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West Europe Report

SCIENCE AND TECHNOLOGY

(FOUO 3/82)

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CONTENTS

ELECTRONICS

SIEMENS EXPANDS 7800 SYSTEM UPWARD WITH FUJITSU MODELS

Munich COMPUTERWOCHE in German 4 Dec 81 pp 1, 2

[Article: "Fujitsu 7.890 and 7.892 Models Announced as Top of the Line in Large Fujitsu Computers"]

> [Text] Munich (CW)--Siemens AG will expand their system 7.800 with Fujitsu's large 7.890 and 7.892 computers (CW No 47/81 p 1). According to the Munich electrical concern, the current largest model, the 7.892, has 15 times the capability of the smallest Fujitsu machine, the model 7.865-2. Of interest to those moving up in system software is the fact that with the "Advanced Virtual Machine" (AVM), comparable to IBM's super tool VM/370 (Virtual Machine/370), several operating systems can work simultaneously.

All models of the 7.800 family are compatible with the BS 3000, MVS, VM/37\ and VS1 operating systems. The new 7.790/92 computer can, according to Siemens, also operate with the IBM systems MVS/SP1 and 2 as well as with the VM/SP release 2.

The capacity of the 7.890 single processor is about 2.5 times that of the model 7.880-2, until now the largest single processor of the 7.800 system. The primary memory capacity ranges from 16 to 64 MB. The model 7.892-2 multiprocessor also offers about 2.5 times the capacity of the model 7.882-2, until now the largest multiprocessor. The main memory is expandable from 32 to 128 MB. Both models can be equipped with a maximum of 64 channels for a maximum processing rate of 96 MB per second.

According to Siemens, the program throughput of the new models will be achieved through the 3-level storage hierarchy: main computer, global and local buffer memories. Pulse-command control improves bus management. Distributed microprograms for controlling command execution and arithmetic operations result in fast access to the microprogram memories.

The LSI technology in the new models includes logic modules with a gate response time of 350 picoseconds and memory elements with acquisition times of 5.5 nanoseconds for the local buffer memory and 16 nanoseconds for the global buffer memory. The main memory consists of 64-Kbit chips. The heat generated in the chips is conducted away by small cooling channels.

The current version of the BS3000 (BS3000 E40) operating system has been expanded by several functions, according to the Munich firm. Thus, with 2 gigabytes of real addressable memory, the entire main memory can now be used for normal task switching operations.

It can contain the executable code and the buffer and control blocks for input/output operations and user data fields. With only a few exceptions, all address locations of the expanded memory are available. Through stronger parameterization of the likewise expanded system decision manager (SDM), heavily loaded systems can be more readily optimized.

Additional software protection to prevent simultaneous alteration of stored data sets by several systems is achieved with the software product DSISD (Data Set Integrity for Shared DASD). The delivery date for these BS3000 expansions is July 1982.

The new software product "Advanced Virtual Machine" (AVM) offers 7.800 users the capability of employing several operating systems on a single computer at the same time. In particular, AVM permits users who are presently working with an IBM operating system on a 7.800 to convert stepwise to the BS3000. The current system is operated in parallel with the BS3000 under AVM control. The VM/370, DOS/VS, VS1 and MVS operating systems can also be used with the BS3000.

The basic 7.890 configuration with 16 MB of resident memory and 16 channels costs about DM 8.1 million. The model 7.892 with 32 MB and 32 channels goes for DM 15 million. Also, Siemens is lowering prices for the 7.875-2, 80-2 and 81-2 by up to 20 percent.

The first System-7.890 computer will be delivered in the spring of 1983. Siemens has already sold 55 Japanese Jumbos, 14 for delivery outside the FRG.

9160
CSO: 3102/119

ENERGY

BRIEFS

COAL GASIFICATION IN ITALY--A consortium consisting of Westinghouse Electric Corporation, Fiat and Ansaldo S.p.A., a subsidiary of the state-owned firm IRI Finmeccanica, will be formed to build a 14-MW electric power plant in Southern Italy. It will use low-grade coal with a high sulfur content; however, environmental pollution will be kept minimal. This project is especially important since Italy plans to reduce its dependence on oil and to diversify its energy supply. Italy will increase its coal consumption from the present 18 million to 50 million tons per year by 1990. The coal gasification facility will be financed in part by an EG loan to Fiat and Ansaldo in the amount of 8 billion lire. The total cost has not yet been disclosed. [Text] [Hamburg ERDOEL & KOHLE-ERDGAS-PETROCHEMIE in German Nov 81 p 472] [COPYRIGHT: Industrieverlag von Hernhaussen KG, Hamburg 1981] 9160

CSO: 3102/119

INDUSTRIAL TECHNOLOGY

ACTIVE MAGNETIC BEARING FOR VERY HIGH SPEED MACHINING

Paris AI & COSMOS in French 12 Dec 81 p 31

[Article by Gerard Collin]

[Text] The program of development of suspension by means of active magnetic bearings has reached the preindustrial phase, after having been started 15 years ago by the team of LRBA [Ballistic and Aerodynamic Research Laboratory] and continued by SEP [European Propellant Company]. The S2M company--a joint subsidiary of SEP and SKE--which is now responsible for this program, believes, in fact, that the market is beginning to respond significantly to the presentations and demonstrations of prototypes accumulated in France, Germany, the United States and Japan especially.

Two markets seem to be directly concerned by the possibilities offered by the S2M Actidyne active magnetic bearings: turning machines and machine tools.

Turning machines include medium-power machines, machines with large shaft lines and cryogenic machines. S2M has already achieved considerable success in this area in the FRG and the United States. In the United States, for example, with a centrifugal compressor and Ingersol Rant (power: 4 MW) and at Delaval. The EDF [French Electric Company] signed a contract for the development of two prototype bearings now in process of delivery. A cold helium laboratory compressor has also been put in operation at Air Liquide.

It is also noted that S2M has already produced 240 turbomolecular vacuum pumps (10^{-14} bars, 30,000 rpm), whose advantage is not causing pollution of the vacuum by lubricants and not causing vibrations. S2M has also sold, in the FRG and Japan, remachining pins, engraved printing cylinder pins and rolling mill cylinder rectification pins.

In the field of aerospace--in which, we remind the reader, Actidyne was born--the following applications are in progress:

The receiving stations for pictures from SEP's VIZIR satellite are equipped with a film drum suspended by active magnetic bearings. The advantage is a lack of friction, therefore, weak, constant couple. This makes possible an accuracy of the drum's speed of rotation on the order of 10^{-6} and respect for micrometric accuracy of printing of the film by laser (see illustration at end).

NASA has signed a feasibility study contract with S2M concerning the Space Shuttle. This study pertains to placing the turbo feed pumps of the Shuttle's liquid hydrogen and oxygen engines--therefore around -240°C--on active magnetic bearings.

For the Space Lab, this time, S2M has studied vacuum pumps for the metallurgy oven under weightlessness. The advantages are a lack of friction, therefore no cooling and no vibrations, and machining at very high speed or TGV [Very High Speed].

TGV Machining: Boeing and the Others

At a time when the authorities and industry are devoting attention to the case of the French machine-tool industry, the Actidyne bearings should give rise to much interest in machining. Now, it must be observed that it really seems that foreign aerospace industry will take first advantage of them, unless there is a definite acceleration of the program in progress in France.

We have already described, in these columns, the French TGV machining development program. See AIR & COSMOS number 875 page -- and page -- especially.

We should point out that this program is conducted primarily between S2M for the pins, RITO [expansion unknown] for the tools (carbide), TMI Forest for associated machines and Dassault.

After the first validation tests of the concept, TMI Forest developed a testing machine making it possible to work at high speeds of advance--30 meters a minute--but on only one axle. The first tests on this machine have just taken place at Capdenac, so that the first really industrial productions in the French aerospace field are not expected in the immediate future.

At the same time, Boeing has decided to jump over all the preliminary steps and has placed an order at Turchan for two machines with one head, 15 kW/five axles. The first one is in operation at Wichita.

It seems at this stage that the French aerospace industry is finally following up on this work only "very weakly." Moreover, although it can be believed that TGV machining of light alloys has virtually been mastered in its principle (especially for a determination of associated tools), it seems that everything still has to be done with regard to steels. The subject of TGV turning--a priori favor- because of its high speeds of advance--does not seem to have been tackled either.

Within the framework of the government program for recovery of the French machine-tool industry, S2M has proposed three subjects:

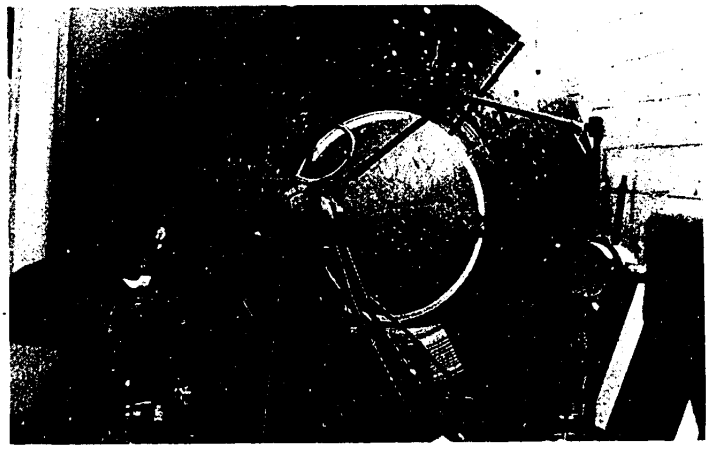
Continuation of Work in Light Alloys

Study of TGV machining of steels.

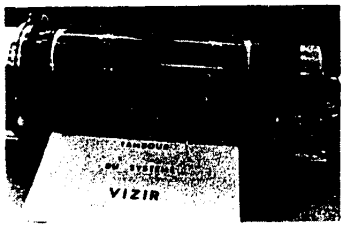
Sudies on TGV machining of "hard" composite materials. By this we understand materials of the carbon-carbon type (for aircraft brakes, for example) that are raising serious machining problems at present.

There certainly is no cause for presenting TGV machining as a panacea for the machine-tool industry and the aerospace industry. There are a number of factors other than turning time that intervene in production costs. But, on the other hand, TGV machining provides a productivity supplement that should even be able to become significant in the case of special machinings: large parts (panels, girders, masts), turning, "hard" composite materials, ceramics and so on.

Then, why not play this very French card to the limit!



S2M has set up, at Vernon, a demonstration of TGV machining simulated by a horizontal lathe--making speeds of advance of 15 meters a minute possible--in a light aeronautic AU4G state T4 alloy, machined by an RITO tool, one tooth (brazed blade, 20° cutting angle, 25 millimeter diameter, blade sweep 23°, speed of rotation 54,000 rpm, B10-1000 (10 kW) pin. Result: 500 to 700 cubic centimeters a minute removed, for a productivity of 70 cubic centimeters a minute per kilowatt.



Film support drum of SEP's VIZIR stations. Each picture consists of 15,000 15,000-dot line, or 7-micron dots for a 900-meter resolution of terrestrial imagery. The film carried on the drum is printed by laser. Engraving accuracy must make it possible to superimpose several films with an accuracy close to a micron or better. Drum positioning accuracy is, therefore, on the same order at rotation speeds of 1 to 20 revolutons per second. Drum weight: 22 kilograms. Twenty devices have been delivered up to now.

10,042
CSO: 3102/116

TRANSPORTATION

A 310: FIRST FLIGHT, SALES, PRODUCTION SCHEDULE

Paris AIR ET COSMOS in French 19 Dec 81 pp 22, 23, 25, 26

/Article signed J. M.: "Airbus Industrial Resolved to Expand its Product Line to Increase its Share of the Market"; passages enclosed in slantlines printed in boldface/

/Text/ A few months from the /A 310's first flight/, major executives of Airbus Industrial have presented to specialized journalists the new aircraft, two of which are in the final stages of construction in shop M90 of Aerospatiale at Toulouse St. Martin. The visit was also the occasion for a series of presentations covering the whole range of production--present and future--of the European consortium, and for reports on its commercial activity, industrial foundation, and position vis-a-vis other major world aircraft builders. Never had Airbus Industrial gone to such lengths to inform journalists, and it is out of the question in these few pages to publish even a summary of the mass of information so dispensed. Thus our readers will find in the weeks to come substantial supplements to the present account.

Before proceeding to the A 310 proper, it is fitting to recall /order and delivery figures/ for the /A 300-A 310/ line of products. At mid-December, Airbus Industrial was still announcing /502 aircraft sold/ (324 A 300s and 178 A 310s) of which /343 were firm orders (255 A 300s, 88 A 310s) and 159 were options/ (69 A 300s, 90 A 310s). The only difference lies in the fact that one of the "non-announced" companies was actually Singapore Airlines, which has just converted six A 300 options into firm orders, and taken two A 310 options. The number of carriers who have officially ordered A 300s thus still remains at 34, but the number of those who are acquiring A 310s has risen from 13 to 14. Taking into account those comapnies who have opted for both aircraft at the same time, the total number of acquirers rises to 42, not including Air Algeria which has rented two A 310 B4-100 from Lufthansa.

Still at mid-December, Airbus Industrial had /delivered 158 aircraft/ (47 A 300 B2s, 111 A 300 B4), with the number of operators rising to 27. Thus it still had /344 Airbusses to deliver/, assuming all options are changed to firm orders, which seems probable in most cases. To the 502 planes al-

ready mentioned, 5 can be added (3 A 300s and 2 A 310s) for which three firms have already accepted proposals made by the consortium. To sum up, the grand total would be /507 planes for 44 firms/. Another interesting point in these statistics is that Airbus Industrial has as buyers 18 of the 20 countries in the world with the highest GNP; the two missing, obviously, being the Soviet Union and the People's Republic of China.

Concerning /production/, it is freely recalled at Toulouse that Airbus Industrial depends on four partners (Aerospatiale, British Aerospace, CASA /expansion unknown/, and Deutsche Airbus, whose employees exceed 160,000, of whom /17,000/, or only slightly more than 10 percent, work for Airbus Industrial; the margin for maneuver is thus very high. These work force figures are comparable to those of Boeing (81,000) and McDonnell-Douglas (70,000). Moreover, the geographical dispersion of the means of production among the four countries constituting the birthplace of the European consortium is far less than that found, for example, in the case of Boeing for the B 767 program, even omitting the Japanese and Italian subcontractors.

The /production program/ curve, even if provisional, is interesting to compare with the much more perturbed ones of American aircraft builders. /The progressive rise in production rate remains an important economic factor/ in the broad sense of the word: it will be /54 in 1982, 70 in 1983, and 88 in 1984/(that is, 8 planes per month for 11 months). Of course, that growth in production is matched by a very considerable investment effort: DM 600 million in Germany, Fr 400 million for Aerospatiale (1980), Ptas 1,450 million for CASA, and about 30 million pounds sterling for British Aerospace (1979-1982), as well as 40 million pounds sterling for additional tooling to raise to 98 the annual production capacity for A 300 and A 310 wing assemblies, not to mention the two Super Guppies already in process of manufacture, which will raise to 4 the number of planes of that type used for fast and economical transportation from plant to plant of the bulkiest components.

In terms of the world market for aircraft of large carrying capacity, Airbus Industrial modestly (!) shows for this year a /penetration rate of 54 percent/, thanks to firm sales of 45 A 300/A 310s as against 7 B-767s (8 percent), 15 B-747s (18 percent), 8 L-1011s (10 percent), and 8 DC-10s (10 percent).

Still more interesting is the comparison of total 1981 sales (83 planes) to 1980 sales: for the same period, that of the first 11 months, total firm sales were in fact 135 in 1980 (which clearly indicates the massing of sales), but Airbus Industrial's part grew by 15 percent, to the detriment of all other builders.

Finally, we note that Airbus Industrial has further enhanced its backlog of aircraft to be delivered: in 11 months, this grew from 341 to 344/349. In fact, delivery lags have become such that there is little chance of seeing further growth in back orders, though the effects of the present bad situation are somewhat offset by those lags. To reach its set goal of 1,000 aircraft, Airbus Industrial is striving above all to increase the number of its

customers, which increased in 11 months from 39 to 44. Broadening of the product line should facilitate that growth.

As was pointed out by Pierre G. Pailleret, senior vice president for marketing of the consortium, the policy of Airbus Industrial is simple, and is defined by three lines of action: to /meet demand, improve present products, and broaden the product line/ so as to maintain a viable European industry. Whence the studies now in progress (to which we shall return in future issues), which are directed concurrently toward the "small" A 320, the large capacity TA 9, the TA 12 (a long-range A 310), and the very long-range quadruple-jet TA 11. The market, of course, will decide what priority to give this or that program, it being accepted that the A 320 and TA 9 are front runners in this race to development. For the A 320, discussions are now well underway with Delta Airlines, but the number one problem remains that of the very "advanced" engine indispensable to provide the aircraft with the best possible economic foundation (see article p 15, this issue).

/Most important is that Airbus Industrial is now attaining true maturity in terms of industrial tooling and technical-commercial policy/. In a word, the European consortium has become "totally credible," and is calling the tune to other major aircraft builders of the world, while negotiating as an equal with engine builders and systems suppliers. Negotiations such as those now proceeding with Delta on the A 320 are the best demonstration of that credibility and stature.

To return to the A 310, we have seen at Toulouse /the first A 310/ (aircraft no 162) practically finished, with its cabin floor occupied by many recording devices, and now beginning its vibration tests with the aid of ONERA /National Office for Aeronautical Studies and Research/. Technicians anticipate the aircraft will be ready to begin flight tests by mid-March (the target date is 31 March), provided of course that weather conditions are not too unfavorable.

A 310 no 2 (airframe no 172) has now received its fin and awaits its engines. Owing to the fact that it will not have to undergo the same preliminary tests as aircraft no 1, it has some chance of catching up with the latter, although the target date for its first flight is the end of April. Thus the second A 310 could be ready to fly in March, and within optimum limits these two prototypes could be capable of making their first flights the same day.

An interesting aspect of preparations for these tests relates to the use of A 300 no 3 as a demonstrator of the EFIS /Electronic Flight Instrument System/, that is, the cathode ray tubes for piloting and navigational data display which are an integral part of the A 310 cockpit. Two Thomson-CSF EFIS have been in service since 8 December on A 310 no 3, thus saving precious time in perfecting the A 310 thanks to the experience gained in flight.

The third A 310 airframe, marked for fatigue tests, will be "operational" as early as April. /The third A 310 to fly/--this one with General Electric

CF6-80A turbojets--is intended for Lufthansa and bears serial no 191. It will reach the final assembly stage in April, and will fly in late July or early August.

The fourth A 310 (airframe no 201), also equipped with CF6-80A engines, will fly in late September or early October. The fifth A 310 (airframe no 217), equipped with Pratt and Whitney engines, will fly in late November or early December. These last two aircraft will be rapidly fitted out for commercial operation, but will also participate in the flight testing program, which should make it possible to obtain /by the end of March 1983 the type certification for the two versions (Pratt and Whitney or General Electric engines).

Meanwhile, by August 1982 the airframe for static tests will have started its ground tests.

Finally, we recall that integration of the A 310 into the common A 300-A 310 assembly line is planned for as early as next fall, in principle for the sixth A 310 (approximate number ranking in series: 220). This will be a delicate operation requiring rigorous balancing of time factors.

A 310: To 148 Tons?

Latest wind tunnel test results, at low and high speeds, with simulation of engine installations, have shown that announced performance levels will be attained, and thanks to various modifications made in the aircraft, they even permit anticipation of still better performance at takeoff, in terms of takeoff weight for a given length of runway. With 237 passengers and reserves of FAR /expansion unknown/ International type fuel, and cruising at Mach 0.78 within an altitude range of 31,000 to 35,000 ft, the A 310 will have a range of:

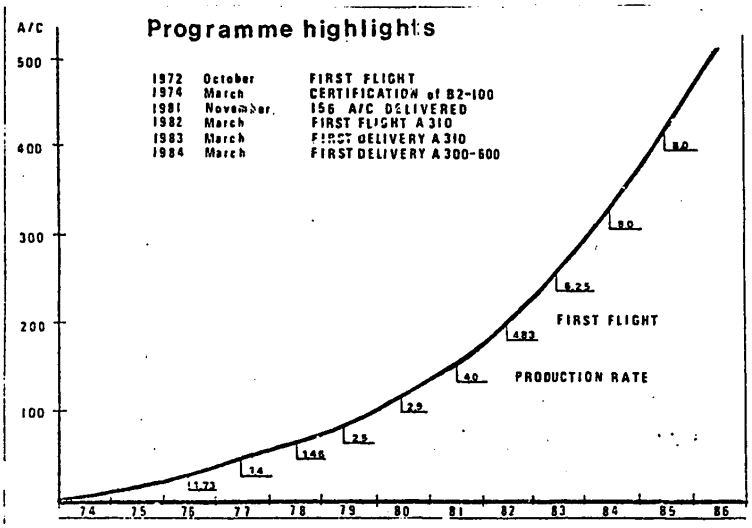
/2,500 nautical miles/,or 4,670 km for the basic A 310-200 version, with maximum weight of 132 tons;

/3,000 nautical miles, or 5,550 km, for the "developped" A 310-200 version, with maximum weight of 138.6 tons.

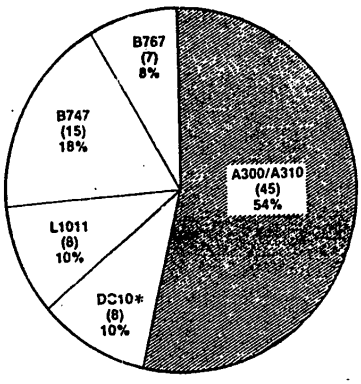
But wind tunnel tests of buffeting limits permit anticipation that it will be possible some day to develop an A 310-300 weighing up to 148 tons. Such an aircraft (see AIR ET COSMOS no 884) should have a range of 3,500 nautical miles, or nearly 6,500 km.

A 310: First Lightening Program

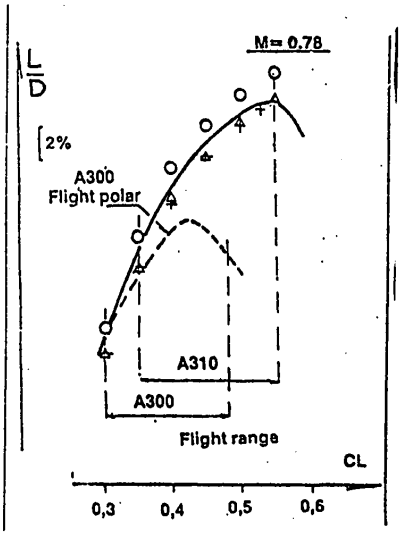
As it is with all new aircraft, the builders of the A 310 are striving, by means of a /lightening program/, for further reductions in empty weight yielding an equivalent gain in useful load.



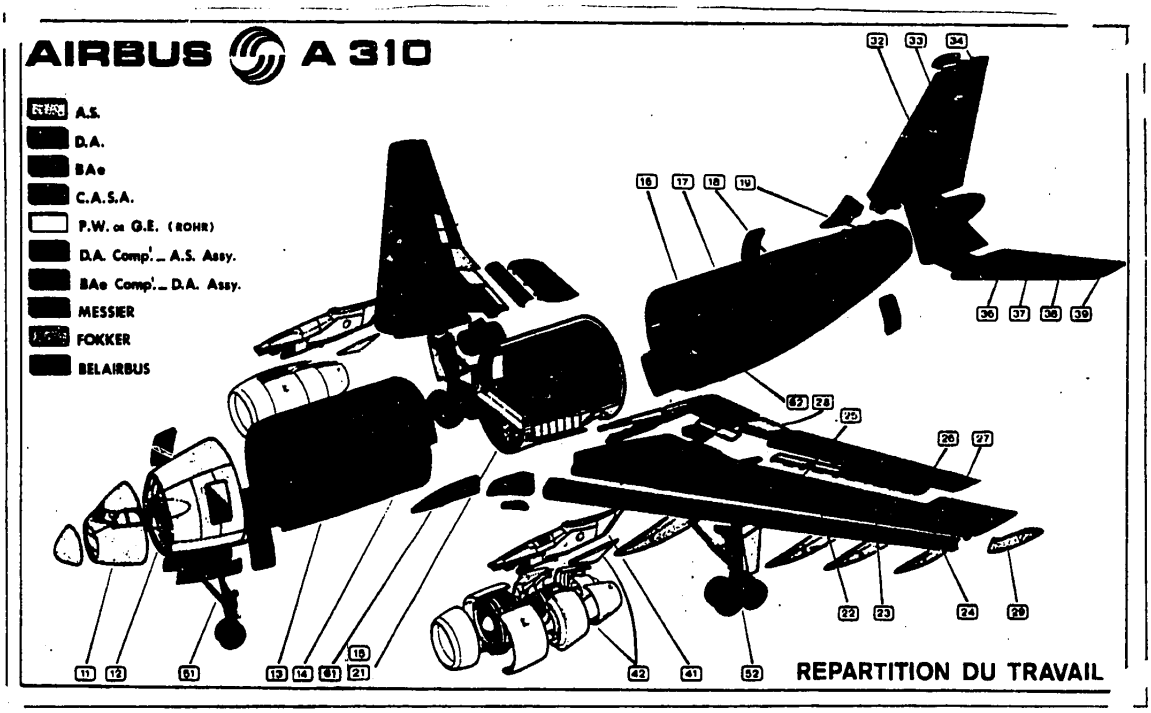
Production curve for A 300 and A 310. The 200th unit will come off the line early in 1984, the 400th in March 1985, the 500th in April 1986. Production rate, now close to 4.5 units per month, is to reach 8 units per month by spring 1984.



Distribution of firm sales of high capacity aircraft from 1 January 1981 to end November; Douglas figure includes KC-10 (Airbus Industrial document).



These two curves of aerodynamic efficiency in relation to lift coefficient illustrate the performance improvement expected from the new A 310 wing (up to 7 percent). The triangles, circles, and crosses which permitted tracing of the anticipated aerodynamic efficiency curve for the A 310 are the result of wind tunnel tests made at Modane by ONERA, Amsterdam by NLR [expansion unknown], and Bradford by ARA [expansion unknown] on models allowing for engine influence on air flow at cruising speed of Mach 0.78.



Distribution of components manufacturing for the A 310 among the four partners of the European consortium: Aerospatiale, 37.9 percent; British Aerospace, 20 percent; CASA, 4.2 percent; and Deutsche Airbus, 37.9 percent. Major subcontractors and suppliers are: airframe, Fokker and SONACA (BelAirbus); landing gear, Messier-Hispano-Bugatti and its associates. Engines, we recall, are supplied by Pratt and Whitney and General Electric with SNECMA /National Aircraft Engine Research and Construction Company/ and MIU /expansion unknown/ participation. Nacelles are supplied by Rohr. The automatic piloting system (numerical CADV /expansion unknown/ is supplied by SFENA /French Air Navigation Equipment Company/ and its associates.

Initial weight tests have already shown the airframe to be somewhat lighter (by 91 kg) than anticipated. The lightening program now adopted leads to /a useful load gain of 687 kg/. Other weight-saving measures can be considered, in part through greater use of carbon fibers. But that program is being held in reserve, to be started only if the clientele asks for it. Weight saving thus obtained would total some 880 kg, but the cost would be on the order of $300 per kg saved.

6145
CSO: 3102/117

TRANSPORTATION

AIRBUS INDUSTRIE PLANS EXPANDED LINE OF AIRCRAFT

Paris AIR & COSMOS in French 2 Jan 82 pp 10, 11, 48

[Article by Jacques Morisset: "Airbus Industrie's Meccano"]

[Text] Meccano (registered trade name): "metal construction toy with interchangeable parts, invented by F. Hornby." This definition (by Larousse) of the famous construction set is perfectly applicable, almost to scale, to the future series of heavy transport aircraft under study in Airbus Industrie and its partners. But what a set! Tonnages from 184 to 227 metric tons. Planned capacities range (in reverse order) from 344 to 253 seats. Ranges are included between 3,100 and 12,650 kilometers, depending on the type of aircraft and method of use. Enough to meet, practically, most of the future requirements of companies for heavy transport aircraft, except for the large slot filled by the B-777.

In fact, so far, Airbus Industrie has aimed only at the single slot of heavy and medium transport aircraft with the A-300, then the A-310 and the future A-300-600. This is a profitable slot, however, insofar as the low cost of fuel had masked, for a long time, the mediocre adaptation of American heavy transport aircraft to medium and, especially, short runs. You do not transport with impunity tons of metal (structure and engines) that have become useless as soon as long runs are no longer involved.

Airbus Industrie, from now on firmly established in that slot, with 44 customer companies scattered over five continents, with a line constantly undergoing modernization (starting in 1984, the A-300B4 and C4-600 will replace the present A-300B4 and C4 aircraft), has planned to develop its activities along two lines: production of a 150-seat aircraft, the A-320, whose characteristics will be firmed up in the coming months (see our last issue); development of a new series of heavy transport aircraft, making maximum use of already existing components (A-300 and A-310) or under development (A-300-600), but oriented in accordance with two plans: on the one hand, offer of a larger capacity (TA-9) and, on the other hand, production of long- and very-long-range aircraft: TA-11 and TA-12.

In the coming weeks, we shall have occasion to discuss the characteristics and performances of these three aircraft again, summarized, however, in the comparative table that we are publishing now [at end] and that shows the possibilities of the future aircraft. Because it is realized that there is no question of the European consortium's wanting to launch everything at the same time, it is obvious that a priority will be set up that will depend first of all on the market, that

is to say on the real marketing possibilities. In practice, the TA-9 has the best chances of showing up in first place in the race in the second half of the decade. The objective aimed at (capacity increased by 25 percent) will enable the TA-9 to present itself as the successor of the DC-10 and of the L-1011 on all runs not exceeding 6,000-6,500 kilometers, provided, of course, that the twin-engine formula is acceptable. This is already a very wide slot in itself, for which demand will show up all the more rapidly now that Lockheed has decided to stop producing the TriStar and Douglas is forced to consider abandonment of the DC-10 line in the future.

This observation also applies, however, to the long-range TA-11 (four jets) and the TA-12 (twin-jet) aircraft. Between 150 and 200 seats, there will be the DC-8-70 (DC-8-60 reengined with CFM-56 engines). Starting at 350 seats, there is the B-747. In between, there will no longer be anything. Therefore, the slot really exists that the TA-11 and TA-12 can fill all the more effectively, because these two aircraft will have the maximum in common, on the one hand, with the A-300-600 and the A-310, on the other hand, with regard to fuselage, cockpit, systems and tail unit. On the other hand, the wing will be new, if only because of the need for increasing its area and for making best use of the progress achieved in aerodynamics. But the research departments are now working on an airfoil whose basic components will be the same for the TA-9, for the TA-11 and for the TA-12, but capable of taking either two engines with a 28-ton thrust (TA-9 and TA-12), or four engines with a 15.5-ton thrust (TA-11).

The diagram that we reproduce here [at end] shows the mechanism by which the fuselages of these three aircraft types will use both components already existing (or under development) and a new component: the center section designed to take the new airfoil. Because the diameter remains obviously the same, the only new tooling required will be for this new center section. In view of the increase in takeoff masses (+11 percent and +37 percent), the landing gear will also be redesigned, but its basic components will be similar for the three aircraft under consideration.

To our knowledge, this the first time that a transport aircraft builder is proposing to devote himself to this kind of Meccano set, not a posteriori, but, rather, a priori, by studying in that spirit all the structural components. This will result in a considerable saving of means, which will make the operation particularly profitable from the industrial point of view. Of course, Boeing lays claim to similar ideas with regard to the development of the B-767 series, but, up to now, it has envisaged only a three-jet derivative, the B-777 (of which it is, moreover, no longer a question, at least for the time being). On the other hand, Airbus Industrie leads by several lengths in this kind of operation and it will, in any case, be in a position, if its partners so desire, to propose a series of transport aircraft as broad as it is competitive. Carriers, who are anxious to have several suppliers, will appreciate this.

It is observed, then, that the development of Airbus Industrie no longer rests on a work tool (the industrial capacities of its partners are still mobilized only partially), but, rather on the consensus of those industrialists, on the aptitude to mobilize the indispensable financial collaboration and on the budgetary capabilities of the governments concerned. The technico-industrial problem is becoming political, because the desire to move ahead and to take the necessary risks is

the real driving force of development. At any rate, in Airbus Industrie Europe has more than ever a remarkable chance to affirm itself on the huge world market for air transport and finally to break the American quasi-monopoly.

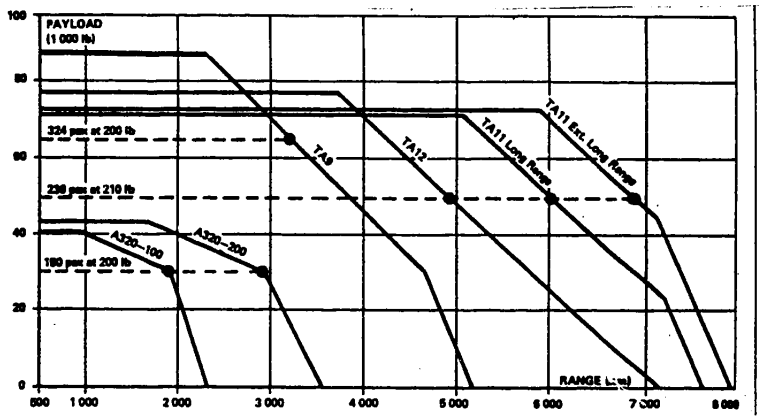
Comparative Characteristics and Performances of the Future Airbus Series

	A.320-200 (1)	A.310-200 développé	A.300B4-200	A.300-600	TA.9 (type 200)	TA.11 (5) (type LR)	TA.11 (5) (type ELR)	TA.12
Poussée au décollage (t) (3) Type de moteur (4) (2)	2 × 11,34 encore non déterminé	2 × 21,77 CF6-80A JT9D-7R4D1	2 × 23,81 CF6-50C2 JT9D-59A	2 × 26 CF6-80C/A JT9D-7R4H1	2 × 28 CF6-80C	4 × 15,4 PW 2034	4 × 15,4 PW 2034	2 × 28 CF6-80C
Envergure (m) (5)	34,48	43,90	44,84	44,84	56,00	56,00	56,00	56,00
Longueur hors tout (m) (6)	37,41	46,67	53,62	53,85	62,02	50,89	50,89	50,89
Surface alaire (m²) (7)	125,8	219	260	260	330	330	330	330
Allongement géométrique (8)	9,45	8,80	7,73	7,73	9,50	9,50	9,50	9,50
Nombre de sièges : (9)								
— en aménagement mixte (10)	150 (12 + 138)	214 (18 + 196)	251 (26 + 225)	269 (26 + 243)	324 (30 + 294)	236 (24 + 212)	236 (24 + 212)	236 (24 + 212)
— maximal (1) (11)	177	289	345	345	400	253	253	253
Capacité des soutes (12) (conteneurs + fret en vrac) (13)	8 conten. + 2,8 m³	15 LD3 + 16 m³	20 LD3 + 17,3 m³	22 LD3 + 17,3 m³	30 LD3 + 17,3 m³	17 LD3 + 12,3 m³	17 LD3 + 12,3 m³	17 LD3 + 12,3 m³
Bilan des masses (tonnes) (14)								
— maxi décollage (15)	71,90	138,6 (3)	165	165 (4)	184	211,2	226,8	190
— maxi atterrissage (16)	62,86	121,5	134	138	163	148,6	150,5	144,5
— maxi sans carburant (17)	59,08	111,5	124	130	152	137,6	139	133,5
— à vide opérationnel (18)	39,66	77,74	88/89	88,5/87,8	105,6	105,3	106,7	98,5
— charge payante maxi (19)	19,42	33.81	36/35	41,5/42,2	46,4	32,4	32,3	35
— carburant maxi (20)	18,80	43,00	49	49	64,9	95,7	100,7	95,7 (6)
Distances franchissables (2) (21)								
— avec C.P. maxi (N.M./km) (22)	1700/3150	1760/3260	2700/5000	2600/4815	1680/3110	5056/9365	5900/10925	3720/6890
— avec passagers seuls (23) (N.M./km)	2950/5465	3000/5550	3300/6110	3560/6595	3200/5925	6010/11130	6830/12650	4910/9095

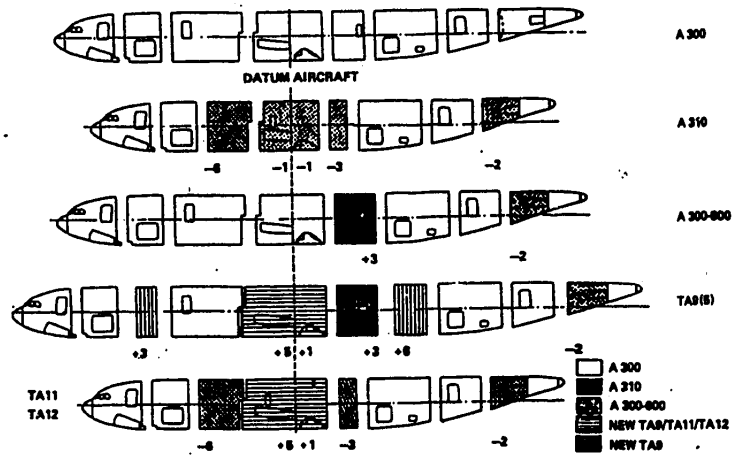
(1) at the rate of 30 inches for the A-320, the A-310 and the A-300; at the rate of 33-34 inches for the TA-11 and TA-12; (2) the distances for passengers only (and their baggage) are for the mixed-type arrangement; (3) there is, in the planning stage, an A-310-300 capable of taking off with a mass of 145-148 metric tons and able to cover 3,500 nautical miles, or close to 6,500 kilometers; (4) the maximum mass of the A-300-600 is scheduled to be increased to 170 metric tons; (5) LR = Long Range and ELR = Extended Long Range; (6) this capacity would actually be far in excess.

Key:

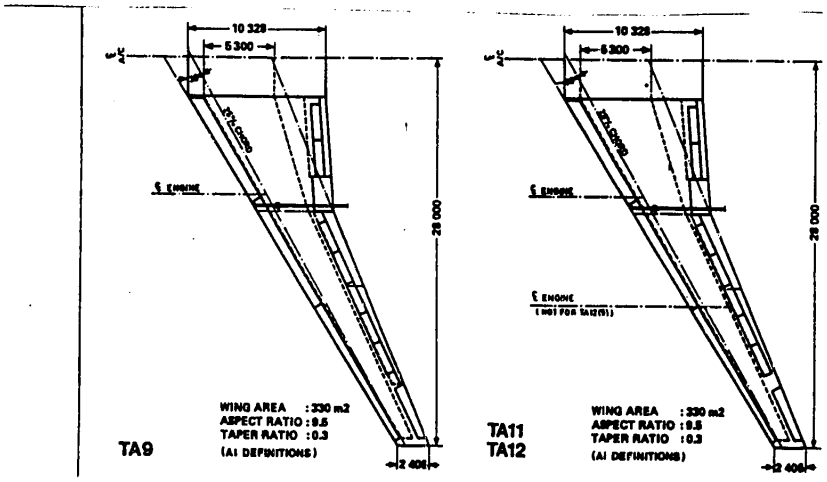
1. developed
2. not yet determined
3. thrust on takeoff
4. engine type
5. wingspan
6. length overall
7. wing area
8. geometric aspect ratio
9. number of seats
10. in mixed arrangement
11. maximum
12. cargo compartments
13. (containers and bulk freight)
14. summary of masses (metric tons)
15. maximum at takeoff
16. maximum at landing
17. maximum without fuel
18. operationally empty
19. maximum payload
20. maximum fuel
21. ranges
22. with maximum payload (nautical miles/kilometers)
23. with passengers only (nautical miles/kilometers)



Only the new aircraft--A-320, TA-9, TA-11 and TA-12--are shown on the graph of payloads and ranges. The ranges are calculated for the A-320 and the TA-9 with "domestic" type FAR [Federal Aviation Regulations] reserves; for the TA-9 and TA-11 with "international" type FAR reserves.

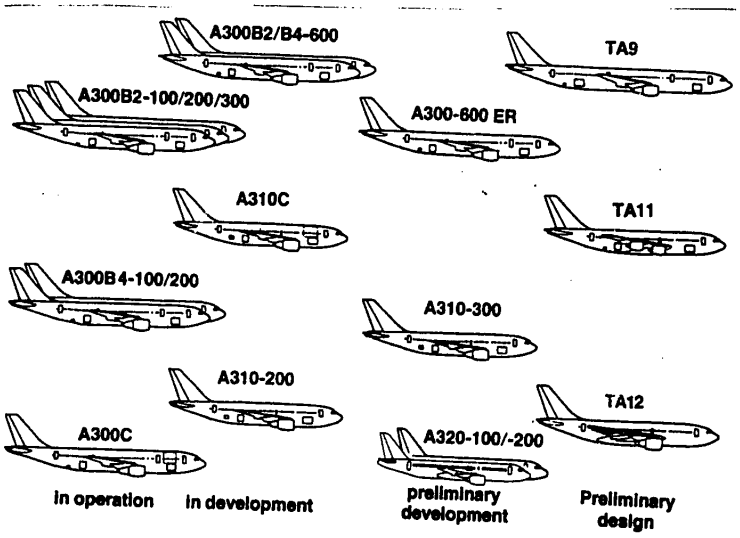


Fuselages: The A-300-600 needs only one single new cylindrical section; the TA-9, TA-11 and TA-12, on the other hand, will require development of a new center section.



The future new airfoil with an area of 330 square meters will equip both the TA-9, TA-11 and TA-12. The differences will pertain to the tank capacities and to the points where the engine pods are attached.

This Sketch Summarizes the Anticipated Development of the Airbus Series



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TRANSPORTATION

BRIEFS

AIRBUS SUBCONTRACTS--Within the framework of compensation agreements, the Norwegian Raufuss Company is now collaborating in manufacturing for Airbus, to which it is supplying loading system components. This subcontracting agreement was concluded by the German partners of Airbus Industrie responsible for agreements with Italian and Norwegian industry, while Aerospatiale has concluded similar agreements with Portugal and Greece, and British Aerospace with Australia and Switzerland. [Text] Paris AIR & COSMOS in French 9 Jan 82 p 11] [COPYRIGHT: A. & C. 1981] 10042

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