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## In This Issue



PHOTO CREDITS—Richard Stefanich (cover); NASA, Michoud (8,9); Oscar and Associates (10); Maj. C. B. Goodie (11); Aerolineas Argentinas (12); Alfredo Dodds (12); By Wingett (14); Vern Manion (15).

ON OUR COVER—About 1,500 persons are working on design and development of the Boeing supersonic transport, a majority of them at the Developmental Center in Seattle. One of its buildings is shown in the cover photo. See next page for more on the SST.

THE BOEING COMPANY
HEADQUARTERS OFFICES
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# BRIEFING

At the recent dedication of the Boeing Space Center near Seattle, James Webb, head of the National Aeronautics and Space Administration, said, "We in NASA will not ignore or neglect our responsibility to work closely with the aircraft industry to maintain our position in world markets, which has such an important effect on our balance of trade and payments. . . . It is clear from the outstanding new research facility which has been built here that the Boeing team has thought about the future and is prepared to do something about it."

The Franklin Institute awarded its Vermilye Medal to Boeing President William M. Allen on November 3, 1965, in Philadelphia, in recognition of outstanding contributions to industrial management. There have been only 10 recipients since the award was established in 1937.

The world's most advanced wind tunnel for helicopter and vertical takeoff and landing research will be built by the Vertol Division at Morton, Pennsylvania. Construction will begin in 1966 and the tunnel will have a 400-square-foot test section and wind speeds to 250 knots. The test section will be used in either a closed or open throat configuration or with slotted walls to reduce wall interference. A moving endless belt, mounted on the floor, will be used to obtain ground effect data.

Airlines ordering new Boeing jetliners in recent weeks included Qantas Empire Airways, three 707-320Cs; Ansett-ANA (Australian National Airlines), one 727-100; Trans-Australia Airlines, one 727-100; Northwest Airlines, six 707-320Cs, and Braathens S.A.F.E., three 737s.

Webster defines a module as a unit of measurement. The new Dictionary of Astronautics by J. L. Nayler says that a module also may be a single assembly of functionally associated parts mounted together. In this and other ways the new dictionary recognizes space-age changes in the English language. The 320-page illustrated dictionary contains much detailed information on such topics as launching spacecraft, orbits and instrumentation of satellites, and space navigation. It is published by Hart, 74 Fifth Avenue, New York City.

***How can we retain the advantages of private enterprise in projects which require government participation?***

# THE PUBLIC-PRIVATE ENTERPRISE

*The following address was made to the Detroit Economic Club on November 1, 1965.*

By WILLIAM M. ALLEN
*President, The Boeing Company*

IN TALKING to you, or I would rather say with you, I have a question that I would like to explore, more than to answer. It is a fairly large question: How can we retain the advantages of private enterprise in major projects which, because of their scope or for other reasons, require government participation?

The question arises primarily because of the explosive growth of technology which permits undertakings that could hardly have been imagined a few years ago. I am going to use the supersonic transport as an example, but I am not necessarily referring to this alone. There is the consideration being given to government-sponsored technical development in the field of high-speed urban and interurban ground transportation. There are the possible projects ahead such as conversion of sea water or some new application of atomic power. Power and water are already heavily government-financed; we do not know what the commercial aspect of these new approaches may be.

We have the recent instance of the communications satellite system. Here the capability for private financing existed, but there was the need for use of government launching facilities, and a question of private ownership of a public service device. As you know, that question was debated for some time in Congress and a suitable private enterprise answer was found in the Comsat Corporation, with government representation on the board of directors.

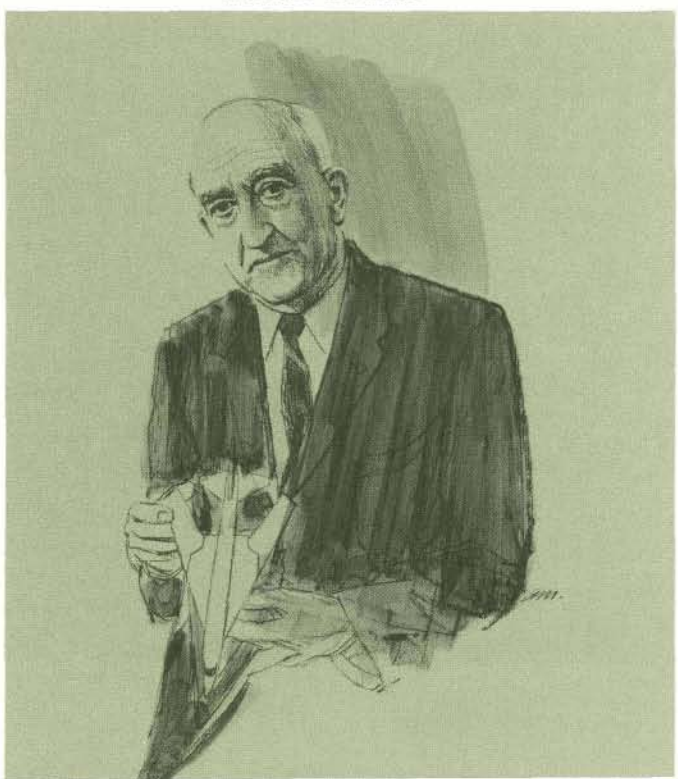
It seems evident that the technological possibilities ahead in the field of air transportation are immense, but that so also will be their complexity and their cost. Let's compare the situation today with that of 40 years ago when there was a vision of flying the Atlantic. Prize money was put up, individual initiative went to work, some lives were lost, but Charles Lindbergh made it. Today there is the vision of flying to the moon. An enterprising individual could scarcely make it on his own, nor can a single company. It becomes a public enterprise. But it can be done. Many other amazing things can be done—but there must be some choices made from the standpoint of cost.

In the case of the supersonic transport, the British and the French faced this problem of cost and the result was a joint project between the two nations. We may see more of this type of solution in the future. But the same consideration emphasizes the importance of finding the most workable form of collaboration between government —representing the public—and private interests, so that such programs will be feasible and yet the dynamics of successful commercial operation will be preserved.

It is not merely a theoretical question. The answer will be found in the next six to nine months in the case of the supersonic transport. Both the government and the contractors involved in the present development phase have recognized by contract the fact that there are many areas of concern, as to roles and relationships and financial commitments, to be resolved between the parties. Therefore there has been established an orderly procedure for getting these subjects on the table and mutually determining the most desirable ground rules before the next phase of work —the prototype construction phase —goes forward. I feel that our government, particularly the Federal Aviation Agency which is administering the contracts, is to be commended for making the provision it has for this determination. I would like to add that we appreciate all that the government has done to move this program forward.

It is not going to be my purpose today to advocate any particular

*William M. Allen*



solutions, but rather to review with you some of the considerations to be faced and to comment on them briefly as I go along.

Let's look more specifically at the SST — the supersonic transport. Here is a case where the risk exceeds the present resources of any one industrial organization engaged in the business, but where there is a known future market of considerable proportion. The product will have the ability to operate at costs competitive with the best of present jet equipment while at the same time cutting travel time by half or two-thirds. The risks grow out of the high cost of development, the long period of time—probably 15 years or more—before profit could be expected to be returned on initial investment, the uncertainties of economic and market developments in the intervening time, and the technical risks—such as the effect of sonic booms—with the possibility of major engineering changes. There is an economic limit to the mark-up that can be introduced in the price of the product to pay back the cost of development.

Some of these uncertainties would be reduced with the passage of time and with further technical development, but there is meanwhile a competitive program moving forward in Europe. This could, if unchallenged, absorb much of the initial market. If the market demand were the only determinant, the product would possibly materialize at a time when the need for it and the profit potential would be commensurate with the risk—but the competition is forcing. The national question of maintenance of our country's position as the leading supplier of domestic and world transport aircraft, and several billion dollars of foreign business to aid in solving our balance of payments problem are involved.

The fact that the competition consists of two foreign governments has had the effect of pressing our own government into action. This is not to say that private industry was not already taking action. In our own case we had invested a good many millions of dollars in the development, and we are continuing to do so, but we cannot launch a marketable product without an exposure which would be several times our total net worth. Even if the project could be financed by private borrowing (and I do not believe this would be possible) there are a number of risk areas that could result in bankruptcy.

This leads us to the question: When is public investment (that is, governmental investment) in such an undertaking justified? I can suggest a few conditions: only when the public will get value received in the fulfillment of a need; when it makes possible what would otherwise be impossible, by spreading the risk over the entire nation; when it will stimulate rather than slow down economic progress; when it maintains U. S. industrial supremacy, thus contributing to favorable balance of payments, or forestalling the adverse balance that could follow as a result of allowing foreign competitors to get ahead in the field. Another condition is, of course, when it contributes to our national security. This security is now defined in terms of both economic strength and superiority in physical equipment.

The supersonic transport fits fairly well all of these conditions, including the two conditions of national defense. But it does not have a present defense market to help pay development costs, so that other means of financing must be sought.

Some may raise a question as to whether a monopoly situation may result from the SST program, with its implied possibility of excessive prices and profits. I feel the answer is that the safeguards are inherent in the situation itself—the foreign competition, the manufacturer's incentive to extend his sales in order to redeem his substantial investment, and the fact that his most precious asset will be at stake, namely, his relationship with his commercial customers and with the U. S. government.

In any event, from the foregoing let us assume that there are conditions in which a public investment in an essentially commercial program is justified.

Now I'd like to get back to the subject of the technology that makes these projects possible. We must ask ourselves, what has brought this technology into existence? To a degree it has been the stimulus of government programs. But an equal factor, certainly, has been the motivation of competitive incentives—the willingness to venture where reward is possible—that has resulted in a whole complex of capabilities in this country. Our competitive system has given rise to the conditions of freedom and flexibility and to the financial, physical and human resources that now make it possible to execute such major undertakings as we are discussing. To use an example from our own experience, it was a private venture investment in the development of a prototype jet transport that got under way the large present production of jet transports for the world market. There is almost unanimous agreement that the flexibility and dynamism of our privately based economy is an actual resource in our country which should be preserved. The question is how to do so in entering upon a possible era of major projects in which the decision-making is at the government level. To put it another way, is it possible to utilize the financial resources of government without impairing the advantages of this other basic American resource of which I speak?

This question leads to another: If some form of industry-government partnership is required in order that a new economic need may be successfully filled, what considerations of the private market economy must be preserved? I will mention a few that I think apply in the case of the SST.

First, there must be a responsiveness to market needs and changes. We have built many products for the government, but up to now the government—a military service or the National Aeronautics and Space Administration — has been both the buyer and the ultimate operator of the equipment. In the case of the SST, the government is not the user, even though it may have the role of sponsor of the program. The commercial airlines are to be the ultimate buyers and operators of the equipment. There are indications that this difference from normal government procurement is already causing problems as to responsiveness to market in the case of the British-French Concorde supersonic transport project. There is the complaint that the airlines are having little to say about the airplane being developed. We believe one of the major reasons for the success of our American transports has been the participation of the airline customers in our developments. The ultimate customer—the public and the airlines—must be well served.

Second, the program, once committed, should not be subject to dislocation because of political developments affecting the availability of funds, such as defense requirements, domestic programs, a national election, etc.

Third, a condition for success is that there be clear responsibility. Here we confront new potential problems. Responsibility is naturally related to risk. Suppose the government assumes the major risk of financing the program and the responsibility of management direction. The manufacturer, on its part, might well be risking as much as its corporate size would justify but without the freedom to make the moves it thought necessary to protect and enhance its investment. In a commercial venture, as we all know, the responsibility flows in a direct line from the manufacturer to the customer. For best effect, we must somehow preserve this relationship.

Also in the realm of responsibility, there is the further question of possible complication and encumbrance resulting from the number of interests and agencies involved. In the case of the supersonic transport these include the Federal Aviation Agency, the Civil Aeronautics Board, National Aeronautics and Space Administration, Department of Defense, Department of Commerce, Congress, the Treasury Department, and the Bureau of the Budget. It is important to industry and government alike to consider the question of what may be done to avoid the complications that could result from this multiplicity of interests.

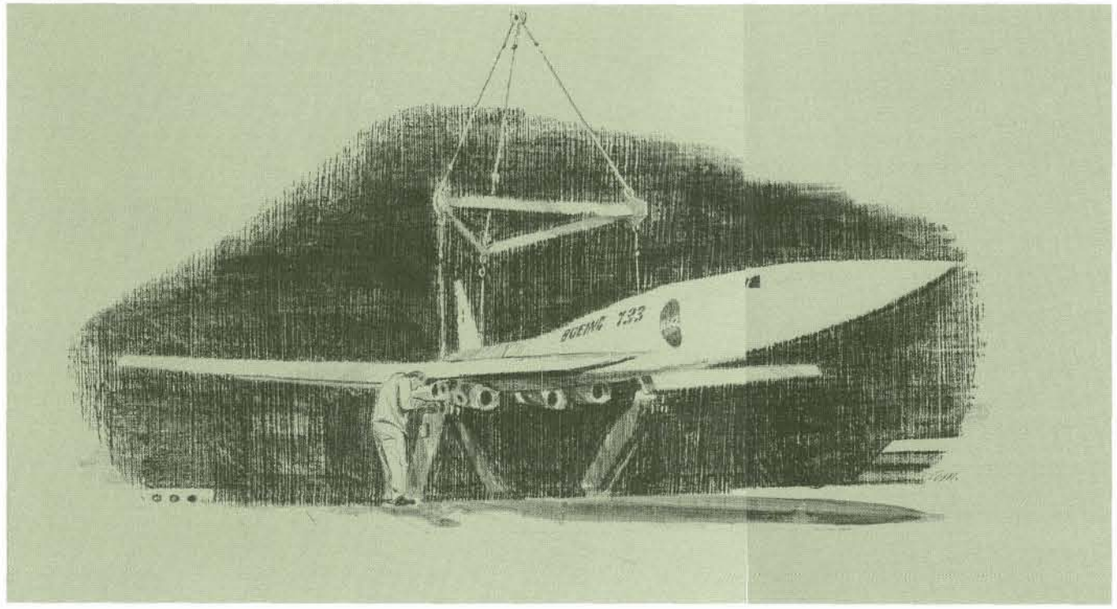
Fourth, there must be, for success, both freedom and incentive to introduce improvement and innovation in the course of the program when it is economically justified, or dictated by judgment for reasons of safety, or when it will improve marketability. These freedoms are inherent in the straight commercial venture. They must somehow be preserved where the government is also involved.

There are various other requirements: Delivery on schedule, obtaining the best product at the lowest cost, freedom on the part of the manufacturer to apply the knowledge gained in its work on other programs. All of these are sound objectives which must be provided for.

Now keeping in mind the purposes we are endeavoring to serve, we can take a look at some of the questions that arise in considering the relationships to be established in the enterprise.

Let's say the prototype airplane is to be constructed under government procurement contract on a cost-plus-fixed-fee basis, with incentive features such as apply in a military developmental contract—and a good case can be made for this form of full financing by the government. Here are typical questions to be faced: Who will own the design and the right to commercially exploit it? Who will own the new aerodynamic, structural, system and sub-system knowledge which could be applied in many other realms? How are airline customers to be assured of a place as principal determinants of the product speci-

*Many wind tunnel tests are made of SST models.*



fications? What degree of government supervision is to apply during performance of the contract?

There are varying philosophies existent in Washington today, as to the most effective way of administering military procurement contracts. One school holds that the buyer should specify what he wants the equipment to accomplish, then leave it to the manufacturer to devise his means of accomplishing this, subject to penalties if he fails. Another school says it is impossible to foresee all the conditions that must be served and that the government's interests are best enforced by careful monitoring and control of all the steps along the road. Our own preference would be the former, but there is also a middle course. We now have intricate procedures for self-discipline to insure that a contract is performed most economically and with greatest reliability and product assurance. We further have developed means for exhibiting or demonstrating to the buyer the proof of this discipline along the road. Thus we have means of retaining management responsibility and still supplying the buyer's legitimate need for assurance.

But there are other questions. In the event that provision is included for government recovery of its investment, there will be the need for setting a proper limitation on the mark-up in the sales price of production models for the purpose of this repayment. An attempt at too rapid a recovery could result in a price that could critically reduce the number of sales. There is the further possibility of the European Concorde being priced to advantage as a matter of government policy, since it is wholly government-financed. Therefore, the question must be raised, should some portion of the U. S. government investment —and if so, what portion—be immediately written off? It may be decided that some such action is necessary and in the national interest in order to maintain America's position of leadership as a supplier of commercial air transportation equipment. However, we by no means wish to regard the SST as a subsidized program. Our objective should be to completely liquidate the public investment if this can be accomplished.

Getting back to the government contract, it is probable that the government will not feel justified in assuming 100 per cent of the costs, even though it is to be subsequently reimbursed from sales. Now the consideration arises of how much financing a given company can afford to venture—what must be the limit of its risk? The entire financing capacity of a corporation cannot be committed to a single program; there are other product programs also to be carried forward.

Other possible arrangements may come up for examination, including financing by some form of consortium or special corporation with government underwriting of the risk, which could require enabling legislation.

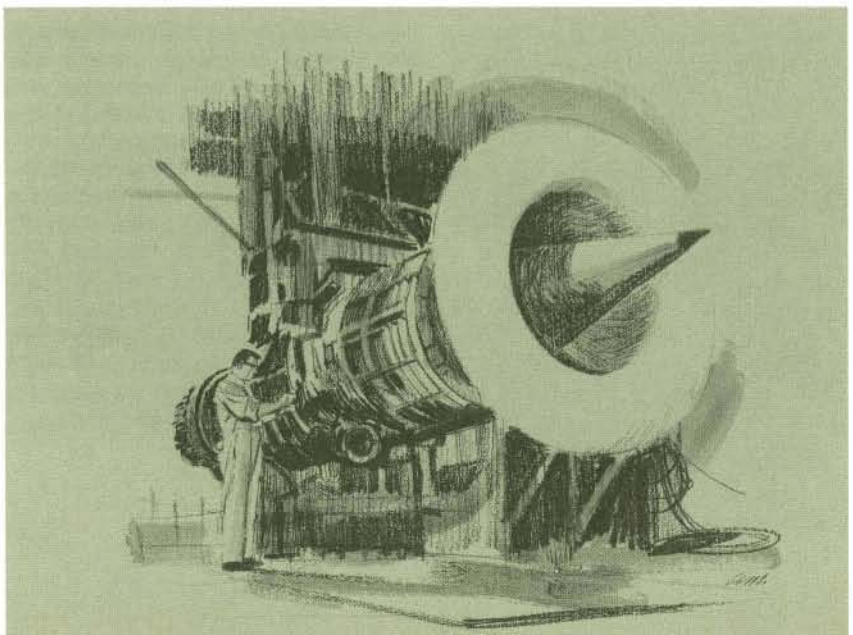
Suppose, for example, it were accepted that the program is economically justified, that ultimate profits could normally be expected to repay the investment, but that the magnitude of the effort and risk is such that commercial financing is simply not obtainable without suitable risk insurance. If this were to be provided by the government, it would mean that any large loss would be borne by the public as a whole. This would require the advance authorization by Congress of sufficient funds to cover the risk. Conceivably such a development underwriting fund could be set up on a permanent basis, to be replenished from successful sales of the product and perhaps used to underwrite other major projects in the future.

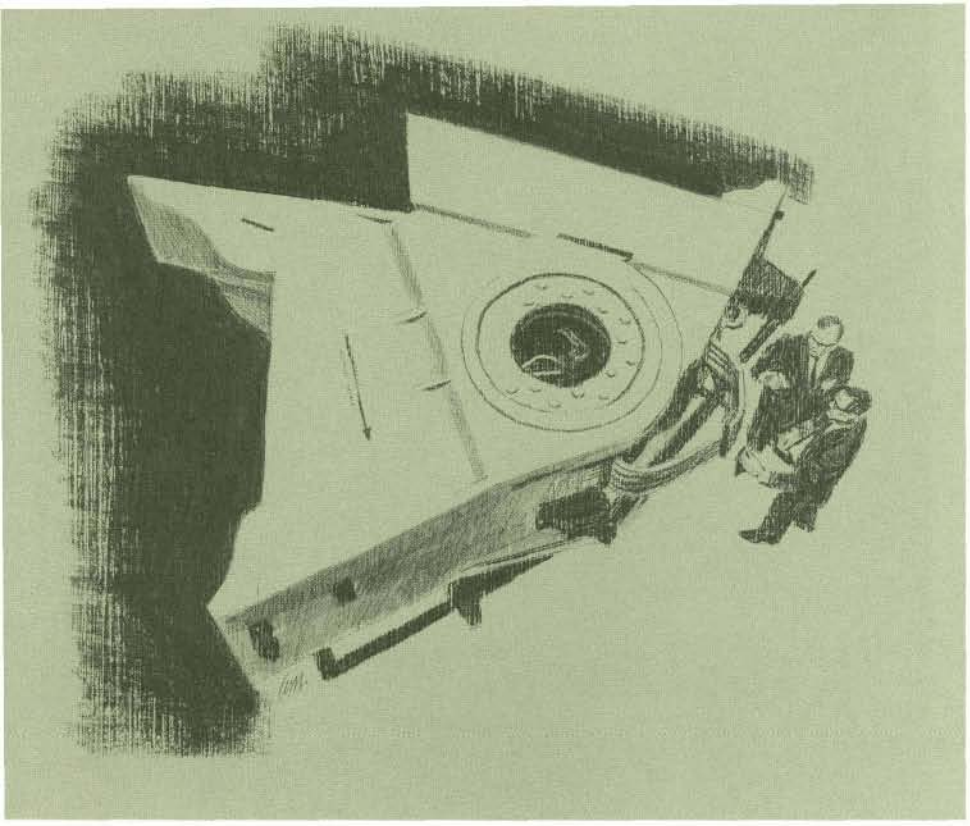
In the event of this type of approach, it would still be necessary that the manufacturer's participation be on a basis that would not bring him completely under the direction of the banker in the case, and thereby lose the required freedom of action. The customer airlines would have this same interest to be protected.

I have tried to indicate that there are many important questions of relationships and responsibilities to be studied, whatever the approach turns out to be, as these matters are given consideration by both government and industry in the coming months.

In the collaboration that is involved, a natural difference of points of view must be recognized. The corporation goes to the government for money but would like freedom from government control; the government may feel, on the other hand, that with the advance of money goes responsibility, and that it can make a contribution toward gaining a better result. Our industry is quick to acknowledge that in the case of both Department of Defense and NASA programs the government agencies have made a contribution, and that a working teamwork has developed. In these

*An SST engine is prepared for test run.*





*SST wing-joint mockup speeds development.*

instances a direct buyer-seller relationship is involved. But there has to be, as we have seen, a new examination of roles in the type of venture we are discussing, where the product is designed for commercial use. Past experience in the airline business has indicated that straight commercial competition has best served the interests of economy, advancement, and reliability of service. What everyone seeks is a means of still retaining the value of this function under the new circumstances. To do so would appear to require a form of government assistance related primarily to risk assumption and appropriate monetary recovery without impairing the necessary freedoms in dealing with airlines, in design, development, test, manufacturing, in program decisions as to models, rates, prices, and so forth.

I have touched on some of the problems, but certainly not with the thought that they are insoluble. On the contrary, there is great incentive on everyone's part to arrive at sound solutions. It is important not only to the SST program but to the future of our way of doing business in this country, that we come to right conclusions on these questions. We have emerged into a new type of world, differing from that in which America achieved its industrial supremacy. We are only beginning to become familiar with the phenomena of this new world: The increasing role of government, particularly abroad; the internationalization of production and of markets; the ever-changing effects of the technology explosion; the government funding, to a considerable extent, of this technical revolution.

We are stepping up to a new kind of venture. What is done with it may determine in part the formula for other giant ventures yet to come, not only in aerospace but in other fields. The ground rules to be established, the ways of maximizing the advantages of our private business system while moving forward, may, to a degree, point the direction and success of our future economy.

I have been using the supersonic transport as a specific case example, and an important one in the public interest. Let me summarize my view of the situation in this case. I feel the circumstances surrounding the design and development of the SST will be such, of necessity, that the manufacturer will have such a large stake in the enterprise that there should be no worry as to his motivation to do the best possible job on the project. The effect of this will redound to the benefit of both the airlines and the government. The manufacturer's stake will include the dedication of very extensive new and existing facilities and of the best people that we have, over a long period of time — 15 years or more — to the effort. It also includes prior research and development. In Boeing's case we will have a company investment of 30 to 40 million dollars in the program by the end of the present preparatory design stage, plus a substantial investment in plant and equipment to do the job.

I believe it is generally recognized that in the development of the subsonic jets the aircraft companies took as great a risk, or greater, than their size and capitalization really justified. In the supersonic transport, the proportionate risk they will be taking will be equally great, if not greater.

Because of this heavy commitment, there is, in my view, as much motivation for private enterprise to do its very best—that is, to serve the public interest—as if the program were wholly its own. In other words, I feel that if a private company has a sufficient stake, as it will have in this instance, so that the government will feel warranted in giving to private enterprise the flexibility and freedom to do the sort of job it would do on its own, we should have a good basis for a successful program.

These are some of the matters that will be getting consideration as the SST program moves toward the next phase, of actual prototype construction. I repeat, it is important to both the public and industry that we find the means that will assure the best result. Our national competitive position is involved, our balance of payments, the ability of private enterprise on the American plan to compete with government enterprise abroad.

My point is this: If there is to be a government-industry partnership in an essentially commercial venture, we must be sure that it rests on the soundest possible basis. There is a great deal at stake, most important of all the success of the undertaking.

***Moon rocket tests are scheduled at new Mississippi facility***

# A ROAR FOR PEARL RIVER

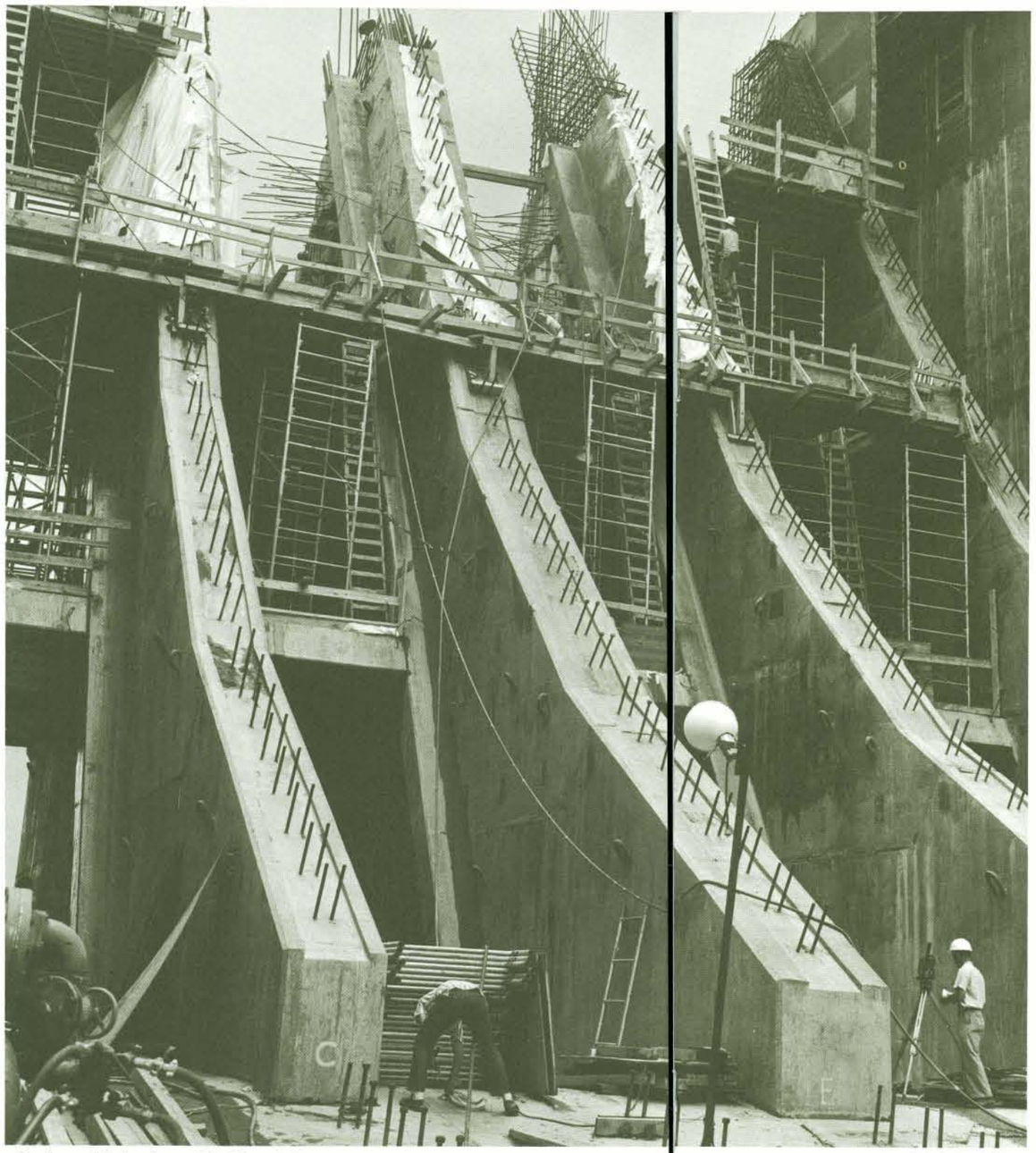
THE SLOW-PACED and placid Pearl River of Mississippi has neither falls nor rapids, but it soon will have a roar.

A new installation of the National Aeronautics and Space Administration approaches completion on the river. Called the Mississippi Test Facility, it still is in the activation stage. When construction is completed on the 142,000-acre site, both the 138-foot S-IC and the 82-foot S-II—first and second stages of the Saturn V moon rocket—will be tested there. They will come in by barge.

The first three S-ICs are being tested at the Marshall Space Flight Center, at Huntsville, Alabama, where initial tests on the first ground-test rocket have been completed. That stage later will be barged down the Tennessee River to the Ohio, to the Mississippi, out into the Gulf of Mexico and back up the Pearl River to the Mississippi Test Facility. Later, all the huge moon rockets will be ground tested at MTF and Boeing will be doing the job.

Construction at MTF is scarcely 2½ years old. MTF was carved from a pine and cypress woodland in Mississippi's Hancock County and in a short time turned into an ultra-modern space-age park.

Boeing's job at MTF is just beginning. The company's staff on the site will build up to 320 people by early 1967, when the S-IC-4—the fourth flight model and the second flight stage to be built by Boeing—is scheduled to barge up to the base of a 400-foot test tower. The rocket will be lifted by crane and placed in one of the dual cells for static firing.



*Rocket will sit above this blast deflector structure.*

*Boeing men at MTF include Manager William Holmes (left) and Bel Whitehead, test engineering head.*

Boeing has as one of its present functions the surveillance of the brick-and-mortar stage of test-stand construction, which is being handled by the Corps of Engineers.

Boeing also is writing requirements for control, check and data-collection equipment which will be used in the tests. After concrete is poured, the work of installing the test equipment in the tower and the control building will begin. In the case of the tower, this means work in Mississippi's tallest building. Eventually, Boeing will move into the completed facility and run the actual tests of rockets numbered four through ten, with possible addition of five later in the program.

General Electric Company, the site support contractor, has charge of the computer data-storage system.

In addition to the two-position stand for the S-ICs, two separate stands are being constructed for the S-IIs. A laboratory and engineering complex, an industrial complex, seven and a half miles of man-made canals, a lock, a bridge and a network of roads and railroads are being built.

Present manpower count at the site exceeds 5,000. It will drop by 2,000 or so when construction and installation work are complete. Boeing, North American Aviation (the S-II builder), General Electric and NASA, which is in overall charge, have personnel there.

The S-II test program is farther along than the S-IC. The first rocket has been delivered and testing is expected to begin this winter.

MTF is about 35 air miles from downtown New Orleans and 45 water miles from Michoud, where Boeing is building the S-ICs. Waterways between Michoud and MTF are not so spacious and deep they can carry any size shipping. A relatively small barge is used for the short trip up the Pearl River.

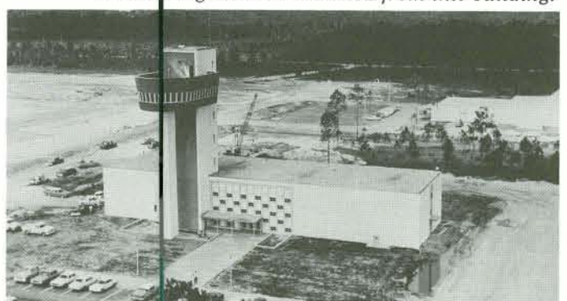
The MTF site was picked for several reasons. It is in a sparsely populated area where relatively little evacuation was required because of the high noise level of rocket testing. The site is close to the Gulf Coast, so shipment of stages to Cape Kennedy will be reasonably simple. The two lower stages of the 364-foot Saturn V are so big that long-distance highway transportation is out of the question.

NASA's acoustics experts concluded early in the program that two zones should be designated for the site. One is the central test area, 813,500 acres immediately around the test stands. In that area the sounds from test firings, particularly from the 7,600,000-pound-thrust S-IC, will prohibit any use other than testing. Another 128,000 acres of buffer zone surrounding the test area is too close for permanent residents, but can be used for hunting, fishing and farming.

The Pearl River once before was a boom area, when loggers were cutting pine forests and the river was alive with cargoes shipped from a community named Logtown. Pioneers found large oysters on the banks of the nameless stream and hopefully named it the Pearl River. The dream of shining pearls never became a reality, but a more fantastic vision of men flying to the moon will be tested here.

*Photo shows S-IC test-stand construction October, 1965.*

*Rocket firing will be controlled from this building.*



*John Yeasting holds citation accepted on behalf of men and women of Boeing Commercial Airplane Division. Sperry Medal winners are, from left: William Cook, Maynard Pennell, Richard Rouzie, John Steiner and Richards Loesch.*

**Sperry Award is received by**

## THE TEAM THAT LAUNCHED A THOUSAND SHIPS

THE NAME of the man who engineered and produced the first wheel and demonstrated it in use is lost in the mists of pre-history. More's the pity, for he effectively created the art of transportation.

We know the later names; it was a leap of millenia from the wheel to the first application of mechanical power to the transport of man and his goods. Newton, Huygens, Trevithic, the Stephensons, Baldwin, Benz, Olds, the Wright Brothers—the list of individuals swells in almost geometric progression into the 20th century.

It is a matter of pride for the man, his associates and his company when one is singled out by his peers for honors in his field. It is a matter of even deeper gratification when the teamwork of five men is so honored and the essential contribution of more than twenty thousand others is recognized for "a distinguished engineering contribution which, through application, proved in actual service, has advanced the art of transportation whether by land, sea or air."

On November 9, before more than twelve hundred members and guests at the Winter Annual Meeting of the American Society of Mechanical Engineers, five Boeing engineers were awarded the coveted Elmer A. Sperry medal for just such a distinguished engineering contribution—the concept, design, development, production and practical application of the Boeing Family of Jetliners. In the same presentation, the men and women of the Boeing Commercial Airplane Division were cited for their dedicated effort in the jetliner program.

Receiving the Elmer A. Sperry Award medals for 1965 were:

Maynard L. Pennell, now a Boeing vice president and supersonic transport program director, for leading the team which produced America's first jet transport and guided evolution of the jetliner family.

Richard L. Rouzie, director of engineering in the Commercial Airplane Division, for his leadership in engineering production which assured the orderly and on-schedule production of the jetliners.

John E. Steiner, chief project engineer for the 727 and 737 jet-transports, for applying airline requirements and operational standards to the design of the jetliner family and leading development of the 727.

William H. Cook, assistant program director—technical of the supersonic transport program, for leadership of the applied research which served as the basis for the engineering excellence of the jet transport family.

Richards L. Loesch, Jr., chief of flight test, Commercial Airplane Division, for continuous leadership in the flight test programs of the 707-720-727 series which established practical operation.

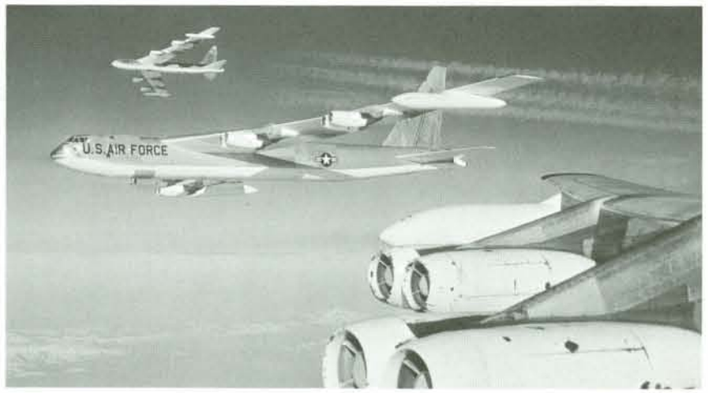
When the medal winners had received their awards, William Littlewood, vice president of American Airlines and a member of the Sperry Board of Award who had introduced the recipients, called forward still another: John O. Yeasting, Boeing vice president and general manager of the Commercial Airplane Division, to receive the citation on behalf of his team—the men and women of his division—for their "dedicated effort and essential contribution to . . . the family of jet transports." Yeasting received the certificate from the hands of Glenn B. Warren, chairman of the Sperry Board of Award.

Representatives of five of the most prestigious engineering societies make up the Sperry Board of Award: The American Society of Mechanical Engineers, the Institute of Electrical and Electronic Engineers, the Society of Automotive Engineers, The Society of Naval Architects and Marine Engineers and the American Institute of Aeronautics and Astronautics.

The award, established in 1955, commemorates the life and achievements of Dr. Elmer Ambrose Sperry whose inventiveness contributed greatly to the advancement of the art of transportation.

In both William Littlewood's introduction and Maynard Pennell's acknowledgment of the awards, one factor was stressed: team effort is the essential of progress in the complex world of today's engineering science. Without it, the new dimension in air transportation typified by the Boeing jetliner family would have been impossible. With it, the intercommunication between peoples which contributes to world understanding, stability and progress has been stimulated on an unprecedented scale.






*SAC author-photographer took many photos of Boeing B-52 bombers.*

**New book portrays Strategic Air Command**

## GOODIE'S GOODY

By DARRELL BARTEE

A PHOTOGRAPHER with a flying, prying camera has produced a full-length picture of the Strategic Air Command, in book form. He knew where the action was because he is a veteran SAC combat crewman himself.

Maj. Clifford B. Goodie is a navigator with the 92nd Strategic Aerospace Wing, Fairchild Air Force Base, Washington, with more than 5,600 flying hours in B-29s, RB-47s and B-52s. His new book, "SAC: A Portrait," contains some 200 photos of SACmen and their weapon systems.

*Maj. Clifford B. Goodie*

In a foreword to the jumbo-sized volume, SAC Commander-in-Chief Gen. John D. Ryan speaks of the "special significance" of the book and calls attention to the first-hand experience of the author.

Photos of Boeing B-47s, KC-135s, B-52s and Minuteman missiles occupy many of the 191 double-sized pages of the work. Major Goodie has included unusual views of SAC's underground command post, alert duty at various bases, and shots telling the story of SAC training. The human element is in the foreground, where it belongs. The publisher is Simon & Schuster, New York; the price is $9.95.

*Sculpture decorates promenade outside Mar del Plata Casino.*

*Brigadier Roberto Garcia Baltar*

### South of the Parana River

# CHRISTMAS COMES IN SUMMER

By ROBERT NEPRUD

IN 1966 it will be possible to enjoy Christmas in South America's summer by flying from New York, Miami or Western Europe to Buenos Aires and other southern capitals aboard one of Aerolineas Argentinas' new, long-range Boeing 707 Intercontinentals. The government-owned airline recently ordered four of the turbofan-powered sky giants.

In announcing the purchase, Brigadier Roberto Garcia Baltar, the airline's president, noted that the new jets will approximately double the number of seats available on the carrier's international flights and will greatly augment cargo-carrying capacity.

Argentina, a large and progressive country, owes much of its recent growth to aviation. Because it is a land of vast distances and terrain as varied as Andean peaks, tropical jungles and table-flat pampas—with the wild and windy wasteland of Patagonia tossed in—it long has depended on airplanes to provide its scattered people with a communications lifeline.

Origin of Aerolineas goes back to Aeroposta Argentina, which had its beginnings in 1927. First flights by the pioneer carrier were between Buenos Aires and Asuncion, Paraguay, in a French Latecoere Model 25 single-engine monoplane with room for four passengers. Intermediate stops were made at Monte Caseros and Posadas, two inland communities.

Late in the year of its inception, Aeroposta tackled the formidable task of extending service south to the territory of Patagonia from Bahia Blanca, a seaport on the Atlantic coast.

Sheep farmers and petroleum experts soon were making use of the aerial seven-league-boots provided by Aeroposta. Mail moved on wings instead of via tedious overland routes or in the holds of coastal steamers.

Aeroposta again extended service southward, with intermediate stops, to the town of Rio Gallegos near the Straits of Magellan, where winds howl almost continually and claw at men and aircraft alike with a blind fury. On some days a 20-man detachment of soldiers from the local Army garrison was required to hold down the frail aircraft and pull it into the protection of a hangar. On windier days, take-offs were made with practically no run, as giant gusts literally lifted the light monoplane into the sky.

In 1936 a group of Argentine businessmen purchased Aeroposta from the original owners. The new management promptly bought several German Junkers JU-52s.

Additional airports and improved ground facilities, including workshops, were established and routes were extended deeper into Patagonia and elsewhere in Argentina. About this time the Argentine government became a partial partner, contributing to the company's capitalization and maintaining ground, radio and weather installations. The airline prospered under the mixed plan. Aeroposta added DC-3s to its fleet and extended its routes.

The years immediately following World War II saw the creation of other mixed-enterprise airlines in Argentina. Among them were Flota Aerea Mercante Argentina (Argentine Merchant Air Fleet), which began to serve Chile, Brazil and parts of western Europe in mid-1946. Zona Oeste y Norte de Aerolineas, covering the western and northern regions of the country, went into operation the same year.

Perhaps the most interesting of the latter-day airlines was Aerolinea Litoral Fluvial Argentina, which used British Short Sandring-


*Painting shows 707-320B Intercontinental jetliner over Iguassu Falls.*

ham flying boats—the civilian version of the wartime Sunderland—to skip up and down such rivers as the Parana and the Uruguay in eastern Argentina.

In 1949 the four airlines merged to create Aerolineas Argentinas. DC-4s and DC-3s continued to be standard equipment, as did the Short flying boats. In 1950, DC-6s were put on flights to New York, to Europe and to some other places. Soon thereafter, Convair 240s were acquired. In March 1959 Aerolineas received its first of four Comets from de Havilland and moved into the jet age.

Many tourists are surprised to learn that Argentina, along with some of its neighboring republics, is more European than Spanish in its atmosphere and background. While Spanish is the official language, many peoples, including Italians, Germans, British and Poles, have made their distinctive contributions to the culture and economy of the country.

With a population of four million, Buenos Aires is the largest city in South America and one of the great cities of the world. It is big, basically modern and animated. Its lights burn long and brightly to the accompaniment of tango rhythms.

Blessed with broad avenues, impressive monuments, spacious parks and a wealth of cultural attractions such as museums, art galleries and fine theaters, Buenos Aires is like Paris in many ways.

For the fancier of good beef, Argentina is a dream come true. Steaks are huge, flavorful and inexpensive. The mixed grills are famous, the local sausages spicy and the meat pies (called empanadas) unforgettable. Wines, especially those from grape-growing Mendoza in the Andes, are excellent.

Popular places to visit are Mar del Plata, a seaside resort renowned for its beaches, casinos, good fishing and fine seafood; San Carlos Bariloche, in the Argentine-Chilean lake district, where mirror lakes and extinct volcanoes enrich the sylvan scene; Iguassu Falls, where 275 separate silver cataracts and a casino beckon; Cordoba, second oldest city on the Continent, exuding history and colonial charm; La Plata, famous for its university and its horse racing, and El Tigre, a boating haven situated on the delta of the Parana River.

This is only a sampling of the attractions of Argentina. The sensible course is to start making plans for a trip. Remember that Christmas comes in summer.

## WEAPONS MAN

WHEN the floor collapsed inside his newly acquired but aging cabin on Whidbey Island, near Seattle, Richard A. Montgomery wasted no time impugning the laws of nature governing termites and the useful life of wood. He simply installed a new floor and made plans for an entirely new structure.

As director of Military Systems, Aerospace Group, Montgomery brings a similar action-oriented approach to his job. His organization evaluates potential military needs and then develops concepts to fill them. A crystal ball, however, even if a working model could be found, would be a doubtful item in Montgomery's office. "He'd want to see a circuit analysis first," said an associate.

Technologically aggressive, Montgomery is known for an ability to penetrate quickly to problem sources. On the personal level, his manner gains swift rapport with military and government people, due in part to his ability to speak their language. Montgomery's method is deceptively simple: he places himself mentally in the customer's shoes and lets the pinches help to evaluate the view.

Canadian by birth, Montgomery holds a bachelor's degree from the University of British Columbia, plus a master's and a doctorate from the California Institute of Technology. It was as Dr. Montgomery that he came to Boeing in 1951, following work on anti-submarine warfare programs on the East Coast. His company service was interrupted by 2½ years spent with the Department of Defense as assistant director for strategic weapons. Montgomery still serves DOD as an unpaid industry consultant.

Off the job, Montgomery likes to travel. He and Mrs. Montgomery enjoy live theater and concerts and comprise a tough bridge twosome. The man reads every newspaper he can lay hands on, books, magazines, foreign affairs publications and technical journals. A believer in community service, he is a past water commissioner for his district.

Montgomery is father of six boys who have been active on the Scouting - fishing - golfing - skiing - Little League circuit for years. Working with them, Montgomery developed a respect for young people which has led to still another activity. He is moderator for a senior youth council organized by his church.

Busy Montgomery says, "I've done less than half of the things in life I'd like to do. The list keeps on growing, and I hope I never catch up."

*New method makes accurate space charts possible*

# ROAD MAP TO THE MOON

By WESLEY ROBINSON

WHEN a river pilot starts down the Mississippi, he uses a chart of currents and shoals to pick the best passage. When astronauts start toward the moon, they likewise will need charts. Recently, for the first time, it became possible to make such charts with absolute accuracy, thanks to an ingenious computer method devised by mathematicians Andre Deprit and J. F. Price of Boeing's Scientific Research Laboratories. Using 33 recurrent power series, with elements computed in a repetitive manner, Deprit and Price have succeeded in planning major orbit paths, plotting orbits in the vicinity of the main path, and determining how stable the whole thing will be. A feature of the method is that these things are done by the computer all at once.

"If you could compare an orbit to a piece of hardware, our results would look like a large flexible tube of several interlocking orbits instead of a single stiff wire of one orbit only," explained Deprit. The method is more accurate than classical methods that have been used for over half a century, and from three to 15 times faster. In some cases, an orbit and its stability can be analyzed by the computer in 22 seconds.

Key to the method is the recurrent power series. This process employs the sums of an infinite number of quantities. If the first quantity is known, the second one can be computed. Once the second quantity is known, the third one can be computed, and so on. After a certain point, the quantities become very small and can be ignored.

Earlier techniques individually plotted as many as 4,000 points to determine an orbit path. The new Deprit-Price method may require only 15 or 20 points.

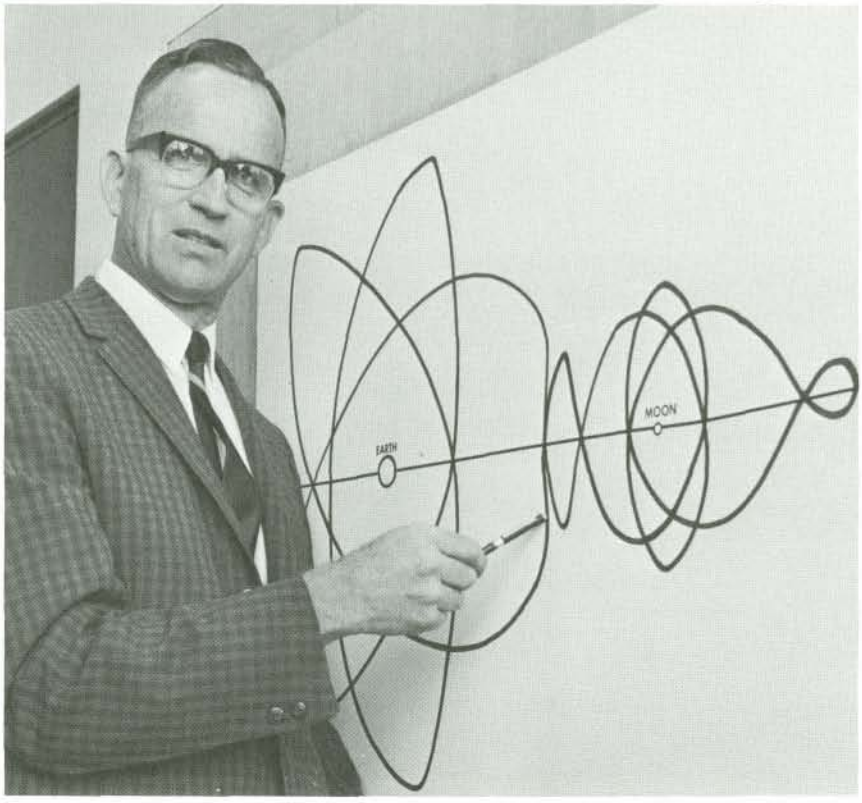
In a recent exercise, Deprit and Price used their method to check a complicated periodic (continuous cycle) orbit. Conceived by scientists as a highway for space freight, the orbit circled the earth three times, then circled the moon three times, then recircled the earth three times in a never-ending cycle. A space freighter in this orbit would require no power, would travel fast and endlessly on its track, yet would stay near the earth and moon for long enough periods to load and unload freight. In most respects, the orbit appeared ideal.

Not so, Price discovered. Slight variations at the beginning of the orbit cycle would cause large variations at the far end of the orbit, making the path highly unstable. A tiny error in trajectory, a slight miscalculation in the mass of either the earth or moon, or variations in the earth-moon relationship could ruin the orbit.

The Deprit-Price computer method holds great promise for research. Given enough computer time, a book of the most feasible earth-moon orbits could be compiled, a true road map through space. Also, Deprit has employed the recurrent power series technique to study the gravity-free planets between the sun and Jupiter. These are minor planets, or asteroids, called Trojans, and are in such a position between the two solar bodies that they are not affected by the gravity of either.

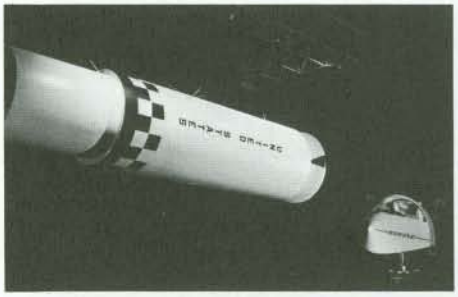
Theoretically, a spacecraft at a similar point between the earth and the moon would remain at the spot forever. Price has calculated the orbits of objects near the Trojan planets for the equivalent of 5,000 years with the new computer method, and has proven that such objects should indeed remain stationary between the larger bodies.

*J. F. Price helped devise method of calculating orbits.*



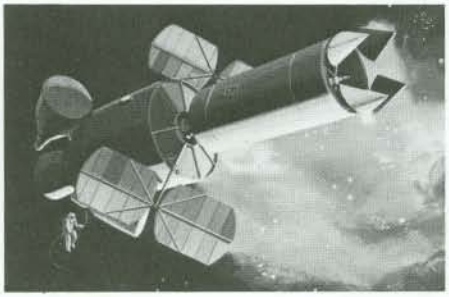

**TWIN TURBINE** Boeing/Vertol helicopters now serve with U.S. Army, Marine Corps and Navy. Sea Knight assault helicopter (at top above) can carry up to 25 fully-equipped combat troops in "vertical envelopment" and other prime missions. It's operational with Atlantic and Pacific Fleet Marine Forces. The U.S. Army's Boeing/Vertol Chinook (pictured with Sea Knight above) has been deployed to Viet Nam with the 1st Cavalry Division (Airmobile). Each Chinook can deliver a complete infantry platoon, or a complete artillery section, to assault landing sites. Chinook is U.S. Army's standard medium assault helicopter.

# *Capability has many faces at Boeing*



**SPACE** maneuvers, such as rendezvous and docking, are simulated in Boeing Space Center. Pilots "fly" spacecraft, controlled through computers, in simulated trajectories, velocities and approach angles of space docking missions.

**WORLD'S** largest rocket, NASA's Saturn V, will launch first Americans to moon. Boeing holds NASA contract for S-1C booster, developing thrust equivalent to 160 million horsepower.



**ORBITING EYE,** a manned telescope to orbit earth 200 miles high, is subject of a Boeing study for NASA. Space telescope could penetrate 20 billion light years, compared to today's three. The Boeing study involves integrating orbital telescope with a manned space station.

**BOEING**

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