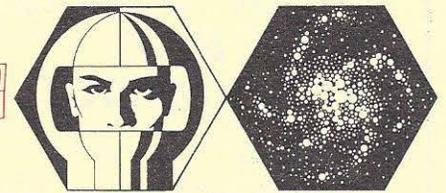


THE FOUNDATION
**COMMERCIAL
 SPACE REPORT**



SPACE INDUSTRY COMES OF AGE IN BUSINESS WEEK

Twenty-five Page Advertising Section Highlights Business in Space as "New Era"

Continuing its interest in space industry, *Business Week* magazine made history itself by publishing the first ever special advertising section on commercial space futures. However, the original ambitious plans for a forty-eight plus page section had to be abandoned early in August due to lack of advertiser response.

The advertising section, which appeared in the September 25th issue of the magazine, included commentary by John F. Yardley, NASA Associate Administrator for Space Transportation Systems; George Jeffs, President of the North American Space Operations of Rockwell International; E.F. Branahl, Vice President and General Manager of McDonnell-Douglas Astronautics Co., St. Louis; Congressman Don Fuqua and Yves Demerliac, Secretary General of Eurospace.

Aerospace companies represented by ads included Rockwell, TRW, United Technologies, and McDonnell-Douglas. The European firms Aerospatiale, VFW-Fokker ERNO, Messerschmitt-Bolkow-Blohm, and Dornier also purchased space. The latter three teamed with the German space organization Deutsche Forschungs und Versuchsanstalt für Luft und Raumfahrt to place a full page advertisement suggesting that parties interested in space manufacturing contact ASN, The West German Association for the Promotion of SpaceLab Utilization.

Besides aerospace firms, a few other

Rockwell corporation was among several aerospace corporations advertising in the special section produced by *Business Week* magazine titled, *Space Industrialization—A New Era*.

corporations participated in the section. These included Perkin-Elmer, Planning Research Corporation, Johns-Manville, and the insurance firm Marsh & McLennan. The new science fiction/speculation magazine *Omni* purchased a two-page color spread.

Originally the advertising section had been planned to include as many as fourteen contributors of "editorial comments" and nearly thirty pages of promotion. Early in August of this year it was realized by the New York *Business Week* office that advertiser interest was not as strong as originally estimated, and the size was cut. Conversations with insiders in the ad sales effort, however, indicate that no real training or advice was given to the sales staff of the magazine, many of whom had no idea of what space industrialization is. Further, there seemed to be a lack of coordination of the sales effort since in at least two places elsewhere in the same issue there are ads for companies promoting communication satellite technology. Either these companies were not approached to participate or they declined to be included in the special section. Whichever is the case, the limited success of the venture bodes ill for early acceptance of space industrialization by

Continued



It's good business. The American space program is generating all kinds of business here on Earth. New products, new services, and new industries. That's because every U.S. trip into the subfreezing, zero-gravity vacuum called space is an education, with results to date that have been phenomenal: new and improved materials to build better products, new approaches to old problems, and a whole new scientific discipline of great benefit to business and consumer alike.

Thousands of companies are profiting from space spin-off technology. Many American companies have found NASA contracts to be highly stimulating to their own R&D and new product development (as could your own organization).

A representative firm, starting small a few years ago, developed a special flowmeter for the oxygen supply of astronauts in the Apollo Project. Today, the same company enjoys over \$3 million in worldwide annual sales on that one item to many industries.

Heat pipe technology developed by a private firm for NASA spacecraft is now in products which stabilize 390 miles of the Alaskan pipeline by keeping the tundra beneath it frozen solid (a \$15 million piece of business).

An airfoil design originally developed for spacecraft recovery is now used by 90% of all hang glider manufacturers. The biggest

company in this rapidly growing market now has annual sales of over \$2 million.

The spin-offs from space technology are virtually unending, and the profits are spread through many business areas. They include: manufacturing, utilities, food production and processing, construction, law enforcement, transportation, health services, education, electronic communications, new consumer products, environmental control, and the production of petroleum and natural gas.

30 years of aerospace technology — yours for the asking. There's a special NASA agency that's helping private enterprise find secondary uses and new applications for space technology. The agency has access to 8 million documents worldwide, and generally charges private businesses only a small service cost for identifying and retrieving the information requested. For more details, write: NASA Headquarters, Office of Industry Affairs and Technology Utilization, Washington, D.C. 20546.

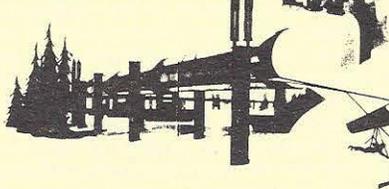
The Space Shuttle. In 1979, it offers a brand-new kind of business trip. The world's first reusable space transportation system, featuring Rockwell-built Space Shuttle Orbiters, is about to make space more accessible than ever. The first flight takes place next year, and by the mid-1980s a fleet of Rockwell-built Orbiters will be making frequent flights into space on a regular schedule. Each Orbiter can carry up to 32½ tons of cargo into the unique environment of space — for governmental, commercial or international projects.

Orbiter crews, including mission and payload specialists, will conduct numerous on-board experiments. They'll also deploy, service and retrieve satellites and experimental packages.

The Shuttle is opening up a new era of reliability and economy in space operations. It's good news for the many companies already doing business in space (via communications, navigation, observation and weather satellites), and the many more companies who are bound to expand their business horizons on Earth.

The Shuttle just might be your kind of business trip. You might find it highly advisable to take direct advantage of the NASA Space Transportation System (STS), with your own projects aboard a Space Shuttle Orbiter. The Space Systems Group of Rockwell International can help you determine the feasibility of actual space missions for your company. We're the STS systems integrator, as well as designer and builder of the Shuttle Orbiter, and we know firsthand how other companies are advancing new product and service ideas via space technology.

To find out how your company can benefit from operations in the special environment of space, call Rockwell's STS User Service Center at 213/922-3344. Or write: Space Systems Group, Rockwell International, 12214 Lakewood Blvd., Downey, CA 90241.

What's all this business about space?



**Rockwell
 International**

"LIBRA" MAKES POINT, BUT LACKS IMPACT

by Tom Brosz

During the past five years I have devoted considerable effort to the field of spaceflight. My goal has been to help create an alternative to the present closed-world solutions to global and national problems. My thesis, and that of my colleagues, has been that the establishment of free societies beyond earth is imperative to mankind's success in the future.

Naturally, I was excited to hear that World Research Inc. was producing a film called "Libra" which explored this thesis. Recently, I was given an opportunity to preview the completed film.

The concept: a group of people, backed by private investors, construct a space colony at L-5. They name the colony "Libra". The purpose of the venture is to build and

operate solar power satellites which collect the sun's energy and beam it to earth via microwaves. There it is converted to electricity for distribution across the globe.

The story takes place at the beginning of the twenty-first century. It is presumed that at this time harsh controls have been placed on energy use by a coalition of governments and cartels. This coalition is known as the International Planning Commission, or IPC. The energy from the new satellites is unregulated, abundant, and less expensive than the energy distributed by the IPC. This is seen as a threat to the coalition, and a senator representing the IPC is sent to Libra colony to attempt to "reason" with them.

Elsewhere, a representative of an investment firm is sent to Libra as well. His mission is to see if there is sufficient future in solar power satellites to warrant further investment.

Both men are shown through the colony. A model of a free economy, Libra abounds with prosperity, optimism, and confidence. The in-

vestor meets with Ms. Morris, one of the founders of the complex. He is impressed enough to return to earth with a recommendation to invest further, overriding objections from some of his fellow investors who fear the wrath of the IPC.

The senator, on the other hand, is nervous and annoyed by all this unregulated activity. He enters into a televised debate with the present president of Libra, the imposing Dr. Baker. Dr. Baker then proceeds to demolish the hapless senator's feeble economic arguments.

The senator returns to earth, and sheepishly reports to his superior at the IPC. His superior, enraged, threatens the use of taxation, tariffs, or worse against the colony to stop the influx of unregulated power from space. The senator expresses a lingering doubt that this will be successful, and the film ends at this critical point.

As far as excitement goes, "Star Wars" this is not. Yet, as an "educational film", I suppose it is not really intended to be. The purpose

American industry.

Two of the most interesting comments in the section came from George Jeffs of Rockwell and M. Demerliac of Eurospace. Jeffs discussed the results of the recent Rockwell and Science Applications space industrialization studies (Report June, July, 1978) and commented on space based services, energy and products. With an extremely diplomatic approach to the STAMPS committee report (Report, August, 1978) he stated: "A committee of the Space Applications Board of the National Research Council recently concluded that although we should proceed with caution, materials processing in space offers sufficient promise to warrant considerably more experimentation in the future. This could ultimately lead to full-scale processing of certain materials in space." While not contradicting the report directly, Jeffs managed to convey a "stamp of approval" to the materials processing effort by invoking the name of the National Research Council. Though the committee did indeed endorse more experimentation, their primary conclusion was that there are "... (no) examples of economically justifiable processes for producing materials in space ...". M. Demerliac, on the other hand, need not worry about that conclusion. Suggesting that SpaceLab will demonstrate processes leading to products in the next five years, he goes on to wonder about matters political rather than scientific. He states: "The heaviest responsibility for the European space decision makers in the coming years will be to act in such a way, that, whenever the possibility is established for a European company to make profit from manufacturing in space, that firm be given access to space."

Demerliac goes on to suggest that it will become necessary for the Europeans to rapidly build and deploy their own version

HIDDEN PERILS IN GOVERNMENT SUPPORT OF SPACE ACTIVITIES

by Robert Poole, Jr.

Commercialization of space is hardly the first attempt at large-scale commercial exploitation of new technology. Many such prior instances have involved extensive government support and participation. Such government involvement undoubtedly spurred the growth of these industries, but also produced long-term consequences adverse to the public and frequently to the industries themselves. Analogous consequences of government space efforts should be considered by those involved in space industrialization.

The thesis of this paper will not be popular with many devotees of space exploitation. That thesis, in essence, is that seeking federal support of space industrialization may amount to selling one's birthright for a mess of pottage. Or, in less poetic language, that there are both short-term and long-term costs involved in federal subsidization—costs that are seldom considered, but which we ignore at our peril. The industrialization of space represents the coming of age of a particular set of technological developments. It is the practical, as opposed to the scientific, application of this new technology.

of a Space Shuttle. In the same paragraph, he further states that solar power satellites are receiving interest in Europe. "Europe must not compromise its independence in a vital field (like Satellite Solar Power) . . ." □

Such events are not without precedent in American history. Prominent examples of successful commercialization of technology include the development of the railroads, mass production of automobiles, development of the telephone system, creation of commercial radio and TV broadcasting, and the introduction of nuclear electric power plants. In each of these cases, the industry in question called on the federal government to play what it considered to be a crucial role in fostering the industry's development. And in each case, this federal assistance had both benefits and costs. We are all familiar with the ostensible benefits—the successful commercialization of the technology and establishment of a viable industry. Less appreciated are the costs, mainly long-term, which accompanied the assistance. Let us look at several examples:

The Railroads

Government was involved in railroad building virtually from the start. From the 1830s to the 1850s, state and local governments, anxious to improve access for products to markets and to increase land values, invested heavily in early railway companies. Two thirds of the Pennsylvania Railroad's 1852 capitalization of 10 million dollars had come from local governments over the years. In the 1830s Ohio adopted a law committing the state to furnish one

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of the film is to present to the viewer a few basic concepts in economics. The problem is, due to lack of funds, too many corners were cut.

The basic idea the film is intended to get across is the concept of freedom as a workable alternative to the mixed or statist economy. Ayn Rand's *Atlas Shrugged* required over a thousand pages to accomplish a similar result, while the movie runs just forty minutes.

It would be extraordinarily difficult to pack such a concept into such a short film, and still leave room for an exciting plot and interesting characters. "Libra" tries valiantly, given a reportedly bare-bones budget, but falls short. There is really no plot as such. When it looks as though a conflict is about to develop between Libra colony and the IPC, the film ends.

Interesting characters? Despite good performances by the actors, the fact that they must spend most of the film as narrators for essays on freedom hampers their development as characters, and most remain wooden figures or worse,

stereotypes.

These essays comprise most of the film. One is either hearing a character reeling off a monologue to another character who listens patiently, or one is listening to an essay as the narration of a film within a film, which the hapless characters are forced to sit and watch.

If this film is intended for school audiences, it will have to rely on its brilliant concept of free space to hold an audience's attention. High school students, spoiled by visually oriented media, may find "Libra's" mainly verbal approach too dull. Disgusting, but true. College students, if the film is intended for such, may consider the film too unsophisticated due to its simplistic construction.

Despite all this, the essays were well written, and succeeded in getting the message across. Why the emphasis on my part on characters, plot, excitement, etc.? Is it fair to judge an educational film on these factors, rather than on the message?

Yes, because a film is a film, not

a record or a book. Ideally, the message should come out in the actor's dialogue, in the story and in the events within it, not in narration or in speeches disguised as dialogue. If this is too unweildly, then perhaps a film with actors and a plot is not the proper media.

Still, two things should be recognized: First, the producers did not, as mentioned, have the funds for a first-class job, and most of the film's faults can be directly traced to this.

Second, I am a SF buff, and my expectations were very high for this concept.

There is enormous potential here. The producers have gained experience, and Libra has thousands of stories to tell about real freedom.

I look forward to a sequel.

The film, along with the newspaper, is definitely worth the rental. It is not what it could have been, but as an advocate of economic freedoms it is a badly needed light in a dark room. □

third of the capital for any railroad company in the state. Besides subsidies and loans, states frequently granted railroads charters, monopoly privileges, the power of eminent domain, and in some cases exemption from taxes. In the 1850s the federal government began to subsidize railroad construction, especially the projects for transcontinental lines. The government made land grants, issued loans, and guaranteed private loans.

By the 1870s the era of extensive railroad building had ended, and intense competition ensued. Railroads attempted various agreements to restrict competition, but none proved effective for more than a short period. Over a period of years, therefore, railroad officials lobbied for federal regulation to accomplish what private agreements could not. The result was passage in 1887 of the Interstate Commerce Act. This legislation, in effect, cartelized the railroad industry and set up the Interstate Commerce Commission as administrator of the cartel.

Between 1887 and 1920 the railroads did relatively well as a cartelized industry. But all during those years, new amendments and regulations were continually added, gradually increasing the extent of ICC control and reducing the authority of railroad management to run their business. The Transportation Act of 1920 culminated this process, imposing much more stringent restrictions on railroad finance, pricing, and service. All key railroad management decisions became subject to ICC approval. The railroads were virtually nationalized, in all but name.

What have been the results of 150 years of government involvement? The initial subsidies, loans, and land grants produced substantial overbuilding, leading to many financial debacles. Numerous uneconomical companies and routes came into being, only to suffer bankruptcy or merger into larger,

more cumbersome systems. Government regulation helped company profits initially, by halting the long-term downward trend of rates—a dubious benefit to consumers, but a usual consequence of cartelization. The creation of the ICC and subsequent regulations also helped freeze the then-existing pattern of routes and companies, preventing the emergence of more efficient systems, such as transcontinental railroads.

In the 20th century the progressively tightened grip of the ICC has come close to strangling the railroads. Their financial ill health needs no further elaboration here. Decades of "deferred maintenance" are gradually taking their toll. The government takeover of bankrupt Penn-Central extended to over a dozen railroads before it was completed. And the deficits of Amtrak and Conrail keep setting new records. What if the government had not intervened? Would we have no railroads today? Obviously we would. The rate of initial construction would have been slower, with investors having to be convinced of the soundness of each venture. Fewer uneconomical lines would have been built; and competition would have weeded out more of the marginal firms. Today we would very likely have several competing transcontinental railroads and a host of specialized shortlines. Unit trains and piggyback freight service would be far more extensive; and innovations like Auto-Train* would probably have occurred on a much wider scale.

*Auto-Train is a private, profit-making company which provides transportation of people and their automobiles from the Northeast to Florida. It was organized in 1971. Its trains operate over the tracks of existing railroads, to which it pays rental fees (as does Amtrak) . . . except that AutoTrain's passengers pay their own way.

The Automobile

In what way did the government subsidize the auto industry? Not, of course, by aiding in the production of automobiles; rather, local, state, and federal governments have provided an extensive and continuing subsidy in the form of paved roads. Prior to the development of the automobile, roads were relatively simple and inexpensive. Except in cities and towns where brick was sometimes used, most roads were paved with little more than dirt, and were built largely by clearing the land and filling in holes. Many roads were privately constructed, including a great number of "turnpike" toll roads in the period between 1800 and 1850.

The advent of the automobile changed all that. Cars, and especially trucks, required paved roads, and these were orders of magnitude more expensive. Thus, the auto industry and automobile owners' associations extensively promoted the idea that the state and federal governments should build paved roads, and that the State's coercive power of eminent domain should be used to obtain the land. As more and more people began to purchase cars, these arguments received wider acceptance; and the concept of "free public roads" took on a new, more expensive meaning: Instead of referring to freedom of access, the word "free" came to mean "without charge." To be sure, the gasoline tax and the highway trust-fund concept did result in users paying, indirectly, for much of the direct cost of road construction. But psychologically—in the terms that affect people's behavior—roads became, and remain today, a "free" good.

With what result? The separation of road use from direct payment has led, in the view

Continued

of many economists, to a massive overuse of roads, especially during rush-hour periods. A perceived price of zero leads to a virtually infinite demand on the urban freeway system. Economists also note that government roads impose many externalities on their surroundings whose costs are not counted, such as noise and air pollution. And land-acquisition costs are frequently understated, since the land is acquired by eminent domain.

In the absence of these direct and indirect subsidies, what kind of auto use and road system might we have today? If the government had never condemned land and paved roads, it is quite possible that America would not be the automobile-dominated society that it is today. To be sure, the inherent flexibility of the private automobile is so great that its popularity would still be high, even if users had to pay directly and in full for paved roads. But several important aspects would very likely be different.

Highways would all be toll roads, and would probably be fewer in number. Most of the freight that now moves by long-distance truck would be carried by rail, at substantial energy and cost savings. Roads designed only for automobiles would exist, charging lower tolls than the much more costly roads designed to take truck traffic.

In urban areas, the trolley lines of the 1920s and 1930s would not have died out. Instead they would have evolved technologically into modern, lightweight computer-controlled transit systems. Buses, taxis, and jitneys—paying monthly or annual user fees—would serve downtown areas. With the coming of computer technology, sophisticated urban expressway-metering systems, like those proposed by William Vickrey of Columbia University, would have come into existence. Such a system—consisting of roadside sensors capable of recording the passage of specific vehicles, and tied in to a central computer for billing—would permit the expressway (not freeway) owner to charge tolls that varied in accordance with demand, thereby greatly reducing congestion and motivating car-pooling. In short, without road subsidies, America would be a much less auto-dependent society.

The Telephone

Despite the extensive patent protection obtained by Bell Telephone Company, the

early telephone industry was characterized by extensive competition. For the first 30 years following Bell's 1876 prototype, numerous firms entered the telephone business, and many succeeded. Many cities had two or more competing telephone companies, often not interconnected. Despite Bell's efforts to buy up competitors, by 1907 there were nearly as many phones provided by independents as the three million provided by Bell.

Clearly, efficient nationwide telephone service required interconnection and standardization; but the question was how to best bring this about—by means of the marketplace or via government decree? The latter course ended up being chosen. Financier J.P. Morgan took the lead role in pushing for consolidation. To achieve his goal of a single nationwide system, he brought Bell pioneer Theodore Vail out of retirement to head AT&T. Vail proceeded to implement the goal of "one policy, one system, universal service." The two key elements in his campaign were (1) creation of state public utility commissions which would grant telephone monopoly franchises and then regulate the rates charged, and (2) creation of a similar federal regulatory apparatus for interstate operations. The Vail plan succeeded rapidly: State commissions were set up in most of the states within a decade; and the federal government brought telephone and telegraph companies under ICC regulation in 1910. They were given their own regulatory agency with the passage of the Communications Act of 1934, which set up the Federal Communications Commission.

Under State PUC and FCC regulation, a technically sound telephone system has been set up. But the system—and its various franchised companies—has fallen behind technologically, offering far less capability, and in many cases charging far higher rates than current technology would permit. It is only in the last 10 years that the FCC has begun to allow limited competition—in both the end-user equipment market and in long-distance transmission. True, specific telephone companies holding exclusive franchises have prospered from government control. But consumers have been denied many of the benefits of advanced technology that have been available in other areas of the market—e.g. in electronics and data processing.

What might today's telephone system be

like if the industry had not obtained government help and protection? It's not likely that there would be duplicate sets of phone lines in our cities—economic considerations would probably have ended that aspect of competition. Yet many other types of competition would probably have blossomed. Right from the start there would likely have been competition in long-distance transmission—much as there has been in rail-roading—with different firms laying out different cross-country routes. In the absence of FCC prohibition, long-distance microwave transmission companies would certainly have come into their own long before the 1970s, providing vigorous competitive service for both voice and data. And satellite transmission of long-distance communications would have brought rooftop antenna service, like SBS** is only now gearing up for, to users by the late 1960s or early 1970s. In fact, commercial investment in communications satellites would very likely have been far greater, and sooner, had not long-distance communications been virtually monopolized by one company anxious to protect its massive investment in cable facilities.

Competition in the interconnect field would have grown up along with the industry—instead of springing to life very belatedly in the 1960s—giving consumers and businesses a far wider range of PBX's, terminals, and special-purpose telephones.

What about standardization in the absence of regulatory control? Oddly enough, the railroads achieved nationwide standardization of track gauge at 4 feet 8½ inches long before they were federally regulated, simply because universal interconnection made good economic sense. And the railroads—again on their own—developed the idea of time zones and nationwide standard time. The machine tool industry likewise developed standardized screw threads. There is every reason to think the telephone industry would have been far-sighted enough to do likewise.

Continued next issue.

**SBS stands for Satellite Business Systems, a joint venture of Aetna Insurance and IBM. Its radically new type of communications satellite network will utilize rooftop antennas, enabling users to bypass the telephone company entirely.

The Report is published monthly, and has a subscription price of \$20 per year (\$15 per year for students, \$25 per year for institutional and library subscriptions and \$25 per year for overseas airmail). Back issues are available at \$2 each from September, 1977. Xerographic copies may be substituted as stocks are depleted. Address all correspondence to Foundation, 85 East Geranium Avenue, St. Paul, MN 55117 or call (612) 370-0990. Editorial Direction: Gary C. Hudson; Special Assistance: Resident Fellows E. Anne Roebke and T.A. Brosz; Staff Artist: David Egge. The Commercial Space Report accepts VISA/BankAmericard and Master Charge. Please give us your full credit card number, expiration date, and the four digit Interbank number (Master Charge only). Your signature is also required on mail orders. Phone orders accepted at (612) 370-0990. No collect calls please. Foundation, Inc. was incorporated in 1971 as a non-profit 501(c)(3) Minnesota Corporation. The company 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. Foundation 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 Commercial Space 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.

NEWS NOTES:

SHUTTLE SET FOR FALL FLIGHT...Washington...It's official - the Space Shuttle's first orbital test flight has been rescheduled by NASA for September 28th of next year. The formal NASA announcement confirmed what had been an open secret among the space community. Several fires during the development of the sophisticated Shuttle engines are primarily responsible for the delay of six months over the previously announced launch date. At the same time, NASA officials admitted that the Shuttle will overrun expected cost targets by 8 to 9 percent. Original estimated cost was 5.2 billion 1971 dollars. John F. Yardley, NASA Associate Administrator for Space Transportation Systems, stated: "If unforeseen problems arise...this schedule could be further delayed. However, NASA believes that there is a good probability of flying the first Shuttle flight during 1979."

MILESTONE REACHED IN SHUTTLE ENGINE TESTS...Huntsville...A flight-configured developmental Shuttle main engine has exceeded 5,000 seconds in test firing at the NASA engine test facility in Bay St. Louis, Mississippi. This is the same time needed to certify a production Shuttle engine for manned flight. About 7,100 seconds of time has been accumulated on two engines since August, 1978, bringing the total engine testing time to more than 25,000 seconds in 342 tests. Of those tests, five consecutive runs at rated power level on one engine were completed, with the engine burning for 520 seconds (the amount of time necessary to place the Shuttle in orbit).

INDIAN COMSAT...Palo Alto...Ford Aerospace & Communications Corporation has announced that the Department of Space of India has contracted with them to build INSAT-1, a multipurpose communication satellite. Besides telecommunications capability, the INSAT spacecraft will carry meteorological equipment. It has the capability to mount direct broadcast TV antennas, permitting it to reach community TV receivers in India's rural zones. Ford will design the satellites to take advantage of the 3910 Delta launch vehicle or the Space Shuttle. Operational date for the system is 1981.

LIBRA PREMIERS...San Diego...World Research, Inc. a non-profit organization, has released "Libra", a film about a space settlement, which in their words "...trumpets the outrageous idea that a free market system is more humane and less oppressive than bureaucratic regulations and controls." (See review in this issue of the **Report**.) The film can be purchased for \$395, or rented for a day rate of \$39.50. A special teaching aid, the Libra Freepress, is available to accompany the film. It is a newspaper such as that which might be produced aboard a space community like "Libra". More information is available from World Research, Inc., 11722 Sorrento Valley Rd., San Diego, CA 92121.

ROLLING STONE SPACED...Los Angeles...Rolling Stone, a counterculture and rock music magazine, has published an article entitled: "Space, the Last Frontier" by writer Ed Zuckerman. Zuckerman attended the AAS Annual Meeting at the Airport Hilton last October in San Francisco, and interviewed many of the attendees. These interviews form the substance of his story. The article, which is mild in tone compared to past Rolling Stone excesses on topics such as nuclear power, discusses both the near term NASA-oriented plans for the Space Shuttle and more ambitious ideas like space settlements

and mining the moon. Subtitle of the article is "Farms on the Asteroids, Hotels on the Moon". Among the disparate people interviewed is Dr. John Carruthers, Director of NASA's materials processing program, and Timothy Leary, who is now promoting space migration. A special article following the primary piece discusses OTRAG. The article is on page 68 of the October 19th issue.

SPACE MEDAL OF HONOR...Kennedy Space Center...Six astronauts have been named by President Carter to receive the newly established "Congressional Space Medal of Honor". They include Neil Armstrong, John Glenn and Virgil I. (Gus) Grissom (posthumous). The medal is given to any "astronaut who in the performance of his duties has distinguished himself by exceptionally meritorious efforts and contributions to the welfare of the Nation and of mankind".

NSI INSIGHT...Washington... The National Space Institute has changed their monthly newsletter's name and format. The new magazine is titled Insight, and the premier issue concentrated on the dual perceptions of the "Space Race" by the U.S. and the U.S.S.R. Insight also reported that the booster for the Soviet Space Shuttle (Report, April, 1978) is soon to undergo flight tests at Tyuratam. For more information on Insight, contact the National Space Institute, 1911 Fort Meyer Drive, Suite 408, Arlington, VA 22209.

NAVSTAR NOW WHITE HOUSE PROBLEM...Washington... The Carter Administration is soon to make a decision concerning the use of the Air Force's NAVSTAR navigation satellite system by private users. Ultimately employing 24 satellites, the system would permit users to locate their position with an accuracy of thirty feet in all directions. Provided that the other armed services agree to use the satellites, the possibility exists that private manufacturers of aviation equipment may be allowed to manufacture low-cost receivers for commercial and private aircraft in the 1980's.

LUNAR PROCESS INDUSTRY...Houston...Science News (Sept. 23, 1978) reports that Robert D. Walton of the Lunar and Planetary Institute in Houston is conducting an ongoing study of means to establish chemical processing plants on the lunar surface. According to preliminary results, a thirty ton plant on the lunar surface could produce thirty tons of output (metals, silicon, oxides and oxygen) per week. However, Walton sees no real effort being made to actually establish such plants for another ten to fifteen years.

LARGE SPACE STRUCTURES STUDY...Seal Beach, CA...Rockwell Corporation has been awarded an 18 month study contract by the NASA Johnson Space Flight Center, Houston, to investigate large space structures. The \$500,000 contract will study the means by which to best approach the problem of building large space structures, and the methods, fixtures and equipment necessary. The role of man will also be investigated, with an eye towards developing technology to "get us to the mid-1980's", according to project manager Ellis Katz of Rockwell. Two possible missions which could be studied include a Solar Power Satellite test article (with microwave antenna), and a large communication antenna on the order of tens of meters in diameter, with thousands of spot focused beams. The latter structure could be used for a hand held personal communicator project.

IAF PAPER AVAILABLE...St. Paul..."Advanced Propulsion Systems and Solar System Spaceships", a paper to be presented at the 29th Congress of the International Astronautical Federation in Dubrovnik, Yugoslavia by Foundation staffer Gary C. Hudson, is available at no charge from Foundation, Inc. The paper discusses in general survey fashion various concepts for high performance spacecraft and their propulsion systems.