

# ICAO CIRCULAR

CIRCULAR 220-AT/88



## REGIONAL DIFFERENCES IN FARES, RATES AND COSTS FOR INTERNATIONAL AIR TRANSPORT 1987

*Approved by the Secretary General  
and published under his authority*

**INTERNATIONAL  
CIVIL AVIATION  
ORGANIZATION  
MONTREAL • CANADA**

*Published in separate English, French, Russian and Spanish editions by the International Civil Aviation Organization. All correspondence, except orders and subscriptions, should be addressed to the Secretary General.*

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## I. INTRODUCTION

1. This study has been prepared pursuant to ICAO Assembly Resolution A21-26 [Clauses 1b) and d)], which directs the Council to undertake analyses of regional differences in the level of international passenger fares and corresponding differences in the level of airline costs. Covering the year 1987, this study is the thirteenth in an annual series, the one for the year 1986 having been published as Circular 210.

2. For 17 international route groups, comprising all international routes, passenger, freight and mail revenue yield data are presented in Chapter II for scheduled services along with passenger and freight revenue yield data for non-scheduled operations. For the same route groups regional differences in the costs related to the scheduled service passenger yields are presented in Chapter III. Finally, certain of the causes of regional differences in costs are identified in Chapter IV.

3. The sources of data used in the study are given in Appendix 1 together with information on the sample sizes on which revenue and cost data are based. The method of analysis used in the study is presented in Appendix 2 together with information on the margins of uncertainty which should be borne in mind when considering the results of studies of this kind.

4. Overviews of published passenger fares and freight rates are available in separate annual publications issued by the Organization in response to Clause 1a) of Assembly Resolution A21-26. Circular 208 covers September 1987 and Circular 219 covers September 1988.

5. Unless indicated otherwise, all references in this Circular to "cents" mean "U.S. cents", and all references to "dollars" mean "U.S. dollars".

## II. LEVELS OF FARES AND RATES

### Passenger traffic

1. Estimates of average unit passenger revenues in 1987 by route group are presented in Table II-1.
2. The first column of data in Table II-1 shows the average revenue per passenger-kilometre for scheduled passenger traffic on each route group. The data are presented without distinction among class of travel or among fare type. Thus they represent the over-all weighted average for all individual routes on all route groups and for all the fares that apply. The over-all average revenue per passenger-kilometre was estimated at 7.79 cents for 1987, but the route group averages vary from a high of 17.6 cents in local Europe to a low of 5.0 cents on routes across the South Pacific.
3. The second column of data shows the average revenue per passenger-kilometre for non-scheduled passenger traffic recorded for each route group. The figures here range from a high of 11.3 cents in local Asia/Pacific to a low of 3.8 cents on routes between Canada, Mexico and the United States. On some route groups, notably those where the revenue yield is comparable to or above that from scheduled services, the non-scheduled traffic concerned is of a very limited volume and highly specific nature, carried on an ad hoc basis at a relatively high cost (e.g. in local Asia/Pacific), while on other route groups the traffic is of greater volume and carried on a more regular basis at a lower cost (e.g. in local Europe). The third and fourth data columns of Table II-1 show the reported non-scheduled revenue per passenger-kilometre for traffic carried by scheduled airlines and for traffic carried by non-scheduled operators; there are in some cases significant differences between the two figures in the same route group.
4. The final four columns of Table II-1 show unit revenues for scheduled services and non-scheduled flights in terms of the average revenue per seat-kilometre. The effect of the higher load factors generally achieved by non-scheduled flights compared with scheduled services is brought out by this presentation. The per seat-kilometre revenues for non-scheduled operations are in most cases much closer to the revenues for scheduled services than the comparable per passenger-kilometre revenues.
5. On a world-wide basis the estimated average revenue per passenger-kilometre for scheduled services (excluding incidental revenues) at 7.79 cents in 1987 showed an increase of about 5 per cent over the 7.42 cents recorded for 1986. Among the individual route groups, most of the 16 route groups for which comparable data are available showed little change or small increases in revenue yield from 1986, with the notable exception of local Middle East which showed a significant decrease in revenue yield (from 14.9 to 13.4 cents). Route groups showing significant increases were local Europe (from 15.6 to 17.6 cents), the Mid Atlantic (from 5.5 to 6.0 cents), the South Atlantic (from 7.0 to 7.5 cents), and local Asia/Pacific (from 7.5 to 8.2 cents). For these and other route groups involving Europe and/or Asia, the increase in average revenue per passenger-kilometre in part reflects the strengthening of major national currencies in these areas against the United States dollar and dollar-linked currencies in 1987. The relative change between 1986 and 1987 would in many cases be significantly different if expressed in the national currencies of the airlines concerned. A brief evaluation of this effect is given in Chapter III, paragraphs 14 and 15.
6. The analyses above relate only to the average unit revenues for all airlines combined on each route group. There can be wide variations around these averages shown amongst individual airlines. In the case of scheduled services the variation amongst airlines of the revenue per passenger-kilometre for each route group is shown in Table II-2. For a few route groups the unit revenues for individual airlines do not vary very

Table II-1. Estimated average unit passenger revenues by international route group<sup>1</sup>, 1987

Route group <sup>2</sup>	Revenue per passenger-kilometre (cents)				Revenue per seat-kilometre (cents)			
	Sched- uled ser- vices <sup>3</sup>	Non-scheduled flights			Sched- uled ser- vices <sup>3</sup>	Non-scheduled flights		
		All cate- gories	By inter- national scheduled airlines	By other carriers		All cate- gories	By inter- national scheduled airlines	By other carriers
1. Between North America and Central America/Caribbean	7.1	4.5	4.5	-	4.4	4.0	4.0	-
2. Between and within Central America and the Caribbean	9.6	-	-	-	5.9	-	-	-
3. Between Canada, Mexico and the United States	6.4	3.8	3.8	-	4.1	3.1	3.1	-
4. Between North America/Central America/Caribbean and South America	7.7	8.7	8.7	-	4.3	4.3	4.3	-
5. Local South America	9.3	9.7	9.7	-	5.3	6.6	6.6	-
6. Local Europe	17.6	4.9	4.7	5.1	11.4	4.3	4.2	4.4
7. Local Middle East	13.4	-	-	-	7.8	-	-	-
8. Local Africa	10.9	6.7	6.7	-	5.9	5.1	5.1	-
9. Between Europe and Middle East	9.2	4.4	4.1	5.2	5.4	3.8	3.6	4.5
10. Between Europe/Middle East and Africa	8.6	7.7	7.6	7.7	5.5	5.5	4.6	6.2
11. North Atlantic	5.9	4.3	5.0	4.0	4.1	3.5	3.6	3.4
12. Mid Atlantic	6.0	-	-	-	4.0	-	-	-
13. South Atlantic	7.5	5.6	-	5.6	4.8	4.6	-	4.6
14. Local Asia/Pacific	8.2	11.3	11.3	-	5.9	8.1	8.1	-
15. Between Europe/Middle East/ Africa and Asia/Pacific	6.4	7.0	8.3	5.5	4.5	4.5	4.5	4.6
16. North and Mid Pacific	6.2	4.3	4.3	-	4.3	3.5	3.5	-
17. South Pacific	5.0	-	-	-	3.5	-	-	-

1. Data for scheduled services, where presented, are considered representative for all airlines operating in the route group concerned. Data for non-scheduled flights represent only carriers for which substantive information was available, and are only presented where they include two or more carriers. The representative nature of the data for both scheduled services and non-scheduled flights is described in Appendix 1 and the margins of uncertainty to be taken into account regarding the scheduled service data are discussed in Appendix 2.
2. More detailed definition of the route groups may be found in Appendix 3 on the reverse of the revenue questionnaire.
3. These figures do not generally include such incidental operating revenues as may be attributed to international passenger traffic. On individual route groups incidental operating revenues not included may represent up to an additional 2 per cent over the average revenue quoted.

Table II-2. Variation in scheduled passenger revenue yield amongst airlines, 1987

Route group (short title)	Average revenue per passenger- kilometre (all air- lines, from Table II-1 (cents)	Number of airlines in this analysis	Revenue per passenger-kilometre for individual airlines (cents)																			
			3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
			to 4	to 5	to 6	to 7	to 8	to 9	to 10	to 11	to 12	to 13	to 14	to 15	to 16	to 17	to 18	to 19	to 20	to 21	to 22	and over
Number of airlines																						
1. North-Central America	7.1	10		1	1	4	2	2														
2. Central America	9.6	5				1	2	0	0	0	0	0	0	1	0	0	1					
3. North America	6.4	13			5	3	3	1	0	1												
4. North-South America	7.7	18			2	2	4	2	2	1	1	0	0	0	2	0	0	0	1	1		
5. South America	9.3	8					1	2	4	1												
6. Europe	17.6	25		1	0	0	0	2	3	2	0	2	1	0	0	0	2	1	2	1	3	5 <sup>1</sup>
7. Middle East	13.4	5									1	2	1	1								
8. Africa	10.9	10							1	6	1	2										
9. Europe-Middle East	9.2	24				4	3	3	7	2	1	2	0	2								
10. Europe-Africa	8.6	28		1	0	2	8	3	2	3	2	0	2	1	0	1	1	0	0	0	0	2 <sup>2</sup>
11. North Atlantic	5.9	35	5	5	12	10	3															
12. Mid Atlantic	6.0	10		1	2	4	2	1														
13. South Atlantic	7.5	13			1	3	3	5	1													
14. Asia/Pacific	8.2	20		1	1	6	5	3	1	1	1	1										
15. Europe-Asia/Pacific	6.4	37	1	6	10	8	8	4														
16. North/Mid Pacific	6.2	16	2	4	1	3	4	1	1													
17. South Pacific	5.0	8		3	4	1																

1. In the ranges of 22-23(3) and 23-24(2).  
 2. In the ranges of 23-24 and 29-30 respectively.



much from the route group average (for example for the South America and South Pacific route groups). However, on most route groups the unit revenues differ significantly amongst airlines, reflecting differing route structures and traffic mix amongst other factors.

### Freight and mail traffic

7. Average reported unit freight and mail revenues in 1987 by international route group are presented in Table II-3.

8. The first column of data in Table II-3 shows the average revenue per tonne-kilometre performed for all scheduled freight traffic on each route group whether carried on passenger, combination or all-freight aircraft. The variation among route group averages is even more marked than in the case of scheduled passenger traffic, ranging from a high of 81.9 cents in local Europe to a low of 21.4 cents on routes across the North Atlantic. Comparing with data for the previous year, 12 route groups out of the 17 showed some increase with the remaining 5 route groups showing decreases. The largest increases were on routes between and within Central America and the Caribbean (from 47.4 to 58.3 cents), between North America/Central America/Caribbean and South America (from 26.0 to 28.3 cents), local South America (from 39.2 to 41.9 cents), local Europe (from 74.6 to 81.9 cents), and for routes between Europe/Middle East and Africa (from 30.3 to 33.7 cents). The relatively large change in revenue yield on routes between and within Central America and the Caribbean should be considered in the context of the low representation of the airlines operating on these routes in 1986 (only two airlines compared with four in 1987). The largest decreases in revenue yield were recorded for routes in local Middle East (from 50.2 to 39.1 cents) and between Europe and the Middle East (from 43.4 to 35.9 cents). These reductions in unit revenue are mainly due to the absence of a major airline from the 1987 data.

9. The second and third columns of data in Table II-3 show the average revenue per tonne-kilometre performed for scheduled freight traffic carried on passenger or combination aircraft and that obtained for traffic carried on all-freight aircraft. In comparing the two sets of figures it may be seen that the revenue yield from all-freight aircraft is frequently lower than that achieved from passenger and combination aircraft, as the former are more likely to carry large shipments which are subject to quantity discount rates or low specific commodity rates. However, for some route groups where there is large cargo capacity offered at competitive rates on wide-body passenger and combination aircraft (for example on routes across the North Atlantic and the South Pacific), the difference in revenue yield is relatively small. Significantly higher yields for all-freight services than for other services are found on some route groups where the proportion of freight traffic carried on all-freight aircraft is relatively small and this type of service is dominated by one or two carriers (e.g. on routes in Local Middle East).

10. The fourth column of data in Table II-3 shows the average revenue per tonne-kilometre performed for all non-scheduled freight traffic on each international route group. The unit revenues among route groups range from a high of 53.2 cents on routes between Europe and the Middle East to a low of 16.1 cents between Europe/Middle East/Africa and Asia/Pacific. The figure for non-scheduled operations is actually higher than that for all-freight scheduled operations for 6 of the 11 comparable route groups. In some cases this reflects the specialized non-scheduled operations of one or two carriers. There were significant changes in average unit revenue between 1986 and 1987 for most of the 10 route groups for which there are comparable data. These changes, in general, occurred in route groups where the non-scheduled freight traffic is relatively small or were otherwise accompanied by a significant change in reported non-scheduled freight traffic over the same period.



Table II-3. Estimated average unit freight and mail revenues by international route group<sup>1</sup>, 1987

Route group (short title)	Freight revenue (cents) per tonne-kilometre performed				Mail revenue (cents) per tonne- kilometre performed - scheduled services
	Scheduled services			Non- scheduled flights	
	Over-all	Passenger and combination aircraft	All-freight aircraft		
1. North-Central America	38.4	38.7	37.3	49.5	36.8
2. Central America	58.3	49.9	-	-	54.9
3. North America	31.8	31.6	32.8	-	48.7
4. North-South America	28.3	29.3	27.1	31.3	39.3
5. South America	41.9	54.0	26.7	21.6	62.3
6. Europe	81.9	84.7	67.6	44.1	72.4
7. Middle East	39.1	38.9	45.2	-	59.2
8. Africa	58.6	59.0	37.2	28.0	56.9
9. Europe-Middle East	35.9	39.2	26.1	53.2	59.5
10. Europe-Africa	33.7	34.2	32.1	43.9	59.7
11. North Atlantic	21.4	21.9	19.7	22.9	36.1
12. Mid Atlantic	27.0	27.0	29.9	-	61.5
13. South Atlantic	25.2	25.7	22.7	-	60.7
14. Asia/Pacific	36.5	36.4	37.1	49.0	53.3
15. Europe-Asia/Pacific	29.9	33.8	21.9	16.1	44.1
16. North/Mid Pacific	27.7	30.9	26.5	23.0	35.1
17. South Pacific	22.4	22.3	24.1	-	37.3

1. Data represent only carriers for which substantive information was available and are only presented where they include two or more carriers. The representative nature of the data is described in Appendix I.

Table II-4. Variation in scheduled freight revenue yield amongst airlines, 1987

Route group (short title)	Average revenue per tonne-kilometre (all airlines, from Table II-3) (cents)	Number of airlines in this analysis	Revenue per tonne-kilometre for individual airlines (cents)																
			0 to 10	10 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 70	70 to 80	80 to 90	90 to 100	100 to 110	110 to 120	120 to 130	130 to 140	140 to 150	150 to 160	160 and over
			Number of airlines																
1. North-Central America	38.4	10			5	4	0	0	1										
2. Central America	58.3	4				2	1	0	0	0	0	0	0	0	0	0	0	1 <sup>1</sup>	
3. North America	31.8	12		2	3	7													
4. North-South America	28.3	21	2	0	9	3	1	3	1	1	0	0	1						
5. South America	41.9	10			2	1	2	2	2	0	0	1							
6. Europe	81.9	25				1	1	0	2	7	3	3	2	0	1	0	0	2	3 <sup>2</sup>
7. Middle East	39.1	5			2	0	1	1	1										
8. Africa	58.6	8			1	1	1	2	2	1									
9. Europe-Middle East	35.9	23		1	3	8	6	0	1	2	1	0	1						
10. Europe-Africa	33.7	25		2	8	3	9	0	0	0	1	0	1	0	0	0	0	0	1 <sup>1</sup>
11. North Atlantic	21.4	35		11	17	5	1	0	0	1									
12. Mid Atlantic	27.0	10		1	6	3													
13. South Atlantic	25.2	13		2	6	5													
14. Asia/Pacific	37.0	20			5	8	2	3	1	1									
15. Europe-Asia/Pacific	29.9	38		4	15	10	2	4	3										
16. North/Mid Pacific	27.7	16		1	7	5	1	2											
17. South Pacific	22.4	8		2	4	1	0	0	0	0	1								

1. In the range between 160-170.

2. In the ranges between 180-190, 240-250, 260-270 respectively.

11. The final column of data in Table II-3 shows the average revenue per tonne-kilometre performed for all mail traffic on each route group (virtually all international mail is carried on scheduled services). The route group averages range from a high of 72.4 cents in local Europe to a low of 35.1 cents on the North and Mid Pacific routes. Between 1986 and 1987, 9 of the 17 route groups show increases in unit mail revenues. The most significant increases were on routes between North America/Central America/Caribbean and South America (from 36.4 to 39.3 cents), between Europe/Middle East and Africa (from 55.9 to 59.7 cents), across the North Atlantic (from 33.4 to 36.1 cents), across the Mid Atlantic (from 53.1 to 61.5 cents), across the South Atlantic (from 53.7 to 60.7 cents), and across the North/Mid Pacific (from 31.4 to 35.1 cents). Decreases were recorded for all but one of the remaining 8 route groups. The most significant decreases were recorded on routes between North America and Central America/Caribbean (from 43.1 to 36.8 cents), in local Middle East (from 101.9 to 59.2 cents) and on routes between Europe and the Middle East (from 65.5 to 59.5 cents). The revenue yield for 1987 on these last two route groups was significantly affected by the absence of a major airline in the 1987 sample. Unit mail revenues in general remain significantly higher than unit freight revenues on scheduled services except for routes between North America and Central America/Caribbean, between and within Central America and the Caribbean, and in local Africa where they were about the same in 1987 and for routes in local Europe, where unit mail revenues were significantly lower than unit freight revenues on scheduled services.

12. A notable feature of the mail unit revenue data is that for most of the route groups involving two or more regions there are substantial differences in the yield recorded by the carriers according to the region in which they are based. This distinction is particularly marked for the following route groups and regions: between North America and Central America/Caribbean, all airlines 36.8 cents, North American airlines 35.9 cents, Central American/Caribbean airlines 44.8 cents; between North America/Central America/Caribbean and South America, all airlines 39.3 cents, North American airlines 30.9 cents, Central America/Caribbean airlines 63.7 cents, South American airlines 52.3 cents; North Atlantic, all airlines 36.1 cents, North American airlines 29.5 cents, European airlines 48.2 cents; and North/Mid Pacific, all airlines 35.1 cents, North American airlines 27.3 cents, Asian airlines 58.8 cents. These differences are to a large extent a result of the lower operating costs of the United States airlines which has led to comparatively low air mail conveyance rates being set by the United States authorities for originating mail.

13. In the case of unit freight revenues, the variation amongst individual airlines of the revenue per tonne-kilometre for scheduled services for each route group is shown in Table II-4. For a few route groups the unit revenues for individual airlines do not vary very much from the route group average (for example on routes within the "North America" route group of Canada/Mexico/United States or across the South Atlantic). However, as for passenger traffic, on most route groups the unit revenues differ significantly amongst airlines.

### III. REGIONAL DIFFERENCES IN SCHEDULED PASSENGER FARES AND RELATED COSTS

#### Over-all financial results by international route group

1. Selected operational data and estimated financial results for the year 1987 are presented in Table III-1 over-all and by route groups.

2. The first column of data in the table shows that the number of scheduled airlines operating jet services in each route group ranged from a low of 13 on South Pacific routes to a high of 64 serving routes between Europe/ Middle East and Africa. It should be noted that propeller aircraft operations of these airlines are excluded from the study, as are the operations of some 122 small international airlines which operate propeller-driven aircraft exclusively; together these operations with propeller aircraft represented about 0.5 per cent of world international seat-kilometres in 1987 with their highest representations in any single route group being 21 per cent between and within Central America and the Caribbean, and 4 per cent in local Africa and in local Europe. Supersonic aircraft operations, which were also excluded, represented slightly more than 0.1 per cent of world operations.

3. The operational data included in data columns 2 to 5 of Table III-1 all have a significant effect on unit operating costs (see Chapter IV). There are considerable differences among route groups in the volume of traffic, the average length of flight stages, the average number of seats per aircraft and the average passenger load factor.

4. Financial results are presented in columns 6 to 8. When consulting these data it should be borne in mind that the revenue figures do not generally take into account the incidental operating revenues. Those incidental revenues which may be directly attributed to passenger traffic include revenues from passengers paying less than 25 per cent of the normal applicable fare, commissions received on sales of transportation on other carriers, "no-show" and cancellation fees (expenses incurred against these revenue items are included in the cost figures shown in column 7); these incidental revenues also include on a net basis capacity equalization payments arising from pooled and/or joint services as well as from the sale of own capacity to other carriers. Revenues accruing from the provision of services other than for air transportation (such as service and maintenance sales or handling services for third parties) and the corresponding costs are excluded from all figures presented in this study. An analysis of incidental revenue data on this basis for 1987 indicates that for international routes as a whole, relevant incidental revenues not included in Table III-1 were about 0.06 cents per passenger-kilometre which, if added to the estimated world-wide unit revenue, increases it by some 1 per cent from 7.79 cents to 7.85 cents per passenger-kilometre. For individual route groups, the passenger-related incidental operating revenues may represent up to an additional 2 per cent over the average revenue quoted.

5. The average operating cost per passenger-kilometre for all international routes was 7.79 cents (column 7), the figures for individual route groups ranging from a high of 16.0 cents in local Europe to a low of 5.4 cents on routes across the South Pacific. These estimated costs include such items as depreciation and interest charges, and sales commission paid, but exclude costs attributable to the carriage of freight and mail.

6. The ratio of passenger revenues to passenger costs (column 8) for international routes as a whole is estimated at 1.01 for the calendar year 1987, varying between individual route groups from 0.85 to 1.10. Taking into account relevant incidental revenues associated with international passenger traffic and margins of uncertainty in estimated revenues and costs (discussed in Appendix 2), the revenue/cost ratio for all international passenger traffic in 1987 is assessed as lying between 0.99 and 1.05, with a most likely value of 1.02.

Table III-1. Basic operational data and financial results for scheduled passenger services by international route group, 1987<sup>1</sup>

Route group <sup>2</sup>	Operational data				Financial results <sup>3</sup>			
	Number of airlines	Percentage of world's international traffic (available seat-kilometres)	Average length of flight stages (km)	Average number of seats per aircraft <sup>4</sup>	Average passenger load factor (%)	Average revenue (cents) per passenger-kilometre <sup>5</sup>	Average passenger costs (cents) per passenger-kilometre	Ratio revenue/costs <sup>5,6</sup>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I. All world international routes	212	100.0	1 714	239	67	7.79	7.71	1.01
II. International route groups:								
1. Between North America and Central America/Caribbean	31	3.5	1 211	191	63	7.1	7.7	0.90
2. Between and within Central America and the Caribbean	18	0.2	681	139	61	9.6	8.8	1.10
3. Between Canada, Mexico and the United States	22	5.4	1 036	160	63	6.4	7.4	0.85
4. Between North America/Central America/Caribbean and South America	36	3.4	2 080	239	56	7.7	7.5	1.00
5. Local South America	16	0.6	907	154	57	9.3	10.0	0.95
6. Local Europe	52	9.5	820	132	64	17.6	16.0	1.10
7. Local Middle East	16	1.1	882	178	58	13.4	12.0	1.10
8. Local Africa	30	0.5	881	139	54	10.9	12.9	0.85
9. Between Europe and Middle East	43	3.9	2 052	210	58	9.2	9.8	0.95
10. Between Europe/Middle East and Africa	64	4.9	2 749	237	63	8.6	8.7	1.00
11. North Atlantic	49	22.9	4 026	301	69	5.9	6.1	0.95
12. Mid Atlantic	18	2.0	3 634	262	67	6.0	6.3	0.95
13. South Atlantic	19	2.0	3 609	266	63	7.5	8.0	0.95
14. Local Asia/Pacific	40	8.5	1 654	273	73	8.2	7.3	1.10
15. Between Europe/Middle East/Africa and Asia/Pacific	56	17.9	3 477	298	71	6.4	6.4	1.00
16. North and Mid Pacific	20	10.6	5 348	307	70	6.2	6.1	1.00
17. South Pacific	13	3.1	4 608	332	69	5.0	5.4	0.95

1. Excluding operational and financial data attributed to supersonic and propeller-driven aircraft.

2. More detailed definition of the route groups may be found in Appendix 3 on the reverse of the revenue questionnaire.

3. The margins of uncertainty which should be considered in relation to these results are discussed in Appendix 2.

4. As defined by available seat-kilometres divided by aircraft-kilometres flown.

5. These figures do not generally include incidental operating revenues. For all international routes that part of this additional revenue which may be directly attributed to international passenger traffic is about 0.06 cents per passenger-kilometre. On individual route groups it may represent up to an additional 2 per cent over the average revenue quoted.

6. Rounded to nearest twentieth for individual route groups.

7. Components of the total passenger costs are presented in Table III-2. The primary breakdown is between "aircraft" operating costs, being those directly attributable to the operation of aircraft on each route group, and "other" operating costs. All the itemized data carry relatively wide margins of uncertainty and should be regarded as indicative only. Nevertheless, it appears that most of the individual items vary significantly among route groups.

#### Variations in revenue/cost ratios amongst airlines

8. The over-all financial results in Table III-1 show that differences in revenues between route groups broadly reflect differences in costs. However, there are cases where individual airlines earn significant profits on some route groups while incurring losses on other route groups, and operations of these airlines on the former route groups could therefore be said to have subsidized operations on the latter groups during the period in question. In studies covering previous years, such apparent cross-subsidy between route groups applied not only in the case of individual airlines but carried across to the averages for some regional groups of airlines. Since 1983, however, no such consistent cross-subsidy has been identifiable.

9. Analysis did, however, reveal several route groups within which the results obtained by different regional groups of airlines show significant differences. The figures shown below represent the unrounded revenue/cost ratio for each carrier group; however these figures should be used with caution because of the relatively large margin of uncertainty associated with them (see Appendix 2, paragraph 22). As in previous years on routes between Europe/Middle East and Africa, European airlines as a group achieved a relatively high revenue/cost ratio (1.09). On South Pacific routes Asia/Pacific airlines as a group showed a revenue/cost ratio some 0.23 below that of North American airlines (0.85 against 1.08). In contrast to the previous year, an increase in unit costs per passenger-kilometre shown by some major South American carriers in 1987 led to a significant deterioration over 1986 in the results of this group of carriers against those registered in other regions operating on the same group of routes. This deterioration is particularly noticeable on routes between North America/Central America/Caribbean and South America where the South American carriers as a group achieved a revenue/cost ratio of 1.02, compared with 1.11 in 1986, whereas the North American carriers' revenue/cost ratio only decreased 3 percentage points (from 1.07 in 1986 to 1.04 in 1987).

10. An examination was also carried out as to how the revenue/cost ratios varied amongst individual airlines operating in the same route group. These variations in revenue/cost ratios amongst airlines on a route group can be an important factor in the negotiation of fares for the route group in question, particularly where unanimity or some form of consensus among the airlines is required on proposed fares.

11. The variations in 1987 are shown in Table III-3. On a few route groups the revenue/cost ratios for the airlines do not vary very much from the route group average (for example across the South Atlantic). However, on most route groups the ratios vary significantly among the airlines and the average revenue/cost ratios do not therefore adequately portray the economics of the operations. On three route groups the revenue/cost ratios of individual carriers ranged from less than 0.7 to greater than 1.3: in local Europe, local Africa and between Europe/Middle East and Africa.

#### Comparison of results for 1987 with those for 1986

12. An over-all comparison between data for 1987 and corresponding data for 1986 shows an increase of about 9 per cent in the estimated passenger cost per available seat-kilometre, from 4.74 to 5.17 cents. Since the world-wide average load factor increased some 4 percentage points, from 63 to 67 per cent, the cost per passenger-kilometre shows an increase of just under 3 per cent, from 7.49 to 7.71 cents.



Table III-2. Estimated passenger costs<sup>1</sup> per passenger-kilometre by cost item, 1987

Route group (short title)	Aircraft operating costs				Other operating costs					
	Total operating costs (cf. Table III-1) (sum of columns 1-9)	Aircraft operating costs excluding fuel and oil <sup>2</sup> (1)	Aircraft fuel and oil (2)	Landing and associated airport charges (3)	En-route facility charges (4)	Station expenses (5)	Passenger services (6)	Commission (7)	Ticketing, sales and promotion (8)	General, administrative and miscellaneous (9)
I. All:										
Cents	7.71	2.16	1.08	0.31	0.16	0.85	1.10	0.75	0.82	0.48
Percentage of total costs	100.0	28.0	14.1	4.0	2.0	11.0	14.2	9.8	10.6	6.3
II. International route groups (cents):										
1. North-Central America	7.7	2.3	1.2	0.3	0.0	1.1	1.0	0.7	0.6	0.5
2. Central America	8.8	2.5	1.6	0.2	0.1	1.3	0.8	1.0	1.1	0.2
3. North America	7.4	2.2	1.1	0.2	0.0	1.3	1.0	0.7	0.6	0.3
4. North-South America	7.5	2.2	1.4	0.2	0.1	0.7	0.9	0.8	0.7	0.5
5. South America	10.0	2.7	2.0	0.5	0.3	0.8	1.1	1.1	1.1	0.4
6. Europe	16.0	4.1	1.4	1.3	0.6	2.5	1.9	1.6	2.1	0.5
7. Middle East	12.0	3.7	1.7	0.4	0.1	1.3	1.2	1.6	1.1	0.9
8. Africa	12.9	4.2	2.5	0.6	0.2	1.5	1.1	1.0	0.8	1.0
9. Europe-Middle East	9.8	3.1	1.3	0.4	0.3	1.0	1.3	0.9	0.9	0.6
10. Europe-Africa	8.7	2.5	1.5	0.3	0.2	0.8	1.2	0.8	0.7	0.7
11. North Atlantic	6.1	1.6	0.9	0.2	0.1	0.7	1.0	0.5	0.6	0.5
12. Mid Atlantic	6.3	1.7	1.2	0.2	0.1	0.5	1.0	0.5	0.7	0.4
13. South Atlantic	8.0	2.2	1.5	0.2	0.3	0.6	1.1	0.8	0.9	0.4
14. Asia/Pacific	7.3	2.2	0.9	0.3	0.1	0.7	1.1	0.8	0.8	0.4
15. Europe-Asia/Pacific	6.4	1.8	1.0	0.2	0.1	0.4	1.1	0.6	0.7	0.5
16. North/Mid Pacific	6.1	1.7	1.0	0.2	0.1	0.4	0.9	0.8	0.6	0.4
17. South Pacific	5.4	1.5	0.8	0.1	0.0	0.5	0.8	0.6	0.7	0.4

- "Passenger" costs have been derived for each route group taking into account the contribution made by the revenue earned for the carriage of freight and mail on passenger flights towards covering total costs for these flights. Due to the margins of uncertainty in the estimates of individual cost items the figures should be regarded as indicative only.
- This item includes flight operations expenses (cockpit crew salaries and expenses, rentals and insurance of flight equipment), aircraft maintenance and overhaul, and aircraft standing charges such as depreciation and interest charges.

Table III-3. Variation of revenue/cost ratios amongst airlines, 1987

Route group (short title)	Average revenue/cost ratio (all airlines, from Table III-1)	Number of airlines in this analysis	Revenue/cost ratio range				
			less than 0.7	0.7 to 0.9	0.9 to 1.1	1.1 to 1.3	greater than 1.3
			Number of airlines				
I. All world inter- national routes	1.01	79	3	15	45	13	3
II. International route groups:							
1. North-Central America	0.90	9	2	3	2	2	-
2. Central America	1.10	4	-	-	2	0	2
3. North America	0.85	13	2	7	4	-	-
4. North-South America	1.00	17	-	4	10	2	1
5. South America	0.95	8	-	4	1	3	-
6. Europe	1.10	20	1	1	10	7	1
7. Middle East	1.10	5	-	-	2	2	1
8. Africa	0.85	10	3	3	2	1	1
9. Europe-Middle East	0.95	20	1	9	9	1	-
10. Europe-Africa	1.00	24	3	4	6	9	2
11. North Atlantic	0.95	31	2	14	13	2	-
12. Mid Atlantic	0.95	9	-	4	3	2	-
13. South Atlantic	0.95	13	-	5	8	-	-
14. Asia/Pacific	1.10	17	-	2	8	5	2
15. Europe-Asia/Pacific	1.00	32	-	15	6	9	2
16. North/Mid Pacific	1.00	14	-	5	6	2	1
17. South Pacific	0.95	8	-	4	2	1	1

Unit revenues (excluding incidental operating revenues) on the other hand showed an increase of about 5 per cent, from 7.42 cents per passenger-kilometre to 7.79 cents in 1987 and as a result the over-all revenue/cost ratio shows a slight improvement between the two years, increasing from 0.99 in 1986 to 1.01 in 1987.

13. As far as the individual route groups are concerned, the year-to-year cost changes show wide variations which are accentuated by differences in trends in load factors. Between 1986 and 1987, eleven out of the 16 route groups for which comparable data are available showed increases in costs per passenger-kilometre. The most significant increases were recorded on routes in local South America (from 9.0 to 10.0 cents); in local Europe (from 14.5 to 16.0 cents), in local Africa (from 12.0 to 12.9 cents) and across the South Atlantic (from 6.6 to 8.0 cents). The remaining five route groups showed decreases in unit costs between 1986 and 1987, significantly on routes in local Middle East (from 12.7 to 12.0 cents), and between Europe and the Middle East (from 10.2 to 9.8 cents).

14. The comparison of unit costs between 1986 and 1987 reflects a relative stability in the price of fuel (see Chapter IV), with a general increase in other costs. However, as with the revenue figures discussed in Chapter II, the comparison has been in some cases significantly affected by a change in the value of the United States dollar against other world currencies. Within the Americas, where most fares and rates are transacted in United States dollars, the changes in unit revenues generally reflect market changes. Similarly, changes in unit costs in the Americas to a large extent reflect the general increase in costs as well as some operational changes, as the greater part of costs are generally borne in United States dollars.

15. Outside the Americas, in those areas where national currencies generally strengthened compared with the United States dollar, the increases shown in revenues and costs are in effect inflated, and notably so in Europe and Asia/Pacific. For example, whereas between 1986 and 1987 average unit revenues and costs for routes in local Europe showed increases of about 13 and 10 per cent respectively when measured in United States dollars, in terms of European currencies they are estimated to have increased about 4 per cent and 1 per cent respectively. For routes in local Asia/Pacific, the average unit revenues and costs in terms of United States dollars showed increases of about 9 and 1 per cent respectively, whereas in terms of national currencies unit revenues are estimated to have increased about 5 per cent and unit costs to have decreased some 3 per cent. In other areas, such as the Middle East and Africa, the United States dollar shows an overall strengthening against related currencies between 1986 and 1987. In these areas, the changes in costs and revenues when these are expressed in United States dollars are lower than those recorded when costs and revenues are expressed in local currencies. However, local currency data are distorted by the relatively large devaluation against the United States dollar of the national currencies of a few countries.

16. Of the 16 route groups for which comparable data are available, six showed an improvement in the revenue/cost ratio between 1986 and 1987. These are: local Europe (from 1.05 to 1.10), between Europe and the Middle East (from 0.90 to 0.95), between Europe/Middle East and Africa (from 0.95 to 1.00), North Atlantic (from 0.90 to 0.95), local Asia/Pacific (from 1.05 to 1.10), and across the South Pacific (from 0.90 to 0.95). In the cases of routes between Europe/Middle East and Africa, and in local Asia/Pacific, unit revenues showed a more favourable development than unit costs (expressed in terms of cents per seat-kilometres). In all cases, however, an improvement in average load factor contributed to the increase in revenue/cost ratio between 1986 and 1987. This is particularly significant for routes across the North Atlantic where the average load factor increased from 61 per cent in 1986 to 69 per cent in 1987. This increase of 8 percentage points in load factor translated a unit cost increase of about 8 per cent for costs expressed in cents per seat-kilometres into a decrease of just over 3 per cent for costs expressed in terms of cents per passenger-kilometre. The load factor on local Asia/Pacific routes rose from 70 per cent in 1986 to reach an all-time

high of 73 per cent in 1987, which was achieved in conjunction with a significant improvement in yield, leading to the most favourable revenue/cost ratio of 1.10 for these routes.

17. Of the remaining ten route groups, six showed a reduction in the revenue/cost ratio, while the change in the ratio of the remaining four route groups was not significant. The route groups which showed a decline in the revenue/cost ratio were on routes between Canada, Mexico and the United States (from 0.90 to 0.85), between North America/Central America/Caribbean and South America (from 1.10 to 1.00), local South America (from 1.05 to 0.95), local Middle East (from 1.15 to 1.10), local Africa (from 0.90 to 0.85), and across the South Atlantic (from 1.05 to 0.95). In all cases the most significant factor was a less favourable development of unit revenues than unit costs, and in most cases there was also little change or a decrease in average load factor. Between 1986 and 1987, routes across the South Atlantic suffered a decrease in average load factor of 7 percentage points (from 70 per cent to 63 per cent). Where there was an increase in load factor, such as on routes between Canada/Mexico and the United States and on routes within local Middle East, this was insufficient to offset the increase in unit costs. The relatively large decrease in revenue/cost ratio for routes involving South American carriers must be in part attributed to a significant increase in aircraft operating costs for these carriers. In addition, for routes within South America there was a significant reduction in the contribution of cargo revenues towards reducing total operating costs.

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#### IV. FACTORS CAUSING REGIONAL DIFFERENCES IN COSTS

1. The financial analysis presented in Chapter III included estimates of the average cost per passenger-kilometre performed for each of 17 international route groups. This chapter is concerned with assessments of factors which caused this average cost to vary among the route groups. Some main factors can be identified and their effects quantified but a number of other factors do not lend themselves to individual assessment and are therefore dealt with in a summary manner, although their combined influence on cost differences is significant.

2. The factors which have been considered are:

- a) the effect on aircraft operating costs of differences among route groups in aircraft equipment being used;
- b) the effect of differences among route groups in the average length of flight stages;
- c) the effect of varying prices of fuel and oil in different parts of the world;
- d) the effect of different levels of airport user charges in different parts of the world;
- e) the effect of differences in the average load factor achieved on each route group; and
- f) other factors.

An examination of the influence exercised by each of the above on the operating costs for traffic in the route groups is made below and the resulting variations in the costs per passenger-kilometre from the world average are subsequently presented in Table IV-5 and discussed in paragraphs 21 and 22 of this chapter.

##### Aircraft mix and stage length [factors a) and b)]

3. The volume of traffic on a route and the geographical characteristics of the route (in particular the lengths of flight stages) determine the sizes of aircraft that are engaged in the traffic, the number of seat-kilometres per departure and per flying hour that can be produced by these aircraft, and the possible utilization of the aircraft in terms of flying hours per year. For these reasons, the geographical characteristics of a route group strongly influence the operating costs per seat-kilometre that will be incurred on that route group. Effects on these costs of differences among the route groups in aircraft mix and average stage length are discussed below.

4. In general, the aircraft operating costs per aircraft-kilometre or per seat-kilometre on a long-haul flight are lower than on a short-haul flight, mainly because of the higher block speed that may be achieved on a long-haul flight and the generally higher aircraft daily utilization recorded. Similarly, large aircraft which may be used where traffic density is high have lower aircraft operating costs per seat-kilometre than small aircraft. The combined impact of these two factors may be illustrated by looking at the average aircraft operating costs incurred in international passenger service in 1987 for different categories of aircraft. Table IV-1 presents the average aircraft operating costs per block hour and per available seat-kilometre for five

Table IV-1. Operational and cost data for aircraft categories 1987  
(international scheduled passenger services)

Grouping of subsonic aircraft	Primary jet types operated on international scheduled services <sup>1</sup>	Percentage of world's international traffic (available seat-km) (%)	Average number of seats <sup>2</sup>	Average length of flight stages operated (km)	Average utilization <sup>3</sup> (hours/day)	Aircraft operating costs <sup>4</sup>	
						Dollars per block hour	Cents per available seat-km <sup>5</sup>
ALL	-	100.0	239	1 714	8.9	4 070	2.2
Narrow-body, short-haul	B737 B757 DC9 M80	8.8	114	773	7.5	2 170	3.4
Narrow-body, medium-haul	B727 TU154	9.0	150	1 122	7.7	2 380	2.4
Narrow-body, long-haul	B707 DC8 IL62	3.7	160	2 505	5.8	2 820	2.1
Wide-body, medium-haul	A300 A310 B767 IL86 L1011	14.8	236	1 871	8.5	4 510	2.5
Wide-body, long-haul	B747 DC10 L1011-500	63.7	325	4 064	10.7	5 820	1.9

1. Only aircraft types providing more than 0.5 per cent of the world international scheduled available seat-kilometres in 1987 are listed in this column. The categorization of aircraft types is based on the average number of seats and average length of flight stages operated in 1987.
2. Available seat-kilometres divided by aircraft-kilometres flown.
3. Including domestic and non-scheduled operations of the international airlines concerned.
4. Data in these columns include flight operations expenses, aircraft fuel and oil (at the world average cost of 17.3 cents per litre), aircraft maintenance and overhaul, and aircraft standing charges such as depreciation and interest charges. If prevailing regional prices rather than the world average price were to be used for aircraft fuel and oil there would be no change in the per seat-kilometre cost data presented, but small changes in some of the per block hour data.
5. Aircraft operating costs have been adjusted in this case to exclude costs attributable to freight and mail traffic.



categories of aircraft, grouped according to their size and by the length of haul for which they were generally used in 1987. The average hourly cost varied from \$2 170 for narrow-body short-haul aircraft to \$5 820 for wide-body long-haul aircraft, but primarily because of their greater productivity the average aircraft operating cost per available seat-kilometre (adjusted to exclude costs attributable to freight and mail traffic) of the wide-body long-haul aircraft was, at 1.9 cents, lower than for any other category. At the other end of the spectrum the narrow-body short-haul aircraft averaged 3.4 cents per seat-kilometre, which is 79 per cent higher than the figure for wide-body long-haul aircraft.

5. Aircraft operational data for each route group (excluding utilization effects) are shown in Table IV-2. The average block speed achieved is shown to be significantly higher on route groups with a long average stage length such as the transatlantic and the transpacific routes than on route groups with a short average stage length such as Europe and the Middle East. This relative economic advantage for the operations of long-haul routes is amplified by the fact that large wide-body aircraft in 1987 accounted for a high proportion of the total capacity on long-haul routes but were being used less on the route groups with a short average stage length. The variation in average aircraft productivity resulting from variations in average block speed and average size of aircraft is very wide. For example, the seat-kilometres per aircraft block hour in the Central America, Europe and Africa route groups are in each case less than one-third of the seat-kilometres per block hour on the South Pacific route group.

6. Differences in aircraft fleet composition among route groups contribute to the differences in both aircraft and other operating costs, but mainly in the aircraft costs. The contribution to regional differences in aircraft operating costs arising from differences in aircraft mix (excluding the effects of differences in stage length, fuel prices and load factors) has been estimated and is presented in paragraphs 21 and 22.

7. Other operating costs as well as aircraft operating costs are of course also strongly influenced by the average length of flight stages operated in a route group. This is because certain important cost items, such as station expenses and landing charges, are primarily dependent upon the number of aircraft and passenger departures. Since the number of seat-kilometres (or passenger-kilometres) per departure increases proportionally with increasing stage length, the cost per seat-kilometre (or per passenger-kilometre) of station expenses and landing charges falls with increasing stage length. Estimated effects of differences in stage length on operating costs (both aircraft and other) are also presented in paragraphs 21 and 22.

#### Prices for aircraft fuel and oil [factor c)]

8. The estimated total consumption of aircraft fuel and oil on international subsonic jet passenger routes in 1987 was about 58 billion litres, and the total cost to the airlines was some U.S.\$10.0 billion for an average price per litre of 17.3 cents. This average price paid per litre represented a slight increase from the 1986 average price of 17.1 cents per litre, representing a levelling out after a continual annual decline in price from the high level of 31.0 cents per litre reached in 1981. Other operating costs increased more than the price of fuel, however, and in 1987 fuel represented just over 14 per cent of the total passenger operating costs compared with about 15 per cent in 1986 and just over 23 per cent in 1981.

9. Detailed estimates have been made of the average prices of fuel purchased in the different regions of the world (Table IV-3) and of the average prices of fuel consumed on the various route groups (Table IV-4). As shown in Table IV-3 on a regional basis the price per litre of fuel in 1987 ranged from about 14 cents in North America to some 26 cents in Africa (almost double the price paid in North America). Between 1986 and 1987 changes in fuel prices varied from region to region, from a reduction of about 6 per cent in Africa to an increase of some 4 per cent in South America.

Table IV-2. Aircraft operational data by route group, 1987

Route group (short title)	Average length of flight stage (km)	Average block speed (km/h)	Percentage distribution of seat-kilometres		Average aircraft productivity: available seat-kilometres per block hour (thousands)
			Narrow-body	Wide-body	
I. All world international routes	1 714	662	21	79	158
II. International route groups:					
1. North-Central America	1 211	627	47	53	120
2. Central America	681	583	99	1	81
3. North America	1 036	593	75	25	95
4. North-South America	2 080	718	24	76	172
5. South America	907	597	76	24	92
6. Europe	820	524	85	15	69
7. Middle East	882	519	47	53	93
8. Africa	881	610	68	32	85
9. Europe-Middle East	2 052	650	25	75	136
10. Europe-Africa	2 749	712	17	83	169
11. North Atlantic	4 026	758	3	97	228
12. Mid Atlantic	3 634	754	14	86	197
13. South Atlantic	3 609	769	8	92	205
14. Asia/Pacific	1 654	666	8	92	182
15. Europe-Asia/Pacific	3 477	727	8	92	217
16. North/Mid Pacific	5 348	793	2	98	244
17. South Pacific	4 608	795	4	96	264

10. On a route group basis (Table IV-4) the estimated fuel prices range from a low of 15.1 cents per litre for routes within North America to a high of 28.9 cents per litre for routes within Africa. Comparing the two sets of fuel price estimates in Tables IV-3 and IV-4, both of which are derived from the same data sources, it may be seen that the average prices paid for fuel for international services carried out entirely within Africa (28.9 cents per litre) are significantly higher than the average prices for all fuel uplifted in Africa for international services to, from and within that region (25.7 cents per litre). Further analysis shows that airlines from outside this region have generally paid lower prices for fuel in the region concerned than airlines based in the region, possibly as a result of favourable terms of bulk purchasing arrangements covering a wider network of services.

#### Airport and associated charges [factor d)]

11. Airport charges in 1987 represented 4.0 per cent of the total costs for international passenger operations. The basis on which these charges are levied varies from airport to airport but aircraft gross weight is the predominant element and a broad and simple comparison of the levels of airport charges in different parts of the world can be based on dollars paid per tonne of aircraft maximum take-off weight. Using this measure, estimated average airport charges in different regions of the world are shown in Table IV-3. The table shows that the world average was 7.5 dollars per tonne and that the average charges in regions ranged from 2.7 dollars in North America and in Central America/Caribbean to 13.1 dollars in Europe. En-route facility charges are not generally included in these estimates because of their more limited significance (2.0 per cent of total costs) and because of the margin of uncertainty associated with their estimation on a regional basis.

Table IV-3. Estimated unit fuel prices and airport charges by region, 1987 (international scheduled services)

Area <sup>1</sup>	Aircraft fuel and oil prices (cents/litre)	Landing and associated airport charges (dollars/depended tonne <sup>2</sup> )
World	17.3	7.5
North America	14.4	2.7
Central America/Caribbean	19.1	2.7
South America	23.0	4.4
Europe	16.4	13.1
Middle East	18.1	5.0
Africa	25.7	5.0
Asia/Pacific	19.0	7.3

1. More detailed descriptions of areas and route groups may be found in Appendix 3 on the reverse of the revenue and cost questionnaire.
2. Tonnes of aircraft maximum take-off weight.

Table IV-4. Estimated unit fuel prices and airport charges  
by route group, 1987 (international scheduled services)

Route group (short title)	Aircraft fuel and oil prices (cents/litre)	Landing and associated airport charges (dollars/ departed tonne <sup>1</sup> )
I. All world international routes	17.3	7.5
II. International route groups:		
1. North-Central America	17.4	3.4
2. Central America	20.5	2.2
3. North America	15.1	1.8
4. North-South America	19.1	3.8
5. South America	22.0	4.6
6. Europe	16.8	15.0
7. Middle East	18.0	4.1
8. Africa	28.9	5.1
9. Europe-Middle East	17.3	8.5
10. Europe-Africa	21.7	7.8
11. North Atlantic	15.2	6.3
12. Mid Atlantic	19.0	6.8
13. South Atlantic	21.2	6.1
14. Asia/Pacific	19.0	7.4
15. Europe-Asia/Pacific	18.0	7.0
16. North/Mid Pacific	16.2	6.9
17. South Pacific	16.2	4.2

1. Tonnes of aircraft maximum take-off weight.

12. Estimates of landing and associated airport charges have also been made on a route group basis and are shown in Table IV-4. The range of these estimates for route groups is from 1.8 dollars per tonne for traffic within North America to 15.0 dollars for traffic within Europe.

#### Load factor [factor e]

13. A large part of the total costs of operating a flight on a scheduled air service is independent of, or only moderately affected by, the number of passengers actually carried on the flight. Since, as shown in Table III-1, the passenger load factors achieved in 1987 varied significantly among route groups, from a low of 54 per cent on routes within Africa to a high of 73 per cent on routes in local Asia/Pacific, they had a significant influence on differences in total operating costs per passenger-kilometre. Estimated effects of differences in load factor on operating costs for each route group are presented in paragraphs 21 and 22.

#### Other causes of regional differences in costs

14. Among the factors that led to regional differences in the total cost of passenger operations in 1987, the varying aircraft operating costs, including the effect of varying prices of fuel, have been discussed above. The effect of varying stage lengths and load factors has been assessed for both aircraft operating costs and other cost items but, with the exception of variations in airport charges, other effects of differences in non-aircraft cost items have not been analysed. The remaining cost items include "station expenses", "passenger services", "commission", "ticketing, sales and promotion" and "general, administrative and miscellaneous" and together accounted for some 52 per cent of the total costs for international passenger operations in 1987. Some of these cost items for passenger operations show significant differences among route groups even after extraction of any stage length and load factor effects. A general commentary concerning these items and their variation is given below.

15. Station expenses (column 5 in Table III-2) relate mainly to the servicing of aircraft and passengers at airports. While they vary greatly among route groups, from 0.4 to 2.5 cents per passenger-kilometre, some of the variation is due to the effects of differences in stage length. If this effect is extracted from station expenses, routes in local South America show the lowest costs per passenger while routes across the North Atlantic show the highest costs.

16. Passenger service costs (column 6 in Table III-2) relate primarily to cabin services provided in flight. In 1987 they increased significantly on a world-wide basis and represented slightly over 14 per cent of total passenger operating costs. The differences in their level amongst the route groups, from 0.8 to 1.9 cents per passenger-kilometre, primarily reflect differences in salary, service levels and utilization of cabin crew.

17. Commission (column 7 in Table III-2) is paid by each airline to travel agents and other airlines for the sale of passenger tickets. Commission is dependent on the extent to which airlines' sales are handled by agents in different parts of the world. However, because the commission is usually a certain percentage of the price of the ticket the variation in this cost item, from 0.5 to 1.6 cents per passenger-kilometre, is also related to the variation in average revenue per passenger-kilometre.

18. Ticketing, sales and promotion (column 8 in Table III-2) is an item for which the level is largely determined by decision-making within individual airlines. In 1987 this represented almost 11 per cent of passenger costs. The variation among the route groups, from 0.6 to 2.1 cents per passenger-kilometre, reflects differing competitive situations and the extent to which airlines handle their own sales in the various route groups.

Table IV-5. Contributions to differences in costs among route groups, 1987

Route group (short title)	World average total passenger operating costs	Effect of air-craft mix on direct operating costs	Effect of stage length and average block speed	Effect of air-craft fuel and oil prices	Effect of landing and asso- ciated airport charges	Effect of load factor	Sum of effects in columns 2-6	Effect of other factors	Actual total passenger operating costs: columns 1+7+8
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(Cents per passenger-kilometre)									
I. All world international routes	7.7	-	-	-	-	-	-	-	7.7
II. International route groups:									
1. North-Central America	7.7	0.4	0.7	0.0	-0.2	0.4	1.3	-1.3	7.7
2. Central America	7.7	0.8	2.3	0.2	-0.2	0.6	3.7	-2.6	8.8
3. North America	7.7	0.6	1.2	-0.1	-0.2	0.3	1.8	-2.1	7.4
4. North-South America	7.7	-0.1	-0.5	0.1	-0.2	0.9	0.2	-0.4	7.5
5. South America	7.7	0.3	1.4	0.3	-0.1	1.1	3.0	-0.7	10.0
6. Europe	7.7	1.2	2.2	0.0	0.3	0.5	4.2	4.1	16.0
7. Middle East	7.7	0.4	2.1	0.0	-0.1	1.3	3.7	0.6	12.0
8. Africa	7.7	0.8	1.4	0.7	-0.1	2.0	4.8	0.4	12.9
9. Europe-Middle East	7.7	0.3	-0.1	0.0	0.0	1.0	1.2	0.9	9.8
10. Europe-Africa	7.7	-0.2	-0.7	0.3	0.0	0.4	-0.2	1.2	8.7
11. North Atlantic	7.7	-0.3	-1.1	-0.1	0.0	-0.1	-1.6	0.0	6.1
12. Mid Atlantic	7.7	-0.3	-1.2	0.1	0.0	0.0	-1.4	0.0	6.3
13. South Atlantic	7.7	-0.4	-1.1	0.2	-0.1	0.3	-1.1	1.4	8.0
14. Asia/Pacific	7.7	0.0	0.0	0.1	0.0	-0.4	-0.3	-0.1	7.3
15. Europe-Asia/Pacific	7.7	-0.3	-0.9	0.0	0.0	-0.2	-1.4	0.1	6.4
16. North/Mid Pacific	7.7	-0.4	-1.4	-0.1	0.0	-0.2	-2.1	0.5	6.1
17. South Pacific	7.7	-0.4	-1.3	-0.1	-0.1	-0.1	-2.0	-0.3	5.4



19. Commission, ticketing, sales and promotion, together reflect the over-all cost of selling passenger tickets. Depending on the route group, between 17 and 24 per cent of total passenger revenues are used to defray this cost.

20. General, administrative and miscellaneous expenses (column 9 in Table III-2) vary from 0.2 to 1.0 cents per passenger-kilometre. This partly reflects variations in the organizational structure and the accounting practices of airlines in different parts of the world, but also variations in salary levels and staff productivity among regions. Additionally, economies of scale may be an important factor affecting variations in this cost item as large airlines, which tend to have lower administrative overheads per passenger-kilometre performed than smaller airlines, play a greater role on some route groups than on others. In recent years, administrative costs have been heavily influenced by fluctuations in exchange rates.

#### Summary of causes of regional differences in costs

21. The effects of the factors described in paragraphs 3 to 20 on the cost levels for route groups are shown in Table IV-5. Column 1 of that table shows against each route group the world average cost per passenger-kilometre in 1987, which was 7.7 cents. Columns 2 through 6 show the deviations from this world average that may be attributed to each of the individually assessed factors described in paragraphs 3 to 13 above, and column 8 shows the aggregate effect of the "other factors" (some other factors were described in summary form in paragraphs 14 to 20). Column 9 shows the resulting actual total costs per passenger-kilometre for each route group.

22. Comparing the various factors identified in columns 2 to 6 of Table IV-5 it will be noted that each of them contributed significantly to differences from the world average cost per passenger-kilometre. On 12 out of the 17 route groups, "stage length and average block speed" was the most important single factor and on the rest "load factor" was the most important single factor, but neither of them was the consistently dominant cause. Also, as may be seen by comparing column 7 (the sum of the effects in columns 2 to 6) with column 8, an important proportion of the differences in route group costs from the world average was due to the "other factors" which do not lend themselves to precise analysis.

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## APPENDIX I. DATA SOURCES AND COVERAGE

### Sources of the data

1. Primary sources of information for this study were two questionnaires which were dispatched (under cover of State Letter EC 2/20.3.2-88/33 of 4 May 1988) to all Contracting States to be filled out with respect to their international carriers. One questionnaire sought information on scheduled and non-scheduled passenger, freight, mail and incidental revenues for each route group, together with corresponding volumes of traffic and capacity. Replies to this questionnaire were received with respect to 85 States. The second questionnaire sought information on costs for international scheduled passenger airlines, and replies were received with respect to 77 States. Facsimiles of the two questionnaires and a list of States for which replies were received are given in Appendix 3.

2. Another important source of information as far as scheduled operations were concerned was a computer analysis of timetable material prepared by publishers of the Official Airline Guide. The basic data provided by this source were, for each and every airline and aircraft type operating in each of the route groups, information on the planned number of seats (combination aircraft), number of departures, aircraft block hours and distance flown (these data are Copyright 1988 by Official Airline Guides, Inc., Oak Brook, Illinois). The ICAO Secretariat carried out research into the operating characteristics of aircraft types and sub-types, and provided Official Airline Guides with resulting data on fuel consumption per block hour (as a function of stage length), maximum take-off weight, payload and volumetric capacity. This information was related to the basic data to provide a bank of operating statistics for each route group and for each geographical area of operation within each route group, as well as aggregate statistics for each area and for the world as a whole.

3. A wide range of supplementary information sources was used, in particular data on airline traffic, traffic by flight stage, on-flight origin and destination traffic, fleet and personnel, and airline financial data regularly filed by Contracting States on Air Transport Reporting Forms and published in the ICAO Digests of Statistics.

### Coverage of the data

4. For scheduled services, traffic, capacity and other operational data were derived both from the questionnaires and from the timetable material, supplemented by material from the regular statistical reports to ICAO, and may be considered as fully comprehensive of all international operations. Revenue and cost data originate essentially from the questionnaires, supplemented by national publications or other suitable sources of financial data where available; in the case of passenger traffic available revenue and cost data were adapted according to operational data to render them representative of all international operations (see Appendix 2). In the case of non-scheduled traffic, the sole source of both operational and financial data was the responses to the questionnaires, and the results shown in this study represent only these responses.

5. The study was based on revenue data obtained for 95 scheduled airlines (including 6 all-cargo airlines) and 13 other carriers (including 2 all-cargo), and on cost data for 79 scheduled passenger airlines.

6. The number of airlines and the coverage of international scheduled passenger traffic represented by revenue and cost data are shown in Table A1-1 by region of airline registration. The over-all representation in terms of available seat-kilometres is

85 per cent for revenue data and 82 per cent for cost data. Representation of the Africa, Middle East and Central America/ Caribbean regions in 1987 remained significantly lower than for the other regions.

7. For each route group the number of airlines and the percentage of traffic represented by these airlines are shown in Table A1-2. In terms of available seat-kilometres representation of revenue and cost data is above 70 per cent for 10 of the 17 route groups. For most route groups the revenue and cost data are considered sufficiently representative to justify presentation of results, although in the case of routes "between and within the Caribbean and Central America" and in "local Middle East" the results need to be interpreted with some caution because of the relatively low representation.

8. The coverage of revenue data for non-scheduled passenger operations is shown in Table A1-3 and the coverage of revenue data for scheduled freight and mail services is shown in Table A1-4.

REPRESENTATIVE NATURE OF REVENUE AND COST DATA FOR  
SCHEDULED PASSENGER OPERATIONS, 1987

Table A1-1. Representation by ICAO region of airline registration

Region	International scheduled available seat- kilometres (millions)	Revenue data represent			Cost data represent		
		Number of airlines	Available seat-kilometres		Number of airlines	Available seat-kilometres	
			No. (millions)	% of total		No. (millions)	% of total
All	1 025 723	89	876 324	85	79	836 607	82
Africa	46 133	12	20 003	43	12	20 003	43
Asia/Pacific	260 867	18	241 698	93	15	227 930	87
Europe	360 881	26	327 658	91	21	302 481	84
Middle East	59 265	3	19 591	33	3	19 591	33
North America	229 992	13	223 335	97	12	223 199	97
Central America/ Caribbean	29 877	5	15 060	50	4	14 425	48
South America	38 708	12	28 978	75	12	28 978	75

Source: ICAO, Form A-1.

Table A1-2. Representation by international route group

Route group (short title)	Revenue data represent		Cost data represent	
	Number of airlines	Percentage of total scheduled seat-kilometres	Number of airlines	Percentage of total scheduled seat-kilometres
I. All world international routes	89	85	79	81
II. International route groups:				
1. North-Central America	10	78	9	77
2. Central	5	48	4	44
3. North America	13	85	13	85
4. North-South America	18	86	17	85
5. South America	8	64	8	64
6. Europe	25	81	20	75
7. Middle East	5	51	5	51
8. Africa	10	57	10	57
9. Europe-Middle East	24	62	20	57
10. Europe-Africa	28	66	24	62
11. North Atlantic	35	92	31	89
12. Mid Atlantic	10	66	9	64
13. South Atlantic	13	93	13	93
14. Asia/Pacific	20	90	17	83
15. Europe-Asia/Pacific	37	83	32	77
16. North/Mid Pacific	16	93	14	90
17. South Pacific	8	96	8	96

Source: Timetable analysis.

Table A1-3. Representative nature of revenue data for non-scheduled passenger operations, 1987, by ICAO region of carrier registration

Region	International non-scheduled passenger-kilometres performed (millions)			Revenue data represent								
	By all carriers	By international scheduled airlines	By other carriers	All carriers			International scheduled airlines			Other carriers		
				Number of carriers	Pass-km performed No. (millions)	% of total	Number of carriers	Pass-km performed No. (millions)	% of total	Number of carriers	Pass-km performed No. (millions)	% of total
All	158 151	76 104	82 047	59	70 981	45	48	27 241	36	11	43 740	53
Africa	3 791	3 791	(Note 1)	7	1 231	32	7	1 231	32	-	-	-
Asia/Pacific	2 795	2 769	26	9	1 893	68	9	1 893	68	-	-	-
Europe	122 628	51 141	71 487	26	62 302	51	15	18 562	36	11	43 740	61
Middle East	2 321	1 979	342	-	-	-	-	-	-	-	-	-
North America	24 800	14 970	9 830	9	5 333	22	9	5 333	36	-	-	-
Central America/ Caribbean	1 072	1 072	(Note 1)	3	17	2	3	17	2	-	-	-
South America	744	382	362	5	205	28	5	205	54	-	-	-

1. Less than 0.5 million.

Source: ICAO, Forms A-1 and A-2.

Table A1-4. Representative nature of revenue data for scheduled freight and mail services, 1987, by ICAO region of airline registration

Region	International scheduled freight tonne-km performed (millions)	Freight revenue data represent			International scheduled mail tonne-kilometres performed (millions)	Mail revenue data represent		
		Number of airlines	Tonne-km performed No. (millions)	% of total		Number of airlines	Tonne-km performed No. (millions)	% of total
All	36 717	92	32 622	89	1 941	84	1 781	92
Africa	1 106	11	475	43	48	11	18	38
Asia/Pacific	11 448	18	10 294	90	366	18	358	98
Europe	13 937	26	13 507	97	758	24	709	94
Middle East	2 025	4	733	36	53	3	14	26
North America	6 411	13	6 235	97	665	13	653	98
Central America/ Caribbean	230	5	121	53	11	5	3	27
South America	1 560	15	1 257	81	39	10	26	67

Source: ICAO, Form A-1.



## APPENDIX 2. METHOD OF ANALYSIS AND MARGINS OF UNCERTAINTY

### Method of analysis

1. General. Data sources in general are discussed in Appendix 1. All airline financial data were initially adjusted where necessary to represent the calendar year 1987, and converted where necessary from local currency to United States dollars. For currency conversions, use was made of the exchange rates provided by States in their reply to the questionnaires. In those cases where an exchange rate was not supplied the average monthly exchange rates for 1987 published in the United Nations Monthly Bulletin of Statistics were used.
2. Prior to detailed analysis all financial and operational data were verified (a) as to mutual consistency and as to consistency with data for previous years, (b) with information provided on statistical reporting forms regularly submitted to ICAO, and (c) with data obtained from a computer analysis of published timetable material (see Appendix 1).
3. Analysis of available revenue data. Scheduled and/or non-scheduled passenger, freight and mail revenues for each international route group, together with corresponding volumes of traffic and capacity, as well as incidental revenues attributable directly to international scheduled services were obtained for individual carriers directly from the revenue questionnaires designed for this purpose (facsimiles of the revenue and the cost questionnaires are included in Appendix 3). This information for individual carriers was aggregated for each route group to obtain weighted average revenues per passenger-kilometre and per seat-kilometre (for passenger traffic) or per tonne-kilometre performed (for freight and mail traffic). In the case of scheduled operations the data for individual airlines, and hence the average unit revenues, include allowance for discounts, pro-rates, etc., but generally exclude deductions for commission payments.
4. Analysis of available cost data. Cost data are obtained and analysed only for international scheduled passenger airlines. While most scheduled (and non-scheduled) carriers maintain revenue and traffic data on a route by route and/or route group basis, far fewer maintain cost data in a correspondingly disaggregated form. Hence, in order to present data which are generally representative of scheduled passenger airline operations in each region of the world, and at the same time minimize the reporting burden on States and their airlines, a questionnaire was designed in which the requirement for disaggregation of system-wide operating costs was both sparing and in line with practices followed by a majority of airlines. The cost data obtained for individual airlines through this questionnaire were subsequently allocated by the Secretariat among route groups (as necessary, that is where an airline operated on more than one route group) using the analysis of published timetable material.
5. The cost data obtained for an individual airline, and the procedures used for allocating these costs among the route groups on which the airline operated, may be divided into three broad categories, as shown in Table A2-1: firstly (A), operating costs which for a given airline and a given aircraft type may, for this purpose, be considered as independent of where the aircraft is flying; secondly (B), operating costs which are significantly related both to aircraft type and to geographical area of operation; and thirdly (C), operating costs and pertinent non-operating items which may be related only in part to aircraft type or to the region in which they are incurred, but which are related significantly to the volume of traffic or the volume of capacity in each route group.
6. Costs in the first category (A) were obtained from the data for each airline as an average system-wide cost per aircraft block hour for each aircraft type used in

Table A2-1. Procedures used to allocate individual airline costs among route groups

Category of costs	Cost item (see note 1)	Airline data input to the study	Cost allocation criteria
A. Cost related primarily to aircraft type	I.1 Flight operation expenses, excluding fuel and oil costs	System-wide costs and system-wide block hours flown for each aircraft type operated	I.1-I.4 Number of block hours flown by each aircraft type on each route group
	I.2 Aircraft maintenance and overhaul expenses		
	I.3 Aircraft depreciation and amortization costs		
	I.4 Interest charges on aircraft		
B. Costs related significantly both to aircraft type and geographical area of operation	II.1 Aircraft fuel and oil costs	Either: a) costs by geographical area of operation, or b) costs by route group (no allocation to route group necessary), or c) costs by aircraft type	II.1 Fuel consumption by each aircraft type in each area of operation
	II.2 Landing and associated airport charges		II.2 Maximum take-off weight times number of departures for each aircraft type in each area of operation
	II.3 En-route facility charges		II.3 Maximum take-off weight times number of block hours flown for each aircraft type in each area of operation
	II.4 Other station expenses		II.4 Maximum payload times number of departures for each aircraft type in each area of operation
C. Costs related significantly to volume of traffic or volume of capacity	III.1 Passenger service costs	System-wide costs	III.1 Number of seat-hours on each route group
	III.2 Commission payments		III.2 Total revenue earned from each route group
	III.3 Other ticketing, sales and promotion costs		III.3 Total revenue earned from each route group
	III.4 General and administrative expenses		III.4-IV.1 Number of tonne-kilometres performed in each route group
	III.5 Miscellaneous operating expenses		
	IV.1 Balance of miscellaneous non-operating items (excluding payments from public funds and balance of income from affiliated companies)		

1. Cost item references are those used in the cost questionnaire (see Appendix 3). The items themselves are described in the Reporting Guidelines on the reverse of the cost questionnaire.

international scheduled service. The costs for each route group were calculated according to the number of block hours flown by each aircraft type operated by the airline on that route group.

7. Costs in the second category (B) were recorded for each airline by route group or by geographical area (or in a few instances by aircraft type). Where recorded by area or by aircraft type, data were adapted to obtain corresponding data by route group using appropriate operational criteria (such as consumption in the case of "aircraft fuel and oil"). The relationships between route groups, geographical areas and aircraft types in terms of operational data were available from the computer analysis of timetable material.

8. Costs in the third category (C) were recorded as system-wide totals for the operations of each airline. These costs were disaggregated into route group costs using a suitable allocation parameter for each cost item. The allocation parameter devised for each item bears a direct or indirect relationship with the volume of traffic or capacity in each route group. In the case of "Commission payments" and "Other ticketing, sales and promotion costs", the allocation parameter used is the total revenue earned from each route group, thereby including effects both from traffic and from regional differences in revenue yields (and hence regional differences in ticketing, sales and promotion costs).

9. For some airlines, cost data within the three categories were reported relating to domestic operations and/or international non-scheduled operations as well as to international scheduled operations. Such costs associated with domestic and non-scheduled operations were subtracted using the same allocation procedures as were used to distribute costs among route groups.

10. As far as data for individual airlines were concerned, total costs for the scheduled international passenger flights in each route group were estimated by summing the itemized costs allocated to the route group. Finally, costs allocable to the carriage of freight and mail on passenger flights were deducted from these total costs to arrive at passenger costs. For this purpose it was assumed that the cost of carriage of freight and mail on passenger and combination aircraft on a route group was equal to the freight and mail revenue from operations of these aircraft.

11. Estimates of revenues and costs for airlines for which financial data were not available. The procedures described above lead to the production of total revenues and (for international scheduled passenger traffic) total costs on each route group by airline region of registration for all those carriers for which the basic financial data were available. In most cases, this financial data base did not include all carriers operating. However, for scheduled passenger traffic, estimated revenues and costs presented in this study are formulated to cover all airlines operating on each route group.

12. In the case of revenues the reported average revenue yield per passenger-kilometre for airlines registered in the same region within each route group has been applied to the total revenue passenger-kilometres for all airlines registered in that region operating on the route group.

13. In the case of costs the estimates for non-reported airlines have been based on cost data for reported airlines from the same region of registration for the route group, but also take into account differences in the operating characteristics of the two groups of airlines concerned (including differences in load factors). With respect to the costs in category A (see Table A2-1), the average costs per block hour for the aircraft of airlines for which cost data were available were applied to the hours flown by the same aircraft types by non-reported airlines from the same region of registration, thus taking into account differences in aircraft fleet, in block speed and in seating configuration. Costs in the categories B and C were similarly estimated on the basis of criteria parallel to those used in allocating costs of individual airlines among route groups.

14. For some route groups where airlines of a particular region have a very low representation (such as Central America and the Caribbean, Africa and the Middle East), the grossing-up process for revenues and costs was adjusted to take into account the revenues and costs of major non-reported airlines on the basis of data provided for previous studies as well as data regularly collected for ICAO Digests of Statistics.

#### Margins of uncertainty

15. General. It is important to recognize that the revenue and cost data presented in this Circular are not perfectly defined quantities, but involve margins of uncertainty. Such margins of uncertainty are inherent in any presentation of airline financial data which covers a multiplicity of currencies, which involves disaggregation of system-wide revenues and costs, or which has an incomplete data base. Hence an important feature of the method used in this series of studies has been to identify and evaluate the various sources of uncertainty for the purpose of establishing the degree of precision in the published data and hence the constraints on drawing conclusions from these data. The evaluations concerned were carried out by means of statistical analysis of detailed airline data and by means of tests as to the sensitivity of the published data to the procedures used in the study. The resulting assessments of margins of uncertainty in average unit revenues, average unit costs and average revenue/cost ratios published in this study for scheduled passenger traffic in 1987 are presented below.

16. Estimates of unit revenues. The margin of uncertainty on the estimated unit revenues for a route group arises from limitations on the quality of reported data, from exchange rate fluctuations and, for scheduled passenger traffic, from the assumption that the average yield for non-reported airlines is the same as that for reported airlines on the same route group. An analysis was carried out to evaluate each of these sources of uncertainty and their cumulative effect, thus producing composite margins of uncertainty for the various route groups. The conclusion was that the estimated scheduled passenger revenue per passenger-kilometre for almost all the route groups presented can be relied upon to  $\pm 6$  per cent. However, caution should be exercised when interpreting the revenue (and cost) data for routes between and within Central America and the Caribbean and in local Middle East due to the relatively low representation in those route groups. Conversely, a significantly narrower margin of uncertainty than  $\pm 6$  per cent applies for those route groups where the representation was relatively high. On a global basis, taking into account all route groups as a whole, the margin of uncertainty is reduced by compensatory effects and by scale, and is estimated at  $\pm 3$  per cent.

17. Estimates of unit costs. The estimates of unit passenger costs for a route group contain similar elements of uncertainty as those for passenger revenues, plus further elements which arise from the need to allocate costs among route groups according to standardized procedures. These additional sources of uncertainty arise because:

- a) the generic nature of some cost items (for example general administrative costs) makes their allocation among route groups a matter of convention; and
- b) even for those cost items which are region or route-specific, the standardized allocation procedures do not take into account the detailed conditions under which individual airlines operate.

18. As for the revenue data, a composite margin of uncertainty was developed in respect of the average unit costs for each route group and for all route groups together. With the exception of routes between and within Central America and the Caribbean, the margin of uncertainty on the estimated scheduled passenger costs per passenger-kilometre for all the other route groups presented is considered to be within  $\pm 10$  per cent. Route groups with high representation show a somewhat narrower margin of uncertainty. On a global basis, taking into account all route groups as a whole, the margin of uncertainty in the average costs per passenger-kilometre is estimated at  $\pm 5$  per cent.

19. On route groups where the margin of uncertainty approaches  $\pm 10$  per cent the contribution of different sources of uncertainty is approximately as follows:

<u>Source of uncertainty</u>	<u>Relative contribution to margin of uncertainty</u>
Incomplete cost data base	3
Generic nature of certain costs and use of standardized allocation procedures	3
Fluctuations in currency exchange rates	2
Other (primarily imperfections in reported data)	2
All	10

20. Much of the uncertainty arising from the generic nature of certain costs is inherent and cannot be influenced (see paragraph 17), and little can be done to reduce the uncertainty arising from fluctuations in currency exchange rates. A major factor in these studies is therefore getting as much coverage of financial data as possible, while at the same time making efforts to improve the quality of reported data.

21. All the above estimates of uncertainty apply only to over-all average cost data (as presented in Chapter III, Table III-1). Estimates of individual elements making up the over-all cost are in a number of cases subject to wider margins of uncertainty.

22. Estimates of revenue/cost ratios. The estimated ratios of revenues to costs have margins of uncertainty which vary from route group to route group depending on the margins of uncertainty in the estimated revenue and cost data. It should be noted, however, that the uncertainties in the revenue and the cost figures for a route group are to some extent inter-dependent; in other words, if the revenue on a route group is over-estimated, the cost figure is also probably over-estimated. This circumstance reduces the margin of uncertainty in the revenue/cost ratios compared with those for either the revenue data alone or the cost data alone. The composite margin of uncertainty for the revenue/cost ratio for individual route groups in this study is estimated at  $\pm 5$  per cent, and for all the route groups together it is estimated at  $\pm 2.5$  per cent.

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APPENDIX 3. QUESTIONNAIRES RELATING TO REVENUES AND COSTS

I. Facsimiles of questionnaires and attachments

QUESTIONNAIRE ON REVENUES OF INTERNATIONAL SCHEDULED AND NON-SCHEDULED AIR CARRIERS

(Reporting Guidelines and Route Group Descriptions Overleaf)

CARRIER NAME: _____ CALENDAR PERIOD: 12 MONTHS FROM _____ TO _____ REPORTING CURRENCY (US\$ OR NATIONAL): _____ EXCHANGE RATE BETWEEN NATIONAL CURRENCY AND THE US DOLLAR DURING PERIOD: 1 US\$ = _____	TOTAL ALL SERVICES (DOMESTIC PLUS INTERNATIONAL)	TOTAL DOMESTIC SERVICES	TOTAL INTERNATIONAL SERVICES (TOTAL FOR ROUTE GROUPS 1 TO 17)	INTERNATIONAL SERVICES BY ROUTE GROUP																	
				1 Between North America and Central America/Caribbean	2 Between and within Central America and the Caribbean	3 Between Canada, Mexico and the United States	4 Between North America/Central America/Caribbean and South America	5 Local South America	6 Local Europe	7 Local Middle East	8 Local Africa	9 Between Europe and Middle East	10 Between Europe/Middle East and Africa	11 North Atlantic	12 Mid Atlantic	13 South Atlantic	14 Local Asia/Pacific	15 Between Europe/Middle East/Africa and Asia/Pacific	16 North and Mid Pacific	17 South Pacific	
<b>SECTION I - SCHEDULED SERVICES</b>																					
<b>I.1 Revenue</b>																					
a) passenger traffic (including excess baggage)																					
b) freight traffic																					
c) mail traffic																					
d) other																					
<b>I.2 Corresponding Volume of Traffic and Capacity</b>																					
a) passenger-kilometres (millions)																					
b) seat-kilometres (millions)																					
c) freight tonne-kilometres performed (millions)																					
d) mail tonne-kilometres performed (thousands)																					
e) available tonne-kilometres (millions)																					
<b>I.3 All-Cargo Services Only (Included in I.1 and I.2 above)</b>																					
a) revenue (total)																					
b) tonne-kilometres performed (millions)																					
<b>SECTION II - NON-SCHEDULED OPERATIONS</b>																					
<b>II.1 Revenue</b>																					
a) passenger traffic																					
b) freight traffic																					
<b>II.2 Corresponding Volume of Traffic and Capacity</b>																					
a) passenger-kilometres (millions)																					
b) seat-kilometres (millions)																					
c) freight tonne-kilometres performed (millions)																					
d) available tonne-kilometres (millions)																					
<b>Remarks</b> (Include description of any deviations from Reporting Guidelines and Route Group Descriptions overleaf.)																					



## REPORTING GUIDELINES

## GENERAL

- a) This questionnaire is to be returned completed by ICAO Contracting States for each of their major international scheduled and non-scheduled air carriers (including any all-cargo carriers). The material provided will not be made public in such a way as to permit identification of individual operators. Information provided should be the total amount for a 12-month period as close as possible to the calendar year specified in the covering State Letter, with the period being identified in the space provided. It is recognized that, in order for your reply to reach ICAO by the date indicated in the State Letter, final audited financial data may not be available, but preliminary data are acceptable.
- b) Data for all-cargo aircraft operations should be included in the relevant sections of the questionnaire. Data for scheduled services with such aircraft should be included in Items I.1 and I.2, and specified under I.3 if possible.
- c) Financial data may be provided either in terms of national currency or in terms of U.S. dollars. In either case the weighted average annual exchange rate used or to be applied to convert national currency into U.S. dollars should be specified in the space provided.
- d) A brief description of each financial data item is given below; for more detailed definitions see the Instructions for completion of ICAO Air Transport Reporting Form EF-1, for airline Financial Data. For definitions of traffic and capacity data items see ICAO Air Transport Reporting Form A-1 for airline Traffic data.
- e) Descriptions of the route groups, which are based on those used by IATA's Cost Committee, are also given below, followed by guidelines on allocating data amongst them.

## SECTION I - SCHEDULED SERVICES

For Items I.1 a) to I.1 c) and I.3 a) report GROSS revenues related to scheduled flights before capacity equalization payments arising from pooled services and from the sale of own capacity to other carriers.

For Item I.1 d) Other revenue is intended to include on a net basis capacity equalization payments arising from pooled services and from the sale of own capacity to other carriers; and on a gross basis (with related expenses reported under the relevant expense item, indicate where different) incidental revenues accruing from air transportation services such as revenues from passengers paying less than 25 per cent of the normal applicable fare; commissions received on sales of transportation on other carriers; "no-show" and cancellation fees. Exclude revenue accruing from the provision of services other than for air transportation, such as for surface transportation; food services; service and maintenance sales; handling services for third parties; and property.

## SECTION II - NON-SCHEDULED OPERATIONS

Include revenue derived from all non-scheduled flights performed for remuneration, including empty flights related thereto, when the responsibility for the performance of transportation is that of the carrier reported.

## DESCRIPTIONS OF ROUTE GROUPS

1. Between North America and Central America/Caribbean

Includes routes between on the one hand Canada and/or the United States (including Alaska and Hawaii) and on the other hand Central America and the Caribbean. Routes between the United States and Puerto Rico/Virgin Islands are considered domestic and are excluded. Central America/Caribbean is defined as the geographical area covered by route group 2 below but excluding Mexico.

2. Between and within Central America and the Caribbean

Includes routes between or among the Bahamas, Belize, Bermuda, Costa Rica, El Salvador, Guatemala, Honduras, the islands of the Caribbean Sea (including Puerto Rico and the Virgin Islands), Mexico, Nicaragua and Panama.

3. Between Canada, Mexico and United States

Includes routes between or among the above States. The United States includes Alaska and Hawaii but excludes Puerto Rico and the Virgin Islands.

4. Between North America/Central America/Caribbean and South America

Includes routes between the geographical areas defined on the one hand by route group 1 and/or Mexico and on the other hand by route group 5 ("Local South America").

5. Local South America

Includes routes between or among the following States: Argentina, Bolivia, Brazil, Chile, Colombia (including San Andres Islands), Ecuador, Falkland Islands (Malvinas), French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela.

6. Local Europe

Includes routes between or among the States of geographical Europe, Algeria, Azores, Canary Islands, Greenland, Iceland, Madeira, Malta, Morocco, Tunisia and Turkey.

7. Local Middle East

Includes routes between or among the following States: Bahrain, Cyprus, Democratic Yemen, Egypt, Iran (Islamic Republic of), Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, United Arab Emirates and Yemen.

8. Local Africa

Includes routes between or among the States of continental Africa and offshore islands, but excluding Algeria, Azores, Canary Islands, Egypt, Madeira, Malta, Morocco, Sudan and Tunisia.

9. Between Europe and Middle East

Includes routes between the two geographical areas defined by route group 6 ("Local Europe") and route group 7 ("Local Middle East") respectively.

10. Between Europe/Middle East and Africa

Includes routes between on the one hand the geographical areas defined by route group 6 ("Local Europe") and/or route group 7 ("Local Middle East") and on the other hand the geographical area defined by route group 8 ("Local Africa").

11. North Atlantic

Includes routes between on the one hand Canada and/or the United States (including Alaska and Hawaii) and on the other hand the geographical areas defined by IATA Tariff Conference 2 ("Local Europe" and/or "Local Middle East" and/or "Local Africa").

12. Mid Atlantic

Includes routes between on the one hand gateway points in the geographical areas defined by route group 2 and/or route group 5 ("Local South America") but north of Rio de Janeiro and on the other hand the geographical areas defined by IATA Tariff Conference 2 ("Local Europe" and/or "Local Middle East" and/or "Local Africa").

13. South Atlantic

Includes routes between on the one hand Rio de Janeiro or any other gateway south thereof in route group 5 ("Local South America") and on the other hand the geographical areas defined by IATA Tariff Conference 2 ("Local Europe" and/or "Local Middle East" and/or "Local Africa").

14. Local Asia/Pacific

Includes IATA Tariff Conference 3, that is international routes within Asia to the east of the Islamic Republic of Iran and of the Ural Mountains, Australia, New Zealand, Papua New Guinea, the islands of the Pacific Ocean excluding the Hawaiian Islands, Midway and Palmyra.

15. Between Europe/Middle East/Africa and Asia/Pacific

Includes routes between the geographical areas defined by IATA Tariff Conference 2 on the one hand and that defined by IATA Tariff Conference 3 on the other hand.

16. North and Mid Pacific

Includes routes via the North and Central Pacific Ocean between on the one hand points in the Americas (that is IATA Tariff Conference 1) and on the other hand Asia and/or the islands adjacent thereto (that is IATA Tariff Conference 3 except Australia, New Zealand, Papua New Guinea and the islands of the South Pacific).

17. South Pacific

Includes routes via the South Pacific Ocean between on the one hand points in the Americas (that is IATA Tariff Conference 1) and on the other hand Australia, New Zealand, Papua New Guinea and the islands of the South Pacific.

## ALLOCATION TO ROUTE GROUPS

All data referring to domestic legs of international operations should be included as international in data for the route group concerned. Any service with a single flight number should be allocated to the route group which covers travel from the point of origin to the point of destination. For example, a flight Zurich-Geneva-Abidjan-Dakar should be reported as a Europe/Middle East-Africa flight (in route group 10) and not split between domestic, Europe-Africa and Local Africa. Specify all reporting differences.

Also specify any services which fall into more than one route group, including the criterion used for allocating data amongst the route groups concerned.

**QUESTIONNAIRE ON COSTS INCURRED BY INTERNATIONAL SCHEDULED AIR PASSENGER CARRIERS**  
(Reporting Guidelines and Geographical Descriptions Overleaf)

<p><b>CARRIER NAME:</b> _____</p>	<p><b>CALENDAR PERIOD:</b> 12 MONTHS FROM _____ TO _____</p>							
<p><b>REPORTING CURRENCY (US\$ OR NATIONAL):</b> _____</p> <p><b>EXCHANGE RATE BETWEEN NATIONAL CURRENCY AND THE US DOLLAR DURING PERIOD:</b> 1 US\$ = _____</p>	<p><b>TOTAL AMOUNTS FOR CALENDAR PERIOD</b></p>							
<p><b>SECTION I - EXPENSES AND OPERATING DATA BY AIRCRAFT TYPE</b>      AIRCRAFT TYPE ).....</p> <p>See General Note b) above and check box(es) if cost data in this Section include: Domestic <input type="checkbox"/> Non-Scheduled <input type="checkbox"/></p> <p>I.1 Flight operations expenses, <u>excluding fuel and oil costs</u> .....</p> <p>I.2 Maintenance and overhaul expenses.....</p> <p>I.3 Depreciation and amortization costs.....</p> <p>I.4 Interest charges.....</p> <p>I.5 Revenue block hours:</p> <p>    a) operated on international scheduled services.....</p> <p>    b) operated on international non-scheduled services.....</p> <p>    c) operated on domestic services.....</p> <p>    d) total all services.....</p>								
<p><b>SECTION II - OPERATING EXPENSES BY GEOGRAPHICAL AREA</b>      AREA (OR ROUTE) GROUP).....</p> <p>See General Note b) above and check box(es) if data in this Section include: Domestic <input type="checkbox"/> Non-Scheduled <input type="checkbox"/></p> <p>II.1 Aircraft fuel and oil.....</p> <p>II.2 Landing and associated airport charges.....</p> <p>II.3 Route facility charges .....</p> <p>II.4 Station expenses .....</p>	NORTH AMERICA	CENTRAL AMERICA/ CARIBBEAN	SOUTH AMERICA	EUROPE	MIDDLE EAST	AFRICA	ASIA/ PACIFIC	
<p><b>SECTION III - OTHER OPERATING EXPENSES</b></p> <p>See General Note b) above and check box(es) if data in this Section include: Domestic <input type="checkbox"/> Non-Scheduled <input type="checkbox"/></p> <p>III.1 Passenger services (including cabin attendants).....</p> <p>III.2 Commission payments .....</p> <p>III.3 Other ticketing, sales and promotion .....</p> <p>III.4 General and administrative .....</p> <p>III.5 Miscellaneous operating expenses .....</p>	<p><b>ALL AREAS</b></p> <p><b>Remarks</b> (Include description of any deviations from Reporting Guidelines and Geographical Descriptions overleaf.)</p>							
<p><b>SECTION IV - BALANCE OF MISCELLANEOUS NON-OPERATING ITEMS</b> .....</p> <p>(Note: + = revenue, - = expense)</p>								
<p><b>TOTAL - SECTIONS I TO IV</b> .....</p>								

GENERAL

- a) This questionnaire is to be returned completed by ICAO Contracting States for each of their airlines that provide international scheduled air passenger services. The material provided will not be made public in such a way as to permit identification of individual operators. Information provided should be the total amount for a 12-month period as close as possible to the calendar year specified in the covering State Letter, with the period being identified in the space provided. It is recognized that, in order for your reply to reach ICAO by the date indicated in the State Letter, final audited financial data may not be available, but preliminary data are acceptable. Similarly, if full information is not available for any Section of the questionnaire, partial and/or aggregated data would be appreciated.
- b) All data provided should preferably refer only to international scheduled services. Should carriers not be able to break out such information separately, the domestic and/or non-scheduled data should be included; the appropriate box(es) at the beginning of each Section should then be checked. Data referring to domestic legs of international services should be included as international. Indicate any exceptions.
- c) Financial data may be provided either in terms of national currency or in terms of U.S. dollars. In either case the weighted average annual exchange rate used or to be applied to convert national currency into U.S. dollars should be specified in the space provided.
- d) All expense, revenue and operating data relating to freight and mail, including those for all-cargo aircraft operations, should be included where relevant in the questionnaire. Expenses incurred for the provision of services to other airlines such as maintenance, handling and catering should be excluded.
- e) A brief description of each data item is given below. More detailed definitions of financial data items are given in the Instructions for completion of ICAO Air Transport Reporting Form EF-1, for airline Financial Data.

SECTION I - EXPENSES AND OPERATING DATA BY AIRCRAFT TYPE

Report for all aircraft types used, whether combination or all-cargo, using model designation (e.g. A300-B6, DC10-30CF, Boeing 747-200P).

- I.1 Flight operation expenses, excluding fuel and oil costs. This item comprises flight crew salaries and expenses, flight equipment insurance, rental of flight equipment (excluding any payments made under aircraft capital or finance lease arrangements), flight crew training, and other flight expenses excluding those covered by Items I.2, I.3, I.4 and II.1.
- I.2 Maintenance and overhaul expenses. Include here all expenses incurred for the repair, overhaul and maintenance of flight equipment, including payments to outside contractors and manufacturers. Exclude expenses incurred for the provision of maintenance and overhaul services to other airlines.
- I.3 Depreciation and amortization costs. Incorporate all such costs relating to flight equipment, including depreciation charges for aircraft acquired through capital or finance lease arrangements. Depreciation of ground property and equipment should be included if possible under the appropriate headings or in Item III.5.
- I.4 Interest charges. Include here gross interest charges on loans for the purchase of flight equipment, including the interest element of aircraft financing leases. Interest charges on other loans or overdrafts should be reported net under Item III.5.
- I.5 Revenue block hours. Provide data by aircraft type wherever possible, even where disaggregated cost data for this Section are not available.

SECTION II - OPERATING EXPENSES BY GEOGRAPHICAL AREA

Geographical Areas are described below. Data for this Section may alternatively be reported by route group in accordance with the descriptions appearing in the associated questionnaire on revenues (in which case please specify each route group).

- II.1 Aircraft fuel and oil. Include through-put charges, non-refundable duties and taxes.
- II.2 Landing and associated airport charges. Include all charges and fees related to air traffic operations which are levied against the airline for services provided at the airport for landing charges, passenger and cargo fees, security, parking and hangar charges.

II.3 Route facility charges. Include all fees levied against the airline for the provision of route facilities and services. Where a single charge is levied for both airport and route facilities, the amount should be reported under Item II.2.

II.4 Station expenses. Include all expenses incurred (passenger and/or cargo) for traffic handling and aircraft loading and servicing, including payments to outside contractors. Exclude expenses incurred for sales staff at airports (to be included under Item III.3) and for the handling and servicing of traffic and aircraft of other airlines.

SECTION III - OTHER OPERATING EXPENSES

III.1 Passenger services. Include all expenses incurred for the provision of passenger services (including pay, allowances and expenses of cabin attendants and other passenger service personnel); premiums for passenger liability and accident insurance paid by the airline; expenses of handling passengers incurred because of cancelled and delayed flights. Exclude expenses incurred for the provision of passenger services to other airlines.

III.2 Commission payments. Include commissions payable to third parties for the sale of transportation on the airline's services, preferably on a gross basis (specify where different).

III.3 Other ticketing, sales and promotion. Include all expenses related to these three functions, including staff, accommodation, reservations, and advertising/publicity.

III.4 General and administrative. Include all expenses incurred in performing the general and administrative functions of the airline. Overhead costs directly related to specific functions should preferably be allocated elsewhere under the appropriate heading.

III.5 Miscellaneous operating expenses. Include all operating expenses which could not be assigned elsewhere in Sections I to III. Include here net interest charges on loans and overdrafts not related to the purchase of flight equipment (see Item I.4).

SECTION IV - BALANCE OF MISCELLANEOUS NON-OPERATING ITEMS

Include profits and losses from retirement of property and equipment, foreign exchange transactions, and miscellaneous non-operating items. Exclude payments from public funds and balance of income from affiliated companies.

DESCRIPTIONS OF GEOGRAPHICAL AREASNorth America

Canada and United States, including Hawaii and Alaska but excluding Puerto Rico and the Virgin Islands.

Central America/Caribbean

Bahamas, Belize, Bermuda, Costa Rica, El Salvador, Guatemala, Honduras, the islands of the Caribbean Sea (including Puerto Rico and the Virgin Islands), Mexico, Nicaragua and Panama.

South America

Argentina, Bolivia, Brazil, Chile, Colombia (including San Andres Islands), Ecuador, Falkland Islands (Malvinas), French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela.

Europe

Geographical Europe and Algeria, Azores, Canary Islands, Greenland, Iceland, Madeira, Malta, Morocco, Tunisia and Turkey.

Middle East

Bahrain, Cyprus, Democratic Yemen, Egypt, Iran (Islamic Republic of), Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, United Arab Emirates and Yemen.

Africa

The continent of Africa and offshore islands, but excluding Algeria, Azores, Canary Islands, Egypt, Madeira, Malta, Morocco, Sudan and Tunisia.

Asia/Pacific

IATA Tariff Conference 3 (includes Asia to the east of the Islamic Republic of Iran and of the Ural Mountains, Australia, New Zealand, Papua New Guinea and the islands of the Pacific Ocean excluding the Hawaiian Islands, Midway and Palmyra).

## II. Respondents to questionnaires

Contracting States that provided replies to the air carrier revenue and cost questionnaires issued under cover of State Letter EC 2/20.3.2-88/33 dated 4 May 1988:

Argentina, Australia, Austria, Bangladesh, Barbados<sup>1</sup>, Belgium, Brazil, Brunei Darussalam<sup>1</sup>, Canada, Chile, Colombia, Costa Rica, Cuba, Cyprus, Czechoslovakia<sup>1</sup>, Denmark<sup>1</sup>, Dominican Republic, Ecuador, Egypt, Ethiopia, Fiji, Finland, France, Federal Republic of Germany, Ghana, Greece, Gulf States<sup>2</sup>, Hungary, Iceland, India, Indonesia, Islamic Republic of Iran, Ireland, Israel<sup>1</sup>, Italy, Jamaica, Japan, Jordan, Kenya, Kuwait, Lebanon, Madagascar, Malawi, Malaysia, Malta, Mauritania<sup>3</sup>, Mauritius, Mexico, Netherland Antilles, Kingdom of the Netherlands, New Zealand, Nigeria<sup>1</sup>, Pakistan, Panama<sup>1</sup>, Peru, Philippines, Portugal, Republic of Korea, Singapore, Spain, Sri Lanka, Swazi-land, Sweden, Switzerland, Syrian Arab Republic<sup>1</sup>, Thailand, Tunisia, United Kingdom, United Republic of Tanzania, United States, Uruguay, Venezuela, Viet Nam, Yaoundé Treaty States<sup>4</sup>, Zimbabwe.

1. Revenue data only; no cost data were provided for the airline(s) concerned.
2. Reply for Gulf Air which is the international scheduled airline of Bahrain, Qatar, Oman and the United Arab Emirates.
3. Reply for Air Mauritanie.
4. Reply for Air Afrique which is the international scheduled airline of Benin, Burkina Faso, Central African Republic, Chad, Congo, Côte d'Ivoire, Mauritania, Niger, Senegal and Togo.

- END -



## **ICAO PUBLICATIONS IN THE AIR TRANSPORT FIELD**

The following summary gives the status and also describes in general terms the contents of the various series of publications in the air transport field issued by the International Civil Aviation Organization:

**International Standards and Recommended Practices on Facilitation** (*designated as Annex 9 to the Convention*) which are adopted by the Council in accordance with Articles 37, 54 and 90 of the Convention on International Civil Aviation. The uniform observance of the specifications contained in the International Standards on Facilitation is recognized as practicable and as necessary to facilitate and improve some aspect of international air navigation, while the observance of any specification contained in the Recommended Practices is recognized as generally practicable and as highly desirable to facilitate and improve some aspect of international air navigation. Any differences between the national regulations and practices of a State and those established by an International Standard must be notified to the Council in accordance with Article 38 of the Convention. The Council has also invited Contracting States to notify differences from the provisions of the Recommended Practices;

**Council Statements** on policy relating to air transport questions, such as the economics of airports and en-route air navigation facilities, taxation and aims in the field of facilitation;

**Digests of Statistics** which are issued on a regular basis, presenting the statistical information received from Contracting States on their civil aviation activities;

**Circulars** providing specialized information of interest to Contracting States. They include regional studies on the development of international air passenger, freight and mail traffic and specialized studies of a world-wide nature;

**Manuals** providing information or guidance to Contracting States on such questions as airport and air navigation facility tariffs, air traffic forecasting techniques and air transport statistics.

Also of interest to Contracting States are reports of meetings in the air transport field, such as sessions of the Facilitation Division and the Statistics Division and conferences on the economics of airports and air navigation facilities. Supplements to these reports are issued, indicating the action taken by the Council on the meeting recommendations, many of which are addressed to Contracting States.

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**PRICE: U.S.\$5.00**  
(or equivalent in other currencies)

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10/89, E/P1/1600

Order No. CIR220  
Printed in ICAO