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REPORT

drawn up on behalf of the Committee on Energy, Research and Technology

on Europe's response to the modern technological challenge

Part B: EXPLANATORY STATEMENT

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A Series: Reports - B series: Motions for Resolutions, Oral Questions, Written Declarations, etc. - C Series: Documents received from other Institutions (e.g. Consultations)

B

EXPLANATORY STATEMENT

INTRODUCTION

1. The purpose of this report is to analyse the trends in the technological revolution which is currently under way, to determine the scale of the challenge from Europe's main competitors, to set down Europe's strengths and weaknesses, and to make a number of suggestions to minimize Europe's weaknesses and keep it in the race among the technologically advanced nations.

Opinion in Europe is becoming more and more aware of this vital aspect of its future. The question is whether there is still time and whether we are prepared to put our declarations and plans into effect by calling for the resources required to carry them out.

The geopolitics of new technologies

2. National development, progress, economic and social advance and the power relationships between nations take place against a background of five spheres of action: science, weapons, mineral raw materials, raw materials for foodstuffs, and energy, to which space and the seabed will soon be added.

3. There are new technology geopolitics just as there are strategic and economic geopolitics. Five high technology disciplines have in fact altered the whole picture with regard to harnessing the aforesaid traditional spheres of action: they are electronics, biotechnology, the new materials, the new nuclear or alternative sources of energy and new ways of harnessing the old forms of energy, and space technology. Each of these forms of technology is linked to at least two others.

All the signs are, in fact, that these interactions are becoming more pronounced. For example, though there is no doubt that there is still a long way to go before a miniaturised biocircuit is developed, the optical circuit is almost with us now. There is a considerable degree of interaction between research into the new materials and space research. Electronics and data processing come into every field, as do the new materials.

4. Dr George Keyworth, Scientific Advisor to President Reagan, said recently in evidence to the House of Representatives Science and Technology Committee that science policy made without considering economic policy is an absurdity. The converse applies equally in this age of rapid technological development. One only has to think of the rapid developments in biotechnological research, and its growing applications for industry, for agriculture, for medicine and even for information technology, and the vast market that it will represent in 15 years' time[1] to see that our economic survival is inextricably linked to and dependent on our capacity to stimulate research and development in the new technologies.

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1 Two years ago the United States' House of Representatives Science and Technology Committee estimated it to be worth $100 billion per annum.

5. This summer, representatives of the Committee on Energy, Research and Technology visited the United States, at the invitation of its Government, to assess advanced technology there and the competition that Europe must face. It is sometimes instructive to see how others see us. With a few exceptions Europe was seen by those we met as an interesting potential market; but the Americans see the technology challenge they have to face as coming from Asia and not from Europe.

There is some evidence to support the view that the United States is losing its competitive edge in certain high technology markets to Japan and other fast-developing countries, such as Korea and Singapore.

American technology policy undoubtedly faces major problems, but in the view of the American commentators we met, those problems are already being faced in a more acute form in Europe. The first thing that Parliament and its Committee on Energy, Research and Technology must tackle is therefore to assess the validity of this proposition: only then can realistic remedies be sought.

New technologies and jobs

6. One other observation made by the people we spoke to about the special nature of the technological challenge needs stressing. Because of the momentum of technological developments, certain preconceived notions about market objectives, especiallly employment, must be abandoned. In parts of the United States the average profitable life of successful high technology companies is only 4 years. They are constantly being created, transmuting, dissolving or being taken over. They cannot on their own provide a large-scale source of new employment. The process is a complex one. Certain technologies are, by their very nature, labour-substituting (robotics, information technologies, etc). Others create entirely new jobs because they open up new sectors of economic activity (space, telecommunications). Yet others wreak far-reaching changes in existing sectors and create jobs directly and indirectly. However, they require different skills and will impose vastly more ambitious retraining requirements (for example, computer-aided design, the next generation of word processors, etc.). Overall, however, it would be a cruel delusion to imagine that the new technologies industries will directly eradicate Europe's high unemployment. The fairest assessment would be that the new technologies are not so muh direct job-creators as creators of wealth, which in its turn can, under favourable conditions, create jobs around it.

7. The ancient (Diocletian) and mistaken (Luddites[2] and the silk-weavers' revolt) idea that new machines create unemployment will in due course undoubtedly prove once again to be false. Two centuries of experimentation entitle one to suggest that going beyond the essential adjustments which a human approach to the problem necessitates, technical progress is a way of increasing living standards and employment at the same time.

Blaming machines for unemployment is ascribing the effect to the cause.

Structural unemployment usually stems from demand and/or supply saturation.

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2 English workers' movement formed from 1811 to 1813 and in 1816 to destroy machines which it claimed caused unemployment (names after Ned LUDD who in 1799 destroyed stocking frames)

Technological innovation creates new supply and new demand. So all technical progress frees purchasing power which goes to old and new products[3].

8. Between 1960 and 1975 the American economy created 20 million new jobs in the non-military sector, i.e. 1.3 million every year. Between 1975 and 1982 the figure was another 14 million, or two million a year, and since 1982 it has been 7.2 million, or a rate of 3.3 million per year[4].

Compare this figure with the position in Europe, where 9 million jobs have been lost since 1970 instead of 1 million being created every year, given the growth in the labour market. The result is that in Europe we have nearly 14 million unemployed, or a rate of 12%, a percentage which shows no signs of being about to drop to any considerable degree.

Since 1973 Japan, whose economy is in any case a full-employment economy, has managed to create 3 million new jobs.

What are the main features of this situation, which is so positive for the United States?

Practically every one of these new jobs has been created in the service sector (15 million between 1973 and 1983); industry in the strict sense lost 1.5 million in the same period and agriculture 87 000. The public services contributed to rising employment in the service sector, but only 15% (in Europe, on the other hand, up to 50% of new jobs in services are in the public sector).

In services themselves, the areas which have benefited are the auxiliary services for companies and the professions, banks, medical services and the catering industry.

Another important feature is that jobs in America are being created in small firms: 80% in firms employing fewer than 20 people; large companies account for only 1% of new job creation.

The vast majority of these new jobs are in new firms less than five years old. Paradoxically, high technology has had only a very minor direct part to play in this job growth; in fact it accounts for only about 2.8% of American jobs altogether[5].

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3 These matters will be dealt with more extensively, particularly in the reports by Mr Brok, on behalf of the Committee on Social Affairs and Employment, and by Mr Ciancaglini, rapporteur of the Committee on Energy, Research and Technology, on the consequences of the new technologies for European society.

4 including 3.5 million in 1984

5 The comparatively modest part played by the new technologies sector in new job creation is also apparent in Europe: in the Federal Republic of Germany, for example, the 28% rise in turnover in the data-processing sector has gone hand in hand with a 4% loss of jobs in the same sector

These new technologies, however, have effects which go beyond their own industry and considerably affect most other sectors, from aerospace to agri-foodstuffs. The new technologies act as catalysts to these other industries. Though they have only limited direct job-creation potential, they do open up considerable prospects for new wealth which in themselves have the effect of creating jobs.

Up to 1985 the destructive effect of the new technologies has been limited and certainly cannot be regarded as being responsible for Europe's galloping unemployment, which is due to a great many other factors (the oil-price shocks, high interest rates, excessive social security and tax burdens, insufficient competitiveness, etc.).

The future, however, may be very different, and there may be a rapid and wide-ranging swing from certain types of jobs to others.

So these new jobs now being created are in the service sector, where we are likely to see substantial developments in the technology field in the next 15 years. Robotics may revolutionize work not just in factories but also in hospitals, hotels, even restaurants (experimental work is being done). Data transmission systems in banks are changing the workings of our banking system beyond recognition. Word-processors, translation machines and new applications of artificial intelligence are going to bring fundamental changes in secretarial work. That sector will not be able to go on creating large numbers of semi-traditional-type jobs as it does today. Aren't the new technologies, on the contrary, going to destroy millions of jobs in that area?[6]

Are they not going to transform working methods in almost every industry, company and service industry, whether new or old? To equip themselves for jobs, women and men will have to acquire a great many more other skills. Isn't there a danger of a new type of illiteracy disqualifying a sizeable percentage of our workforce in its present form and with the training it currently has?

Won't mass familiarization and education work have to be done, from the earliest years of school up to teacher training level, as well as constant retraining?

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6 In a study that is soon to be published entitled 'The impact of automation on employment 1963-2000', by the University of New York's Institute for Economic Analysis, Professor LEONTIEF, a Nobel Prize winner for economics, states that new technology will lead to the fall we are already seeing in industrial employment, compounded by a sharp drop in administrative, secretarial and office jobs. This will be offset by rapid growth in jobs in information technology, crafts and the professions. In the long term, there could even be an acute labour shortage overall if retraining of workers is too slow or too ineffective to enable them to obtain new jobs.

Today's analysis of the impact of the new technologies on employment may, therefore, be very different from any we make tomorrow. But whatever the situation, European countries cannot isolate themselves from the technological revolution in order to protect outdated jobs: that would be to condemn our industries, in a harshly competitive world, to a premature death.

On the other hand, if the situation becomes any clearer, the only way to give a lasting answer to the looming social, moral and personal upheaval which is on the horizon is to achieve a new social consensus based on a fresh distribution of labour.

New technologies will shake up the economic and social fabric

9. Whatever the anwers to these questions, the large-scale shift in jobs towards the information technology industries that is looming must not be interpreted as a decline in the fundamental importance of industry.

Even if it is automated, computerised and non-labour-intensive, industry remains the prime source of wealth and economic strength.

It is the high productivity of industry and agriculture that will provide the surpluses to support growth in services and the activities of the information society.

Europe's technological capacity and the dynamism of its industry will enable it to take up the challenge and win.

10. We Europeans can learn a different lesson, and a hard one, from current developments in the United States: the waves of technological change follow each other much faster than did the technical ones in the past: Silicon Valley has given way to Highway 208 and the North Carolina triangle. In turn they will give way to others. We in Europe must learn the essential lesson: by their very nature the high technology economies are precarious, constantly changing and particularly vulnerable to shifts in the economic indicators.

11. What we are living through is not the continuation of the past but a new future. This is not a post-industrial economy following on from that of the 19th century, nor even a hyperindustrial economy[7], but a new and different system and, very probably, a new and different kind of civilization. Whereas the obvious distinguishing mark of the industrial system we are leaving behind was the reduction of man's physical capacities and of each of his senses, that of the system we are entering is the reduction of the capacities of his brain, his intelligence and his memory. It is a new world, and we must approach it without preconceptions. The revolutionary machines of the industrial era were converters of energy; the revolutionary machines of the scientific era we are now entering are converters of knowledge and intelligence.

12. Though all the new technologies will make their mark on the new society, the information technologies will cause upheaval and completely transform it.

We are witnessing a shift in work, products, consumer goods and leisure towards information and an ever wider range of technology.

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[7] Gerhard Mensch: 'Stalemate in Technology', pub. Ballinger, 1979

This shift is creating great complexity in the fabric and workings of advanced human societies, which can no longer function and develop using the standards, means, methods and goals of the industrial era.

Most of the technologically advanced nations are now crossing this threshhold of complexity.

In particular, this upheaval is calling into question the principle of causality that has hitherto operated in our societies.

Actions seen as causes no longer have the same effects.

Actions are becoming fewer in number and more complicated; they are taking place in new environments and giving rise to chain reactions which lead to unforseeable and undesirable consequences.

The consequences of these unexpected effects are often more significant than the expected effects. The unleashing of effects makes societies which have crossed the threshhold of complexity ungovernable according to traditional principles of causality.

13. There are two responses to this ungovernability; they may be alternatives, but it is preferable to combine them:

- greater mastery of technology
- decentralized decision-making.

Greater mastery of technology consists of raising the threshhold of analysis and knowledge to the threshhold of complexity by assessing in greater depth the plethora of new perameters thrown up by the use of computer systems.

Decentralization is another response which reduces the scale of knowledge required for making a given decision by limiting its scope. It also meets the growing need for speed, efficiency, flexibility and initiative in decision-making relating to new technology.

PART I

The context

Civilian or military? National or multinational?

14. In one sense it is no longer possible to distinguish between civilian and military new technologies.

In product research, experimentation and design it is difficult to separate what will ultimately be military applications from civilian ones.

Civilian and military technologies are multipurpose. SDI is a classic example. Almost all so-called civilian technologies also have military applications (cf the Falklands war) and almost all military applications have significant civilian spin-offs.

Broadly speaking the overlap between the civilian and military fields is to the advantage of countries with large military budgets, which are inevitably geared to research into new technologies and their development and use.

15. In one sense it is no longer really possible to talk about national economies or national firms in the high technology sphere. Our national economies are now forced to operate in a world economic context where the interest rates of one major industrial country and the exchange rates of another have as much effect on the level of our economic activities as these factors domestically. Even the United States has to accept that it is one of many operators: 15% of production in the United States is now owned under foreign management; in Europe the figure is 25%.

16. By analogy, each sector of economic activity, from wheat to steel, is subject to international market forces and follows a global rather than a national or regional logic.

17. In this context the dislocation of multinationals from the nation state's structure has become even more pronounced.

This distinction is very clear when we look at the recession. So far the multinationals have, generally speaking, managed to dodge the recession. In an economic context suffering from it the multinationals have, unlike others, made a profit out of it. In the United States they have shown an annual growth rate in turnover of 3.6% on average since 1973, which is very much higher than the average growth for single-nation firms. European and Japanese multinationals have shown slower growth than the American multinationals, but the rate is still higher than that of the economies in which they operate. This is particularly true of the German, Dutch and Scandinavian multinationals. It is the multinationals which control the high technology of the future, whether they innovate themselves or absorb the innovations of others. If high technology of this type is eventually going to be one of the ways of getting out of the recession, it will be through the multinationals rather than the single-nation companies. If we examine AT & T's role, now free to move into information technology on a large scale, we can see that it has penetrated the European market using European firms as agents. It already has 25% of Olivetti's stock with an option to increase it to 40%. In the Netherlands it operates with Philips a joint venture producing transmission cables and optical microwave equipment. It is providing software for IT systems in Europe and Japan and it is heavily involved in the Spanish market through a microelectronics subsidiary in Spain.

18. At the same time AT & T is implanting itself very firmly in Korea, having taken a 44% stake in Lucky Gold Star, one of the leading South Korean semi-conductor manufacturers, which is currently heading the race to catch up with the Japanese in the highest level semi-conductorships. Through the link-up with AT & T, Gold Star sends chips and computer monitors to Olivetti. Thus a multilateral and multinational network builds up attaining higher degrees of flexibility which give these corporations a degree of autonomy vis-a-vis national policies. The pattern emerging more and more on the world scene is that of a two-tier economy, part managed by states and part by the multinationals.

The danger for Europe on the technologies front is that policies aiming to reinforce Europe's technological base might be jeopardized by major multinationals that prefer to protect their own interests rather than the general interests of Europe.

We should also be concerned at the spectacle of international agreements between the multinationals reducing their dependence on Europe so that they relocate in other parts of the world, especially the Pacific area.

Acceleration of technological development

19. To strengthen Europe's technology base, it is useful to identify and understand the factors which have contributed to major spurts forward elsewhere. To take the American example first, technological change has been boosted by a series of events which have galvanized research and development efforts: the Second World War, the creation of a science policy in the immediate aftermath of the War[8], the conquest of space, particularly the Apollo project, and now two coinciding but separate events, the Strategic Defence Initiative (SDI) and the growing awareness of the menace of Japanese competition.

20. Research and development expenditure as a proportion of total spending has risen yet again in the last 24 months. The annual average growth rate of such spending in real terms was about 3.7% between 1972 and 1983. Industrial investment in research and development reached 12.3% in 1984 and is estimated to be 11% in 1985 and to stay at a high level until 1988. The dynamic element in this push has tended for long to be information technologies. Now the situation is more diverse. Biotechnology and new materials are also playing a driving role.

21. Various factors have combined to make the European Community wary in its initial approach to the technological revolution. This wariness is founded on quite legitimate concerns not solely relating to employment. It is clear, for example, that the rapid expansion of the high technology industries will mainly be to the advantage of the industrialized world, and that the gap between it and the developing world will widen.

While the West and the Far East develop ever more sophisticated applications of the new technologies, famine threatens 100 million Africans. The new technologies, especially biotechnology, may well help solve the problems of malnutrition and famine. The European Community is therefore wise, in discussing this issue, to bear in mind the risks of a further widening of the North-South gap.

22. Combined with this very important consideration is a more general hesitation due to the uncertainties as to the impact of the new technologies[9]. There is no doubt that our society is in the grip of a series of convulsions due to the new technologies which are affecting not just employment but also working conditions and the nature of work itself, the education and training systems, the social fabric, leisure patterns and even family life. It is no exaggeration to say that human nature, human intelligence and human emotions will also be affected. There is considerable uncertainty as to the nature and scale of the changes that will occur. Many moral problems also arise, notably as regards genetic engineering, but also privacy, individual independence and humanized working conditions.

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[8] Busch, Vannevar 'Science: frontier of infinity'. Report to the President on a post-war scientific research programme (First published July 1945)

[9] This question will be gone into in detail in Mr Ciancaglini's report

23. Future generations will not have the luxury of choice as regards new technologies: either individuals will come to terms with them or they will be relegated to a marginal role in society. The whole relationship of business, education and research will be altered. Notions of democratic accountability and freedom of information will be affected.

24. In the face of these doubts and uncertainties, the different regions of the world are reacting differently. In the United States these concerns do not seem to be causing any qualms in the business world. Once the regulatory framework has been decided, the business and research communities proceed, with a greater awareness of the commercial risks of the enterprises undertaken and of the precarious nature of the high technology market than of its social and moral effects.

25. In Europe, however, these preoccupations, combined with the traditional prudence of investors and a society which values security of employment more highly than buoyancy of income, are too often met with scepticism and a state of relative inactivity. There is still in some of our societies an important strand of political opinion which almost rejoices in an antediluvian attitude to new technologies, is profoundly sceptical about automation, almost Luddite in its approach to machinery, and yearns for some alternative to postpone its introduction.

26. This is a very human reaction, and one cannot chastise those who hold these views, but their presence undoubtedly acts as a brake on Europe's response to the technological challenge because these attitudes hold no sway either in the United States, or Japan, or in the newly industrialized countries.

Everything possible must obviously be done to ensure that the new technologies and their consequences are approached in a constant spirit of concern for man, his sufferings and his future, but it is just as obvious that discounting or delaying the introduction of these technologies means ceasing to belong to this, the most advanced part of the world, dropping out of the race and thereby slowly but irreversibly declining.

PART II

The rivals

27. Let us now take a closer look at the position of our main rivals.

Their position in the new technology market is not a straightforward one, as each has points of strength and weaknesses. We will look at their situations in the following order: the United States, Japan, the newly industrialized countries of the Far East, and the Soviet Union.

28. This is by no means an exhaustive list. Certain newly industrialized countries in other regions are also harnessing new technologies to gain influential positions in certain markets: such as Kuwait and Saudi Arabia as regards petrochemicals. Certain other countries are on the point of making an important entry into the high technology markets, such as Malaysia. But for the moment at any rate it seems appropriate to limit our assessment to the countries in direct and immediate competition with us.

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The United States: the challenge today

29. Your rapporteur has already commented on the vital role played by ambitious political objectives in the strengthening of technological research. The SDI programme in the United States, following on from the Apollo project, is a sign of that policy. No-one knows whether the objectives laid down in the SDI programme are obtainable, but they are a major stimulus to American research efforts. The injection of $26 billion over the next few years will almost certainly have a catalytic effect and breathe new life into industry and research centres.

30. The programme is multi-disciplinary: fibre optics, energy, space research, new materials, microelectronics, will all be essential parts of SDI. Therefore the spin-off effects are likely to be widespread.

31. Because of the scale of the programme and the relative abundance of the financing, participation, even on a sub-contractual basis, is attractive to European firms and universities facing domestic cutbacks and limits on national projects.

32. But of course the SDI programme is only a small part of the research and development effort[10]. The total American R & D effort for 1985 is likely to be of the order of $108 billion to $110 billion. Of this figure approximately 12% will be for basic research. A total of $55 billion will be provided by Government, and some 60% of that latter figure i.e. $31 billion for the 1985 fiscal year, will be for research within the Department of Defense. A total of nearly $40 billion has been requested for the 1985-1986 fiscal year by the Reagan Administration for Department of Defense R & D.

33. As regards the private sector, R & D expenditures are equally impressive. Total R & D for the private sector amounted to nearly $50 billion in the 1984-1985 fiscal year. It will in all probability be almost $55 billion in the 1985 fiscal year. R & D expenditure by the 820 top companies increased by 14% in 1984.

34. The following table shows where the major gains in R & D took place in 1984:

	Percent gain over 1983
Computer peripherals	41%
Computer software	41
Semiconductors	32
Machine tools	22
Instruments	21
Computers	20
Electronics	19
Automotive	16
All-industry average	14

35. The trend is likely to be sustained throughout 1985 and onwards. McGraw-Hill Inc. economics department forecasts at least an 11% rise in 1985. Even in the computer industry, facing an unprecedented slump, R & D spending will increase by 11%.

[10] The SDI budget for the 1984-1985 fiscal year was $1.8 billion; for 1985-1986 Congress will reportedly approve a budget of nearly $3 billion

36. The sums committed to R & D by certain companies are impressive. In 1984 IBM committed $3.14 billion, General Motors $3 billion, AT & T $2.3 billion, Ford nearly $2 billion. Certain companies are committing more than 25% of total sales to R & D (Dysan, ADAC Laboratories). If another measurement is taken, the comparison between R & D and labour costs, quite a few companies are now spending more than $20,000 on R & D per employee.

This is a comprehensive research effort covering all sectors: in 1984 research amounted to:

$3 billion for aerospace,
$3.6 billion for chemicals,
$3.8 billion in the drugs field,
$2 billion in electronics,
$1.6 billion in the electrical industry,
$670 million in food,
$6.8 billion in computers,
$1 million in office equipment,
$675 million in peripherals,
and $300 million in software.

There is, therefore, in R & D terms a precise strategy: to maintain American competitiveness, particularly in regard to Japan, across the board and retain military supremacy with regard to the USSR in all sectors.

Encouragement for research in the United States

37. We know to our cost in Europe that the problem of maintaining a competitive position lies not necessarily with R & D funding, nor even with public science policy - although both of these issues are problematic for Europe. The problem lies with the interface between R & D and applying and marketing the results.

38. The United States appears to be successful in localizing research next to its application. It has managed to do this by creating the right environment in which research and industry may cooperate. This has not come about by accident.

39. The educational community has been particularly responsive to industry's needs: industry, facing a tough domestic market situation and stiff international competition, has learnt how to exploit better link-ups with the universities, and government has encouraged this development and even given it financial support.

40. There exists within the United States a wide variety of instruments which have stimulated innovation. The following list is by no means exhaustive:

(a) Readily available venture capital, encouraged by fiscal concessions. The venture capital market in 1985 is of the order of \$18 - \$20 billion. Venture capital exists because of the prospect of quick returns (a maximum of 6 years), and has been strengthened by a relatively low failure rate. One out of 20 firms is doomed to early failure, but 50% or more of ventures are successful;

(b) Federal laboratories are operating on a \$15 billion budget, and contractors receiving federal funds have certain patent rights. The right of federal scientists to obtain financial or commercial advantage through incentives is likely to be extended by the Dole/Danforth Bill which will enable federal scientists to share in royalties and which is likely to pass into law;

(c) Seed capital. A notion which scarely exists in Europe and through which small companies get small amounts of capital ranging from \$50,000 to \$1 million as start-up;

(d) The positive role of the National Science Foundation with, by American standards, a relatively small budget of \$1.5 billion, selecting particular cooperative projects between industry and research centres in different regions. One example cited was the creation of a series of self-sufficient research centres, funded over the first 5 years from the National Science Foundation and reaching a state of independence and financial self-sufficiency at the end of the 5-year period: Ohio State University for welding, MIT for basic polymers, Worcester University for automation etc;

(e) Favourable regulatory environment for cooperative R & D efforts. The Courts are obliged to consider pro-competitive aspects: patent policy has been liberalized: avoidance of frivolous losses;

(f) Non-financial assistance to start up firms. This consists in particular in the creation by local authorities in conjunction with business of incubators where individual potential entrepreneurs with innovative ideas are given office space, secretarial facilities, insurance assistance, other administrative facilities and business advice in order to set up their business at a minimum cost. After a short period, up to 2 years, they are expected to leave the incubators and compete under normal conditions;

(g) Set-asides, whereby local governments pledge to support technical universities with an annual grant (engineering schools have grown 60% in the last 4-5 years in some areas);

(h) A fiscal environment favourable to innovation: reduction in capital gains tax from 50% to now nearer 20%: social charges on average 7% less than in Europe;

(i) Flexibility of response to the market: start-up firms in many states requiring only 24 hours to get the regulatory authorization and instruments for beginning operations: in Europe it is up to six months;

(j) Excellent communications. Great importance is attached to this by high-tech industries. It is worth noting that a very high proportion of the Strategy 21 programme for the development of Pittsburgh is to be devoted to major improvements to the local airport;

(k) The existence of a vast internal market. Every single American commentator that the Committee raised this issue with alluded to the existence of an integrated market as a vital element in America's technological competitiveness.

41. As a result of this panoply of measures and advantages, the United States is meeting the technological challenge in a relatively robust manner: but in basic research its achievements are comparable with, but not vastly superior to, work being achieved in Europe. While it maintains a dominant position as regards mainframe computers, software technology in Europe is strongly competitive with that of the United States. As regards telecommunications, the need to reconcile national standards has acted as an important spur for Europe to develop its own integrated broadband network: work in the United States does not appear to be progressing along these lines.

42. American supremacy is obvious in space, biotechnology, data processing (IBM accounts for 60% of the computer market) and new materials, and there is now a prospect that the sheer abundance of funding for research will, within 5 years, give to America a clear advantage and possibly in some sectors an irreversible lead of the kind enjoyed by mainframe computers.

43. But there are certain elements for deep concern in the United States' position. They have already lost important market shares in high-tech products, such as semiconductors, to South Korea, Japan, Taiwan, Hong Kong and Singapore. A crucial and direct factor in this has been a consistently over-priced dollar. The growth in the American economy cannot go on for ever being financed by deficit spending on an unprecedented scale and by the accumulation of foreign debt. These questions are beyond the remit of this committee, but they might in future act as a brake on the American boom in research and development.

44. Another area for concern is the double-edged sword of limits to technology transfer. The renewal of the Export Administration Act, and the wide-ranging scope of the military critical list, are widely resented in the scientific community. In the long run this may weaken the American research community's links with that of the rest of the world to the detriment of all. Research, like any human activity, needs access to knowledge and competition. An embargo cuts that off.[11] Even its effectiveness is in doubt if, as is the case, the whole field covered by the embargo is effectively penetrated by intelligence, not to say espionage, and neither side is in any real doubt as to what the other is doing.

45. Pure research, non-military, is certainly more difficult to finance in the United States and yet it is essential both in terms of technological objectives and as a stimulant to the overall research strategy.

It is no accident that Europe's research effort is relatively strong in areas such as thermonuclear fusion where there is no prospect whatsoever of commercial return before 25 years, and yet is of enormous interest to the scientific community and everyone concerned about future energy problems.

11 As has been pointed out by various members and experts from the United States' National Academy of Sciences: ' ... seeking to contain the public nature of basic research would mean putting whole areas of science under wraps, and this could be extremely damaging to both general scientific and economic progress and to military progress ...'

46. To conclude, the existence of cultural, scientific, economic and technological links between the existing power blocs is likely to create links of peaceful interdependence. If they were to disappear, only power relationships, and thus sources of conflict, would remain.

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Japan: the challenge today and tomorrow

47. Japan is a technological superpower in new-technology-related products. It has a very large positive trade balance, with exports outstripping imports by 3 to 1. This balance is improving every year. It is based principally on a large R & D effort - $25 billion in 1983. In terms of the percentage of GDP Japan is third after the United States and Germany. Industry is the main element in Japan's R & D effort (accounting for 75%, with only 24% from the State), and it enjoys tax advantages for that purpose. Basic research accounts for only 5.5% of the total. Of the five principal domains of technological development, Japan has concentrated its efforts on electronics and new materials. This has been a wise strategic decision, given the importance of these two areas in most other high-tech fields.

48. In particular Japan's strength now lies in semiconductor technology, carbon fibre technology (despite being hampered by a certain structural weakness in the user industries such as aerospace), and optical fibres. It is increasingly strong in biotechnology where its basic research is thought to match United States' levels. It is weaker in technologies related to energy, although it has achieved a strong position in coal technology, and is believed to have arrived at rough parity with Europe as regards nuclear fusion. Space represents the main area of weakness but increasing efforts are being made, with an estimated 4-year time-lag vis-a-vis Europe's space industry. Short-term time-lags like this have little significance for Japan, which has a strong record of catching up once a strategic aim has been accepted by the consensus (e.g. Japan entered telematics only in 1964 but on a number of fronts has now reached a very strong position).

49. The image of Japan as being weak on basic research and strong on application seems no longer appropriate. Since the War, in fact, there have been impressive technological breakthroughs in Japan, starting with the tape-recorder. Japan no longer simply copies in order to create.

Quite clearly there are a variety of factors giving Japan an extremely strong competitive position in high-tech industries.

50. First, Japan has set itself research as a national goal to which the efforts of government, industry, the unions and the universities have devoted themselves. On this the consensus seems absolute.

51. Secondly, the export-led wealth of Japanese firms enables them to put up a strong R & D effort.

52. Thirdly, Japan possesses the qualified personnel to carry through the technological revolution: four times as many engineers as the European average, 350 000 researchers, mostly in the large enterprises.

53. Fourthly, Japan has not been plagued by an internal debate about the degree of government intervention: the government is a player in the team. Although some estimate that the role of MITI has diminished it still plays a vital role, particularly for new growth areas such as biotechnology. In fact the Japanese Government does not regard its role as being that of a final arbiter with authority over those involved in economic activity in the country, but as that of an adviser who provides help. This positive role for government has, at least in part, made up for the absence of a significant venture capital market.

54. Fifthly, Japanese companies have been remarkably successful in combining data processing with telecommunications, as their successes with micro-processing and bottom-range micro-computers show.

55. MITI, to which attention is so often drawn has acted principally in a coordinating capacity, trying to bring maximum R & D potential to bear on sectors regarded as being of decisive economic importance for the future. The investigations which MITI carried out in 1970 to 1971 and which identified data processing and semi-conductors as essential to Japan's development was the stimulus for launching these projects.

To promote further research, the Japanese Government has gradually set up a range of bodies:

- the Japan Research and Development Corporation;
- the Science and Technology Agency (dependent on MITI, assisting basic research bodies in the industrial sector);
- the Industrial Technology Centre (sponsored by MITI and the Ministry of Education to encourage cooperation between industry and the universities);
- data banks run by the Science and Technology Agency, the Ministry of Agriculture and the Ministry of Health;
- a system of encouraging science and technology (aid and tax concessions) run by ERATO, Exploratory Research and Advanced Technology;
- etc.

56. The picture is not one of unrelieved optimisim. Japan is heavily regulated, particularly as regards biotechnological research, patent registration is slow and open to challenge, language barriers remain a severe problem preventing many Japanese scientists and researchers playing a full role in the world community of science. Most importantly, the trade question, if not resolved rapidly, could have harmful effects on Japanese competitiveness.

57. Interestingly enough, Japanese industry is now pursuing a free trade policy (for others) as a strategic choice. This is partly to share the heavy burden of R & D costs, but also to ensure access to world markets, whatever

the outcome of the protectionist debate, Japanese firms are aiming high in choosing their partners in other countries (Toyota with General Motors, Japanese telecommunications firms with AT and T). This bodes ill for Europe.

58. Japan appears to have the flexibility, the qualified manpower, the capital and the determination to switch its R & D efforts as appropriate. Currently it is centred on biotechnology and the new materials as the growth points for Japanese industry for the future. Even if it loses its supremacy in microelectronics, and if the results from fifth generation computer research and robotics are not as spectacular as hoped, Japan has succeeded in spreading the risk.

59. In the high-tech fields in which Japan has proven experience we must be alert to the challenges its industries have taken up in the following areas:

- the race for increasing computing capability and the building of super-computers;

- compact electronic components to reduce transmission times;

- the development of new programming languages;

- and of opto-electronics comprising recent Japanese advances in lasers, optical fibres and data transmissison;

- the development of man-to-man machine communication by software designed to carry vocal or visual messages in both directions;

- falling prices for existing equipment.

- the improvement of third generation robots;

- photographic electronics (In 1984 47% of the value of photographic equipment was accounted for by the electronics incorporated in it).

60. The general outlook of Japanese leaders seems to be undergoing a profound change. They are becoming extremely concerned at the risk that the world isolation suffered by Japan after 1930 for political reasons might reemerge today for economic reasons. The fear of driving other nations to protectionism in order to defend their commercial interests, leaving Japan ostracised and alone, is very real.

61. This anxiety will induce Japan to review its national defence policy under pressure from the United States and in the face of the Soviet threat and the crisis in the Middle East, which is jeopardizing its energy supplies. The country also wishes to see its economy interwoven with those of the other major nations and to develop the machinery for international solidarity. A policy of acquiring holdings in American and European companies will therefore be pursued and direct investments will be made. In 1984 the Japanese electronics industry set up seven units in the United Kingdom for mass consumables two in Germany, three in France, three in Spain and one in Belgium; it also set up two units for semi-conductors in Ireland, one in Scotland and one in Germany.

The Japanese Government will similarly encourage foreign high-tech companies to set up in Japan.

Finally, it will continue to go along with the discreet transfer of technology to China.

The Far East: the challenge for tomorrow

62. Increasing interest is being shown, particularly in the United States, about the competitive challenge in high technology products from Korea, Taiwan, Hong Kong, Singapore and Malaysia. An eye is even being kept on Brazil.

63. Any industrialized country, new or old, can by the very nature of the new technologies buy itself relatively rapidly into the market, where fresh openings are always becoming available. To do that requires nonetheless an accurate perception of the growth points followed by a sustained, large-scale finance and research effort. Such an approach has been adopted by South Korea in the semi-conductor sector[12]. There is strong evidence that Singapore has latched onto buyer technology as the motor force for economic growth in the last years of the 20th century. Joint ventures have been launched by Biotech Research Laboratories Inc. concentrating on products to meet medical needs in Asia and the United States. Scientific and technological research in China is still suffering from the effects of the black years of the cultural revolution. The policy which has now been pursued for several years by Deng Xiaoping is breathing new life into society and the economy in China. The Chinese Government wishes to see the country move towards a modern society based on science and technology. However, it must proceed with caution: mechanization and automation could cause a serious crisis brining with it unemployment for tens of millions of people. The Governemnt also faces structural difficulties - vast differences in the quality of scientific staff, poverty and ignorance. Nevertheless, China has in fact entered the fields of space and nuclear technology and its basic research in biology and mathematics is of a high quality, although the massive modernization plan which has now been launched still has many years to go before completion. China has realistic but careful policies towards the USSR, the United States and even Japan. On the other hand, there are fields in which its efforts obviously complement those of Europe and which offer opportunities which should be explored with the greatest care.

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[12] Korean exports (24.4 thousand million dollars last year) are attributable in large measure to technological products manufactured by the large electronics companies SAMSUNG, DAEWOO and GOLDSTAR, which sell complete ranges of mass consumption electronics products.

Brazil

Brazil is also restructuring and rebuilding its research capacity. Despite the crushing burden of debt, and with help from the World Bank, a new five-year programme, costing more than 500 million dollars has been assembled; aid to be funnelled principally into the earth sciences, biotechnology and information technologies. As regards agricultural science, there is a clear overriding objective: learning how to make more fuel out of sugar cane. In the field of information technology, a 'reserved market' has stimulated th e proliferation of micro- and mini-computer firms. In less than ten years, more than 140 Brazilian companies have been created., but increasingly the measures are under political attack resulting from the economic consequences of the overprotectionism which this market generates. In space, however, with the satellite launcher programme well underway and with the launch, aboard Ariane, of Brazilsat earlier this year, the country is positioning itself to compete in the expanding space technologies market. On the other hand, the Brazilian Government has had to make substantial cuts in its ambitious 20 reactor nuclear programme, which was launched in 1975 and now amounts to very little.

The country is, however, proceeding with its project to manufacture its own nuclear arms.

64. These countries all possess the essential prerequisites for an impressive entry into the high-tech market:

- profitable industries, made successful through low-costs and aggressive marketing, prepared to invest significantly in R & D;

- a national strategy worked out on a consensual basis with industry.

65. It would be premature to analyse further, at least in this report, the force of the challenge: but, in certain sectors, it already exists and it may lead to an even stronger expression of an existing phenomenon: the regionalization of certain high-tech industries with their centre being based on the Pacific rather than on the Atlantic coasts of the continents concerned.

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The Soviet Union

66. The nature of the Soviet challenge in high technology is difficult to ascertain given the secrecy which surrounds it.

The most one can get at is a certain subjective truth by way of a few general remarks.

Technology is at the very heart of the system, since the marxist theory of economic development and social change lays great stress on economic effectiveness, productivity and technological development. The USSR Communist party, moreover, is involved at all levels in the preparation and implementation of science policy and research and development programmes.

67. It would be imprudent to discount Soviet capability in the technology sphere by pointing to the wastage, the carelessness, the social and economic bankruptcy of the system, the condemning of the consumer, with no rights and no protection, to poverty and a life of queuing. All these things are true. But they should not make us forget the huge machine which, while shedding much of its load from time to time, moves relentlessly onward, dictating its own order and its direction.

Whatever the weaknesses and obstacles, ' where there's a will there's a way'.

68. Inside its closed world, the USSR has given a huge boost to technical innovation, R & D and technical training.

Despite the 1914/1917 war, the civil war from 1917 to 1923, the Second World War from 1941 to 1945, the Thirties terror and the enormous human losses in wars and reigns of terror, total Soviet GNP as a percentage of that of the United States, taking an average figure calculated in roubles and dollars, went up from 15% in 1928 to 40% in 1955 and 60% in 1976[13]. Currently it is estimated at 67%.

69. The annual hourly production growth rate for the 1928/1975 period was of the order of 4% according to Western data (5.5% according to Soviet figures), which is higher than the rate for the United States, comparable to Western Europe's and below Japan's[14].

70. This high growth rate was achieved by calling on available manpower reserves rather than by improving productivity through technical or technological progress.

71. These reserves are now thinning out and the Soviet Government is at the crossroads. It can freeze the status quo with all the consequences that this might have for national production and per capita national consumption, or it can give itself a fresh boost to improve productivity per worker by going over to regular use of the new technologies. Some observers, however, think that if these were applied it could eventually lead to the regime and its institutions making themselves, to some degree, open to challenge. It is open to doubt whether a system involving exacting internal logic, such as information technology for example, can operate in a society without logic or with a contrary logic.

The new technologies are far from guiltless in their inter-reaction with social forms.

Thus, data processing encourages flexibility and the unlimited growth of capitalism through automation, increases in tertiary sector productivity, and economic rationalization and by reducing the management bottleneck. On the other hand, it calls into question the inflexible structure of centralized state bureaucracy and socialized conditions of employment and production.

[13] 'Soviet economy in a time of change', US Congress, Washington DC, US Government Printing Office, 1979

[14] Increase in annual hourly production growth rates in 1984 was 3.2%
Development of Soviet GNP in 1983: +3.2%, and in 1984: +2.7%
Development of GDP in 1984: 4.4%

72. This need for modernization is becoming more and more clear to the Soviet leadership, and Mr Gorbachev's recent appointment is a sign of this realization.

73. The planning and coordination of research and development is under the authority of the Council of Ministers, which oversees the activities of the departments concerned, namely:

- the State Department for Science and Technology (GKNT)

- the State Department for Economic Planning (Gosplan)

- the USSR Academy of Science

- the State Department for Inventions and Discoveries.

The Academy of Science and the GKNT lay down the general guideline for scientific policy and research in collaboration with the many ministries concerned.

Gosplan is responsible for planning with regard to technological innovation.

74. Research and development appropriations increased from 3.9 thousand million roubles in 1960 to 11.7 thousand million on 1970 and 23.8 thousand million in 1982. The figure reportedly now stands at roughly 27 000 million. At the end of the 1970s, the breakdown of expenditure was as follows:

- basic research 9%

- applied research 28%

- development 63%

75. The main emphasis of scientific policy and the 1981-1985 five-year plan was as follows:

- more rapid transition from basic research to practical applications

- greater research and dvelopment efficiency

- deliberations on a provisional 20-year scientific programme.

Priority was given to the following research and technology sectors:

- nuclear power

- alternative energy sources: solar power (Central Asia), geothermal power and wind power

- thermonuclear fusion, which is considered basic to energy suppies in the 21st century

- space, creation of permanent manned space stations

- biological sciences, and in particular agricultural biotechnology

- industrial automation to provide an increasing response to the lack of labour

- lasers

- synthetic materials

- oceanography.

Level of Soviet technology

76. As for the level attained by Soviet technology, any assessment is a leap in the dark. At most, we can make some guesses on the basis of existing data. If we take as our basis verifiable official Soviet information and the views of the special services and the specialist economic administration departments in the western countries, we can cautiously advance the following assessments.

77. Agriculture takes second place to the military sector from the point of view of expenditure on research. Encouragement has been given to biotechnology sectors relevant to agriculture[15]. The Soviet Union has the necessary infrastructure and research staff to make new and real progress in this imbalanced sector of the economy. Judicious and extensive use of biotechnology with applications in the agricultural and food sectors would provide the USSR with new opportunities on the world market if it decided, under its new leader[16], to pursue this course[17].

- As regards space, the USSR with cruder, more rough and ready equipment, is more or less neck and neck with the United States. There are reports that Soyuz is to be replaced by a space plane. This crew-carrying minishuttle is being developed at the same time as a reusuable launcher, a rocket capable of putting a 15 tonne pay load into orbit and a giant rocket capable of putting 150 tonnes on a satellite trajectory near the earth's surface.

78. Anti-satellite lasers are being tested at the secret centre in Shary-Shagan[18]. The Soviet optics industry is top quality, as the photographs of the planet Venus show. But it is typical of the system that although the cameras are good, colour films are unobtainable ....

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[15] 'Biotechnology in the Soviet Union', a paper delivered to the members of CERT by Miss Annemreke JM ROOBEEK of the University of Amsterdam

[16] Interestingly, as early as last April Mr GORBATCHEV's first economic contact with western economic experts concerning the modernization of the Soviet economy was with WILHEM CHRISTIANS, one of the two executive directors of the Deutsche Bank AG. In a long conservation with him he examined the conditions under which West German companies were to help modernize Soviet agriculture.

[17] The deficit on the USSR's balance in agricultural trade is the largest in the world - 16 000 million dollars in 1983. Even allowing for forestries and fisheries it still amounts to 14.4 thousand million dollars.

[18] Soviet military power 1984, US Government Printing Office

79. Electronics and the computer industry have been set up, but are a long way behind the West. Some of the backwardness has been made up by a big copying and information drive, but it is still of the order of seven to eight years. Psychological hurdles which are very difficult to overcome hinder the introduction of micro-electronics in everyday life. The pocket calculator, which is ignored in teaching establishments despite the launching of an ambitious school data processing programme, has a long way to go before its supplants the abacus.

80. The third-generation robot (high-level artificial intelligence machines capable of several different and complex tasks and reacting to the environment through a system of sensors) is still in the realms of fantasy in the USSR.

81. As far as communication technologies are concerned, the USSR will have a lot of catching-up if the time-lag between it and the West is not to become intolerable.

82. As regards energy, the Soviet Union is launched on a major programme of construction of 1 000 Mw nuclear power stations, and its technology is advanced for gas and coal of which it has some of the largest reserves in the world.[19]

83. In the field of fast breeder reactors, the Soviet programme is the only one which could claim to rival the French programme.

Following on from the experimental reactors BRIO (1959), BOR 60 (1969) and the prototype 350 mW BN350 (1972), the Bieloyarsk plant entered into service with the 600 mW BN600 in 1980.

84. The USSR has taken over from Japan as the world's greatest copier. Whereas Japan used to use its companies' commercial departments for that purpose, the Soviet Union deploys all its official departments:

- the Ministry of Foreign Trade

- the KGB (State Security Committee)

- The GRU (Main Intelligence Directorate)

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19 Known reserves of the USSR in:

- oil 8 595 million tonnes	3rd place in the world
- natural gas 39.6 bn m^3	1st place in the world
- lignite 6 790 000 million tonnes	1st place in the world
- coal 1 720 300 million tonnes	1st place in the world

- The GKNT (Committee for Science and Engineering)

- and even the respectable Academy of Sciences.

85. The chief beneficiaries from this intelligence drive are the military industry and military technology. This military industrial sector, with 135 undertakings employing over 5 million people, is coordinated by the Committee of the Council of Ministers for military questions, which brings together nine ministries, particularly all the technological ministries (the electronics industry, the electrotechnical industry, the transmission industry, the radio industry, the aeronautics industry, mechanical construction, the chemical industry, etc.).

This military industrial complex with links to the economic and political structure of the Soviet State represents a distinct and economically relatively privileged sector. Its production system, which is separate from that of non-military industry, is privileged not only in terms of the level of remuneration but also by its system for ordering and importing modern equipment and new technologies: it is because of this complex that the USSR on the one hand presents the image of a highly advanced nation in certain technologies with armed forces, arms and space technology as good as or superior to that of the United States and on the other hand the image of a developing country importing machines and new technologies and exporting its raw materials.

86. In general, however, the technological effort of the Soviet Union is hindered by vast inherent handicaps: an uncompetitive economic environment, an important dislocation between research and its successful application, the legendary bureaucracy, managerial resistance to new methods and ostracism from technology transfer.

87. Nonetheless, in your rapporteur's view, it would be foolish to write off the Soviet Union's potential challenge in the new technologies. The presence of an overwhelming national consensus, however such a consensus may be contrived, combined with plentiful funding and a vast if underdeveloped market, will make the Eastern bloc a serious factor to be reckoned with.

With the technological level it has already attained, the Soviet Union could already be a daunting trading rival in certain sectors if that level were based on efficient and competitive trading and production structure. There is no lack of sophisticated scientific and technological expertise in the USSR but this is not widely used in the economic and social sector. A close eye must be kept on any improvements in that direction.

88. Scientific relations with the capitalist countries which have developed to a certain extent since the late 1960s are conducted via the Academy of Sciences in the case of basic research and via the GKNT for technological cooperation with Western firms.

89. Scientific cooperation with the Eastern European countries takes place within the Council for Mutual Economic Aid (COMECON).

Cooperation between the USSR and the other socialist countries generally aims to reduce any possible dependence on the Western world and encourage economic integration with the USSR. For example, such cooperation has led several countries to abandon their own research into nuclear physics and focus their work in the DOUBNA joint research centre in the Soviet Union.

90. Only one country, East Germany, has a genuine major technological potential, in optics and information science. Its U-D microprocessors and SM miniature computers are comparable with the equivalent IBM and Digital Equipment products of which they are copies, although they are slower.

East German computers are produced by the ROBOTRON works in Dresden which exports half of its production to the USSR and which has doubled its production of integrated circuits and microprocessors since 1980.

East Germany also produces computerized machinery and first and second generation robots. It is said to currently have 35 000 of these elementary robots compared with 25 000 in the USSR.

PART III - EUROPE

Europe: the state of the union

91. Notwithstanding a number of indisputable successes, it is high time that European technology woke up from its sleep.

Two statements deserve our attention: firstly, one by the OECD recently to the effect that:

'Europe will increasingly supply the rest of the world with food products, raw materials and low-technology manufactured goods,'

and secondly the remark by the American Office of Technological Assessment in 1984 that:

'Japan will be the United States' most serious rival in marketing biotechnology - Germany, the United Kingdom and France are behind the USA and Japan. These European countries dare not take risks at industry and government level and do not have many firms specializing in the marketing of biotechnology.'

In the case of electronics, too, the assessment was the same.

92. The world market for information technology goods was estimated at $240 billion in 1980 and this figure will rise to $500 billion by 1990. The biotechnology and telecommunications markets will each account for up to $100 billion. In this market Europe is a large trader, overall narrowly in surplus (exports $110 billion/imports $90 billion). This compares with Japan, which is overwhelmingly in balance (exports $59 billion/imports $9 billion): and the overall volume of trade in high-tech products in Europe is higher than in either the United States or Japan, both as regards exports and imports.

But the relative situation of Europe is deteriorating. According to the most accurate measures of comparative advantage in high-tech trade, Europe has lost 20% of its advantage in 20 years, while the United States has remained constant and Japan has doubled its advantage.

93. The figures below give a picture of the economic environment in which high technology is developing.

WORLD POSITION OF THE EUROPE OF TWELVE (1983 - 1984)

	Europe of 10	Europe of 12	USA	Japan	USSR (1982)
Gross domestic product (in billion = 000m ECU)	2 777	3 010	4 639	1 441	1 551
GDP per capita in ECU	10 797	9 404	19 475	12 088	5 610
Employment by sector (1983) as a percentage:					
. Agriculture	7.5%	9.2%	3.5%	9.3%	15%
. Industry	34.6%	35.3%	28 %	34.8%	39%
. Services	57.9%	55.5%	68.5%	55.9%	46%
Unemployment rate (1984)	10.9%	11.5%	7.4%	2.7%	0%
Price index (% annual variation 1984)	6.1%	6.3%	3.2%	2.2%	4%
Trade balance 1984 (in bn ECU)	-20.2	-34.5	-64.6	+23.6	+10
Balance of payments 1984 (in bn ECU)	+ 2.8	- 1	-47.1	+23.6	?

Technological level of Europe

94. Europe is a big spender on R & D. Taking public and private spending, military and civil, Europe spent some $51.6 billion in 1983 (the private/public breakdown being approximately 50/50. However, only the Federal Republic of Germany matches the United States and Japan in R & D spending per head. At least 3 of the Community of 12 fall into the OECD bottom category of showing little or no interest in R & D.

95. R & D spending is fragile, because of its vulnerability to government cutbacks and to industrial uncertainties. Increasing unemployment is noted in certain Member States amongst researchers and engineers.

96. It is worth nonetheless repeating the extraordinary vitality of Europe's basic and applied research throughout the 20th century. From antibiotics and DNA, to radio, television, radar, jet aeroplanes, stored programme computers, rockets, nuclear power - fission and fusion, audio and video recording. Practically every aspect of our working and leisure activities has been altered as a result of inventions by European scientists. This is not just historical reminiscence: Europe today has many strong points. In space, after years of inactivity, through the Ariane programme, under the auspices of the European Space Agency, Europe is commercially more successful in space than the United States.

97. Airbus Industrie, despite the unhelpful attitude of some of the national airlines, has won from scratch a majority share of the market in a field in which it is fully competitive and is now making an impressive showing in the American domestic market.

98. Within the European Community's framework various programmes are at the very peak of world technological progress: the JET project of course, but also research and development in alternative energies. Europe almost certainly leads in particle physics.

99. The Commission has successfully brought together industry and research centres in a series of programmes, starting with ESPRIT for information technologies, BRITE for advanced production and now RACE for research in telecommunications.

100. As regards the key sectors indicated earlier;

(a) Europe has a lead position in energy-related techniques: its researches into thermonuclear fusion are at least at parity with Japan and the United States. For nuclear fission, it appears well ahead of the United States, hampered by regulatory and environmental pressures. Concerted research into alternative energies and energy saving is well coordinated in Europe which has persevered with programmes despite the oil glut. For hydrocarbons, Community programmes have usefully focussed research on prospecting techniques and optimal use of energy. Only as regards coal technology is the Community lagging behind the United States, and, possibly, Japan.

(b) Europe has a strong position in space. Its competitivity, as shown by the European Space Agency is due to the reliability of its launcher and satellite programmes. With the Spacelab and Colombus programms, Europe will be able to excel in the utilization of space. The success of the Ariane programme, despite three failures in 17 launchings, is partly due to it being as reliable as the US shuttle and less expensive. The new second generation shuttle, drawing lessons from the shortcomings of the first may amount to much more formidable competition.

(c) In the telecommunications sphere the situation has been complicated by the absence of European norms, and progress with OSI is essential if European competitiveness is to be maintained. Ten European companies are each making different digital public exchanges, each developed at a cost of up to 1 billion dollars, as opposed to three only in the United States. Regulatory costs confronting new firms in the telecommunications equipment industry within the Community's market may be up to one hundred times greater than those facing their American rivals. The new RACE programme, with the objective of an integrated broadband network covering the full communications range: text, voice and image, by 1995 seems to be a more comprehensive research goal than any equivalent in the United States.

But Japan has set itself similar objectives and target dates; and the fillip given to research into optical fibre transmission and satellite research by the SDI programme indicates that telecommunications will be perhaps the decisive battleground for the high technology competitors at the end of this century. There are fears, now that IBM has made its decisive entry into this area, that it could achieve a dominant position here, as it has in the world of computers.

(d) In electronics, the weakness of Europe's position is manifest despite some laboratory research in the large firms in Europe being at least equal to the best in Japan and America. With mainframe computers, and particularly now the new generation supercomputers, Europe has had to face massive and agressive competition from the United States. Europe has three indigenous mainframe computer companies each of which has 1% to 2% of the world market, whereas IBM accounts for a 70% share. This has spilled over to nearly the whole range of computer science products. The US and Japan have between them taken more than 90% of the world's semiconductor market, now worth $30 billion. Even if Europe gains a foothold in the corner of some part of the market, such as personal computers or software technology, it will have difficulty in sustaining its position.

(e) Biotechnology is the classic case of a major European break-through in an area such as recombinant DNA technology opening up vast new market potential only to be exploited by others. Since the European discovery of the structure of DNA, Europe's research efforts to date have been far less extensive than those of the United States. They have displayed a typical lack of coordination and marketing skill. Nonetheless Europe, according to various observers[20], has a leading position in pharmaceutical and fermentation (enzyme, antibiotics) research. But poor commercialization and inadequate training have thrown away this research potential and made Japan and South-East Asia the competitors the Americans fear.

(f) In the field of new materials, and particularly, technical ceramics, light alloys and composites which constitute a prerequisite for maintaining competitivity in transport and electronics, Europe has almost to start from scratch, whereas the United States and Japan have provided substantial public and private investment and obtained striking results. They have also been more successful in steering traditional industries, such as mining and steel, into research on new and raw materials.

Europe's weaknesses

101.The central problem, however, is in the interface with commercial exploitation of research efforts. It is now your rapporteur's intention to summarize the main reasons for this weakness in a list which is neither exhaustive nor necessarily in the order of importance:

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20 OTA Report 1984, 'Commercial biotechnology, an International Analysis'
European Biotechnology Federation: 'A realistic view of Biotechnology' (September 1984)
Mrs Viehoff's report on behalf of the Committee on Energy, Research and Technology (Doc. 2-1144/84)

(a) absence of a large, single market: unanimously agreed by observers to be a vital factor hampering Europe's technological effort;

(b) vast regional disparities as regards R & D resources;

(c) poor rewards and status for Europe's scientists and engineers resulting in

(i) increasing attractiveness of the American industrial and academic environment and the brain drain,

(ii) a smaller body of qualified - and particularly young - scientists in Europe;

(d) duplication resulting from - lack of coordination
- divergent standards
- refusal to cooperate between States and between companies;

(e) companies facing cash problems in a tight credit situation spending less on R & D than their American or Japanese counterparts;

(f) inadequacy of training and retraining;

(g) absence of a venture capital market:

(h) hesitation about the role of government in stimulating R & D and in strengthening the technological base: lack of consensus on this point;

(i) absence of instruments available in many parts of the United States to stimulate private R & D and to coordinate efforts between government, local and federal, industry and research;

(j) a trammelled and over-regulated economy whose costs have gone up astronomically over the last 20 years. The EEC public sector accounted for 32% of GDP in 1960 and 51% in 1982. European companies' social security costs and tax burden are much too heavy and seriously affect their international competitiveness. This goes a long way to explaining European lethargy as compared to the dynamism of other areas and shrinking European employment as compared to expanding American employment;

(k) frequently hostile attitudes between government and business, business and labour, labour and government;

(l) wariness and mistrust still existing between universities and industry;

(m) absence of large-scale imaginative projects capable of galvanizing efforts and inspiring the research community;

(n) absence of a clear research strategy, or even full public awareness of the problem.

The role of the European Community

102.The European Community institutions, and particularly the Commission, have tried to find different ways of surmounting all these barriers, but the Community itself is hampered by the cumbersome nature of its decision-making. Here the fault lies mainly with the Council, whose main function seems to be combating Europe: unseemly wrangling over the minutiae of Commission proposals, budgetary cutbacks for programmes representing quite small amounts but vital in themselves (e.g. biotechnology, where months of horse-trading led to a 30 m ECU cutback on a 5-year programme which was initially costed at only 88 m ECU), national civil servants continuing a rearguard action against Commission programmes, after Ministers and even Heads of Government have declared support, log-rolling worthy of 19th century Congressmen with unjustifiable research programmes being concocted as a pay-off in order to facilitate the adoption of worthwhile ones.

103.The Community has taken a long time to develop separate structures for European R & D: the dichotomy between direct and indirect research and the poor reputation of the Joint Research Centre have not helped the Community's reputation. Now, however, through the information technologies task force, more flexible structures have been developed, with the Community acting as the broker and coordinator with industry and the research community. The adoption, on Parliament's insistence and despite Council resistance, of the ESPRIT programme, ushered in a new network of relationships between the Commission, industry and universities.

104.Nevertheless, the Community's R & D effort is still hampered by budgetary restrictions imposed by the Budgets Council, which appears to have lost all touch with the reality, the needs and the future of Europe. It measures out that future by the yardstick of budgetary bureaucracy and not with a vision of the survival of Europe and its place in the world. These politicians display an unusual lack of awareness and misunderstanding of the modern world.

Europe: taking up the challenge

105.This restrictive attitude in the Council is growing stronger at a time when a new political consensus is emerging in Europe, recognizing the need for a technological community and a major R & D effort. Three factors appear to have contributed to this emerging consensus:

(a) the perceived threat from Japan and the United States;

(b) the leverage used by the United States in the technology transfer question;

(c) a catalyst, SDI, with the offer of participation to European companies and research institutes.

106.Your rapporteur takes the view that whatever attitude individual governments may take to SDI matters less than the certainty of participation in SDI research programmes of European companies, universities and individual scientists. It is probable, however, that this participation will be less than originally thought, if only because the budgetary future of SDI seems far from guaranteed. Certain aspects of SDI research, such as laser technology and energy-related questions, are of direct interest to the Community. Unfortunately, the restrictions on technology transfer may prevent Europe from deriving significant benefit from this programme, even when its companies have participated. Your rapporteur believes that the Community institutions should recognize the reality of some European participation in SDI, but insist on a coordinated response, first to ensure that research results are disseminated as widely as possible: secondly, to prevent an accentuation of the brain drain or an excessive diversion of Europe's scarce research resources.

107. Irrespective of whether the influence of SDI is real or not in Europe, the stimulus which this programme will give to research in general, particularly in the United States, means that the Member States must develop their own response. Without such a response Europe will fall further behind.

108.The most dramatic sign of such an awakening has been the French EUREKA initiative, although this was merely the culmination of a series of proposals and suggestions from industry (Mr DEKKER's speech, Mr LUBBER's memorandum, the Commission's own initiatives, etc.). The announcement of the EUREKA initiative, however ill-prepared or imprecise it may be, has had the effect of forcing the Research Ministers of the different Member States to concentrate on the issue of European cooperation.

109.As always, however, in the Community any initiative is the object of hesitation and suspicion. The first conference of Research Ministers (12 from the Community plus representatives from Switzerland, Austria, Norway, Sweden and Finland) was inconclusive. In particular there is as yet no agreement on the appropriate institutional structure, though at least the threat of a separate Agency outside the Community structure appears to have been avoided. The best arrangement would be Community participation via the Commission varying according to each project, guaranteeing of the necessary coordination and based on the structure which already exists in the Commission, the information technologies task force. The main uncertainty concerns resources: the initial offer by the French Government of FF 1 billion has not so far met with similar responses from any of the principal partners. It is anyway hopelessly inadequate and represents less than .2% of European expenditure on research and development. A EUREKA programme with an annual budget of less than 3 bn ECU would scarcely have any point.

110.Alongside the move towards the concretizing of the EUREKA approach, the Commission's own memorandum 'Towards a European Technology Community' (COM(85) 350 final) has met with a favourable reaction and the 10 areas indicated as potentially mobilizing projects have been approved both by the European Council and again by the EUREKA conference[21].

[21]These areas are: information technologies, biotechnologies, new materials, lasers and optics, large scientific instruments, broadband telecommunications, new-generation means of transport, use of space, mastering the marine environment and exploring the earth's crust, education and training technologies

The European response

111.Acceptance of slow, genteel and inescapable decline is not a serious option for the European Community. Various commentators, from Professor Dahrendorf to former US Ambassador to the United Kingdom, Elliot Richardson, have lauded European cultural values almost as a kind of alternative in the event of European technological failure.[22] This notion is not acceptable. Europe's quality of life and relative social harmony are primarily dependent on its ability to provide reasonable living standards for the majority of its people. These living standards can only be maintained if Europe regains its industrial competitiveness, particularly in the high-tech areas. If not, most of Western Europe is condemned to decline, poverty and structural unemployment. This decline is by no means inevitable, it can be successfully combated. If it comes about it will be the result of our blindness and defeatism. We shall then deserve our decline.

112.Even more important than this, if Europe loses more of its economic independence through accepting a sub-contractual relationship with the United States and Japan and others, its political independence will not long survive.

Europe must above all else guard against becoming the first colony of the third industrial revolution.

113.Of course, Europe has a special contribution to make to that revolution, in bringing to the fore the social, human and physiological consequences. The Community should be constantly assessing programmes in the light of its social and humanitarian objectives. Here the outline suggestions from the Italian Presidency for the IRIS project are particularly useful.

114.The third industrial revolution is here: we cannot escape it: we must try to master it.

115.In practical terms your rapporteur recommends that the Research Ministers, due to meet in Germany at the beginning of November, decide now on the practical form of the EUREKA project. That means agreeing on adequate finance from a variety of sources: the Community budget, the EIB, national contributions, the private sector, perhaps even a special loan on the capital market. It would not be understood by public opinion if progress in this area were halted by some arcane argument based on conflicting budgetary dogmas.

116.It also means agreeing on a structure which should be light and therefore not subject to national bureaucracies - with the European Commission having a minority partner status in each project to ensure effective coordination and accountability. This also means defining a collective approach to the Strategic Defence Initiative, and deciding on precise forms of cooperation with the United States and Japan.

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[22] The feeling of certain Americans (Bruce Nussbaum, for example, adviser to President Reagan) who have the Californian vision of the world, and who are quite happy to see the axis of power transferred from the Atlantic to the Pacific accompanied by technological and industrial decline in Europe, so that it becomes weaker economically and ultimately part of the Third World and with the Soviet Union sharing this fate, is that this is a process which should be encouraged rather than prevented.

117. Your rapporteur also recommends that a number of general steps be taken within the next 5 years to create a climate in which innovation is encouraged, not smothered. The Commission's memorandum 'Completing the Internal Market' (COM(85) 310 final), with the aim of it being established by 1992, should not merely be approved in principle: the different measures must be adopted within tight deadlines by Council. The Commission's proposals on risk capital should be approved without delay. At the same time the Commission should bring forward more imaginative proposals to create a venture capital market in Europe. The Commission should examine the different structures and facilities available to start up firms in different parts of the United States and introduce proposals rapidly.

118. The Commission, following on from its modest proposals on researcher mobility, should now report on new ways to boost the rewards and status of scientists and engineers.

119. The COMETT proposals, launched recently by Commissioner SUTHERLAND with a view to strengthening training and retraining, should be examined expeditiously.

120. In the medium term, however, the objective of increased international competitivity in high technology products will remain elusive unless the Community sets itself ambitious projects. The difficulties with the Community's framework programme for research and development activities, with EUREKA, and with the Commission's memorandum 'Towards a European Technology Community', derive from the fact that the scientific objectives are too widely drawn. If the Community, Member States, local government, industry and the research communities are to collaborate effectively and set aside adequate funds then a series of wide-ranging but well defined projects, with potentially major spin-off effects, within the framework of Community objectives, should be devised.

121. Your rapporteur believes that Parliament should indicate to the Commission, to Council and to public opinion certain specific ideas, the feasibility of which should be examined rapidly by the Commission, which should report back to Parliament and to Council so that projects can be decided upon within the next 12 months.

122. For each of the main technological sectors identified, a strategic objective should be established, and feasible short-term and medium-term projects decided. These projects should be capable of acting as a catalyst to stimulate Europe's competitivity.

(i) As regards energy technology Europe should set itself the objective of reinforcing its competitive lead, particularly through the pursuit of the nuclear fusion programme, and strengthening research into coal technology (liquefaction and gasification). For the moment, two projects should be assessed, and, if feasibility is established, adopted: first, the development of extremely powerful lasers: secondly, the construction of giant mirrors in space - both with a view to long-distance cableless electrical energy transmission. These projects would have vitally important consequences for the supply of the energy needs of the Third World.

(ii) As regards space-related technologies, Europe must develop and achieve an autonomous capacity both for space exploration and launching systems. From such a state of independence, Europe could help condition the peaceful use of space in the light of its own political objectives. In the short term, this means the expeditious application of the decisions of the Rome ministerial meeting of January of this year. In the medium term, two new major projects could be examined:

- a science base on the surface of the moon in which, with the special conditions prevailing, new research on materials and biotechnology could be conducted. Mr Toksvig, rapporteur on space policy, (PE 95.639/rev.II), draws this conclusion from his detailed study of the question.

- a solar energy project in space. The placing of large solar panels in space is potentially an exciting source of efficient alternative energy supply. Some of the technology involved will be developed anyway in the course of the SDI programme. While solar energy costs may be falling, efficient solar power on a large scale remains elusive. A project of this nature, by its very scale beyond the reach of any company or Member State, could galvanize different technology sectors in a major cooperative effort for an unassailable political objective; the first step would be the development of new optical techniques through the operation of mirrors and detectors.

(iii) Perhaps the most important effort must be undertaken to achieve a European comeback in electronics and information technologies across the board. This implies European projects in microelectronics, optoelectronics, artificial intelligence, computer-integrated manufacturing and design (CAD/CAm) and high-performance supercomputers. Various existing programmes, and most significantly, the ESPRIT programme, have started to create the conditions for collaborative research efforts in this field. What is now required are large-scale projects, in conformity with Community objectives and requirements and capable of stimulating R & D activities in the various fields of electronics and information technologies. The Community must tackle in the first instance, the construction of supercomputers, a vast and growing market from which Europe has so far excluded itself. The EUREKA objective - in terms of operations per second - is three to eight times greater than any performance registered in either Japan or the United States. The longer-term aim should be the creation, over a period of eight to ten years, of a European network of supercomputers and videocommunications, linking Community institutions, public authorities in the Member States, universities and private users.

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A second project in this sphere recommends itself, particularly, but not exclusively, to the European Parliament: Operation Gift of Tongues. The linguistic problems of the Community have evolved from an administrative problem to a major stumbling block in its development. There will always be a place within the Community for highly qualified translators and interpreters. But a major R & D operation is becoming increasingly necessary to develop an effective automated simultaneous interpretation and translation system. Voice-recognition technology is taking off both in Europe, the United States and Japan. A project of this kind with important spin-offs for artificial intelligence and robotics could revolutionize the Community's working methods and have vitally important consequences for European industry, where language remains a major barrier.

In the first stage, the Community should accelerate its automatic translation project and increase its spread of languages. If Europe is to achieve a dominant position in this sector, then it cannot limit the language spread to its own working languages.

(iv) For biotechnology, the European Parliament will be making proposals in the first few months of 1986, following the hearings to be organized by the Committee on Energy, Research and Technology in Brussels on 20-21 November.

These hearings take on an added urgency in view of the need to bring together the various industries and research centres in the kind of collaborative venture pioneered through ESPRIT. Only this kind of approach could enable the Community to exploit to the full its impressive research potential.

(v) For new materials, the Commission has just proposed a new four-year programme of R & D into raw and new materials, including composites and soft alloys, to cost 100 million ECU over four years. The European Parliament will seek to assess whether this programme is sufficiently comprehensive to enable it to catch up with escalating American and Japanese efforts. The Commission recommends specifically a major action on superconductivity and the development of new superconductors, for which many industrial applications particularly in transport could be envisaged.

(vi) Two other multidisciplinary projects should be also assessed:

- The European train of the future. The failure to collaborate effectively on advanced rail connections has been an historic mistake. We have all seen that effective communications are an indispensable element in stimulating the new technologies in the different regions. Those Member States who are developing high-speed trains are doing so on a national basis, and therefore limiting their own prospects for commercialization. A project to develop, through European cooperation, high-speed rail communications, between the various industrial areas in Europe which would have important consequences on employment and economic activity but would also stimulate technological applications in the transport area.

(vii) Very high speed aviation

Another interesting project could be one indicated, by the Commission, in its memorandum (Com(85) 350 final) page 3 - 3 concerning advanced aerospace propulsion systems requiring research into materials, combustion phenomena, structure and aerodynamics, with a view to very high speed commercial aviation. The scale of such a project would require major Community finance.

123. Like the rest of the world, Europe has not escaped the economic recession, but that in itself is indicative of a deep structural recession which is the fault of its industrial and technological decline. If it wants to deal with the situation, it must embark on a major industrial modernization and technological research drive, geared to practical applications. We cannot acquiesce in the prospect described in his report to Congress by the United States Trade Secretary in February 1982: 'Many high-technology industrial markets today are Japano-American, with no real European presence. It is vital for the United States that this balance be maintained in the 1980s.'

Europe must show that the future sketched out in those terms can be a different one and can involve our part of the world in the changes to be undergone by the technologically advanced nations.

Europe must not become the continent of lost opportunities.

European Communities

EUROPEAN PARLIAMENT

Working Documents

1984-1985

21 February 1985

Doc. 2-1705/84

MOTION FOR A RESOLUTION

tabled by Mrs CHOURAQUI, Mr JUPPÉ, Mr FITZSIMONS, Mr MAC SHARRY, Mr MANCEL, Mr CARIGNON and Mr FLANAGAN

pursuant to Rule 47 of the Rules of Procedure

on the new technologies

The European Parliament,

A. whereas the world today is witness to an 'economic war', dominated by confrontation between the large trading blocs - a war in which the new technologies sector is crucial to the survival of Europe's industries and the preservation of its competitiveness,

B. whereas the development of the new technologies can be seen either as a matter for apprehension - if Europe allows control of production to pass to its principle partners - or as a matter for hope, if the Community responds to the challenge it is faced with, and recovers lost markets while at the same time creating new employment and using more innovation in all its activities,

C. having regard to the steadily increasing gap between Europe and its major American and Japanese competitors in the new technologies sector,

1. Points out that Europe's greatest industrial achievements of world importance - those making the most use of the new technologies - have almost all resulted from European cooperation and concerted efforts in research and development;

2. Considers that the new technologies, important features of which are their very high added value and considerable export potential, require high levels of brain power, which Europe possesses in abundance, and consume only modest amounts of energy and raw materials;

3. Notes in this regard that:

- in the information technology sector alone, the spectacular rate of growth, of 9% to 10% annually, suggests that sales figures in this sector will rise from US$ 240,000 to 500,000 million between 1980 and 1990,

- thinly-spread national initiatives have not been sufficient to meet the challenge facing the European new technologies industry, and it is absolutely vital to encourage increased research coordination in the sectors in question;

4. Requests the Commission to make information available on the promotion programme for the new technologies that it plans to implement during its term of office, and to prepare a detailed document, with statistics, on all current and future Community-backed projects in I.T, telecommunications, biotechnics, electronics, data processing and other similar sectors, aimed at the development of the new technologies in the private sector, in the public sector, and at the interinstitutional level;

5. Considers that all these measures should be taken in conjunction with tax, customs and monetary measures designed to create a genuine internal European market, which would allow the Community multiplier effect to be brought quickly and fully into play, particularly with regard to employment and investment;

6. Instructs its President to forward this resolution to the Commission and the Council of the European Communities.

European Communities

ANNEX II

EUROPEAN PARLIAMENT

WORKING DOCUMENTS

English Edition 1985-86

18 April 1985 SERIES B DOCUMENT B2-130/85

MOTION FOR A RESOLUTION

tabled by Mr EPHREMIDIS, Mr ADAMOU and Mr ALAVANOS

pursuant to Rule 47 of the Rules of Procedure

on statements by the President of the Commission concerning Community participation in space armament programmes

A Series: Reports - B series: Motions for Resolutions, Oral Questions, Written Declarations, etc. - C Series: Documents received from other Institutions (e.g. Consultations)

The European Parliament,

A. sharing the express opposition of the people of the European Community to any form of militarization of space and in agreement with resolution 39/59 of the General Assembly of the United Nations on the use of space exclusively for peaceful purposes, which was adopted by an overwhelming majority of 150 nations including all the Member States of the Community,

B. having regard to the United States' efforts - made public on 10 February 1985 at the international armaments conference and officially reiterated during the recent visit to Europe of US Defence Secretary Weinberger - to persuade the Member States of the Community and NATO to participate in a Strategic Defence Initiative (SDI) with a view to setting up a space armaments system for so-called 'Star Wars',

C. recognizing the genuine danger that any kind of research, testing or development of space weaponry could lead to a new, more perilous and costly arms race,

D. whereas implementation of the space arms programme would constitute a flagrant violation of the 1972 Anti-Ballistic Missile (ABM) Agreement between the USA and the USSR,

E. seeking to avert a heightening on tension and incitement to war or the possibility of one side relying on its military superiority to exert coercion on the other should the present equilibrium be upset, which might be the case if one of the two politico-military blocs made the first nuclear strike in the belief that it would escape a counter-blow by reason of its comprehensive space shield,

1. Expresses its very grave concern at the statements made by the President of the Commission, Mr Delors, concerning Community participation in 'Star Wars', as these statements intensify the danger of Community involvement in the USA's hazardous plans and are contrary to the European Community treaties;

2. Expresses its concern at similar statements by the West German and other governments of Community Member States, which are contrary to popular demand from the nations of the Community for détente and disarmament;

3. Expresses its concern at the statement made by the President of the USA that his country's space arms programme cannot be the subject of the Geneva negotiations;

4. Calls on the Commission and the governments of the Member States to comply with the UN General Assembly's resolution on the peaceful use of space and abstention from developing or preparing arms for use in space, which is contrary to international law;

5. Calls on the Community institutions and the governments of the Member States to support the conclusion of an agreement between the USA and the USSR on the non-militarization of space - to be included in the Geneva negotiations - and to refrain from any action which might give rise to further difficulties in these negotiations.