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West Europe Report

SCIENCE AND TECHNOLOGY

(FOUO 4/81)

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TRANSPORTATION

AIRBUS SALES, OPERATIONS, PRODUCT SUPPORT: UPDATE

Sales, Deliveries Continue

Paris AIR & COSMOS in French 21 Mar 81 p 16

[Article by J. M.]

[Text] Eastern Airlines' decision to take up nine options for Airbus A.300 aircraft (announcement of this decision was considered imminent at midweek in American circles) will enable the Miami carrier to remain far ahead, in terms of firm orders, of the 30 companies that have chosen the A.300. Eastern had actually first placed firm orders for 23 A.300 B4-100 planes with General Electric CF6-50 engines (19 have been delivered to date) and then bought back 2 A.300 B2-200s from Iran Air, making a total of 25 firm orders for A.300s. The options exercised will raise this figure to 34.

The companies that have placed the largest number of firm orders for A.300 aircraft are, after Eastern, Air France (23 A.300 B2-100s and A.300 B4-100/200s, 18 of which are in service), Thai International (10 A.300 B4s and 2 A.300-600s), Lufthansa (11A.300 B2-100s and B4-100s, all in service), Saudi Arabian Airlines (11 A.300 B4-600s) and Laker Airways (10 A.300 B4-200s, 2 of which have been delivered). But when options are added, Air France is still ahead with 35 A.300s (23 + 12). Finally, considering firm orders and options for A.310 aircraft, Lufthansa is the largest potential customer with 61 planes (11 A.300s, 25 + 25 A.310s), followed by Air France (23 + 12 A.300s, 5 + 10 A.310s), Eastern (34 A.300s) and Swissair and KLM both last with 20 A.310s (10 + 10). But Eastern already estimates that its Airbus needs will amount to 60 planes.

Orders Booked

Thus at mid-March, Airbus Industrie's total sales were: --A.300s: 316 planes (241 firm sales, 75 options); --A.310s: 138 planes (74 firm sales, 64 options); or all versions combined, 454 aircraft (315 firm sales, 139 options) for 37 customers that have officially announced their orders. But of this total, there are still 34 A.300s (16 + 18) corresponding to "unannounced" orders (including 3 conversions of options acquired in February by 2 companies).

[Photo caption p 16]--The first A.300 B4-200 of Air Afrique made its first flight to Toulouse on 25 February. It will be delivered in May. Among the next Airbuses to be airborne we mention T.A.A.'s first A.300 (it will fly in May) and Varig's first A.300, deliverable in June.

Deliveries

There were four Airbuses delivered in February: --on 5 February, delivery to Air France of its 18th plane, an A.300 B4-200 with CF6-50C2 engines and registration F-BVGO; --on 17 February, delivery to Laker Airways of its 2nd plane, an A.300 B4-200 with CF6-50C2 engines and registration G-BIMB; --on 19 February, delivery to Lufthansa of its 11th and final plane, an A.300 B2-100 with CF6-50C engines and registration D-AIAF; --on 24 February, delivery to Singapore Airlines of its 2nd plane, an A.300 B4-200 with CF6-50 engines and registration 9V-STB.

As of 28 February, 125 Airbuses had thus been delivered to 23 companies, or 45 A.300 B2s and 80 A.300 B4s; two of the companies are actually using aircraft leased from Hapag Lloyd (by Egyptair) and Korean Air Lines (by Saudi Airlines).

This month, Airbus Industrie delivered to SAS its fourth A.300 B2-300 (13 March) and to Iberia Airlines its first A.300 B4-100. The total is therefore 127 planes, but will soon rise to 128 with the delivery of Singapore Airlines' third A.300 B4-100.

Air Afrique's first A.300 B4-200 made its maiden flight to Toulouse on 25 February. It will be delivered in May. Among the next Airbuses to take to the air, we should mention TAA's[Trans-Australia Airlines] first A.300 (it will fly in May) and Varig's first A.300, which will be ready for delivery in June.

Delivery of Iberia's First A.300 B4

During a ceremony that has now become traditional, the Spanish Iberia Airlines took delivery of its first A.300 B4-100 on Monday, 16 March.

The plane was officially delivered in Toulouse to Mr Felipe Cons Gorostola, president of Iberia, by Mr Bernard Lathiere himself. With registration EC-DLE and christened "Donana" (after a famous Spanish national park, chosen by Iberia in reference to the Airbus' ecological features), the plane was then flown to Madrid, where it will be put into service on 29 March for Paris, Barcelona and Malaga.

Iberia will thus become the 14th airline to use the European medium-range aircraft and the first to put into service A.300 B4-100s equipped with twin Pratt and Whitney JT9D-59A turbojets with 53,000 pounds (or 24 tons) unit thrust. The interior arrangement selected by Iberia gives the aircraft a 251-seat capacity, with 26 in first class.

Between now and the end of the year, Iberia will receive three other A.300s of the same type, which will be operated to Rome, Frankfort, Seville, London and Las Palmas.

Engines

With regard to engines, all companies have announced their choices, except Air Afrique for its two A.310s (but its A.300 B4 is equipped with CF6-50 engines). The breakdown also as of mid-March, is as follows: --A.300: of 282 planes identified (223 + 59), 240 (193 + 47) have General Electric CF6-50 engines and 42 (30 + 12) have Pratt and Whitney JT9Ds; --A.310: of 138 planes (74 + 64), 95 (46 + 49) will have General Electric CF6-80 engines and 41 (46 + 15) [as published] will have Pratt and Whitney JT9D-7R4s.

This will make a total of 83 planes (42 + 41) equipped with Pratt and Whitney engines and 335 (239 + 96) with General Electric engines; or 20 percent with Pratt and Whitney engines and 80 percent with General Electric engines.

The eight companies that have chosen Pratt and Whitney engines are Austrian Airlines, Garuda, Iberia, Sabena, Saudi, SAS, Swissair and, very recently, Kuwait Airways.

Finally, it should be noted that three engines are available for the A.300 B4-600: the JT9D-7R4H (already chosen by Saudi Airlines), the CF6-80C1 and the Rolls-Royce RB 211-524D4.

Operations Record Shows Reliability

Paris AIR & COSMOS in French 21 Mar 81 pp 19-21, 23, 25, 27

[Article by J. G.]

[Text] The table shown below provides a numerical summary of the operations of 19 airlines which used various versions of the Airbus in 1980. The table was compiled using data received from Airbus Industrie and a very large number of carriers using Airbus aircraft. But the table does not claim, particularly with regard to the total number of flight hours, to show a complete true picture, for several reasons:

Airbus Industrie, for which the concept of each aircraft's useful life is an essential consideration, figures flight hours only from the time that the aircraft's wheels have left the ground and until the time that the undercarriage has made contact again with the runway: the company is concerned with the "airborne" view, but regardless of the flight's purpose: it is concerned just as much with a training or escort flight as with a commercial flight, whether or not the latter generates profits.

The same is generally true, in commercial airlines, of technical officials who are responsible for monitoring the operating life and cycles of their fleet's aircraft in relation to actual flight time.

On the other hand, from the commercial standpoint--and also for determining the breakdown of the flight crew's flight hours--flight hours are counted differently: the "block-to-block" concept prevails. Flight hours are counted from the time that the aircraft leaves the parking area and until the time that it stops again in the parking area. On the other hand, of course, commercial service refuses to consider flights that are not of a commercial nature and that do not produce revenue: escorting, positioning, training.

What has just been said about the total number of flight hours is just as applicable to the average duration of flights as to the average number of flight hours per day.

Above all, we examined the homogeneity of the results, whether the figures are read horizontally or vertically. Thus figures concerning hours apply only to aircraft actually in flight and, insofar as possible, in commercial flight.

A reading of this nonexhaustive table must be accompanied by several other comments: the Hapag Lloyd company, for example, owned five A.300 planes as of 31 December, but leased two of them to Egyptair for practically the entire year: of the 14,300

Technical Summary of Airbus Use in 1980

(1) Compagnies	(2) Nombre d'avions en service commercial		(5) Total des heures de vol en 1980	(6) Durée moyenne des vols	(7) Nombre moyen d'heures de vol par jour	(8) Disponibilité technique en %
	(3) au 1/1/80	(4) au 31/12/80				
Air France	14	17	38 000	1 h 45 mn	5 h 55 mn	98,2
Air Inter	5	7	11 500	1 h 00 mn	5 h 25 mn	99,0
Alitalia		4	3 400	2 h 30 mn	5 h 00 mn	97,2
Cruzeiro do Sul		2	2 700	1 h 55 mn	7 h 20 mn	97,9
Eastern Air Lines	12	19	50 000	2 h 05 mn	7 h 40 mn	98,8
Egyptair		2	1 800	2 h 15 mn	9 h 40 mn	98,5
Hapag Lloyd	4	5	14 300	2 h 30 mn	5 h45 mn	98,6
Indian Airlines	6	8	14 600	1 h 30 mn	5 h 55 mn	98,1
Iran Air		2	1 500	1 h 15 mn	1 h 15 mn	99,4
Korean Air Lines	8	8	14 000	1 h 35 mn	5 h 30 mn	99,2
Lufthansa	10	10	22 300	1 h 05 mn	5 h 45 mn	98,8
Malaysian Airline System	2	3	8 500	2 h 00 mn	8 h 00 mn	98,8
Olympic Airways	2	5	8 500	1 h 30 mn	5 h 40 mn	98,0
Pakistan International Airlines		4	6 000	1 h 50 mn	5 h 00 mn	98,4
Philippine Air Line	2	2	4 400	2 h 20 mn	5 h 50 mn	97,9
Scandinavian Airlines System		3	3 300	1 h 10 mn	5 h 20 mn	97,6
South African Airways	4	4	9 200	1 h 10 mn	5 h 40 mn	98,4
Thai International	6	6	19 000	2 h 05 mn	6 h 40 mn	97,8
Trans European Airways T.E.A.	1	1	2 000	1 h 55 mn	6 h 50 mn	99,1
TOTAL :	78	114	233 000			98,3

Key:

1. Companies
2. Number of planes in commercial service
3. As of 1 January 1980
4. As of 31 December 1980
5. Total flight hours in 1980
6. Average duration of flights
7. Average number of flight hours per day
8. Technical availability in %

hours "applied" to the company, about 6,000 hours were flown by Egyptair. Iran Air in turn is assigned the highest technical availability ratio by computers: 99.4 percent. But this result was obtained on the basis of too few hours, in the case of planes flying an average of only slightly more than 1 hour daily.

We consider the performance of Korean Air Lines to be more significant: a technical availability ratio of 99.2 percent. We also consider more significant the good results obtained by companies whose use of Airbuses, since they were put into service, is now figured in tens of thousands of flight hours: such is the case of Air France (more than 125,000), Eastern (nearly 80,000), Lufthansa (nearly 70,000), Korean (62,000), Hapag Lloyd (37,000), South African (32,000), Air Inter (30,000) and TEA (20,000).

In the case of certain airline companies, the following sections supplement the data summarized in the table.

Improvement in Air France's Airbus Availability

Air France was the first company to put Airbuses into commercial service. That was in May 1974 on the Paris-London route, 22 months before any other airline. The fleet of Airbuses operated by Air France has grown continually since then. The national company has thus accumulated unequalled experience with this aircraft for nearly 7 years; its air traffic is illustrated by the following figures, as of 31 December 1980; 10.974 million passengers transported; 85.640 million km traveled; 145,000 flight hours; 239 million tons-km of freight transported. All of this traffic was flown with exceptional regularity.

The first planes delivered to Air France in 1974 and 1975 were the A.300 B2 type, whose main features were a maximum weight of 142 tons at takeoff and a stopping distance of 3,500 km fully loaded.

Since 1975, Air France has taken delivery of a growing number of Airbus A.300 B4-100s with the same external appearance but with a 4,600-km radius of action and a maximum takeoff load of 157.5 tons, making nonstop flights possible on links such as France-Senegal or France-Middle East (Paris-Kuwait, for example). Airbus Industrie has also developed an even better performing version at Air France's request: the A.300 B4-200 or "super B4," whose maximum commercial weight has been increased to 165 tons and whose radius of action, with the same commercial load, has been raised to about 5,400 km. All A.300 B4 aircraft previously delivered to Air France have been converted into "super B4s" by means of certain modifications.

Air France's Airbuses are equipped with twin General Electric-SNECMA [National Aircraft Engine Design and Construction Company] CF6-50C turbojets with a unit thrust of between 23,100 and 23,550 kp [kg thrust], depending on the version of the aircraft. Three versions are currently in operation: long-range with 236 seats (26 in first class, 210 in economy class); "standard" medium-range with 261 seats (18 in first class, 243 in economy class); medium-range with 292 seats (40 in business class and 252 in "vacation" class); the latter aircraft was put into service in 1980 when Air France began its Vacation Plan.

The Airbus is also described by Air France as a very economical plane: under identical operating conditions, i.e., over comparable distances and with the same occupancy ratio, its cost per seat-km offered is about 25 percent less than that of the Boeing 727; fuel consumption is also 30 percent less than that of the Boeing 727.

Air France operates 18 Airbuses (9 B2s and 9 B4s) over routes describing a wide circle whose circumference touches Moscow, the Persian Gulf, Dakar and Lisbon.

1980 Results

Air France's Airbus fleet increased from 14 to 17 planes last year (the 18th plane has just been delivered). Using these planes over an ever larger number of routes, the shortest of which is Paris-London (342 km) and the longest being Paris-Dakar (4,600 km), Air France transported 2.917 million passengers and 74.5 million tons-km

of freight last year. These planes traveled 24.5 million km. The occupancy ratio (passengers) was 60.1 percent and the total cargo ratio was 53.7 percent.

Of the approximately 2,100 flight personnel employed by Air France today, 102 captains, 94 cocaptains and 96 flight engineers are qualified to fly Airbus aircraft.

High-Quality Maintenance

Between 1979 and 1980, the technical availability ratio of Air France's Airbuses improved from 97.9 to 98.2 percent. This improvement can be attributed to three factors: good aircraft design which ages well and which is today very close to its technical maturity, good operation and good maintenance of most of its equipment (a certain number of minor problems no doubt still exist, but there have not been any serious basic problems and the number of these minor problems is dropping regularly from year to year) and then there is also high-quality servicing.

It is Air France's equipment division, in ultramodern facilities at Roissy-Charles de Gaulle Airport, which handles the maintenance of everything not related to Airbus engines. Engine maintenance is handled at Orly Airport by another department of the equipment division, which services all CF6-50C turbojets mounted on the DC-10 and Airbus aircraft of member companies of the ATLAS group. In 1983, 233 CF6-50C engines were serviced by this department in the course of some 500,000 working hours.

At Roissy-Charles de Gaulle airport, maintenance of Airbuses (excluding engines) is carried out in four stages: --a check every 3 days, using powerful equipment and relatively large staffs: this is in accordance with the equipment division's express aim of trying to detect any regularities as early as possible; --a so-called T-A visit (every 190 and then every 230 hours), taking slightly less than 8 hours and representing 75 hours of labor for a 10-mechanic crew; a so-called T-B visit, also including one-fourth of a C visit, every 550 hours (the periodic recurrence will increase to 650 hours) and lasting about a day and a half (600 hours of labor for 25 to 28 mechanics working in three shifts); --an intermediate, major maintenance visit currently every 6,000 flight hours (lasting 3 weeks and representing 16,000 hours of labor); --a major visit every 9,000 to 10,000 hours (extension to 12,000 hours is already planned), representing 30,000 hours of labor and lasting 4 weeks (5 weeks if the plane has to be repainted).

There are no supply problems, but the high cost per flight hour of the materials used for the minor maintenance should be noted: about three times that required for the Boeing 727. The duration of the periods required to update the manufacturer's technical documentation should also be noted.

Air France's A.300 B2s have a very low rate of daily use; the daily rate use of the B4s, on the other hand, is very high (up to 11 hours), which does not reflect the mean ratio (see preceding table).

The quality of Air France's Airbus maintenance personnel has been recognized, which has led to the company training mechanics of other Airbus operators: 100 mechanics from Pakistan International Airlines and 50 Alitalia mechanics were trained last year. This program will continue in 1981; plans have been made to train 65 Egyptair mechanics.

Air France, Main GE Agent for CF6-50C Engines

Last year, Air France had the tough job of modifying a good number of C versions of the General Electric-SNECMA CF6-50 turbojet on the DC-10 and Airbus aircraft of member companies of the ATLAS group (with which Air Inter is associated in the case of Airbus aircraft). These modifications mainly consisted of two types: on one hand, replacing the titanium case with a steel case to end a series of indicents which had been occurring for several months; it was possible to carry out this operation within a reasonable period of time so that 95 percent of all the CF6-50C engines in the ATLAS group's Airbuses could be modified and renovated by late 1980. On the other hand, Air France went ahead with the aerodynamic modifications stipulated by the manufacturer for these engines (mainly involving the air intake and fan) to convert them into versions that perform better and are less vulnerable to taking in foreign bodies. Ninety percent of the CF6-50C engines of Air France and Air Inter were thus converted into CF6-50C2 versions. In the course of this dual operation, Air France considered it advantageous to go ahead with a more general engine renovation, resulting in consumption being as low as when they were new. Air France also decided to equip its A.300 B2 Airbuses with reduced-thrust CF6-50C2R versions; Air Inter (see below) adopted the same policy. The removal ratios of the CF6-50C engines on Airbus aircraft were still very high 1 year ago: 0.82 per 1,000 flight hours in the case of the B2; 0.54 per 1,000 flight hours in the case of the B4; as opposed to 0.33 per 1,000 flight hours for the DC-10.

The company believes that the modifications have had a very salutary effect. The fact remains that the CF6-50C engine, if it is close to its technical maturity, is subject to very stringent operating conditions.

Very High Cyclical Frequency for Air Inter's Airbuses

Cyclical frequency characterizes Air Inter's Airbus operation. The rate of daily use is 5 hours and 25 minutes, but since the average duration of a flight is less than 1 hour, this means that each Air Inter Airbus averages more than 5.5 flights daily, putting it through repeated cycles. Operating an engine for a 50-minute flight results in very significant variations in the temperature gradient, which places a heavy burden on the mechanical maintenance of engine assemblies and subassemblies. At Air Inter, the high-pressure compressor was the engine unit that was the greatest cause of engine removal during the first half of 1980, due to breakage of the blades of the sixth and seventh stages. Air France's modification (see previous section) for all of the ATLAS group companies operating Airbuses--including Air Inter in this case--has made it possible to reduce Air Inter's engine removal ratio from 0.97 per 1,000 flight hours in August 1980 to 0.48 in September and to 0.31 in November.

Conversely, the fact that Air Inter operates its Airbuses only on short routes makes it possible to reduce the amount of fuel carried, and thus the takeoff weight. This reduction of takeoff weight has made it possible to reduce the thrust (derating) in about 95 percent of the cases. This reduction, which is approximately 6 percent, but which could be raised to 8 percent, is a favorable feature for proper maintenance of engine components. With its seven Airbuses in service in 1980, Air Inter transported 2.420 million passengers and 12,000 tons of freight over its various routes, the shortest of which is still Paris-Lyon (390 km) and the longest being Paris-Ajaccio (910 km) in the summer season. The published commercial flight hours--13,525--were

counted from the time that the plane left the parking area to the time that the pilot cut off the engines. Last year, 12,040 flights were made in Airbuses with an average occupancy ratio of 64.72 percent, which is less than what it was in 1979 (66.17 percent), probably because of the substantial increase in the capacity offered (nearly 2 million seats-km offered).

According to Air Inter, on a typical Paris-Bordeaux route, an Airbus with 314 seats consumes 4.9 liters per passenger per 100 km; a 150-seat Mercure consumes 6.1 liters.

Of a total flight staff of 602 persons, 113 flight personnel are presently qualified to fly Airbus aircraft. The Air Inter Airbus with the largest number of flight hours has flown 7,700 hours since its delivery to the company. Air Inter is preparing to take delivery of its eighth Airbus on 1 April, which will be its first A.300 B4-200; the aircraft is now being built by UTA [Air Transport Union] for Airbus Industrie. It is up to the standards of other Air Inter Airbuses, particularly with respect to its automatic landing system.

In practice, this AFCS (Automatic Flight Control System) is fully satisfactory. Automatic landings made under actual conditions of almost zero visibility (minimum: 125 meters horizontal visibility and a 25-foot ceiling measured at the height of the main undercarriage) have been 100-percent successful, meaning an all-round success rate (and thus in good weather as well) of at least 95 percent.

Air Inter has made plans to take delivery of its 9th and 10th Airbuses in September 1982 and March 1983; these will be B2 versions previously operated by Air France and which will have undergone a major overhaul. With its 9th Airbus, Air Inter will have an aircraft of this type on reserve for the first time.

99-Percent Technical Regularity with Indian Airlines' Airbuses

Indian Airlines, which put its first Airbuses into service in late 1976-early 1977, announced at the last minute that it had achieved a technical regularity ratio of 99 percent for the 4th quarter of 1980 with an Airbus fleet that increased from 6 to 8 planes last year. Operating these 8 planes over 13 routes, including 1 international route, the longest being Delhi-Madras (1,780 km) and the shortest being Bombay-Dabolim (430 km), Indian Airlines transported 2.07 million passengers last year with an occupancy ratio of 76.8 percent, 2 percent higher than the 1979 ratio. Indian Airlines' Airbuses--whose cabins have an economy class arrangement (278 seats)--traveled 10.41 million km and transported 30.71 million tons-km of freight. The total tons-km transported is 210.31 million.

The Indian Airlines' Airbus with the largest number of flight hours has flown 9,630 hours to date; the maintenance rate per flight hour was 29.6 men per hour last year. With regard to fuel consumption, Indian Airlines lists the following results: in the case of the Airbus, 0.48 liter per seat-km offered and 0.363 liter per ton-km offered; in the case of the Boeing 737, 0.051 liter per seat-km offered and 0.603 liter per ton-km offered. The total hourly consumption was 7,750 liters.

The company has 125 flight personnel who are now qualified to fly Airbus aircraft.

Eastern's Airbuses: 50,000 Hours in 1980

Eastern Airlines [EAL] had 12 A.300 B4 Airbuses in service as of 1 January 1980 and 17 A.300 B4s and 2 A.300 B2Ks as of 31 December 1980. The airline obtained the following results with this fleet last year: 2.863 million passengers and 71,210 tons of freight transported over 35 routes of the EAL network, the shortest of which is Miami-Washington (340 km) and the longest being Miami-San Francisco (4,220 km). These 19 planes traveled 30.640 million km and carried 503.8 million tons-km. The mean occupancy ratio was 55.5 percent last year; it was 57.8 percent in 1979 and 56.2 percent in 1978.

Of a total of 4,250 flight personnel, 395 are qualified to fly Airbus aircraft. Two of the EAL A.300s have 268 seats in a single economy class; two others have 24 seats in first class and 220 seats in economy class; the other 15 planes have 24 seats in first class and 216 in economy class.

The EAL airbus with the largest number of flight hours has flown a total of 9,610 hours; the company estimates the maintenance rate per flight hour at 4.4 men per hours, the rate of engine malfunction in flight at 0.09 per 1,000 flight hours and the rate of unscheduled engine removal at 0.53 per 1,000 flight hours. Expressed in gallons per seat-mile offered (1 U.S. gallon = 3.785 liters; 1 mile = .609 km), the fuel consumption of Eastern's fleet is: A.300: 0.1447; L-1011: 0.1672; B.727-200: 0.2386; DC9-50: 0.2045; DC9-30: 0.2155.

The company will put six more Airbuses into service in 1981 (plus five in 1982 and four in 1983) to serve the same routes. It considers itself heavily penalized by the maximum weight limitations imposed on it for New York's La Guardia Airport, due to the arrangement of the Airbus undercarriage. It criticizes the freight loading system and use of teflon for the wing's leading edge. It has noted a certain amount of erosion on the leading edge from the stationary vertical standpoint. But the company also considers the Airbus to be the most silent of all aircraft in its fleet and in any case, the most economical: 3.24 cents per seat-mile offered.

Increase in SAS Freight Traffic Thanks to Airbus

Scandinavian Airlines System received its first Airbus in January 1980 and put it into service for the first time in February 1980 on its Copenhagen-London route. It operated a total of three Airbuses in 1980 and received its fourth Airbus on 14 14 March 1981. The shortest route served by an Airbus last year was the Copenhagen-Goteborg run (220 km) and the longest was Copenhagen-Paris (1,020 km). SAS is the first company using Airbuses to have chosen to equip them with Pratt and Whitney JT9D-59A turbojets which develop 24,000 kp and are identical to those used to propel SAS' 747 Combis. SAS' A.300 B2/300s have a takeoff weight of 142 tons, maximum landing weight of 136 tons and an empty weight of 126 tons. They have the fuselage of the B2 version and the airfoil of the B4. Their cargo capacity is between 10 and 12 tons and SAS has requested a larger freight door than on the basic version. Thanks to Airbus, SAS increased its freight traffic last year by 34 percent on Scandinavia-France routes (in both directions), by 33 percent on Scandinavia-Great Britain routes and by 16 percent on its domestic routes. SAS has 85 flight personnel who are qualified to fly Airbus aircraft. European passenger traffic is declining, according to SAS, which is planning to lease two of its Airbuses for 1 or 2 years until growth resumes.

Shortest Run of Korean Airbus Network: 1,450 Km

With eight A.300 B4 Airbuses in service last year, Korean Air Lines transported 931,590 passengers and 30,700 tons of freight over 9 different routes, 4 of which are international routes, the longest of which, Seoul-Manila, represents only 2,625 km. The shortest route, however, is 1,450 km. Korean Air Lines recorded the following occupancy ratios for its Airbuses: 61.9 percent in 1978, 65.2 percent in 1979, 62.5 percent in 1980, with a mixed-cabin arrangement: 24 seats in first class and 215 in economy class. The maintenance rate per flight hour in 1980 was 15.25 men per hour.

Lufthansa: 1 Hour and 5 Minutes Average Duration of Airbus Flight

Lufthansa acquired its first Airbuses in 1976. It operated 10 last year, for which it recorded the following results: 22,300 flight hours; 13.7 million km traveled; maintenance rate per flight hour: 11.16 men per hour.

Lufthansa transported an average of 6 tons of freight on each Airbus flight over its European network and 9 tons over routes serving the Middle East. In revenue, 1 ton of freight corresponds to about 6 extra passengers per flight.

Lufthansa's 10 Airbuses (5 B2 versions and 5 B4 versions) were put into service last year on about 20 different routes, the shortest of which was Frankfort-Stuttgart (157 km) and the longest was Frankfort-Jeddah (4,160 km). The B4 version consumes 400 liters per hour more than the B2 version.

The company believes that the Airbus is one of the most reliable, economical and comfortable planes in its fleet; no delay for technical reasons has been recorded in the case of the Airbus. The average duration of each flight is 1 hour and 5 minutes, which means a very high cyclical frequency.

920,000 Passengers and 8,000 Tons of Freight on Olympic Airbuses

Olympic Airways took delivery of its first two A.300 B4-100 Airbuses in February 1979. It was with these two planes that the company started its Airbus operation in 1980; a third A.300 was later delivered to the airline in March and two other A.300s in April of last year.

Using these five planes, Olympic Airways has served seven cities in its international network and three cities in its domestic network and has obtained the following traffic results:

International Routes: The Airbus was put into service on the lines connecting Athens with London, Paris, Frankfort, Cairo, Tel Aviv, Rome and Zurich; on these routes, the A.300s made 2,460 flights last year and transported 417,800 passengers; 4,500 tons of freight and 375 tons of mail; the mean cabin occupancy ratio was 67 percent; 4.6 million km were traveled.

Domestic Routes: Olympic put the A.300 into service on the routes connecting Athens with Chania and Heraklion (two cities in Crete), Rhodes and Salonika; the traffic results recorded were: 2,800 flights; 500,300 passengers; 3,600 tons of freight; 200 tons of mail; the mean cabin occupancy ratio was 70 percent. About 935,000 km were traveled.

The longest route in Olympic's network is Athens-London (2,415 km); the shortest is Athens-Chania (270 km). Airbuses have replaced three types of aircraft in the Olympic system: the Boeing 707, 720 and 727.

Altogether, Olympic's five Airbuses--it has been operating this total number of planes only since April--transported nearly 920,000 passengers and 8,000 tons of freight last year.

In 1980, all Olympic Airbuses were put into commercial service with the following cabin arrangement: 14 seats in first class and 241 in economy class.

The Greek airline, which has firm orders for eight A.300 B4-100s, will take delivery of its sixth Airbus in July. In 1981 it hopes to surpass the figure of 1 million passengers transported on board its Airbuses. Delivery of this aircraft will enable it to serve the island of Cyprus and Jeddah next summer, which are respectively 1,130 and 2,650 km from Athens; Boeing 707s are now being operated on the respective routes.

This year and until the end of this month, the cabin arrangement of Olympic Airbuses will be the same as it was last summer; beginning 1 April, the arrangement will be: 40 seats in business class and 232 seats in economy class. Olympic plans to equip its Airbuses with 280 seats as of 1 August.

Olympic handles a good deal of its Airbus maintenance (airframe + engines + equipment) in its Athens facilities. Half of all its mechanical personnel have been trained for such operations. The company has announced a maintenance rate per flight hour of 10 men per hour and has complained about the cost of spare parts. On the routes for which Airbuses are used, it believes that its fuel savings have been 15 to 35 percent in comparison to aircraft replaced by the Airbus.

Of the 495 flight personnel employed by Olympic as of 31 December, 100 were qualified to fly Airbuses. The next flight personnel to be qualified for Airbuses will go through the training program at South African Airways; according to Olympic, the training schedule for coming months will not permit acceptance of the company's pilots as early as desired.

Product Support, Maintenance

Paris AIR & COSMOS in French 21 Mar 81 pp 29-30

[Article by Gerard Collin]

[Text] After-sales support of Airbus aircraft has constituted a real challenge to the European aerospace industry since the beginning of the program. On one hand, because the European aeronautics industry had hardly any experience with after-sales support for airlines when the aircraft was first put into service (May 1974). And on the other hand, because it was a multinational program with different customs, languages and technical levels.

Ironically, and according to the admission of Mr Bernard Ziegler himself, vice president in charge of Airbus Industrie operations, the Airbus program's slow start in 1974, 1975 and 1976 made it possible "to have the time to learn and to acquire experience." And for Airbus Industrie leaders, the path being followed today is

significant. We quote Bernard Ziegler: "We maintain that we have learned and today have available after-sales service second only to Boeing's or on the same level, and sometimes even better." In short, Airbus Industrie also claims to be Boeing's major competitor, based on its results.

The first criterion is still the aircraft's punctuality rate, determined on the basis of delays of more than 15 minutes due to aircraft malfunctions. The graphs published by Airbus Industrie put the A.300 in first place among large transport aircraft. "The year 1980 was a test year at this level," Mr Ziegler said. "In 1 year, we actually went from 14 to 22 operators and from 80 to 120 planes in service, or plus 50 percent, with customers as far away as TDA in Japan and Cruzeiro in Brazil. But our punctuality rate rose from 98.2 to 98.4 percent."

260 Persons in After-Sales Service

To achieve this, Airbus Industrie established an after-sales support structure covering all aspects of service. Altogether, Airbus Industrie has 260 persons in "product support," including 150 Frenchmen and 72 Germans (1 March 1981).

First, there is a "field service" network of permanent Airbus Industrie representatives to airline companies. At the present time, 76 persons are thus scattered over four continents (soon to be five) for 30 operators. During initial operations, Airbus Industrie assigns 5 to 6 persons.

With regard to spare parts, Airbus Industrie has established a spare parts warehouse in Hamburg and branches in Hong Kong and the United States, worth more than $100 million at the present time. Of course, these centers are extensively computerized, since the purpose is to have overall management of spare parts between Airbus Industrie's availability and that of airline companies. The maximum time required to dispatch a spare part in response to an AOG* request is 4 hours, to which transport time must be added.

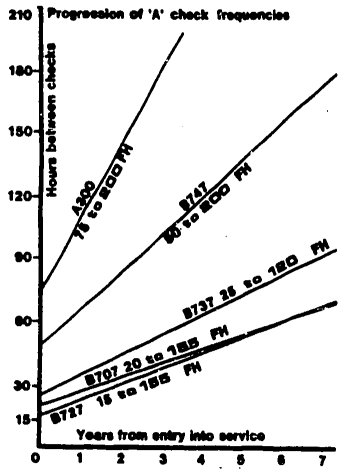
As with other aircraft manufacturers, the documentation published by Airbus Industrie is impressive. To date, Airbus Industrie has actually published 100 million pages, or 637 tons in paper and microfilm, at a cost of $21 million.

This impressive output required a major coordination effort among partners up the line. "This is the area," B. Ziegler said, "in which we are perhaps still most open to criticism, but here again we may take the lead." This documentation is published initially in accordance with ATA [Air Transport Association] standards, of course, and in English:** (ATA 100, 101, 200). Non-ATA forms of documentation are also published, in particular to satisfy operators' specific requests.

Production of this documentation is also extensively computerized. It has been assigned to SNIAS [National Industrial Aerospace Company].

*Aircraft on Ground: aircraft immobilized due to lack of spare parts.

**It should be noted that versions may be available in other languages, but in two cases in which a translation was requested (France, Japan), the operators handled the translation themselves. It should also be noted that the flight manual is first produced in French and then translated, since France is the country of the aircraft's original certification.



Comparative progressions of type-A visits for A.300 and Boeing aircraft

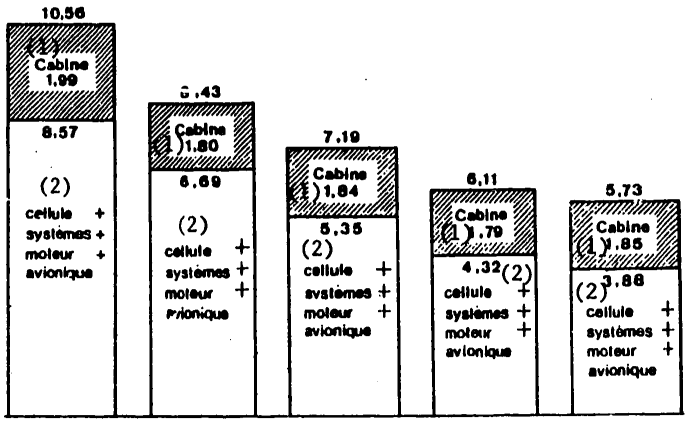
Maintenance Program

Another basic feature of after-sales support is the maintenance program.

This program is specifically determined by the MRB or "Maintenance Review Board" document. In its principles and in its application to Airbus, it defines aircraft maintenance for the airframe, engines and equipment. The periodic recurrence of jobs, their nature and their scope are thus specified. This document was prepared jointly by Airbus Industrie, the customer airlines who wanted it, General Electric and Pratt and Whitney in the case of engines and Garrett (APU [expansion unknown]), with the participation of observers from French (DGAC [expansion unknown]) and German (LBA [expansion unknown]) Official Services. The MRB document is approved by these Official Services and then submitted to foreign authorities: the FAA [Federal Aviation Administration] thus accepted the document for Eastern Airlines' aircraft.

The MRB is itself based on concepts formulated in Europe by the "EMSG" or European MSG [Maintenance Steering Guide], which revised the "MSG 2" document previously adopted by airline companies, in the case of the DC-10 in particular. In the opinion of Airbus Industrie, the EMSG is superior to the MSG 2 in two respects: --first, because it is based on a mathematical, logical, more systematic and more precise approach; --second, because it includes a new concept of inspection by area, making it possible to reinforce, through visual detection, observation of mechanical failure or gradual corrosion.

The Airbus MRB was completely reorganized in April 1980 for various reasons. First, the number of versions of the aircraft had grown considerably, reaching about 10. Second, it was advisable to compile the already recorded results of 6 years of operation, which made it possible to confirm that the aircraft aged "well."



Change recorded by Air France in cost of minor Airbus maintenance, in hours of labor per flight hour

This work made it possible to redefine maintenance jobs, to eliminate a certain number of them, to introduce or to extend observation through selection of samples and, in general, to defer maintenance operations. The periodic recurrence of operations was thus extended in the aircraft's early life, even though this might mean shortening it beyond the "threshold" of 12,000 flight hours. The concept of special observation of the oldest plane in the fleet, the so-called "fleet leader," was also introduced.

Overall, the periodic recurrence of Airbus maintenance visits (A, B or C) thus showed a clear and favorable trend toward extension and, moreover, put the Airbus in a favorable position in this regard in comparison to other transport aircraft (see first graph).

For the time being, the Airbus is aging "well," but in Toulouse it has been recognized that the fleet is still young: the plane that has flown the most number of hours (Hapag Lloyd) has only 13,000 hours and the largest number of cycles has been recorded by Lufthansa (nearly 12,000). The 20,000-flight hours "rendezvous," at which point a thorough inspection of the aircraft is prescribed by the MRB, will be significant: the first is expected in 1983-84, 10 years after the first plane was put into operation.

Overall, in Toulouse it is estimated that the Airbus' maintenance cost is already equivalent (or better) to that of the B727's cost in relation to the number of seats, despite the much greater experience acquired in the latter case.

The A.310: A.300 Experience and MSG 3

The maintenance program and after-sales support for the A.310 have already been extensively established. They will benefit directly from the experience acquired with

the A.300, from Airbus Industrie's world network and from the structures for Airbus Industrie-operator relations: periodic conferences with operators, "customer desks" in Toulouse (informally called "wailing offices"), the MRB, representatives, spare parts inventories, emergency action, etc.

With regard to its maintenance program, the A.310 will be handled in accordance with version 3 of the MSG: this time there will not be any European-style EMSG (the MSG 3 also includes the concept of inspection by area, which is dear to Europeans). From the outset, the periodic recurrence of the A.310's maintenance visits will be much longer than that of the A.300 in the beginning, and even longer than some of those for the present Airbus: 250 flight hours or 1 month for visits in the case of visit "A" (as opposed to 200), which is actually evidence of the progress made, the aircraft manufacturer's confidence and the significance of the features which the A.300 and A.310 have in common. From the maintenance standpoint, Airbus Industrie also expects a great deal from the avionics (digital) and from the new generation of systems.

Sochata Developing CF6 Maintenance Facilities

For more than 8 years, Sochata-Snecma's Billancourt center has been repairing major parts of the General Electric CF6-50C engine on Airbus aircraft and which Snecma assembles in its Corbeil plant.

Sochata-Snecma's largest customer is Air France, the main agent for overhaul of CF6-50 engines of the ATLAS group (with Lufthansa).

For several years, Sochata-Snecma has been trying to extend this clientele to include facilities which, like those of Air France, overhaul all or part of CF6-50 engines, in particular Caledonian Airmotive, Lufthansa, KLM, Pakistan International and Finnair.

The principal parts involved are mainly located in the hot parts of the engine: turbine blades, diffuser housing, combustion chambers. The low-pressure compressor's paddles and blades and the housing of this compressor are also among the parts which Sochata handles.

Altogether, Sochata-Snecma has already repaired more than 175 types of various parts of CF6-50 engines and has acquired experience in this area which it will apply to General Electric's CF6-80 engine and to the new General Electric-Snecma CFM56 engine.

In addition to repairing engine parts, Sochata-Snecma is preparing operations for complete overhaul of the CF6-50 engine, which will be possible by early 1982.

One Example of Endoscopic Facilities for CF6 Engines

Among other companies specializing in endoscopic methods, EFER 3B has proposed units for maintenance of turbojets such as the CF6-50 and its derivatives and JT9D engines.

These units are built in accordance with the specifications of engine mechanics and can be mounted on all standard connections, thus enabling users to standardize their equipment. Concerning the CF6-50 in particular, EFER 3B proposes:

a) Three endoscopes with optical-fiber illumination, 10-mm outside diameter with high-luminosity optics for inspection of stationary and movable blades and a side-angle endoscope for inspection of the combustion chamber.

Optional: 8-mm diameter with 1-mm reinforcement for inspection under difficult conditions.

Optional: Special photography endoscope permitting photographs, motion pictures, Polaroid or television shots.

b) A series of cold-light generators with iodine quartz lamp, adjustable or otherwise, particularly a compact, suitcase-type multiple-current light generator able to accept all types of power.

EFER 3B has developed an arc generator with a high-power lamp with an operating life of 1,000 hours, in a compact case, for inspection of combustion chambers (very dark) and permitting photographs or television shots.

c) Universal cold-light conductors with mechanically resistant sheathing.

d) Two photo systems with fully automatic exposure using ASA 400 or Polaroid film.

e) A compact videocassette recorder for inspection of turbine blades, including a light generator, television screen, incrustation system for detailing the video recorder's picture and a minicamera with remote-control operation of video recorder.

To make endoscopic inspection possible during stopovers, EFER 3B and UTA have developed an on-board kit with an endoscope and independent light generator.

EFER 3B is also developing a mobile endoscopic inspection unit that is fully self-contained, making possible on-the-spot visual inspection with a high-power independent generator, compact video recorder, videocassette and remote-control image transmission system.

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TRANSPORTATION

A 310 PROGRESS REPORT, FIRST PUBLISHED PHOTOS

Paris AIR & COSMOS in French 7 Mar 81 pp 14-15

[Article by Jacques Morisset]

[Text] The first major subassemblies of the A 310 No 1 and of the planes that are to follow it are now taking shape in the plants of the Airbus Industrie consortium's partners. The photographs on these two pages, published for the first time, give a good idea of the new European plane's advanced stage.

AEROSPATIALE [National Industrial Aerospace Company]

Fuselage Section 11, which houses the cockpit [Photo 1], has just been completed at Toulouse and has been transferred to the Toulouse Saint-Martin assembly plant. This Section 11 is to be inserted between the radome and Section 12, which contains the two forward passenger-access doors. The latter section, which is being built at Nantes, will be transferred to Toulouse at the end of April for completion and assembly with Section 11.

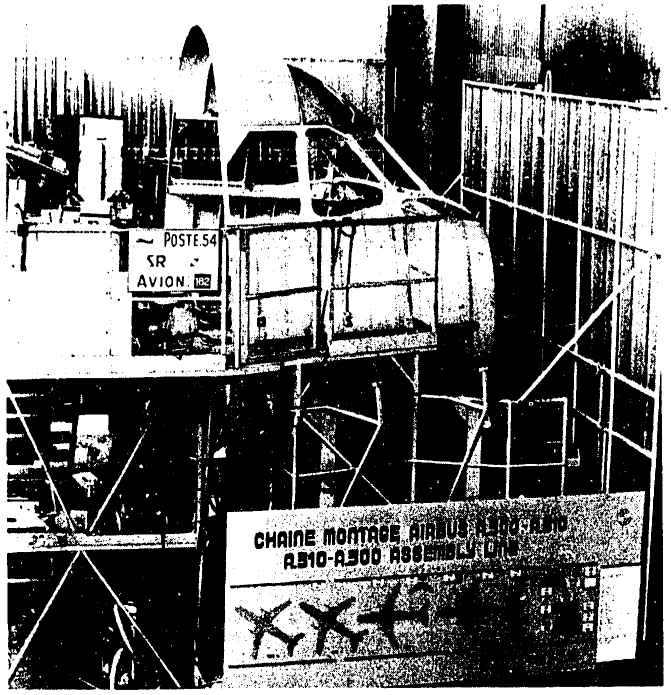
Section 15-21 (the middle body), the upper shell of which [Photo 2] was delivered in December by MBB [Messerschmitt-Baldow-Blohm] of Hamburg to be joined with the section's midstructure being fabricated in St-Nazaire, is on the verge of completion. It will arrive in Toulouse in May.

VFW [United Technical Flight Company - FRG]

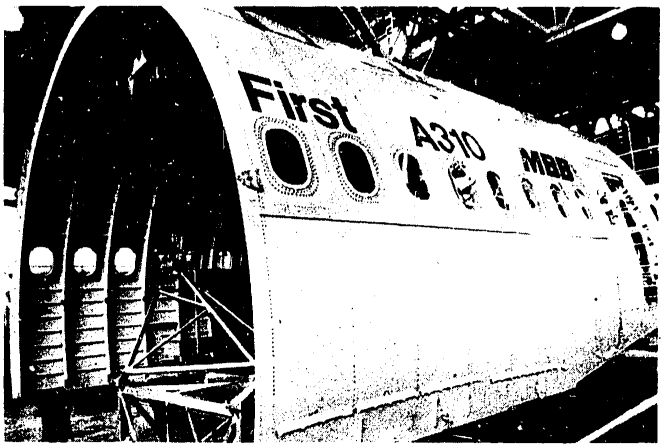
The structure of Section 13-14 (the forebody) [Photo 3] was completed by the VFW plant in Einswarden at the end of January and transferred on 8 February to its Lemwerder plant 50 km away. This section, now being equipped (installation of systems), will be completed around mid-April and flown to Toulouse by "Super Guppy" by the beginning of May. It will be joined to the 11-12 assembly in May.

MBB

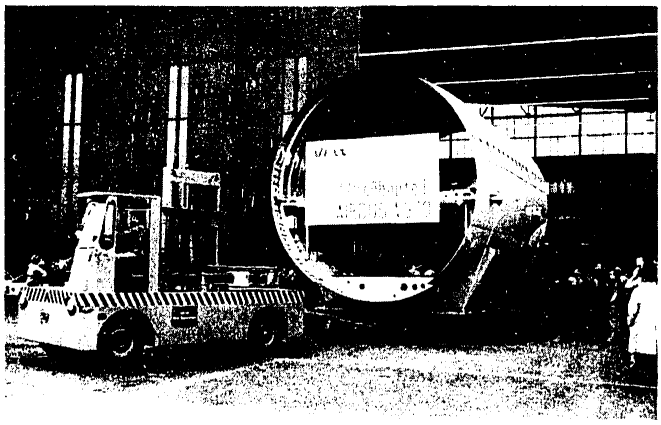
MBB, another Airbus Industrie partner through Deutsche Airbus GmbH, is assembling, in its Hamburg plant, the structure of the first Section 16-19 (the afterbody)



[Photo 1]: First Section 11 (cockpit) of the A 310, photographed recently at Toulouse. It pertains, on the combined A300-A310 assembly line, to plane no. 162, being built for Swissair (Pratt and Whitney JT9D-7R4 engines).



[Photo 2]: This photo was taken at MBB's Hamburg plant in December, just prior to delivery of the upper panels of middle body Section 15-21 to Saint-Nazaire.



[Photo 3]: First fuselage Section 13-14 leaving VFW's Einswarden plant (6 February).

[Photo 4]. This assembly will be transferred to Toulouse, still by "Super Guppy," in July, after installation of its systems. Its rear cone will arrive in Toulouse in August.

British Aerospace

Assembly of the first wing spars is proceeding normally at the Chester plant [Photo 5], where the longerons, the ribs and the double-cambered main exterior panels are in place in their main assembly jigs [Photo 5]. The first set of structures is scheduled to be delivered to VFW in Bremen during the latter half of May for the installation of systems. In this regard, VFW is now completing the wing equipment mockup that is to be used to prepare many of the circuits of the various systems: hydraulic, electric, air conditioning, flight controls, etc. Between now and May, the elements of these circuits will therefore have been formed and cut to the required lengths, and their installation will be completed rapidly. A mockup of the wing spar, fabricated at Hatfield, has also been used to check the interfaces between the wing elements fabricated at Bremen and at Chester. Lastly, British Aerospace is now completing the second set (of six planned sets) of assembly jigs for the wing of the A 310, while a third set is already in the process of fabrication.

Belairbus

In Belgium. Belairbus is now machining the high-lift flap rails, which are now in the course of being mounted in their jigs.

Fokker

In its shops specializing in the fabrication of composite-material components, Fokker is currently fabricating the flap rail fairings (aramina-base fibers), the "all speed" ailerons, the wing tips, the landing strut fairing panels (of carbon fibers).

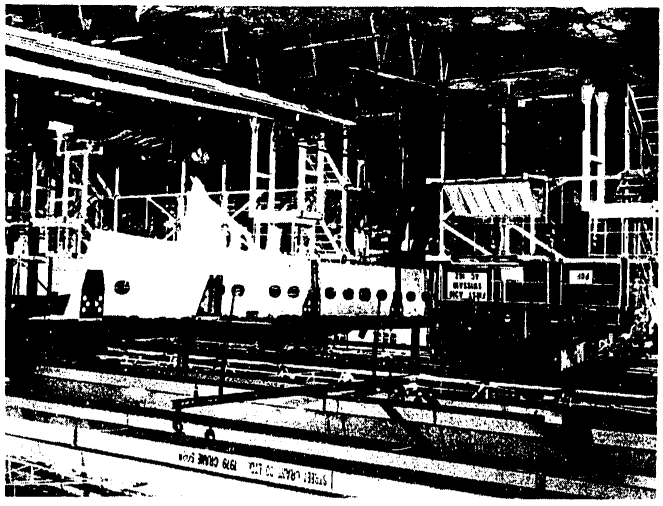
CASA [Aeronautical Construction - Spain]

CASA is actively working on the elements entrusted to it: horizontal empennage, landing gear hatches, passenger access hatches.

Italy

We recall that Aeritalia, representing Italian industry, and Deutsche Airbus signed an agreement in December under which the German company subcontracts to Italian industry the fabrication of the B2/B4-600 tail cone portion of the fuselage (the A 300 tail cone, however, which is common to the A 310 and to the future model of the present A 300, is fabricated by MBB).

[Photo 4]: Section 16-19 (afterbody) being assembled ar MBB's Hamburg plant. Installation of systems will commence this month. This section is to be delivered, complete, to Toulouse in July.



[Photo 5] First A 310 wing spar panels in place in assembly jig at British Aeroslace's Chester plant. These also pertain to plane no. 162.

Messier-Hispano-Bugatti

Messier-Hispano-Bugatti, the designer of the A 310 landing gear and prime contractor for its fabrication, is proceeding on schedule together with its British and German subcontractors: Dowty Rotol for the main gear, and Liebherr Aerotechnik for the forward gear.

Avionique

The suppliers of the plane's electronic systems are also on schedule. We cite in alphabetical order: Liebherr-Marconi (control calculators for the slotted wing tips and flaps), Litton (inertial system), SFENA [French Air Navigation Equipment Company] with Smith Industries and Bodenseewerke (automatic pilot assembly), Sperry (flight management calculators), Thomson-CSF (electronic data display system, roll calculator).

Maiden Flight Within Year

Final assembly of A 320 No 1, as we have seen, will commence at Toulouse in May with the juncture of Sections 11, 12, and 13-14. Shortly thereafter, middle body Section 15-21 will arrive, followed (in July and August) by Section 16-19, the horizontal empennate and the tail cone. The wing, completed and tested, will arrive in Toulouse at the end of August. The first A 310 will therefore take its final shape in September, while Boeing will be starting its flight testing of Boeing 767 No 1 (see AIR & COSMOS Nos 847 and 849).

The first flight of A 310 No 1 is scheduled for March 1981 [as published]; the next four developmental planes are to follow shortly after the first one. One year later, the new Airbus should be certified airworthy and enter into regular service...

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TRANSPORTATION

SPANISH COMPANY ACTIVE IN AIRCRAFT DEVELOPMENT PROJECTS

Paris AIR & COSMOS in French 28 Mar 81 pp 20-21

[Article by Regis Noye]

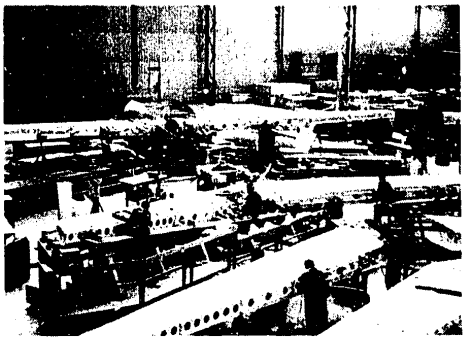
[Excerpt] Upon delivery of the first Airbus A.300 to Iberia, CASA (Construcciones Aeronauticas S.A.) opened its Getafe plant (a few kilometers from Madrid) to the European press. Naturally, this visit was organized together with Airbus Industrie to mark Spain's participation in the European A.300 and A.310 programs, which currently amounts to 4.2 percent.

During a general presentation, the CASA sales group summarized the various activities of the company, which is being rather aggressive while remaining clearly aware of its possibilities. Briefly, the Spanish firm CASA was a private company until 1971, and now includes a 69.9 percent share held by the national holding company INI (National Institute of Spanish Industries). The remaining shares are distributed among Northrop Corp. (13.3 percent), MBB (11 percent), private companies (1.1 percent, of which 0.6 percent belongs to Dassault), and two Spanish banks (5 percent). This capital amounts to 1,121.5 million pesetas (about 73 million francs). The sales volume, which has been steadily growing for about 10 years, reached 210 million dollars in 1980, 50 percent of which came from the export market. CASA currently has a personnel of 8200, distributed among five plants: two in the vicinity of Madrid (including the Getafe facility with its 3400 employees, which is the largest), two in the Seville area, another in Cadiz, and the last one in Ajalvir.

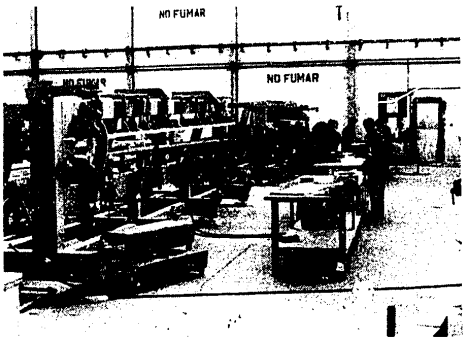
Varied Activities

Ninety-four percent of CASA's activities are in aeronautics, and the remaining 6 percent devoted to the production of automobile industry parts (shock absorbers, hydraulic components, and so on). The firm's activity is highly diversified and falls into four major categories:

Mass production of two aircraft: the C 212 Aviocar civil and military transportation twin turbojet, and the C 101 Aviojet military training and light tactical support single jet;



Above, overall view of fabrication shop for A.300 horizontal stabilizers. As in the case of the doors, the present rate is four per month, with a projected schedule of eight in 1982. All these components are regularly shipped to Toulouse by Super Guppy. Below, assembly fixture for the Boeing 757 outboard trailing edge flaps, the first lot of which should be delivered on 20 May.

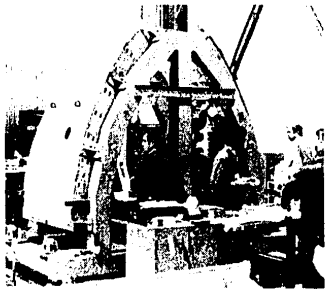


Subcontracting for the largest world manufacturers: Airbus Industrie (horizontal stabilizers, main and forward landing gear doors, and forward passenger doors for the A.300); Boeing (midsection passenger-door stairs and directional tab for the B 727, and carbon outboard trailing edge flaps for the B 757); McDonnell Douglas (DC-10); Dassault (Falcon 10 wings, 70 percent of the Mirage F1 fuselage, consisting of the center portion and the nose); MBB (assembly of Bo105 helicopters for the Spanish Army);

Inspection and maintenance of all combat planes for the Spanish Air Force as well as the United States Air Force Phantoms based in Europe;

Related activities in the space, solar, and electronics fields.

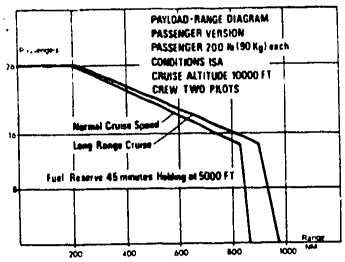
Two important elements should be added to these programs, however: first, equal-part cooperation with the Indonesian firm Nurtiano in developing the 35 to 50 seat CN-235 commuter plane; second, CASA's acquisition of manufacturing technologies as well as necessary tooling for composite-material structural elements, which will probably enable the firm to obtain a good number of subcontracts in this field in the not-too-distant future.



Fixture and tooling required for opening tests of the A.300 forward passenger doors. The production rate is two times four per month (one door on each side).

With a cabin volume of 22 cubic meters, the C.212 Aviocar can carry 26 passengers and their luggage, or 2.7 tons of freight.

For the CN-235, the Spanish firm expects to announce all the details of the new program at a press conference to be held at the end of April in Madrid. All the specifications and performances which will be disclosed are derived from a study conducted with some 100 potential users. It is already known that the aircraft, designed in keeping with CASA's objectives, will be equipped with two CT7-5 turboprops of 1700 horsepower at takeoff. Two prototypes will be built for certification: one in Spain and the other in Indonesia. The first flights are planned for the end of 1983, and mass production for the end of 1984.



Payload-range curves for the C212 Aviocar.

254 Aviocars Sold

Let us remember that the C212 series 200 is the successor of the first model which CASA had developed in the early 1970's for military use and at the request of the Spanish Army. Thanks to an increased payload, it can carry 26 passengers and their luggage (broken down to 90 kg each, or in this case a payload of 2.35 t), or 2.77 tons of freight in the cargo version, or any combination of the two. Simple in design, the Aviocar is easy and inexpensive to maintain, and its purchase price is not excessive (2 million dollars). Moreover, it is especially appreciated in the less industrialized countries because of its good performance for a craft of such tonnage, and notably because of its short takeoff and landing requirements added to its versatility. According to CASA, its major competitors are currently the Israeli Arava and the Shorts Skyvan in the military domain, as well as the Swearingen Metro, the Twin-Otter, and the Brazilian Bandeirante, in the civilian field. It was only in 1979 that the C212-200 truly penetrated the market for this type of plane; 254 Aviocars have now been sold throughout the world (70 of them in 1980), and 190 have already been delivered to some 20 countries, with 60 to 70 percent of these sales originating in the civilian sector.

This plane's production rate is now exceeding three to four planes per month in Spain and two additional planes per month in Indonesia, where they are assembled by Nurtanio by agreement with CASA. In addition to Spain and Portugal, the major sales of Aviocars are in the Far East and Latin America. However, the list should also include the United States where the C212 is now being sold (24 units ordered and 11 delivered) since November 1979 by a representative (American Casa Distributor Inc), and French-speaking Africa where sales are handled by Dassault (one plane has already been sold to Gabon). Because of the great demand, the Spanish manufacturer is presently examining the possibilities of licensed production in India and a distribution system in non-French speaking Africa. The production of the C212 is expected to remain constant (4+2 planes/month) until the sales of the future CN-235 begin, at which time the demand for the C212 should be significantly reduced.

Brief Specifications of the C212 Series 200

Engines: Two TPE-331-10-501 C, 900 HP Garrett Air-Research turboprops, with four-blade Hartzell propellers.

Span: 19 m; Length: 15.2 m

Cabin: 7.9 m long; 2.1 m wide; 1.8 m high; 22 cubic meters volume.

Weights: maximum takeoff 7450 kg; maximum without fuel 7050 kg; useful load 2770 kg in cargo version; fuel 2000 l.

Cruising speed, 350 km/h; specific range, 1075 km/kg (see payload-range graph); two-engine ceiling, 8534 m; one-engine ceiling, 3500 m; takeoff runway length, 610 m; landing runway length, 595 m.

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TRANSPORTATION

NEW HYDROFOIL TO ENTER SERVICE IN SUMMER

Milan IL MONDO in Italian 27 Mar 81 pp 83, 85

[Article: "Rodriquez Shipyards--On the Attack with the Hydrofoil"]

[Text] The new hydrofoil is already almost ready; it is a Jumbo Hydrofoil. It will go into service on 15 July and will be able to carry 250 passengers from Palermo to Naples in 5 hours. "It is a real jewel, born of the union between advanced technological research and some 20 years of experience in the sector," maintains Gaetano Mobilia, assistant manager of Rodriquez Shipyards of Messina. In the international ranking of hydrofoil builders, the Rodriquez yards are in third place, behind the powerful Boeing company in the United States and the Soviet yards. "We have sold a good 25 of our hydrofoils as far away as Hong Kong and Macao, beating the competition from the Japanese. And also, quite a few of the craft that run between France and Great Britain, in the Channel, come from the Messina yards," Mobilia tells.

This activity could now have further prospects of development: indeed, the Rodriquez manager declares, "we are ready to produce a military hydrofoil, for all wartime and peacetime uses of the Navy or of the Coast Guard. But it would be necessary for the competent ministries to finance their construction for us, as the U.S. Navy has done with Boeing. With the prototype made, all those most favorable foreign markets, in which Boeing rules the roost for now, would open up for the Italian industry."

The Rodriquez yards have an ancient history, and industrial experience built entirely on the sea. The first yard opened, in the port of Messina, dates back to 1860. Hydrofoil work began in the period just after the war. Many at the time thought it was a chancy operation. Now, in fact, the Rodriquez yards can boast a small empire founded not only on the shipyards but also on a shipping company SNAV, on agricultural enterprises and tourist activities. The only blemish is IMSA, a railway equipment factory, closed on account of "excessive labor costs" (220 put out of work, months and months of tough trade-union protests).

It is said of the Rodriquez yards in Messina that they are entrepreneurs who risk a lot, who take the attack, capable but also protected by political favor, by big contributions from the Region, especially to the shipping company. "That is not true; political aid is unknown to us," Mobilia counters. And he tells this story: "SNAV, which was in a very serious crisis, was saved 4 years ago thanks to a very

risky operation. We sent our hydrofoils, with our crews, to Beirut, during the Lebanon crisis, to evacuate the Maronite Christians besieged by the Palestinians. It was real madness, working under the mortar fire. But we pulled it off. We made money from it. And we even found new customers in the Arab countries."

The international shipbuilding crisis now causes great concern to the Rodriquez yards also, though. "And we southern entrepreneurs," Mobilia declares, "are particularly exposed. Our Soviet and American competitors are well-protected by their governments. But we, for our part, do not have a government policy for shipbuilding (with subsidies granted per a precise plan, and not just in the form of aid). And when we operate in foreign markets, we cannot count on adequate assistance for the offshore purchases either. What is more, we labor under other handicaps in Sicily: higher cost of money than elsewhere, a deficient transport system, a public administration that functions only for political in-groups, university research that pays little attention to industry's requirements. Not to mention the fact that the Sicilian and southern entrepreneurial fabric itself has big gaps and frays in it: for specialized fabrication work we are forced to turn to firms in the industrial triangle of the North. All these are added costs that increase the difficulties of an undertaking. A good deal of courage is needed in order to go forward under these conditions."

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TRANSPORTATION

BRIEFS

FIRST FLIGHTS OF DORNIER PROTOTYPES--According to Dornier, April should bring the first flight tests of the two prototype light transport airplanes of the new Do-228 family, which the German manufacturer has been developing for nearly 2 years and which, it may be remembered, are equipped with wings made by a new technology, known as TNT (see AIR ET COSMOS, Nos 811, 812, and 825). The Do-228-100 prototype (15 seats) left the plant on 23 March, and after satisfactorily completing initial ground testing, the craft could have its first flight on 1 April at the latest, at the Oberpfaffenhofen airfield near Munich. As for the Do-228 prototype model 200 (19 seats), its equipment is now being installed, and its first flight is scheduled for 30 April. The German manufacturer has confirmed that these two aircraft will be exhibited on the ground and in flight at the Bourget Fair. [Text] [Paris AIR & COSMOS in French 28 Mar 81 p 16]

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