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REMARKS PREPARED FOR DELIVERY BY
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TO THE NATIONAL PRESS CLUB
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THE SST AND THE GOOD EARTH

The Supersonic Transport, a development primarily of concern to the aviation and airline industries, has become something of a national issue. A number of people, however, have told me that all they know about the SST is what they read in the papers. And that, of course, is what concerns me.

Jests aside, the merit or folly of the SST program is not determined by any single factor or ruled by any casual appraisal of the issues. I came to this job last April, and I am not yet satisfied that I have examined the full extent of the SST's potential impact on our society. I have explored in some depth what I consider to be foremost among the compelling forces at work on the Administration's SST decision -- those relating to economics and the environment -- and these comprise my report to you today.

Let me just say, first, that before accepting Secretary Volpe's invitation to direct the SST program I spent several months satisfying myself that the development of a supersonic transport was a wise, productive, and altogether fruitful venture for the two participants, the Government and the aviation industry.

Briefly, in the course of my evaluation, I made a complete review of the SST configuration with NASA Langley. I talked with every major U.S. airline president, most of the international airline presidents, and members of their staffs. I reviewed the major Air Force program contracts and project control procedures at Wright-Patterson Air Force Base, for lessons learned on programs like the F-111 and C-5, the F-15 and B-1. I went over the SST program with other airframe manufacturers to ascertain their moral and technical support. Finally, I reviewed the British-French Concorde program with their government-industry leaders to assess the viability of that program and get a better sense of its timing.

Equally briefly, this is what I found:

Our SST configuration is a good one, with a 21 to 27 per cent economic advantage to the airlines over the Concorde.

Airline support for our SST prototype program is 100 per cent. An in-service date of 1978 is considered by the airlines to be good timing. The SST will meet airline needs for increased productivity in that time frame, and still allow the airlines to recover from their heavy investments in prior aircraft purchases.

The SST contract has been reviewed by many authorities and found to be an excellent and workable agreement.

Other manufacturers, some of whom are not directly engaged in the SST program, have nevertheless assured me of their staunch support. They do this in recognition of the importance of the SST project to our aviation industry and to the nation's economy.

These findings comprise the foundation on which I agreed to pick up and carry forward the direction of the prototype program. At the present time we are about midway in the prototype development phase, which began with the contract awards in 1967 and will be completed in calendar year 1973.

We are far enough along, in other words, to know what the airplane will be like and to have a high degree of confidence in its attractiveness both for those who will buy it and those who will fly it. The design is a good one -- from the technical and operational points of view. The B-2707-300 promises to be a safe, comfortable airplane for the passengers; an efficient, profitable aircraft for the airlines. It should also be emphasized that the SST will in no way represent any regression in comfort or safety from the transports in current jet fleets.

For example, the SST fuselage will be a foot wider than contemporary jets and will house from 260 to 298 passengers in individual comfort conditions about equal to the jumbo jets. The prime comfort feature, of

course, is the sharply reduced transit time. Studies by the Civil Aeromedical Research Institute of the FAA have shown that the human body begins to show distress (or at least disagreement) when sitting duration time exceeds four hours. With the SST, the five to thirteen hour transoceanic flights of today will be cut drastically; many major city pairs will be four hours apart, or less, by SST. The films, stereo recordings, and lounges provided on today's jets are features designed to distract the passenger from the fact that travel is a necessary but not a very fulfilling use of one's time. The SST affords the traveler the most attractive of all comfort factors -- short duration exposure to the confinement of flight.

We know some other things of concern and importance to the potential SST consumer. Landing and takeoff speeds are within 13 per cent of current jets. Safety margins from aerodynamic stall are equal to or better than present aircraft. The SST engines, rated at 65,000 pounds of thrust, already have demonstrated 70,000 pounds in ground tests. And in range/payload characteristics the 2707 has a decided edge over the original 707 prototype.

With 273 passengers (split 90-10 tourist and first class) and allowing for 5000 pounds of baggage, the 2707-300 exceeds the range capabilities of the original 707 "dash 80" (with 75 passengers and 5000 pounds baggage) by more than a thousand miles. While the growth of the SST cannot be predicted with any absolute accuracy, all of our experience indicates that growth versions will, indeed, appear and probably sooner than we are now inclined to think. The 707, for example, now flies nearly 5,000 miles with 166 passengers, a 100 per cent improvement over its prototype.

Range, comfort, performance characteristics -- all of these are important; but the two aspects of the SST program that seem to have taken precedence over all other public considerations in the past year or so are concern over the environment, and the economic competition represented by the Concorde and, to a lesser degree perhaps, by the Russian TU-144. I would like, therefore, to deal with these subjects in some detail.

First, the question of environmental impact ...

The SST is not a sudden whim of the Administration or a Johnny-come-lately to the national scene. The program has been in being now nearly ten years. By the time the SST makes its first commercial flight, 18 years of research and development will have gone into the challenge of making supersonic air transportation safe, sane and acceptable.

Environmental considerations have been inherent in the program almost since its inception. Even then there was concern over engine exhaust emmissions, so smokeless engines were specified.

Five and six years ago we are asking many of the same questions certain ecologists are asking today -- about the effects of added water vapor introduced into the stratosphere, about radiation, and about particulate emissions high in the atmosphere. According to the best scientific opinion available to the Government, the possibilities that SST operations might affect weather, temperature, or the surface environment adversely were held to be "very remote."

For example, with reference to concern over additional water vapor at high altitudes, it has been pointed out that one severe thunderstorm can deposit as much water in the stratosphere as 400 SST's would make each flying four flights a day, and thousands of thunderstorms occur every day around the world. Even if the added water vapor were to remain in the stratosphere for up to 18 months, as has been theorized, the result would be an increase from the normal 3 parts per million to 3.1 parts per million, a negligible increase.

One of the best available precedents for studying the effects of various chemicals and particles on the atmosphere is to compare the effects of volcanic eruptions. William Anders, Executive Secretary of the National Aeronautics and Space Council, has pointed out that the famed Krakatoa eruption injected several cubic miles of lava, water and rock into the upper atmosphere. This residue circled the earth for some time, yet singly or in interaction with the sunlight caused no noted effects on long-term temperature cycles, world weather, or life on earth due to ozone disturbance.

While the weight of scientific opinion together with existing evidence argue against the likelihood of any significant environmental effects from SST operations, there is not unanimous assurance that supersonic transport flights will not produce undesirable consequences to life on earth. It is proper, therefore, that we seek such assurance before any production commitments are made. Last May 27th, in commenting on House passage of the FY 71 SST appropriation request, Secretary Volpe said "... all necessary research will be undertaken to insure that SST operations are environmentally acceptable."

I can announce to you today that the means for carrying out that pledge now exist. An Environmental Advisory Council has been formed, composed of some of the most knowledgeable environmental specialists in the United States. The function of this Council is to further explore and advise me on all environmental matters. The Council will suggest or plan research in any areas where doubts or uncertainties exist. Where further research is necessary it will be conducted, so that the definitive data and unequivocal answers on which the environmental acceptability of the SST can be determined will be in hand before a decision is made on the production program.

The members of this Council are:

Dr. Myron Tribus, Chairman. Dr. Tribus is Assistant Secretary for Science and Technology, Department of Commerce.

Dr. Lester Machta, Director, Air Resources Laboratory, Environmental Science Services Administration.

Mr. H. J. Mastenbrook, Atmospheric Physicist, U.S. Naval Research Laboratory.

Mr. George Chatham, Aeronautics and Space Specialist, Legislative Reference Service, Library of Congress.

Dr. Harald Rossi, Professor of Radiology Physics, Columbia University and Chairman, FAA Committee on Radio Biology Aspects of the SST.

Dr. Paul Tompkin, Chairman, Federal Radiation Council.

Dr. Robert M. White, Administrator, Environmental Science Services Administration.

Dr. S. J. Gerathewohl, Chief, Research Planning Branch, Office of Aviation Medicine, FAA.

Now ... in recognition that noise is also an undesirable element in our environment, we have expanded our research and development efforts in noise identification and reduction. A number of distinguished specialists in this field already have agreed to serve as the SST Community Noise Advisory Council. They are:

Dr. Leo Beranke, General Manager, Professional Services and Chief Scientists, Bolt, Beranke, and Newman, Inc., Cambridge, Massachusetts. Dr. Beranek will chair the Council.

Mr. Frank W. Kolk, Vice President for Development Engineering, American Airlines.

Mr. Kenneth Eldred, Vice President and Technical Director, Wyle Labs, El Segundo, California.

Dr. Harvey H. Hubbard, Director, Acoustics Branch, NASA/Langley.

Dr. John O. Powers, Director, Office of Noise Abatement, FAA.

Mr. Daniel R. Flynn, Executive Secretary of the Noise Abatement Panel, Department of Commerce.

Mr. George Chatham, Aeronautics and Space Specialist, Legislative Reference Service, Library of Congress.

I want to say I am grateful to all of these gentlemen for their willingness to serve as advisors in their specialized fields. They have not yet had their first meeting, nor have Dr. Tribus and Dr. Beranek yet had sufficient opportunity to indicate to me other individuals they may want to appoint to examine noise and environmental issues. They are,

of course, free to call upon anyone whom they feel can contribute to our objective, which is to get at the truth of the SST's environmental effects.

We have also assembled a proposed program of noise and environmental research, which features the combined scientific expertise and funding participation of several Government agencies. While it's hard to put a price tag on an inter-agency program like this, especially one still flexible, open-ended and subject to further development, we estimate the total cost of the research program to be $27.6 million. Of that total, approximately $17 million will support the examination of weather effects and radiation factors.

It is not necessary to develop the entire program "from scratch." Many of the experiments are being done, or can be done, by established Government agencies. The coordinated program assures the inputs useful to the SST project will be made from on-going presently funded activities. Where gaps exist in the total research program, the projects necessary to acquire the needed information will be formulated and carried out by the appropriately equipped organization. The findings from these experiments and investigations will, of course, be made available to the scientific community, to the Congress, and to the public.

Before I leave the subject of the SST's environmental aspects, I want to try to clear up some misconceptions about the noise the SST will make. To do that I must first resort to a bit of technical history.

Sound is defined as pressure or energy and is measured in "bels," a term derived from Alexander Graham Bell. The lowest unit of sound pressure, or energy, the ear can detect is the decibel. The problem with using the decibel (db) is that it does not really measure annoyance. Fingernails against a blackboard, for example, are not very loud in terms of pressure, but can be very annoying. Conversely, music played full volume on a hi-fi set can be extremely loud, but not necessarily displeasing (depending, of course, on the choice of music.)

In any event, the psycho-acoustics profession noted the distinction many years ago, and about 15 years ago the transportation industry initiated studies to find a way of separating "sound" (pleasant) from "noise" (unpleasant).

Bolt, Beranek and Newman, a highly qualified psycho-acoustics firm in New York, under contract to the Port of New York Authority, performed experiments starting in 1959 and developed a measure of human reaction to noise, measured in decibels, called the "perceived noise level (PNdb)." This unit, which accounts for frequency as well as energy or pressure, was adopted in 1964 by the aviation industry, the Society of Automotive Engineers Standard Committee on Noise, the airlines, and the FAA, to denote annoyance from noise.

Later investigations showed that the duration and pure tone content of a sound also affected its perceived "noisiness." This work led to the development of a unit called "effective perceived noise level (EPNdb)" also measured in decibels. This unit, EPNdb, accounts for frequency, energy, tone, and duration of sound and is the currently adopted measure of human annoyance from noise.

All of this is background information necessary to the understanding that those who say the SST will be the equivalent of 50 subsonic jets taking off simultaneously are engaging in what I term "scientific mischief." If you plot decibels -- pressure or energy versus sources (of sound) -- you'll get a plot that says about 15 db is equivalent to about 50 sources. Now, if I snap my fingers, that's one source; if ten of us snap our fingers, that's ten sources. If we close our eyes, and go through the scientific experiment the psycho-acoustic experts conduct, they will tell you that the annoyance is doubled. If 25 of us each snap our fingers on both hands, that's 50 sources, but not 50 times as annoying or noisy; it's three times. That's because sound pressure is logarithmic, not linear.

For example, if one noise source is "one" then the addition of nine noise sources increases the annoyance by two, a total of 50 noise sources by about three and a half, and 100 noise sources by four. Using this relationship in reverse, the ill-informed can then say that if the difference between the subsonic jet and the SST on the airport is 17 to 20 PNdb, then the SST is like adding 50 to 100 equal noise sources, but not 50 to 100 times as annoying.

Now, what we have been talking about is airport noise -- on the airport itself, 2100 feet to the side of the runway. What's there? Mostly, taxiways, parking aprons, possibly access roads or vehicle parking. The airplane noise that's primarily objectionable is community noise -- the annoyance the airplane causes, over the community, on approach or takeoff.

In this respect, the SST Boeing is proposing to build will be about half as annoying as present-day 707's or DC-8's -- the international-range subsonic jets. The high-pitched compressor whine of the fan jets of today will be eliminated from the SST because of the unique supersonic engine inlet, and the rapid climb-out capability of the SST on takeoff will take the airplane to about twice the altitude today's jets achieve at the three-and-a-half mile point from brake release.

To return to the "50-to-1" comparison, for a moment; to accept that as a valid indication of what people hear, we would have to concede that on the same basis the 707 would be equivalent to 25 SST's landing simultaneously, or 50 SST's taking off together.

In effect, the SST will take the community noise of today's jets and confine it to the airport, where it belongs.

Now, secondly, along with a growing responsiveness to the environmental considerations, the reality of the Concorde on the world scene is becoming increasingly apparent. The assumption that the dollar outflow from speed-induced travel would offset any balance of payments benefits from SST sales is invalidated by the presence of a viable Concorde. People will travel the supersonics, be they the Concorde or the 2707.

Moreover, I have found that the trade balance computations used prior to this year do not reflect the "real world" of airline equipment purchases. The assumption is that because the free world airlines buy about 84 per cent of their jets from the United States, this large share of the aluminum subsonic civil aircraft market would continue to be American-dominated regardless of our decision on the SST. This isn't necessarily so. I have done some marketing of commercial aircraft, and I can assure you that airline executives make their purchases only after careful examination of the manufacturer's "family" of aircraft. There are logics of economy implicit in single- source purchasing. The European aviation "cartel" could become such a source. With the Concorde for the blue ribbon international routes, a twin-engine 250-passenger low-cost airbus for high density domestic routes, and the Mercure for the DC-9 and 727 market, the French/British industry would be in a good position to challenge the U.S. aviation industry. Considering that the civil aircraft market represents a 100 billion dollar business, it's not surprising that other nations would be willing to compete aggressively for a larger piece of the action.

Finally, I would just like to make the point, lest anyone jump to the conclusion that the SST is a "make work" proposition, that an airplane of the SST's capabilities is not only economically practical but virtually essential in a growing world with a large consumer appetite for air transportation.

The SST's great redeeming value is its greater productivity. While the 2707 has about two thirds the passenger capacity of the 747, it will be nearly twice as productive -- its ability to do work (or earn revenues) will be about double the work capacity of the 747. The improvements in productivity that come with succeeding generations of aircraft are what enable airlines to accommodate travel growth requirements, maintain favorable departure and arrival schedules, and -- most important -- stabilize fares in the face of rapidly rising costs.

By 1985 the international traffic levels -- the traffic SST's can carry without violating overland supersonic flight restrictions -- will equal the total free world traffic today. If productivity hadn't kept pace with demand, we would need 47,000 DC-3's to do the air carrier job today, and we would need nearly 300,000 DC-3's in the early 1980's.

The SST is clearly designed to meet future needs -- the needs of travelers, the needs of the airlines, the needs of the nation. The production of supersonic transports means jobs for America's aviation industry and the protection of that industry against foreign incursion. Made-in-the-USA SST's mean tax dollars to help support vital Government activities that are not self-supporting or revenue-producing. Continuation

of the current prototype development program with the environmental safeguards implicit in it, is also the best assurance we can give to ourselves and to the peoples of the world that supersonic air transportation will not distress the quality of like or further blemish what Frank Borman so aptly described as "the good earth, an oasis in space."

I assure you that the President, Secretary Volpe and I are firmly committed to an SST program of that caliber and construction.

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TO THE TOWN HALL
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I would imagine you frequently hear speakers from Washington, who come to your city to hand down the word from on high. I want to assure you I'm not a bureaucrat; I haven't been in Washington long enough to know how to qualify. And I don't really have any "word" on the SST program I haven't learned, or seen, or checked for myself. My business is aviation. I've done some engineering, designing, and testing of airplanes; someone counted them for me and tell me something over a hundred different kinds. Also, I'm from Santa Monica, so I'm "back home" today after about 90 days in Washington. I'm speaking to a city that knows a good deal about the economics, the importance and---yes---

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the problems of airplanes; and to an audience that I am sure is concerned both about the future of our Nation and the welfare of Southern California.

I generally prefer not to read a speech. For one thing, it's not conversational, and we're used to being informal and friendly in California. Then, too, once words are written down sometimes they never go away. For example, Octave Chanute, one of America's outstanding aviation pioneers, said in 1904: "Airplanes eventually will be fast. They will be used for sport, but they are not to be thought of as commercial carriers. To say nothing of danger, the sizes must remain small and the passengers few, because the weight will increase as the cube of the dimensions, while the supporting surfaces will only increase as the square."

So Mr. Chanute dismissed the airplane as a practical means of transportation because it obviously wasn't feasible technically. I suppose that's a problem we engineers have---their knowledge gets in the way of their imagination.

Simon Newcomb, an eminent American astronomer, also just after the turn of the century, pronounced judgment on the airplane. "Imagine the proud possessor of the aeroplane darting through the air at a speed of several hundred feet per second," he wrote. "It is the speed alone that sustains him. How is he ever going to stop? Once he slackens his speed, down he begins to fall. . . a dead mass. How shall he reach the ground without destroying his delicate machinery?"

Again, the airplane was discarded as a practical idea, because it didn't conform to natural laws.

Now, I realize that history is replete with examples of profound predictions from foggy crystal balls. But we need not go back 60 or 70 years to find murky judments or short-sighted forecasts. In 1953, just five years before the first commercial jet flew coast-to-coast, the then president of one of America's major air carriers said that the jet, and I quote, ". . . is inefficient at low altitude and at reduced power. It is very expensive to operate and is not now suited for very long-range operations due to high fuel consumption and limited weight-carrying capacity." End of quote.

There were others who shared that view. In fact, a search of the trade journals of the late forties and early fifties would turn up a number of gloom-and-doom predictions for the jet.

Now, as recently as two weeks ago, a gentleman came to this forum with prophecies of folly and failure for the Supersonic Transport. He is, of course, not alone. There are others across the country who have heard a part of the story about supersonic transports and, on the basis of incomplete or circumstantial evidence, concluded that the SST must be considered guilty until it's proven innocent.

No one is seriously suggesting that the SST be rejected for want of technical feasibility (supersonic aircraft have been around for 25 years); or because it's contrary to natural laws (that man, for example, was meant to fly only at 625 miles per hour and no faster). What we are hearing is a lot of alarmist speculation about economic and environmental unacceptability which, according to what I know about the program, is based on misconceptions, half-truths and negative thinking. I want to deal with some of those matters today.

Let me say, first, that before going to Washington to take over the direction of the SST prototype development program I spent several months satisfying myself that the development of an SST was a wise, productive and altogether fruitful venture for the Government and the aviation industry. In the course of my examination I reviewed the design thoroughly. I talked with every major airline president in this country, and many abroad. I went over the program with other airframe manufacturers to ascertain their moral and technical support. I reviewed the British-French Concorde with the government-industry leaders of that program to get a better sense of its viability and timing.

I found 100 per cent support for the U.S. SST program among the airlines. The manufacturers, some of whom have no part in the prototype program, favor SST development as good for the industry and good for the country. And there is general agreement that the 1978-79 time period is about right for the introduction of the U.S. SST into commercial service, taking into account traffic forecasts and the recovery of the airlines from prior investments in new equipment.

In my review of the competition, I found that the U.S. SST---the Boeing 2707-300---will have a 21 to 27 per cent economic advantage

to the airlines over the Concorde. The U.S. plane will be faster. It will be bigger. It will carry more fare-paying passengers in greater comfort and with commercial aircraft safety.

Without a U.S. SST, however, the Concorde and the Russian TU-144 would be the fastest planes in the commercial skies. Airlines will buy them and people will fly on them. I don't believe there is any doubt on the part of the French and British about the success of the Concorde program. The prototypes have flown at Mach 1.54 which, to an aerodynamicist, means their design is "home free" as far as supersonic flight characteristics are concerned. The new British government has announced solid support for the program. Twelve aircraft have been committed to production. And I assure you, that when Air France and BOAC and the other foreign international carriers put Concordes into scheduled service, the U.S. carriers---to remain competitive---will do likewise.

The first question critics ask, of course, is to wonder why anyone needs to fly from New York to Rome in 4 hours 48 minutes instead of 8 hours 12 minutes; or from Los Angeles to Tokyo in five-and-a-half hours instead of 10 hours plus.

One answer is comfort. On an individual passenger basis, the SST will be as comfortable as the jumbo jets. But the SST also affords the traveler the most attractive of all comfort factors---short duration exposure to the confinement of flight.

A second answer is convenience. Shorter elapsed flight times mean greater schedule flexibilities, plus a better use of one's time.

A third answer is simply that the faster way has been the preferred way throughout the history of transportation. This is why I am puzzled when opponents of the SST speak of "passenger resistance." Who resists a better way of doing something? Why should anyone resist personal benefit and comfort? Except for cruise vessels designed for people seeking leisurely travel, the passenger liners have all but disappeared from the seaways. Some 98 per cent of all international travelers today fly. Flying is faster and faster means cheaper.

A second thing critics say is that the SST won't be better because it will distress the environment--that SST operations will affect the climate, even imperil life on earth.

I want to say that I do not resent in any way expressions of concern relative to the environment, nor do I object to questions being raised about the environmental characteristics of the SST. Those of us who believe in the SST program also live on this earth and share the environment, and we have asked many of the same questions certain ecologists are asking today. Only we asked them several years ago, and the program has moved forward with assurances from the best scientific counsel available to the Government that any adverse effects to the weather or from radiation are "very unlikely."

But since some uncertainties do exist regarding photochemistry, circulation response, and the natural variability of stratospheric properties, we cannot express unequivocal confidence that all of the environmental issues have been satisfied.

Because this degree of uncertainty exists, I announced yesterday, in Washington, an expanded environmental and noise research program, representing about $27 million in on-going or new research activities by various agencies of the Government; plus the formation of two committees---the SST Environmental Advisory Council and the Community Noise Council---to further explore and advise me on the noise and environmental characteristics of the SST.

These two councils are chaired by highly competent people---Dr. Myron Tribus, Assistant Secretary of Commerce for Science and Technology, who heads the Environmental Council, and Dr. Leo Beranek, General Manager for Professional Services and Chief Scientist of Bolt, Beranek and Newman, Inc., the eminent New York psychoacoustics firm. They have available to them 12 gentlemen of impeccable credentials in areas relating to atmospheric phenomena, radiation, weather and noise. One of the members of the Noise Council, for example, is Mr. Kenneth Eldred, Vice President and Technical Director of Wyle Labs here in El Segundo.

Dr. Tribus and Dr. Beranek are free to call on any individuals they believe to be qualified to assess the environmental acceptability of the SST.

I might mention that Mr. Russel Train, Chairman of the President's Council on Environmental Quality, has reviewed the research program we have proposed and approves it wholeheartedly. I have discussed the environmental matters with Mr. Train on several occasions. He agrees

that the two airplanes in the prototype and flight test program pose no threat to the environment, and that the period of prototype development is the appropriate time to resolve any concerns about the effects SST operations might have on the quality of life.

One of those concerns pertains to noise, so perhaps I should point out that the SST is not the big noisemaker some critics claim. What the SST will do is take the levels of noise people are accustomed to hearing today over the community---on approach to the airport and after takeoff---and confine those degrees of annoyance to the airport. Over the community, the SST will be about half as annoying as the noisiest four-engine jets now operating.

Before I leave this subject, I would like to call two related developments to your attention: one, the environmental provisions in the Administration's Airport/Airway Development Act of 1970 recently passed by the Congress; and, two, the design of the new Palmdale Intercontinental Airport which, like other new jetports built or proposed in recent years, stresses compatible land use concepts to buffer the community against excessive noise.

Through the provisions of the Airport/Airway Development Act, some $15 billion worth of improvements and additions will be made to the nation's airports and airway facilities during these next ten years. The Act specifically states that before Federal grants will be awarded, airport development sponsors must demonstrate (1) adherence to air and water quality standards, (2) full consideration of all environmental impacts including consistency with urban planning goals, and (3) assurances that zoning actions have or will be taken to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations.

The SST, coming into use in the late 1970's, will be a beneficiary of the improvements in our nation's civil air facilities, including new airports like Palmdale. I think it is highly significant, and indicative of your future concern for the quality of transportation in Southern California, that the airport complex proposed for the Antelope Valley incorporates the features needed to overcome the principal objections people have to airports today.

Eight-and-a-half miles long and four-and-a-half miles wide, the Palmdale airport will be large enough to contain offensive aircraft

noise, and of ample proportions to avert the delays and congestions afflicting our cramped airports today. The Palmdale facility is being designed to have multiple entrances and sufficient access roads to avoid vehicle traffic tangles. Most important, perhaps, a high-speed high-capacity rapid transit system linking Palmdale with the Los Angeles population centers is part of the master plan. Grants for feasibility studies of a 150-mile per hour tracked air cushion vehicle, to run initially between Los Angeles and the San Fernando Valley and, later, to Palmdale, already have been awarded by the Department of Transportation. Such a system will put the Palmdale airport---and SST travel---as close in time to the Los Angeles traveler as the present freeway system does to Los Angeles International.

A third objection voiced against the SST---in fact, your speaker of July 7th based much of his opposition on this point---relates to the importance of aircraft to our balance of trade and the extent to which the SST can be expected to affect the balance of trade.

Historically, a favorable balance of trade has been considered desirable for a number of reasons, not the least of which are the importance of maintaining the stability of the dollar as an international monetary standard, providing a capability for the United States to meet its obligations for helping the undeveloped countries of the world, and the undergirding of our economy so we can sustain programs in education, transportation, housing, law enforcement, and environment improvement.

Virtually every U.S. economic and financial organization---the World Bank, the Treasury Department, the Budget Bureau, Federal Reserve Board, Export-Import Bank, the Commerce Department---believes a favorable balance of trade is necessary to a healthy national economy. Various methods have been tried by governments to bring about an improved balance of trade. These include deflation, devaluation, import restrictions, export encouragement, capital controls, and restriction of tourism. All of these possible means have certain drawbacks which limit their effectiveness, except for the simple solution which is to maintain a favorable ratio of exports over imports.

That solution, however, is not as simple to achieve. Since 1965, our export surplus has been declining. We now have a negative balance of trade in such major product categories as automobiles, foods and beverages, iron and steel products, building materials, textiles. Among

manufactured products, only industrial machinery and civil aircraft have retained strong export balances.

One of the things I found in my detailed review of the SST program was that the balance of trade studies that had been made to determine the effect of a U.S. SST erred in a very serious way. They assumed the absence of a successful Concorde in the world aircraft market. Yet today there is general agreement that the Concorde flight test program has exceeded expectations and that deliveries of the Concorde to the airlines in 1974 can be anticipated.

Without a Concorde it was assumed that the "speed induced" travel generated by the U.S. SST would increase travelers' expenditures abroad, and thereby offset the benefits of export sales. With a Concorde in the picture, however, the complexion changes significantly. People who will be motivated to travel by virtue of the greater speeds supersonic transports provide will fly the Concorde if a U.S. SST is not available.

The balance of trade difference, therefore, becomes $17 million if the Concorde I is considered; $22 billion if the improved Concorde, now reported to be on the drawing boards, is taken into account.

There is an ancillary point that merits a moment of discussion at this point. As I understand it, your speaker of July 7th implied that the United States might lose other aircraft markets by concentrating on the SST.

I am also concerned that we may abdicate our dominance of the free world civil aircraft market, but for a different reason. I have had some experience with a number of aircraft companies, and I know a little about what airline executives look for when they're buying airplanes. First and foremost, they want good operating economics. But they also want to conserve on training, maintenance, and spare parts costs. One way to do that is to buy, as far as possible, from the manufacturer offering a family of aircraft to meet the various airline needs.

If the United States restricts itself to the jumbo jets and the tri-jets for the 1980's, then the foreign family of civil transports---the Concorde (especially the Concorde II) for the blue ribbon overwater routes, the A-300 or BAC 311 twin-jet airbus for high density land

routes, and the French Mercure replacement for the DC-9 and B-737---may well, and probably will, induce many airlines, particularly nationally-owned foreign airlines, to purchase their new equipment closer to home... from the European manufacturers. In that event, our subsonic jet business would diminish significantly.

Now, fourthly, let's talk a bit about jobs since my predecessor to this platform dismissed employment as any justification for support of the SST program.

Most of you, I am sure, know what's happening in the aerospace industry today. The downturn in space and aircraft projects has been felt in the Southern California community. In Seattle, Boeing's mid-1968 peak employment of 101, 500 dropped by the end of 1969 to 80, 000, to 55, 000 by June of this year, and will hit 45, 000 before the end of the year. Such cut-backs have contributed materially to the rate of unemployment for that area which at 10 per cent is double the national average.

For the year ending September 1970 employment throughout the aerospace industry will have dropped by twelve-and-a-half per cent from a year ago---a loss of 168, 000 jobs or one out of every eight. This job loss is not confined to any particular type of employee, but rather has an across-the-board application. Scientists and engineers (representing 15 per cent of the work force) are down 14 per cent from a year ago (28, 000 jobs). Production workers, comprising 51 per cent of the force, are down 13 per cent (89, 000 jobs), while technicians show a one-year loss of 10, 000 jobs, matching the 14 per cent decline of the scientists and engineers.

The SST program has both an immediate and a long-term influence on employment in the industry. The prototype program represents 20, 000 jobs nationally---3500 here in Southern California. The two prime contractors, General Electric and Boeing, have facilities or subcontractors in Southern California. Boeing will spend $66 million with subcontractors here; General Electric, $30 million. Some 50, 000 jobs will be required during the production phase. But without the U. S. SST, the industry faces a loss of 28 per cent of all the jobs available at the end of 1979. If we have a less favorable family of civil airplanes to offer the 173 airlines of the world, and if as a consequence future subsonic sales are filled largely by foreign aircraft like the A-300 and the BAC-311 and the Mercure, then the 28 per cent

job loss swells to 46 per cent. Dollar-wise, we are discussing a 100 billion dollar business through 1990. Small wonder the French and British governments are willing to subsidize their industry, considering the size of the prize at stake.

Fifth, it has been inferred that there is no real market for supersonic transports, that "no one really knows the dimensions of the potential market for the SST."

That's true. No one dreamed of the size of the market for jet aircraft, ten years, or even five years, before they came on the scene. Market forecasts traditionally have been on the low side , and I am inclined to think that our estimated market of 500 U. S. -built SST's (assuming overland flight restrictions because of the sonic boom) will prove to be low.

My reason is the continuing need by the airlines for aircraft which improve productivity. By productivity, we mean the ability of an airplane to earn revenue.

There are two ways to increase productivity: make airplanes bigger, to carry more passengers; or make them faster, so they can serve more people in a given period of time.

We have about reached the limit of our ability to make planes bigger, without also overhauling our airports and other facilities for handling them. The U. S. SST, with two-thirds the passenger capacity of the 747 and three times the speed, works out to be just about twice as productive as the 747.

This means: one, fewer airplanes are needed to carry the passenger traffic; two, travel growth can be accommodated without overpopulating airports; and, three, fares can be kept at reasonable and reasonably-stabilized levels.

It is worth noting in this respect that the purchase price of the SST (which is estimated to be $37-40 million in 1967 dollars, or about $50 million in 1980 dollars) has a direct relationship to productivity. Historically, new aircraft have produced sufficient revenue to pay back their costs in five to six years. This has been true from the DC-3 through to the 707, and it will apply equally to the 747 and the 2707. Pay back capability is due to productivity---the ability of the airplane to produce

revenue. The utility of the SST on the long-haul transoceanic routes, traditionally the most remunerative schedules, in the high-traffic years of 1980 and beyond is such that the airplane can be profitably operated without a fare surcharge.

In summary, the Government and the industry are engaged in a development program geared to the future needs of our country. The investment in that program, over approximately a ten year period, will be on the order of $1.3 billion, shared 78 per cent by the Government, 22 per cent by industry and the airlines. We are half way to our objective, which is the construction and flight testing of two prototype aircraft meeting the standards and specifications necessary to guarantee a viable production program.

The return on the Government's investment will be significant. First, the direct investment in the prototype development will be repaid through royalties on the sale of each aircraft. The royalties will be assessed so that the Government's money is repaid when 300 airplanes are sold. On the sale of 500 airplanes, an additional one billion dollars will be returned to the taxpayers.

The indirect return to the people, through Federal, state, and local taxes generated by SST development and production, has been computed at $6.2 billion. In addition, the economy will benefit from 150,000 jobs (direct and indirect) and some $10 billion in SST exports. We will realize none of these, I might add, if we permit the Concorde to sweep the world market for supersonic transports. To the contrary, we stand to lose jobs to Europe and more of our gold to the world if we elect to import, not export, SST's.

Finally, your speaker earlier this month spoke of "national pride" as a reason for supporting the SST program. By reducing pride, as he did, to boastfulness ("...if you want to talk about how very fast your airplanes can fly," I believe he said), he displayed, in my judgment, a shallowness of thinking typical of many short-sighted critics of the entire SST issue.

Pride and leadership come not as the result of being bigger or louder, but from being <u>better</u>. We lead in aviation because we build better airplanes. I am confident we can build a better supersonic aiplane---environmentally acceptable, economically profitable, technically exceptional, and properly timed to the operators' needs.

As long as we build the better mousetrap, the world will beat a path to our door, and we can continue to take quiet pride in American workmanship, in the quality of our technology, and in the ability of the free enterprise system to compete economically with foreign nationalized systems.

DEPARTMENT OF TRANSPORTATION | NEWS

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REMARKS PREPARED FOR DELIVERY BY
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SUPERSONIC TRANSPORT DEVELOPMENT
DEPARTMENT OF TRANSPORTATION
TO THE ROTARY CLUB OF ATLANTA
ATLANTA, GEORGIA
24 AUGUST 1970

THE AIRLINES AND THE SST

After living most of my life in Southern California, and the last 120 days in Southwest Washington, it's delightful to return to the "real South" and enjoy that Southern hospitality for which you are justly famous. While I spent a number of working years with Lockheed, it was not my good fortune to be attached to the Marietta operation, so while I have not lived in Atlanta I have visited here from time to time, always a pleasant occasion. I have also watched your city grow over the years, and your progress has indeed been most impressive.

I was pleased to learn that your former Mayor, Ivan Allen, is a member of this Club, as well as my good friend Charlie Dolson, Chairman of the Board of Delta Airlines.

It was Mayor Allen, I believe, who was largely responsible for spearheading the "Forward Atlanta" program and did so much to establish this city as "a good place to do business."

It's my conviction, after some years in the aviation profession, that America is a good place to do business -- aviation business.

We have proved that in the past -- rather convincingly. Eighty-five per cent of the transport aircraft in use in the Free World were made in the USA. Aircraft represent one of our strongest exports, accounting for not less than 900 million dollars in trade every year for the last ten years, and as much as 2.5 billion dollars in any one year. The aerospace industry, the nation's largest, has for many years been a vital and vibrant factor in our nation's economy. Today that industry is wavering, employment is shrinking, and the regions and cities heavily dependent on aircraft and space manufacturing, research and development are experiencing withdrawal symptoms as fewer aerospace dollars circulate through the economy.

Now, the free enterprise system is marvelously adaptable, and I'm not here prophesying gloom and doom for the aviation industry or for our country's economy. But I do think we need to be concerned over trends I see developing which could affect the course of the industry and the health of our economy.

First, there is a climate of public resentment building up which is out of all proportion to aviation's environmental faults or failings. Compared to the numbers of people served by air transportation, the number of people exposed to noise around airports is relatively small. Yet noise control is properly a matter of concern and in prior years would have been a target for technical correction, not social complaint.

In the campaign for clean air, the jet airplane is probably the cleanest and certainly the most efficient means of moving people and products yet devised. According to the Department of Health, Education and Welfare jet aircraft account for about one per cent of the air pollution over the United States, and that fraction is being reduced by an industry conversion to smokeless engines -- similar to those on the 747 "jumbo" jet and the type which will be standard equipment on the Supersonic Transport.

Airplanes also require much less real estate than rail or road transportation systems, emit fewer pounds of pollutants per passenger mile than cars, diesel trains or ocean liners.

The tendence, therefore, to point to the airplane as a gross offender against the environment is, in my opinion, ill-founded and unfortunate.

I am concerned, secondly, because transportation is essential to our society, and we need balance in our air transportation just as we must have balance in and among all the modes.

Atlanta has been a key transportation and distribution center for more than a hundred years. Because Atlanta is a transportation hub, it is also a city of industry, a medical and educational center, and the financial capital for an important region of our country. This city could not have known its past glories or attained its present stature if those who guided its development had been content to see Atlanta remain a rail center. The highways, the freeways and the airways also have been important to Atlanta's growth and prosperity.

Now you are conscious of still greater needs -- for a rapid transit system to relieve streets crowded with cars ... for a second airport to relieve your present facility, already third or fourth busiest in passenger enplanements in the nation.

What is true here is true elsewhere throughout the country and, in a sense, worldwide. People are hungry for transportation -- not just more transportation necessarily, but better, more productive transportation. I have the pleasure to work for a great guy -- Secretary of Transportation, John Volpe. I know how dedicated he is to the balanced transportation concept -- how determined he is to bring improvements to all forms of transportation, and keep the country moving.

Revamping transportation in America is a massive undertaking. Bringing one mode up to par is a long-time task; producing a balanced blend of transportation is an even more agonizing job. It took years of effort and billions of dollars to bring the nation's highway system in line with demand. In the meantime, our airports and airways, our railroads, and our urban transportation capabilities have fallen behind. The $14 billion Airport Airway Development and Revenue Acts recently passed by the Congress, the Administration's proposed $10 billion Public Transportation Assistance Act, and a multi-million dollar plan to rescue and rejuvenate the railroads -- to preserve and improve intercity rail service -- all represent major Government programs to catch up to demand in public transportation.

Curiously, in the face of all of these programs to compensate for shortsightedness in the past, the one program which seeks to avoid a transportation deficiency in the furture is being criticized harshly as a frill and a luxury. I refer to the preoccupation by the press and segments of the public today with the program to build a prototype Supersonic Transport for use by the world's airlines beginning in 1978. The SST program represents less than three per cent of the Department of Transportation Fiscal Year 1971 budget request, which I believe is a proper and reasonable amount to invest in the future. That three per cent will continue a program begun nine years ago, and which will cost about 1.5 billion dollars over a 13 year period, to construct and test an airplane of great potential value to aviation in America and to the security of American aviation leadership throughout the world.

Then, I'm concerned, thirdly, because I detect an amazing lack of understanding on the part of too many people for the significant effects the civil aircraft industry has on our economy. This was summed up quite well, I thought, in a recent editorial by the editor of a leading aviation journal. Alluding to the effects a decline in employment has had on the Seattle area, this editor said, and I quote: "We suggest that the sociologists who have developed a strong anti-technology bias, study the Seattle situation carefully. They may find that their view that the aerospace dollar is a wasteful competitor for the welfare dollar in the Federal budget is indeed a mirage. They may find that, without the dynamic economics of the revenue-producing aerospace cycle, they will lack not only the tax dollars to finance their programs but also the new technology required to implement those programs with a cost-effectiveness not possible with current outmoded techniques. For it is the aerospace dollar that is producing the technical breakthroughs that will make it possible to control environmental pollution, extend education, build cheaper and better housing and, above all, generate the dynamic new industrial technologies that create new products, new markets and new jobs. Without the dynamics of aerospace spearhead technology, any nation's economy will inevitably slide into obsolescence and decay." End of quote.

The program we have under way -- to produce a superior Supersonic Transport with good airline economics -- has just that goal as its purpose: to help prevent the decline and decay of America's aviation industry and, by upholding the leadership of that industry, undergird our economy for the vital non-revenue-producing activities that must be supported.

The program, however, faces opposition, much of which is based on gross misconceptions about the SST.

One mistake commonly made is the assumption that the airlines don't want an SST. I would like to put that idea to rest here and now.

I have letters from 13 major Free World airlines enthusiastically endorsing the U.S. SST development program and urging continuation of the prototype.

This is not really a new attitude on the part of the airlines. They have favored the SST program over the years. Many airlines, in fact, have invested rather substantially in the prototype development. But I can say with assurance that the current vote of confidence I have from these airline executives constitutes the strongest expression of airline support we have ever received.

I won't take the time to read the various endorsements but I will, with your permission, quote from one which is representative of the nine U.S. and four foreign carriers who have expressed their support.

I quote: "Based on all the factors known to us, we seriously urge that our Government now proceed with all deliberate speed toward construction of a U.S. SST prototype that, hopefully, will permit our country to retain its rightful position of aeronautical leadership in the late 1970's and the decade of the 1980's." Signed, C. H. Dolson, Chairman of the Board and Chief Executive Officer, Delta Air Lines.

Let's consider for just a few minutes why the airlines want an SST.

The first and most obvious value is speed.

Given a choice, most people prefer to get somewhere the fastest, most convenient way possible. The SST will cut most international flight times in half, and effectively reduce oceans to lakes.

Speed also has a comfort value. Aeromedical studies by the Civil Aeromedical Research Institute of the FAA show that the human body begins to show distress (or at least displeasure) when sitting durations exceed four hours. Even given the cabin sizes now available in the 747, passengers on a long trip may find it hard to be truly comfortable for six, eight or ten hours.

The U.S. SST will be comfortable. Cabin room, per passenger, compares favorably with the 747 and with the new trijets. The SST will afford more square feet of floor space and more inches of seating space, per passenger, than the 707 or DC-9.

Thirdly, the airlines want the SST for a very good business reason -- it promises to make money for them.

To fully understand the revenue-earning potentials of the SST, we have to appreciate the importance of periodically improving aircraft productivity as a means of (1) accommodating normal travel growth requirements without overpopulating airways and airports, (2) maintaining a reasonable financial return for the airlines in spite of cost escalations, and (3) providing the public reasonable fares.

If we didn't achieve increases in productivity, by making planes larger or faster or both, we would soon run out of capacity. It's interesting to note, for example, that one U.S. SST, flying just seven hours a day, with only a 50 per cent load factor, would in one year produce the same number of revenue passenger miles as were generated in 1935 by the 500 airliners then operating in the United States. Even though it has a somewhat smaller payload, the SST will be nearly twice as "productive" -- that is, do about twice the work -- of the 747.

The international segment of the total air market is growing at a faster rate than the domestic, and the return on investment for the airlines always has been higher for the long-haul, international routes

than for the shorter, domestic schedules. The ten-year average, for example, through 1969 shows a 9.63 per cent yield on international service, compared to 5.93 per cent for the domestic routes. The SST, being an over-the-ocean airplane, fits this industry pattern of higher yield operations. It also has the capability, because of its impressive earning power, to pay back its cost in a five to seven year period.

While I'm talking about earning power, I might say just a word about the skeptics who argue that the British-French Concorde, which is smaller and somewhat slower than our SST will be, won't be economically viable and therefore, they claim, the airlines won't buy or operate it. On this subject I should say, first, that the Concorde as a going airplane looks a great deal better today than it did a year or so ago. The flight tests have been proceeding successfully. Ten aircraft have been committed to production. And there are reports, which I consider reliable, hinting that an improved Concorde may be in the works.

In any case, the British and French governments, and the European aviation industry, obviously have confidence in the Concorde and are building it with a clear determination to put it on the airways and, in so doing, compete aggressively for a greater share of the global air transport business. As a "foot in the door" maneuver, the Concorde could perhaps be a loss leader for the government-subsidized foreign carriers. Perhaps it isn't essential that Concorde I make money.

But our analysis shows that it can. Assuming a $20 million purchase price for a 120-seat airplane, configured 90 per cent tourist and 10 per cent first class, the Concorde can return its operators 12.8 per cent, after taxes, at a nominal 55 per cent load factor and operating with a 15 per cent surcharge, which is less than the difference between tourist and first class fare. At a 70 per cent load factor, which is reasonable to expect for a high-speed aircraft, especially while it is in short supply the Concorde could earn over 20 per cent, again after taxes.

To compare this kind of return on investment to our own SST, our airplane, with its greater capacity, offers the airlines a 21 to 27 per cent economic advantage over the Concorde. It's that kind of productivity which in the past has enabled the airlines to stabilize or reduce air fares while costs of operations and other consumer services have gone up.

To conclude, let me suggest a few reasons why you and I -- the public -- want America to have the SST.

Essentially, it's an economic reason. When we consider the direction our balance of trade has been going in recent years, we realize that we are fast relinquishing our position as an "export" nation. Once preeminent in such technical areas as shipbuilding and electronics, we have seen those proceeds migrate abroad. Movies are no longer made in America in any numbers; even automobiles have moved from the plus to the minus column in that trade account. In fact, without U.S. aircraft to bolster our exports, we would have shown a trade imbalance in the last two years.

I am not persuaded that we can give away any part of our aviation industry, or export the types of jobs so important to the economy of Southern California, the Pacific Northwest, or Atlanta, Georgia. I do not accept the proposition voiced by critics of the SST program that our balance of trade would not suffer by our forfeiture of the SST market. To the contrary, my calculations -- based on some years of experience in this business -- tell me that we are flirting with a potential 22 billion dollar impact on our economy over a 12 year period; that if we include the sale of spares in our export arithmetic and take into account the added appeal of a Concorde II, the total amount involved could reach 45 billion dollars before 1990.

The benefits, though, are even more personal, and perhaps closer to home. The several dollars each of us may pay in taxes to support the SST prototype will be returned, in full, when the airplane is in production and delivered to the airlines. Contractually, the manufacturers must pay a royalty to the Government on each airplane sold, and that royalty is computed so that the entire Government investment will be repaid when 300 airplanes are sold. On 500 airplanes, the ball park market forecast, the Government will realize a billion dollars in direct profit, plus the benefits of some 6 billion dollars in Federal, state, and local taxes generated by SST production. If we fail to build the SST, we stand to lose not only our investment, but the potential return on that investment as well, including an estimated 150,000 jobs and 12 billions in imports -- funds U.S. airlines will expend to acquire the Concorde in sufficient numbers to meet the demand and compete effectively with the foreign carriers.

Too much, perhaps, has been made of the so called "prestige" at stake in the SST decision. It is a false issue, if we presume that prestige is the motivating force in our SST ambitions.

You have a great city in Atlanta, but you did not develop Peachtree Center or move forward in your cultural, sports and educational programs because you yearned for the prestige of accomplishment. To build a better city or a better airplane, we must produce what people want, and need, and will use to good advantage. Prestige, and leadership, are the rewards that come from undertaking something difficult and challenging, and doing it well. You understand that here in Atlanta. We seek to exemplify the same enterprise, the same spirit, the same zest in building a good airline airplane, that will make money for the airlines, provide safe efficient air transportation for the public, and return a profit to the United States of America.

34379-350

STATEMENT BY WILLIAM M. MAGRUDER, DIRECTOR SUPERSONIC TRANSPORT DEVELOPMENT, DEPARTMENT OF TRANSPORTATION BEFORE THE SENATE APPROPRIATIONS TRANSPORTATION SUBCOMMITTEE 27 AUGUST 1970

Mr. Chairman, gentlemen of the Committee, this is my first formal appearance before your Committee of the Senate in my capacity as Director of the SST Development Program for the Department of Transportation to present our fiscal year 1971 budget request. I appreciate the opportunity to report on the program, and the time you have extended to me for this statement. Perhaps, if I may, I should tell you something of the exercise I put myself through before I accepted Secretary Volpe's invitation to affiliate with the program.

Over a period of several months I engaged in a number of fundamental reviews to satisfy myself that the development of a supersonic transport prototype was in every way a wise program for the Government and for the industry.

Briefly, in the course of the evaluation, I made a complete review of the SST configuration with NASA Langley and talked with major U.S. airline presidents, most of the international airline presidents, and key members of their staffs. Major Air Force program contracts and project control procedures at Wright-Patterson Air Force Base were reviewed for lessons learned on programs like the F-111, C-5 F-15 and B-1. I went over the SST program with other airframe

manufacturers to ascertain their moral and technical support and finally reviewed the British-French Concorde program with their government-industry leaders to assess the viability of that program and get a better sense of its timing.

Mr. Chairman, this is what I found:
Our SST configuration is a good one, with a 21 to 27 percent economic advantage to the airlines over the Concorde.

Airlines contacted support our SST prototype program 100 percent. An in-service date of 1978 is considered good timing by the airlines. The SST can meet airline needs for increased productivity in that time frame, and still allow the airlines to recover from their heavy investments in prior aircraft purchases.

The SST contracts have been reviewed by many authorities and found to be excellent and workable documents.

Other manufacturers, some of whom are not directly engaged in the SST program, have nevertheless assured me of their staunch support. They do this in recognition of the importance of the SST project to our aviation industry and to the nation's economy.

I found, too, that the Concorde is a <u>real</u>, not imaginary, threat and that it may spearhead a family of European aircraft aimed at winning a larger share of the world air transport market.

At the present time, we are about midway in the prototype development phase, which began with the contract awards in 1967 and will be completed in calendar year 1973.

Since coming to Washington early last April, I have explored in some depth many of the compelling forces involved in the SST decision. Surely, I have not yet exhausted all the possibilities of the SST's potential impact on our society, but a summary of what this "inventory-taking" has entailed follows:

First, a re-evaluation of the SST's balance of trade impact. Having just come from the aviation industry, I am aware of several important and salient factors missing from previous trade balance analyses.

Second, an examination of SST and jumbo jet operating economics in the 1980's as reflected by the airlines' need for improved productivity per dollar. Since productivity is a measure of how much work an airplane can do continually, increasing productivity (by introducing larger and/or faster airplanes) offsets the rising costs of labor, maintenance, and materials and thereby allows airlines to maintain reasonably stable fares while improving service to the customer and earning reasonable yields.

Third, a careful examination of the progress of the development program since the last consideration by the Senate in the fall of 1969.

Fourth, a scientific community and government agency-wide search for answers to the strident claims of environmental degradation postulated for an SST fleet.

And, fifth, a review of progress in developing a finance plan for private industry and the financial community to handle the production portion of the program, following completion of the prototype phase.

I propose to address each one of these items and afterwards, of course, will be happy to answer your questions. In addition to the subjects already mentioned, some time was spent appraising the airplane itself, re-examining the competition, and assessing the impact of the SST on employment. With your permission, lets touch on those matters briefly.

First, then, with regard to the 2707-300, we are far enough along in the development program to have a high degree of confidence in its attractiveness, both for those who will buy it and for those who will fly it. (Figure A-1) The design is a good one, from both the technical and operational points of view. Our SST promises to be a safe, comfortable airplane for the passengers; and an efficient, profitable aircraft for the carriers.

More specifically in this respect, let me touch upon certain particulars which this aircraft will offer.

Initially, it will afford the passenger a new dimension in comfort. The fuselage will be one foot wider than contemporary jets, and the cabin width will equal or exceed the DC-9 and 707 in inches per passenger, and in the optional seven abreast configuration, will compare favorably with the 747 and the large trijets. Also, the cabin floor area, in square feet per passenger, is also commensurate with present jets.

The prime comfort feature, however, is the sharply reduced transit time. Studies by the Civil Aeromedical Research Institute of the FAA have shown that the human body begins to show distress (or at least displeasure) when sitting duration time exceeds four hours. (Figure D-4) With the SST, the long and tiring transoceanic flights of today will be cut drastically; in fact, many major city pairs will be three hours apart, or less, by SST. (Figure D-3) The films, stereo recordings, and lounges provided on today's jets are features designed to distract the passenger from the fact that travel is a necessary but not a very fulfilling use of one's time. The SST will afford the traveler the most attractive of all comfort factors -- short duration exposure to the confinement of flight. (Figure D-2)

Second, the SST when introduced into commercial service will provide a range capability which will make it competitive on the North Atlantic routes, the most lucrative route system in the world. (Figure B-3)

The range of the SST will be about 3500 nautical miles using airline operational rules and reserves, adequate for flights from Paris to New York at full payload. While the subsonic jets will hold the range advantage when the SST is introduced, one has only to think back to 1959 to recall that the first generation 707's and DC-8's could not fly the Atlantic non-stop routinely. Only the improved versions mastered the long range European and Asian routes. Airline operation of the initial SST appears certain of transatlantic range and will provide the guidance and impetus for further improvements in the SST

fleet. It is, perhaps, worth noting that the first SST production plane is expected to exceed the range/payload capabilities of the initial 707 by about 700 miles. While the growth of the SST cannot be predicted in any absolute fashion today, all of our experience indicates that growth versions will, indeed, appear and probably sooner than we are now inclined to think. (Figure B-5) The development of the 707 is a case in point.

Third, the SST will be capable of operating from existing airports and will not entail an expensive modification of our airport system. The SST has been designed from the outset to be capable of operating from any airfield which presently accommodates long range subsonic jets. (Figure B-4). The maximum field length requirements for the SST are identical to the maximum requirements of the subsonic jets. As for airport compatibility on noise grounds, I want to emphasize that over the community, where most noise complaints originate, the SST will be about half as annoying as the intercontinental subsonic jets.

Fourth, the SST will be a profitable aircraft in airline operation. In this respect, let me point out that in the analyses of SST operating costs which are being conducted for planning purposes, the impact of speed on the fleets of the 1980's is considered to be a favorable influence, and, that of cost escalation, an unfavorable influence. As (Figure C-6) illustrates,

these analyses show that, historically, the initial jet, the 707-120 through the latest jumbo 747 have been distinguished at their introduction by improved total operating costs (expressed on a cents per revenue passenger mile basis). This has been true because of two basic considerations. First, the improved productivity of each new type resulted in lower basic operating costs, partially offsetting the effects of escalating costs. Second, the higher than normal load factors during the introductory period served to reduce costs per revenue passenger mile. Following introduction, however, the costs tend to raise primarily because of labor. The SST, however, has a proportionally greater amount of cost in fuel which has a very low escalation rate. This is one of the reasons it appears the SST total operating costs may even better the best of the jumbo jets during most of the life of the aircraft.

THE COMPETITION

I realize, Mr. Chairman, that the members of this Committee are undoubtedly familiar with the British-French Concorde (Figure E-1) and the Russian TU-144 (Figure E-2), and I do not propose at this time to compare the foreign supersonics with the U.S. SST other than point out an examination of the Concorde program, together with the data compiled by the State Department, Air Force Technical Intelligence, and other sources indicate conclusively that the Concorde has exceeded expectations in its prototype flight test program to date. A number of planes have been committed to production, and an improved version -- the Concorde II -- is being given consideration by the British and French governments, very likely in accord with one or more other European nations. For the record, then, I would like to submit a Table of Characteristics and a Status Table on the three aircraft, for the Committee's reference. (Figures E-4 and E-5)

THE ENVIRONMENT

Turning now to an aspect of the SST program that has come into sharper national focus in the past year, let me outline for you our position on the environmental concerns related to the SST. Simply stated, we are committed to the proposition that supersonic air transportation should not distress the quality of life or further blemish what Frank Borman so aptly described as "the good earth--an oasis in space."

By the time the United States SST makes its first commercial flight, 25,000 feet above today's airways, it will have been 18 years in research and development. From the outset, the development program has taken into account such environmental concerns as engine exhaust emissions, sonic boom impact, community noise, passenger and crew radiation exposure, and ozone effects on passenger and crew.

More recently, other environmental questions have been raised and theories postulated. There has been speculation that the impact of water vapor upon upper atmospheric ozone content might cause a possible imbalance of ultra violet ray exposure at the world's surface; that the impact of water vapor on cloud formations might change weather or affect the surface temperature; and that the impact on the atmosphere from the injection of carbon dioxide, nitric oxide, surphur dioxide and particulates might cause adverse effects.

According to existing data and available evidence, there is no evidence of likelihood that SST operations will cause significant adverse effects on our atmosphere or our environment. That is the considered opinion of the scientific authorities who have counseled the Government on these matters over the past five years. Nevertheless, the desired degree of certainty about these matters has not been attained and, for this reason, we have formed an Environmental Advisory Committee composed of some of the most knowledgeable atmospheric, radiation, and noise specialists in the United States, to further explore and advise me about these matters. (Fig. F-2). This Committee will suggest and plan research in any areas where lack of information, doubts or uncertainties still exist. Where further research is necessary, it will be conducted so that unequivocal answers will be available in the 1973-1974 time period. This assures that, before SST production is initiated, the most expert scientists in the United States will have available pertinent information and definitive data necessary to determine whether or not environmental degradation could result from any SST fleet operations. The Chairman of the SST Environmental Advisory Committee is Dr. Myron Tribus, Assistant Secretary for Science and Technology, Department of Commerce, and former Dean of Engineering at Dartmouth. Those who have advised us on environmental matters and are available to assist Dr. Tribus include: Dr. Lester Machta - Director, Air Resources Lab, Environmental Science Services Administration; Mr. H. J. Mastenbrook--Atmospheric Physicist,

U. S. Naval Research Lab; Mr. George Chatham--Aeronautics and Space Specialist, Legislative Reference Service, Library of Congress; Dr. Harald Rossi, Professor of Radiology Physics, Columbia University and Chairman, FAA Committee on Radio Biology Aspects of the SST: Dr. Paul Tompkin--Chairman, Federal Radiation Council; Dr. Robert M. White--Administrator, Environmental Science Services Administration; and Dr. S. J. Gerathewohl--Chief, Research Planning Branch, Office of Aviation Medicine, FAA.

Dr. Tribus, of course, is free to call on anyone else in or out of the Government whom he feels may be qualified to contribute an environmental appraisal of the SST. As a result of a number of conversations with Dr. Tribus on this subject, it is my understanding that he plans to expand the membership of the Committee significantly.

Two things should be made clear about the SST and the environment, One: environment is not a new issue; it has been a subject of some concern and considerable examination for more than five years. And, two: Mr. Russell Train, Chairman of the President's Council on Environmental Quality, in testimony before the Joint Economic Committee, Subcommittee on Economy in Government, in May of this year said, "In and of themselves the two prototype models would not give rise to environmental problems provided appropriate precautions

are taken with regard to their test flights." The SST prototype program, therefore, while not a threat to the environment, does afford an excellent opportunity for the acquisition of empirical data of broad aeronautical and meteorological value.

Let's note in passing that Mr. Train has reviewed our Environmental Research Program on several occasions, and he approves of it wholeheartedly.

NOISE

Now...in recognition that noise is also an undesirable element in our environment, we have expanded our research and development efforts in noise identification and reduction. A number of distinguished specialists in this field have agreed to consult with us in an advisory capacity, **(Figure F-3)**. The Chairman of our SST Community Noise Advisory Committee is Dr. Leo Beranek, a noted authority in the field of psychoacoustics. Dr. Beranek is General Manager and Chief Scientist of Bolt, Beranek, and Newman, Inc. of Cambridge, Massachusetts. Along with Dr. Beranek, other distinguished professionals who have counseled us on the noise aspects of the SST and have agreed to serve with Dr. Beranek on the Committee include: Mr. Frank W. Kolk--Vice President for Development Engineering, American Airlines and Chairman of the SAE A-21 Aircraft Noise Committee; Mr. Kenneth Eldred--Vice President and Technical Director, Wyle Labs, El Segundo, California; Mr. Harvey H. Hubbard--Director, Acoustics Branch, NASA Langley; Dr. John O Powers--Director, Office of Noise Abatement, FAA; Mr. Daniel R. Flynn--Executive Secretary of the Noise Abatement Panel, Department of Commerce; Mr. George Chatham, Aeronautics and Space Specialist, Legislative Reference Service, Library of Congress; Dr. Raymond A. Bauer, Professor of Business Administration, Harvard University; Dr. Jack L. Kerrebrock, Professor of Aeronautics and Astronautics and Director, Space Propulsion and Gas Turbine Laboratories, Massachusetts Institute of Technology;

Mr. Aubert L. McPike, Chief, Acoustics Branch, McDonnell-Douglas Corporation; Mr. Clifton A. Moore, General Manager, Los Angeles Department of Airports; Mr. Newell D. Sanders, Chief, Special Projects Division, NASA Lewis; Mr. Charles R. Foster, Director, Office of Noise Abatement, OST/DOT; and Dr. Henning E. von Gierke, Chief, Biodynamics and Bionics Division, Aerospace Medical Laboratory, Wright Patterson Air Force Base.

Perhaps the most misunderstood and certainly the most easily confused of the SST environmental impact concerns is airport-community noise. The facts, however, are as follows **(Figures F-6 and F-33)**

The take-off noise of the SST over the community will be lower than the typical jet in the present intercontinental fleet, and will meet the levels established in the FAA's Noise Rule for the latest subsonic jets. This means the SST will relieve, not aggravate, the present noise situation over the community, where people may live or work.

The approach noise of the SST over the community will also be lower than the current DC-8, and 707 jets. The high-pitched "whine" of the compressor (similar to the whine from today's subsonic jet aircraft) will not be heard from the SST because of the unique supersonic engine inlet. This inlet design prevents the whine from propagating forward out of the inlet thus reducing annoyance to the people on the ground.

The airport sideline noise, 2100 feet to the side of the runway is higher than we would like it to be. We recognize the need to further reduce the airport sideline noise and research is underway to this end.

SONIC BOOM

I might say a word here about sonic boom, simply to reassure the public that safeguards do exist and will be enforced.

The President and Secretary Volpe have said that no SST, foreign or U.S., will be allowed to fly over United States territory at speeds or conditions that would cause a sonic boom to reach the ground. The FAA Notice of Proposed Rule Making (NPRM) dated 16 April 1970 formalizes this edict. Since 1958, fifteen sonic boom research programs have been completed, and, while continued research will seek out methods of design to produce a "boomless" SST, our design will not fly so as to cause sonic booms on populated land areas. Moreover, overland flights at boom-producing speeds are <u>not</u> mandatory in order for the SST to be successful. (Figure F-5) Over 70% of all the surface of the world is water; 89% of all international airline route mileage, over 700 miles, is over water.

The SST can fly efficiently (insignificant range loss due to flying at subsonic speeds) at below boom-producing speeds to the secondary gateway inland cities.

There will be a conservative market for at least 500 SST's by 1990, or about $20 billion worth of business in current dollars. (When spare parts and price level escalations are included, the sum of this business is considerably larger.)

I should also point out that the effects of sonic boom over oceans are not unknown. Extensive overwater supersonic flight, from 20 years of military operations, has not produced any damage claims or any evidence of damage to marine life or coastal wildlife. Nevertheless, research is being continued in this area as an added safeguard.

BALANCE OF PAYMENTS

Earlier in my statement, I mentioned that prior studies of the SST's effects on our balance of payments appeared to me to overlook certain important factors. Accordingly, I have explored this matter in some detail. Let me summarize for you what I have found.

I have personally discussed the balance of payments problem with the experts and have been amazed at its complexity. It is virtually impossible to accurately relate one account like aircraft exports to the total balance of payments. Our payments balance depends upon many interrelated aspects of the financial and economic fibers of our economy and for that reason our analyses are in terms of the narrower balance of trade considerations although the impact of the SST on our net tourist expenditures abroad can also be substantial. Historically, this country has had a strong position in its balance of trade that has enabled it to help other countries of the world and in so doing still maintain equilibrium in the total balance of payments picture. A few of the key examples of what our favorable trade balance means are: (Figure G-2)

- Helping to finance various expenditure accounts in our balance of payments, including the tourist account, military expenditures, and substantial U.S. private investment abroad.

- In so doing, helping to maintain the stability of the dollar as an international monetary standard, thus facilitating the free flow of international trade and investment which has

added to the growth of real income of both the U.S. and the rest of the free world.

- Permitting the removal of restraints on U.S. private investment abroad.

- Providing a capability for the U.S. to meet its obligations for helping to develop the under-developed countries of the world.

- Reducing the need to finance deficits by drawing down our reserve assets.

Over the years, governments have tried various methods of improving their balance of trade. (Figure G-14) For example:

- Deflation. Tighten credit, reduce money supply, budget surplus. But: depresses profits, reduces GNP growth.

- Devaluation. An option open to other countries. But not to the U.S. because of its size in world trade and the reserve currency role of the dollar.

- Import Restrictions. Increase tariffs or impose quotas. But: foreign nations will retaliate.

- Export Encouragement. Provide incentives such as adequate export credit facilities. But: they cannot do the job alone.

- Capital Controls. Restrict bank loans and investments abroad. But: contrary to U.S. policy of encouraging free international capital flows.

- Restrict Tourism. Put ceilings on dollars spent abroad. But: naturally irritating and doubtful in effectiveness.

It is very significant that estimates of the magnitude of the SST impact upon our U.S. balance of trade, made last year, were, to a large extent, influenced by cables from our overseas embassies indicating the Concorde program would probably not reach the commercially viable production stage. Earlier this year, most of the Government agencies having concern with the SST development, including the State Department, concluded that the Concorde flight test program to date is going better than originally anticipated. While it is too early to precisely predict the eventual economic viability of the first production Concordes, it nonetheless appears that their program is headed for commercial service in 1974, provided it meets applicable certification criteria and operational rules of the major international airports. The airlines while not completely satisfied with the capacity of the first Concorde nonetheless continue to support the program and both the French and British Governments have made sizable financial investments to get the initial production Concordes underway. If a supersonic transport of British-French design appears on the world airways within four years, a few essential facts and factors related directly to trade balance considerations are worth considering.

In the earlier balance of payments studies there was serious concern that the SST through its speed would generate increased tourism and that this tourism would have an adverse effect on our total balance of payments picture and negate the advantages the U.S. would obtain in the trade account from selling 500 SST's. Underlying these studies was a general consensus by those departments having such concern that the Concorde program would not be viable.

However, if there is a viable Concorde, this oft-described "speed induced travel" factor (Figure G-4) almost disappears since only the difference between the Mach 2.2 Concorde and Mach 2.7 SST is relevant. The speed induced travel concept, if accepted, was used to illustrate a potential negative trade impact from travelers' expenditures abroad, port expenditures, and the like that would all be charged to the SST. Under the assumption of no Concorde, the amount could be sizable. But if the Concorde is in airline service, the induced U.S. expenditures abroad over the SST time period to 1990 are roughly estimated at about $3 to $4 billion as compared to a roughly estimated favorable trade swing of between $17 and $20 billion in 1967 dollars. I should also mention that there is considerable difference of opinion as to the validity of speed induced travel and for this reason we did not consider this input in our charts.

Second, the trade balance computations used prior to this year did not adequately reflect the "real world" of airline equipment purchases. The assumption is that the free world airlines presently buy about 84% of the civil subsonic jets in the U.S. and that this lion's share of the swept wing, aluminum subsonic civil aircraft market will continue to be American, regardless of our action on the SST. This is not a valid premise. Airline executives make their purchases only after careful examination of the manufacturer's "family of aircraft." If the United States restricts itself to the jumbo jets and the tri-jets for the 1980's, then the foreign family of civil transports -- the Concorde for "blue ribbon" overwater routes, the A-300/BAC-311 twin engine 250-passenger low cost airbus (Figure G-6) and the French Mercure replacement for the DC-9/Boeing 737 (Figure G-7) -- may well, and probably will, induce many airlines, especially nationally owned foreign airlines, to purchase their "family" outside the U.S., in fact, "closer to home."

Third, when the U.S. technology is matched by the civil aviation industry abroad, the U.S. airplane manufacturers begin to encounter a business arrangement commonly referred to as the "offset agreement." For example, for McDonnell-Douglas to make a Canadian airline sale, they may have to put the wing and tail manufacture into a Canadian plant, or, when Lockheed wants to sell to British airlines, a Rolls-Royce engine may be required, and for the McDonnell-Douglas jet to be eligible

for Alitalia markings may require fuselage panels built in Italy. The significant impact of this fact (which reaches billion-dollar levels) upon balance of trade was not considered in prior trade-balance studies. Note, however, that when our technology takes a big jump ahead of foreign technology, this negative offset disappears. The labor and material to build the all-titanium U.S. SST will be American, an added safeguard to our trade-balance and national economy, for no other free nation has the titanium manufacturing technology of the United States.

One thing is clear in the balance of payments area: it is extremely difficult to predict with much precision future developments of the major nations and aircraft companies of the world. I don't believe that comparison of the U.S. SST vs. the Concorde should be done on an all-black or all-white premise. Nevertheless, in order to simplify the presentation of potential trade swings, it is necessary to make assumptions that there would or would not be a U.S. SST competing with the foreign-built supersonic transports. To the best of our ability, I have asked that our trade balance studies consider real life factors, but I must say, at best, these projections only convey possibilities of what could happen.

A summary of the results of DOT studies shows that if there is a viable Concorde and no U.S. SST, we suffer a trade imbalance from 200 Concordes imported worth $7.0 billion and lose by not building an SST,

$10.1 billion from sales abroad, for an unfavorable swing in trade balance of $17.1 billion. (Figure G-8) Ia a more airline-economical Concorde II appears, this unfavorable trade impact would grow to $22.1 billion. I call this our conservative or base estimate. This is due to a greater impact upon the jumbo-trijet market from a more commercially attractive Concorde II. However, taking into account the effect on import sales of a more favorable "family of civil aircraft," this impact could grow to $27.1 billion and, when the real world offset agreements are accounted for, then this trade impact could reach almost $30 billion, all computed in 1967 dollars, over a 12-year period (1978-1990). (Figure G-9)

When we apply a conservative escalation of 3% per year to current dollars through 1985, only half the life of the production program, the trade impact numbers can boggle the mind; from a minimum of $17.1 billion to $45.6 billion over a 12-year period, or $3.5 billion per year. (Figure G-10)

Finally, when aircraft are sold over a time period such as the SST 1978-to-1990 time span, the spare parts for airframe and engine support can add exports with a value of 50% of the initial sales price. This factor has been largely ignored in our previous trade balance assessments. If we add this to the above highest estimate, about $50 billion trade swing can be projected.

As I am sure the gentlemen on this Committee recognize, export business

of this magnitude is no longer easily attained or duplicated in other product fields. An examination of Commerce Department statistics shows a steady erosion of our export markets and a migration of our technology abroad. (Figure G-11). Automobiles, for example, passed from a favorable to an unfavorable balance of trade in 1968 and last year we imported $1.4 billion more than we exported. (Figure G-12). Unfortunately this trend is continuing and information recently available indicates that imported car sales set a new high in July, up 25% from the year ago figure. Imports of iron and steel products are up 380% over a 10-year period. Consumer goods, excluding automobiles, has shown better than a 340% gain in the same period. Exports associated with our electrical and electronics industries also represent a disturbing situation. Since the mid 1960's, our exports have been growing approximately 15% per year. However, during this same period, imports have been increasing at the rate of 40% per year. Should these trends continue, it appears that by the end of 1972, our imports will exceed our exports in a field in which we originally excelled in technology. On the other hand, the products of American civil aircraft technology have been near the top of the export list for the past ten years. This is a strong technology base that we cannot afford to default.

It is a significant fact that our exports of civil aircraft are being converted to favorable trade balances at a ratio in excess of 90%. In other words, nine of every ten dollars of civil aircraft exports contribute to our favorable trade balance. This point has not been lost in the deliberations of Sir George Edwards, Managing Director of British Aircraft Corporation, who recently said that the economic

future of Great Britain is largely dependent upon the advance of aerospace and related technologies, mainly due to the high conversion ratio of exports against imports.

Civil aviation leadership means advanced technology unmatched outside the U.S. and bulwarked by a stable trade balance. These attributes work together toward a common end -- a sound U.S. economy. Without a sound economy, we can never honor our commitments to better education, better housing, better law enforcement, better transportation, and, to improve our environment, a better quality of life for all.

LABOR FORCE FOR SST PRODUCTION

The parallels of a sound economy and a growing labor force are such that there is a significant SST impact upon the U.S. labor force. As indicated earlier, when the governments and industries of Canada, Great Britian, France, Germany, Italy, and Japan determined that their technology in civil aircraft began to match that of the U.S. industry, they hastened to promote "offset agreements" as a means of augmenting their own employment base.

Quite obviously in these circumstances, U.S. aircraft manufacturers were placed in a position of having to adopt a "half-a-loaf" approach in dealing with these agreements. However, in the SST program we are now dealing with the whole loaf, since we alone possess the necessary titanium technology in the free world. Should we decide not to go forward with our technological edge, then the British and French would be afforded the opportunity to use their less advanced Concorde which is scheduled for airline service in 1974 as a family "leader" to attract sales to their airbus and other subsonic aircraft. Should this happen we could then lose not only the SST market but our dominance in commercial aviation as well, and afford the competition the necessary ingredients of time and resources with which to make the quantum jump from aluminum to titanium technology.

Estimates of the significance of the SST upon our aircraft employment,

(Figure J-5), indicates a loss of 28 percent of all jobs available at the end of 1979 if we do not have the U.S. SST program. If we have a less favorable family of civil airplanes to offer to the airlines of the world and if, as consequence, future subsonic sales are filled by foreign aircraft such as the A-300/BAC-311 and the French Mercure, then the 28 percent can be much larger and represent a material employment loss to this industry.

The U.S. SST program will provide a peak direct labor force of 50,000 jobs most of which are highly-skilled with potential application throughout the United States over the period to 1990. Taking into account the multiplier factor, the SST more reasonably affects 150,000 jobs if the economy is not fully employed. I do not want to give the impression, Mr. Chairman, that our position assumes total loss of these persons to the work force in the event the program does not go forward --- it is our position, however, that minimally it will require substantial dislocation of families and material retraining efforts to adapt these workers to different skill requirements in different industries. Such changes are not accomplished without significant personal hardships or without some government expenditures. We are in full accord with the policy of this Administration to return to a full employment economy by 1972 and believe the nation is better off if these jobs are in the technologically progressive aircraft industry rather than elsewhere, particularly in view of the current downtrend.

Perhaps the present condition of aerospace employment in the United States can be used as a mirror of the future. In current perspective, (Figure J-6), employment in the aerospace industry is already suffering from declining sales of large civilian transport aircraft coupled with reduced expenditures for military aircraft and missiles and space programs. For the year ending September 1970 employment will have dropped by twelve and one-half percent from a year ago --- a loss of 168,000 jobs or one out of every eight. Contrary to popular misconceptions that the aerospace industry employs only white collar workers, this job-loss is not restricted to any particular type of employee but rather has an across-the-board application. Scientists and engineers who comprise only fifteen percent of the work force will lose 28,000 jobs, down 13.8 percent from the year-ago level, production workers representing fifty-one percent of the force will lose 89,000 jobs, a drop of 12.8 percent and technicians representing five percent will lose 10,000 jobs, a drop of 14.1 percent.

Impressive as these statistics appear in totality, they tend not to convey the true import of the situation. For example, the 168,000 jobs comes more into perspective when viewed in light of the fact that this is roughly comparable to the population of Arlington County, Virginia, which according to the 1960 census was slightly more than 163,000 persons. Quite obviously, the loss of this number of tax-paying Americans, if even for a limited time, must have repercussions in various segments of the economy.

None of these statistics, of course, provide a reasonable measure of the personal hardships which necessarily accompany such situations. It is not an easy decision for most families which requires their total removal from a location which is their home --- in certain instances it may not be an acceptable option to even attempt and they remain in the area, even if unemployed.

As I said earlier, Mr. Chairman, the present aerospace employment picture, depressing as it is, can be useful in that it can be a mirror of the future, if we experience the loss of employment from having exported one of our best national resources-which is what will happen if we fail to answer this foreign SST challenge. I am not projecting such a dire situation, but rather trying to illustrate that our aircraft industry is very vital to our overall economy and well being.

Before concluding my remarks concerning this vital area of consideration, I think it may be pertinent to highlight certain sections of a "Statement by the AFL-CIO Executive Council on SST." At their meeting on 3 August 1970, in Chicago the Council, in supporting this program said in part ---

(1) "Today, the USSR and the French and British are developing airliners that will fly at supersonic speeds on trans-oceanic flights. These nations, using government funds, have produced prototypes and are now well along in their testing programs."

(2) "Without an SST, the American aerospace industry will be unable to maintain its leadership in world aviation, losing most of the market for trans-oceanic airliners."

(3) "American aerospace workers will also lose sorely needed employment."

(4) "We urge the United States Senate to vote funds for the development of an American SST. The age of supersonic travel over water will soon be here. The United States cannot afford to be left in the lurch."

AIRLINE NEED FOR PRODUCTIVITY

Turning now from the need for an SST as an overall U.S. national requirement for economic health, lets consider the importance of the SST to the airlines, both U.S. and international.

Productivity refers to an airplane's ability to do work efficiently. In air transportation terms, one measure of productivity is available seats per airplane times the speed (shown as the available seat miles per hour per plane). (Figure H-3) Analyses show the SST to be approximately:

- Three times as productive as the Concorde (1974) and the jumbo tri-jets (1971)
- Twice as productive as the largest jumbo jet (1969)
- Four times as productive as the basic subsonic jet fleet (1965)
- Sixteen times as productive as a DC-6 (1950)
- About one hundred times as productive as the DC-3 (1940)

New productivity levels provide the basis for the airlines to:

- Accommodate the normal travel growth requirements coincident with attractive service in terms of departure and arrival schedule,
- Maintain a reasonable financial return in spite of cost escalation,
- Provide the traveling public with reasonable fares, and
- Maintain reasonable world-wide civil air transport fleet sizes.

If we look at the impact of productivity in the light of these factors (Figure H-4), we see, first, the increase in intercontinental revenue passenger miles growth conservatively projected by Boeing to be such that by 1985, the SST traffic alone will equal the entire free world traffic today, 260 billion revenue passenger miles, or 100 million passengers traveling by SST - and this with no supersonic overland flights. Almost 75% of all intercontinental flights are projected to be in SST's.

Secondly, as a means of showing how important it is for aviation to plan ahead, and to underscore why we must go ahead now, examine what could have occurred had the aviation industry not been ready, capable and willing to offer the needed advances in aircraft technology, reflected in improved productivity per dollar, through improved models about every five to eight years (Figure H-5).

. Only 345 pre-war DC-3's were built to serve the airlines of the entire world. By 1947, the DC-3/4 and Constellation fleet had grown to 2000 civil aircraft

. At the end of the piston engine airplane era a total of some 4500 DC-6's, DC-7's, Constellations and other piston airplanes were in use by the airlines of the world.

Today the airline fleets of the Free World number about 3500 subsonic jets. Had the industry not pressed ahead with the jet age, in spite of all the outcry of the critics of progress of the early '50's, we would today be choking the airways and airports with piston aircraft and cause significant environmental degradation.

Now, looking ahead to the 1980's, if the U.S. aircraft industry does not continue to move ahead with its advanced generations of more productive, more comfortable, safer, more reliable air transportation, we will stifle our industry. The economic benefits resulting from meeting the increased demand will be reaped by countries currently planning and aggressively pursuing this lucrative market.

Some critics of the SST contend that international air travel is limited to an insignificant segment of the U.S. population. Consider the composition and magnitude of air transportation projected for the 1980's. It appears this next advance in travel - communication - cultural exchange - business will be of service to a significant segment of our U.S. population. Examination of present day travel and that predicted for the 1980's shows that:

- Today, some 44.7 million separate Americans (22% of our population) travel by air domestically and over six million internationally (3% of our population). (Figure H-6).
- By 1985, which is only the mid-life of the first generation of SST's, 50% of our population, 126.4 million Americans will travel by air domestically and 25 million, or 10% of our population, internationally. This is hardly a "jet set."
- 62.3% of international air passengers between the U.S. and foreign countries are U.S. citizens.
- The business/pleasure split of international air passengers is 26%/74% for the North Atlantic and 24%/76% worldwide. Passengers in the Pacific area are split about 50-50, business and pleasure.

- The North Atlantic routes (Figure H-7) alone represent the most lucrative airline route system in the world, carrying over six million people in 1969 between North America and Europe and projected to carry 28 million in 1985. About two million Americans or one percent of our population flew this route in 1969, and about nine million are expected to fly in 1985. During the 1960's, nineteen North Atlantic carriers flew 31.3 million passengers. Passenger volume increased 243% from 1960 - 1968. This air communications system links the two most powerful economic communities in world history -- Europe and the United States. By shrinking distances on the entire globe to 12 hours or less, the SST will open up similar traffic in other directions from the U.S.

- From a profit standpoint, the SST clearly aims at the prime market (Figure H-8). Long-haul routes are traditionally more profitable than short haul. Most SST flights will be "long distance." International operations have been shown from CAB statistics to be consistently 60% higher in rate of return than domestic operations, returning 9.6% internationally versus 5.9% on total investment, based on the 10-year average through 1969. This is important to the SST program and fleets of the future in terms of:

  . Repayment of the government cost share,
  . A healthy airline industry,
  . A more rapid payoff of the new equipment directly for a greater return on investment.

Greater productivity is also the way the airlines generate the funds to pay back the loans required for new equipment. Much has been said about the potential price of a U.S. SST escalating from a 1970 estimate of $37 million per airplane to the order of $50 million in 1978. (Figure H-9) Historically, new equipment has produced sufficient revenue to pay back its cost in about 5-6 years.

Notice that the SST is not expected to be an exception, and that this payback capability is due to its phenomenal productivity -- the ability of the airplane to produce revenue.

With all these productivity factors in mind:

- Holding fleet sizes to manageable levels --
- Accommodating known travel growth trends with adequate service and at reasonable fares --
- Providing airlines returns adequate for their solvency --

We must yet ask what does SST productivity do for the average citizen -- the traveling public -- all 25 million of us in 1985? (Figure H-10) If we examine cost history and projections to 1985, we can see a steady rise in costs for all aspects of airline operations -- except perhaps for fuel. In spite of this all too familiar trend, notice that airline fares, compared to the Department of Labor Consumer Price Indices, have actually decreased since 1947. (Figure H-11) The ability of the airplane manufacturing industry, combined with progressive

and dedicated airline management, enables nearly 45 million Americans today or about 22% of our population, to enjoy the phenomenon of lower prices while other prices have risen an average of 50%! The SST will be available to everyone and specifically to the 25 million Americans who will chose to fly internationally. This is equivalent to 10% of our population which will further enjoy these benefits in the 1980's.

THE BUSINESS OF THE SST - A PARTNERSHIP

With all of the capabilities of the SST program to help undergird the economy from a national interest standpoint, it is at the same time a unique government-industry partnership that is more of an investment than a direct federal subsidy. This is, of course, in the nature of the American way of doing business, for the SST is a civil transport in the business sense and the Government is most certainly not to be involved in competing with private industry for profit. (Figure K-9) The contract arrangement provides for both parties to realize a reasonable return as follows:

- The prototype costs will be returned to the government by the time the 300th airplane is delivered.
- When the 500th airplane is delivered, Government royalties will reach one billion dollars above the investment. The constitutional government method of obtaining revenue, however, is through taxes, and, when the taxes calculated from SST employment (50,000 direct jobs and 150,000 total jobs, including indirect) are considered part of the return, an additional $6 to $7 billion will be returned by 1990 for a return on the prototype investment of almost 17%. Returns to the manufacturers are estimated to be 15% and 11% for Boeing and GE, respectively.

FINANCING PLAN

The Government's involvement in the financing of the prototype program has always been based on these basic economic realities: (Figure K-4)

- The size of the financial burden exceeds the capabilities of any single or joint private U.S. industrial aerospace concern.
- The 100% government subsidized French-British Concorde is already at least four years ahead of our SST and has completed more than 220 hours of successful prototype flight testing.
- The potential adverse impact upon our nation's balance of trade if we forfeit the SST market to the foreign manufacturers demands we build the prototype to protect future options. To forfeit the SST, in the face of intense and dedicated foreign subsidized civil aircraft competition could well lead to a serious erosion of our total civil aviation market and aircraft employment.

The cost-sharing/loan nature of the prototype U.S. program features: (Figure K-2)

- A 90% government - 10% industry cost share up to a cost incentive point of $625 million for Boeing and $284 million for General Electric after which industry shares 25% of added costs.
- Industry bears the burden of all facility costs, about $54 million for the prototype and $100 million for production. The manufacturers also will spend about $78 million in commercial costs during the prototype time period.
- For the prototype program through 100 hours of flight test:
  Boeing $122 million or 9% of allowable cost.
  G.E. $51 million or 4% of allowable cost.

Airlines $59 million or 5% of allowable cost.

Government* $1051 million or 82% of allowable cost, but with facility and commercial costs of $132 million by manufacturers the final share will be:

Government $1051 million or 74%

Manufacturers and airlines $364 million or 26%

The financing of the production phase has not relied on government participation nor was it, nor is it, intended to do so. (Figure K-5) The finance plan is evolving with discussions already in progress with financial organizations, industry, labor, CAB, etc. The present timing for a plan is June 30, 1972. It is hoped that this year an outline of the plan can be developed; however, the success of the prototype design and the associated research and development are the keys to attracting the private financial community to this program. As one leading financial expert put it, "with a proven successful prototype flying and the prospect of more than $25 billion worth of business, someone will find the cash to promote this business." The industrial financing of a program as large and with such national economic impact is a truly U.S. wide project. Labor, the airlines, the manufacturing industry, the lending institutions, the government fare-route regulating authorities and the international fare-route regulating authorities will all be directly involved in developing the necessary actions to assure:

- A healthy airline-industry economy
- An attractive economical design

*Government and manufacturers also invested $291 million and $17 million respectively prior to the prototype phase.

- A well-managed, imaginative total transportation system to accommodate the SST.

Two important factors, normally representing the only requirements for private financing assurance, are implicit in the SST Program already. These are:

- A willing buyer.(10 airlines have put up nearly $60 million of risk money to show their willingness to support this program.)
- A proven vehicle which will be provided by the prototype phase.

The magnitude of the financing used, the current economic status of the airlines and the industry make an accurate projection impracticable at this time; nevertheless, the objectives and plan for private financing remain unchanged.

FISCAL YEAR 1970 PROGRESS

In the year since the SST program was last reported to this Committee, considerable progress has been made by both the airframe and engine contractors, paving the way for prototype construction work. A Class II full-scale structures mockup was assembled. Prototype structure design releases have been started. Forging drawings, long-lead raw material items and specification control drawings are being released to support the progressive stages of manufacturing fabrication and assembly.

The major subcontractors have been awarded prototype production contracts. The contractors recently announced include Aeronca, Inc., North American Rockwell, Rohr Corporation, Fairchild Hiller, and Northrop Corporation for the airframe and Cleveland Pneumatic for the landing gears.

During FY-1970 Boeing also awarded the following subsystems and equipments contracts.

Sperry Rand - Flight Control Electronics

Bertea Corp. - Horizontal Stabilizer Power Control Unit

GE Company - Variable Speed Constant Frequency Elec. Sys.

Air Research Manufacturing Co. - Secondary Flight Controls

Abex Corp.- Forebody Actuation System

Hamilton Standard - Power Servo Inboard Flaperon

At General Electric, engineering activities have demonstrated significant progress in the development of the GE4 engine for the SST. Initial

testing of the 633 lb/sec airflow engine at maximum nonaugmented conditions produced 54,250 pounds of thrust at a specific fuel consumption of 0.974. This is better than the contractual requirement by more than 5%. At full augmented power, the engine established a new world's record of 69,900 pounds thrust at a specific fuel consumption of 1.74. This is better than the contractual requirement by 2%. The 633 lbs/sec compressor demonstrated the ability to meet the design objectives. The engine was successfully operated at simulated Mach 2.7 conditions with augmentation. Improved performance guarantees for the flight test engine were incorporated into the contractual engine specifications. About 80% of the design for the 68,600 pounds thrust Flight Test Status Engine has been completed.

Program Management FY-70 Activities. In program management, some replanning was necessary in FY-70 to stay within the resource constraints placed on the program. To some extent this is like squeezing a balloon - the volume or work content is unchanged, but it is pushed out in other places and shows up in FY-1972, FY-1973, and FY-1974. Based on reviews of other programs, my programming people feel this may lead to a schedule slip of first flight. While we are making every effort to keep funding restrictions from impacting the program, analysis of the probable effects leads us to the conclusions that the first flight may slip approximately three months.

I am encouraged that Boeing and GE believe they can replan their efforts without a schedule slip or any resulting increase in costs. Based on

estimates of my people, it appears that if the manufacturers are unable to meet the current first flight date, the prototype cost will be $1283 million to perform the prototype phase through 100 hours of test flight. This would represent a $76 million increase in the potential cost of the prototype phase over last year's estimate. On this issue, however, I would like to point out that we are presently underruning our cost and indications of the companies are that they can replan and stay within their estimates. I'm not sounding an alarm; I do want to indicate that we are very cost and schedule conscious, and also that both Government and industry management must be on their toes. Funding must be provided at the planned rate in order to accomplish the program within forecast cost and schedule.

WHAT FY-71 WILL PRODUCE

Mr. Chairman, FY-71 is our critical year. This is the year when we will start to see the airplane take shape. We are going to begin assembly of the first major section near the end of the fiscal year. It also, as one would expect, is our major funding year. During this period of development, we will see our manpower reach its peak. To support this effort, we are requesting $290 million. I would like to review the highlights of some of the work that will be underway.

Boeing's FY-1971 Planned Major Accomplishments

Engineering Activities have proceeded rapidly and smoothly leading to fabrication of numerous prototype aircraft parts in FY-1971. Approximately 85% of all detailed structural drawings will be released to the shop before the end of the fiscal year. All procurement specifications will have been completed, most of the systems and parts orders will have been placed on contract and assembly of the first major airplane section (the wing aft section) will commence during FY-1971.

Analysis and Test Activities will have, by the end of FY-1971, passed their peak, phasing from production of design data to verification of components and systems before flight tests. Tests on numerous portions of the airplane will have been completed, such as all flutter model tests, nacelle model tests and full-scale inlet seal tests. Ground

engine/nacelle tests will be in full sway, as will full-scale tests of the fuselage movable forebody, the environmental control system, the flight control system, the electrical system, the full-scale engine air intake system, the fire detection system and various structural proof tests. The horizontal tail box and the vertical tail box static tests will be completed as verification of the structural design.

Manufacturing will commence early in 1971 on prototype detail parts. By the end of the fiscal year approximately 70% of all detail parts will be under construction by Boeing and the major subcontractors. Fabrication of major tools will start in the middle of the fiscal year and near the end of the year, assembly of the first major airplane section (the wing aft section) will begin in the major fixture. Refinement of the Class II mockup structure will occur during fiscal year 1971, and Engineering and Manufacturing will be using the mockup for tubing and electrical wiring development.

Procurement of raw materials, both metallic and non-metallic, will continue to support the extensive fabrication effort occurring in fiscal year 1971. Systems and equipment items for test purposes will continue to be received throughout the fiscal year. Late in FY-1971, the initial prototype engines will be completed and available for qualification testing and later installation into the number one prototype airplane.

These engines will be extensively tested to demonstrate the satisfactory operation of the engine under various conditions which simulate actual operating conditions as well as increasing the durability and reliability of the engine. Approximately 1600 hours of full scale engine testing will be performed during this period, bringing the program total to about 2400 test hours, or over 50% of the contractual target.

The significant engine tests to be performed during this period are as follows:

- Inlet - Engine Aerodynamic Compatibility Tests will insure at static sea level conditions that the engine-inlet system is compatible and will meet the performance, safety, and reliability requirements for the SST. This test will provide full-scale compressor and engine results under simulated inflow conditions at an early date so that modifications, if necessary, can be made prior to the full-scale testing of the inlet and engine in the supersonic simulated flight conditions of the AEDC propulsion wind tunnel facility.

- Hot Gas Re-ingestion Test will demonstrate the ability of the engine to operate in the thrust reverser mode on landing.

- Engine Air Start Test will determine the ability of the engine to restart at operational altitudes.

Engine Durability and Reliability Tests will confirm the life and endurance of the engine under operating conditions.

Engine Component Testing will continue including nozzle and reverser scale model performance tests and cyclic cascade tests of advanced turbine blade and vane designs. Approximately 12,000 component test hours will be performed during this period, bringing the program total to 122,000 test hours or about 95% of the contractual target.

Engine Design of the 68,600 pounds thrust Flight Test Status engine will be completed by the first quarter of the fiscal year. Engineering analysis of test data resulting from engine and component tests will continue in support of the Flight Test Status engine.

Manufacturing of tools and hardware necessary to produce twenty-seven and a half equivalent sets of Flight Test Status engines will continue. During this period, all tools will be in place and approximately 35% of the material will be available to fabricate 28% of the Flight Test Status engine hardware.

Other FY-1971 Planned Major Accomplishments

Supporting Research and Development will be conducted during FY-1971 by the Office of Supersonic Transport Development (OSTD) in accordance with overall program objectives. The effort will be applied in two main areas:

1. Program Financial Planning and Economic Analysis and Forecasting. Some of the effort and studies to be conducted or initiated in this area are:
   - Macroeconomic impact of SST on the U.S. economy
   - Update economic forecast and demand studies

2. Environmental Studies and Research and Development
   Due to increased concern of the environmental control aspects of the SST program, a parallel research program will be continued by OSTD with major emphasis in the following areas to obtain a part of the answers to questions of environmental uncertainties discussed previously prior to the commencement of the production program:
   - Radiation Studies
   - Noise Reduction Studies
   - High Altitude Weather Studies

SUMMARY

In summary, a great deal has been said, and written, about the relationship of the United States SST to its leadership in aviation and the enhancement of the nation's prestige by fostering that leadership. (Figure L-2) These two intangibles, leadership and prestige, come not as a result of being bigger or faster, but from being better. They are not inputs to the SST program, but are very realistic and honest outputs earned when our free enterprise system plans ahead, succeeds in competing with the nationalized systems abroad, and produces benefits for the nation as a whole. The Supersonic Transport Program can be such a national effort, for it reflects:

- An eighteen-year research and development planning effort by our entire technical and scientific community.
- A carefully developed government-industry partnership (Figure C-2) with joint returns to the government and to the industry, and the promotion of a healthy industrial base in the United States
- A significant impact upon our balance of trade value (Figure C-4)
- A design which will answer airline industry needs for improved productivity in the 1980's and substantial economic advantage over the competition.
- A significant labor base, which, if not undertaken, would default aircraft industry jobs to industrial concerns overseas.

DEPARTMENT OF TRANSPORTATION | NEWS

OFFICE OF THE SECRETARY

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Remarks prepared for delivery by
William M. Magruder
Director, SST Development, Department of Transportation
To the Dallas Salesmanship Club
Dallas, Texas - 29 October 1970

The salesman's delight is a product that satisfies. The aviation industry has been delivering such a product for better than thirty years. As a result, 85 per cent of the Free World jet market is supplied by American industry. This position of U.S. leadership in civil aviation has been earned. It is a matter of some pride; but that's secondary. Leadership in aviation is primarily a matter of dollars and cents: it sustains an enterprise that is a major factor in our economy, it brings money into the country, it helps keep American dollars at home.

One reason our industry has been so successful in selling airplanes throughout the world is customer satisfaction. The aviation industry offers guarantees unmatched by any other industry I know of. When an American aircraft manufacturer delivers an airplane to a carrier he guarantees field length performance, takeoff and approach speeds, noise levels, engine emissions limits, elapsed time to climbout, cruise altitude and speed, payload range, pavement stress, and even special mission

capabilities. The manufacturer guarantees maintenance and reliability ratios of 98 per cent and better, with penalties of free spare parts, and ten years of structural life for the main elements of the airplane. Where can a buyer get guarantees like that? Not in our appliances; not even in our automobiles, where the five-year guarantee just went out of existence.

About the only thing the manufacturers don't guarantee is a profit -- for themselves or the carriers. That's earned the hard way, by competition. And the airlines, or the manufacturers, have not set any records for profitability.

What the industry has done, and in admirable fashion in my opinion, is meet the growth in public demand for air transportation. Even more remarkably, they have made air travel available to everybody without increasing fares. In this day and age, that's an accomplishment bordering on the miraculous.

This is not to say that the airlines or the manufacturers have brought about this revolution in transportation all by themselves. They have had the helping hand of the Government, both legislatively and financially. Not just in air transportation alone, but in the evolution of the railways and the highways, the support of transportation for the public has long been a public service -- and that support is taking on new dimensions under the Nixon Administration.

We have a difficult challenge before us. As Secretary Volpe has pointed out on a number of occasions, we have to double the capacity of America's transportation system within the next 20 years. And we have to do it with some strings attached.

For example, we can't do the job by numbers alone.

We can't, in other words, permit a doubling of the numbers of vehicles on our highways or in the skyways. It has never made sense to the airlines to operate two or three planes where one would do the job. In fact, the ability of the industry to periodically and predictably increase the productivity of its products is one reason traffic has grown while fares have gone down.

So it is not the intention of the Government or the industry to flood the airways with airplanes.

Another constraint that must be observed in doubling our transportation capacity is regard for the environment. Transportation facilities are imperative to a mobile society, but the cost to the environment must be a factor in the decision-making process. Secretary Volpe already has demonstrated his concern and his convictions in this respect in a number of ways.

Then, thirdly, we can't go from here to there in our transportation objectives without a healthy industry. We simply can't improve a suffering transportation system unless the components of that system are alive and well and financially able to tackle the challenges. That applies to any mode, but I am thinking especially of the aviation industry which is not exactly enjoying the rosy glow of good health at the moment. Incidentally, I think it's worth noting that the scheduled U.S. airlines achieved a 10.1 per cent growth in revenue passenger miles in 1969, a 15.7 per cent rise in freight ton miles, and a 13.3 per cent increase in total operating revenues -- but experienced a 74.4 per cent decline in net profit and a 34 per cent reduction in rate of return on investment. The problem is partly the influx of new equipment into the carrier fleets, resulting in a surplus of seat miles and a profit squeeze. But if history is any teacher and forecasts have any validity, time will close the gap between capacity and traffic. What we must also do is take the team approach to the alleviation of transportation's nagging problems. That means the industry and labor and the regulatory agencies of the Government working together to produce a healthy industry. I believe Secor Browne, Chairman of the Civil Aeronautics Board, has a point when he suggests that the airline industry is over-competitive and that route and fare structures need to be re-examined.

Now, I would like to talk for a few minutes on how the supersonic transport can help -- not hurt -- an ailing industry, and how the SST logically assists the task of getting to the 1980's prepared to handle the transportation needs of that decade and following.

Let's look, <u>first,</u> at the history of aviation in America.

The airplane was American-born but European-bred. We didn't acquire our pre-eminence in aviation by osmosis or default. It really took World War II to make the airplane a typically American product.

The development and purchase by the military of the C-54 helped make the DC-4 a product for civilian transport. The Air Force was the largest buyer of the DC-6 in its military form, the C-118. Later, requirements for the C-121 paid for much of the development of the Lockheed Constellation.

The jet didn't arrive on the scene entirely of its own strength either. The B-47, B-52 and KC-135 programs developed the $2 billion worth of technology which made the 707 and the DC-8 possible. Now, Boeing had the foresight to see the jet market, and the courage to put $16 million of corporate money into the construction of the "Dash 80". But we wouldn't have the jets of today -- and Boeing admits this -- without the foundation of Government support at the research and development stages.

The point, I think, is simply that Government-industry partnership in the development and fostering of aeronautical policies and capabilities in America is an established fact, and has been highly successful. In the past the outlet for the Government's financial assistance frequently has been the military, for reasons of National security. Today the pattern is changing somewhat; civil and military technologies are taking different directions. Interestingly, and for the first time, civilian needs rather than military are pushing the state of the art in aeronautics. The military has no compelling need for the highly productive, titanium technology, advanced transport necessary to assure that the aviation industry can provide the capacity predictable in the concluding quarter of this century. Nor do military requirements dictate developments in mass, short-haul STOL aircraft progress. Similarly, noise and pollution control technologies are being spurred by civil, not military operational requirements.

Government assistance in the development of the SST, therefore, is not precedent-setting. If there is anything new about the partnership, it is the payback provisions written into the contract which stipulate that royalties will be assessed on the sale of production SST's in amounts that will insure repayment of the entire Federal investment by the time the 300th airplane is sold. That, to my knowledge, is new -- and, in my judgment, a loan arrangement, with specific payback machinery, is preferable in our free enterprise system to the system of fully nationalized industries in the countries competing with us for SST sales. I would even venture to suggest that the SST program may be showing the way to the realization of the new, and certainly costly, transport systems of the future.

Then, second, let's look at what our civil air system has produced for America, and for Americans.

It has produced new dimensions in transportability that no other mode, or combination of modes, could ever approach. I often think that when we dwell on the imperfections in aviation, we should consider what our transportation situation would be without the airplane. Civil aviation developments have put travel, virtually anywhere in the world, within the reach of nearly any citizen.

The notion that jet travel is only for a "jet set" is about ten years out of date. Statistics show that about 45 million American, or 22 per cent of our population, travel by air domestically; another six million internationally. But we don't really need statistics to prove that the air age has arrived. A writer for the New York Times made the point in a recent article when he said, and I quote:

> "Go out to the nearest airport and watch the people coming through the arrival gates. These are not jet setters; they are ordinary people. They fly to work, to school or college, to funerals and weddings, and to vacation places. In the early '30's, the airlines carried movie stars. Today their passengers are the common people -- tieless, jacketless, sportshirted, dungareed, occasionally shoeless, often under 30." End of quote.

Air travel also has revolutionized the business world; changed sales, distribution and promotion habits. But it's not even the businessman who keeps the airlines in business today. A few years ago business travel accounted for about 85 per cent of domestic airline passenger traffic. Nowadays personal air travel has grown to the point where it represents about half of airline passenger traffic.

How has this come about, that air travel should be available to the rank and file?

One reason is accessibility. Major airports are within easy reach of tens of millions of people. For others, regional carriers and commuter airline service have developed to such a degree that almost no community is left wanting for air transportation.

A second reason is public preference. Twenty years ago the airlines accounted for 14 per cent of the common carrier passenger miles between cities in the United States. Last year they accounted for 75 per cent. Twenty years ago there were only 2.2 million air passengers between the United States and other countries. Last year there were more than 18 million. In 1949 U.S. scheduled airlines carried fewer than 17 million passengers. In 1969 they served 159 million. By 1985, 100 million people will be traveling by SST alone.

But a third, and perhaps bigger reason for the acceptance of air transportation is price. Air travel today is a bargain.

The average cost of travel for the air traveler was 5.96 cents a mile in 1959. Ten years later, in 1969, the cost was 5.68 cents a mile, actually lower than in the first year of the jet age. Considering how the prices of food and lodging and other forms of transportation have gone up, the percentage of a vacationer or businessman's total expenses represented by his air fare is substantially lower than it was ten years ago.

This economic legerdemain is due to increases in productivity -- improvements in the revenue-earning capabilities of the airplane -- that the industry achieves every five or six years. For example, we are at the beginning of what is generally considered to be the second jet age, with the arrival of the wide-body subsonic jets -- the 747, DC-10 and L-1011. Yet, it is the sixth overall re-equipment cycle of the airlines since World War II. Each time the industry has done a better job of providing the equipment needed to do the job, so efficiently and productively that the airplane itself has literally offset the cost increases occurring in labor, fuel, operations, and administration.

So, thirdly, let's look at how the SST stands to benefit productivity in the 1980's and beyond.

To begin with, I want to dispell the idea that aircraft developments always take the direction of bigger, faster, noisier, or that the SST is an expression of technology for the sake of technology. That's utterly false. The success of the larger jets (707, DC-8) has led to their smaller cousins (727, 737, DC-9). The new large-capacity subsonics are bigger, but comparatively they are quieter. Personally, I think you are going to like the DC-10 and the L-1011 when they go into commercial service next year. They are noticeably quieter, and will probably set a new standard for noise suppression capability. They will also have smokeless engines.

There is a purpose, however, to building planes bigger and faster, and it relates to their ability to do work for their operators. The 747 is probably about as far as we can go in increasing the size of commercial aircraft, not from the design or engineering point of view, but as a matter of airport compatibility. So we turn to speed, which is another way of improving productivity.

The SST will do about four-and-a-half times as much work as the 707; twice what the 747 can do. One SST can go to Europe and back again, while the 747 is making the trip one way. This not only increases the utilization time on the aircraft, but permits greater schedule flexibilities. The end result of improved productivity is an expansion of capacity without a commensurate expansion of costs, which means that the airlines are better able to keep a lid on fares while meeting the public need for air transportation.

We must bear in mind that unless aviation forecasts are glaringly in error, travel by 1985 on the SST international routes alone and will equal all of the free world air travel today.

To put it another way, if we had to do today's air transportation job with nothing better than the DC-3, we would need some 47,000 airplanes in our carrier air fleets. By 1980 it would take 145,000 DC-3 aircraft to meet the air travel needs, and nearly 200,000 in 1985. In airline parlance, the DC-3 produced 28,000 set miles per day. In contrast, the SST will produce four-and-a-half million seat miles a day.

Then, fourth, let's consider what it takes to bring all of this about. Are the costs to the taxpayer, to the environment, and to our national priorities too great to justify the SST?

I would like to say, simply, that if we thought they were, the Government would not be involved in the SST program. It must be understood, first, that the Government's support of the SST rests on the assumption that concern for the future properly belongs among today's priorities. The extent of support is not large. The $290 million being requested for fiscal year 1971 represents 2.6 per cent of the Department of Transportation budget; one-hundredths of one per cent of the Federal budget.

Secondly, opponents of the program oft-times fail to acknowledge that other transportation improvement programs are going forward and are in no way suffering because of any financial or political emphasis on the SST.

For example, the President has endorsed and the Congress has passed the $10 billion Airport-Airways Development Act and the $10 billion Urban Mass Transportation Assistance Act. The Government is going to the rescue of the intercity passenger train service through the "railpax" system -- establishment of a National Railroad Passenger Corporation to take over and operate designated passenger trains. There is a program underway to revitalize shipbuilding and modernize our merchant fleet over the next ten years. In short, the seventies are years for building, for catching up with and overcoming the neglect of past years. Stopgap or halfway measures are no longer acceptable. We must prepare for the eighties and for the capacity we will need in our total transportation system. The SST program is a part of that effort.

The possible cost to the environment is getting close and careful scrutiny. There have been a great many charges brought against the SST, as a potential violator of the environment. I would just like to say that there are four courses of action we have taken in dealing with these charges:

-- One, we have gone to the experts and sought their opinions. We were doing that, as a matter of fact, before "environment" became a household word.

-- Two, we have worked and are continuing to work with responsible individuals and organizations, in and out of Government, equipped and qualified to get at the facts. I have two advisory committees at work, which include members of the Commerce Department's Technical Advisory Board, a group of top scientists outside the Government.

-- Three, we have formulated an expanded research program, specifically designed to answer the unknowns and resolve the uncertainties about the effects of supersonic flights on the upper atmosphere.

-- And, four, we are coordinating our efforts with the President's Council on Environmental Quality and have, in fact, submitted to the Chairman of the Council the environmental impact statement required of any new program, one of the first to be submitted, I might add.

It has been suggested by our critics that because we have not thrown up our hands in the face of theories, conjecture and speculation about the possible effects of large-scale SST operations, and summarily cancelled the prototype program, that we are acting irresponsibly with regard to the President's expressed desire to protect the environment. No so. If there is anything environmentally unacceptable about the SST, we want to know it. But we want to act on the basis of facts, not fears. The prototype program is the means of keeping America's option open to compete in the world supersonic transport market. It would be folly to cancel that option without due cause, and thereby deprive our economy of the future benefits of SST production and sales. So we are keeping an open mind on the issues, and staying alert and responsive to the environmental concerns.

This is also the case with respect to noise, which is of concern to the public and the airport operators alike. Impacted airports -- that is, metropolitan airports surrounded by population -- are today targets of constant complaints.

These complaints certainly are not without cause. The jet engine, by nature is noisy. But turbine engine technology has by no means reached a dead end. In earlier years, technical efforts were aimed at developing more power, and in improving thrust-to-weight ratios. Those efforts have been eminently successful.

More recently, technical attentions are being focused on correcting the jet engine's bad manners. We now know, for instance, how to get rid of the smoke. And while engines are getting more powerful, (and the 747 is a current example) they are not necessarily getting noisier. As I mentioned earlier, the DC-10 and L-1011 will be appreciably quieter. We have over $30 million ticketed for noise suppression work on the SST prototype, and with eight years to go before commercial service I am confident we will bring the noise problem under control.

The problem we are fighting is essentially one of airport noise. The majority of complaints today are from people who live under the takeoff and approach patterns -- in the communities adjacent to the airport. This "community noise" is the principal bone of contention. In response, the FAA has set tougher noise standards for the new subsonic jets, issued an advance notice of proposed rule making for supersonics, and is considering the feasibility of requiring retrofit work on existing jet fleets to reduce the public's exposure to aircraft noise.

Despite all the criticism about how noisy the SST is going to be, I would like to point out that if our SST were flying today, with today's engine and noise technologies, we would be able to meet the FAA's new rules for takeoff and approach noise limits. Out over the community, on approach or takeoff, the SST would be less annoying to the people below than many of the jets currently in use. On the airport itself, however, where people don't live, the SST would be noisier but about the same at 2100 ft to the side of the runway as present jets are 3.5 miles from takeoff and 1 mile before touchdown or landing. And that's where the major thrust of our noise reduction work is directed. We want to lessen the noise on the airport, but not at a higher cost in community noise levels.

It has become clear in recent times that significant relief from aircraft noise can be achieved through compatible land use concepts and realistic zoning practices. In the case of new airports, regulated land use can be an effective noise preventive. The boundaries for your new Dallas-Fort Worth Regional Airport, for example, were established with the SST in mind. And that's good planning.

What you are building here in Dallas-Fort Worth is an airport which, when completed, will be capable of handling more traffic than the three major airports serving New York City combined, without congestion or delays. Moreover, the communities around the airport are assured protection against unacceptable noise -- even if technology fails to produce any future improvements. The FAA rule for new jets -- 108 EpNDB 3.5 miles from brake release point and 1 nautical mile to the sideline -- was the constraing used in laying out the two north/south runways. In

this respect, I would just like to say that I think the Dallas-Fort Worth Airport Board has done an excellent job of looking ahead. The North Central Texas Council of Governments has done an equally thorough job in assuring that urban mass transit and highway plans are tied in with airport planning, and in winning broad public acceptance for the airport by informing community residents of noise contours, zoning requirements, and potential economic benefits to the region from airport operations. This kind of approach must be the pattern of the future nationwide. In fact, many of the environment protection measures taken in the development of this airport are echoed in the terms of the Airport/Airway Development Act of 1970, and hopefully the evolution of airports and airplanes alike in the years ahead will together move swiftly toward the goal of reduced public exposure to noise.

Fifth, and finally, let's look at the principal national benefits of a successful U.S. SST program.

To begin with, the SST gives us a transportation capability not attainable any other way. Ninety-eight per cent of all international travel today is accomplished by air. The SS United States, fastest ocean liner afloat, went out of service earlier this year after losing $4 million in 1969, despite a $12 million Federal subsidy. For long-haul, over-ocean travel, the airplane is essential, and supersonic transports do the job better. With the growth in international air travel projected for 1980 and beyond, the industry will ultimately need airliners of 800 to 1,000 passenger capacities, if the quest for capacity is not satisfied through increased speed. The British, French and Russian manufacturers stand ready to equip the world's airlines with SST's -- and pocket the economic rewards -- if we step back from the challenge.

A second benefit, therefore is economic.

We have looked at the economic prospects in every conceivable fashion, and what it all amounts to is a $1.4 billion investment risk, not a subsidy, against the balance of trade impact of not less that $22 billion and possibly as much as $45 billion over a 12-year period; plus at least six-and-a-half billion dollars in tax revenues; plus the likelihood of 150,000 direct and indirect jobs in an industry where unemployment is already becoming acute; plus a $2.3 billion payback in royalties. This national revenue will give us the resources to better solve our social challenges of the '80's, challenges that usually absorb revenue, instead of creating such as the fashion of the SST.

We are perhaps prone to forget or overlook the impact the jet age has had on our economy. The airlines alone, added 150,000 jobs as a result of the jet, and increased their dollar turnover from $4.5 billion to $15 billion annually.

Aviation is a major industry in America; a vital factor in our economy. We have built superior aeronautical products throughout the propellor and jet transport ages. We have the capability to sustain that leadership in the supersonic age. We are being challenged from abroad as never before -- not only with the Concorde, already in flight test, but with a family of aircraft designed as replacements or alternatives to the bread-and-butter planes in the American product line.

An industry with a proven ability to deliver on its guarantees to its customers can also deliver on its guarantees to the nation. I am confident that continued development of the U.S. SST will demonstrate the ability of the industry and the Government, working together in Yankee tradition, to guarantee supersonic transport leadership without compromising National environmental objectives, or intruding on National priorities.

50-DOT-70

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Dallas, Texas - 29 October 1970

The salesman's delight is a product that satisfies. The aviation industry has been delivering such a product for better than thirty years. As a result, 85 per cent of the Free World jet market is supplied by American industry. This position of U.S. leadership in civil aviation has been earned. It is a matter of some pride; but that's secondary. Leadership in aviation is primarily a matter of dollars and cents: it sustains an enterprise that is a major factor in our economy, it brings money into the country, it helps keep American dollars at home.

One reason our industry has been so successful in selling airplanes throughout the world is customer satisfaction. The aviation industry offers guarantees unmatched by any other industry I know of. When an American aircraft manufacturer delivers an airplane to a carrier he guarantees field length performance, takeoff and approach speeds, noise levels, engine emissions limits, elapsed time to climbout, cruise altitude and speed, payload range, pavement stress, and even special mission

capabilities. The manufacturer guarantees maintenance and reliability ratios of 98 per cent and better, with penalties of free spare parts, and ten years of structural life for the main elements of the airplane. Where can a buyer get guarantees like that? Not in our appliances; not even in our automobiles, where the five-year guarantee just went out of existence.

About the only thing the manufacturers don't guarantee is a profit -- for themselves or the carriers. That's earned the hard way, by competition. And the airlines, or the manufacturers, have not set any records for profitability.

What the industry has done, and in admirable fashion in my opinion, is meet the growth in public demand for air transportation. Even more remarkably, they have made air travel available to everybody without increasing fares. In this day and age, that's an accomplishment bordering on the miraculous.

This is not to say that the airlines or the manufacturers have brought about this revolution in transportation all by themselves. They have had the helping hand of the Government, both legislatively and financially. Not just in air transportation alone, but in the evolution of the railways and the highways, the support of transportation for the public has long been a public service -- and that support is taking on new dimensions under the Nixon Administration.

We have a difficult challenge before us. As Secretary Volpe has pointed out on a number of occasions, we have to double the capacity of America's transportation system within the next 20 years. And we have to do it with some strings attached.

For example, we can't do the job by numbers alone.

We can't, in other words, permit a doubling of the numbers of vehicles on our highways or in the skyways. It has never made sense to the airlines to operate two or three planes where one would do the job. In fact, the ability of the industry to periodically and predictably increase the productivity of its products is one reason traffic has grown while fares have gone down.

So it is not the intention of the Government or the industry to flood the airways with airplanes.

Another constraint that must be observed in doubling our transportation capacity is regard for the environment. Transportation facilities are imperative to a mobile society, but the cost to the environment must be a factor in the decision-making process. Secretary Volpe already has demonstrated his concern and his convictions in this respect in a number of ways.

Then, thirdly, we can't go from here to there in our transportation objectives without a healthy industry. We simply can't improve a suffering transportation system unless the components of that system are alive and well and financially able to tackle the challenges. That applies to any mode, but I am thinking especially of the aviation industry which is not exactly enjoying the rosy glow of good health at the moment. Incidentally, I think it's worth noting that the scheduled U.S. airlines achieved a 10.1 per cent growth in revenue passenger miles in 1969, a 15.7 per cent rise in freight ton miles, and a 13.3 per cent increase in total operating revenues -- but experienced a 74.4 per cent decline in net profit and a 34 per cent reduction in rate of return on investment. The problem is partly the influx of new equipment into the carrier fleets, resulting in a surplus of seat miles and a profit squeeze. But if history is any teacher and forecasts have any validity, time will close the gap between capacity and traffic. What we must also do is take the team approach to the alleviation of transportation's nagging problems. That means the industry and labor and the regulatory agencies of the Government working together to produce a healthy industry. I believe Secor Browne, Chairman of the Civil Aeronautics Board, has a point when he suggests that the airline industry is over-competitive and that route and fare structures need to be re-examined.

Now, I would like to talk for a few minutes on how the supersonic transport can help -- not hurt -- an ailing industry, and how the SST logically assists the task of getting to the 1980's prepared to handle the transportation needs of that decade and following.

Let's look, <u>first,</u> at the history of aviation in America.

The airplane was American-born but European-bred. We didn't acquire our pre-eminence in aviation by osmosis or default. It really took World War II to make the airplane a typically American product.

The development and purchase by the military of the C-54 helped make the DC-4 a product for civilian transport. The Air Force was the largest buyer of the DC-6 in its military form, the C-118. Later, requirements for the C-121 paid for much of the development of the Lockheed Constellation.

The jet didn't arrive on the scene entirely of its own strength either. The B-47, B-52 and KC-135 programs developed the $2 billion worth of technology which made the 707 and the DC-8 possible. Now, Boeing had the foresight to see the jet market, and the courage to put $16 million of corporate money into the construction of the "Dash 80". But we wouldn't have the jets of today -- and Boeing admits this -- without the foundation of Government support at the research and development stages.

The point, I think, is simply that Government-industry partnership in the development and fostering of aeronautical policies and capabilities in America is an established fact, and has been highly successful. In the past the outlet for the Government's financial assistance frequently has been the military, for reasons of National security. Today the pattern is changing somewhat; civil and military technologies are taking different directions. Interestingly, and for the first time, civilian needs rather than military are pushing the state of the art in aeronautics. The military has no compelling need for the highly productive, titanium technology, advanced transport necessary to assure that the aviation industry can provide the capacity predictable in the concluding quarter of this century. Nor do military requirements dictate developments in mass, short-haul STOL aircraft progress. Similarly, noise and pollution control technologies are being spurred by civil, not military operational requirements.

Government assistance in the development of the SST, therefore, is not precedent-setting. If there is anything new about the partnership, it is the payback provisions written into the contract which stipulate that royalties will be assessed on the sale of production SST's in amounts that will insure repayment of the entire Federal investment by the time the 300th airplane is sold. That, to my knowledge, is new -- and, in my judgment, a loan arrangement, with specific payback machinery, is preferable in our free enterprise system to the system of fully nationalized industries in the countries competing with us for SST sales. I would even venture to suggest that the SST program may be showing the way to the realization of the new, and certainly costly, transport systems of the future.

Then, second, let's look at what our civil air system has produced for America, and for Americans.

It has produced new dimensions in transportability that no other mode, or combination of modes, could ever approach. I often think that when we dwell on the imperfections in aviation, we should consider what our transportation situation would be without the airplane. Civil aviation developments have put travel, virtually anywhere in the world, within the reach of nearly any citizen.

The notion that jet travel is only for a "jet set" is about ten years out of date. Statistics show that about 45 million American, or 22 per cent of our population, travel by air domestically; another six million internationally. But we don't really need statistics to prove that the air age has arrived. A writer for the New York Times made the point in a recent article when he said, and I quote:

> "Go out to the nearest airport and watch the people coming through the arrival gates. These are not jet setters; they are ordinary people. They fly to work, to school or college, to funerals and weddings, and to vacation places. In the early '30's, the airlines carried movie stars. Today their passengers are the common people -- tieless, jacketless, sportshirted, dungareed, occasionally shoeless, often under 30." End of quote.

Air travel also has revolutionized the business world; changed sales, distribution and promotion habits. But it's not even the businessman who keeps the airlines in business today. A few years ago business travel accounted for about 85 per cent of domestic airline passenger traffic. Nowadays personal air travel has grown to the point where it represents about half of airline passenger traffic.

How has this come about, that air travel should be available to the rank and file?

One reason is accessibility. Major airports are within easy reach of tens of millions of people. For others, regional carriers and commuter airline service have developed to such a degree that almost no community is left wanting for air transportation.

A second reason is public preference. Twenty years ago the airlines accounted for 14 per cent of the common carrier passenger miles between cities in the United States. Last year they accounted for 75 per cent. Twenty years ago there were only 2.2 million air passengers between the United States and other countries. Last year there were more than 18 million. In 1949 U.S. scheduled airlines carried fewer than 17 million passengers. In 1969 they served 159 million. By 1985, 100 million people will be traveling by SST alone.

But a third, and perhaps bigger reason for the acceptance of air transportation is price. Air travel today is a bargain.

The average cost of travel for the air traveler was 5.96 cents a mile in 1959. Ten years later, in 1969, the cost was 5.68 cents a mile, actually lower than in the first year of the jet age. Considering how the prices of food and lodging and other forms of transportation have gone up, the percentage of a vacationer or businessman's total expenses represented by his air fare is substantially lower than it was ten years ago.

This economic legerdemain is due to increases in productivity -- improvements in the revenue-earning capabilities of the airplane -- that the industry achieves every five or six years. For example, we are at the beginning of what is generally considered to be the second jet age, with the arrival of the wide-body subsonic jets -- the 747, DC-10 and L-1011. Yet, it is the sixth overall re-equipment cycle of the airlines since World War II. Each time the industry has done a better job of providing the equipment needed to do the job, so efficiently and productively that the airplane itself has literally offset the cost increases occurring in labor, fuel, operations, and administration.

So, thirdly, let's look at how the SST stands to benefit productivity in the 1980's and beyond.

To begin with, I want to dispell the idea that aircraft developments always take the direction of bigger, faster, noisier, or that the SST is an expression of technology for the sake of technology. That's utterly false. The success of the larger jets (707, DC-8) has led to their smaller cousins (727, 737, DC-9). The new large-capacity subsonics are bigger, but comparatively they are quieter. Personally, I think you are going to like the DC-10 and the L-1011 when they go into commercial service next year. They are noticeably quieter, and will probably set a new standard for noise suppression capability. They will also have smokeless engines.

There is a purpose, however, to building planes bigger and faster, and it relates to their ability to do work for their operators. The 747 is probably about as far as we can go in increasing the size of commercial aircraft, not from the design or engineering point of view, but as a matter of airport compatibility. So we turn to speed, which is another way of improving productivity.

The SST will do about four-and-a-half times as much work as the 707; twice what the 747 can do. One SST can go to Europe and back again, while the 747 is making the trip one way. This not only increases the utilization time on the aircraft, but permits greater schedule flexibilities. The end result of improved productivity is an expansion of capacity without a commensurate expansion of costs, which means that the airlines are better able to keep a lid on fares while meeting the public need for air transportation.

We must bear in mind that unless aviation forecasts are glaringly in error, travel by 1985 on the SST international routes alone and will equal all of the free world air travel today.

To put it another way, if we had to do today's air transportation job with nothing better than the DC-3, we would need some 47,000 airplanes in our carrier air fleets. By 1980 it would take 145,000 DC-3 aircraft to meet the air travel needs, and nearly 200,000 in 1985. In airline parlance, the DC-3 produced 28,000 set miles per day. In contrast, the SST will produce four-and-a-half million seat miles a day.

Then, fourth, let's consider what it takes to bring all of this about. Are the costs to the taxpayer, to the environment, and to our national priorities too great to justify the SST?

I would like to say, simply, that if we thought they were, the Government would not be involved in the SST program. It must be understood, first, that the Government's support of the SST rests on the assumption that concern for the future properly belongs among today's priorities. The extent of support is not large. The $290 million being requested for fiscal year 1971 represents 2.6 per cent of the Department of Transportation budget; one-hundredths of one per cent of the Federal budget.

Secondly, opponents of the program oft-times fail to acknowledge that other transportation improvement programs are going forward and are in no way suffering because of any financial or political emphasis on the SST.

For example, the President has endorsed and the Congress has passed the $10 billion Airport-Airways Development Act and the $10 billion Urban Mass Transportation Assistance Act. The Government is going to the rescue of the intercity passenger train service through the "railpax" system -- establishment of a National Railroad Passenger Corporation to take over and operate designated passenger trains. There is a program underway to revitalize shipbuilding and modernize our merchant fleet over the next ten years. In short, the seventies are years for building, for catching up with and overcoming the neglect of past years. Stopgap or halfway measures are no longer acceptable. We must prepare for the eighties and for the capacity we will need in our total transportation system. The SST program is a part of that effort.

The possible cost to the environment is getting close and careful scrutiny. There have been a great many charges brought against the SST, as a potential violator of the environment. I would just like to say that there are four courses of action we have taken in dealing with these charges:

-- One, we have gone to the experts and sought their opinions. We were doing that, as a matter of fact, before "environment" became a household word.

-- Two, we have worked and are continuing to work with responsible individuals and organizations, in and out of Government, equipped and qualified to get at the facts. I have two advisory committees at work, which include members of the Commerce Department's Technical Advisory Board, a group of top scientists outside the Government.

-- Three, we have formulated an expanded research program, specifically designed to answer the unknowns and resolve the uncertainties about the effects of supersonic flights on the upper atmosphere.

-- And, four, we are coordinating our efforts with the President's Council on Environmental Quality and have, in fact, submitted to the Chairman of the Council the environmental impact statement required of any new program, one of the first to be submitted, I might add.

It has been suggested by our critics that because we have not thrown up our hands in the face of theories, conjecture and speculation about the possible effects of large-scale SST operations, and summarily cancelled the prototype program, that we are acting irresponsibly with regard to the President's expressed desire to protect the environment. No so. If there is anything environmentally unacceptable about the SST, we want to know it. But we want to act on the basis of facts, not fears. The prototype program is the means of keeping America's option open to compete in the world supersonic transport market. It would be folly to cancel that option without due cause, and thereby deprive our economy of the future benefits of SST production and sales. So we are keeping an open mind on the issues, and staying alert and responsive to the environmental concerns.

This is also the case with respect to noise, which is of concern to the public and the airport operators alike. Impacted airports -- that is, metropolitan airports surrounded by population -- are today targets of constant complaints.

These complaints certainly are not without cause. The jet engine, by nature is noisy. But turbine engine technology has by no means reached a dead end. In earlier years, technical efforts were aimed at developing more power, and in improving thrust-to-weight ratios. Those efforts have been eminently successful.

More recently, technical attentions are being focused on correcting the jet engine's bad manners. We now know, for instance, how to get rid of the smoke. And while engines are getting more powerful, (and the 747 is a current example) they are not necessarily getting noisier. As I mentioned earlier, the DC-10 and L-1011 will be appreciably quieter. We have over $30 million ticketed for noise suppression work on the SST prototype, and with eight years to go before commercial service I am confident we will bring the noise problem under control.

The problem we are fighting is essentially one of airport noise. The majority of complaints today are from people who live under the takeoff and approach patterns -- in the communities adjacent to the airport. This "community noise" is the principal bone of contention. In response, the FAA has set tougher noise standards for the new subsonic jets, issued an advance notice of proposed rule making for supersonics, and is considering the feasibility of requiring retrofit work on existing jet fleets to reduce the public's exposure to aircraft noise.

Despite all the criticism about how noisy the SST is going to be, I would like to point out that if our SST were flying today, with today's engine and noise technologies, we would be able to meet the FAA's new rules for takeoff and approach noise limits. Out over the community, on approach or takeoff, the SST would be less annoying to the people below than many of the jets currently in use. On the airport itself, however, where people don't live, the SST would be noisier but about the same at 2100 ft to the side of the runway as present jets are 3.5 miles from takeoff and 1 mile before touchdown or landing. And that's where the major thrust of our noise reduction work is directed. We want to lessen the noise on the airport, but not at a higher cost in community noise levels.

It has become clear in recent times that significant relief from aircraft noise can be achieved through compatible land use concepts and realistic zoning practices. In the case of new airports, regulated land use can be an effective noise preventive. The boundaries for your new Dallas-Fort Worth Regional Airport, for example, were established with the SST in mind. And that's good planning.

What you are building here in Dallas-Fort Worth is an airport which, when completed, will be capable of handling more traffic than the three major airports serving New York City combined, without congestion or delays. Moreover, the communities around the airport are assured protection against unacceptable noise -- even if technology fails to produce any future improvements. The FAA rule for new jets -- 108 EpNDB 3.5 miles from brake release point and 1 nautical mile to the sideline -- was the constraing used in laying out the two north/south runways. In

this respect, I would just like to say that I think the Dallas-Fort Worth Airport Board has done an excellent job of looking ahead. The North Central Texas Council of Governments has done an equally thorough job in assuring that urban mass transit and highway plans are tied in with airport planning, and in winning broad public acceptance for the airport by informing community residents of noise contours, zoning requirements, and potential economic benefits to the region from airport operations. This kind of approach must be the pattern of the future nationwide. In fact, many of the environment protection measures taken in the development of this airport are echoed in the terms of the Airport/Airway Development Act of 1970, and hopefully the evolution of airports and airplanes alike in the years ahead will together move swiftly toward the goal of reduced public exposure to noise.

Fifth, and finally, let's look at the principal national benefits of a successful U.S. SST program.

To begin with, the SST gives us a transportation capability not attainable any other way. Ninety-eight per cent of all international travel today is accomplished by air. The SS United States, fastest ocean liner afloat, went out of service earlier this year after losing $4 million in 1969, despite a $12 million Federal subsidy. For long-haul, over-ocean travel, the airplane is essential, and supersonic transports do the job better. With the growth in international air travel projected for 1980 and beyond, the industry will ultimately need airliners of 800 to 1,000 passenger capacities, if the quest for capacity is not satisfied through increased speed. The British, French and Russian manufacturers stand ready to equip the world's airlines with SST's -- and pocket the economic rewards -- if we step back from the challenge.

A second benefit, therefore is economic.

We have looked at the economic prospects in every conceivable fashion, and what it all amounts to is a $1.4 billion investment risk, not a subsidy, against the balance of trade impact of not less that $22 billion and possibly as much as $45 billion over a 12-year period; plus at least six-and-a-half billion dollars in tax revenues; plus the likelihood of 150,000 direct and indirect jobs in an industry where unemployment is already becoming acute; plus a $2.3 billion payback in royalties. This national revenue will give us the resources to better solve our social challenges of the '80's, challenges that usually absorb revenue, instead of creating such as the fashion of the SST.

We are perhaps prone to forget or overlook the impact the jet age has had on our economy. The airlines alone, added 150,000 jobs as a result of the jet, and increased their dollar turnover from $4.5 billion to $15 billion annually.

Aviation is a major industry in America; a vital factor in our economy. We have built superior aeronautical products throughout the propellor and jet transport ages. We have the capability to sustain that leadership in the supersonic age. We are being challenged from abroad as never before -- not only with the Concorde, already in flight test, but with a family of aircraft designed as replacements or alternatives to the bread-and-butter planes in the American product line.

An industry with a proven ability to deliver on its guarantees to its customers can also deliver on its guarantees to the nation. I am confident that continued development of the U.S. SST will demonstrate the ability of the industry and the Government, working together in Yankee tradition, to guarantee supersonic transport leadership without compromising National environmental objectives, or intruding on National priorities.

DEPARTMENT OF TRANSPORTATION | NEWS

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Remarks prepared for delivery by
William M. Magruder, Director
Office of SST Development
Department of Transportation
to the
Aero Club - Boston, Massachusetts
12 November 1970

THE SUPERSONIC WAY TO GO

To be successful in Washington, someone has suggested, you have to be able to lay a firm foundation with the bricks others throw at you. I have fielded a few bricks in the eight months I have been on the job as Director of the SST Program for Secretary John Volpe. I also have tried, in good faith and as earnestly as I know how, to rebuild a firm foundation under the Supersonic Transport Development Program.

The foundation was there. No question about it. Over a nine year period, three administrations -- bi-partisan -- and 24 separate Congressional committees have examined and re-examined the SST program -- its logic and its risks, its pitfalls and prospects, its costs and rewards -- and concluded it was a job worth doing ... a project in the National interest.

Yet the foundations for the structuring of a successful SST technology and eventual production program have been shaken in recent times by a chorus of critics who claim that the SST will subvert the National welfare ... even devastate the earth.

It has been my purpose to shore up the SST's foundations by answering fears with facts, and reducing the horror stories to exercises in reason and research.

My efforts have been concentrated mainly within the Government, working with officials in the various Departments and agencies, to sort out right from wrong in the charges against the SST, to separate fiction from fact, and to determine on the basis of the best information available the potential costs of our SST venture -- the costs of going forward with the prototype program, and the costs to the United States of not having an SST in the time period when supersonic will be "the way to go."

But I also have had occasion, during these months, to meet with contractor and civic groups around the country. I especially welcome the opportunity to talk with aero-minded people. Leaders like Crocker Snow, your State Director of Aeronautics, understand aviation's problems and appreciate the challenges. Moreover, you know what we mean when we talk about America's aviation leadership.

Not too many people, I find, understand that the U.S. position of leadership in civil aviation has been earned. It is also a matter of some pride; but that's secondary. Leadership in aviation is primarily a matter of dollars and cents: it sustains an enterprise that is a major factor in our economy; it brings money into the country; it helps keep American dollars at home.

One reason our industry has been so successful in selling airplanes throughout the world is customer satisfaction. The aviation industry offers guarantees unmatched by any other industry. When an American aircraft manufacturer delivers an airplane to a carrier he guarantees field length performance, takeoff and approach speeds, noise levels, engine emissions limits, elapsed time to climbout, cruise altitude and speed, payload range, pavement stress, and even special mission capabilities. The manufacturer guarantees maintenance and reliability ratios of 98 per cent and better, with penalties of free spare parts, and ten years of structural life for the main elements of the airplane. Where can a buyer get guarantees like that? Not in our appliances; not even in our automobiles, where the five-year guarantee just went out of existence.

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What the industry has done, and in admirable fashion in my opinion, is meet the growth in public demand for air transportation. Even more remarkably, they have made air travel available to everybody without increasing fares. In this day and age, that's an accomplishment bordering on the miraculous.

So . . . the last thing I want to imply -- to this audience, to the Congress, or to the public -- is any lack of concern on the part of the Government, the manufacturers, and the airlines engaged in the SST development program for the consequences of our actions. We are concerned and we are taking all due precautions in the course of the prototype program. As everyone in our business knows full well, the purposes of flight test, the reasons for experimental programs, the very essence of prototype development aim at proof of the product before purchase. Our business is consumer protection. We are also, not incidentally, engaged in pursuits conducive to the security -- economic and technical as well as military -- of our country. So we do not take concerns lightly, but I do believe that facts should prevail over fancy and that allegations should be revealed for what they are.

Now the facts are these: first, the SST is not a priority program of the 70's. It's a program concerned with the priorities for the 1980's. It's an eighteen year look-ahead.

We must expect the Government, no less than industry, to plan for the needs of tomorrow. Victor Hugo once observed that "knowing exactly how much of the future can be introduced into the present is the secret of a great government." He certainly did not have the SST in mind, or anything like it, but all too often today's priorities are yesterday's mistakes -- the results of unknowns, poor planning, or plans that went awry. Seldom do we have the opportunity to plan 18 or 20 years ahead -- to give a place among our priorities to an enterprise that will reward the nation handsomely in future years. In fiscal terms, the SST represents less than three per cent of our FY '71 transportation budget, a modest amount to invest in the future by anybody's bookkeeping standards. So that's fact number one.

Second: critics have said that the Government has no business getting involved in the development of a civilian airplane, which is the

responsibility of private enterprise. To get at the facts of that situation, we have to review a bit of aviation history -- and only briefly, for an Aero Club audience.

The airplane was American-born but European-bred. The United States didn't acquire pre-eminence in aviation without a little Government hand-holding. It really took World War II to make the airplane a typically American product.

The development and purchase by the military of the C-54 helped make the DC-4 a product for civilian transport. The Air Force was the largest buyer of the DC-6 in its military form, the C-118. Later, requirements for the C-121 paid for much of the development of the Lockheed Constellation.

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300th airplane is sold. That, to my knowledge, is new -- and, in my judgment, a loan arrangement, with specific payback machinery, is preferable in our free enterprise system to the system of nationalized industries in the countries competing with us for SST sales. I would even venture to suggest that the SST program may be showing the way to the realization of the new, and certainly costly transport systems of the future.

Third: I am frequently reminded that the airlines are not exactly prospering at the moment and that the industry -- at least in the eyes of some -- seems destined to run forever from "disaster to disaster, with unbounded enthusiasm." It's true, of course, that the industry is experiencing a temporary surplus of seat miles as always happens when new, more productive aircraft are first introduced. To assume that this will be the case in 1978 or '80, or '85 is to presume some drastic reversal in air travel trends not now perceptible.

In the 1980's the only vehicle that we can see as an advanced air transport machine that will fit in the present air traffic control system and on Free World airports without requiring significant changes to either will be an airplane that combines the productivity of speed and capacity such as the supersonic transport. One U.S. SST can carry 300 passengers to Europe, 300 passengers back, and start a second trip, while one jumbo jet is carrying about the same number of people one way. This improvement in productivity will allow the airlines in the 1980's to earn reasonable revenues, offer improved passenger service, and at the same time keep the fares at today's levels.

Not many people outside of the kind of people gathered here might realize it, but the airlines are always encouraging the industry to produce more productive airplanes every five to six years. In so doing, they have given the traveling public a unique benefit over the past quarter century -- the same fares or even lower fares in equivalent dollars for traveling from one point on the face of the earth to another in spite of all other costs having gone up 50 to 100 per cent. The airlines do, indeed, need a supersonic transport in the 1980's and, as a matter of fact, the only question is whether or not they will be able to buy it in the United States. As you know, France, Britain and Russia are already committed to SST's in the mid-70's and are two years into their flight test programs while in the United States the debate lingers on. The Concorde, as you may know, has flown at Mach 2 and is very much a reality, regardless of what you may hear about Britain having second thoughts.

The aircraft industry has never forced a new airplane on anybody, and doesn't plan to start with the SST. The industry responds to demand, and since a new airplane is at best a five to ten year development proposition, some forecasting is inevitable. The airlines are not ready for the SST today any more than they were ready for the 747 eight years ago. But the need is clearly predictable. So those who say the airlines wish the SST would go away are misquoting, misreading, or misinterpreting the airlines' position on supersonic transports.

I have asked each of the airlines with position delivery reservations three simple questions:

-- Do you need an SST?

-- Do you approve of the United States building a prototype before production?

-- Do you concur in the delivery time period of 1978 and following?

The answers to these questions -- from the chief executive officers of the major airlines -- were a unanimous "yes." They foresee the need for an SST. They favor prototype development for a plane of the SST's technical advances. And they agree that the 1980's mark the time when airplanes of greater productivity will be essential to meet traffic demands.

Then, fourth, there are the environmental concerns that for the most part have been vastly exaggerated, or notoriously misrepresented.

The sonic boom is a case in point. For years now the Government's policy has been one of protection for the people of the United States against the annoyance of sonic booms from civil aircraft. There are those who disbelieve the Government, but the fact is the FAA rule against sonic booms from SST aircraft will go into effect soon -- probably around the first of the year -- and when SST's go into service their booms will be confined to the open seas.

Another example occurred this past summer at Williams College at Williamstown, Massachusetts, where 70 of the world's most eminent environmental scientists conducted a Study of Critical Environmental Problems sponsored by the Massachusetts Institute of Technology. Subsequent exposure in the press of the results of that meeting gave the impression that these scientists opposed or recommended modification or cancellation of the SST program. Shortly after that press exposure, the Chairman of the Working Group of the Committee, Dr. William Kellogg, Director of the Laboratory of Atmospheric Scientists at the National Center

for Atmospheric Research in Boulder, Colorado, expressed to me his concern about the interpretation of the working group's conclusions. He sent me a letter which states as follows: "As Chairman of the Working Group on Climatic Efforts for the Study of Critical Environmental Problems, I am most concerned that our conclusions are understood by all who are concerned with the Supersonic Transport Program and that we work together to obtain better information. Nowhere have we indicated that we believe the supersonic transport development should be held up or delayed pending the results of the study of this group." End of quote. Incidentally, the full report of the SCEP has now been published and puts to rest some of the environmental charges brought against the SST -- notably, any worries about ozone depletion or carbon dioxide buildup in the stratosphere.

There have been, of course, a number of charges brought against the SST, as a potential violator of the environment. All are getting close and careful scrutiny. I would just like to say that there are four courses of action we have taken in dealing with the charges:

-- One, we have gone to the experts and sought their opinions. We were doing that, as a matter of fact, before "environment" became a household word.

-- Two, we have worked and are continuing to work with responsible individuals and organizations, in and out of Government, equipped and qualified to get at the facts. I have two advisory committees at work, which include members of the Commerce Department's Technical Advisory Board, a group of top scientists outside the Government.

-- Three, we have formulated an expanded research program, specifically designed to answer the unknowns and resolve the uncertainties about the effects of supersonic flights on the upper atmosphere.

-- And, four, we are coordinating our efforts with the President's Council on Environmental Quality and have, in fact, submitted to the Chairman of the Council the environmental impact statement required of any new program, one of the first to be submitted, I might add.

It has been suggested by our critics that because we have not thrown up our hands in the face of theories, conjecture and speculation about the possible effects of large-scale SST operations, and summarily cancelled the prototype program, that we are acting irresponsibly with

regard to the President's expressed desire to protect the environment. Not so. If there is anything environmentally unacceptable about the SST, we want to know it. But we want to act on the basis of facts, not fears. The prototype program is the means of keeping America's option open to compete in the world supersonic transport market. It would be folly to cancel that option without due cause, and thereby deprive our economy of the future benefits of SST production and sales. So we are keeping an open mind on the issues, and staying alert and responsive to the environmental concerns.

This is also the case with respect to noise, which is of concern to the public and the airport operators alike. Impacted airports -- that is, metropolitan airports surrounded by population -- are today targets of constant complaints.

These complaints certainly are not without cause. The jet engine, by nature is noisy. But turbine engine technology has by no means reached a dead end. In earlier years, technical efforts were aimed at developing more power, and in improving thrust-to-weight ratios. Those efforts have been eminently successful.

More recently, technical attentions are being focused on correcting the jet engine's bad manners. We now know, for instance, how to get rid of the smoke. And while engines are getting more powerful, (and the 747 is a current example) they are not necessarily getting noisier. As I mentioned earlier, the DC-10 and L-1011 will be appreciably quieter. We have over $30 million ticketed for noise suppression work on the SST prototype, and with eight years to go before commercial service I am confident we will bring the noise problem under control.

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than many of the jets currently in use. On the airport itself, however, where people don't live, the SST would be noisier but about the same at 2100 ft to the side of the runway as present jets are 3.5 miles from takeoff and 1 mile before touchdown or landing. And that's where the major thrust of our noise reduction work is directed. We want to lessen the noise on the airport, but not at a higher cost in community noise levels.

It has become clear in recent times that significant relief from aircraft noise can be achieved through compatible land use concepts and realistic zoning practice. In the case of new airports, regulated land use can be an effective noise preventive. This should be a matter of concern here in Boston, where a search for a new airport site has been underway for some time now.

I might mention at this point that the development of the SST does not in itself dictate a need for new airports. When you look at civil aviation forecasts, and see triple and sixfold increases in air travel figures for the seventies and eighties, you get an idea why airport improvements have to be planned. Some traffic demands doubtlessly can be reduced by substituting fast, efficient surface transport (like the Turbo Train or its successor) on short, intercity routes; or by exploiting STOL and VTOL technologies and "satellite" air fields more aggressively. But operations at Logan, which went from 118,600 in 1959 to 217,000 in 1969 are headed toward the saturation point of 384,000 air carrier operations a year, now forecast for the mid-1970's. What's happening here is happening across the country, and the need for air transport facilities must be met whether or not there is a U.S. SST.

Fifth, and finally, there are the national benefits of a successful U.S. SST program which critics deny but the facts support.

To begin with, the SST gives us a transportation capability not attainable any other way. Ninety-eight per cent of all international travel today is accomplished by air. The SS United States, fastest ocean liner afloat, went out of service earlier this year after losing $4 million in 1969, despite a $12 million Federal subsidy. For long-haul, over-ocean travel, the airplane is essential, and supersonic transports do the job better. With the growth in international air travel projected for 1980 and beyond, the industry will ultimately need airliners of 800 to 1,000 passenger capacities, if the quest for capacity is not satisfied through increased speed. The British French and Russian manufacturers stand ready to equip the world's airlines with SST's -- and pocket the economic rewards -- if we step back from the challenge.

A second benefit, therefore is economic.

We have looked at the economic prospects in every conceivable fashion, and what it all amounts to is a $1.4 billion investment risk, not a subsidy, against the balance of trade impact of not less than $22 billion and possibly as much as $45 billion over a 12-year period; plus at least six-and-a-half billion dollars in tax revenues; plus the likelihood of 150,000 direct and indirect jobs in an industry where unemployment is already becoming acute; plus a $2.3 billion payback in royalties. This national revenue will give us the resources to better solve our social challenges of the '80's, challenges that usually absorb revenue, instead of creating it such as the fashion of the SST.

We are perhaps prone to forget or overlook the impact the jet age has had on our economy. The airlines alone, added 150,000 jobs as a result of the jet, and increased their dollar turnover from $4.5 billion to $15 billion annually.

Aviation has become a major industry in America; a benefactor of our economy. We have built superior aeronautical products throughout the propellor and jet transport ages. We have the capability to sustain that leadership in the supersonic age. We are being challenged from abroad as never before -- not only with the Concorde, already in flight test, but with a family of aircraft designed as replacements or alternatives to the bread-and-butter planes in the American product line.

An industry with a proven ability to deliver on its guarantees to its customers can also deliver on its guarantees to the nation. I am confident that continued developmentoof the U.S. SST will demonstrate tha ability of the industry and the Government, working together in Yankee tradition, to guarantee supersonic transport leadership without compromising National environmental objectives, or subverting National priorities.

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58-DOT-70

Remarks prepared for delivery by
William M. Magruder, Director
Office of SST Development
Department of Transportation
to the
Aero Club - Boston, Massachusetts
12 November 1970

THE SUPERSONIC WAY TO GO

To be successful in Washington, someone has suggested, you have to be able to lay a firm foundation with the bricks others throw at you. I have fielded a few bricks in the eight months I have been on the job as Director of the SST Program for Secretary John Volpe. I also have tried, in good faith and as earnestly as I know how, to rebuild a firm foundation under the Supersonic Transport Development Program.

The foundation was there. No question about it. Over a nine year period, three administrations -- bi-partisan -- and 24 separate Congressional committees have examined and re-examined the SST program -- its logic and its risks, its pitfalls and prospects, its costs and rewards -- and concluded it was a job worth doing ... a project in the National interest.

Yet the foundations for the structuring of a successful SST technology and eventual production program have been shaken in recent times by a chorus of critics who claim that the SST will subvert the National welfare . . . even devastate the earth.

It has been my purpose to shore up the SST's foundations by answering fears with facts, and reducing the horror stories to exercises in reason and research.

My efforts have been concentrated mainly within the Government, working with officials in the various Departments and agencies, to sort out right from wrong in the charges against the SST, to separate fiction from fact, and to determine on the basis of the best information available the potential costs of our SST venture -- the costs of going forward with the prototype program, and the costs to the United States of not having an SST in the time period when supersonic will be "the way to go."

But I also have had occasion, during these months, to meet with contractor and civic groups around the country. I especially welcome the opportunity to talk with aero-minded people. Leaders like Crocker Snow, your State Director of Aeronautics, understand aviation's problems and appreciate the challenges. Moreover, you know what we mean when we talk about America's aviation leadership.

Not too many people, I find, understand that the U.S. position of leadership in civil aviation has been earned. It is also a matter of some pride; but that's secondary. Leadership in aviation is primarily a matter of dollars and cents: it sustains an enterprise that is a major factor in our economy; it brings money into the country; it helps keep American dollars at home.

One reason our industry has been so successful in selling airplanes throughout the world is customer satisfaction. The aviation industry offers guarantees unmatched by any other industry. When an American aircraft manufacturer delivers an airplane to a carrier he guarantees field length performance, takeoff and approach speeds, noise levels, engine emissions limits, elapsed time to climbout, cruise altitude and speed, payload range, pavement stress, and even special mission capabilities. The manufacturer guarantees maintenance and reliability ratios of 98 per cent and better, with penalties of free spare parts, and ten years of structural life for the main elements of the airplane. Where can a buyer get guarantees like that? Not in our appliances; not even in our automobiles, where the five-year guarantee just went out of existence.

About the only thing the manufacturers don't guarantee is a profit -- for themselves or the carriers. That's earned the hard way, by competition. And the airlines, or the manufacturers, have never set any records for profitability.

What the industry has done, and in admirable fashion in my opinion, is meet the growth in public demand for air transportation. Even more remarkably, they have made air travel available to everybody without increasing fares. In this day and age, that's an accomplishment bordering on the miraculous.

So . . . the last thing I want to imply -- to this audience, to the Congress, or to the public -- is any lack of concern on the part of the Government, the manufacturers, and the airlines engaged in the SST development program for the consequences of our actions. We are concerned and we are taking all due precautions in the course of the prototype program. As everyone in our business knows full well, the purposes of flight test, the reasons for experimental programs, the very essence of prototype development aim at proof of the product before purchase. Our business is consumer protection. We are also, not incidentally, engaged in pursuits conducive to the security -- economic and technical as well as military -- of our country. So we do not take concerns lightly, but I do believe that facts should prevail over fancy and that allegations should be revealed for what they are.

Now the facts are these: first, the SST is not a priority program of the 70's. It's a program concerned with the priorities for the 1980's. It's an eighteen year look-ahead.

We must expect the Government, no less than industry, to plan for the needs of tomorrow. Victor Hugo once observed that "knowing exactly how much of the future can be introduced into the present is the secret of a great government." He certainly did not have the SST in mind, or anything like it, but all too often today's priorities are yesterday's mistakes -- the results of unknowns, poor planning, or plans that went awry. Seldom do we have the opportunity to plan 18 or 20 years ahead -- to give a place among our priorities to an enterprise that will reward the nation handsomely in future years. In fiscal terms, the SST represents less than three per cent of our FY '71 transportation budget, a modest amount to invest in the future by anybody's bookkeeping standards. So that's fact number one.

Second: critics have said that the Government has no business getting involved in the development of a civilian airplane, which is the

responsibility of private enterprise. To get at the facts of that situation, we have to review a bit of aviation history -- and only briefly, for an Aero Club audience.

The airplane was American-born but European-bred. The United States didn't acquire pre-eminence in aviation without a little Government hand-holding. It really took World War II to make the airplane a typically American product.

The development and purchase by the military of the C-54 helped make the DC-4 a product for civilian transport. The Air Force was the largest buyer of the DC-6 in its military form, the C-118. Later, requirements for the C-121 paid for much of the development of the Lockheed Constellation.

The jet didn't arrive on the scene entirely of its own strength either. The B-47, B-52, and KC-135 programs developed the $2 billion worth of technology which made the 707 and the DC-8 possible. Now, Boeing had the foresight to see the jet market, and the courage to put $16 million of corporate money into the construction of the "Dash 80" prototype. But we wouldn't have the jets of today -- and Boeing acknowledges this -- without the foundation of Government support at the research and development stages.

The point, I think, is simply that Government-industry partnership in the development and fostering of aeronautical policies and capabilities in America is an established fact, and has been highly successful. In the past the outlet for the Government's financial assistance frequently has been the military, for reasons of National security. Today the pattern is changing somewhat; civil and military technologies are taking different directions. Interestingly, and for the first time, civilian needs rather than military are pushing the state of the art in aeronautics. The military has no compelling need for the highly productive, titanium technology, advanced transport necessary to assure that the aviation industry can provide the capacity predictable in the concluding quarter of this century. Nor do military requirements dictate developments in mass, short-haul STOL aircraft progress. Similarly, noise and pollution control technologies are being spurred by civil, not military operational requirements.

Government assistance in the development of the SST, therefore, is not precedent-setting. If there is anything new about the partnership, it is the payback provisions written into the contract which stipulate that royalties will be assessed on the sale of production SST's in amounts that will insure repayment of the entire Federal investment by the time the

300th airplane is sold. That, to my knowledge, is new -- and, in my judgment, a loan arrangement, with specific payback machinery, is preferable in our free enterprise system to the system of nationalized industries in the countries competing with us for SST sales. I would even venture to suggest that the SST program may be showing the way to the realization of the new, and certainly costly transport systems of the future.

Third: I am frequently reminded that the airlines are not exactly prospering at the moment and that the industry -- at least in the eyes of some -- seems destined to run forever from "disaster to disaster, with unbounded enthusiasm." It's true, of course, that the industry is experiencing a temporary surplus of seat miles as always happens when new, more productive aircraft are first introduced. To assume that this will be the case in 1978 or '80, or '85 is to presume some drastic reversal in air travel trends not now perceptible.

In the 1980's the only vehicle that we can see as an advanced air transport machine that will fit in the present air traffic control system and on Free World airports without requiring significant changes to either will be an airplane that combines the productivity of speed and capacity such as the supersonic transport. One U.S. SST can carry 300 passengers to Europe, 300 passengers back, and start a second trip, while one jumbo jet is carrying about the same number of people one way. This improvement in productivity will allow the airlines in the 1980's to earn reasonable revenues, offer improved passenger service, and at the same time keep the fares at today's levels.

Not many people outside of the kind of people gathered here might realize it, but the airlines are always encouraging the industry to produce more productive airplanes every five to six years. In so doing, they have given the traveling public a unique benefit over the past quarter century -- the same fares or even lower fares in equivalent dollars for traveling from one point on the face of the earth to another in spite of all other costs having gone up 50 to 100 per cent. The airlines do, indeed, need a supersonic transport in the 1980's and, as a matter of fact, the only question is whether or not they will be able to buy it in the United States. As you know, France, Britain and Russia are already committed to SST's in the mid-70's and are two years into their flight test programs while in the United States the debate lingers on. The Concorde, as you may know, has flown at Mach 2 and is very much a reality, regardless of what you may hear about Britain having second thoughts.

The aircraft industry has never forced a new airplane on anybody, and doesn't plan to start with the SST. The industry responds to demand, and since a new airplane is at best a five to ten year development proposition, some forecasting is inevitable. The airlines are not ready for the SST today any more than they were ready for the 747 eight years ago. But the need is clearly predictable. So those who say the airlines wish the SST would go away are misquoting, misreading, or misinterpreting the airlines' position on supersonic transports.

I have asked each of the airlines with position delivery reservations three simple questions:

-- Do you need an SST?

-- Do you approve of the United States building a prototype before production?

-- Do you concur in the delivery time period of 1978 and following?

The answers to these questions -- from the chief executive officers of the major airlines -- were a unanimous "yes." They foresee the need for an SST. They favor prototype development for a plane of the SST's technical advances. And they agree that the 1980's mark the time when airplanes of greater productivity will be essential to meet traffic demands.

Then, fourth, there are the environmental concerns that for the most part have been vastly exaggerated, or notoriously misrepresented.

The sonic boom is a case in point. For years now the Government's policy has been one of protection for the people of the United States against the annoyance of sonic booms from civil aircraft. There are those who disbelieve the Government, but the fact is the FAA rule against sonic booms from SST aircraft will go into effect soon -- probably around the first of the year -- and when SST's go into service their booms will be confined to the open seas.

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