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West Europe Report

SCIENCE AND TECHNOLOGY

(FOUO 6/82)

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SCIENCE POLICY

RESEARCH, TECHNOLOGY MINISTER ON GOVERNMENT PLANS

Paris PARADOXES in French Winter 82 pp 64-69

[Interview with Jean-Pierre Chevenement, minister of scientific research and technology, by Jacques Houbart; date and place not given]

[Text] From 13 to 16 January the National Symposium on Research and Technology, preceded last fall by major regional meetings that brought together all laboratory and industry partners, was held in Paris. The chief organizer of this vast operation, Minister of State for Scientific Research and Technology Jean-Pierre Chevenement, conceived it as the trigger for a renewal of research and development in France. He plans to achieve an investment in research on the order of 2.5 percent of the GNP by 1985. But this massive investment in gray matter provided by the taxpayers will not be enough to fertilize the economy.

Will not the success of this laudable enterprise be threatened:

if the development of the class struggle prevents businesses, particularly the small and medium-sized industries, from participating in the movement;

if the fanaticism of certain union members who stir up the antinuclear committees is given free rein;

if the bureaucratization of researchers cuts them off from economic reality and the demands of growth?

Our colleague, Jacques Houbart, asked these questions of Jean-Pierre Chevenement.

[Question] At the time of the regional meetings that paved the way for the National Symposium on Research and Technology, you stressed the fact that, while the French national research effort came to 2.2 percent of the GNP in 1968, in the face of the impact of oil [prices] the Valery Giscard d'Estaing administration allowed it to drop to 1.8 percent. Feeling that the best anticrisis therapy is the injection of gray matter [into the economy], you, Mr Minister, propose to achieve a rate of 2.5 percent by 1985. But doesn't the "change" therefore consist of a return to the first days of the Fifth Republic, indeed to that policy of "great programs" (nuclear, aeronautics, computer) so disparaged by a Malthusian Left that sees only an activity of "Satan" in scientific and technological progress?

[Answer] On 1 July the president and the government set an ambitious objective in the national research and development effort: to go from the 1.8 percent of the GNP of today to 2.5 percent by 1985. Whether in the 1990's France is ahead of or lags behind the big industrialized countries depends very largely on our ability to achieve this objective.

In fact, the solution of most of the problems that confront us today involves an important scientific and technological component. The government feels that the technological research and development effort constitutes one of the privileged ways of getting out of the cultural, social and economic crisis into which France finds itself plunged. The ambitious objectives the government has set for the technological research and development effort are also part of a strategy to prepare for the future. They will be written into the orientation and programming law the government will present to Parliament in April 1982.

The great technological programs (nuclear, space, aeronautics, data processing) you refer to have played an important role in the country's scientific and technological development. They were and, furthermore, still are an important element in a policy of national independence. Today our outlook is different. In particular, it is a question of assuring France's economic and social development in the 1990's. New mobilizing programs will be the tool of this policy. Setting them in motion should permit us to link major objectives of national interest (national independence, ability to compete economically and recapture of the domestic market, full employment of manpower, national solidarity, etc.) with completed basic research efforts, applied research and technological development. These programs will link laboratories, teams and businesses with pilot projects.

As you can see, it is not a matter of returning to the 1960's. It is a matter of prolonging the positive effort achieved then in certain key domains (space, nuclear research, aeronautics), of correcting jeopardized situations (electronics, data processing) and above all of extending this effort to new techniques (biotechnologies, National Institute for Energy), to neglected industrial sectors (food production, mechanics) or a few strategic domains (materials, scientific instrumentation, etc.).

And lastly, I attach a great deal of importance to seeing to it that this research effort takes into account our stake in democracy as it is today manifested in our society and throughout the entire world.

This is the point of the two priority missions created for research on employment and working conditions and research on cooperation with the developing countries.

The research and development technology policy should respond to the expectations of the world of labor and of the oppressed countries.

[Question] Inaugurating the ANVAR [National Agency for the Valorization of Research] conference in Lyons last 15 October, you stressed the major role business (particularly small and medium-sized businesses and industries) should play in the great leap forward in the field of research. You said that it would be "illusory" to expect to achieve a rate of 2.5 percent of the GNP "unless a considerable effort was made by businesses." But is this considerable effort possible if,

bound hand and foot financially and by the unions and with their staff crushed by the Internal Revenue Service, businesses cannot play their liberal role as in the United States, for example?

[Answer] The objective of a national outlay for research and development set at 2.5 percent of the GNP by 1985 can only be achieved if a joint effort is made by the government, nationalized enterprises and private firms.

1. As far as the public sector is concerned, the budget of the ministry I am in charge of bears witness to the effort the government intends to make. It has increased by 29.6 percent in comparison with 1981.

2. The nationalization of a certain number of big companies is based on the observation that the country is faced with technological challenges (Thomson in electronics, Saint Gobain in data processing, Rhone Poulenc in biotechnologies) and that private industry could no doubt not in fact raise the necessary funds. As a result of these nationalizations, the research and development effort should be considerably strengthened.

3. After all, I have always insisted on the fact that a very broad private industry sector should subsist and progress along with the nationalized sector.

You cite the example of the United States and the "liberal role" we ought to allow private businesses to play. In answer to your question, I would say two things:

a) "Bound hand and foot by the unions": Do you really have the impression that for 8 months now union action has been clearly demonstrating a determination to thwart economic development?

b) "Bound hand and foot financially": Businesses complain of overly high interest rates on loans. I can readily understand, but this is after all the object of the policy the government is pursuing at the present time, to reduce the rate of inflation and gradually lower the prime lending rate and the overall scale of rates.

I point out to you that interest rates have not risen for 8 months now.

Aside from the difficulties of financing investments that are real, but which should not be exaggerated, we must overcome the reticence of French businessmen to free their capital in order to increase their own funds and improve their firms' ability to assume debts.

More generally speaking, government devices (ANVAR grants, mobilizing programs, etc.) should in the course of the next few years enable us to make a vigorous effort to renew industrial research.

[Question] Aside from businesses, in a big public organization like the CNRS [National Center for Scientific Research] they appear to be getting ready to grant the dominant unions a bigger role. Naturally, it is a good thing for the unions to be able to effectively defend the workers and convey their own ideology. But if it is a question of basic research or technological orientation, particularly in the field of energy, don't we run the risk of seeing a veritable Lysenkoism come into being?

[Answer] I don't very well see what Lysenkoism has to do with your question. I am well aware that conditioned reflexes exist. I encourage you to rid yourself of them. For me, it is simply a matter of seeing to it that staff members participate, through their representatives, in the preparation of choices and in the management of research agencies. The 1979 reform of the CNRS considerably reduced this kind of fair participation by staff members. At the end of the national symposium, we'll see how we can establish new set-ups within the CNRS and in the other public institutions. Meanwhile, I have simply restored to staff representatives those rights they had before the reform and added three important union figures from outside to the institution's council as observers. This is a temporary measure which will not prejudice the final formula. This measure will enable us to enlarge the representativeness of the council, which until now has been limited to a certain number of scientific and industrial bigwigs.

[Question] After the last war, on the initiative of the ABC with Joliot, the issue of a peaceful atom was a favorite topic of the Left. Since 1968 the latter, or at least various parties and unions, has developed a real antinuclear fanaticism, going as far as sabotage. Can't we reply to the pseudo-ecologists with real ecological data, present the balance sheet on energy risks, compare various sources? Play up the /dangers of using coal/ [in italics], a technique that releases not only sulphur, dust, considerable radioactivity (higher than that produced by nuclear power plants in unconfined complexes), but also a large amount of carbon dioxide that is added to the products of other combustion reactions and really represents a major risk to the ecology of the entire planet?

[Answer] Indeed, during the 1950's the idea of a peaceful atom raised people's spirits. Expected soon, control over nuclear energy even served as an argument for protesters of the time. I am thinking of the villagers of Tignes who used it to oppose the construction of hydroelectric dams.

It is, of course, useful to compare the relative risks of the different industrial activities and the different sources of energy. Such studies have already been completed and continue to be conducted and more thoroughly gone into. Nuclear energy always comes out ahead. In a rather general way, we note that the conventional techniques are more dangerous and deadly than the advanced techniques. Comparative risk studies therefore constitute an indispensable preliminary to any effective action to improve industrial safety, but they have little impact on individual reactions.

For example, no one refuses to travel by car, whereas many people are still afraid of flying. Yet airplanes are incomparably safer than cars.

No doubt the results of risk studies have been poorly popularized, but I primarily believe that the problem is a quite different one. On the one hand, how one perceives the risk is a matter of emotional reaction, and columns of figures have little influence on an emotional reaction. Familiarization with it is much more effective.

But, above all, the opposition to it does not stem from the risk; it has quite different roots. It isn't this or that industry that is concerned. It is an overall refusal on the part of present-day society.

We are therefore dealing with a cultural problem. The proper reply is that this society ought to learn to know itself better in order to better take charge of itself. In connection with this, I am convinced that development of the social sciences and the scientific approach to social problems will force the "antiscience" ideologies, which, moreover, through some incomprehensible reaction today flourish, to retreat.

We must reverse the attitude of the French toward science, give them a taste for knowledge and action.

In connection with this, I don't feel it useful to terrorize them with a new myth (carbon dioxide) before knowing the results of the studies I have requested on this matter.

[Question] Mr Minister, may I ask you one last question on your thoughts about /regulation/ [in italics] of researchers?

Whether he be a university professor or an engineer or simply self-taught, isn't the researcher, by definition — like sportsmen — a creature of adventure and whims, beyond regulation? Might one say that it is certainly appropriate to solidly aid him in his efforts and guide his later mutation, but not to turn him into a bureaucrat? How can you ensure the effectiveness of these teams? Was the last administration's desire to facilitate mobility among researchers so reprehensible?

[Answer] The researcher, a creature of adventure? Certainly!

But the researcher "on the fringe," as you describe him, a man of whims and impulses, "beyond regulation," is fundamentally a marginal person. In reality, research is a profession that demands an exceptional combination of qualities: creative imagination, enthusiasm and intellectual curiosity, but also perseverance, method, rigor and a sense of responsibility.

Whether they are researchers, engineers, technicians or administrators, whether they work in the administration, in public institutions or in private firms, all those individuals who participate in the research effort are not on the fringe of the society. They are at the very heart of it, just as it is true that the solution to none of the great problems of our time: health, employment, working conditions, energy, communications, environment, will be found largely in research.

For 40 years now, the direction the whole society has been moving in has been institutionalization of research, considered to be a vital function of the society. Today even more than yesterday, progress is going through a renewed effort to search for knowledge, to experiment and to innovate. Researchers' job is, to be sure, to investigate, but also to improve their research through applications, to teach in order to pass on their duty to inform and aid the nation in its choices for the future.

All this demands not marginalization but, quite the contrary, job security, prospects of clearly defined careers and good fringe benefits. Public charters and collective agreements should in future recognize these rights for them. This constitutes an indispensable condition for effectiveness and true mobility, voluntary and organized.

Social regression has never aroused enthusiasm; furthermore, we have seen that this is so. To create new dynamism, we have to get social progress and economic progress to march in step.

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SCIENCE POLICY

RESERVATIONS VOICED ABOUT CENTRALIZED, PLANNED RESEARCH

Paris L'EXPRESS in French 12-18 Feb 82 p 80

[Article by Dominique Pignon, researcher at the theoretical physics laboratory of the Advanced Teacher Training School: "The New Alliance"]

[Text] The colloquium on "Research and Technology" concluded on a note of success; but Jean-Pierre Chevenement, minister of state, should listen to Chevenement, the initiator of this "states general" of research, for the lessons learned exceed the initial objectives of the organizers. Many leading figures in the field of research indicated that they have reservations concerning the plan for a union between science and the state that would be too close.

The systematic preference of the great scientific organizations for large-scale programs of research and development comes increasingly in conflict with the forms of innovation and discovery. Institutional inertias often hinder the precise initiatives that go counter to the prevailing current. Moreover, the attempts to render the bureaucracies (even the scientific ones) less cumbersome have, in the past, often produced adverse effects and resulted instead in strengthening their paralyzing control.

The fact is that these reservations of principle conceal deep-seated tensions. The very nature of research demands creativity and innovation, that is to say, risk-taking and the right to make mistakes; whereas the institutions that are in charge of research insist on guaranteed estimates and abhor uncertainties. More and more often, therefore, innovation has been the province of those teams that labor on the periphery of the large-scale programs--teams such as that of Roger Guillemin, Nobel laureate in medicine, who has had to exile himself in the United States in order to carry out his research. These new teams of "elite soldiers" (which are becoming the rule in the sector of the most advanced research) are opposed to the ponderousness of the French organizational model.

The concluding report by Philippe Lazar, the new director of the National Institute of Health and Medical Research (INSERM), used exotic words, favoring ideas such as "networks," "interfaces" and "open systems" and praising the "aleatory factor" and risk-taking. It is indeed a new philosophy of science and knowledge, enunciated unabashedly, and the traditional "hard" world of classical industry cannot fail to regard it as a provocation. This new concept of the "soft" technological galaxy--enunciated by a biologist--rubs the governmental and technological power structures in France the wrong way. The great

governmental entities are more inclined to continue to think in terms of "hierarchy," "authority," "command" and "centralized planning." The models associated with these designations have been successful in connection with the freeway programs, the establishment of the nuclear industry, and the equipping of armies; but they have also failed in connection with modernization of the steel industry and have been incapable of assisting in the process of building a competitive computer industry. Moreover, the fact that data processing (just as in the case of the biotechnologies) does not fit the pattern of extremist centralism is unquestionably a sign of the obsolescence of these management models. The fact that the adverse effects of these models is multiplying is an increasingly obvious symptom of this obsolescence.

The technological options can no longer be dealt with in the minor mode. The difficulty thtt the politicians have in assimilating, and taking into account, the technological dimension of the political options is another indi ion.

Here, too, the explosion of knowledge is rendering the old organizational models obsolete. The present-day holders of technological power are less and less often the aristocrats of knowledge that they once were. For the most part, they are today merely administrators who are far removed from the real problems. The "middle class" of researchers and technicians--the new "brain workers"--want in their turn to be recognized as a new tribunal for decision-making. For that reason, what is at stake is in fact a democratic--albeit peaceful--revolution, to wit: "Pluralize the right to speak; grant it to all those whose competence, whose responsibility, whose civic spirit, whose labor and whose curiosity entitle them to be legitimate actors in the process of making the cultural, scientific and technical choices for our future." As we can see, the general reporter minces no words. The ambition of the "new alliance" goes singularly beyond politics--the politics of the Left as well as the politics of the Right. This endeavor will have to attack many impregnable fortresses--both on the left and on the right--if the technological "new deal" is to be carried through to success.

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NEW PROPELLER TECHNOLOGIES FOR COMMUTER AIRCRAFT

Paris AIR & COSMOS in French 28 Nov 81 pp 23,48

[Article by J. M.]

[Text] The recent RAAA (formerly: CAAA) show at New Orleans (see AIR ET COSMOS Nos 881 and 882) provided propeller manufacturers an opportunity to highlight the evolution that characterizes their present production as well as their future one.

Putting aside the future "propfan" (see AIR ET COSMOS No 863, 6 Jun 1981), which the designers now think will hardly make its debut before the second half of this decade (in the civil domain at least), the propeller still has a good future ahead of it, owing to increased fuel costs: The turbojet, even of advanced design, is still too much of a fuel guzzler for the regional transport plane, and the propeller remains the best generator of mass movement, at least in the 500-km/hr range, a range that is amply sufficient for short runs.

But which propeller? After three decades of virtual stagnation, a "new propeller" has appeared, characterized by high efficiency, light weight, and a reduced noise level. The use of blades made of composite materials and the advances that have taken place in the domain of aerodynamics are to a great extent at the origin of this revival. Three propeller makers are, from this standpoint, operational: Hamilton Standard and Hartzell in the United States, and Dowty in Great Britain. In continental Europe, the situation is much less encouraging but not hopeless, thanks to Dornier and to Ratier-Figeac, the first of whom has recently commenced flight tests (9 October) on an experimental TNT [New Technology Wing] plane using a high-efficiency 4-bladed propeller developed in cooperation with the Hoffman firm, the DFVLR [German Research and Experimental Institute for Aeronautics and Astronautics] and the Technical University of Stuttgart, and the second of whom has beefed up its Research and Development Department, invested in computer facilities, and launched a program of design and development of a broad line of propellers (see AIR ET COSMOS No 866, 27 June) that is to cover the gamut from 150 to 1,500 kW.

The latter French firm has also obtained from the STPA [expansion unknown] a contract on which it is already at work to develop a glass-fibered, 3-bladed, variable-pits propeller suitable for the Epsilon. the Figeac firm, which has reconfigured a "propeller-design" department, reorganized its fabrication operations and opened a "composites" workshop, has set for itself a precise immediate

objective: That of cooperating with the propeller maker who will be chosen for the ATR 42, with a view to representing him in France, assemble the propellers, and provide technical assistance.

Getting back to the American propellers: Hamilton Standard, a leader in the "propfan" research effort, has developed its new 14-RF (1,500-2,000 hp) propeller, a 4-bladed one measuring 3.2-3.3 m in diameter and weighing less than 90 kg, cone included, which has already been adopted by Embraer for its Brasilia, by CASA/ Nurtanio for its CN-235 and by De Havilland Canada for its Dash-8. This propeller is available with a system of regulation (mounted on the reducer) that offers all imaginable possibilities, plus, as options, electronic synchronization and de-icing. It is to be noted that the blades of the 14 RF are of mixed fabrication.

Hartzell Propeller offers no less, with its HD line, which will cover the gamut between 1,400 and 2,200 hp, with diameters from 3.05 to 4.05 m and weights ranging from 80 to 90 kg. The four supercritical-profile blades of this propeller are made entirely of composite materials featuring extensive use of Kevlar. The resultant weight gain is between 15 and 28 percent. The other line (M 11073) includes 3-blade, 4-blade and 5-blade propellers (also made of Kevlar), designed for the PT6A-45 and PT6A-65; the weight of a 3-blade unit is 52 kg... (the 5-blade propellers will equip, for example, the Frakes improved N 262 and the Shorts SD3-30.

Dowty showed its 4-bladed, 3.20-diameter propeller that is to be mounted on the SF 340's CT7-5. It is the latest addition to a family of propellers that already equip the Gulfstream, the Merlin, the Metro, the JetStream, etc. The blades of this propeller have a carbon-fiber spar.

Pending now is the choice to be made by AEROSPATIALE [(French) National Industrial Aerospace Company] and AERITALIA [expansion unknown] for the ATR 42. Competing for this award are Dowty and Hamilton Standard.

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TRANSPORTATION

BRIEFS

AIRBUS ORDERS--Mr Tony Hart, chairman of the Board of Directors of Air Jamaica, Mr Horace Barber, secretary general of the Finance Ministry of Jamaica, and Mr Jean-Yves Richard, Airbus Industrie's director of sales for South America and the Caribbean, signed a contract on 8 January providing for the delivery in October 1982 of two Airbus A-300 B4-200 jetliners powered by General Electric CF6-50 C2 engines. These planes will be configured to carry 265 passengers, that is, 12 in first class and 253 in tourist class. Air Jamaica, founded in 1966, is Jamaica's national air transport company. Air Canada is a minor stockholder. Its current fleet consists of four B-727-200's, six DC-8's (three of which are Series 60), and one DC-9-30. The two A-300 B4's just ordered will be put into service in November 1982 on the heavily traveled routes linking Jamaica with New York and Miami, and on the major touristic routes to Los Angeles, Chicago, Dallas, Atlanta, etc. With this order, Airbus Industrie's client airlines now number 43 and officially placed orders for A-300/A-310's now total 505 planes, as follows: 327 Type A-300 (258 firm orders + 69 options) and 178 Type A-310 (88 firm orders + 90 options). Air Jamaica's decision is relatively significant, since it means that the European consortium will henceforth have six clients in the Americas, the first five being Eastern Airlines (34 Type A-300 firm orders + 26 options); Cruzeiro do Sul (2 Type A-300); Varig (2 Type A-300); VASP (3 Type A-300) and Wardair (6 + 6 Type A-310). [Article by J. M.] [Text] [Paris AIR ET COSMOS in French 16 Jan 82 p 15] [COPYRIGHT: A. & C. 1982] 9399

AIRBUS FLIGHT TESTS WITH AFT CG--Airbus No 3 was used in a series of flight tests to explore the behavior of the plane with aft CG at 42 to 45 percent of its mean aerodynamic chord versus the 35 percent currently allowed on the A-300. The aftmost limit of CG travel has already been determined by simulator to be 50 percent. Actually, a 10-percent CG setback would enable a 1.5-percent reduction to be achieved in Airbus fuel burn, by reducing trim compensation drag (produced by the tailplane). These figures apply only during cruising, of course, since for takeoff and landing a CG displacement in excess of 33-35 percent is out of the question--despite the attractiveness of aft CG from the standpoint of performance during takeoff and climbing, owing still to the reduction of drag--because of the geometry of the landing gear. One possible solution is that of in-flight fuel transfer, a portion of it being transferred to tanks lodged in the tailplane. A solution of this type is planned for certain of the long-range Airbuses. We note that the current Airbus mean cruising CG travel aft is around 25 percent. [Text] [Paris AIR ET COSMOS in French 16 Jan 82 p 16] [COPYRIGHT: A. & C. 1982] 9399

RJ-500 BENCH TESTS--Rolls-Royce disclosed on 30 December that bench tests have started in Bristol on the high-pressure system of the future RJ-500 turbojet it has developed jointly with the Japanese engine-building industry, and that it has already totaled 12 hours of operation in an altitude chamber. This system includes a 9-stage axial-flow compressor and a 2-stage HP (high-pressure) turbine. It is heavily instrumented to enable measurement of its operating characteristics (efficiency, vibrations, turbine temperature). These tests were preceded by basic tests run during the past several months on the blower, the shafts, the combustion chamber and the turbine. The first complete engine is due to return to the test bench, still Bristol, next month. A second unit will return to IHI [Ishikawajima-Harima Heavy Industries] at Mizuho, Japan, near Tokyo, in March. The RJ-500 in question, the RJ-500-01, is a "demonstrator" the building of which was begun less than 2 years ago. A distant offspring of the RB-401, the RB-183 and the RB-211 on the part of Rolls-Royce, and of the FJR-710 on the part of the Japanese, it was designed and dimensioned as the demonstration model of an engine of 9 tons of static thrust, capable of delivering a cruising thrust of 2.25 tons at Mach 0.8/ 30,000 feet, with an attractive 0.65-kg/kg p-h specific consumption, its intake diameter being 1.5 meters. This RJ-500 was in fact optimized for a 120/150-seat twin-engine jetliner weighing some 60 tons at takeoff: In effect, the Fokker F29 (see AIR ET COSMOS No 817). Then, the projects of the principal builders having begun to show some headway, Rolls-Royce felt it must press forward with its project and published, at the recent Bourges Exposition the basic characteristics of its two proposed engines: The RJ-500-25 (diameter: 1.55 m; thrust: 9.5 tons at takeoff, 2.5 tons cruising; SFC [specific fuel consumption] lowered to 0.627), and the RJ-500-35 (diameter: 1.77 m; thrust 11.3 tons at takeoff, 2.95 tons cruising; SFC 0.601). The latter is one of the engines being considered by Airbus and Delta Airlines to equip the future A-320-200. In any case, the RJ-500 will keep its main features, namely, its simplicity and its small number of components, both of which will moderate its production cost. However, the needed increase in thrust will nevertheless require the use of a 10-stage HP compressor and a 4-stage LP [low-pressure] turbine. The planned bypass ratio is 6, the pressure ratio 22.4, and the flow rate 382 kg/sec (see AIR ET COSMOS No 865). [Article by J.M.] [Text] [Paris AIR ET COSMOS in French 16 Jan 82 p 16] [COPYRIGHT: A. & C. 1982] 9399

AEROSPATIALE, RENAULT TECHNICAL EXCHANGE--Jacques Mitterrand, president and general manager of AEROSPATIALE [National Industrial Aerospace Company], and Bernard Hanon, president of RNU-Renault [National Administration of Renault Factories], on 1 February signed an agreement establishing the framework for collaboration between Renault and AEROSPATIALE. This agreement--of indeterminate duration--is intended to permit a mutual exchange of information and expertise and is oriented particularly toward transfers of technology. AEROSPATIALE will bring to Renault its knowledge concerning the new materials (composite materials, new fibers, refractory materials) and their application in connection with the reduction of the weight of structures. The utilization of lightweight materials in the design of the vehicles is one of the orientations that will make it possible to reduce the fuel consumption of the vehicles. Renault will bring to AEROSPATIALE its special skills, particularly in the domain of automation and robotics, both at the design level and at the

level of medium- and large-scale mass production techniques. The collaboration between Renault and AEROSPATIALE will be embodied in the specific agreements that will cover not only joint research and development but work done by either company in behalf of the other. When indicated, assistance can be requested from governmental sources. A coordination committee consisting of six members (three for each company) will monitor implementation of the agreement and prescribe the objectives of the research. [Text] [Paris AIR & COSMOS in French 6 Feb 82 p 9] 10992

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