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NORTH ATLANTIC TRAFFIC FORECASTS (March 1966)

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FOREWORD

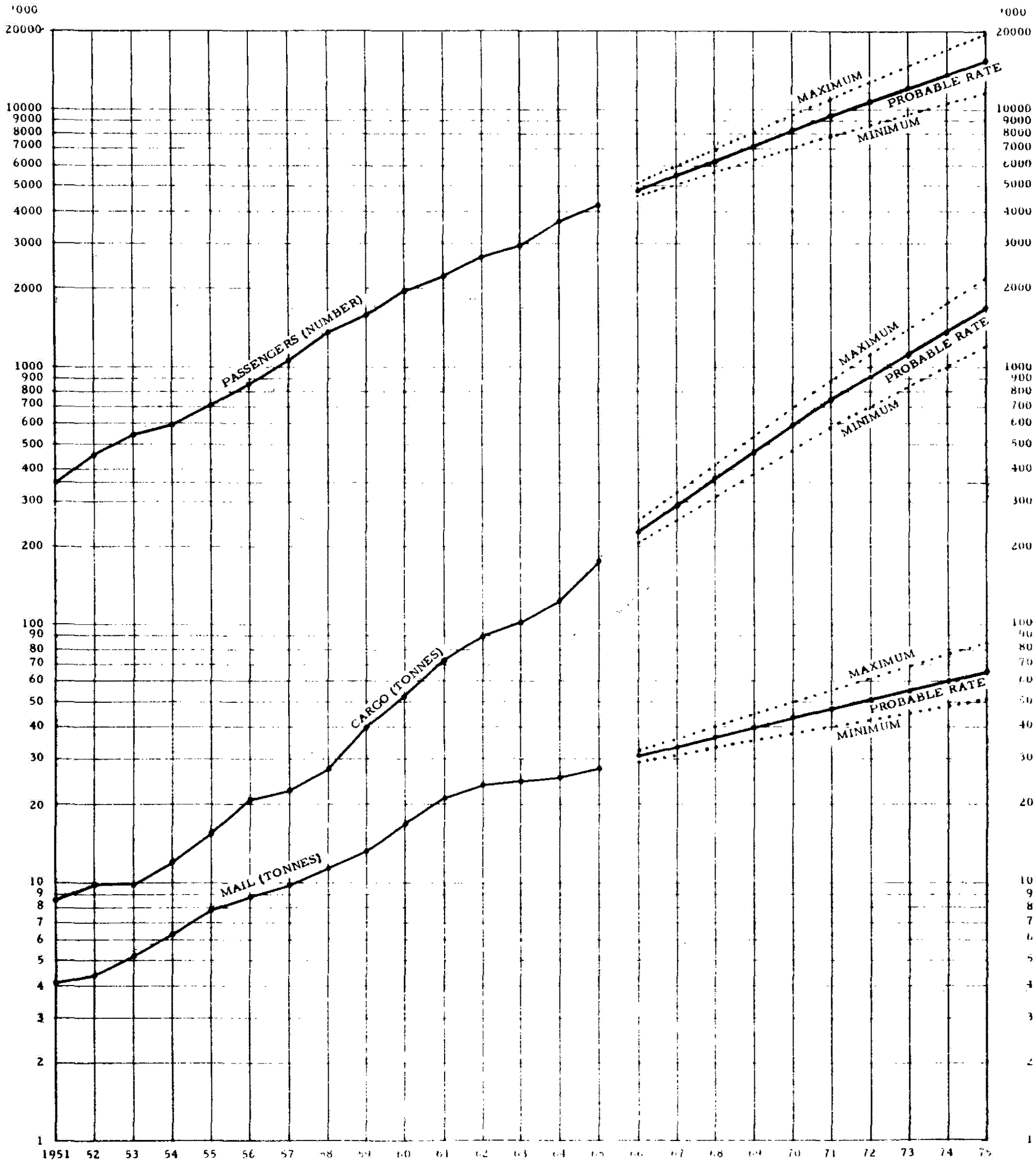
The Fifteenth Session of the Assembly requested the Council to prepare long- and medium-term forecasts of future trends and developments in civil aviation, including, where possible, regional as well as global data, and make these available to Contracting States (Resolution A15-6). The object of such forecasts would be to aid the Council in carrying out its functions in the economic field and to provide Contracting States with information on which to base future policy decisions. It was decided that these forecasts should be prepared in the first instance on a regional basis and that the work should be co-ordinated with other economic studies in order to minimize its cost. In due course inter-regional and global forecasts will be developed.

The present study provides forecasts of traffic on the North Atlantic air route up to 1975. It was carried out in conjunction with a statistical study of air traffic on the route required each year for the Systems Planning of air navigation facilities, in consultation with the Federal Aviation Agency of the United States and the International Air Transport Association, whose published statistics form the main basis of the forecasts.

DIAGRAM 1

FORECASTS OF TRAFFIC ON THE NORTH ATLANTIC ROUTE

Total passengers, cargo and mail carried on all civil aircraft



For statistics of this graph see Tables 2, 4 and 6

See text pages 3 to 19.

NORTH ATLANTIC TRAFFIC FORECASTS

(March 1966)

I. PASSENGER TRAFFIC

General trend in North Atlantic air passenger traffic

1. In the years 1964 and 1965 there was a distinct upward turn in the trend graph of passenger traffic on the North Atlantic route (see Diagram 1, opposite). This was a reflection of a similar upward turn in world airline passenger traffic referred to in the ICAO Review of the Economic Situation of Air Transport (Circular No. 73, June 1965) which resulted in an upward adjustment of the long-period passenger traffic forecasts that had been made previously for the world as a whole. It is now necessary to make similar adjustments to previous forecasts for the North Atlantic route. These latter, made in 1960 in connection with estimating the possible market for a supersonic airliner (Doc 8087-C/925), proved to be reasonably accurate up to 1965 (see Diagram 2), but it is now clear that they assumed a too-rapid flattening off in the rates of increase during the decade 1965-1975.

2. When we add the 1964 and 1965 figures to the long-period trend graph for passenger traffic on the North Atlantic, we can see that, although there is a tendency for the rate of increase to fall in the long period, this tendency is very gradual. During the decade 1951 - 1960 the rate of increase did not fall at all, maintaining a fairly steady 19 per cent per year throughout the period. In 1963 it fell to as low as 10 per cent, perhaps owing to all the discussion of fare increases, but the good results of 1964 and 1965 brought the annual average for 1961 - 1965 up to 17 per cent, only two percentage points below that for the previous five years. For the years 1965 - 1975 the most probable conservative estimate at the present time is that North Atlantic passenger traffic will average about 15 per cent increase per year from 1965 - 1970 and perhaps 13 per cent per year from 1970 - 1975.

3. The general economic assumptions behind the forecasts in this paper are listed in Appendix I. In the passenger field, four questions require special attention--(1) the future trend in passenger fares and its effect on the volume of demand, (2) the possibility of the introduction of new large passenger aircraft with effects on operating costs, fares, and passenger demand, (3) the probability that supersonic aircraft will be introduced on the route in 1972 and again in 1974, and (4) seasonal variations.

Future of passenger fares

4. The ICAO forecasts for world air traffic made in June 1965 (Circular No. 73) assumed a rather slow reduction in world air fares of about 1 per cent per year until 1975. Reductions on the North Atlantic are likely to be faster, partly because it is considered to be a generally profitable route, and partly because the elasticity of demand is recognized to be good, at least in the summer. The 1964 extensions of cheap fares on the North Atlantic to the summer months are estimated to have represented approximately a 10 per cent reduction in average fares and the associated annual increase in volume was about 27 per cent (40 per cent in the second quarter), with a further good increase, probably of about 19 per cent, in 1965. Traffic on the North Atlantic route has a natural rate of increase of about 9 per cent per year, irrespective of fare reductions, due to increases in personal incomes and business and government activity in both North America and Europe and to other continuing factors such as improvements in the speed and convenience of the air services, airline and tourist publicity, and the gradual education of the public to the use of air transport. Allowing for this natural rate of increase, the 1964 results suggest that the elasticity of passenger demand in response to carefully chosen fare reductions may be as high as 3 to 1 for the tourist traffic in summer and probably averages about 2 to 1 for the year as a whole.*

5. Unit operating costs per seat-kilometre on the North Atlantic vary from carrier to carrier and full details are not available. The statistics for the Atlantic Division of Pan-American Airways shown in Diagram 3, however, show a clear picture of fare reductions following cost reductions over the past five years and suggest that the process is likely to continue although probably at a slower pace. The main reduction in unit operating costs resulting from the introduction of the large jets between 1959 and 1964 may be considered to have largely worked itself out, but further reductions can be expected as these aircraft are depreciated and are "run in" from the point of view of maintenance and operation. There is also a continuous trend towards increasing the number of seats per aircraft by extending the proportion of tourist configuration and each time this is done there is a concomitant reduction in operating costs per seat-kilometre. In the year 1967 it is expected that this latter process will be accelerated by the introduction of stretched versions of the existing types. It is believed that the total effect of these factors will be great enough to overcome the general tendency for costs to rise due to inflationary tendencies in North America and Europe.

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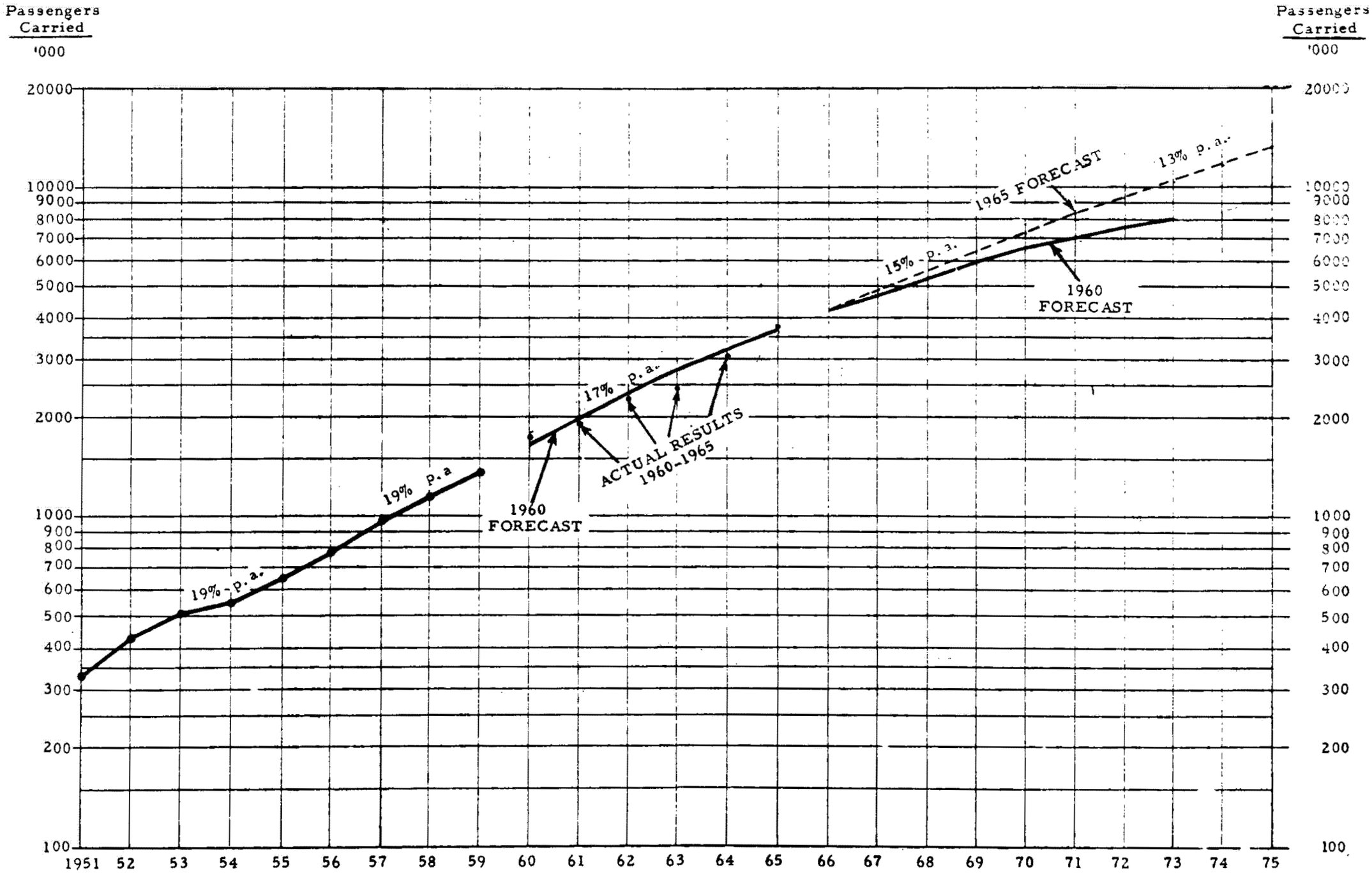
* "Elasticity of demand in response to fare reductions" is taken here to mean the ratio of the percentage increase in the volume of passenger traffic to the percentage reduction in average fare. The concept is basically simple but its calculation is complex and there is insufficient data to estimate its level with any degree of accuracy. Some notes on the methods used here will be found in Appendix II.

DIAGRAM 2

CHANGES IN NORTH ATLANTIC FORECASTS

Passengers on IATA Scheduled Services



For statistics of this graph see table 3

See text pages 4 to 12.

6. The average passenger load factor on the North Atlantic showed an improvement in 1965 but remains below 60 per cent for the year as a whole and below 50 per cent for many off-peak periods. The arguments for further fare reductions, at least during these off-peak periods, are therefore fairly strong if new markets can be found with satisfactory elasticity of demand (e.g., mid-week tourist fares in the summer, etc.). It seems probable also that the carriers will continue to try to improve winter utilization of aircraft and crews by offering reduced fares in the winter as well as in the summer.

7. Taking all these things into consideration, it is considered probable that average fares on the North Atlantic route will fall at the rate of about 3 per cent per year until 1970 and then at about 2 per cent per year until 1975.* If the natural rate of increase in passenger volume (irrespective of fare reductions) is taken at 9 per cent per year over the decade and the elasticity of demand at 2 to 1, this would give volume increases at the rate of 15 per cent per year from 1965 to 1970 and 13 per cent per year from 1970 to 1975.

Possible introduction of new large aircraft

8. One of the factors that would be likely to affect passenger fares on the North Atlantic is the introduction of much larger passenger aircraft developed from the military transports. Various sizes have been discussed, with seating capacities up to about 1000 seats, and since their unit operating costs per seat-mile would be lower than those of the present aircraft on the North Atlantic route, their introduction would strengthen the arguments in favour of reducing fares.

9. The probability of such aircraft being introduced in substantial numbers before 1975 is, however, believed to be fairly small. Only a few airlines would have enough passengers** to fill them without a great reduction in frequencies unless they could offer substantial fare differentials and these could not be counted on. Moreover, the carriers will be anticipating large capital expenditure for supersonic aircraft and will be unlikely to favour other large re-equipment expenditure. Extra-large cargo

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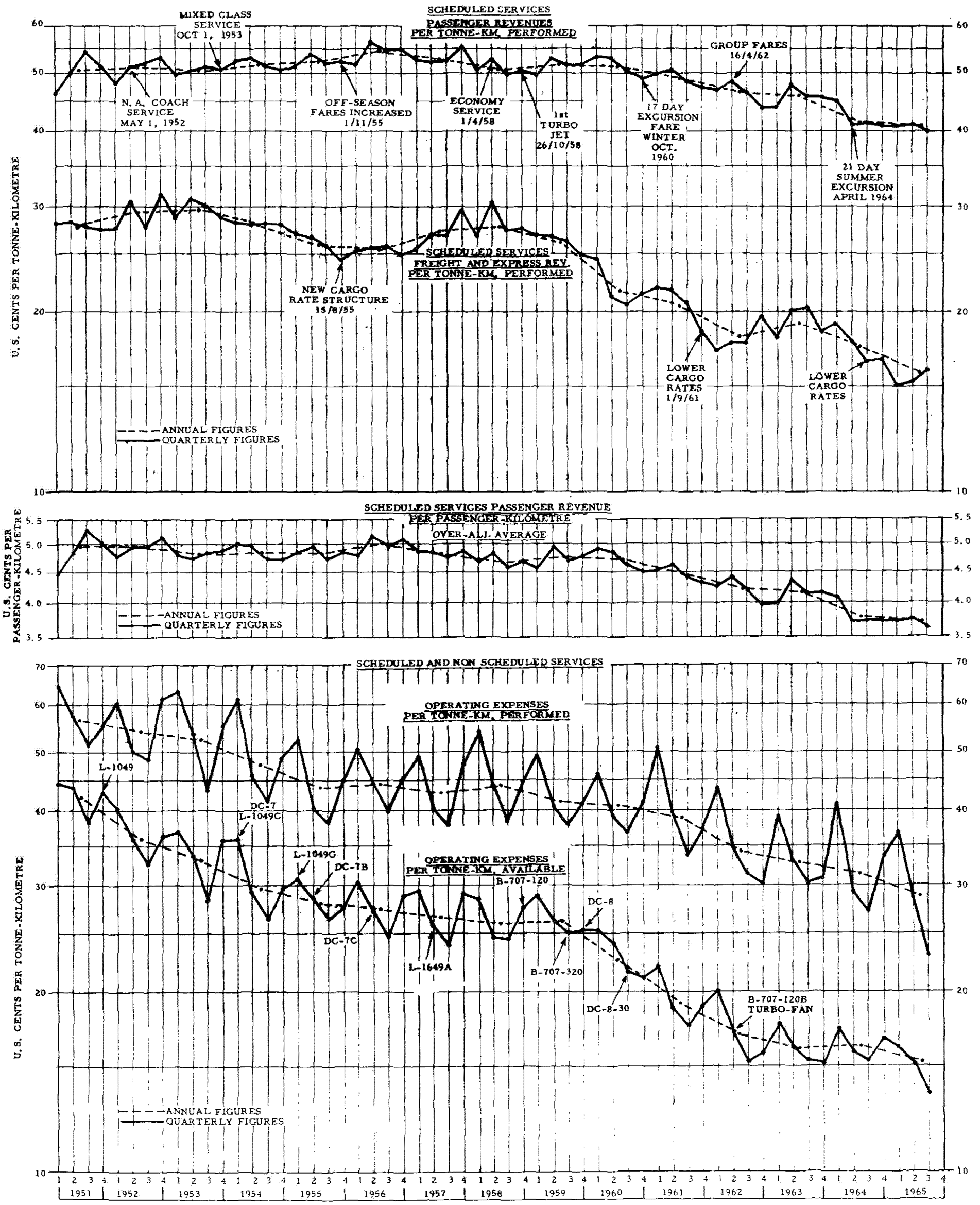
* Figures of average fares on the route are not available but it is estimated that average passenger revenue in 1965 was 3.7 cents per km. (5.9 cents per mile).

** If traffic in 1972 is 2-1/2 times its present level as seems probable, any airline now using 180-seat aircraft should then be able to use 450-seat aircraft with similar load factors and frequencies and recent information indicates that at least one airline will be operating aircraft of this size on the North Atlantic at that time, although perhaps initially with not that many seats and more cargo space. From 1972 on, the supersonic airliners should be absorbing part of the passenger traffic.

DIAGRAM 3

RATES OF REVENUE AND COST OF PAN-AMERICAN AIRWAYS SERVICES
ON THE NORTH ATLANTIC ROUTE
QUARTERLY 1951 - 1965



For statistics of this graph see table 7

See text pages 4 to 11.

Source: PAA Atlantic Division.

aircraft of a similar kind, with accommodation for passengers as well, might have more appeal, particularly if the passenger capacity could be much increased in the summer to help to accommodate the seasonal peak demand, but these would have less effect on passenger fares. The forecasts of future trends of passenger fares made in the previous section, therefore, assume that no passenger aircraft with capacity greater than about 250 seats (i.e., stretched versions of present types) will be introduced on the North Atlantic before 1975, and that if larger aircraft are introduced they will be either cargo versions or mixed passenger/cargo versions with about 300 passenger seats.

Introduction of supersonic aircraft in 1972 and 1974

10. It now seems probable that the Concorde will be introduced on the North Atlantic route in about 1972 and an American supersonic airliner, in 1974.* For the purpose of the rate forecasts made above, it is assumed that they will be operated with a differential fare about 10 per cent above that of the subsonic jets, but would have sufficient popular appeal to achieve good load factors. Their advent would thus represent a fare increase for one section of North Atlantic traffic, although there might well be simultaneous or immediately previous reductions in fares on the remaining subsonic jets great enough to produce some overall fare decrease at least until 1975, by which time the differential on the supersonic aircraft might be eliminated or reduced. This is the basis for the assumption that fares will continue to fall at 2 per cent per annum between 1970 and 1975.

11. It is too early to make reliable predictions concerning the rate at which supersonic airliners might be introduced on the North Atlantic route, but on the basis of estimated production capacities and experience with the subsonic jets, it has been suggested that the following assumptions might be used as a basis for any estimates that have to be made:-

Concorde

1. that delivery of certificated aircraft will begin in 1972;

2. that total deliveries during the forecast period will be 84 aircraft, of which 42 will go to North Atlantic carriers; of those 42 aircraft, 6 will be operating in 1972, and 12 additionally each forecast year thereafter;

3. that the Concorde will average 125 seats and operate at an average load factor of 70 per cent--or 87.5 passengers per flight on average;

4. that average utilization per aircraft through 1975 will be 1.5 round trips across the Atlantic per day.

---

* Other supersonic airliners might also be introduced within the period, but in any event they would be unlikely to affect the fare situation.

United States' Aircraft

1. that delivery of certificated aircraft will begin in 1974;

2. that total deliveries during the forecast period will be 29 aircraft, of which 22 will go to North Atlantic carriers; of those 22 aircraft, 5 will be in operation during 1974 and 17 during 1975;

3. that the U. S. SST will average 225 seats and operate at an average load factor of 70 per cent--or 157. 5 passengers per flight on average;

4. that average utilization per aircraft in 1974 and 1975 will be 1. 5 round trips across the Atlantic per day.

12. On this basis there would be a fairly rapid build-up of supersonic capacity on the route, from about 3 per cent of the total in 1972 to about 40 per cent in 1975. Overall load factors would probably be depressed somewhat by the extra capacity even though the supersonic airliners themselves may well achieve good ones.

Charter flights and non-IATA airline operations

13. The above discussion relates to scheduled passenger services on the North Atlantic and primarily to those operated by IATA member airlines. It is assumed that non-IATA scheduled passenger traffic will continue to form about 3 per cent of IATA operations.

14. Charter traffic is more difficult to forecast. For many years it was increasing steadily in both volume and proportion to scheduled traffic until, in 1963, charter-flight passengers represented 17 per cent of scheduled service passengers. Since then, however, the percentage has fallen, no doubt due to the introduction of more competitive summer fares on the scheduled services, and was about 13 per cent in 1965. It is expected that the proportion of charter to scheduled-service passengers will continue to fall in the future, levelling off at about 10 per cent.

Seasonal variations on the North Atlantic route

15. Passenger traffic on the North Atlantic route has always shown wide seasonal variations between summer and winter. The present situation, as shown in Table 1, is that the peak passenger traffic on scheduled services occurs in August in the westwards direction and is just over three times the average of the traffic (in either direction) in the following winter. In 1964 the average westward flow in August was 8, 800 passengers per day as compared with 2, 600 per day the following winter or 30 per cent of the August figure. Ten years ago, in 1955, the winter flow was 38 per cent of the August westward peak.

Table 1

SEASONAL VARIATIONS ON THE NORTH ATLANTIC ROUTE

(IATA Members)

	Average daily traffic flow for peak month- August, westwards	Daily traffic flow for worst quarter of following winter Average of both directions	
			Per cent of August
Number of scheduled-flight passengers per day:			
1955	1,740	660	38%
1963	7,000	2,150	31%
1964	8,800	2,600	30%
1965	10,600		
Number of scheduled flights per day: (and load factor)		Load Factor	Load Factor
1955	33	(90%)	21 (55%)
1963	68	(76%)	42 (38%)
1964	70	(89%)	48 (40%)
1965	85	(88%)	
Number of charter-flight passengers per day:			
1955	85	54	
1963	1,260	224	
1964	1,380	197	
1965	1,280		

16. To deal with this wide variation in passenger demand, the airlines allocate aircraft to the route in numbers that will approximately meet the general level of summer demand (from July to September) with load factors of 60 to 70 per cent, accepting a load factor of about 90 per cent in August in the westward direction, although this almost certainly means that passengers are turned away during this period. Then aircraft utilization is reduced the following winter so that frequencies fall to about 60 per cent of the previous summer's level. At these frequencies their monthly load factors are of the order of 30 to 40 per cent.

17. It may be noted that the 1963 winter passenger flow figure, which was only 31 per cent of the summer peak, was recorded after three years in which special low winter fares had been offered by the airlines (on a 17- or 21-day return basis not available in the summer). Up to 1962 it was possible to interpret the winter results as showing a tolerably good response to these low-fare offers. By 1963, however, it seemed clear that the low winter fares were not achieving the better balance between winter and summer that had been hoped for. It is true that charters were probably carrying a proportion of the tourists looking for cheap transportation in the winter, but they were carrying an even greater proportion of the summer tourist trade.

18. The extension of the cheap excursion fares to the summer season in 1964 achieved an excellent response. The passenger increases in the 2nd and 3rd quarters were 40 and 32 per cent respectively, but of course this had the effect of accentuating the seasonal variation. It seems probable that summer traffic will continue to increase faster than winter traffic as lower fares continue to attract the summer tourist trade. It is estimated that the relationship between the August peak passenger flow and the low winter average is likely to be about 4:1 in 1970 and 5:1 in 1975.

19. The seasonal variation in the number of charter-flight passengers per day is considerably greater than for passengers on scheduled flights, as might be expected since the charter flights attract particularly the summer tourist trade. The number of charter-flight passengers now reaches about 1,300 per day at the August westward peak. The winter level is only about 200 per day, less than a sixth of the August figure. Table 1 shows the great expansion in North Atlantic passenger charter flights that has taken place since 1955. It will be noted that with approximately similar charter fares in summer and winter, the summer volume multiplied itself by 15 in the decade while winter traffic only multiplied by about 4, emphasizing once again the much greater summer response to cheap fares. It is believed that the seasonal variation in charter traffic between the peak daily flow in August and the average daily flow in the following winter will remain at about 6:1.

Total passenger traffic forecasts

20. Based on the trend expectations described above, the figures for total daily passenger flow on the North Atlantic, summer and winter, in 1970 and 1975 would be of the following order (including non-IATA airlines and the polar services):

North Atlantic Passenger Flow

Including IATA and non-IATA, Scheduled and Charter

	Annual total of passengers carried on route (counting each direction separately)	Peak Month Daily average for August, westwards	Low Period Daily average for following winter in each direction
1965	4,199,000	12,200	3,200
Forecasts			
1970	8,250,000	25,000	6,000
1975	15,250,000	48,000	9,500

Variation from the forecasts

21. These forecasts represent what are considered most probable estimates based on past trends and the stated assumptions. The actual results in any particular year will vary upwards or downwards from the forecasts according to special circumstances or to changes in the long-period trends. In a year when new cheap fares are introduced, the increase in passenger volume is likely to be greater. In a year when no new cheap fares are introduced, the increase is likely to be less. Many special factors also affect individual years, including traffic generators such as international exhibitions or olympic games, or, alternatively, things that tend to reduce tourist travel such as strikes, international tension, etc. The long-period trend may be affected by changes in governmental attitudes towards international tourism and fare policies or in competition from sea transport and the tourist attractions of other regions. The effect of these unpredictable factors can be taken into account when utilizing forecasts for planning purposes by estimating maximum probable figures and minimum probable figures above and below the forecasts. This has been done in Diagram 1, using a variation of

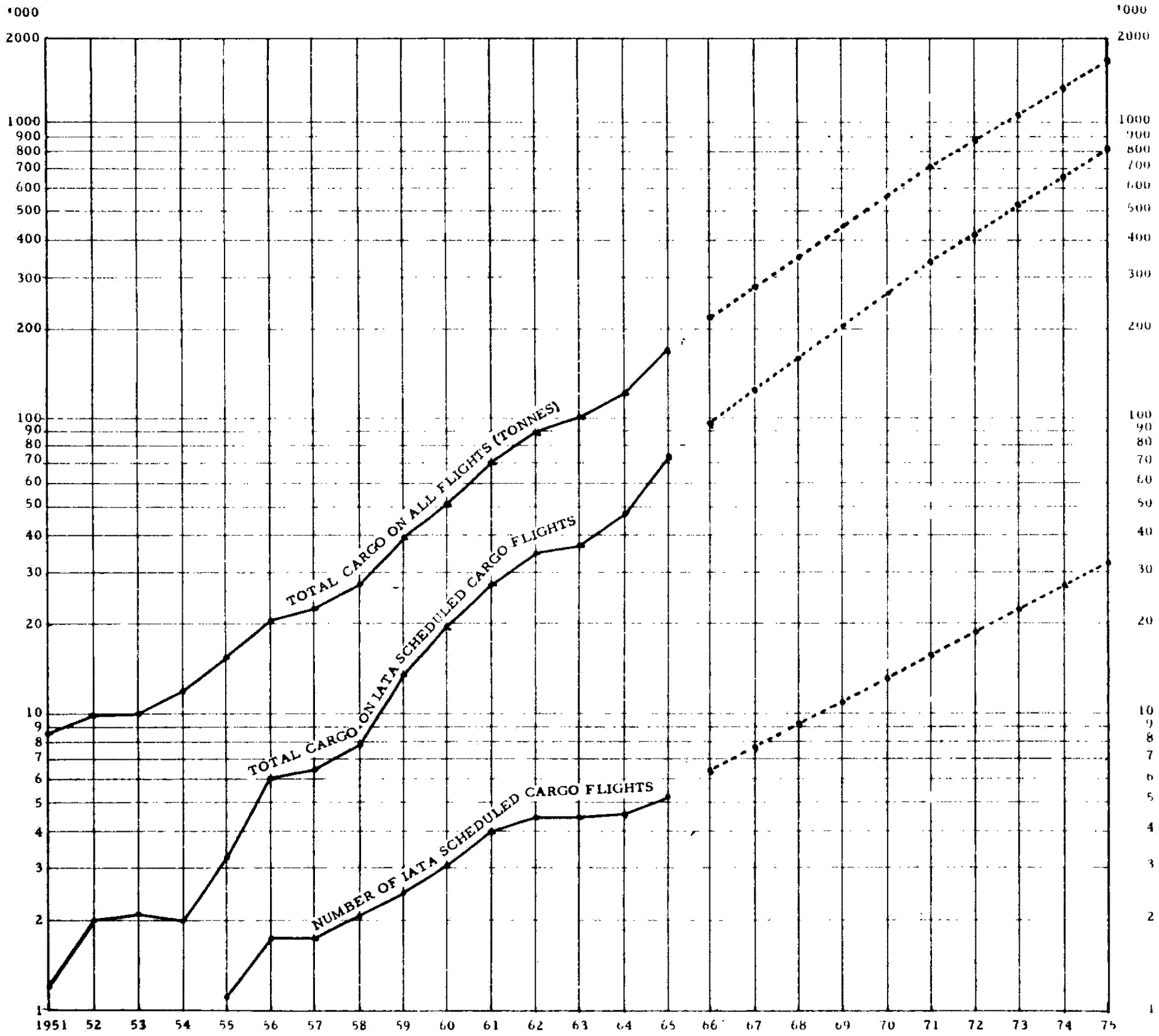
plus or minus 5 per cent for the year 1966, for which the level of fares and other relevant conditions are already known, and increasing it to plus or minus 25 per cent in 1975 when the variations in previous years could have a cumulative effect.

DIAGRAM 4

CARGO VOLUME ON THE NORTH ATLANTIC

IATA and NON-IATA AIRLINES

1951-1965, Forecasts to 1975



For statistics of this graph see Table 4

See text pages 15 to 17

II. CARGO TRAFFIC

Current trends

22. The increases in the volume of North Atlantic cargo traffic, as reported month by month in 1964 and the first half of 1965, were so good that it seemed as though the long-hoped-for "breakthrough" had finally taken place (see Diagram 5). Increases of 40 per cent or more over the same month of the previous year were common during this period, and for several months the volume increase on cargo flights was close to 70 per cent. If such rates of increase were maintained, by 1975 cargo on cargo flights would outstrip that on passenger flights by more than 2 to 1 and air cargo would become the most important revenue source for the route.

23. It is not probable that these rates of increase will be maintained, but it is clear that North Atlantic air cargo traffic has both a good natural rate of increase irrespective of reductions in rates and also a healthy responsiveness to rate reductions. Between 1951 and 1965 total cargo volume on passenger and cargo flights increased from 8,600 to 177,000 tonnes, that is to say, multiplied by a factor of 20 (see Diagram 4). This increase was partly stimulated by rate reductions and the general cargo rate structure was changed three times (1955, 1961, and 1964), but average revenue yield per tonne-kilometre remained approximately steady for substantial periods (1951-1954 and 1956-1960) and fell only about 40 per cent over the 15 years. The statistics suggest that even when no new rates are introduced, North Atlantic air cargo has a tendency to increase at about 15 per cent per year.

24. The new cargo rates introduced in the middle of 1964, and therefore not having full effect until 1965, appear from the PAA North Atlantic figures to have produced an average reduction in yield per tonne-kilometre of about 16 per cent (see Diagram 3) and by 1965 volume had increased 85 per cent. If 32 per cent of the increase was due to the natural rate of increase (two years at 15 per cent per year cumulatively), we may estimate that a 16 per cent fall in rates caused volume to expand about 40 per cent more than it would otherwise have done (185 is 40 per cent above 132). This would suggest that the elasticity of demand for North Atlantic air cargo traffic was of the order of 2.5 to 1, but the rate reductions were accompanied by a new rate structure, new large cargo aircraft and much sales effort on the part of the airlines.

Load factors

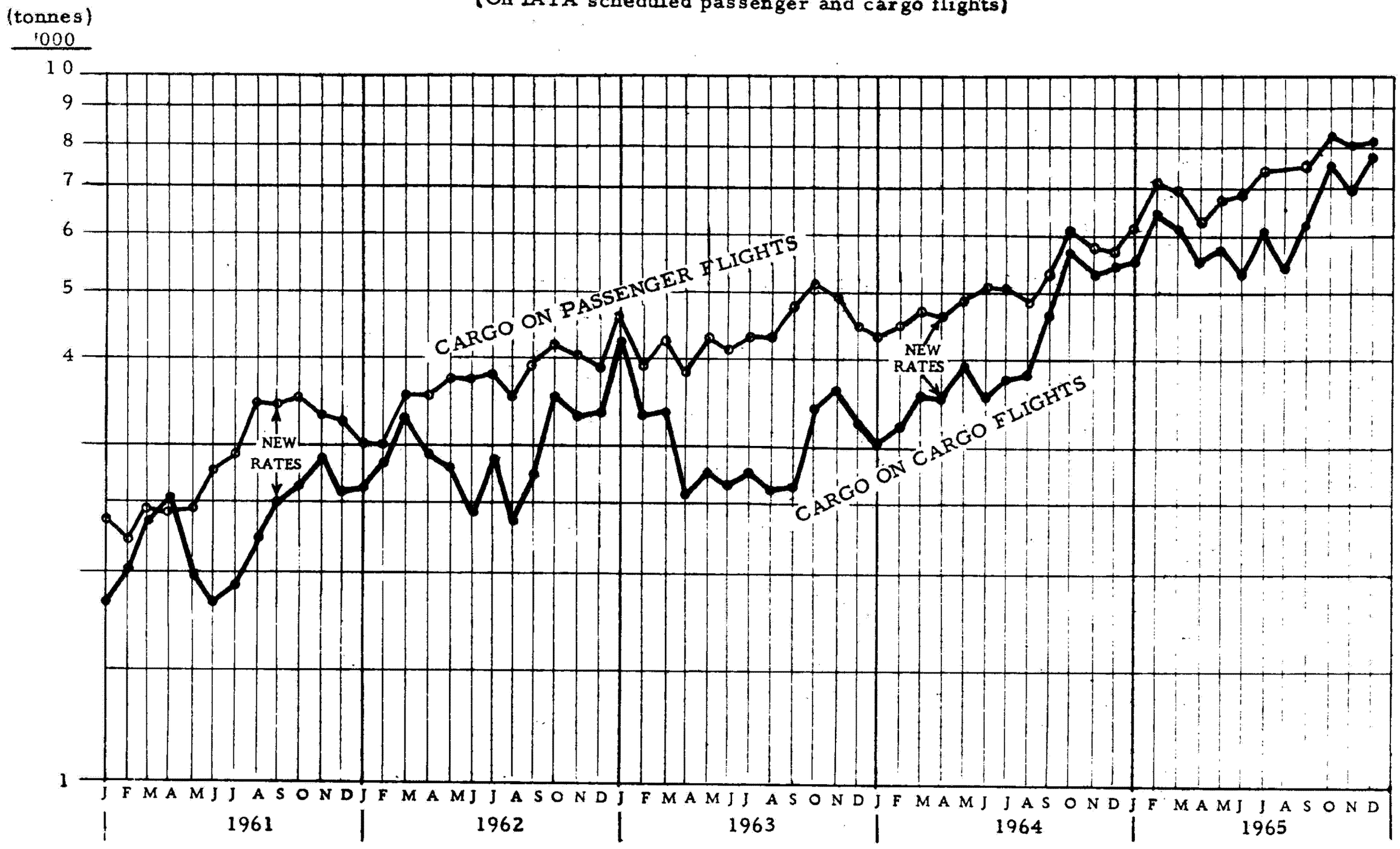
25. Up-to-date information concerning cargo load factors on the route is not available but they are probably somewhat low. In 1965, passenger flights averaged about 1.9 tonnes per flight and even cargo flights averaged only 14 tonnes per flight. For the passenger aircraft the cargo load factor is not so important and in any event the cargo load represents a small extra revenue. The older cargo aircraft (Super Constellations,

DIAGRAM 5

CARGO VOLUME ON NORTH ATLANTIC

MONTHLY 1961 - 1965

(On IATA scheduled passenger and cargo flights)



For statistics of this graph see table 5

See text pages 15 to 17.

DC-7's, etc.) with higher operating costs probably often operate at a loss. The jet freighters are able to operate at a cost figure of about 7.5 cents per tonne-kilometre available (averaged for all operators on the route), which, with average revenue yield of about 16 cents per tonne-kilometre performed, would give a break-even load factor of about 47 per cent.

26. The jet freighters should thus be making a profit already (with average load factors at about 50 per cent) and the continuing upward trend of demand should result in both higher load factors and a steady increase in the number of cargo flights operated. There is every reason to hope that this upward trend will be maintained by further rate reductions as the jet freighters with their large capacities and low operating costs finally replace the older piston-engine types.

Forecasts

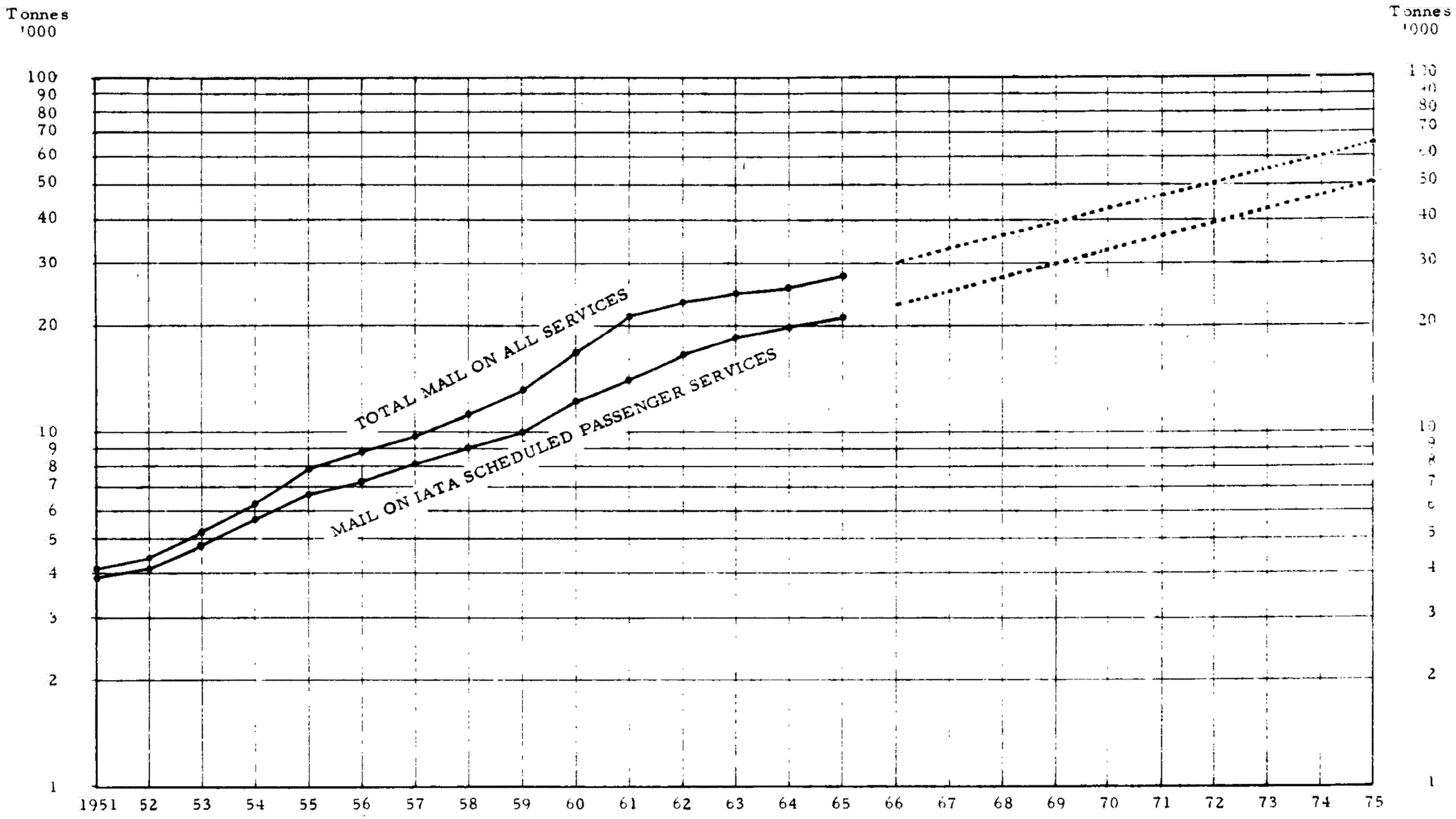
27. It is estimated that the volume of cargo on cargo flights will increase at an average rate of 30 per cent per year until 1970 and then at the rate of 25 per cent per year until 1975 with rates falling at about 5 per cent per year in the first period and about 3 per cent per year in the second period. The introduction of stretched versions of the present jet freighters between 1968 and 1970, and perhaps of much larger cargo or combined passenger/cargo aircraft between 1970 and 1975, should make these rate reductions possible. It is not thought that the supersonic aircraft will greatly affect cargo rates or volume, but if their cargo capacity is small as seems probable, their introduction would mean proportionately less cargo space on passenger aircraft and proportionately more cargo available for the cargo services.

28. The resulting forecasts for cargo volume on passenger and cargo flights are shown in Table 4 and Diagram 4. The maximum probable variation from the forecast line is taken to be from plus or minus 10 per cent in 1966 to plus or minus 30 per cent in 1975.

DIAGRAM 6

AIR MAIL VOLUME ON NORTH ATLANTIC

1951-1965, Forecasts to 1975
(IATA and other flights)



For statistics of this graph see Table 6

See text page 19.

III. AIR MAIL TRAFFIC

Present trends

29. Air mail plays a small part in the economics of North Atlantic air services--about 6 per cent in volume, 10 per cent in revenue, and both these percentages are tending to fall since mail volume is not increasing as fast as that of passengers and freight. Its volume tends to be much affected by the arrangements made by the U.S. Government for the carriage of mail to U.S. personnel in Europe, which often involves large contracts for the civilian airlines. Much of this goes on cargo flights where it can account for rapid increases in the total volume as, for example, between the years 1957 and 1961 when North Atlantic mail traffic on cargo flights more than tripled in four years.

Forecasts

30. Such periods of rapid increase tend to be followed by periods of relative stagnation and to make it difficult to forecast the results for any particular year. In the long period, however, the trend is expected to continue approximately as in the past with increases in volume of about 55 per cent each five years or about 9 per cent per year. The overall average revenue per mail tonne-kilometre performed received by the airlines on the route is expected to fall slightly (perhaps by about 2 per cent per year) if governmental policies continue unchanged, but these rate reductions are unlikely to affect the postage rates paid by the public and it is clearly an inelastic market. The main volume increases (apart from the changes in the U.S. military contracts) come simply from the expansion of general economic activity in Europe and North America. In the absence of information to the contrary, it is assumed that the volume of U.S. military mail travelling on the civil airlines will remain about constant.

31. The resultant forecasts are shown in Diagram 6 and Table 6. The maximum probable variation from the forecasts is taken to be from plus or minus 5 per cent in 1966 to plus or minus 25 per cent in 1975.

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APPENDIX I

GENERAL ASSUMPTIONS UNDERLYING THE FORECASTS

(1) that economic development in North America and Europe in matters affecting the demand for transportation on the North Atlantic route (e.g., population, industrial productivity, middle- and upper-class incomes) will continue to expand approximately on present trends; also, that there will be no major war or general economic depression;

(2) that there will be no major change in the competition offered by surface vessels on the North Atlantic route;

(3) that average unit operating costs on the route, taking all airlines together, will continue to fall* at about 2 per cent per year until 1973 when the curve is likely to flatten out owing to the introduction of supersonic aircraft at somewhat higher unit costs;

(4) that average fares on the route will continue to fall, probably by the introduction of special cheap rates at off-peak times, at about 3 per cent per year until 1970 and then at about 2 per cent per year;

(5) that average cargo and mail rates on the route will fall at about 2 per cent per year until 1975;

(6) that the North Atlantic air route has at the present time a "natural" rate of passenger traffic increase averaging about 9 per cent per year even if fares are not reduced; cargo traffic has a "natural" increase rate of about 15 per cent and mail, a "natural" increase rate of about 9 per cent;

(7) that the passenger elasticity of demand on the route is about 2:1, higher in the summer, lower in the winter (see Appendix II) and that cargo elasticity is somewhat higher, perhaps about 2.5:1;

(8) that stretched versions of the present generation of long-range jets with maximum seating capacity up to about 250 seats will be introduced on the route in the next five years and possibly much larger passenger/freight aircraft in the period 1970-1975.

(9) that a Mach 2+ airliner with about 125 seats and higher unit operating costs than contemporary subsonic jets will be introduced from 1972 onwards; that a Mach 3 airliner with about 225 seats and somewhat lower operating costs than the Mach 2 aircraft will be introduced from 1974 onwards.

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* This implies an assumption that there will not be any sudden and large increase in the costs over which the carriers have no control, such as charges for airports and route facilities, insurance costs, fuel taxes, etc.

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APPENDIX II

NOTES ON THE CONCEPTS OF ELASTICITY OF DEMAND AS USED IN THIS STUDY

1. The concept of elasticity of demand as a tool for economic analysis has many defects. It is defined differently by different people. It is normally used to relate market response to price reductions, but some people use it to measure response to other changes such as improvements in the quality of the product or to greater advertising or sales effort, and it is never possible to know how much these latter factors affect the response to price reductions. Price reductions are seldom simple and there is little agreement as to how they should be measured or as to how to take into account things like general price inflation, rises in consumers' incomes, or changes in competitive prices. The statistics of the volume of demand in relation to price changes in the past often suggest widely different elasticities of demand for different years.

2. The concept is, nevertheless, basically simple and definite. It endeavours to answer the question: by how much will sales increase in any particular market if price is reduced by a certain amount? Anyone who is trying to forecast the future trend of a market where prices may be changed must try to answer questions of this kind. The following notes indicate the way in which the concept has been defined and estimated for the purposes of this report:

(i) Elasticity of demand is here taken to relate increases in traffic volume on the North Atlantic route to decreases in fares and rates. The traffic increase is measured as a percentage of volume (e. g. , in the number of passengers or tonnes of freight carried). The reduction in fares or rates is measured as a percentage change in the average. The relationship between the two percentages is expressed as a ratio. Thus if a 10 per cent reduction in fares produces a 20 per cent increase in volume, the elasticity of demand is said to be approximately 2:1. (For large changes, ratios must be used instead of percentages so that an elasticity of 1:1 describes a market situation where a price reduction will produce just sufficient increase in sales to yield the same gross revenue as before.)

(ii) An attempt has been made to separate the effect of price reductions from all other market changes so that the percentage increase in volume used in the calculation is that produced by the fare reductions, above and beyond any increase due to other factors.

(iii) The main other factor is the natural resilience of the market which produces what is called a "natural" rate of increase each year. In the case of the North Atlantic air route, this "natural" market resilience is due to the steady annual increase in population and incomes and economic activity

on both sides of the Atlantic. The general tendency towards inflation of costs and incomes is thus incorporated in the "natural" rate of increase and is not separately considered. The sales effect of normal advertising effort is also considered to be included in the "natural" increase, but it is assumed that there will be special extra sales and advertising effort associated with any reduction in fares or rates.

iv) The effect on the market of a reduction in fares or rates is assumed to last for several years, during each of which a percentage increase will be added to the "natural" rate of increase, which is assumed to remain approximately constant.

v) Changes in the quality of the product (whether for better or for worse) have not been offset against changes in fares or rates. Thus the surcharge for jets was taken to represent a fare increase although the passenger may have got better value for money. Similarly, tourist fares are regarded as lower than first-class fares in spite of the fact that the tourist passenger gets proportionately less space to sit in.

vi) Average fares and freight rates are considered to be measured by the average revenue yield to the carriers per passenger-kilometre or per tonne-kilometre performed. In the absence of data concerning the route as a whole, the average revenue yield for the Pan-American Atlantic Division has been taken as indicative of the situation on the whole route.

Table 2

PASSENGER TRAFFIC FORECASTS ON THE NORTH ATLANTIC

Totals on routes north of 40°, including scheduled and non-scheduled, IATA and non-IATA and the Polar route

	Passengers on IATA scheduled operations	Passengers on IATA Charter Flights	Passengers on non IATA airlines	Total Passengers
	'000	'000	'000	'000
	(1)	(2)	(3)	(4)
1951	330	11.9	10	352
1952	430	15.7	13	459
1953	510	16.8	15	542
1954	550	30.9	16	597
1955	650	39.5	18	707
1956	780	49.5	23	852
1957	970	50.6	29	1 050
1958	1 190	99.0	36	1 325
1959	1 370	172.6	41	1 584
1960	1 760	159.0	53	1 972
1961	1 920	256	58	2 230
1962	2 270	315	68	2 640
1963	2 420	414	73	2 910
1964	3 070	482	92	3 640
1965	3 610	480	108	4 200
Forecasts				
1966	4 200	500	126	4 830
1967	4 800	530	144	5 470
1968	5 500	550	165	6 210
1969	6 300	630	189	7 120
1970	7 300	730	219	8 250
1971	8 250	820	247	9 320
1972	9 350	930	280	10 560
1973	10 500	1 050	315	11 860
1974	12 000	1 200	360	13 560
1975	13 500	1 350	405	15 250

Note: All figures rounded off in third or fourth place.

Sources: **IATA traffic from IATA published statistics.**
Non-IATA traffic from ICAO Joint Support and Traffic Control data.
Columns 1 and 2 from IATA statistics. Forecasts as in text.
Column 3 taken at 3% of column 1.

Table 3

CHANGES IN NORTH ATLANTIC TRAFFIC FORECASTS

Passengers on IATA Scheduled Services

	1960 forecasts '000	Reported number of IATA sched. service passengers per annum '000		Current forecasts '000	
1951		330			
1952		430			
1953		510	Trend:- 19% p. a.		
1954		550			
1955		650			
1956		780			
1957		970			
1958		1 190	Trend:- 19% p. a.		
1959		1 370			
1960	1 650	1 760			
1961	2 000	1 920			
1962	2 350	2 270			
1963	2 750	2 420	Trend:- 17% p. a.		
1964	3 200	3 070			
1965	3 600	3 610			
1966	4 200			4 200	
1967	4 700			4 800	
1968	5 300			5 500	Trend:- 15% p. a.
1969	5 900			6 300	
1970	6 450			7 300	
1971	7 000			8 250	
1972	7 600			9 350	
1973	8 000			10 500	Trend:- 13% p. a.
1974				12 000	
1975				13 500	

Sources: 1951-1965--IATA North Atlantic Traffic Statistics.
1960 forecasts for 1960-1975--ICAO Doc 8087-C/925, pp. 43 and 107.

Note: All data relates to scheduled services of IATA members on North Atlantic route, including "polar" services, excluding non-IATA airlines, services across mid-Atlantic (south of 40°) and partial crossings. The effect of excluding polar flights would be to reduce the figures by about 4%. The effect of adding non-IATA scheduled services would be to increase the figures by about 3%.

Table 4

NORTH ATLANTIC CARGO TRAFFIC

1951 - 1975

	Cargo on IATA Scheduled Services			Number of IATA scheduled cargo flights	Cargo on non-sched. and non-IATA flights	Total cargo volume
	On pass. services	On cargo services	Total on all services			
	'000 tonnes			'000	'000 tonnes	
	(1)	(2)	(3)	(4)	(5)	(6)
1951	6.3	1.2	7.5	0,35	0.90	8.6
1952	6.2	2.0	8.2	0.51	1.20	9.8
1953	6.7	2.1	8.8	0.68	0.96	9.9
1954	8.0	2.0	9.9	0.66	1.92	12.0
1955	9.7	3.3	13.0	1.10	2.40	15.6
1956	12.4	6.1	18.5	1.74	2.35	20.8
1957	13.7	6.5	20.2	1.74	2.70	22.9
1958	16.0	7.9	23.9	2.09	3.62	27.5
1959	19.1	13.7	32.8	2.52	6.87	39.7
1960	26.5	19.6	46.1	3.17	5.40	51.8
1961	35.2	27.7	62.9	4.04	8.08	71.0
1962	44.2	35.5	79.7	4.51	9.07	88.8
1963	52.9	37.2	90.2	4.50	11.33	101.5
1964	60.8	49.2	110.0	4.60	12.90	122.9
1965	86.1	74.9	161.0	5.30	16.10	177.1
(FORECASTS)						
1966	108	97	205	6.4	21	226
1967	135	126	261	7.7	26	287
1968	169	164	333	9.2	33	366
1969	211	213	424	11.0	42	466
1970	264	277	541	13.2	54	595
1971	317	346	663	15.9	63	726
1972	380	433	813	19.0	81	894
1973	456	541	997	22.8	100	1 097
1974	547	676	1 223	27.4	122	1 345
1975	656	845	1 501	32.9	150	1 651

Sources: Columns 1 - 4--from IATA statistics. Forecasts as in text.
Column 5--up to 1964, IATA charter cargo plus 10% of scheduled cargo. After 1964, 10% of scheduled cargo.
Column 6--column 3 plus column 5.

Table 5

NORTH ATLANTIC CARGO TRAFFIC ON IATA SCHEDULED FLIGHTS

MONTHLY 1961-1965

	On Passenger Flights	On Cargo Flights
	Tonnes	Tonnes
1961		
January	2 357	1 802
February	2 213	2 076
March	2 587	2 460
April	2 566	2 559
May	2 598	1 982
June	2 833	1 876
July	2 961	1 941
August	3 499	2 288
September	3 442	2 538
October	3 502	2 643
November	3 329	2 905
December	3 297	2 596
1962		
January	3 053	2 626
February	3 001	2 937
March	3 550	3 479
April	3 540	2 955
May	3 735	2 816
June	3 777	2 416
July	3 899	2 893
August	3 541	2 396
September	3 952	2 736
October	4 232	3 559
November	4 021	3 346
December	3 856	3 352
1963		
January	4 671	4 180
February	3 946	3 330
March	4 234	3 363
April	3 853	2 559
May	4 235	2 730
June	4 196	2 655
July	4 237	2 791
August	4 289	2 638
September	4 784	2 668
October	5 129	3 407
November	4 920	3 641
December	4 450	3 251

Table 5 (Cont'd)

	On Passenger Flights	On Cargo Flights
	Tonnes	Tonnes
1964		
January	4 317	3 088
February	4 458	3 239
March	4 697	3 540
April	4 646	3 532
May	4 862	3 927
June	5 092	3 533
July	5 099	3 779
August	4 833	3 805
September	5 370	4 328
October	6 129	5 752
November	5 737	5 233
December	5 603	5 430
1965		
January	6 133	5 499
February	7 131	6 454
March	7 046	6 124
April	6 358	5 548
May	6 779	5 799
June	6 888	5 304
July	7 359	6 019
August	6 468	5 459
September	7 529	6 276
October	8 266	7 611
November	8 035	6 964
December	8 086	7 838

Source: IATA North Atlantic Traffic Statistics.

Table 6

MAIL TRAFFIC ON NORTH ATLANTIC

IATA and other flights (including Polar flights)

	Mail on IATA Services			Total all Services
	Pass. Flights	Cargo & Charter Flights	Total	
	'000 tonnes			'000 tonnes
	(1)	(2)	(3)	(4)
1951	3.9		3.9	4.1
1952	4.1	0.1	4.2	4.4
1953	4.8	0.2	5.0	5.2
1954	5.7	0.3	6.0	6.3
1955	6.7	0.8	7.5	7.9
1956	7.2	1.2	8.4	8.8
1957	8.1	1.2	9.3	9.7
1958	9.1	1.7	10.8	11.3
1959	10.0	2.5	12.5	13.1
1960	12.3	3.8	16.1	16.9
1961	14.2	5.9	20.1	21.1
1962	16.8	5.9	22.7	23.8
1963	18.7	5.0	23.7	24.9
1964	19.9	4.5	24.4	25.6
1965	21.1	5.3	26.5	27.8
Forecasts				
1966	23.0	5.8	28.8	30.2
1967	25.1	6.3	31.4	33.0
1968	27.4	6.9	34.3	36.0
1969	29.9	7.5	37.4	39.3
1970	32.6	8.2	40.8	42.8
1971	35.5	8.9	44.4	46.6
1972	38.7	9.7	48.4	50.8
1973	42.2	10.6	52.8	55.4
1974	46.0	11.6	57.6	60.4
1975	50.1	12.6	62.7	65.8

Sources: Cols 1-3 from IATA figures. Forecasts taken at +9% each year.
Col. 4 taken at 5% over IATA total.

Table 7

RATES OF REVENUE AND COST OF PAN-AMERICAN AIRWAYS SERVICES

ON THE NORTH ATLANTIC ROUTE

(Yearly & Quarterly 1951 - 1965)

In United States Cents

Years and Quarters	UNIT PASSENGER REVENUE (a)		Unit (a) Freight and Express Revenue per tonne-km	UNIT OPERATING EXPENSES (b)	
	Per Passenger-Kilometre	Per Passenger Tonne-Km.		Per tonne-km. performed	Per tonne-km. available
1951 - 1st quarter	4.47	46.3	28.0	64.8	44.2
- 2nd	4.85	49.9	28.2	57.7	43.8
- 3rd	5.30	54.1	27.7	51.2	38.3
- 4th	5.06	51.4	27.4	55.6	42.9
Year	4.96	50.8	27.8	56.7	42.1
1952 - 1st quarter	4.77	48.2	27.6	60.7	40.3
- 2nd	4.93	51.2	30.5	50.3	36.0
- 3rd	4.93	51.9	27.7	48.6	32.7
- 4th	5.13	53.0	31.2	61.3	36.3
Year	4.95	51.3	29.3	54.4	35.9
1953 - 1st quarter	4.82	49.8	28.6	63.1	36.9
- 2nd	4.79	50.3	30.8	53.5	33.6
- 3rd	4.84	51.2	30.0	43.3	28.4
- 4th	4.88	50.9	28.8	55.3	35.9
Year	4.83	50.6	29.5	52.5	33.2
1954 - 1st quarter	5.06	52.4	28.2	61.7	35.9
- 2nd	4.95	52.9	27.9	45.7	29.3
- 3rd	4.74	51.4	28.0	41.2	26.4
- 4th	4.73	50.4	27.9	48.9	29.6
Year	4.85	51.8	28.0	47.8	29.7
1955 - 1st quarter	4.84	51.1	26.9	52.4	30.8
- 2nd	4.95	53.9	26.6	40.4	28.6
- 3rd	4.73	52.0	25.7	38.2	26.4
- 4th	4.85	52.2	24.4	44.9	27.5
Year	4.83	52.4	25.8	43.8	28.1
1956 - 1st quarter	4.80	51.6	25.2	50.9	30.4
- 2nd	5.18	56.4	25.5	44.3	27.3
- 3rd	4.98	54.7	25.7	39.8	24.7
- 4th	5.10	54.8	24.9	45.2	28.8
Year	5.03	54.7	25.3	44.4	27.5

(a) Scheduled Services.
(b) Scheduled and non-scheduled services.

Source PAA Atlantic Division

Table 7 (Cont'd)

Years and quarters	UNIT PASSENGER REVENUE (a)		Unit (a) Freight and Express Revenue per tonne-km	UNIT OPERATING EXPENSES (b)	
	Per Passenger-Kilometre	Per Passenger Tonne-km.		Per tonne-km. performed	Per tonne-km. available
1957 - 1st quarter	4.86	52.4	25.5	49.1	29.4
- 2nd	4.81	52.1	26.8	40.1	25.7
- 3rd	4.78	52.2	26.8	37.7	23.9
- 4th	4.88	55.2	29.5	47.9	29.1
Year	4.83	52.8	27.2	42.8	26.6
1958 - 1st quarter	4.70	50.5	26.7	54.2	28.4
- 2nd	4.83	52.3	30.3	43.6	24.6
- 3rd	4.59	49.9	27.2	38.5	24.5
- 4th	4.67	50.3	27.5	44.9	27.5
Year	4.69	50.7	27.8	44.1	26.0
1959 - 1st quarter	4.59	49.5	26.6	49.4	28.8
- 2nd	4.87	52.7	26.6	40.5	26.2
- 3rd	4.70	51.5	26.1	37.8	25.0
- 4th	4.78	51.6	24.9	41.0	25.4
Year	4.77	51.5	26.0	41.4	26.2
1960 - 1st quarter	4.92	53.0	24.4	46.2	25.2
- 2nd	4.88	52.9	21.1	39.1	24.0
- 3rd	4.64	50.4	20.5	36.8	21.5
- 4th	4.51	48.9	21.3	41.0	21.0
Year	4.72	51.2	21.6	40.8	22.6
1961 - 1st quarter	4.52	49.9	21.8	50.6	22.0
- 2nd	4.64	50.5	21.6	39.7	18.8
- 3rd	4.43	48.4	20.5	33.6	17.5
- 4th	4.32	47.1	18.3	37.3	19.0
Year	4.48	48.9	20.3	38.8	19.1
1962 - 1st quarter	4.26	46.7	17.2	43.5	20.2
- 2nd	4.41	48.2	17.7	34.6	17.7
- 3rd	4.21	46.1	17.7	31.3	15.3
- 4th	3.98	43.5	19.5	31.2	15.8
Year	4.21	46.1	18.1	34.2	16.9
1963 - 1st quarter	3.98	43.6	17.9	39.0	17.6
- 2nd	4.36	47.7	19.9	33.3	16.2
- 3rd	4.15	45.5	20.1	30.2	15.3
- 4th	4.15	45.4	18.4	30.6	15.1
Year	4.18	45.7	19.0	32.8	16.0
1964 - 1st quarter	4.08	44.6	18.9	40.7	17.3
- 2nd	3.72	40.8	17.7	29.1	15.8
- 3rd	3.73	41.0	16.5	27.1	15.3
- 4th	3.72	40.6	16.6	33.5	16.6
Year	3.78	41.4	17.3	31.5	16.2
1965 - 1st quarter	3.72	40.6	15.0	36.7	16.2
- 2nd	3.75	41.0	15.3	28.5	15.1
- 3rd	3.64	40.0	16.0	22.9	13.6
- 4th					
Year					

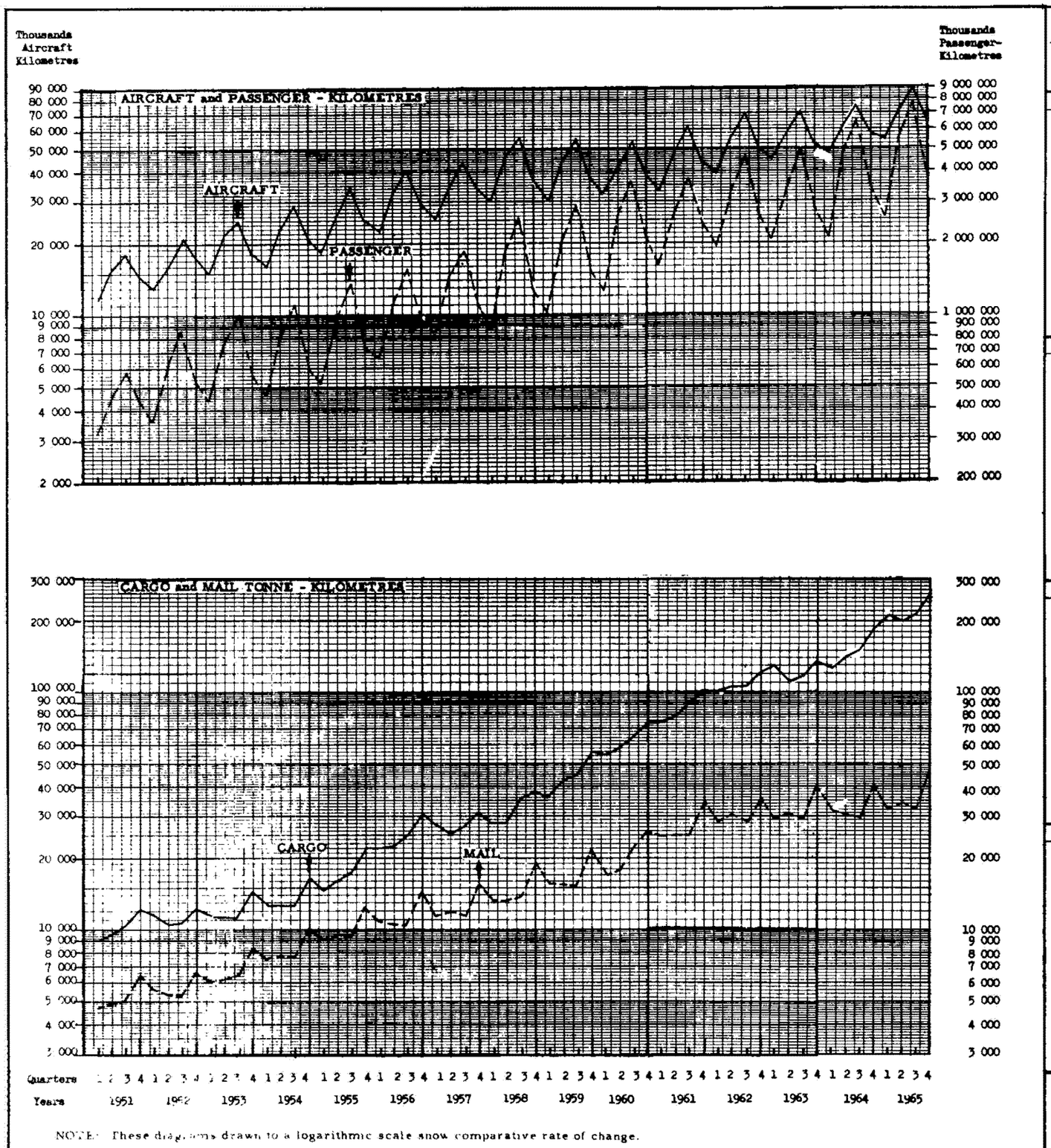
(a) Scheduled services. (b) Scheduled and non-scheduled services.

Table 8

QUARTERLY REVENUE TRAFFIC ON ALL SCHEDULED SERVICES

1951-1965

NORTH ATLANTIC



NOTE: These diagrams drawn to a logarithmic scale show comparative rate of change.

YEARS	DATA by quarters 1st	2nd	3rd	4th	YEARS	PERCENTAGE CHANGE over same quarter of previous year 1st	2nd	3rd	4th
	Thousands					%	%	%	%
	A I R C R A F T K I L O M E T R E S								
1951	11 693	15 604	18 838	14 569					
1952	13 079	16 033	21 983	17 688	1952-51	+11.9	+ 2.7	+16.7	+21.4
1953	15 169	22 308	25 075	18 128	1953-52	+16.0	+39.1	+14.1	+ 2.5
1954	16 379	23 309	29 002	21 158	1954-53	+ 8.0	+ 4.5	+15.7	+16.7
1955	18 524	26 680	34 672	25 218	1955-54	+13.1	+14.5	+19.6	+19.2
1956	22 759	32 483	40 903	29 541	1956-55	+22.9	+21.8	+18.0	+17.1
1957	25 575	35 370	44 952	34 309	1957-56	+12.4	+ 8.9	+ 9.9	+16.1
1958	30 690	47 883	56 392	36 245	1958-57	+20.0	+35.4	+25.4	+ 5.6
1959	30 443	45 369	55 363	37 499	1959-58	- 0.8	- 5.3	- 1.8	+ 3.5
1960	32 081	42 323	53 603	38 154	1960-59	+ 5.4	- 6.7	- 3.2	+ 1.7
1961	33 440	49 956	61 177	43 648	1961-60	+ 4.2	+18.0	+14.1	+14.4
1962	39 133	55 583	70 405	49 665	1962-61	+17.0	+11.3	+15.1	+13.8
1963	45 892	60 220	71 786	52 294	1963-62	+17.3	+ 8.3	+ 2.0	+ 5.3
1964	47 729	61 538	74 708	56 969	1964-63	+ 4.0	+ 2.2	+ 4.1	+ 8.9
1965	54 824	72 765	88 809	65 775	1965-64	+14.9	+18.3	+18.9	+15.5
	P A S S E N G E R - K I L O M E T R E S								
1951	321 525	469 788	588 384	433 411					
1952	360 036	623 331	864 644	529 485	1952-51	+12.0	+32.7	+47.0	+22.2
1953	443 256	762 954	1 011 544	568 552	1953-52	+23.1	+22.4	+17.0	+ 7.4
1954	464 613	821 315	1 133 583	605 489	1954-53	+ 4.8	+ 7.6	+12.1	+ 6.5
1955	518 798	974 496	1 361 894	732 226	1955-54	+11.7	+18.7	+20.1	+20.9
1956	664 576	1 127 797	1 571 917	954 635	1956-55	+28.1	+15.7	+15.4	+30.4
1957	856 082	1 481 040	1 899 970	1 107 711	1957-56	+25.8	+31.3	+20.9	+16.0
1958	875 330	1 858 863	2 567 912	1 260 567	1958-57	+ 4.7	+25.5	+35.2	+13.8
1959	1 049 917	2 076 541	2 876 671	1 516 950	1959-58	+19.9	+11.7	+12.0	+20.3
1960	1 254 148	2 655 151	3 685 682	2 111 285	1960-59	+19.5	+26.8	+28.1	+39.2
1961	1 615 212	2 751 524	3 798 795	2 391 356	1961-60	+28.8	+ 4.5	+ 3.1	+13.3
1962	1 938 090	3 271 406	4 677 178	2 610 223	1962-61	+20.0	+18.9	+23.1	+ 9.2
1963	2 089 654	3 381 565	4 962 054	2 889 216	1963-62	+ 7.8	+ 3.4	+ 6.1	+10.7
1964	2 122 742	4 751 021	6 549 736	3 456 981	1964-63	+ 1.6	+40.5	+32.0	+19.7
1965	2 552 523	5 575 664	7 840 608	3 893 214	1965-64	+20.2	+17.4	+19.7	+12.6
	C A R G O T O N N E - K I L O M E T R E S								
1951	9 026	9 692	10 563	12 152					
1952	11 475	10 413	10 859	12 387	1952-51	+27.1	+ 7.4	+ 2.8	+ 1.9
1953	11 484	11 431	11 310	14 602	1953-52	+ 0.1	+ 9.8	+ 4.2	+17.9
1954	12 517	12 758	12 671	16 647	1954-53	+ 9.0	+11.6	+12.0	+14.0
1955	14 870	16 246	17 845	22 297	1955-54	+18.8	+27.3	+40.8	+33.9
1956	22 473	22 840	25 091	31 369	1956-55	+51.1	+40.6	+40.6	+40.7
1957	27 103	25 264	27 287	31 225	1957-56	+20.6	+10.6	+ 8.8	- 0.5
1958	28 150	28 407	36 299	38 522	1958-57	+ 3.9	+12.4	+33.0	+23.4
1959	36 469	42 517	45 159	56 248	1959-58	+29.6	+49.7	+24.4	+46.0
1960	55 401	58 628	64 162	75 138	1960-59	+51.9	+37.9	+42.1	+33.6
1961	74 227	79 283	91 677	100 495	1961-60	+34.0	+35.2	+42.9	+33.7
1962	102 556	105 814	106 792	123 004	1962-61	+38.2	+33.5	+16.5	+22.4
1963	130 480	111 256	117 737	136 392	1963-62	+27.2	+ 5.1	+10.2	+10.9
1964	128 366	140 756	149 680	186 356	1964-63	- 1.6	+26.5	+27.1	+36.6
1965	211 137	201 721	215 128	257 260	1965-64	+64.5	+43.3	+43.7	+38.0
	M A I L T O N N E - K I L O M E T R E S								
1951	4 723	4 938	5 151	6 539					
1952	5 674	5 397	5 328	6 652	1952-51	+20.1	+ 9.3	+ 3.4	+ 1.7
1953	6 085	6 295	6 551	8 334	1953-52	+ 7.2	+16.6	+23.0	+25.3
1954	7 506	7 891	7 626	10 266	1954-53	+23.4	+25.4	+16.4	+23.2
1955	9 120	9 645	9 367	12 862	1955-54	+21.5	+22.2	+22.8	+25.3
1956	10 959	10 579	10 469	14 511	1956-55	+20.2	+ 9.7	+11.8	+12.8
1957	11 653	12 064	11 549	15 838	1957-56	+ 6.3	+14.0	+10.3	+ 9.1
1958	13 315	13 250	13 770	19 180	1958-57	+14.3	+ 9.8	+19.2	+21.1
1959	15 490	15 856	15 270	22 112	1959-58	+16.3	+19.7	+10.9	+15.3
1960	17 164	18 273	22 084	31 017	1960-59	+10.8	+15.2	+44.6	+40.3
1961	24 990	25 297	25 316	35 097	1961-60	+45.6	+38.4	+14.6	+13.2
1962	28 906	30 595	28 457	36 937	1962-61	+15.7	+20.9	+12.4	+ 5.2
1963	29 257	31 055	29 574	40 357	1963-62	+ 1.2	+ 1.4	+ 3.9	+ 9.3
1964	32 202	30 884	29 910	41 097	1964-63	+10.1	- 0.5	+ 1.1	+ 1.8
1965	32 364	34 136	32 628	46 501	1965-64	+ 0.5	+10.5	+ 9.1	+13.1

NOTES: Estimated statistics. The source of the basic data is the International Air Transportation Association (IATA) 'World Air Transport Statistics' publication to which has been applied an average journey distance of 5 500 kilometres to arrive at the estimated traffic figures for the four series.

Source: ICAO Digest of Statistics Traffic by Quarters No. 100, Series T No. 21, Page 92.

ICAO TECHNICAL PUBLICATIONS

The following summary gives the status, and also describes in general terms the contents of the various series of technical publications issued by the International Civil Aviation Organization. It does not include specialized publications that do not fall specifically within one of the series, such as the ICAO Aeronautical Chart Catalogue *or the* Meteorological Tables for International Air Navigation.

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES are adopted by the Council in accordance with Articles 54, 37 and 90 of the Convention on International Civil Aviation and are designated, for convenience, as Annexes to the Convention. The uniform application by Contracting States of the specifications comprised in the International Standards is recognized as necessary for the safety or regularity of international air navigation while the uniform application of the specifications in the Recommended Practices is regarded as desirable in the interest of safety, regularity or efficiency of international air navigation. Knowledge of any differences between the national regulations or practices of a State and those established by an International Standard is essential to the safety or regularity of international air navigation. In the event of non-compliance with an International Standard, a State has, in fact, an obligation, under Article 38 of the Convention, to notify the Council of any differences. Knowledge of differences from Recommended Practices may also be important for the safety of air navigation and, although the Convention does not impose any obligation with regard thereto, the Council has invited Contracting States to notify such differences in addition to those relating to International Standards.

PROCEDURES FOR AIR NAVIGATION SERVICES (PANS) are approved by the Council for worldwide application. They comprise, for the most part, operating procedures regarded as not yet having attained a sufficient degree of maturity for adoption as International Standards and Recommended Practices, as well as material of a more permanent character which is considered too detailed for incorporation in an Annex, or is susceptible to frequent amendment, for which the processes of the Convention would be too cumbersome. As in the case of Recommended Practices, the Council has invited Contracting States to notify any differences between their national practices and the PANS when the knowledge of such differences is important for the safety of air navigation.

REGIONAL SUPPLEMENTARY PROCEDURES (SUPPS) have a status similar to that of PANS in that they are approved by the Council, but only for application in the respective regions. They are prepared in consolidated form, since certain of the procedures apply to overlapping regions or are common to two or more regions.

The following publications are prepared by authority of the Secretary General in accordance with the principles and policies approved by the Council.

ICAO FIELD MANUALS derive their status from the International Standards, Recommended Practices and PANS from which they are compiled. They are prepared primarily for the use of personnel engaged in operations in the field, as a service to those Contracting States who do not find it practicable, for various reasons, to prepare them for their own use.

TECHNICAL MANUALS provide guidance and information in amplification of the International Standards, Recommended Practices and PANS, the implementation of which they are designed to facilitate.

AIR NAVIGATION PLANS detail requirements for facilities and services for international air navigation in the respective ICAO Air Navigation Regions. They are prepared on the authority of the Secretary General on the basis of recommendations of regional air navigation meetings and of the Council action thereon. The plans are amended periodically to reflect changes in requirements and in the status of implementation of the recommended facilities and services.

ICAO CIRCULARS make available specialized information of interest to Contracting States. This includes studies on technical subjects as well as texts of Provisional Acceptable Means of Compliance.

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