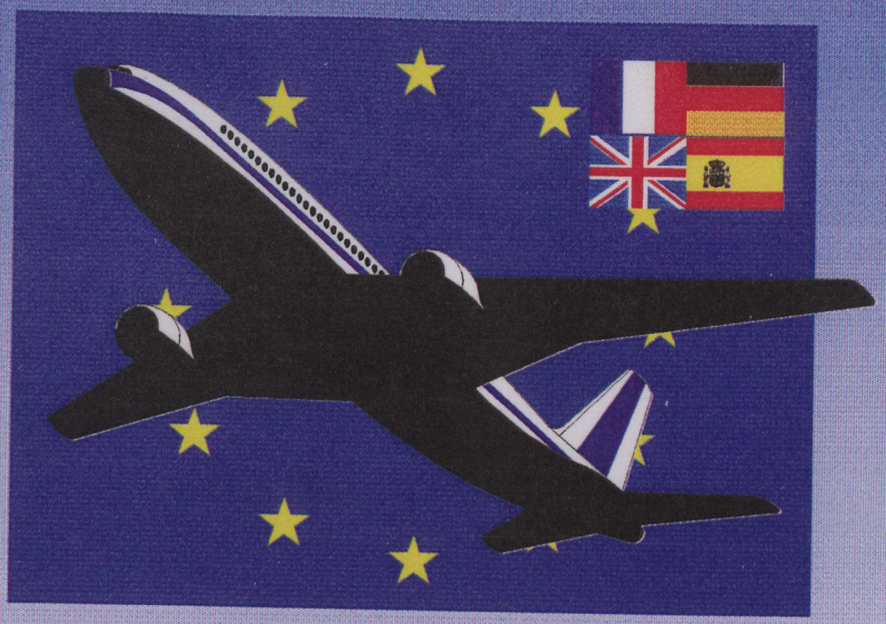
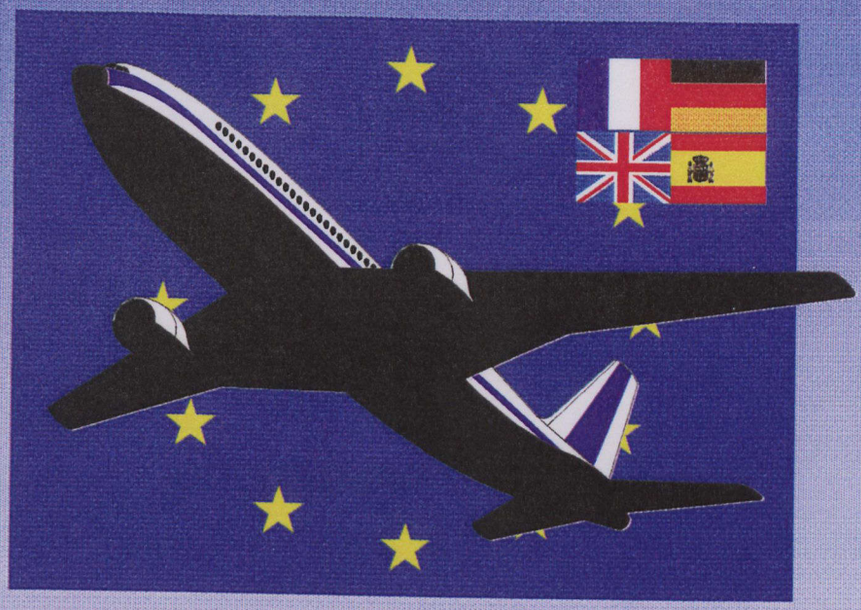


Airbus Industrie
CHALLENGES
For the Canadian Aerospace Sector

Procurement Guidelines



Airbus Industrie
CHALLENGES
For the Canadian Aerospace Sector

Procurement Guidelines

AIRBUS INDUSTRIE

Challenges for the Canadian Aerospace Sector

- Procurement Guidelines -

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Corrections to Text

1. Page 8: Reference to Exhibit 32 should read Exhibit 30
2. Page 12: Reference to Exhibit 33 should read Exhibit 31
3. Page 13: Reference to Exhibit 34 should read Exhibit 32
4. Page 14: Reference to Exhibit 35 should read Exhibit 33
5. Page 15: Reference to Exhibit 36 should read Exhibit 34
6. Page 18: Reference to Exhibit 31 should read Exhibit 29
7. Page 23: Reference to Exhibit 32 should read Exhibit 30
6. Page 23: Reference to Exhibits 33-36 should read Exhibits 31-34

Apologies for any inconvenience this may have caused.

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This report is prepared for information purposes only. The Consultant bears no responsibility for any use, in part or in whole of the aforementioned report, and bears no liability to any parties using the information contained herein.

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(*) For extracts, please contact Mr. Guy Ladequis

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None of the afformentioned individuals bear any responsibility for any errors or omissions within this study.

Executive Summary

This study was carried out with the view to assessing the prospects for Canadian aerospace firms to increase their involvement in current and future Airbus Industrie (AI) programs. Historically, Canadian firms have been stifled by the complex structure of AI and discouraged by the perception that "European Content" was one of the critical factors in bid evaluations. The Canadian sector's performance in Airbus programs, particulary at the second and third tiers, is manifested through these assertions.

- *The reality is that the current AI structure, with all its complexities, has served as a crucial instrument in Europe's quest to meet the technological challenge to manufacture large civil aircraft. Although there has been a great deal of discussion regarding the adoption of a more conventional "prime contractor" model, the anticipated difficulties associated with this proposition will prevent drastic changes to the status quo in the short and perhaps medium terms.*

- *Firms seeking to do business with the Airbus consortium for the first time, therefore, require a road map to help navigate through the manner in which it currently functions. Accordingly, a significant portion of this report provides practical information to assist firms to get to the relevant procurement decision makers. While cross Atlantic rivalry has resulted in some internalization of inputs, the value of US content in Airbus programs remains more or less equal to that of Europe.*

Discussions with each of the Airbus partners also failed to uncover any specific "European content" requirements, and moreover, the Airbus partners appear to be pushing to become increasingly transparent. The prospects of increased involvement in Airbus programs by the Canadian sector over the short and medium term will depend largely on its ability to respond to the present real "commercial challenges" facing Airbus and its existing supplier network brought about by the environmental changes facing the industry at large. Innovation and proactiveness will continue to be essential ingredients for successful suppliers.

Over the longer term, indeed, the Airbus case also presents some interesting lessons to the Canadian sector and to policymakers. The high cost of program development is transforming the traditional role of suppliers into partners which can offer fully integrated systems and can bear an increasing portion of program risk. Accordingly, we can expect to see much smaller and strategically selected supplier networks in future programs.

The Canadian sector is challenged to respond to these emerging trends by building on its leadership positions in selected market niches. Broadening system capabilities can be accomplished through joint ventures, strategic alliances, or other forms of industrial collaborations. To this end the Canadian sector can learn from the "Airbus model", which is arguably the linchpin of successful international industrial collaborations. The historical perspectives presented are aimed at providing insights on the management of international collaborations and to offer more knowledge about Airbus and the industrial partners as potential significant customers.

The Airbus initiative would also not have been possible without extensive backing from the governments of the participating industrial interests. Emerging trends facing the supply chain of aircraft manufacturers, more than ever, require that they have access to low cost risk capital. Canadian policy makers face a universal dilemma of deciding whether to continue to support its sector, and if so, how to steer its limited resources and policy tools in a manner which will best help the sector to reorganize itself to meet the future challenges.

The Aircraft Manufacturing Industry - Overview

International aircraft manufacturing operates within a three-tiered capability hierarchy. Only a few firms have developed the design and systems integration competencies and marketing expertise which are necessary to compete successfully in the first tier of the industry as prime manufacturers. Accordingly, the world market for large civil aircraft is principally served by Airbus, Boeing, and McDonnell Douglas. These prime manufacturers rely on a larger network of international second tier suppliers of proprietary aircraft subsystems and major structural components. In turn, the first and second tiers utilize a vast network of third tier suppliers of parts and services. This study is directed at Canada's second and third tiers in their efforts to market systems, products and services to the Airbus Consortium.

The world market for large civil aircraft is directly impacted by economic cycles, world security issues, and government policy and regulatory decisions. Primary customers such as airliners and leasing companies are sophisticated purchasers, which demand rigorous safety, quality, performance, and support requirements. The major carriers also exert considerable buyer power and, therefore, tend to demand price and financing concessions. Successful suppliers are sensitive to the pressures placed on aircraft manufacturers by carriers. The aircraft manufacturing industry is also characterized by its high financial and market risk, steep learning curves, substantive economies of scale and scope, first mover advantages, and high technical and financial barriers to entry.

Governments have played critical roles in providing direct and indirect support due to the sector's global scope and importance in the economic and military dimensions of national security. Aircraft manufacturing can also be a significant generator of trade surpluses, provides highly paid skilled employment, and a facilitator of advanced manufacturing techniques and materials technology which can support other industries. In 1979, major aircraft-producing nations signed the GATT Agreement on Trade in Civil Aircraft to eliminate tariffs on civil aircraft, engines, and parts to facilitate an expanded globalization of the industry. In July 82, the US and EEC signed a bilateral agreement setting guidelines restricting the levels of direct and indirect government support, yet international markets and manufacturing activities remain distorted to this end.

The Canadian Aerospace Sector

The Canadian industry is unique among major international competitors to the extent that it does not rely on domestic military procurement and to the extent that it is owned or controlled by foreign interests. The Canadian sector's focus has been on civil markets (75%) and on export opportunities (64%).

At C$10 billion sales it employs 55000 skilled workers and is the 6th largest in the world. The industry also projects a healthy growth of 43% from 1995 to 1998. Strong export performance suggests that the Canadian sector is globally competitive in a marketplace which is becoming more and more challenging.

The industry's owes its success to its focus on becoming the best-in-class in selected niche product areas. Examples of Advanced technology niches include satcom antennas, simulation equipment, aircraft environmental systems, business and regional aircraft, landing gear, and composite components. To remain at the leading edge of technology, the industry invests over C$1 billion annually into research and development. Canada also has a unique defense trade relationship with the United States dating back to World War II which facilitates technology exchange and access to the world's largest and most advanced aerospace and defence market.

The industry's strength is also attributed to the Canadian business climate which is blessed with an effective education system to provide highly skilled labour, favourable exchange rates, and world class infrastructure to enhance international competitiveness.

Airbus Industrie

With annual turnover of US$8.5 billion and a formidable product portfolio, AI has achieved approximately 30% market share of airliners seating more than 100 passengers. AI integrates the design and construction competencies of Europe's premier aerospace firms by leading and coordinating the definition, design and production of the Airbus product range of aircraft and performing all marketing, commercial negotiations, financing and product support functions as a single point of contact for commercial airlines.

- Formed under French law in 1970 as a "Groupement d'Interet Economique", AI is jointly owned by Aerospatiale of France (37.9%), British Aerospace Operations Ltd. (henceforth BAe Airbus) of the United Kingdom (20%), Construcciones Aeronauticas. S.A. (henceforth CASA) of Spain (4.2%) and Daimler Benz Aerospace Airbus (henceforth DASA) of Germany (37.9%)

These four partners have dual roles as both owners and industrial participants, carrying out most of the design and all aircraft manufacturing and assembly, while the entire effort is coordinated and managed by AI.

Having developed a family of seven technically sophisticated designs, AI has delivered aircraft to 110 customers worldwide. Recent sizable sales to Air Canada suggest that 75 of its fleet of 129 aircraft will be European jets, making it Airbus' largest penetration of any North American carrier thus far.

Fully equipped sections of the different AI aircraft are produced in various factories of the four partners throughout Europe, which in turn rely on an extensive worldwide network of systems and structural component suppliers. These sections are then transported to assembly locations in either Hamburg for the A321 and A319 and to Toulouse for all other models.

Airbus History

The idea of the "Airbus" was conceived as part of an Anglo-French initiative dating back to early 1965. During this period, air traffic was growing at a much faster pace than currently being witnessed today. Hawker-Siddley of the UK and Breguet-Nord of France originally pursued a twin-engine, wide body, short haul aircraft provisionally named the HBN 100. The idea was later merged with Sud-Aviation's Galion project to eventually become known as the A300 Airbus. Five German companies (Messerschmitt, VFW, Siebel, Hamburger Flugzeugbau, and Dornier) followed with interest the Anglo-French discussions for the proposed Airbus and late in 1966 formed Arbeitsgemeinschaft Airbus (later became Deutsche Airbus) to manage the German share of the design study.

The A300B

Problems associated with the commercial credibility of the A300 threatened the collapse of the entire project. This lead Henri Ziegler, head of Sud Aviation at the time, to assemble a small team to secretly and quickly redesign the aircraft utilizing a significant amount of existing American technology. The original Airbus was, therefore, redefined from the A300 to the A300B. Turbulence surrounding the relationship between the original partners would lead to the withdrawal of British government support in April 1969. Shortly thereafter, Germany and France signed a Memorandum of Agreement which clarified and reaffirmed their determination to proceed with the Airbus project. In seeking to retain a political and industrial balance in the Airbus initiative, the German state financially supported the efforts of Hawker-Siddley to remain within the program, thus it became a major subcontractor with responsibility for the wing design and development. The Dutch government also agreed to contribute 6.6% of the A300B development costs in return for manufacturing wing slats and flaps by Fokker as an associate. Overall, this program enjoyed only limited success, however, a sale to Eastern Airlines early in 1978 allowed the consortium to reach a commercial milestone fuelling enthusiasm to build on its technical foundation.

Introducing A310 and A320

With the official launch of the A310 in July 1978 and, after a period of courting British allegiance by both American and European interests, the British government announced new agreements making British Aerospace ((BAe) a consolidation of Hawker Siddley and British Aircraft Corp.) a full partner of AI effective Jan 1, 1979. BAe would assume a 20% interest in the consortium, reducing the holdings

of Aerospatiale and Deustche Airbus to 37.9% and leaving CASA's interest at 4.2%. Also, in the spring of 1979, Belairbus joined as an associate partner to produce slats and tracks for the A310 wing and a major wing/body faring. The A310 would be a shortened derivative of the A300B with the same fuselage diametre and a completely redesigned wing. The A310 would also incorporate several innovations including the two-man crew cockpit (eliminating need for the flight engineer), fuel storage in the horizontal stabilizer (extending range), and wing-tip fences (improving fuel economy and safety). The A310 enjoyed increasing commercial success, particularly in the Middle East largely due to controversial US foreign policy in the region.

AI announced the formal launch of the A320 in March 1984 in an effort to respond to the huge replacement market for older generation DC-9, 727, and 737 models. The decision to move forward with the A320 was delayed considerably largely due to the lack of a suitable powerplant for the single aisle market segment.

The formation of International Aero Engines (a joint venture between, Pratt&Whitney, Rolls Royce, Fiat, MTU, and a consortium of three Japanese firms) in May 1982 provided the required stimulus to CFMI (the aeroengine alliance between GE and Snecma favoured by the French partner) to develop an enhanced version of the CFM 56 engine. This, coupled with firm orders from Air France and British Caledonian propelled the backing for the program's development. The sales success of the A320 surpassed all expectations by introducing a product whose technical and operational features such as fly by wire controls and other revolutionary characteristics distinguished it from existing available aircraft. Later derivatives of the A320 were the A321 and more recently, the A319.

Introducing A330 and A340

In June 1987, AI announced the simultaneous launch of the A330 and A340 programs. Basing the two new aircraft of different payload and range on the same fuselage, wing, cockpit, and A320 avionics and flight control technology, AI would extend its product line while incurring minimal risk. The introduction of the A330/A340 proved to be the culmination of AI's strategy to offer potential customers a "family" of aircraft, however, it also served to intensify a growing political conflict with the US over unfair competition associated with the direct government support offered to AI consortium partners.

Indeed the US government commissioned "Gellman Research Associates" to study the extent and impact of European government subsidies to Airbus programs and the Europeans countered by commissioning "Arnold and Porter" to evaluate the magnitude of US indirect support for its aerospace industry thus, leading to the July 1992 bilateral agreement which "attempts" to restrict the level of direct and indirect support offered to large civil aircraft manufacturers.

GIE Structure

Initially, the only entity representing the project was "Airbus International", a sales office set up in the 1969 memorandum of understanding (between Germany and France) authorized only to quote prices and delivery schedules to airlines. Long and trying negotiations resulted in the creation of Airbus Industrie as a GIE under French law late in 1970.

This form of business organization permits participating firms to integrate their technical strengths, industrial capacities, and marketing skills while preserving their individual autonomy. Initial statutes provided for the development, production, sales and support of the A300B. The GIE can be viewed as an unlimited partnership where its partners are corporations which are each jointly and severally liable to third parties with whom the GIE becomes contractually engaged.

To this end, the GIE offers potential clients both financial credibility (as the organization is backed by the cumulative resources of all the industrial participants) and a single responsible organization with which to negotiate sales and expect product support. Other features of a GIE include a flexible capital structure, no tax liability except professional taxes, as income or losses flow through directly to its partners, and the ability to facilitate the accession of new members.

The AI GIE (Appendix 1) has proved to be a flexible arrangement which is well suited to international ventures where firms unwilling to relinquish control through merger can coordinate activities while avoiding the sunk costs and tax consequences of an incorporated joint venture. Another successful case involving the GIE framework is represented by the Franco-Italian (and more recently Anglo) ATR (AIR) initiative.

The adoption of the GIE and the corresponding work sharing agreements has served to place the same firms that own AI in the paradoxical position of being the only subcontractors to an organization which they own (Exhibit 1). Within such work shares, each partner is required to specify the precise content of its portion and to quote prices and delivery schedules for those components.

Work share allocations are distributed roughly in accordance with the relevant partner's interest in the consortium, but are also the result of long and intensive negotiations because each partner seeks to define and price its share to meet its own goals. In a sense then, the GIE acts as a general contractor which buys components from the partners and associates. While some obvious weaknesses exist in this approach, the inherent tensions and internal rivalry of this structure has, in essence, been a crucial factor to the success of Airbus because the partners are continually forced to rationalize their solutions and proposals by facing the scrutiny of their astute counterparts. The results have demonstrated that such built-in checks and

balances have served to make programs technically and commercially better than might otherwise have been accomplished.

Financial

The partners fund AI's routine payments for overhead expenses and procurement of engines (and in some cases nacelles) based on a budget proposed by AI management and approved by the Supervisory Board. Non recurring development costs and production funding are borne by the partners in their roles as subcontractors who retain complete autonomy for all aspects of their work share including procurement. In turn, the partners have sought this money from their respective national governments (and more recently from private sources) usually in the form of loans on attractive terms to be repaid with the revenues from aircraft sales.

The creation of the Airbus Finance Corporation (AFC), incorporated under the laws of the Irish Republic and owned jointly by the AI partners, was announced in December 1994 to ease some of the financial exposure from the balance sheets of the Airbus partners associated with GIE unlimited liability. This entity consolidated AI's existing portfolio of leased aircraft and aims to achieve an A+ credit rating to support the future issuance of bonds backed by aircraft within its portfolio. AFC and AI achieved a vote of confidence from the international financial community by successfully securing access to US$2.4 billion through the issuance of investment bonds in key international markets.

Suppliers assume the credit exposure of the specific partner with whom they are contractually engaged - not AI or the remaining partners. Payments are usually processed between 30 and 90 days, depending on the partner.

Airbus Corporate Structure

The Organizational structure of AI today is largely shaped by the efforts of the "four wise men" commissioned by the governments of AI supporting states during the summer of 1987 to conduct a review of the consortium's administrative structure.

Their report tabled in April 1988 criticized AI for having an overly large administrative body which handicapped the timeliness and effectiveness of decision making, for lacking financial information on the results of the consortium's entire operations, and for the lack of an effective link between marketing and production therefore precluding effective cost control. They recommended that, in the long run, AI should strive to become a fully integrated independent European civil aerospace company. To streamline decision making, the five member Supervisory Board, traditionally chaired by a German, has become the main instrument of overall policy as opposed to being simply the ratifier of major decisions made at the state or partner levels (Exhibit 2). A seven member executive board, traditionally chaired by

a Frenchman, was also created to exert full control over Airbus programs (Exhibit 3). The position of financial director was also created to develop a comprehensive system of cost accounting and control. This position caused enormous controversy as it would initially be given access to the partner's cost records to evaluate the prices charged for work shares. Interestingly, the "wise men" recommended that AI take over more of the subcontracting with outside firms because it could be more aggressive in seeking the best prices and terms. To this date however, contractual engagements of AI rest solely with the industrial partners and associates (except in the case of engines and reverse thrust equipment). Nevertheless, AI has now adopted sophisticated information systems to track suppliers engaged with more than one partner to ensure that the best terms are negotiated consistently.

The report also suggested that recruitment of personnel be carried out directly by AI based on merit as opposed to having staff appointed to AI by the partners so as to avoid conflicts of interest or division of loyalty. To this end, employees now appear to increasingly identify themselves with AI as opposed to its industrial partners - having their own distinct culture and independent Human Resources Directorate.

Airbus Organizational Structure

The Chairman of the executive board also serves as the Managing Director overseeing day to day operations of AI. The AI management structure incorporates seven functional directorates including Commercial, Engineering, Customer Services, Industrial, Programs & Processes, Administration and Transport (Exhibit 4). Although AI is not directly engaged in procurement of aircraft components or systems (except for customer selected engines & nacelles), it does exert considerable influence (particularly the Commercial, Engineering, Customer Services, and Administration directorates) on the partners in their equipment selections in view of its position in the supplier performance feedback loop.

Commercial (Exhibit 5): Direct contact with the market is maintained by the Commercial Directorate which is responsible for all sales, contract and sales financing, and establishing marketing strategies for current and potential programs. This directorate has negotiating limits with potential customers to an undisclosed threshold, beyond which, it must obtain approval from the managing directors of the partners. Responsiveness to changing market conditions is assured by direct links with a network of regional offices and with the group's subsidiary, Airbus Industrie of North America.

Engineering (Exhibit 6): As mentioned, the AI partners and associates retain full capability in all aspects of aircraft construction meaning they perform most of the basic research and detail design; however, the engineering directorate coordinates the overall effort and sets overall broad product performance specifications. This directorate is also responsible for all airworthiness and product safety matters. At

times it also engages in specific projects to improve product performance and safety.

Customer Services (Exhibit 7): The largest directorate is represented by Customer Services which employs 45% of all AI's 2098 staff members. Sixty field offices and technical representatives in forty countries provide 24hr service worldwide. This directorate is also responsible for managing the Airbus training facility in Toulouse, supplier monitoring, technical manuals and publications, and warranty control.

Industrial (Exhibit 8): The main responsibility of this directorate is to coordinate the production process among the four partners and three associates as well as to control product quality. It also ensures product customization to client requirements, conversions, and delivery scheduling.

Programs & Processes (Exhibit 8a): Overall responsibility for Airbus programs is assigned to each of the program directors within this directorate. The EDP function, also within this directorate, generates information for all aspects of business process analysis and planning activities.

Administration (Exhibit 9): Although AI does not issue an annual report externally, the Administration directorate maintains financial controls and an intricate set of supplier and costing records. This process facilitates the partner's major procurement activities by ensuring similar, and where possible improved, terms are negotiated consistently by each of the AI partners. Other roles include administration of AI direct procurement contracts, treasury, and business planning.

Transport: Supports the final assembly activities in Toulouse and Hamburg by maintaining a special fleet of land and air equipment to transport pre-equipped sub-assemblies just in time from the various partner factories across Europe.
(refer to Exhibit 32 for Airbus Industrie contact names and coordinates)

Work Sharing

The process of allocating work to the partners on the various sections of the aircraft is a complex process involving the competitive bidding among partners, an assessment of the relevant partner's expertise, and allocations according to the partner's ownership share in AI. Refer to Exhibits 10a - 10e for Aerostructure work share allocations for each of the Airbus programs.

System responsibilities are also assigned to the partners on the basis of three levels forming part of the negotiated work share. Level 1 responsibility is assigned to the system leader who assumes complete responsibility for system integration, design and certification, Level 2 responsibility entails providing a subsystem designed and incorporated into a level 1 responsibility system. Level 3 responsibility involves

supply of a system component incorporated into either a Level 2 partners subsystem a Level 1 partner's system.

Aerospatiale is engaged in providing complete auto flight, electrical power, flight control, engine fuel and control and navigation systems on all programs all landing gear on A300/A310, nose landing gear on A320 family, air conditioning on the A300/A310, and cabin finishings on A330/A340. British Aerospace is responsible for fuel systems on all the programs, complete landing gear systems on A330/A340 and main landing gear on the A320 family. Daimler Benz Aerospace has responsibility for environmental systems on all programs except A300/A310, communication, finishes the cabins on the all programs except A330/A340, indicating/recording, lighting, oxygen, vacuum, waste, APU and ignition systems (Exhibit 11).

In the earliest programs (ie A300B and A310), work was simply negotiated and distributed based on competence, partnership share, and, political considerations. The more recent bidding process resulted in the award of fuselage plugs for the A321 to British Aerospace, a responsibility which traditionally went to DASA. DASA, in turn, received compensating work on wing flaps. Strong sales of the A321 influenced the AI supervisory board's decision to locate its assembly facility in Hamburg; however, this decision was also swayed by the government of Germany and resisted by Aerospatiale. While final assembly and cabin finishing for the A321 and A319 take place in Hamburg (discussions about moving A320 to Hamburg from Toulouse in progress) cabin finishing for the A330 and A340 programs has been transferred to Aerospatiale in Toulouse resulting in significant investments by both partners.

Each of the partners also maintains staff responsible for ensuring that work allocations are in accordance with the partnership interest. Since the partners maintain autonomy for procurement decisions associated with their work shares, potential direct suppliers to Airbus programs must be cognizant of work sharing arrangements so as to properly focus their marketing efforts to the responsible partner.

Production

Each of the partners play an integral role in the production flow of Airbus products (Exhibit 12). The system is based on the integration of large subassemblies that are worked to near completion by each of the partners. To minimize transportation costs, these subassemblies are equipped as fully as possible with the necessary wiring, tubing, and other components and equipment to accommodate systems, before being transported just-in-time in special aircraft or trucks to the final assembly location in Toulouse or Hamburg depending on the program. For this reason, final assembly accounts for only 4% of the total man hours required to

assemble the aircraft.

Assembly facilities for the A330 and A340 in Toulouse (Exhibit 13) and those in Hamburg (Exhibit 14) for the A319 and A321 employ flexible production methodologies which can easily accommodate special customer requirements and facilitates necessary reorganization of production lines arising from cancellations. Other assembly facilities in Toulouse for the A300, A310 and A320 programs employ more rigid "line" arrangements.

Future Programs

In the short to medium term, Airbus appears committed to growing the family of aircraft in order to meet evolving market requirements. The latest enhancements include more range and payload with the A321-200 and A340-800 featuring optional additional centre-tank(s). Studies are also being carried out for a shortened A330 seating slightly more passengers and a longer range than the A300-600.
Nearest to launch is an even longer range A340. Other studies include A340 derivatives with enhanced powerplants permitting one-stop round-the-world capability, a "stretched" A330 with seating capacity which could match today's largest available aircraft, versions of the A340 with lower deck w/c's, beds or seating, and several composite and high technology material projects.

Significantly, the AI consortium partners plus Alenia of Italy recently signed an agreement to proceed with the establishment of an Airbus military aircraft company which is poised for the pre-development phase of the "Future Large Aircraft" (FLA) in 1996. The proposed military transport would offer a replacement alternative to the Transall/Hercules currently used by various European armed forces. BAe, Aerospatiale, and DASA Airbus are also collaborating in the development of a next generation multi-role tanker transport (MRTT) which is to be based on the Airbus A310-300 aircraft. This military aircraft would provide a replacement alternative for the current generation of strategic tankers based on the B707 or VC10 aircraft.

Longer term studies include the A3XX which envisions a four-engine, long-haul airliner seating 530-570 passengers in three classes or up to 850 passengers in an all economy layout. Passengers on this Very Large Commercial Transport (VLCT) would be seated on two decks with access to the top deck through stairs at the front and rear of the aircraft. Exploratory research is also carried out by Aerospatiale, British Aerospace and Daimler Benz Aerospace Airbus on a second generation Supersonic Commercial Transport (SCT). This program is envisioned to build on the technical achievements of the Concorde program.

The present situation in Europe with respect to the development of a 100 passenger capacity aircraft has been complicated due to the pursuit of separate development strategies on the part of Aerospatiale and DASA. This division stems from English

and French unwillingness to accept German leadership through its planned development of the FA-X-100, the successor to the Fokker 100. Airbus Industrie is unlikely to become involved in this part of the market until after European consolidation.

Research initiatives arise from within the Airbus organization or at the partner level, through feedback and requests from customers, and from direct proposals from suppliers with innovative ideas to improve product performance and safety. Suppliers selected or engaged in research projects are often selected as suppliers on programs subject to the relationship established at this early stage and to commercial considerations. Firms requiring technical information to develop products or systems for secondary markets should pose requests directly to the Engineering departments of the partner with the relevant level 1 work share responsibility and concurrently to Airbus Engineering. To legitimize such requests, suppliers must provide up front assurances for the protection of proprietary property and the proposal should be accompanied by a firm order or request from an Airbus customer.

Aerospatiale (France) (Appendix 2)

Aerospatiale is the premier state controlled aerospace company of France. 62.16% of its shares are owned directly by the government of France, 17.82% are owned indirectly through another state company, Societe de Gestion de Participations Aeronautiques, and 20% by Credit Lyonnais. Aerospatiale was formed in the early 70's as a merger between Sud-Aviation and Nord-Aviation following a pattern of mergers rationalizing the state-owned sector.

The company is organized into four autonomous divisions including Eurocopter (60% Aerospatiale, 40% Daimler Benz Aerospace), Space and Defense, Missiles, and Aeronautics. Aerospatiale's 37.9% interest in the AI GIE is managed within the Airbus operational centre of the Aeronautics division where it operates along side six other operational centres including AIR (regional aircraft - formerly ATR, with the accession of British Aerospace Aerospatiale's interest now amounts to 33.3% of the GIE), Systems & Services (through Atec, which is engaged in automated flight warning systems and ground test equipment), Sogerma Socea (engaged in maintenance and overhaul activities), Socata (business jets), Sextant Avionique (30% Aerospatiale and 70% Thomson-CSF, involved in avionics systems and flight training equipment) and Aerostructures (created early in 95 to support other operational centres and also to deal with external industrial relationships including Bombardier on the Global Express program).

Aerospatiale experienced significant losses in 1992 leading to a recapitalization by the French state. Losses in 1993 and 1994 have been reducing in view of internal restructuring and rationalization. The president of Aerospatiale, Mr. Louis Gallois, recently expressed a willingness to recapitalize the group with FF 10 billion in

private capital from other leading French aerospace firms including Thomson-CSF, Matra, and Dassault. The Airbus operational centre is currently headed by Mr. Gerard Blanc, who is also cited as a possible successor to Jean Pierson as Managing Director of AI. The three Airbus program families (wide body, narrow body, long range) and three programs under study (FLA, VLCT, and Supersonic) are supported by seven functional departments (Exhibit 16).

All purchasing activities related to the Aeronautical division are controlled through Toulouse. The purchasing departments of the Airbus (Exhibit 17) and Aerostructure (Exhibit 18) operating centres are responsible for vendor selection, contract negotiation, and complete logistical support up to final aircraft installation. Three factories located in Nantes, St. Nazaire, and Meaulte manufacture structural components and parts for Aerospatiale's work share in Airbus programs. These factories are directed and receive functional support including purchasing from the Aerostructure operational centre (Exhibit 19). Final assembly of the all Airbus aircraft, except the A321 and A319, takes place at Colomiers and St. Martin (Toulouse).
Internal biases exist with respect to the procurement of some avionics equipment through the company's part ownership in Sextant, however, Aerospatiale currently welcomes inquiries and proposals directly from prospective suppliers. The company has extensive industrial collaborations and interests in Canada.

(refer to Exhibit 33 for Aerospatiale contact names and coordinates)

British Aerospace Operations Ltd (UK) (Appendix 3)

British Aerospace (BAe) was formed as a nationalized group after the consolidation of British Aircraft Corp., Hawker Siddley, and other aerospace and defence state interests. In the early 80's, the UK government sold BAe over two stages and became a widely held public limited company. Soon after, the company diversified into areas including the automotive and construction sectors. Serious losses in the early 90's lead to a major restructuring and divestiture of its automotive activities to focus on its core business related to defense and commercial aerospace.

The Commercial Aerospace division operates autonomously from defense and is currently organized into 4 business units which include BAe Airbus, Regional Aircraft (Jetstream & AIR) and Aerostructures. BAe Operations Ltd is a separate legal entity with three business streams including Airbus business, Filton Aerostructures (separate legal entity and profit centre) and Aviation services.

The Airbus business unit is responsible for management of BAe's 20% interest in AI and executing its negotiated work share as well as for manufacturing wings and fuselage sections for the Hawker 800 and 1000 programs. Filton Aerostructures manufactures other structural components and parts for BAe's work share as well

as the centre fuselage for the Avro RJ Regional Jet. Aviation services is another separate company within BAe Operations Ltd and engages in heavy maintenance of larger commercial airliners, conversions of VC10 airliners into air-to-air tankers, and Liverpool airport maintenance.

BAe Operations Ltd is headed by Chris Geoghegan and various programs are supported by functional areas in a matrix organization (Exhibit 21). Procurement for the Airbus Business unit takes place at Filton within the Product Operations Directorate along with Engineering and Manufacturing. The procurement department is headed by Alan Wakeham and is organized into 4 distinct areas including equipment, airframe, materials, and non-production (Exhibit 22). Procurement has been closely aligned with engineering, accordingly, each of the department's procurement officers works with an engineering counterpart to facilitate product and supplier performance evaluations and to reinforce customer support. Filton Aerostructures has its own procurement department headed by John Ramsey.

BAe Airbus manufacturing and equipping of wing boxes and design activities are primarily undertaken at sites in Chester and Filton. However, some sub assemblies, and detailed machining and composites work also takes place at plants located in Brough and Samlesbury. Wheel and brake assemblies on landing gear systems are integrated at a small plant in Toulouse.

BAe Airbus procures through a system of open tenders and is pressing to become increasingly transparent, nevertheless there is still some bias towards internal supply sources in aerostructures and precision machining through its ownership in Filton Aerostructures. The company does not have system supply capabilities within the group (unlike Aerospatiale, through its interest in Sextant, is a major player in avionics systems).

(refer to Exhibit 34 for British Aerospace contact names and coordinates)

<u>Construcciones Aeronauticas S. A (Spain)</u> (Appendix 4)

CASA is the principal player in the Spanish aeronautical sector and has been quite profitable since 1993. The company was founded in 1923 and is presently owned by TENEO which is part of the very large state industrial "INI Group".

The company is organized into three divisions including Space, Aircraft, and Aircraft Maintenance. CASA's interest in AI is managed within the Aircraft division, which accounts for well over 80% of the company's turnover and engages in aircraft and component design, manufacturing and marketing (Exhibit 23).

In house products include the CN-235 (twin turboprop STOL seating 44 passengers),

C-212 (26 passengers), and the C-101 (military jet trainer). Other significant European consortium participations include Eurofighter (13%) and FLA (20%). The group has developed a reputation for its carbon fibre competencies. CASA's Airbus participation has been assuming growing significance contributing almost 25% of the group's turnover. Major procurement on all CASA programs are negotiated by Mr. Javier Matallanos, Director of Material and Logistics, who's department works closely with the program directors in a matrix format (Exhibit 24). Responsibility for CASA's interest in Airbus rests with its program director, Mr. Carlos Gutiérrez, who reports directly to the Vice President -Programs, Mr. Luis Munoz (Exhibit 25). The company's involvement in Airbus programs is focussed predominantly on the design and manufacturing of horizontal stabilizers and a variety of passenger and landing gear doors.

A significant portion of work related to CASA's Airbus work share is carried out within the group at factories located in Cadiz, Getafe, San Pablo, and Tablada. The balance is carried out by a host of predominantly Spanish subcontractors and suppliers and a limited number of foreign firms with carbon fibre competencies.

CASA aims to maintain its position in composite structures and is also striving to assume an expanded role in Airbus programs if it can increase its participation in the Airbus GIE or if present guidelines surrounding the distribution of work share are relaxed in favour of more market oriented approaches.

(refer to Exhibit 35 for Construcciones Aeronauticas S.A. contact names and coordinates)

<u>Daimler Benz Aerospace Airbus (Germany)</u> (Appendix 5)

The purchase by Daimler Benz of Deutsche Aerospace in the early 90's from German state interests represents the culmination of the German aerospace sector's consolidation dating back from the 1960's. Currently, Daimler Benz Aerospace (DASA) represents one business within the diversified Daimler Benz group. DASA is organized into four divisions including Aeronautics, Space, Propulsion, and Defense. The aeronautics division is in turn organized into five operational centres including Airbus, Regional Aircraft, Military Aircraft, Eurocopter, and Fokker (Exhibit 26).

DASA has been undergoing a major restructuring over the past two years culminating with the present "Dolores" program. A significant portion of the company's cost base is in DM while its revenues are based on US dollars. As a result, the strengthening DM has placed serious pressure on DASA's cost structure.

The object of "Dolores" is to reduce this exposure by moving a significant portion of its cost base into US dollars zone. The outcome of' "Dolores" will result in

possible closures of additional facilities including those located in Speyer and Laupheim. Over the past two years, DASA has closed plants in Lemwerder and Munich and reduced personnel by more than 3600. While keeping its core production activities, DASA could potentially move some other primary and secondary structures and component manufacturing activities outside Germany where there is considerable world excess capacity. Other factories are located in Bremen, Dresden, Nordenham, Stade, and Varel. The Stade facility is a world class composite material centre.

Final assembly of the A321 and A319 and major fuselage sections on other Airbus programs takes place in Hamburg-Finkenwerder. Management of the Airbus Spares centre in Hamburg has also been negotiated into DASA's work share. Primary responsibility for procurement rests within the Materials management functional area which is headed by Mr. Reiner Oelwein (Exhibit 27). Procurement for "flying parts" is headed by Mr. Werner Muenster, who's department is organized into four product areas including Raw Materials, Aircraft Equipment (systems), Customized Equipment, and Aerostructures (Exhibit 28). The Airbus division is also engaged in Fokker and Dornier programs as well as a limited military business unit.

Past Canadian supplier involvement is notably disappointing with DASA Airbus. This likely stems from both a lack of knowledge of Canadian capabilities on the part of DASA (as sourcing efforts are concentrated in the US through satellite procurement offices) and a lack of aggressiveness towards this market on the part of the Canadian sector; however, the company stresses that it remains open to proposals which may help to meet its current challenges.

(refer to Exhibit 36 for Daimler Benz Aerospace Airbus DmbH contact names and coordinates)

Supplier and Product Qualifications

Each partner is responsible for designing and developing all structures, components, systems and procures all that is required in accordance with its negotiated work share. While the partners have developed their own stringent supplier and product qualification criteria, each partner recognizes the other's qualification procedures thereby eliminating the need for requalification with other Airbus partners.

The basic requirements for a company to qualify as a vendor to the independent procurement departments of the AI partners remains fairly consistent and would be initiated only if there is a reasonable likelihood of a potential future contract. Suppliers are evaluated by Airbus partner procurement departments on the basis of their ability and willingness to meet the demanding aspects of aircraft construction.

To ensure the prospective supplier is capable of remaining a reliable source for

supply and support over the life of the program, a thorough review of its financial stability and production facilities is carried out. Furthermore, an in depth assessment of the firm's ability to provide maintenance and warranty support in strict accordance with the "World Airline Supplier Guide" is undertaken by evaluating the infrastructure and organization in place as well as by reviewing "track records".

Other important considerations involve the firms ability to meet the partners' production methodologies (ie. JIT) and delivery lead-time and reliability. The quality standards required depend on the nature of the expected commercial relationship. Prospective suppliers engaged in engineering, manufacturing, installation, and support, generally call for ISO-9001, AQAP-1, and/or MIL-Q-9858A certification (and AQAP-13 for software developers).

Commercial relationships which do not require engineering from the supplier (therefore it is not necessary to audit processes built into engineering phase to secure product quality) must generally meet ISO-9002, AQAP-4, and/or MIL-I-45208A.

For the supply of non-critical components, and where the prospective supplier's activities and quality system corresponds to supplying products whose quality is assured by a final inspection only, ISO-9003, AQAP-9, and/or MIL-I-45208A is necessary.

The supplier certification process can take from four months to well over a year and can be quite costly. Certification by FAA (US), JAA (Europe), other major aircraft manufacturers such as Boeing, McDonnell Douglas, Canadiar, or de Havilland, and the "Coordinating Agency for Supplier Evaluation", can help to expedite this process. Costs for certification can be born by the supplier, however, this may depend on commercial considerations.

The Product qualification process is also carried out independently by the respective partners. Generally, the relevant partner prepares a product profile outlining the specifications and performance and develops a program to test adherence to the product definition.

Tests are carried out by either the applicant or an independent testing facility and the results therefrom are forwarded to the partner for evaluation. The partner then accepts or rejects the product based on its ability to meet the predetermined criteria. Once again, prior product certifications can help facilitate the process and costs can be born by the supplier, but depend largely on commercial considerations.

Suppliers of Buyer furnished equipment must also comply with the same procedures. No exceptions are made in situations where a particular carrier demands a specific product from a specific supplier (Appendix 6).

Environmental Analysis

Although expected air travel growth will favourably impact the demand for new large civil aircraft, the short term implications to aircraft manufacturing are stifled in view of both demand and supply side issues. The Gulf War of 1990 coincided with a general recession among industrialized countries and the demand for air travel proved especially sensitive to this downturn, resulting in a 3% decrease in the number or revenue passenger miles for the first time since the commencement of jet travel. These factors inflicted severe damage to airliners, which are only just starting to see signs of a return to profitability. Furthermore, by 1994, there continued to exist considerable excess inventory of usable aircraft on the market. The following will summarize the demand and supply side conditions to large aircraft manufacturers such as Airbus and its suppliers:

Demand-Side Conditions

The aircraft manufacturing industry faces uncertain markets over the next decade, with the strongest growth expected to occur in the Peoples Republic of China (PRC) and other countries in the Asia/Pacific Rim. Airbus forecasts that by the year 2014, these markets will exceed those of both Europe and North America.

Although European and North American markets will continue to remain important, the increasing relevance and leverage of Asian markets will force manufacturers to accommodate those nations which aspire to develop indigenous aerospace sectors. The Airbus consortium decision to locate a $40 million training facility in the PRC was motivated by the future strategic importance of this market.

The international airline industry continues to operate in the midst of major restructurings. Earlier signs included numerous code-sharing agreements that link together the flight schedules of North American, European and Asian international carriers and the cross-ownership of shares. Sales contracts for large civil aircraft are usually few in number and of significant magnitude. As the airline industry continues to restructure and consolidate in this fashion, manufacturers of large commercial aircraft can expect further strengthening of buyer power which will be felt throught the supply chain.

International airlines are also faced with serious cost reduction challenges. Low ticket prices and excessive airline capacity necessitates higher utilization of existing fleets, postponement of new orders, and significant efforts to reduce operating costs. By the end of 1994, approximately 350 stored aircraft existed which could enter into service immediately. To compete with idle existing inventory, new products must demonstrate far reaching operating cost advantages. As an example, in recent negotiations with the American carrier Valuejet, demands for minimal capital outlays were exacerbated by demands for guaranteeing operating costs.

Commercial airlines are still financially weak as a result of the recession of the early 1990's. Even with a return to profitability, the massive volume of financing required to facilitate the aircraft deliveries projected over the short to medium term is expected to be beyond the financial capacity of the customers themselves. Manufacturers and governments are under pressure to provide acquisition financing until private capital returns to the aircraft financing scene in a meaningful manner. As an example, to facilitate the huge order place by Saudi Arabia with Boeing and McDonnell Douglas, the US government's Export-Import Bank provided the trade financing guarantees. Also noteworthy is the creation of Airbus Financial Corporation which aims to be in a position to structure Airbus aircraft acquisition financing within five years. Aeroengine suppliers are already participating in the financing game and this trend could eventually impact other major system suppliers.

The market is generally well-served by existing product offerings, with relatively few uncontested market niches except in the larger capacity segment (Exhibit 31). Given the continuing requirement for massive up-front development costs, far fewer new aircraft programs are likely to be launched over the next decade than in the past. Suppliers who aspire to continue will face substantial pressure to participate on the few new aircraft programs that are announced.

Suppliers to the large aircraft manufacturers face even more serious challenges. Not only are pressures from airlines on aircraft manufacturers pushed down to the supplier level, suppliers have far fewer choices of customers with whom to potentially do business. The intense rivalry between the major aircraft manufacturers often means having to choose allegiances.

Supply-Side Conditions

The existing supply chain has production capacity that exceeds the market's foreseeable requirements, particularly in areas of primary and secondary aerostructures and precision machining. Despite this low capacity utilization, a new host of competitors are likely to appear to the year 2000.

The expansionary plans of the infant aircraft sectors of emerging Asia/Pacific Rim countries are supported by financially strong and committed states. In other cases, most notably Japan and South Korea, established and capable industries are poised for a much more prominent role in the international industry. Since the strongest market growth is expected to occur in the Pacific Rim, aspiring or emerging aerospace nations there will be hoping to leverage their procurement to obtain increased work shares within the international aircraft supplier hierarchy. The Chinese approach towards the development of a 100 seat aircraft represents a prime case of this emerging trend.

Former USSR and Eastern bloc nations already tend to possess competent and low-

cost capabilities and can provide prime manufacturers with both lower cost production opportunities and the prospect of sales growth in non-traditional markets over the longer term. Governments in these economically depressed regions will be seaking to integrate their aircraft industries into the international supply chain to stimulate new sources of urgently needed western currency. As an example, Aerospatiale recently qualified the Russian firm Tupolev to manufacture titanium ribs for engine pilons since Russian materials expertise presents an attractive opportunity to provide a lower cost supplier base while also developing relationships as a longer term strategy.

Producers of civil aircraft for regional markets and aerostructures on larger aircraft may also see some erosion of their position due to the refocusing of former defence industries in both the United States and Europe. Defence contractors may attempt to convert their facilities to commercial aircraft production or to diversify into commercial activities by purchasing weak producers thereby improving their chances of survival. As an example, Raytheon Corporation's newly acquired Avro business jet subsidiary from British Aerospace will be merged with its Beach Aircraft division to rationalize the two aircraft manufacturing operations. DASA's intentions for struggling Fokker are also being closely watched.

The international industry appears likely to remain a contest for the treasuries of supportive governments. The industry's attractiveness for fostering advanced technologies and manufacturing techniques, employing highly skilled and well paid workers, generating trade surpluses, and manifesting national sovereignty in both military and economic dimensions continues to attract the fiscal resources of countries which already have developed sectors and to attract those of emerging aerospace nations. The July 92 bilateral agreement which seeks to limit the amount direct and indirect government support applies only to the US and Europe and on large civil aircraft.

In the US, recent cutbacks in defence requirements stemming from the end of the Cold War have led to a redirection of government support towards commercial markets. The strong indirect support which the US government has historically provided to the civil aircraft industry through defense procurement programs has been transforming into more direct support. In an effort to restore its dominance of the commercial aircraft market, the US government has been undertaking a $2 billion project for technology acquisition to produce a 300 seat supersonic aircraft, capable of crossing the Pacific Ocean in less than four hours.

Airbus' Response to Environmental Challenges

The emerging trends have not gone unnoticed by Airbus and the GIE partners. In essence, the Airbus responses are represented by the collective initiatives of the consortium partners in their roles as prime subcontractors with leadership from the

Airbus organization. Efforts at cost reduction have impacted all areas of the aircraft business, yet appear most focussed on the design and production operations.

Airbus and the major industrial partners have sought innovative technologies in computer-aided design and manufacturing and are encouraging their key systems and structural component suppliers to introduce compatible systems. Implementation of these systems are aimed at reducing the development time and shortening the learning curves associated with product launches, thus also reducing the importance of first mover advantages. Recently, Aerospatiale, British Aerospace Airbus, DASA, and Computervision of the US embarked on a joint development project aimed at introducing "Airbus Concurrent Design". These tools serve to integrate the design, production, and product support functions at early stages of product definition to reduce the number of hours required for aircraft assembly and costly errors traditionally experienced at the early stages of the production process.

Cost reduction initiatives have not rested solely with new programs and, while each of the Airbus partners have announced cost reduction targets in the order of 30% (with no escalation), these cost cutting efforts have been compounded by equally stringent milestones to improve responsiveness and service quality.

Direct supplier response to these measures will entail extensive value engineering efforts to simplify product functions and integration, and relaxing of specifications and tolerances where possible. These efforts may also require changes to the subsupplier base and restructuring at the direct supplier level. Uncooperative or incapable direct suppliers face the grim prospect of being replaced. To meet the stringent demands, the level of supplier integration through traditional "negotiated" approaches to sourcing is evolving into a more transparent relationship where the respective prime contractor treats the supplier as a partner to achieve common cost, quality and leadtime targets.

Risk sharing strategies are also assuming expanded importance with the Airbus partners. Historically, a portion or all non-recurring costs including tooling were reimbursed by the prime manufacturers. Moreover, the suppliers risk regarding recurring costs was largely eliminated since primes (in the case of AI - each of the industrial partners) were legally obligated to pay for the volume of components specified in the contract regardless of demand for the aircraft. Today, second tier and key third tier suppliers will be faced with increasing pressure to pay for their non recurring development costs (subject to commercial considerations) and to assume more direct exposure to market risk, thereby creating a need to develop in-house market research expertise. In concert with this transfer of risk to suppliers, the Airbus partners are shrinking their supplier networks and moving towards more single source strategic relationships.

On another dimension, the enormous costs associated with possible future programs

such as the A3XX or the SCT may result in the willingness of Airbus to seek development capital from potential suppliers/partners. The need for further consolidation of the European aerospace industry may also result in the accession of new partners in AI. Alenia of Italy has currently assumed a 20% interest in the Airbus Military Aircraft company (interest may change subject to level of government procurement of FLA and other factors).

BAe divested its struggling regional jet business and recently joined Aerospatiale and Alenia as equal partner in the AIR GIE (formerly ATR). DASA is also supporting Alenia's participation in the Airbus MRTT program in view of competencies established in developing conversion kits for the McDonnell Douglas DC10 program. These positions will likely promote the accession of Italy into the Airbus group when a new civil program is launched. Potential suppliers must monitor both the work shares negotiated by new partners and the impact on the work shares of existing partners.

As the European industry consolidates, continued rationalization can also be expected. DASA has already closed factories in Munich and Lemwerder and is currently under negotiations with Labour Councils to determine the fate of factories in Speyer and Laupheim. Discussions in France regarding the prospect of a private sector recapitalization will provoke further rationalizations at Aerospatiale. Although CASA of Spain is still in government hands, its activities appear focused and the company has been quite profitable as a result. The growing need for efficiency and rationality reinforces the challenge for Airbus to reorganize itself into a fully integrated company with a single system of cost accounting and financial oversight while maintaining the natural tensions which have been so critical to its success. In doing so, the Airbus partners may have to compromise their relative work shares in return for enhanced responsiveness to a rapidly evolving environment and improved financial performance.

The practical problems in moving in this direction stems from the issue of control. More precisely, who will exert authority over the government funds and industrial assets that have been effectively combined through the Airbus system. Furthermore, each of the partners are engaged in a variety of civil and defence programs and collaborations independent from the Airbus Consortium. Assets and resources overlap other obligations therefore making their transfer to a single entity difficult and undesirable.

These issues will not be resolved over the short term, however, suppliers can expect an evolution towards a prime contractorship model. It is too early to predict which partners, if any, would maintain procurement autonomy and the nature of work shares arising therefrom.

Opportunities for the Canadian Sector

The Canadian aerospace sector can be cautiously optimistic about its prospects for increased involvement in current and future Airbus programs. In response to an overall challenge to become much more cost conscious and responsive to customer demands, each of the Airbus partners is pushing for increased transparency, none admitted any specific European content requirements, and all recognized the Canadian sector potential and expressed an openness to proposals.

Short Term

Realistically, the ability to for the Canadian sector to respond to the Airbus "commercial challenge" in the short term will be limited in view of the fact that systems suppliers on existing programs have been selected. The partners would have to be hard pressed before removing an existing supplier thus incurring recertification costs, product manual changes and other logistical considerations.

For the most part, cost cutting efforts are directed at renegotiations with the existing supplier base, nevertheless there are occasions where inflexible or poorly performing suppliers are replaced. To become abreast of these possible developments, suppliers are encouraged to be proactive in establishing relationships with the independent procurement directorate at the relevant Airbus partner.

Alternatively, Canadian suppliers may consider getting involved indirectly through an existing supplier, which itself, will be hard pressed to carry out value engineering and "benchmarking" initiatives to redefine its products or (sub)systems and production processes and methodologies in more cost effective manners. Prime supplier lists for each of the partners with contact coordinates can be found in Appendix 8.

Canadian suppliers should seek involvement in Airbus enhanced program or new program research projects which take place either at Airbus Industrie or at the partner level Engineering directorates. Procurement directorates work closely with their Engineering counterparts, therefore, involvement at this stage presents opportunities to establish key relationships with individuals close to the final procurement decision.

Firms seeking to develop products for secondary markets should also employ pro-active approaches. Requests for technical information for these initiatives should be directed to the respective Level 1 responsibility partner's Engineering Directorate and concurrently to the Airbus Industrie Engineering directorate. These requests should be accompanied by assurances for protection of proprietary property and, if possible, proof of a valid order or a request from an Airbus customer.

While there are opportunities in buyer furnished equipment, marketing strategies for these products should be primarily focused directly at the airlines. The Airbus Commercial directorate, however, is also positioned to facilitate recommendations to the airlines. Suppliers of equipment normally selected by the airline are also reminded that their firms and products must be qualified by the responsible Airbus partner.

Third tier suppliers face even stronger challenges. Traditionally, these small and medium sized firms have focussed their attentions on American producers and on built-to-print type contracts. The lack of aggressiveness towards offshore markets is evidenced through negligible involvement on Airbus programs. To become an attractive source of supply to the Airbus industrial partners, and indeed to other large civil aircraft producers, these suppliers must progress beyond simple built-to-print capability by offering engineering solutions and other value added services while simultaneously improving their production efficiencies.

Bearing this in mind, how should potential Canadian suppliers proceed ? Firstly, it is recommended that interested firms thoroughly familiarize themselves with the potential client(s) by reviewing this document as well as other information which may be publicly available in order to keep abreast of rapidly evolving developments. A good appreciation for the manner in which Airbus currently functions may avoid critical and costly mistakes and misperceptions at the introduction stage.

Secondly, firms should carry out a self assessment to determine to which Airbus partner(s) their marketing efforts should be focused while not ignoring other stakeholders which may have an impact on the procurement decision. This may entail reviewing the respective partners' work shares as outlined in the report and, where ambiguities may exist, verifying which partner is responsible for procuring the relevant product or system by contacting Airbus directly (Exhibit 32).

Finally, once the work share responsibility is established and/or research initiatives are identified, firms are encouraged to take proactive approaches to assess the demands and any particular conditions which the relevant partner is facing by introducing themselves and their products and systems (Exhibits 33-36).

As Airbus and the industrial partners are continually seeking ways to improve their competitiveness and responsiveness to market demands, follow up by way of product demonstrations, seminars, or proposals through the procurement and/or engineering directorates may serve to facilitate inclusion in future bidders lists and to provoke the supplier qualification process. Alternatively, the prospective supplier may consider working with an existing supplier if one has already been selected or, moreover, if a satisfactory relationship has been established.

Longer Term

To meet the evolving longer term trends impacting AI, and indeed many other players in the international civil aircraft industry, the Canadian sector must broaden its capabilities either through collaborative efforts, negotiating expanded product mandates and/or by financing the development of broadened capabilities internally.

Collaborative efforts offer a risk sharing approach to firms seeking to expand their capabilities and markets. The Canadian sector can look to the Airbus model which successfully reconciled the diverse and conflicting interests of its industrial partners by setting clear and overriding objectives and by effectively combining the resources and expertise of the industrial partners through clear and stable mandates.

The Airbus case also demonstrates the effective role governments can play in developing key economic sectors. The respective national European governments of each of the industrial partners played a catalytic and integral role in adding credibility and staying power to the Airbus initiative. Moreover, in a world context, there are few signs that competing nations are willing to reduce support for their respective industries. Traditionally, the Canadian industry has also enjoyed a successful partnership with federal and provincial governments to become a serious player in international aerospace. While Canada is demographically small with fewer resources than its US and European counterparts, efforts can be made to target the limited resources and policy tools to assist Canadian companies in meeting the evolving industry requirements and in maintaining a level playing field with the respective industries of competing nations.

The issue of government support is beyond the scope of this study; nevertheless, the issue is raised to draw a parallel to its significance in the Airbus case.

AIRBUS INDUSTRIE

EXHIBITS 1 - 34

The Airbus Industrie system

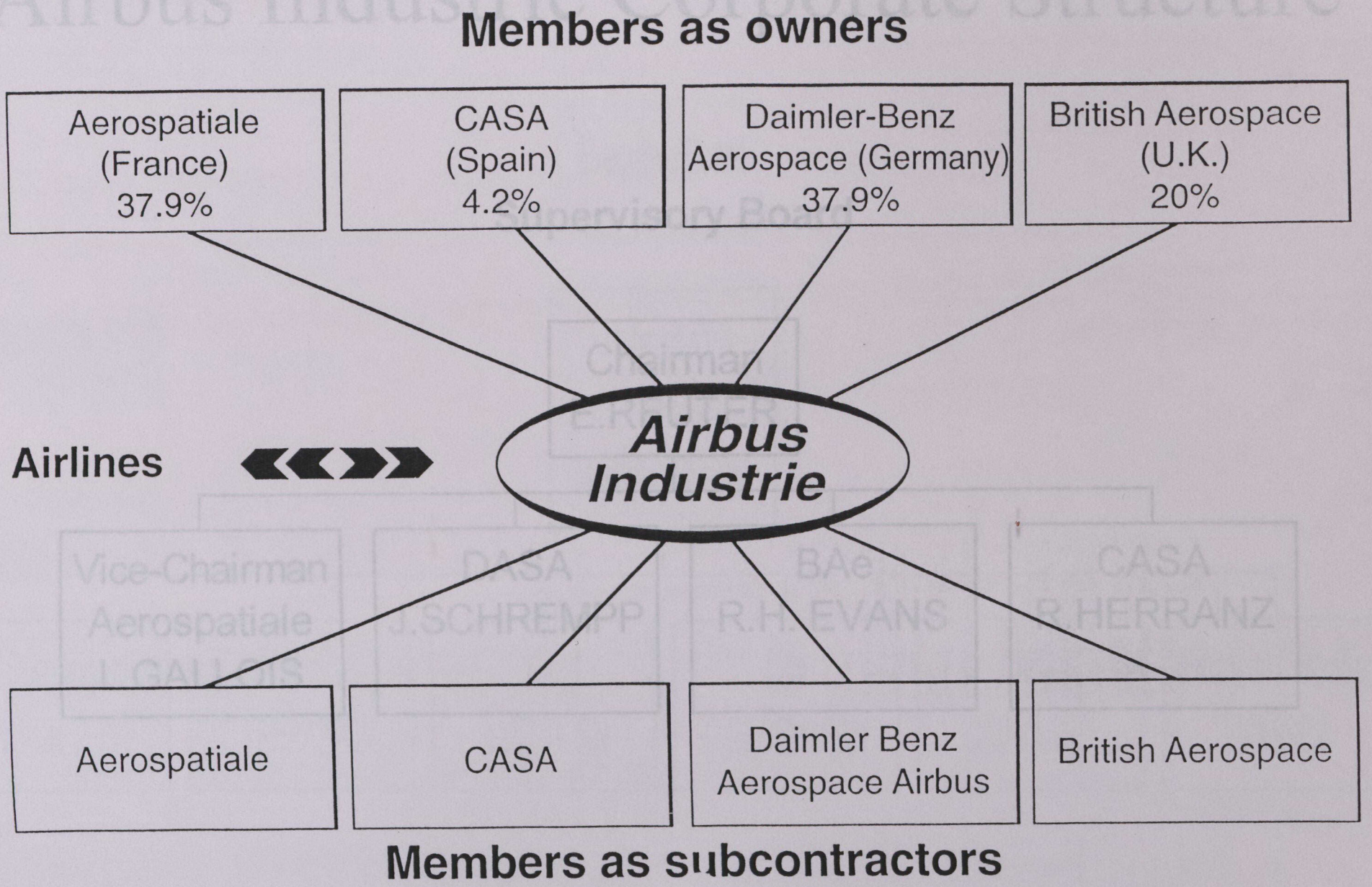

Exhibit 1

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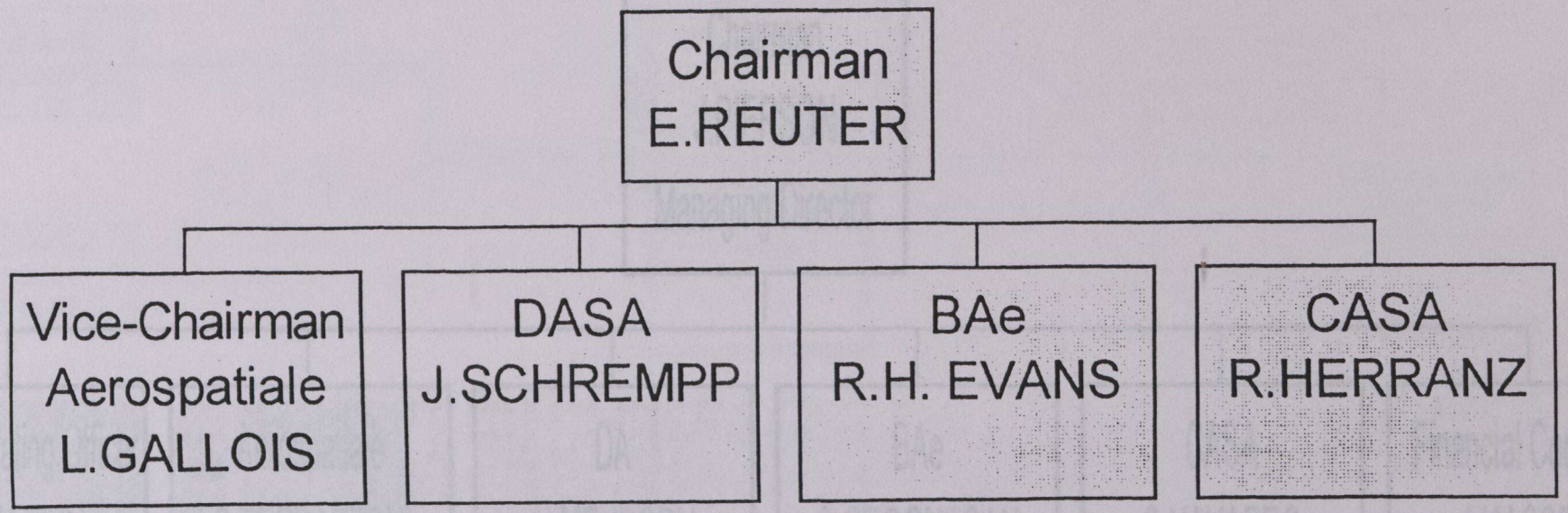
Exhibit 1

The Airbus Industrie System
Members as owners
Aerospatiale (France) 37.9%
CASA (Spain) 4.2%
Daimler-Benz Aerospace (Germany) 37.9%
British Aerospace (U.K.) 20%
Airbus Industrie
Airlines
Members as subcontractors
Aerospatiale
CASA
Daimler Benz Aerospace Airbus
British Aerospace

Airbus Industrie Corporate Structure

Exhibit 2

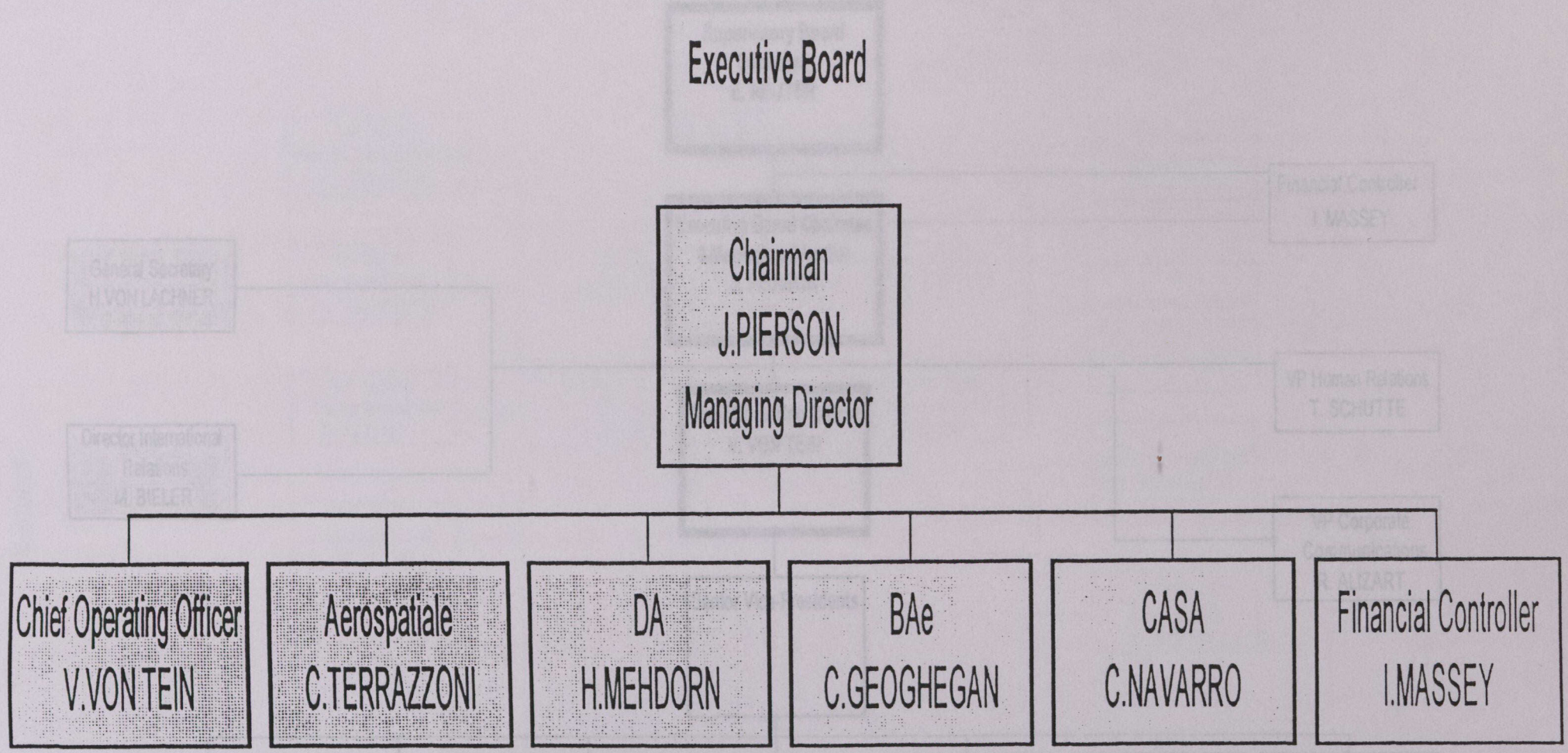


Airbus Industrie Corporate Structure

Exhibit 2

Airbus Industrie Corporate Structure

Exhibit 3



Airbus Industrie Corporate Structure

Exhibit 3

Airbus Industrie

Airbus Industrie organisation

Exhibit 4

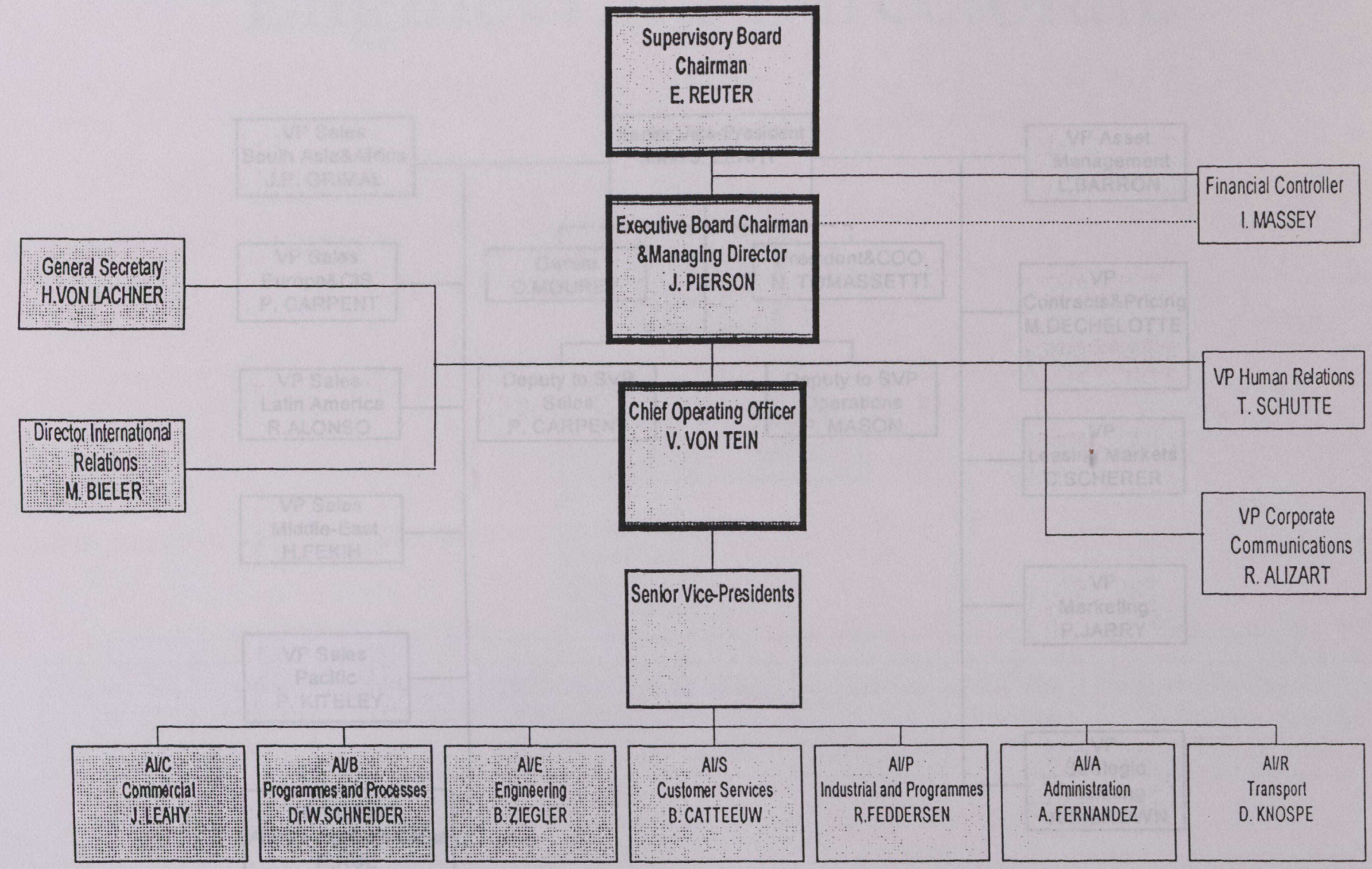


Exhibit 4

Airbus Industrie organisation

COMMERCIAL DIRECTORATE

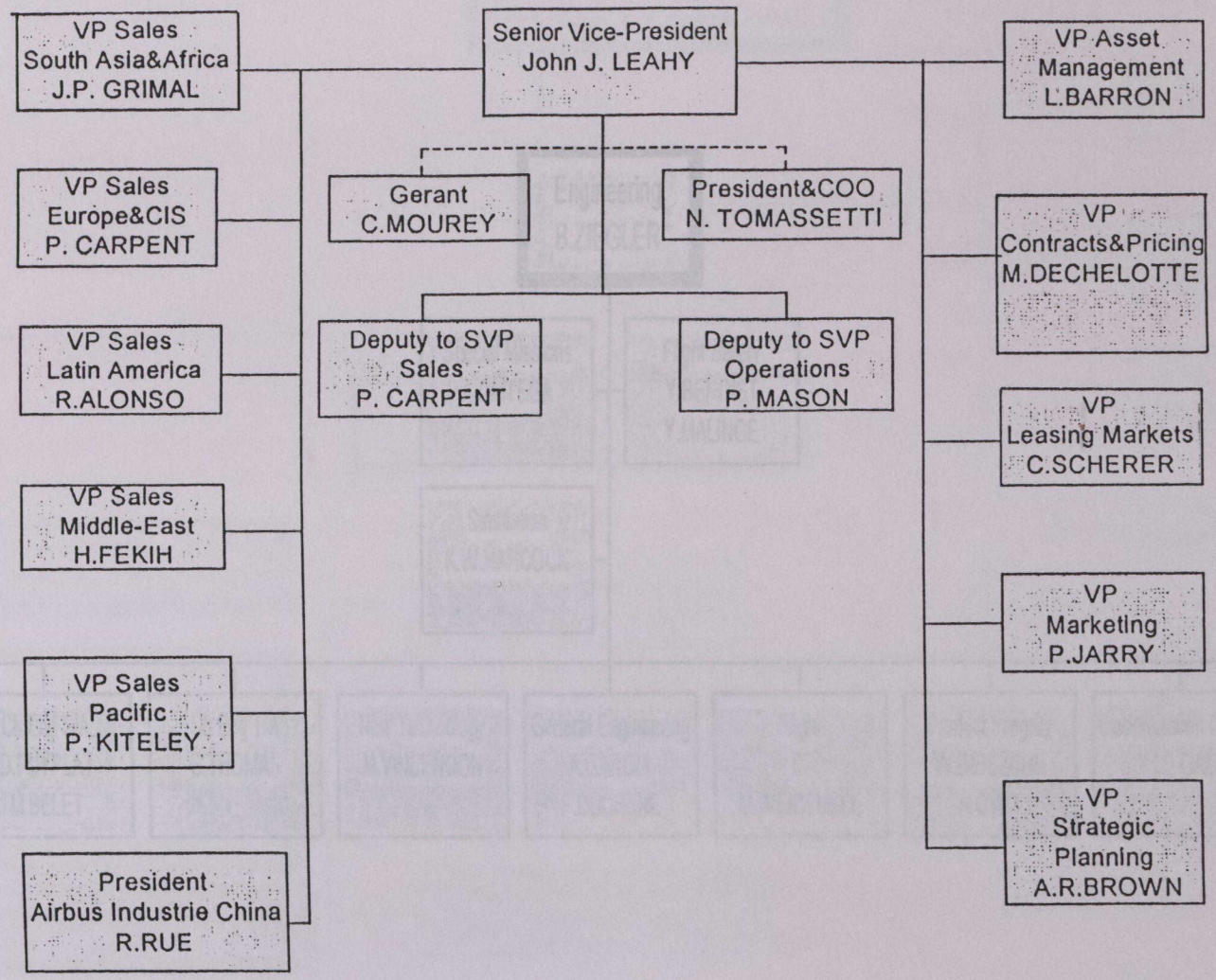


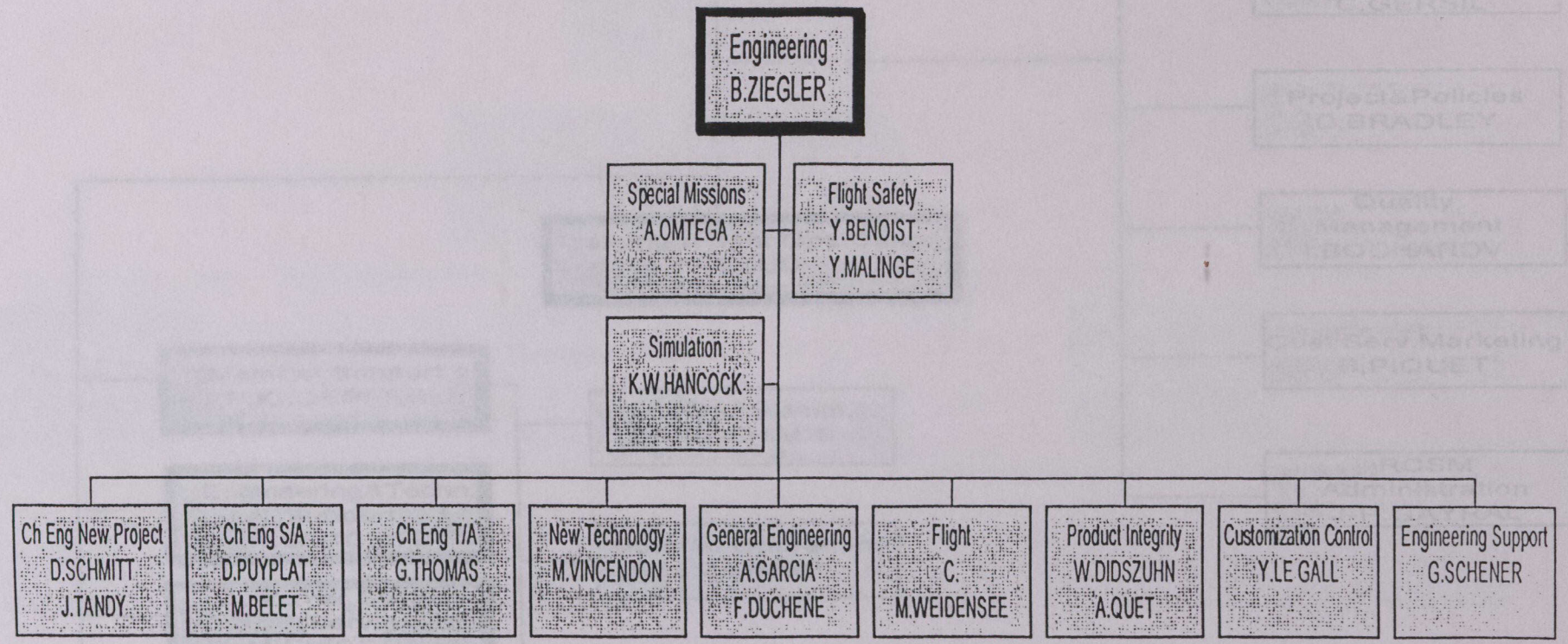
Exhibit 5

COMMERCIAL DIRECTORATE

Airbus Industrie

Engineering Directorate

Exhibit 6

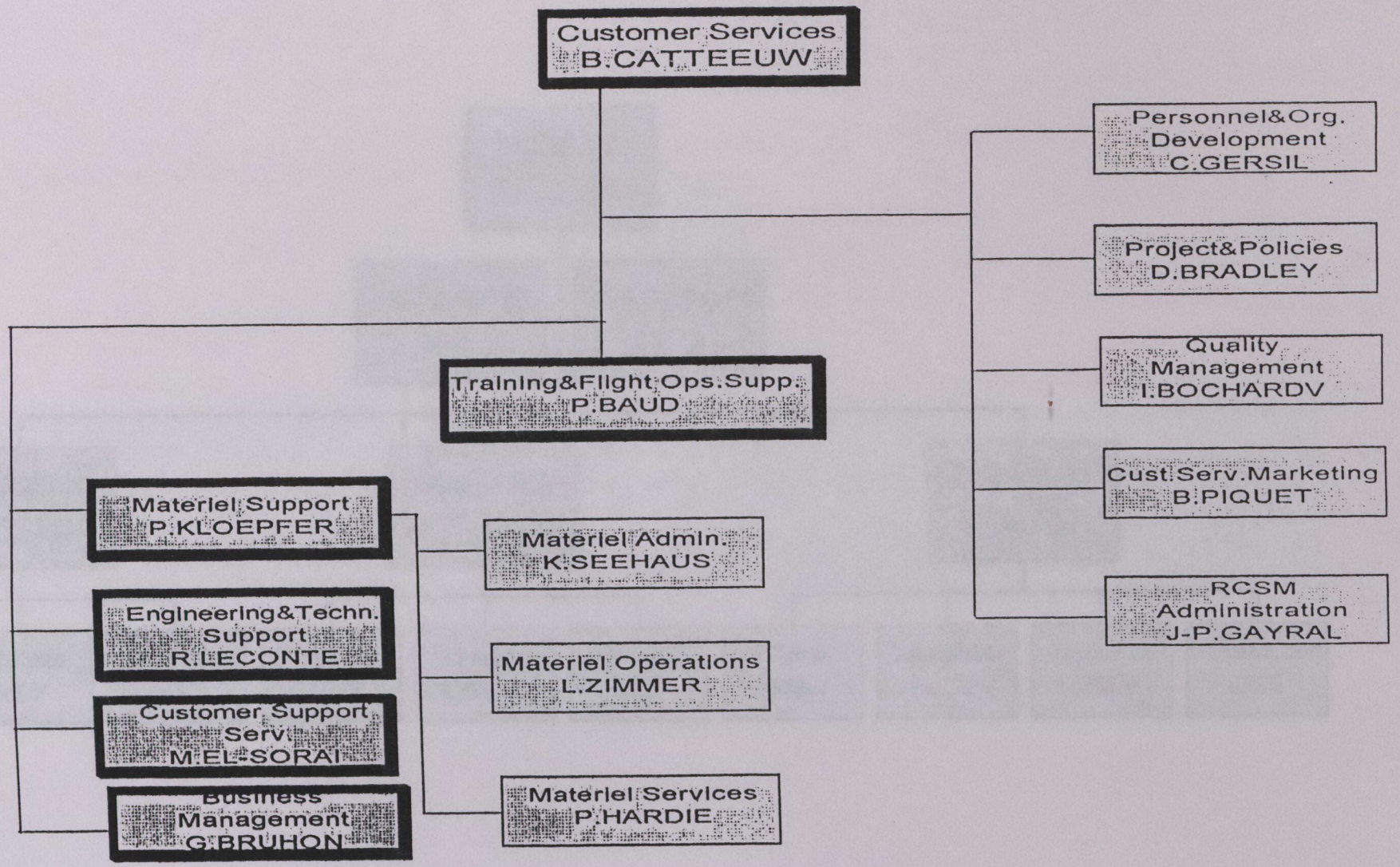


Engineering Directorate

Airbus Industrie

Customer Services Directorate

Exhibit 7



Customer Services Director

Airbus Industrie

Industrial Directorate

Exhibit 8

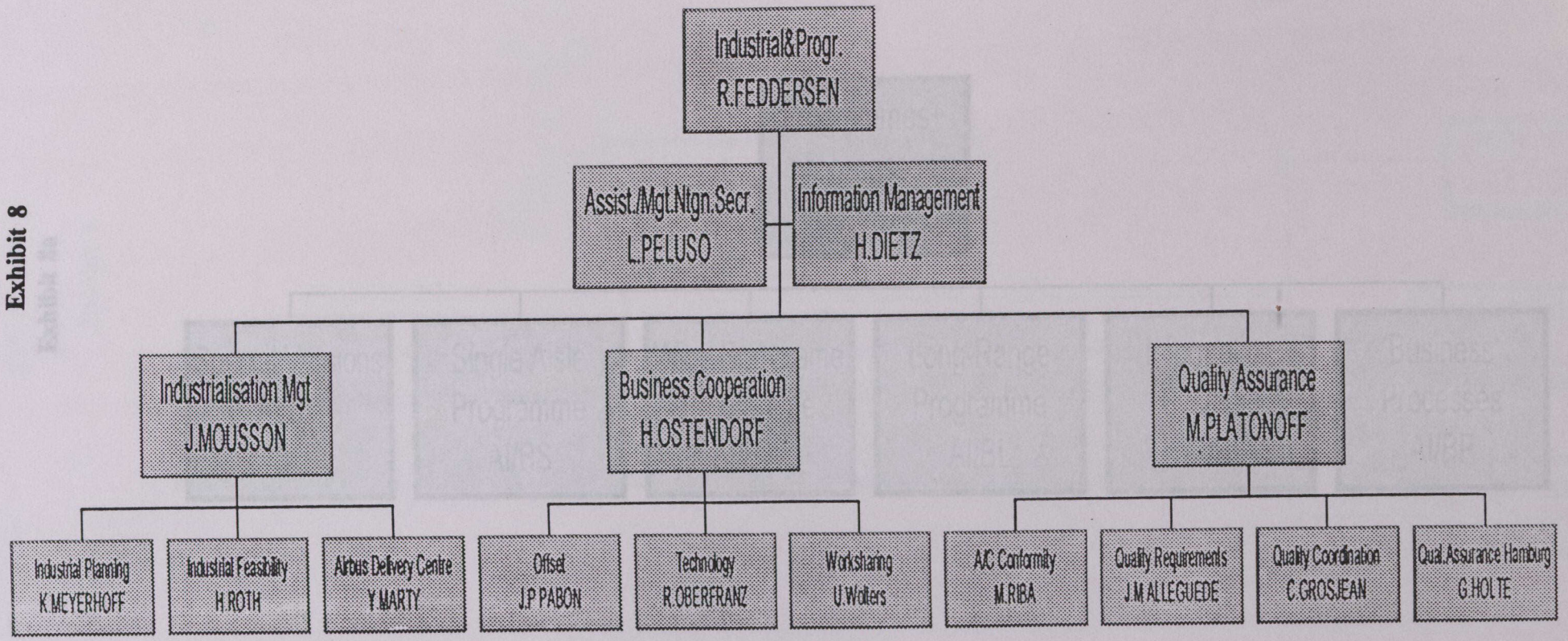


Exhibit 8

Industrial Directorate

Airbus Industrie

Programmes and Processes

Exhibit 8a

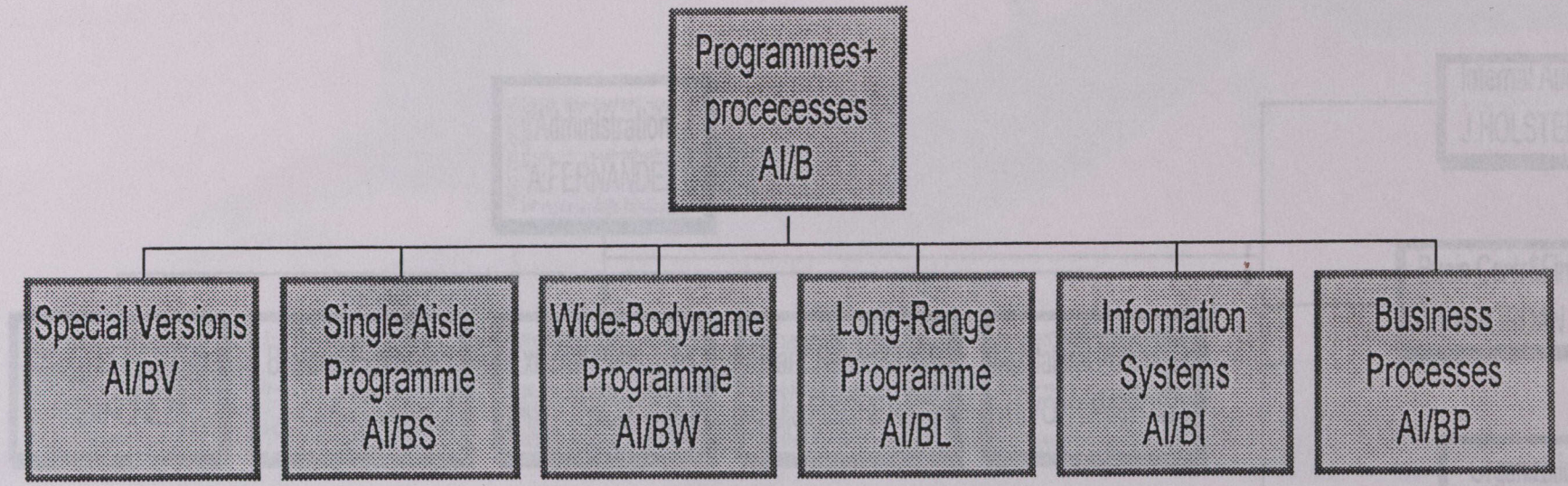


Exhibit 8a

Programmes and Processes

Airbus Industrie

Administration Directorate

Exhibit 9

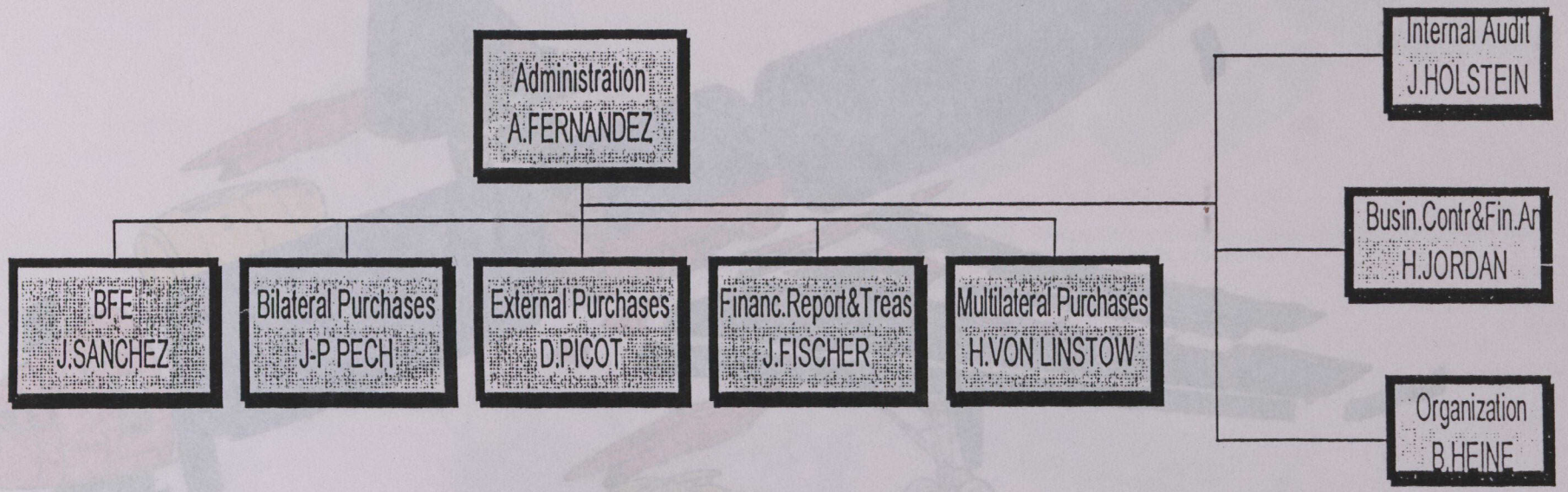


Exhibit 9

Administration Directorate

A300-600 production sharing

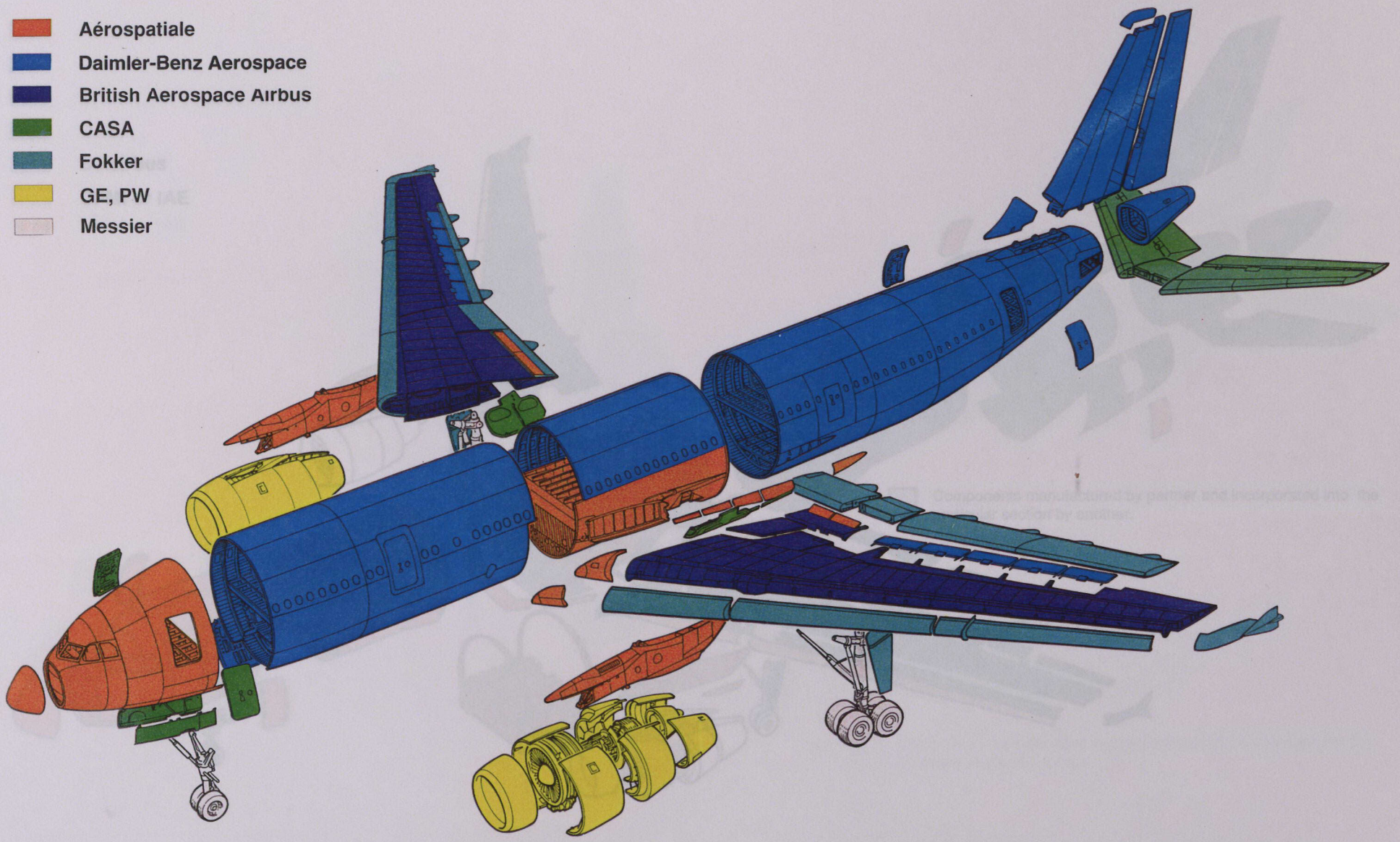


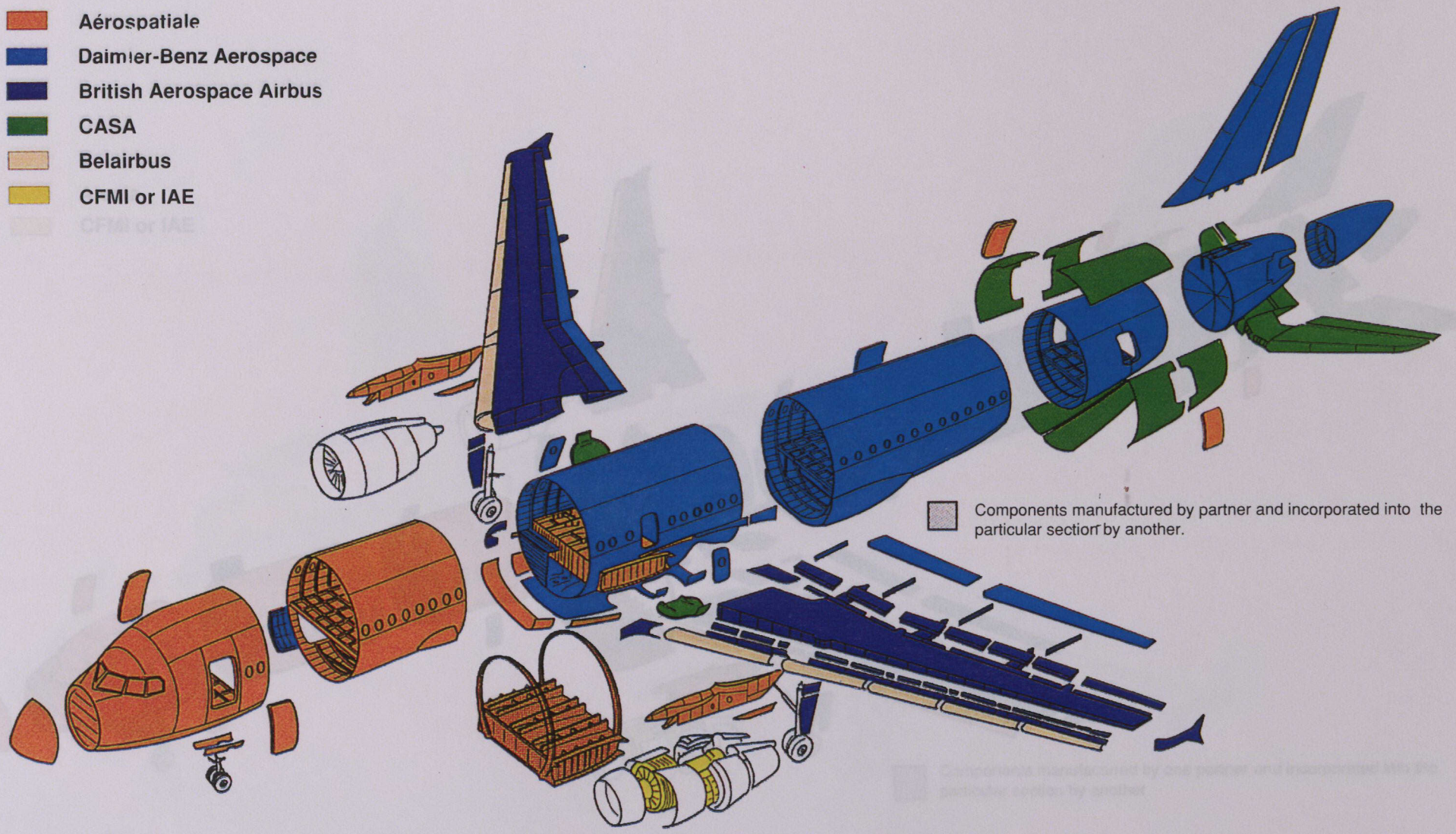
Exhibit 10a

Exhibit 10a

A300-600 production sharing

A319 production sharing

- Aérospatiale
- Daimler-Benz Aerospace
- British Aerospace Airbus
- CASA
- Belairbus
- CFMI or IAE



Components manufactured by partner and incorporated into the particular section by another.

Exhibit 10b

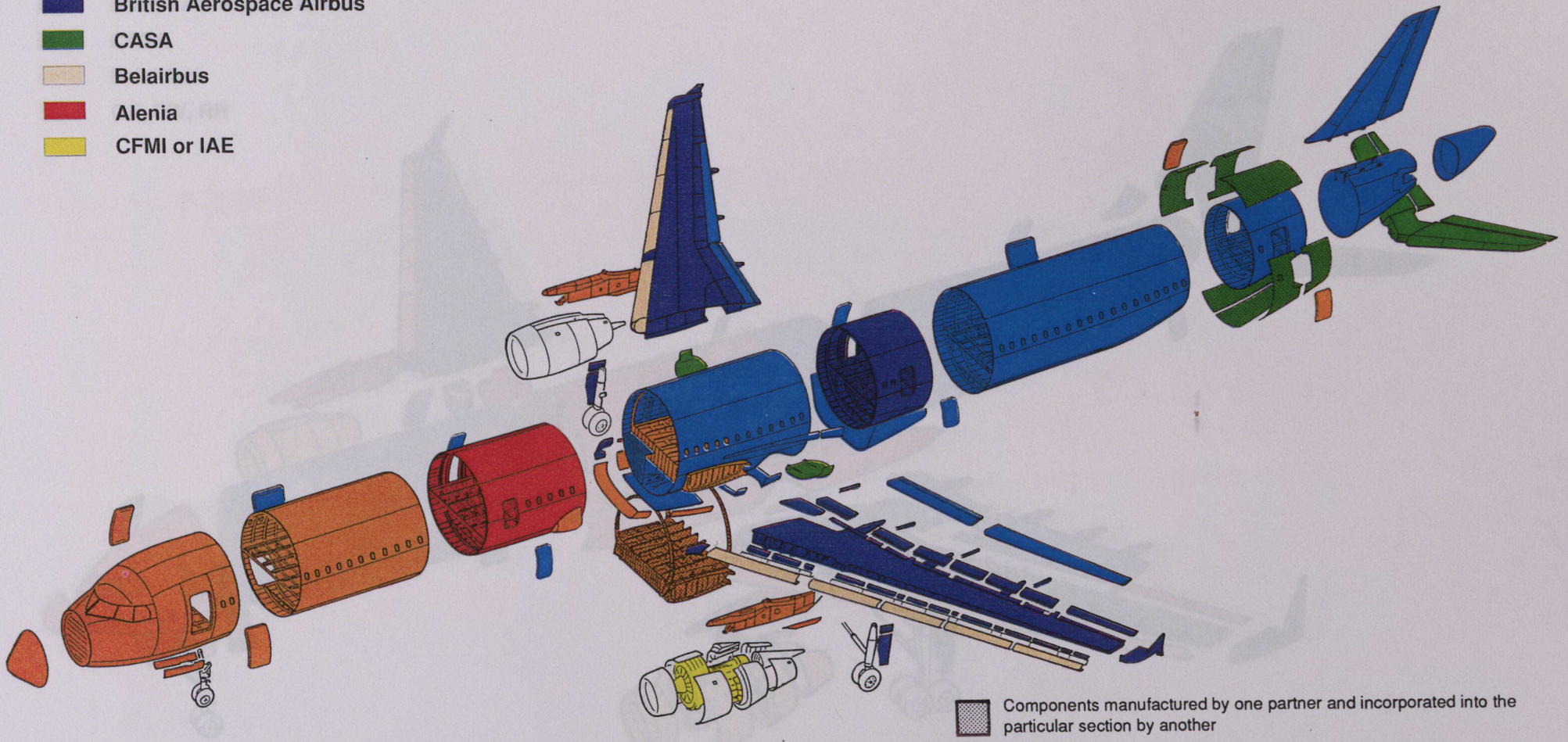
Exhibit 10b

A319 production sharing

A321 production sharing

Exhibit 10c

- Aérospatiale
- Daimler-Benz Aerospace
- British Aerospace Airbus
- CASA
- Belairbus
- Alenia
- CFMI or IAE



Components manufactured by one partner and incorporated into the particular section by another

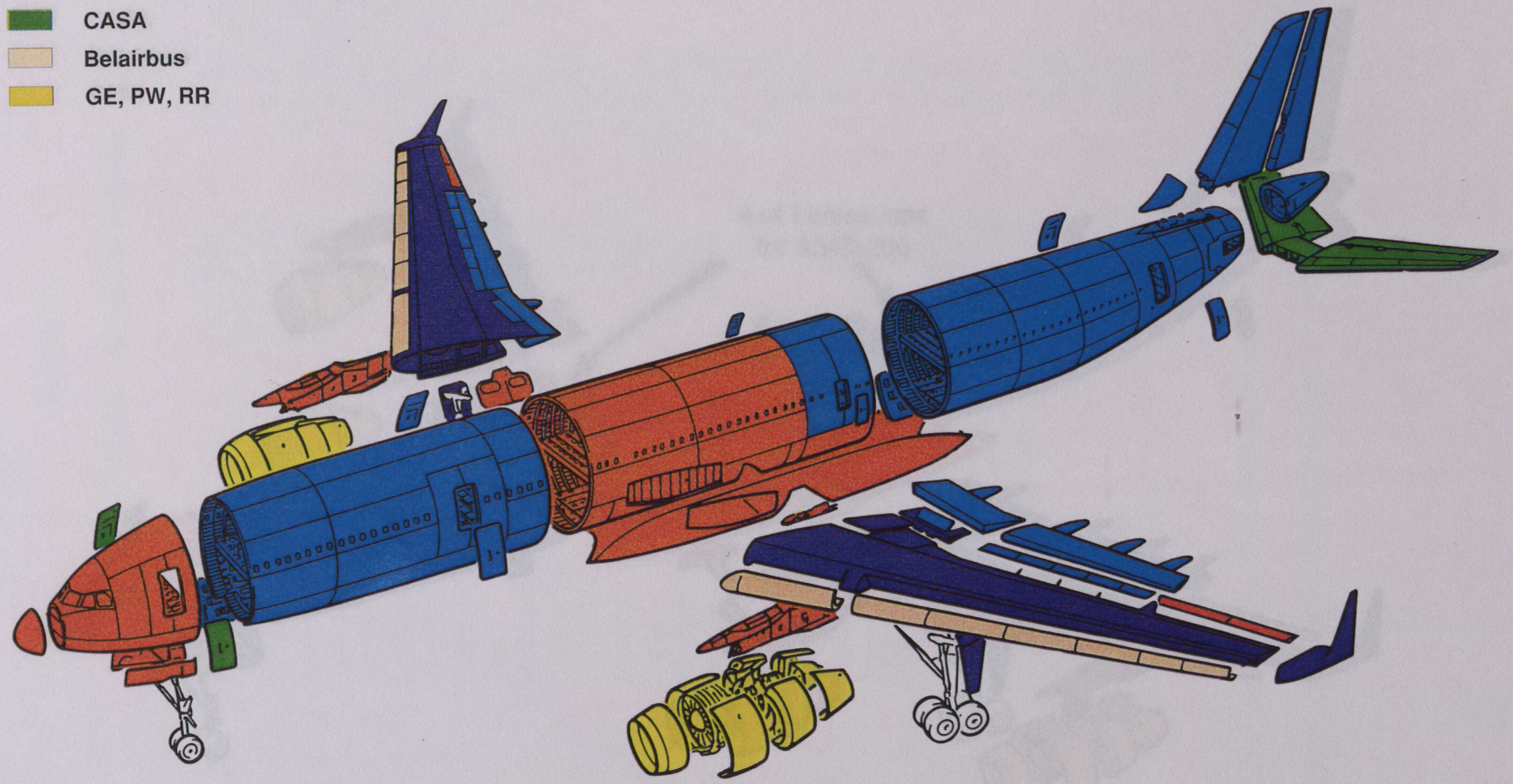
Exhibit 10c

A321 production sharing

A330 production sharing

Exhibit 10d

- Aérospatiale
- Daimler-Benz Aerospace
- British Aerospace Airbus
- CASA
- Belairbus
- GE, PW, RR



A330 production sharing

A340 production sharing

- Aérospatiale
- Daimler-Benz Aerospace
- British Aerospace Airbus
- CASA
- Belairbus
- CFMI

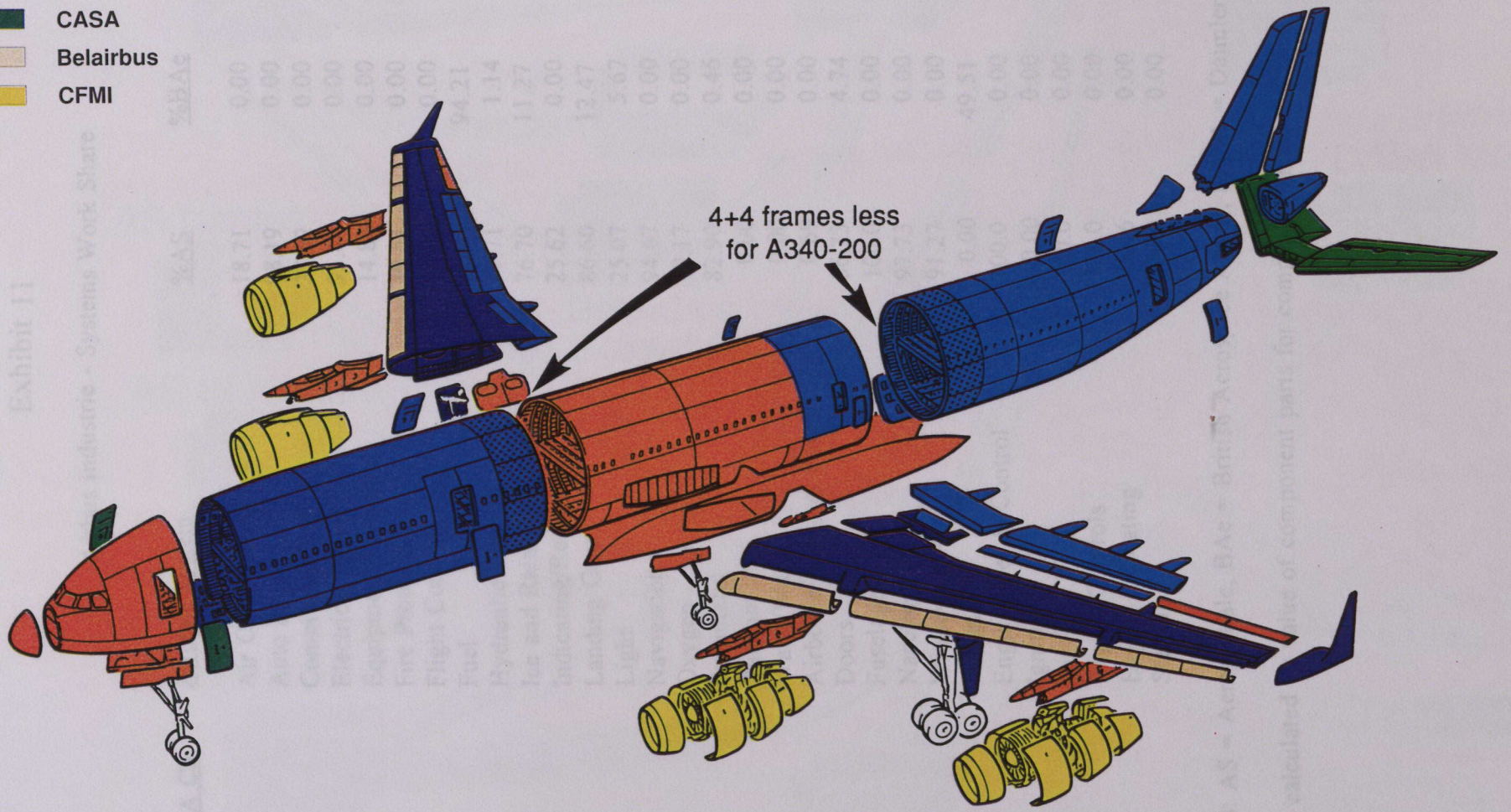


Exhibit 10e

Exhibit 10e

A340 production sharing

Exhibit 11

Airbus Industrie - Systems Work Share

ATA Ch.	Aircraft System	%AS	%BAe	%DASA
21	Air Conditioning	18.71	0.00	81.29
22	Auto Flight	98.19	0.00	1.81
23	Communication	35.62	0.00	64.38
24	Electrical Power	93.44	0.00	6.56
25	Equipment/Furnishing	14.80	0.00	85.20
26	Fire Protection	49.51	0.00	50.49
27	Flight Controls	61.23	0.00	38.77
28	Fuel	0.07	94.21	5.72
29	Hydraulic Power	67.71	1.14	31.15
30	Ice and Rain Protection	76.70	11.27	12.04
31	Indicating/Recording	25.62	0.00	74.38
32	Landing Gear	86.60	12.47	0.93
33	Light	25.07	5.67	69.26
34	Navigation	94.67	0.00	5.33
35	Oxygen	19.17	0.00	80.63
36	Pneumatic	82.90	0.46	16.65
37	Vacuum	0.00	0.00	100.0
38	Water/Waste	0.00	0.00	100.0
49	Airborne Auxilary Power	0.69	0.00	99.31
52	Doors	36.73	4.74	58.54
53	Fuselage	100.0	0.00	0.00
54	Nacelles/Pylons	97.73	0.00	2.27
56	Windows	91.27	0.00	8.53
57	Wings	0.00	49.51	50.49
73	Engine Fuel & Control	100.0	0.00	0.00
74	Ignition	0.00	0.00	100.0
75	Air	100.0	0.00	0.00
76	Engine Controls	100.0	0.00	0.00
77	Engine Indicating	95.16	0.00	4.84
80	Starting	100.0	0.00	0.00

NB: AS = Aerospatiale, BAe = British Aerospace Airbus, DASA = Daimler Benz Airbus

(% calculated by value of component parts for complete system)

Airbus Industrie production flow

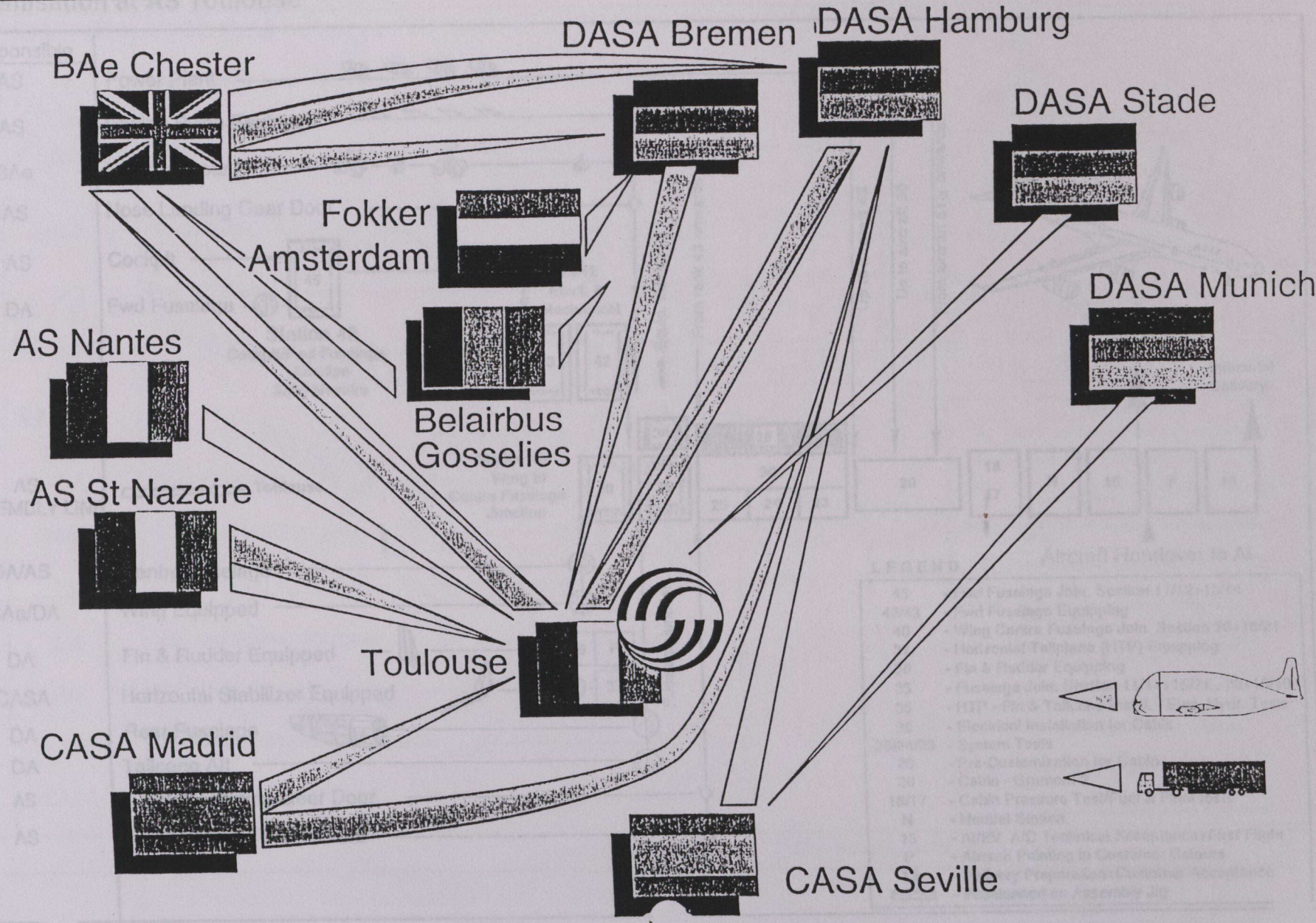


Exhibit 12

Exhibit 13

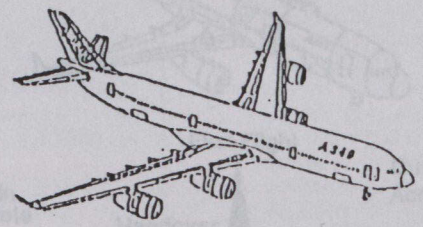
Airbus industrie production flow

A340 Final Assembly Line

Aircraft customisation at AS Toulouse

Exhibit 13

Section	Responsible	
	AS	Power Plant
41	AS	Engine Pylon Equipped
	BAe	Landing Gear
	AS	Nose Landing Gear Door
11/12	AS	Cockpit
13/14	DA	Fwd Fuselage
	AS ASSEMBLY LINE	Toulouse
15/21	DA/AS	Centre Fuselage
20	BAe/DA	Wing Equipped
31	DA	Fin & Rudder Equipped
35	CASA	Horizontal Stabilizer Equipped
16-19	DA	Rear Fuselage
19.1	DA	Tailcone Aft
-	AS	Central Landing Gear Door
-	AS	Main Landing Gear Doors



Station 45
Cockpit/Fwd Fuselage Junction
- Saint Nazaire

43/42 Elect. & Mechanical

Equip. Instal.

From rank 43 onwards

Up to aircraft 42

Up to aircraft 50

From aircraft 51y onwards

Station 40
Wing to Centre Fuselage Junction

Fuselage junction

First Flight

Industrial Delivery

Aircraft Handover to AI

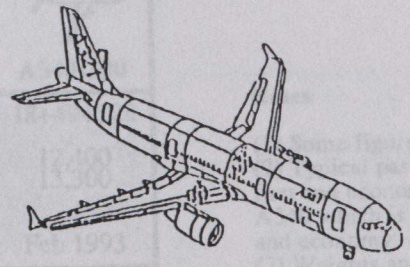
LEGEND

45	- Fwd Fuselage Join. Section 11/12+13/14
42/43	- Fwd Fuselage Equipping
40	- Wing Centre Fuselage Join. Section 20+15/21
37	- Horizontal Tailplane (HTP) Equipping
36	- Fin & Rudder Equipping
35	- Fuselage Join. Section 11/14+15/21 , 20+16/19
35	- HTP - Fin & Tailcone Instal. - Elec. Hydr. Tests
30	- Electrical Installation for Cabin
25/24/23	- System Tests
28	- Pre-Customization for Cabin
20	- Cabin - Gramont 2
18/17	- Cabin Pressure Test/Fuel & Final tests
N	- Neutral Station
15	- AI/EV A/C Technical Acceptance+First Flight
P	- Aircraft Painting in Customer Colours
13	- Delivery Preparation+Customer Acceptance
	- Positionned on Assembly Jig.

A321 Final Assembly Line

INDUSTRIAL AND PROGRAMMES DIRECTORATE

Section	Responsible	Designation
42	AS	Power plant
	AS	Radome
20	BAe	Wing equipped
11-14A	AS	Fwd fuselage
14A	ALN/DA	
16A	BAe	
15/21-19	DA	Rear Fuselage
51/52	BAe/AS	Complete landing gear
41	AS	Engine pylon equipped
31	DA	Fin and rudder equipped
19.1	DA	Tail cone
35	CASA	Horizontal stabilizer equipped
	CASA	Main landing gear doors



Toulouse 6

Electrical Power on

Hyd. Power on

Cabin complete

First Flight

Handover

Customer Acceptance

Assembly line Hamburg

41 | 40 | 35 ΔP | 25 24 | 23 F 21 | 17 | 17A | 17B | FL1 | Paint | FL2

Key positions :

6	Elect. & mechan. equip. instal. at Toulouse Section 11-14A
41	Fuselage junction. System connections
40	Wing-Fuselage-Mounting. Landing gears. Engine pylons System connections
35/ΔP	Fin & rudder. Horiz. stabil. Furnishings. Pressure test Tail cone
25/24	Landing gear doors. Filling of systems. Furnishings. PSU. System tests
23/21/F	Furnishings (carpets, class dividers, seats) Fuel leak test
17/17A	Final tests. Rest of furnishings. Cabin cleaning. Ground checks. Fuel calibration
17B	Final tests. Cabin acceptance. Communication & safety checks. Final test outside
FL1	Gound check. Flight preparation. First flight
Paint	Aircraft painting. Weighing
FL2	Customer ground check. Customer acceptance

Exhibit 14

21FAL268.DRW

Reason for reissue	Date : 03.06.04	Established by AI/PI-CPN

A321 Final Assembly Line

AIRBUS INDUSTRIE

Airbus Industrie aircraft family

Metric units
(May 95)

		Single-Aisle			Widebody-Twins			Four-engine Widebody	
		 A319	 A320	 A321	 A310-300	 A300-600R	 A330	 A340-200	 A340-300
Typical passenger load		8 + 116	12 + 138	16 + 169	20 + 200	26 + 240	30 + 305	18+42+203	18+49+228
Range with full passenger load	(km)	3,550 4,900 5,550	5,000 5,350	4,150 4,350 4,900	8,050 8,900 9,600	7,500 7,700	8,300 8,900	13,800 *15,000*	12,400 13,300
First airline delivery		Spring 1996	March 1988	Jan 1994	Dec 1985	April 1988	Dec 1993	Jan 1993	Feb 1993
Engine choice		CFM56-5A/B or V2500-A5	CFM56-5A/B or V2500-A1/5	V2500-A5 or CFM56-5B	CF6-80C2 or PW4000	CF6-80C2 or PW4000	CF6-80E1 or PW4000 or Trent 700	CFM56-5C	CFM56-5C
Engine thrust class	(kN)	98-104	111-118	133-146	230-260	249-270	284-307	140-151	140-151
Overall length	(m)	33.8	37.6	44.5	46.7	54.1	63.7	59.4	63.7
Fuselage diameter	(m)	3.96	3.96	3.96	5.64	5.64	5.64	5.64	5.64
Wingspan	(m)	34.1	34.1	34.1	43.9	44.8	60.3	60.3	60.3
Wing area	(m^2)	123	123	123	219	260	362	362	362
Wing sweep	(deg)	25	25	25	28	28	30	30	30
Overall height	(m)	11.8	11.8	11.8	15.8	16.5	16.8	16.8	16.8
Max take-off weight	(tonnes)	64.0 68.0 70.0	73.5 75.5 77.0	83.0 85.0 89.0	150.0 153.0 157.0 164.0	170.5 171.7	212.0 217.0	257.0 275.0	257.0 271.0
Max landing weight	(tonnes)	61.0	64.5	73.5 74.5 75.5	123.0 124.0	140.0	174.0 179.0	182.0 185.0	187.0 190.0
Typical operating weight empty	(tonnes)	40.1	41.8	47.9 50.6	80.8 80.8 82.6	90.3	120.3 120.6	123.1 123.8	126.9 129.3
Max payload	(tonnes)	16.9	19.2	21.6 22.6 23.5	32.2 32.2 31.4	39.7 32.0	43.7 48.4	46.9 44.2	48.1 48.7
Max fuel capacity	(litres)	23,860	23,860	23,700 26,600	61,070 68,270 75,470	68,150 73,000	97,170 98,250	139,700 155,400	140,000 141,000
Underfloor containers	(LD3)	4 (LD3-46)	7 (LD3-46)	10 (LD3-46)	14-15	22-23	32-33	26-27	32-33

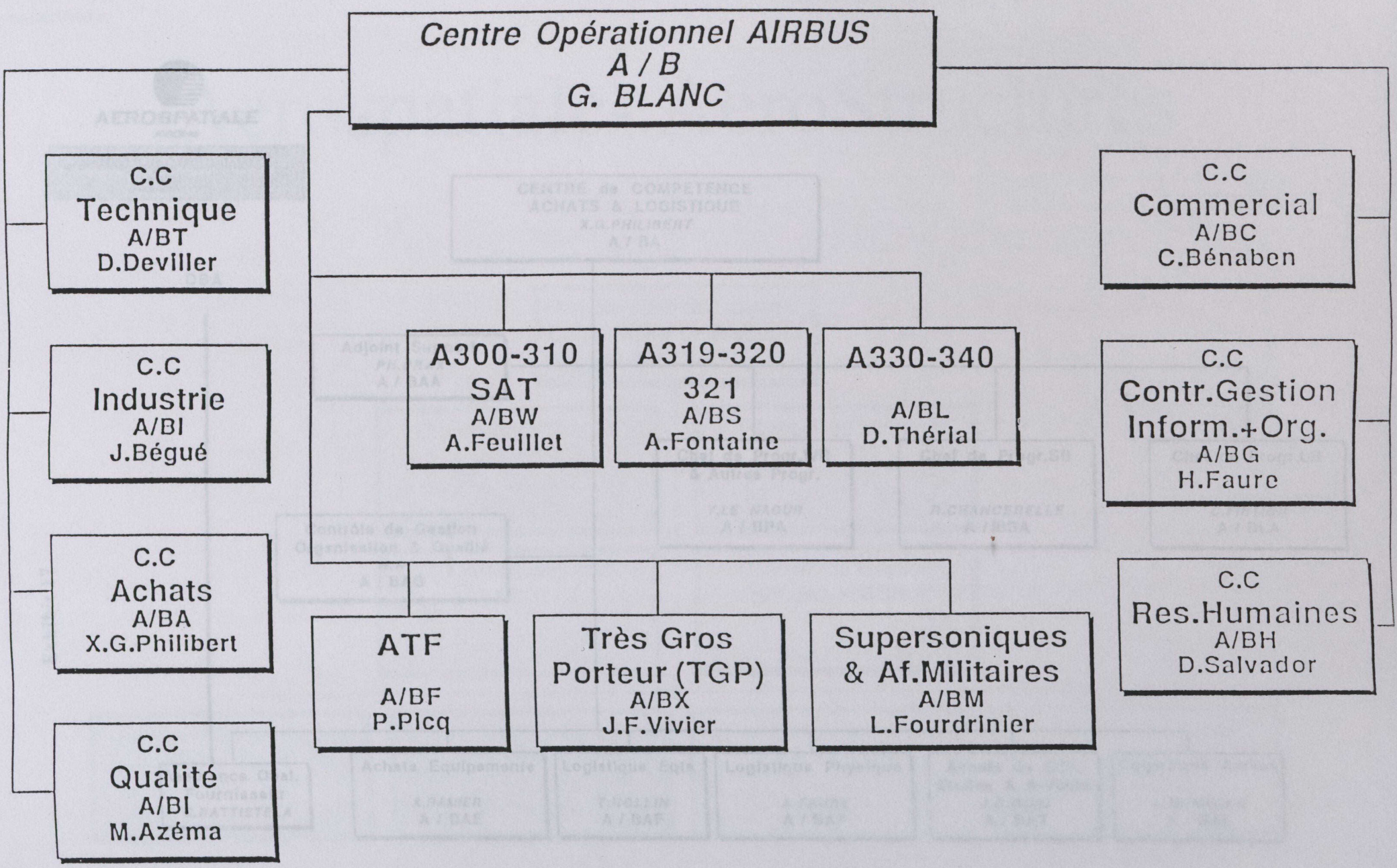
Notes

(1) Some figures rounded
(2) Typical passenger load is first and economy, except A340 which is first, business and economy
(3) Weights and ranges are for aircraft currently offered. Performance varies slightly among engine types. Other versions include A310-200 and A300-600
(4) A320's cargo-containers are LD3-46s or 46Ws, which have an LD3 base and a reduced height of 1.17 m
(5) The longest range A300-600R features one additional centre tank (ACT) in the aft cargo-hold. The penultimate and longest range A310-300s have one and two ACTs, respectively. The longest range A321 has one ACT
(6) Convertible versions of the A300, A310 and A300-600 and freighter variants of the A300 and A300-600 are also in service
(7) Improved versions of the A330 and A340 are also being studied, including A340-8000 product development carrying 232 passengers up to 15,000 km with up to 3 ACTs.
(8) General Electric = CF6-80C2 and -80E1, Pratt & Whitney = PW4000, Rolls-Royce = Trent 700, CFM Int'l = CFM56-5, Int'l Aero Engines = V2500

AI/GC-I 5/95

Exhibit 15

Exhibit 16

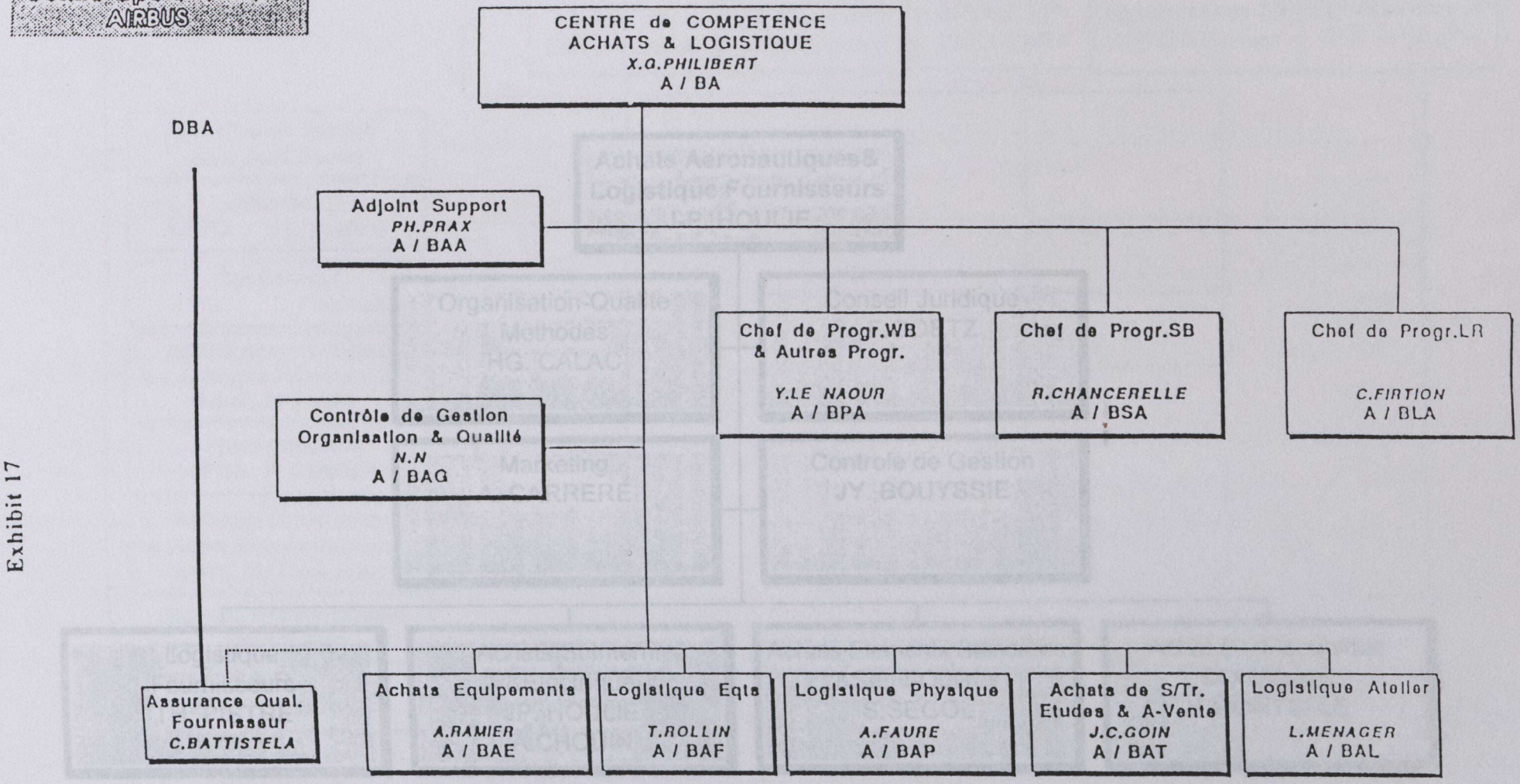

Centre Opérationnel AIRBUS
A / B
G. BLANC
C.C
Technique
A/BT
D.Deviller
C.C
Industrie
A/BI
J.Bégué
C.C
Achats
A/BA
X.G.Philibert
C.C
Qualité
A/BI
M.Azéma
A300-310
SAT
A/BW
A.Feuillet
A319-320
321
A/BS
A.Fontaine
A330-340
A/BL
D.Thérial
ATF
A/BF
P.Picq
Très Gros
Porteur (TGP)
A/BX
J.F.Vivier
Supersoniques
& Af.Militaires
A/BM
L.Fourdrinier
C.C
Commercial
A/BC
C.Bénaben
C.C
Contr.Gestion
Inform.+Org.
A/BG
H.Faure
C.C
Res.Humaines
A/BH
D.Salvador

Centre Opérationnel AIRBUS
A\B
G. BLANC
C.C
Qualité
AVA
M.Azéma
C.C
Achats
AVA
X.d'Halluin
C.C
Industrie
AVI
J.Béjus
C.C
Technique
AVT
D.Deville
ATA
AVF
P.Bold
Trés Gros
AVK
Porteur(TGP)
Supersoniques
& Militaires
AVM
Transport
A330-340
AVL
D.Thréhal
A319-320
321
AVS
A.Fontaine
A300-310
SAT
AVW
A.Feuillet
C.C
Res.Humaines
AVH
C.C
Contr.Gestion
AVG
C.C
Commercial
AVC

Exhibit 17

AEROSPATIALE
AVIONS

Centre Opérationnel AIRBUS



Airbus Industrie
Aerospatiale

Aerospatiale- AeroStructures

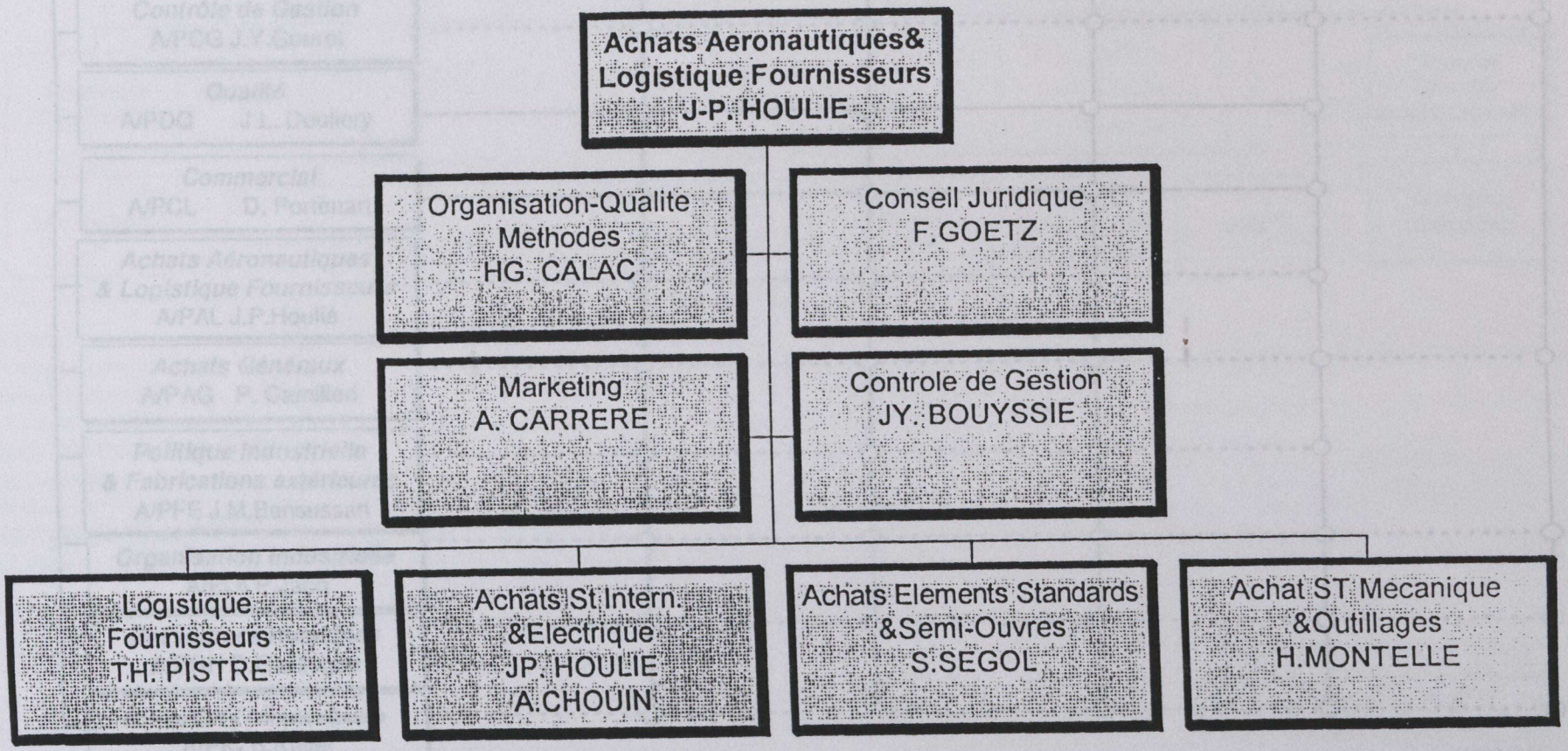
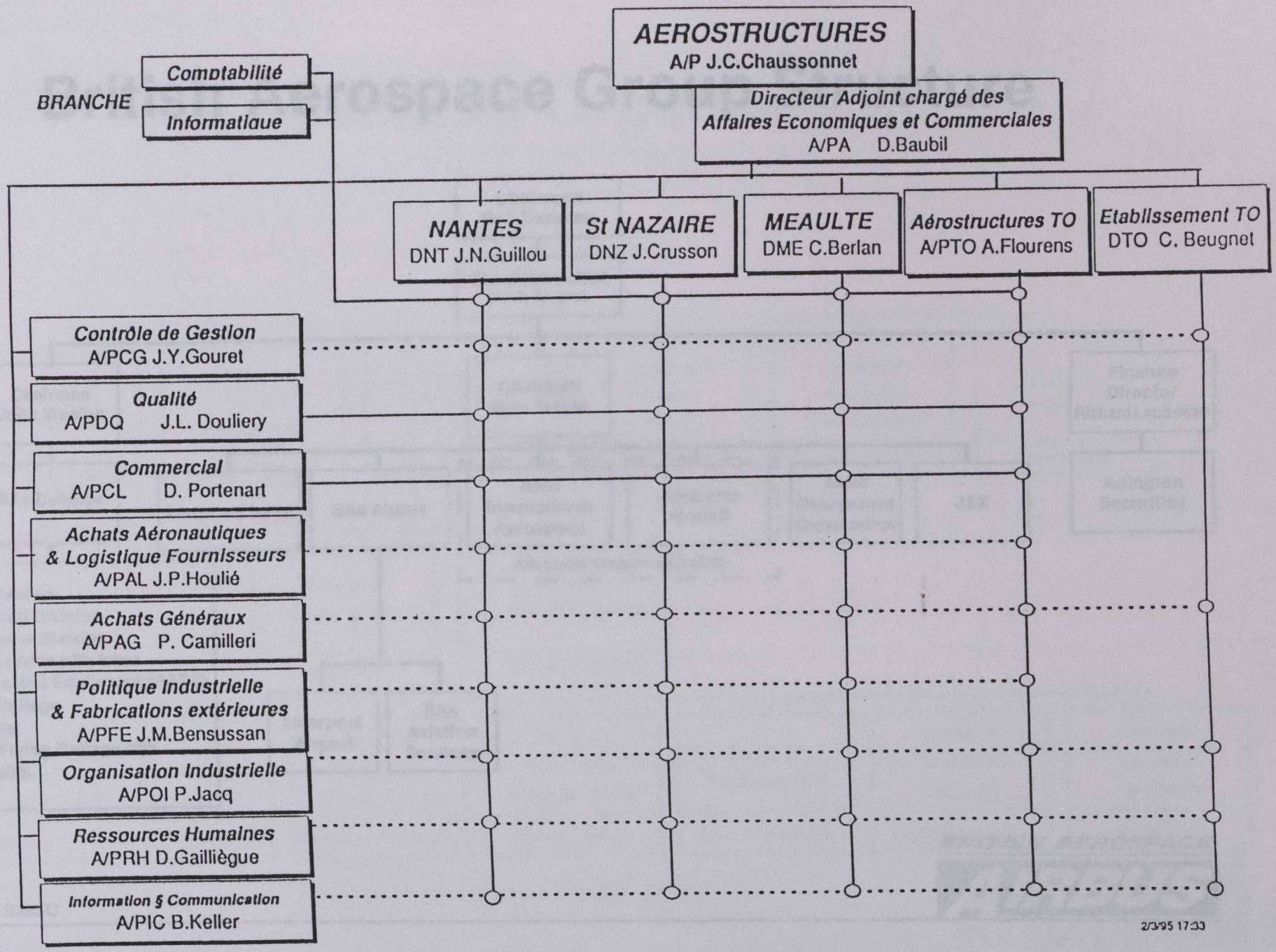


Exhibit 18

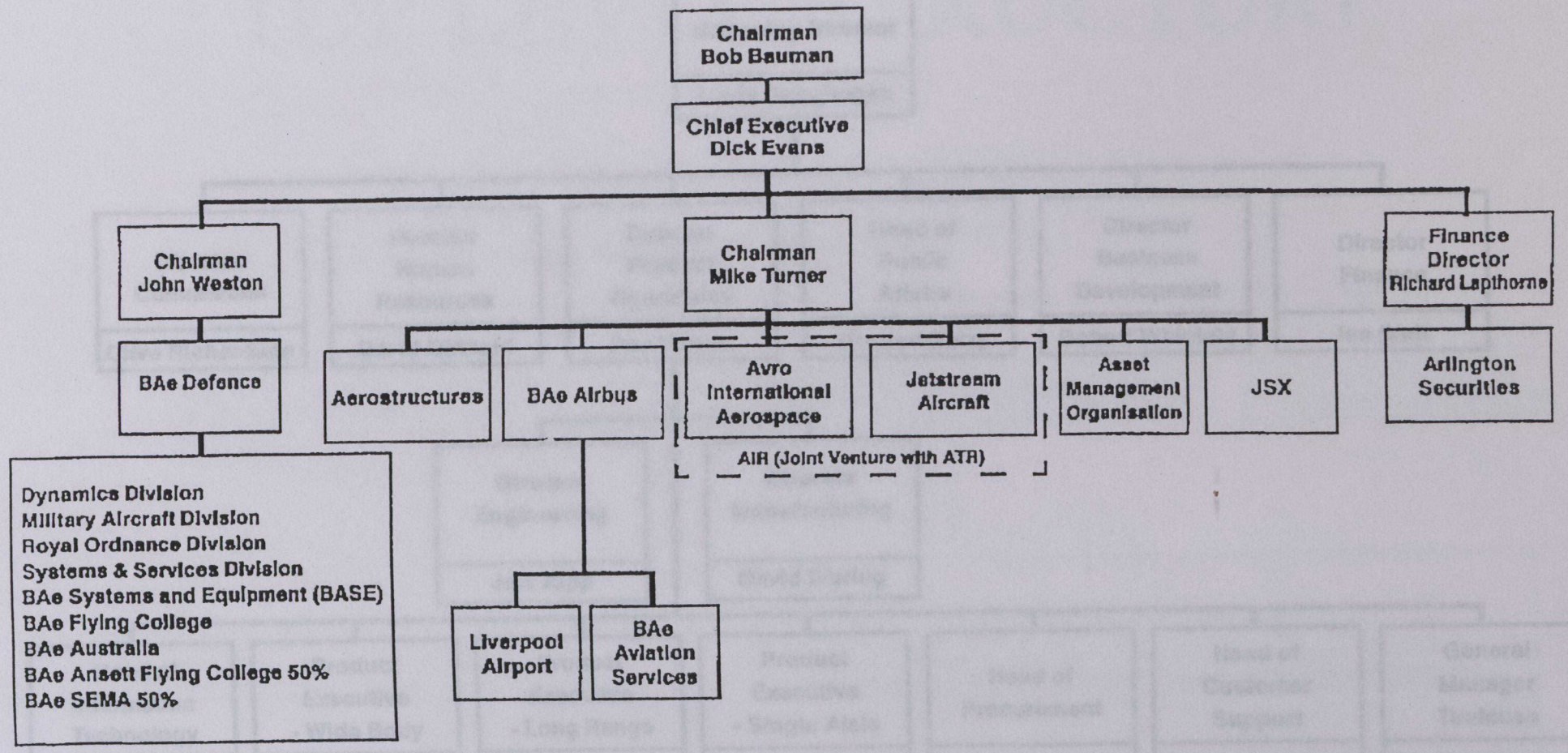
Aerospatiale- AeroStructures

Exhibit 18

Exhibit 19


AEROSTRUCTURES
A/P J.C.Chaussonnet
BRANCHE
Comptabilité
Informatique
Directeur Adjoint chargé des Affaires Economiques et Commerciales
A/PA D.Baubil
NANTES
DNT J.N.Guillou
St NAZAIRE
DNZ J.Crusson
MEAULTE
DME C.Berlan
Aérostructures TO
A/PTO A.Flourens
Etablissement TO
DTO C. Beugnet
Contrôle de Gestion
A/PCG J.Y.Gouret
Qualité
A/PDQ J.L. Douliery
Commercial
A/PCL D. Portenart
Achats Aéronautiques & Logistique Fournisseurs
A/PAL J.P.Houlié
Achats Généraux
A/PAG P. Camilleri
Politique Industrielle & Fabrications extérieures
A/PFE J.M.Bensussan
Organisation Industrielle
A/POI P.Jacq
Ressources Humaines
A/PRH D.Gailliègue
Information § Communication
A/PIC B.Keller
2/3/95 17:33

British Aerospace Group Structure



BRITISH AEROSPACE AIRBUS

ABL.BPM06 0395C

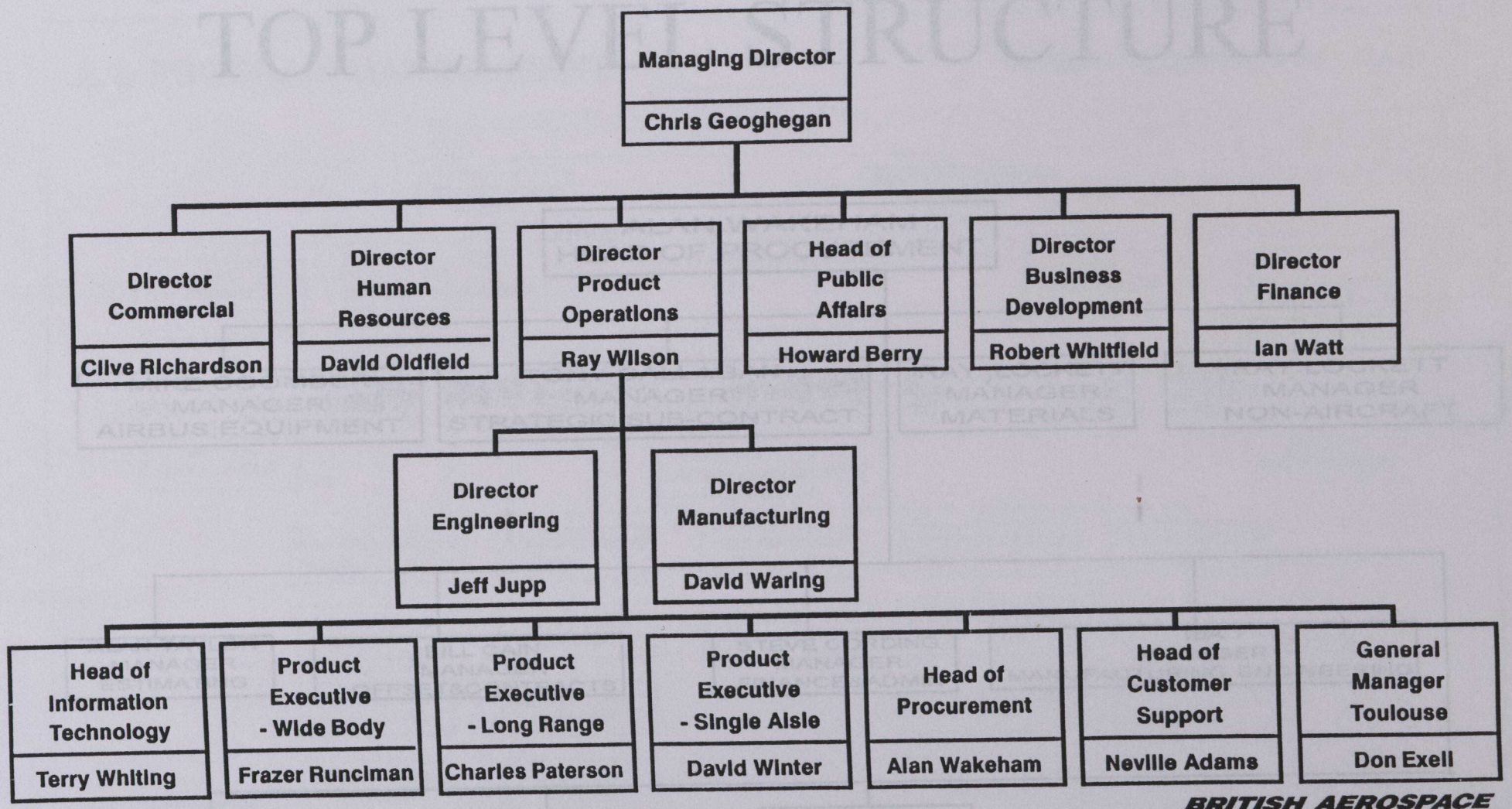
Exhibit 20

Exhibit 20

British Aerospace Group Structure

Exhibit 21

BAe Airbus Organisation



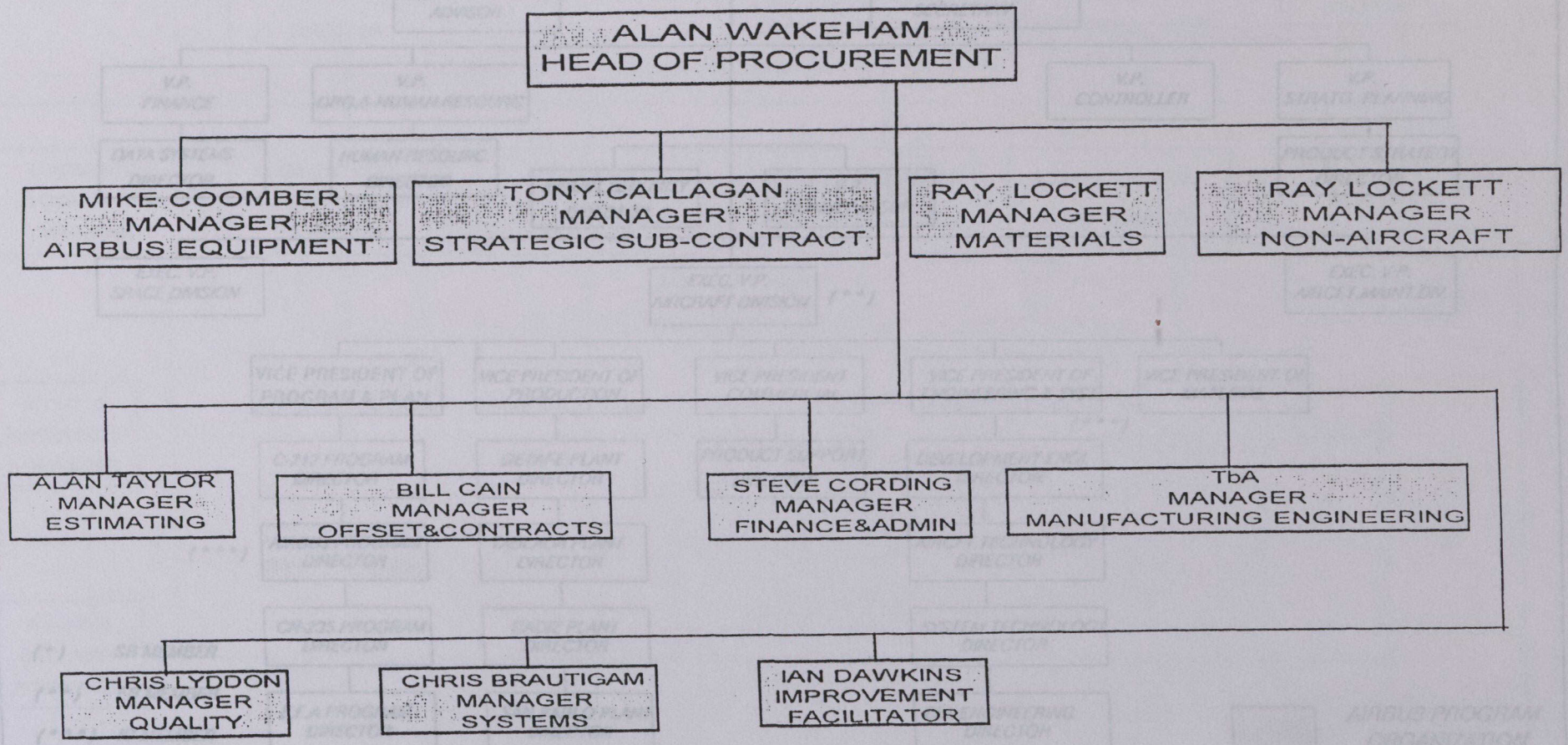
BRITISH AEROSPACE AIRBUS

ABL.BPM14 0995C

BAe Airbus Organisation

Exhibit 22

British Aerospace - PROCUREMENT TOP LEVEL STRUCTURE



British Aerospace - PROCUREMENT

TOP LEVEL STRUCTURE

CASA

AIRBUS PROGRAM
AT CASA

2.2. PROGRAM MANAGEMENT

BASIC ORGANIZATION CHART

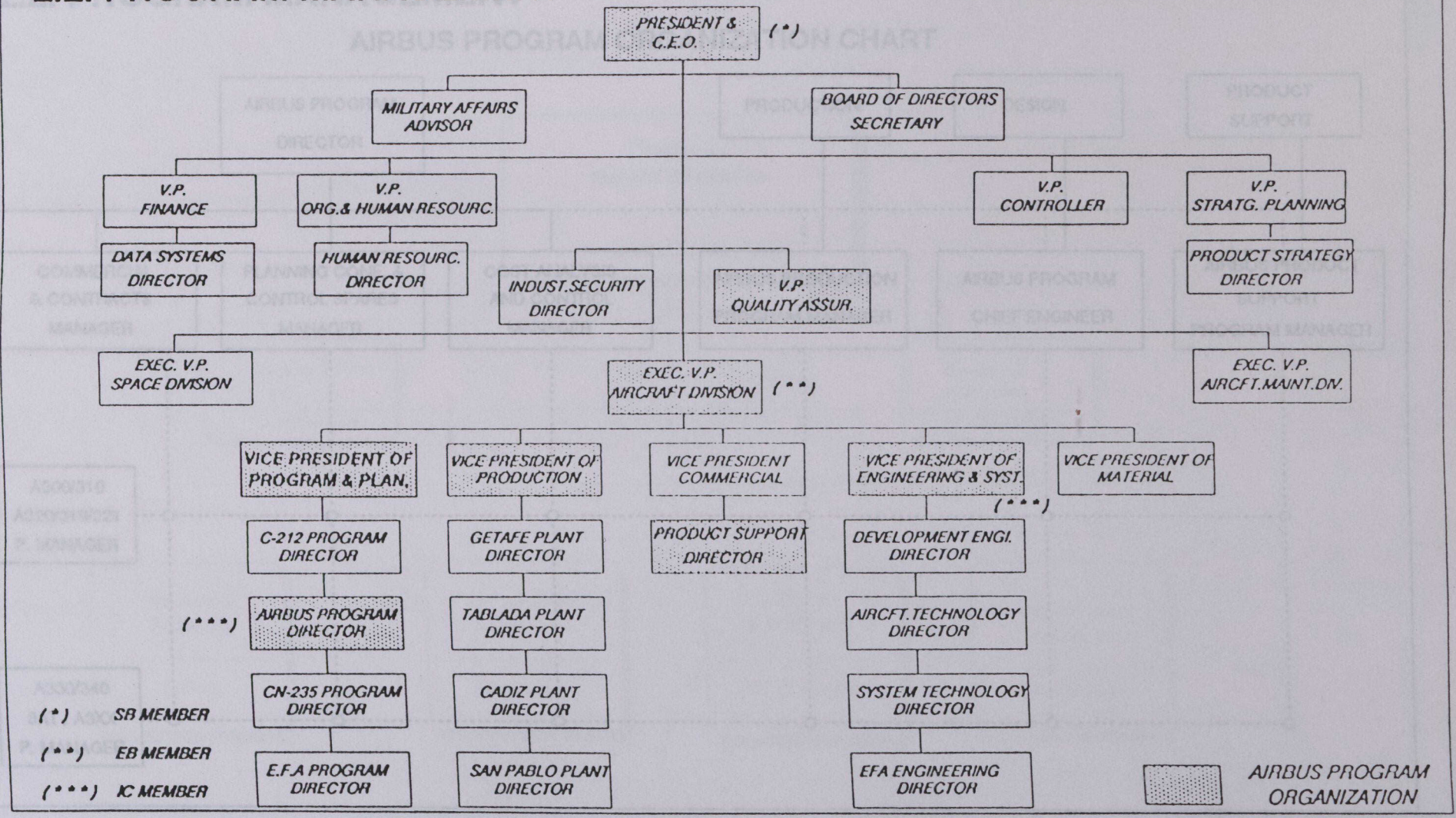


Exhibit 23

CASA

AIRBUS PROGRAM
AT CASA

2.2. PROGRAM MANAGEMENT

BASIC ORGANIZATION CHART

CASA

AIRBUS PROGRAM
AT CASA

2.2. PROGRAM MANAGEMENT

AIRBUS PROGRAM ORGANIZATION CHART

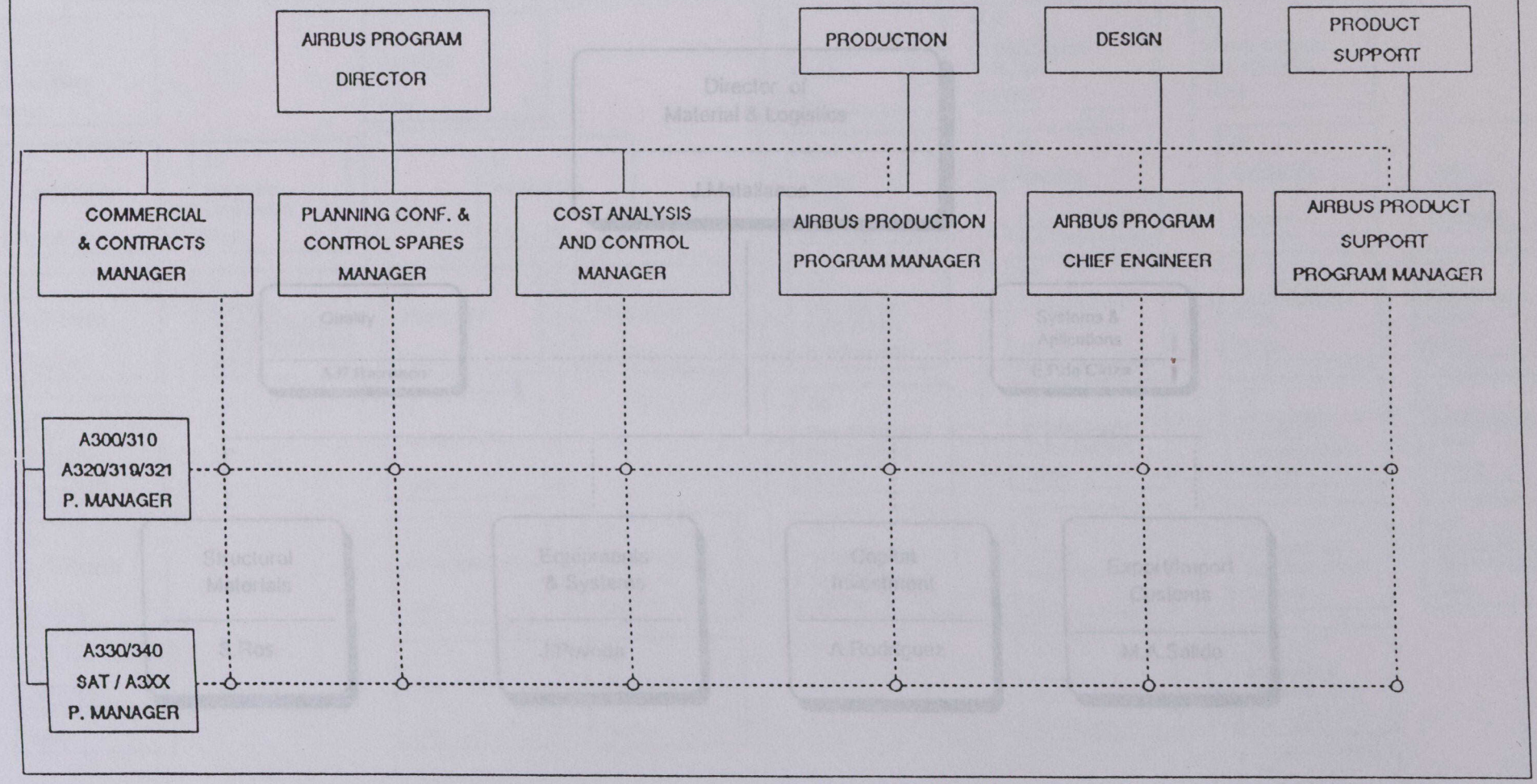


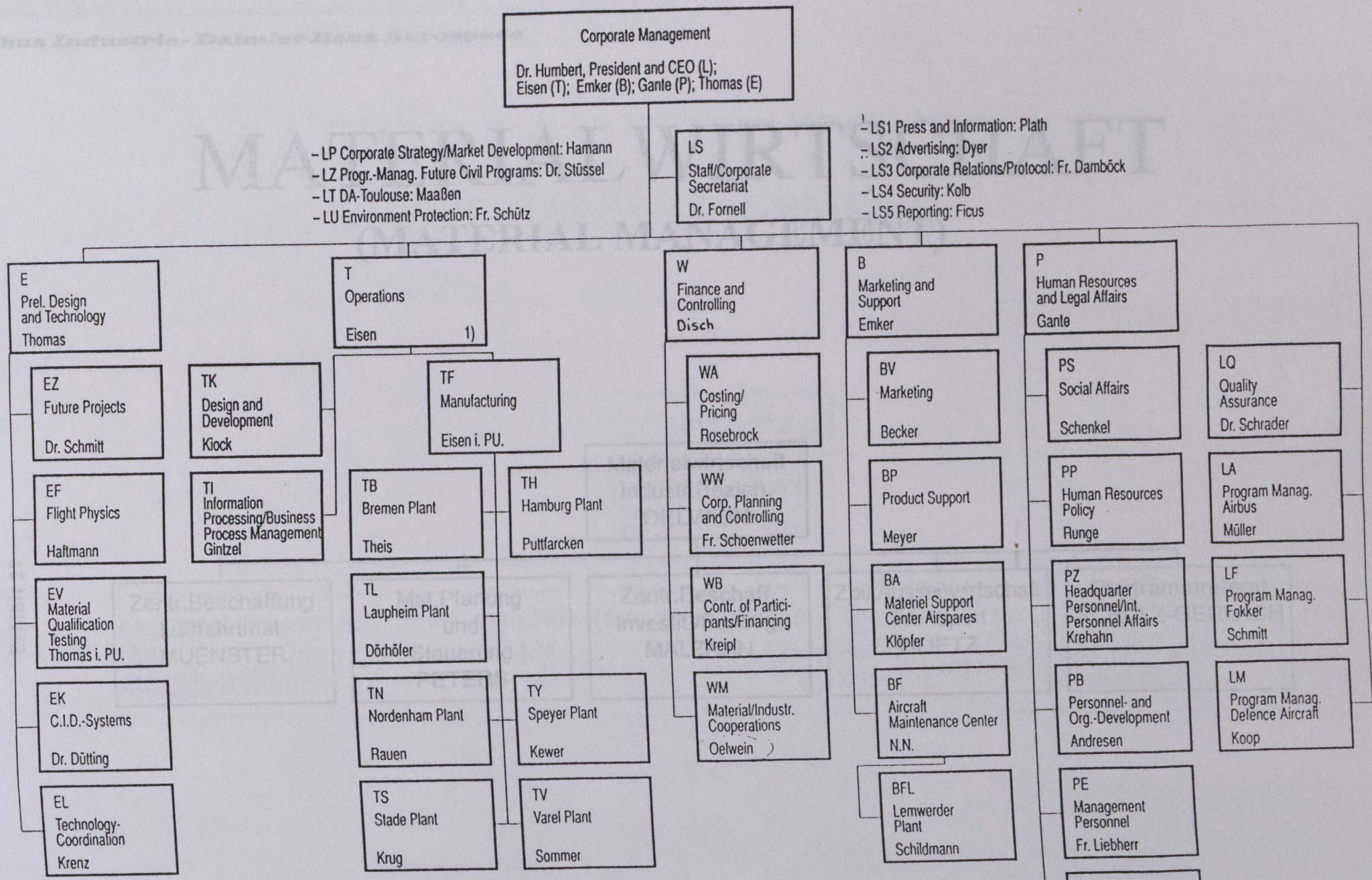
Exhibit 24

CASA
AIRBUS PROGRAM
AT CASA
2.2. PROGRAM MANAGEMENT
AIRBUS PROGRAM ORGANIZATION CHART

Exhibit 25

Director of
Material & Logistics
J.Matallanos
Quality
A.R.Barruego
Systems &
Aplications
E.P.da Ciriza
Structural
Materials
S.Ros
Equipments
& Systems
J.Poveda
Capital
Investment
A.Rodriguez
Export/Import
Customs
M.A.Salido

Exhibit 26



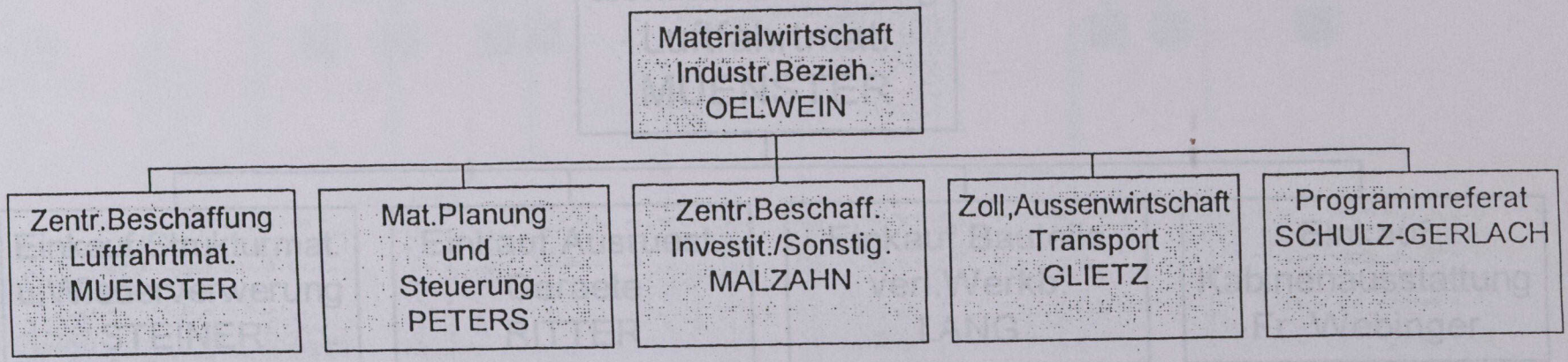
1) Industrial Leadership of Elbe Flugzeugwerke GmbH

Date: 01.03.1994

MATERIALWIRTSCHAFT

(MATERIAL MANAGEMENT)

Exhibit 27



MATERIALWIRTSCHAFT

(MATERIAL MANAGEMENT)

MATERIALWIRTSCHAFT
(MATERIAL MANAGEMENT)

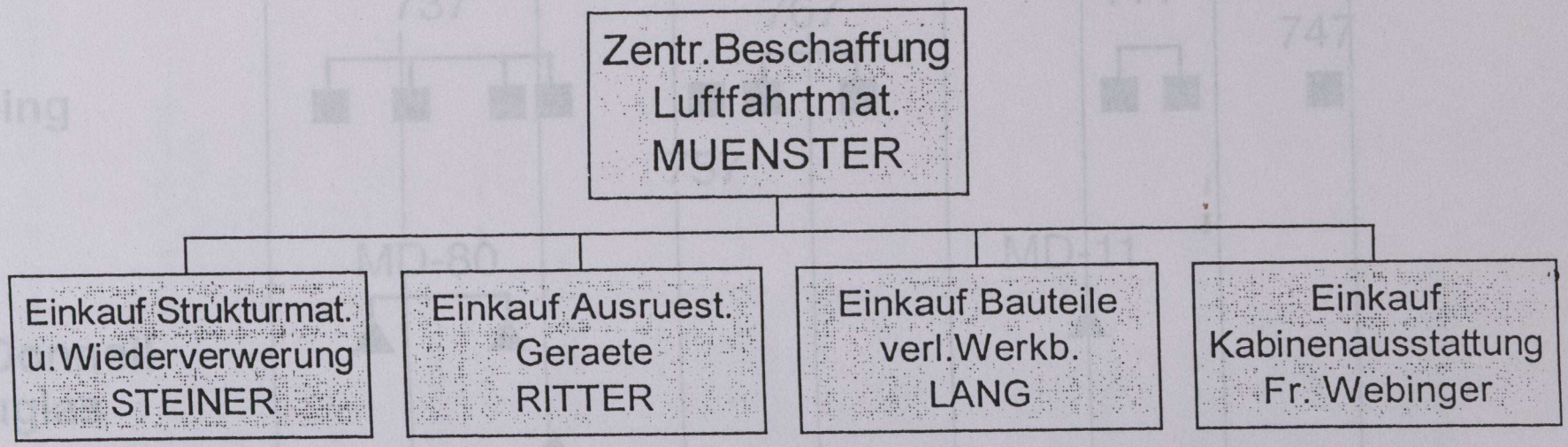


Exhibit 28

MATERIALWIRTSCHAFT
(MATERIAL MANAGEMENT)

Competing product lines

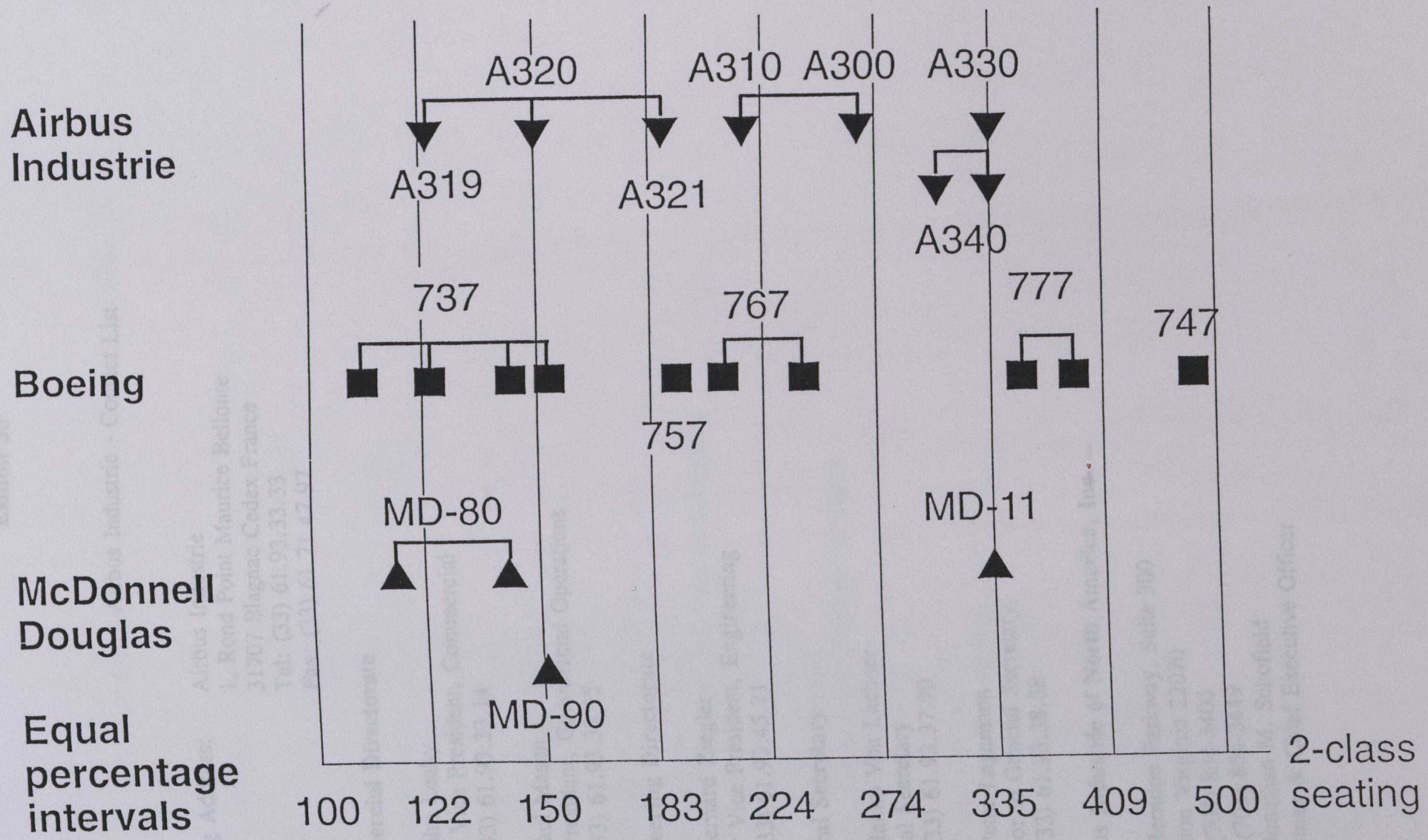


Exhibit 29

Competing product lines
Airbus Industrie
A319
A320
A321
A310
A300
A340
A330
Boeing
737
707
757
747
717
McDonnell Douglas
MD-80
MD-90
MD-11
Fokker
100
Jetstream
Saab-Scania
Embraer
Canadair
Dornier

Exhibit 30

Airbus Industrie - Contact List

Mailing Address: Airbus Industrie
1, Rond Point Maurice Bellonte
31707 Blagnac Cedex France
Tel: (33) 61.93.33.33
Fax: (33) 61.71.47.97

Commercial Directorate

Mr. John Leahy
Senior Vice President, Commercial
Tel: (33) 61.93.33.14

Mr. Paul Mason
Vice President, Commercial Operations
Tel: (33) 61.93.33.15

Engineering Directorate

Mr. Bernard Ziegler
Senior Vice President, Engineering
Tel: (33) 61.93.45.21

General Secretary

Mr. Hanko Von Lachner
General Secretary
Tel: (33) 61.93.37.90

Mr. Peter Lagemann
Advisor to General Secretary
Tel: (33) 61.93.38.88

Airbus Industrie of North America, Inc.

593 Herndon Parkway, Suite 300
Herndon Virginia 22070
Tel: (703) 834-3400
Fax: (703) 834-3449
Mr. Jonathan M. Schofield
Chairman & Chief Executive Officer

Exhibit 30

Exhibit 31

Aerospatiale - Airbus Operations Centre - Contact list

Mailing Address: Aerospatiale
316, route de Bayonne
31060 Toulouse Cedex 03
France

Mr. Gerard Blanc
Managing Director
Tel: (33) 61.18.35.00
Fax: (33) 61.18.33.62

Mr. Xavier Georges Philibert
Vice President, Procurement & Logistics
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Exhibit 32

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Exhibit 33

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Exhibit 34

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AIRBUS INDUSTRIE

Challenges and Lessons for the Canadian Aerospace Sector

APPENDICES 1-9

PLEASE NOTE THAT FOR APPENDIX 1, 7 AND 9 YOU SHOULD CONTACT MR. GUY LADEQUIS FROM THE CANADIAN EMBASSY IN PARIS
TEL. (33.1) 44.43.23.59 - FAX (33.1) 44.43.29.98

POUR LES APPENDIX 1, 7 ET 9 VEUILLEZ CONTACTER M. GUY LADEQUIS A L'AMBASSADE DU CANADA A PARIS
TEL. (33.1) 44.43.23.59 - FAX (33.1) 44.43.29.98

Memorandum September 23, 1995

To: Airbus Study File

From: Robert de Gasperis

Re: Visit to Airbus Industrie Sept 15, 1995

Present R. de Gasperis, Consultant
G. Ladequis, Canadian Embassy, Paris
P. Lagemann, Assistant to Secretary General, Airbus Industrie
P. Mason, Vice President, Commercial Operation, Airbus Industrie
H. Von Lachner, Secretary General, Airbus Industrie

Overview

The first visit associated with this study was at Airbus Industrie in Toulouse. Guy Ladequis and I first met with Mr. Peter Lagemann, an assistant to the Secretary General to discuss the day's itinerary. It was decided that we would begin with a tour of the Aerospatiale A330/A340 assembly facility and then proceed to lunch, where we would be joined by Mr. Hanko Van Lachner (Airbus Industrie Secretary General). After lunch we would proceed back to the boardroom where we would be joined by Mr. Paul Mason (Airbus Industrie Vice President Commercial Operations), and where we would review questions related to Airbus Industrie and its role in program procurement prepared in advance of the meeting.

Aerospatiale Plant Tour 10:30-11:30

Final assembly of aircraft accounts for only 6% of the total value added in the aircraft manufacturing process, yet, this aspect is most visible and prestigious. Aerospatiale maintains responsibility for final assembly of the A300/A310 and A330/A340 families of aircraft, and the A320. The A321 and A319 are assembled in Hamburg, Germany.

The A330/A340 facility is not just architecturally pleasing, it is state-of-the-art. The plant employs a flexible manufacturing methodology which easily accommodates special customer requirements. In addition, the flexible methodology facilitates mitigating circumstances in the event of customer cancellations. Aerostructures are brought in just-in-time from the consortium partners and associates. Most aerostructures arrive pre-equipped with major systems. A diagram depicting the A330/A340 assembly process can be viewed in exhibit 1.

A question arose as to the logistical considerations when major subcontractors are involved in supply of systems which overlap the aerostructure sections of more than one partner. For instance, environmental ducts which are installed throughout the aircraft, are these procured by Daimler Benz (which is responsible for Air Conditioning) and then distributed to other partners? This was not clarified.

We also closely observed an upper tailfin which was recently received from Daimler Benz. Airbus pioneered the extensive use of carbon fibre components on its more recent programs. In the second bay, we were permitted to walk directly beneath the undercarriage of an A340 currently in production. Here we observed the installation of the centreline landing gear

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P. Lagemann, Assistant to Secretary General, Airbus Industrie
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H. Von Lachner, Secretary General, Airbus Industrie

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We also closely observed an upper nacelle which was recently received from Daimler Benz. Airbus plans to extensive use of carbon fibre composites on its more recent programs. In the second bay, we were permitted to walk directly beneath the undercarriage of an A340 currently in production. Here we observed the installation of the centreline landing gear

supplied by Messier Dowty Canada.

BoardRoom 11:30-12:00
We discussed the current GIE (groupment d'interet economique) partnership framework, formed under French law in 1970. This arrangement provided a unique mechanism of cooperation that preserved national control of key industrial assets while insuring their effective combination to realize the objective to develop wide bodied civil aircraft (which would not have been possible unilaterally). Each of the partners, however, also share jointly and severally all of the consortium's obligations. To alleviate the massive financial exposure to the partners, Airbus Financial Corporation was recently formed with a mandate to guarantee the obligations of Airbus Industrie. In the future, its mandate may be broadened to provide a source of financing to Airbus customers.

We debated whether this structure, or more specifically a scenario where its owners acted also as prime subcontractors, was conducive to the objective of cost minimization and discussed the possibility of the creation of a single legal entity. Mr. Lagemann and I did not agree on the whether the structure served to minimize costs nor did he speculate on the timing and likelihood of changes to the legal structure.

Lunch 12:00-13:30
Lunch was served in the executive dining room complements of Airbus. Mr. Van Lachner welcomed study, but admitted that the emphasis of research should be at the partner level, who are directly engaged in equipment and/or aerostructure procurement. He indicated that the current state and continued restructuring of the international airline industry has resulted in the strengthening of its buyer power. Accordingly, the enormous price pressures and demands for product support exerted by civil carriers means that Airbus partners must become increasingly transparent in its procurement strategies to effectively respond to this challenge.

We also had an in depth discussion of the CAE case in its quest to secure flight data to develop flight training simulators for the A330/340 programs. Mr. Lagemann suggested that a number of flags were raised largely due to CAE's approach to secure the information. He also admitted that CAE's case was not supported by Airbus Training Centre managers who perceived potential CAE simulators would end up in direct competition with Airbus' own Training Centres. Nevertheless, we were assured that Airbus would at all times welcome the development of derivative products and services, which would benefit its customers through increased efficiency and safety. It was suggested that to legitimize requests for technical information, a more effective approach would be to channel such requests in conjunction with the respective Airbus customer through to the Airbus engineering department in Toulouse. Assurances for the protection of proprietary property would be sought by Airbus and commercial considerations may also be applicable depending on the circumstances (memo to be sent to Allied Signal Canada re development of wing heater blankets for Airbus programs).

Interview 13:30-17:00
The function of Airbus Industrie is to lead and coordinate the definition, design and production of the Airbus product range and to perform all marketing, sales and support functions. With the exception of engines and nacelles (on certain programs), Airbus does not have formal responsibility for equipment procurement. Although the final procurement

decision is left with the responsible partner, this is not to suggest that Airbus does not exert influence on their procurement decisions.

There are currently seven directorates at Airbus Industrie (Commercial, Programmes and Processes, Engineering, Customer Services, Industrial and Programmes, Administration, and Transport). Mr. Lagemann suggested that Engineering and Customer support exerted a high degree of influence on the partner procurement decision and to a lesser degree from the Commercial, Programmes and Processes and Industrial Programmes directorates with almost no involvement from Administration and Transport. This is largely due to the respective directorate's position in the customer feedback loop (directorate functions to be elaborated in final report). The managing director's role is predominantly commercial and public relations and is therefore rarely involved in supplier decisions.

The high level of directorate involvement stems from Airbus' "support image problem" and that "support offered by Airbus (to its customers) is only as good as the support of the suppliers". It was recognized that in order for Airbus to more effectively compete with Boeing, which was perceived to be "more service oriented", it was/is of utmost importance to address this image.

Mr. Lagemann also indicated that Airbus developed General Conditions of Purchase on supplier contracts which the partners would consistently employ. These conditions centred on two principles, which include industrial and product support. The industrial section makes reference to product technical specifications and performance. The product support section is linked to the technical performance and it also clarifies the level of technical expertise, training, and part support to be provided. Generally, this section makes reference to the "World Airline Supplier Guide", where AOG response is required within 4 hrs. He admitted that in the past Airbus was not adequately enforcing the second portion of the contract, but that attitudes have changed drastically. The formation of a supplier monitoring group within the Customer Services directorate polices this aspect of supplier contracts.

We discussed the structure of parts and training subsidiaries. We were advised that Aeroinformation no longer exists as a separate entity and that its training activities were under the direct responsibility of the Customer Services directorate. Management of the Airspares centre in Hamburg was negotiated into Daimler Benz's work sharing agreement and that ASCO (subsidiary of AINA) manages the parts centre in Washington. Suppliers of proprietary (20% of all parts ie. engine mounts) and non-proprietary parts (80% of all parts, ie. hydraulic pumps, screens) are provided by suppliers selected on Airbus programs.

Mr. Mason suggested that in view of the fact that suppliers on existing Airbus programs have been selected, Canadian companies should focus their energies on BFE contracts which form a significant portion of the Aircraft value (request more particulars). Nevertheless, Mr. Lagemann suggested that Canadian firms should take a proactive approach by making presentations and submitting proposals through the Airbus Engineering directorate for the supply of systems or components superior and/or more economical technologies are developed.

It was mentioned that to improve the chances of involvement in future Airbus programs, suppliers should try to get involved in new or enhanced programs or research projects. Some of the new programs include the FLA (equal share of all Airbus partners + Alenia), 3XX

VLCT, Supersonic, Very Long Range A340, Satellite Navigation Project (turbulence detection system).

Airbus Industrie is not directly engaged in supplier qualifications; however, Mr. Lagemann noted that suppliers on major North American programs would be favourably considered. In addition, Canadian standards are also recognized. Cost reduction targets have been established at each of the partners in response to industry demands and the renegotiation of existing contracts is a continual process.

Airbus Finance Corporation was formed late in 1994 to transfer the financial exposure from the balance sheets of the four partners which shared jointly and severally all of Airbus obligations. In the future its mandate may be broadened to provide a source of aircraft acquisition financing to its customers.

Open items
Information requested regarding work sharing agreement (ie by component), up to date organizational charts, BFE (commercial considerations, scope). To discuss if generators and hydraulic pumps procured with engines by Airbus Industrie. Discuss selection of Garret APU vs Pratt & Whitney Canada alternative by DASA.

Visit to Pratt & Whitney Canada 17:30-18:30
Mr. Richard Root of Pratt & Whitney Canada met us at the Aerospatiale ATR centre. We proceeded with a quick tour of the Aerospatiale ATR final assembly facility. He noted that PWC enjoys an excellent relationship with the ATR GIE, having been selected on every ATR program since its inception. Mr. Root mentioned PWC was currently preparing a tender for the proposed ATR 72 derivative and that it was facing competition from Allison-Rolls Royce, which also challenged PWC on the Dash 8 - 400. He was not certain what impact the addition of BAe as a partner in the ATR group would have on its relationship with ATR.

Oct. 3, 1995

Memorandum

To: Airbus Study File

From: R. de Gasperis

Re: Meeting with BAe Airbus, Oct. 2, 1995

Participants: P. Bruce, Manager-Business Development, BAe Airbus
R. de Gasperis, Consultant
G. Ladequis, Commercial Attaché, Canadian Embassy, Paris
C. MacLean, First Secretary, Canadian High Commission, London
A. Wakeham, Head of Procurement, BAe Airbus

Discussion Highlights

BAe was formed as a nationalized group after the consolidation of British Aircraft Corp., Hawker Siddeley, and other aerospace and defense state interests. In the early 80's, the UK government sold BAe over two stages and became a widely held public limited company (PLC). Soon after, the company diversified into areas including the automotive and construction sectors. Serious losses in the early 90's lead to a major restructuring and divestiture to focus its activities in core businesses related to defence and commercial aerospace. The commercial aerospace business operates independently from defense and is currently organized into 4 units, which include BAe Airbus, Jetstream, AIR, and BAe Aerostructures.

The group's involvement in Airbus dates back to the late 60's through Hawker Siddeley, which was contracted to design and manufacture wings for the A300, notwithstanding the UK government's decision to withdraw from the program. This was due to its recognized competence in wing design and development and the lack thereof on the part of both the French and German partners. BAe was later permitted to buy into the consortium, however it was consigned to a 20% share.

BAe Airbus manages BAe PLC's interest in Airbus Industrie and is primarily engaged in designing, manufacturing and assembling the primary structure of all Airbus program wings and also equipping A319, A320, and A321 wings. BAe Airbus is not involved in equipping wings of the larger A300, A310, A330 and A340 programs as the value of worksharing agreements are negotiated to remain close to the partnership interest (20% in the case of BAe Airbus). The company also manufactures a fuselage section on the A321 and supplies other Airbus components including aspects of fuel controls and landing gear installed by other partners on other sections of the aircraft. An official breakdown of the worksharing agreements indicating detailed systems and component responsibilities of each of the Airbus partners was requested but denied by the BAe representatives.

Procurement takes place in the Product Operations Directorate along with Engineering and Manufacturing. The procurement department is headed by Alan Wakeham and is organized into 4 distinct areas which include equipment, airframe, materials, and non-production (see

attached organizational chart). Procurement has been closely aligned with engineering (as opposed to manufacturing), accordingly, each of the departments procurement officers works closely with an engineering counterpart to facilitate product and supplier performance evaluations and to reinforce customer support. The main "gateways" into the organization, therefore, are through the commercial or technical loops.

The GIE (Groupement d'Interet Economique) has served as an effective medium for the partners to pool their individual technological capabilities to achieve what would otherwise not be possible, entry into the market for large civil aircraft. While this form of joint venture proved highly successful at the infant industry stage, the BAe Airbus representatives recognized the need to move towards a single entity thereby improving contact between Airbus and its suppliers, the timeliness of decision making, and other operational and production inefficiencies.

Each of the Airbus partners also serve as prime subcontractors, which bid on the various tasks associated with the design and development of major aerostructure and corresponding systems of the final aircraft. The allocation of the value of the work share is roughly consistent with the individual partner's holding. Once such contracts are negotiated, they effectively carry on for the life of the program. Aircraft price pressures are felt immediately at the partner level as the managing director is directly involved in sales negotiations. Pricing concessions are absorbed in accordance with the partnership interest. That is, while the prime subcontract price remains fixed, it is possible for the individual partner to realize a loss on the sale of the aircraft and a corresponding profit on the workshare contract.

BAe Airbus manufacturing and equipping of wing boxes and design activities are primarily undertaken at sites in Cheshire and Filton. However, some sub assemblies, detailed machining and composites work also takes place at plants located in Brough and Samlesbury (request exact plant location along with brief narrative re nature of involvement and production methodology). Wheel and brake assemblies on landing gear systems are integrated at a small plant in Toulouse.

Most contracts for equipment are awarded in $US, however there are some supply contracts for airframe components written in pounds sterling. As Airbus aircraft are sold in $US and, correspondingly, prime subcontracts are written in $US, BAe Airbus must cover or carry its exposure to any non $US denominated contracts. There is risk associated with a declining dollar when revenues are earned in dollars and costs are denominated in an appreciated local currency. Quotations are normally requested in both currencies and evaluated internally.

Terms in supplier contracts do not correspond with the terms in partners' prime subcontracts with Airbus Industrie. Provisions in contracts would facilitate a change in supplier if it were warranted. However; this would be difficult to rationalize in view of the need for recertification, changes to customer manuals, and the jeopardy to established loyalties to suppliers which may have contributed to non-recurring costs. The circumstances under which a supplier change would be considered include the prospect of revolutionary and innovative new systems or products, substantial cost savings (ie. 30-35%, possibly less depending on the system), and significant improvements in reliability and support. The company has established cost reduction targets of 35% by 1998. Existing suppliers which are not sensitive to the BAe Airbus cost reduction targets and business conditions also run the risk of being replaced.

There is no formal policy to source materials, products, or systems from within the BAe PLC group. It was suggested that, if the bidding was close and other factors were equal, the local supplier had the psychological advantage. Affiliated companies would have to "match the best". Overall, it was clear that direct involvement on existing programs is very unlikely other than in exceptional circumstances. The chances, if any, would necessarily be in the area of equipment or materials. The presence of only two credible suppliers of aircraft grade aluminum suggest there may be room for another player. World excess capacity in aerostructures makes opportunities in this area extremely unlikely at this time.

The chances of involvement in existing programs are slightly better through an existing contractor which will be hard pressed to find or develop cost improvements. A listing of existing supply contractors together with a brief description of the equipment offered shall be made available.

The reduction in government assistance directed at new product development has created opportunities for suppliers willing to absorb non recurring costs associated with system research and development. This was particularly the case with the A330 and A340 programs where the preference to outsource product development in return for world product mandates helped to reduced the high levels of commercial risk.

To improve the possibility of penetrating this Airbus partner, Canadian companies must be prepared to get involved very early in proposed new programs, research projects, and existing program enhancements. Some of the projects and programs cited include: a new 100 seater, Multi Role Tanker Transport, European FLA, Super Jumbo, composite material projects, and existing program derivatives. More information on existing projects could be obtained from the Airbus Engineering and New Product Development departments in Toulouse. The identification of new suppliers usually stems from involvement in research projects, the existing supplier pool, through feedback from the airlines, vendor conferences or direct solicitations. The direction of future procurement is likely to be more strategic to encompass fewer relationships with technological leaders.

The new supplier certification takes approximately one year. Certification by other aircraft manufacturers, including Canadian, will help to expedite the process although it was cited that Airbus' machine shop qualifications were more stringent than the typical North American airframes. BAe Airbus does not use the Co-ordinating Agency for Supplier Evaluation, all evaluations are carried out in-house. The process can involve extensive review of performance, production facilities and quality standards (ISO 9000), financial information, and physical tests. The process can be costly, however, recovery of such costs depend on commercial factors, and, once complete, the certification is valid with each of the other Airbus partners.

BAe Airbus has very limited experience with Canadian suppliers. Messier Dowty Canada has been selected to supply centreline landing gear on the A330 and A340 programs. This may largely have to do with marketing relationships established in the UK. Some of the reasons cited for the repatriation of the Canadair aerostructure contract included, excess capacity in existing BAe factories in the UK, minor pricing and quality concerns, and lack of loyalty to Canadair in view of BAe Airbus' full payment for non-recurring costs. There was also some disappointment expressed with respect to BAe not being selected to participate in the Global Express program. With the exception of Canadair, the BAe Airbus representatives did

not appear to demonstrate a knowledge of the competencies of the Canadian sector.

BAe Airbus representatives were presented with a copy of "1995 Guide to Canadian Aerospace Products and Services for World Markets". Additional copies to be forwarded to procurement officers.

Received 1993 and 1994 BAe PLC annual reports, UWE Study "The Economic and Industrial Importance of the Airbus Partnership, Airbus worksharing diagrams, BAe-The Facts booklet, and a series of BAe Airbus news releases.

Memorandum

Oct. 7, 1995

To: Airbus Study File

From: Robert de Gasperis

Re: Meeting at Daimler Benz Aerospace Airbus, Oct. 4, 1995

Present
D. Baker, Canadian Consulate, Hamburg
D. Butler, Canadian Embassy, Bonn
H. Beck, Daimler Benz Aerospace Airbus, Capital Equipment Procurement
R. de Gasperis, Consultant
G. Ladequis, Canadian Embassy, Paris
H. Lang, Daimler Benz Aerospace Airbus, Dolores Program, Aerostructures
W. Muenster, Daimler Benz Aerospace Airbus, Central Procurement, Aircraft
W. Remus, Program Manager, Cargo Conversions

The Canadian delegation met first with Mr. Remus, formerly involved in equipment procurement but currently involved in a new program to convert passenger aircraft into freight applications, and Mr. Beck, who is involved in procurement of capital equipment.

We first spoke about current restructuring associated with the "Dolores" program. They indicated that recent media reports have been quite accurate in assessing the DASA situation. DASA sales are based in $US, however, a high portion of its cost base is in DM. Accordingly, the strengthening DM has placed serious pressure on the company's cost structure. The object of "Dolores" is to reduce this exposure by moving a significant portion of its cost base into the "dollar zone". "Dolores" is perceived to be the culmination of a general restructuring, which has been occurring over the last two years at DASA. Indeed, Mr. Remus indicated that he has had to reduce his level of management staff considerably (two levels of management eliminated) by offering generous retirement packages and/or other incentives. "Dolores" is now expected to impact the factories. The Munich factory was recently closed and the Speyer, Laupheim, Stade, and Bremen factories are in danger. The outcome of "Dolores" is expected to be announced within weeks and we can expect to see DASA keep its core production activities and move a good deal of other aerostructure activities outside where there is a great deal of world excess capacity. Eastern Europe and Asia were also cited as potential areas where production activities can be moved.

Daimler Benz Aerospace Airbus' (henceforth DASA Airbus) mandate from DASA does not rest with Airbus Programs. Along with managing its workshare arrangement with Airbus Industrie, this group is also involved in Fokker and Dornier programs as well as a limited military business unit. It was noted that DASA Airbus does not procure aircraft sub-systems from within the DASA group.

Insofar as machinery and equipment is concerned (including testing equipment), Mr. Beck indicated that presently 60-70% is procured in Germany, 20% in the rest of Europe, and 10% in North America and the rest of the world. He expects that after "Dolores", the North American share will raise to 30-40%. He is comfortable with this prospect in view of the

high quality and technical North American standards which could meet German requirements. Mr. Beck indicated a need to develop company contacts with capabilities in this area in Canada. He also indicated that a DASA satellite procurement office located in Canada with a mandate to identify and prescreen capable suppliers would help to this end. Two such offices already exist in the United States which may help to explain the enormous imbalance between Canadian and American involvement in DASA Airbus programs. He also indicated his preference to deal directly with potential suppliers in order to avoid agency costs and that the supplier certification criteria for capital equipment is not as time consuming as, say, for aircraft component & system suppliers where it may take over a year. It should be noted also that although opportunities exist in this area, DASA Airbus' capital budget (formerly 100 million DM) has decreased substantially, but Mr. Beck would not elaborate on the magnitude.

Last December, DASA Airbus met with its major suppliers and subcontractors to seek an answer to the cost challenge of Boeing as well as to seek ways to improve Airbus market penetration. A copy of "The Challenge to the Aircraft Industry" was provided. DASA Airbus stressed to its suppliers that to ensure future competitiveness, Airbus must strengthen its customer and market orientation, re-design businesses and processes, increase quality and technology levels, and reduce through-time and costs. In an effort to get more involved in existing Airbus programs, Canadian firms with specific competencies may be able to assist existing DASA Airbus suppliers in their value engineering efforts aimed at meeting these challenges.

Shortly after lunch, we were joined by Mr. Muenster, who heads procurement for all aspects that go into the aircraft. He immediately expressed his interest in this initiative citing that the volume of Canadian involvement in DASA Airbus programs has been negligible to date with a mere 300 thousand DM as compared to 120 million DM for our American counterparts. He indicated that Canada was well placed vis a vis "Dolores" given the long term tendency for the $C to move closely with the $US. We may expect to see the volume of North American inputs increase to 60% from 40% with the implementation of "Dolores".

Mr. Muenster indicated that his department was divided into 4 areas namely, Raw Materials, Aircraft Equipment, Customized Equipment, and Aerostructures. These groups were headed by Mr. Roland Steiner (0421.538.2600), Mrs. Elke Ritter (X7171), Mrs. Ingrid Webinger (X7152), and Mr. Horst Lang (X7223) respectively. He stressed that an immediate area where Canadian firms may get involved would be in Aerostructures through Mr. Lang, who's department will be impacted most profoundly and more immediately by "Dolores".

When asked about the historical involvement of Canadian system suppliers on DASA Airbus programs, Mr. Muenster admitted that he was not very well abreast of Canadian competencies in aircraft subsystems. We discussed Allied Signals involvement in the A300 program and lack of success thereafter due to Liebherr's entry into the market for environmental systems. It was noted that Allied Signal Canada was a typical example of a captive branch plant of its American parent insofar as developing the controls for environmental systems. As in the case with BAe Airbus, Mr. Muenster indicated that we can expect DASA Airbus to streamline its supplier networks thereby increasing the volume each receives. In order for firms like Allied Signal Canada to be involved in future programs, it would have to either broaden its product mandate or seek alliances with other equipment suppliers so that it can offer a complete integrated subsystem.

Pratt & Whitney Canada's (PWC) unsuccessful attempt to offer an alternative to the Garrett APU on the A340 program was largely to do with economics. It was perceived that Garrett's recent loss to PWC on the Boeing 747-400 program, led the company to address its product support problems as well as become much more realistic with its pricing strategy.

Prior to leaving the meeting, Mr. Muenster summarized that current priorities with DASA rested with addressing its production problems, namely in aerostructures, which present some opportunities for Canadian firms. He also suggested he was not sure how Canadian industry in its present form, can address aircraft major systems solutions, particularly in view of the DASA approach to develop fewer supplier relationships for complete system integrators. Accordingly, some emphasis could be placed serving the major suppliers as their sub-suppliers. Opportunities may also exist with high value hardware where transportation costs can be rationalized.

Mr. Remus indicated that the Canadair "Global Express" model is the way DASA Airbus wanted to go with the proposed FA-X (successor to the Fokker 100). Approaches whereby key second tier suppliers are becoming "risk sharing partners" are also evolving in future new Airbus programs. In concert with this transfer of risk to suppliers, DASA Airbus will be moving to single sourcing of components, which will further serve to reduce the number of suppliers.

The factories currently have limited mandates for procurement in areas including raw materials and tools. Since they have been historically treated as cost centres, there have been some minor incidents where factories tried to move beyond their mandates to achieve purchasing economies.

To ensure purchasing policy harmonization, Airbus Industrie ensures that suppliers used by more than one partner offer consistent terms. It was generally felt, however, that an enormous amount of redundancy existed between Airbus and the partner organizations. Interestingly, it was also noted that DASA Airbus had an infrastructure in place to evaluate its work sharing agreement. Even the management of the Airspares centre in Hamburg has been factored into DASA Airbus' work share.

We met briefly with Mr. Lang as we were leaving the DASA facility. Mr. Lang is responsible for implementation of the "Dolores" initiatives, which are currently directed at sourcing aerostructures in the "dollar" zone. He indicated that he had solicited a proposal from Bombardier in Canada and that a response was received from Shorts Bros. in Ireland.

Memorandum

October 10, 1995

To: Airbus Study File

From: Robert de Gasperis

Re: Meeting with Aerospatiale Oct. 6, 1995

Present: R. de Gasperis, Consultant
G. Ladequis, Canadian Embassy, Paris
P. Prax, Deputy Vice President, Airbus Programs Procurement, Aerospatiale

Mr. Prax welcomed the opportunity to speak with us. He indicated Aerospatiale enjoyed an extensive relationship with Canada citing a nuber of collaborations including Canadair's involvement in the Airbus A330 program, extensive procurements made by both Air Canada and Canadian Airlines, Aerospatiales involvement in the Canadian government Polaris and Canadair Global Express programs, and Aerospatiale's direct investment in Canada through Atlantic Composites. He admitted that Canada is perceived more as a collaborator as opposed to the fierce competitor perception of the United States. Mr. Prax also noted that Aerospatiale's second and third largest suppliers were Canadair and Pratt & Whitney Canada with 1994 turnover of 414 and 370 million FF respectively.

Aerospatiale is organized into four divisions, which include Eurocopter (70% Aerospatiale, 30% DASA), Space and Ballistic Missilles, Missilles & Defence, and Aeronautical. The company's interest in Airbus Industrie is managed withing the Airbus subdivision of the Aeronautical Branch where it operates along side six other subdivisions including AIR (now 33.3%, formerly ATR), Aerostructures, Systems & Services (Atec), Sogerma Socea (Maintenance activity), Socata (100%, small business jets), and Sextant (30% Aerospatiale, 70% Thompson, Avionics).

The Airbus organization is in turn organized by 5 departments which include Design, Purchasing, Commerciale, Quality, and Industrial. Mr. Prax noted that its a good idea for suppliers to be involved at the design stage and that the company's procurement activities are closely aligned with engineering. He also stressed that early in Airbus' development it was faced with responding to the technical challeng, today, however, it must respond to the cost challenge.

Mr. Prax indicated that the market for large civil aircraft is changing and so are the "habbits" of the airlines. While some of the very large carriers including Air Canada, Air France, and Luftansa continue to operate their own maintenance facilities, a number of the smaller carriers seek these services outside their organizations and are therefore placing pressure on the Airframers to commit to a maximum operating and maintenance cost (Valuejet Case).

As we have heard all along at previous partners, the GIE structure is very complex, however, Mr. Prax insisted that each of the main Airbus Partners have developed common strategies and approaches. It was noted that a great deal of input is derived from Airbus Industrie and other partners when major procurement decisions are taking place. For

instance, we were advised that Aerospatiale strongly supported PWC's proposal to supply the APU on the A340 program, notwithstanding DASA's eventual decision to award the APU to Allied Signal-Garrett. Mr. Prax noted that Aerospatiale had very favorable experiences with PWC's world support network and therefore shared this information with DASA. While a considerable amount of redundancy exists within the current GIE framework, it is clear that procurement decisions no longer take place in a vacuum at the partner level. We wonder, therefore, how much further impact the eventual consolitdation will have on procurement.

In summary, Aerospatiale is engaged in furnishing the Avionics Systems, DASA in Air Controls-APU and Hydraulic equipment, and BAe in Fuel controls and Landing Gear. In the ATR GIE, Aerospatiale is responsible for power plant and avionics, Alenia of Italy is responsible for landing gear and air conditioning.

We were advised by Mr. Prax that the supplier selection criteria is rather complex, however, the basic approach is to identify the "best supplier in the world", at the best price, which can meet Aerospatiale's JIT requirements, and posesses exceptional quality and product support.

Procurement activities at Airbus are organized into three subfunctions namely, purchasing (involved in all aspects of negotiations), logistics (which is involved in coodination up to final installation on aircraft and to push suppliers to reduce their lead times), and storage (ensures 15 days worth of stock). Overall the department is seeking to meet technological and cost targets.

Again, as we have heard from previous partners, cost reduction targets in the order of 30% have been established. Furthermore, it was noted that the company intends to reduce its number of major suppliers from 250 to 25 (Aerospatiale currently has 4741 suppliers, but 85% of turnover is with the top 250). The company intends to establish a more strategic approach in its supplier selection in order to decrease lead times and to address the difficulty in managing a great number of suppliers. Also future supplier/partner relationships will be more marketing oriented. This assertion seemed to contradict Mr. Prax's view that Canadian suppliers should come forward to make proposals to him directly. Although he was somewhat elusive insofar as identifying where his present requirements rested, he did indicate that there were some immediate priorities in electical systems. It should be noted that Aerospatiale owns 30% of Sextant Avionique, which is also its largest supplier. Interestingly, he noted that he did not find Allied Signal Canada very competitive. We did not get the impression there would be major opportunities outside aircraft systems.

In the case of Subcontractors, Aerospatiale incures all the development costs. Suppliers, however, incure all or share non-recuring costs with Aerospatiale. Major subcontractors include Canadair, Sogerma Socea, Socata, Latecoere, Labinal, Ratier Figeac, Asta, Hurel Dubois, Erca, Mecachrome, Corse Composites Aeronaut, Composite Aquitaine. Major suppliers include Sextant Avionique, Messier Dowty, Honeywell, Sunstrand Aerospace, Messier Bugatti, Lucas France, ABG Semca, Rockwell Collins, Pechiney, Rhenalu, Fortech, ECE, Intertechnique, Allied Signal, Sarma, Litton Aero, Alcoa International, Reamet, Saint Chamond Granat, Aubert et Duval, Samm, Team, and Sfim Industries.

Mr. Prax noted that Aerospatiale was developing a supplier evaluation system which would scrutinize a supplier's potential (before being awarded a contract) and result (post contract award 2X per year). These supplier evaluations would adhere to similar principles which

consider the supplier's technological, logistical, quality, commercial, and product support capabilities. He stressed that, although supplier feedback is received from the Airbus Industrie customer support directorate, in fact, the procurer had more leverage to demand action. Logistics staff administer a questionaire to assess supplier performance, and that should a particular supplier performance be deemed less than acceptable, an "action plan" would be prepared in conjuection with the respective supplier. Failure on the part of the supplier to remedy weak areas would result in its replacement.

As in the case with DASA Airbus, Aerospatiale intends to meet with its major suppliers sometime early next year to discuss cost reduction strategies. Mr. Prax stressed that in order to meet Airbus' commercial challenges, its suppliers must reduce costs, improve quality, decrease lead delivery time, improve product support, and facilite Aerospatiale JIT requirements. Teams have already been established to identify parts which may be simplified and/or procured on a more integrated basis to improve cost and assembly time. Unlike DASA, Aerospatiale's cost base is predominantly in $US, nevertheless, its financial planning has been carried out based on 5.8FF/$US.

Aerospatiale's capitalization plans to source private sector capital (Dassault, Matra, Thompson cited as potenial investors) will likely place increasing pressure on cost reduction commercial activities.

Memorandum

October 18, 1995

To: Airbus Study File

From: Robert de Gasperis

Re: Meeting at Construcciones Aeronauticas S.A, October 18, 1995

Present R. de Gasperis, Consultant
C. Gutierrez, CASA, Director Airbus Programs
A. Herrero, Canadian Embassy, Madrid
J.C. Martinez, CASA, Airbus WB & NB Program Manager
L. Munoz, CASA, Vice President, Programs
Cl. Pile, Canadian Embassy, Madrid, Defense Attaché

Mr. Gutierrez proposed that CASA address a number of the questions circulated in advance of the meeting through a presentation prepared by Mr. Martinez.

CASA is a financially autonomous state company within the INI Group and is the premier aerospace firm in Spain. Founded in 1923, the company is now involved in a number of international consortia including Airbus (4.2%), Airtec (50%), Arianspace (1.9%), Eans (15%), Euram (13%), Eurofighter (13%) and FLA (20%).

The Aircraft Group is largest of three divisions followed by Aircraft maintenance and Space. CASA's interest in Airbus is managed within the Aircraft division, which accounts for well over 80% of the company's annual turnover. In house products include the CN-235 (twin turboprop STOL seating 44 passengers), the C-212 (twin turboprop STOL seating 26 passengers), and the C-101 (advanced jet trainer and ground attack aircraft).

The company's involvement in Airbus programs is focussed predominantly on the design and manufacturing of the horizontal stabilizer section for all models, fuselage section 18 for the A320 and A321, passenger doors for the A300, A310, A330 and A340, main landing gear doors for the A300, A310, and A321, front landing gear doors for the A300 and A310, and Dado panels for the A320 & A321. The company claims to specialize in composite structures. A significant portion of work related to CASA's work share is carried out within the group at factories located in Cadiz, Getafe, San Pablo, and Tablada. Some work is also carried out by independently owned factories in Spain, which were established with CASA's technical assistance, and by a limited number of foreign firms with carbon fibre competencies.

Major procurement on all CASA programs are negotiated by Mr. Javier Matallanos, Director of Material and Logistics, who's department works closely with each of the program directors in a matrix organizational structure. Responsibility for CASA's interest in Airbus rests with its program director, Mr. Carlos Gutierrez, who reports directly to the Vice President Programs, Mr. Luis Munoz.

The company has been profitable since 1993 and invests approximately 15% of its annual

sales in R&D. Research activities are focussed on carbon fibre technologies with some activity taking place at the University of Madrid (recent program). The company has been reducing its debt burden steadily since 1991.

Mr. Gutierrez did not envision major changes to the status quo Airbus Organization with its owners acting as major subcontractors in the foreseeable future (perhaps 10 years). One of the complications precluding a rapid move towards a single legal entity entails the evaluation and transfer of assets. He also confirmed CASA's aim to increase its participation in the Airbus GIE and/or to increase its own involvement in Airbus programs if workshare rules are relaxed in favour of market oriented approaches.

Mr. Gutierrez made it quite clear that CASA would not offer copies of typical contract terms and conditions (as was the case with each of the other industrial partners visited). When asked if he would welcome proposals from Canadian firms, he indicated that he would have to obtain clearances before offering an affirmative response. He also remained none committal with respect to being able to provide a detailed supplier list as such information was considered proprietary. He did indicate that he may make available a partial list of those suppliers which he considered could be assisted by Canadian firms in CASA's cost cutting initiatives.

Overall, he confirmed the Airbus study could be a useful exercise. He stressed that CASA wanted to develop contacts in Canada for potential collaborations. CASA has been somewhat isolated from the large civil carriers by AI and he acknowledged that there was also a genuine desire by CASA to develop relationships with large clients like Air Canada to help it assess its own performance and to continue to pursue business development opportunities in Canada such as its recent involvement as subcontractor to Bristol Aerospace on the Canadian F5 upgrade project. To this end, both Colonel Pile and Mr. Herrero indicated their willingness to provide assistance. CASA's immediate priority was to identify potential risk sharing partners for its proposed FA-X (fighter trainer) program to join its South African and South Korean partners.

Oct 25 - Called Juan Carlos Martinez, who confirmed he would forward a list of CASA subcontractors/suppliers which could be assisted by Canadian suppliers. In addition, he agreed to forward guidelines on quality standards.

Aerospatiale - Major Suppliers

ABG Semca
Mr. Claude Charpy
Purchasing Manager
408, avenue des Etats Unis
31016 Toulouse Cedex
Tel: (33) 61.35.22.17
Fax: (33) 61.35.29.39
Air systems and components

AERAZUR
Mr. Michel Roussel
Mgr, Aeronautic Equipment Div.
58, boulevard Gallieni
92137 Issy les Moulineaux Cedex
Tel: (33.1) 41.23.23.23
Fax: (33.1) 46.48.74.79
Parachute gear, composites, fuel tanks

ALTRAN TECHNOLOGIES
Mr. Jean Michel Martin
Commercial Mgr.
58, Bd Gouvion St Cyr
75858 Paris Cedex 17
Tel: (33.1) 44.09.10.00
Fax: (33.1) 40.68.00.23
Advanced Technology Consulting

AUXILEC
Mr. Jacques Caminade
Commercial Mgr.
41, boulevard de la Republique
78400 Chatou
Tel: (33.1)34.80.73.00
Fax: (33.1)30.71.01.40
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Mr. Cariak
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Fax: (33.1)47.75.96.10
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ECE-Groupe Intertechnique
Mr. Jean Poitou
Purchasing Manager
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75960 Paris Cedex 20
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Fax: (33.1)47.97.50.78
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Mr. Jean Phillippe
Purchasing Manager
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92363 Meudon La Foret Cedex
Tel: (33.1)46.01.11.11
Fax: (33.1)46.30.78.58
Aircraft structural and engine parts

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Fax: (33.1)30.55.71.61
Fuel circulation equipment, optronics, power management cockpit equipment

LABINAL
Mr. Philippe Joron
Purchasing Manager
5, avenue Newton, B.P. 218
78051 St Quentin en Yvelines Cedex
Tel: (33.1)30.85.30.85
Fax: (33.1)30.43.41.71
Gas turbines, electromechanical systems and assemblies, filter systems

LATECOERE
Mr. P. Martin
Purchasing Department
135, rue de la Periole
31079 Toulouse Cedex
Tel: (33)61.58.77.00
Fax: (33)61.61.22.91
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92601 Asnieres Cedex
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Fax: (33.1)47.91.61.35
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MESSIER-BUGATTI
Mr. Gerard Foucher
Purchasing Manager
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Batiment SL, Societe DO Avion,
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Mr. Siramis
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Mr. Pierre Gabriac
Purchasing Manager
Route de Cahors, B.P. 2
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Tel: (33)65.50.50.50
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SAGEM
Mr. Pardoix
Purchasing Director
6, avenue d'Iena
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Inertial navigation systems, avionics systems, electro-optics systems and equip.

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Fax: (33.1)40.90.07.47
Propulsion systems, satellite equipment, missile systems

SEXTANT AVIONIQUE
Mrs. Hellot
Purchasing Department
A Aerodrome de Milla Coublay, B.P. 59
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Tel: (33.1)46.29.88.00
Fax: (33.1)40.94.02.51
Electronic equipment & avionics

SNECMA
Mr. Jean-Pierre Champagnon
Purchasing Manager
2, boulevard du General Martial Valin
75724 Paris, Cedex 15
Tel: (33.1)69.87.92.60
Fax: (33.1)40.60.81.02
Aircraft engines

SNR ROULEMENTS
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Mr. Jean Depierre
Purchasing Manager for Aeronautics
1, rue des Eusinus
B.P. 2017, 74010 Annecy Cedex
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TEAM
Mr. Edgar Lapeyronnie
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10, place Vauban
94523 Rungis Cedex
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Fax: (33.1)46.87.14.47
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THOMSON-CSF
Mr. Noel Clavelloux
Manager, Aeronautics Equipment Branch
173, boulevard Haussmann
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Mr. Brillant, Director, Aerospace
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Wokingham
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Lambourne Court
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Director of LG Products
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Nose Gear

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BRAKING SYSTEMS DIVISION
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Zone BP40
78141 Velizy
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Fax: 33 146 298591

Brake and Sheering Control System, A340

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Mr F Beyer
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Pfanderstrasse 50-52
Postfach 1363
0-88 Lindenburg ALGAU
West Germany

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Fax: 8381 46 377

Flaps and Slats, A320

C & D INTERIORS
Mr J Downey
President
7330 Lincoln Way
Garden Grove
CA 92641
USA

Tel: 714 891 1906
Fax: 714 895 6884

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Fax: 513 339 4556

Nose and main wheel and brakes A340

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Mr R Freeman
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Chineham
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Fax: 0181 813 4351

Landing Gear Control and Interface Unit, A320, A340

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Panton Road
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Mr I Campbell
Managing Director
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Berkshire
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Fax: 01734 794511

Fuels Systems, A340

Intertechnique
BP2 Bd Sagmat
42230 Roche la Moliere
France

Tel: 33 1779 07100
Fax: 33 1779 07171

Fuel systems A340

Annie Guenrieteau
Intertechnique
BP No 1
78374 Plaisir
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Fuel Systems A320

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B33 9QR

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Fax:0121 784 7899

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ALCOA (SHEET & PLATE)
Aerospace Rolled Product Divs.
P.O. Box 8325
Bettencorf
USA

International V.P. Sales&Marketing:
John Piowaty
Tel: 319 344 3033
Fax: 319 344 3021

Major rolling mill manufacturer of Aluminium Plate and supplies wingskins for all Airbus variants and standard rib plate.

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California
USA
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Location Manager: Vi Bird
Tel:410 242 8181
Fax:410 247 4441

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Fax: (34.1)208.3958
Computers, systems, components

ANDALUCIA AEROSPACIAL
Mariano Santiago
Director of Business Development
Edif. World Trade Center
Isla de la Cartuja
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Tel: (34.5)448.8271
Fax: (34.5)448.8272
Airborne structure components

CESELSA-INISEL
Jose Perez-Nievas, President
La Granja 84
E-28100 Alcobendas (Madrid),
Spain
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Fax: (34.1)623.7352
Electronic systems

COMPANIA ESPANOLA DE SISTEMAS AERONAUTICOS
Alfonso Garcia, Commercial Director
P.O. Box 214
Avda. John Lennon s/n
Tel: (34.1)624.0111
Fax: (34.1)624.0114
Airborne structural components

ENIDINE S.A.
Fernando Mendiguren, Manager
Sabino Arana 38
E-48013 Bilbao Spain
Tel: (34.4)442.5424
Fax: (34.4)442.0215
Airborne structural & mechanical components

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A-4910 Ried, Austria
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General Manager
Parque Tecnologico de Alava, 2 avendia
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Tel: (34.4)518.5600
Fax: (34.4)518.5614
Materials, chemicals, hardware

HEATH TECNA AEROSPACE
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Kent Washington
98064-9704, USA
Tel: (206)872-7500
Manufacture composite structures

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Fax: (34.1)384.8002
Engines

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Avda. Burgos 8 - bis
E-28036 Madrid Spain
Tel: (34.1)396.3300
Fax: (34.1)396.3131
Electronic systems and components

INTERNATIONAL DE COMPOSITES
Luis Estaire, CEO
Polig. Inds.
Tarpeya s/n
E-45007 Toledo, Spain
Tel: (34.2)526.9504
Fax: (34.2)526.9510
Materials, chemicals, hardware

MOOG Spain
P. Gondard, Manager
Jesus Aprendiz 21
E-28007 Madrid Spain
Tel: (34.1)552.6701
Fax: (34.1)433.5250
Airborne structural and mechanical components

RAMON VIZCAINO S.A.
Jose M. Vizcaino, President
Aptdo. 1363, B. Herrera s/n
E-20080 San Sebastian, Spain
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Fax: (34.4)339.1443
Airborne structural and mechanical components

SAFT IBERICA
Luis Marcos, Product Manager
Artapadura 11
E-01080 Vitoria, Spain
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Fax: (34.4)527.5749
Electronic systems and components

SENER INGENIERIA & SISTEMASSA
J. Sendagorta, CEO
Severo Ochoa 4
E-28760 Madrid Spain
Tel: (34.1)807.7000
Fax: (34.1)807.7201
Electronic systems and components

STOPSON ESPANOLA S.A.
Julio Rubio, Manager
Deu y Mata 104/110
E-08209 Bacelona, Spain
Tel: (34.3)321.6684
Fax: (34.3)321.6249
Materials, chemicals, hardware

Daimler Benz Aerospace Airbus GmbH - Major Suppliers

AEROQUIP GmbH
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Fax: (49)8105.75.55
Hydraulic components

AIK ISOLIER-UND KUNTSTOFF
Otto-Hahn-Str.5
34123 Kassel, Germany
Tel: (49)561.580.10
Fax: (49)561.580.1252
PCB bas materials, prepregs

ALBERT MUEHLENBERG oHG
Gutenbergring 14-16
22848 Norderstedt
Tel: (49)40.523.2016
Fax: (49)40.523.5092
Interior finishings

APPARATEBAU GAUTING GmbH
Ammerseestrasse 45-49
82131 Gauting
Tel: (49)89.893.170
Fax: (49)89.893.17.215
Air conditioning, fire protection

AUTOFLUG GmbH
Industriestrasse 11
25462 Rellingen Hamburg
Tel: (49)4101.307.0
Fax: (49)4101.307.316
Interior finishing, oxygen systems

BAVARIA AVIONIK TECHNOLGIE
Kirschstrasse 20
80999 Muenchen
Tel: (49)89.818.40
Fax: (49)89.812.0833
Air conditioning

BODENSEEWERK
GERAETETECHNIK GmbH
Postfach 101 155
88641 Ueberlingen Bodensee
Tel: (49)7551.890
Fax: (49)7551.892.822
Avionics, flight controls

BREMER EDELSTAHL GmbH
An der Gete 1
28211 Bremen
Tel: (49)421.492.051
Fax: (49)421.441.013
Special metals trader

CIBA-GEIGY GmbH
Oeflinger Strasse 44
79664 Wehr Baden
Tel: (49)7762.820
Fax: (49)7762.7870
Composite Material & Components

COURTAULDS AEROSPACE
Postfach 950
40709 Hilden
Tel: (49)2103.771
Fax: (49)2103.775.13
Paints, coatings

Daimler Benz Aerospace Airbus - Major Suppliers (continued)

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90478 Nuernberg
Tel: (49)911.947.0
Fax: (49)911.947.3680
Ballast units

DRAEGERWERK AG
Moislinger Allee 53/55
23542 Luebeck
Tel: (49)451.882.0
Fax: (49)451.882.2080
Fire protection, oxygen systems

FEINMECHANISCHE WERKE MAINZ
Industriestrasse 56-58
55120 Mainz-Mombach
Tel: (49)6131.698.0
Fax: (49)6131.698.200
Flight controls

FERDINAND STUEKERJUERGEN GmbH
Gruener Weg 4
33397 Rietberg-Varensell
Tel: (49)5244.4040
Fax: (49)5244.404.44
Molded extrusion components

HELLA KG HUECK & CO
Rixbecker Str. 75
59552 Lippstadt
Tel: (49)2941.38.1
Fax: (49)2941.38.8432
Aircraft lights

LIEBHERR AEROTECHNIK GmbH
Pfaenderstrasse 50-52
88161 Lindenberg
Tel: (49)8381.46.0
Fax: (49)8381.46.377
Flight controls, air conditioning

NORD-MICRO ELEKTRONIK
Victor-Slotosch Str 20
60388 Frankfurt
Tel: (49)6109.303.0
Fax: (49)6109.303.233
Air conditioning, pneumatics

STN ATLAS ELEKTRONIK GmbH
Huenefeldstrasse 1-5
28199 Bremen
Tel: (49)421.538.03
Fax: (49)421.538.3320
Maintenance and testing equipment

VDO LUFTFAHRTGERATEWERK
An der Sandelmuhle 13
D-60439 Frankfurt
Tel: (49)69.5805.0
Fax: (49)69.5805.399
Indicating instruments, hydraulic power