

the Foundation Institute Incorporated 1971

REPORT:

Copyright FOUNDATION (INCORPORATED)

ADVANCES IN COMMERCIAL AND GENERAL SPACE DEVELOPMENTS

European Space Effort Grows

Ariane, National Programs Advance

With the first flight of the European Space Agency Ariane heavy booster less than two years away, in June 1979, the ESA reports the project is progressing according to plan.

Confidence of potential users is also rising with reports that Comsat is investigating the possibility of flying the Intelsat V payload aboard the booster. Both Ariane and the Space Shuttle are candidates for the mission, and at this date Comsat, which manages the Intelsat program, has not committed to one or the other vehicle. Ariane officials have offered the booster to Comsat for the price of 20.5 million dollars per flight, which is almost a quarter of a million dollars less than comparable service on-board the Shuttle. The possibility of further subsidation of the Ariane has not been ruled out. If put into practice, it would mean that there would be powerful economic reasons for commercial and non-U.S. satellites to abandon Shuttle and fly with ESA.

Certain technical milestones have been completed so far, and can be summarized as follows:

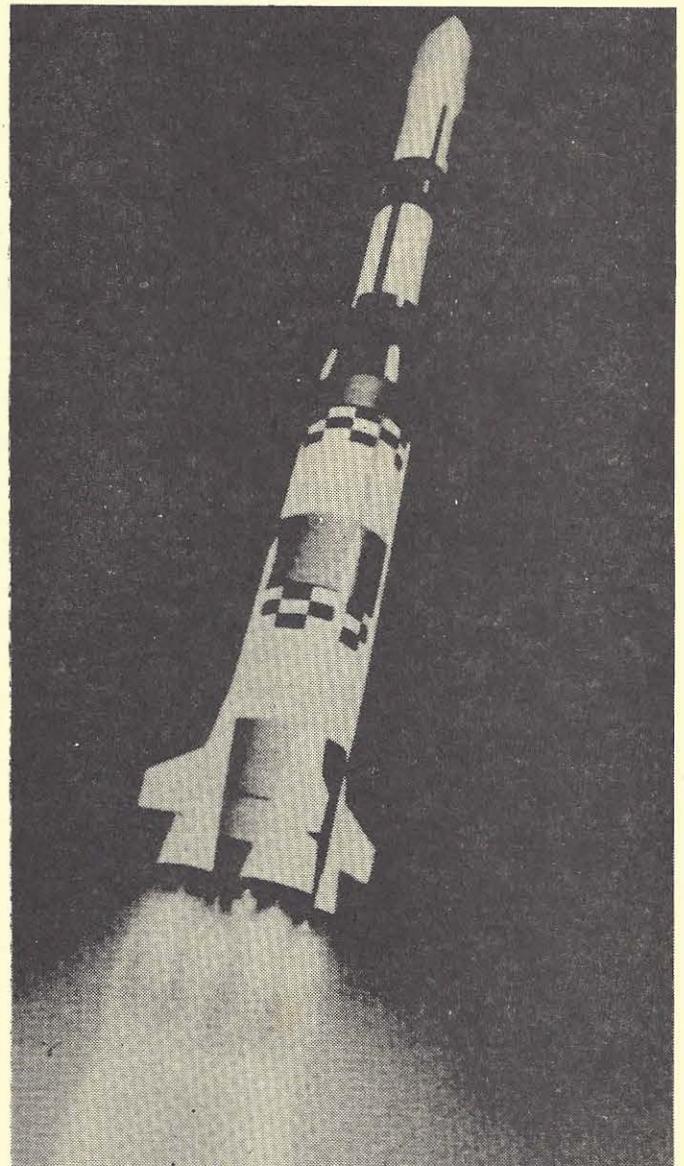
First Stage: The four first-stage motors were tested seven times between November 1976 and August 1977 at the French Vernon test facility. Qualification of the first stage structure is proceeding normally.

Second Stage: Static testing of the stage in vacuum has been carried out. Certain problems with the welds of the main propellant tank has led to schedule slippage, but contractors are working to correct the difficulties.

Third Stage: This stage, using the S.E.P. HM-7 oxygen/hydrogen rocket engine, has also had development difficulties. A problem with shut-down of the engine delayed test activities until September of this year. According to ESA spokes-

men, the problem has been analyzed and corrected.

The rest of the vehicle structure and flight electronics has been qualified, and work on the French Guiana Space Center is progressing satisfactorily.



European Space Agency Ariane launch vehicle in simulated flight. First test flight will be in 1979.

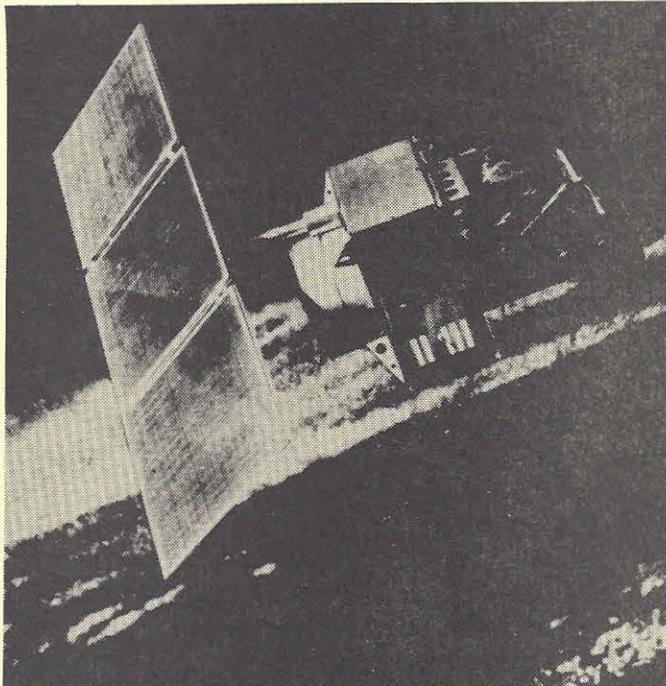
The Foundation Institute REPORT:

French Look to National Programs

The French have recently announced their decision to develop an Earth Observation Satellite under the name SPOT (the French acronym for Trial Earth Observation System).

The system will use a 700 kilogram satellite to be put into a low altitude sun-synchronous orbit by the Ariane launch vehicle in 1984. The spacecraft payload will consist of two high resolution instruments (each capable of 20 meters resolution). The instruments will operate in four wavelengths in the visible and near infrared regions of the spectrum, and be equipped with steerable reflecting mirrors which will allow stereoscopic photos to be taken.

Since it is no real secret that the French want a military observation system of their own, and since it has been suggested that the Ariane program has as a primary purpose the launch of observation satellites, the decision by the French government to fly the SPOT spacecraft has naturally aroused speculation concerning its potential unannounced mission. The capability of the optics to resolve 20 meter ground targets exceeds the minimum 50 meter resolution limits urged by the Soviets during the recent meeting of the International Astronautical Federation in Prague this October.



French national earth resources spacecraft in sun-synchronous orbit. Launch is scheduled for 1984. Some observers believe the spacecraft will also be used for military observation missions.

Space Processing of Materials

AAS Committee Offers Position Report on Space Plans

The American Astronautical Society (AAS) is striving to develop a program to ensure that benefits from future space programs meet the practical needs of non-aerospace users. This effort is focused in the AAS User-Developer Exchange Program which consists of five committees: Earth Resources Management and Inventory, Navigation, Communications, Energy and Materials Processing in Space. The latter committee has just published its 1977 Position Report following a meeting at Battelle Columbus Laboratories in May of this year.

The AAS committees provide a forum for the exchange of long-range planning concepts between space program developers and user organizations and ensure that user and developer requirements are incorporated into future space programs planning. In particular, the Materials Processing Committee is charged with exploring methods for integrating industrial and commercial requirements into planning for future near-term and long-term space processing projects. Among the present members of the Committee are Don Waltz and Bob Hammel of TRW, Hal Bloom of General Electric, Curtis Watts at Battelle Columbus, Jim Rose from McDonnell Douglas, John Walsh at Beckman and William Aubin of Grumman Aerospace. James Bredt serves as NASA Advisor to the Committee.

The Materials Processing Committee was convened in a meeting during May of this year to discuss the Materials Processing Program and individual projects, exchange information on the issues concerning both users and developers of space processing projects, and to gather opinions from non-Committee individuals who had expressed a desire to input information for the Committee to base recommendations upon. Thirty-four people attended the meeting, representing NASA, aerospace and non-aerospace industries, universities, the U.S. Department of State, law firms and research institutes.

The two day meeting emphasized program management and business/economic considera-

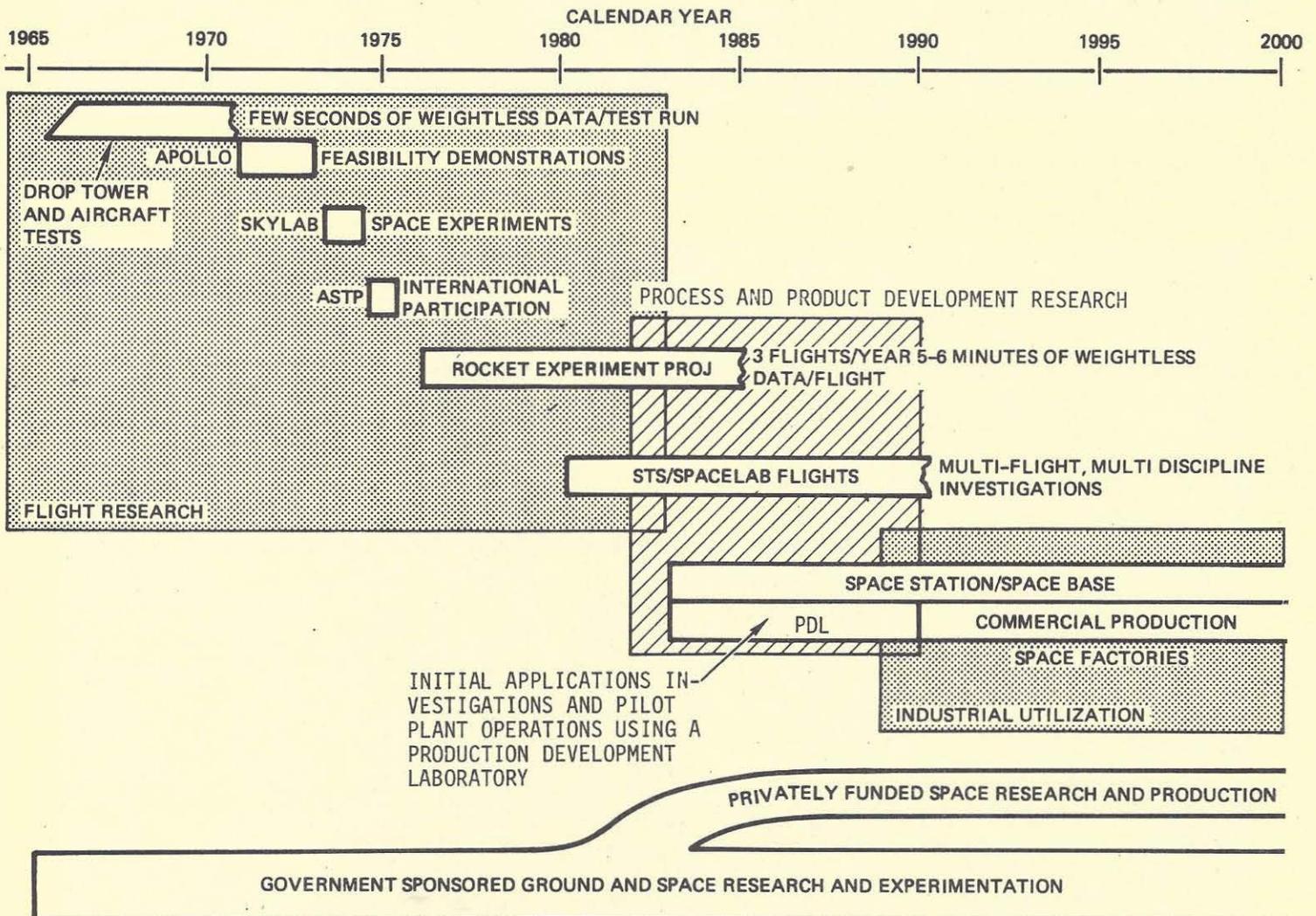
The Foundation Institute REPORT:

tions, although sufficient technical data were introduced to define the activities involved in implementing the various facets of space processing.

Major consideration was devoted to the NASA Materials Processing in Space Program (MPS), which originated in the last ten years following experimental and theoretical evidence of potential processes which could be performed in the space environment. A substantial body of literature exists already concerning the technical questions involved. The AAS Committee addressed the questions of MPS program implementation, user-developer relationships, business-legal complications and finally, government-industry relationships. The major conclusion is that the industrialization of MPS to result in space manufacturing

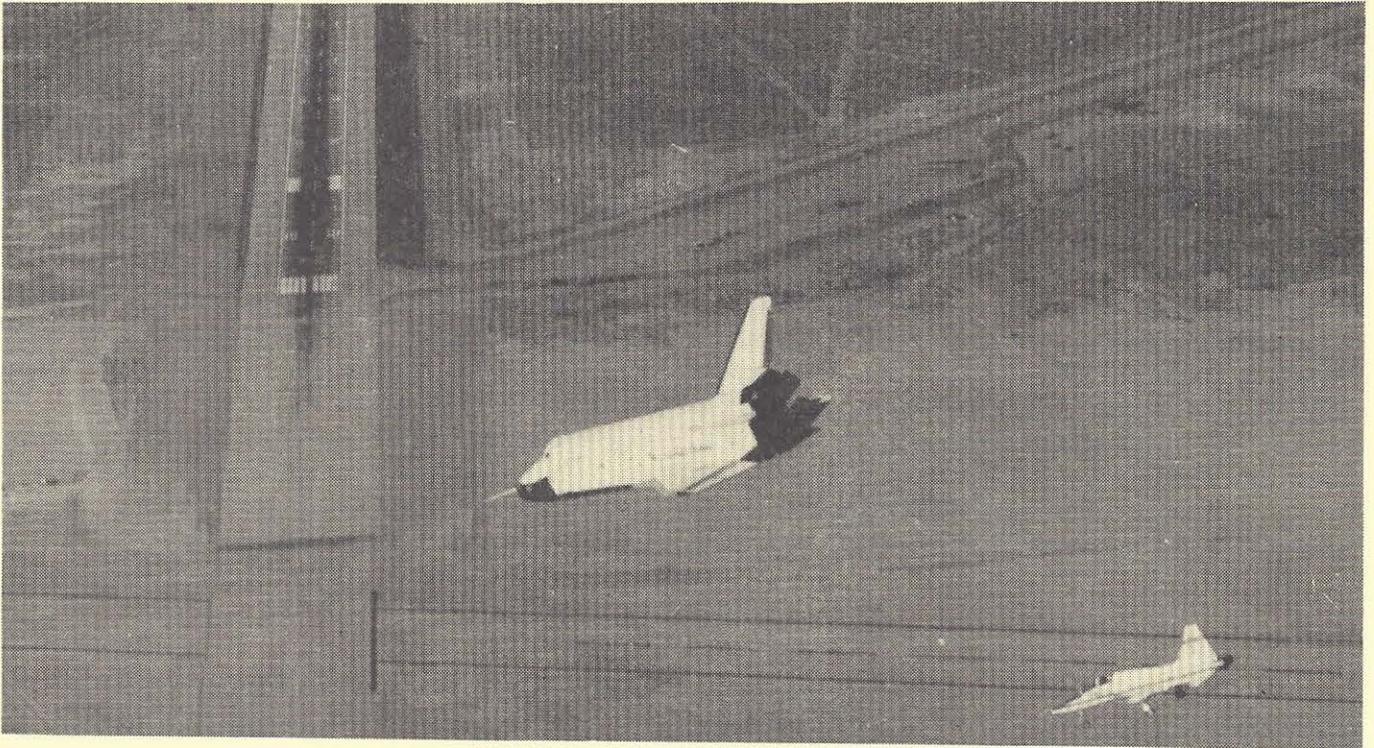
will require a series of phased events building upon the results of basic and applied research conducted in space. An aggressive schedule of steps necessary is shown in the chart accompanying. Reading between the lines of the Committee report it becomes apparent the participants feel constrained by the present pace and orientation of the NASA five-year plan for Material Processing. The chart of steps necessary for industrialization of space processing is more aggressive than the NASA plan as well as relying more heavily upon the resources of private industry. The Committee points out that, as on earth, a major part of the efforts needed will involve establishing facilities and techniques to translate R&D to product activities. Here the marketplace, and the

Continued on Page 6.

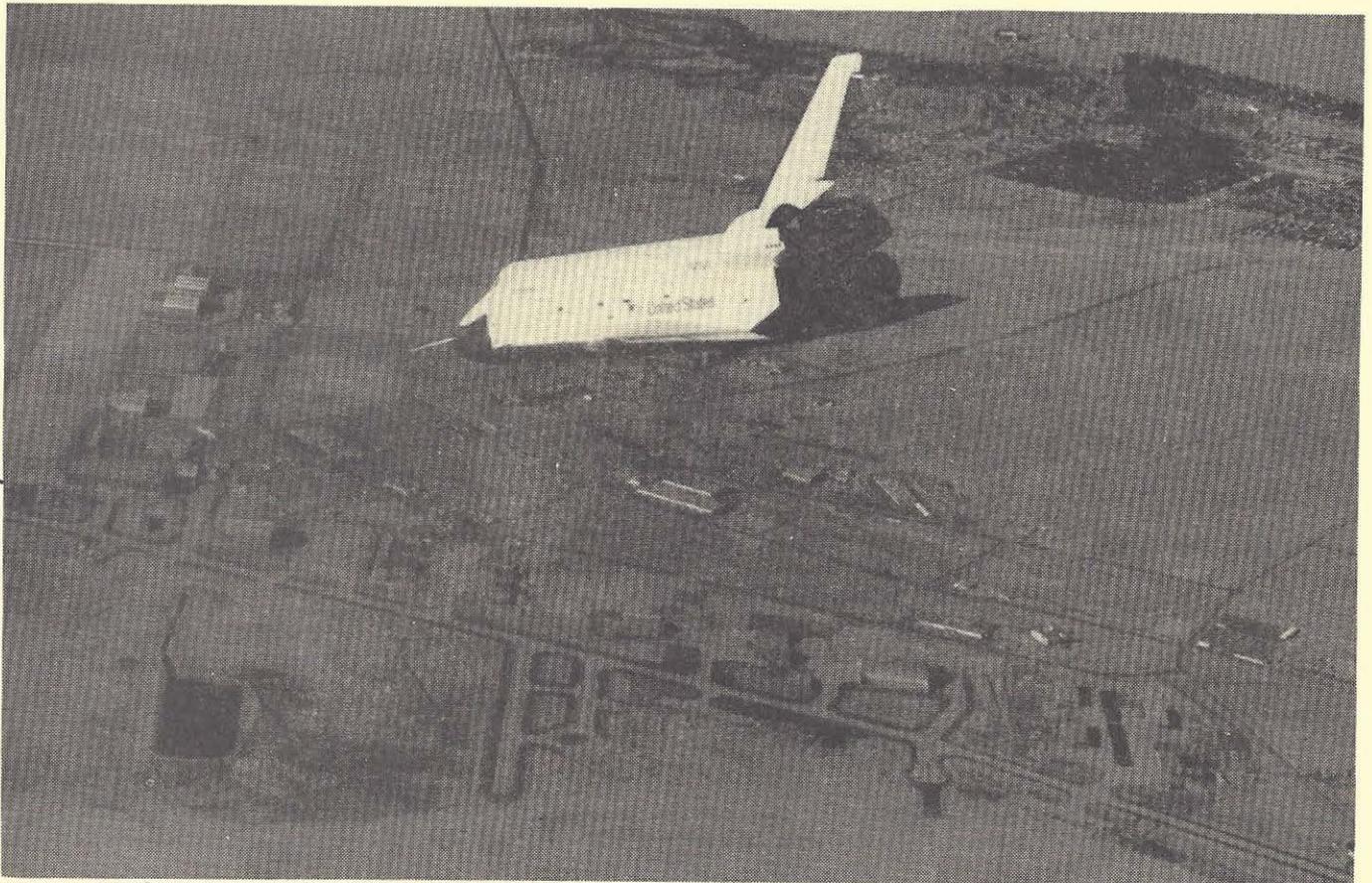


Steps necessary for space industrialization. Designed as part of the 1977 AAS Position Report of the Space Processing of Materials Committee of the User-Developer Exchange Program, this chart shows several steps toward large-scale space industrialization which are at odds with the NASA program. The AAS recommends an aggressive effort of Research and Development leading to a space station and initial product applications as early as 1985.

The Foundation Institute REPORT:



The Space Shuttle Orbiter 101 "Enterprise" heads toward the completion of a two-minute, 34 second unpowered phase of the fourth Approach and Landing Test free flight on October 12, 1977. The flight marked the first time the Enterprise had been up without a tail cone. Runways, hangers and other Edwards Air Force Base facilities form the background for the orbiter (and T-38 chase plane, above). Crewmen for the free flight were astronauts Joe H. Engle and Richard H. Truly. Free flight testing is now concluded.



The Foundation Institute REPORT:

news notes...

MANNED SUBORBITAL FLIGHT...Sacramento...CBS News has reported the plans of former launch vehicle designer Robert Truax to build and fly a sub-orbital manned spacecraft/booster. Purpose behind the scheduled 1979 flight was not announced, but Truax made comments concerning the high cost of orbital flight and indicated he needed a million dollars in additional funding to launch as planned. Reportedly, he is using hardware from an Atlas vehicle obtained in the surplus market. CBS played up the idea as a stunt, obviously unaware that Truax has been involved with launchers for more than twenty years, and was the first designer of single-stage-to-orbit oxygen/hydrogen vehicles employing aerospike engines in the late 1950's.

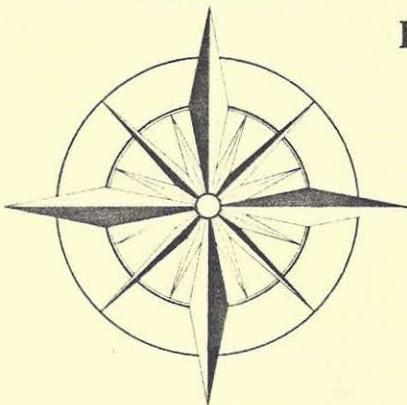
STOCK OFFERING...Rumors are circulating concerning a proposed stock offering which may take place in the next year to support space industrialization. If the offering does take place, it may be based on the concept outlined by C. Basler at the Annual Meeting of the American Astronautical Society in San Francisco in October. An abstract of his paper was published in the last issue of the Foundation REPORT, page 2.

ARTICLE TO BE PUBLISHED...Washington...An abstracted note concerning the Foundation Large Launch Vehicle (See Foundation News, first issue of the Foundation REPORT) is to be published in an upcoming issue of the National Space Institute newsletter within the next few months. The article will discuss the possibility of building a very low cost chemical booster which could lower the price of a pound of payload delivered into earth orbit by no less than a factor of five over the Space Shuttle. Philosophy of design and operation will be discussed.

KIKU II IN ORBIT...Japan...National Space Development Agency of Japan

Continued on Page 6.

PASSIM



Passim, 3102 Beauchamp, Houston, Texas 77009

**SPACE
INDUSTRIALIZATION?
ECONOMETRICS?
SYSTEMS
STUDIES?**

Let Passim help you. If you have a requirement for space industrialization studies, we can provide you with experienced consideration of both technology and *business* needs. Before you get deeply involved in space industry planning, get involved with Passim.

advertisement

**PRESENTATIONS
•
PROPOSALS
•
ARTWORK**

For Inexpensive High-Quality Communications Contact The Foundation Institute
Viewgraphs and Slides in Color; Painting and Illustrations of All Types; Multimedia Presentations

The Foundation Institute REPORT:

Continued from Page 5.

(NASDA) reported that it has launched Japan's first geostationary satellite, Kiku II. Japan is the third country, after the US and the USSR, to have successfully orbited such a satellite. NASDA used an "N" booster, derived from the McDonnell Douglas Delta. The satellite body was also built in the US, but the launch site hardware and tracking control facility was made in Japan. Future launches will include a geostationary meteorological satellite to be launched in a month, a comsat, and a broadcasting satellite for 1978 launch.

OTRAG FOLLOWUP...Houston...Foundation staff had an opportunity to view a half hour film produced by Orbital Transport and Rockets of West Germany and Zaire recently. The film was narrated by OTRAG consultant Richard Gompertz, and covered the manufacture and testing of the modular OTRAG vehicle, the site selection and construction of the launch facility, and OTRAG's future plans. OTRAG is very interested in the need for a spaceport similar to the concept discussed in the October, 1977 issue of the REPORT (Earthport, page 4), due to uncertainty revolving about its Zaire site. The company has spent \$30 million on development of the vehicle and the site up to this time.

Continued from Page 3.

cognizant industry, have the best capability to plan and perform. The Committee endorsements recommend NASA pursue a policy of applications of space processing discoveries by seeking early participation from industrial investigators.

Copies of the Position Report "Space Processing of Materials" may be obtained from: AAS Publications Office, Box 28130, San Diego, CA. 92128.

THE FOUNDATION INSTITUTE was incorporated in 1971 as *Foundation*, a non-profit 501(c)(3) tax-exempt Minnesota Corporation. The Institute is a diversified research and development organization formed to engage in advanced scientific and technology studies. Funds are provided by contract research for industry, as well as by donations, gifts and internal business profits.

Capabilities include theoretical research and study, systems research and development of services and products. A high level of effort is presently being expended in astronautics, especially the commercial utilization of outer space and the need for economical space transportation.

The Institute has a permanent and consulting staff of professionals to call upon including engineers, designers, scientists, communications experts, management specialists and the like. Corporate headquarters is presently in St. Paul, Minnesota.

THE FOUNDATION INSTITUTE REPORT is a concentrated effort to report all areas of private and industrial initiatives in the development of space. We hope it will stimulate ideas by raising questions and offering innovative concepts contributed by acknowledged leaders in the field.

If you have any comments, ideas or requests for information or articles, we encourage you to contact us. The **REPORT** is published monthly, and has a subscription price of \$10/year.

THE FOUNDATION INSTITUTE Telephone:
85 East Geranium Avenue (612) 489-4466
St. Paul, Minnesota 55117 489-6067

Staff:

Gary C. Hudson, Chancellor
Stanley E. Williams, Executive Director
Gary R. Lindberg, Communications Officer
Arthur M. Dula, General Counsel
Bonnie Van Abel, Administrative Officer
Joe Sutton, Business Manager
Tom A. Brosz, Resident Fellow
E. Anne Roebke, Resident Fellow
Dagne Florine, Non-Resident Fellow
Harmon Abrahamson, Non-Resident Fellow

A non-profit, tax-exempt corporation. Contributions are tax-deductible. Office hours: 10 A.M. to 6 P.M.