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STUDIES

The aeronautical and space industries of the Community compared with those of the United Kingdom and the United States

GENERAL REPORT **Volume 4**

COMPETITION INDUSTRY – 1971 – **4**

Survey carried out on behalf of the **Commission of the European Communities** (Directorate-General for Industry)

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Competition Industry No. 4
BRUSSELS 1971

THE AERONAUTICAL AND SPACE INDUSTRIES OF THE COMMUNITY COMPARED WITH THOSE OF THE UNITED KINGDOM AND THE UNITED STATES

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PART 1

The market for civil aircraft

1. INTRODUCTION

In 1966 there were about 700 airline companies operating in the Western world[1]. They employed 750,000 persons and earned $10,630 million with about 6,000 aircraft which carried 200 million passengers in 1966 and flew 27,490 million ton/km.

These results were achieved in a decade which saw tremendous changes both in the equipment employed and in the operation of air transport. The air transport industry entered the jet era in October 1958. The remarkable increase in productivity achieved with aircraft of this type is reflected in the 218% expansion in total capacity available[2] between 1958 and 1966, as against an increase of 35% in the number of aircraft in service.

The following sections will be devoted to a consideration of the main components of the market for civil and commercial aircraft, namely, the material and fleets, airline companies and traffic.

2. TYPES OF AIRCRAFT

The aircraft used for the purposes of civil and commercial transport are classified, according to the type of power unit with which they are equipped, as piston-engined, turboprop and jet aircraft; and, according to their range, as short-, medium- and long-range aircraft.

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[1] Of these, rather more than 100 were engaged in international services.

[2] In available ton/km.

The last types of long-range piston-engined aircraft were the DC7-C and the Lockheed 1649 A, introduced in 1956 and 1957.

The first turboprop aircraft to enter into service was a medium-range aircraft (Viscount); next, two long-range aircraft were brought into service: the Bristol Britannia and the Lockheed Electra[1].
More recently, the turboprop has been used on short-medium range routes with tye types: Fokker F27[2] (in 1958) and Dart Herald, Handley Page and Avro 748 (in 1962). Lastly, in 1964, the twin turboprop Nord 262 entered service on short routes with low traffic density.

The jet went into service on the North Atlantic route as a long-range aircraft (Comet 4 and Boeing 707)[3] in October 1958. The following year the first medium-range jet - the Caravelle - was introduced on European routes. On American routes the first medium-range jet plane was the trijet Boeing 727, which appeared after 1960 with the special feature of landing on a short runway and in airports near cities.

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1 They were not very successful, being almost contemporaneous with the first four-engined jets. The Bristol Britannia went into service on the London-New York route in December 1957.

2 Still being built in 1968.

3 In actual fact, Comet 1 had entered service in 1951. A few serious accidents due to a phenomenon which until then was poorly understood - metal fatigue - compelled the designers (de Havilland) to engage in years of further studies. The final version, the Comet 4, thus went into service in 1958, in direct competition with the B 707, which was much more advanced in design.

For medium distances, the BAC 111, Douglas DC-9 and Boeing 737 were also planned. For short distances the jet plane tried to compete with the Fokker F.28.

Towards 1965, the increased volume of traffic and the congestion at airports and in airlanes, together with the need for a reduction in operating costs made it necessary to seek new solutions through the production of high capacity aircraft.

So far as long-range aircraft were concerned, at the outset the types already in production were modified by lengthening the fuselage and increasing the take-off weight and the payload[1]. For 1969-70 the entry into service of the first aircraft of the new generation is forecast - the Boeing 747 Jumbo jet. In the field of medium-range aircraft Boeing has converted the B 727 into the B 727-200, increasing the load capacity as compared with the preceding model. The big medium-range planes - the airbus - of new design will not go into service before the seventies (L-1011 and DC-10).

The effort to secure high speeds has led to the design and development of supersonic aircraft: the Concorde and the B 2707, the introduction of which is forecast for the seventies.

The aircraft employed for the transport of freight were, up to 1960, piston-engined planes adapted[2] from passenger aircraft (Douglas DC-6A and Lockheed L 1049 H) or converted when replaced by new planes[3]. The Douglas DC-7F, which was from the outset planned as the cargo version, is an exception.

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[1] The Douglas succeeded in increasing by 40% the capacity of the modified DC-8, in this way creating an aeroplane of the new generation.

[2] Being built. [3] Particularly jet planes.

The reason for the conversions lay in the fact that no purely "cargo planes", built only for military purposes were available, and aircraft could be used which were technically excellent but economically obsolete. The civil aeroplane devised specifically for the transport of freight made its appearance in 1961 with the first deliveries of the Argosy and Canadair CL-44[1]. The production of versions adapted from passenger planes continued, however, in the sixties. In view of the limited demand for freight-carrying planes, this solution offers a twofold advantage. On the one hand, it makes it possible to keep the unit cost of aircraft within acceptable limits[2], and on the other hand, it constitutes a source of considerable saving for airline companies which use the two models[3]. Amongst the aircraft of this type, the turbojets Boeing 707-320, Douglas DC-8F and Vickers VC10 cargo are particularly important. In many cases, however, users have opted for the mixed version - passengers and freight.

The evolution from the piston engine to the turboprop, and ultimately the jet, has brought about a parallel evolution in the capacity, speed, use and price of aircraft, as is shown by the following table:

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[1] Adapted from the Bristol Britannia turboprop.

[2] The series of cargo planes would be relatively small and therefore more costly.

[3] As a result of standardization of equipment for maintenance and overhauls; stocks of spare parts can be reduced and some of the equipment is interchangeable.

Evolution of the Characteristics of the Principal Types of Aircraft

ASK = available seat/km
ATK = available ton/km

Category	Seats	Block speed (km/h)	Utilisation (h/day)	Productivity ASK/year (mill.)	Productivity ATK/year (mill.)	Cost [1] ($mill.)
Long-range						
1946 Douglas DC 4 (*)	48	330	7.0	40	3.5	0.6
1952 Douglas DC 6 (*)	64	430	8.0	80	7.0	1.2
1958 Lockheed L 1649 (*)	90	470	9.0	140	12.3	3.1
1964 Boeing 707-320 (**)	148	740	10.0	400	35.1	8.4
1970 Boeing 747 (**)	380	790	10.0	1,100	96.5	24,0
1973 Concorde (**)	124	1,550	9.0	630	55.3	25,2
1976 Boeing 2707 (**)	280	1,850	9.0	1,700	149.1	48,0
Medium-range						
1946 Douglas DC 3 (*)	25	200	5.0	10	0.9	0.2
1952 Convair 340 (*)	42	330	6.0	30	2.6	0.9
1958 Viscount (***)	60	360	6.4	50	4.4	1.4
1959 Caravelle (**)	84	480	6.8	100	8.8	3.6
1970 Boeing 727-200 (**)	148	520	7.2	200	17.5	7.8
1973 Airbus (**)	280	520	7.5	400	35.1	16.0

(*) Piston-engined (**) Jet (***) Turboprop

[1] Average unit cost, including spares to the value of 20% of the basic price.

Source: F. SIMI & J. BANKIR, AVANT ET APRES CONCORDE, EDITIONS DU SEUIL.

3. NUMBERS OF AIRCRAFT

3.1 Total Number

The total number of aircraft owned by the airline companies of the ICAO member states[1] increased, between 1958 and 1967, by some 1,600 units, but at very different rates according to the category of plane (Fig. 1).
The fleet of piston-engined aircraft begins to decrease as from 1960. Turboprop aircraft increase, after 1961, at a greatly reduced rate and, lastly, turbojets increase from 14 to 2,200 units and, from 1964 onwards, exceed the number of turboprop planes.

Consideration of the number of aircraft owned by the companies which are members of IATA[2] shows (Fig. 2) a less marked increase in the total number of planes and a greater impact of jet aircraft:

- the number of jets exceeds that of turboprops as early as in 1962;
- furthermore, in the period 1959-66, the total number of piston-engined aircraft falls by more than 50%.

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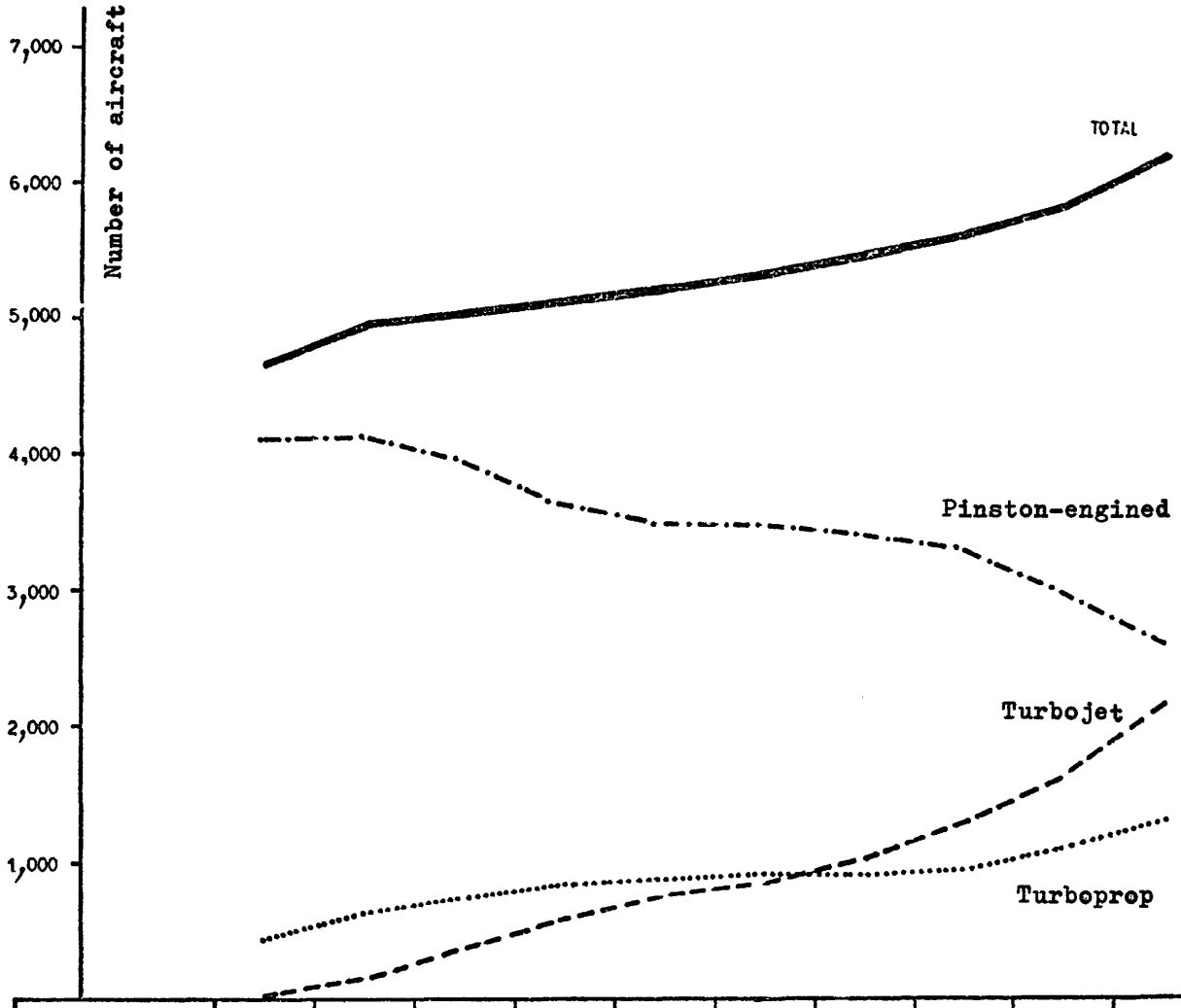
[1] ICAO (International Civil Aviation Organization) is an association which groups the airline companies of 101 states, excluding the Iron Curtain countries (with the exception of Yugoslavia), the People's Republic of China, North Korea and North Vietnam.

[2] The International Air Transport Association: groups 101 of the chief airline companies. This association handles 91% of the scheduled world traffic and 97% of the scheduled international traffic.

FIG. 1

Growth of Fleets by Category of Aircraft (1958-67)

(ICAO member companies)



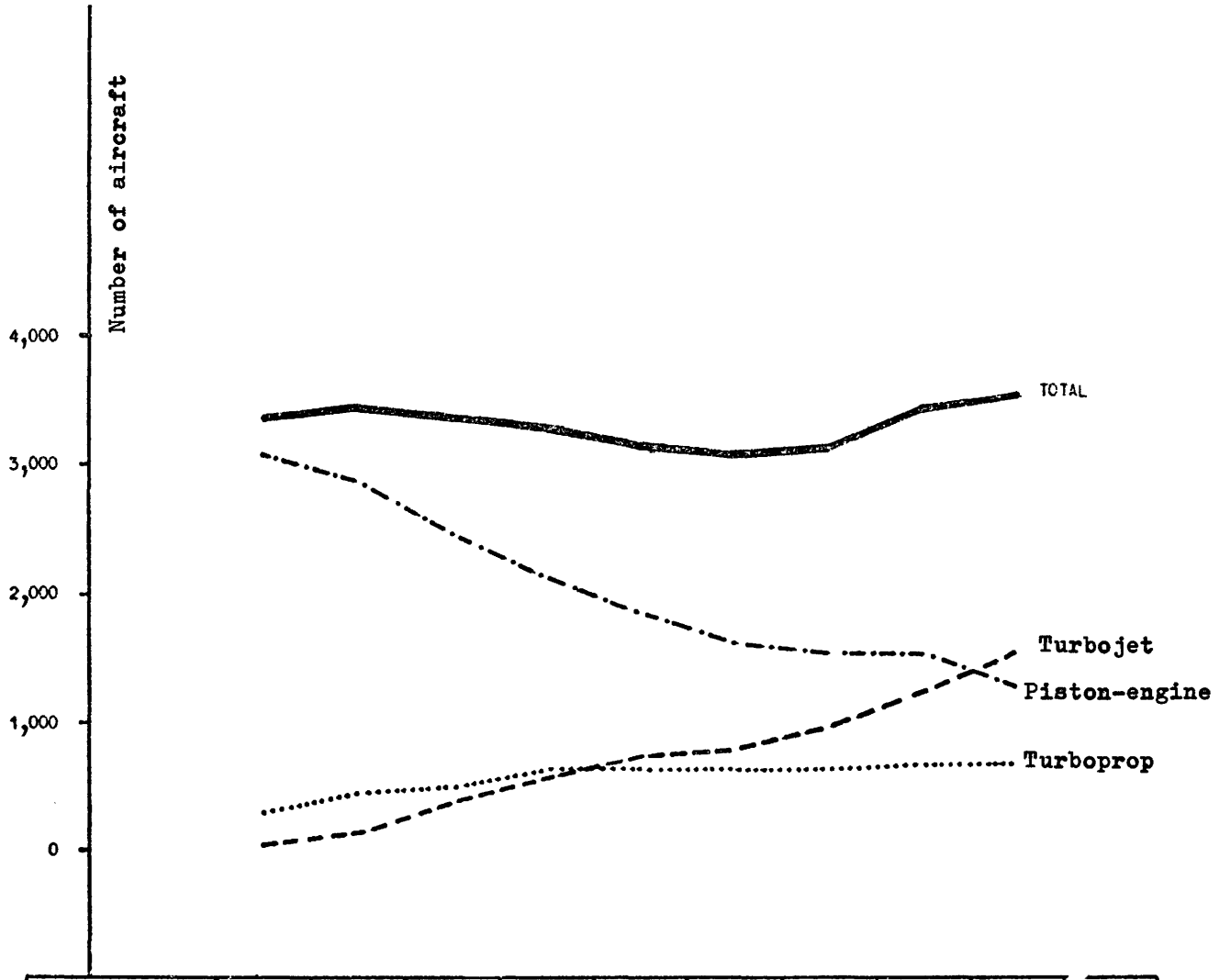
Category	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Turbojets	14	140	388	609	766	872	1,044	1,311	1,688	2,206
Turboprop	418	629	723	847	897	933	944	997	1,139	1,335
Piston-engined	4,174	4,172	3,903	3,666	3,550	3,518	3,473	3,322	3,004	2,688
TOTAL	4,604	4,941	5,014	5,122	5,213	5,323	5,461	5,630	5,831	6,229

Source: ICAO

FIG. 2

Growth of Fleets by Category of Aircraft (1958-66)

(IATA member companies)



Category	1958	1959	1960	1961	1962	1963	1964	1965	1966	
Turbojet	14	140	382	572	705	789	964	1,226	1,558	
Turboprop	286	437	460	604	627	625	614	657	672	
Piston-engined	3,069	2,862	2,477	2,109	1,801	1,644	1,528	1,539	1,277	
TOTAL	3,369	3,439	3,339	3,285	3,133	3,058	3,106	3,422	3,507	

Source : IATA

The following table gives the figures for the number of different types of commercial transport aircraft owned by the ICAO and IATA member companies between 1958 and 1966:

Breakdown by Percentage at the End of Each Year (1958-66)

CATEGORY	ICAO Companies								
	1958	1959	1960	1961	1962	1963	1964	1965	1966
Turbojet	0,2	2,6	7,7	11,9	14.7	16,4	19,1	23,3	29.0
Turboprop	9.1	12,9	14,4	16.5	17,2	17.5	17,3	17,7	19,5
Piston-engined	90.7	84.5	77,9	71.6	68,1	66.1	63.6	59,0	51,5
TOTAL	100.0	100.0	100,0	100.0,	100,0	100.0	100.0	100,0	100.0

Source: ICAO

CATEGORY	IATA Companies								
	1958	1959	1960	1961	1962	1963	1964	1965	1966
Turbojet	0,4	4.1	11,4	17,4	22,5	25.8	31,0	35,8	44,4
Turboprop	8,5	12.7	14,4	18,4	20,0	20,4	19,8	19,2	19.2
Piston-engined	91.1	83.2	74,2	64,2	57,5	53,8	49,2	45,0	36,4
TOTALE	100.0	100,0	100,0	100,0	100,0	100,0	100,0	100.0	100,0

Source: IATA

From the above it will be seen that during the period 1958-66 the proportion of piston-engined aircraft owned by ICAO companies fell from 90.7 to 51.5% and in the case of the IATA companies from 91.1 to 36.4%.

The growing importance of jet aircraft is, however, much more significant[1] than would appear from a mere consideration of their numerical preponderance.

Fig. 3, which is taken from ICAO estimates, shows the portion of total capacity accounted for by the various categories of aircraft. Thus jets, which in 1966 represented 35.4% of the world's civil aircraft, contributed, in the same year, 79% of the total capacity offered.

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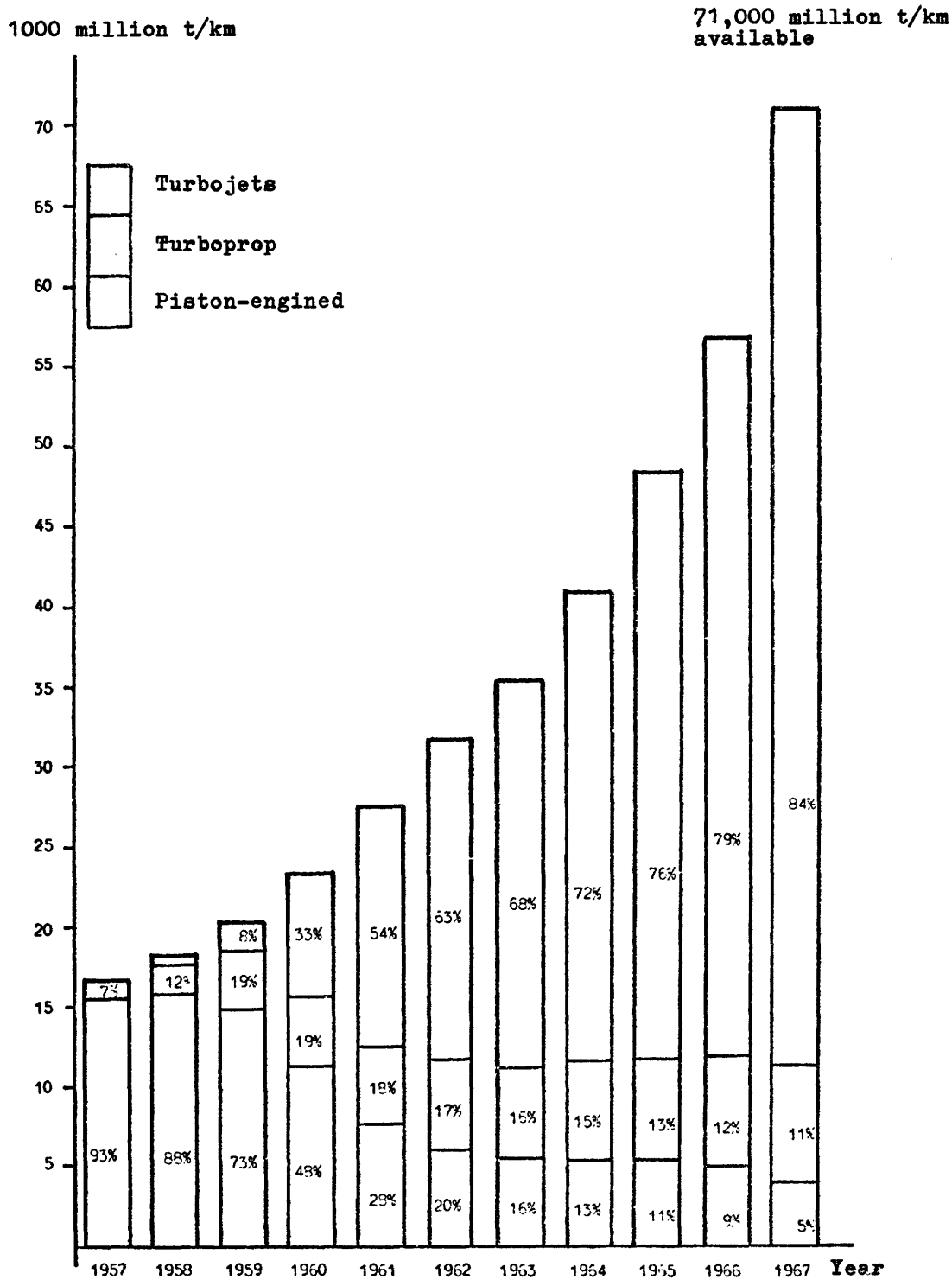
[1] Owing to the greater potential production and the different average service life.

FIG. 3

Capacity (t/km), by Category of Aircraft (1957-67)

(ICAO Companies)



Source: ICAO estimates

The trend of the average characteristics of aircraft fleets over the past decade is clearly shown in the ICAO table (Fig. 4) concerning the total scheduled air transport activities of the states which are members of that organization. On an average, the capacity per aircraft has been doubled, the speed multiplied by 1.5 and operating expenses per t/km available[1] have decreased by 31%.

The jet engine has brought to air transport speed, capacity, longer range and greater profitability but has, on the other hand, required new investments, part of which is provided by the state (lengthening of runways, construction of bigger airports, development of ground aids and air traffic control) and part by the airline companies (aircraft, ground installations, training and instruction of staff).

In relation to such costs it is possible to make an estimate[2] of the most important item in the expenditure of the airline companies, i.e., aircraft purchases[3]. During the decade 1958-68, 3,254 aircraft were purchased, for a total value of about $17,000 million. In 1968 an additional 1,573 aircraft were on order for a total value of $19,000 million[4] (see Tables 3/1 and 3/1a).

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[1] Expressed in dollars at current value.

[2] Estimate drawn up on the basis of average sale prices, including the initial allowance for spares (20% of the basic price).

[3] Excluding piston-engined aircraft, light aircraft (feeders) and helicopters.

[4] Including the value ($7,258 million) of the supersonic planes on which options are now held.

FIG. 4

Evolution of Average Characteristics of Fleets of ICAO Member Companies

(1957-66)

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
Average number of seats per plane	47	50	53	60	68	76	80	83	87	93
Number of passengers per plane	29	29	32	35	38	40	42	44	44	47
Average speed (km/h)	325	335	345	360	390	420	435	450	465	475
Average operating cost per t/km available (US cents per t/km)	23.6	23.1	23,2	22.9	21.4	20,2	19.3	18.6	17.2	16.3
Flying cost	7.2	6.9	6.7	6.3	5.8	5.5	5.2	5.0	4.5	4,2
Maintenance and overhaul	4.5	4.6	4.6	4.4	4.0	3.7	3.4	3.3	2.9	2,6
Aircraft amortization	2.1	2.0	2.1	2.6	2.7	2.5	2.3	2.0	1,9	1.8
Miscellaneous	9.8	9.6	9.8	9.6	8.9	8.5	8.4	8.3	7.9	7.7

Source: ICAO

3.2 Breakdown by Type of Aircraft and by Country

Information concerning orders and deliveries is available annually for each type of aircraft[1] (Tables 3/2 - 5). The orders for jet aircraft deserve special attention. There is seen to be an initial period (up to 1961) marked by large orders, followed by a definite fall. The appearance of new types of aircraft and the greater funds available to the airline companies result in an appreciable increase in orders for jets after 1965 (Fig. 5).

A total of 76% of the aircraft in service in the world[2] in 1968 and 83% of those ordered were built in the US. The percentages increase appreciably if only jet aircraft are considered (80 and 88% respectively) and still more if account is taken of the value of the aircraft instead of their number (83% for aircraft in service and 88% for those on order).

Aircraft made in Europe[3] represent 22% of the world total expressed in units but only 16% of their value (Tables 3/6 and 3/6a). The lower proportion of the value of the European products is due to the fact that they consist mainly of medium/short-range aircraft (chiefly turboprop) which are manufactured at relatively low unit prices. With reference to the aircraft ordered in 1968, the proportion of European-made equipment decreases appreciably and represents only 15%

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1 ICAO statistics.

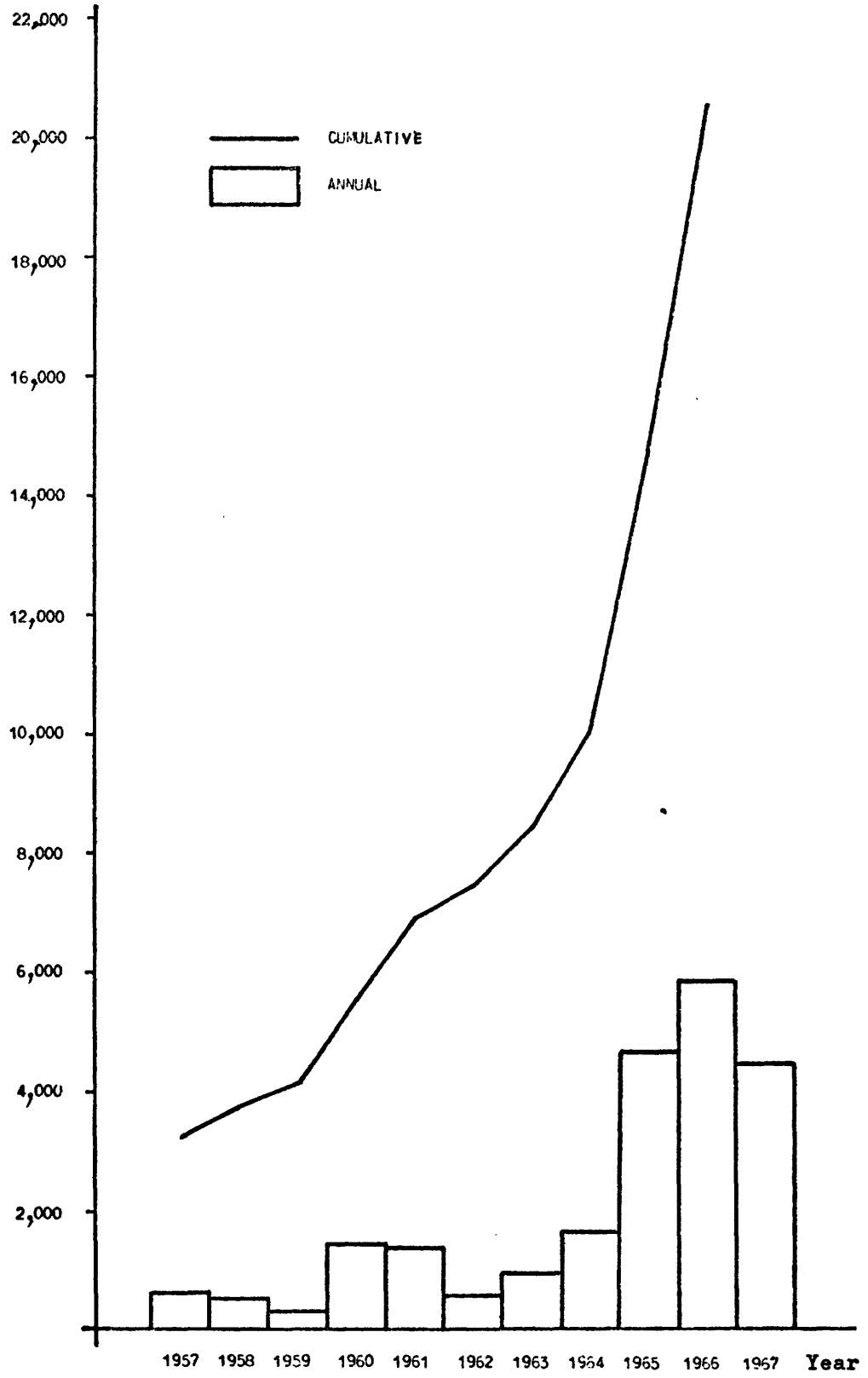
2 Data compiled on the basis of the World Airline Survey carried out by "Flight International". The values do not coincide with the ICAO statistics because they also include the fleets of companies with non-scheduled services.

3 United Kingdom, France and the Netherlands.

FIG. 5

Orders for Jet Aircraft (1957-67)

(Millions of dollars)



in number and 12% of the value. As regards the geographical distribution of the fleets[1], the position (Tables 3/7 and 3/8 is as follows:

Breakdown of Commercial Aircraft Fleets in Number and in Value by Geographical Areas (April 1968)

(%)

Area	Number	Value
USA	51.2	61.7
Europe	25.6	21.5
- EEC Countries	9.9	9.6
- United Kingdom	8.5	6.2
- Other European countries	7.2	5.7
Other countries	23.2	16.8
Total	100.0	100.0

After the USA and Europe the Far East is the region with the highest percentage of aircraft, both in regard to the total numbers owned and in regard to the number of jets.

The breakdown of the world's jets by geographical areas corresponds in practice to that of the traffic. The greater amount of air transport (US, Europe, Far East) is accompanied by fleets that are not only more powerful[2] but also more modern, as is shown, so far as the latter aspect is concerned, by the percentage breakdown of orders for jets in 1968 (Tables 3/7 and 3/8 mentioned above). Three types of European aircraft

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[1] Only jet and turboprop aircraft.

[2] For example, the US and Europe together represent 83% of world capacity expressed in MTK (million tons/km).

(Caravelle, BAC 111 and Fokker F.27) are at present operated by United States companies. The first to be marketed in the US was the Fokker F.27. Its success was remarkable: 473 aircraft were sold, no fewer than 195 of them in the US and Canada. This success must largely be attributed to the agreements concluded between Fokker and the American company of Fairchild Hiller. The latter undertaking had secured from Fokker the licence to build the F.27[1] in the US for the whole of the Western hemisphere and also acted as distributors in that geographical area for the Dutch-made versions. The Fairchild Hiller company built a total of 138 F 227 and has sold 183 aircraft (F 227 and F-27). The presence in the US of a distributor, who in this case was also the manufacturer under licence of the plane, seems, at least as much as the excellence of the machine, to account for the success of the F-27.

The Caravelle was marketed in the US as from 1961, i.e., in a period that was very difficult for airline companies throughout the world[2], and in particular for American companies.

The introduction of long-range jets in the immediately preceding years had led, on the one hand, to a marked reduction in load factors and, on the other hand, to an increase in costs for financing and for the amortization of new investments. For these reasons the American companies did not welcome the Caravelle[3], which, moreover, had created serious problems for them on medium-length routes also. Account must

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[1] Series 200.

[2] In 1961 the losses of the ICAO companies amounted to a record total of $118 million.

[3] Bought only by United Airlines (20).

also be taken of the fact that the French plane had been designed for European operation, i.e., for medium distances considerably shorter than those in the US.

The third European jet to be marketed in the US was the BAC 111. This plane was designed at a time when airlines had become fully aware of the economic advantages offered by jets and already foresaw the usefulness of aircraft specifically designed for medium hauls of less than 400 km. The BAC 111 therefore came into being when the companies' demands were at their height and was in direct competition with another aircraft - the Douglas DC-9.
As a result of the difficulties encountered by Douglas the British firm was able to deliver the BAC 111 with a lead of eight months over the DC-9. However, sales (61 units), which at first were more than satisfactory, very soon stopped short since Douglas was in a position to offer almost immediately new series of the DC-9 with carrying capacities definitely greater than that of the BAC 111[1], which was exactly what the airlines, whether American or not, were looking for.

The same reasons, i.e., the delay in delivery of the American SST as compared with the date forecast for the entry into series of the Concorde, have in all probability led some American companies to take out options on the Anglo-French supersonic aircraft.
The following diagrams show the percentage of American (Fig. 6a) and European aircraft (Fig. 6b) in relation to the total value of the fleets operated by the airline companies in the different regions.

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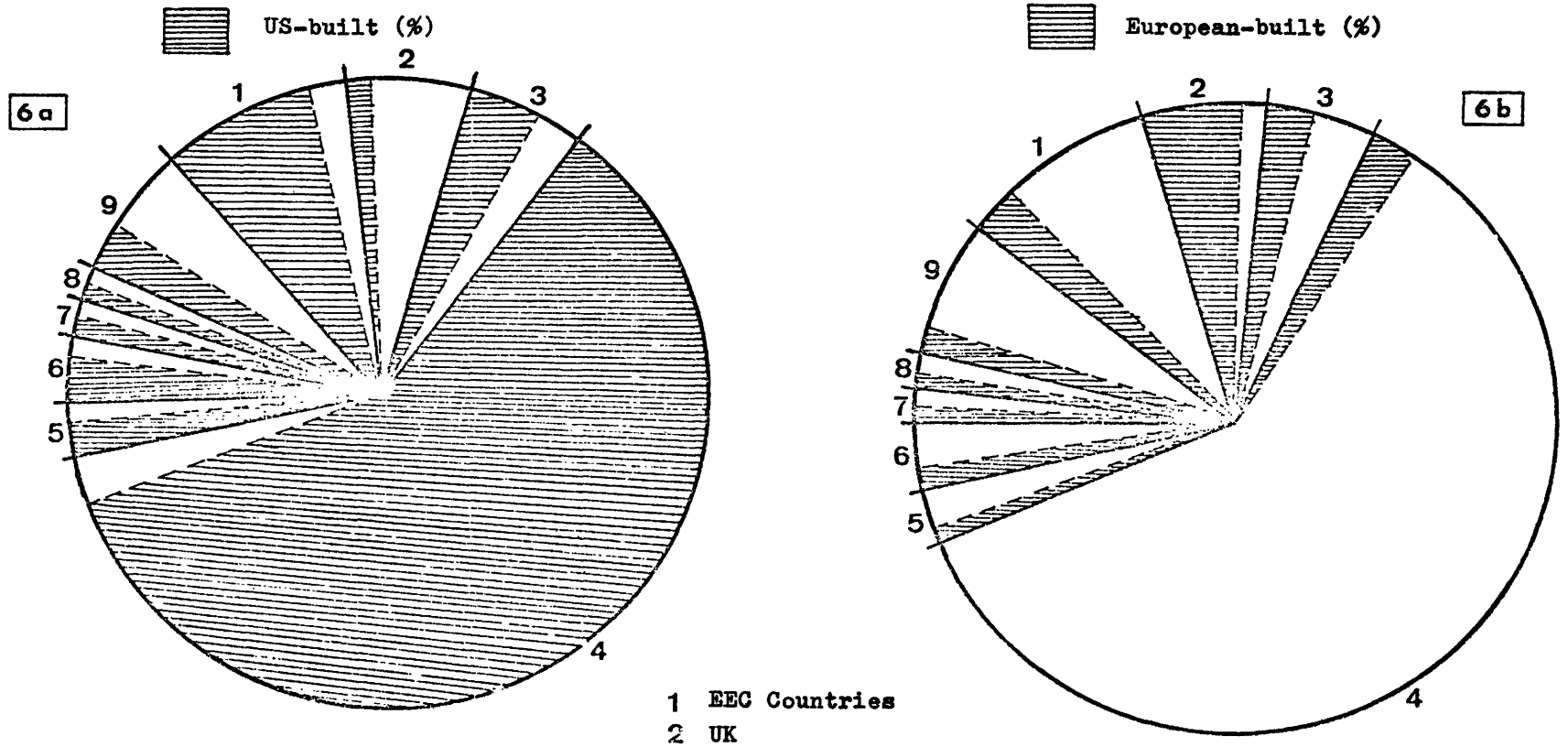
[1] The engines of which (Rolls-Royce Spey) were much less powerful than those of the DC-9 (Pratt and Whitney JT9D).

FIG. 6

Value of Aircraft in Service in the World, by Continents (1968)



1 EEC Countries
2 UK
3 Other European countries
4 USA
5 Canada
6 Central and South America
7 Africa
8 Middle East
9 Far East

4. AIRLINE COMPANIES

In the Western world the number of airline companies engaged in providing services, both scheduled and otherwise, is about 700. The most important, however, are the 101 companies which are members of IATA[1] and, of these, the 21 which handle more than 70% of the scheduled services throughout the world.

In the activity and in the management of the airline companies the state plays a part of undoubted importance. On the one hand, scheduled carriers operate on the basis of government agreements, with fares subject to government approval, from airports which are publicly owned and are managed by the state. On the other hand, 55% of the IATA companies[2] are completely or for the greater part state-owned and in many cases[3] receive government subsidies and loans. In most cases and according

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[1] See footnote 2 on page 6.

[2] The percentage rises to 73 if the US airlines, which are all private, are excluded. So far as companies under the flags of EEC countries and of the United Kingdom are concerned, the position at the end of 1966 was as follows (source: Interavia November 1967):

Country	Flying Flag Carrier	State Participation (%)
Belgium	Sabena	65.0
France	Air France	70.0
Germany	Lufthansa	79.4
Italy	Alitalia	96.2 (IRI)
Netherlands	KLM	50.5
United Kingdom	BEA	100.0
	BOAC	100.0

[3] Including the local US companies which receive subsidies from the CAB.

to the statements of those directly concerned, this close connection with the state does not influence either management activities or the policy of the companies with regard to supplies. Subject to the necessary exceptions, therefore, the aims and activities of the companies are, it would seem, not unlike those of the private operators.

In regard to the management of the airline companies, a clear difference in productivity can be seen - in terms of turnover per employee - between European and American airlines, as appears from the following table (1967 figures):

C E E		U K		U S A	
COMPAGNY	Turnover per employee ($)	COMPAGNY	Turnover per employee ($)	COMPAGNY	Turnover per employee ($)
Lufthansa	17,841	B E A	11,955	United Airlines	23,870
Air France	17,600	B O A C	20,068	P.A.A	26,075
SABENA	8,478 *			TWA	29,170
Alitalia	23,655			American Airlines	25,490
K L M	14,313			Eastern Airlines	23,493
				Delta Airlines	25,007
				Northwest Airlines	37,435
				Braniff Airways	23,583
				National Airlines	31,521
				Western Airlines	26,432
AVERAGE (total turnover/total employees)	16,604		15,903		26,093

* 1966 figure.

Source: Annual Reports of the various companies.

The divergence noted seems to be all the more marked and less justifiable if it is borne in mind that:

(a) the intercontinental fares, which are decided upon at IATA meetings, are accepted and applied by all the member companies;

(b) the US domestic fares are on an average lower than the European fares[1];

(c) for the majority of US airlines the percentage of domestic traffic in relation to the total is appreciably higher than that of the European airlines.

The market constituted by the airline companies is characterized by:

(a) keen competition at the world level and on intercontinental routes[2], under a system of fixed rates;

(b) strong competition between American operators on the domestic routes of the United States and on routes to neighbouring countries;

(c) poor competition between European operators on European routes, competition on those routes being limited by numerous pooling agreements between the European companies;

(d) a legalized monopoly, acting in favour of companies flying the national flag and companies associated with them, on the domestic routes of the various European countries[3].

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[1] The fare per passenger/km is 17.5 cents in the US; in Europe for EARB member companies it is 21.5 cents on European routes and as high as 30 cents on certain domestic routes (Source: F. Simi and J. Bankir, Avant et après Concorde, 1968).

[2] Particularly over the North Atlantic.

[3] The importance of the presence of private operators should not be underestimated. They do not, however, at least for the moment, exercise a decisive influence (see the "National Reports").

It is the first characteristic which is the basic one in that it not only makes it necessary for the competing companies to have competitive aircraft and services, but also calls for undertakings of a certain size and structure, management efficiency, reliability and an image capable of meeting competition at world level in a world market.

Of the remaining points, reference will only be made here to the differences in political and geographical conditions between the US and Europe as factors - in our view not entirely the only ones - accounting for the different situations that may be encountered.

The characteristics mentioned under (a) and (b) impel airline companies to adopt procurement policies which are not dissimilar and which have as their aim and common denominator the reduction of aircraft operating costs to a minimum, this manifesting itself in an effort to achieve a high degree of homogeneity[1] in their respective fleets.

Furthermore, the relatively low profit margins of the companies, on the other hand, and the nature of the demand, on the other, have, especially in recent time, necessitated ever-increasing diversification of the equipment employed by airline companies, in relation both to the distances covered and to the type of traffic handled.

In view of the basic characteristic of the airline companies, which is mentioned above, they must strive, even in markets which are relatively or wholly protected, to achieve the maximum efficiency with regard to their equipment and their management, together with the utmost reliability and the best

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[1] As regards types of aircraft, wherever possible, and especially manufacturers.

image, and all this in a market area that will certainly be more extensive than the markets to which we are referring here.

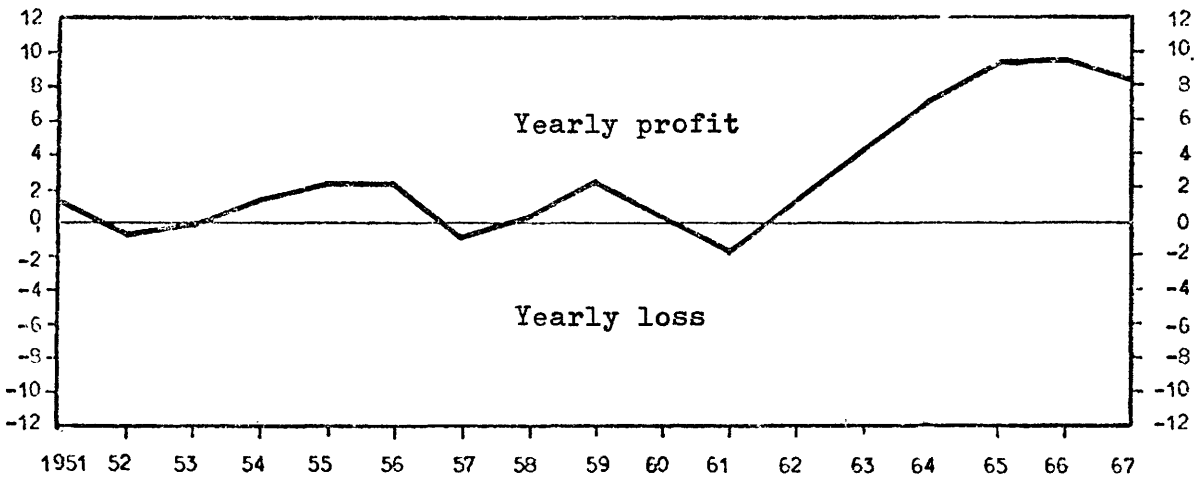
During the past decade, and more particularly at the beginning of that period, the airline companies spent large amounts of money on the purchase of jets. The cost of the necessary financing and the higher level of amortization, at a time when the demand was not yet equal to the supply, combine, together with other factors, to explain the deficit of the ICAO companies as shown in the graph on the following page.

Annual profit or loss in relation to turnover

Annual Trading Results in Relation to Turnover for all ICAO Companies

(1951-67)

(%)



Source: ICAO statistics.

From 1962 onwards the gross profits of the scheduled world airlines (ICAO) increased continually, reaching appreciable levels. The situation was, on the contrary, somewhat less brilliant if account is taken of net profits, which appear to be fairly meagre - when they are not in fact outright losses - as the result of costs not related to operational management, such as interest payable on loans contracted for the purchase of aircraft and equipment. The amount thus devoted to financing such purchases has increased continually and in recent times has risen to considerable levels.

It may be recalled, for instance, that the total long-term indebtedness of all the US companies rose by a factor of 8 between 1954 and 1964 ($1,800 million in 1964 as against 225 million in 1954). In 1964 this indebtedness represented more than 60% of the capital invested.

However, this tendency to increase investments, both in absolute and in relative value, shows no sign of diminishing. The total orders in 1968 ($19,000 million) exceed in value both the purchases in the whole of the previous decade and the total turnover of the airline companies in 1966 ($10,630 million).

All this has accentuated the process of expansion on the part of the airline companies and, in more recent times, has led the latter to bring pressure to bear on manufacturers with a view to securing longer periods for payment.

The leasing of aircraft is also assuming ever-increasing importance. This particular form of contract, by which the airline companies rent aircraft directly from the manufacturers, enables the former to spread their expenditure over a period whilst at the same time enjoying greater

flexibility in the management of their equipment[1].

The year 1958 may be said to have marked the beginning of the phase of expansion and the emergence of different forms of cooperation; the entry into service of jet aircraft impelled the companies to seek various solutions with the object of pooling their resources by means of agreements for cooperation in various fields (technical, commercial and financial) and in many different forms.

Until 1958, if we leave aside the SAS (Scandinavian Airlines System) consortium[2], the classical form of cooperation (agreements concerning pools, joint lines, ground services at airports, etc.) had enabled airline companies to overcome the difficulties arising from an excess of competition.

The SAS-Swissair agreement of 1958 - under which each company concentrates its own strength on certain types of aircraft,

---

[1] The most recent needs of the airline companies obviously affect the financial situation of the manufacturers. At the end of 1967, for instance, Boeing had tied up $248 million in long-term loans and $114 million in leased aircraft. The corresponding figures for McDonnell Douglas were $107 million and $27 million respectively on the same date.

[2] Created in 1951 without legal status by the Danish, Norwegian and Swedish airlines (DDL, DNL and ABA), which continue to exist with their own legal status. The consortium formed under earlier agreements of 1946 (for the transatlantic lines) and 1948 and 1949 (for the European lines) is merely an economic entity responsible for organizing air transport.

whilst allowing the other company to use some of its planes - marks the beginning of a tendency towards ever greater co-operation. In the same year a few airline companies of countries in the European Economic Community endeavoured, without success, to find a basis for cooperation within the framework of the projected Air Union.

Recently the idea of a system of technical cooperation has been gaining more and more ground in both Europe and in the United States. This would make it possible to spread amongst the associated companies the heavy cost of ground facilities and to reduce management costs whilst increasing the return from investments made by the various partners in accordance with the requirements of a unified fleet.

In 1967 the first conference, which was held in Paris (the Montparnasse Committee), proposed that a statute for technical cooperation be drawn up. The airlines represented at that Conference were Air Lingus, Alitalia, BOAC, Iberia, KLM, DLH, Sabena, SAS, Swissair and Air France. The statute laid down certain important principles such as the need for standardization of aircraft. From this beginning and this setting two consortia emerged for the operation of the B 747. These are:

- KSS, made up of KLM, SAS and Swissair[1];
- ATLAS, made up of Air France, UTA, Alitalia, Lufthansa and Sabena;

and one for the DC-10 (KSSU, made up of KLM, SAS, Swissair and UTA).

It is probable that others will be created, for example, for supersonic aircraft and for those of the Airbus type.

---

[1] This consortium was actually formed before the creation of the Montparnasse Committee, but the companies that were members of it agreed to their group being incorporated in that Committee.

In 1961, eleven countries of French Africa[1] set up, under the name "Air Afrique", a multinational company the capital of which was subscribed as to 66% by the African member countries and as to 34% by France.
The member states use this company for their international services and they may also employ it for their own domestic purposes.

In British Africa, after the dissolution of the Federation of Rhodesia and Nyasaland in 1963, Central African Airways have continued to operate on international routes and have set up three subsidiaries for services inside the three states.

In East Africa the independence of Kenya, Tanganyika, Zanzibar and Uganda has not changed the structure of East African Airways.

In Latin America there have in the course of the past few years been attempts - so far unsuccessful - to form several groupings. In addition, without leading to actual mergers, many pooling agreements have been concluded which involve a system of partial leasing.

At the national level modifications in the structure of airline companies have been numerous and varied according to the states concerned and to the conditions under which air transport is operated. Although it is not possible, within the limits of the present study, to give an analysis of all the changes made in the different countries[2] it is nevertheless

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[1] Twelve in 1964.

[2] Amongst the numerous groupings those of the following companies may be mentioned: Alitalia, BUA, Varing, United Air Lines, Middle East, Air Liban, UTA, VIASA, All Nippon Airways.

advisable to mention:

(a) the tendency towards the partial or total concentration of companies, even though some of the projects of the more important companies have not been carried out[1];

(b) the tendency towards geographical specialization, a distinction being made between international and domestic services. In the United States there is already a clean division between the large international companies (domestic trunk-lines) and the local companies, whilst it is only in recent years that European national airlines have tended to entrust an ever-increasing part of their domestic traffic to separate companies which in most cases are subsidiaries of them[2].

This policy and the creation of subsidiary companies for non-scheduled services (charter flights, package tours, etc.) has made it possible to expand the national airlines and at times to make better use of aircraft that are technically sound but economically obsolete.

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[1] Projects: PAA/TWA, American/Eastern, BOAC/BEA, Air Canada/CPAL, Air India/Indian Airlines.

[2] Air Inter in France, ATI in Italy, NLM in the Netherlands.

5. AIR TRAFFIC

5.1 General Survey[1]

In 1967 the ICAO companies' scheduled traffic amounted to 32,770 million TKP[2] of passengers, freight and mail; this traffic is 3.4 times that in 1958 and has consequently increased at an annual average compound rate of 14.6%.

During the period considered the increase in capacity was even more marked - a total of 63,500 million ATK[3] in 1967 as against 17,100 million in 1958; with an average annual compound rate of 15.7% (Fig. 7) and an absolute increase of a factor of 3.7. This results in a drop in the average load factor, which fell from 56.3% to 51.6%[4] between 1958 and 1967.

This decrease was particularly marked after 1960 (50.5% in 1963), whilst a slight upward movement is noted in 1964 and a decline after 1966.

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[1] The majority of the statistics used were compiled by the ICAO on the basis of the scheduled services, and therefore do not include non-scheduled traffic (charter flights, package tours, etc.), which in recent years has grown considerably and in 1966 represented about 10% of total ICAO traffic.

[2] TKP = ton/km performed.

[3] ATK = available ton/km.

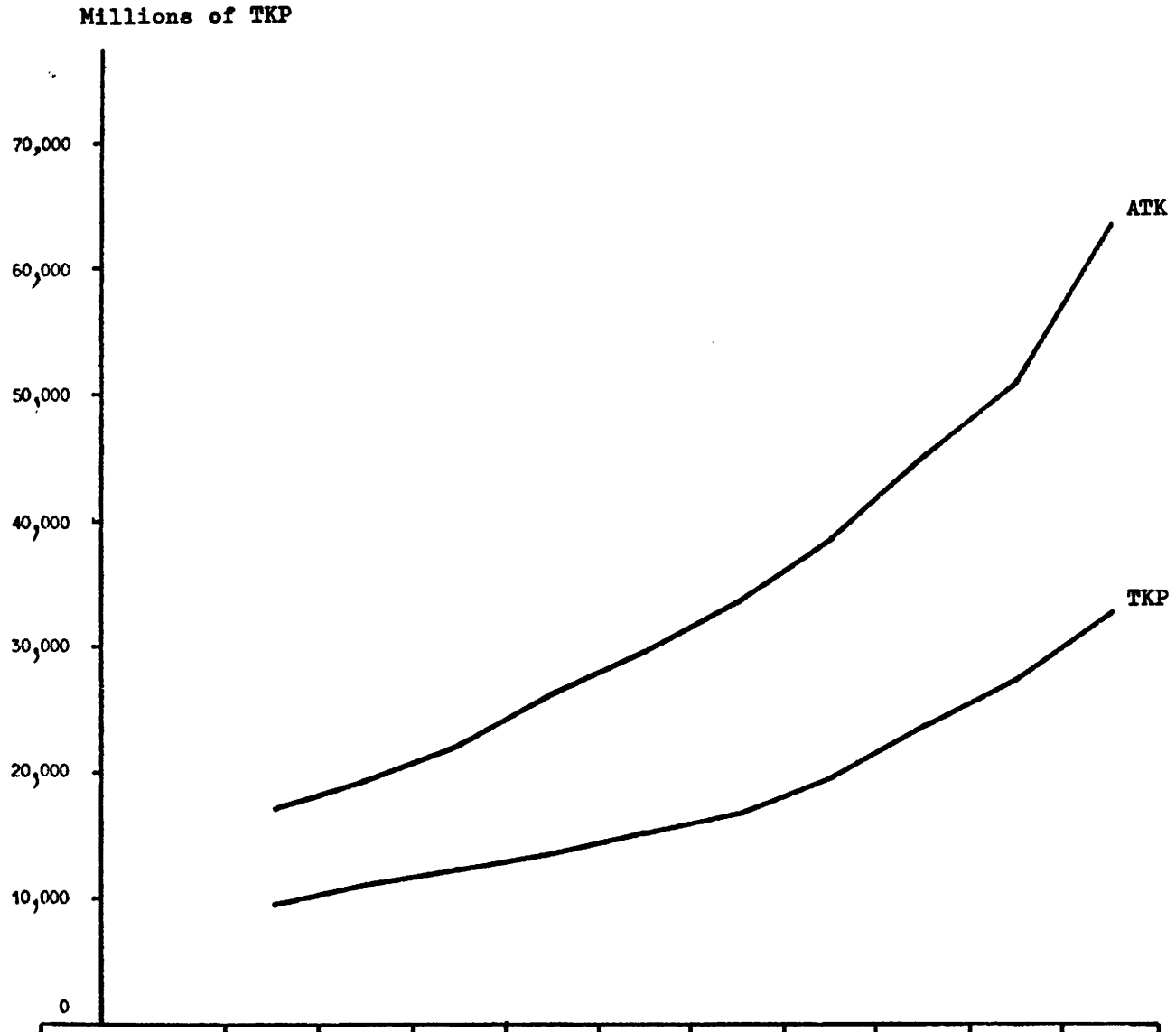
[4] 50.5 in 1968.

FIG. 7

ICAO Companies

Available Capacity (ATK) and Traffic Handled (TKP) (1958-67)

(Scheduled domestic and international services)



	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
TKP (in millions)	9,610	11,000	12,340	13,460	15,130	16,970	19,740	23,460	27,490	32,770
ATK (in millions)	17,100	19,290	22,360	26,070	29,850	33,640	38,540	45,360	51,110	63,500
Load factor (%) (TKP/ATK)	56.3	57.0	55.2	51.6	50.7	50.5	51.2	51.7	52.8	51.6

Source: ICAO statistics.

The decrease in the load factor was more pronounced on the domestic routes (49.2% from 1962 to 1964) than on the international routes (52% over the same period).

During the period under consideration the distribution of world air traffic by category (passengers, freight and mail) did not change appreciably (Fig. 8). The average annual increases recorded in the ten-year period were 16.7% for freight, 13.9% for passengers and 16.8% for mails.
The TKP for passengers is still more than three-quarters of the total, even though the figure for 1967 is slightly below that for 1958 (73.7 as against 77.7%).

International traffic increased by 278% between 1958 and 1967, whilst domestic traffic showed an increase of 217%. The proportion of the former in relation to the total therefore increased slightly.
However, the proportion of international traffic (Fig. 9), which increased continuously up to 1964 (48% of total), subsequently fell to 42% in 1967.

Throughout the decade, 21 airline companies constantly handled more than 70% of the scheduled traffic of the ICAO companies (Table 3/9).

These 21 companies break down as follows, by continent:

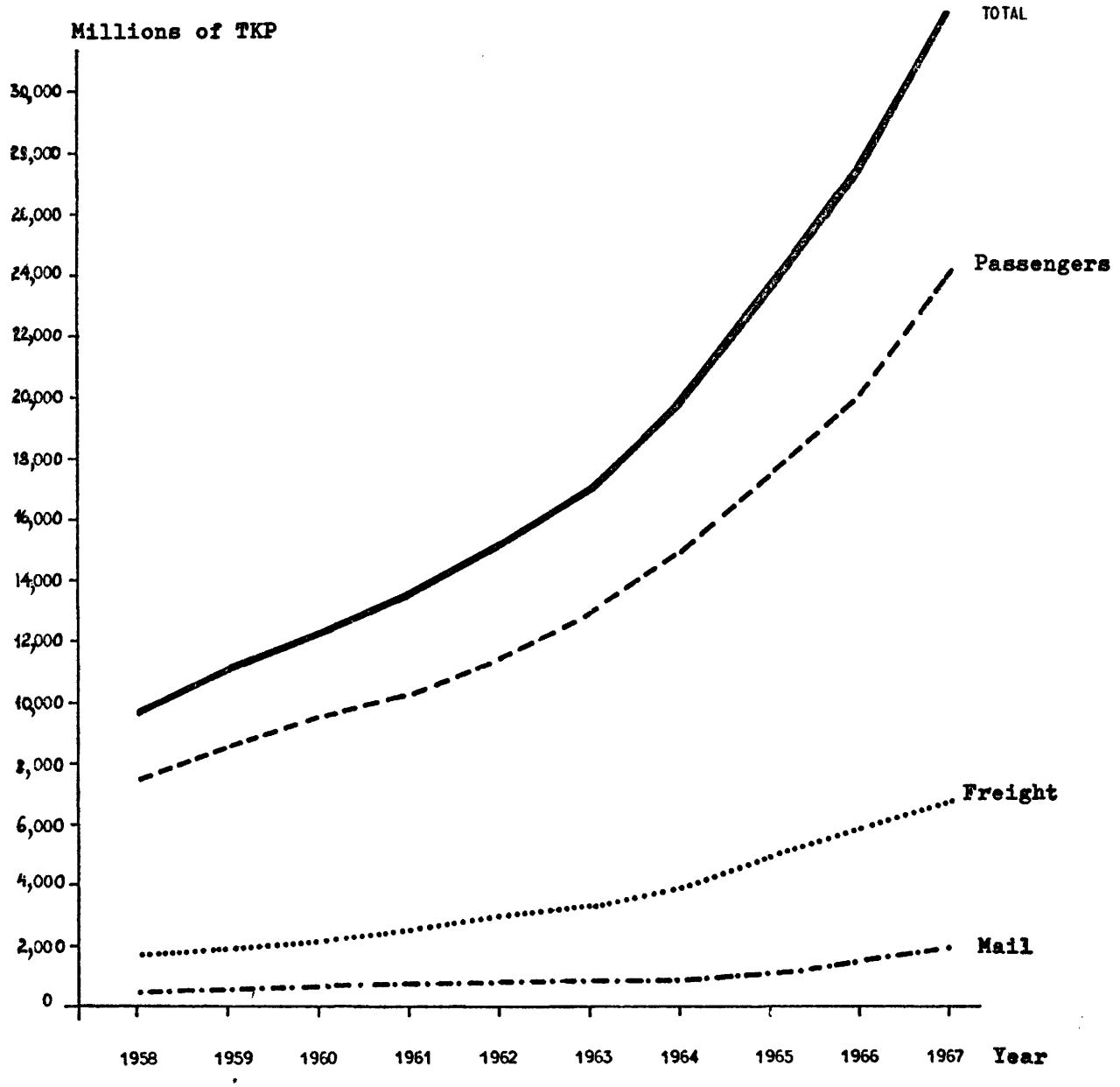
- 10 in North America (UAL, PAA, AA, TWA, EAL, Delta, Air Canada, Northwest, National, Braniff);
- 9 in Europe (Air France, Alitalia, BEA, BOAC, Lufthansa, KLM, Sabena, SAS, Swissair);
- 1 in Australia (Qantas);
- 1 in Japan (JAL).

FIG. 8

ICAO Companies

Growth in TKP by Categories of Traffic (1958-67)

(Scheduled domestic and international services)

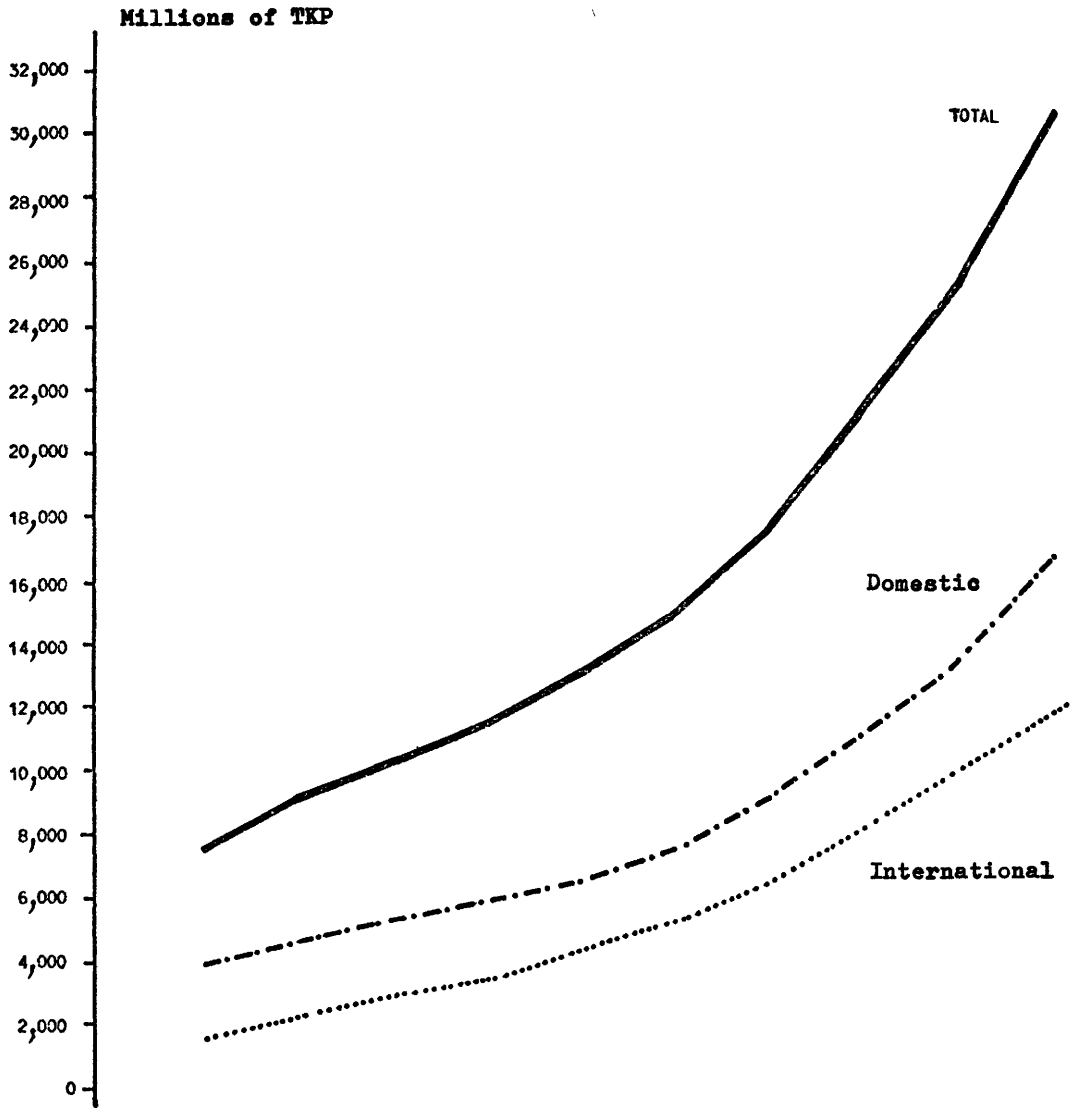


Source: ICAO statistics.

FIG. 9

ICAO Companies

Scheduled Domestic and International Traffic (1958-67)



	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Domestic	5,940	6,740	7,360	7,950	8,690	9,680	11,210	13,220	15,430	18,870
International	3,670	4,270	4,970	5,520	6,400	7,180	8,540	10,240	12,060	13,900
Total	9,610	11,010	12,330	13,470	15,090	16,960	19,750	23,460	27,490	32,770

Source: ICAO statistics.

On account of the location of the chief companies, air traffic is not uniformly distributed. However, there are three major zones:

- one developed: the North American continent, which in itself represents more than one-half of the world traffic;
- one in the course of development and still striving after large-scale operation, which includes: Europe, the Mediterranean and certain parts of Asia;
- one heterogeneous zone, mainly made up of the developing nations.

5.2 Regional Survey

The breakdown of the traffic handled by the world airline companies, listed by countries of origin, did not undergo any fundamental changes between 1956 and 1967.

North America - which, after the decline in 1961, returned to the percentage levels of 1956 - constitutes the area of maximum air traffic (64.5%), followed by Europe (21.7%), whilst the remaining countries, taken together, account for only 13.8% of the scheduled world traffic in TKP, as is shown by the following table:

Breakdown of Traffic Handled*, by Regions (Total 100)

REGION	1956	1961	1967
North America	64.9	60.2	64.5
Europe	18.7	24.0	21.7
Far East	3.2	4.1	4.8
South America	6.2	5.0	3.0
Oceania	3.8	3.2	2.6
Africa	2.3	2.2	2.1
Middle East	0.9	1.3	1.3

* In t/km.

Source: ICAO

This table shows for South America and Oceania an increase in traffic which is below the world average. In Europe, on the other hand, air traffic has developed at a higher rate, particularly round about 1961.

Examination of world traffic (domestic and international services) on a country-by-country basis shows that the proportion accounted for by the American companies - which had declined between 1961 and 1964 - remained by far the greatest: 58.7% in 1967 (Tables 3/10 and 3/10a). The second, third and fourth places are constantly occupied, in that order, by the United Kingdom, France and Canada, which together represent about 14% of world traffic each year.

The countries of the European Community handle on an average 1.11% of the total traffic (in TKP), whilst the sum of the traffic of USA, the United Kingdom and the EEC countries in 1967 was equal to 75% of the world scheduled traffic.

In the international services the first place is still occupied by the American companies (27% of the traffic handled in 1967), followed by the British and French companies with 1.11% and 1.8% respectively.

For the principal countries and at world level the growth of traffic is shown by means of a graph in Fig. 10, whilst the average annual increases (1957-67) in traffic as a whole and in international traffic are shown in Fig. 11.

Of the international routes, the North Atlantic is undoubtedly the most important axis. For 1964 the estimate[1] was as high as 2,500 million TKP, equal to 25.8% of international traffic.

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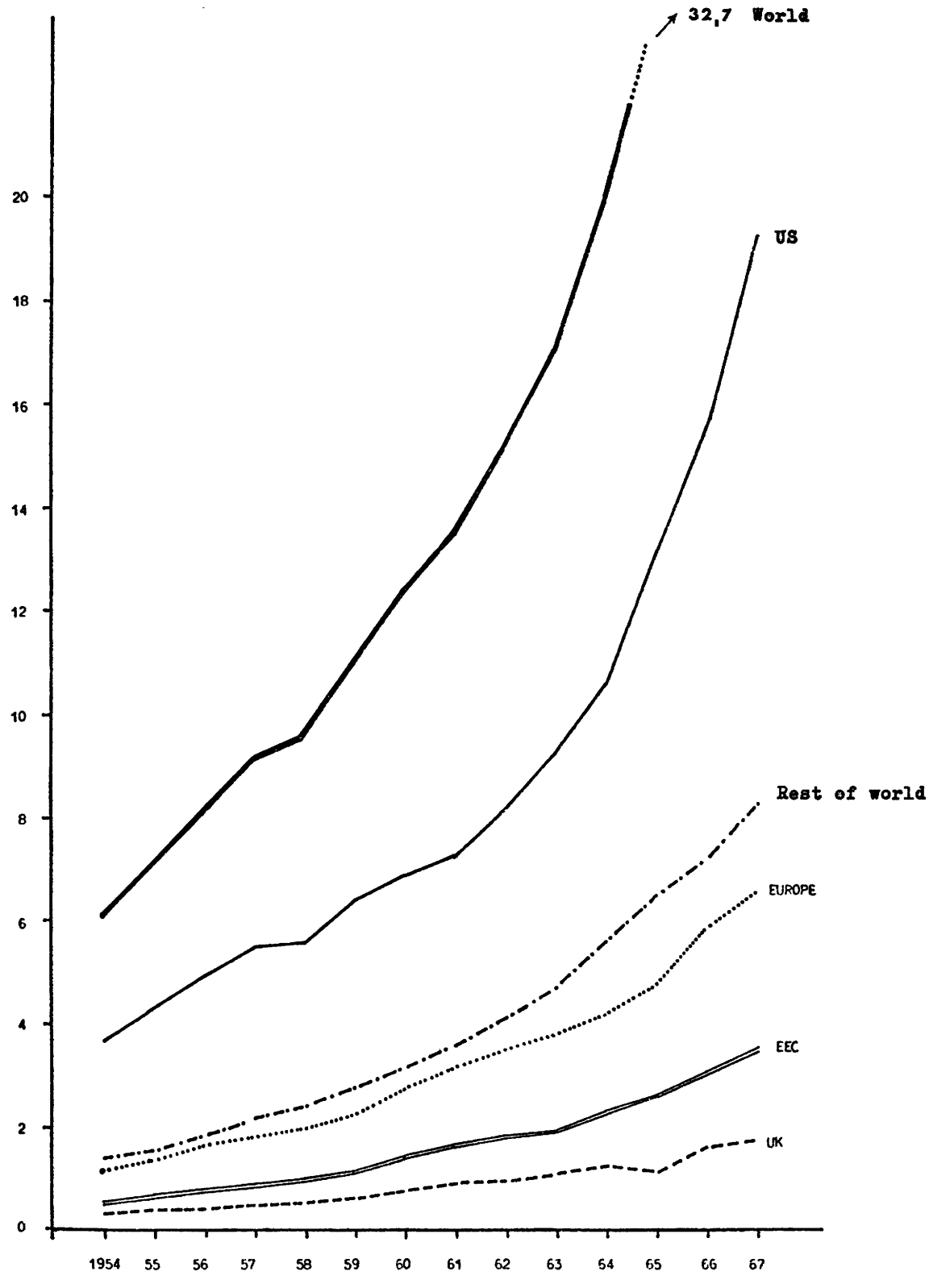
[1] The only statistics available (IATA) do not give any indications as to TKP but only as to the number of passengers and the tons of freight and mail. The estimate is taken from an ITA study by Besse and Mathieu.

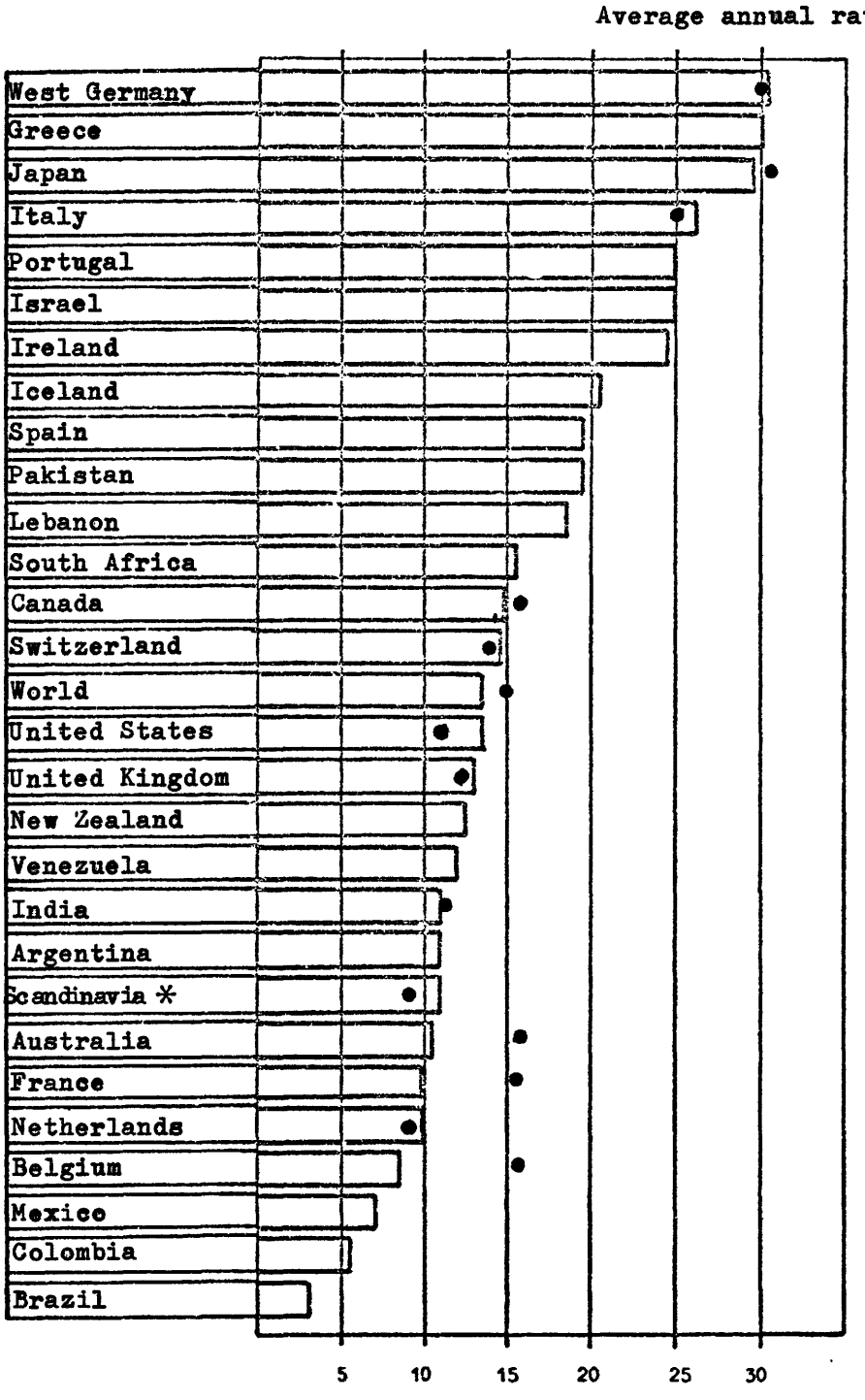
FIG. 10

Traffic Handled (1954-67)
(Millions of TKP)



Source: ICAO statistics.

FIG. 11 **Increase in Scheduled Services, by Countries (1957-67)**



● Increase in international traffic.

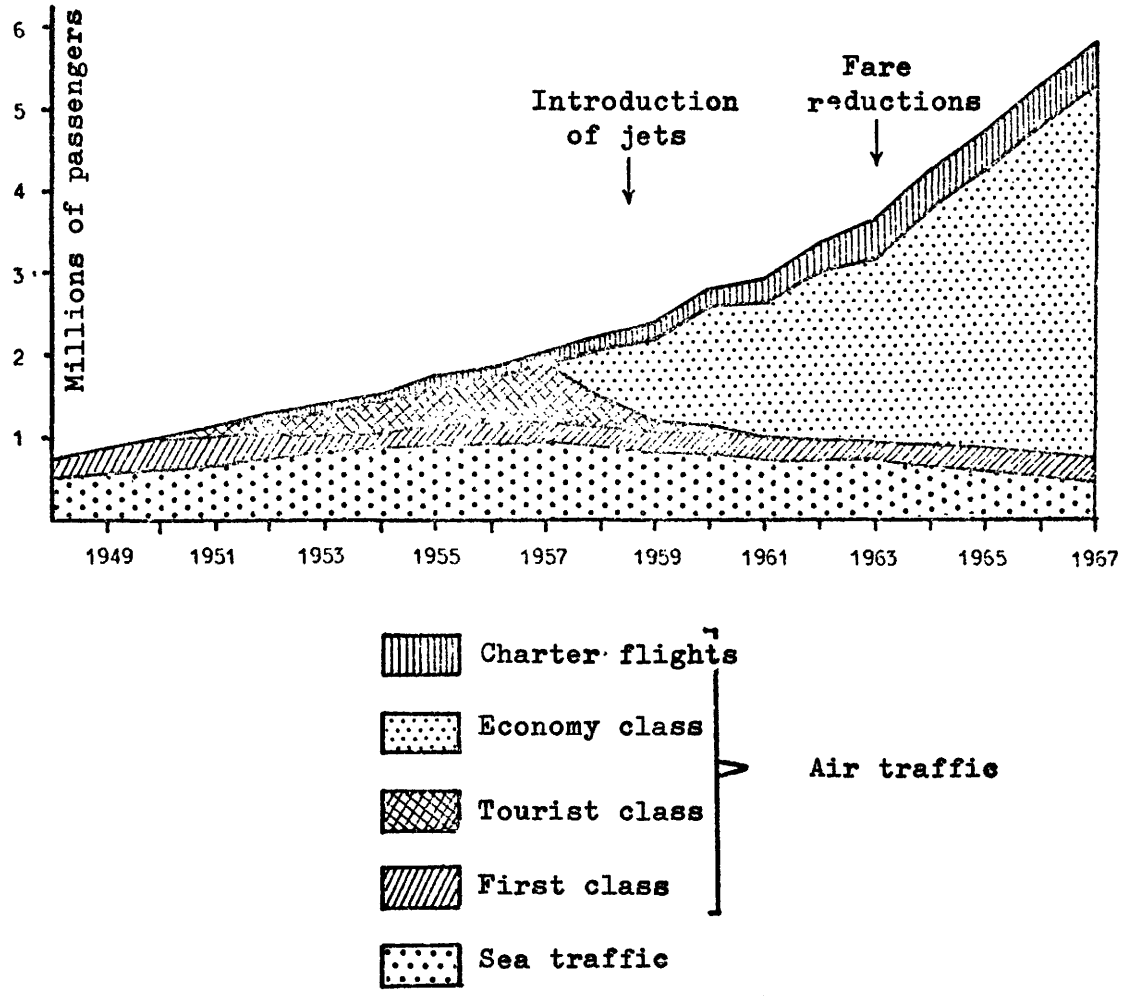
* Association of three states: Denmark, Norway and Sweden.

Source: ICAO statistics.

Up to 1964 the relative importance of North Atlantic traffic was appreciably greater for freight and mail than for passenger traffic, the North Atlantic route accounting for 16-17% of world freight and postal traffic as against 11% of world passenger traffic.

The introduction of long-range four-engined jets, which made it possible to fly across the Atlantic non-stop, at the same time reducing the time of the flight from 13 to 7 hours, together with a policy of fare reductions, has modified the structure of North Atlantic passenger traffic, as is shown in the following graph (Fig. 12):

Fig. 12 North Atlantic Sea and Air Traffic (1949-67)



Source: E Simi and J. Bankir: Avant et après Concorde.

In 1957, air traffic (49.5%) had almost overtaken sea traffic: 1,018,000 passengers as against 1,037,500. In 1967, air traffic absorbed more than 90% of the North Atlantic passenger traffic.

It is estimated that the American companies handled 36% of the traffic on this route, followed by the British (12%), French (8%), German, Italian and Canadian carriers.

With 1,400 million TKP (scheduled services), the intra-European (international) traffic of the companies which are members of the EARB[1] represents about 11% of world regular international traffic and 5.5% of total world scheduled traffic (domestic and international services).

In Western Europe, 49 companies handle 6% of ICAO world traffic over some 300,000 km of routes flown 1,000 times a year. The American companies, with a territory twice the size, have a network of 450,000 km flown more than 5,000 times a year and they handle 40% of ICAO traffic[2].

Throughout the period (1958-66) intra-European traffic developed at a more rapid rate (+209%) than US domestic traffic (+129%) and world traffic (+186%), but at a lower rate than the international traffic of the ICAO companies (+320%).

The US domestic network still constitutes the area of greatest air traffic, totalling 45% in 1966, i.e., 12,400 million TKP out of a total 27,480, even though in the course of the period (1958-66) the rate of expansion of American domestic traffic was appreciably lower than the world rate[3].

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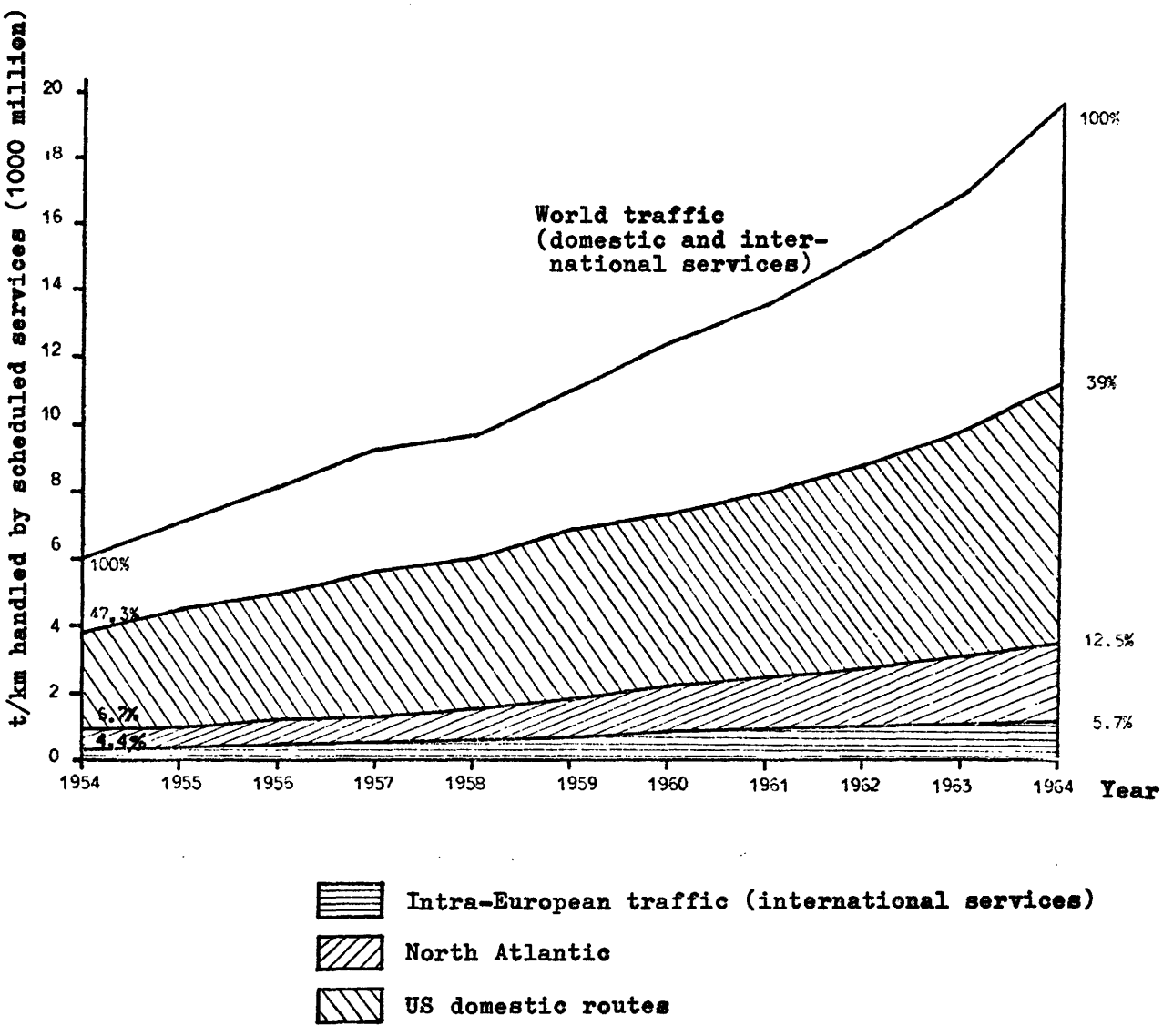
1 European Air Research Bureau, a body of which 17 European companies are members.

2 With 50 companies.

3 In recent years, air transport has gained a first-rank position in the US. In 1965 the percentage of passengers/km transported by air was 59 whereas rail and road transport accounted for only 15 and 26% respectively. In 1954 the figures were respectively 26, 39 and 35%.

Intra-European, North Atlantic and US domestic air traffic together represent about 60% of the world total (Fig. 13) and this percentage did not vary much during the period 1954-64.

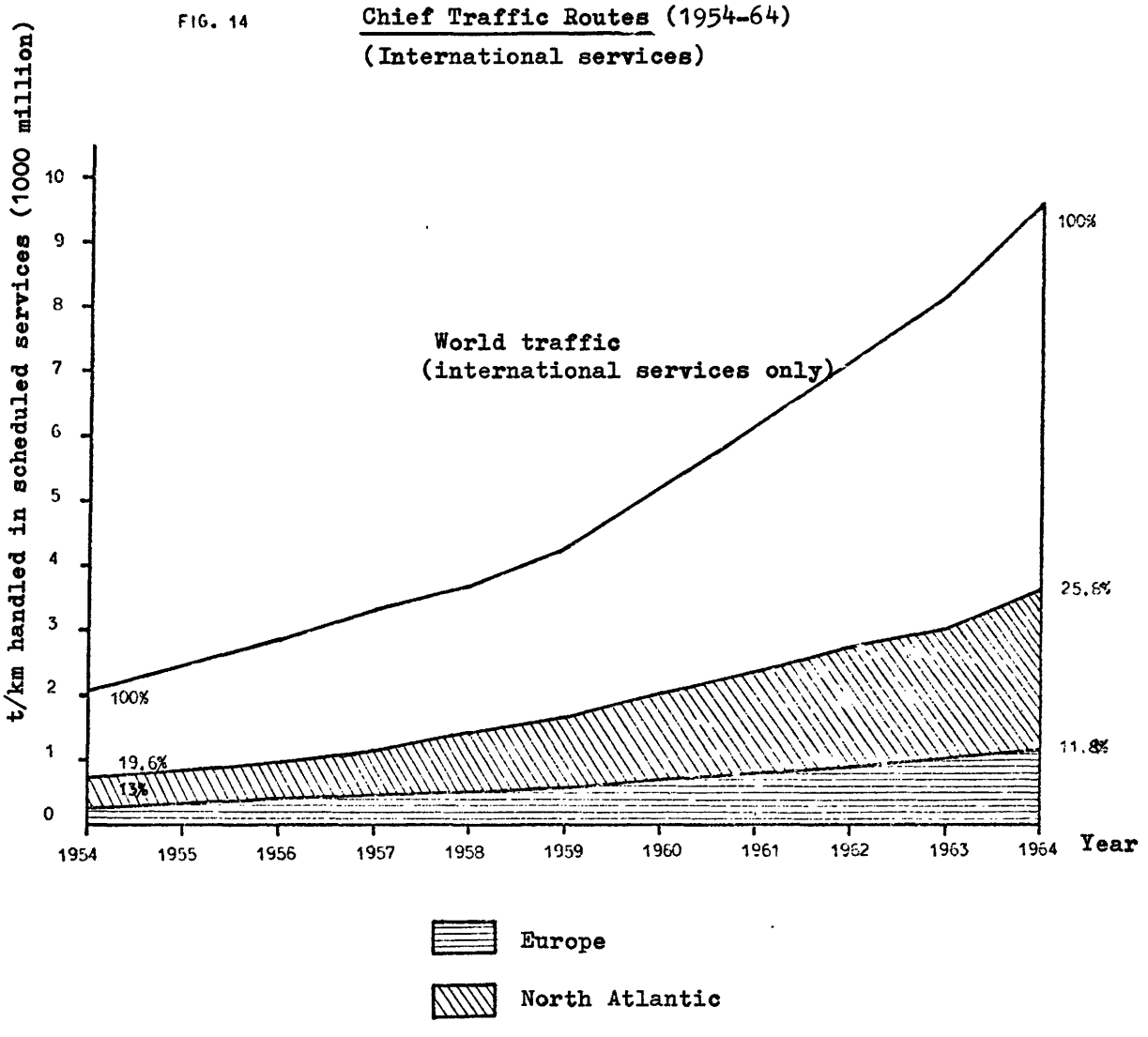
FIG. 13 **Chief Traffic Routes** (1954-64)
(Domestic and international services)



Source: G. Besse and R. Mathieu: Dix ans de transport aérien commerical, Etudes ITA, 1965.

If account is taken of international traffic alone (Fig. 14), it is found that, in 1964, intra-European traffic and North Atlantic traffic together represented rather less than 40% of the ICAO total.

FIG. 14 Chief Traffic Routes (1954-64)
(International services)



Source: G. Besse and R. Mathieu: Dix ans de transport aérien commercial, Etudes ITA, 1965.

6. STRUCTURE AND SIZE OF THE LIGHT AIRCRAFT MARKET

Definition

According to international standards, aircraft weighing not more than 5,650 kg with a normal load are considered to be light aircraft.
In the following study, however, small jets - such as the French Mystère 20 and the British HS 125 - the weight of which exceeds the abovementioned limit will be included in the general aviation category.

Use of light aircraft

The various possible uses of light aircraft include:

- commercial transport
- short distance taxi services
- scheduled short distance services
- military communications
- aerial reconnaissance and photography
- agricultural aviation (in particular crop-spraying)
- training
- travel and business
- air competitions.

Categories of aircraft

Light aircraft are generally subdivided into four main categories:

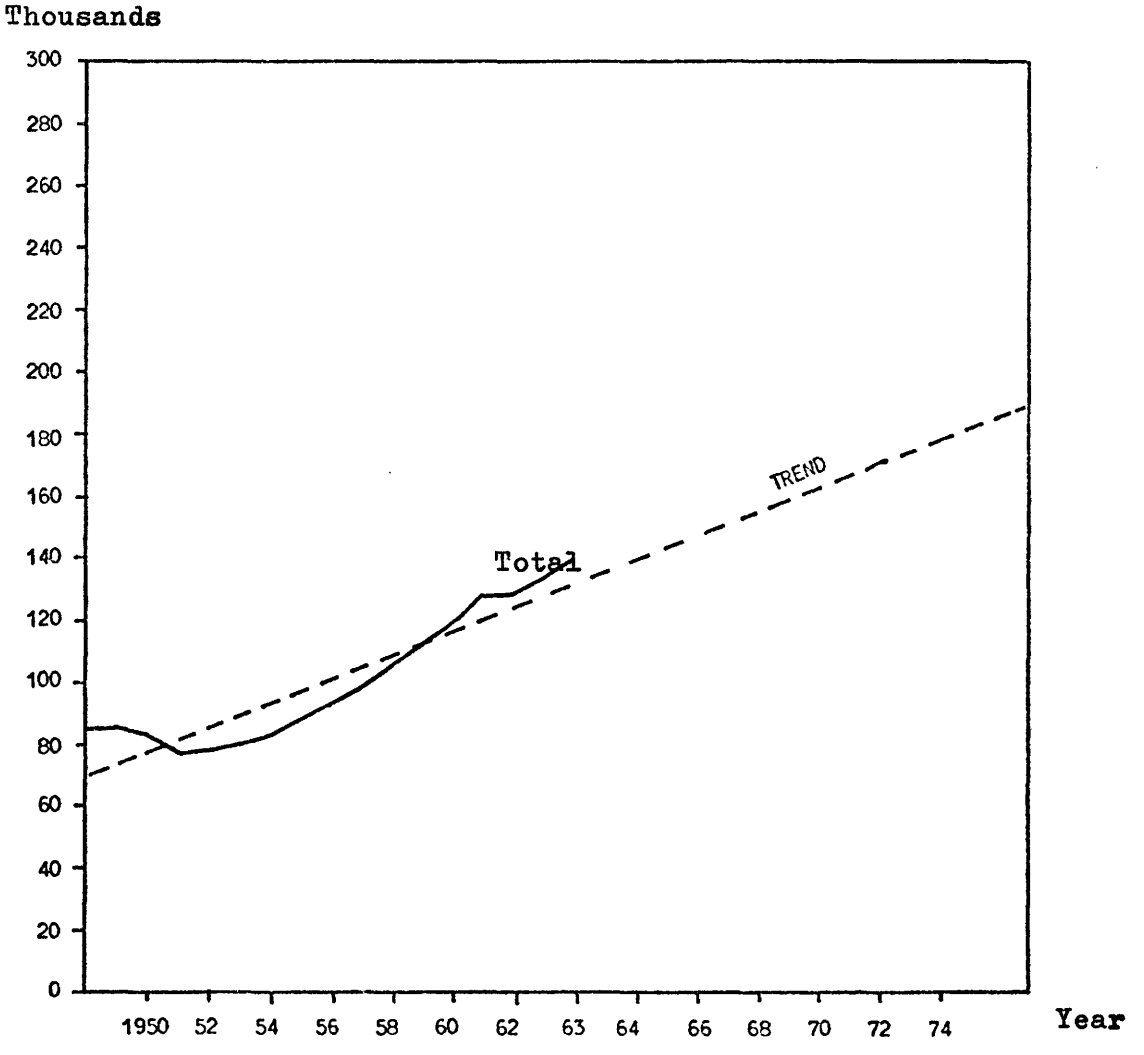
- single engined up to a maximum of four seats
- light twin-engined with five seats
- medium twin-engined with 6-8 seats
- large (up to 10 seats).

World total

In 1965 the total number of light aircraft in service in the Western world was about 140,000 units, including military planes.

The consistent growth in these numbers from 1949 to 1965 is shown by the following graph:

Light Aircraft in Service in the Western World



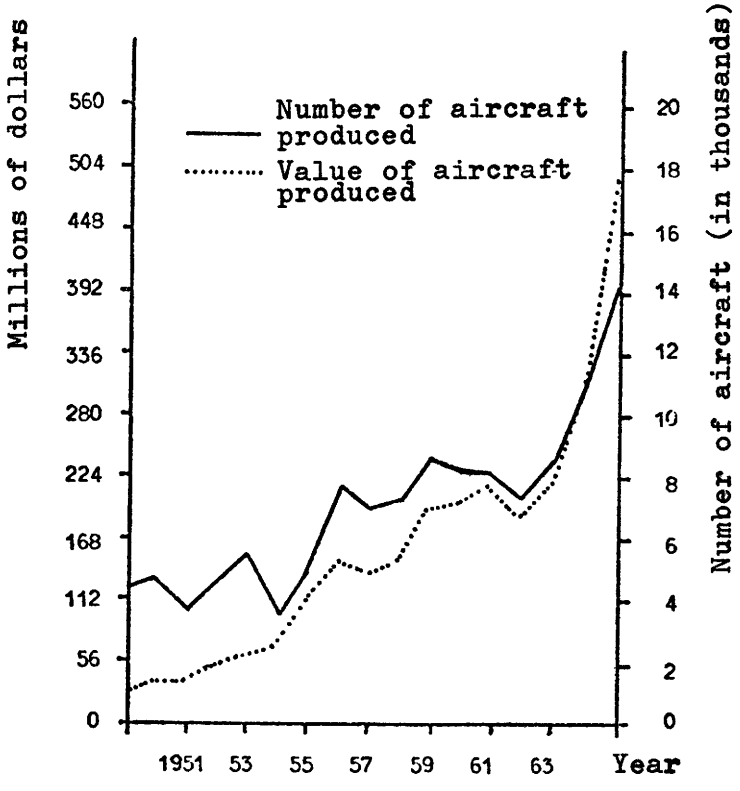
Source: L'AVIATION LEGERE, SES PROBLEMES, SES PERSPECTIVES, SES PERFORMANCES by P.G. MANSFIELD IN ETUDES AERONAUTIQUES, APRIL 1966.

The total value of the light aircraft in service in 1965 may be estimated approximately $1,700 million, of which about 700 million, in respect of 55,000 planes, relate to military aircraft and aircraft operated by airlines.

The United States consitutes the most important market for general aviation, it being estimated that about 75% of the total mentioned above is located in the US.
The French total is about 4,800 planes, the British about 1,000 and the German about 1,500.

Production

Production of light aircraft in 1965 exceeded 14,000 units and was increasing steadily (especially from 1963 onwards) as is shown in the following graph:



Source : P.G. MANSFIELD IN ETUDES AERONAUTIQUES, APRIL 1966, cit.

Of the 14,000 aircraft produced in the Western world in 1965, 12,300 were built in the United States. Of these, 2,200 were exported and 10,100 were sold on the home market.

France, also in 1965, produced 500 units, Britain 140 and Belgium 125. A comparison of the number of aircraft produced with the corresponding value shows the increase in average unit prices that marked the period 1949-65, as follows:

Year	Average unit price
1949	$5,600
1957	$19,600
1965	$35,000

The cause of the increase in unit prices was the introduction of turboprop and jet aircraft[1], which, moreover, together with the improvement of pressurization plant and instruments, contributed decisively to the development of general aviation.

Unlike the general situation in Europe, the big American producers of commercial aircraft are virtually unrepresented in the general aviation sector. Such aircraft are constructed in the United States by specialized firms, three of which account for an average of 75% of total world output[2]. Qualitatively, however, European production is of a high level, which is indicated by the fact that some European planes are constructed and sold in the US with considerable success[3].

---

[1] About 4,000 jets were built in 1965.

[2] In 1965 Cessna produced 5,629 aircraft, Piper 3,776 and Beech 1,192.

[3] Such as the D.H. 125 (UK), the Mystère 20 (France) and the Hansa 10 (Germany).

The market and its organization

The size of the United States market is such that it cannot be compared with the world market[1]. This is due to various factors - economic, social, geographical (including the special distribution of installations) and to the way in which, especially in recent years, has been organized in the USA. Mention may be made of:

(a) the abundance of available airports[2] and of landing strips reserved for light aircraft;

(b) the existence of some three to four thousand fixed base operators - genuine connecting links between the manufacturers and users - who generally supply the following services: repairs, fuel supplies, flying instruction, leasing of aircraft, charter services, purchase and sale of new and used planes.

(c) a highly developed organization for granting loans[3] to purchasers which includes, in addition to specialized credit companies and banks, finance companies specially set up by the manufacturers themselves[4].

---

[1] See the above remarks concerning the total number of aircraft in the US and the domestic demand.

[2] 10,125 in 1967 as against 306 in France, 176 in the United Kingdom and 128 in Germany.

[3] The term varies from five to seven years.

[4] This is the case with Cessna and Beech.

7. ESTIMATE OF COMMERCIAL AVIATION DEVELOPMENT IN THE SEVENTIES

7.1 Introduction

The analysis of the supply, i.e., deliveries of civil and commercial aircraft, has been divided into two sections. The first consisted in determining the future demand for air traffic (passengers and freight) on the basis of existing documentation. In the second this future demand has been converted into requirements (and subsequently into deliveries) of aircraft in 1980.

7.2 Forecasts of Traffic

In view of the existence of numerous and detailed forecasts of traffic made both by users (airline companies and their associations) and by manufacturers[1], it was felt to be unnecessary to draw up a new and different forecast of world traffic (and for the chief routes).

The approach used for the principal forecasts employed in this study may be summarized as follows:

- at user level, the forecasts cover a period of not more than 10 years and have been established mainly on the basis of the following factors:
  (a) past trends
  (b) economic indices
  (c) transport costs
  (d) flexibility (cost and incomes)[2]

---

[1] And others by the chief airports.

[2] ICAO estimates that the flexibility of demand (expressed in seats/km) is equal to 2, i.e., a 1% drop in the fares leads to an increase of 2% in additional traffic.

- at manufacturer level, the forecasts attempt to establish, at least in its broad outlines, the prospective supply for a period of 15-20 years with the object of drawing up as accurate an estimate as possible for the first ten years.

Boeing forecast

The pattern chosen by Boeing consists in a multiplicative function of the different factors raised to an appropriate power calculated on annual variations and not on absolute values[1].

The method takes account of six factors of which three are in actual fact significant - population, incomes and cost - and of one factor which is equally important: the speed of the aircraft. In regard to the cost, the study introduces the notion of "sensitivity threshold"[2] and also brings in some psychological factors.

In addition, an attempt is made to distinguish the two components in the kilometre traffic: the number of journeys and the average length of journey, which are not governed by the same influences. The number of journeys is linked with population, incomes and cost, whereas the average distance of the journey depends on the structure of the networks, the part played by airtransport in the particular country and the operating conditions.
Fig. 15 is a graphical representation of the Boeing forecast of international air traffic (passengers), by geographical areas, in 1975.

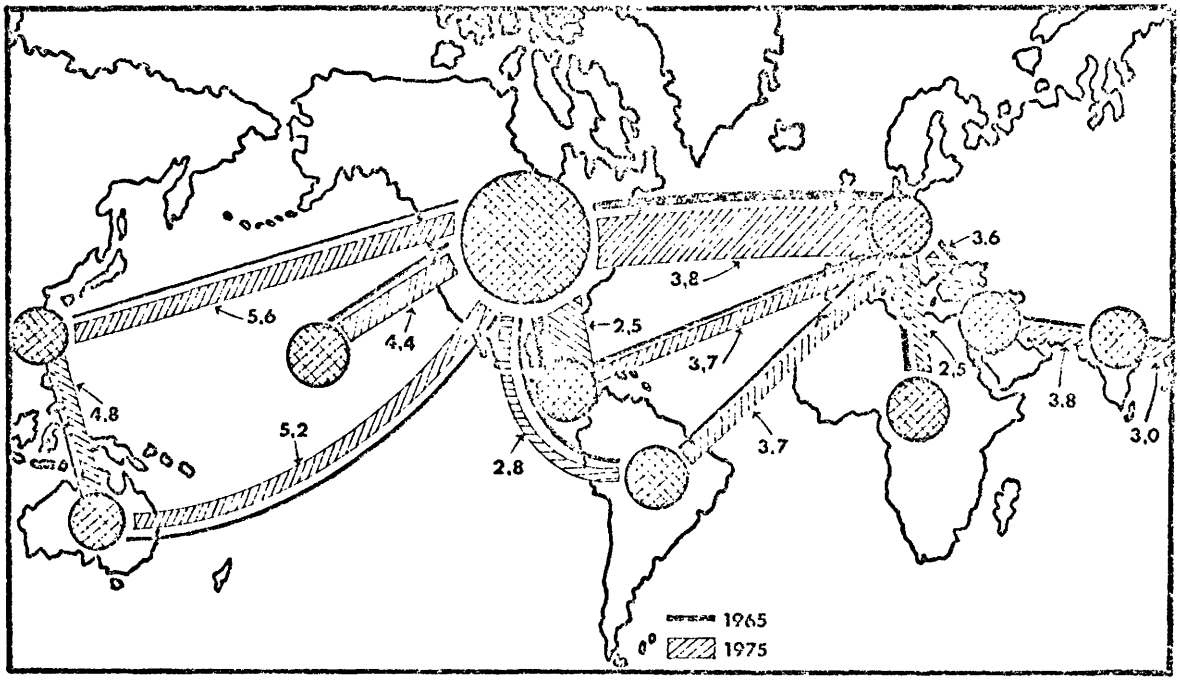
---

[1] To eliminate any correlations that may exist between the different parameters.

[2] Below which a variation in cost has no appreciable effect on demand.

FIG. 15 Boeing Forecast - International Air Traffic (1975)

(Passengers)



The area of the circles is proportional to the number of passengers travelling from or to each zone (1975 forecast). The width of the lanes is proportional to the traffic.

On the chief routes the figures indicate by how many times, according to Boeing, traffic in 1975 will be greater than in 1965.

Douglas forecast

The forecasts devised by Douglas are the result of a series of studies and partial analyses concerning:

- gross national product;
- total traffic;
- comparative development of numerous economic indices and of air transport;
- number of families who travel by air;
- total income and available income;
- portion of available income set aside for air travel.

Lockheed forecast

Analysis by sector based on:

- study of past results (trend of annual variations following on the rate of increase);
- gross national product;
- qualitative data: introduction of new transport hardware (air and ground), improvement of possibilities in the tourist field, growth of desire to travel, etc.

For passenger and freight traffic the forecasts of the three American manufacturers (Boeing, Douglas and Lockheed) and ICAO are shown in Figs. 16 and 17 respectively. In view of the striking discrepancy between the various forecasts, IATA has formulated forecast hypotheses by calculating the average values of the principal forecasts (world forecasts both for international traffic and for American domestic traffic).

The average value consist of rates of annual increases classified in three periods: 1965-70, 1970-75 and 1975-80. The classification into three periods is very important insofar as the rate for the period 1970-75 is lower than that for

the preceding period and there is (in terms of the rate of increase) an even more accentuated fall in the period 1975-80. By applying, for each period, the annual average rates to the initial traffic of 1965 we obtain the curve of the demand for transport - broken down into passengers and freight and also into international traffic and American domestic traffic - shown in Fig. 18 which is adopted in this study for calculating the forecast of the number of aircraft in service.

To obtain separate forecasts for two other important routes - the North Atlantic and the intra-European services - the average rates of the Lockheed, ICAO, Sperry and Bjorkman forecasts were calculated in the absence of IATA averages (Fig. 19). The annual average increases (1965-80) for total traffic and for international traffic are not very different from those for the period 1958-65: 13.5% (total) and 15.0% (international) as against 13.6% (total) and 15.7% (international) in the period covered (1958-65).

FIG. 16

Forecasts of Passenger Traffic

(1965-80)

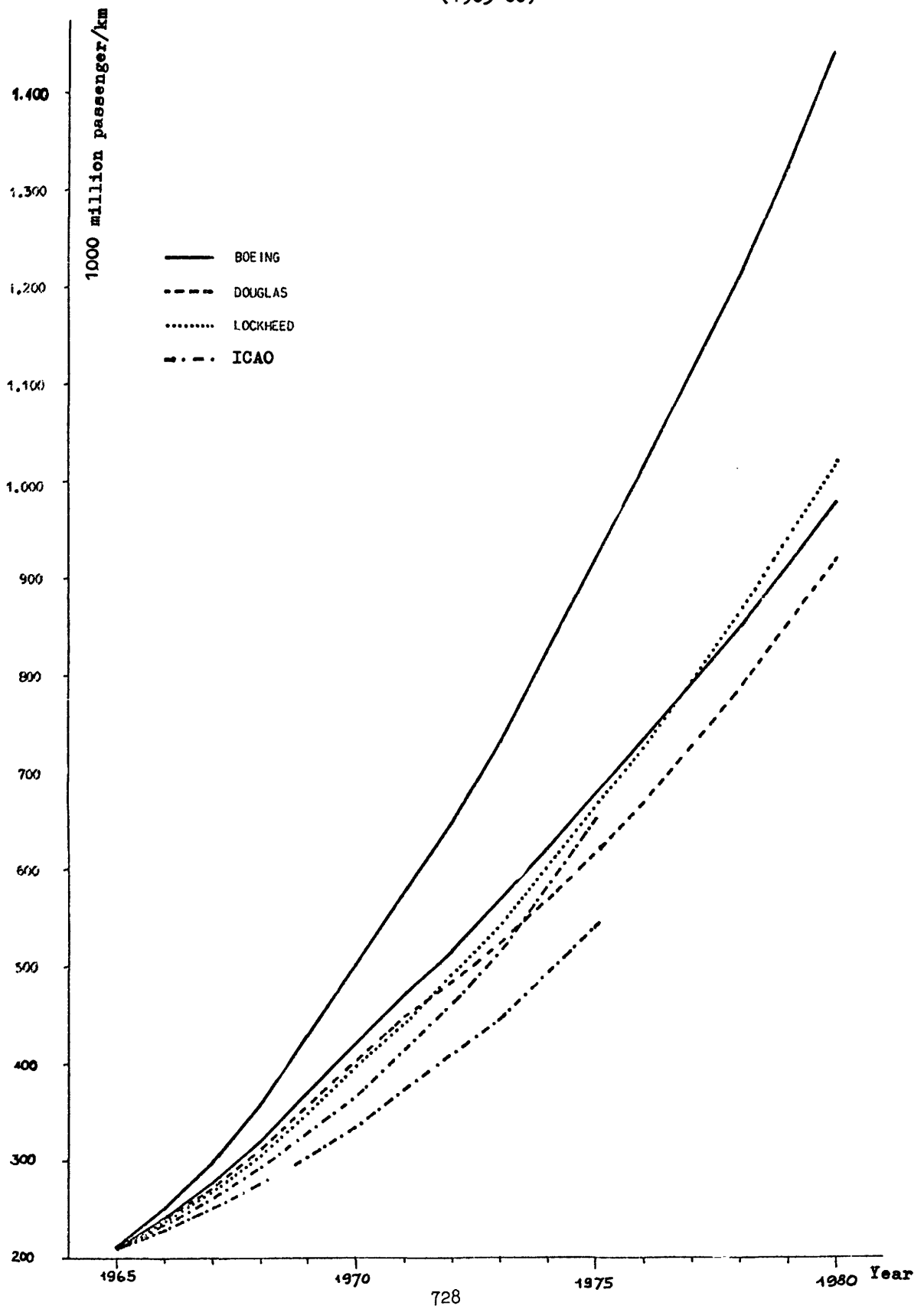


FIG. 17

Forecasts of Freight Traffic
(1965-80)

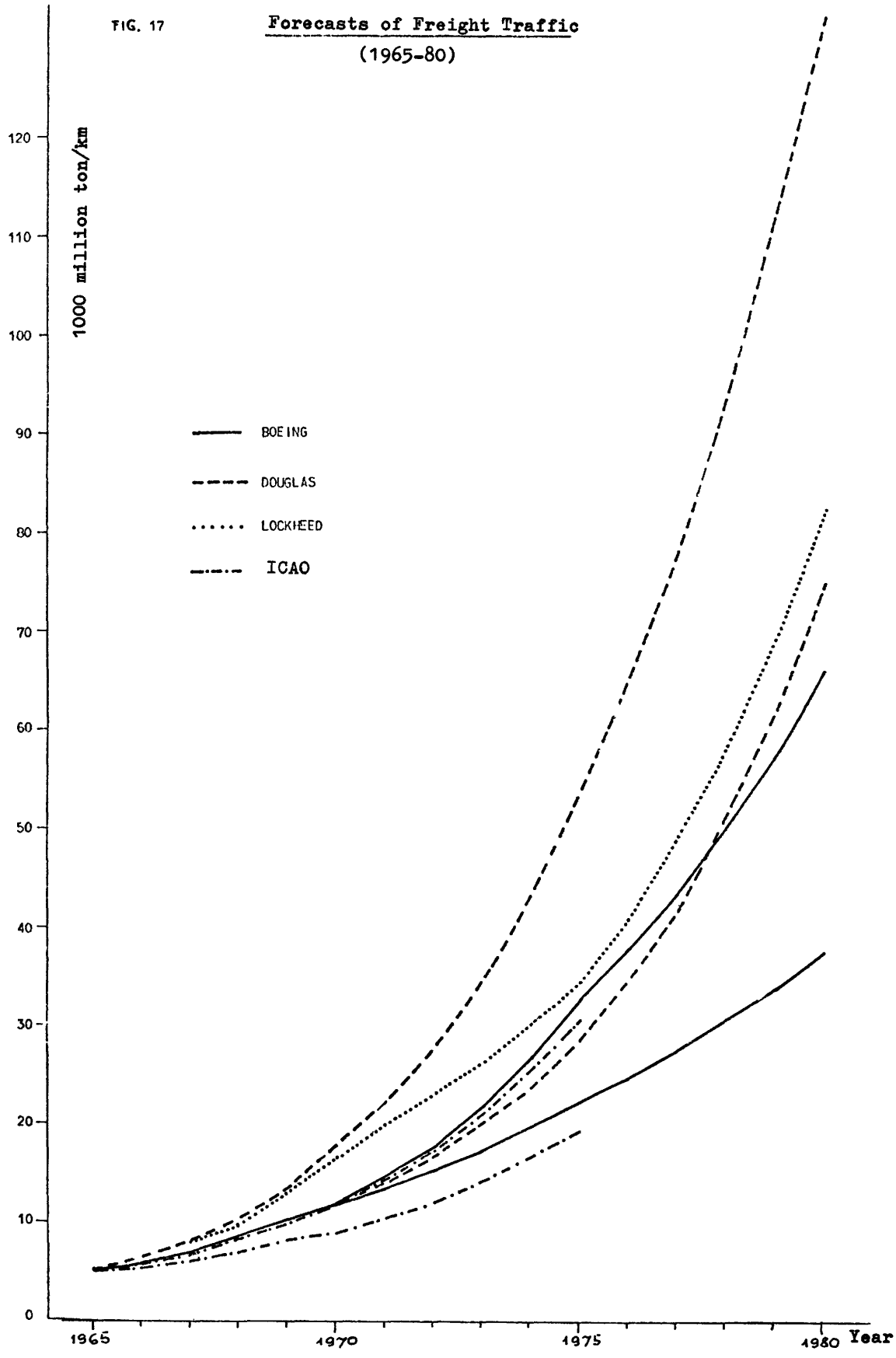
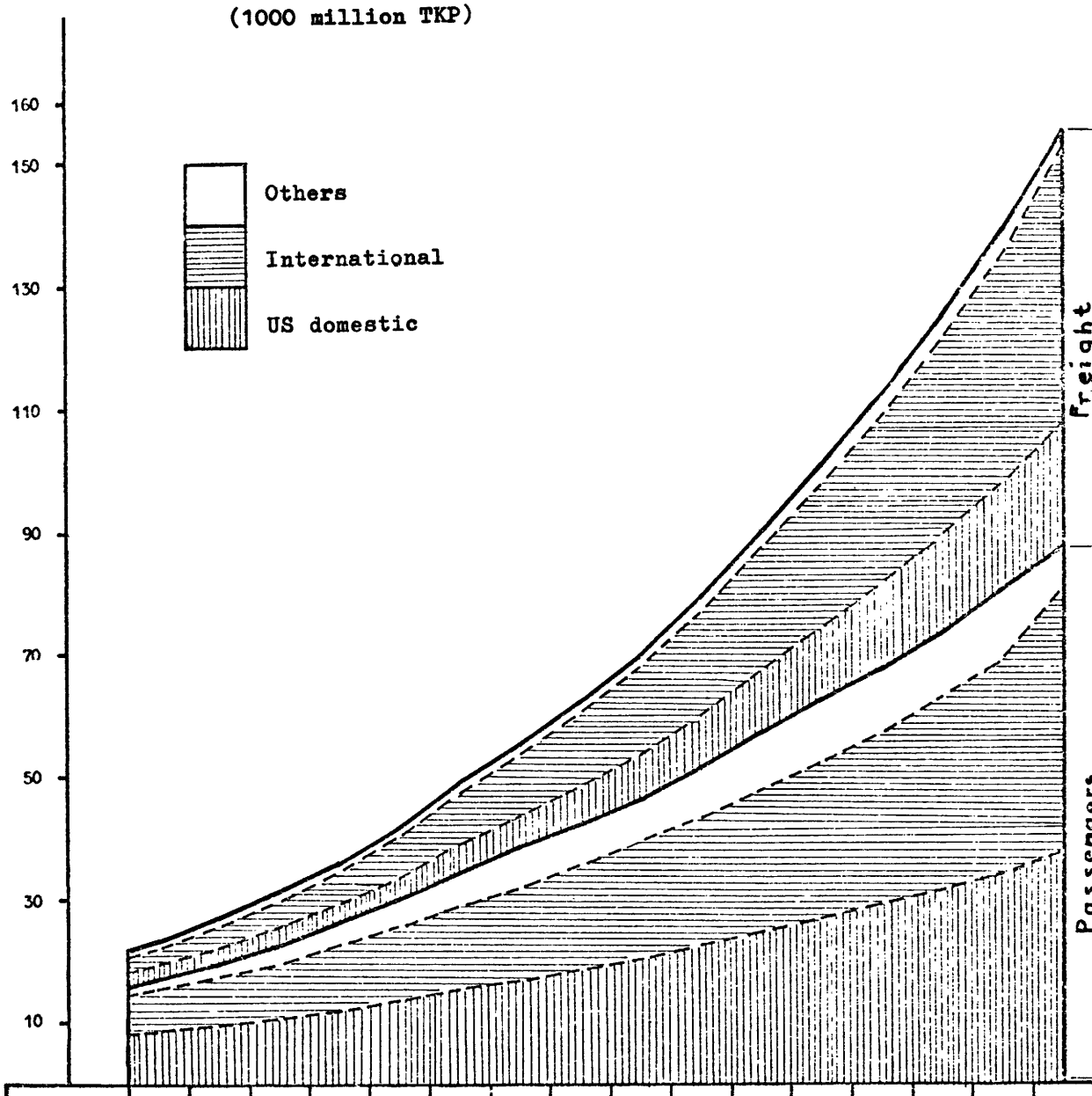


FIG. 18 **IATA Forecasts of World Passenger and Freight Traffic (1965-80)**

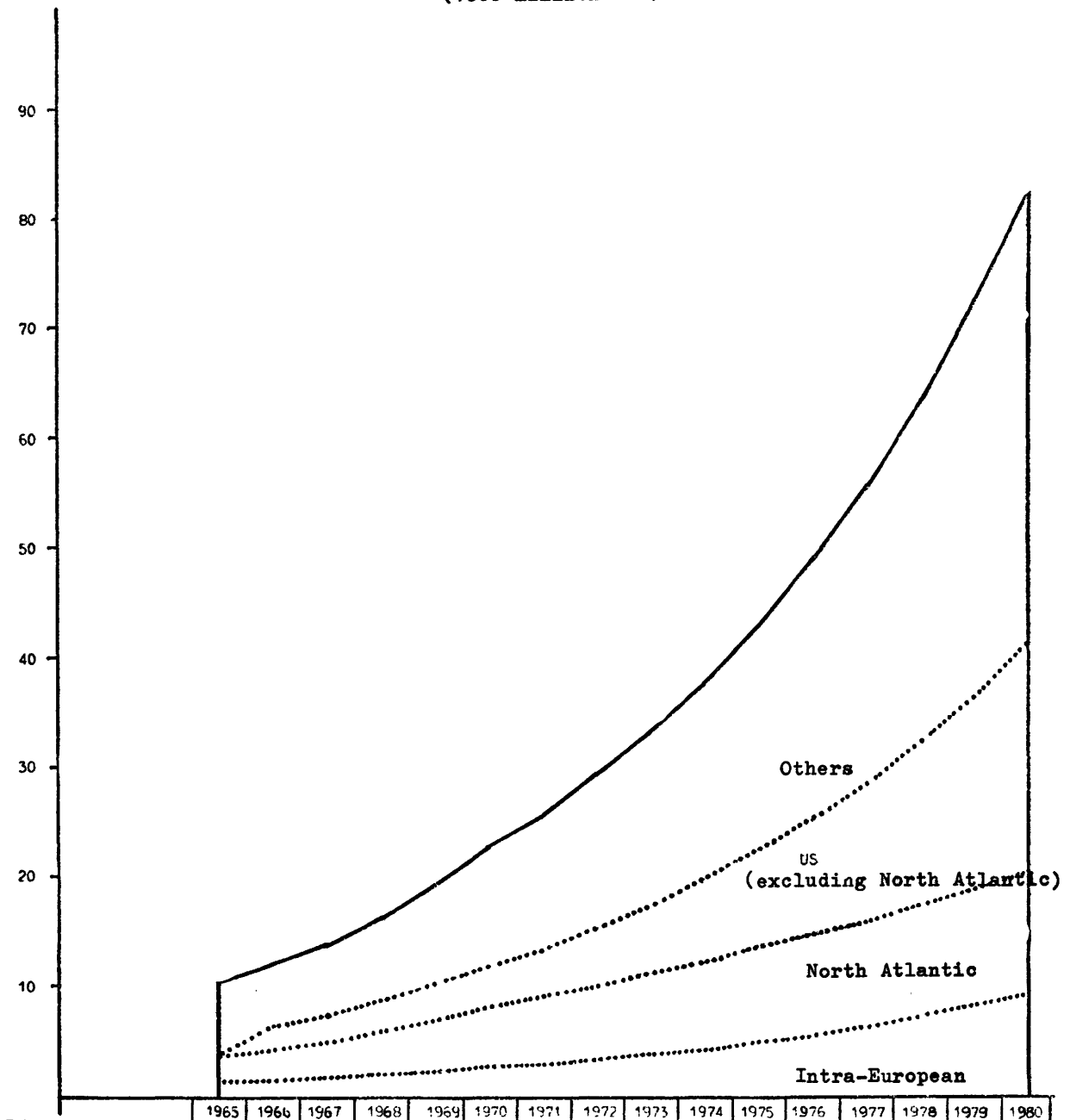


	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Passengers	17.4	19.9	22.8	26.1	29.9	34.9	38.4	42.3	46.6	51.3	57.4	62.4	67.8	73.7	80.1	87.1
Freight	6.0	7.1	8.5	10.1	12.0	14.3	16.9	20.0	23.7	28.1	33.3	38.5	41.5	51.4	59.4	68.7
TOTAL	23.4	27.0	31.3	36.2	41.9	49.2	55.3	62.3	70.3	79.4	90.7	100.9	112.3	125.1	139.5	155.8

FIG. 19 **Forecast of World International Passenger and Freight Traffic**

(1965-80)

(1000 million TKP)



	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Intra-European	1.3	1,4	1.5	1,8	2,1	2,5	2,8	3,2	3,6	4,1	4,7	5,4	6,1	7,0	8,0	9,1
North Atlantic	2,5	2,9	3,4	4,0	4,7	5,5	6,1	6,7	7,4	8,1	8,9	9,3	9,8	10,3	10,8	11,3
US	1,8	2,1	2,4	2,8	3,3	3,8	4,5	5,3	6,3	7,4	8,7	10,4	12,4	14,8	17,6	20,9
Others	4,6	5,5	6,6	7,7	9,1	10,8	12,2	13,9	15,8	18,0	20,6	23,7	27,3	31,3	36,0	41,5
TOTAL	10,2	11,9	13,9	16,3	19,2	22,6	25,6	29,1	33,1	37,6	42,9	48,8	55,6	63,4	72,4	82,8

7.3 Types of Aircraft[1]

On the basis of their respective ranges and transport capacities the types of aircraft which will be in service in the period 1969-80 have been grouped in the following categories:

- supersonic (Concorde, B 2707);
- large-capacity long-range turbojets (B 747, DC-8 (Series 60), C-5A);
- long-range turbojets (B 707, DC-8, VC10);
- large capacity medium/long-range turbojets (L-1011, DC-10, A-300);
- medium-range turbojets (B 727/200, Trident);
- short/medium-range turbojets (DC-9, B 737, BAC 111, F.28, VFW 614, Mercure).

Obviously, the types mentioned include some but not necessarily all of the aircraft that may be in service in 1980.

In this connection it should be noted that even if the majority of the aircraft are in the production or planning stage, there are considerable margins of uncertainty concerning the existence and/or the year of entry into service of some projects (e.g., the supersonics).

At the very worst it may be assumed that the ton/km offered will be made up with other types of planes. Account must be taken of the possibility that medium/short range aircraft with V/STOL characteristics may be developed and go into service.

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[1] Excluding general aviation aircraft.

7.4 Estimate of the Number of Aircraft in Service in 1980 and Demand in the Period 1968-79

The demand for air transport has been converted into requirements by numbers and types of aircraft, in accordance with subjective opinions and on the basis of specific assumptions.

In the first place it is assumed that the contribution of each individual area to the total traffic and the routes of 1980 is the same as the present one.

Another assumption is that there is a load factor which is equal to the average for the period 1957-67, i.e., 52.5% on international routes and 49.2% on domestic routes[1].
If the forecast for demand in respect of passengers and freight in ton/km units is known, the two factors can be used to forecast the total TK available for passengers and freight and also for routes and categories of traffic (Table 3/11).
Once the total TK available and its subdivisions are known, as was stated above, a breakdown by category becomes possible (Fig. 20) on the basis of the productivity of each category[2] and of the possible market penetration of the different aircraft produced.

It has been assumed that the total demand for aircraft is made up partly of the additional demand (for the additional traffic) and partly of the demand for replacements (in respect of the part covered by aircraft due to be withdrawn from service).

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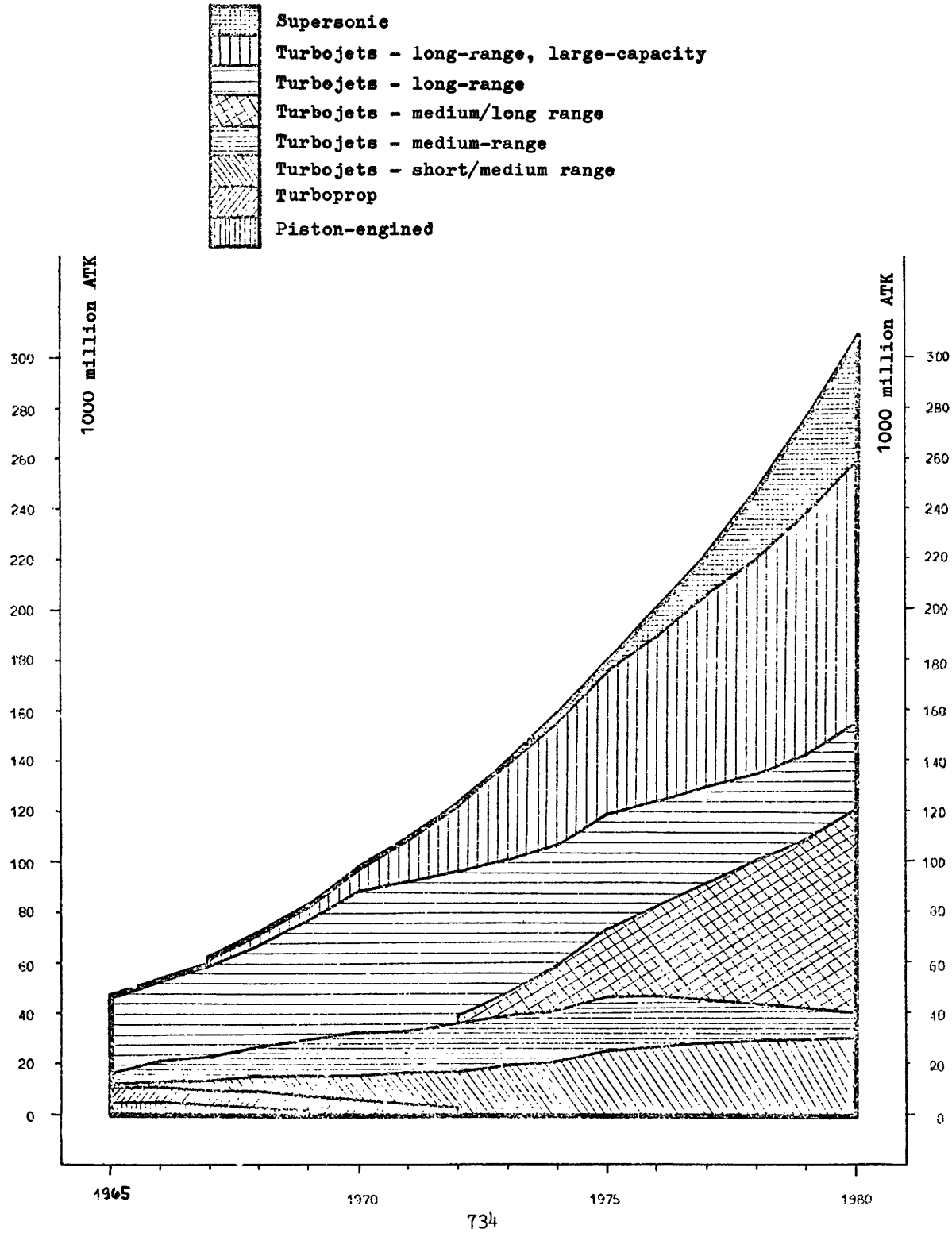
[1] These coefficients are lower than the figure which the companies normally consider to be the optimum (55%). It is also felt that a certain reduction is acceptable for the future insofar as the effects must be felt of the increase in capacity offered due to the introduction of high-capacity aircraft.

[2] Calculated on the average annual utilization, the speed and the capacity.

FIG. 20

Estimate of the Breakdown of the Commercial Aircraft Market by Categories of Aircraft (1965-80)



The distribution of ATK by categories of aircraft has been worked out at world level and for each market area.

In this phase the chief factors considered are unrelated to the demand for air transport and are linked with:

- the dates for the planning-out of the turboprop aircraft and the first jets;
- the introduction of new types;
- the rate of delivery planned by the major manufacturers.

With reference to the first two points, the assumptions are as follows:

(a) The Viscount and Electra turboprops are to be withdrawn from service during 1969.

(b) The jet aircraft will be gradually phased out starting from the year shown opposite the name of each type:

1.	CV 880/990	1968
2.	DC-8	1969
3.	Caravelle	1970
4.	B 720	1970
5.	B 707	1970
6.	VC10	1973
7.	BAC 111	1973

(c) The new aircraft will be introduced in the following order:

1.	B 747	1970
2.	L-1011 and DC-10	1972
3.	Concorde	1972
4.	A-300	1973
5.	Mercure	1974
6.	B 2707	1976

The initial estimate of the demand for aircraft has also been critically revised in the light of the pattern of orders placed by the companies in each area. Successive approximations have ultimately led to the determination of the hypothetical demand of the airline companies in each area, by types of aeroplane.

Requirements, by categories, have been converted into deliveries of aircraft at an interval (generally one year) ahead of the time they are actually needed.

Finally, forecasts of purchases of aircraft were later corrected on the basis of the orders anticipated, up to 1980, by the chief manufacturers[1]. It should be pointed out that this estimate represents one of the possible solutions and not necessarily the most accurate.

The uncertainty is due above all to the fact that different categories of aircraft can be used alternatively on the same route and this renders the breakdown of traffic on such route, by categories of aircraft, more speculative[2].

Amongst other factors, the uncertainty concerning the marketing of supersonic planes is particularly significant, there being a possibility that regulations may be drawn up with the object of limiting their use over certain areas because of the sonic boom. Restrictions on landing rights and permits to fly over areas of high traffic density are also possible.

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[1] And also having regard to the fact that in the aerospace sector supply is more rigid than demand.

[2] That is to say, dependent on factors that are difficult to predict by economic statistics.

According to the estimates the world fleet in 1980 should be composed of 7,240 jet aircraft, with a value, at 1967 prices[1], of $90,000 million. World demand in the twelve-year period 1968-79[2] should not be much different from this figure. The breakdown of demand by major geographical areas in the twelve-year period considered has been assumed to be as follows:

	Value		Aircraft	
	$million	%	Units	%
Europe	21,630	24.2	1,769	23.9
Canada	4,262	4.7	448	6.1
US	53,164	59.4	4,239	57.4
Central & South America	2,659	3.2	328	4.4
Middle East	959	1.1	77	1.1
Far East	5,365	6.0	408	5.5
Africa	1,295	1.4	120	1.6
TOTAL	89,534	100.0	7,389	100.0

In particular, the distribution of demand at the European level is found to be as follows:

	Value		Aircraft	
	$million	%	Units	%
EEC Countries	12,362	57.1	832	47.0
United Kingdom	5,350	24.7	490	27.7
Total EEC + UK	17,712	81.8	1,322	74.7
Other European Countries	3,918	18.2	447	25.3
TOTAL EUROPE	21,630	100.0	1,769	100.0

[1] 20% of the basic price is included as initial allowance for spare parts.

[2] See Tables 3/12-15.

The share of world demand (in value) accounted for by the EEC, UK and US is respectively 13.8, 11.2 and 59.4%, whereas at the level of European demand (24.2% of the world total) the share of the EEC is 57.1% and that of the UK 24.7%.

7.5 Qualitative Characteristics of the Demand for Commercial Aircraft in the Seventies

The forecast of a substantial increase in freight and passenger traffic in the seventies is now accepted by all the airline companies.
This forecast rests in fact on a fairly sound basis. Even supposing minimal increases in present fares, the rise in per capita income in the states which today provides a large percentage of the demand for air transport should guarantee an increase in the demand itself.
The assumption of a trend towards higher fares, in real terms, does not, however, seem to be acceptable to us and the variations in recent years merely confirm this view.
The forecasts of an increase in the demand for air transport may therefore be regarded as objectively realistic.

In this context the question arises of what is likely to be the attitude of the airline companies and what policies they will adopt to maintain the profitability of their undertakings. It would appear that the solution can be found only in greater productivity with respect to management, the services offered and the equipment employed. At the management level, activity should be developed mainly in two directions: automation of certain operations (e.g., check-in, seat reservations, etc.) and reduction of the high cost of ground facilities, training of flying personnel, etc., this being a programme that can be carried out by setting up associations of the ATLAS type.

At the level of the services offered more consistent efforts should be made along the lines already indicated in the form of charter flights and package tours, which ensure high utilization factors for the planes thus employed.
Such arrangements have, however, a wider significance. Through them the airline company offers its own clients a range of services of which the most typical, i.e., air transport, constitutes a part that is sometimes by no means predominant.

The activity of the airlines therefore seems destined to become more far-reaching and more diversified and their image will as a result undergo a change.
Greater productivity with regard to the equipment employed must be pursued through a diversification of the equipment itself in terms of the services offered, the type of transport and the different routes. If an adequate demand for transport is assumed, the possibility emerges of specializing the machines in relation to the features of the demand.
The B 747 freight carrier, intended solely for the transport of containers, is only the first striking example of what may be expected in the future.

Linked with this problematical aspect there is also a further factor, namely, the introduction of jumbo jets and supersonic aircraft on intercontinental routes. It seems clear already that the entry into service of these aircraft will have considerable repercussions on the policy of the various countries with regard to airports. The general lines of this policy are practically laid down already in the sense that a few airports within each country will be equipped and specialized for intercontinental traffic. Though not so far-reaching, there will certainly be similar effects when large medium-range aircraft (the Airbus) go into service.

The characteristic feature of the airport networks of the various countries will therefore have to be the existence of a limited number of airport centres to which it will be necessary to direct the flow of passengers and freight coming from other cities and vice versa. This therefore foreshadows a new type of specialized transport (airport to airport) using medium/short and short-range aircraft, the volume of which will doubtless be considerable.

The need to employ appropriately designed aircraft on these routes is self-evident and the airline companies interviewed have explicitly admitted this.

To revert to the subject of this short chapter, it may be expected that in the seventies the airline companies' demand for commercial aircraft will be more diversidied than in the past, which may have favourable implications for European manufacturers, who are in the forefront, in two fields of study that are fairly promising, namely, short take-off and vertical take-off aircraft.

PART 2

The market for military aircraft and missiles

1. MILITARY AIRCRAFT AND MISSILE FORCES OF THE EEC MEMBER STATES, THE UNITED KINGDOM AND THE UNITED STATES

European and United States military aircraft and missile forces at the end of 1967[1] broke down as follows (total and by country of origin[2]):

EEC, UK and US Military Aircraft and Missiles

at 31 December 1967

Country	Total number		Country of origin				
	Units	%	EEC	UK	US	Other European countries	TOTAL
BELGIUM	749	1.6	21.8	0,5	77.7	-	100.0
NL	931	2,0	16.9	1.3	81.8	-	100.0
ITALY	1,033	2,2	29.1	0.2	70.7	-	100.0
GERMANY	3,758	8,0	50.5	2.6	46.9	-	100.0
FRANCE	3,400	7.3	67,6	-	32.4	-	100.0
TOTAL EEC	9,871	21.1	48.8	1.2	50.0	-	100.0
UK	3,795	8,1	0.6	85.9	13,5	-	100,0
TOTAL EEC + UK	13,666	29.2	35,4	24,7	39.9	-	100,0
US	33,064	70,8	-	-	100.0	-	100,0
TOTAL EEC + UK + US	46,730	100.0	10.4	7.2	82,4	-	100.0

1 See Tables 3/16-18. The airforces of the EEC countries and of the United Kingdom are described in detail in the respective national reports.

2 Cases of EEC/UK collaboration have been classified under the EEC; cases of construction under US licence have been taken to be of US origin and cases of Canadian construction as of US origin. Equipment of Soviet origin has not been taken into consideration.

The conventional value of the airforces of the EEC, UK and US at the end of 1967[1] has been estimated respectively at $10,276, 5,083 and 40,650 million. The breakdown by Community member countries and the origin of the different forces is shown in the following table:

	Total value		Country of origin (%)				
	$ million	%	EEC	US	UK	Others	TOTAL
BELGIUM	608	1.1	30.3	69.6	0.1	-	100.0
NL	643	1.1	13.5	85.9	0.6	-	100.0
ITALY	1,408	2.5	19.6	80.3	0.1	-	100.0
GERMANY	4,282	7.6	24.8	74.5	0.7	-	100.0
FRANCE	3,335[2]	6.0	78.6	21.4	-	-	100.0
TOTAL EEC	10,276	18.3	41.2	58.5	0.3	-	100.0
UK	5,083	9.1	10.9	26.1	63.0	-	100.0
TOTAL EEC + UK	15,359	27.4	31.1	47.8	21.1	-	100.0
	40,650[3]	72.6	-	100.0	-	-	100.0
TOTAL EEC + UK + US	56,009	100.0	8.5	85.7	5.8	-	100.0

[1] See footnotes 1 and 2 on the previous page.

[2] Excluding the FNS (nuclear strike force).

[3] Excluding non-ballistic missiles.

In terms of value, the share of the total aircraft and missile forces of the three areas[1] accounted for by the US (72.6%) is striking. Beyond this, although significant in itself, the absolute value of the US aircraft and missile forces is impressive ($40,650 million)[2]; even more noteworthy is the fact that 85.7%[3] of the forces of the three areas are of United States origin (as against 8.5% EEC and 5.8% UK).

The examination carried out below with reference to defence expenditure and to the general pattern of developments in the military aviation sector in the EEC and in the UK will help to explain the reason for this difference. The fact remains, however, that it is impossible not to be struck by the vast extent of the domestic military market in the US.

This fact, together with the similar finding which emerged in regard to the civil market, provides some explanation of the size and vitality of the US aerospace industry.

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[1] EEC, United Kingdom and United States.

[2] To which must be added $15-20,000 million for non-ballistic missiles already delivered to the three services.

[3] Equivalent to $47,906 million.

2. EXPENDITURE AND TRENDS IN MILITARY AVIATION AND MISSILE SECTORS

The potential market for military aircraft and missiles in the EEC was, throughout the period prior to 1968, far from negligible, especially in relation to the size of the EEC space industry.

Defence spending in the EEC[1] in the period 1958-68 was on average 17-18% of the US figure, whilst the EEC space industry had in the same period a payroll equivalent to 14-16% of that of the US space industry.

On the other hand, the situation was quite different in the UK, where the space industry, with a payroll equal, on average, to 25% of that of the US, had at its disposal a military market which, in terms of total expenditure on defence, amounted to barely 10% of the US market at the beginning of the period and then fell to little more than 7% in 1968.

It is true that the EEC/US ratio in regard to total defence spending cannot be directly transferred in the same way as the ratio for procurements from the space industry. Expenditure for the purchase of missiles and military aircraft by the EEC accounts on average for barely 10% of all defence spending, whereas in the United States it amounts to as much as 15-18% of the total. Account must also be taken of the fact that, in the EEC group, some countries also include under the head "procurements" expenditure that would be more properly listed under R&D.

Although in size it is by no means negligible, the EEC military space market has never formed a single unit. It should

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[1] See Table 3/19.

rather be regarded as a non-homogeneous group made up of so many national, for the most part independent markets. The influence of its total size has never in practice made itself felt, at all events as far as the EEC space industry is concerned.

It is only within the framework of NATO that it was for a certain period possible to ensure the utilization of equipment which was common to the various nations (F-104G, the Hawk and Sidewinder missiles) and was produced under US licence by the EEC space industry.

The manufacture of such equipment, although it has exercised a notable influence on production capacity and on the mastery of certain technologies employed in the manufacture under licence of aircraft and missiles, has nevertheless not proved capable of constituting a common basis on which to develop international projects for the continuation of the R&D effort within the EEC.

Furthermore, France did not participate in this, so that the influence of NATO joint production, however great, ultimately proved to be of limited duration.

The general pattern of the EEC market for military missiles during the period 1958-68 may be subdivided into two phases[1]:

a) In the first phase (up to 1965) several EEC countries (Belgium, Netherlands, Italy, Germany) collaborated in the joint production of aircraft and missiles within the NATO framework (F-104G, G91, Hawk, Sidewinder) with the aim of modernizing their respective armed forces, which up till then had been supplied with equipment obtained

[1] The "National Reports" relating to the EEC member countries and to the United Kingdom contain a detailed description of the policy of the various states in regard to the aircraft and missile sector.

from the US or from the United Kingdom as MAP aid or, to a lesser extent, purchased from those countries.

(b) In the second phase, all attempts at joint production within the framework of NATO having been abandoned, each country pursued its own policy for procuring aircraft and missiles, sometimes in association with other states, whether or not members of the EEC (UK), by means of special programmes (Transall, Atlantic, Jaguar, Anglo-French helicopters, etc.).

In this second phase a special contribution to collaboration was made by France which, as already stated, had not taken part, in the first phase but had pursued the independent development of home-grown aircraft and missiles to replace those obtained from the United States or manufactured under British licence.

The end of the period thus was marked by the complete break-up of the potential single market constituted by the EEC member countries.

Belgium and the Netherlands pursued a policy of procurement abroad, combined with subcontracting to their own aerospace industry, the first being oriented towards France and the second towards the US (or the Canadian subsidiaries of the US industry).

Germany, except for the Transall and Atlantic programmes already mentioned and others in the tactical missile sector in collaboration with France, adopted a policy of purchasing US material (directly or under licence) for its short- or medium-term needs and placed contracts with its own space industry for a series of advanced studies, particularly in the VTOL sector, with the object of enabling it to produce its own designs at a later stage.

Italy continues its policy of manufacture under licence of US aircraft and missiles in order to ensure work for its own space industry, which, however, also carries out certain programmes which are of considerable technical sophistication, even though strictly confined to the national framework (G91Y, G222, M.B.326).

France continues to draw on its own industry, using French-designed aircraft, and resorts to the US only for the procurement of special equipment required in small quantities. In the missile sector it is developing its own nuclear strike force and has gone so far as to produce ballistic missiles of its own design, as well as a whole series of home-grown tactical missiles.

During the same period Britain also has passed through two phases. In the first it endeavoured to maintain its own armaments industry at the level hitherto reached, entrusting it with the construction of a whole series of prototypes of aircraft and missiles of advanced design, probably more from motives of technological prestige and in the hope of exports than in order to meet the real need of national defence.

This policy was suddenly abandoned because of the continually rising costs entailed. After having procured or sought to procure direct from the US sophisticated hardware for its own forces (Polaris, F-111) for the purpose of keeping the qualitative level equally high, the United Kingdom resigned itself to a down-grading, both qualitative and quantitative, in the aircraft and missile sector, thereby aligning itself with some of the EEC countries. Towards the end of the period the United Kingdom thus found itself in the position of having abandoned the development of advanced home-grown designs, limiting

itself, on the one hand to the manufacture under licence or the procurement of US equipment and, on the other hand, to financing its own space industry only for the carrying out of programmes that were easily "exportable" or could be implemented in collaboration with French industry (light fighter planes, trainers, helicopters, tactical missiles, etc.).

The dispersal of effort, both among the various countries and within individual countries, resulted in American influence remaining very strong throughout the period, with the sole exception of the case of France, as has been seen.

3. ASSUMPTION CONCERNING DEVELOPMENT OF THE DEMAND FOR MILITARY AIRCRAFT AND MISSILES IN THE SEVENTIES

3.1 Introduction

Any forecast of the military market for aircraft and missiles in the EEC countries must be based on appropriate assumptions concerning:

(a) the armed forces budgets of individual countries for the procurement, maintenance and repair of aircraft;

(b) the needs of the armed forces of the individual countries.

In regard to point (a), two different assumptions are possible; The first is that the military expenditure of the individual countries remains constant at the absolute value it had reached in 1967. The second is that this expenditure represents a more or less constant percentage of the GNP of the individual countries and therefore increases by an average of 4% each year[1] during the period under investigation. Depending on the country considered, one or other of the two assumptions is taken as the "more probable" on the basis of the trend shown by military expenditure in the period 1957-67 and, where known, on the basis

[1] Average annual compound rate of increase.

of the declared policy of the government of the country in question.

The needs of the armed forces of each country for aircraft and missiles have been estimated, for the period under consideration, on the assumption that they maintain their operational efficiency at a constant level, i.e., replacing aircraft and missiles by others of more modern design as soon as those which they possessed in 1967 become obsolete. Replacement is on the basis of equivalent operational efficiency of the type of aircraft or missile and not simply on that of numerical parity.

In the case of classes of aircraft which are found during the period to be no longer tactically efficient, provision is made, if necessary, for their replacement by other classes (e.g., the replacement of light aircraft for the army air forces by helicopters) whilst maintaining in service, for auxiliary duties, the types henceforth functionally obsolete until the supply of them is exhausted.

An assumption of this kind presupposes that, during the period considered, the defence of the EEC member countries is not completely divorced from the NATO framework and that therefore the European countries do not need to provide themselves with their own intercontinental missile forces or to increase the operational efficiency of their own armed forces. It presupposes also that, during the period under consideration, there will not be any international crises of notable importance. This was the basic assumption underlying the estimate of the size of the military markets of the EEC and the United Kingdom in the period 1968-80.

For a satisfactory estimation of what part of this market can be supplied by the EEC or United Kingdom space industry and

what part must be supplied by the space industries of other countries it is, however, essential to draw up certain working hypotheses, which in the context of this study have been defined as follows:

(a) For political reasons the governments of the EEC countries will place orders for the production of aircraft and missiles with the national space industries, reserving for them the status of "privileged supplier", in order to reduce the cost of the supplies themselves also.

(b) Only when, for the production of a certain type of aircraft or missile, it might become necessary to introduce into the EEC some completely new technologies which have never been tried out previously, even at the level of a prototype (successful or unsuccessful), will the governments have recourse to foreign industries, unless the size of the series to be produced does not justify the acquisition of the new technologies. Thè choice between production on the basis of a home-grown design (developed within the country or in collaboration with other industries of the EEC, and/or with the UK industry and/or with that of the US and production under licence will be made on a case-by-case basis having regard to the policy hitherto pursued by the particular government, the actual technical possibilities of collaboration (apart from any political difficulties that may arise and any differences in views among the individual armed forces) and the existing facilities of the space industry of the country concerned.

(c) In the case of production in collaboration, the share-out between the industries of the participating countries will be made, both as regards the design studies and as regards

the series manufacture, in proportion to the orders placed by the individual countries.

(d) In the case of production under licence it will be agreed that 10% of the value is to be paid to the company which developed the design as payment for the licence and for the acquisition of the technical knowhow necessary.

(e) The capacity of the EEC's aero-engine industry will not improve qualitatively during the period considered; it will therefore always be necessary to purchase higher powered engines from the US or the United Kingdom or else to produce them under licence from one of those two countries. In the event of a choice being possible it is assumed that preference will always be given to the United Kingdom space industry.

(f) The Communist countries will not be taken into consideration as possible suppliers.

(g) From the overall cost of aircraft and missiles will be deducted the value of the ground electronic equipment and the avionics, estimated on the basis of similar designs, in order to arrive at the value of the orders earmarked for the EEC (or UK) space industry.

(h) Finally, in regard to maintenance and repairs, it will be assumed that these are always entrusted to the national space industry, which is normally the case, except, of course, for supplies from other countries in the case of spare parts which are not produced (even under licence) in the country concerned.

This series of assumptions naturally leads to the supposition that the EEC governments pursue a very definite policy of entrusting to the EEC aerospace industry the study and

implementation of all the aircraft and missile projects that it is technically in a position to handle. This presupposes also that the EEC aerospace industry has the will and the initiative to tackle development problems in a practical way, so that it will be in a position to meet the new demands of the national military market as they arise, but without involving itself in new sectors (e.g., the design of high-powered turbo-engines in the EEC).

Both these bonditions seem to be sufficiently realistic, even though the first of them presupposes, in a certain sense, the governments' willingness to support their respective aerospace industries[1], while the second will inevitably entail the formation of international industrial groupings, since some of the programmes that must be implemented in the EEC during the period 1968-80 can not conceivably be efficiently handled on a national scale. The framework outlined also excludes completely any form of direct intervention by the US, whose industry would be limited to meeting the needs of the EEC with its own supplies in respect of those of them which could not be satisfied by the national industry of the individual countries. The US would in the meantime continue to supply the EEC with all the military hardware it needed via NATO without attaching any strings, even in regard to standardization.

Finally, it is assumed that the position of the United Kingdom will remain that of a nation outside the EEC and that it will intervene only in the form of a joint participant in cases in which its technological capacity is required and in which it has a direct interest from the point of view of its own supplies.

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[1] In most cases it would be more economical to obtain supplies from the US.

It is assumed, however, that the United Kingdom also will give preference to carrying out a programme in collaboration with the EEC rather than to the direct procurement or production under licence of US designs.

All the assumptions listed above, and the presuppositions on which they are based, are obviously subject to discussion. With their aid, however, it is possible to arrive at an overall estimate of what the domestic military market might represent for the EEC's aerospace industry during the period 1968-80 as a result of concordant decisions taken by the various governments and companies involved.

3.2 National Financial Resources and Needs in Regard to the Procurement, Maintenance and Repair of Aircraft and Missiles[1]

3.2.1 Belgium

Financial resources: Of the total defence budget of $535 million for 1967, spending on aircraft and missiles may be estimated (on the basis of the average for 1956-65) at $38 million.
According to the basic assumption this would mean that a budget of $456 million would be available for the period 1968-80, if expenditure remains constant at the 1967 level, or $593 million if defence spending increases at an average annual rate of 4% (compound).

Needs: At the end of 1967 the Belgian air force was composed of aircraft and missiles worth a total of $608 million (about 70% of US origin and 30% EEC)[2]. During the period 1968-80 maintenance and spare parts for this air force will require

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[1] The "feasible" selections of new missiles are listed in this Section in the light of the hypotheses and reservations formulated in Section 3.1.

[2] See Table 3/20.

total funds that can be estimated at $405 million. On the basis of the budgetary data given above, it is seen that the amount of the funds to be allocated for the procurement of new hardware to replace technically obsolete equipment is somewhat small.Furthermore, the Belgian air force will have to undertake to[1]:

(a) purchase Mirage 5 planes, already ordered from France, at a total cost of $150 million;

(b) modernize its transport command by the purchase of transport aircraft (possibly the Transall) and heavy helicopters (possibly the Sud Frelon) at a total cost of $100 million;

(c) replace F-104G fighters (possibly by the MRCA 75 Panther) at a cost of $75 million;

(d) purchase light helicopters (possibly of EEC design);

(e) replace Entac anti-tank missiles (possibly by Milan missiles) and Sidewinder air-to-air missiles (possibly by missiles of EEC design if the Panther is procured) at a cost of $7 million;

(f) replace Honest John tactical missiles and Nike anti-aircraft missiles at a total cost of $130 million;

(g) purchase trainers worth $32 million (possibly of EEC design) and target drones with $1 million (possibly of EEC design).

The total cost of maintenance, spares and purchases would thus be $908 million for the period 1968-70, a figure which is much higher than the amount available, unless a great increase in defence expenditure is assumed.

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[1] See Table 3/21.

Since Belgian defence expenditure, as a percentage of GNP, is the lowest of all the EEC countries (3.7% in 1955, 2.8% in 1967), it may be assumed that no further reduction in terms of its proportion of GNP is possible in the future. This would provide justification of the assumption that the total funds available for 1968-80 would be nearer to $593 than to $405 million.

Even on such an assumption it is nevertheless obvious that the Belgian air force will have to give up many of the modernization programmes necessary in order to maintain operational efficiency at the present level.

It may be noted that the programmes to be abandoned might, in addition to the Panther be those for the replacement of tactical and anti-aircraft missiles (which might possibly be supplied by the US under MAP), air-to-air missiles (Sidewinder being kept in service), heavy transport planes (which are not indispensable in view of the geographical situation and the lack of defence interests outside Europe). With due account also for the corresponding decrease in expenditure on maintenance and spares, this would bring the total spending for the period 1968-80 down to $590-610 million, i.e., within the limits of the figure available.

On such assumption the Belgian air force would in 1980 have a value (at 1967 prices) of $515 million and would be made up as to 75% of EEC products and as to 25% of American equipment.

3.2.2 Netherlands

Financial resources: Defence expenditure 1967: $876 million of which $115 million went on supplies of aircraft and missiles (estimate based on data for 1956-65). On the assumption of a budget fixed at the 1967 value, this would give a figure

of $1,380 million, which would rise to $1,794 million if an average annual compound increase of 4% were assumed.

Needs: At the end of 1967 the Netherlands air force had a value of $643 million (86% of US (or Canadian) origin and 14% EEC)[1].

In addition to spending on maintenance and spares (which could be estimated at $700 million), it would be necessary during the period 1968-80[2]:

(a) to procure fighter planes: a decision has already been taken to order the Canadair F 5 at a total cost of $167 million;

(b) to replace the F-104G (possibly by the Panther, but the competing Swedish Viggen and French Mirage F1 should not be ruled out) at a cost of $300 million;

(c) to replace the Grumman D 2A sea reconnaissance aircraft through the (probable) purchase of other Atlantic planes at a cost of $30 million;

(d) to replace Fokker S 11 trainers (possibly by the Italian SIA 202 or the German SIAT 223) at a cost of $2 million;

(e) to replace anti-tank missiles (possibly by the Milan) at a cost of $3 million;

(f) to purchase heavy helicopters (possibly the Frelon or machines developed from it) at a cost of $20 million;

(g) to replace the Sidewinder air-to-air missile (possibly by EEC products in view of the choice of the Panther) at a cost of $3 million;

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[1] See Table 3/22.

[2] See Table 3/23.

(h) to purchase light helicopters for the army (possibly EEC products) at a cost of $15 million;

(i) to replace remote-control target drones (possibly by EEC products) at a cost of $1 million;

(j) to purchase transport aircraft (possibly EEC products) at a cost of $15 million;

(k) to replace naval missiles (probably through the purchase of UK missiles developed from those at present employed) at a cost of $8 million;

(l) to phase out anti-aircraft and tactical missiles obtained from the US via NATO; these would probably replaced by other missiles of US origin, for a total amount of $105 million.

Procurement, maintenance and spares would cost a total of $1,369 million during the period 1968-80. This figure is virtually the same as the appropriations for the same period, if it is assumed that defence expenditure remains constant in terms of absolute value. It may therefore be anticipated that expenditure on aircraft and missiles by the Netherlands will represent by and large an ever-decreasing proportion of GNP, which is in line with the general trend of Netherlands defence spending (5.6% of GNP in 1955, 4.0% in 1967).

On the basis of the assumptions formulated, the Netherlands air force would in 1980 have a conventional value of $756 million, 26% of it accounted for by products of US origin, 63% by EEC products and 1% by British equipment.

3.2.3 Italy

Financial resources: Defence budget for 1967: $2,075 million, of which $190 million is allocated for aircraft and missiles (estimate on the basis of 1965 data).

With expenditure constant at the 1967 level, $2,280 million would be available for the purchase of aircraft and missiles in 1968-80 and this would rise to $2,964 million if an annual increase of 4% is assumed.

Needs: At the end of 1967 the conventional value of the Italian air force was $1,407 million (80% of US origin and 20% EEC)[1]. It should be pointed out, however, that, in accordance with the policy constantly pursued by the Italian Government, a considerable proportion of the equipment of US origin was produced under licence in Italy.

In regard to future programmes it is known or it may be assumed that in the period 1968-75 it would be necessary[2]:

(a) to purchase a certain number (60-100) of light helicopters for the army. The possible choices would seem to be the Agusta-Bell 206A (unit cost $0.096 million) and the Nardi Hughes OH 6A (unit cost $0.072 million). A total expenditure of $6 million may be assumed. This will, however, go to Italian industry in the form of production under licence;

(b) to replace the F 84 F, the possibility of purchasing the McDonnell-Douglas RF-4E, at a total cost of $157 million, having been considered. The smaller number of aircraft required (44) would seem to preclude the advantage of

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[1] See Table 3/24.

[2] See Table 3/25.

production under licence. It would, moreover be the first time that Italy had made a purchase of such size direct from a foreign country without some kind of industrial return favour;

(c) to replace C-119 transport planes and to modernize the transport squadrons. Various solutions would seem to be possible. According to American sources[1] about 40 Transall or Lockheed C-130 were to be purchased together with 60-80 smaller aircraft, such as the Fiat G222, Breguet Br 941S or Hawker Siddeley Andover.
With regard to the supplies first mentioned (estimated $160 million), no form of co-participation would be advisable other than subcontracting (as is at present planned for the Atlantic) in view of the small number of aircraft required. In the second case, on the other hand, the national industry might find a market worth about $75 million, since there is an Italian competitor.

(d) to continue production of Agusta-Bell helicopters to replace the army's light aircraft. The market here is worth a total of about $10 million, including the possible production of AB 106 helicopters for the navy;

(e) possibly to manufacture the AM.3, for which it is estimated that there is a domestic military market worth about $4.5 million;

(f) possibly to continue with the series production of the G91Y;

(g) to modernize the missiles carried by the navy, creating a market estimated at $12 million, with the possibility of

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[1] Aviation Week and Space Technology, February 1969.

using Indigo and Nettuno.

The total Italian military missile market in the period 1968-75 therefore seems to be made up as follows as regards purchases:

Programmes under way

F 104S	$350 million
Agusta-Bell UH-1B	$ 10 million
Agusta-Sikorsky SH-3D	$ 23 million
Sparrow missiles	$ 3 million
Atlantic	$105 million
G91Y	$ 14 million
Agusta A 101G	$ 20 million
Siai S-205	$ 20.5 million
Total	$545.5 million

New programmes

Army helicopters	$ 6 million
Replacement F 84 F	$157 million
Replacement C-119	$160 million
Medium transport	$ 75 million
Helicopters	$ 10 million
AM.3	$ 4.5 million
G91Y	$ 70 million
Naval missiles	$ 12 million
Total	$494.5 million

It is there evident that it will not be possible to carry out all the necessary programmes during the period considered and it may acccordingly be anticipated that some of them will have to be put off until the following period (the one it will most

probably be impossible to carry out would seem to be the replacement of the F 84 F by the RF-4E).

On this assumption, a total of $850 million would be spent in the period 1968-75: the Italian industry should receive orders, either for its own products or for equipment produced under licence, for a total value of about $600 million (including royalties on studies commissioned abroad and the price of parts bought abroad), whilst $250 million would be spent in Europe (on the assumption that the Transall is chosen) or alternatively $90 million in Europe and $160 million in the US (on the assumption that the C-130 is chosen).

In the following five-year period, however, the situation of the Italian military market is less easy to foresee owing to the absence of any indications whatsoever concerning programmes.
It may be assumed that in that period the bulk of spending will have to be devoted to the purchase of missiles either for the necessary modernization of the missile forces or because the need for making further aircraft replacements will be less urgent, the Italian air force having been provided with fairly modern fighters (F 104S, G91Y), transport planes (Transall, C-130, G222, BR 941) and helicopters in the period 1970-75.

In the aircraft field, the sole programme of any size is presumably the Panther. The F 84 F will have to be replaced and this may well be done with 175-200 Panthers. Photographic missions would in that case be carried out by the F-104G.
On the other hand, the abandonment of the VAK 191 B programme, together with the decision not to purchase, at all events for the moment, British Harriers, and the change in the G222 programme from VTOL aircraft to STOL aircraft and later to

conventional take-off planes, create the impression that in Italy the need for the adoption of VTOL military aircraft is not keenly felt at present, it being preferred to continue with helicopters.

In the period 1975-80 the chief procurement programmes will therefore relate to:

(a) the MRCA 75 Panther fighter (in the development of which Italy is participating through Fiat) at a total cost of $510 million;

(b) the renewal of the long-range anti-aircraft and tactical missile forces at a total cost of $160 million. As for the other European countries, it may be assumed that this will be done with US equipment, in view also of the fact that the EEC industry (excluding France) has nothing to offer in this sector;

(c) the renewal of air-to-air and anti-tank missiles at a total cost of $8 million possibly with EEC products).

When expenditure for maintenance and spares (which may be estimated at $750 million) is added to the procurement budget, the needs of the Italian air force as regards aircraft and missiles amount to a total of $2,291 million for the whole of the period 1968-80.

This figure is near enough to that calculated for the funds available (assuming that the value of the latter remains constant at the 1967 level), even though it is not unlikely that expenditure for maintenance and repairs will have to be increased. The level of this expenditure (estimated on the basis of the 1967 data) appears in point of fact to be lower than for other European countries, which may in part be explained by the low number of hours flown by Italian military

aircraft (again as compared with other countries).

On these assumptions the Italian air force would in 1980 have a value of $1,536 million (36% of US origin and 64% EEC). This level could be reached by reducing the percentage of GNP earmarked for procurements, in accordance with the general trend of Italian policy (defence expenditure: 4% of GNP in 1955; 3.1% in 1960).

3.2.4 West Germany

Financial resources: Defence budget 1967: $5,358 million, of which $624 million was earmarked for missiles (estimate based on 1964 data).

Total funds available for 1968-70: with expenditure remaining constant at the 1967 level: $7,478 million; with an increase of 4%[1] per year: $9,734 million.

Needs: At the end of 1967 the German air force had a value of $4,300 million (74% of US origin, 9.5% UK and 16.5% EEC)[2]. So far as the future is concerned, the German military market undoubtedly constitutes one of the most outstanding in Europe and the question as to whether it will tend towards a policy of self-sufficiency, European co-production or even procurement from the US or US co-production is therefore of the greatest importance for the future of the European aerospace industry.

In the more immediate future, i.e., during the period up to 1975, the German air forces will, as far as can be foreseen, have to[3]:

(a) replace the Alouette helicopters. Competitors already known are numerous and three of them are German-made (Bölkow BO 105, VFW H5, Dornier Do 132), one is French (Sud SA 340), one Italo-American (Agusta-Bell 206) and one American (Hughes OH-6A).

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[1] Average annual compound rate. [2] See Table 3/26. [3] See Table 3/27.

The point acting in favour of the first three is obviously their nationality. On the other hand, for all three money will have to be spent in order to adapt them to military use (estimated at $6 million for the BO 105 and $13.7 million for the VFW H5), whilst in the other cases the military version of the helicopters is already in regular production.

(b) adopt an armed helicopter. There seems to be a move towards a joint Bölkow/Sud-Aviation design estimated to cost $75 million in R&D; the only competitor might be the Lockheed Cheyenne (US);

(c) introduce a training helicopter, for which there already exists a Bölkow design, development of which would cost $12.5 million in R&D;

(d) purchase 20-40 more medium helicopters for the navy. These might be some more CH-53A, in addition to those already ordered, or Sikorsky SH-3D, for example, constructed under licence by the British company of Westland.

(e) replace the Cobra anti-tank missile by Milan and Hot missiles built by Nord-Bölkow;

(f) introduce an anti-aircraft missile for protection against low-level and low-speed attacks (Nord-Bölkow Roland).

(g) introduce a ship-to-air missile. It is planned to use the American Standard 1A, side by side with which there might be an order for further British Seacats;

(h) intoduce an air-to-ground missile in place of the Atlantic (Nord-Bölkow Kormoran).

On the other hand, because of the changed tactical requirements, it is thought that the Italo-German VAK 191 B (now solely German) aimed at the production of a vertical take-off fighter

to replace the Luftwaffe's G91 will not proceed beyond the prototype stage.

Consequently, the German military market for the period round about 1970 (1968-72) may be considered to be fairly clearly defined. Assuming as usual that replacement will be on the basis of equal operational efficiency and excluding R&D expenditure, it may be estimated that the amounts spent will be as follows:

£50 million for the replacement of the Alouette and the training helicopters;
$100 million for armed helicopters;
$40 million for medium helicopters;
$10 million for anti-tank and anti-aircraft missiles;
$10 million for ground-to-air and air-to-ground missiles for the navy;

This gives a total of at least $210 million in addition to the amounts already earmarked for the RF-4E ($500 million), replacements to the F-104G ($110 million) and G 91 T' ($23 million), the CH-53A ($350 million, $250 million of it for 1969-72), Skyservant ($2.5 million) and HFB ($14 million) programmes.

In all, this would bring expenditure for the 1968-72 period, taking account of the commitments for earlier programmes (in particular, UH-1D, Atlantic and Transall) to a total of $1,497 million for new equipment alone.

The present situation in the German military aeronautical market may be summarized as follows:

Forecast of German Military Demand in the Period 1968-72

(millions of dollars)

Programme	Total	Payments to		Others
		US	Germany[1]	
RF-4E	500	400+455	100+45	-
F 104G	110	10	60	50
CH-53A[2]	250	125	125	-
UH-1D[2]	70	35	35	-
Skyservant	2.5	-	2.5	-
HFB 320	14	-	14	-
Atlantic Transall[2]	220	-	220	-
G 91 T	23	-	23	-
Light helicopters[3]	50	0+20	50+20	0+10
Training helicopters[3]	22.5	-	22,5	-
Armed helicopters[3]	175	-	175+140	0+35
Medium helicopters	40	0+20	0+20	0+40
Tactical missiles	10	-	10	-
Naval missiles	10	5	5	-
TOTAL	1,497	575+660	862+722	0+135

[1] Including licence fees.

[2] Period 1968-72.

[3] Including R&D.

If account is taken of licence fees and of the plant which the German industry will have to purchase in the US for the manufacture of the hardware shown in the table as being entrusted to it, it emerges that very probably the German military market, as was anticipated, will represent for the US aerospace industry a value of about $800 million in the immediate future. There is, however, also the symptomatic

tendency, as appears from the table itself, to allocate the remaining 50% of the market to German industry while indulging in the various forms of international collaboration at the R&D phase, particularly with France.

With regard to the more distant future, i.e., the years round about 1975, forecasts become more difficult. Undoubtedly, if the forecasts concerning the immediate future should prove to be correct, the German aerospace industry would increase its own capacity considerably and would thereby be in a position to satisfy national military needs, at least from the technical and production point of view, on its own, or at most under a system of European collaboration in which the role of leader would fall to it.

If the operational requirements of the years round about 1975 should then confirm what has, in a certain sense, been the presupposition underlying the entire German R&D programme, i.e., the evolution of military aircraft towards the VTOL types, the German aeronautical industry would probably be in a position to offer aircraft that would be competitive at the international level to foreign countries also.

In the aeronautical sector, the most important types which Germany must put into service after 1975 are:

1. A highly versatile supersonic fighter plane capable of replacing the present F-104G and G91 planes. This is a problem which is more or less common to all European countries and to solve which various attempts have been made. In particular, Germany tried first with the VTOL formula (VJ 101 and German-American AVS programmes, both abandoned), then with the national NKF programme and lastly with the multinational MRCA 75 Panther. There can be no doubt that, for this last type of aircraft also, the

Luftwaffe will constitute the chief market, which may be estimated (still on the basis of replacement at equal operational value) at about $1,700 million.

2. A transport plane with VTOL characteristics. In this connection, it is known that much of German aeronautical R&D is directed towards the study of VTOL planes, whether fighters (VAK 191 B, VJ 101C, AVS) or transport planes. Insofar as present operational requirements make the introduction of military transport planes with VTOL characteristics seem hardly likely in the near future, it is possible that the situation may change by 1975. In this sector the German industry has a prototype under test at present - the Dornier Do 31 - and various design studies under way with special appropriations from the Ministry of Defence (about $9 million for 1967 - Mack Plan). These are being carried out by five firms - Bölkow, Dornier, EWR, HFB and VFW - combined in a study committee which is in turn split into four groups, consisting of specialists from the various firms. Their brief is to examine:

   (a) general problems of V/STOL techniques (under VFW supervision;
   (b) structures for the aircraft of the future (under EWR);
   (c) control and navigating systems (under Dornier);
   (d) the preparation of basic designs.

   The last-named group is studying various solutions for the replacement of the Transall by VTOL planes, namely 12 types of aircraft with payloads of 5, 10 and 15 tons in the form of a helicopter (Bölkow), a jet-lift vertical take-off plane (VFW and Dornier) and a fan-lift aircraft (HFB, Dornier, EWR).

It is therefore more than probable that such an R&D effort, which is equalled only by the US work - so far unsuccessful - in the same sector, will lead to the design of the VTOL military transport plane of 1975.
Furthermore, the Do 31, even if it does not go into series production, will continue to be developed especially for the purpose of acquiring data useful for the abovementioned programmes. An amount of $4 million was put aside for this in 1968.

3. Tactical and anti-aircraft missiles to replace the present Pershing, Sergeant, Honest John, Nike and Hawk.
In this sector, unlike the preceding ones, there is not sufficient German R&D activity to enable them to be replaced by home-grown products. In all likelihood it will therefore be necessary to buy foreign again, i.e., probably in the US.

However, the German military market, assuming replacement is made on the basis of equal operational efficiency, will after 1972 attain truly outstanding dimensions. In addition to expenditure on the completion of the CH-53A programme, it will be necessary to find:

(a) $1,700 million for the replacement of the F-104G (European collaboration probable in the Panther programme);

(b) $750 million for the replacement of the missile forces (except for the shorter-range tactical and anti-aircraft missiles), probably with purchases in the US;

(c) $400-500 million for VTOL transport planes, probably of original German design or via European collaboration;

(d) $50 million for the replacement of trainers, probably of German design or in collaboration.

It should be noted that, even assuming that all the programmes necessary to maintain the German air force at its present operational efficiency are in fact carried out, the total expenditure necessary ($7,905 million) is only slightly higher than the "minimum" available ($7,478 million).

Furthermore, Germany is the only European country in which defence expenditure has continued to increase from year to year as a percentage of GNP, growing from 3.9% in 1955 to 4.1% in 1961, 5.5% in 1964 and 4.3% in 1967. Although the marked initial increase was justified by the need to rebuild the armed forces, the continuity of the effort is obvious. It therefore seems reasonable, on the basis of German military policy during the past decade, to assume that expenditure on procurement will continue in the future to account for at least a constant percentage of GNP. This would give an amount available for aircraft and missiles of $9,734 million during 1968-80 as against needs (with operational efficiency equal to that in 1967) to the value of $7,905 million. It is evident that Germany can appreciably increase the operational efficiency of its air force during the coming decade, and this will probably prove to be the case since:

(a) From the time it was built up again, the Luftwaffe has continually increased its own operational efficiency by replacing aircraft by equal numbers of others of higher performance (and therefore increasing operational efficiency) if not by increasing outright the actual numbers. It should be noted that the original nucleus of the Luftwaffe at the time of it was formed was already appreciable.

(b) An increase in the operational efficiency of the German armed forces is probably in accordance with US military policy in regard to Europe, as it would permit a gradual

reduction of the US (and British) armed forces in Europe and would perhaps also offset the uncertainty of the French attitude towards NATO.

(c) As will be seen later, the operational efficiency of the French armed forces probably reached its peak around 1966-68 and the French commitment in this sense seems likely to be reduced; the same may be said of the United Kingdom armed forces[1]. A strengthening of the armed forces of the other European countries is accordingly indispensable if a military balance of power is to be maintained between East and West. In the aircraft and missile field only Germany is economically strong enough to undertake such a task and will in all probability therefore tend to become militarily the most powerful country in Europe.

It must not be forgotten, moreover, that, whilst the US will inevitably have to resort to MAP aid, as in the past, in order to step up the armed forces of other countries, in the case of Germany it will suffice for that country to devote to the purchase of armaments a proportion of the sum it has to pay to the US for the maintenance of the US armed forces on its own territory.

Furthermore Germany's desire to reduce as much as possible this expenditure, which is of no advantage to the national industry, and therefore to supply her own armed forces with German-made equipment, is quite logical.

This also explains why, on the basis of the above forecasts, missile procurements are approximately balanced as between the German industry and the US for the period up to about 1972-75

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[1] Even though, in this case, the reduction is partly compensated by the abandonment of international defence obligations outside Europe.

and then come mainly from the German industry. Since, however, the German aerospace industry is not at present in a position to meet the requirements of the national armed forces, Germany must inevitably have recourse to the industries of other countries in the form of joint design and construction.

However, on the assumption that replacements of equipment will be made on the basis of equal operational efficiency (an assumption which, for the reasons discussed above, does not seem very probable), the German air force would have in 1980 a value of $4,693 million (38.5% of US origin and 61.5% EEC).

3.2.5 France

Financial resources: Defence budget 1967: $4,785 million, of which $470 million were earmarked for aircraft and missiles (estimate on the basis of data for 1960-65).

For 1968-80 total financial resources at constant value (1967): $4,700 million with an annual compound increase of 4%: $7,332 million.

Needs: Obviously the French needs for supplies of aircraft and missiles are strictly dependent on the policy that will be followed during the next decade, in particular in regard to the nuclear strike force.
Pending a final decision, it may be assumed that the original programme for the nuclear strike force will be carried out to completion, albeit with some delay, although it is not very likely that it will be developed any further.
If these assumptions are admitted as valid, the expenditure on aircraft and missiles still necessary in order to carry out the original nuclear strike force programme would amount to a total of about $490 million, the greater part of which would have to be met in the course of 1970.

The draft budget of the French armed forces for 1969[1] provides for the following expenditure for the nuclear strike force (shown side by side with the amounts originally laid down in the Loi Programme):

General R&D	$110 million	(73)
Nuclear programme (arms and propulsion)	$379 million	(420.2)
Transport and military uses of space	$375 million	(173)
Tactical nuclear weapons	$ 48.8 million	(79.8)
Total	$912.8 million	(746)

To this must be added, to be charged against the "Annexe des Poudres" budget, $23.9 million for propellants for missiles (out of a total budget of $36 million), of which a not inconsiderable part may conceivably be devoted to the production of propellants for SSBS and MSBS, in addition to $10 million for R&D in the propellant field.

Under the Loi Programme for 1965-70 there will therefore still be available, on the assumptions mentioned above, about $1,100 million to be spent in 1970 (or later, depending on the sums available in the budget) as against the $706 million provided for in the Loi Programme itself for the completion of the nuclear strike force. Since the bulk of the costs, as from 1969, relate to the work on the nuclear submarines Foudroyant and Terrible, it is probable that only a small part of this sum will be devoted to the French aerospace industry.

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[1] Air et Cosmos, 9 November 1968.

In the "conventional" armaments sector, always assuming that French policy will be directed to maintaining the operational efficiency of the national air forces constant at the 1967 value[1], the following predictions can be made for the period up to 1975:

1. Replacement of the present F-100, Vautour and Mirage III (partially) by Dassault Mirage F1 aircraft at a cost estimated at $400 million. In the draft budget for 1969 there is provision (in addition to the above amount) for the expenditure of $174 million on the purchase of a series of 30 Mirage 1 aircraft (reduced from 40 owing to French economic difficulties) and the completion of the industrial plant necessary for production.

2. Construction of 150 Jaguar aircraft at a total cost of $250 million; of this amount, $88 million have already been spent in 1968 (purchase of 50 Jaguar) and a further $34 million for the completion of the necessary industrial plant are provided for in the 1969 budget. Consequently the remainder of the Jaguar programme constitutes a market that may be estimated at $136 million.

3. Replacement of the Magister, Paris and T 33 trainers by a twin jet of joint Dassault/Dornier design. The value of the aircraft to be replaced in the French armed forces aggregates $125 million.

4. Replacement of the heavy Sikorsky H-34 helicopters by Frelon helicopters, at a cost of $136 million. This replacement,

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[1] The conventional value of the French aircraft and missile forces (excluding the nuclear strike force) was $3,335 million at the end of 1967. See Table 3/28.

which was to continue in 1969, has been postponed owing to the familiar budget cuts.

5. Construction of WG.13, SA 340, SA 330 helicopters at a total cost of $185 million.

6. Replacement of the Etendard and Crusader carrier-borne aircraft probably by aircraft developed from the Mirage prototype, at a cost of $100 million.

7. In the missile sector, the Mandragore anti-missile programme having been abandoned, practically the whole of the French missile forces will have to be replaced in the course of 1975, taking into account also the requirements of the nuclear strike force. In this sector the programmes of which details have been issued provide for:

   (a) replacement of the SS.12 and SS.11 by the Hot and Harpon missiles;

   (b) replacement of Entac by Milan missiles;

   (c) replacement of the AS.20 and AS.30 by AS.33 missiles (French);

   (d) introduction of the AS.37 Martel missile (Franco-British collaboration);

   (e) introduction of the Roland missiles;

   (f) introduction of the Crotale anti-aircraft missiles.

The total cost of these short-range missiles is estimated at about $55 million.

Longer-range missiles should also go into service in the period 1970-75, to replace the American missiles which are today generally in use in France (and in the rest of Europe).

These are:

(a) the Pluton tactical ballistic missile with a 10-15 kiloton nuclear warhead (to replace Honest John), the first launchings of which are planned for 1969. A total of 40 launchers is planned.

(b) the MM.38 sea-to-sea naval missile with a range of 40 km;

(c) an anti-aircraft missile to replace Nike.

The total French domestic market for these missiles is worth about $300 million.
Taking into account also smaller orders (Nord 262 - $40 million; Cessna 310 - $0.75 million and the further production of missiles and aircraft in service at present (Atlantic, Transall: $150 million), the value of the French military market in the period 1970-75 may be set at $1,500 million (excluding expenditure on R&D and for the nuclear strike force).

The whole of this market (with the exception of payments for licence fees for some types of power units and airborne equipment) will be reserved for French aerospace companies, which will be able to operate either alone or in collaboration with British or German industries. As far as the period 1975-80 is concerned, forecasts are more difficult, largely because there is no knowing in what direction French defence policy may evolve.

It is, however, probable that the French air force will have to equip itself with variable geometry fighters, which might be developed or derived from the present Mirage G (as an alternative to the Panther), and with STOL transport aircraft (derived or developed from the present Breguet 941) and fighter helicopters and heavy transport helicopters at a total cost of $1,500 million.

All these types of aircraft could be produced by the French aerospace industry, which has already carried out the basic R&D, or they could be developed in collaboration with the industries of other countries, especially if these types also meet the operational requirements of the armed forces of the various countries interested in the programmes. Finally, expenditure for maintenance and repairs during the period 1968-80 may be estimated at $3,200 million.

Even if we assume that any further development of its own nuclear strike force is abandoned, France would therefore need $6,902 million[1] for aircraft and missile procurements during the period 1968-80, and this figure is in good agreement with that of about $7,300 million calculated on the basis of an assumed annual increase of 4% in the defence expenditure, which would thus represent an almost constant percentage of GNP.

On these assumptions the French "conventional" aircraft and missile forces would in 1980 be worth $3,807 million (88% of EEC origin and 12% produced under Franco-British collaboration) as against $3,335 million in 1967 (21% US, 66% EEC, 13% Franco-British collaboration[2]). On its own account the nuclear strike force would be worth $7,600 million in 1980 (as against $1,640 million in 1967).

The changed domestic situation and the economic difficulties that have been alluded to several times, however, suggest that in all probability the French armed forces will be able to

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[1] See Table 3/29.

[2] See footnote 1 on page 100.

maintain the level of efficiency reached about 1967 in the future also. In that case spending on procurements would presumably be reduced, for the period 1968-80, to something in the region of $4,700 million, which would automatically entail the abandonment of some of the more ambitious programmes in order to bring needs into line with expenditure (cut-back in the Mirage G programme or its replacement by the Panther, abandonment of the STOL transport plane, abandonment of the Pluton, MM.38 and anti-aircraft missiles, abandonment of armed helicopters and reduction of the heavy helicopter programme, reduction in expenditure for maintenance and spares by cutting down the number of operational aircraft, etc.).

3.2.6 United Kingdom

Financial resources: Defence budget for 1967: $5,292 million, of which an estimated $690 million are earmarked for the procurement of aircraft and missiles. For 1968-80, $8,280 million would thus be available for procurements, if it is assumed that the defence budget remains constant at 1967 levels, or $10,764 million if it rises at an annual average compound rate of 4%. Since it is very probable that the decisions taken in 1964, i.e., those providing for a gradual cut-back in defence spending to not more than 6% of GNP, will not be reversed even after 1970, of the two figures given above it may be presumed that the lower one is the nearer to reality. Furthermore, it should be remembered that the reduction in Britain's military commitments outside Europe tends to lessen the percentage of the defence budget spent on aircraft and missiles.

Needs: At the end of 1967 the British aircraft and missile forces were worth $5,078 million (25% of US origin, 63% British, 10.5% produced under Franco-British collaboration,

1.5% of other origin).

The principal replacements of aircraft and missiles which will be necessary during the period 1968-75 are:

1. Replacement of the Honest John tactical missiles by more powerful versions of the same missile in the United States, but it is also possible thatthis will not be necessary since these missiles will be required for use by the British forces (BAOR) in Germany.

2. Replacement of the carrier-borne Sea Vixen and Scimitar. The decision to do away with aircraft carriers has already been announced and for this reason such replacements will no longer be necessary.

3. Replacement of the Argosy, Valetta, Devon, Heron, Beverley, etc., transport aircraft. Replacement by the Hercules and Andover can be taken as already decided upon as also can the cut-back in the number of transports.

4. Replacement of the Jet Provost trainers by the later pressurized version, Jet Provost T.Mk 5.

5. Replacement of the basic trainer used in the first period, the DHC Chipmunk most probably by the British designed Beagle Pup-150.

Accordingly, the British military market for the period 1970-75, as far as procurements are concerned, may be valued as follows, taking into account programmes at present under way or due to be started shortly:

Jaguar and P.1127 fighters	$510 million
WG.13, SA 340 and SA 330 helicopters	$280 million
Nimrod marine reconnaissance aircraft	$240 million
Jet Provost T.Mk 5 trainers	$ 45 million
Beagle Pup basic trainers	$ 20 million
Sea King helicopters	$ 57.5 million
Phantom fighters	$350 million
Basset light transport	$ 1 million
Martel missiles	$ 20 million
Sea Dart missiles	$ 3 million
Swingfire missiles	$ 5 million
Rapier missiles	$ 5 million
Tactical missiles	$ 40 million
Total	$1576.5 million

For the period 1975-80 the chief programmes for military procurements in the aircraft sector should concern:

1. A variable geometry fighter. The most probable candidate seems at present to be the MRCA 75 Panther and it is conceivable that, against the background of international collaboration in which this programme is being carried out, contracts almost equal to the value of the national market for this type of aircraft, at present estimated at $600-700 million, might be placed with the British aircraft industry.

2. A VTOL fighter developed from the P.1127, the technology of which does not seem likely to ensure a useful operational life much beyond 1975. Resumption of the P.1154 programme would be feasible, naturally with the necessary improvements. However, the existence of a massive German R&D programme in this sector seems to point to the likelihood of the joint development of an Anglo-German (or Anglo-

Franco-German) design, having regard also to the small size of the British domestic military market (estimated at $300 million).

3. A VTOL or STOL transport aircraft, which also might be developed after resumption of the abandoned HS 681 programme. However, the possibility of Anglo-German collaboration seems more probable. The market may be estimated at $200 million.

4. Fighter helicopters. As their development with British R&D is not worth while, provided that they can be developed in collaboration with France, this solution is economically more advantageous than purchasing in the US or production under US licence. The market may be estimated at $80 million.

5. Heavy transport helicopters. In this sector direct purchase of the American production licence seems probable. The market may be estimated at $150 million.

6. Short-range missiles (air-to-air, air-to-ground, ground-to-air, anti-tank, etc.). The development of programmes based on national British R&D is likely, together with forms of Anglo-French collaboration for the more advanced types. Total market of $71 million.

7. Ballistic missiles. Polaris will certainly be obsolete from the operational point of view before 1980. It can only be replaced by missiles (a further developed Poseidon?) procured in the US or by models developed from the French SSBS. The cost of this programme may be estimated at $900 million and it seems that it could be carried out only by resorting to direct purchase from the US.

Including $3,600 million for the total expenditure on maintenance and spares, the British aircraft and missile market

in the period 1968-80 would therefore amount to a total of $7,727 million[1], which is thus slightly below the amount that would be available if we assume a defence budget remaining constant at 1967 levels and the same distribution of appropriations amongst the various armed forces. In view of what was stated earlier, it is not improbable that the funds available for aircraft and missiles during the period 1968-80 might in fact be reduced to $7,600-7,700 million.

On the assumptions outlined above the value of the British aircraft and missile forces in 1980 would be $5,250 million (42% of US origin, 21% British, 13% the result of Franco-British collaboration, 24% the result of collaboration between the United Kingdom and the other EEC countries).

3.3 R&D Expenditure

In the preceding section it was assumed that the EEC industry would supply the armed forces of the Member States with the bulk of their aircraft and missile supplies during the period 1968-80, commensurate with the industry's development potential on the basis of the technological knowledge acquired by it up to 1967.

Within the limits of the programmes planned for the period 1968-80 it is therefore necessary to estimate the funds required for the military R&D programmes in order to ensure the satisfactory completion of the production programmes.

With reference to the more significant of them, an attempt has been made in the following table to estimate the cost of the military R&D needed to ensure the completion of the EEC and UK programmes mentioned at various points in Section 1.3.2,

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[1] See Table 3/31.

basing the estimate of the costs on examples from similar programmes where no other data were available.

In the columns headed "EEC and UK earospace industry" the cost of the R&D required for the electronics and avionics part of the programme has been deducted, in addition to the value of the contracts placed in other countries.

The table does not show any R&D expenditure for military uses of space or for the construction of atomic or thermonuclear weapons. The breakdown of R&D expenditure has been made in accordance with the basic assumptions mentioned in the general introduction.

Smaller programmes the cost of whose R&D can be fully covered by the estimated funds for basic R&D (i.e., expenditure which is not specifically earmarked for a clearly defined programme) have been disregarded, as also have unsuccessful programmes.

R&D Expenditure Necessary for Carrying Out the Military Programmes Entrusted to EEC and UK Industry during the Period 1968-80

(Millions of dollars)

Programme	Total R&D cost	EEC aerospace industry	UK aerospace industry
Panther	1,000	500	300
Trainers	40	40	-
Mirage G (development)	40	30	-
STOL transport	100	100	-
VTOL transport	150	110	25
VTOL fighter plane	150	100	25
Heavy helicopters	20	18	-
Light helicopters	50	45	-
Training helicopters	15	15	-
Fighter helicopters	175	110	40
Air-to-air missiles	30	15	-
Ground-to-air missiles	30	-	15
Air-to-ground missiles	30	15	-
Anti-aircraft missiles	150	70	-
Naval missiles	60	30	-
Naval missiles	30	-	15
Tactical missiles	250	150	-
Anti-tank missiles	10	7	-
Anti-tank missiles	10	-	7
Basic R&D, failures, various	2,500	1,300	700
TOTAL	4,940	2,655	1,177

Side by side with this R&D "market" there are obviously the funds earmarked for military R&D in the defence budgets of the individual countries.

These may be estimated, as always on the basis of the 1967 data and on the two assumptions of the 1967 value remaining constant or of an annual increase of 4%, as follows for the period 1968-80:

Belgium	(p.m.)	$	10 million
Netherlands	(p.m.)	$	20 million
France (average 1960-65)		$	2,420-3,145 million
Germany (1967 data)		$	1,130-1,470 million

Italy (R&D included in procurements, cannot be estimated)

Bearing in mind the observations already made concerning the trends in German and French defence expenditure, a sum of $3,900 million would therefore seem to be available for the EEC countries (to which must be added the Italian expenditure, which cannot be estimated) as compared with needs amounting to $4,260 million. It is thus evident that, taking account of Italian R&D expenditure, the EEC countries should not increase expenditure on their own aerospace R&D beyond the 1967 level in order to carry out the programmes necessary for supplying their own armed forces, but should merely employ it more efficiently. In this connection the study has been based on the assumptions that R&D funds are in fact used in the EEC aerospace industries and not "transferred" from them, in a some disguised form, to the British or US industries; it is only in this way that the efficient use of the effort made will become possible, thus benefiting future programmes also.

In regard to the United Kingdom, on the other hand, the situation is quite different. If it is assumed that spending on aerospace R&D remains constant at the 1968 value, a total sum of $4,500 million would be available for 1968-80 as against

actual military requirements of not even $1,200 million.

It thus emerges that the United Kingdom has an excess of funds available for aircraft and missile R&D in relation to the actual production orders possible. Naturally this excess could be used in the form of an indirect subsidy to the UK aerospace industry, in either the military or the civil sector, as in fact certain pointers indicate to be happening. In other words, the amounts available in the British military budget are such as to permit lavish R&D spending, thus maintaining the national aerospace industry at a high technological level. On the other hand, the military needs are not such as to enable aircraft and missiles to be produced in quantities commensurate with the R&D funds available. Obviously another interpretation is also possible, but this seems to be more "journalistic". It is that the cost of British R&D is much greater than that of other countries and that in consequence the production/R&D ratio is much lower by comparison with what is found elsewhere.

A factor arguing in favour of the first hypothesis is the great number of cancellations of British aerospace projects in the recent years when they had already reached a relatively advanced stage of development. Only in a few cases were these cancellations warranted on the basis of the excessive cost of the R&D whilst in all the others (TSR.2, Blue Streak, HS 681, P.1154, etc.) the justification put forward was precisely that of insufficient orders.

3.4 Military Exports[1]

The forecast of military exports from the EEC to other countries in the period 1968-80 seems to be somewhat speculative, for various reasons:

1. The soundest markets for military aircraft and missiles are those areas of the world marked by present or potential national or international crises (Asia, South Africa, the Middle East). In view, however, of the instability of these regions it is impossible to foresee what direction will be taken by individual countries' procurements, which are, moreover, dictated primarily by political considerations.

2. On the one hand, the implementation of EEC military programmes makes the aircraft and missiles produced by the EEC aerospace industry more "saleable", owing to the larger number produced and, especially, to the actual possibility of demonstrating their qualities by putting them into service on a large scale in the countries manufacturing them. On the other hand however, this increase in production might be obtained through political intervention at government level of the "Buy EEC" type without any excessive concern about the ultimate cost. It might therefore happen that the EEC products, although technically acceptable, could be too costly for countries outside the Community.

3. The bulk of the EEC military market would be reserved for the national industries and taken away, either directly or indirectly, from the US industry. The latter would therefore find itself forced to assume a still more

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[1] See in Table 3/32 the chief types of aircraft exported by the European countries and the United States up to 1968.

competitive position on the remaining markets, where the EEC industries would enjoy no political protection.

4. To sum up, it does not appear likely, at all events in the period under consideration, that the EEC industry will be able to increase its own exports to foreign countries appreciably. It is therefore assumed that those exports will remain practically constant at the level reached in 1967 and that consequently, for the period 1968-80, they will amount to a total of $1,850 million.

3.5 Conclusions

The following tables summarize the conclusions that can be drawn on the basis of the observations made so far.

Funds Available for Military Aircraft and Missile Procurements and R&R, 1968-80

(Millions of dollars)

Country	*	Procure-ments	R&D	TOTAL
BELGIUM	Min.	456	10	466
	Max.	593		603
	Probable	590		600
NL	Min.	1,380	20	1,400
	Max.	1,794		1,814
	Probable	1,380		1,400
ITALY [1]	Min.	2,280	-	2,280
	Max.	2,964	-	2,964
	Probable	2,300	-	2,300
GERMANY	Min.	7,478	1,130	8,608
	Max.	9,734	1,470	11,204
	Probable	9,000	1,470	10,470
FRANCE	Min.	4,700	2,420	7,120
	Max.	7,332	3,145	10,477
	Probable	5,000	2,400	7,400
EEC	Min.	16,294	3,580	19,874
	Max.	22,417	4,645	27,062
	Probable	18,270	3,900	22,140
UK	Min.	8,280	4,500	12,780
	Max.	10,764	5,850	16,614
	Probable	8,000	4,500	12,500

* Min. = 1967 expenditure x 12

Max. = Increase of 4% a year by comparison with 1967 expenditure

[1] The R&D expenditure is included in the procurements figures (see p.111)

Military Aircraft and Missile Market of EEC Industry 1968-80

(Millions of dollars)

	Needs *				Probable funds available	Market for EEC aerospace industry
	TOTAL	from EEC	from UK	from US		
BELGIUM						
Procurements	503	356	17	130		283
Maintenance, spares	405	305	-	100		230
TOTAL	908	661	17	230	590	513
NL						
Procurements	669	408	69	192		295
Maintenance, spares	700	500	5	195		375
TOTAL	1,369	908	74	387	1,380	670
ITALY						
Procurements	1,541	1,205	117	219		977
Maintenance, spares	750	680	-	70		540
TOTAL	2,291	1,885	117	289	2,300	1,517
GERMANY						
Procurements	4,405	2,559	443	1,403		1,959
Maintenance, spares	3,500	2,800	-	700		2,100
TOTAL	7,905	5,359	443	2,103	9,000	4,059
FRANCE						
Procurements	3,702	3,670	4	28		2,802
Maintenance, spares	3,200	3,000	-	200		2,000
TOTAL	6,902	6,670	4	228	5,000	4,802
EEC						
Procurements	10,820	8,198	650	1,972	18,270	6,316
Maintenance, spares	8,555	7,285	5	1,265		5,045
R&D	4,260	4,260	500	-	3,900	2,655
Exports	-	-	-	-	-	1,200
TOTAL	23,635	19,743	1,155	3,237	22,170	15,416
						UK aerospace industry excluding electronics
UK						
Procurements	4,127	-	2,894	1,233	8,000	2,198
Maintenance, spares	3,600	-	3,400	200		2,500
R&D	1,300	-	1,300	-	4,500	1,177
Exports	-	-	-	-	-	1,200
TOTAL	9,027	-	7,594	1,433	12,500	7,075

*On the assumption that operational efficiency is maintained at the 1967 level.

Value of Military Aircraft and Missiles Classified by Origin of Design[1]

	Total value ($mill.)	1967 EEC (%)	1967 US[3] (%)	1967 UK (%)	1967 Others (%)	Total value ($mill.)	1980 EEC (%)	1980 US (%)	1980 UK (%)	1980 Others (%)
BELGIUM	608	30	70	-	-	515	75	25	-	-
NL	643	14	86	-	-	756	63	26	1	-
ITALY	1,407	20	80	-	-	1,536	64	36	-	-
GERMANY	4,300	16,5	74	9.5	-	4,693	61,5	38.5	-	-
FRANCE[2]	3,335	72,5	21	6,5	-	3,807	94	-	6	-
EEC	10,293	35.5	58	17.0	-	11,307	73.5	26,5	≈0	-
UK	5,078	5,5	25	68,5	1,5	5,250	16,5	42	37,5	-

[1] Operational efficiency constant at 1967 level.

[2] Excluding nuclear strike force.
In the case of UK/EEC collaboration, 50% of the value has been attributed to the UK and 50% to the EEC, apart from the Panther which has been attributed as to 100% to the EEC.

[3] Including Canada.

Examination of these tables shows that, for the period 1968-80, with "probable" funds totalling $22,170 million available, the countries of the EEC will need a sum of $23,635 million for procurements, maintenance, spares and R&D.

The slight difference between the two figures increases, however, if the analysis is carried out at the level of individual countries. It is seen at once that, side by side with countries (Italy, Netherlands) in which the funds available and the requirements balance one another almost exactly, there are others (Germany) in which there is an excess of available funds compared with requirements, which offsets in the total for the EEC, those countries (Belgium, France) where the needs exceed the funds that may be assumed to be available for the future.

Hitherto such imbalances have been corrected:

1. In the case of Germany by resorting to massive purchases of aircraft and missiles from the other countries and making almost non-recoverable capital investments in the development of its own missile industry.

2. In the case of France the situation will arise only in the future inasmuch as, up to the present, thanks to the programmes for the nuclear strike force and the independent development of its own aircraft and missiles, the funds available and the needs have balanced each other and will continue to do so if military expenditure is maintained (in terms of proportion of GNP) at the 1967 level.

The tables show further that there is a possibility of offering the EEC aerospace industry a total military market (including exports but excluding electronics, avionics and purchases abroad of equipment or licences) of the order of $15,400 million for the period 1968-80.

Within the terms of reference of this study, however, in addition to the political will of the individual governments, which has already been mentioned several times, such a possibility also requires the creation of international bodies capable of compensating for the misalignment between supply and demand in the individual markets and presupposes the effective use of the funds available to the EEC industries.

This possibility is also primarily dependent on the assumption that:

1. Germany will in fact be responsible for the development of her own air forces in line with the funds which become available if its own defence budget is maintained at the 1967 level in terms of the percentage of GNP. In this case a reduction in military expenditure in France as a proportion of GNP would not have an appreciable effect on the EEC as a whole.

   or:

2. Germany will reduce her own military expenditure, as a percentage of GNP, in such a way as to maintain constant the efficiency of its own air forces, but at the same time France will maintain her own military expenditure at the 1967 level in terms of the percentage of GNP.

At present, of these two assumptions, the first seems to be the more probable.

As regards the United Kingdom, it is obvious that the high level of military expenditure reached in the past is reflected in future estimates (which are based on historical data). There is thus a marked excess of funds over needs (in the neighbourhood of $3,500 million for the period).

The situation is, moreover, complicated by the fact that the British aerospace industry, as compared with that of the EEC,

is seen already to be too large for the funds available in the possible market of the period 1968-80 ($7,075 million), to which there appear to be various alternatives:

1. To increase the British air forces artificially beyond the level at present considered necessary. This way would be contrary to the policy hitherto pursued by the British Government.

2. To step up further the technological potential of the national aerospace industry by entrusting to it extensive R&D programmes, in particular the development of inter-continental ballistic missiles. This way would also be contrary to the policy pursued by the British Government during the past decade.

3. To transfer the excess funds to other sectors of the aero-space industry (civil aircraft, space).

4. To effect an appreciable cut-back in expenditure allocated to the aerospace sector, the funds thus saved being trans-ferred to other sectors of the national economy, a drastic reduction in the size and technological capacity of its own aerospace industry being accepted at the same time.

5. To bring about an appreciable and continuous increase in exports, both military and civil, so as to enable the cuts in defence spending mentioned in the preceding assumption to be carried out without a redimensioning of the aerospace industry being necessary.

To sum up, the problems with which the British domestic mili-tary market is confronted by its own aerospace industry are totally different from, and indeed in a certain sense are opposite of, those which the domestic military market creates for the aerospace industries of the EEC countries.

PART 3

The international trade

1. IMPORTS AND EXPORTS OF AIRCRAFT AND AERO-ENGINES[1,2]

In the United States, the demand for aircraft and aero-engines is covered almost wholly out of national production. The few exceptions include imports of the Caravelle (France) and the BAC 111 (United Kingdom) and of the Rolls-Royce Dart and Spey engines.

The outstanding feature of American imports is that purchases from abroad have been limited to civil aircraft and equipment not produced in the United States (or not produced there at the time of import).

Virtually the same applies to British imports of aircraft and equipment. The British Government has always backed a "Buy British policy", particularly in the case of commercial aircraft, and has only imported from abroad when similar British types were not available[3].

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[1] This section deals only with aircraft and aero-engines because the official statistics give no figures for missiles. It will be recalled, however, that since 1960 the EEC countries have purchased the American missiles Nike, Honest John, Sergeant, Tartar, Pershing, Terrier and the British Seacat missile, at a cost of about $700 million. The United Kingdom has purchased Bullpup, Sidewinder and Polaris missiles from the United States at a cost of $650-700 million.

[2] See tables 3/33, 3/34 and 3/36-39.

[3] For example, imports of the Boeing 707, which received its certificate five years before the corresponding British model (VC10).

As regards military aircraft, special reference should be made to recent purchases of Phantoms and Hercules[1] from the United States.

Overall, the percentage of imports in relation to the value of output and to national demand has not been high (8-11%), except in one or two years.

On the other hand, the EEC countries are fairly heavily dependent on the foreign market. From 1960-67, the EEC imported[2] aircraft and aero-engines to the value of 34% of its own production and 30% of its internal market[3].

This dependence of the Community on outside production - especially American - becomes even more significant when one considers the types of aircraft imported; with the exception of the medium-range Caravelle, all commercial jets in service with EEC airlines were purchased abroad.
The marked dependence of the EEC countries as regards military aircraft also is clearly demonstrated by the large numbers, including around a thousand F-104's, built in EEC countries under licences from non-member countries (the US in particular); the exception is France, which has developed aircraft both on its own and jointly with other countries.

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[1] Partly built in the United Kingdom.

[2] From countries not member of the European Community.

[3] Annual value of imports between $350 and 420 million (545 million in 1967); total value (1960-67) $3,264 million.

It will be recalled that the main causes of this dependence are as follows:

1. The long period of reconstruction, which has seriously limited the contribution of the German and Italian industries to both design and construction work.

2. The Netherlands and Belgium have made no major contribution because their aircraft industries are small.

3. The structure of the industry in the individual countries, combined with limited overall national demand and the variety of such demand, has made it impossible either to work out valid independent aircraft programmes or to construct, even under licence, all the types required for each national market.

This state of affairs has also had an adverse effect on exports; again excepting France, aircraft exports from the EEC to outside countries have been few and on a minor scale.

Since 1960, only France has been in a position both to cover its military, and some of its civil, requirements[1] out of domestic production, and to export effectively. French products, including the Caravelle, Mirage, Alouette and Fan Jet Falcon and Turbomeca engines, were principally responsible for the increase in EEC exports from 1960 to 1967 at an average rate (14.7%) which is much higher than the American figure (3.8%) and is beaten only by the British figure (15.9%).

EEC exports increased 2.6 times overall, from $152 to 397 million, over the period under review and, by 1967, were equal to 76.5% of British exports ($519 million) and 17.6% of American exports ($2,250 million) (Fig. 21).

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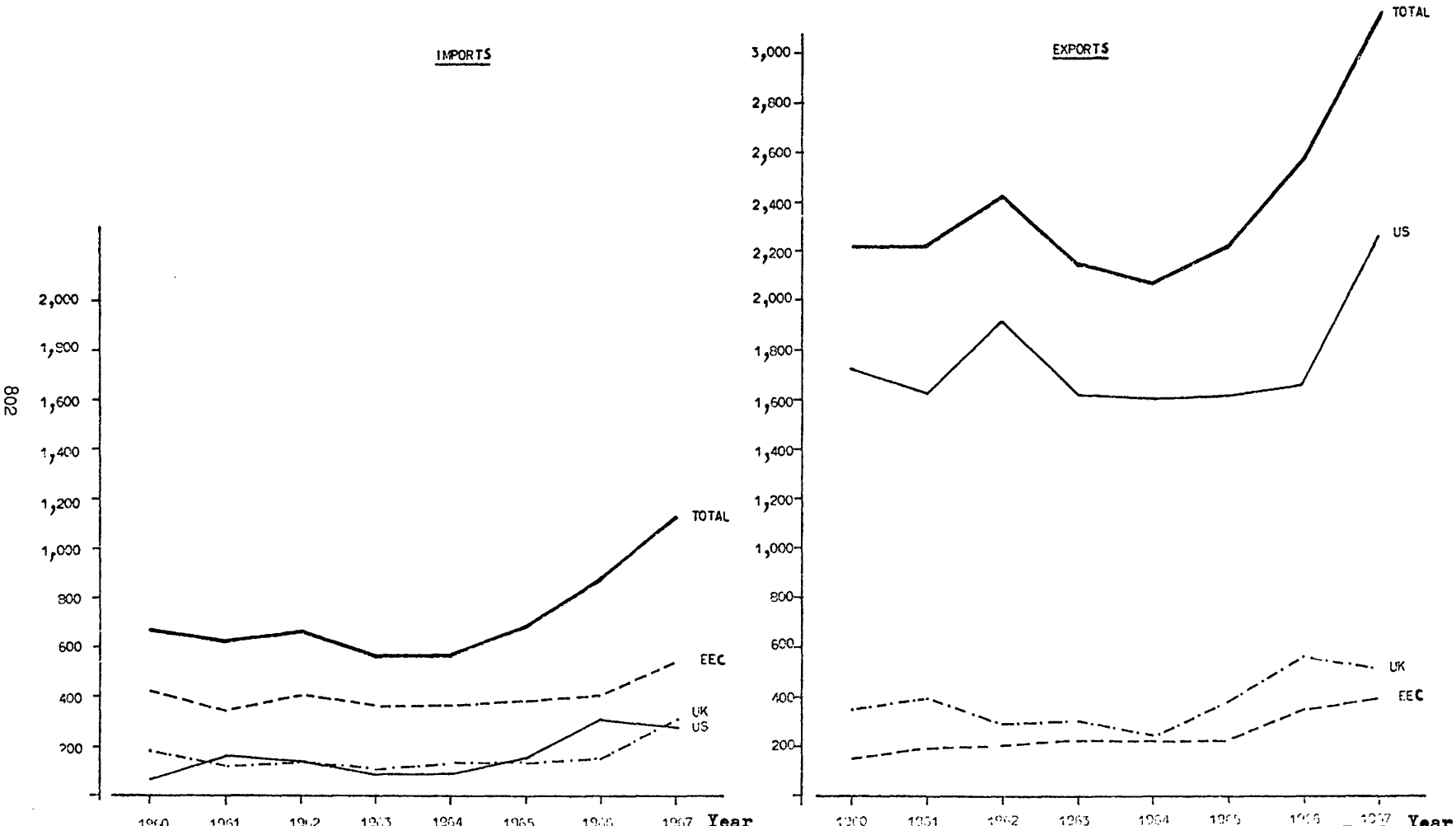
[1] With the Caravelle, although the engine was imported.

FIG. 21

Imports and Exports of Aeronautical Products by Countries (1960-67)

(Millions of dollars)



Source: Statistical Office of the European Communities, Analytical Tables, Import-Export 1960-67; The Overseas Trade Accounts, 1960-67; US Dept. of Commerce, Bureau of Census, Import-Export, 1960-67.

The EEC share in total exports of aircraft and engines from the EEC, the United Kingdom and the United States rose from 6.8% in 1960 to 12.5% in 1967; this increase may be attributed partly to a more vigorous export policy and partly to the fact that the absolute value of American exports remained constant (except in 1967).

From 1960 to 1967, exports from the EEC to outside countries were worth $2,000 million, which was about two-thirds of the value of imports and, on average, some 20% of total Community output. Since, over the period under review, EEC internal demand amounted to 115% of the value of the Community aircraft industry's total output and since, as was already noted, exports averaged 20% of that value, it may be argued theoretically that the EEC industry's output should have been 35% higher than it in fact was.

Apart from exports to non-member countries, mainly in Africa, trade within the Community was by no means negligible in a number of years (Table 3/35)[1].

In the United States, the percentage of national output taken up by external demand is not very high (10-11% up to 1962), despite the high absolute figure for annual exports (around $1,600 million).

The figures quoted above do not, however, give a complete picture of American exports. There are two other kinds of exports which are difficult to quantify and are not included in the statistics for exports of goods (in this case, aircraft, and components). We are referring here to the enormous

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[1] Particularly between 1963 and 1965 in the case of the F-104. Over the whole period under review, exports within the Community were worth about $2,000 million, which was 20% of total Community output.

quantities of aircraft and aero-engines delivered to European and other countries on MAP account and the granting of construction licences. American exports slowed down somewhat from 1963 to 1966, but recovered sharply in 1967.

The foreign market provides major outlets for the British aircraft industry.

Despite the drop in the number of exportable types as compared with previous years, 27% of British output went abroad in the period 1960-67. This was achieved through substantial exports of components[1], aircraft, including the Jet Provost and Lightning (military) and the Viscount, BAC 111, HS 125 and HS 748 (civil), and engines (Dart, Viper and Spey).

The importance of aircraft exports to the EEC countries and the United Kingdom can easily be appreciated by comparing their exports per head[2] with the American figure:

Aircraft exports per head (1967)

EEC countries	UK	US
($)	($)	($)
2,428	2,043	1,616

The main reasons for exporting vary from country to country. For many years, the United States have followed the policy of "off shore" purchases on the military side and have to some extent discouraged foreign sales of strategic equipment (including aircraft).

In 1963, the difficult balance of payments situation called for a change of direction. There was a shift towards a "Buy American" policy, particularly as regards the other members of NATO, although this was partly offset by the direct

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1 Approximately 40% of total British exports.

2 i.e., per employee in the aerospace industry.

production of sub-systems and parts by the purchasing country[1].

Exports also lengthen production runs and thus substantially reduce unit costs. This would appear to be a determining factor for manufacturers in the case of commercial aircraft, even allowing for the fact that the American home market is already very large.

Both factors had even greater significance in the United Kingdom, owing to the precarious balance of payments situation and the limited character of home demand.
Because of the close ties between government and firms, both factors are important at all levels, even though the cancellation of certain military aircraft suitable for export and the special features of a number of commercial airoraft would appear to be inconsistent with this statement.

Problems relating to the balance of payments and the growth of demand are also basic factors in EEC exports.
The second would appear to be the more important, however, in view of the inadequacy of internal demand and the improvement in the balance of payments.

The export aid policies adopted by the United States, the United Kingdom and the EEC countries may not be a direct consequence of these factors but they are certainly closely linked with them. The most significant of the various forms of direct and indirect export aids are loans and credit guarantees. So far as the aircraft industry is concerned, the maximum period for payment laid down by the Berne Union[2]

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[1] As in the case of the UK-built Phantoms.

[2] Set up in 1923; one provision of its statute is that international loans shall not exceed the limits for normal commercial transactions.

would appear to have been overtaken by events, particularly as regards exports to the developing countries.

In the United States, export loans are granted by the Export-Import Bank, which is a government credit agency, up to a maximum of 60% of the value of the order[1].

The maximum term for export loans for aircraft and equipment is seven years under the rules of the Eximbank. The Bank's total working capital amounts to $9,000 million.

In 1967, a total of $792 million was loaned in respect of aircraft exports, and this represented 77% of all loans by the Eximbank that year[2].

In the United Kingdom, the Export Credits Guarantee Department (ECGD) serves much the same purpose as the American Eximbank. The ECGD allows from seven to 10 years for repayment depending on the types of aircraft exported.

There are no similar permanent institutions in the EEC countries, but some of the latter have concluded contracts allowing 12 years for payment in respect of a number of commercial transactions, especially with East Eruopean countries.

The bulk of exports (78%) from the EEC, the United Kingdom and the United States consist of aeronautical products made by the airframes branch.

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[1] Of the remaining 40%, half is normally paid in cash by the purchaser and the other half is lent by the exporting firm.

[2] Changes in the Eximbank's regulations are at present under consideration. Its working capital is to be raised to $13,500 million, the repayment period will be extended from seven to 10 years, and loans will be increased from 60 to 70% of the price (in which case the cash payment by the purchaser will be cut to 10% of the value of the order). However, despite the proposed increase in available funds, consideration is being given to a cut in loans for exports of commercial aircraft.

On average, 50% of British exports come from the engines branch (Fig. 22), but the EEC countries and the United States export mainly aircraft and airframes (78%).

The table which follows shows the percentage contributed to total exports by each country, and by the airframes and engines branches, from 1960 to 1967:

	EEC	UK	US	Total exports
	1	2	3	1 + 2 + 3
Airframes	10.3	10.5	79.2	100.0
Engines	9.8	35.8	54.4	100.0
Aeronautical products (Branches: airframes and engines)	10.3	16.0	73.7	100.0

Military aircraft exports[1] are estimated to account for 65-70% of the overall figure, with variations between the three areas: EEC (74%), US (77%) and UK (45%).

From 1960 to 1967, the destination of exports was (Fig. 23) as follows[2]:

Exporting country / Destination	EEC	UK	US[3]
EEC	-	23.4%	27.0%
UK	11.6%	-	4.7%
US	17.9%	20.0%	-
Rest of world	70.5%	56.6%	68.3%

[1] About $13,000 million over the eight years (1960-67).

[2] The actual percentages vary from year to year.

[3] Civil exports only; military exports appear as an overall figure for security reasons.

FIG. 22 **Aircraft Imports and Exports by Branches and Countries (1960-67)**

(Millions of dollars)

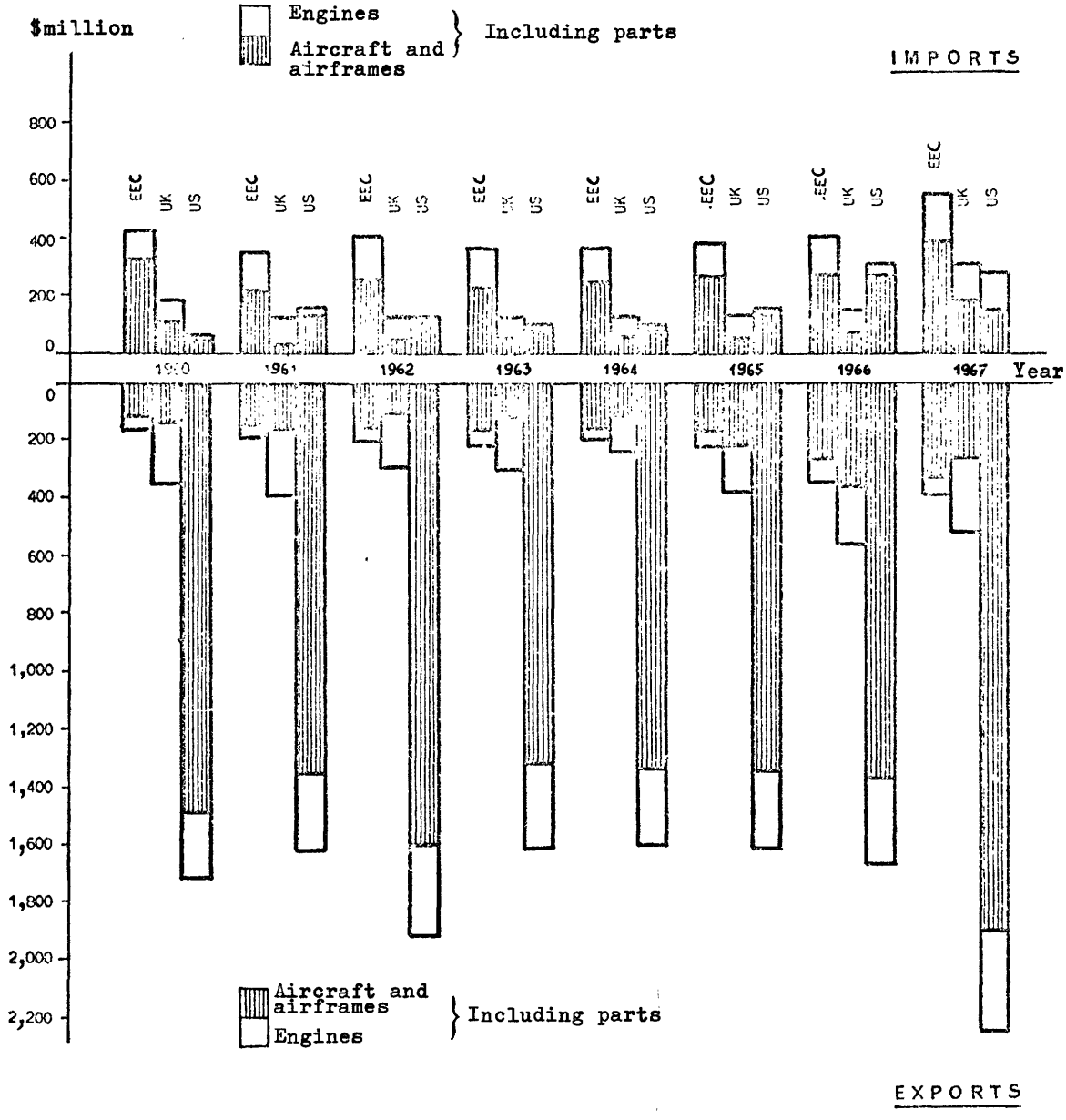
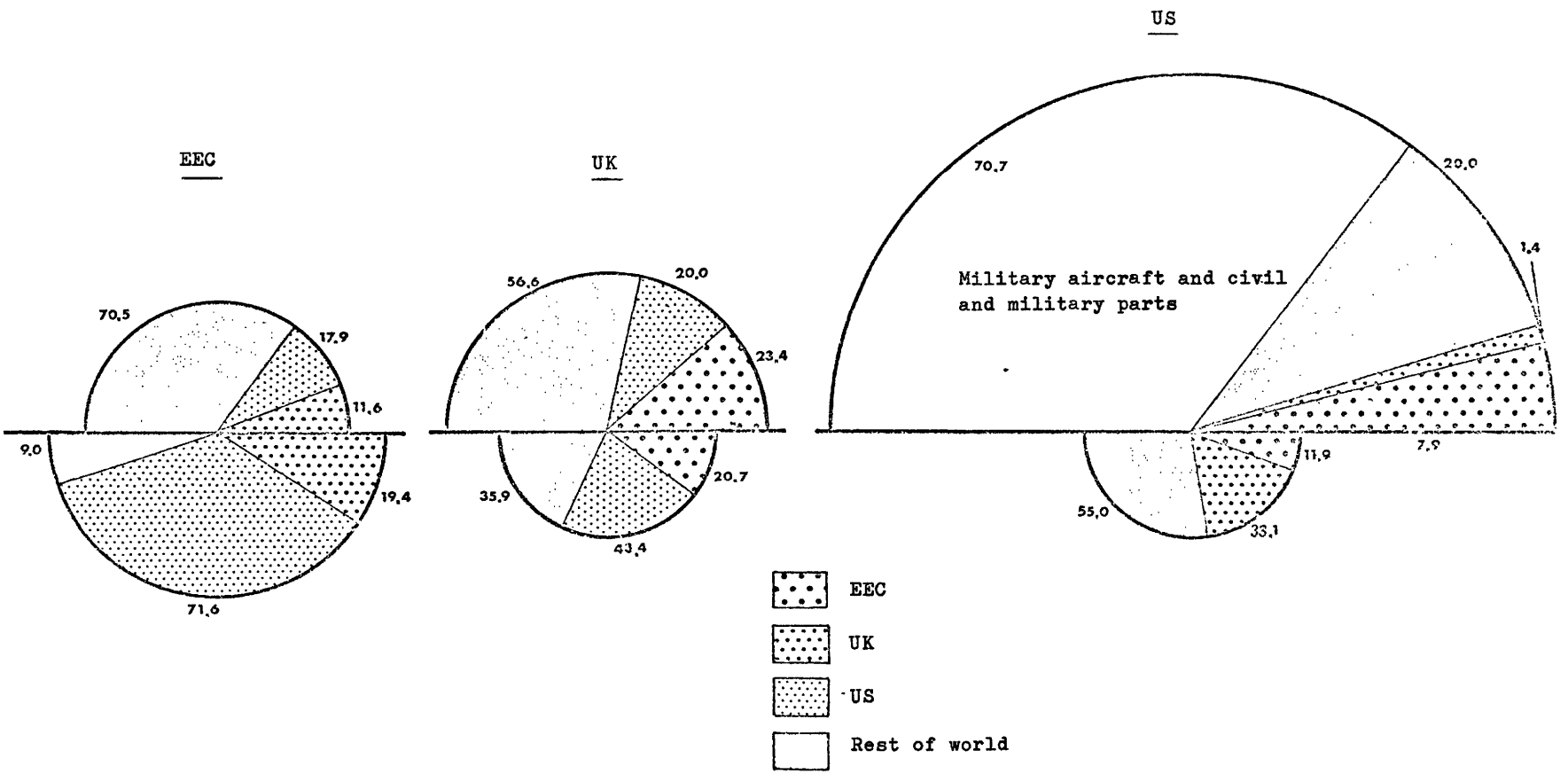


FIG. 23

Percentage Distribution of Imports and Exports by Countries and Geographical Areas
(1960-67)



In all three cases, the majority of exports go to the countries covered by the heading "Rest of world".

From 1960 to 1967, imports were distributed geographically (Fig. 23) as follows:

Importing countries / Countries of origin	EEC[1]	UK	US
EEC	-	20.7	11,9
UK	19.5	-	33,0
US	71,6	43,4	-
Rest of world	8.9	35,9	55,1

It will be noted in particular that the EEC countries import mainly from the United States (71.6%), whereas the United States obtain a majority of their imports (55.1%) from the "Rest of the world" and principally from Canada[2].

The EEC countries had a constant deficit on trade in aeronautical products, while the United States and the United Kingdom had a constant surplus (Table 3/40).
With the exception of 1965 and 1966[3], however, the United Kingdom had a constant deficit with the United States.

The EEC's final deficit on trade in aeronautical products with countries outside the Community, which varied annually between $65 and 276 million, is the result of a deficit with the United Kingdom and the United States[4] and a surplus with the "Rest of the world".

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1 Exports to countries outside the Community only.

2 Where a number of American Companies have subsidiaries.

3 Years when the BAC 111 was being exported.

4 Averaging about $300 million annually.

The following table shows the percentage contribution of international trade in aeronautical products to the national economy:

	1960	1961	1962	1963	1964	1965	1966	1967
EEC								
Aircraft exports as percentage of visible exports	0,6	0,7	0,7	0,6	0,5	0,5	0,7	0,7
Aircraft imports as percentage of visible imports	1,7	1,3	1,3	1,0	0,9	0,9	0,9	1,1
UK								
Aircraft exports as percentage of visible exports	3,3	3,6	2,7	2,5	2,0	2,8	3,9	3,8
Aircraft imports as percentage of visible imports	1,6	1,1	1,1	1,0	0,9	0,9	1,1	2,0
US								
Aircraft exports as percentage of visible exports	8,9	8,2	9,4	7,4	6,4	6,2	5,7	7,4
Aircraft imports as percentage of visible imports	0,4	1,0	0,8	0,6	0,5	0,7	1,2	1,0

In relation to the balance of visible trade, which is in deficit[1] for the United Kingdom and in surplus for the EEC and the United States, the balance on trade in aeronautical products:

- reduces the surplus of the EEC countries;
- reduces the United Kingdom's deficit;
- contributes to the United States' surplus[2].

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[1] From 1960 to 1967

[2] Running at 20-30% annually.

TABLES ANNEXED TO CHAPTER 3

The aeronautical market

List of tables

List of Tables

Table 3/1

Number of Jet and Turboprop Aircraft in Service and on Order in 1968

		EUROPE								US		CANADA		Central & South America		AFRICA		Middle East		Far East		World Total	
		EEC		UK		Others		TOTAL															
Turbojets	Long range (Total)	104	(59)	71	(31)	55	(36)	230	(126)	692	(395)	31	(27)	33	(3)	24	(7)	32	(14)	80	(60)	1122	(632)
	US aircraft	104	(46)	25	(18)	50	(36)	179	(100)	692	(360)	31	(23)	23	(3)	15	(6)	16	(12)	75	(53)	1031	(557)
	European aircraft		(13)	46	(13)	5		51	(26)		(35)		(4)	10		9	(1)	16	(2)	5	(7)	91	(75)
	Medium/ short range (Total)	149	(86)	50	(78)	118	(34)	317	(198)	637	(558)	20	(28)	40	(17)	27	(6)	19		61	(16)	1121	(823)
	US aircraft	60	(72)		(4)	46	(26)	106	(102)	558	(555)	20	(28)	22	(15)	7	(3)	7		42	(15)	762	(718)
	European aircraft	89	(14)	50	(74)	72	(8)	211	(96)	79	(3)			18	(2)	20	(3)	12		19	(1)	359	(105)
	TOTAL	253	(145)	121	(109)	173	(70)	547	(324)	1329	(953)	51	(55)	73	(20)	51	(13)	51	(14)	141	(76)	2243	(1455)
	US aircraft	164	(118)	25	(22)	96	(62)	285	(202)	1250	(915)	51	(51)	45	(15)	22	(9)	23	(12)	117	(68)	1793	(1275)
	European aircraft	89	(27)	96	(87)	77	(8)	262	(122)	79	(38)		(4)	28	(5)	29	(4)	28	(2)	24	(8)	450	(193)
Turboprops	Long range (Total)			45	(5)	9	(1)	54	(6)	36	(3)			3				2		1		96	(9)
	US aircraft									10	(3)									1		11	(3)
	European aircraft			44		5		49		5				3								57	
	TOTAL others			1	(5)	4	(1)	5	(6)	21								2				28	(6)
	Medium/ short range (Total)	82	(11)	122		66	(2)	270	(13)	375	(42)	77	(1)	65	(25)	37	(2)	15		221	(26)	1058	(109)
	US aircraft	14						14		294	(21)	4	(1)	18	(5)					10		340	(27)
	European aircraft	68	(11)	122		66	(2)	256	(13)	79	(1)	71		42	(11)	37	(2)	13		187	(24)	685	(51)
	TOTAL others									2	(20)	2		5	(9)					24	(2)	33	(31)
	TOTAL	82	(11)	167	(5)	75	(3)	324	(19)	411	(45)	77	(1)	68	(25)	37	(2)	15		222	(33)	1154	(119)
	US aircraft	14						14		304	(24)	4	(1)	18	(5)					11		351	(30)
	European aircraft	68	(11)	166		71	(2)	305	(13)	84	(1)	71		45	(11)	37	(2)	13		187	(24)	742	(51)
	TOTAL others			1	(5)	4	(1)	5	(6)	23	(20)	2		5	(9)			2		24	(2)	61	(37)

Table 3/1a

Value of Jet and Turboprop Aircraft in Service and on Order in 1968

(Millions of dollars)

		EUROP				US	CANADA	Central & South America	AFRICA	Middle East	Far East	World Total
		EEC	UK	Others	TOTAL							
Turbojets	Long range (Total)	874 (1,645)	518 (756)	406 (637)	1,798 (3,038)	5,519 (7,874)	260 (650)	220 (25)	175 (101)	195 (243)	607 (1,352)	8,774 (13,283)
	US aircraft	874 (1,317)	210 (513)	386 (637)	1,470 (2,467)	5,519 (6,992)	260 (549)	182 (25)	122 (97)	125 (193)	588 (1,176)	8,266 (11,499)
	European aircraft	(328)	308 (243)	20	328 (571)	(862)	(101)	38	53 (4)	70 (50)	19 (176)	508 (1,784)
	Medium/ short range (Total)	685 (395)	205 (324)	474 (143)	1,364 (862)	4,098 (4,309)	88 (139)	197 (58)	127 (23)	91	374 (70)	6,339 (5,461)
	US aircraft	364 (346)	(17)	215 (116)	579 (479)	3,802 (4,298)	88 (139)	132 (50)	55 (12)	44	302 (66)	5,002 (5,044)
	European aircraft	321 (49)	205 (307)	259 (27)	785 (383)	296 (11)	-	65 (8)	72 (11)	47	72 (4)	1,337 (417)
	TOTAL	1,559 (2,040)	723 (1.080)	880 (780)	3,162 (3,900)	9,617 (12,183)	348 (789)	417 (83)	302 (124)	286 (243)	981 (1,422)	15,113 (18,744)
	US aircraft	1,238 (1,663)	210 (530)	601 (753)	2,049 (2,946)	9,321 (11,290)	348 (688)	314 (75)	177 (109)	169 (193)	890 (1,242)	13,268 (16,543)
	European aircraft	321 (377)	513 (550)	279 (27)	1,113 (954)	296 (893)	(101)	103 (8)	125 (15)	117 (50)	91 (180)	1,845 (2,201)
Turboprops	Long range (Total)	-	160 (21)	35 (4)	195 (25)	125 (8)	-	11	-	8	3	342 (33)
	US aircraft	-	-	-	-	27 (8)	-	-	-	-	3	30 (8)
	European aircraft	-	156	18	174	10	-	11	-	-	-	195
	TOTAL others	-	4 (21)	17 (4)	21 (25)	88	-	-	-	8	-	117 (25)
	Medium/ short range (Total)	110 (8)	185	63 (1)	358 (9)	926 (171,4)	146 (1)	127 (35)	33 (1)	15	222 (33)	1,837 (250.4)
	US aircraft	39	-	-	39	852 (103)	20 (1)	57 (4)	-	-	24	992 (108)
	European aircraft	71 (8)	185	63 (1)	319 (9)	71 (0,4)	123	61 (16)	33 (1)	15	167 (30)	789 (56)
	TOTAL others	-	-	-	-	3 (68)	3	9 (15)	-	-	41 (3)	56 (86)
	TOTAL	110 (8)	345 (21)	98 (5)	553 (34)	1,051 (179,4)	146 (1)	138 (35)	33 (1)	23	235 (33)	2,179 (283.4)
	US aircraft	39	-	-	39	879 (111)	20 (1)	57 (4)	-	-	27	1,022 (116)
	European aircraft	71 (8)	341	81 (1)	493 (9)	81 (0,4)	123	72 (16)	33 (1)	15	167 (30)	984 (56.4)
	TOTAL others	-	4 (21)	17 (4)	21 (25)	91 (68)	3	9 (15)	-	8	41 (3)	173 (111)

Table 3/2

Orders for Turboprops, by Type (1960-67)

(Number of aircraft on 31 December each year)

			Up to 1967	1967	1966	1965	1964	1963	1962	1961	1960	Before 1960
- Long range	Britannia	(UK)	59	-	-	-	-	-	-	-	2	57
	CL 44	(CA)	23	-	-	14	5	-	2	2	-	-
	L 382/100	(US)	18	5	6	7	-	-	-	-	-	-
	Argosy	(US)	7	-	-	-	4	-	-	3	-	-
- Medium/short range	Viscount	(UK)	408	-	-	-	2	-	-	11	11	384
	Vanguard	(UK)	44	-	-	-	1	-	-	-	3	40
	Herald	(UK)	40	-	1	15	10	2	12	-	-	-
	HS 748	(UK)	87	37	15	10	7	4	5	9	-	-
	F 27	(NL)	360	34	32	83	13	20	16	32	25	105
	Nord 262	(F)	33	11	5	3	10	4	-	-	-	-
	Electra	(US)	174		-	-	-	-	-	4	2	168
	Convair 600/640	(US)	97	37	7	53	-	-	-	-	-	-
	F 227	(US)	5	5	-	-	-	-	-	-	-	-
	NAMCO YS11	(J)	75	25	8	2	40	-	-	-	-	-
TOTAL Turboprops			1,430	154	74	187	92	30	35	61	43	754

NB. Aircraft ordered by ICAO member countries from non-member countries are excluded because details are not available.

Source: ICAO Bulletin No. 4-5 (1960-67).

Table 3/2a

Deliveries of Turboprops, by Type (1960-67)

(Number of aircraft at 31 December each year)

			Up to 1967	1967	1966	1965	1964	1963	1962	1961	1960	Before 1960
- Long range	Britannia	(UK)	59	-	-	-	-	-	-	-	2	57
	CL 44	(CA)	38	-	-	19	-	-	10	9	-	-
	L 382/100	(US)	18	7	11	-	-	-	-	-	-	-
	Argosy	(US)	13	-	-	-	4	-	-	9	-	-
- Medium/short range	Viscount	(UK)	413	-	-	-	2	5	-	17	5	384
	Vanguard	(UK)	44	-	-	-	1	-	-	23	20	-
	Herald	(UK)	39	2	6	5	6	8	12	-	-	-
	HS 748	(UK)	59	16	12	8	5	6	12	-	-	-
	F 27	(NL)	310	20	62	27	25	33	13	37	17	76
	Nord 262	(F)	30	8	11	6	3	2	-	-	-	-
	Electra	(US)	174	-	-	-	-	-	-	12	40	122
	Convair 600/640	(US)	95	57	34	4	-	-	-	-	-	-
	F 227	(US)	33	33	-	-	-	-	-	-	-	-
	NAMCO YS11	(J)	36	17	8	11	-	-	-	-	-	-
TOTAL Turboprops			1,361	160	144	80	46	54	47	107	84	639

NB. Aircraft ordered by ICAO member countries from non-member countries are excluded because details are not available.

Source: ICAO Bulletin No. 4-5 (1960-67).

Table 3/3

Orders for Turboprops, by Type (1960-67)

($ millions[1] at 31 December each year)

			Up to 1967	1967	1966	1965	1964	1963	1962	1961	1960	Before 1960
- Long range	Britannia	(UK)	218.3	-	-	-	-	-	-	-	7.4	210.9
	CL 44	(CA)	96.6	-	-	58.8	21.0	-	8.4	8.4	-	-
	L 382/100	(US)	48.6	13.5	16.2	18.9	-	-	-	-	-	-
	Argosy	(US)	13.3	-	-	-	7.6	-	-	5,7	-	-
- Medium/short range	Viscount	(UK)	489.6	-	-	-	2.4	-	-	13.2	13.2	460.8
	Vanguard	(UK)	127.6	-	-	-	2.9	-	-	-	8.7	116.0
	Herald	(UK)	56.0	-	1.4	21.0	14.0	2.8	16.8	-	-	-
	HS 748	(UK)	139.2	59,2	24.0	16.0	11.2	6.4	8.0	14.4	-	-
	F 27	(NL)	252.0	23.8	22.4	58.1	9,1	14.0	11,2	22.4	17.5	73.5
	Nord 262	(F)	29,7	9,9	4.5	2.7	9.0	3,6	-	-	-	-
	Electra	(US)	417.6	-	-	-	-	-	-	9.6	4,8	403,2
	Convair 600/640	(US)	475.3	181.3	34.3	259.7	-	-	-	-	-	-
	F 227	(US	4.0	4,0	-	-	-	-	-	-	-	-
	NAMCO YS11	(J)	127.5	42.5	13.6	3.4	68.0	-	-	-	-	-
TOTAL Turboprops			2,495.3	334.2	116,4	438.6	145.2	26,8	44.4	73,7	51.6	1,264.4

[1] Including the value of spares supplied with the order.

Source: compiled by SORIS from ICAO Bulletin (1960-77).

Table 3/3a

Deliveries of Turboprops, by Type (1960-67)

($ millions[1] at 31 December each year)

			Up to 1967	1967	1966	1965	1964	1963	1962	1961	1960	Before 1960
- Long range	Britannia	(UK)	218.3	-	-	-	-	-	-	-	7.4	210.9
	CL 44	(CA)	127.0	-	-	79,8	-	-	9.4	37,8	-	-
	L 382/100	(US)	48.6	18.9	29.7	-	-	-	-	-	-	-
	Argosy	(US)	24,7	-	-	-	7.6	-	-	17.1	-	-
- Medium/short range	Viscount	(UK)	141.6	-	-	-	2,4	6.0	-	20.4	6.0	106.8
	Vanguard	(UK)	127.6	-	-	-	2.9	-	-	66.7	58,0	-
	Herald	(UK)	54.6	2.8	8,4	7,0	8,4	11.2	15,8	-	-	-
	HS 748	(UK)	94,4	25,6	19,2	12,8	8.0	9,6	19,2	-	-	-
	F 27	(NL)	217.0	14.0	43,4	18.9	17.5	23.1	9.1	25.9	11,9	53.2
	Nord 262	(F)	27.0	7.2	9.9	5,4	2,7	1,8	-	-	-	-
	Electra	(US)	417.6	-	-	-	-	-	-	28,8	96,0	292.8
	Convair 600/640	(US)	465.5	279.3	166.6	19,6	-	-	-	-	-	-
	F 227	(US)	26.4	26.4	-	-	-	-	-	-	-	-
	NAMCO YS11	(J)	61.2	28.9	13.6	18.7	-	-	-	-	-	-
TOTAL Turboprops			2,051.5	403,1	290,8	162.2	49,5	51.7	54,5	196,7	179,3	663.7
			4.8	8,8	6,8	1.2	1,5	-	-	2,3	5,4	4.4

[1] Including the value of spares supplied with the order.

Source: compiled by SORIS from ICAO Bulletin (1960-67).

Table 3/4

Orders for Jet Aircraft, by Type (1957-67)

(Number of aircraft at 31 December each year)

		Up to 1967	1967	1966	1965	1964	1963	1962	1961	1960	1959	1958	1957	Before 1957
- Long range	DC 8 (US)	490	71	109	74	30	14	29	15	7	17	8	15	101
	B 707 (US)	633	92	97	132	54	40	12	49	13	7	-9	38	108
	B 720 (US)	154	-	5	8	11	2	7	30	45	10	25	11	-
	B 747 (US)	141	53	88	-	-	-	-	-	-	-	-	-	-
	CV 880/990 (US)	100	-	-	-	6	9	-4	4	-	7	34	4	40
	VC 10 (UK)	32	3	-	2	-13	-	-2	4	10	-	-	-	28
	COMET (UK)	68	-	-	-	-	2	6	5	13	9	8	6	19
- Medium/short range	B 727 (US)	687	119	140	197	84	20	10	37	80	-	-	-	-
	B 737 (US)	218	64	40	86	-	-	-	-	-	-	-	-	28
	DC 9 (US)	474	97	132	187	34	24	-	-	-	-	-	-	-
	BAC 111 (UK)	127	30	15	12	10	25	19	16	-	-	-	-	-
	TRIDENT (UK)	52	5	-	16	3	13	2	-	-	-	-	-	13
	CARAVELLE (F)	278	11	23	22	16	9	13	43	50	9	30	8	44
	F 28 (NL)	9	8	-	1	-	-	-	-	-	-	-	-	-
TOTAL Jet aircraft		3,463	553	649	737	235	158	92	203	218	59	96	82	381

NB. Aircraft ordered by ICAO member countries from non-member countries are excluded because no details are available. A "minus" sign indicates a cancelled order.

Source: ICAO Bulletin No. 4-5 (1960-67).

Table 3/4a

Deliveries of Jet Aircraft, by Type (1957-67)

(Number of aircraft at 31 December each year)

		Up to 1967	1967	1966	1965	1964	1963	1962	1961	1960	1959	1958	1957
- Long range	DC 8 (US)	318	41	34	29	20	18	22	52	85	17	-	-
	B 707 (US)	486	113	59	56	32	28	37	13	77	65	6	-
	B 720 (US)	153	5	5	10	6	6	31	68	22	-	-	-
	B 747 (US)	-	-	-	-	-	-	-	-	-	-	-	-
	CV 880/990 (US)	102	-	-	-	6	21	23	39	13	-	-	-
	VC 10 (UK)	31	4	3	10	14	-	-	-	-	-	-	-
	COMET (UK)	68	-	-	-	2	2	7	12	18	21	6	-
- Medium/short range	B 727 (US)	482	156	114	111	95	6	-	-	-	-	-	-
	B 737 (US)	4	4	-	-	-	-	-	-	-	-	-	-
	DC 9 (US)	225	154	67	4	-	-	-	-	-	-	-	-
	BAC 111 (UK)	99	19	46	34	-	-	-	-	-	-	-	-
	TRIDENT (UK)	33	1	10	9	12	1	-	-	-	-	-	-
	CARAVELLE (F)	230	19	16	18	22	24	36	37	43	15	-	-
	F 28 (NL)	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL Jet aircraft		2,231	516	354	281	209	106	156	221	258	118	12	-

NB. Aircraft ordered by ICAO member countries from non-member countries are excluded because no details are available.

Source: ICAO Bulletin No. 4-5 (1960-67).

Table 3/5

Orders for Jet Aircraft, by Type (1957-67)
(at 31 December each year) ($ millions[1])

			Up to 1967	1967	1966	1965	1964	1963	1962	1961	1960	1959	1958	1957	Before 1957
- Long range	DC 8	(US)	4,116.0	596.4	915.6	621.6	252.0	117.6	243.6	126.0	58.8	142.8	67.2	126.0	848.4
	B 707	(US)	5,317.2	772.8	814.8	1,108.8	453.6	336.0	100.8	411.6	109.2	58.8	-75.6	319.2	907.2
	B 720	(US)	1,108.8	-	36.0	57.6	79.2	14.4	50.4	216.0	324.0	72.0	180.0	79.2	-
	B 747	(US)	3,384.0	1,272.0	2,112.0	-	-	-	-	-	-	-	-	-	-
	CV 880/990	(US)	600.0	-	-	-	36.0	54.0	-24.0	24.0	-	42.0	204.0	24.0	240.0
	VC 10	(UK)	268.8	25.2	-	16.8	-109.2	-	-16.8	33.6	84.0	-	-	-	235.2
	COMET	(UK)	258.4	-	-	-	-	7.6	22.8	19.0	49.4	34.2	30.4	22.8	72.2
- Medium/short range	B 727	(US)	5,358.6	928.2	1,092.0	1,536.6	655.2	156.0	78.0	288.6	624.0	-	-	-	-
	B 737	(US)	915.6	268.8	168.0	361.2	-	-	-	-	-	-	-	-	117.6
	DC 9	(US)	1,990.8	407.4	554.4	785.4	142.8	100.8	-	-	-	-	-	-	-
	BAC 111	(UK)	492.6	114.0	57.0	45.6	38.0	95.0	72.2	60.8	-	-	-	-	-
	TRIDENT	(UK)	228.8	22.0	-	70.4	13.2	57.2	8.8	-	-	-	-	-	57.2
	CARAVELLE	(F)	1,000.8	39.6	92.8	79.2	57.6	32.4	46.8	154.8	180.0	32.4	108.0	28.8	152.4
	F 28	(NL)	27.9	24.8	-	3.1	-	-	-	-	-	-	-	-	-
TOTAL Jet aircraft			25,058.3	4,471.2	5,832.6	4,686.3	1,618.4	971.0	582.6	1,334.4	1,429.4	382.2	514.0	600.0	2,636.2

[1] Including the value of spares supplied with the order.

Source: compiled by SORIS from ICAO Bulletin (1960-67).

Table 3/5a

Deliveries of Jet Aircraft, by Type (1957-67)
(at 31 December each year) ($ millions[1])

			Up to 1967	1967	1966	1965	1964	1963	1962	1961	1960	1959	1958	1957
- Long range	DC 8	(US)	2,671.2	344.4	285.6	243.6	168.0	151.2	184.8	436.8	714.0	142.8	-	-
	B 707	(US)	4,082.4	949.2	495.6	470.4	268.8	235.2	310.8	109.2	646.8	546.0	50.4	-
	B 720	(US)	1,101.6	36.0	36.0	72.0	43.2	43.2	223.2	489.6	158.4	-	-	-
	B 747	(US)	-	-	-	-	-	-	-	-	-	-	-	-
	CV 880/990	(US)	612.0	-	-	-	36.0	126.0	138.0	234.0	78.0	-	-	-
	VC 10	(UK)	260.4	33.6	25.2	84.0	117.6	-	-	-	-	-	-	-
	COMET	(UK)	258.4	-	-	-	7.6	7.6	26.6	45.6	68.4	79.8	22.8	-
- Medium/short range	B 727	(US)	3,759.6	1,216.8	889.2	865.8	741.0	46.8	-	-	-	-	-	-
	B 737	(US)	16.8	16.8	-	-	-	-	-	-	-	-	-	-
	DC 9	(US)	945.0	646.8	281.4	16.8	-	-	-	-	-	-	-	-
	BAC 111	(UK)	376.2	72.2	174.8	129.2	-	-	-	-	-	-	-	-
	TRIDENT	(UK)	145.2	4.4	44.0	39.6	52.8	4.4	-	-	-	-	-	-
	CARAVELLE	(F)	828.0	68.4	57.6	64.8	79.2	86.4	129.6	133.2	154.8	54.0	-	-
	F 28	(NL)	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL Jet aircraft			15,056.8	3,388.6	2,289.4	1,986.2	1,514.2	700.8	1,013.0	1,448.4	1,820.4	822.6	73.2	-

[1] Including the value of spares supplied with the order.
Source: compiled by SORIS from ICAO Bulletins (1960-67).

Table 3/6

Number of Jet and Turboprop Aircraft in Service and on Order in 1968

(by country of origin)

Country of origin	Turbojet aircraft						Turboprop aircraft						All aircraft					
	Long range		Medium/ short range		Total		Long range		Medium/ short range		Total		Long range		Medium/ short range		Total	
	Absolute figures ($millions)																	
US	1,031	(557)	762	(718)	1,793	(1,181)	11	(3)	340	(27)	351	(30)	1,042	(560)	1,102	(745)	2,144	(1,305)
UK *	91	(4)	135	(81)	226	(122)	57	-	423	(27)	480	(27)	148	(41)	558	(108)	706	(149)
FRANCE *	-	(34)	224	(18)	224	(52)	-	-	-	-	-	-	-	(34)	224	(18)	224	(52)
NL	-	-	-	(6)	-	(6)	-	-	262	(24)	262	(24)	-	-	262	(30)	262	(30)
Other countries	-	-	-	-	-	-	28	(6)	33	(31)	61	(37)	28	(6)	33	(31)	61	(37)
TOTAL	1,122	(632)	1,121	(823)	2,243	(1,361)	96	(9)	1,058	(109)	1,154	(118)	1,218	(641)	2,179	(932)	3,397	(1,573)
	Percentages																	
US	91,9	(88,1)	68.0	(87,3)	79,9	(86,8)	11.4	(33.3)	32,1	(24.8)	30,4	(25.4)	85.5	(87.4)	50.6	(79,9)	63.1	(83.0)
UK *	8,1	(6.5)	12,0	(9,8)	10,1	(9,0)	59,4	-	40,0	(24.8)	41.6	(22.9)	12,2	(6,4)	25,6	(11,6)	20,3	(9,5)
FRANCE *	-	(5,4)	20,0	(2.2)	10,0	(3,8)	-	-	-	-	-	-	-	(5.3)	10.3	(2,0)	6,6	(3,3)
NL	-	-	-	(0.7)	-	(0.4)	-	-	24,8	(22,0)	22,7	(20,3)	-	-	12,0	(3,2)	7.7	(1,9)
Other countries	-	-	-	-	-	-	29,2	(66,7)	3,1	(28.4)	5,3	(31.4)	2.3	(0,9)	1,5	(3,3)	1.8	(2,3)
TOTAL	100,0	(100,0)	100.0	(100.0)	100,0	(100.0)	100,0	(100.0)	100.0	(100.0)	100,0	(100.0)	100.0	(100,0)	100.0	(100.0)	100.0	(100.0)

* Options on the Concorde are divided equally between the United Kingdom and France.

Source: compiled by SORIS from Flight International "World Airline Survey".

Table 3/6a

Value of Jet and Turboprop Aircraft in Service and on Order in 1968

(by country of origin)

Country of origin	Turbojet aircraft						Turboprop aircraft						All aircraft					
	Long range		Medium/ short range		Total		Long range		Medium/ short range		Total		Long range		Medium/ short range		Total	
	Absolute figures ($millions)																	
US	8,266	(11,499)	5,002	(5,075)	13,268	(16,574)	30	(8)	992	(108)	1,022	(116)	8,296	(11,507)	5,994	(5,183)	14,290	(16,690)
UK *	509	(915)	532	(333)	1,041	(1,248)	195	-	605	(39)	800	(39)	704	(915)	1,137	(372)	1,841	(1,287)
FRANCE *	-	(869)	805	(65)	805	(934)	-	-	-	-	-	-	-	(869)	805	(65)	805	(934)
NL	-	-	-	(19)	-	(19)	-	-	184	(17)	184	(17)	-	-	184	(36)	184	(36)
Other countries	-	-	-	-	-	-	117	(25)	56	(86)	173	(111)	117	(25)	56	(86)	173	(111)
TOTAL	8,775	(13,283)	6,339	(5,492)	15,114	(18,775)	342	(33)	1,837	(250)	2,179	(283)	9,117	(13,316)	8,176	(5,742)	17,293	(19,058)
	Percentages																	
US	94.2	(86.6)	78.9	(92.4)	87.8	(88.3)	8.8	(24.2)	54.0	(43.1)	46.9	(40.9)	91.0	(86.4)	73.3	(90.3)	82.6	(87.6)
UK *	5.8	(6.9)	8.4	(6.1)	6.9	(6.6)	57.0	-	32.9	(15.7)	36.7	(13.9)	7.7	(6.9)	13.9	(6.5)	10.6	(6.7)
FRANCE *	-	(6.5)	12.7	(1.2)	5.3	(5.0)	-	-	-	-	-	-	-	(6.5)	9.8	(1.1)	4.7	(4.9)
NL	-	-	-	(0.3)	-	(0.1)	-	-	100.0	(6.8)	8.5	(6.0)	-	-	2.3	(0.6)	1.1	(0.2)
Other countries	-	-	-	-	-	-	34.2	(75.8)	3.1	(34.4)	7.9	(39.2)	1.3	(0.2)	0.7	(1.5)	1.0	(0.6)
TOTAL	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)

* Options on the Concorde are divided equally between the United Kingdom and France.

Source: compiled by SORIS from Flight International "World Airline Survey".

Table 3/7 Number of Jet and Turboprop Aircraft in Service and on Order[1], by Continents - (April 1968)

Category and Type of Aircraft	EUROPE						US		CANADA		Central & South America		AFRICA		Middle East		Far East		Whole World	
	EEC		UK		TOTAL															
	Absolute figures (number)																			
Turbojets	253	(145)	121	(109)	547	(324)	1.329	(953)	51	(55)	73	(20)	51	(13)	51	(14)	141	(76)	2,243	(1.455)
Long range	104	(59)	71	(31)	230	(126)	692	(395)	31	(27)	33	(3)	24	(7)	32	(14)	80	(60)	1,122	(632)
Medium/short range	149	(86)	50	(78)	317	(198)	637	(558)	20	(28)	40	(17)	27	(6)	19		61	(16)	1,121	(823)
Turboprops	82	(11)	167	(5)	324	(19)	411	(45)	77	(1)	68	(25)	37	(2)	15	-	222	(26)	1,154	(118)
Long range	-	-	45	(5)	54	(6)	36	(3)	-	-	3	-	-	-	2	..	1	-	95	(9)
Medium/short range	82	(11)	122	-	270	(13)	375	(42)	77	(1)	65	(25)	37	(2)	13	-	221	(26)	1,058	(109)
TOTAL	335	(156)	288	(114)	871	(343)	1.740	(998)	128	(56)	141	(45)	88	(15)	66	(14)	363	(102)	3,397	(1,573)
Long range	104	(59)	116	(36)	284	(132)	728	(398)	31	(27)	36	(3)	24	(7)	34	(14)	81	(60)	1,218	(641)
Medium/short range	231	(97)	172	(78)	587	(211)	1.012	(600)	97	(29)	105	(42)	64	(8)	32	-	282	(42)	2,179	(932)
	Percentages																			
Turbojets	11,3	(10,0)	5,4	(7,5)	24,4	(22,3)	59,2	(65,5)	2,3	(3,8)	3,2	(1,4)	2,3	(0,9)	2,3	(0,9)	6,3	(5,2)	100,0	(100,0)
Long range	9,3	(9,3)	6,3	(4,9)	20,5	(19,9)	61,7	(62,5)	2,8	(4,3)	2,9	(0,5)	2,1	(1,1)	2,9	(2,2)	7,1	(9,5)	100,0	(100,0)
Medium/short range	13,3	(10,4)	4,5	(9,5)	28,3	(24,1)	56,8	(67,8)	1,8	(3,4)	3,6	(2,1)	2,4	(0,7)	1,7	-	5,4	(1,9)	100,0	(100,0)
Turboprops	7,1	(9,3)	14,5	(4,2)	28,1	(16,1)	35,6	(38,1)	6,7	(0,9)	5,9	(21,2)	3,2	(1,7)	1,3	-	19,2	(22,0)	100,0	(100,0)
Long range	-	-	46,9	(55,6)	56,3	(66,7)	37,5	(33,3)	-	-	3,1	-	-	-	2,1	-	1,0	-	100,0	(100,0)
Medium/short range	7,8	(10,1)	11,5	-	25,5	(11,9)	35,5	(38,5)	7,3	(0,9)	6,1	(23,0)	3,5	(1,8)	1,2	-	20,9	(23,9)	100,0	(100,0)
TOTAL	9,9	(9,9)	8,5	(7,2)	25,6	(21,8)	51,2	(63,4)	3,8	(3,6)	4,2	(2,9)	2,6	(0,9)	1,9	(0,9)	10,7	(6,5)	100,0	(100,0)
Long range	8,5	(9,2)	9,5	(5,6)	23,3	(20,6)	59,8	(62,1)	2,5	(4,2)	3,0	(0,5)	2,0	(1,1)	2,8	(2,2)	6,7	(9,3)	100,0	(100,0)
Medium/short range	10,6	(10,4)	7,9	(8,4)	26,9	(22,6)	46,5	(64,4)	4,5	(3,1)	4,8	(4,5)	2,9	(0,9)	1,5	-	12,9	(4,5)	100,0	(100,0)

[1] The totals do not coincide with the ICAO statistics because they do not include aircraft owned by companies operating non-scheduled services (charter flights, etc.).

Source: Flight International "World Airline Survey".

Table 3/7a

Number of Jet and Turboprop Aircraft in

Category and Type of Aircraft			EUROPE								US	
			EEC		UK		Others		TOTAL			
Turbojets Long range	B 747	US		(14)		(8)		(9)		(31)		(97)
	B 707	US	60	(3)	25	(4)	9	(3)	94	(10)	314	(111)
	DC 8 51	US	44	(11)			4	(6)	48	(17)	154	(14)
	DC 8 60	US					22	(11)	22	(11)	36	(76)
	B SST	US		(18)		(6)		(5)		(29)		(62)
	B 720	US					2		2		131	
	CV 880-990	US					13	(2)	13	(2)	57	
	VC 10	UK			29	(5)			29	(5)		
	COMET	UK			17		5		22			
	CONCORDE	UK/F		(13)		(8)				(21)		(35)
Total long range			104	(59)	71	(31)	55	(36)	230	(126)	692	(395)
Turbojets Medium/short range	CARAVELLE	F	87	(12)			67	(3)	154	(15)	20	
	L 1011	US										(94)
	B 727	US	31	(12)			6	(2)	37	(14)	405	(186)
	B 737	US	11	(16)		(4)		(5)	11	(25)	7	(141)
	DC 9	US	18	(44)			40	(19)	58	(63)	146	(134)
	BAC 111	UK	2	(1)	25	(31)	5		32	(32)	59	(3)
	TRIDENT	UK			25	(43)			25	(43)		
	F 28	NL		(1)				(5)		(6)		
Total medium/short range			149	(86)	50	(78)	118	(34)	317	(198)	637	(558)
Turboprops Long range	ARGOSY	UK			4				4		5	
	BRITANNIA	UK			40		5		45			
	L 382-100	US									10	(3)
	CL 44	C			1	(5)	4	(1)	5	(6)	21	
Total long range					45	(5)	9	(1)	54	(6)	36	(3)
Turboprops Medium/short range	F 27	NL	23	(11)			35	(2)	58	(13)	47	
	CV 600	US	2						2		92	(21)
	CV 640	US									8	
	ELECTRA	US	12						12		129	
	FH 227	US									65	
	HERALD	UK	6		11				17			
	VANGUARD	UK			19				19			
	HS 748	UK			9		3		12			
	VISCOUNT	UK	39		83		28		150		32	
	SHORT SKYVAN	UK										(1)
	YS 11	G									2	(20)
Total medium/short range			82	(11)	122		86	(2)	270	(13)	375	(42)

Source: Flight International "World Airline Survey"

Service and on Order, by Continents - (April 1968)

CANADA		Central & South America		AFRICA		Middle East		Far East		Whole World	
					(3)		(1)		(14)		(146)
1	(1)	9	(3)	7	(3)	10	(8)	25	(14)	460	(150)
24	(3)	6		5				30		267	(34)
6	(10)	2						1	(11)	67	(108)
	(9)						(2)		(13)		(115)
		3		3		4		3		146	
		3				2	(1)	16	(1)	91	(4)
				4		2				35	(5)
		10		5	(1)	14		5		56	(1)
	(4)						(2)		(7)		(69)
31	(27)	33	(3)	24	(7)	32	(14)	80	(60)	1 122	(632)
		14		17	(3)	7		12		224	(18)
											(94)
1	(6)	11	(5)	7		4		35	(1)	500	(212)
1	(4)		(2)		(3)				(8)	19	(183)
18	(18)	11	(8)			3		7	(6)	243	(229)
		4	(2)	3				3	(1)	101	(38)
						5		4		34	(43)
											(6)
20	(28)	40	(17)	27	(6)	19		61	(16)	1121	(823)
										9	
		3								48	
								1		11	(3)
						2				28	(6)
		3				2		1		95	(9)
5			(2)	22		3		127	(9)	262	(24)
		4								98	(21)
4		6								18	
		1						10		152	
	(1)	7	(5)							72	(6)
3		6	(1)			4		3		33	(1)
23										42	
		25	(8)					13	(15)	50	(23)
40		11		15		6		44		298	
					(2)						(3)
2		5	(9)					24	(21)	30	(31)
77	(1)	65	(25)	37	(2)	13		221	(26)	[illegible]	(109)

Table 3/7b

Number of Jet and Turboprop Aircraft in Service and on Order in EEC Member Countries (April 1968)

Category and Type of Aircraft			FRANCE		GERMANY		ITALY		BENELUX		Whole of EEC	
Turbojets – Long range	B 747	US		(4)		(3)		(4)		(3)		(14)
	B 707	US	32	(2)	19				9	(1)	60	(3)
	DC 8<51	US	8	(1)			16	(4)	20	(6)	44	(11)
	DC 8>60	US										
	B SST	US		(6)		(3)		(6)		(3)		(18)
	B 720	US										
	CV 880-990	US										
	VC 10	UK										
	COMET	UK										
	CONCORDE	UK / F		(8)		(3)				(2)		(13)
	Total long range		40	(21)	19	(9)	16	(14)	29	(15)	104	(59)
Turbojets – Medium/short range	CARAVELLE	F	53	(7)	3	(1)	21	(4)	10		87	(12)
	B 727	US		(10)	27	(1)			4	(1)	31	(12)
	B 737	US			11	(16)					11	(16)
	DC 9	US					12	(28)	6	(16)	18	(44)
	BAC III	UK			2	(1)					2	(1)
	F 28	NL				(1)						(1)
	TRIDENT	UK										
	Total medium/short range		53	(17)	43	(20)	33	(32)	20	(17)	149	(86)
Turboprops – Long range	ARGOSY	UK										
	BRITANNIA	UK										
	L 382-100	USA										
	CL 44	C										
	Total long range											
Turboprops – Medium/short range	F 27	NL	1	(10)	4		12		6	(1)	23	(11)
	CV 600	USA							2		2	
	CV 640	USA										
	ELECTRA	USA							12		12	
	FH 227	USA										
	HERALD	UK			2		4				6	
	VANGUARD	UK										
	HS 748	UK										
	VISCOUNT	UK	14		10		14		1		39	
	Total medium/short range		15	(10)	16		30		21	(1)	82	(11)

Source: Flight International "World Airline Survey".

Table 3/8

Value of Jet and Turboprop Aircraft in Service and on Order, by Continents

(April 1968)

Category and Type of Aircraft	EUROPE						US		CANADA		Central & South America		AFRICA		Middle East		Far East		Whole World	
	EEC		UK		TOTAL															
	Absolute figures ($millions)																			
Turbojets	1,559	(2,040)	723	(1,090)	3,162	(3,900)	9,617	(12,138)	348	(789)	417	(83)	302	(124)	286	(243)	981	(1,422)	15,113	(18,744)
Long range	874	(1,645)	518	(756)	1,798	(3,038)	5,519	(7,874)	260	(650)	220	(25)	175	(101)	195	(243)	607	(1,352)	8,774	(13,283)
Medium/short range	685	(395)	205	(324)	1,364	(862)	4,098	(4,309)	88	(139)	197	(58)	127	(23)	91	-	374	(70)	6,339	(5,461)
Turboprops	110	(8)	345	(21)	553	(34)	1,051	(179)	146	(1)	138	(35)	33	(1)	23	-	235	(33)	2,179	(283)
Long range	-	-	160	(21)	195	(25)	125	(8)	-	-	11	-	-	-	8	-	3	-	342	(33)
Medium/short range	110	(8)	185	-	358	(9)	926	(171)	146	(1)	127	(35)	33	(1)	15	-	222	(33)	1,827	(250)
TOTAL	1,669	(2,048)	1,068	(1,101)	3,715	(3,934)	10,668	(12,362)	494	(790)	555	(118)	335	(125)	309	(243)	1,216	(1,455)	17,292	(19,027)
Long range	874	(1,645)	678	(777)	1,993	(3,063)	5,644	(7,882)	260	(650)	231	(25)	175	(101)	203	-	610	(1,352)	9,116	(13,073)
Medium/short range	795	(403)	390	(324)	1,722	(871)	5,024	(4,480)	234	(140)	324	(93)	160	(24)	106	-	596	(103)	8,176	(5,711)
	Percentages																			
Turbojets	10.3	(10.9)	4.8	(5.8)	20.9	(20.8)	63.6	(65.0)	2.3	(4.2)	2.8	(0.4)	2.0	(0.7)	1.9	(1.3)	6.5	(7.6)	100.0	(100.0)
Long range	10.0	(12.4)	5.9	(5.7)	20.5	(22.9)	62.9	(59.3)	3.0	(4.9)	2.5	(0.2)	2.0	(0.7)	2.2	(1.8)	6.9	(10.2)	100.0	(100.0)
Medium/short range	10.8	(7.2)	3.2	(5.9)	21.5	(15.8)	64.7	(78.9)	1.4	(2.5)	3.1	(1.1)	2.0	(0.4)	1.4	-	5.9	(1.3)	100.0	(100.0)
Turboprops	5.0	(2.8)	15.8	(7.4)	25.4	(12.0)	48.2	(63.3)	6.7	(0.3)	6.3	(12.4)	1.5	(0.3)	1.1	-	10.8	(11.7)	100.0	(100.0)
Long range	-	-	46.8	(63.6)	57.0	(75.8)	36.6	(24.2)	-	-	3.2	-	-	-	2.3	-	0.9	-	100.0	(100.0)
Medium/short range	6.0	(3.2)	10.1	-	19.6	(3.6)	50.7	(68.4)	8.0	(0.4)	7.0	(14.0)	1.8	(0.4)	0.8	-	12.1	(13.2)	100.0	(100.0)
TOTAL	9.6	(10.8)	6.2	(5.8)	21.5	(20.7)	61.7	(65.0)	2.9	(4.2)	3.2	(0.6)	1.9	(0.6)	1.8	(1.3)	7.0	(7.6)	100.0	(100.0)
Long range	9.6	(12.5)	7.4	(5.9)	21.9	(23.4)	61.9	(60.3)	2.9	(5.0	2.5	(0.2)	1.9	(0.8)	2.2	-	6.7	(10.3)	100.0	(100.0)
Medium/short range	9.7	(7.1)	4.8	(5.7)	21.1	(15.3)	61.4	(78.4)	2.9	(2.5)	4.0	(1.6)	2.0	(0.4)	1.3	-	7.3	(1.8)	100.0	(100.0)

Source: compiled by SORIS from Flight International "World Airline Survey".

Table 3/8a

Value of Turbojet

(April 1968)

	Type of Aircraft		EUROPE							
			EEC		UK		Others		TOTAL	
Turbojets – Long range	B 747	US		(336)		(192)		(216)		(744)
	B 707	US	504	(25)	210	(33)	76	(26)	790	(84)
	DC 8 51	US	370	(92)			33	(51)	403	(143)
	DC 8 60	US					185	(92)	185	(92)
	B SST	US		(864)		(288)		(240)		(1392)
	B 720	US					14		14	
	CV 880-990	US					78	(12)	78	(12)
	VC 10	UK			244	(42)			244	(42)
	COMET	UK			65		20		85	
	CONCORDE	UK/F		(328)		(201)				(529)
	Total long range		874	(1645)	519	(756)	406	(637)	1799	(3038)
Turbojets – Medium/short range	CARAVELLE	F	313	(43)			241	(11)	554	(54)
	L 1011	US								
	B 727	US	242	(94)			47	(15)	289	(109)
	B 737	US	46	(67)		(17)		(21)	46	(105)
	DC 9	US	76	(185)			168	(80)	244	(265)
	BAC 111	UK	8	(3)	95	(118)	18		121	(121)
	TRIDENT	UK			110	(189)			110	(189)
	F 28	NL		(3)				(16)		(19)
	Total medium/short range		685	(395)	205	(324)	474	(143)	1364	(862)
Turboprops – Long range	ARGOSY	UK			8				8	
	BRITANNIA	UK			148		18		166	
	L 382-100	US								
	CL 44	C			4	(21)	17	(4)	21	(25)
	Total long range				160	(21)	35	(4)	195	(25)
Turboprops – Medium/short range	F 27	NL	16	(8)			25	(1)	41	(9)
	CV 600	US	10						10	
	CV 640	US								
	ELECTRA	US	29						29	
	FH 227	US								
	HERALD	UK	8		16				24	
	VANGUARD	UK			55				55	
	HS 748	UK			14		5		19	
	VISCOUNT	UK	47		100		33		180	
	SHORT SKYVAN	UK								
	YS 11	G								
	Total medium/short range		110	(8)	185		63	(1)	358	(9)

Source: compiled by SORIS from Flight International "World Airline Survey"

and Turboprop Aircraft in Service and on Order, by Continents

($millions)

US		CANADA		Central & South America		AFRICA		Middle East		Far East		Whole World	
	(2328)						(72)		(24)		(336)		(3504)
2638	(932)	8	(8)	76	(25)	59	(25)	84	(67)	210	(118)	3365	(1259)
1294	(118)	202	(25)	50		42				252		2243	(246)
302	(638)	50	(84)	17						8	(92)	562	(906)
	(2976)		(432)						(96)		(624)		(5568)
943				21		21		29		22		1050	
342				18				12	(6)	96	(6)	546	(24)
						34		17				295	(42)
				38		19	(4)	53		19		214	(4)
	(882)		(101)						(50)		(176)		(1734)
5519	(7874)	260	(650)	220	(25)	175	(101)	195	(245)	607	(1352)	8775	(13243)
72				50		61	(11)	25		43		805	(65)
	(1692)												(1692)
3159	(1451)	8	(46)	86	(39)	55		31		273	(8)	3901	(1553)
30	(592)	4	(17)		(8)		(12)				(33)	80	(767)
613	(563)	76	(76)	46	(34)			13		29	(25)	1021	(963)
224	(11)			15	(8)	11				11	(4)	382	(144)
								22		18		150	(189)
													(19)
4098	(4309)	88	(139)	197	(89)	127	(23)	91		374	(70)	6339	(5492)
10												18	
				11								177	
27	(8)									3		30	(8)
88								8				117	(25)
125	(8)			11				8		3		342	(33)
33		4			(2)	15		2		89	(6)	184	(17)
451	(103)			20								481	(103)
39		20		29								88	
310				2						24		365	
52			(1)	6	(4)							58	(5)
		4		8	(1)			6		4		46	(1)
		67										122	
				40	(13)					21	(24)	80	(37)
38		48		13		18		7		53		357	
	(0.4)						(1)						(1.4)
3	(68)	3		9	(15)					41	(3)	55	(86)
926	(171.4)	146	(1)	127	(35)	33	(1)	15		232	(33)	1837	(250.4)

Table 3/8b

Value of Turbojet and Turboprop Aircraft in Service and on Order in EEC Member Countries (April 1968) ($millions)

	Category and Type of Aircraft		FRANCE		GERMANY		ITALY		BENELUX		Whole EEC	
Turbojets	Long range											
	B 747	US		(96)		(72)		(96)		(72)		(336)
	B 707	US	268.8	(16.6)	159.6				75.6	(8,4)	504	(25)
	DC 8<51	US	67.2	(8,4)			134.8	(33,6)	168.0	(50)	370	(92)
	DC 8>60	US										
	B SST	US		(288)		(144)		(288)		(144)		(864)
	B 720	US										
	CV 880-990	US										
	VC 10	UK										
	COMET	UK										
	CONCORDE	UK		(201,6)		(75.6)				(50.8)		(328)
	Total long range		336.0	(610.6)	159.6	(291.6)	134.8	(417.6)	243 6	(325.2)	874	(1,645)
	Medium/short range											
	CARAVELLE	F	190.6	(25.2)	10.4	(3.4)	75.6	(14,4)	36.4		313	(43)
	B 727	US		(78)	210.6	(8)			31 4	(8)	242	(94)
	B 737	US			46.0	(67)					46	(67)
	DC 9	US					50,6	(117,8)	25.4	(67,2)	76	(185)
	BAC 111	UK			8,0	(3)					8	(3)
	F 28	NL				(3)						(3)
	TRIDENT	UK										
	Total medium/short range		190,6	(103.2)	275,0	(84,4)	126,2	(132,2)	93,2	(75,2)	685	(395)
Turboprops	Long range											
	ARGOSY	UK										
	BRITANNIA	UK										
	L 382-100	US										
	CL 44	C										
	Total long range											
	Medium/short range											
	F 27	NL	0.7	(7,3)	2,9		8.2		4,2	(0.7)	16	(8)
	CV 600	US							10.0		10	
	CV 640	US										
	ELECTRA	US							29,0		29	
	FH 227	US										
	HERALD	UK			2,6		5.4				8	
	VANGUARD	UK										
	HS 748	UK										
	VISCOUNT	UK	16,9		12,0		16,9		1.2		47	
	Total medium/short range		17.6	(7,3)	17,5		30.5		44.4	(0.7)	110	(8)

Source: compiled by SORIS from Flight International "World Airline Survey"

Table 3/9

Total Traffic of Main Airlines (1957-66) - Domestic and International Services

(Millions of t/km flown)

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	Percentage increase 1958-66
U A L	821	889	894	999	1,279	1,473	1,576	1,760	2,186	2,379	+189
P A A	721	733	857	1,003	1,159	1,351	1,493	1,770	2,158	2,900	+302
A A	891	886	1,004	1,114	1,085	1,204	1,306	1,477	1,734	2,256	+153
T W A	713	720	862	935	921	1,028	1,246	1,557	1,902	1,957	+174
E A L	733	650	768	742	749	658	885	1,026	1,283	1,286	+75
Air France	358	373	399	462	557	593	598	657	737	861	+140
B O A C	275	288	340	439	506	537	596	733	864	994	+261
Delta	222	240	264	300	356	463	509	592	716	987	+344
Air Canada	238	272	305	339	404	436	456	505	623	760	+219
Northwest	227	265	329	318	267	371	416	514	661	779	+243
K L M	255	259	300	357	383	397	372	434	513	591	+131
Alitalia	63	82	115	149	211	300	352	398	457	536	+750
Lufthansa	55	79	104	164	226	286	350	420	520	650	+1,081
S A S	185	208	216	251	257	284	312	359	397	427	+130
B E A	144	151	176	210	235	258	302	338	372	418	+190
National	149	167	182	166	183	250	278	333	426	441	+195
J A L	54	67	83	98	153	179	238	295	343	454	+740
Braniff	152	163	168	192	201	216	232	260	311	431	+183
Qantas	84	100	123	160	162	195	223	271	342	331	+294
Swissair	93	111	119	140	164	197	217	249	289	324	+248
Sabena	121	147	136	158	155	164	165	199	207	394	+225
TOTAL (1)	6,554	6,850	7,744	8,696	9,613	10,840	12,122	14,147	17,046	20,156	+207
Airlines in ICAO Member States (2)	9,200	9,610	11,010	12,330	13,470	15,090	16,960	19,750	23,450	27,490	+199
(1) as percentage of(2)	71.2	71.3	70.4	70.5	71.5	71.6	71.4	71.6	72.7	73.3	

Source: IATA Statistics.

Table 3/10

ICAO Companies - Scheduled Domestic and International Traffic, by Countries

(millions of t/km flown)

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
TOTAL EEC	956	1,062	1,191	1,448	1,711	1,876	1,949	2,320	2,607	3,085	3,551
FRANCE	462	494	535	619	734	728	710	781	894	1,066	1,217
GERMANY	55	79	104	164	226	286	350	459	520	650	787
ITALY	63	82	115	149	211	300	352	444	471	557	620
BENELUX	376	407	437	516	540	562	537	636	722	812	927
UK	513	543	654	813	914	987	1.096	1,244	1,246	1,663	1,752
US	5,494	5,547	6,406	6,904	7,257	8,132	9,264	10,531	13,119	15,601	19,244
Others	2,237	2,458	2,749	3,175	3,578	4,135	4,661	5,615	6,485	7,141	8,223
Whole world	9,200	9,610	11,000	12,340	13,460	15,130	16,970	19,740	23,460	27,490	32,770

Source: ICAO Statistics.

Table 3/10a

ICAO Companies - Scheduled Domestic and International Traffic, by Countries

(Percentages)

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
TOTAL EEC	10,4	11,1	10,9	11.7	12.7	12.4	11.5	11.7	11.1	11,2	10,8
FRANCE	5.0	5,2	4,9	5.0	5.5	4,8	4.2	4.0	3 8	3.9	3,7
GERMANY	0.6	0,8	1,0	1.3	1,7	1,9	2,1	2.3	2,2	2.3	2,4
ITALY	0,7	0,9	1,0	1,2	1.5	2,0	2,1	2,2	2,0	2.0	1,9
BENELUX	4.1	4.2	4.0	4,2	4.0	3,7	3.1.	3,2	3,1	3.0	2,8
UK	5.6	5.7	6,0	6.6	6,8	6.5	6.5	6.3	4,9	6,1	5.4
US	60.0	57,9	58,4	56.1	54,0	53.9	54.5	53.5	56.2	56.8	58,7
Others	24,0	25.3	24,7	25.6	26.5	27.2	27.5	28.5	27.8	25.9	25,1
Whole world	100,0	100,0	100.0	100,0	100,0	100.0	100,0	100.0	100.0	100,0	100.0

Source: ICAO Statistics.

Table 3/11

Forecast of Available t/km Capacity (Passengers and Freight), by Routes and Types of Traffic

(1965-80) (Thousand million t/km)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Rate of increase 1965-80
International traffic																	
European	2.1	2,5	2,9	3.4	4.0	4.7	5.4	6.1	6.9	7.9	9.0	10.2	11.6	13.3	15.2	17.4	+ 15.1
North Atlantic	4.8	5.5	6.5	7,6	9.0	10.5	11.6	12.8	14.1	15.4	17.0	17.7	18,7	19,6	20.6	21.5	+ 10.5
Other International (including traffic handled by American companies)	12.5	14.7	17.1	20,0	23.6	27.8	31.8	36.5	42,0	48,3	55.7	65.0	75.6	87,9	102,1	118.8	+ 16,2
		4.0	4.6	5,3	6,3	7.2	8.6	10.1	12.0	14,1	16.6	19,8	23,6	28 2	33.5	38,9	+ 17,6
TOTAL *	19,4	22.7	26,5	31.0	35.6	43.0	48.8	55.4	63.0	71,6	81.7	92,9	105,9	120,8	137,9	157,7	+ 15.0
Domestic traffic																	
US	20,7	23,6	26,9	30.5	34,7	39,7	44,5	50,0	56,3	63,6	71,8	79,1	87,2	96,3	106,5	117,7	+ 12.3
Others	6.1	7.1	8.5	9.9	11.4	14,4	15.9	17.5	19.3	21.3	23,4	26.8	28.0	29.1	29.9	30,7	+ 11.8
TOTAL **	26,8	30,7	35.4	40.4	46,1	54,1	60.4	67.5	75.6	84,9	97,2	105,9	115,2	125.4	136.4	148,4	+ 12,1
TOTAL TRAFFIC	46.2	53,4	61,9	71,4	82,7	97,1	109.2	122,9	138,6	156,5	178.9	198,8	221,1	246,2	274,3	306.1	+ 13,4

* Assuming a load factor of 52.5%.

** Assuming a load factor of 49.2%.

Table 3/12

Forecast of Commercial Jet Aircraft in Service in the World in 1980 (Excluding Communist Bloc)

(Numbers)

	EUROPE	CANADA	US	Central & South America	Middle East	Far East	AFRICA	Whole world (excl. Communist bloc)
Supersonic	110	16	262	15	4	31	2	440
Turbojets, long range, high capacity	250	28	835	25	4	77	21	1,240
Turbojets, long range	157	21	498	23	24	58	19	800
Turbojets, medium/long range, high capacity	380	80	630	12	22	60	16	1,200
Turbojets, medium range	211	70	282	66	10	86	15	740
Turbojets, short/medium range	703	233	1,700	187	17	110	50	3,000
TOTAL	1,811	448	4,207	328	81	422	123	7,420

Source: Soris estimate.

Table 3/12a

Forecast of Commercial Jet Aircraft in Service in the World in 1980 (Excluding Communist Bloc)

($millions[1])

	EUROPE	CANADA	US	Central & South America	Middle East	Far East	AFRICA	Whole world excl. Communist bloc)
Supersonic	3,957	608	10,000	583	146	1.214	50	16,558
Turbojets, long range, high capacity	5,550	510	17,790	546	96	1.551	477	26,520
Turbojets, long range	1,319	176	4,184	193	202	485	160	6,719
Turbojets, medium/long range, haigh capacity	6,840	1,440	11.340	216	396	1,080	288	21,600
Turbojets, meidum range	1,624	539	2,171	508	77	662	115	5,696
Turbojets, short/medium range	3,093	1,025	7,480	823	75	484	220	13,200
TOTAL	22,383	4,298	52,965	2.869	992	5,476	1,310	90,293

[1] Including the value of spares supplied with the order.

Source: SORIS estimate.

Table 3/13

Forecast of Commercial Jet Aircraft in Service in Europe in 1980

(Numbers)

	EEC countries	UK	Other European countries	Whole of Europe
Supersonic	84	21	5	110
Turbojets, long range, high capacity	189	28	33	250
Turbojets, long range	87	55	15	157
Turbojets, medium/long range, high capacity	163	105	112	380
Turbojets, medium range	59	122	30	211
Turbojets, short/medium range	260	168	275	703
TOTAL	842	499	470	1,811

Source: SORIS estimate.

Table 3/13a

Forecast of Commercial Jet Aircraft in Service in Europe in 1980

($millions[1])

	EEC countries	UK	Other European countries	Whole of Europe
Supersonic	3,006	711	240	3,957
Turbojets, long range, high capacity	4,185	672	693	5,550
Turbojets, long range	732	462	125	1,319
Turbojets, medium/long range, high capacity	2,934	1,890	2,016	6,840
Turbojets, medium range	454	939	231	1,624
Turbojets, short/medium range	1,144	739	1,210	3,093
TOTAL	12,455	5,413	4,515	22,383

[1] Including the value of spares supplied with the order.

Source: SORIS estimate.

Table 3/14

Forecast of World Demand for Commercial Jet Aircraft 1968-79 (Excluding Communist Bloc)

(Numbers)

	EUROPE	CANADA	US	Central & South America	Middle East	Far East	AFRICA	Whole world (excl. Communist bloc)
Supersonic	110	16	262	15	4	31	2	440
Turbojets, long range, high capacity	228	22	799	23	4	76	21	1,173
Turbojets, long range	122	21	380	20	20	49	16	628
Turbojets, medium/long range, high capacity	380	80	630	12	22	60	16	1,200
Turbojets, medium range	226	76	468	71	10	82	15	948
Turbojets, short/medium range	703	233	1,700	187	17	110	50	3,000
TOTAL	1,769	448	4,239	328	77	408	120	7,389

Source: SORIS estimate.

Table 3/14a

Forecast of World Demand for Commercial Jet Aircraft 1968-79 (Excluding Communist Bloc)

($millions[1])

	EUROPE	CANADA	US	Central & South America	Middle East	Far East	AFRICA	Whole world (excl. Communist bloc
Supersonic	3,957	608	10,000	583	146	1,214	50	16,558
Turbojets, long range, high capacity	4,959	420	17,502	516	96	1,536	486	25,515
Turbojets, long range	1,026	176	3,192	167	168	411	134	5,274
Turbojets, medium/long range, high capacity	6,840	1,440	11,340	216	396	1,080	288	21,600
Turbojets, medium range	1,755	593	3,650	554	78	640	117	7,387
Turbojets, short/medium range	3,093	1,025	7,480	823	75	484	220	13,200
TOTAL	21,630	4,262	53,164	2.859	959	5,365	1,295	89,534

[1] Including the value of spares supplied with the order.

Source: SORIS estimate.

Table 3/15

Forecast of European Demand for Commercial Jet Aircraft 1968-79

(Numbers)

	EEC countries	UK	Other European countries	Whole of Europe
Supersonic	84	21	5	110
Turbojets, long range, high capacity	189	28	11	228
Turbojets, long range	65	46	11	122
Turbojets, medium/long range, high capacity	163	105	112	380
Turbojets, medium range	71	122	33	226
Turbojets, short/medium range	260	168	275	703
TOTAL	832	490	447	1,769

Source: SORIS estimate.

Table 3/15a

Forecast of European Demand for Commercial Jet Aircraft 1968-79
($millions[1])

	EEC countries	UK	Other European countries	Whole of Europe
Supersonic	3,006	711	240	3,957
Turbojets, long range, high capacity	4,185	672	102	4,959
Turbojets, long range	547	386	93	1,026
Turbojets, medium/long range, high capacity	2,934	1,890	2,016	6,840
Turbojets, medium range	546	952	257	1,755
Turbojets, short/medium range	1,144	739	1,210	3,093
TOTAL	12,362	5,350	3,918	21,630

[1] Including the value of spares supplied with the order.

Source: SORIS estimate.

Table 3/16

Military Aircraft and Missile Forces of the EEC, UK and Rest of Europe (in December 1967 by Country of Origin*)

Country	EEC				UK				Other European countries				Whole of Europe				Overall total
Origin	EEC	UK	US	Other European countries	EEC	UK	US	Other European countries	EEC	UK	USA	Other European countries	EEC	UK	US	Other European countries	
Ballistic missiles	[27]	-	-	-	-	-	64	-	-	-	-	-	[27]	-	64	-	64 [27]
Bombers	62	-	-	-	-	120	-	-	-	-	-	-	62	120	-	-	182
Tankers	-	-	12	-	-	24	-	-	-	-	-	-	-	24	12	-	36
Fighter/strike aircraft	1,332 [376]	-	1,719 [320]	-	- [150]	800 [105]	148 -	- -	78 -	480 -	1,482 -	1,126(1) [166]	1,082 [701]	1,280 [106]	3,332 [320]	1,126 [166]	6,820 [1,293]
Reconnaissance aircraft	135 [27]	-	159 [88]	-	- -	110 [38]	- -	- -	18 -	- -	158 -	- -	272 [27]	110 [38]	307 [88]	- -	689 [153]
Tactical supp. aircraft	-	-	50	-	-	-	-	-	-	-	-	-	-	-	50	-	50
Transports	572 [1]	53	328	-	-	411	70	-	12	21	272	174(2)	584	485	670	174	1,913
Rescue aircraft	-	-	8	-	-	-	-	-	-	-	37	-	-	-	40	-	40
Communications	149 [125]	-	59 [12]	-	-	64	46	-	9	-	40	12	187	64	208	12	471
Observation	640	-	650	-	-	50	-	-	50	-	360	11	690	50	1,010	11	1,761
Helicopters	786 [497]	64	983 [135]	-	19 [930]	370	251	-	114	34	344 [54]	-(3) -	919 [1,427]	455	1,587 [238]	-	2,931 [1,665]
Trainers	1,140 [25]	-	970	-	-	1,312	-	-	99	447	500	1,240	1,239	1,759	1,570	1,240	5,808 [122]
TOTAL	4816[1078]	117	4,938[552]	-	19[1080]	3261 [144]	515	-	378	982	3,293[54]	2,563[166]	5,035	4,347	8,786	2,563	
Grand Total	9,871 [1,633]				3,795 [1,224]				7,216 [220]				20,731 [3,267]				

(1) + 100 URSS, (2) + 10 URSS, (3) +22 URSS

[ ]· Orders in 1968.

(•) Austria, Denmark, Finland, Greece, Irelang, Norway, Turkey, Sweden, Switzerland, Yogoslavia.

* UK/EEC collaboration counted as EEC, building under US licence countend as US, Canada construction as US, USSR construction not included).

Table 3/16a

Military Aircraft and Missile Forces of the

Country	FRANCE				GERMANY				ITALY			
Origin	EEC	UK	US	Other Europ. countries	EEC	UK	US	Other Europ. countries	EEC	UK	US	Other Europ countries
Ballistic missiles	[27]											
Bombers	62											
Tankers			12									
Fighter/strike aircraft	793 [250]		109		369		709 [50]		170 [20]		285 [165]	
Reconnaissance aircraft	115		59		20		[88]		[18]		40	
Tactical support aircraft			50									
Transports	336		110		222	49	39		2		92	
Resecue aircraft							8					
Communications aircraft	110		45 [12]		18 [125]				21		5	
Observation aircraft	200		237		428		40				152	
Helicopters	318 [460]		280		345	50	544 [135]		[12]	2	120	
Trainers	364		200		495 [25]		422		108		36	
TOTAL	2,298 [737]		1,102 [12]		1,897 [150]	99	1,762 [273]		301 [50]	2	730 [165]	
Overall Total	3,400 [749]				3,758 [423]				1,033 [215]			

[ ] 1968 orders.

EEC Countries in December 1967 by Country of Origin

BELGIUM				NL				TOTAL EEC			
EEC	UK	US	Other Europ. countries	EEC	UK	US	Other Europ. countries	EEC	UK	US	Other Europ. countries
								[27]			
								62			
										12	
[106]		321				295 [105]		1,332 [376]		1,719 [320]	
				[9]		60		135 [27]		159 [83]	
										50	
[1]	4	53		12		34		572 [1]	53	328	
										8	
						9		149 [125]		59 [12]	
12		157				64		640		650	
38 [25]		13		85	12	26		786 [497]	64	983 [135]	
113		38		60		274		1.140 [25]		970	
163 [132]	4	582		157 [9]	12	762 [105]		4816 [1078]	117	4.938 [555]	
749 [132]				931 [114]				9,871 [1.633]			

Table 3/17

Book Value of Aircraft and Missiles Held by the EEC and the United Kingdom on 31 December 1967

($millions)

Country	EEC				UK				TOTAL EEC + UK			
Origin	EEC	UK	US	Other European countries	EEC	UK	US	Other European countries	EEC	UK	US	Other European countries
Ballistic missiles	-	-	-	-	-	-	-	-	-	-	-	-
Bombers	310.0	-	-	-	-	820.0	-	-	310.0	820.0	-	-
Tankers	-	-	100,0	-	-	-	-	-	-	-	100.0	-
Fighter/strike aircraft	1,899.0	-	2,491.0	-	240.0	1,345.0	350.0	-	2,139.0	1,345.0	2,841.0	-
Reconnaissance aircraft	565,0	-	535.0	-	-	240.0	-	-	565.0	240.0	535.0	-
Tactical support aircraft	-	-	-	-	-	-	-	-	-	-	-	-
Transports	776.4	10.0	285,0	-	-	453.0	150.0	-	776.4	463.0	434.0	-
Rescue aircraft	-	-	0.5	-	-	-	-	-	-	-	0,5	-
Communications aircraft	28.9	-	1.75	-	-	33.5	3.5	-	28.9	33.5	5.25	-
Observation aircraft	12.6	-	9.0	-	-	3.0	-	-	12,6	3.0	9.0	-
Helicopters	300.0	16.5	705.0	-	286.5	37.0	97.5	-	586.5	53.5	802.5	-
Trainers	286,2	-	380.0	-	-	125,0	40,0	-	286,2	125.0	420.0	-
Missiles	55,5	5.5	1,502.0	1.0	25.0	147.0	687.0	-	80.5	152.5	2,189.0	1
TOTAL	4,233.6	32,0	6,009.4	1.0	551.5	3,203.5	1,328.0	-	4,785.1	3,235.5	7,337.4	1
Overall Total	10,276				5,083				15,359			

Table 3/17a

Book Value of Aircraft and

Country	FRANCE				GERMANY				ITALY			
ORIGIN	EEC	UK	US	**	EEC	UK	US	**	EEC	UK	US	**
Ballistic missiles												
Bombers	310.0											
Tankers			100,0									
Fighter/strike aircraft	1,320,0		105.0		330.0		1,157,0		99.0		710,0	
Reconnaissance aircraft	290.0				115,0		500.0		105,0			
Tactical support aircraft												
Transports	317.6		8.0		440.0	10,0	27.0		2.5		160.0	
Rescue aircraft							0.5					
Communication aircraft	7.0		0.75		16.9				5,0			
Observation aircraft	10.0		9,0		1.6							
Helicopters	229.5		145.0		30,0	15,0	495,0		20,0		38.0	
Trainers	110.0		15.0		115,0		264.0		40.2		45.0	
Missiles	28,0		330,0		15,0	3,0	747,0		4,5		178,0	1,0
Total	2,622,1		712,75		1,063.5	28,0	3,190,5		276.2		1,131,0	1.0
Overall Total	3,335 *				4,282				1,408			

* Excluding the nuclear strike force.

** Other European countries

Missiles Held by the EEC Countries on 31 December 1967

($millions)

BELGIUM				NL				TOTAL EEC			
EEC	UK	US	**	EE	UK	US	**	EEC	UK	US	**
								310.0			
										100.0	
150.0		160,0				359.0		1,899.0		2,491.0	
				55.0		35.0		565.0		535.0	
1.3	1.0	90.0		15.0				776.4	10,0	285.0	
										0.5	
						1,0		28,9		1.75	
1,0								12,6		9,0	
8.0		7.0		12.5	1.5	20.0		300,0	16.5	705.0	
19,0		33,0		2.0		23.0		285,2		380,0	
5.0		133,0		3,0	2,5	114,0		55.5	5.5	1,502,0	1.0
184.3	1.0	423.0		87.5	4.0	552,0		4,233.6	32.0	6,009.3	1.0
608				643				10,276			

Table 3/18

Estimate of Military Aircraft and Missiles in Service in the US

(December 1967) (Numbers and value)

	USAF	USN	USMC	US Army	TOTAL	Value* ($mill.)	Funds required for financial year ($mill.)
Ballistic missiles	1,054	656	-	-	1,700	20,000	764
Strategic bombers	540	-	-	-	540	10,800	-
Tanker aircraft	650	-	60	-	710	5,000	-
Fighter/strike aircraft	4,200	1,300	1,000	-	6,500	10,470	2,360
Reconnaissance aircraft	700	700	75	-	1,475	3,300	684
Tactical support aircraft	600	-	76	-	676	270	26
Transports	3,000	1,400	200	200	4,800	5,900	510
Rescue aircraft	100	50	-	-	150	50	-
Helicopters	500	1,000	800	6,600	8,900	2,850	470
Communications aircraft	350	270	-	825	1,445	200	10
Observation aircraft	500	50	-	1,500	2,050	100	57
Trainers	4,000	1,500	-	318	5,820	1,710	n.a
Drones	n.a	n.a	n.a	n.a	n.a	-	n.a
Air-air missiles	n.a	n.a	n.a	-	n.a	-	30
Anti-aircraft missiles	n.a	n.a	n.a	n.a	n.a	-	685
Air-ground missiles	n.a	n.a	n.a	n.a	n.a	-	n.a
Anti-submarine missiles	-	n.a	-	-	n.a	-	-
Anti-tank missiles	-	-	n.a	n.a	n.a	-	126
Tactical missiles	n.a	n.a	-	n.a	n.a	-	117
TOTAL (Excluding missiles)	15,140	6,270	2,211	9,443	33,064	40,650	

AIAA data 1968: at 30 June 1967 at 30 June 1969 (estimate)

* Excluding spares

Aircraft in active service	USAF	15,017	15,044
	USN+USMAC	8,417	8,606
	US Army	9,490	11,464
Total aircraft		24,022	22,623
Helicopters		8,902	12,486
Grand total		32,924	35,114

Table 3/19

Total Defence Expenditure, MAP Allocations, Expenditure on Military Aircraft and Missile Procurements and R&D by the EEC Countries, the UK and the US

($millions) (1958-68)

Country		1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
BELGIUM	1. Total defence expend.	366	374	383	391	422	495	497	n.a	525	535	433
	2. MAP	n.a	n.a	n.a	9.5	18.8	7.3	39.6	4.8	1.6	0.1	n.a
	3. Procurements	22	16	21	12	24	70	67	n.a	n.a	n.a	n.a
	4. R&D	-	-	-	-	-	-	-	-	-	-	-
NL	1. Total defence expend.	460	418	480	559	607	641	728	n.a	782	876	904
	2. MAP	n.a	n.a	n.a	30.3	12.8	18.9	10.7	49.7	0.1	3.3	n.a
	3. Procurements	34	23	42	70	72	134	116	n.a	n.a	n.a	n.a
	4. R&D	-	-	-	-	-	-	-	-	-	-	-
ITALY	1. Total defence expend.	1,035	1,067	1,136	1,298	1,378	1,650	1,760	1,860	1,982	2,075	2,098
	2. MAP	n.a	n.a	n.a	135	83.7	55.9	40.0	94.2	3.2	4.6	n.a
	3. Procurements[1]	24	24	29	39	43	72	82	95	n.a	n.a	n.a
	4. R&D (included in 3.)	-	-	-	-	-	-	-	-	-	-	-

Source: EEC and UK - see National Reports. [1] Excluding missiles. US - Aerospace Facts and Figures, AIAA.

Table 3/19 continued

Total Defence Expenditure, MAP Allocations, Expenditure on Military Aircraft and Missile Procurements and R&D by the EEC Countries, the UK and the US

($millions) (1958-68)

Country		1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
GERMANY	1. Total defence expend.	2,376	2,773	3,029	3,294	4,308	4,981	4,838	n.a	4,335	5,358	n.a
	2. MAP	n.a	n.a	n.a	16	1,5	0,4	0,3	0,2	- 0,1	-	n.a
	3. Procurements	238	276	235	369	558	781	561	n.a	n.a	n.a	n.a
	4. R&D (estimate)	n.a	n.a	24	59	59	80	97	86	89	109	n.a
FRANCE	1. Total defence expend.	3,380	3,657	3,909	4,161	4,525	4,661	4,791	5,161	4,404	4,735	5,080
	2. MAP	n.a	n.a	n.a	14,4	33,8	8,0	5,2	4,9	- 1,6	-	-
	3. Procurements	278	276	274	307	386	435	565	469	n.a	n.a	n.a
	4. R&D (estimate)	25	30	30	40	45	66	68	100	n.a	n.a	n.a
EEC	1. Total defence expend.	7,617	8,289	8,937	9,703	11,240	12,428	12,614	12,500	12,028	13,529	14,000
	2. MAP	n.a	n.a	n.a	205,2	150.6	90.5	95.8	153.8	3.2	8.0	-
	3. Procurements	596	615	601	797	1,083	1,492	1,391	n.a	n.a	n.a	n.a
	4. R&D (estimate)	n.a	n.a	54	99	104	146	165	186	n.a	n.a	n.a

Source: EEX and UK - see National Reports.

US - Aerospace Facts and Figures 1968, AIAA.

Table 3/19 continued

Total Defence Expenditure, MAP Allocations, Expenditure on Military Aircraft and Missile Procurements and R&D by the EEC Countries, the UK and the US

($millions) (1958-68)

Country		1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
UK	1. Total defence expend.	4,455	4,439	4,634	4,785	5,079	5,239	5,720	5,936	6,082	5,292	5,450
	2. MAP	n.a	n.a	n.a	14,0	27,5	11,6	0,3	0,4	- 0,1	-	n.a
	3. Procurements	503	480	491	542	587	558	543	n.a	n.a	n.a	n.a
	4. R&D in industry	218	258	252	297	300	275	275	295	239	253	n.a
US	1. Total defence expend.	44,234	46,483	45,691	47,494	51,103	52,755	54,181	50,163	57,718	70,095	76,491
	2. MAP(aircraft&missiles)	n.a	n.a	n.a	419	367	445	218	359	299	182	112
	3. Aircraft procurements	n.a	n.a	n.a	5,898	6,400	6,309	6,058	5,200	6,635	8,411	9,369
	Missile procurements	n.a	n.a	n.a	2,972	3,442	3,817	3,577	2,096	2,069	1,930	2,124
	TOTAL procurements	n.a	n.a	n.a	8,870	9,842	10,126	9,635	7,296	8,704	10,341	11,492
	4. R&D, aircraft	n.a	n.a	n.a	547	624	544	939	1,017	976	1,048	1,209
	R&D, missiles	n.a	n.a	n.a	3,025	2,777	2,241	2,352	1,901	1,801	2,502	2,438
	R&D, space	n.a	n.a	n.a	518	749	946	1,284	921	930	993	1,017
	TOTAL R&D	n.a	n.a	n.a	4,090	4,150	3,731	4,575	3,839	3,707	4,533	4,664
	Grand total of procurm. from the aerospace ind.	13,246	13,171	13,196	13,871	14,331	14,191	13,218	11,396	13,284	15,854	16,200

Source: EEC and UK - see National Reports

US - Aerospace Facts and Figures 1968, AIAA.

Table 3/20

Belgian Air Force - Situation at the End of 1967

Aircraft or missile	Type[1]	Entry into service	Due for replacement	Source of supply[2]	Number	Book value $mill.	Country of origin
REPUBLIC F 84F	C	50-55	-70	MAP	221	-	US
LOCKHEED F 104 G	C	60-65	75+	L	75	120	
				MAP	25	40	
DOUGLAS C 47/DC 3	T	50-55	70+	MAP	12	90	
DOUGLAS DC 6	T	50-55	70+	MAP	4		
DOUGLAS DC 4	T	50-55	70+	MAP	2		
FAIRCHILD C 119 G	T	55-60	70+	MAP	35		
LOCKHEED TF 104 G	Tr	60-65	75+	P	13	20	
LOCKHEED T 33	Tr	55-60	70+	MAP	25	13	
PIPER L 18	Tr	50-55	-70	MAP	157	-	
SIKORSKY S 58	H	60-65	70+	P	13	7	
MQM 33	D	60-65	70+	MAP	n.a.	1	
NIKE	AM	60-65	75+	MAP	8 sq.	60	
HAWK	AM	60-65	75+	L	2 batt.	60	
SIDEWINDER	AG/AM	60-65	75+	L	n.a.	2	Total
HONEST JOHN	TM	60-65	70+	MAP	n.a.	10	$M 423
HAWKER HUNTER	C	55-60	-65	L	220	-	UK Total
PERCIVAL PEMBROKE	T	50-55	70+	P	4	1	$M 1
DASSAULT MIRAGE 5	C	70-75	80+	P	88	150	FRANCE
JAGUAR O MIRAGE 5	C	70-75	80+	P	18		
DASSAULT FALCON	T	1967	80+	P	1	1,3	
FOUGA MAGISTER	Tr	55-60	70+	P	48	19	
SUD ALOUETTE II	H	65-70	75+	P	63	8	
ENTAC	TM	60-65	75+	P	n.a.	5	Total
SS 11	TM	55-60	70+	MAP	n.a.		$M 183
DORNIER Do 27	Tr	60-65	75+	P	12	1	GERMANY Total $M 1
AVRO CF-100	C	50-55	-60	MAP	53	-	CANADA Total $M-
STAMPE & RENARD SV4	Tr	45-50	-70	R	65	-	BELGIUM Total $M-
					Grand TOTAL	$millions	609

Source: SORIS estimate

1 Type

Tr = Trainer or communications aircraft
C = Combat aircraft (fighter, strike, tactical reconnaissance
D = Drone, remote controlled target or reconnaissance aircraft
H = Helicopter
AM = Anti-aircraft missile
AG/AM = Air-to-ground or air-to-air missile
TM = Tactical missile (ground-ground or anti-tank)
T = Transport aircraft
NM = Naval missile
N = Naval aircraft (reconnaissance or anti-submarine)
BAGAM = Ballistic air-to-ground or air-to-air missile
B = Bomber
H(L)= Light helicopter
T(T) = Tactical transport
BM = Ballistic missile
H(H)= Heavy helicopter
T(L) = Light transport
C/Tr= Combat/trainer aircraft
T(S) = Strategic transport

2 Source of supply

P = Purchased
L = Produced under licence
R = National R&D
MAP = Military Aid Planning

Table 3/21

Belgian Air Force - Estimate of Procurements 1968-80

($millions)

PROGRAMME	Procurements						Remarks
	Overall	Source					
		EEC (incl. avionics)	CEEC (excl. avionics)	UK	US & CANADA	Others	
Mirage 5	150	150	120	-	-	-	
Transports (Transall?)	90	88	80	2	-	-	Co-production F/G, UK engines (L)
Heavy helicopters (Frelon?)	10	10	9	-	-	-	F production
F-104G replacement(MRCA 75?)	75	60	38	15	-	-	G/UK/I/NL design, UK engines
Anti-aircraft missiles (?)	120	-	-	-	120	-	No EEC design
"-tank missiles (Milan?)	5	5	3.5	-	-	-	F/G production
Trainers (?)	32	32	24	-	-	-	F/G production, I production
Tactical missiles (?)	10	-	-	-	10	-	No EEC design
Air-to-air missiles (?)	2	2	1	-	-	-	F production
Light helicopters (?)	8	8	7	-	-	-	F production
Drones(target aircraft)(?)	1	1	0,5	-	-	-	F production
Maintenance, spares	405	305	230	-	100	-	
TOTAL	908	661	513	17	230	-	

Source: SORIS estimate.

Table 3/22

Netherlands Air Force - Situation at the End of 1967

Aircraft or missile	Type[1]	Entry into service	Due for replacement	Source of supply[2]	Number	Book value $mill.	Country of origin
REPUBLIC F 84 F	C	50–55	–70	MAP	175	–	US
LOCKHEED F 104 G	C	60–65	75+	L	95	192	
				MAP	25		
GRUMMAN S 2 A	N	55–60	–70	MAP	26	20	
LOCKHEED NUPTUNE	N	55–60	–70	MAP	17	–	
DOUGLAS C 47	T	50–55	–70	MAP	n.a.	–	
LOCKHEED TF 104 G	Tr	60–65	75+	P	14	22	
SNB 5	Tr	55–60	–70	MAP	6	1	
L 18/L 21	Tr	55–60	–70	MAP	64	–	
N.A. T 6	Tr	50–55	–70	MAP	260	–	
SIKORSKY S 55	H	55–60	–70	MAP	6	–	
SIKORSKY SH-34	H	65–70	75+	P	20	20	
MQM 33	D	60–65	–75	MAP	n.f.	1	
SIDEWINDER	AG/AM	60–65	75+	L	n.a.	3	
HAWK	AM	60–65	75+	L	12 sq.	50	
NIKE	AM	60–65	75+	MAP	6 sq.	45	
TERRIER	NM	55–60	70+	MAP	n.a.	5	Total
HONEST JOHN	TM	60–65	70+	MAP	n.a.	10	$M 369
GRUMMAN S 2 F	N	55–60	–70	MAP	17	15	CANADA
CANADAIR F 5	C	70+	80+	P	105	167	Total
D H C BEAVER	Tr	55–60	75+	P	9	1	$M 183
HAWKER HUNTER	C	50–55	–65	L	200	–	UK
WESTLAND WASP	H	60–65	75+	P	12	1.5	Total
SEACAT	AM	60–65	75+	P	n.a.	2.5	$M 4
ATLANTIC	N	70+	80+	P	9	55	FRANCE
SUD ALOUETTE	H	60–65	75+	P	77	9	
SS 11	TM	55–60	70+	MAP	n.a.	3	Total
AS 12	AG/AM	60–65	75+	P	n.a.		$M 67
AGUSTA-BELL AB 204 B	H	60–65	75+	P	8	3.5	ITALY Total $M 3.5
FOKKER F 27	T	60–65	75+	R	12	15	NL
FOKKER S 11	Tr	50–55	70+	R	40	0.5	Total
FOKKER S 14	Tr	55–60	70+	R	20	1.5	$M 17
						Grand Total	$M 643.5

Source: SORIS estimate.

[1,2] For symbols see Table 3/20

Table 3/23

Netherlands Air Force - Estimate of Procurements 1968-80
($millions)

PROGRAMME	Procurements						Remarks
	Overall	Source					
		EEC (incl. avionics)	EEC (excl. avionics)	UK	US & CANADA	Others	
F 5	167	80	60	-	87	-	
F-104G replacement(MRCA 75?)	300	240	165	60	-	-	G/UK/I/NL design, UK engines
Naval reconn. (Atlantic?)	30	29	22.6	1	-	-	F/G/NL/B co-production
Trainers (?)	2	12	1.4	-	-	-	I/G production
Heavy helicopters (?)	20	20	16	-	-	-	F production
Drones (?)	1	1	0,5	-	-	-	F production
Anti-aircraft missiles (?)	95	-	-	-	95	-	No EEC design
Tactical missiles (?)	10	-	-	-	10	-	No EEC design
Naval missiles (?)	8	-	-	8	-	-	No EEC design
Light helicopters (?)	15	15	13	-	-	-	F production
Anti-tank missiles (?)	3	3	2	-	-	-	F production
Transports (?)	15	15	13	-	-	-	NL production
Air-to-air missiles	3	3	1.5	-	-	-	F production
Maintenance, spares	700	500	375	5	195	-	
TOTAL	1,369	908	670	74	387	-	

Source: SORIS estimate.

Table 3/24

Italian Air Force - Situation at the End of 1967

Aircraft or missile	Type[1]	Entry into service	Due for replacement	Source of supply[2]	Number	Book value $mill.	Country of origin
Lockheed F 104 G	C	60–65	75–80	L	125	200	US
North American F 86 K	C	55–60	–70	L	60	-	
Republic F 84 F	C	55–60	70–75	MAP	100	160	
Lockheed F 104 S	C	65–70	80–	L	165	330	
Grumman S2A	N	55–60	–70	MAP	40	-	
Beech C 45	T	50–55	–70	MAP	5	-	
Douglas C 47	T	50–55	–70	MAP	5	-	
Douglas DC 6	T	55–60	–70	P	2	-	
Convair CV 440	T	55–60	–70	P	5	-	
Fairchild C 119 G	T	55–60	70–75	MAP	50	160	
Lockheed TF 104 G	Tr	60–65	75–80	P	28	45	
North American TG	Tr	50–55	–70	MAP	n.a.	-	
Lockheed T 33 A	Tr	55–60	–70	MAP	n.a.	-	
Cessna O-1E	Tr	55–60	–70	MAP	120	-	
Piper L 18/L 21	Tr	55–60	–70	MAP	n.a.	-	
Bell UH-1B	H	65–70	75–80	L	25	10	
Sikorsky SH-3D	H	65–70	75–80	L	24	23	
Bell 47	H	60–65	75–80	L	50	5	
Sikorsky HU-19	H	55–60	–70	P	4	-	
HAWK	AM	60–65	75+	L	4 batt.	90	
TARTAR	NM	60–65	70+	P	n.a.	15	
TERRIER	NM	60–65	70+	P	n.a.		
SIDEWINDER	AG/AM	60–65	75+	P	n.a.		
SPARROW	AG/AM	65–70	80+	P	n.a.	3	
HONEST JOHN	TM	60–65	70+	MAP	508	20	
NIKE	AM	60–65	75+	MAP	3 comp.	50	Total $M 1,131
Westland Whirlwind	H	55–60	–70	P	2	-	UK Total $M -
ATLANTIC	N	70–75	80+	P	18	105	FRANCE
AS 20	AG/AM	55–60	–70	P	n.a.	2	
SS 11	TM	55–60	70+	MAP	n.a.	2	
CT 20	D	60–65	75+	L	n.a.	0.5	Total $M 109
FIAT G91	C	55–60	70+	R	170	85	ITALY
FIAT G 91Y	C	65–70	75+	R	20	14	
Piaggio P 166	T	55–60	75+	R	21	5	
FIAT G 222	T	65–70	–80	R	2	2.5	
SIAI S 205	Tr	65–70	–80	R	4	0.2	
Macchi MB 326	Tr	60–65	75+	R	100	40	
FIAT G 59B	Tr	50–55	–70	R	n.a.	-	
Augusta A 101G	H	65–70	–80	R	12	20	Total $M 166
MOSQUITO	TM	60–65	75+	L	n.a.	1	Total $M 1
						Grand Total	1,407 $M

Source: SORIS estimate

[1,2] For symbols see Table 3/20

Table 3/25

Italian Air Force - Estimate of Procurements 1968-80
($millions)

PROGRAMME	Procurements						Remarks
	Overall	Source					
		EEC (incl. avionics)	EEC (excl. avionics)	UK	US & CANADA	Others	
G 91 Y	84	82	61	-	2	-	US engine (L)
G 222	75	60	54	-	15	-	US engine
SIAI S 205	0.5	0.5	0.4	-	-	-	
A 101 G	20	19.5	15	0.5	-	-	UK engine (L)
F 104 S	350	315	195	-	35	-	US licence
UH-1B	10	9	8	-	1	-	US licence
SH-3D	23	21	17	-	2	-	US licence
Sparrow	3	-	1,5	-	3	-	
ATLANTIC	105	102.5	86	2.5	-	-	UK engine (L)
Army helicopters (?)	6	5.4	4.6	-	0.6	-	US licence
F-104G replacement(MRCA 75?)	510	400	270	110	-	-	G/UK/I/NL design, UK engine
Transport (Transall?)	160	156	140	4	-	-	F/G production, UK engine (L)
Light helicopters (?)	10	10	9	-	-	-	I production
AM 3	4.5	4.5	4	-	-	-	
Naval missiles (?)	12	12	6	-	-	-	I production
Anti-aircraft missiles (?)	140	-	-	-	140	-	No EEC design
Tactical missiles (?)	20	-	-	-	20	-	No EEC design
Air-to-Air missiles (?)	5	5	2.6	-	-	-	F production
Anti-tank missiles (?)	3	3	2	-	-	-	F production
Maintenance and repairs	750	680	540	-	70	-	
TOTAL	2,291	1,885	1,517	117	289	-	

Source: SORIS estimate.

Table 3/26

German Air Force - Situation at the End of 1967

Aircraft or missile	Type[1]	Entry into service	Due for replacement	Source of supply[2]	Number	Book value $mill.	Country of origin
REPUBLIC F 84F	C	55-60	-65	MAP	450	-	US
REPUBLIC RF 84F	C	55-60	-65	MAP	180	-	
LOCKHEED F 104 F	C	60-65	-65	MAP	30	-	
LOCKHEED F 104 G	C	60-65	75+	P	60	1,050	
	C	60-65	75+	P/L	599		
	C	65-70	75+	L	50	110	
Mc DONNELL RF-4E	C	70-75	80+	P	88	500	
GRUMMAN HU-16	N	55-60	70+	P	8	0.5	
DOUGLAS C 47	T	55-60	70+	MAP	27	13	
DOUGLAS DC 6	T	55-60	70+	P	4	10	
CONVAIR CV 440	T	55-60	70+	P	6		
LOCKHEED JET STAR	T	60-65	75+	P	2	4	
NORTH AMERICAN T 6A	Tr	55-60	-65	P	88	-	
LOCKHEED T 33	Tr	55-60	-70	P	192	30	
PIPER L 18 C	Tr	55-60	-70	P	40	-	
CESSNA T 37	Tr	60-65	75+	P	47	12	
CESSNA T 38	Tr	60-65	75+	P	46	2	
LOCKHEED TF 104 G	Tr	60-65	75+	P	137	220	
SIKORSKY H 34	H	55-60	-75	P	115	-	
VERTOL H 21	H	60-65	-75	P	32	-	
SIKOKSKY CH-53A	H	70-75	80+	P	135	350	
BELL UH-1D	H	65-70	80+	L	352	140	
MQM 61	D	55-60	75+	P	n.a.	3	
HAWK	AM	60-65	75+	L	9batt.	200	
NIKE	AM	60-65	75+	P	6batt.	100	
PERSHING	TM	60-65	75+	P	3batt.	253	
HONEST JOHN	TM	60-65	70+	P	12batt.	20	
SERGEANT	TM	60-65	75+	P	4batt.	166	
SIDEWINDER	AM	60-65	75+	L	n.a.	5	Total $M3190.5
CANADAIR SABRE V	C	55-60	-65	MAP	75	-	CANADA
CANADAIR SABRE VI	C	55-60	-65	P	225	-	Total $M -
DORNIER Do 27	Tr	55-60	-70	R	428	1.6	GERMANY
DORNIER Do 28	Tr	60-65	75+	R	3	0.4	
DORNIER SKYSERVANT	Tr	70-75	80+	R	125	2.5	
HFB 320	T	65-70	80+	R	15	14.0	
BÖLKOW COBRA	TM	60-65	70+	R	n.a.	5.0	Total $M 23.5

[1,2] For symbols see Table 3/20.

Source: SORIS estimate.

Table 3/26 continued

German Air Force - Situation at the End of 1967

Aircraft or missile	Type[1]	Entry into service	Due for replacement	Source of supply[2]	Number	Book value $mill.	Country of origin
HAWKER SEA HAWK	C	55-60	-65	P	68	-	UK
FAIREY GANNET	N	55-60	-65	P	16	-	
PERCIVAL PEMBROKE	T	55-60	70+	P	49	10	
BRISTOL SYCAMORE	H	55-60	70+	P	50	15	
SEACAT	AM	65-70	75+	P	n.a.	3	$M28
PIAGGIO P 149 D	Tr	55-60	-70	L	200	2	ITALY
FIAT G 91 R	C	60-65	70+	L	369	330	
F-86 K	C	55-60	-65	P	88	-	
FIAT G 91 T	Tr	55-60	75+	L	45	40	
	Tr	65-70	75+	L	25	23	
AGUSTA BELL 47	H	60-65	70+	P	45	5	$M400
ATLANTIC	N	65-70	80+	J	20	115	GERMANY + FRANCE
TRANSALL	T	65-70	80+	J	110	440	TOT. $M555
FOUGA MAGISTER,	Tr	55-60	70+	P	62	50	FRANCE
	Tr	55-60	70+	L	188		
SUD ALOUETTE	H	60-65	75+	P	300	25	
NORD. NORATLAS	T	55-60	-70	P	25	-	
	T	55-60	-70	L	148	-	
SS 11	TM	55-60	70+	P	n.a.	10	
AS 12	AG/AM	60-65	70+	P	n.a.		
AS 30	AG/AM	60-65	75+	P	n.a.		
AS 20	AG/AM	60-65	75+	P	n.a.		TOT. $M 85
					Grand Total		$M 4,282

Source: SORIS estimate

[1,2] For symbols see Table 3/20.

Table 3/27

German Air Force - Estimate of Procurements 1968-80

($millions)

PROGRAMME	Procurements						Remarks
	Overall	Source					
		EEC (incl. avionics	EEC (excl. avionics	UK	US	Others	
RF 4E	500	100—45	80—35	-	400—455	-	
F 104 G	110	100	75	-	10	-	
CH 53 A	250	125	115	-	125	-	
UH 1 D	70	35	32	-	35	-	
Sky Servant	2.5	2.5	2.2	-	-	-	US engines (L)
HFB 320	14	11	9.6	-	3	-	US engines
G 91 T	23	22.4	16,8	0.6	-	-	UK engines (L)
Light helicopters	50	50	45	-	-	-	German design
Training helicopters	22.5	22.5	20	-	-	-	
Armed helicopters	175	175	160	-	-	-	Franco-German design
Naval helicopters	40	20	18	-	20	-	
Anti-tank missiles(Milan?Hot?)	5	5	2.5	-	-	-	Franco-German design
"-aircraft missiles (Roland?)	5	5	2.5	-	-	-	Franco-German design
Naval missiles (Standard?)	5	-	-	-	5	-	
Air-to-ground missiles(Kormoran)	5	5	2.5	-	-	-	Franco-German design
Atlantic/Transall	220	215	193	5	-	-	UK engines (L)
F-104G replacement(MRCA 75?)	1,700	1,275	850	425	-	-	UK engines
VTOL transport	408	396	340	12	-	-	Uk engines (L)
Tactical missiles	400	-	-	-	400	-	
Anti-aircraft missiles	350	-	-	-	350	-	
Trainer aircraft	50	50	40	-	-	-	
Maintenance and spares	3,500	2,800	2,100	-	700	-	
TOTAL	7,905	5,414—5,359	4,104—4,059	443	2,048—2,103	-	

Source: SORIS estimate.

Table 3/28

French Air Force* - Situation at the End of 1967

Aircraft or missile	Type[1]	Entry into service	Due for replacement	Source of supply[2]	Number	Book value $mill.	Country of origin
Republic F 84 F, RF 84 F	C	50—57	64—68	MAP	120	-	US
North American F 100	C	55—57	68—72	MAP	67	47	
Douglas Skyraider	C	59	—70	P	50	-	
LTV Crusader	C	60—65	74—77	P	42	42	
Boeing KC 135	T	60—64	75+	P	12	100	
Douglas C 47	T	—60	—70	P	100	-	
Douglas DC 8	T	60—65	75+	P	1	7	
Douglas DC 6	T	55—60	—75	P	6	1	
Convair PBY-6	T	50—55	—70	?	3	-	
Beech 18	Tr	50—55	—70	MAP	45	-	
Douglas B 26	Tr	50—55	—70	P	20	-	
Lockheed T 33A	Tr	55—60	-68	P	50	15	
North American T6	Tr	55—60	—68	P	150		
Cessna 310	Tr	65—70	—80	P	12	0.75	
Cessna O-1	Tr	55—60	70+	MAP	100	5	
Piper PA-22	Tr	55—60	70+	P	22	4	
Piper L 18/ L 21	Tr	55—60	70+	MAP	115		
Bell 47	H	55—60	70+	P	84	9	
Sikorsky H 34	H	55—60	—72	L	136	136	
Vertol H 21	H	55—60	—70	P	20	-	
Sikorsky H 19	H	55—60	—70	P	40	-	
Lockheed Neptune	N	55—60	—70	MAP	59	-	
HAWK	AM	60—65	—75	L	3 reg.	200	

* Excluding the nuclear strike force

Source: SORIS

[1,2] For symbols see Table 3/20

Table 3/28 continued

French Air Force* - Situation at the End of 1967

Aircraft or missile	Type[1]	Entry into service	Due for replacement	Source of supply[2]	Number	Book value $mill.	Country of origin
TARTAR	NM	60—65	70—	P	5 DDG	10	
HONEST JOHN	TM	60—65	70+	P	5 batt.	10	
NIKE	AM	60—65	75+	P	2 brig.	100	Total $M 686.75
JAGUAR	C	70+	80+	J	150	250	FRANCE + UK
WG 13	H	70+	80+	J	230	160	
SA 340	H	70+	80+	J	100	12.5	
SA 330	H	70+	80+	J	130	13	Total $M 435.50
ATLANTIC	M	65—70	80+	J	40	230	FRANCE + GERMANY
TRANSALL	T	65—70	80+	J	50	200	Total $M 430
Dassault MIRAGE F1	C	69+	80+	R	100	400	FRANCE
Dassault MIRAGE III	C	60—65	70+	R	358	540	
Dassault MYSTERE	C	55—60	70+	R	270	-	
ETENDARD	C	60—65	73+	R	85	50	
VAUTOUR	C	55—60	—75	R	80	80	
Dassault MIRAGE IV A	B	60—65	75+	R	62	310	
Breguet ALIZE	N	60—65	—75	R	75	60	
Nord NORATLAS	T	55—60	—75	R	165	80	
Breguet SAHARA	T	55—60	—75	R	8	8	
Dassault FALCON	T	65—70	80—	R	2	2.6	

* Excluding the nuclear strike force

Source: SORIS estimate

[1,2] For symbols see Table 3/20

Table 3/28 continued

French Air Force* - Situation at the End of 1967

Aircraft or missile	Type[1]	Entry into service	Due for replacement	Source of supply[2]	Number	Book value $mill.	Country of origin
FLAMANT	T	55–60	–75	R	120	12	France cont'd
Nord 262	T	65–70	80+	R	30	15	
Potez PARIS	Tr	55–60	70+	R	44	110	
Fouga MAGISTER	Tr	55–60	70+	R	320		
BROUSSARD	Tr	55–60	–75	R	110	7	
Nord 3400	Tr	55–60	–75	R	100	5	
Nord 3202	Tr	55–60	–75	R	100	5	
Sud ALOUETTE	H	55–65	–75	R	288	24	
DJINN	H	55–60	–70	R	50	2.5	
Sud FRELON	H	65–70	80+	R	23	20	
CT 20	D	60–65	75+	R	-	3	
SS 12	TM	60–65	70+	R	-		
AS 12	AG/AM	60–65	–75	R	-		
SS 11	TM	55–60	70+	R	-		
AS 20	AG/AM	60–65	75+	R	-	25	
ENTAC	TM	55–60	70+	R	-		
MALAFON	NM	60–65	75+	R	50		
Matra 530/511	AM	60–65	75+	R	-		
MASURCA	AM	60–65	75+	R	-		
AS 30	AM	60–65	75+	R	-		Total $M 1,782.5
					Grand Total		$M 3,334.8

* Excluding the nuclear strike force Source: SORIS estimate

[1,2] For symbols see Table 3/20

Table 3/29

French Air Force - Estimate of Procurements 1968-80
($millions)

PROGRAMME	Procurements						Remarks
	Overall	Source					
		EEC (incl. avionics)	EEC (excl. avionics)	UK	US	Others	
Nuclear strike force	490	490	350	-	-	-	
MIRAGE F1	400	400	300	-	-	-	
JAGUAR	250	250	170	-	-	-	F/UK co-production
Nord 262	10	10	5	-	-	-	
Trainer	125	125	100	-	-	-	F/G design
Cessna 310	0,75	-	-	-	0.75	-	
FRELON	136	136	122	-	-	-	
ATLANTIC/TRANSALL	150	146	130	4	-	-	UK engines (L)
Helicopters	185	185	166	-	-	-	F/UK co-production
Carrier-borne aircr.(Mirage G?)	100	87.5	75	-	2.5	-	US engines (L)
Hot,Harpon missiles	10	10	8	-	-	-	
Milan missiles	5	5	3	-	-	-	
AS.33 missiles	10	10	8	-	-	-	
Roland missiles	10	10	5	-	-	-	
Martel missiles	10	10	5	-	-	-	F/UK production
Crotale missiles	10	10	5	-	-	-	F design
Pluton missiles	150	150	100	-	-	-	F design
Surface-to-surface missile 38	20	20	10	-	-	-	F design
Anti-aircraft missiles	130	130	70	-	-	-	F design
Swing-wing aircraft	1,000	975	720	-	25	-	US engines (L)
STOL aircraft	300	300	270	-	-	-	F design
Armed helicopters	100	100	90	-	-	-	F design
Heavy helicopters	100	100	90	-	-	-	F design
Maintenance and spares	3,200	3,000	2,000	-	200	-	
TOTAL	6,902	6,670	4,802	4	228		

Source: SORIS estimate.

Table 3/30

British Air Force - Situation at the End of 1967

Aircraft or missile	Type [1]	Entry into service	Due for replacement	Source of supply [2]	Number	Value $mill.	Country of origin
McDonnell PHANTOM	C	65-70	-80	P	148	350	US
Lockheed HERCULES	T	65-70	-80	P	66	150	
Douglas C 47	T	50-55	-70	MAP	4	-	
N A Harvard	Tr	50-55	-70	MAP	2	-	
Westland SEA KING	H	65-70	75+	L	60	57.5	
Westland WHIRLWIND	H	55-60	-75	L	102	-	
Westland WESSEX	H	60-65	75+	L	50	30	
Hiller 12	H	55-60	-70	P	41	-	
Westland SIOUX	H	60-65	70+	L	100	10	
AGM 37	D	55-60	75+	P	15	5	
AGM 33	D	55-60	75+	P	-		
POLARIS	BM	65-70	75+	P	64	638	
BULLPUP	AG/AM	60-65	75+	L	n.a.	22.2	
SIDEWINDER	AG/AM	60-65	75+	P	n.a.	2	
HONEST JOHN	TM	55-60	70+	P	508	20	
CORPORAL	TM	55-60	-70	P	n.a.	-	Total $M 1,280
Agusta SIOUX	H	60-65		P	50	5	ITALY Total $M 5
D H C BEAVER	T	60-65		P	46	3.5	CANADA
D H C CHIPMUNK	Tr	50-55	-75	L	200	40	Total $M 43.5
JINDIVIK	D	60-65	75+	P	150	5	AUSTRALIA
MALKARA	TM	60-65	75+	J	-	-	Total $M 5
JAGUAR	C	70+	80+	J	150	240	UK + FRANCE
VG 13	H	70+	80+	J	280	200	
SA 340	H	70+	80+	J	600	75	

Source: SORIS estimate.

[1,2] For symbols see Table 3/20

Table 3/30 continued

British Air Force - Situation at the End of 1967

Aircraft or missile	Type[1]	Entry into service	Due for replacement	Source of supply[2]	Number	Value $mill.	Country of origin
							cont'd
							UK + F
SA 330	H	70+	80+	C	50	5	
MARTEL	AM	70+	80+	C	n.a.	20	Total $M 540
Sud ALOUETTE	H	60-65	70+	P	19	1.5	FRANCE
AS 30	AG/AM	60-65	-75	P	1,000	5	
SS 11	TM	60-65	-75	P	-		Total $M 6.5
Gloster JAVELIN	C	55-60	-68	R	68	-	UK
H S.A HARRIER	C	70+	80+	R	90	270	
BAC LIGHTNING	C	60-65	75+	R	204	510	
H S A HUNTER	C	55-60	70+	R	200	-	
D H SCIMITAR	C	55-60	-70	R	76	75	
D H SEA VIXEN	C	55-60	-70	R	80	80	
H S A BUCCANEER	C	60-65	-75	R	115	275	
Avro VULCAN	B	55-60	70+	R	120	600	
H P VICTOR	B	55-60	70+	R			
BAC CANBERRA	B	50-55	70+	R	144	220	
Fairey GANNET	N	50-55	-68	R	15	-	
Avro SHACKLETON	N	50-55	-70	R	75	-	
H S A NIMROD	N	70+	80+	R	38	240	
Vickers VC 10	T	60-65	80+	R	14	100	
Bristol BRITANNIA	T	55-60	70+	R	23	90	
Vickers VALETTA	T	45-50	-70	R	40	12	
Percival PEMBROKE	T	50-55	-75	R	40	8	
Beagle BASSET	T	65-70	-80	R	20	2	
A S ARGOSY	T	60-65	70+	R	56	120	
H S A. ANDOVER	T	60-65	75+	R	37	46	
Avro ANSON	T	40-45	-70	R	40	-	
Blackburn BEVERLEY	T	55-60	-68	R	30	-	
D H DEVON	T	45-50	70+	R	40	4	
D H COMET	T	55-60	70+	R	5	-	

Source: SORIS estimate.

[1,2] For symbols see Table 3/20

Table 3/30 continued

British Air Force - Situation at the End of 1967

Aircraft or missile	Type[1]	Entry into service	Due for replacement	Source of supply[2]	Number	Value $mill.	Country of origin
D.H. HERON	T	50-55	70+	R	9	2	UK cont'd
Bristol 170	T	50-55	-70	R	2	-	
Scottish TWIN PIONEER	T	55-60	70+	R	36	11	
Short BELFAST	T	65-70	75+	R	10	75	
Vickers VISCOUNT	T	55-60	-70	R	2	2	
D H DOMINIE	Tr	60-65	-80	R	20	14.5	
Folland GNAT	Tr	55-60	70+	R	105	80	
BAC JET PROVOST	Tr	55-60	70+	R	200	-	
Vickers VARSITY	Tr	50-55	-70	R	30	-	
H S A HUNTER	Tr	50-55	-75	R	135	135	
BAC JET PROVOST T 5	Tr	70+	-80	R	100	45	
Scottish PIONEER	Tr	55-60	70+	R	40	3	
Auster AOP MK 9	Tr	50-55	-70	R	-	-	
Westland BELVEDERE	H	60-65	70+	R	26	25	
Bristol SYCAMORE	H	50-55	70+	R	12	-	
Saro SKEETER	H	55-60	70+	R	50	-	
Westland SCOUT/WASP	H	60-65	-75	R	120	12	
BLOODHOUND	AM	55-60	75+	R	400	40	
FIRESTREAK	AG/AM	55-60	75+	R	n.a.	3	
RED TOP	AG/AM	60-65	-80	R	n.a.		
BLUE STEEL	BA/GAM	60-65	70+	R	n.a.	40	
SEACAT/TIGERCAT	AM	60-65	-75	R	n.a.	10	
SEASLUG	AM	60-65	75+	R	n.a.	3	
THUNDERBIRD	AM	55-60	75+	R	n.a.	40	
SEA DART	AM	70-	80+	R	n.a.	3	
VIGILANT	TM	60-65	-75	R	n.a.	3	
SWINGFIRE	TM	70+	-80	R	n.a.	-	
RAPIER	AM	70+	80+	R	n.a.	-	Total $M 3,198.5
					Grand Total		$M 5,078.5

Source: SORIS estimate.

[1,2] For symbols see Table 3/20.

Table 3/31

British Air Force - Estimate of Procurements 1968-80

($millions)

PROGRAMME	Procurements						Remark
	Overall	Source					
		EEC	UK (incl. avionics)	UK (excl. avionics)	US	Others	
NIMROD	240	-	240	200	-	-	
JAGUAR	240	-	240	180	-	-	
Elicotteri	280	-	280	250	-	-	F/UK co-production
SEA KING	57,5	-	52	45	5.5	-	US licence
BAC 167/T5	45	-	45	35	-	-	
HARRIER	270	-	270	210	-	-	
PHANTOM	350	-	157,5	150	192.5	-	
HERCULES	100	-	20	20	80	-	
BASSETT	1	-	1	1	-	-	
MARTEL	20	-	20	10	-	-	F/UK co-production
SEA DART	3	-	3	1,5	-	-	
SWINGFIRE	5	-	5	3	-	-	
RAPIER	5	-	5	3	-	-	
Tactical missiles	40	-	-	-	40	-	No UK design
Sea-to-surface miss.(Poseidon?)	900	-	-	-	900	-	
Trainer (Pup-150?)	20	-	20	18	-	-	
Swing-wing aircr.(MRCA 75?)	750	-	750	525	-	-	UK/NL/I/G design
VTOL combat aircraft	300	-	300	220	-	-	UK/G design?
V/STOL transport aircraft	200	-	200	170	-	-	UK/G design?
Combat helicopters	80	-	80	70	-	-	UK/F design?
Transport helicopters	150	-	135	120	15	-	US licence
Air-to-air missiles	5	-	5	2,5	-	-	
Air-to-ground missiles	10	-	10	5	-	-	
Ground-to-air missiles	50	-	50	25	-	-	UK/F design?
Anti-tank missiles	6	-	6	4	-	-	
Maintenance and repairs	3,600	-	3,400	2,500	200	-	
TOTAL	7,727	-	6,294	4,698	1,433	-	

Source: SORIS estimate.

Table 3/32

Main Types of

Country	Aircraft	Type[1]	In production from - to	National output+ (number)
FRANCE	Dassault OURAGAN	C	1949—1955	478
	Dassault MYSTERE	C	1951—1960	420
	Dassault MIRAGE III & 5	C	1956+	800 June 68
	Sud MAGISTER	Tr	1952+	591 Jan.68
	Sud ALOUETTE II/III	H (L)	1955+	1,765 Jan.68
	Super SUPER FRELON	H (H)	1962+	52 June 67
ITALY	FIAT G 91 R/T	C	1956+	348
	Macchi M3 326	Tr	1957+	150
	Piaggio P 148/149	Tr	1951—1956	149
GERMANY	Dornier Do 27	Tr	1955+	570 June66
SWEDEN	SAAB J 29	C	1949—1956	661
	SAAB J 35 DRAKEN	C	1955+	596
	SAAB 105 XT	C/Tr	1963+	180
CANADA	De Havilland BEAVER	Tr	1947+	1,670 Dec.67
	De Havilland OTTER	T (T)	1951—1968	500 Aug.68
	De Havilland CARIBOU	T (T)	1958+	265
	De Havilland BUFFALO	T (T)	1864+	34
	De Havilland TWIN OTTER	T (T)	1965+	129 Jan.68
	Canadair CL 41	Tr	1960+	210 Sept.67
UK	De Havilland VAMPIRE	C/Tr	1943—1958	3,268
	Gloster METEOR	C	1945—1958	3,416
	Hawker SEA HAWK	C	1947—1960	538
	English Electric CANBERRA	B	1949—1964	1,100 +
	De Havilland VENOM	C/Tr	1949—1960	1,143
	Folland GNAT	Tr	1955+	145
	HSA BUCCANEER	C	1958+	192
	HSA HUNTER	C	1951+	1,739
	BAC 167 / JET PROVOST	Tr	1955+	607 June68
	HSA ANDOVER / 748	T (T)	1959+	144Sept.68

+ Orders and deliveries. (°°) Production under licence taken arbitrarily as 10%

(°)Comprending sales of "unserviceable" aircraft originally procured by the armed forces of the selling country and MAP transfers, excluding production under licence.

* Estimate based on "new" price in 1968. The figures listed are merely intended to give an idea of the volume of exports by types.

[1] For symbols see Table 3/20.

Military Aircraft Exported

(R&D independent of country of origin)

Product. under licence abroad+ (number)	TOTAL + (number)	National military orders + (number)	Military sales abroad + &(°) (number)	Civil sales + (number)	Nat.mil. orders as percentage of total (°°) %	Mil.sales as percentage of total %	Value of mil.sales abroad $M (°°)
-	479	359	120	-	73.3	100	68 *
-	420	270	150	-	62	100	99 *
149	949	558	313	-	68.5	100	641 *
286	877	437	151	-	70.5	100	55 *
100	1,865	500 (?)	846 +	n.a.	28.1	81	95 *
-	52	23	21	2	44,2	95.6	25 *
319	667	204	144	-	53.7	100	132 *
383	533	100	21	4	53.3	99	24 *
196	345	71	75	3	42	99	4 *
50	620	428	51 +	n.a.	74,5	85.1	n.a.
-	661	661	30	-	100	100	2,83
-	596	550	46	-	92.3	100	59.2
-	180	160	20	-	89	100	1.1
-	1,670	-	1,107 +	141 +	-	n.a.	n.a.
-	500	66	400	34	13.2	80	80 *
-	265	8	253	4	3	99	220 *
-	34 +	15	19 +	-	44.1	100	33 *
-	129	66	12	34	51,1	60.4	3.6
-	210	190	20	-	90,5	100	10 *
532	3,800	2,225	1,151	-	85	100	400 *
372	3,788	2,984	933	-	86.4	100	450 *
-	538	434	136	-	80.7	100	88 *
443	1,543	900	195	-	78.6	100	330 *
390	1,510	1,031	147	-	87.2	100	56 *
175	320	105	40	-	64.7	100	29 *
-	192	176	16	-	91.7	100	38.4
460	2,199	1,130	636	-	63.3	100	680 *
-	607	485	122	-	79,9	100	50 *
41	185	37	19	78	25	44.6	30 *

Table 3/32 continued

Main Types of

Country	Aircraft	Type[1]	In production from – to
cont'd			
UK	BAC PROVOST	Tr	1950—1964
	Percival PEMBROKE	T (T)	1948—1958
	Bristol 170	T (L)	1945—1958
	De Havilland DOVE	T (T)	1945—
	Westland SCOUT	H (L)	1959—
	Bristol SYCAMORE	H (L)	1947—1956
F + G	TRANSALL	T (S)	1964+
	ATLANTIC	N	1964+
US	Lockheed F 80	C	1944—1949
	Lockheed T 33	Tr	1948—1959
	Republic F 84	C	1946—1952
	Republic F 84 F	C	1951—1955
	North American F 86	C	1947—1956
	North American F 100	C	1953—1960
	Lockheed F 104	C	1954+
	Northrop F 5 / T 38	C	1959+
	LTV CRUSADER	C	1955—1965
	Mc Donnell PHANTOM	C	1958+
	Douglas SKYHAWK	C	1952+
	Cessna T 37 / A 37	Tr	1954+
	Lockheed NEPTUNE	N	1944+
	Lockheed ORION	N	1958+
	Lockheed HERCULES	T (S)	1954 +
	Cessna T 41	Tr	1950 +
	Sikorsky S 55	H (L)	1949—1958
	Sikorsky S 58	H (L)	1954+
	Sikorsky CH 53	H (H)	1964+
	Sikorsky S 61	H (H)	1959+
	Bell 47	H (L)	1946+
	Bell IROQUOIS	H (L)	1956+
	Vertol 107	H (H)	1958+

For headings see Table 3/32

Military Aircraft Exported

National output+ (number)	Product. under licence abroad + (number)	TOTAL + (number)	National military orders + (number)	Military sales abroad+ and (°) (number)	Civil sales + (number)	Nat.mil. orders as percentage of total (°°) %	Mil.sales as percentage of total %	Value of mil.sales abroad $M (°°)
461	-	461	373	113	-	80.9	100	6 *
161	-	161	87	71	3	54	98	15 *
214	-	214	2	88	126	1	46.5	30 *
542 Oct.67	-	540	43	114	385	8	25,1	12 *
181 Jan.65	-	181	142	36	4	78,4	97,6	2 *
180	-	180	101	62	17	56,1	90,5	6 *
169	-	169	160	9	-	94,6	100	27 *
72	-	72	60	12	-	83.4	100	69
1,736	-	1,736	1,736	113	-	100	100	40 *
5,691	866	6,557	2,481	1,455	-	43	100	770 *
4,437	-	4,437	2,401	2,431	-	54.2	100	1,200 *
3,429	-	3,429	1,742	1,954	-	50,7	100	1,175 *
7,053	2,200	9,253	6,287	3,174	-	86.5	100	2,400 *
2,294	-	2,294	2,294	349	-	100	100	350 *
796	1,627	2,423	295	549	-	30,7	100	1,120
1,142 July 68	290	1,432	780	652	-	3	100	950 *
1,261	-	1,261	1,219	42	-	96.5	100	67.7
3,000 Sept.68	-	3,000	2,816	184	-	94	100	1,091
2,000 July 67	-	2,000	1,846					
1,224 June 68	-	1,224	n.a.	430	-	n.a.	100	110 *
1,101	116	1,227	1,049	167	-	94.2	100	120
255	-	255	230	25	-	90.2	100	127.5
1,100 Jan. 68	-	1,100	909	195	13	82.6	99	525
11,149 Jan. 66	430	11,579	459	64	n.a.	4	4,5	1,50
1,200 Dec. 58	589	1,789	738	160	n.a.	59	50	45 *
1,793 Jan. 67	331	2,124	n.a.	379	n.a.	n.a.	n.a.	125 *
247 June 68	-	247	112	135	-	45.4	100	324
480 June 67	196	676	430	25	25	86	96.3	45 *
4,550 Jan. 68	1,564	6,114	1,487	382	2,925 +	31.7	n.a.	30 *
4,590 Jan. 68	660	5,250	4,500	149	75	96,6	98,5	50 *
520 Jan. 68	39	559	468 +	31	17	88.5	96	18 *

Table 3/33

EEC Countries, United Kingdom, United States - Imports of Aeronautical Products
(1960-67) ($millions)

	1960	1961	1962	1963	1964	1965	1966	1967
EEC from (outside the Community):								
United Kingdom	58	63	78	105	81	73	78	98
United States	344	255	296	230	258	282	284	384
Rest of the world	26	41	26	27	28	34	48	63
TOTAL	428	359	400	362	367	389	410	545
United Kingdom from:								
EEC countries	18	25	24	24	33	39	51	49 *
United States	112	38	50	43	36	49	50	174
Rest of the world	54	61	57	50	52	45	57	n.d.
TOTAL	184	124	131	117	121	133	158	304
United States from:								
EEC countries	1	44	16	1	2	11	40	36
United Kingdom	27	57	32	19	16	71	139	60
Rest of the world	34	50	82	76	72	77	124	184
TOTAL	62	151	130	96	90	159	303	280
Grand total	674	634	651	575	578	681	871	1,129

Sources: Statistical Office of the European Communities, Analytical Tables, Import-Export 1960-67.
The Overseas Trade Accounts, 1960-67.
US Department of Commerce, Bureau of the Census, Import-Export, 1960-67.

* Incomplete figure.

Table 3/34

EEC Countries, United Kingdom, United States - Exports of Aeronautical Products (1960-67) ($millions)

	1960	1961	1962	1963	1964	1965	1966	1967
EEC to (outside the Community):								
United Kingdom	20	25	22	41	19	23	35	44
United States	29	72	39	27	23	34	63	66
Rest of the world	103	99	147	153	175	175	252	287
TOTAL	152	196	208	221	217	232	350	397
United Kingdom to:								
EEC countries	67	85	89	97	75	80	91	132
United States	63	54	35	23	18	93	187	138
Rest of the world	218	258	175	185	152	207	283	249
TOTAL	348	397	299	305	245	380	561	519
United States to:								
EEC countries[1]	236	104	121	58	84	133	143	231
United Kingdom[1]	90	6	17	16	9	21	9	27
Rest of the world[1]	290	306	259	215	243	381	481	634
Military aircraft and military and civil parts	1,118	1,213	1,532	1,338	1,274	1,085	1,043	1,358
TOTAL	1,734	1,629	1,929	1,627	1,610	1,620	1,676	2,250
Grand total	2,234	2,222	2,436	2,153	2,072	2,232	2,587	3,166

[1] Civil and commercial aircraft only, excluding parts.

Sources: - Statistical Office of the European Communities, Analytical Tables, Import-Export, 1960-67.
- The Overseas Trade Accounts, 1960-67.
- US Department of Commerce, Bureau of the Census, Import-Export, 1960-67.

Table 3/35

Intra-Community Imports and Exports of Aeronautical Products[1]

(1960-67) ($millions)

	1960	1961	1962	1963	1964	1965	1966	1967
	IMPORTS							
Aircraft and airframes	54	76	77	133	139	105	98	92
Engines	32	24	57	119	99	43	35	55
TOTAL	86	100	134	252	238	148	133	147
	EXPORTS							
Aircraft and airframes	58	95	117	324	390	288	138	124
Engines	37	31	71	74	96	48	49	39
TOTAL	95	126	188	398	486	336	187	163

Source: Statistical Office of the European Communities, Analytical Tables, Import-Export, 1960-67.

[1] The equalization rule applied by the Statistical Office of the European Communities has not been followed because the export value is considered to be more accurate. The difference between exports and imports over the period is equal to the value of the military aircraft imported by Germany but not shown in the German import figures.

Table 3/36 EEC Countries, United Kingdom, United States - Exports of Aircraft and Airframes (Including Parts)

(1960-67) ($millions)

	1960	1961	1962	1963	1964	1965	1966	1967
EEC to (outside the Community):								
United Kingdom	8	8	7	23	7	10	15	28
United States	25	68	30	22	18	29	57	64
Rest of the world	84	74	124	124	144	139	207	241
TOTAL	117	150	161	169	169	178	279	333
United Kingdom to:								
EEC countries	11	17	19	20	22	19	29	52
United States	16	11	9	9	11	69	146	66
Rest of the world	115	137	87	100	88	138	188	156
TOTAL	142	165	115	129	121	226	363	274
United States to:								
EEC countries[1]	219	85	106	50	74	116	119	195
United Kingdom[1]	88	3	15	15	7	18	5	23
Rest of the world[1]	238	252	214	179	207	313	429	568
Military aircraft and military and civil parts	947	1,027	1,276	1,078	1,058	879	822	1,116
TOTAL	1,492	1,367	1,610	1,322	1,346	1,356	1,375	1,902
Grand total	1,751	1,682	1,886	1,620	1,637	1,760	2,017	2,509

[1] Only civil and commercial aeronautical equipment, excluding parts.

Sources: - Statistical Office of the European Communities, Analytical Tables, Import-Export, 1960-67.
- The Overseas Trade Accounts, 1960-67.
- US Department of Commerce, Bureau of the Census Import-Export, 1960-67.

Table 3/37

EEC Countries, United Kingdom, United States - Exports of Engines, (Including Parts)

(1960-67) ($millions)

	1960	1961	1962	1963	1964	1965	1966	1967
EEC to (outside the Community):								
United Kingdom	12	16	15	18	12	13	20	15
United States	3	5	8	5	5	6	6	3
Rest of the world	19	25	23	29	31	35	45	46
TOTAL	34	46	46	52	48	54	71	64
United Kingdom to:								
EEC countries	56	68	70	77	52	60	61	80
United States	47	43	26	14	8	24	41	72
Rest of the world	103	121	88	85	63	70	95	93
TOTAL	206	232	184	176	123	154	197	245
United States to:								
EEC countries[1]	17	19	16	9	10	18	24	36
United Kingdom[1]	2	3	2	1	2	3	3	3
Rest of the world[1]	51	54	45	35	35	38	53	67
Military aircraft and military and civil parts	171	186	256	260	216	206	221	242
TOTAL	242	262	319	305	263	265	301	348
Grand total	482	540	549	533	434	473	569	657

[1] Only civil and commercial aeronautical equipment, excluding parts.

Sources: - Statistical Office of the European Communities, Analytical Tables, Import-Export, 1960-67.
- The Overseas Trade Accounts, 1960-67.
- US Department of Commerce, Bureau of the Census, Import-Export, 1960-67.

Table 3/38

EEC Countries, United Kingdom, United States - Imports of Aircraft, Airframes, (Including Parts)

(1960-67) ($millions)

	1960	1961	1962	1963	1964	1965	1966	1967
EEC from (outside the Community):								
United Kingdom	21	19	24	39	26	21	24	47
United States	300	190	217	172	204	228	223	316
Rest of the world	12	19	13	14	14	15	21	33
TOTAL	333	228	254	225	244	264	268	396
United Kingdom from:								
EEC countries	3	3	4	6	10	13	21	n.a.
United States	90	18	24	23	17	29	27	148
Rest of the world	9	11	13	16	16	16	20	n.a.
TOTAL	102	32	41	45	43	58	68	185
United States from:								
EEC countries	1	44	16	1	2	10	39	36
United Kingdom	19	42	22	16	13	59	120	38
Rest of the world	33	48	81	74	68	69	112	175
TOTAL	53	134	119	91	83	138	271	249
Grand total	488	394	414	361	370	460	607	830

Source: - Statistical Office of the European Communities, Analytical Tables, Import-Export, 1960-67
- The Overseas Trade Accounts, 1960-67.
- US Department of Commerce, Bureau of the Census, Import-Export, 1960-67.

Table 3/39

EEC Countries, United Kingdom, United States - Imports of Engines, (Including Parts)

(1960-67) ($millions)

	1960	1961	1962	1963	1964	1965	1966	1967
EEC from (outside the Community):								
United Kingdom	37	43	54	66	55	52	54	51
United States	43	65	78	58	54	54	61	68
Rest of the world	15	22	14	13	14	19	27	30
TOTAL	95	130	146	137	123	125	142	149
United Kingdom from:								
EEC countries	15	21	20	18	24	26	29	49
United States	21	21	26	19	19	20	23	26
Rest of the world	46	50	44	34	35	29	38	44
TOTAL	82	92	90	71	78	75	90	119
United States from:								
EEC countries[1]	..	..	..	..	..	..	1	..
United Kingdom	8	16	10	4	4	12	20	22
Rest of the world[1]	1	2	1	1	3	8	12	9
TOTAL[1]	9	18	11	5	7	20	33	31
Grand total	186	240	247	213	208	220	265	299

[1] Excluding parts.
.. Worth less than $1 million.

Sources: - Statistical Office of the European Communities, Analytical Tables, Import-Export, 1960-67.
- The Overseas Trade Accounts, 1960-67.
- US Department of Commerce, Bureau of the Census, Import-Export

Table 3/40

EEC Countries, United Kingdom, United States - Trade Balance for Aeronautical Products

(1960-67) ($millions)

	1960	1961	1962	1963	1964	1965	1966	1967
EEC: (import/export balance with non-Community countries)								
United Kingdom	-38	-38	-56	-64	-62	-50	-43	-55
United States	-315	-182	-257	-203	-235	-248	-221	-318
Rest of the world	77	58	121	126	147	141	204	224
TOTAL	-276	-162	-192	-141	-150	-157	-60	-149
United Kingdom:								
EEC countries	49	61	65	73	41	41	40	..
United States	-49	16	-15	-20	-17	45	137	-36
Rest of the world	163	197	119	135	100	162	226	..
TOTAL	164	274	169	188	124	248	403	215
United States:								
TOTAL	1,672	1,477	1,799	1,531	1,519	1,462	1,373	1,970

Source: compiled by SORIS.

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