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## Discussion - Session Three

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## DISCUSSION — SESSION THREE

The comments made by the speakers are their own personal remarks and do not necessarily represent the official view of any organization or agency they represent.

MR. LEE S. KRIENDLER: I have a question for Col. Keel. What is the word that Lockheed uses for the Air Force to begin its system safety program? In other words, I do not understand who is doing what here?

COLONEL JAMES S. KEEL: That is a good question; sometimes we don't either. Under the prime contractor, which Doug Berry was very concerned about, under this particular program in the definitional phase, when the people submit their bids they all do the same thing. When the contract is awarded, who ever gets it agrees to the requirements; but they all submit their safety system engineering plan. The contractor does his own analysis, and he is responsible for that. The Air Force does not get involved in telling him how to design or whether his analysis is good or bad. Through the offices of the Air Force System Command, they might manage. But if they have a good computer program, they will find it out themselves. So we primarily monitor their program management, rather than the application of it. I do not know if that answers your question or not; but, we do not get involved shirt-sleeve to shirt-sleeve and do it with them. It is their problem. In some contracts, everything we do belongs to the government, anyway, by contract, others may not.

MR. A. D. TINKELBERG: Another question for Col. Keel. Colonel, in regard to the safety index that Lockheed has tabulated, is that a probability of an unsafe event; or is that a relative safety from system to system; or just what is the meaning of the safety index?

COL. KEEL: There is a probability; it gets pretty complicated and I am really not qualified in that aspect. But it is a probability of an event occurring. You do a qualitative analysis by looking at all the failure data, through the Air Force and through federal aviation, and where they started from. To give an example, from the Air Force side of the house in looking at quantitative data for a couple of years and pumping it into the program, a hazard level may be used; many people use many different ways, but theirs is based on a zero or a one-to-one-hundred point system. Every system is looked at, and it finally comes out where they have a hazard value for a component in a system. Let me give you an example on a real quick one off the top of my mind to show you how this thing can work. Galleys, this airplane is going to have galleys in it; the Air Force has not had any galley problems; commercial aviation has had a fairly severe galley problem; galleys are a nuisance type problem, the boarders, departures, and delays. We gave that a zero rating, and we went along with it. Then when they pumped the FAA data into it, it was sitting way up high. So we adjusted ours, and we made a design change and some switching in the galley. That did not answer what you wanted to find out, but it is a probability factor.

MR. CARL MCKENRY: I have a couple of questions. My first question is for Dr. Goldsmith. I noted in your meritorious proposal about the medical review panel that you said you would determine whether a particular condition exists; but as Mr. Yodice mentioned, the lifetime to the problem is what is the effect of this particular condition. I noticed the occasion recently where the Federal Air

Surgeon went to his specialist in this area for an opinion on a particular condition. The specialist wrote back that the condition would, of course, affect air safety. The particular person involved went to a specialist in the same condition, and after a personal examination the conclusion was that this condition was not affecting air safety. This, of course, went to the Board, and the Board reversed it, because the examiner had in this case given equal weight to the general opinion by letter of the specialist who had not examined this particular patient, as it did to the specialist's opinion who had personally examined him. Now my question is, do you envision some solution to this sort of problem in your proposal?

DR. LEE S. GOLDSMITH: It is a little hard to distinguish conditions isolated from the particular individual; to get a little concrete, an individual can have a heart attack which may effect only one vessel in his heart; the rest of his heart is perfectly normal. So you can isolate a condition just by saying a condition has been there, based on that particular condition. Usually this will not be sufficient. This is why I envisioned having three specialists in a given field examining individuals so they can ascertain what the condition actually is, and represent what that condition means in response to aviation. Three men together will furnish a better opinion. This way you will not just have one letter coming in, you will have something with which to work and with which a decision could accurately be made. Their opinions will not be completely isolated from the condition and will not be isolated from the given individual.

MR. MCKENRY: In other words, go to the individual as well as the general condition.

DR. GOLDSMITH: Yes.

CHAIRMAN JOHN S. YODICE: I am going to take the liberty as Chairman to ask a question. I would like to ask my question of Mr. Barber. I was very much interested in your remarks about the consideration being given to the possibility of auctioning off air space among users; presumably the person who would pay the highest amount for air space would be entitled to its use. I wonder if you might elaborate on that for us and let us know how far the thinking has gone in this area?

MR. RICHARD J. BARBER: First of all, I am suggesting this as an idea; I think it is one worthy of serious consideration. I am advancing this primarily as a suggestion for our mutual discussion here; let me suggest how it would work. Assume that on some major route involving movement between two heavily air-populated airports at a given time—a regular work day or week day or day of the week—at say 5:00 p.m., that we know that we have a certain amount of capacity to move planes out of an airport into the receiving airport through the system. We know that if we begin to push more into that system, we will get a variety of congestion and pressure one way or another, *e.g.*, delay getting out, delay getting in, some delay in the system itself. Assume that you identified the volume that could be handled in this route, meaning the number of planes that could takeoff with the very minimum of delay, which you would identify, ten minutes, five minutes, whatever it would happen to be. Identify the same thing at the other end, minimum of delay, and assume that you concluded that in this route that you can move 50 airplanes or have available 50 slots. Assume further that there was demand in excess of 50, that is, the number of scheduled flights for general aircraft operations in this route typically might be 100 which is going obviously to cause a congestion.

There are several ways of dealing with this. One thing would be to sort and classify the planes overtly. This is what I meant by regulation; you could make

some classification here and say that we will prefer for the 50 slots the bigger airplanes with a heavier load factor. Another way to do it would be to make a massive additional capital investment—maybe in more airports or more electronic equipment—increasing the capacity so that you could handle 100. This would involve a certain cost of investment and of operations overtime. My auction suggestion would be this: it would say you have 50 slots available between 5:00 p.m. and 6:00 p.m. on a work day on this route. He who bids and bids highest gets the 50 slots. In other words, if you put them up, you put them on an auction basis, and you could adjust this in a variety of ways. You could speculate about it as easily as I can. What it would mean is that an airline that said they wanted to have a 5:00 departure would come in and bid. They would bid a certain amount for that slot. Other aircraft, airplanes, or airlines, other users, or private corporations or private citizens who wanted to do it could endeavor to bid in this arrangement also. Obviously the bidders that would win would be those, I assume, who would have not only the greatest desire, but also those who probably would be in the air carrier business who have a large number of passengers. I would expect, therefore, that commercial carriers would win the bidding, and that, which one of them would win would depend upon their own willingness to or their own support for their belief that you had to have a plane taking off at 5:00 or 5:30 or 5:15 rather than at 4:00 or 7:00. It would be a very simple device. No real difficulty with it at all; but you could get into a variety of techniques that would make it quite significant and rather easy to work out. If you do not think so, go back to your computer people that you worked on, and you ask them, and they will give you a program for this in about an hour. This would have one great advantage; it would in effect test the economic value and reward the public which had created the value for the use of that system. In other words, it would be a user-cost idea, adjusted for the value to the user of the space in a particular route, at a particular time. It would be a far better rational allocation device than I think you would get by imposing a variety of user charges. Now this might give you something to start discussing.

CHAIRMAN YODICE: Can I ask you, has this been under consideration by the Department of Transportation, and how far has that consideration gone?

MR. BARBER: I should think that every conceivable way of making better use of our air resources has been under consideration by the Department of Transportation.

CHAIRMAN YODICE: I am not sure that is responsive. Has this one been under consideration?

MR. BARBER: I would assume that because it is an efficient allocation device that it, too, has been under consideration. Due to the fact that I may have spoken it, may suggest that it is under consideration.

CHAIRMAN YODICE: That was my assumption. I was trying to probe that. I have a few comments. First, I think it is rather unique that consideration would be given to this kind of an allocation system in transportation, when it seems that the philosophy of the government in all other spheres of activity seem to be exactly the opposite. The air space is a public resource, a natural resource which should be available to the whole of citizenry, and I don't think it should be available to those who are more economically powerful than others. This is the reason I suggest to you that it may not be politically parallel to what is happening in other areas. But that is not the most serious drawback. I see some other more serious drawbacks. The airlines do operate on a schedule and can predict with some certainty what times and routes would suit their demands. General aviation, by its

very nature, cannot possibly make its demands known in advance with that preciseness; so if we were to use a bidding process, it would be almost impossible for general aviation to get into the bidding. The president of General Motors may have to go from Detroit to New York for a meeting at 4:00 on a particular day, and he may not know that until 3:00 that day or until a day earlier. I can see why he would have some very serious problems in bidding. In addition, routes are not as precisely prescribed as your analysis would suggest. Various routes and altitudes can be used to go from Detroit to New York. Pilots will be influenced in their selection of altitudes by weather and their routes and aircraft and rating capabilities. In addition, we are all looking forward now to an off-course computer which will be available both to the airlines and to general aviation. I assume the military already has them, where you can select your routes to suit the weather pattern. I sincerely think that the weather is a more important consideration in the safe and efficient utilization of air space than getting money to the government, which again is another facet which fascinates me. It seems that the federal government would be in the process of selling off the natural air space to the highest bidder, which again does not seem to me to be an appropriate role for the government. Certainly there has been some suggestion which has not been fully implemented yet about having the user pay to the government for services provided to the user by the government. And there probably is some philosophical justification for that. But then I wonder, when the economics of the matter reap a larger return to the government than the actual cost of the services rendered doesn't this in effect put the government in business? Of course, these comments are just off the top of my head, and I am sure if I am given time I could find a few more problems.

MR. C. O. MILLER: I would like to simply ask a question, but I feel it is important at this juncture to quote that famous professor, Gigo. I am sure some of you know him. He is a combined professor, doctor, lawyer, engineer, and Indian chief, and he is the world's expert on computers. In case you have not heard of it, his message to the world is, "Garbage in, garbage out." That is how he got his name. This applies, in my humble opinion, to the comment about air space using; it also applies to a lesser extent to my good friend Jim Keel's implication that you can come up with a safety level for any aircraft system when the input to that safety level computation is only functional failures. This is an extremely controversial point within the safety engineering fraternity; let me summarize it this way. We feel "yes," we would like to have a nice simple numerical assessment of the level of safety to which we can all design. But in my humble opinion, the state of the art does not permit this beyond relatively simple mechanical systems. And I do not think this group should be led down the path as suggested. We, now as safety engineers, do not have a way of going out and coming up with a numerical assessment of the total safety of a system. I personally do not believe this is capable within the state of the arts. It is an outstanding "goal." Because he did make a comment in his presentation about \$1 billion being spent in air safety, he also mentioned losses concerning certain numbers of people who, according to our calculations, the percentage of fatalities in aviation are about 4 percent of those of the automobile field, whereas the actual dollar loss is closer to maybe 20 to 25 percent, which suggests there is a rather different economic picture facing us in aviation safety as opposed to perhaps a moral issue. My question is based upon this, because I would like to know, Mr. Barber, where did you get your \$1 billion expenditure in air safety? Has the FAA or anybody else followed up on the study in 1963 which suggested we gather all the quantitative material

we can? As far as I know, nobody has ever taken action on this study. In other words, where are the economics of safety data, investments, losses, returns, and some sensible approach, so that we can all talk the same language?

MR. BARBER: The \$1 billion investment—take a good look at the federal budget on expenditures by the FAA and do not simply look at the line for capital—is the *total* expenditures by the FAA. If you do not think the FAA is fully dedicated to safety management of the system, ask Gen. McKee. The \$1 billion, I think, is a sum for purposes of looking at the total federal involvement in the air system, and looking again at both the budget and the declarations of the administration with predominant emphasis upon management of a system as a safety instrument. The \$1 billion figure, I think, is quite a sound one. As for the data of consuming, the costing or the careful evaluation that would allow a very simple evaluation of relationships between a variety of investments, impact on safety, and accidents, has been considerable. There has been improvement by the FAA in including the quality of the statistical material that it had. However, I do not think anyone feels that it is efficient now to make very fine judgments about pay-outs for these particular actions and particular safety accidents in the pay-out. This is very difficult stuff with which to deal, as some of the questions here have suggested. The relationship, for example, between a particular type of disorder of a physical disorder is very hard to relate to an accident, to put some kind of a figure on it. Likewise, it is very difficult to take even the most simple type of, seemingly simple kind of capital in this investment and come up with a figure, for example, ILF. Some work that has been done by a number of technically oriented people raises some very interesting questions about the safety pay out of ILS systems, and yet, I suppose most people have certain reaction to think that this is obviously a very safety oriented device. It may be oriented to evict a management and to improve operations, but it may not be oriented, as well as any of us would think, to data that depends on and develops, that relates ILS to some safety index. So I think that the FAA has been working very hard with this type of a challenge, but I think that not only the government, but industry itself, and the Air Force as well, is working on this problem. We certainly have a long way ahead of us though.

Now let me come back to Mr. Yodice's statement. This question that the air is a natural resource is a rather interesting one, and I think we all say it occasionally, and maybe we catch ourselves saying it. This is a system in which you have the investment of public taxed dollars—dollars that were taken from 200 million Americans to be put into equipment and to operations demanding a system for air transportation that now costs \$1 billion a year. I ask you whether that is a free resource. In other words, it is always very nice to think in your imagination that we are the Transportation Department; we are the ones that are going to make good use of the system. You forget that, in a way, the government is simply the trustee of those dollars, and when we talked about charging someone for using the space, I know it would not make much sense to a collected group of the great populace. If you said, "Look, give me \$1 billion, and then I do not want to be charged by you to use that money," then I think we have to face this question that we are putting money into the air system. We are putting tax dollars into the air system. The question is, then, how do you go about managing the use of that, constructing an economic balance between the people who directly use the system and those who put up the money? Now there are a variety of ways of doing it. User-costs are one, rationing, regulatory rationing in order to minimize investment; auction arrangements are a variety of derivations that

we can think of. But when you are bringing \$1 billion into the system, I think the public is entitled to get something back. The question really then becomes, not whether they should, but how do you go about instrumenting so the full amount for that use is received in return. I think we have not looked enough at the full range of possibilities to try to come up with the one that would be the best in principle.

MR. MILLER: I just feel it is important that the group here recognize that, first of all, the safety people have been acutely aware of the economics of the safety problem. The safety people, in the form of Mr. Jerome Lederer who has had this at the top of Guggenheim projects for the last x number of years, are aware. It seems that Jerry and Carl Smith and I put together the planning committee report in 1963, where we fully acknowledged the full complexity of this problem. We even went so far as to try to identify the variables that were involved in this process. Some of these are easy to come by; some are not. The fact remains to my knowledge, *no* one has stepped up to the problem of trying to really say what are we investing; what are we losing; what are some of the returns we get. No one has faced the problem so we can get some kind of an efficient, some kind of an intelligent approach to this problem. I have considerable contempt at any statement that says, "Because the FAA's budget is \$1 billion, that in fact is \$1 billion invested in safety." That, Mr. Whitehead, is the same kind of thing I think you were referring to as utter nonsense.

CAPT. ROBERT BUCK: I would just like to talk about that \$1 billion for a minute; that is the total FAA budget, I do not think it is all devoted to safety. For example, a device that gets it down to a lower minimum would be to put a squeaky old beacon out there and raise the minimum to a thousand feet. We will not get the job done, but we can do it as safely. But the other point is, I have not heard any mention of the fact that out of this \$1 billion there are other facilities included that ought to be separated from the FAA someday. All the other actions of the FAA—maintaining the aid building and everything else—and also a big bunch of that air space is used for national defense and used by the military aircraft that they are flying around in. I think another small point is, when we auction this space off we are really auctioning airport space not air space. I can takeoff from Paris, and I may have to change my altitude or my route a slight amount; but I keep plugging along at Mach 2 until I get to Deer Park, twenty-three miles from Kennedy, and then it stops. So Deer Park is where the auction has to be.

CHAIRMAN YODICE: Captain Buck, one of the points you raised is under consideration by the government and that is to include a public interest factor in any computation of the total cost of an overall system, which would include the national defense use, and then recoup what is left. Of course, one of the things that troubles me about Mr. Barber's suggestion now is that it may very well recoup a lot more than the investment in the air space. In addition, it is probably little known by people who deal primarily with military and airline operations but there are a great, great number of general aviation operations that never get into the system. In flying my own airplane, I can go from Flushing Airport in New York to Montgomery County Airport, which is outside Washington and is a county owned facility, and never get into the national system, never cost the federal government a dollar. Yet, this is the kind of flying that would be restricted or eliminated by auctioning off your air space. I would also challenge a statement that we ought to reconsider the fact that the air space is a natural resource. The Federal Aviation Act is very clear that there is a public right of free-

dom of transit through the navigable air space. I even think there may be some constitutional implications; but what concerns me more than these legal technicalities is the practicability of applying any system other than the "first come, first serve" system which is a very simple and fair system and which, as Captain Buck suggests, is self adjusting because of the costs of operating into a particular airport. I do not go into Kennedy, or La Guardia, or Newark because it is very expensive to go into those airports. The general aviation operators that do go into those airports go in because they can afford them, because they are the kind of operations that need to use that type of facility. Now, the great drive, which I think is a very good one, is for short parallel strips on the major airports for general aviation. Another fallacy in the user-costs concept is if they try to assess me for the use of La Guardia; they are assessing me for the cost of some very thick and very long runways. My airplane can land in a thousand feet; I do not need all that runway, and I do not need all of that thickness. Yet I will have to pay for all of the length and thickness. If they put a short strip at the major airports, I can use that without interfering with the operations on the longer, heavier runways.

MR. HAROLD CAPLAN: Mr. Yodice, would it be permissible to tell a short story, and make a brief comment in asking a question? First, I do not really want to upstage George here, but his story reminded me of another one which may or may not be familiar to the audience, about the aircraft in turbulence and its relation to divine happenings. It is about the passenger who was very agitated and in the midst of the turbulence saw a priest reading the Bible very calmly and serenely and said, "Father, can't you do something about this?" And he replied, "I'm sorry, my son, I'm only in sales, not administration." That is the short story. To my knowledge, the only insurance companies that have any specific air safety division happen to be in London. Of course, you would not be able to drag out of me the name of the company where it happens to be.

Now, a short comment on Mr. Barber's thesis. I do not think he is really describing user-charges at all; he may be. If he is talking about user charges, the only comment I would like to make is that his is the sort of approach that is being recommended by a socialist government in England to deal with motor transport in busy cities. Many people do not think it is a good idea; it might work if he is auctioning priorities because then, Captain Buck, if he comes in fast on the Atlantic, he might like a priority system that could get his big jet down or a priority system that could get the big commercial airline off the ground quicker, instead of lining up twelve at a time at Kennedy. And what he may be suggesting is a cost-benefit study of the FAA. No doubt that situation will approach \$1 billion. Now, two questions, one for George Whitehead and the other for Colonel Keel. George, your approach to the aviation regulations condition and policies is really very similar to that on our side of the Atlantic; but we do not regard that specific part of the policy as contributing to air safety because we do not like the regulations, and we do not enforce them. We are simply like latching on to them. We are taking advantage of them where we can. If you are complaining about the air taxi system, why not complain about military airlift command that takes all the conditions out of our policies? Why is it that the CAB has invaded the field of insurance for supplemental air carriers and not bothered with the major air carriers? I would love to know the answers to those questions. My question of Colonel Keel is, I noticed that your attribution of design defects as causes of accidents was, I think, 42 and 44 percent. This is substantially higher than the achievement in commercial air transportation. Do you have any explanation of the big difference?

MR. GEORGE I. WHITEHEAD: I do not know what your question was.

MR. CAPLAN: The question was, why do you regard the policy conditions about air regulation as a contribution to safety?

MR. WHITEHEAD: I did not mention air regulations at all; I regard the policy as an emasculated one in respect to violation of air safety regulations. What I am talking about is pilot certification and aircraft certification. We feel that if we have a pilot clause which says that multi-engine aircraft, the pilot having 1,000 hours, we feel this way; we are very concerned with who is going to be driving this machine. We think that first of all, and this is always first, it makes for a profitable operation for us, because we feel that our chances with a 2,000 hour pilot flying a multi-engine aircraft is better than somebody with 100 hours or 250 hours. The other thing is that in making a profit for us, it is also going to make for a safe operation with a more experienced pilot. As far as the aircraft itself is concerned, we are talking about the air worthiness of the aircraft. If it is an experimental aircraft, it is an aircraft that is not properly certificated; we do not want to be at risk on it.

COL. KEEL: When we made this analysis we took a look at all of the pilot factors, primary cause and most probable causes of pilot error. We call it pilot factor now. Then we further analyzed, through our supporting systems, whether there was a design consideration there. So here is where it contributes to the pilot making the error: design influenced his error. Someone else brought this out this morning. So I will make it clear: this is not 42% design. I do not like to use the term "design deficiency"; we sometimes clean it up and say, "where improvement is needed." But it is a duck—it walks like a duck, and it quacks like a duck. So it is deficiency. We cannot divide these things into neat little packages in accident investigation, as you all know, and say, "This is design." But just this past week I did see an accident report in the Air Force that said, "The cause of this accident was design deficiency." But then you can get into legal ramifications of this which I do not even want to think about. But our figures do run right about 35% when you look at them in a big aspect. We have suspected for many years that there are material failures which we cannot prove. We have a guy in a fire that punches out because he has a fire; we do not even know, because the aircraft is destroyed, whether there was a design deficiency in the fuel manifold of the engine. But, then, when we start getting some good data back through investigations, then we can start pinning down these deficiencies. We could go back and say these were all design deficiencies; we do not do that. These are just the 42% which we can actually look at the report and read it. But it may have been a pilot error accident; it may have been a material failure accident; it may have been a weather accident. But design is in it and influenced that accident. That is where we use that figure.

SPEAKER UNIDENTIFIED: Colonel, isn't part of the reason because so much of the USAC stable is fighters, and it's not as prohibiting for a single engine fighter to blow an engine as compared to a four engine transport.

COLONEL KEEL: No, I will not buy that. You may be right but I cannot buy it just off the top of my head, because I know of multi-engine aircraft where we have some horrible design problems. I think Captain Buck would probably bear this out. We keep improving with each generation of airplanes, but I know of transports or bombers, for example; and this is just about the same category, 30 to 35%, when you look at it the way we've looked at it.

SPEAKER UNIDENTIFIED: I may not have put it well, but in a larger airplane you have a larger crew; you have more emergency systems; and what I'm

trying to say is that you can tolerate more design problems that are less than the best compared to a guy all alone in a smaller airplane.

COLONEL KEEL: Well, I do not know. Dead is dead; and a fire is a fire. But you may be right, but I cannot buy that. I think an airplane is an airplane; whether it is a little airplane or a big airplane; it basically has the same systems that make it up. You basically have the same problems in design, and you basically have the same problems that create accidents, that create failures of sub-systems, of components. Now obviously, in the single man airplane, the man is working a lot harder than in a multi-crew airplane, or so fighter pilots lead you to believe. Really, you are trying to compare apples and oranges there; but the guy is still flying an airplane. He is just like the guy in the left seat of a transport; he is making the approach or he is making his radar approach. So this could bear further discussion. I do not think I am really qualified to get into that.

MR. A. LEE BRADFORD: If the government is going into leasing airspace or they are going to be required to furnish a reasonably safe space in relation to the hazards particularly around the airports where they have ground control furnishing a safe place for somebody to fly, and moreover, when you come along with your supersonic planes and you have the booms and you have damage to the area, is the landlord going to be liable for that, too, because they leased the air to the planes?

MR. LLOYD B. ERICSSON: Mr. Barber, I had understood you to say the FAA had made no cost effectiveness determinations on safety equipment. But isn't that just what they did when they started discontinuing TAR's, which they are in the process of doing, on the grounds that there is insufficient utilization on a standby or backup basis to warrant the cost?

MR. BARBER: You misinterpreted me; I do not believe I left that impression. There is obviously quite a bit of cost effectiveness within the FAA about a number of things. I do not think it is as complete as they would like it or as anyone else would like it, but this is certainly tied into the TAR. This comes back to the questions concerning cost benefit, which is what it comes down to. It is really what we are talking about, cost benefit. All the discussion here—certification for medical examination, use of the air space, even the question here a moment ago about bolts—come down to cost benefit. What are you going to use public money for and how are you going to tie it in some way to the person who gets the benefit of it? You can lay aside this fear that the government is going to collect the dollar. I suppose there are two things about this: one, if they did, I suppose there could be quite a dividend to give a lot of people some money back; and the other thing, of course, you could move up to a ceiling and put an upper limit on the amount. So I do not think that needs discussing. The real question is, how are you going to manage the use of an air system which is managed, developed, and supervised, by the use of vast public sums.

COLONEL KEEL: I do not want to leave anybody with the impression that systems safety engineering is going to replace sex or sliced bread. But, gentlemen, we had no other choice in the Air Force than to go this route a few years ago. It is another part of our overall program to conserve our resources. We are not saying that everyone else should do it, too. We tried to bring out how we are beginning to fly airplanes, and the C5A was the first attempt. There are twenty-two other identifiable ways of doing his in airplanes, missiles, or space programs; but this is just a segment of our overall accident prevention program. Now this C5A could go up in smoke on first flight; I am not going to say that the airplane is going to be accident free. I do know that we have eliminated some accidents in

that airplane as a result of this program. It reminds me of the little girl who visited her granddad who was quite an old codger, and he taught her to swear when she was about two years old. Her mother had a very hard problem with her to break this habit of profanity; at five years old she had it very badly, so her mother one day gave her a horrible whipping, and the little girl went into her bedroom and picked up her doll and her little suit case and packed her clothes and went out and sat on the curb. Up came a neighbor and asked the little girl, "Roberta, is you mother home?" She said, "Beats the hell out of me; I don't live there anymore." That may well happen to me with the CJA; I may not live there anymore, but I do know it is safer.

End of Wednesday morning discussion.