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STATUS C

DIRECTORATE STATUS

FROM: SYMINGTON, JAMES: O'CONNOR & HANNAN

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 07/30/92

SUBJECT: LETTER REGARDING THE COLUMBUS 500 SPACE SAIL CUP
PROJECT.

DIRECTORATE
ASSIGNED: STAFF
ASSIGNED:

ACTION
REQUIRED: STAFF
ACTION:

OSTP DUE DATE: SENDER'S DUE DATE: STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

COPIES TO: PHYSICAL SCIENCES
D. Allan Bromley

WHITE HOUSE TRACKING #: CONTACT PERSON:
PHONE: EXT:
REMARKS:

OSTP RECEIVED: 08/10/92
FILE: PHYSICAL SCIENCES

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O'CONNOR & HANNAN

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28023 MADRID, SPAIN
(011) 341 575-0944 & 357-2251
FAX (011) 341 577-0759

JAMES W. SYMINGTON

July 30, 1992

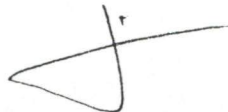
Dr. D. Allan Bromley
Assistant to the President
for Science & Technology
OEOB Room 358
17th and Pennsylvania Avenue, N.W.
Washington, D.C. 20500

Dear Allan:

Here is the packet I promised. Notice Bob Abernathy's
letter re U.S. interest.

I'll call on return from the Grove.

Best,

A handwritten signature in dark ink, consisting of a stylized 'J' and 'S' intertwined.

James W. Symington



p 2 of 3

Dear Tim —

Thanks for your call about
 Prof. Syromiatnikov and Mr. Goldin.
 I spoke with both men, and want to
 do a story on the project when I
 return from vacation the end of August.

Goldin was not much help, but
 Syromiatnikov was wonderful. I hope I
 can find enough visual material —
 artists' illustrations, even animation, if
 possible — to do him and the concept
 justice.



p 313

Question: This seems a wonderful idea, this space sail project — fun, dramatic, not too costly; why does it not seem to have more official support? If there is not some fundamental technical flaw, which there does not seem to be, what is the political problem?

For four weeks, beginning the 27th, it will be at:

P.O. Box 251

Taaffe, N.H. 03452

Tel: (603) 532-8082

All the best.

BR

Columbus 500 Space Sail Cup
Steering Committee Members

General James Abrahamson, Chairman

Dr. Klaus Heiss

Hon. James W. Symington

Dr. Freeman Dyson

Mr. H. Guyford Stever

Mr. Julian Scheer

Mr. Frank Borman

Mr. Neil Armstrong

Mr. Michael Collins

Dr. Robert L. Forward

Dr. Ivan Bekey

Senator John Glenn

Mr. Roald Sagdeev

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28001 MADRID, SPAIN
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TELEX 23543
FAX OII 34 1 431 8576

JAMES W. SYMINGTON

February 6, 1992

Mr. Ted Turner
Turner Broadcasting System, Inc.
One CNN Center
Box 105366
Atlanta, Georgia 30348

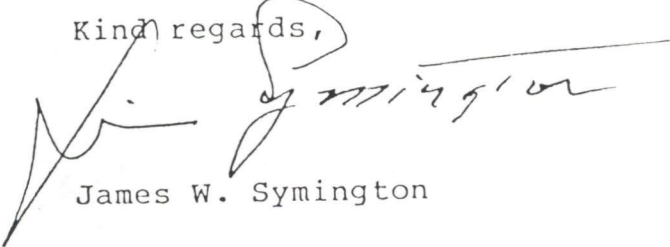
Dear Ted:

You may recall our meeting when you briefed Washington on your World plan. I was a guest of Evelyn McConnell. Later I wrote to interest you in a solar sail commemoration of Columbus next October.

My purpose in writing you now is to let you know that a group of Russian space scientists, including the head of their Energia project, plans to launch such a sail from the MIR space station next October. The MIR at some 300 miles is too low for a deployed sail to escape earth's residual gravity, but the technology of deployment and sail characteristics will be vividly demonstrated. They call it now NovySvyet (new light), an apt reference as it will be five to ten times brighter than the moon as it orbits for a few weeks before falling back or retrieval. They have given the Columbus Space Foundation, which I co-chair, exclusive rights to contract for U.S. participation and special media coverage.

Your good secretary suggested I speak with Mr. Ed Turner about this, and I have a call into him, but wanted to alert you as well - especially in view of your long-standing interest in U.S.-Soviet (now Russian) cooperation in peaceful science and technology. It should be quite a spectacle with lots of educational aspects for the young people of the world.

Kind regards,


James W. Symington

Ted Turner

O'CONNOR & HANNAN

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May 29, 1990

The Honorable C. Boyden Gray
Counsellor to the President
The White House
Washington, D.C. 20500

Dear Boyden,

Here are the operative materials regarding the Columbus 500 Space Sail project which hopes to launch near October, 1992 at least three such sails. (Nina, Pinta and Santa Maria).

After reaching high earth orbit they would be deployed and propelled by sunlight alone and guided by radio signal from earth stations. Note NASA applauds the venture having nearly commissioned a sail rendezvous with Halley's comet. (See also The Vice President's reaction as chairman of the President's Space Council).

A great boost to our hopes has been the very serious Soviet interest. Just a fortnight ago, our project Chairman, Dr. Klaus Heiss, a long time NASA consultant, signed a memorandum of understanding with Mr. Mikheev, the Director of Energia producer or the large Proton rocket. This agreement, if consistent with the space policies of both countries, would provide for the launching on one Proton of four sails, one Soviet, and three which would be chosen by the Space Sail Cup with the guidance of the American Institute of Aeronautics and Astronautics (A.I.A.A.).

Boyd Gray

Mr. C. Boyden Gray
May 29, 1990
Page 2

While there may be questions of a technical variety, a kindly mention by the President of the possibility of such a joint venture as in keeping with the larger purposes of space cooperation would be of incalculable value in stimulating private sector interest and investment. No federal funds involved!

Dr. Mikheev said that he would see to it that Mr. Gorbachev would be familiar with the background material and would respond cordially and affirmatively to any such mention. I thought perhaps in a possible listing of promising areas of mutual enterprise the President might include "solar sail cooperation".

Also, Boyden, these sails while experimental, are not just gimmicks or toys. They present a technology which may well become central to interplanetary cargo transportation in the 21st century. It could well be that when the first man reaches Mars he will draw fresh provisions from an orbiting sailcraft which was sent on ahead.

Further affiant saith not, except great thanks for your interest,

With best,

A handwritten signature in black ink, consisting of a large, stylized loop followed by a horizontal line extending to the right.

James W. Symington

GEORGE E. BROWN, Jr., California
JAMES H. SCHEUER, New York
MARILYN LLOYD, Tennessee
DOUG WALGREN, Pennsylvania
DAN GLICKMAN, Kansas
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COMMITTEE ON SCIENCE, SPACE,
AND TECHNOLOGY

SUITE 2321 RAYBURN HOUSE OFFICE BUILDING
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January 25, 1990

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The Honorable Anthony M. Frank
Postmaster General
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Washington, D. C. 20260-0010

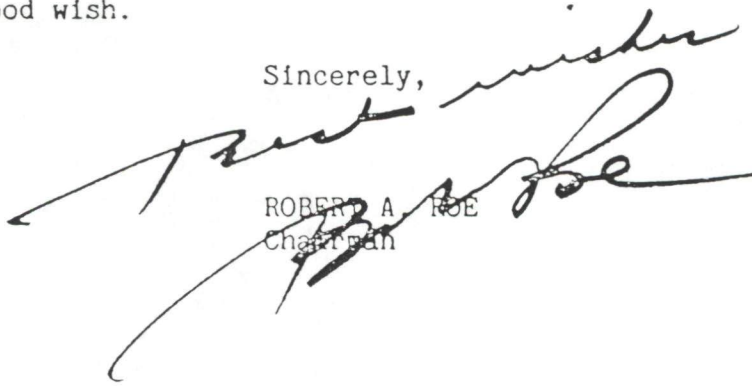
Dear Mr. Postmaster General:

It is my understanding that plans are afoot for a worldwide space sail contest in connection with the Columbus Quincentenary in 1992. Dr. Klaus Heiss and former Congressman Jim Symington, co-chairmen of the Columbus 500 Space Sail Cup project, have told me of their discussions with you concerning the possible recognition of the enterprise in programs the Postal Department would like to highlight as part of its own Columbus observances.

The purpose of this note is to encourage any such development, and to express the hope that your Department, perhaps in concert with private sector interests, might highlight the educational and scientific aspects of this venture in celestial navigation. It is certainly in keeping with the spirit of 1992 which marks not only Columbus' voyage itself, but the International Space Year. And I cannot think of anything better calculated not only to capture the imagination of Americans young and old, but to set their sights on the future.

With every good wish.

Sincerely,


ROBERT A. ROE
Chairman

RAR:Kgm



THE POSTMASTER GENERAL
Washington, D.C. 20260-0010

October 25, 1989

Dear Mr. Vice President:

It was good visiting with you at the Redskins game. A subject which I had intended to mention and one which is of considerable interest to us, is that of the Columbus 500 Space Sail Cup, a project under the aegis of the Quincentenary Commission which will commemorate Columbus by the launching of solar sails into space in October, 1992. As I understand it, the project Chairman, Dr. Klaus Heiss, a long-time NASA consultant, and former Congressman Jim Symington, who chaired the Space Applications Subcommittee in the 1970's, have twice visited with Mark Albrecht on the subject, and were accompanied on their second visit by Gordon Morison, Assistant Postmaster General, Philatelic and Retail Services Department.

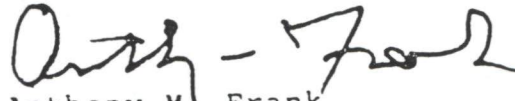
What is contemplated is the placing of three such sails into "sun-synchronous" orbit so they will be visible as three lights in the sky worldwide for a few months as, propelled by the sun's energy alone, they slowly spiral out of earth's gravitation and head for the moon and Mars. Competitive sails may be expected to be designed and launched by the Soviets, Japan, France, and possibly other nations or private consortia. This vivid way of projecting the example of Columbus and the spirit of discovery into the next dimension seems to us a most apt subject for philatelic recognition. The contest should stimulate young minds across the nation, indeed the world, to think ahead to the exploratory challenges of the 21st century.

Apparently some leading space scientists believe such sails could provide the motive power for future inter-planetary traffic, so the contest has great scientific and educational value according to the enclosed letter from NASA Frank Borman, Mike Collins, Guy Stever and others, including Space Sail scientists Freeman Dyson and Bob Forward, are members of the project's Advisory Committee, which General Jim Abrahamson has chaired. I believe the co-chairman's contacts with Mark Albrecht were made in the hope that you as Space Council Chairman might wish to take note of the project and give it your encouragement.

The purpose of this letter is to let you know that we would welcome any such expression of interest as well. It is one thing to re-enact the visit of the three caravels from Spain, and we shall give due recognition to that endeavor, but there is something particularly appealing in this innovative voyage into the future.

We would be glad to discuss our ideas on this matter with greater specificity at your convenience.

Sincerely,


Anthony M. Frank

The Vice President
Executive Office Building
Washington, D.C. 20501-0010

bcc: Mr. Symington w/o enclosure
Mr. Morison

CHRISTOPHER
COLUMBUS



QUINCENTENARY
JUBILEE
COMMISSION

November 27, 1992

Mr. Nikolay N. Sevastianov
General Director
Space Regatta Consortium
Moscow, Russia

Dear Mr. Sevastianov:

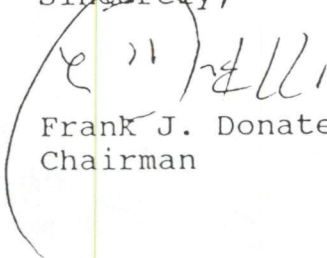
On behalf of the Columbus Quincentenary Commission, I wish to congratulate you and your colleagues of the Space Regatta Consortium for your grand initiative in the design, preparation and construction of a solar powered space sail to be launched in October, 1992. The Commission was advised three years ago by Dr. Klaus Heiss, Chairman of the Columbus 500 Space Sail Foundation, of plans to elicit worldwide competition in this imaginative manner of celebrating and projecting the spirit of navigation and discovery into the next dimension, space and the universe. The Commission received this report with enthusiasm, and encouraged the Foundation to proceed with such plans.

The purpose of this letter is to assure you that the Commission continues to give its wholehearted encouragement to the Space Sail project in general and in particular, welcomes the considerable progress made under your direction and that of your distinguished colleague, Vladimir S. Syromiatnikov.

The attached memorandum signed by you both represents our understanding of the events contemplated to occur on or about October 12, 1992. We note with satisfaction that the American coordinating entity will continue to be the Columbus 500 Space Sail Foundation. There could be no more appropriate way of marking the 500th anniversary of Columbus' voyage than by the launch and deployment of a sun-powered sail in space. If the first such sail were to fly under the banner of Russia's Space Regatta Consortium, it would be an historic milestone in mankind's eternal quest for new knowledge and understanding.

Again, on behalf of the members of the Columbus Quincentenary Commission, I convey to you heartiest congratulations and very best wishes for success.

Sincerely,


Frank J. Donatelli
Chairman



THE VICE PRESIDENT
WASHINGTON

January 5, 1990

Dear Jim:

Thank you for bringing to my attention the "Columbus 500 Space Solar Sail Cup" contest sponsored by the Columbus Quincentenary Jubilee Commission. It, indeed, seems like an innovative and exciting project that will stimulate our youth, demonstrate new technologies for space exploration, and illustrate the power of private enterprise.

You have my wholehearted support. I wish you and the Commission all success in this endeavor, and look forward to seeing those lights sailing through the night sky toward new worlds.

Sincerely,

Dan Quayle

The Honorable James W. Symington
- O'Connor and Hannan
1919 Pennsylvania Avenue, N.W.
Suite 800
Washington, D.C. 20006-3483

10/5/89

National Aeronautics and
Space Administration

Washington, D.C.
20545

Office of the Administrator

APR 19 1989

Honorable James W. Symington
Counsel, Columbus Quincentenary Commission
O'Connor and Hannan
Suite 800
1919 Pennsylvania Avenue, NW
Washington, DC 20006-3483

Dear Mr. ^{JWS}~~Symington~~:

In response to your letter of March 22, 1989, we have reviewed the Solar Sailing Cup concept and agree that it is a clever idea, very likely to capture the public imagination, excite the young, and encourage technical education.

We understand that the Columbus Quincentenary Commission has adopted the Cup as an official U.S. program, and we are pleased to lend our wholehearted endorsement of this demonstration of innovative space technology. We believe that there are no technical "show stoppers" for construction and deployment of a low-performance sail of the small size contemplated, though the attainment of controlled flight for the very long flight times, which will be required to reach the Moon or Mars, requires a reliability which may not be achievable in a low-budget student program. Thus, the criteria for winning the competition should be carefully set.

Additionally, we recommend against impacting any sail spacecraft on Mars since the requirements to sterilize the spacecraft to avoid contamination of the planet may place prohibitively expensive demands on the competitors. Controlled passage at some distance (such as 10,000 Km) from Mars might be as effective and more attainable.

It is our understanding that the Solar Sail Cup is to be a private sector program, and agree that this is most appropriate. To NASA this means that the Commission, its AIAA agent, its contractors, and its sponsors will provide the funding and will be responsible for all phases of the activity, including planning, design, construction, program management, software and guidance algorithms, spacecraft control, launch, insurance, mission management, operations, data reduction, and public relations.

NASA would be pleased to support this program by providing technical advice to the U.S. team, and by providing tracking, telemetry, and command services for the U.S. entry on a basis of non-interference with ongoing NASA commitments.

I am designating Mr. Ivan Bekey of our Office of Exploration as the NASA point of contact for all future interactions on this program. He may be reached at (202) 453-8928.

Sincerely,



Dale D. Myers
Acting Administrator

cc:

Z/Dr. Martin

Z/Mr. Bekey

AGREEMENT BETWEEN

THE SPACE REGATTA CONSORTIUM OF MOSCOW

AND

THE COLUMBUS 500 SPACE SAIL FOUNDATION OF WASHINGTON, D.C.

AGREEMENT

Hereinbelow are the provisions of an Agreement signed this day between the Space Regatta Consortium of Moscow, hereinafter referred to as "the Consortium", and the Columbus 500 Space Sail Foundation of Washington, D.C., hereinafter referred to as "the Foundation".

The Consortium and the Foundation hereby mutually undertake and agree to cooperate in furtherance of the Consortium's plan to prepare and launch a sun-powered sail in space in the year 1992, in response to the initiative of the Foundation to promote world-wide competition in the design, construction and launch of the first such sail in space. The terms and conditions of such cooperation are as follows:

1. The Foundation, with the knowledge and support of the U.S. Columbus Quincentenary Commission will provide to the maximum extent feasible U.S. participation in such aspects of the project as the Consortium may allow. Such U.S. participation would include, but not necessarily be confined to: all commercial investments in the project; media coverage of the project, (including radio and television rights); film rights; advertising to be carried on the sail, or otherwise produced in connection with the project; purchase of services made possible by the project such as the nighttime illumination of a community by the project's "Novy Svyet"; and the U.S. production and sale of items referencing the project and carrying its identifying logo.

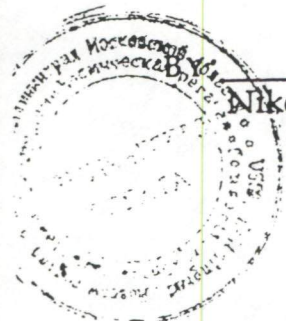
2. In consideration of the Foundation's aforesaid undertaking the Consortium grants the Foundation an exclusive agency to seek out and screen all applications from U.S. sources to participate in any of the aforesaid ways, on behalf and under the direction of the Consortium. For its efforts in this agency capacity the Foundation will be entitled to and will receive ten percent of all sums due and payable to the Consortium from any such participating U.S. source.

3. In the event of any dispute between the parties as to the interpretation or implementation of this Agreement, said dispute will be resolved by arbitration under the rules and regulations of the American Arbitration Association. Any such arbitration will be governed by the applicable laws of the District of Columbia, and shall take place in the District of Columbia. All parties shall consent to the jurisdiction of the courts of the District of Columbia, and the decision or decisions of any such arbitration shall be final and enforceable in any court of competent jurisdiction.

4. The terms of this Agreement shall be two years commencing on this date, and subject to renewal for an additional period or periods at the convenience of both parties.

SPACE REGATTA CONSORTIUM:

COLUMBUS 500 SPACE SAIL FOUNDATION:



Nikolay N. Sevastianov

Nikolay N. Sevastianov
General Director

and

Professor Vladimir S. Syromiatnikov
Professor Vladimir S. Syromiatnikov
Technical Director

BY:

Klaus P. Heiss

Klaus Heiss
Chairman

and

James W. Symington
James W. Symington,
Vice Chairman

DATE: 21 June 1992

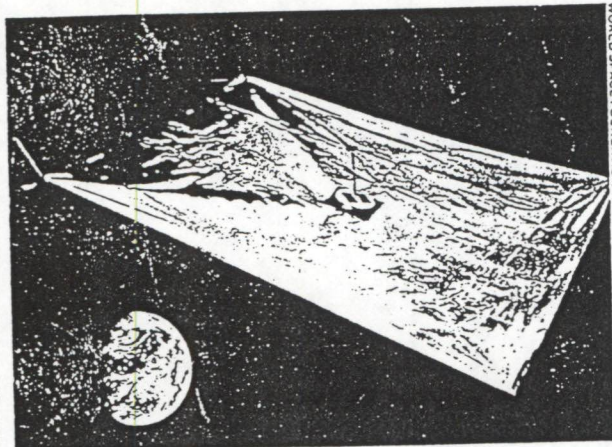
Race to Mars?

Spaceships may sail to the red planet on solar breezes

*For I dipt into the future, far as
human eye could see . . .
Saw the heavens fill with
commerce, argosies of magic
sails . . .*

—Alfred, Lord Tennyson

Tennyson's 19th century vision, described in his poem *Locksley Hall*, could become 20th century reality if an international group of space buffs has its way. In the U.S. and Canada, in Europe and Asia, teams of scientists and designers are busily completing plans for innovative craft that will travel through space propelled



Outward bound: artist's version of a solar vessel

Timed to celebrate the anniversary of a historic voyage.

solely by sunlight reflecting off their giant sails. At a meeting this fall of the International Astronautical Federation in Dresden, Germany, at least three of the ships will be picked to compete in a fantastic voyage: an unmanned sailing race to Mars.

It may smack of science fiction, but the planners are deadly serious. The race is being sponsored by the Christopher Columbus Quincentennial Jubilee Commission, which hopes to get the ships launched around Oct. 12, 1992, the 500th anniversary of the discovery of America. Among the spacecraft designers are former NASA and aerospace experts. And included on the committee that will choose the winning designs are Lieut. General James Abrahamson, former head of the Star Wars program, and former astronauts Frank Borman and John Glenn.

If all goes according to plan, the competition winners, each weighing 500 kg (1,100 lbs.) or less, will be launched by rocket into Earth orbit. There, high above the atmosphere, each will unfurl a giant sail consisting of wispy plastic coated with a

film of aluminum. Positioned by radio signals from the ground, the sails will catch the gentle push of sunlight.

Gentle, indeed. Scientists estimate that photons of sunlight falling on an area the size of a football field exert a pressure equal to the weight of a marble. Yet in the vacuum of space this tiny force is sufficient to accelerate the sailship.

"It will be very slow," admits Emerson LaBombard, project director for the space sailer being developed by a U.S. team at the World Space Foundation in Pasadena, Calif. "In the first hour, we may zoom ahead and pick up a yard. In one day maybe 100 yards." But the acceleration would continue, ultimately resulting in speeds far in excess of 100,000 m.p.h.—and without expending a drop of rocket fuel.

Increasing their velocity in Earth orbit, the spacecraft would spiral out from the planet, eventually swinging by the moon for a gravity assist that would hurl them into a trajectory toward Mars. Depending on their route and design, they could take as little as 500 days or more than 800 to reach the red planet.

The concept of a space sailing race first surfaced in Arthur C. Clarke's 1963 story *The Wind from the Sun*, about a seven-craft regatta to the moon. And in the mid-1970s, scientists at the Jet Propulsion Laboratory in Pasadena actually designed a sophisticated sailship to rendezvous with Halley's comet, but a NASA budget squeeze killed the project.

Lack of financing may also be fatal to the Mars race. The Jubilee Commission has placed the burden of fund raising on the individual teams, which must spend anywhere from \$3 million to \$15 million to complete each entry. Boosting the sailships into orbit is another worry; rocket launches are prohibitively expensive for most teams, which are desperately seeking help. Robert Staehle, head of the World Space Foundation, flew to Paris last month for a workshop with teams from Europe and Asia. The goal: a proposal to the European Space Agency for piggybacking the sailships on a 1992 Ariane rocket flight.

Even if the Mars race fails to come off, Staehle says, his group plans to fly a test sail in space, "operating on a shoestring, if necessary," to prove the concept of space sailing. Eventually, he is convinced, great sailships will ply the trade routes between Earth, the moon and Mars and even fly to the stars.

—By Leon Jaroff.

Reported by Edwin M. Reingold/Los Angeles and Stephen Sawicki/Boston

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The Origin of Solar Sailing

In a previous issue, a recent history of solar sailing was presented and a more thorough background was promised. In this issue the discovery of solar sailing will be outlined, as accurately as possible in view of some ambiguities resulting from the recent publication of the personal notes of Konstantin Edvardovich Tsiolkovskiy and Fridrikh Arturovich Tsander. It is almost certain that one of these two men was the inventor of the solar sailing concept. But new ideas do not come from nothing; they come from the synthesis of many inputs acquired previously by the inventor. Thus, to put the discovery in perspective, we should examine the period from about 1860 to 1920 in order to understand the inputs available.

During the period 1864 to 1873, James Clerk Maxwell published his theory of electromagnetism. This magnificent work synthesized the previous results of Faraday, Oersted, Ampere, and many others into a unified theoretical structure that yielded some new and exciting predictions. One of these was that the speed of electromagnetic radiation (of which, Maxwell predicted, light is an example) is a finite constant—about 300,000 km/sec. Another was that electromagnetic radiation should exert a pressure when it is absorbed by or reflected from matter. If light were really electromagnetic waves, it should produce a pressure. Here was a major new testable prediction of the theory.

The search for quantitative evidence of light pressure has a long history of its own. Kepler, in 1619, had predicted that comet tails were finely divided material being pushed by light pressure. Many investigators had sought a clear demonstration of such pressure but to no avail because the interaction of the surrounding gas molecules made the experiments subject to all kinds of ambiguities. There is not space here to describe the interesting search for experimental proof of radiation pressure. Suffice it to say that it was finally achieved in 1900 by Lebedev and, independently in 1901, by Nichols and Hull. An interesting historical background is to be found in a second paper by Nichols and Hull in the *Physical Review*, Vol. XVII, July 1903.

Thus it was fairly common knowledge among scientists after 1900 that light exerted the pressure given by Maxwell's theory. It is reasonable that both Tsander and Tsiolkovskiy knew of this phenomenon and may also have been aware of two other important developments prior to their almost simultaneous articulation of the concept of a light pressure propulsion system. One such development was the suggestion by Svante August Arrhenius in 1908 that life might have been spread throughout the galaxy by spores dispersed by light pressure. If Tsiolkovskiy knew of this suggestion, it would certainly have piqued his interest because of his lifelong fascination with the idea of the expansion of mankind into the cosmos.

The second development that may have influenced Tsander and Tsiolkovskiy was the publication in 1924 of Professor Eddington's work on the internal constitution of the stars. Eddington's celebrated mass-luminosity relationship gave good theoretical evidence that light pressure dominates the gravitational field in the interior of stars. It showed that light pressure was not just a curiosity but a major factor in the internal structure of stellar mechanisms.

In whatever way the two Russian engineers were influenced by the progress in electromagnetic physics, they both articulated the concept of large mirrors driven by light pressure in the year 1924. Three years earlier, however, Tsiolkovskiy had noted that the pressure of light rays could be used to attain cosmic velocities but it is not clear whether he was referring to a photon rocket or a light sail driven by light sources on Earth or in space. This statement is reported by V. Sokolsky in reference to Tsiolkovskiy's unpublished notes dated September 21, 1921. Sokolsky's paper was published in the *Smithsonian Annals of Flight*, No. 10, paper 24, pp. 269-276.

In 1924 Tsander suggested the use of large mirrors as a propulsion system. He pointed out that large mirrors in orbit could collect and redirect sunlight to a spaceship also equipped with a large mirror. The spacecraft could thereby attain very large speed changes without the use of fuel. Unfortunately, the date on Tsander's notes could not be deciphered except for the year. This information can be found in NASA Translation TTF-541 dated May 1969 entitled *From A Scientific Heritage*. The notes were compiled by Tsander's daughter and published with a foreword by Professor A. Gvasnikov. It is interesting to note that Tsander did not explicitly mention the use of direct sunlight pressure in his 1924 notes. The editors of the publication cited above were of the opinion that the notes were written in the late summer of 1924.

In an article entitled *The Spaceship* written sometime in 1924, Tsiolkovskiy made the explicit statement that: "... the pressure of sunlight ... may even today be applied in the ether to vehicles that have already conquered the gravitation of the Earth and only require further propulsion in outer space." (See *K. E. Tsiolkovskiy—Selected Works*, MIR Publishers Moscow 1968, compiled by V. Sokolsky.) This statement, as far as I know, is the first explicit description of a solar sail as it is currently envisioned.

It is unfortunate that the references are so ambiguous as to the exact dates of the publications and notes. We should reserve judgment on the priority until more information can be obtained or is shown not to be available. The author would be most grateful to anyone who can provide more comprehensive information on these important historical events.

Reprints available.

Solar Sail Project

World Space Foundation

P.O. Box Y.

South Pasadena, Calif. 91030

Chauncey Uphoff

Exploring the Frontiers of Innovation

MEMORANDUM

FROM: DR. KLAUS P. HEISS
TO: SAM KELLER, ASSOCIATE DEPUTY ADMINISTRATOR
NASA

SUBJECT: SPACE SAIL 1992 MISSION
MIR COMMERCIALIZATION - NASA

March 5, 1992

I. ENERGIA/REGATTA SPACE SAIL MISSION: FALL 1992 FROM MIR STATION

The Russians will deploy in Space the first Space Sail this Fall, 1992. The Sail is named "Novey Svet", which means "New Light" and also "New World" (see Attachment 1). The Russian Space Sail Mission is a direct result of the Columbus 500 Space Sail Cup competition (see Attachment 2). The mission will yield valuable data also for US Space Sail designs and technology development(s). An extraordinary variety of Space Sail designs has been submitted to the Columbus Space Sail Cup Foundation, with the most prospective and advanced designs clearly from America. As the technology is proven and demonstrated, extraordinary new Space exploration missions will be enabled throughout the Solar system.

The Sail is being built at the NPO Energia Center by the Space Sail Regatta Consortium under V. Syromiatnikov, a veteran of the Apollo Soyuz mission and was selected among four Russian teams from the US Quincentenary competition on the Columbus 500 Space Sail Cup (see Attachment 3).

The mission will make use of the Proton resupply vehicle for the MIR Space Station and the event will be viewed and televised from both, the MIR Station as well as the resupply vehicle.

The Space Sail has a dimension of about 100 ft circular, the deployment sequence will take from 30 minutes to one hour, if necessary assisted by cosmonauts. The sail will then stay in Low Earth Orbit (the MIR orbit) and its orbit will decay within one week.

During its stay in orbit, the Space Sail will have a luminosity of 6 to 7 times that of the full Moon and will be the brightest object ever seen in the night sky (about 50 km Earth diameter of reflectance area). It will be visible between 51 degrees North and South - the MIR orbit for about one week to ten days in the early evening hours.

NPO Energia will use/has acquired a multipoint VideoTelecommunication system ("DICE" - Direct Inter-Establishment Communications Experiment) developed for ESA by JOANNEUM (Austria) capable of linking Mission Control (Moscow Region) to MIR Station and DICE centers in Europe and, prospectively Washington DC, where the Overseas Enterprise Conference Foundation (OECON) hopes to have an operational DICE system in place at either George Washington University or at the Uniformed Services University of the Health Services (USUHS). The DICE system was successfully tested on the Austrian MIR mission in October 1991, and will again be used in the German MIR mission this Spring, 1992.

II. OPPORTUNITY FOR US - RUSSIAN CO-OPERATION: A "QUINCENTENNARY" OCTOBER 1992 MISSION.

During discussions in mid January with US Columbus Sail Cup representatives, the Consortium managers at NPO Energia in Moscow raised the possibility of deploying the Sail precisely on October 12, 1992 - the Columbus day - and suggested US astronaut participation on that MIR resupply flight. Currently the resupply flight is scheduled for November 1992. This was an "ad hoc" suggestion, which however is full of possibilities.

Whereas the Russian motivation may also have been driven by the prospect of hard currency revenues (typically US\$10 Million per astronaut mission), the opportunity exists to constructively engage NPO Energia in a symbolic mission of co-operation (Mid October 1992) which could at the same time lead to a constructive Joint Space Exploration strategy (MIR Station, US Space Station, Lunar Base) wherein valuable Russian assets are incorporated into a US strategy of Space Exploration, rather than let these considerable assets "float freely" and uncontrolled.

Whereas a broadening of the Space Sail Mission to include US astronaut participation is maybe too ambitious, a simple co-operative agreement on the 1992 Space Sail demonstration Mission may have considerable merit. It can be easily structured through the Columbus 500 Space Sail Cup Foundation and its agreement with the Regatta Consortium (see Attachment 4).

An MoU of US/Russian joint Space Sail mission to commemorate Columbus and exploration could consist of the following:

(1) Official participation by the US (through NASA, the Quincentenary Commission, the Columbus 500 Space Sail Cup Foundation etc.), wherein in return for, say, a \$500,000 contribution to the Space Sail deployment the US would obtain all the test data from the demonstration flight, including

- thin structure deployment data - test of various thin sail materials and coatings (e.g. kevlar, spectra, mylar etc) - particle impacts on sail surface - other sail degradation data - dynamics of thin Space structures - navigation and control data
- reflectance efficiencies over time - stress data from Space environment on Sail structure and materials - flight dynamics data - stability and accuracy of sailing - ion/particles/sail interactions in low Earth orbit among others.

In addition, NASA can greatly assist the mission in testing some technology components important to solar sail missions of its own as part of this flight.

Missions for Solar Sails designed as part of the Columbus 500 Space Sail Cup competition have outlined the technical feasibility of transporting a 100lb+ net payload to any point in the Solar system within 18 months (Mars) or two years (Jupiter) with a launch by a Pegasus rocket to 2,000 miles circular!!! (APL, Westinghouse, John Hopkins team).

(2) For another modest budget contribution US educational activities around the Space Sail mission would be organized throughout the US, using among others the Discovery Channel to reach over 100,000 school children directly, essay and science competitions on exploration, space and sciences (see original Space Cup Memorandum). Small "payloads" or experiments designed by students could be included as well;

(3) Use the "DICE" Videoconferencing capability for a Pilot Project in Tele-education and Telemanagement between the US and Central and Eastern Europe (see OECON Pilot Project - Attachment 5).

(4) Most important, a highly symbolic and visible co-operation on a ONE TIME MISSION could stimulate strong support to actively continue and expand the Space exploration efforts and Space Station uses in the 1990s and beyond. The DICE capability would allow NASA-OCF to structure the participation and use of the MIR Station through its CCDS - assuring US competitiveness - and at the same time develop the users and operations knowledge so necessary for SSF.

A co-operative strategy has considerable merits, given the destructive discussions and lack of enterprising thinking with regard to manned Space flight here, in Europe and possibly also in Russia.

III. VISTAS BEYOND THE 1992 SPACE SAIL MISSION: CO-OPERATION WITH COMPETITION

The development and announcement of such a joint Space Exploration strategy on the precise 500th anniversary of the discovery of the Americas, by the United States and Russia, should put manned Space explorations on a firm footing for the next decade(s) and remove it from the destructive day to day "budgetary" and "scientific" discussions (sometimes well meaning).

The advantages of such a joint strategy - for the USA and for Russia - are considerable and include:

(1) Use of the MIR Station capability constructively - with possibly the Office of Commercial Programs at NASA responsible for the coordinated and limited use of these facilities for US industry.

(2) Jump start of Life Sciences investigations in preparation for US Space Station uses in the late 1990s; insights gained could be invaluable in achieving early, efficient US Space Station operations and uses early on in the SSF life cycle.

(3) Pre-emption through this policy of European or Japanese acquisition of MIR Station capabilities to the exclusion of the US.

(4) Possible acceleration of US (or joint US-Russian) deployment of a permanent manned Lunar Base - an event which could be feasible under a joint strategy certainly early in the next century.

(5) By cementing manned Space flight in a constructive US-Russian undertaking, the time consuming and mistaken discussions and arguments against manned Space exploration will be presented with a persuasive rebuttal.

In fact, the widespread public perception that the many talents used to date in the pursuit of military matters could now be transformed to peaceful and profitable Space enterprise needs to be reduced to a concrete, longer term, positive vision beyond Space Stations - toward a permanent presence of Man on the Moon and beyond. Public support for such an expanded and broadened outlook may well involve an imaginative use of the combined talents in manned Space flight.

Last and not least, by keeping the October 1992 joint Space Sail mission confidential, a true "October Surprise" may be possible. The timing could not be better.

In the absence of a joint strategy I believe that the capabilities of MIR will be offered worldwide, and particularly to NASA CCDS, possibly seriously undermining future uses and support for the US Space Station.

Similarly, a Russian-European or Russian-Japanese Space exploration initiative may become irresistible as time goes on, to the exclusion of US industry and technology interests.

Thus this symbolic Russian/US joint mission commemorating the discovery of the Americas could lead to a policy of "Constructive Co-operation" to the benefit of US interests (Space exploration, technology, industry). It also will keep Russian Space transportation experts busy on inventing new things, rather than selling their services elsewhere.

For the US President a bold initiative to establish a Permanently Manned Lunar Base would give substance to the expectation that some if not most of our considerable aerospace engineering and science talents will stay gainfully employed - rather than be relegated to selling icecream and hotdogs, the sad story of the 1970s (California, Colorado, Texas, Florida).

IV. "DICE": A TELE-EDUCATION DEMONSTRATION OPPORTUNITY

Key to linking the deployment of the Space Sail from MIR to VideoSystems in Europe and the US is the DICE system. Once in place at NPO Energia, this capability can/should be used by NASA-OCF for technology demonstration projects in the fields of Tele-education, Tele-science and Tele-management, areas where the US has a tremendous lead and where a worldwide services market can be established once proven and demonstrated: the market potential of extending US technology based services world-wide through Space communications in these new fields is unlimited (similar to financial, accounting and legal services, which increasingly are dominated world-wide by US enterprises!).

For the past 18 months OECON has been working with Central European Government and business entities and US institutions (IEEE, George Washington University, USUHS, US Chamber of Commerce, World Bank, private companies) to bring about advanced (post graduate and executive) tele-education and telemanagement programs between the US and Central and Eastern Europe (see Attachment 5).

The principal objectives of the pilot project are

4.1 TELE-EDUCATION AND MANAGEMENT

- (1) Establishment of tele-training and management centers in Central and Eastern Europe for links to the US, and Washington DC in particular;
- (2) Development of customized tele-training programs for science and business, using the considerable US knowledge base in these new services;
- (3) Establishment of a Transatlantic link for these services into Central and Eastern Europe;
- (4) Continuing education projects linking Central and Eastern European Universities to US institutions (academic, business, government);
- (5) Develop new forms of cooperation between scientific and business establishments using Space communications (VSATs);
- (6) Use of data banks, libraries, computing facilities transatlantic and within Europe;
- (7) Participation in advanced scientific and business meetings, conferences, seminars and workshops;
- (8) Executive and post-graduate management, business, finance, science and technology training courses, extending key US service capabilities overseas into Central and Eastern Europe (IEEE, NTU, US Chamber of Commerce, several universities, USUHS). Topics include banking, public health, civil service training, environmental technologies and issues, energy management, agriculture business management and know-how.

The OECON Tele-education Pilot project can be expanded to include tele-medicine applications. The prospect of linking US medical research and teaching establishments with those in Central and Eastern Europe, as well as other regions, offers major opportunities of co-operation, training and joint research.

In addition, the opportunity exists to expand the tele-medicine effort to include Tele-education, Tele-Management, innovative and co-operative uses of the MIR Space Station as well as coverage of the Space Solar Sail demonstration mission from MIR this Fall 1992.

4.2 TELEMEDICINE

(1) WEEKLY MEDICAL "GRAND ROUNDS"

In the United States medical teaching is continuously taking place at the great medical centers. Some of the most valuable and best attended regular meetings are weekly "Grand Rounds", wherein complex medical problems are presented, gifted clinicians discuss the differential diagnoses, the pathophysiology and treatment. The professional audience asks questions of the expert as well as offering their own suggestions. (see attached letter from Richard Jed Wyatt, MD Chairman of the Board).

(2) SPACE MEDICINE

The single most "fitting" application for NPO Energia in connection with DICE are the many applications in Space medicine. For your information a Memorandum of meetings held in Washington D.C. (at USUHS - a leading medical institution that hosted the International Telemedicine/Disaster Medicine Conference) is enclosed.

NPO Energia has a unique "market niche" for the next decade in using the MIR Space Station as a research platform for very important extended duration "real time" medical research at the heart of the long term Space explorations effort of Russia and countries worldwide.

The opportunity to enlarge the ongoing US/Russian effort in this area is unique and should not be missed:

(a) The Lewis facilities linking NASA to Energia/Moscow (NASA/Russian Telemedicine Spacebridge to Armenia) can be significantly enlarged with the DICE capability, allowing not only three/four site accesss to Armenian disaster relief efforts, but **MOST IMPORTANTLY ALSO ACCESS TO THE MIR SPACE STATION** for Tele-science applications.

(b) The use of this Video teleconferencing and significant communications capability in conjunction with the MIR station will allow

- * continued and expanded disaster medicine experiment efforts between NASA/USA and Russia/Energia,

- * extension of NASA communications license/uses of Russian satellite capabilities; USUHS is exploring options to establish a Dice facility at its headquarters in Washington DC.

- * potential expansion of Russian satellite uses for DICE in other regions for telemedicine, tele-education and business/management training applications,

- * a co-operative agreement between NASA and NPO Energia for innovative uses of the MIR space station for commercial and scientific experiments and work, by giving direct access to these facilities to users and their own research, evaluation, test and development equipment, particularly in Space medicine research.

(3) TELEMEDICINE/DISASTER MEDICINE

Summary notes of the International Telemedicine/Disaster Medicine Conference of December 1992 at USUHS in Washington DC (Bethesda) are attached. Russian participation is very significant and an outgrowth of the NASA/USSR Telemedicine Spacebridge effort to Armenia.

It is my considered opinion that through the DICE "bridge" both NPO Energia and NASA can become lead institutions in this most important field of new technology and services world-wide. For Energia/Russia the direct access to the leading medical establishments in the US as well as the prospect of INTERACTIVE co-operation and communication(s) on the scale offered by DICE are unique and prospectively a very proper way of bringing about rather IMMEDIATE benefits from Space co-operation and technology. If combined with the Teleeducation pilot project one can foresee a very active and intensive use of the DICE capabilities starting this Fall.

USING RUSSIAN SATELLITE CAPABILITIES (TRANSATLANTIC) WILL ALLOW ENERGIA EASILY TO RECOVER SOME OR ALL OF ITS INVESTMENT IN DICE - AND MUCH MORE.

I have discussed some of these possibilities also with Prof. Syromiatnikov during my visit in Moscow in January. When combined with some of the communications technology know-how of Joanneum, the prospects for expanding DICE communications applications are considerable.

(4) OTHER MIR SPACE STATION USES

It is my judgement, that the vast POTENTIAL market for US Space Station uses still needs considerable Government (i.e. NASA) support and DICE offers the possibility (in conjunction with satellite communications capabilities) of many CCDS (NASA Centers for Commercial Development) customers to make use of these facilities (with and through NASA, or directly, with NASA support). Of major advantage to such future SSF user/operators would be the opportunity for in-situ RDT&E of prototype operational systems designs, with attendant significant cost savings implications.

(5) NPO ENERGIA PARTICIPATION IN TELE-EDUCATION PILOT PROJECT

Given the great communications capability offered by DICE, NPO Energia can become an important center for demonstrating the vast potential for tele-education and telemanagement, linking Moscow to Central and Western Europe, as well as the United States. The OECON Pilot Project is attached.

Former Congressman James Symington and I will meet Friday, March 6, 1992 with the President of the US Chamber of Commerce - the main US business institution - to discuss/agree on the expansion of their Domestic Video-Teleconferencing network to Central and Eastern Europe, with Moscow a key potential node (management, business, financial executive training, conferences, project(s) management, business round tables).

The interest by IEEE in this project is amply documented and its decade long experience can be offered through NPO Energia to Russia.

(6) SPACE SOLAR SAIL MISSION FALL OF 1992/SPACE CONGRESS ISY

Last but not least, the DICE capability will allow

- (a) Active participation by NPO Energia/Russia in the Space Congress Video Teleconferencing demonstrations (Disaster Relief, Education, other "life" video conferences using DICE),
- (b) Hold a separate "Quincentenary" in-situ Space Sail Video Teleconference linking Moscow and Washington directly (September/October 1992 - an extremely significant time in Washington DC given the election in early November),
- (c) Show the deployment of the Space Solar Sail demonstration "Live" during the deployment sequence, with worldwide viewer participation (in the US alone via the Discovery Channel the pictures will be routed to over 100,000 children throughout the United States "Life", with the possibility of asking questions within the US - and maybe to the Cosmonauts !) and perhaps using a selected student-designed "payload".
- (d) If the mission can be scheduled for October 12, 1992 (Columbus Day), DICE will also allow the DIRECT participation of Italy (Rome) and Madrid (Spain) with other DICE sites participating passively.

V. RELATED NOTES

James Symington and I met this week with the Vice President and the Space Council staff to discuss the Solar Sail mission planned for this Fall by/at NPO Energia. There exists GREAT interest in the proposed ONE TIME co-operative Mission to symbolize the historic, scientific and educational value of Space, Space Stations and possible "Vistas" for US/Russian co-operation in Space.

It is my opinion that an OCTOBER Sail Mission would have a deep psychological impact in breaking a potential stalemate (or lack) in thinking constructively and co-operatively about major Space exploration efforts in the 1990s and beyond with Russia. While obvious, the situation is much more complex than it appears when viewed from here - and has nothing to do with the immediate value of using MIR as a platform or the fact that it is Russian (i.e. it is a purely domestic US problem).

IT IS PARAMOUNT - HOWEVER - TO HAVE THE SOLAR SAIL MISSION SCHEDULED IN OCTOBER RATHER THAN IN NOVEMBER: NOVEMBER IS IRRELEVANT WHEN VIEWED FROM WASHINGTON DC - AND NOT ONLY BECAUSE COLUMBUS LANDED 500 YEARS AGO IN THE AMERICAS.

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

September 11, 1992

Karl

sent to
DAB
9/11/92

Space - Miscella

MEMORANDUM FOR D. ALLAN BROMLEY

FROM: DOUG BEASON *DB*

SUBJECT: JAMES SYMINGTON'S LETTER ON SOLAR SAILS

BACKGROUND

DAB received a package from James Symington on the Columbus 500 Space Sail Cup competition (attached) and wanted Doug Beason's comments. It has been hypothesized that solar sails can use photon momentum to (slowly) accelerate payloads, once the payloads are in orbit. The Space Sail Cup competition is an international contest in connection with the Columbus quincentenary; from Symington's package it appears the contest has a large, popular backing.

ANALYSIS

- Although experimental, solar sails may fill a small niche for future space transportation.
- The Columbus 500 Space Sail Cup Steering Committee consists of a politically bipartisan group (see tab)
 - Freeman Dyson and Robert Forward are perhaps the most "visionary" members
 - Several astronauts, including John Glenn, are members
- An old NASA letter in the package fully supports the contest
 - The letter is signed by Dale Myers (1989), Acting Administrator
 - NASA's Office of Exploration has been given authority to interact with the committee
 - NASA states that it will "support this program" and that there appears to be "no technical show stoppers."
- The "international" makeup seems limited to Russian and U.S participation
 - An agreement is included between the Space Regatta Consortium of Moscow and the Columbus 500 Space Sail Foundation of Washington

CONCLUSIONS

- The background material is consistent and appears to be on the "up and up"
- Considering public reaction if this succeeds, and since there are no "technical show stoppers," this merits some level of recognition

cc: Karl Erb

"Document Control"

TYPE: PRESIDENTIAL PRIORITY DOCUMENT NUMBER: 9201365
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

FROM: BUDICA, R.J.: KAISER MARQUARDT

APR 20 1992

TO: PRESIDENT BUSH

DATE OF
CORRESPONDENCE: 04/02/92

SUBJECT: A LETTER URGING THE PRESIDENT TO CONTINUE TO SUPPORT
THE NATIONAL AERO SPACE PLANE PROGRAM.

DIRECTORATE STAFF
ASSIGNED: PHYSICAL SCIENCES ASSIGNED:

ACTION
REQUIRED: FOR DAB'S SIGNATURE STAFF
ACTION:

SENDER'S DUE DATE:
OSTP DUE DATE: 04/22/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

COPIES TO: D. Allan Bromley

WHITE HOUSE TRACKING #: CONTACT PERSON:
PHONE: EXT:
REMARKS: THIS WAS FORWARDED BY PRESIDENTIAL CORRESPONDENCE AS BATCH MAIL.

OSTP RECEIVED: 04/17/92 DEPT RECEIVED:
FILE: ~~P-EOP-PRESIDENTIAL PRIORITY~~

CENTRAL FILES: *See Answer*



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**KAISER
MARQUARDT**

REC'D

1265
DR. ROBERT J. BUDICA
VICE PRESIDENT
ENGINEERING

92 APP 17

52

01
MAIL

2 April 1992
Ref: 92-108L

The Honorable George Bush
President of The United States
The White House
Washington, D.C. 20506

Dear Sir,

During this phase of transition at the NASA, it is important to maintain and strengthen the programs and activities that have the greatest potential for benefiting not only The Nation's space program, but also those that simultaneously enhance our technological and economic leadership among the nations of the world.

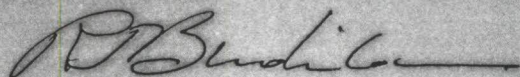
The National Aero Space Plane (NASP) is just such a program. Being technology driven, this effort will eventually produce fully reusable vehicles able to carry payloads and crews into space at fractions of the cost of current and competing systems.

But even more important, the materials, propulsion elements, electronic controls and design/analysis methods developed as part of this effort will provide the U.S. with a major lead in the commercial aircraft, energy, automotive, computer and medical equipment industries - to name just a few.

The technological push and capabilities of NASP will also provide the motivation to our young people for a stronger technical education; the foundation for the pursuit of their life's dreams of personal achievement.

While the budget battles are fought, and in the heat of the election campaign, I urge you to continue your strong endorsement and support of this essential national development.

Sincerely,



R. J. Budica
Vice President, Engineering

RJB/sm

THE WHITE HOUSE
WASHINGTON

April 27, 1992

Dear Mr. Budica:

Thank you for your letter to President Bush expressing your support for the National Aero Space Plane program. I share your enthusiasm, and I can assure you I am doing my best to assure funding for this very important project.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "D. Allan Bromley". The signature is fluid and cursive, with a large, sweeping initial "D" and a long, trailing flourish at the end.

D. Allan Bromley
The Assistant to the President
for
Science and Technology

Mr. R.J. Budica
Vice President, Engineering
Kaiser Marquardt
16555 Saticoy Street
Van Nuys, CA 91406-1739

bcc: M. Van Cleave

STAFFING SHEET

PHONE:

EXTERNAL COORDINATION:

ACTION REQUESTED:[illegible]

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9200824
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

FROM: BUGLIARELLO, George: POLYTECHNIC UNIVERSITY

TO: DR. D.A. BROMLEY

MAR 18 1992

DATE OF
CORRESPONDENCE: 03/10/92

SUBJECT: HE IS FORWARDING HIS RECOMMENDATION FOR NASA
ADMINISTRATOR.

DIRECTORATE STAFF
ASSIGNED: PHYSICAL SCIENCES ASSIGNED:

ACTION STAFF
REQUIRED: FOR DAB'S SIGNATURE ACTION:

SENDER'S DUE DATE:
OSTP DUE DATE: 03/30/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT: 4/6/92

COPIES TO:

WHITE HOUSE TRACKING #: CONTACT PERSON:
REMARKS: KAC drafted letter, PHONE: EXT:

OSTP RECEIVED: 03/13/92 DEPT RECEIVED:
FILE:

CENTRAL FILES: *Spec - N A SA*



333 Jay Street, Brooklyn, New York 11201 718-260-3600/FAX 7182603136

0824A

RECEIVED

GE MAR 13 12:28 George Bugliarello, President

USIP
MAIL ROOM
Polytechnic
UNIVERSITY

March 10, 1992

The Honorable Dr. D. Allan Bromley
Assistant to the President for Science and Technology
Director, Office of Science and Technology Policy
Old Executive Office Building
17th Street and Pennsylvania Avenue, NW
Washington, DC 20506

Dear Allan:

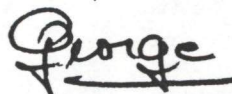
One more addition to the by now voluminous amount of literature with which I have been inundating you about Polytechnic University.

A few days ago we heard from Walter Massey who is coming here to visit Polytechnic. We are delighted at that and we hope that if his impressions are favorable he may also put a good word toward making the appearance of the President possible at our inauguration on May 28th.

On another note, I recently learned that Hans Mark has resigned as Chancellor of the University of Texas System and I am taking the liberty of suggesting him for consideration as a candidate for NASA Administrator, given his long experience at NASA as Deputy-Administrator from '81 to '84, when we started Magellan, and his earlier experience at NASA-Ames in the 70's, where he was responsible for several important scientific programs - Pioneer Jupiter, Saturn and Venus. I am taking the liberty of enclosing his bio.

With many thanks and warmest regards,

Yours,



George Bugliarello

encl.

New York City:
333 Jay Street
Brooklyn, NY 11201
718-260-3600
FAX 7182603136

Long Island:
Route 110
Farmingdale, NY 11735
516-755-4400
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Hawthorne, NY 10532
914-347-6940
FAX 9143476939

MOT vs. MBA

The new Master's degree program known as Management Of Technology (MOT) reflects the need to understand and manage the technologies on which businesses are built.

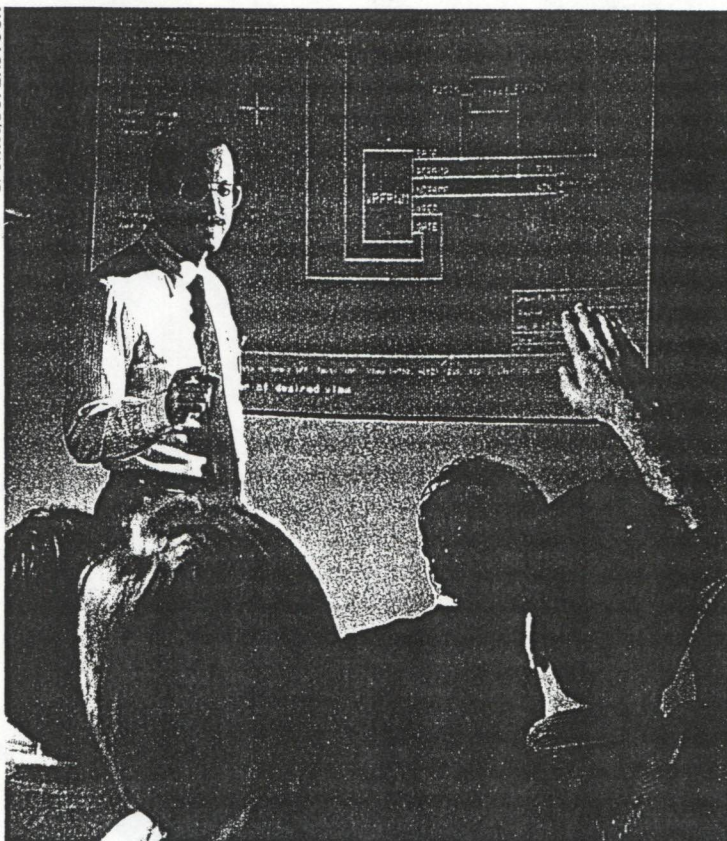
Can American industries keep up with the lightning speed of technological advances? Can their managers oversee the design of the world's most energy-efficient car, make it easy to repair, and entirely recyclable? Can they do it before the Japanese or anyone else?

Challenges like these have led to an entirely new Master's degree program called Management Of Technology (MOT). Its establishment was sparked by the realization that today's corporate executives need to master much more than the fundamentals of business management. They should understand the technologies upon which their businesses are based and how to manage every facet of them. This focus is generally not available in the business schools.

"The typical business school tends to teach business management for nontechnical businesses," said Alistair M. Hanna, director of McKinsey & Company and co-chairman of the National Research Council's Steering Group for Research on Management of Engineering and Technology. "Graduates of these programs can run companies involved in less technical industries like consumer goods, basic industries, and financial institutions. However, if they get into semiconductor or airplane industries, they have a limited grasp of the issues involved."

The MOT Master's degree program is currently offered by at least eight American universities, including the Massachu-

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setts Institute of Technology, Johns Hopkins University, and the Westchester Graduate Center of Polytechnic University. The curricula tend to integrate business-school courses with the principles of managing commercial technology. MIT designed the first MOT-degree program ten years ago, while Polytechnic launched its first program in 1990.

While no one predicts that the MOT degree will replace the Master of Business Administration (MBA), it is nevertheless true that an increasing number of students are choosing it instead. They tend to be experienced managers of technology, many with engineering degrees.

Students currently enrolled in Polytechnic's

MOT program are executives or managers responsible for some form of technology. The curriculum encourages them to think globally, in terms of the whole rather than individual parts. Nowhere else but in the MOT curriculum could they focus on the complex processes involved in designing, manufacturing, and marketing the latest lap-top computer, or prepare for the advent of high-definition TV.

Miroslav Eror, 42, a mechanical engineer and manufacturing manager for Materials Research Corporation, a maker of computer chips, will graduate from Polytechnic's MOT program in January. For the past two years, he has devoted Fridays and Saturdays to his studies. Company officials offered to finance Eror's Master's degree. They are hoping he will intro-

BY CAROL GOLDBERGER

MOT programs strive to identify and teach those qualities that facilitated Japanese industry's robust participation in the world market.

duce new techniques to reduce the development time in commercializing their technologies. He shopped around before choosing the MOT. "An MBA program would have focused on organizational structure, accounting principles, and marketing, but the MOT has a different point of view. It specifically emphasizes how technology changes, how the organization needs to follow technological changes, and how these changes need to be managed," he said.

The key word here is "change."

In 1987 and early 1991, the National Research Council assembled a steering group consisting of senior corporate executives and deans of engineering and business schools. Its purpose was to find out what American industry needs to do to recapture its world leadership in high technology and how American universities can help in the process.

A report of their findings, entitled *The Management of Technology, The Hidden Competitive Advantage*, concludes that technology-intensive American industries are in a rut. Those in question include electronics, software, telecommunications, aerospace, automobiles, imaging, and robotics. The way out is to identify and apply principles of managing technology. According to the report, "U.S. industry spent \$64 billion on research and development in 1989, yet less than \$1 million was spent in studies to learn how to manage this huge effort more effectively."

In the 1950s and 1960s, American industry enjoyed worldwide success through efficient mass production. When market conditions began to change with the advent of high technology, many corporations did not keep pace. MOT programs examine companies that have managed innovation processes successfully. They also pinpointed the reasons for stagnation.

"During the past 15 years, there has been an apparent erosion in product quality and an ability to innovate," said A. George Schillinger, director of Polytechnic's MOT program. "A consensus

emerged that American managers were contributing to the decline. They had become preoccupied by short-term financial performance, quantitative techniques, and the power of computers. In the process, they distanced themselves from the realities of production. They lost that precious hands-on sense that you need in order to manage something."

MOT programs strive to identify and teach those qualities that facilitated Japanese industry's robust participation in the world market. Americans needn't model themselves after the Japanese, who have, after all, developed management styles consistent with their culture and traditions. However, they do want to emulate and surpass them in the manufacturing and development of high technology.

For example, MOT curricula are geared to teaching Americans how to design products more quickly, yet devise better and more testing. The Japanese excel at this. They are also good at fine-tuning products. That means staying with what may be a tedious task for months or years, something Americans tend to find dull, even demeaning. "The Japanese believe in getting a product into the market, determining what is wrong with it. Then they keep on improving, improving, improving until it is just right. And then they keep on improving," said Hanna.

MOT degree candidates take courses with names like Managing the Innovative Process, Technology Strategy, Strategic Management, and Managerial Implications of Current Developments in Science and Technology. Each course emphasizes the overriding principles of managing technology: flexibility, innovation, change, integration.

The Developments course at Polytechnic is a good example of the curriculum's emphasis. Scientists involved in cutting-edge research visit the class to give an up-to-date assessment of progress in their field. Ed Wolf, professor of physics at Polytechnic, will teach the course this December.

Among the topics he'll cover is the

commercial applications of superconductors. The technology is still in the development stage, but the possibilities are staggering. Gadgets made with superconductors can be used to detect oil deposits, image the brain, build a levitating train, or make unbelievably fast computer chips.

"Right now, superconductors are being looked at by companies like IBM and Japanese computer makers," said Wolf. "The students want to know what kinds of things they might get involved with to put their companies ahead. This information is part of a database which may help them form ideas on whether or not to go into anything with superconductors."

Students taking the program not only enjoy much of the course content, but are already noticing modifications in perception. "I'll spend a lot more time paying closer attention to the impact of technology on people. I'll try to match the rate of introduction of technology in the company to peoples' ability to absorb it," said Jim Nanton, a vice president at Citicorp and MOT student at Polytechnic.

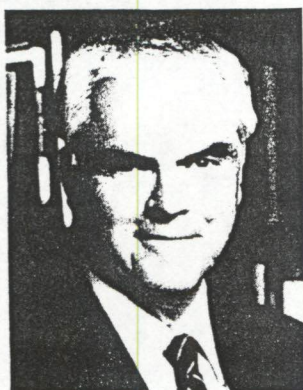
Error said he now looks at his company "through a new set of glasses. Typically, I would examine efficiency in one area, say engineering or manufacturing. Now I think in terms of the overall benefit to the company."

In a world where change has become the status quo, adaptability is the secret to future success. MOT programs are designed with the understanding that American firms will grow more effectively if they can incorporate change into every level of their operations. "Imagine a factory manager who gets some communication from engineering that he has to change certain things in a product," said Anthony J. Wiener, associate director of MOT at Polytechnic. "Formerly, that would have been an annoyance. Now, he must be ready to alter production without too much disruption so products can improve and evolve."



The University of Texas System

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HANS MARK
Chancellor

Hans Mark was named Chancellor of The University of Texas System on May 30, 1984. As Chancellor he heads one of the largest university systems in the United States with a total enrollment exceeding 150,000 students. These students attend eight academic and six health-oriented institutions located across the state in Arlington, Austin, Brownsville, Dallas, Edinburg, El Paso, Galveston, Houston, Odessa, San Antonio and Tyler.

Before joining the U. T. System, the Chancellor served as Deputy Administrator of the National Aeronautics and Space Administration (NASA), having been appointed to that post in 1981 by President Ronald Reagan. From 1977 to 1979, he was Undersecretary of the U. S. Air Force, and was named Secretary of the Air Force by President Jimmy Carter in 1979. Prior to moving to Washington, he was director of the NASA-Ames Research Center at Moffett Field, California, where he coordinated and carried out research in areas ranging from fundamental aerodynamics, to spacecraft development, to the human factors that affect space flight.

Born in Mannheim, Germany, on June 17, 1929, Hans Mark came to the United States with his parents in 1940 at the age of eleven and became a naturalized citizen in 1945. He obtained an A.B. degree in physics from the University of California at Berkeley in 1951 and a Ph.D. in physics from the Massachusetts Institute of Technology in 1954. Hans Mark's interest in both physics and nuclear engineering was stimulated by the influence of his distinguished father, Herman Mark, a world-renowned chemist known widely as the father of polymer chemistry.

His first academic appointment was as a lecturer in physics at Boston University in 1952. His most recent appointment is that of Professor of Aerospace Engineering and Engineering Mechanics at The University of Texas at Austin. In the intervening years,

he held academic positions at the Massachusetts Institute of Technology, served as a professor and department chairman at The University of California at Berkeley between 1960 and 1969, and from 1973 to 1984 as consulting professor of engineering at Stanford University.

Spanning more than three decades, his academic career has been marked by numerous outstanding achievements. His pioneering investigations of x-ray emission from stars led later on to the identification of certain objects as black holes. Mark has made significant contributions to nuclear and atomic physics over the years. He has also led the engineering development of a number of spacecraft and experimental aircraft.

Mark is the author and co-author of more than one-hundred-fifty scholarly articles as well as numerous books, including most recently The Space Station: A Personal Journey, The Management of Research Institutions, and In Search of the Fulcrum.

As a result of his distinguished career he was elected as a member of the National Academy of Engineering in 1976. He is also a member of Tau Beta Pi, Sigma Xi, Phi Beta Kappa, and a fellow of the American Physical Society, the American Institute of Aeronautics and Astronautics and the American Association for the Advancement of Science. Tau Beta Pi awarded him its outstanding Engineering Teacher Award at U.C. Berkeley in 1966. NASA awarded him the Distinguished Service Medal in both 1972 and 1977. He also received the Decoration for Exceptional Civilian Service from the U.S. Air Force in 1979, and the Distinguished Public Service Medal from the Department of Defense in 1981. In further recognition of his accomplishments, he is the recipient of two honorary degrees, the honorary Doctor of Science degree from Florida Institute of Technology in 1978 and the honorary Doctor of Engineering degree from Polytechnic Institute of New York in 1982.

His wife, the former Marion G. Thorpe, holds a Doctor of Education degree, specializing in linguistics and reading. Before moving to Austin she was a teacher in the public schools of Massachusetts, California, and Maryland. She is currently a curriculum specialist for the Austin Independent School District, supporting dropout-prevention programs. They have two children -- Jane Mark, a bilingual psychologist in Spokane, Washington, and Rufus James Mark, an assistant professor in radiation oncology at the UCLA Medical School.

Resume of Hans Mark

1. Vital Statistics

Place of Birth: Mannheim, Germany
Date of Birth: June 17, 1929 (Came to United States in 1940; Naturalized U.S. Citizen in 1945)
Married 1951 to Marion G. Thorpe
Two Children, born 1955 and 1957
Home Address: 1909 Hill Oaks Court, Austin, Texas, 78703
Home Telephone: (512) 477-2753

2. Education

Primary and Secondary Schools, New York City, 1941-1947
AB., Physics, University of California, Berkeley, 1951
Ph.D., Physics, Massachusetts Institute of Technology, 1954

3. Positions

a. Research Appointments

Research Assistant, Mass. Inst. of Tech., 1951-54
Research Associate, Mass. Inst. of Tech., 1954-55
Research Physicist, Univ. of Calif., Berkeley, 1955-56
Research Physicist, Univ. of Calif., Lawrence Radiation Laboratory, Livermore, Calif., 1956-58 and 1960-69
Visiting Staff Scientist, U.S. Naval Research Laboratory, Washington, D.C., February 1981 to July 1981

b. Academic Appointments:

Lecturer in Physics, Boston University, 1952-53
Lecturer in Physics, Univ. of Calif., Berkeley, 1957-58
Assistant Professor of Physics, Mass. Inst. of Tech., 1958-60
Lecturer in Nuclear Engineering, Univ. of California, Berkeley, 1960-61
Associate Professor of Nuclear Engineering, Univ. of California, Berkeley, 1961-66
Professor of Nuclear Engineering, Univ. of California, Berkeley, 1966-69
Lecturer in Applied Science, Univ. of Calif., Davis, 1965-73
Consulting Professor of Engineering, Stanford Univ., 1973-1984
Professor of Aerospace Engineering and Engineering Mechanics, The University of Texas at Austin, 1988-Present

c. Administrative Appointments:

Acting Head, Neutron Physics Group, Laboratory for
Nuclear Science, Mass. Inst. of Tech., 1954-55
Experimental Physics Division Leader, Univ. of Calif.,
Lawrence Radiation Laboratory, Livermore, Calif.,
1960-64
Chairman, Department of Nuclear Engineering, Univ. of
Calif., Berkeley, 1964-69
Reactor Administrator, Berkeley Research Reactor,
Univ. of Calif., Berkeley, 1964-69
Director, NASA-Ames Research Center, Moffett Field,
Calif., 1969-1977
Under Secretary of the Air Force, 1977-1979
Secretary of the Air Force, 1979-1981
Deputy Administrator - National Aeronautics and Space
Administration, 1981-1984
Chancellor, The University of Texas System, 1984-
Present

4. Consulting and Directorships

Institute for Defense Analyses, 1958-61
U.S. Army, Safeguard Systems Evaluation Agency, 1966-1970
National Science Foundation, 1966-60
John Wiley and Sons, Consulting Editor, 1966-1970
U.S. Air Force Scientific Advisory Board, 1968-1977
NAS-NRC Committee on Atomic and Molecular Physics, 1972-1975
Member, Board of Directors, Fannie and John Hertz
Scholarship Foundation, 1973-Present
Consultant, Commission of Critical Choices for Americans,
1974-1976
Consultant to Vice President of United States, 1974-1976
Member, President's Advisory Group on Science and
Technology, 1975-1977
Defense Science Board, 1976-1977
Member of the Corporation, Polytechnic University of New
York, 1976-1977, 1984-Present
Director, Pennzoil Corporation, 1984-1987
Trustee, MITRE Corporation, 1985-1988
Trustee, Hudson Institute, 1985-1987
Member, Executive Panel, Chief of Naval Operations, U.S.
Navy, 1984-1988
Member, Scientific Advisory Committee, Strategic Defense
Initiative Organization, Dept. of Defense, 1984-Present
Member, National Research Council Associateship and
Fellowship Programs Advisory Committee, 1987-Present
Member, Barry Goldwater Scholarship and Excellence in
Education Foundation, 1988-Present
Member, Steering Committee on Security and Competitiveness,
Center for Strategic and International Studies,
1989-Present

Member, Board of Visitors, Defense Intelligence College,
1990-Present
Member, Secretary of Energy Advisory Board, 1990-Present
Member, BDM Holdings, Inc., Board of Directors, 1991-Present

5. Professional Societies

American Physical Society (Fellow)
American Geophysical Union
American Society of Engineering Education (Director, Nuclear
Education Division, Member, ASEE Committee on Relation-
ships with U.S. AEC, 1967-68)
American Nuclear Society (Chairman, Awards Committee,
Education Division, 1967-69; member, Executive
Committee Education Division, 1969-72)
American Institute for Aeronautics and Astronautics (Fellow)
Society for Engineering Science (Director, 1972-76)
American Association for the Advancement of Science (Fellow)
Member, 1990-91 Steering Group, Section on Engineering
American Association of University Professors

6. Honorary Societies

Tau Beta Pi
Sigma Xi
Phi Beta Kappa
National Academy of Engineering
Council on Foreign Relations

7. Awards

Tau Beta Pi Outstanding Engineering Teacher Awards, Univ. of
Calif., Berkeley, 1966
Distinguished Service Medal, NASA, 1972 and 1977
Sc.D. (hon.) Florida Institute of Technology, 1978
Decoration for Exceptional Civilian Service, U.S. Air Force,
1979
Distinguished Public Service Medal, Dept. of Defense, 1981
D.Eng., (hon.), Polytechnic Institute of New York, 1982
Outstanding Leadership Medal, NASA, 1984
Exceptional Scientific Achievement Medal, NASA, 1984
William Elgin Wickenden Award, American Society of
Engineering Education, 1990
Theodore von Karman Astronautics Lectureship, American
Institute of Aeronautics and Astronautics, January 6,
1992

Updated 1/29/92

Significant Scientific Contributions

Hans Mark

1. Contributed to the early experimental confirmation of the collective model of nuclear structure by establishing the existence of nuclear rotational energy levels in a number of heavy isotopes. (Items 1, 2, 3 and 4 on publication list) 1954-56.
2. Contributed to the development of velocity dependent potentials for models of nuclear structure. (Items 6, 7, 26 and 56 on publication list) 1956-71.
3. Contributed to the precise determination of the wave lengths of nuclear gamma-rays using crystal diffraction methods. The significant development here was the use of high-current particle accelerations (Items 9, 11 and 12 on publication list) and high-flux research reactors (Items 17, 19 and 24) to produce intense nuclear gamma-ray sources for this purpose, 1956-60.
4. Contributed to the extending and improving the accuracy of measurements of atomic fluorescence yields. The significant development in this work was the first concerted application of nuclear counting methods (coincidence counting, solid state detectors) to the measurement of atomic branching ratios (Items 25, 27, 28, 31 and 50 on publication list). Also contributed to comprehensive review articles on the subject of atomic fluorescence yields (Items 37, 60, 61 and 71) 1961-1975.
5. Contributed to the development of x-ray astronomy. The significant portions of this work include the development of methods for accurate telemetry of x-ray energy spectra of an x-ray nova (Item 46), the simultaneous observation of the optical and x-ray spectrum of an x-ray star (Items 48 and 51) and the detection of extra-galactic x-ray sources (Item 52) 1965-1970.
6. Contributed to various fields of nuclear instrumentation. (Items 14, 16, 17, 18, 30, 42, 55, 57 and 58 on publication list) 1958-1971.
7. Contributed to the development of methods for calculating more accurate atomic wave functions for better calculations of atomic energy levels and atomic transition rates. (Items 75, 76, 77, 78, 79, 82, 85, 88, 92, 93, 94, 100, 101, 102, 104, 105, 107, 110, 112, 113, 114, 117, 118, and 121 on publication list) 1976-1984.

Publications -- Hans Mark

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2. Clyde McClelland, Hans Mark and Clark Goodman, "Electric Excitation of Heavy Nuclei by Protons." Phys. rev., 97, 1191 (1955).
3. Hans Mark, Clyde McClelland and Clark Goodman, "Electric Excitation of Certain Medium-Weight Nuclei by Protons." Phys. Rev., 98, 1245 (1955).
4. Hans Mark and George T. Paulissen, "Electric Excitation of Certain Rare-Earth Nuclei by Protons." Phys. Rev., 100, 813 (1955).
5. Hans Mark and Clark Goodman, Angular Distribution of Neutrons From O^{18} (p,n) F^{18} ." Phys. Rev., 101, 768 (1956).
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7. A. A. Ross, R. D. Lawson and Hans Mark, "Nucleon Energy Levels in a Velocity-Dependent Potential." Phys. Rev., 104, 401 (1956).
8. A. G. Rubin, F. Ajzenberg-Selove and Hans Mark, "Energy Levels of Si^{28} ." Phys. Rev., 104, 727 (1956).
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109. Hans Mark, "Why Space?" *L5 News*, Vol. 7, No. 7, p. 1, July 1982.
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THE WHITE HOUSE
WASHINGTON

April 6, 1992

Dear Dr. Bugliarello:

Thank you for your letter of March 10 and your good words concerning Hans Mark. I, too, have great respect for Hans' experience and ability.

Sincerely yours,



D. Allan Bromley
The Assistant to the President
for
Science and Technology

Dr. George Bugliarello
President
Polytechnic University
333 Jay Street
Brooklyn, NY 11201

George:
I am afraid that at
the moment it looks
as tho' the President
will be elsewhere on
May 28/29 and I
will probably have
to be with him
DAB.

Will let you know as soon
as I have something definite

OFFICE OF SCIENCE AND TECHNOLOGY POLICY

STAFFING SHEET

SUBJECT: Response to Dr. Bugliarello.

ORIGINATOR: K. ERB PHONE: 513 0

DATE ORIGINATED: 4/6 DATE DUE: ASAP CORR TRACKING NO: 9200824

EXTERNAL COORDINATION: _____

	COMMENTS	DATE
DIRECTOR		
GENERAL COUNSEL		
EXEC. ASST.		

ACTION REQUESTED:

[illegible]

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

February 28, 1992

Dear Mr. Hallat:

Thank you for your recent letter to Dr. Bromley, the Assistant to the President for Science and Technology. I am pleased to direct you to Dr. Wesley Huntress, Director of Solar System Exploration at NASA to answer your questions on the planets. You may reach Dr. Huntress at 600 Independence Avenue, Washington, D.C. 20546.

Sincerely,



Dr. J. Douglas Beason
Senior Policy Analyst

Mr. Alan Hallat
320 Garfield Street
Nanticoke, PA 18634

"Document Control"

TYPE: ACTION

DOCUMENT NUMBER: 9200608

ORIGINATOR: 02

STATUS I

DIRECTORATE STATUS

FROM: HALLAT, Alan

TO: DR. D.A. BROMLEY

FEB 27 1992

DATE OF
CORRESPONDENCE: 02/11/92

SUBJECT: HE IS WRITING ASKING FOR INFORMATION ON PLANETS FOR
HIS TERM PAPER.

DIRECTORATE

ASSIGNED: PHYSICAL SCIENCES

STAFF

ASSIGNED:

Doug Benson 2/27

ACTION

REQUIRED: DIRECT REPLY

STAFF

ACTION:

SENDER'S DUE DATE:

OSTP DUE DATE: 03/03/92

STAFF DUE DATE

DATE COMPLETED:

DATE COMPLETED/DEPT:

2/27/92

COPIES TO:

WHITE HOUSE TRACKING #:

CONTACT PERSON:

REMARKS:

PHONE:

EXT:

OSTP RECEIVED: 02/11/92

DEPT RECEIVED:

FILE: PHYSICAL SCIENCES-SPACE

CENTRAL FILES:

0608 P

Alan Hallat
320 Garfield St.
Nanticoke, Pa 18634
Feb 12, 1992

Mr. Allan Bromley
The White House Staff
1600 Pennsylvania Ave
Washington DC
NW 20500

Dear Mr. Allan Bromley;
I am a student at Bishop ~~Alan~~ ^{John} Hallan
High school, and am writing a term
paper on the planets. I would greatly
appreciate any information you might
be able to send me.

Thank you for your consideration!

Yours truly,
Alan Hallat

MAIL ROOM

92 FEB 11

RECEIVED

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9200029
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

FROM: TRULY, Richard H.: NASA

TO: DR. D.A. BROMLEY

① Doug ✓
② Karl

DATE OF
CORRESPONDENCE: 01/03/92

SUBJECT: HE REQUESTS DR. BROMLEY'S PERSONAL VIEWS IN ADVANCE
OF THE OMB CLEARANCE PROCESS FOR THE NASA STRATEGIC
PLAN.

DIRECTORATE STAFF
ASSIGNED: PHYSICAL SCIENCES ASSIGNED:

ACTION STAFF
REQUIRED: AS APPROPRIATE ACTION:

SENDER'S DUE DATE:
OSTP DUE DATE: 01/20/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

COPIES TO: D. Allan Bromley

WHITE HOUSE TRACKING #: CONTACT PERSON:
PHONE: EXT:

REMARKS: I gave DAB a draft talking paper on "Vision 21" per
his request. Doug 1/9/92

OSTP RECEIVED: 01/06/92 NASA DEPT RECEIVED:
FILE: B-PHYSICAL SCIENCES SPACE

CENTRAL FILES:





National Aeronautics and
Space Administration

Washington, D.C.
20546

Office of the Administrator

RECEIVED

92 JAN 6 P2: 55 January 3, 1992

The Honorable D. Allan Bromley
Assistant to the President
for Science and Technology and
Director, Office of Science and
Technology Policy
Executive Office of the President
Washington, DC 20506

OSTP
MAIL ROOM

Dear Dr. *Allan* Bromley:

Because of your personal interest in NASA and the civil space program, I wanted you to have a copy of an important NASA document and to solicit your personal views in advance of the formal OMB clearance process. I've also provided an advance copy to Mark Albrecht, Dick Darman, and Bob Grady.

During the course of the last year, members of the NASA management team have been working to formulate a multiyear strategic plan. This effort involved the active participation of NASA Headquarters and Field Center personnel and culminated with a senior management review of the proposed plan in Washington, D.C., this past December.

The final product generated by this effort is "Vision 21 - The NASA Strategic Plan" which I have endorsed and intend to submit to the Congress in conjunction with the fiscal year 1993 NASA budget. The strategic plan should serve as a very useful roadmap of the future for the NASA team, as well as respond to the Congressional requirement contained in House Report 102-226, the VA-HUD-Independent Agencies FY 1992 Appropriations Bill Conference Report, that NASA submit a strategic plan concurrently with the fiscal year 1993 budget.

Best wishes for a successful and productive new year, and thank you for your sustained commitment to NASA and the civil space program.

Sincerely,

Richard H. Truly
Richard H. Truly
Administrator

Allan -
Thanks - I'll be out of town
thru Wed. next week - Marty
Kress (453-1948) has the
action

Enclosure

Vision 21

The NASA Strategic Plan

DRAFT TALKING PAPER ON VISION 21**(prepared by Doug Beason)****January 9, 1992****Overview**

- o NASA's "strategic plan," a "living roadmap for the future"
- o States that NASA has "an overarching management responsibility to **actively support and nurture mathematics, science and technology education**"
- o In NASA's words: Fully consistent with National Space Policy, NSpC and Congressional directives and guidance
- o NASA's **Goals:**
 - Advance scientific knowledge of the planet Earth, the sun, the solar system, the universe, and fundamental physical and biological processes;
 - Expand human activity beyond Earth orbit into the solar system;
 - Strengthen the competitive posture of the U.S. in space and aeronautics;
 - Attract young people to mathematics, science and technology, and ensure a more technically literate society for the future.
- o To accomplish this, NASA's **critical missions** are:
 - Space science
 - Mission to planet Earth
 - Mission from planet Earth
 - Aeronautics research
- o Using the following **enabling capabilities:**
 - Human resources
 - Physical resources
 - Space technology
 - Space Station Freedom
 - Space transportation and communications systems

Observations

o Overall a good, thorough vision

- Most of the recommendations of the "Augustine Committee" and the "Synthesis (Stafford) Group" are here
- Also, recommendations of the "Frieman Committee" (such as the reference to "small missions," bottom of p6) are present

o Caveats

- However, a "first-order point" is missing from these recommendations:
(see yellow tab, p6)
 - p6: Strategic plan for science should include **input from the science community** (re: Augustine recommendation #2, see next page)
 - As Vision 21 reads, it will "share the benefits" with the community
 - Input must be given by the community, as well as sharing benefits
- Lower order (in the noise) points:
 - p1: Will anyone (ie OMB, Commerce) make a fuss by the last sentence of paragraph 4 ("... partnership between government and the private sector ...")?
 - p2: First paragraph, after Vision and Goals: "Technology breakthroughs will enhance American competitiveness ..."
 - Should something be mentioned about tech transfer?
 - p6: list of "fundamental advances" coming from Space Station Freedom
 - Includes material science, which is listed second after fluid physics
 - In reality, this is at lower end of priority list
 - In general: NASA should reference using the Augustine, Stafford and Frieman recommendations more, to strengthen their position
 - They seem to have implemented the recommendations
 - But they haven't brought this out enough; e.g.:
 - p5: Augustine says space science should be first priority
 - p8: Frieman recommendations for EOS, EOSDIS
 - p25: Augustine, Stafford recommends heavy-lift launch vehicle
 - p28: New management initiatives are recommended by Augustine, Stafford

Recommendation

o OSTP should support Visions 21