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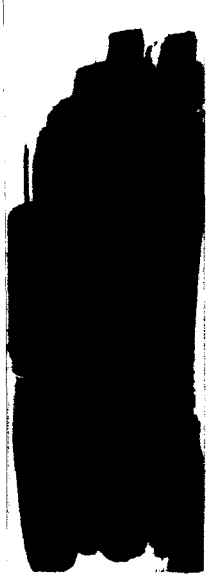
"THE SPACE PROGRAM'S INTERNATIONAL FACTOR"

In the brief course of seven years, all areas of the earth, however remote, and all its societies, advanced or primitive, have felt the impact of the Space Age. Sometimes that impact has been minor, sometimes indirect. But the portents have been clear for all to see.



Enlightened leaders recognize the benefits of even a modest involvement in space projects as an aid in building interest in scientific and technical developments and knowledge of what they can do to help a nation progress, in spreading an awareness of significant trends in the extra-national world, and stimulating young people to follow scientific and technical careers.

They are aware that space science and space technology are exacting and gratifying disciplines. They have come to understand that these disciplines have an intimate relationship to a wide range of other sciences and technologies and have found new ways to put many of them to work at the most advanced frontiers--precisely where the greatest gains are likely to be made.

Through this awareness, the world's confrontation with its space challenges has been assured an important role in the councils of Government and has become a potent factor in affairs of state.

Your council on World Affairs may be interested in how we in the national space program view our activities as a factor in the Nation's international relations, and the program's specific contributions to international cooperation.

An important underlying and increasingly powerful concept for us and for other nations is that the power of the modern rocket has given mankind the use of a new and unlimited tool, the earth satellite, to be employed in doing the work of the world. An orbiting spacecraft, regardless of its country of origin, is truly international. It is a new kind of

scientific and technical tool, free of the physical, geographical, and political limitations that circumscribed the use of its every predecessor.

Space itself, of course, has no frontiers. By its very nature it is indivisible. Our United States programs to explore and use space have immediate significance for every other nation because they are based on a national policy and a long line of actions that prove our strong desire that they be for peaceful purposes for the benefit of all mankind.

Consequently, when we talk about the "National Space Program" of the United States, we must always remember it is--and will continue to be--international as well. The program's mission of achieving for this Nation pre-eminence in all major fields of space exploration and use carries with it the inseparable implication for all nations that this pre-eminence will be used for their benefit as well as our own.

Space has become one of the newest dimensions of power: a dimension that ranks potentially with that of the land, the sea, and the air. And because national

security is based on such dimensions, our security is heavily involved in our space achievements. Prudence demands that we conduct our program on a scale and at a pace that will permit no hostile force to employ space against us as an unchallenged avenue of aggression, politically or militarily.

At the same time we must never lose sight of another powerful concept, that in the eyes of the world, space has become an area of active competition with much more at stake than considerations of national pride or prestige. In the view of other nations, the relative effectiveness of the American system of free enterprise is, in a very real sense, being tested in space.

The most recent reminder that the test is continuing occurred last month with the Soviet Voskhod flight, during which three men orbited the earth for a 24-hour period in a single spacecraft. This was a difficult and significant accomplishment. But more than that, it was a clear indication that the Russians are continuing to pursue a vigorous space program. We do not know the full details of their program; but they have disclosed enough to make clear that they think space is worth the investment of large amounts

of resources each year.

As to our own position, the American space program is a carefully planned, step-by-step endeavor which represents a careful judgment of what needs to be done, regardless of what happens elsewhere. But we would be completely unrealistic not to assume that the U.S.S.R. will exploit to the fullest every opportunity offered by the successes they have achieved and the capabilities they have in space. We must face the fact that the Soviet leadership is devoting and will continue to devote massive investments to this end.

The Voskhod flight also serves to remind us that the Russians started orbiting extremely heavy payloads seven years ago. With Sputnik we started behind, and since then we have been making major efforts to catch up.

A key factor in our drive to achieve space pre-eminence is the powerful Saturn V booster now being developed. This rocket is emerging from an evolutionary process that will also develop Saturn I and Saturn IB. When Saturn V becomes ready for test flights in 1967, it will be able to generate 7.5 million pounds of thrust and place 240,000 pounds into

earth orbit. It will also launch our explorers to the moon. This is more than 10 times the weight-lifting capacity of our 1.5-million pound thrust Saturn I launch vehicle, which has already been successfully flight tested on seven occasions.

Meanwhile, however, we are continuing to build our explorative space competence in a broad variety of ways.

Project Gemini is the successor to Project Mercury which successfully sent six astronauts into space.

We will launch our first two-man Gemini spacecraft early next year.

In later Gemini flights, the astronauts will remain in earth orbit for periods as long as two weeks. In this program, we will learn to maneuver in space and to join two spacecraft in orbit. In all these areas we are working closely with the Air Force and the Gemini spacecraft will be used in the development of an Air Force manned orbital laboratory.

In 1966, we will be ready to start the three-man Apollo flights, in a spacecraft of great power and maneuverability. With Apollo, we will be able to carry out a variety of manned missions, anywhere from the near space of today's orbital flights to distances up to a quarter of a million miles from

earth, or to any intermediate points desired. The over-all program will provide for the United States some 5,000 man-hours of experience in orbital flight, before we land a team of American explorers on the moon and return them to earth.

Thus, and I want to make this point very clear, Project Apollo has greater utility than that of lunar exploration alone, even though that is one of its extremely important goals. The prime objective of the Apollo program, and of the entire national space effort, is to gain for our Nation pre-eminence in space. This is far more important than any single specific goal.

With this as background, let us take a closer look at the over-all NASA space program from the viewpoint of international relations. The objectives, thus considered, are threefold: first, to acquire sufficient knowledge of space science, and competence in space technology, to assure our national security and economic well-being; second, to use space to reduce international tensions and to build communities of interest and patterns of cooperation; and third to find and employ effective means to increasingly use space for peaceful purposes for the benefit of all mankind,

including those millions of mankind now behind the iron curtain.

At first glance, these objectives might appear contradictory. Under closer scrutiny, however, they reflect the careful balance between prudence and constructive intent that was wisely written by our Congress into the National Aeronautics and Space Act of 1958. That document, the "charter" of the National Aeronautics and Space Administration, set the pattern for serving broad foreign policy objectives through useful scientific and technical projects.

Thus, the NASA space effort has from the beginning been carefully designed to promote the peaceful uses of space and space technology. It has been a program unparalled in its openness, in both operation and results. The benefits flowing from it are shared with all mankind.

This policy of openness, in contrast with the covert space activities of the Russians, has gained for the United States significant benefits. Our program has strengthened many nations in the Free World and our ties with them. In many of the emerging nations it has provided a means to advance their scientific and technical capabilities and has

led to progress toward limited cooperative endeavors with the Soviet Union.

NASA very early offered to enter into projects of mutual interest with the scientists of other countries. The governing philosophy, however, has from the first been rigorous, and based on mutual sharing of costs and benefits.

This philosophy underlies the specific guidelines of the cooperative program: that all participants undertaking a cooperative role commit to this role their own resources in funds, personnel, and equipment; that there be no dollar support from the United States; that the content of a given project be of mutual interest and possess valid scientific objectives; that the organizational context be civilian in character; and that the scientific results be open to all interested parties.

Within this framework, we have offered all countries, both advanced and developing the opportunity to participate. These offers, requiring clear assumptions of responsibilities and costs, have gained a wide response and have led to projects of great value to all participants.

NASA currently has 22 operational tracking and data

acquisition stations located in 18 different countries, with three additional locations agreed upon but not yet operational. Local scientists, engineers or technicians in the various countries participate in operating more than half of these overseas stations. The level of interest in these operations abroad is such that British, Canadian, and Australian agencies carry significant portions of the operating costs of stations located in their territories. The knowledge and interest which result from this participation are reflected in current foreign planning for their own tracking and data acquisition facilities, with a rational concern for equipment and techniques which are compatible with NASA operations.

To date, agreements have been reached covering the launching of 13 international scientific satellites. NASA has already launched three of these which were conceived, designed, engineered, and financed abroad--Ariel I and II for the United Kingdom, and Alouette I for Canada. Additional satellite launchings are scheduled for both of these countries as well as for the French, Italians, and the European Space Research Organization which is comprised of nine cooperating European states.

In addition to international satellite projects, a program has been established under which foreign scientists may propose individual experiments to be included on NASA satellites. These proposals are reviewed in competition with those submitted by American scientists and--if selected --they are prepared, and funded, by the sponsoring agencies abroad.

One such experiment, designed by a college group in the United Kingdom, was launched on a U.S. satellite in August. At least a dozen more, designed by experimenters in the United Kingdom, France, and the Netherlands, are scheduled for flights in the next three years. As many more have been proposed.

Many foreign countries have shown interest in scientific sounding rocket experiments because of their simplicity and relatively low cost. Sounding rockets follow an almost vertical flight path, gathering information about atmospheric and other conditions above the launch site. This puts a premium on their repeated and sometimes simultaneous use at different geographical locations at many points around the world, under differing conditions.

Obviously, then, international cooperation is an essential ingredient for successful use of sounding rockets. In the past year alone, NASA has carried out launchings with a dozen different countries.

Many of these have been overseas--in India, Sweden, Norway (with Denmark participating), Pakistan, Italy, Canada, and New Zealand.

Australia, France, and Japan have joined with us in experiments in the United States. The Netherlands and Argentina are even now approaching their first joint sounding rocket experiments with us.

In the field of weather satellites, some 41 countries are participating in NASA's projects, conducting special observations of local weather conditions at their own expense, using aircraft, balloons, and other devices. These observations are synchronized with the passes of U.S. weather satellites over their territory.

Recently, twelve countries have joined us in testing the Automatic Picture Transmission equipment carried by Tiros VIII and the successful but short-lived advanced weather satellite known as Nimbus I. By the use of special

equipment, small enough to be mounted on a truck, these countries now have direct access to our satellites as they pass overhead, and can receive from them photographs of regional cloud systems which are clues to their local weather conditions.

As experiments with Nimbus satellites continue, additional countries will undoubtedly install receiving equipment.

An important part of NASA's international program involves our agreements with the U.S.S.R. The objective of cooperation in space was stated by President Eisenhower and actively pursued by President Kennedy during his three years in the White House. It has since been confirmed by President Johnson, whose views in this regard are long-standing.

Today an agreement exists between NASA and the Soviet Academy of Sciences for coordinated action in three space projects: (1) Launching by each nation of operational meteorological satellites in complementary orbits and the establishment of a conventional communications link between Washington and Moscow for the exchange of resulting data; (2) "Mapping" of the earth's magnetic field in space by satellites launched in complementary orbits, with exchange

of data; and (3) The use of Echo II for communications tests between the two countries.

Of the three projects, the first appears most promising. Last month test patterns were successfully sent for the first time over the new weather data link between the United States and the Soviet Union, and the link is now being used for a two-way exchange of conventional weather information. Beginning next year, the Soviet Union will have a workable weather satellite, and we will be exchanging satellite information.

In regard to cooperation on the Echo II experiments, the project was carried out in a generally satisfactory way, although there were some areas in the Soviet Union's technical procedures which we feel could have been designed to give more useful results.

In sum, while only limited progress has been achieved in the field of space cooperation between the Soviet Union and the United States, a beginning has been made and one potentially important program--a joint operational weather satellite system --is in prospect.

Most of you present this evening have seen some of the TV programs which are clear examples of international

cooperation in communications satellites. I am sure that many of you have witnessed television broadcasts from Europe, and recently, of the Olympic Games, transmitted from Tokyo via our Syncom II communications satellite. And the results of our recent election were made available overseas by the same means.

To send and receive these programs via satellite required not only the development of rocket and spacecraft technologies, but also the construction of special ground stations costing many millions of dollars. A half dozen such stations have been built by European governments at their own expense, under cooperative agreements. Japan built its station especially to televise the Olympic Games, but the station will, of course, be used for continuing transmissions.

The contributions stemming from participation of this kind have been extremely valuable. By bringing nations and peoples closer together, they are paving the way for future international cooperative use of commercial communications satellites.

International personnel exchanges, which provide for direct contacts between scientific and technical personnel,

contribute importantly to all the cooperative efforts I have mentioned. We have made training opportunities available to foreign scientists and technicians in several forms, but in nearly all cases the sponsoring country pays for the travel and subsistence of its trainees. This requirement for investment on the part of the participating country assures careful consideration of the personnel selected and their future utilization when they return. Costs of instruction are borne by NASA.

To date, there have been some 92 International Research Associates in NASA centers, 44 International Graduate Fellows in U.S. universitites, and 176 foreign technical trainees at NASA centers in support of cooperative projects and ground facility operations. In addition to the formal exchanges, NASA and its centers are hosts to numerous foreign visitors. Up to July 1 of this year, there had been 8,400 such visitors from 95 countries; 1,900 of these since January 1.

One consequence of the international aspects of the U.S. space program directly affects the American aerospace industry: A limited market abroad has been created for American space products--principally, but not exclusively, in Europe.

Europeans buy from this country such items as antennas; ground stations; telemetry, command, and power components for satellites; spacecraft subsystems such as solar cells and sensors; sounding rockets and sounding rocket payloads; range equipment, environmental test facilities; and so forth.

What we have been discussing up to this point is the U.S. space program, with its heavy emphasis on international cooperation. However, the picture would not be complete without a recognition that the Europeans have their own launch vehicle development program. It is known as the European Launch Development Organization, or ELDO.

Work is well under way on a three-stage launch vehicle to be called Europa I. The plan is that the heavy first stage will be built by the British.

The second stage will be French, the third stage German, and the satellite vehicle it will launch will be Italian. Some 1,000 engineers are at work full time on the project, and this year there will be a peak expenditure of $70 million dollars.

The first stage was successfully test fired last June,

by still another participant, Australia, from a test range running northwest from Woomera.

Three test flights from a new range running north from Woomera are projected for 1966-67, placing 1,200-pound test satellites into polar orbit. These will check out the performance of the system and carry a limited number of scientific experiments. Later satellites, weighing 2,000 pounds or more, may carry communications or weather equipment.

For these flights, equipment built in Belgium will provide the guidance, and telemetry and control systems are being furnished by the Netherlands.

As you can see, this is an ambitious project, involving the close and continuing cooperation of many different countries.

It should once again be emphasized, however, that Europe has not been alone in recognizing the benefits that space exploration and use are offering to the world. In the complex of United Nations organizations, great interest has been shown by many nations, great and small.

At the UN, space has brough East, West, and neutrals together in a code of legal principles to govern space

activity, which was unanimously adopted in the General Assembly late last year.

In the forum of the International Telecommunications Union, a UN agency, agreements were reached on the assignment of radio frequencies for space research and space communications.

And in another UN agency, the World Meteorological Organization, a start has been made in the evaluation and planning of requirements for a world weather satellite system which also promises real economic and human benefits.

Thus, it is clear that our national effort in space research and exploration is becoming a factor in developing greater international cooperation--cooperation which is not limited to the nations of the Free World, but which spans the Iron Curtain, as well.

It is in this contest, as a force which joins all mankind in the conquest of space, rather than in striving against each other, that the space effort may bring its most significant and enduring rewards.

Yet we must remember, with Lord Hailsham, that international cooperation is not a substitute for National excellence.

It will soon be November 22 again. President Kennedy planned to use these words about our space effort on that date a year ago:

"(Our national space program) is expensive--but it pays its own way, for freedom and for America. For there is no longer any fear in the free world that a Communist lead in space will become a permanent assertion of supremacy and the basis of military superiority.

"There is no longer any doubt about the strength and skill of American science, American industry, American education, and the American free enterprise system.

"In short, our national space effort represents a great gain in, and a great resource of, our national strength..."

Those words that were never spoken sum up as well as any I know what we are about in space and what we have accomplished. Our task today is to make certain that those words remain valid as space opens up vast new vistas for mankind.