DEPARTMENT OF THE AIR FORCE

OFFICE OF THE SECRETARY

MEMORANDUM

May 26, 1982

MEMORANDUM FOR [redacted] STAT
IC STAFF

Returned for your information.

J Morrell

JIMMEY R. MORRELL
Lt Col, USAF
Deputy for National
Security Council Affairs

1 Attachment

Declassified in Part - Sanitized Copy Approved for Release 2012/10/23 : CIA-RDP92B00181R001801680006-1

IUNITY STAFF

TO:

Return to [redacted]

STAT

This is the paper I mentioned. I found its perspective enlightening and worth considering

[redacted]

STAT

~~Treat as classified~~

Do we know who generated this?

NO! JRM

But not a surprising view for the State/ADDA [redacted] crowd. JH

STAT

INFORMATION

International Aspects of U.S.

Space Policy

ACDA

Draft 3/3/82

Declassified in Part - Sanitized Copy Approved for Release 2012/10/23 : CIA-RDP92B00181R001801680006-1

3/2/02

INTERNATIONAL ASPECTS OF U.S. SPACE POLICY - AN ASSESSMENT

One of the basic objectives of U.S. space policy is to conduct our visible civil programs in a manner which creates an international climate of legitimacy and acceptance thus allowing the U.S. more freedom to conduct all of its space activities (military as well as civil) with minimal international interference. This is one of the reasons why the U.S. has carefully developed and maintained worldwide user communities in areas of launch assistance, remote sensing, weather service, telecommunications, and space sciences. International involvement in these programs has also proved valuable from both the economic and the technical points of view. The ongoing review of U.S. space policy should consider current practices as they serve all of these goals and should consider any new policies in these contexts among others.

I. Policy Framework

A. Legal Climate

U.S. activities in space are conducted within the context of a body of domestic and international law and policy. The National Aeronautics and Space Act of 1958, the United Nations Outer Space Treaty of 1967, and numerous Presidential policy decisions provide consistent guidance encouraging the widespread use of space for "peaceful purposes." This encouragement applies to private as well as public entities, with the requirement that the activities of non-governmental organizations be placed under the supervision of their governments. There is considerable latitude for policy flexibility within this minimal regulatory regime. It is acknowledged internationally that this body of jurisprudence is not intended to inhibit non-aggressive military activity in space, civil or military remote sensing programs, or private sector activity in space.

B. Foreign Policy

While the space program is not an instrument designed for foreign policy ends, its contributions to our foreign policy are substantial. First, foreign policy benefits accrue because of the role of military space systems in promoting foreign policy objectives. Space systems are key to our ability to constrain Soviet misconduct through deterrence, which is vital to our relationship with nations which look to the U.S. for political leadership. Space assets are critical elements in our military command and control functions and our ability to communicate rapidly and reliably with our forces and with our allies. U.S. and allied arms control negotiations and policy positions in START, TNF, MBFR, ASAT, CW/BW and non-proliferation negotiations and agreements depend on intelligence information for compliance verification and assurance. Our capabilities to detect missile launches, accidental or otherwise, contribute to strategic stability.

In addition, a robust and durable space program demonstrates the scientific and technological capabilities of the United States, thus contributing to our image as a world leader. Furthermore, to the extent that capabilities developed for the space program can contribute to American economic viability and competitiveness, they strengthen the country. Perceived and actual U.S. strength clearly undergirds all U.S. foreign policy objectives.

Lastly, opportunities for international participation in civil portions of our space program can assist our foreign policy goals. Few nations have the capability to operate in space themselves; our provision of access to space for qualified foreign partners permits them to share in highly visible and attractive programs. It also shows U.S. willingness to conduct joint programs to solve joint problems. This mutually beneficial cooperation contributes to positive overall bilateral relations with these countries. Furthermore, our willingness in general to provide to the world the results and benefits of our science and applications programs provides a positive element to our relations with a much larger number of countries. More generally, specific space programs with clear development potential--such as Landsat--strengthen the U.S. position in the constant debate over proper North-South relationships.

Need to do more of this.

C. Space Cooperation

In the tight budget times that all of the industrialized democracies are now facing, no nation can afford to dominate all areas of scientific accomplishment. Collaboration on large-scale, high-cost programs provides us the opportunity to pursue programs that would otherwise be unaffordable.

Carefully constructed cooperative programs can yield the benefits of access to foreign scientific and technological expertise, foreign R&D facilities, and foreign funds. Historically, this strategy has been successful for the US: foreign expenditures for the development of spacecraft for joint programs, construction of hardware for U.S. spacecraft, and support of scientific experiments on joint missions have thus far exceeded $2 billion. This strategy has not involved the setting aside of money specifically for international cooperative projects. Cooperation is carried out through foreign participation in domestic projects competitively selected on their own merits and funded under domestic funding lines.

Cooperation can also be a factor in minimizing competitive pressure. Foreign agencies' alignment of their space programs with ours--as for example, in developing Shuttle-compatible systems--has the first order effect of supporting our system and the second order effect of diverting foreign resources from competitive programs.

There is yet another benefit of international cooperation in our space projects which, although less tangible, is real. Meaningful participation by our friends and allies in high visibility programs confirms the openness of our programs. This very effectively counters Soviet and other attempts to cast suspicion on our national intentions in space. Widespread support for U.S. space programs such as remote sensing has developed over the years--despite early vociferous objections--because of the availability of the program to all foreign nations. This general acceptance of U.S. activity in space has served to protect our freedom of action for all our desired routine uses of space, including civil, military and commercial uses.

D. Competition

Waning U.S. leads in space technology areas in the face of increasingly stiff foreign competition argue for new strategies to enhance U.S. competitiveness. We are seeing aggressive pursuit of the market by Europe and Japan in areas such as launch services, remote sensing and telecommunications satellites. Foreign governments support competitiveness across the board in funding R&D, price subsidization and financing; development of attractive package deals; and creation of quasi-governmental marketing organs.

Industry to government relationships in many other countries differ radically from those in the U.S. Although the private sector is active, foreign government intervention acknowledges limitations on the ability of the private sector to support the high R&D and operational costs of aerospace projects. Aggressive pump-priming by European and Japanese Governments have ensured these countries' effective competition in the world market place against other space powers, particularly the U.S. In France, elements of the aerospace industry have been heavily government-supported--and government involvement is increasing under the Mitterand Government which is nationalizing much of the private aerospace industry. A close relationship between many foreign governments and foreign industry, particularly in high technology areas, is traditional; the Japanese Ministry of International Trade and Industry (MITI) forms partnerships with Japanese industry on high risk, high technology R&D projects. Furthermore, the Japanese Government, like many others, actively promotes the international marketing of domestic products and technology; this marketing assistance takes many forms including the formation of government-supported sales promotion organizations and the provision of extremely attractive package deals and financing arrangements for foreign customers.

In the area of launch services, European salesmen are moving aggressively into a traditional U.S. preserve, the provision of reimbursable launch services. Barring a greatly improved U.S. marketing posture, the European launcher, Ariane, with its aggressive marketing, low prices, and attractive financing will be able to capture a share of the world market for reimbursable satellite launches limited only by its total launch capacity. The Europeans have already begun to offer extremely attractive package deals for the launch of communications satellites built by European vendors. Thus, if this approach proves successful, the economic loss to U.S. industry, particularly the U.S. telecommunications industry, may far exceed the revenue loss for launch services alone.

In the area of remote sensing, there is a rapidly growing competition to the U.S. monopoly. France and Japan in the near term are motivated by the prospects of worldwide commercial sales to benefit their industries. (In fact, France expects the U.S. to develop into 50% of its market.) Some developing countries, including India and Brazil, are motivated by the political prestige of operating their own systems. Furthermore, aggressive foreign competition has developed in the market for ground station hardware. Canadian, German, French and Japanese firms have well developed lines of ground receiving hardware and processing equipment. Non-U.S. firms have even acquired a significant portion of the market for supplying ground station equipment to countries receiving Landsat direct read-out. A number of foreign firms also offer data analysis and other value-added services, an area which until recently was dominated by the U.S.

Foreign international sales efforts often rely on comprehensive government foreign aid assistance packages and concessionary financing. Although French, Canadian, German, and Japanese foreign assistance funding is active in support of their remote sensing industries, it has been the practice of the U.S. Agency for International Development not to fund foreign acquisitions of remote sensing ground station hardware. In commercializing the French remote sensing satellite system, SPOT, the French Government has made a ten-year commitment to data continuity and has concluded that considerable subsidies will be needed, at least through this decade, for continued government R&D, support for operation of the space and ground segments, and assistance in the worldwide marketing effort.

In the area of telecommunications, the ability of U.S. industry to continue to provide needed domestic and international telecommunications services depends on its ability to meet rapidly expanding demands. The worldwide multibillion dollar market for telecommunications equipment is being served by European and Japanese firms as well, however. In those countries, government-industry teams and direct government-sponsored R&D serve to reduce perceived program risks and spur domestic industry in effective international competition. The competitiveness of U.S. industry will depend on its participation in R&D, particularly in advanced satellites and the yet to be developed 30/20 GHz (Ka) frequency band. These competitive factors should be considered in any future study of government participation in advanced communications satellite technology.

It is relevant to note that in the area of research and development specifically, a recent OECD report reviewed trends in industrial R&D in selected OECD countries and noted that aerospace R&D is characterized by a very high degree of government funding and it is, in fact, the only manufacturing industry in which private funds are not the major source in most countries.

E. Competition vs. Cooperation

Ever-increasing capabilities simultaneously make foreign nations more effective competitors and more desirable partners. To reap the benefits of cooperation without jeopardizing the competitive position of U.S. industry, care must be exercised in selecting, defining and implementing joint programs. Projects or pieces of projects leading to the development of commercially useful technology are not usually open for international participation. In projects where there is foreign involvement, that involvement is structured so as to avoid technology transfer. Control of overall project design generally remains with the U.S. and participation in one element of a project does not entitle a participant to technical information on other elements; generally, only the minimum amount of technical information necessary to ensure effective interface among the various elements of a project is exchanged.

In all of the competitive areas cited above, ongoing NASA programs involve interactions with foreign partners and/or customers. In the area of launch services, foreign customers must be provided information necessary to design their payloads to interface with the launch vehicle and withstand the launch environment. However, they are provided no information regarding the major operating systems of the launch vehicles themselves. In fact, recognizing the commercial and national security sensitivities of advanced U.S. launcher technology, NASA conducts no cooperative programs in the launch vehicle technology area. In the area of remote sensing, foreign ground station operators must be provided with orbital parameters and data transmission characteristics necessary to operate their ground stations. But, they are provided no U.S. technological information related either to the remote sensing satellite or to the construction of ground stations. In the telecommunications area, U.S.-built satellites purchased by foreign customers have usually been delivered on-orbit thus facilitating control of the technology. Regardless of technology area, the normal export control procedures are maintained in all transfers of technical information and equipment; these procedures work to ensure that U.S. commercial viability and U.S. national security not be jeopardized through the transfer of inappropriate technology. Current practices protecting U.S. technology should be reaffirmed in any guidelines resulting from the broad space policy study.

II. Program Issues

Following are a number of separate issue papers focussing on the international implications of the broad space policy issues under discussion in the ongoing review of U.S. space policy. These papers are intended as an initial discussion of these issues. Further careful assessment, in the context of the overall policy review, is recommended for each topic.

COOPERATIVE SCIENCE AND APPLICATIONS PROGRAMS

Since NASA's inception, NASA programs have been open to foreign participation. Foreign partners have assumed financial responsibility for contributions ranging from flight instruments to ground-based support and scientific and technological expertise in many fields. This mutually beneficial foreign involvement has clearly extended NASA resources and provided scientific and technical, financial and foreign policy gains.

We are, furthermore, entering a new era in space activities when many countries are coming of age in areas which were previously dominated by the US. Foreign technology developments and ambitious foreign space programs have led to significantly increased capabilities abroad which open up new vistas for international space cooperation. Because of this, NASA no longer needs to play the role of funding the major share of all cooperative projects, with foreign partners playing a more minor role with regard to total mission costs.

In many recent missions, foreign partners have sought a larger, more important role. An example is Infrared Astronomical Satellite (IRAS), where the foreign involvement (the Netherlands is providing the spacecraft and the UK the ground operations center) is almost equal to the US costs (infrared telescope assembly and launch). The same is true of the Active Magnetospheric Particle Tracer Explorers (AMPTE) where Germany and the US each provide one spacecraft, scientific instruments and ground operations support, with NASA additionally providing the launch.

We can take this scenario one step further and essentially reverse the roles established in earlier experience allowing our foreign partners to provide the spacecraft, launch, and tracking and data acquisition operations. This new mode of cooperation, where US instruments would fly on a foreign satellite, could permit NASA to gain maximum returns for minimum expenditures. Early possibilities for this arrangement include the European Space Agency ocean remote sensing mission, ERS-1, on which NASA is considering flying a coastal zone color scanner. This opportunity would satisfy an important NASA objective for its broad ocean science program. Other opportunities for the flight of U.S. instruments on foreign spacecraft are presented by two Canadian missions: Mobile Satellite Communication System and Radarsat. Negotiations are underway in all three areas.

Where nations decide to go it alone on missions with similar objectives, it can be beneficial to develop an arrangement for coordinated or complementary measurements. In this manner countries with similar programs can pursue their independent interests and at the same time expand their data bases from one another's programs. For example, NASA's Dynamics Explorer satellites and the Bulgarian 1300 spacecraft are independently pursuing investigations of the interactive coupling of the Earth's magnetosphere and ionosphere; an exchange of related observations has been agreed in order to enhance the scientific results of both sides. Similarly, close coordination is underway between Europe, Japan, the USSR and the US to assure the maximum return from both spaceborne and ground-based observations of Comet Halley in 1985-86.

NASA has always had a policy of open data dissemination under which the results of NASA scientific research are available to the world scientific community. The US should encourage foreign space agencies to pursue the same policy for missions under their control so that all scientists have access to such data whether their nations are directly involved or not. In an era of constrained budgets, open data dissemination by others is critical to permit US access to important new data generated by foreign missions.

Just as the U.S. stands to gain substantially from international space cooperation, we risk a corresponding penalty when a commitment is terminated in an untimely fashion. Deep cuts in NASA's budget recently forced the cancellation of a significant portion of a large cooperative program with the European Space Agency (ESA) on the International Solar Polar Mission (ISPM). While legally justified under the terms of the joint agreement, the decision to cancel the U.S. portion of the ISPM was made without consultation with ESA at a point when ESA had already obligated the greater part of its share of the funding. The elimination of the U.S. spacecraft from the two spacecraft mission led to extensive protest from Europe and gave rise to serious concerns about the reliability of the U.S. as a partner in large scale, long term cooperative programs. Regaining the confidence of our foreign counterparts should be a major and immediate goal.

The costs to the U.S. of curtailing a cooperative project, other than those inherent in the loss of the opportunity, includes loss of prestige and strained relations that could, if the venture were large enough, conceivably spread beyond the scientific sphere. A would-be partner might also be more reluctant to accept--or offer--a proposal for a future joint mission, thus depriving the U.S. of a beneficial foreign contribution or a chance to contribute to and share in the results of a foreign space mission. These losses are potentially serious in financial as well as other terms.

In order to reap maximum benefit from foreign countries' aggressive pursuit of their own space programs, the following approaches should be incorporated into U.S. policy on cooperation in space activities:

-- The US should continue to seek the type of international cooperation in space activities which has proven beneficial in the past by serving budgetary, scientific and technical and foreign policy interests. Such cooperation should continue to be structured in a manner which maintains U.S. technological leadership and in no way jeopardizes U.S. national security and economic interests.

-- In areas of programmatic compatibility, the US should seek to fly US instruments on foreign spacecraft, thus allowing the foreign partner to shoulder the bulk of mission expenses.

-- Where independent space projects with similar scientific objectives are undertaken, the US should seek coordinated or complementary observations to enhance the independent program objectives.

-- The US should encourage foreign space agencies to adopt open data dissemination policies for foreign space missions commensurate with US practices.

-- NASA should consult with foreign space agencies with regard to long-term program planning. Such consultation should aim towards the development of complementary, non-redundant activities and programs with cooperation in areas where mutual benefit will result.

-- The U.S. derives many benefits from long-term projects requiring funding over many years. NASA, together with the Department of State, OSTP and OMB, should attempt to develop funding policies and mechanisms which will provide greater assurance of U.S. reliability to foreign partners. Multi-year authorizations and appropriations for programs having major foreign involvement should be one of the mechanisms seriously considered. At the very least, all concerned agencies need to reach a common understanding of international implications involved in abrogating international agreements.

SPACE STATION

The U.S. has seen substantial foreign interest in NASA's future plans for establishing a space station. Much of the foreign countries' interest flows from previous commitment to the Shuttle; much of it comes from a combination of long-standing successful cooperation with NASA and recognition that they will not have the resources to pursue such a program on their own. The European Space Agency contributed the $1 billion Spacelab system (52% of this money came from the FRG); Canada presented us the $100 million Remote Manipulator System (Canadarm). Italy has proposed joint development of a tethered satellite system at a cost to them of $27 million (40% of total program cost). ESA has just approved funding to study the development of a Shuttle-launched, free flying, retrievable space platform for science and applications purposes. All of these foreign programs have tied the participating nations to utilizing U.S. space systems, with the secondary effect of diverting resources from competitive programs. Interest in joining the U.S. in the next step is thus logical--derived both from this linkage of their programs with ours and from a desire to expand upon technology and systems already developed for the STS.

The decision as to whether the U.S. will proceed with the development of a space station has, of course, not been made. A variety of faster-or slower-paced, manned or unmanned options for developing a permanent presence in space are currently under consideration. International involvement in any U.S. development of a space station would serve broad U.S. interests by:

-- Extending U.S. resources available for the program by accepting potentially large foreign contributions to the program.

-- Providing access to foreign science and technology relevant to the program.

-- Providing foreign policy benefits by allowing our partners to share in a highly attractive and visible program.

-- Helping the U.S. obtain international acceptance of a U.S. space station, rather than have it viewed with suspicion.

-- Promoting foreign utilization of U.S. space services thus assisting U.S. competitiveness in the face of growing space launch capabilities abroad.

At the same time a study of the desirability of international participation in a space station must recognize that anticipated national security community uses of a space station could argue against foreign involvement in the program. The study must evaluate the seriousness of these concerns and present workable solutions where potential problems are acknowledged. To this end recommendations should ensure that:

-- Foreign participation is properly structured to avoid technology transfer and interference with national security objectives for the program.

-- Control of the overall station design and development remains with the U.S., however, other countries' capabilities and end-product utilization requirements should be considered in the early planning stages.

-- All partners will accept full financial responsibility for carrying out their portions of the program.

-- To minimize technology transfer problems, participation in one element of the program will not entitle a participant to technical information on any other portion of the program.

-- To avoid managerial and technical interface problems:

-- Obligations and responsibilities of each cooperating partner will be clearly defined on a case by case basis.

-- Foreign contributions should, insofar as possible, take the form of discrete hardware packages that lend themselves to clean managerial and technical interfaces.

-- Involvement of foreign participants in management decision-making will be restricted to that necessary and proper for the effective fulfillment of their responsibilities.

Because of the high level of foreign interest and the potential benefits to the U.S. of foreign contributions, current early planning activities related to a U.S. space station, should proceed on a basis that does not foreclose international cooperation.

LAUNCH SERVICES*

With Ariane now operational, Arianespace salesmen are moving aggressively into a traditional U.S. preserve, the provision of reimbursable launch services for communications satellites. By 1985 and thereafter, at least 10 Ariane vehicles will be launched annually; after ESA scientific and other payloads are accommodated, at least 10-15 Delta-class communications satellite launches will be available for commercial customers. Through a combination of lower prices and concessional financing (mostly the former), Ariane appears likely to fill this capacity and more; already, only a few open slots remain in Arianespace's launch schedule through 1985.

In both 1985 and 1986, STS commercial slots will be available for no more than 10 Delta-class communications satellites (or the equivalent) each year; Delta ELVs will accommodate 10-11 per year on the basis of present production assumptions, and Atlas/Centaur is currently expected to be phased out in 1987, with only four launches planned in 1985 and one each in 1986 and 1987. Availability of STS launch slots for commercial purposes may improve after 1986, but is unlikely

---

* This subject will be addressed in greater detail in NASA-led "National Space Transportation System" study being conducted in the context of the Space Policy Working Group.

to reach even 20 per year (Delta-class or equivalent) much before 1988.

Meanwhile, there are about one hundred communications satellites currently manifested on NASA vehicles, and the bestavailable projection of demand shows a requirement for 24 Delta-class (or equivalent capacity) launches in 1987, rising to about 32 annually by the end of the decade. Although this analysis suggests that by 1986 or 1987 the world supply of launch capacity may begin to exceed the demand, estimates of demand for launch services have historically proven overly conservative. Unless plans to phase out NASA expendable launch vehicles are reversed and their use continued at least through 1990, a significant deficit in available launch capacity will probably develop. In the meantime, this assumed phase-out forecloses significant procurement economies; at least partly as a result, these vehicles are too expensive to be a viable alternative to Ariane. Only the STS appears, under today's pricing policies, capable of matching or beating Ariane prices, and even that advantage is likely to erode sharply after FY 1985 when prices will go up. If only STS is available after 1987, Arianespace will be strongly tempted to fill the resulting capacity gap.

If it is likely that both NASA and Arianespace will be able to fill their launch schedules for the remainder of the decade, it might be argued that price and financing are inconsequential in such a seller's market. Indeed, most U.S. domestic communications satellite companies operate in a regulated common carrier mode which permits them to pass such costs on to the end-user. Moreover, their operation has proven extremely profitable, so that reliability of service, leading to assurance that satellites will be orbited on schedule and begin producing revenue, is of paramount importance.

This assumption cannot be made, however, in the case of non-U.S. customers. Many of them are in developing countries which seek to realize development benefits rather than profits from satellite communications. Revenues are likely to be relatively limited, and often in non-convertible currencies, while costs (for launch services and the satellites themselves) are in hard currency. Price and financing may be of critical importance in these cases.

The impact of competition from Ariane is unlikely to be limited only to the loss of launch business. If Ariane's aggressive marketing, low prices and attractive financing enable it to operate at full capacity in the post-1985 period, it may capture over 30 percent of the world market for reimbursable communications satellite launches. Arianespace has already begun to offer both communications satellite and launch services in a single package. The attractive price break offered by Ariane launch services can be used to advantage in pricing such packages to compete with U.S. satellite makers.

Under current policies, U.S. launch capacity will probably be too limited and priced too high to prevent significant Ariane market penetration by the mid-80s. This penetration promises significant balance-of-payments effects, both directly and because of its impact on the European competitive position in the satellite construction market. Decisions must be made soon on what measure the U.S. wishes to take and what costs it is willing to bear in order to meet this challenge.

Pricing and financing issues aside, it is important to note a positive element of U.S. policy which has served to make U.S. launch assistance attractive and reliable. U.S. policy regarding space launch assistance dating from the early 1970's provides that the U.S. will launch spacecraft for foreign countries and organizations on a non-discriminatory basis. this launch assistance is available for spacecraft projects which are for peaceful purposes and are consistent with U.S. obligations under relevant international agreements. For reimbursable launch services, foreign users are charged on the same basis as comparable non-USG users. Furthermore, foreign spacecraft are given the same treatment as non-USG users with regard to priority and scheduling.

Changes in the U.S. approach which could improve our competitive posture in the launch services area would include:

-- A launch vehicle capability suited to the demands of the international marketplace. This implies a number and mix of launch vehicles adequate to assure foreign customers and partners, as well as all domestic users, that the U.S. will be reliable in meeting its commitments, both as to capability and schedule. In particular, the role of ELV's should be re-evaluated, with a particular eye to potential economies that could make them more competitive with Ariane.

& keep STS competitive

-- A launch vehicle policy which is sufficiently flexible on price and other conditions such as financing to permit it to be competitive with other launching organizations. Such policy should also provide for an aggressive marketing effort.

-- Maintenance of a non-discriminatory launch policy which provides reasonable assurance to foreign customers and partners that they will not be unfairly or arbitrarily treated vis-a-vis equivalent U.S. commercial and government users.

TELECOMMUNICATIONS

The major international issue in satellite telecommunications technology is the relative vigor of U.S. and foreign R&D to meet future demands. Traffic projections between now and the end of the century illustrate the economic magnitude of the issue. Total worldwide demand in the year 2000, for all types of service, is estimated to be over 10,500 equivalent transponders; this compares with a 1980 demand for 311 equivalent transponders. This amounts to about $43 billion in total market potential, over $18 billion of which is focused in North American demand. Of the total to the turn of the century, the demand for U.S. domestic services alone is expected to be about 2,700.

Continued use of current satellite telecommunications technology could result in saturation of satellite communications capacity by 1990 or 1992. Full utilization of current technology C- and Ku-band satellites for U.S. domestic use, with the required 4° orbital separation, will permit about 800 equivalent transponders in orbit and result in orbit saturation by about 1985; reduction to 3° separation on orbit will allow up to 1,200 transponder equivalents, sufficient to meet projected demand only through about 1990. The use of advanced technologies, principally incorporating the 30/20 GHz or Ka-band, will allow these demands be met, an assessment which has not been lost on Japanese and European competitors.

U.S. carriers will still be able to meet high priority service expansion demands, but perhaps only through the purchase of this foreign technology currently under development. However, a penalty will be imposed in the loss of worldwide exports of all types of telecommunications equipment, in the loss of the jobs required to produce that equipment, and in the consequent further deterioration of the U.S. balance of payments with the rest of the world.

During the mid-1970's, the U.S. Government withdrew to a large extent from an active civil communications satellite R&D role. An off-setting, broad-scale R&D activity was not assumed by the private sector. The principal reasons cited for this lack of involvement include the large financial outlays required (exacerbated by the fact that many critical systems can only be tested through a demonstration program on orbit) and the risk involved. A typical flight R&D program is likely to cost in excess of $60 million per year over a four-year period. By comparison, even the largest U.S. commercial communications satellite organizations can only sustain R&D expenditures of about $5-10 million per year. Foreign competition, meanwhile, has grown apace, particularly in Japan and Western Europe. In those countries, government-industry teams or direct government-sponsored technology development in industry, together with meaningful long-term planning and steady funding levels, are the vehicles for reducing perceived program risk, shortening the effective period of high risk exposure and supporting domestic industry in international competition.

The potential market for advanced communications satellite technology is large. Western Union (June 1981) has estimated that the global market for communications satellites and related earth stations between 1981 and the year 2000 will total between 38 and 49 billion dollars (1981 dollars). Because of the growing orbit and spectrum saturation in the currently used C and Ku frequency bands much of the increase in demand after 1990 must be met through use of the yet to be developed 30/20 GHz frequency band.

There continues to be keen competition from foreign governments involved in the development, demonstration, and planned operation of advanced communications technologies. The Japanese communications satellite program includes the use of Ka-band, with additional advanced technologies (multiple beam antennas and on-board switching) planned for the 1985-86 time frame; Japanese operational direct broadcast at Ku-band is expected in 1983-84, with a follow-on expected in 1986. The European L-Sat, recently approved, calls for multiple frequency use, including Ka-band, incorporating advanced technologies for both broadcast and fixed communication services. The Italian ITALSAT will also investigate advanced Ka technologies. Each of these programs is the beneficiary of strong government support.

The competitive position of U.S. prime spacecraft production industry in this technology is eroding. There are several reasons but the most important of them are the following:

-- At least a 7 to 10 year development period is required before new communications satellites operating in the 30/20 GHz band can be brought into commercial operations. Investment requirements are large and in the range 200-300 million dollars, with return on investment about 4.3% (1981), less than the national average. Significant revenue returns from that investment cannot be expected for perhaps 10 years. Even at rates much lower than the current 16 1/2 - 17 1/2% prime rate, the present worth of revenues which do not start to flow until 10 years in the future is almost zero. The current cost of money to the carrier compels the spacecraft production industry to operate with short planning horizons and to require payback to begin no more than 2 to 3 years following the initial investment. This mitigates the attractiveness of risky R&D programs.

-- The second factor recognizes that the technology required to open the 30/20 GHz frequency band and to realize the spectrum conserving potential of that band is high risk technology with relatively long term development times. Modification of discounted carrier revenue projections to reflect these perceived risk levels further reduces the present worth of possible future revenues, and again serves to deter the production industry from undertaking such programs.

-- The third factor is the non-monolithic and highly competitive nature of the U.S. communications satellite industry. Maintaining that competitive position requires these companies to concentrate their limited R&D resources on near term developments in order to match the efforts of their U.S. competitors. This is especially true in recent years when even the largest and strongest of U.S. corporations have seen substantial declines in the general level of profitability, and reported profits are unrealistically raised by the failure to fully reflect the impact of inflation.

-- Finally, a number of foreign governments provide marketing support to sustain and enhance the position of their spacecraft industry. Apart from the investment support provided by MITI and other Japanese government organizations in development of advanced technologies per se, we have noted instances of multi-national European financing consortia designed to provide attractive packages for proposal to a number of Third World customers. These packages add European launch services (Ariane) to specific satellite contracts--to the simultaneous benefit of both the European satellite builders and Arianespace. Such arrangements enhance the competitiveness of these bids and build a perception of foreign superiority and confidence.

Normal business management considerations and practices will probably not permit the U.S. communications satellite industry to undertake a long-term research and development program of the scope and magnitude required. Industrial investment concentrates on relatively modest enhancements with immediate utility in current satellite systems. This concentration on near-term pay-off is consistent with U.S. business practices in other sectors.

The appropriate role of the U.S. Government in meeting foreign competition in space-based telecommunications should be reviewed in the context of the broader space policy study. Such a review should consider:

-- the advisability of USG support for long-range, high-risk research and development in telecommunications, particularly considering the effects of an absence of government support since 1973 on the worldwide competitiveness of the U.S. satellite communications industry.

-- the development of creative financing arrangements and procedures to make U.S. satellite builders competitive with foreign firms which have the advantage of government subsidization of financing.

-- the development of mechanisms to improve the marketability of U.S. satellites, including package deals enabling customers to arrange for launch services along with the purchase of satellites

2/8/82

REMOTE SENSING OF LAND RESOURCES

A. NATIONAL AND FOREIGN POLICY CONSIDERATIONS

Since the mid-1960s when planning began for civil land remote sensing activities, the U.S. has pursued several national and foreign policy objectives, including:

- o Fostering international receptivity to and acceptance of U.S. space remote sensing activities--both civil and those critical to our national security.

- o Maintaining U.S. leadership in the development and use of space technology.

B. COOPERATION

In pursuing the above policy objectives, NASA established programs to encourage foreign use of data from its experimental Landsat and Skylab programs and concluded agreements with more than a dozen foreign agencies involving direct reception of Landsat data. These cooperative activities:

- o Helped demonstrate the commercial potential of satellite land remote sensing activities by helping establish foreign markets for sales of ground equipment and analysis services and through initiation of access fees paid by the foreign Landsat ground stations.

- o Supported U.S. foreign policy and development assistance activities, particularly in Africa, Asia, and Latin America. During the past decade Landsat has become known internationally as a valuable tool countries can use to assist national development and resources management. U.S. willingness to "share the benefits" resulting from this technology has been favorably received by the vast majority of developing countries and has assisted U.S. efforts to promote economic and political ties with these states.

- o Helped minimize serious consideration of restrictions on U.S. space remote sensing activities in general and on the acquisition and distribution of space-acquired data in particular. Such restrictions have been under discussion in U.N. fora since the early 1970s.

C. FOREIGN COMPETITION

The success of the Landsat program and the widespread international participation in and acceptance of it have also stimulated the development of competitive foreign activities.

1. Satellite Systems: Beginning in 1984, foreign agencies will be launching satellites with sensor technology which is more advanced than that being used in the Landsat-D system. The foreign satellites will also compete in selling data to the international user market which, while embryonic and not well defined, offers considerable long-term potential.

   o France is developing a two-satellite polar orbiting remote sensing system called SPOT which will use multilinear array sensors to acquire 20-meter multispectral and 10-meter panchromatic data. The first SPOT will be launched in 1984 with the second spacecraft available for launching a year later. France has recently established SPOT-Image--a private entity, partially owned by the French government, which has already begun to market SPOT data aggressively and to promote the sale of related French commercial equipment and services. The French government is funding (and will operate) the SPOT space segment and is giving assurances of SPOT data continuity through the 1980s.

   o Japan is planning an Earth Resources Satellite (ERS) program with the first spacecraft to be launched in 1987. ERS-1 is expected to carry both mechanical scanning systems (comparable to Landsat) and multilinear array sensors. Japan may also fly an imaging radar sensor for all-weather, day/night observations on an early ERS satellite mission. In addition, Japan plans to launch a Marine Observation Satellite (MOS-1), in 1986. While its plans concerning marketing ERS data are not known, the Japanese government is actively promoting the sale of Japanese-made ground equipment for reception and analysis of data from current land remote sensing satellites.

   o The European Space Agency is developing an earth resources satellite program, the first spacecraft of which is planned for launching in 1987. This spacecraft is expected to carry both an altimeter and a scatterometer/imaging radar and will be used for land and ocean observations.

- The Soviets are experimenting with various space remote sensing techniques including multilinear array systems capable of acquiring 30-meter data. To date, the USSR has not operated a dedicated Landsat-type satellite system and has not made the data it acquires from its experiments available except under bilateral arrangements, usually with Eastern bloc countries.

  In discussing the above, it should be noted that U.S. industry has the capability to build multilinear array sensors similar to those planned for several foreign satellite missions.

2. Ground Systems: As noted above firms in Canada, France, Japan, and West Germany offer well-developed lines of ground receiving and processing equipment for Landsats 2, 3, and D. Foreign firms also offer data analysis and other value-added services--an arena which just a few years ago was dominated by U.S. companies.

D. COMMERCIALIZATION

Since 1979, the U.S. has formally pursued the goal of commercializing civil land remote sensing satellite activities. Foreign organizations using Landsat data are well aware of this effort and, thus far, have not raised serious objections. Instead, the principal foreign concern has been whether the U.S. will assure continuity of Landsat-type data. In the future, foreign concerns may also be raised over increases in the price of data products (especially if these increases are not accompanied by assurances of a continued service), changes to the longstanding practice of public availability of Landsat data, and incompatibility among data products generated by competing national satellite systems.

In view of the above and in developing U.S. space policy, the following points should be considered:

-- Lack of commitment to continuity of future U.S. operational land remote sensing satellite services will seriously undermine U.S. technical leadership internationally and will erode the current beneficial patterns of foreign reliance on U.S. remote sensing technology. Without such a commitment, the U.S. will forfeit to foreign competitors its leadership role and the associated commercial gains. Accordingly, it should be national space policy to pursue continuation of the Landsat program through vigorous U.S. governmental and commercial activity.

-- From a foreign policy standpoint, commercialization of land remote sensing satellite services poses no serious obstacles. It is important to note, however, that an early decision on the form such commercialisation will minimize negative speculation and facilitate continued international acceptance to our national remote sensing activities.

-- As the U.S. proceeds with commercialization, the private sector (both prospective investors and data users) will want and should have a national policy statement concerning availbility of data from future privately-operated sytems. Such a statement should be formulated to take into account both the goal of non-regulation of commercial marketing activities and the value of the current public non-discriminatory availability approach in bolstering U.S. efforts to resist international restructions on the conduct of current and future remote sensing activities. Given a policy of public non-discriminatory availability of Landsat-type data in an operational era, the U.S. Government can still provide for exceptions which are determined to be in the national interest. Commercial satellite proposals involving highly specialized data needs which can only be met by launching a satellite on a "subscription basis" might constitute such an exception.

-- In pursuing commercialization, the U.S. should note and build upon the positive working relationships which exist between NASA and the eleven foreign agencies operating Landsat ground stations. These relationships can work to the U.S.' foreign policy benefit as similar relations did more than a decade ago when communications satellite activities were first commercialized. Foreign Landsat ground stations can also promote sales of data from future remote sensing satellite systems--a fact which has not gone unrecognized by the French who are actively pursuing SPOT satellite marketing arrangements with current Landsat station operators.

2/8/82

METEOROLOGICAL REMOTE SENSING

A. NATIONAL AND FOREIGN POLICY CONSIDERATIONS

As with land remote sensing, the U.S. has since the 1960s successfully pursued the objectives of international acceptance and technological leadership in connection with its civil meteorological satellite activities. A further policy objective has been to support the cooperative international framework for exchange of weather information which significantly assists U.S. civil, commercial, and military forecasting activities.

B. COOPERATION

In pursuing the above policy objectives, NASA and NOAA early on discussed the benefits of satellites for meteorology in international fora and encouraged use of U.S. meteorological satellite data received either directly from the satellites or through other established channels. U.S. meteorological satellite data were considered to be a supplement to data gathered through traditional means and, like other meteorological data (which have been freely exchanged for over one hundred years), were made available internationally at no charge.

NOAA and NASA also encouraged widespread international participation in their meteorological satellite activities. This has included:

- encouraging the establishment of ground facilities in more than 120 countries for direct reception of NOAA polar orbiting satellite data.
- arranging with France and the United Kingdom for these countries to provide instruments at no charge to be flown on NOAA's polar orbiting satellites. The provision of these instruments has resulted in cost savings and programmatic benefits for NOAA and the U.S.
- arranging for informal coordination among operators of the current and planned geostationary meteorological satellites (the U.S., Japan, The European Space Agency, India, and the USSR) in order to encourage the development of compatible systems and data output products. This has considerably enhanced the usefulness to U.S. forecasters of data from the foreign geostationary spacecraft.

As a result, the U.S. has become the keystone in a highly cooperative and complex international data exchange network based on the premise that no country can ever meet its needs for weather services without utilizing data acquired by agencies in other countries.

C. COMPETITION

In contrast to land remore sensing, there is essentially no international competition assiciated with the provision of meterological satellite data. This is largely ude to the cooperative international approach introduced by the U.S. and followed by other meterological satellite operators during the past two decades. Spacecraft and ground equipment capabilities equivalent to those of the U.S. do exist in other countries, and there is some resulting competition in sales of ground and space system equipment. For the most part, however, foreign industries have not been encouraged by their governments to engage in aggressive international marketing. As a result, the U.S. has retained commercial leadership. For example, the two most recent foreign procurements of meteorological satellites went to U.S. firms. (The Japanese GMS-2 satellite was built by Hughes and the Indian INSAT is being built by Ford-Aerospace).

D. COMMERICALIZATION

As a result of a proposal made by a U.S. firm earlier this year, the U.S. government is currently considering commercialization of its civil meterological satellite activities. In concept, such commercialization need not directly affect the free exchange of meteorological satellite data since the U.S. could purchase data from a commercial operator and subsequently make these data available to the international community at no charge. It is highly unlikely, however, that, should commercialization occur, the complex international data exchange network would continue unchanged.

Instead, a decision to commercialize would likely result in a curtailment in the provision of no-cost meterological satellite data by the U.S. This almost certainly would cause reciprocal changes in the ways other countries collect and provide data at no charge to the U.S. For example, it could impair the U.S.' ability to provide long-term weather forecasts which rely heavily on foreign derived data and which are critical to both civil and military activities. Cutbacks in services, such as those provided by Canada in the Arctic, could affect our ability to provide reliable forecasts for civilian and military aviation. In addition, these U.S. actions could provoke foreign reactions in other arenas such as the continuing UN consideration of internationally-operated satellite systems.

If foreign satellite and non-satellite data either were no longer available or were available at a cost the U.S. Government could not afford, the U.S.' capability to make weather forecasts for civil, commercial, and military purposes would be seriously imparied. In view of the severe national security and international ramifications commercialization of U.S. meterological satellite activities raises serious concerns and may not be in the national interest.

In the meteorological satellite arena the following points should be taken ... policy directions:

1. The pattern of international cooperation and data exchange associated with the U.S. meteorological satellite system is quite different than that associated with the U.S. Landsat program. Meteorological satellite data have, since they were first acquired two decades ago, been freely exchanged on a world-wide basis both bilaterally and under the auspices of the World Meteorological Organization. This data exchange is just another facet of the traditional free international exchange of weather information which has occurred for more than one hundred years. This tradition recognizes the fact that no country can effectively provide weather forecasting services without data acquired by other countries.

2. The commercialization of U.S. civil meteorological satellite services, as recently proposed by one U.S. company, is likely to result in the introduction of charges for U.S.-acquired meteorological satellite data as well as cutbacks in the provision of U.S. satellite data to other countries. Such changes in the way the U.S. disseminates meteorological satellite data internationally will likely provoke reciprocal developments in other countries and, accordingly, disrupt the current pattern of free international exchange of weather satellite data.

3. In view of the above and from a foreign policy standpoint, changes to the long-standing tradition of free, widespread distribution of meteorological satellite data do not appear to be desirable. The U.S. is a primary beneficiary of this world-wide data exchange.

4. In contrast to land remote sensing, commercialization of civil weather satellite services does appear to pose significant foreign policy, as well as national security, problems. Accordingly, commericalization weather satellites should be considered separately from commercialization of land satellites. Viewed separately, from considering the above-mentioned foreign policy and national security factors, although substantial cost savings could lead to a different conclusion, foreign policy and national security factors raise serious concerns and argue that commericialization may not be in the national interest.

?

AMEN!

In Congruent

TELECOMMUNICATIONS

The major international issue in satellite telecommunications technology is the relative vigor of U.S. and foreign R&D to meet future demands. Traffic projections between now and the end of the century illustrate the economic magnitude of the issue. Total worldwide demand in the year 2000, for all types of service, is estimated to be over 10,500 equivalent transponders; this compares with a 1980 demand for 311 equivalent transponders. This amounts to about $43 billion in total market potential, over $18 billion of which is focused in North American demand. Of the total to the turn of the century, the demand for U.S. domestic services alone is expected to be about 2,700.

Continued use of current satellite telecommunications technology will result in saturation of satellite communications capacity by 1990 or 1992. Full utilization of current technology C- and Ku-band satellites for U.S. domestic use, with the required 4° orbital separation, will permit about 800 equivalent transponders in orbit and result in orbit saturation by about 1985; reduction to 3° separation on orbit will allow up to 1,200 transponder equivalents, sufficient to meet projected demand only through about 1990. Only through

Repeat

advanced technologies, principally incorporating the 30/20 GHz or Ka-band, can these demands be met, an observation which has not been lost on Japanese and European competitors. U.S. carriers will still be able to meet high priority service expansion demands, but perhaps only through the purchase of this foreign technology currently under development. However, a penalty will be imposed in the loss of worldwide exports of all types of telecommunications equipment, in the loss of the jobs required to produce that equipment, and in the consequent further deterioration of the U.S. balance of payments with the rest of the world.

During the mid-1970's, the U.S. Government withdrew to a large extent from an active civil communications satellite R&D role. An off-setting, broad-scale R&D activity was not assumed by the private sector. The principal reasons cited for this lack of involvement include the large financial outlays required (exacerbated by the fact that many critical systems can only be tested through a demonstration program on orbit) and the risk involved. A typical flight R&D program is likely to cost in excess of $60 million per year over a four-year period. By comparison, even the largest U.S. commercial communications satellite organizations can only sustain R&D expenditures of about $5-10 million per year. Foreign competition, meanwhile, has grown apace, particularly in Japan and Western Europe. In those countries, government-industry teams or direct government-sponsored technology development in

Repeat

steady funding levels, are the vehicles for reducing perceived program risk, shortening the effective period of high risk exposure and supporting domestic industry in international competition.

The potential market for new 30/20 GHz satellite technology is large. Western Union (June 1981) has estimated that the global market for communications satellites and related earth stations between 1981 and the year 2000 will total between 38 and 49 billion dollars (1981 dollars). Because of the growing orbit and spectrum saturation in the currently used C and Ku frequency bands much of the increase in demand after 1990 must be met through use of the yet to be developed 30/20 GHz frequency band.

There continues to be keen competition from foreign governments involved in the development, demonstration, and planned operation of advanced communications technologies. The Japanese communications satellite program includes the use of Ka-band, with additional advanced technologies (multiple beam antennas and on-board switching) planned for the 1985-86 time frame; Japanese operational direct broadcast at Ku-band is expected in 1983-84, with a follow-on expected in 1986. The European L-Sat, recently approved, calls for multiple frequency use, including Ka-band, incorporating advanced technologies for both broadcast and fixed communication services. The Italian

Repeat

ITALSAT will also investigate advanced Ka technologies. Each of these programs is the beneficiary of strong government support.

The competitive position of U.S. prime spacecraft production industry in this technology is eroding. There are several reasons but the most important of them are the following:

-- At least a 7 to 10 year development period is required before new communications satellites operating in the 30/20 GHz band can be brought into commercial operations. Investment requirements are large and in the range 200-300 million dollars, with return on investment about 4.3% (1981), less than the national average. Significant revenue returns from that investment cannot be expected for perhaps 10 years. Even at rates much lower than the current 16 1/2 - 17 1/2% prime rate, the present worth of revenues which do not start to flow until 10 years in the future is almost zero. The current cost of money to the carrier compels the spacecraft production industry to operate with short planning horizons and to require payback to begin no more than 2 to 3 years following the initial investment. This mitigates the attractiveness of risky R&D programs.

-- The second factor recognizes that the technology required to open the 30/20 GHz frequency band and to realize the spectrum conserving potential of that band is high risk technology with relatively long term development times. Modification of discounted carrier revenue projections to reflect these perceived risk levels further reduces the present worth of possible future revenues, and again serves to deter the production industry from undertaking such programs.

-- The third factor is the non-monolithic and highly competitive nature of the U.S. communications satellite industry. Maintaining that competitive position requires these companies to concentrate their limited R&D resources on near term developments in order to match the efforts of their U.S. competitors. This is especially true in recent years when even the largest and strongest of U.S. corporations have seen substantial declines in the general level of profitability, and reported profits are unrealistically raised by the failure to fully reflect the impact of inflation.

-- Finally, a number of foreign governments provide marketing support to sustain and enhance the position of their spacecraft industry. Apart from the investment support provided by MITI and other Japanese government organizations in development of advanced technologies per se, we have noted instances of multi-national European financing consortia designed to provide attractive packages for proposal to a number of Third World customers. These packages add European launch services (Ariane) to specific satellite contracts--to the simultaneous benefit of both the European satellite builders and Arianespace. Such arrangements enhance the competitiveness of these bids and build a perception of foreign superiority and confidence.

Normal business management considerations and practices will probably not permit the U.S. communications satellite industry to undertake a long-term research and development program of the scope and magnitude required. Industrial investment concentrates on relatively modest enhancements with immediate utility in current satellite systems. This concentration on near-term pay-off is consistent with U.S. business practices in other sectors.

The appropriate role of the U.S. Government in meeting foreign competition in space-based telecommunications should be reviewed in the context of the broader space policy study. Such a review should consider:

-- the advisability of USG support for long-range, high-risk research and development in telecommunications, particularly considering the effects of an absence of government support since 1973 on the worldwide competitiveness of the U.S. satellite communications industry.

-- the development of creative financing arrangements and procedures to make U.S. satellite builders competitive with subsidization of financing.

-- the development of mechanisms to improve the marketability of U.S. satellites, including package deals enabling customers to arrange for launch services along with the purchase of satellites.

0672B

Defense-related Space Programs

Our military structure relies increasingly on space systems. Many operations related to national defense are carried on in space, which are also vital to maintaining a credible deterrent, and to the monitoring of arms control agreements. Policy decisions affecting civilian and military programs cannot ignore this link.

A major program requirement is a flexible, assured launch system. The Space Shuttle will enhance our capabilities by expanding payload capacity, and by providing manned support for satellite service and recovery. In time, by allowing replenishment or repair or costly satellites, the Shuttle may evantually reduce operating costs. At the same time, total dependence on the Shuttle for all military launch services may be unwise, as the Space Transportation System (STS) may be unavailable for critical payloads at short notice, particularly in times of crisis or conflict. It may be necessary to retain at least a minimum capability in expendable launch vehicles.

Most of our low-altitude military space systems are vulnerable to countermeasures or direct attack from the Soviet low-altitude ASAT, which has been tested for over a decade and to which we attribute a limited operational capability. This vulnerability should be reduced or eliminated where possible, by a program conbining rapid replacement, in-orbit spares, hardening, etc.

Our ground-based facilities to detect, track, and identify space objects at low and high altitudes are being expanded. Improcements are being made in our information processing capability for better orbital predictions, ASAT targeting, and strike assessment. R&D in space surveillance technologies is continuing as well.

The President has directed that, in the absence of an agreement limiting antisatellite weapons and in the face of an already tested Soviet ASAT system, we develop a US ASAT capability and work vigorously to make our satellites survivable. A study on ASAT capability is now being done by DOD. R&D on a miniture air-launched direct-access ASAT weapon has been underway for some time; tests are scheduled for 1983. In addition, high-energy lasers and particle beam concepts are being considered for possible far-term application. It should be noted that N/A/AT capabilities do <u>not</u> per se decrease the survivability of military satellites.

The integral role of space systems in our military force structure increases the contribution they make to our national security. To maintain and improve our security, the US should reconsider the merits of an anti-satellite system, and maintaining back-up capability in expendable launch vehicles. In this regard the improved capability and flexibility provided by a second launch site at Vandenbug AFB is an essential factor. In addition survivability enhancements to assure satellite operation in a hostile environment must be judged with the context of national security policy.

Declassified in Part - Sanitized Copy Approved for Release 2012/10/23 : CIA-RDP92B00181R001801680006-1