTORS

I — From the imperial system to metric system

1 short ton (2 000 lb) = 0.9072 tonnes
1 long ton (2 240 lb) = 1.0160 tonnes
1 statute mile (5 280 feet) = 1.6093 kilometres
1 nautical mile (6 080 feet) = 1.8531 kilometres
1 ton-mile (short tons and statute miles) = 1.4600 tonne-kilometres
1 ton-mile (long tons and statute miles) = 1.6352 tonne-kilometres.

Note.— “Tonne” denotes metric and “ton” the imperial system of measurement.

II — Default mass/densities values

Air carriers are encouraged to use the values which best correspond to their operations, however if no other values are available, it is recommended the following factors be used:

Passenger mass including checked baggage:	100 kg
Freight density:	161 kg/cubic metre
Baggage density:	161 kg/cubic metre
Jet fuel density:	0.8 kg/litre

Appendix C

USEFUL RESOURCES

While the Internet is a valuable source of information, care must be taken when making use of information from unauthorized sources. For example, there are many sites which claim to show ICAO or IATA location codes which are subject to copyright. Most of them do not have the official information, are out of date or even worse use creative thinking to generate these codes. For example, while many codes used by IATA for locations in the United States are identical to the three-letter codes used by the US Federal Aviation Administration, this is not always true.

Also, one has to be extremely careful when extracting similar information for different entities from different sources. Often electronic or hardcopy magazines will publish statistical data which they themselves have collected. Unfortunately these data are often provided without the benefit of clear instructions, hence the information which appears in such tables need not be homogeneous nor comparable despite appearing under the same heading or label.

Users who seek statistical data on civil aviation from different sources are better served by accessing international or regional organizations as in principle most of them use the ICAO definitions and therefore the data should be comparable. However, when in doubt check with the organization concerned or contact the Economic Analysis and Policy Section at ICAO.

Below is a list of sources which may assist States in compiling the statistical data to be reported to ICAO, as well as a list of international and regional organizations which collect civil aviation statistics. Some of the data they have may be publically available, in some cases subject to a fee, while other data may only be collected to be shared among their own members.

Useful resources when completing ATR Forms

Aircraft Manufacturers

- *Aeroplane Characteristics for Airport Planning*

Most aircraft manufacturers produce this information for each aircraft type. These documents provide, in an industry-standardized format, aeroplane characteristics data for general airport planning. However, they also include sections on aeroplane description and performance which may be used to verify aircraft data.

IATA

- *Airline Coding Directory*

ICAO

- *Airport Economics Manual* (Doc 9562)
- CAST/ICAO Common Taxonomy Team Website (<http://intlaviationstandards.org/>)
- *Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services* (Doc 8585)
- *Location Indicators* (Doc 7910)
- *Manual on Air Navigation Services Economics* (Doc 9161)
- *Manual on the Regulation of International Air Transport* (Doc 9626)

Useful resources on civil aviation statistics**International organizations**

- Airports Council International (ACI)
- International Air Transport Association (IATA)
- Civil Air Navigation Services Organization (CANSO)

Regional airline organizations

- Airlines for America (A4A)¹
- African Airlines Association (AFRAA)
- Arab Air Carriers Organization (AACO)
- Association of Asia Pacific Airlines (AAPA)
- Association of European Airlines (AEA)
- European Low Fares Airline Association (ELFAA)
- European Regional Airlines Association (ERA)
- Latin American and Caribbean Air Transport Association (ALTA) - formerly AITAL

Regional State Organizations

- Latin American Civil Aviation Conference (LACAC)
- EUROSTAT — Statistical Office of the European Commission
- Statistical Office of the Andean Community of Nations

1. Uses definitions based on those of the US Department of Transportation, main difference with ICAO is the inclusion of routes to/from Canada in the domestic services of US carriers.

Appendix D

ICAO statistical regions

List of countries and territories classified by region of geographical location

Africa

Algeria	Gabon	Nigeria
Angola	Gambia	Rwanda
Benin	Ghana	Sao Tome and Principe
Botswana	Guinea	Senegal
Burkina Faso	Guinea-Bissau	Seychelles
Burundi	Kenya	Sierra Leone
Cameroon	Lesotho	Somalia
Cape Verde	Liberia	South Africa
Central African Republic	Libya	South Sudan
Chad	Madagascar	Sudan
Comoros	Malawi	Swaziland
Congo	Mali	Togo
Côte d'Ivoire	Mauritania	Tunisia
Democratic Republic of the Congo	Mauritius	Uganda
Djibouti	Morocco	United Republic of Tanzania
Egypt	Mozambique	Western Sahara
Equatorial Guinea	Namibia	Zambia
Eritrea	Niger	Zimbabwe
Ethiopia		
Territories		
France	Mayotte, Reunion Island	

Asia/Pacific

Afghanistan	Kiribati	Philippines
Australia	Kyrgyzstan	Republic of Korea
Bangladesh	Lao People's Democratic Republic	Samoa
Bhutan	Malaysia	Singapore
Brunei Darussalam	Maldives	Solomon Islands
Cambodia	Marshall Islands	Sri Lanka
China	Micronesia (Federated States of)	Tajikistan

Cook Islands	Mongolia	Thailand
Democratic People's Republic of Korea	Myanmar	Timor-Leste
Fiji	Nauru	Tonga
India	Nepal	Turkmenistan
Indonesia	New Zealand	Tuvalu
Japan	Pakistan	Uzbekistan
Kazakhstan	Palau	Vanuatu
Japan	Papua New Guinea	

Territories

Australia	Coco Islands, Norfolk Island
France	French Polynesia, New Caledonia, Wallis and Futuna Islands
New Zealand	Niue Islands
United States	American Samoa, Guam, Johnston Island , Kingman's Reef, Midway, Palmyra, Saipan (Mariana Islands), Wake Island

Europe

Albania	Georgia	Norway
Andorra	Germany	Poland
Armenia	Greece	Portugal
Austria	Holy See (The)	Republic of Moldova
Azerbaijan	Hungary	Romania
Belarus	Iceland	Russian Federation
Belgium	Ireland	San Marino
Bosnia and Herzegovina	Italy	Serbia
Bulgaria	Latvia	Slovakia
Croatia	Liechtenstein	Slovenia
Cyprus	Lithuania	Spain
Czech Republic	Luxembourg	Sweden
Denmark	Malta	Switzerland
Estonia	Monaco	The former Yugoslav Republic of Macedonia
Finland	Montenegro	Turkey
France	Netherlands	Ukraine

Territories

Denmark	Faroe Islands, Greenland
United Kingdom	Gibraltar, Isle of Man

Latin America and Caribbean

Antigua and Barbuda	Dominica	Nicaragua
Argentina	Dominican Republic	Panama
Bahamas	Ecuador	Paraguay
Barbados	El Salvador	Peru
Belize	Grenada	St. Kitts and Nevis
Bolivia (Plurinational State of)	Guatemala	St. Lucia
Brazil	Guyana	St. Vincent and the Grenadines
Chile	Haiti	Suriname
Colombia	Honduras	Trinidad and Tobago
Costa Rica	Jamaica	Uruguay
Cuba	Mexico	Venezuela (Bolivarian Republic of)

Territories

Chile	Easter Island
France	French Guiana, Guadeloupe, Martinique
Netherlands	Aruba, Netherlands Antilles
United Kingdom	Anguilla, British Virgin Islands, Cayman Islands, Falkland Islands (Malvinas), Montserrat, St. Helena and Ascension, Turks and Caicos Islands
United States	Puerto Rico, Virgin Islands

Middle East

Bahrain	Kuwait	State of Palestine
Iran (Islamic Republic of)	Lebanon	Syrian Arab Republic
Iraq	Oman	United Arab Emirates
Israel	Qatar	Yemen
Jordan	Saudi Arabia	

North America

Canada	United States
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Territories

France	St. Pierre and Miquelon
United Kingdom	Bermuda

— END —

ISBN 978-92-9249-347-9



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